VALUE ENGINEERING SUMMARY
OF
MAINTENANCE OF TRAFFIC
PROCESS
FRANKFORT, KENTUCKY

AUGUST 21-25, 2000

Prepared by:
Ventry Engineering, L.L.C.

In Association With:

Kentucky Transportation Cabinet

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I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering study performed by Ventry Engineering for the Kentucky Transportation Cabinet. The study was performed during the week of August 21-25, 2000.

The subject of the study was the Maintenance of Traffic (MOT) Process..

PROJECT DESCRIPTION

The objective of this Value Engineering Study is to review the Kentucky Transportation Cabinet's current practices and procedures for handling maintenance of traffic in highway worksites for the purpose of identifying possible areas where their current practices may be improved. It is important to note that the scope of this study is not in any way intended to criticize the Cabinet's practices or policies but to provide recommendations to implement maintenance of traffic improvements.

METHODOLOGY

The Value Engineering Team reviewed the Kentucky Transportation Cabinet's existing MOT practices and procedures and developed recommendations that may be appropriate for the implementation of improved MOT practices.

RESULTS

As a result of this Value Engineering Study, the Value Engineering Team identified the following areas where current MOT practices may be improved:

Training

1) Reactivate the Traffic Control on Construction and Maintenance Project Committee, revise the name to Maintenance of Traffic (MOT) Committee, expand the membership to include construction, maintenance, Traffic Engineering, Design, Safety, and FHWA and expand the committee scope to include minimum work zone traffic and certification training requirements.

2) Establish a three (3) level MOT Training program for the Department, consultants, contractors and Utility personnel.

3) Utilize available and approved MOT Training course such as those prepared and presented by the American Traffic Safety Services Association (ATSSA), International Municipal Sign association (IMSA), and National Highway Institute (NHI). Capitalize on the training capabilities of the Kentucky Technology Transfer Center.

Specifications

1) Revise Standard Specifications to require contractors to provide a qualified individual as the Worksite Traffic Control Supervisor (WTCS), who shall be responsible for selecting, installing, and maintaining all traffic control devices in accordance with the plans, specifications and the MUTCD.

2) Specify in the Traffic Control Plans wherever there is a need for Uniformed Law Enforcement Officer for MOT enforcement.

3) Include a typical section for each construction work phase in the Traffic Control Plans.

4) Develop additional individual pay items covering work currently included in the Lump Sum Maintenance of Traffic item.

5) Provide additional guidance in the Department's Design Guidance Manual for the use of variable message signs on construction projects.

6) Revise the sign post splicing detail to limit the splicing overlap to 4" above ground, which has been crash tested in accordance with NCRP Report 350 and meets AASHTO Standard Specifications for Structural Supports for Highway Signs.

7) Develop a special provision for later inclusion in the Standard Specifications, requiring the contractor to provide trained Flaggers to direct single lane traffic on two lane, two way roadways or other situations which require stopping traffic.

Policy and Procedures for Traffic Control

1) Include a list of traffic control considerations to be reviewed at the Preliminary Line and Grade Inspection Meeting.

2) Develop a list of MOT design considerations and phasing criteria for inclusion in the MOT section of the Highway Design Manual.

3) Require major Traffic Control Plan (TCP) changes submitted by the contractor be signed and sealed by a professional engineer registered in the State of Kentucky.

4) Develop a definition of Major and Minor Changes to TCP.

5) Ensure that all TCP activities are coordinated with all involved entities at the Project Preconstruction Meeting and Weekly Project Coordination Meetings.

6) Require all utilities performing work within the highway R/W to comply with the Departments Standard Drawings and TCP training requirements

7) Require mandatory participation at the Post Construction Review meeting of project personnel involved in the project (Contractor, Construction Project Engineer, Design Engineer, etc.)

8) Continue bi-annual District Traffic Control and annual traffic control reviews.

Typical Traffic Control Plan Applications

1) Use regulatory speed limit signs in highway work zones in addition to advisory speed limit panels to provide more enforceable speed limit control.

2) Develop eight (8) additional standard drawings covering traffic control in work zone situations not now included in the Departments standard TCP drawings.

II. TEAM MEMBERS AND PROJECT DESCRIPTION

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III. MAINTENANCE OF TRAFFIC REPORT

STATEWIDE
MAINTENANCE OF TRAFFIC
V.E. STUDY BRIEFING
August 21, 2000

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III.(A) INTRODUCTION

A. INTRODUCTION

The Value Engineering Team first completed an investigative phase consisting of a review of the Cabinet's current policies and procedures for handling maintenance of traffic through highway worksite areas and a briefing by Cabinet personnel regarding the effectiveness of their current practices.

After completing the review of the Cabinet's current MOT practices, the Value Engineering Team identified the following four general areas as focal points for conducting this study:

- Training
- Specifications
- Policies and Procedures
- Typical Traffic Control Plan Applications

The Cabinet's existing MOT practices and procedures in these four general areas are described in the following sections with suggestions that may be appropriate for the implementation of improved practices.

III.(B) TRAINING

B. TRAINING

Training was recognized by the Value Engineering Study team as an extremely important element of a successful maintenance of traffic program. The Kentucky Transportation Cabinet has training policy and procedures for Department personnel involved with maintenance of traffic through highway worksites. The Value Engineering team concluded that an expanded training program to include contractor and consultant training and certification/qualification will provide long range improvements to maintenance of traffic design and implementation. The Cabinet's current training related activities and suggested revisions are described in the following paragraphs:

1. Present Traffic Control Training Program

Present training practices set forth in the *Traffic Control Through Highway and Street Work Zones* Policy and Procedure Manual assigns training responsibility to the Employee Development Branch, Division of Management Services. They are to review all available training from all sources and select suitable courses.

Department personnel selected to attend training will be done by the various offices (Construction, Design or Maintenance) involved in traffic control.

In addition, the Manual indicates in part " ...the Contractor is responsible for traffic safety on the project". Kentucky Transportation Cabinet, Department of Highways *Standard Specifications for Road and Bridge Construction* Section 112.03.12 identifies the requirement for the Contractor to designate an employee to be a traffic control coordinator. This coordinator is to inspect the project traffic control daily, report incidents within the work zone and must be able to respond at all times.

2. Suggested Revisions to Training Program

   a. Reactivate the Traffic Control on Construction and Maintenance Project Committee.

      Included with the reactivation of this Committee should be the broadening of the Committee's make-up, scope and authority as described below. It is also recommended that the name of this Committee be shortened to the "Maintenance of Traffic" (MOT) Committee. One representative from the following offices should make up the committee: Construction, Maintenance, Traffic Engineering, Design, Safety, and FHWA. Committee members should be experienced and trained in work zone safety. An important function of the committee would be to establish minimum work zone traffic control training and certification requirements for specified responsible department, consultant, utility owners, and contractor personnel. A responsible person is a person involved with any project or work area on the State Highway System in either traffic control plan design, traffic control implementation or traffic control maintenance. The MOT Committee would also select, review and approve all traffic control courses required for all levels of training.

b. Three Level Maintenance of Traffic Training Program

It is suggested that a three level maintenance of traffic program be established.

1) The first level would be required training for all appropriate Department, Contractor and utility personnel.

2) Level two would be training for Department, contractor and utility personnel involved in short term (one work shift) activities.

3) The third level would be for Department designers and construction inspectors; roadway contractor personnel; utility owner employees; utility contractor employees; and consultant designers and inspectors.

Level three minimum certification requirements for a worksite traffic control supervisor (presently called the Contractor's Traffic Control Coordinator*) should be:

a) Successful completion of an approved (by the Committee) work zone traffic control course.
b) Pass a written examination of an approved work zone traffic control course.
c) A minimum of one (1) year field experience in work zone traffic control.

These requirements are found in NCHRP Synthesis 208. A copy is included in Appendix A of this report.

Department personnel selected for level three training should be squad leaders in design and chief construction inspectors.

Consultants should be required to have traffic control trained design squad leaders and chief construction inspectors.

*See recommended changes in the duties of the Traffic Control Coordinator in Specification recommendation.

Utility owner employees and utility contractor employees working on any state highway right-of-way should be trained. Minimum training requirements for level three personnel other than worksite traffic control supervisor should be:

a) Successful completion of an approved (by the Committee) work zone traffic control course.
b) Pass a written examination of an approved work zone traffic control course.

The certification/training program should require re-certification/retraining every three(3) years by attending an eight (8) hour refresher course and successfully passing an exam or as required by the certifying administrators (i.e. ATSSA, IMSA, etc)

3. Available Training Courses

Training courses for level three participants are available from the American Traffic Safety Services Association (ATSSA), Fredericksburg, Virginia and International Municipal Signal Association, Inc. (IMSA), Newark, NY for Worksite Traffic Control Supervisors, utility construction personnel and construction inspection personnel.

In addition, NHI Course No. 38003 "Design and Operation of Work Zone Traffic Control" (1988) and State of Florida Department of Transportation "Design of Traffic Control Plans (1992) are available for Department, consultant and utility design squad leaders as reference material and for developing design training courses.

Level two training is available through the Kentucky Technology Transfer Center and associations previously mentioned.

Flagger training is available through the same agencies and associations as well as many private and state DOTs.

4. Available References

Available references covering maintenance of traffic through highway worksite areas include the following:

a) US DOT Publication No. FHW-HI-50-014
   NHI Course No. 38003
   Design and Operation of Work Zone Traffic Control
b) State of Florida, DOT, Office of Construction
   Construction Project Administration Manual
   Chapter 6 – Maintenance of Traffic
c) NCHRP Synthesis 208
   Development and Implementation of Traffic Control Plans for Highway Work Zones
d) International Municipal Signal Association, Inc
   Traffic Signal Technician Certification Program
   Level I, II, and III Traffic Signal Certification Handbook

5. Policy and Procedures and Guidance Manuals

The requirements for each of the three levels of training or certification should be included in the following publications:

- *Traffic Control Through Highway and Street Work Zone Policy and Procedure Manual*
- *Highway Design Guidance Manual*
- *Operations Guidance Manual*
- *Employee Safety and Health Manual*
- *Contract Special Provisions* (eventually to be placed in *Standard Specifications*)
- Contractor / consultant pre-qualification requirements
- *Utility Accommodation Policy*

III.(C) SPECIFICATIONS

C. SPECIFICATIONS

The Value Engineering Study team recognized that the *Standard Specifications for Road and Bridge Construction* provides the basis for the development of the traffic control plan (TCP). This study therefore included a review of the current *Standard Specifications* with the objective of identifying possible areas where specification revisions may improve maintenance of traffic procedures. The result of this review are presented in the following paragraphs:

1) Traffic Control Coordinator

Kentucky Department of Transportation requires a Traffic Control Coordinator on projects. This requirement is listed in the traffic control general notes and is included in the plans. These notes state that the contractor shall designate an employee to be the Traffic Control Coordinator. This person shall inspect the project maintenance of traffic on a daily basis, seven days a week for the life of the project. This person shall report all incidents throughout the work zone to the Engineer. The contractor shall furnish the name and telephone number where the Traffic Control Coordinator can be contacted at any time.

The following is a basic recommendation to revise changing this specification to requiring a Worksite Traffic Control Supervisor. The Specification should include essentially these requirements: "The Contractor shall designate a qualified individual as the Worksite Traffic Control Supervisor (WTCS) who shall be responsible for selecting, installing and maintaining all traffic control devices in accordance with the Plans, Specification and the MUTCD. This individual's traffic control responsibilities shall have priority over all other assigned duties. The Contractor shall ensure that the WTCS has at least one year of experience directly related to worksite traffic control in a supervisory or responsible capacity and is certified by the American Traffic Safety Services Association Worksite Traffic Supervisor Certification Program or an equal approved by the Department.

As the representative of the Contractor, the WTCS shall have full authority to act on behalf of the Contractor in administering the Traffic Control Plan. The WTCS shall have appropriate training in safe traffic control practices in accordance with Part VI of the MUTCD. The WTCS shall supervise the initial installation of traffic control devices which will be reviewed by the Engineer prior to the beginning of construction. The WTCS shall review the project on a day to day basis for the life of the project. The WTCS shall participate in all modifications to traffic control devices as required by sequence of operations or phased construction.

The WTCS shall be available on a 24-hour basis as needed to maintain traffic control devices with access to all personnel, materials, and equipment necessary to respond effectively to an emergency situation within forty-five (45) minutes of notification of the emergency.

The WTCS shall immediately correct all safety deficiencies. Minor deficiencies that are not immediate safety hazards are to be corrected within 24 hours.

On projects where traffic control duties will not require full time supervision, the Engineer may allow the Contractor's project superintendent to serve as the WTCS as long as satisfactory results are obtained.

2) Maintenance of Traffic Enforcement

There are certain construction activities that impede traffic flows such that supplemental traffic control is desirable. Uniformed law enforcement officers with blue lights are respected by motorists; therefore, it may be in the best interest of the situation to utilize Off-duty law enforcement officer(s) as a supplement to traffic control devices to assist the motorists and provide a safer work zone.

Currently, the Kentucky Department of Highways has no specific guidelines for the use of Off-duty law enforcement. This addition to the traffic control in a project is determined by the design team and is added to the General Notes in the plans.

The following recommendation is made for all projects in determining the feasibility of using Off-duty law enforcement:

Conditions to consider for use of Off-duty law enforcement may include, but not be limited to:

- work within high use signalized intersections.
- high volume urban roadways with lane closures during peak hour traffic
- nighttime lane closures on Interstates
- any work zone in highly congested urban areas, including areas where traffic is in close proximity to construction workers and equipment.

On each individual project, the designer and/or the project manager shall coordinate with the construction office to determine if law enforcement services will be justified. On limited access projects, the associated Kentucky State Police post shall also be included in the coordination.

Once the determination has been made that law enforcement will be used on a project, the designer/project manager and the construction engineer shall develop supporting documentation for each MOT phase including the conditions requiring the law enforcement services.

The traffic control plan shall clearly indicate the intended use of the officer(s) during each phase of construction as well as the need for the service. Off-duty law enforcement will be paid for under "pay by hour" item number.

The Contractor may choose to use law enforcement services beyond the details of the traffic control plan for situations that assist with mobilization, de-mobilization, maintenance of traffic set-up, rolling road blocks, and other instances where he prefers the use of law enforcement.

The Contractor is responsible for the coordination of these uses and will be included under the lump sum maintenance of traffic pay item.

3. Highway Design Guidance Manual

The Division of Design is currently proposing revisions to the Design Guidance Manual . This document was reviewed by the Value Engineering Study team and is included as Appendix B. There are several additions that the VE Study team recommends for inclusion in this new Manual and feels that this would be an opportune time to incorporate these changes.

.0510 Traffic Control Plan

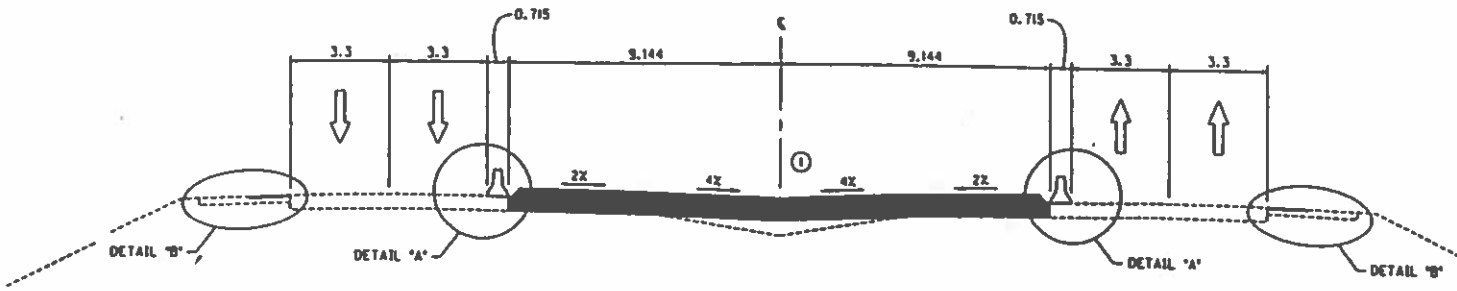
The recommendation of the VE Study team is to require all traffic control plans to also include a typical section for each work phase. This typical section should include lane widths, offsets to barriers or warning devices, the construction area and any other pertinent items.

A typical example is shown on a following page.

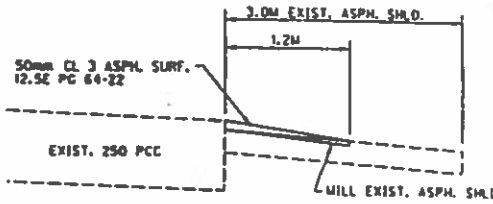
The Traffic Control Plan should include the location of all arrow boards and variable message signs with the messages to be used for all phases of the maintenance of traffic.

.0540 Maintenance of Traffic Bid Items

The proposed Manual states that "As traffic control plans become more extensive and complex, separate pay items shall be required." The VE team recommends that even more items now included in the lump sum maintenance of traffic item be broken down into individual pay item numbers. Example: drums and barricades used for channelization purposes; hazard markers, etc (to be paid per each per day). One of the advantages of adding more individual pay items is the elimination of other lump sum items such as diversions or crossovers and the need for the additional item for lane closures. The work effort for the item would furnish, install, and remove the item.

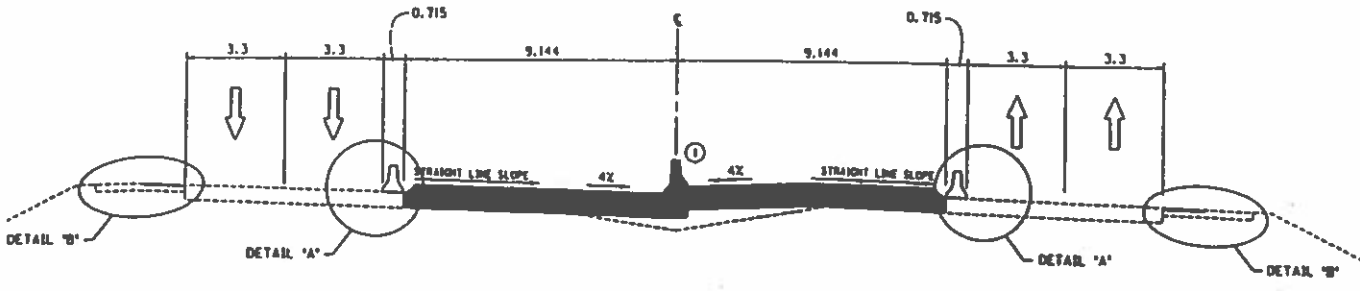


NORMAL SECTION

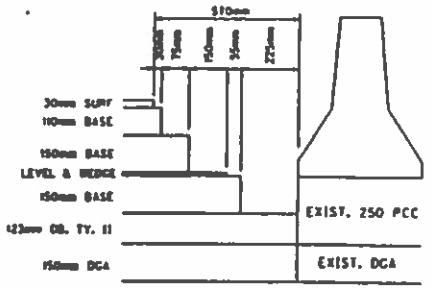


DETAIL "B"

PROVIDE SMOOTH TRANSITION FROM EXIST P.C.C. PVMT. TO EXIST. ASPH. SHLD.

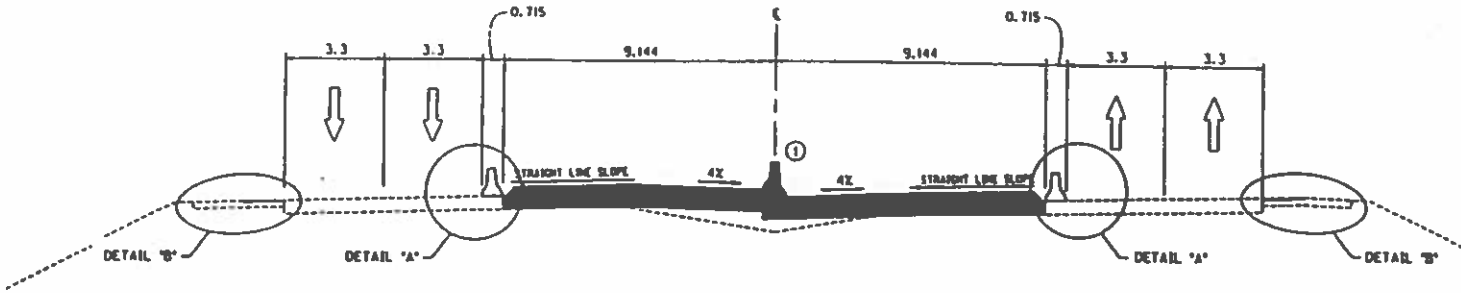


SUPERELEVATED RIGHT



DETAIL "A"

CONSTRUCT THIS PHASE



SUPERELEVATED LEFT

① CONSTRUCT PERMANENT MEDIAN BARRIER THIS PHASE:
STA. 49+188 TO 50+630
STA. 51+974 TO 52+660

PHASE I
COMMON MEDIAN

METRIC

4. Variable Message Signs (VMS)

The Kentucky Department of Highways has a very good *Special Note* regarding the use of variable message signs on construction projects. Variable message signs have been determined to be an extremely effective traffic control device. The Value Engineering Study team feels that additional guidance should be included in the Department's Design Manual for the application of this device. This guidance should assist the designer in determining when to use the variable message sign in the traffic control plan. The construction phases, location, allowable messages, hours of operation, and other parameters for using the variable message sign is to be included in the traffic control plan .

When the VMS signs are not in use , they should be stored outside the clear zone or in a location where they cannot be hit by motorists.

5) Post Splicing

Currently, the Kentucky Division of Highways has a standard drawing (TSC-265-01) as shown on a following page, for posts to be used to support interim signs in work zones. This standard drawing provides details for splicing to obtain height requirements. It is prefaced with a note that preferably posts should not be spliced. There is no evidence that this design has ever been tested to determine if the height of splicing indicated meets any federal frangibility requirements.

It is extremely important that all posts for interim signs yield upon impact unless the posts are protected by guardrail, portable barrier, impact attenuator or other type of positive barrier protection. Unprotected posts shall meet the breakaway requirements of the "1985 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals". It is the recommendation of the Value Engineering Study team that if splices have to be made to obtain proper height, then the splicing is to conform to the splicing details shown on a following page. This splice breakaway system has been tested according to NCHRP Report 350 and is shown in the AASHTO *Guide to Small Sign Support Hardware*, June 1998.

Post Splicing Detail TSC 265-01

Application:

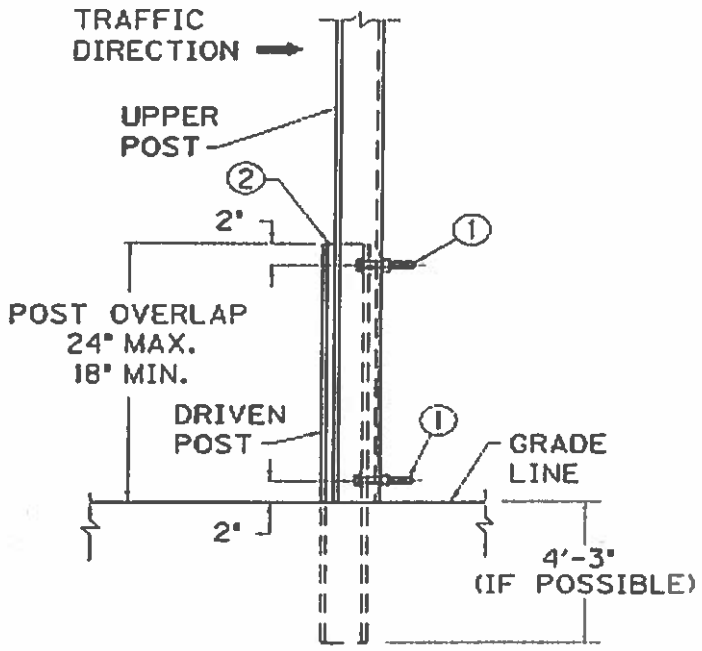
Preferably, signposts are not to be spliced. However, to obtain the required height, signposts may be spliced once in their length and according to this standard drawing.

General Notes:

1) Two M8x50 hex head cap screws, two round washers, two lock washers and two hex head nuts (ASTM A307)

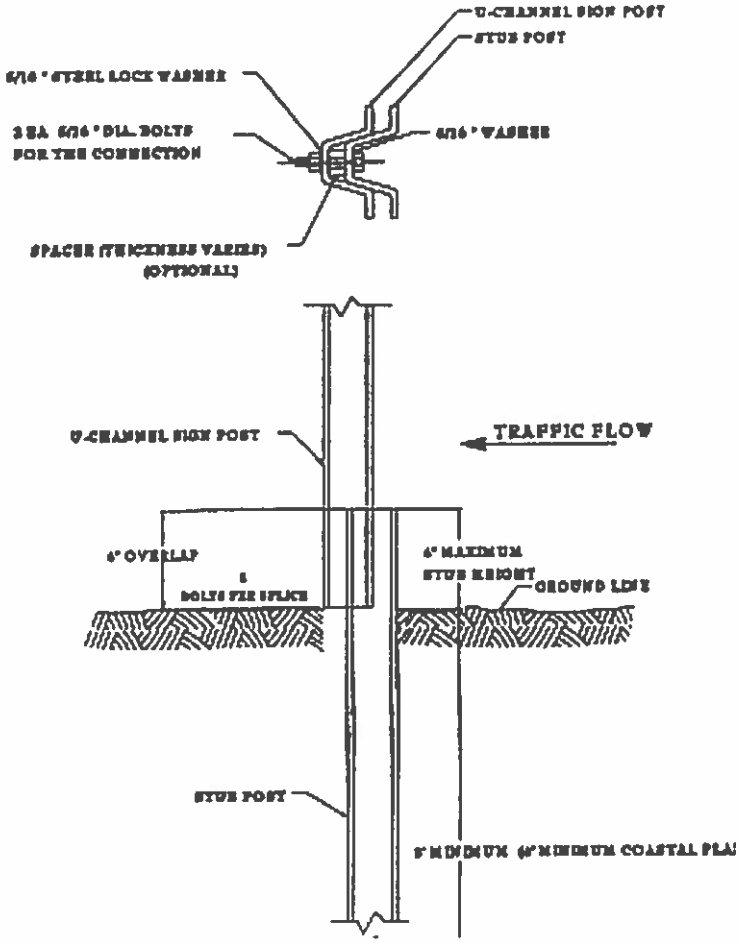
2) The driven post stub shall be removed when the upper post is not in place.

Detail shows 18" to 24" post overlap for splice at ground line. Bottom post driven 4' 3" (if possible)



SIDE ELEVATION

Recommend full-length posts or proposed 4" splice.



4" Overlap

6. Flagging

Flaggers are responsible for human safety and make the greatest number of public contacts of all construction personnel. It is extremely important that qualified personnel be selected to perform flagging operations. Presently, the Kentucky Transportation Cabinet has no specification requiring contractors to provide trained flaggers.

The Value Engineering Study team recommends placing the following requirement in project *Special Provisions* with ultimate inclusion in the *Standard Specifications*:

> The Contractor is to provide trained flaggers to direct single lane traffic on two-lane, two-way roadways or other situations requiring stopping traffic. The Worksite Traffic Control Supervisor or others, as approved by the Department, will provide training for flaggers using Department approved training materials or sources.

III.(D) POLICY AND PROCEDURES

D. POLICY AND PROCEDURES FOR TRAFFIC CONTROL

The Kentucky Transportation Cabinet currently has three manuals that address traffic control. They are Policy and Procedure for Traffic Control Through Highway and Street Work Zones, Highway Design Manual and the Construction Manual. The Policy and Procedures manual was developed to provide guidance and establish procedures to help assure that adequate consideration is given to motorists, pedestrians, and construction workers on all construction projects. This study therefore focused on this document to assess its adequacy as well as an evaluation as to the degree to which the written policy and procedure is being followed in actual practice. In addition the Value Engineering Team also identified other traffic control policies and procedures that have an impact on the maintenance of traffic through work sites. The policy and procedure analysis was based on the review of the following:

(1) Highway Design Guidance Manual

a) Review MOT Section (61-03.0500)
b) Compare with other state manuals to determine suggested changes.
   i) Plans Preparation Manual
   ii) Roadway Design Standards
c) Determine additions and deletions

(2) Construction Guidance Manual

a) Procedures for changes in MOT by Contractor
   i) Review existing policies and procedures
b) Determine what requirements should be included.
c) Develop recommendation requirements for procedures to handle major and minor changes to existing TCP.

(3) Impact of Utility Relocation on highway construction TCP

a) Review existing procedures relating to utility TCP and its impact on highway construction.
b) Develop procedures for integrating utility relocation TCP into the Highway construction TCP

(4) Post Construction review of project

a) Review existing procedures for feedback on TCP changes and revisions.
b) Develop suggested policy and procedural changes to ensure the designer feedback.

(5) Bi-annual District Traffic Control review

a) Review current feedback information
b) Develop informational feedback loops.

(6) Traffic Control Through Highway and Street Work Zones Policy and Procedure Manual

a) Review of the Statewide Traffic Control Review Team's procedures
b) Develop suggested policy and procedural changes to enhance feedback on current TCP policies.

1) Highway Design Guidance Manual

a) Existing Conditions

The existing Maintenance of Traffic section 61-03.0500 Traffic Control and Detours is currently under revision where enhancements and clarifications are being incorporated. The manual does reference three documents relating to TCP design - "Traffic Control Through Highway and Streets", Standards Drawing Manual & MUTCD. The designer will be required to use the combination of all three manuals to determine the design philosophy behind the establishment of a cost effective Traffic Control.

b) Suggested Improvements

The following suggested improvement ideas have been designed to aid the designer in the development of the Traffic Control Plans.

i) Include list of traffic control consideration to be reviewed at the Preliminary Line and Grade Inspection meeting.

In order to ensure that all aspects of TCP design are considered and any potential conflicts are addressed during the early stage of design, the following list of suggested review items should be included in the Preliminary Line and Grade Inspection meeting:

- Design Features and Considerations,
- Contract Specifications,
- Public Input,
- Local Business Impact
- Utility MOT requirements.

See Appendix C - FDOT Plans Preparation Manual Volume I, Section 10.3

ii) Establish MOT design consideration requirements

A list of MOT design considerations should be included in the MOT section of the Highway Design Manual. This will aid the designer in developing a TCP that will address all aspects of the project and minimize the amount of possible revisions prior to construction. *See Appendix C* - FDOT Plans Preparation Manual Volume I, Section 10.4, Items1-18.

iii) Establish a section on Preparing Traffic Control Plans.

This should be a step by step approach for designers to follow when developing the Traffic Control Plan for a specific project. This will give the designers a more consistent approach to developing the proper Traffic Control Plan. *See Appendix C - FDOT Plans Preparation Manual section 10.5 TCP Development.*

iv) Include information about the TCP development.

Currently the only reference to TCP plan development approval is that the plan will be inspected at the Preliminary Line and Grade & the Plans-in-Hand point. It only indicates that the TCP will be reviewed but does not indicate what should be done at the different stages of design. By adding a TCP Design Review Outline, which will indicate to the designer what will need to be completed at each phase review, there will be consistency in the preparation, development and approval process.

Suggested Review Procedures:

- Phase I – A description of the traffic control plan with phasing sequence and work involved.
- Phase II – A majority of the traffic control plan completed (75-90%), including typical sections, drawings for each phasing sequence, if applicable, and a list of the phasing sequence with notes and pay items.
- Phase III – A final TCP, including all notes, pay items and final quantities.

2) Construction Guidance Manual

a) Existing Conditions

The procedure for allowing the road contractor to modify the existing Traffic Control Plan is broken down into two separate procedures. One addresses the approval process for major changes to the TCP, which will require a high level of approval, and the minor changes a lower level. The differences between major and minor changes are very ambiguous. This will allow a vast variation in the definition of what will be considered a major change in the TCP.

b) Suggested Improvements

The following suggested improvement ideas are designed to add clarification, placement of liability, and ensure consistency in the application:

i) Changing of Existing TCP (*Section 63-01.1732*)

The contractor is allowed to submit TCP changes to the existing Signed and Sealed TCP without incurring any liability risk associated with the changes. If the contractor wants to make major changes to the existing TCP, then they should be willing to accept some of the liability associated with the change. Currently the change is submitted and the department approves the change, as well as, accepts all the liability associated with the change. If the contractor believes the major change will improve the overall TCP on the project, then they should be willing to accept some of the liability for the change.

The liability sharing can only be accomplished, if the suggested major change from the contractor, is Signed and Sealed by a professional engineer registered in the State of Kentucky. In this way the department and the contractor will accept joint liability for the change, rather than the department accepting the total liability.

See Appendix D, FDOT's Construction Project Administration Manual, Attachment #1, p. 6-1-4.

ii) Identify the difference between a major and a minor change to the TCP.

The existing procedure, Section 63-01.1732, indicates that suggested major and minor changes to the existing TCP will have different authorization levels. Since there is no definition of the differences between major and minor changes, there will be inconsistencies of what can be approved by the project engineer.

Clear and concise definitions of Major and Minor changes need to be established. The following suggested definitions were obtained from Appendix D, FDOT's Construction Project Administration Manual, Attachment #1, p. 6-1-4.

Suggested definitions:

Major Changes – Any deviation of traffic movements from existing TCP.

Minor Changes – Any changes that will not affect the traffic movement.

iii) Preconstruction meeting and Weekly Project Coordinating Meeting

- **Preconstruction Meeting**
  At the Preconstruction Meeting all agencies, utilities and other outside influences should attend the meeting. The TCP of each entity should be discussed and coordinated with the department's overall TCP.

- **Weekly Project Coordinating Meeting**
  A weekly Project Coordination meeting between the contractor's Traffic Control Coordinator (Worksite Traffic Control Supervisor), Construction Project Engineer and the affected outside entities should be established to discuss the activities that will be performed during that week construction. All entities that will be involved in the week's construction activities should be included in the meeting. i.e. utility contractor, local agency's contractor, etc. Their construction activities and related traffic control plans should be reviewed and the overall TCP for the week's activities should be established.

3) Impact of Utility Relocation on Highway Construction TCP

a) Current procedure

The utility companies are only told to meet the requirements of the MUTCD when they perform any work within the public R/W. If the utility relocation work is an intricate part of the highway construction project, only then are they required to submit the relocation plan. The utility TCP is not part of the utility relocation plans; therefore there is very little coordination of the utility TCP and highway construction TCP. The utilities are only required to meet the MUTCD where the highway contractor must meet the Department's Standard Drawings.

b) **Suggested Improvements**

i) **Utility Permitting Requirements**

Any utility that will be performing work within the public R/W should be required to meet the department's Standard Drawings for their TCP. They are currently only required to meet the MUTCD which is less restrictive than the department's Standard Drawings. The entity's TCP should be a part of their permit requirements for any type of construction activities within the public R/W.

See Appendix E - FDOT Utility Accommodation Manual Chapter 3 for examples of permitting requirements and Chapter 8 for MOT requirements

ii) **Relocation Projects**

On relocation projects where the utility relocation will be an intricate part of the highway construction project, the utility should submit a utility relocation schedule along with their construction drawings. The utility relocation schedule should identify the utility work phases and which highway construction phase the utility will be done in. The utility will submit a TCP for each utility work phasing. This information will be made part of the highway bid specification. Therefore, the contractors bidding on the project will know upfront if there is any external influences not under their control that can impact the productivity.

The utility's relocation TCP should be integrated into the overall project TCP. This will avoid any duplication or conflicts during actual construction.

4) **<u>Post Construction Review of Project</u>**

a) **Current procedure**

The Post Construction meeting is conducted on a random basis. There is an attempt to have all personnel involved in the project attend the post construction project. There is no official department procedure addressing what should be reviewed on each project. There is limited feedback to only the personnel that attend the meeting. The information pertaining to the Post Construction review is posted on the Internet in an Access file for department wide availability.

b) **Suggested Improvements**

The following suggested improvement ideas should be considered to enhance the effectiveness of the review process:

i) Mandatory attendance of all personnel involved in the project.
   - Highway construction contractor
   - Contractor's Traffic Control Coordinator
   - Construction Project Engineer
   - Operation Engineer
   - Designer
   - Utilities, if applicable
   - Others

ii) Development of a list of items to be reviewed, in order to establish good or bad trending for feedback purposes. Overall project TCP should be reviewed as part of this review process.

iii) A formal feedback procedure should be established. All personnel regardless of their attendance should receive feedback on the project.

iv) Trending situations and common occurrence situations should be identified and suggested solutions should be developed.

5) Bi-Annual District Traffic Control Review

Kentucky Traffic Control Reviews have been established as outlined on page 14 of "Traffic Control Through Highway and Street Work Zones Policy and Procedure Manual"

The "Traffic Control Through Highway and Street Work Zones Policy and Procedure Manual" outline District Reviews

a) Current Procedures

Current policy outlines District Reviews by District TEBM for Traffic Control routine reviews shall include all traffic control devices on all significant construction projects. Major deficiencies shall be brought to the immediate attention of the Project Engineer and District TEBM for Construction. Deficiencies shall be reported to Directors of Construction, Traffic & Roadway (Highway) Design, when deemed appropriated by Chief Highway District Engineer.

b) Suggested Improvements

This policy should be continued. The District Traffic Engineer and District TEBM for Traffic are valuable resources for Construction Traffic Maintenance. The Reviews should list District Reviews by District TEBM *or authorized representative*. Additionally, this policy should be included in the Traffic Guidance Manual.

Project Engineers and District Construction personnel should continue to call on expertise of the District and Central Office Traffic personnel.

6) Traffic Control Through Highway and Street Work Zones Policy and Procedure Manual

a) Current Procedures

Current policy outlines that a Statewide Review Team consisting of representatives of Divisions of Construction, Traffic, Operations and Roadway (Highway) Design shall annually review randomly selected projects throughout the State. The purpose of the reviews is to assess the effectiveness of the procedures outlines in the "Traffic Control Through Highway and Street Work Zones Policy and Procedure Manual". Additionally, a representative of FHWA, District TEBM for Construction, District TEBM for Traffic, Project Engineer and Project Traffic Control Inspector shall accompany the team and provide appropriate input. An annual report of results of the review is to be forwarded to FHWA and other offices.

A Division of Construction representative administrates this review process. Six Districts are evaluated per year with one or two projects per districts. An office review of the Project Engineer, discussion of any changes and a daytime and nighttime drive through the construction project is completed on each selected project.

b) Suggested Improvements

This policy needs to be continued. All representatives need to be in attendance for both daytime and nighttime reviews. Additional members of the review team should include the project design manager and the contractor's traffic control coordinator. Copies of the annual reviews should be made available for all participants via the Internet or hard copy. Additionally, the reviews should be made available to District and Central Office Design and Construction personnel, Design and Construction Consultants and the MOT Committee (formally known as the Traffic Control on Construction and Maintenance Project Committee).

III.(E) TYPICAL TRAFFIC CONTROL PLAN APPLICATIONS

E. TYPICAL TRAFFIC CONTROL PLAN APPLICATIONS

Standard drawings have been developed for typical traffic control plans such as lane and shoulder closures, median crossovers and construction zone diversions. The obvious advantages of having standard drawings for traffic control plans covering frequently encountered maintenance of traffic operations are the elimination of repetitive plan preparations and the assurance that a high degree of uniformity is provided for maintaining traffic through highway worksites.

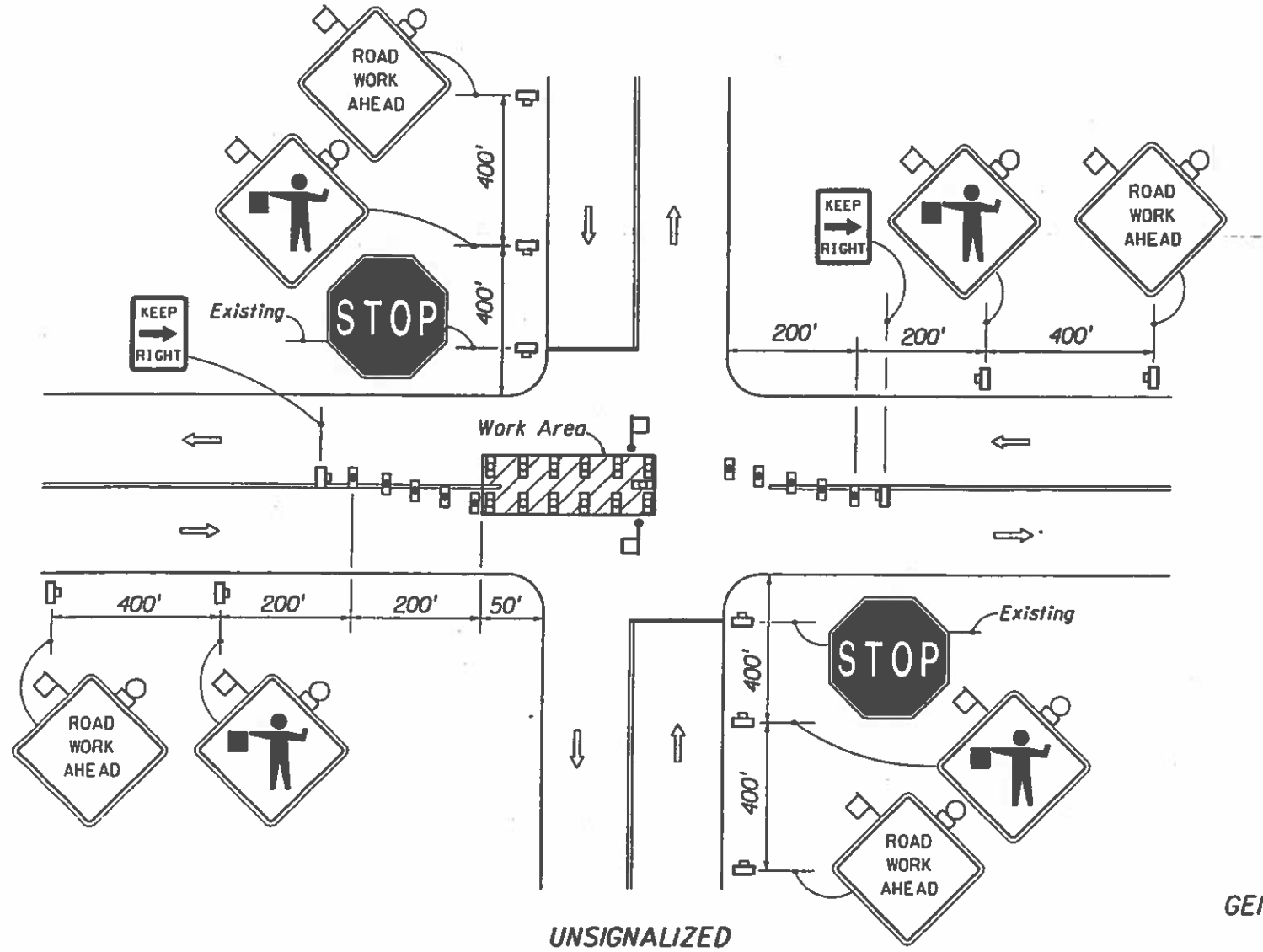
1) Existing Practices

The Department currently has a well detailed set of 38 *Standard Drawings* covering typical traffic control plan applications and traffic control devices. These *Standard Drawings* comply with the *Manual on Uniform Traffic Control Devices* and cover the most frequently encountered maintenance of traffic requirements such as at lane and shoulder closures and median crossovers.

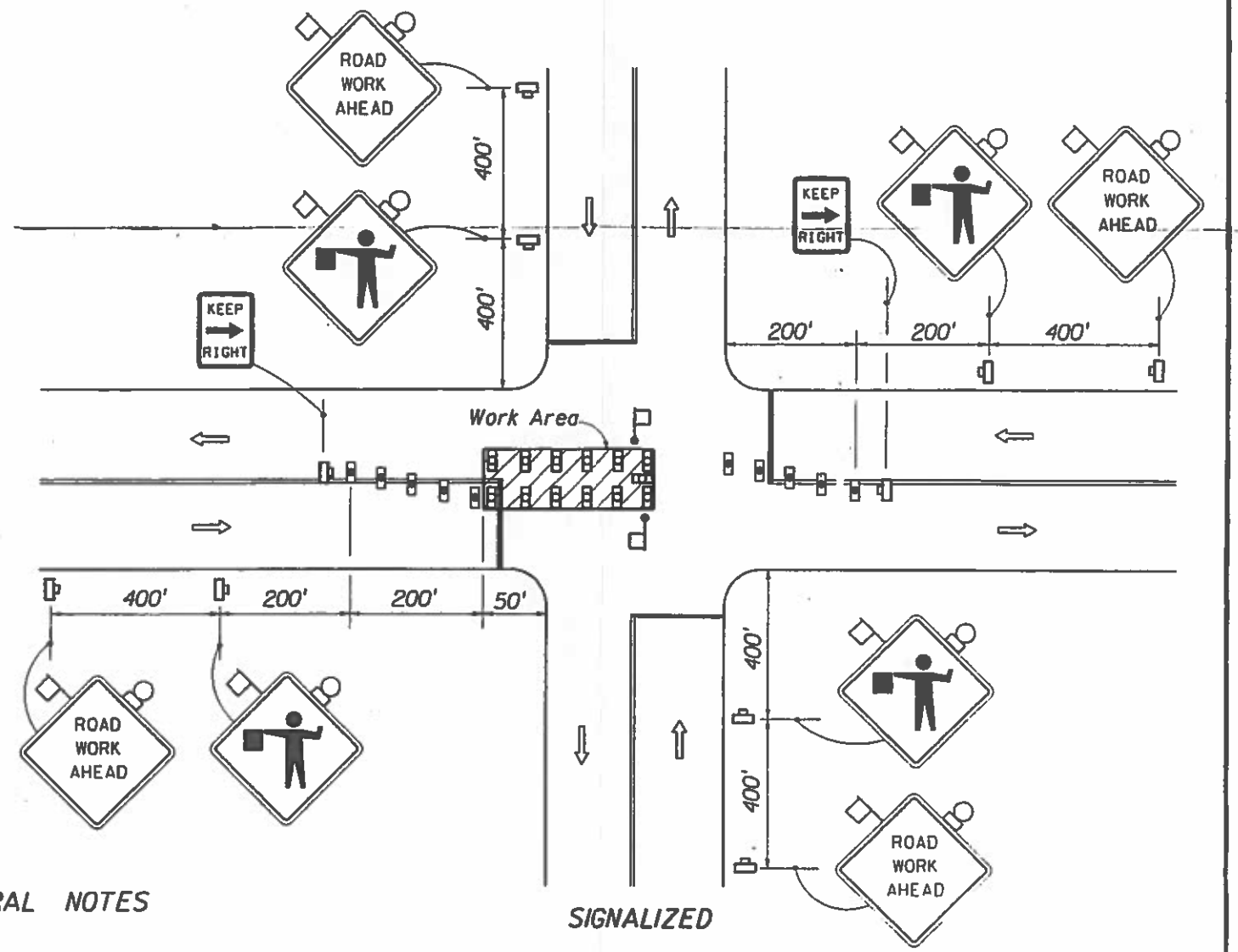
a) Suggested Revisions

- Advisory Speed Limit Panels
  The Value Engineering Study team noted that the *Standard Drawings*, such as No. TSC-207-01, Lane Closure, show advisory orange background speed limit panels in advance of the lane closure. It was the consensus of the team that the preferred signing practice is to utilize a regulatory speed limit sign in conjunction with the advisory speed limit panel since it does provide a more enforceable speed limit. The team also concluded that it is a desirable practice to place regulatory speed limit signs at one mile intervals in highway worksites with reduced speed limits.

- Additional *Standard Drawings*
  The Value Engineering Study team identified the following additional types of highway worksites where standard drawing of traffic control plans are considered to be appropriate. Suggested standard drawings are included on the following pages.
  Urban Intersections
  Urban Lane Closure
  Urban Multi-lane Intersection
  Urban Multi-lane Lane Closure (4 sheets)
  Urban Lane Shifts
  Rural Conversion to Four Lane Divided (2 sheets)
  Urban Conversion to Four Lane Divided (2 sheets)
  Pedestrian Control



UNSIGNALIZED



SIGNALIZED

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Flagger
- Stop Bar

GENERAL NOTES

1. All vehicles, equipment, workers(except flaggers) and their activities are forbidden in lane and intersection areas reserved for traffic.
2. The first two warning signs shall have an 18" x 18" (min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
3. The FLAGGER legend sign may be substituted for the symbol sign.
4. All signs shall be post mounted if closure time exceeds 12 hours.
5. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted [redacted].
6. Flaggers shall be located where they can control more than one direction of traffic.

   Flaggers shall be in sight of each other or in direct communication at all times.
7. Maximum spacing between barricades, vertical panels, cones, tubular markers and drums shall be not greater than 25'.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. [redacted]
10. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
11. Work performed for a period of 60 minutes or less is to be conducted in accordance with Index No. 607.

[redacted]

TYPICAL APPLICATIONS

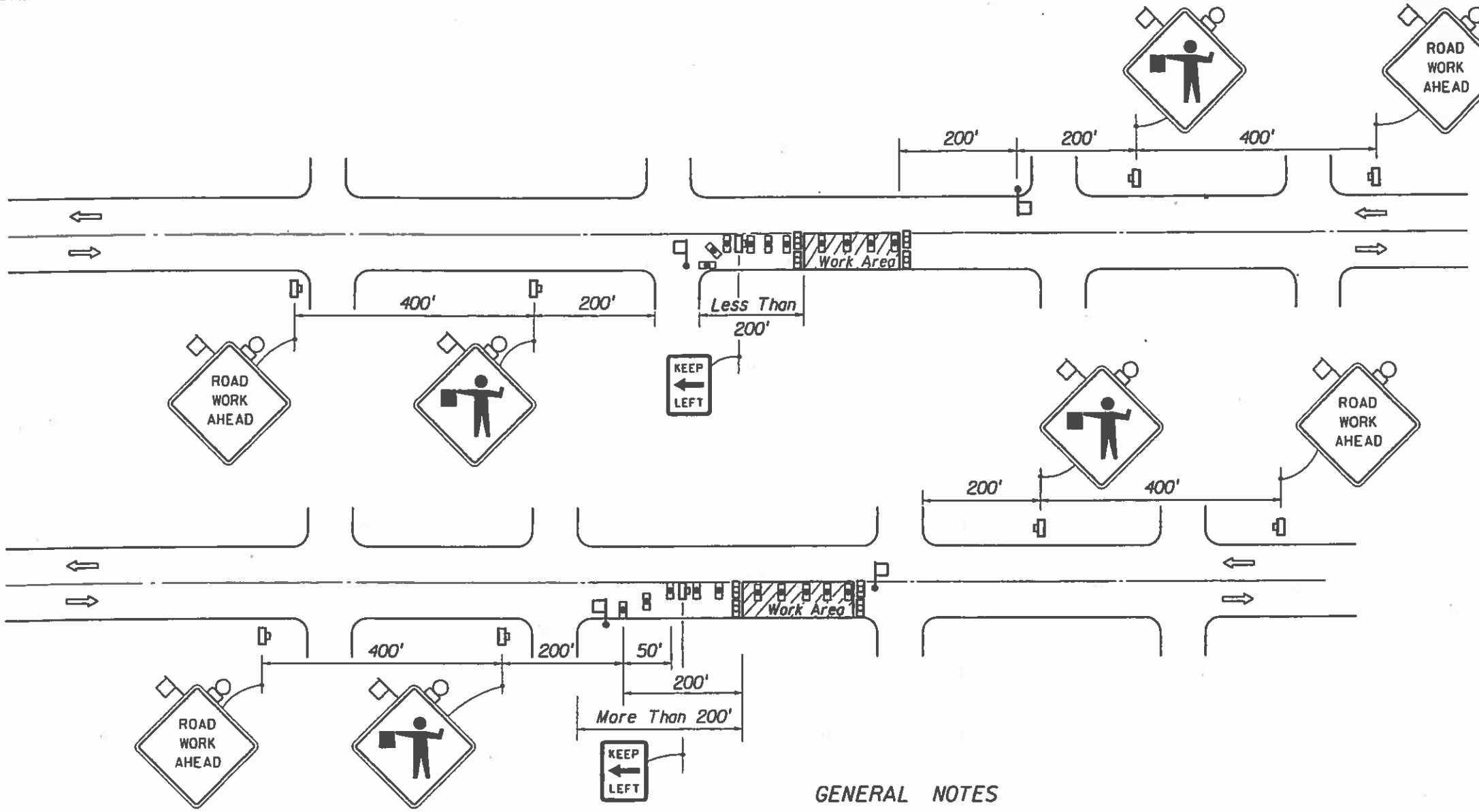
Utility Work

Pavement Repair

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF A PORTION OF ONE OR MORE TRAFFIC LANES IN AN INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES

URBAN INTERSECTIONS



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREAS LESS THAN 200' DOWNSTREAM FROM AN INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREAS 200' OR MORE DOWNSTREAM FROM AN INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Flagger

GENERAL NOTES

1. Work operations shall be confined to one travel lane, leaving the opposing travel lane open to traffic.
2. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the roadway.
3. [redacted]
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted [redacted].
5. If work area is confined to an outside auxiliary lane the work area shall be barricaded and the FLAGGER signs replaced by ROAD WORK AHEAD signs. Flaggers are not required.
6. Flaggers shall be in sight of each other or in direct communication at all times.
7. The ROAD CONSTRUCTION AHEAD and FLAGGER signs shall have an 18" x 18" (min.) orange flag and a Type B light attached and operating at all times.

   Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
8. The FLAGGER legend sign may be substituted for the symbol sign.
9. All signs shall be post mounted if the closure time exceeds 12 hours.
10. The maximum spacing between devices shall be not greater than 25'.
11. Arrows denote direction of traffic only and do not reflect pavement markings.
12. Longitudinal dimensions are to be adjusted to fit field conditions [redacted].
13. [redacted]

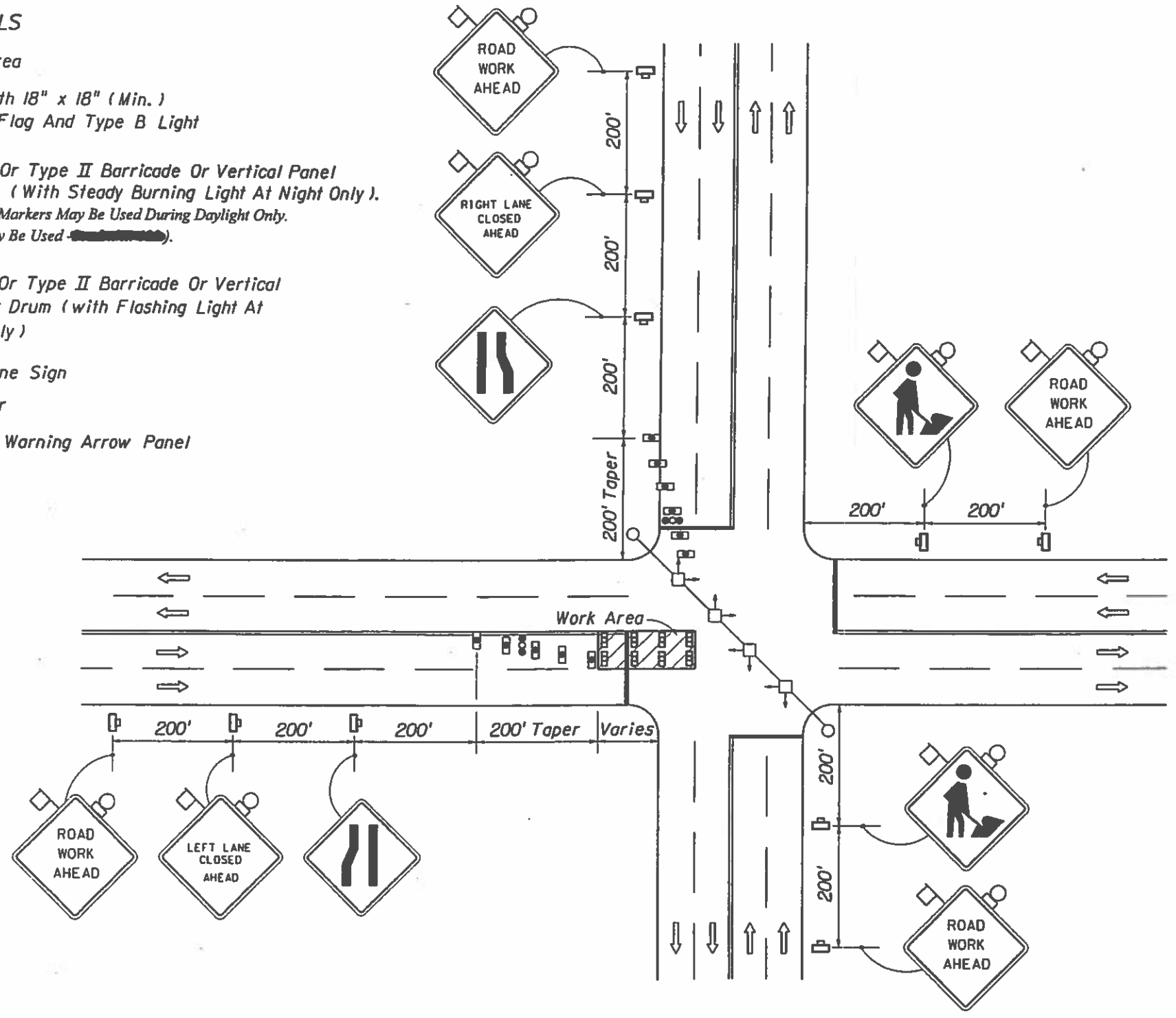
TYPICAL APPLICATIONS

- Utility Work
- Pavement Repair
- Structure Adjustments

URBAN LANE CLOSURE

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Stop Bar
- Advance Warning Arrow Panel



SIGNALIZED

GENERAL NOTES

1. All vehicles, equipment, workers (except flaggers) and their activities are forbidden in lane and intersection areas reserved for traffic.
2. [redacted]
3. The first two warning signs shall have an 18" x 18" (min.) orange flag and a Type B light attached and operating at all times.

   Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
4. All signs shall be post mounted if closure time exceeds 12 hours.
5. The WORKERS legend sign may be substituted for the symbol sign.
6. Dual signs are required for divided roadways.
7. Arrows denote direction of traffic only and do not reflect pavement markings.
8. Maximum spacing between barricades, vertical panels, cones, tubular markers and drums shall be not greater than 25'.
9. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
10. Longitudinal dimensions are to be adjusted to fit field conditions. [redacted]

[redacted]

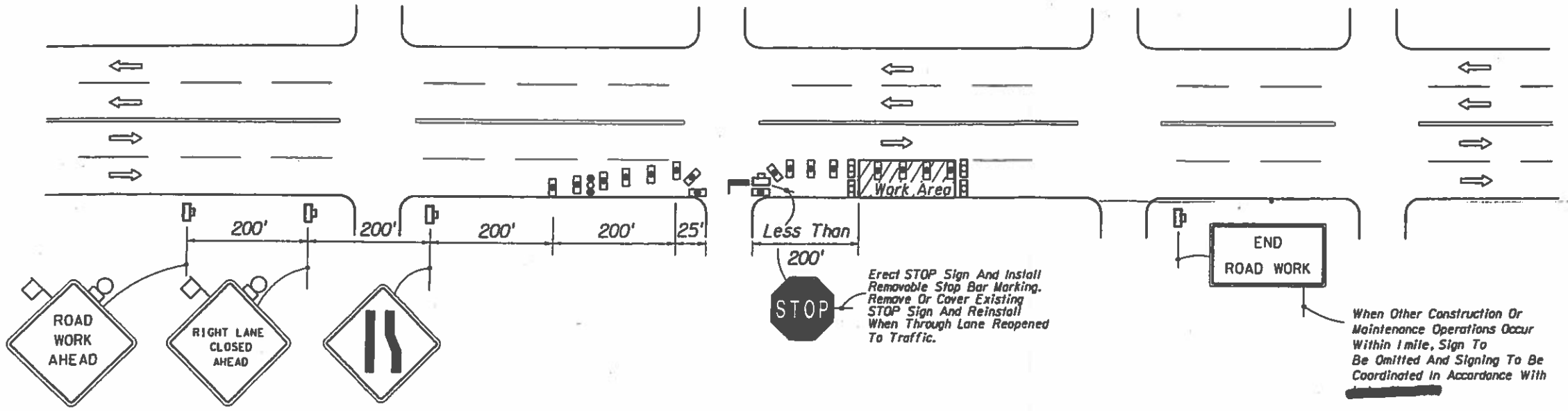
TYPICAL APPLICATIONS

Utility Work
Pavement Repair
Structure Adjustments

CONDITIONS

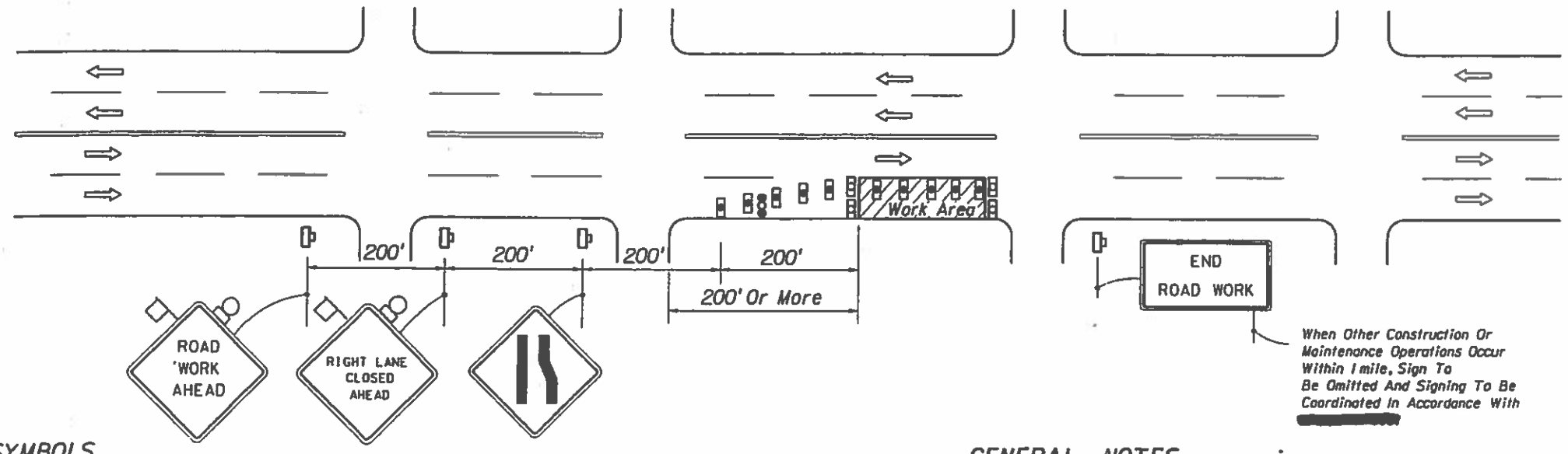
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF AT LEAST ONE MEDIAN TRAFFIC LANE FOR A PERIOD OF MORE THAN 60 MINUTES

URBAN
MULTI-LANE
INTERSECTION



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE, AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 200' OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted])
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES

1. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the roadway.
2. Work operations shall be confined to either one lane or lane combinations as follows:
   (a) Outside travel lane; (b) Outside auxiliary lane;
   (c) Outside travel lane and adjoining auxiliary lane;
   (d) Inside travel lane$^{\Delta}$; (e) Inside auxiliary lane$^{\Delta}$;
   (f) Inside travel lane and adjoining auxiliary lane$^{\Delta}$;
   $^{\Delta}$ See Sheet 2 Of 2

   If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT (LEFT) LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs, and the merge symbol signs eliminated.

   [redacted]
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted [redacted]
5. The first two warning signs shall have an 18" x 18" (min.) orange flag and a Type B light attached and operating at all times.

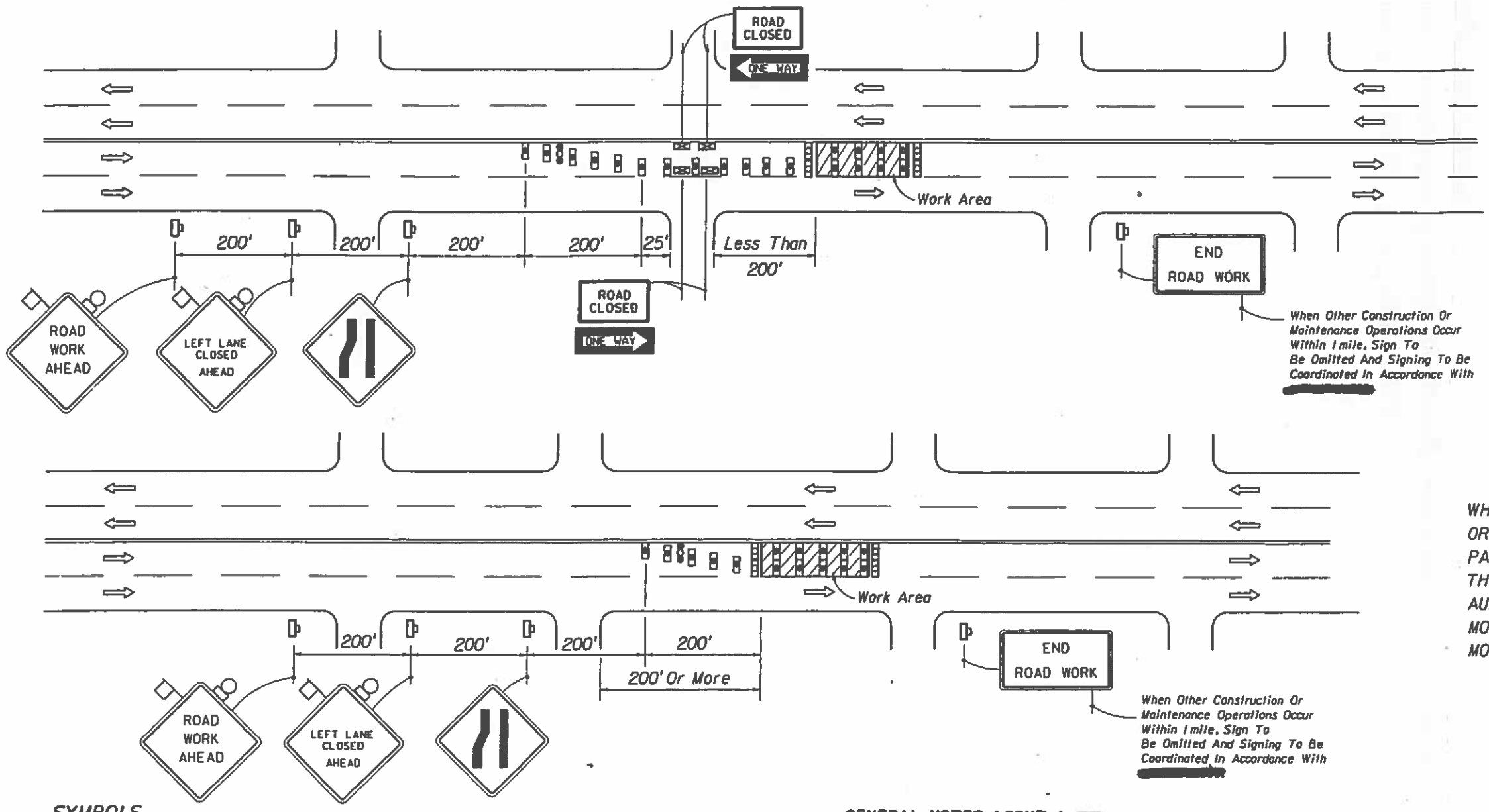
   Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
6. All signs shall be post mounted if the closure times exceeds 12 hours.
7. Dual signs are required for divided roadways.

(Continued)

TYPICAL APPLICATIONS

Utility Work
Pavement Repairs
Structure Adjustments

URBAN MULTI-LANE LANE CLOSURE



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE INSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE INSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 200' OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Type III Barricade
- Work Zone Sign
- Advance Warning Arrow Panel

GENERAL NOTES (CONT.)

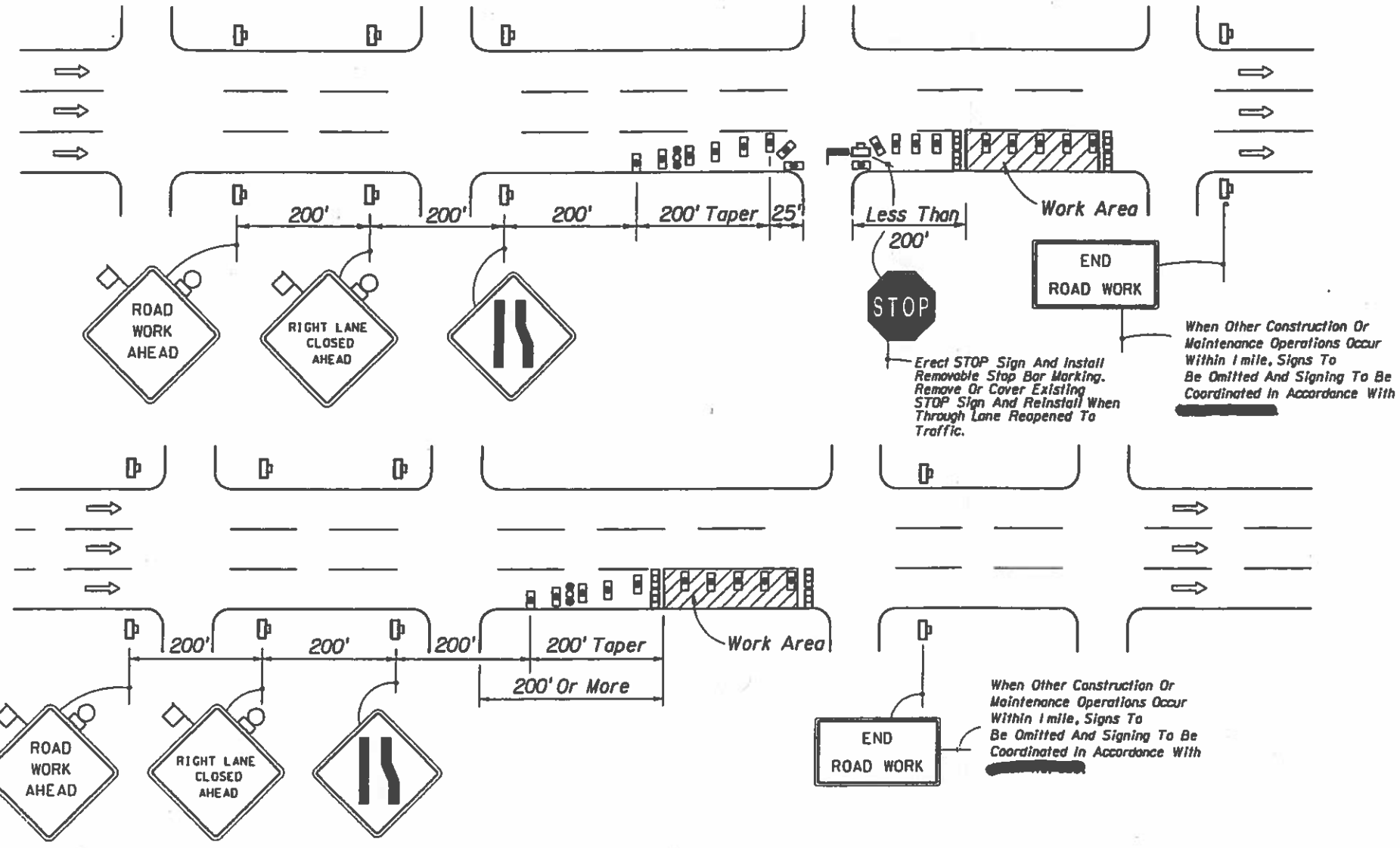
8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 25'. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 15' up to 25 MPH; 30' for 30-40 MPH; 50' for 45 MPH or greater.
   Spacing for devices parallel to the travel lanes shall be 25' centers for cones or tubular markers and 50' Centers for Type I or Type II barricades or vertical panels or drums for 250', thereafter cones or tubular markers at 50' centers and Type I or Type II barricades or vertical panels or drums at 100' centers.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions.

[redacted]

TYPICAL APPLICATIONS

Utility Work
Pavement Repairs
Structure Adjustments

URBAN
MULTI-LANE
LANE CLOSURE



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR THE MEDIAN TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR THE MEDIAN TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 200' OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the roadway.

2. Work operations shall be confined to either one lane or a combination of lanes as follows:
   (a) Outside travel lane; (b) Outside auxiliary lane;
   (c) Outside travel lane and adjoining auxiliary lane;
   (d) Outside travel lane and adjoining center lane;
   (e) Outside travel lane and adjoining auxiliary and center lanes;
   (f) Median travel lane[Δ]; (g) Median auxiliary lane[Δ];
   (h) Median travel lane and adjoining auxiliary lane[Δ];
   (i) Median travel lane and adjoining center lane[Δ];
   (j) Median travel lane and adjoining auxiliary and center lanes[Δ];
   [Δ] See Sheet 2.

   If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs and the merge left symbol signs eliminated.

3. [redacted]

4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted [redacted]

5. When work is performed in the median lane or the median and adjoining center lanes the barricading plans are inverted and LEFT LANE CLOSED AHEAD and merge right symbol signs shall be substituted for the RIGHT LANE CLOSED AHEAD and merge left symbol signs.

   If work is confined to the median auxiliary lane the work area shall be barricaded and the LEFT LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs and the merge right symbol signs eliminated.

6. The first two warning signs, each side, shall have an 18"x 18" (min.) orange flag and a Type B light attached and operating at all times.

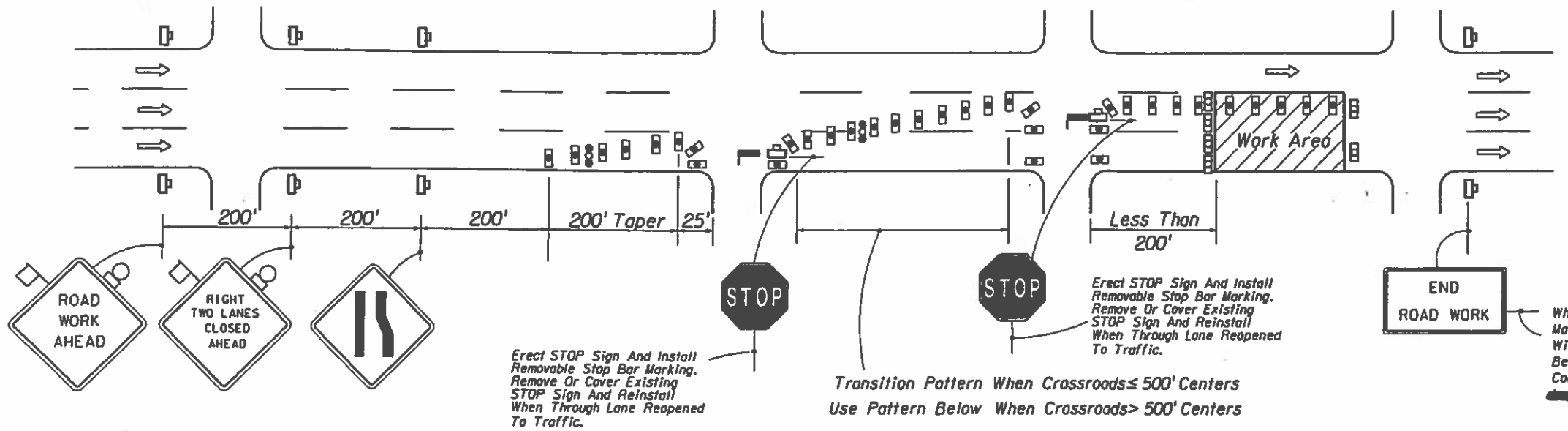
   Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.

(Continued)

TYPICAL APPLICATIONS

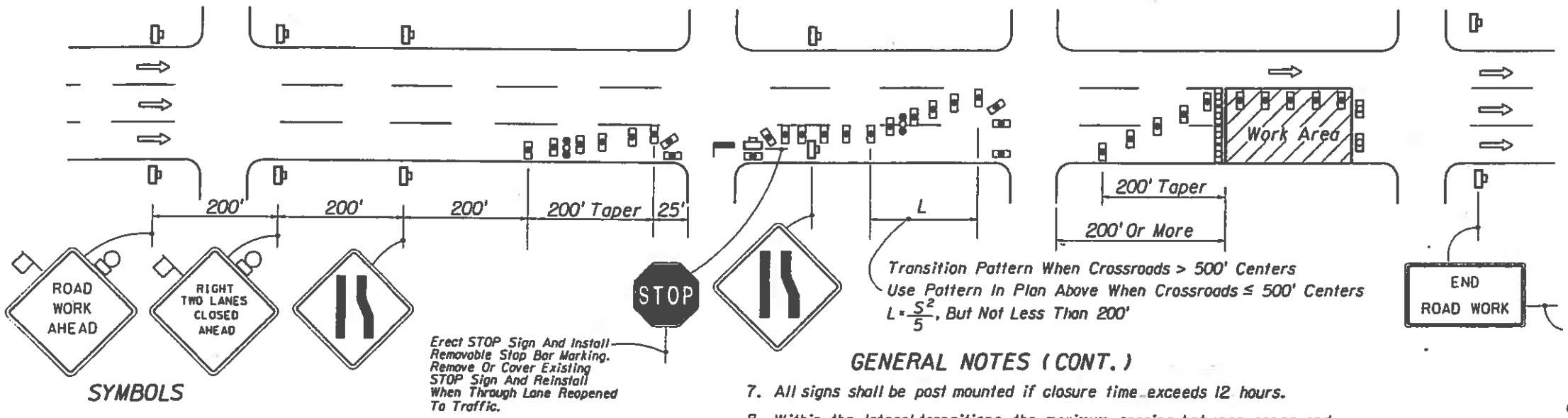
- Utility Work
- Pavement Repair
- Structure Adjustments

URBAN
MULTI-LANE
LANE CLOSURE



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA 200' OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18"x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES (CONT.)

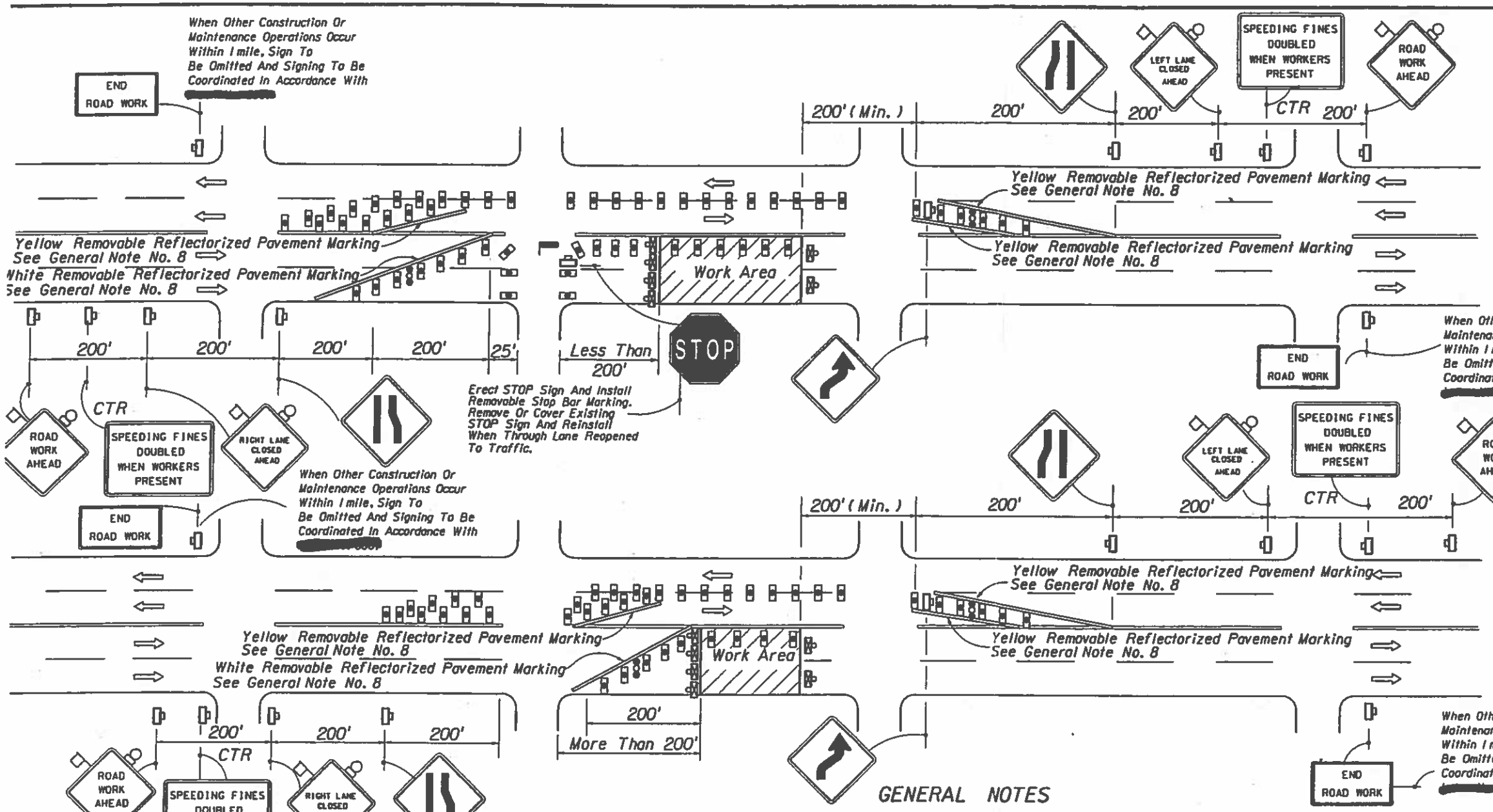
7. All signs shall be post mounted if closure time exceeds 12 hours.
8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 25'. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 15' up to 25 MPH; 30' for 30 MPH-40 MPH; 50' for 45 MPH or greater.
   Spacing for devices parallel to the travel lanes shall be 25' centers for cones or tubular markers and 50' centers for Type I or Type II barricades or vertical panels or drums for 250', thereafter, cones or tubular markers at 50' centers and Type I or Type II barricades or vertical panels or drums at 100' centers.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions.

[redacted]

TYPICAL APPLICATIONS

- Utility Work
- Pavement Repair
- Structure Adjustments

URBAN MULTI-LANE LANE CLOSURE



CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA LESS THAN 200' FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA 200' OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

SYMBOLS

- Work Area
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

GENERAL NOTES

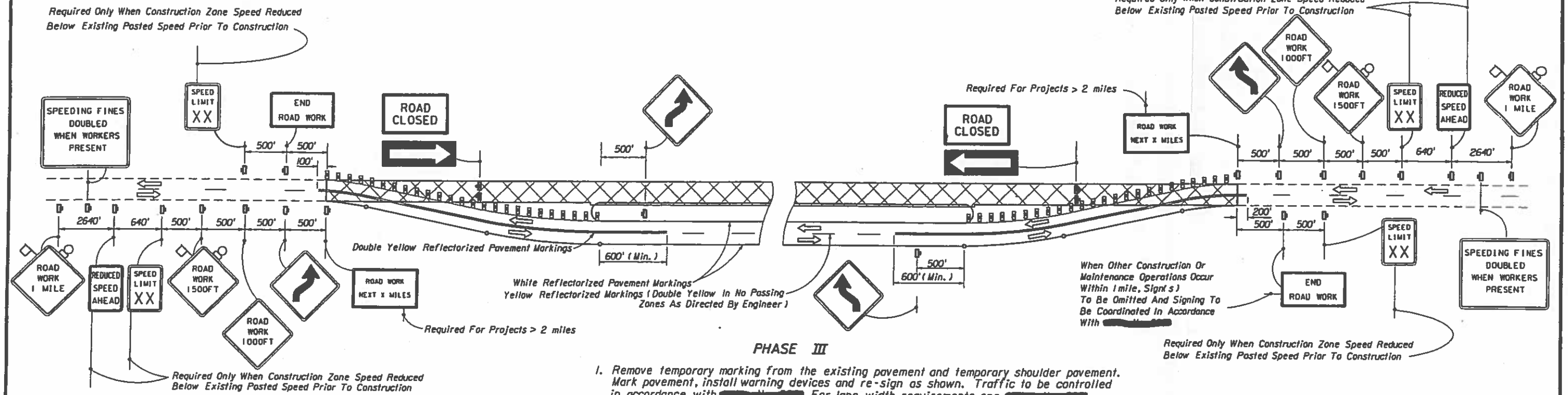
1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
2. [redacted] operations of 60 minutes or less (daylight only) [redacted]
3. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted [redacted]
4. The first two warning signs shall have an 18" x 18" (min.) Orange flag and a Type B light attached and operating at all times.
   Mesh signs may be used for (Daylight Only) operations
   Type B Lights and Orange Flags are not required.
5. All signs shall be post mounted if the closure time exceeds 12 hours.
6. Dual signs are required for divided roadways.
7. Channelizing devices are to be spaced with Type I or Type II barricades or vertical panels or drums at 50' centers, except in tangent work areas spacing may be increased to 100' after the first 250' when approved by the Engineer.
8. Removable reflectorized pavement markings shall be used when closure time exceeds one daylight period.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. [redacted]

[redacted]

TYPICAL APPLICATIONS

Utility Work
Pavement Repair
Structure Adjustments

URBAN LANE SHIFTS



PHASE III

1. Remove temporary marking from the existing pavement and temporary shoulder pavement. Mark pavement, install warning devices and re-sign as shown. Traffic to be controlled in accordance with [redacted]. For lane width requirements see [redacted].
2. Route through traffic to newly constructed roadway.
3. Resurface or reconstruct existing pavement including required shoulder pavement and friction course.

PHASE IV

1. Reroute through traffic as shown in Phase II. Signing to be as shown in Phase II.
2. Construct friction course over pavement constructed in Phases I and II.

SYMBOLS

- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).
- Type III Barricade (With Flashing Light)
- Work Zone Sign

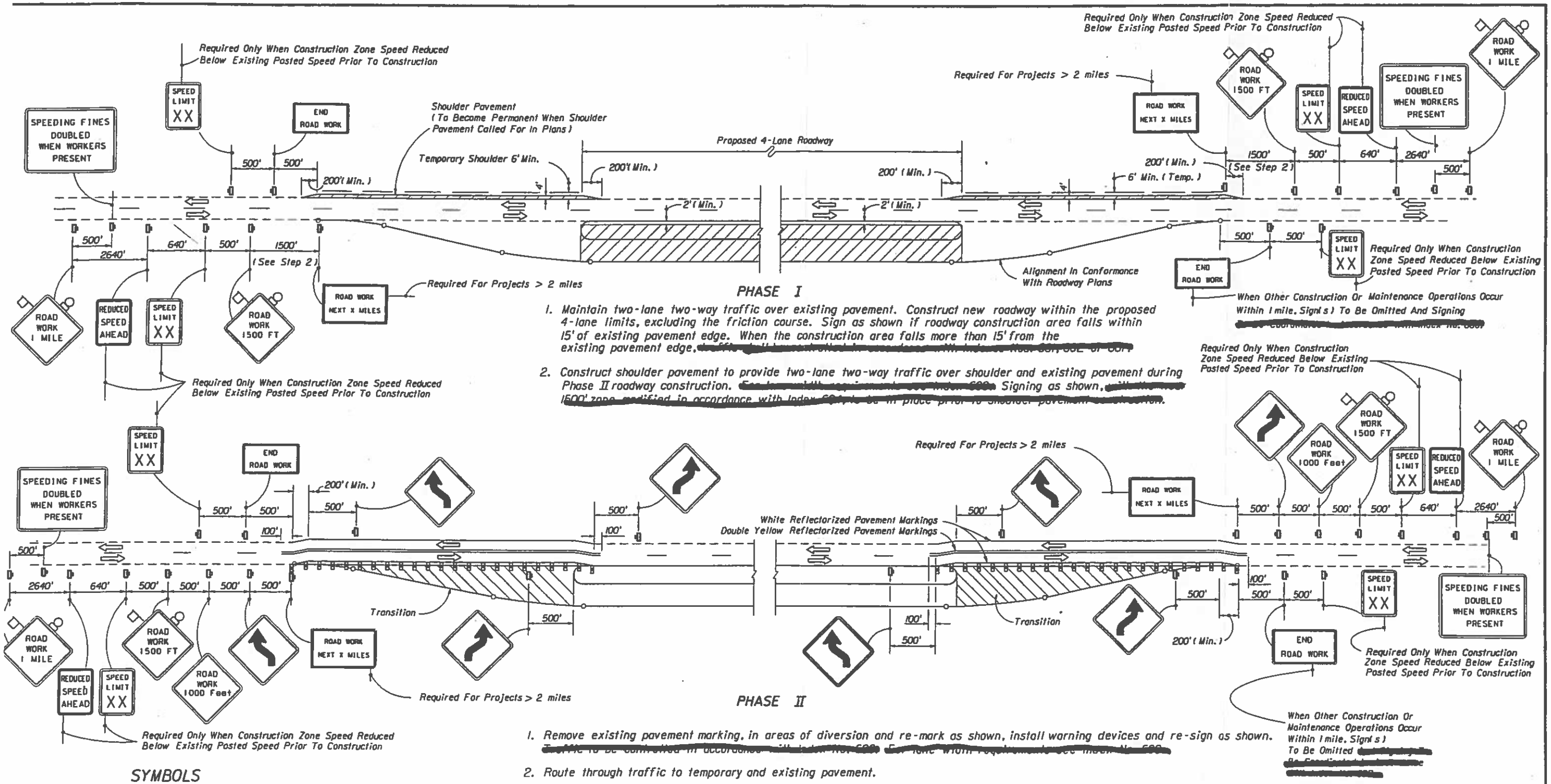
GENERAL NOTES

1. The first two warning signs shall have an 18" x 18" (min.) orange flag And a Type B light attached and operating at all times.
2. Existing signs and pavement markings that conflict with construction signing and marking shall be obliterated or removed.
3. Lane widths for maintenance of two-way traffic should desirably be equal to lane widths of the existing facility, but lanes shall be not less than 10' in width. When one-lane one-way operations are necessary, a minimum width of 12' shall be maintained and traffic controlled in accordance with [redacted]
4. Within the lateral transitions, the maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 15' up to 25 MPH; 30' for 30-40 MPH; 50' for 45 MPH or greater.
   The maximum spacing between warning devices used for delineation between the travel way and construction area to be 50' for Type I or Type II barricades or vertical panels or drums.
5. Warning Devices shall be in conformance with 'DropOffs in Work Zones'. [redacted]
6. For speed sign applications, see 'Regulatory Speed in Work Zones [redacted]
7. For reflectorized raised pavement marker applications, see Reflective Pavement Markers [redacted]
8. Additional barricades, signing, lighting or other traffic controls shall be provided for limited work areas in accordance with other applicable TCZ Indexes.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. [redacted]
11. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
12. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
13. For general TCZ requirements and additional information refer to [redacted]

LEGEND

- Phase I Construction
- Phase II Construction
- Phase III Construction

RURAL CONVERTING TO FOUR-LANE DIVIDED



1. Maintain two-lane two-way traffic over existing pavement. Construct new roadway within the proposed 4-lane limits, excluding the friction course. Sign as shown if roadway construction area falls within 15' of existing pavement edge. When the construction area falls more than 15' from the existing pavement edge, [illegible] Index No. 600, 602 or 604.
2. Construct shoulder pavement to provide two-lane two-way traffic over shoulder and existing pavement during Phase II roadway construction. [illegible] Signing as shown, [illegible] 1500' zone modified in accordance with Index 600 to be in place prior to shoulder pavement construction.

1. Remove existing pavement marking, in areas of diversion and re-mark as shown, install warning devices and re-sign as shown. Traffic to be controlled in accordance with Index No. 600. For lane width requirements see Index No. 600.
2. Route through traffic to temporary and existing pavement.
3. Construct transitions, excluding friction course.

SYMBOLS

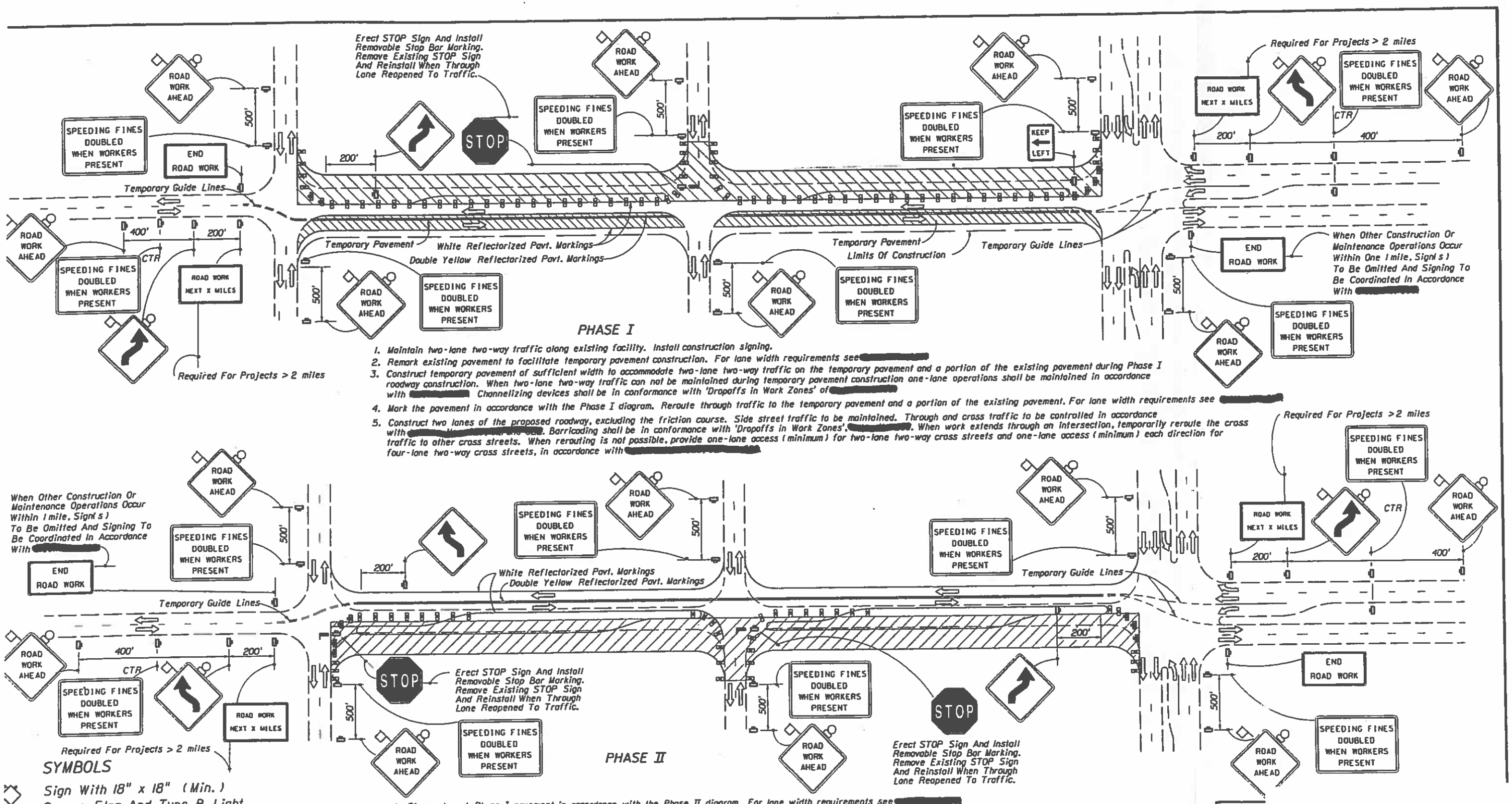
- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Work Zone Sign

Note: See Sheet 2 for General Notes.

LEGEND

- Phase I Construction
- Phase II Construction
- Phase III Construction

RURAL CONVERTING TO FOUR LANE DIVIDED

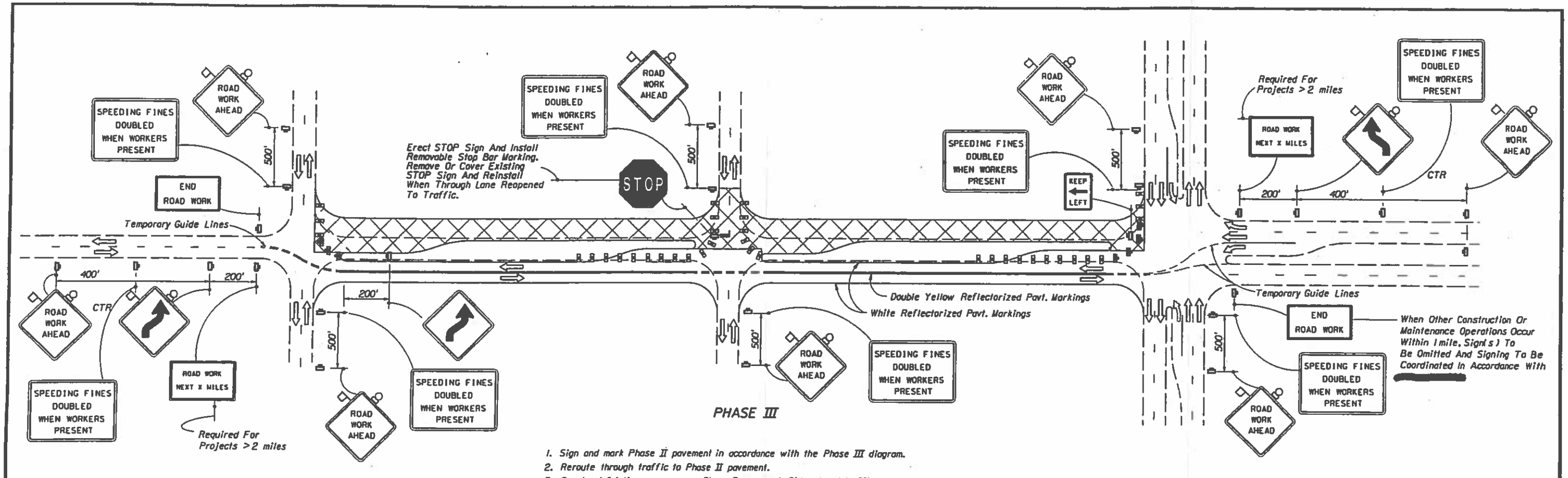


1. Maintain two-lane two-way traffic along existing facility. Install construction signing.
2. Remark existing pavement to facilitate temporary pavement construction. For lane width requirements see [redacted]
3. Construct temporary pavement of sufficient width to accommodate two-lane two-way traffic on the temporary pavement and a portion of the existing pavement during Phase I roadway construction. When two-lane two-way traffic can not be maintained during temporary pavement construction one-lane operations shall be maintained in accordance with [redacted] Channelizing devices shall be in conformance with 'Dropoffs in Work Zones' of [redacted]
4. Mark the pavement in accordance with the Phase I diagram. Reroute through traffic to the temporary pavement and a portion of the existing pavement. For lane width requirements see [redacted]
5. Construct two lanes of the proposed roadway, excluding the friction course. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with [redacted]. Barricading shall be in conformance with 'Dropoffs in Work Zones', [redacted]. When work extends through an intersection, temporarily reroute the cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets, in accordance with [redacted]

1. Sign and mark Phase I pavement in accordance with the Phase II diagram. For lane width requirements see [redacted]
2. Reroute through traffic to Phase I pavement.
3. Complete all Phase II construction, including the friction course. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with [redacted] Channelizing devices shall be in conformance with 'Dropoffs in Work Zones' of [redacted] When work extends through an intersection, temporarily reroute cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets, in accordance with [redacted]

See Sheet 2 for General Notes.

URBAN LANE CONVERSION



1. Sign and mark Phase II pavement in accordance with the Phase III diagram.
2. Reroute through traffic to Phase II pavement.
3. Construct friction course over Phase I pavement. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with [redacted]. When work extends through an intersection, temporarily reroute cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets.

GENERAL NOTES

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to [redacted].
2. The first two warning signs shall have an 18" x 18" (min.) orange flag and a Type B light attached, and operating at all times.
3. Lane widths for maintenance of two-way traffic should desirably be equal to lane widths of the existing facility, but lanes shall not be less than 10' in width. When one-lane one-way operations are necessary, a minimum width of 12' should be maintained and traffic controlled in accordance with [redacted].
4. At signalized intersections, signals shall be directed or relocated as required to the center of relocated lanes.
5. For reflectorized raised pavment marker application see [redacted].
6. Additional barricades, signing, lighting or other traffic controls for limited work areas shall be provided in accordance with other applicable TCZ indexes as conditions warrant in each phase.
7. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. [redacted]

[redacted]

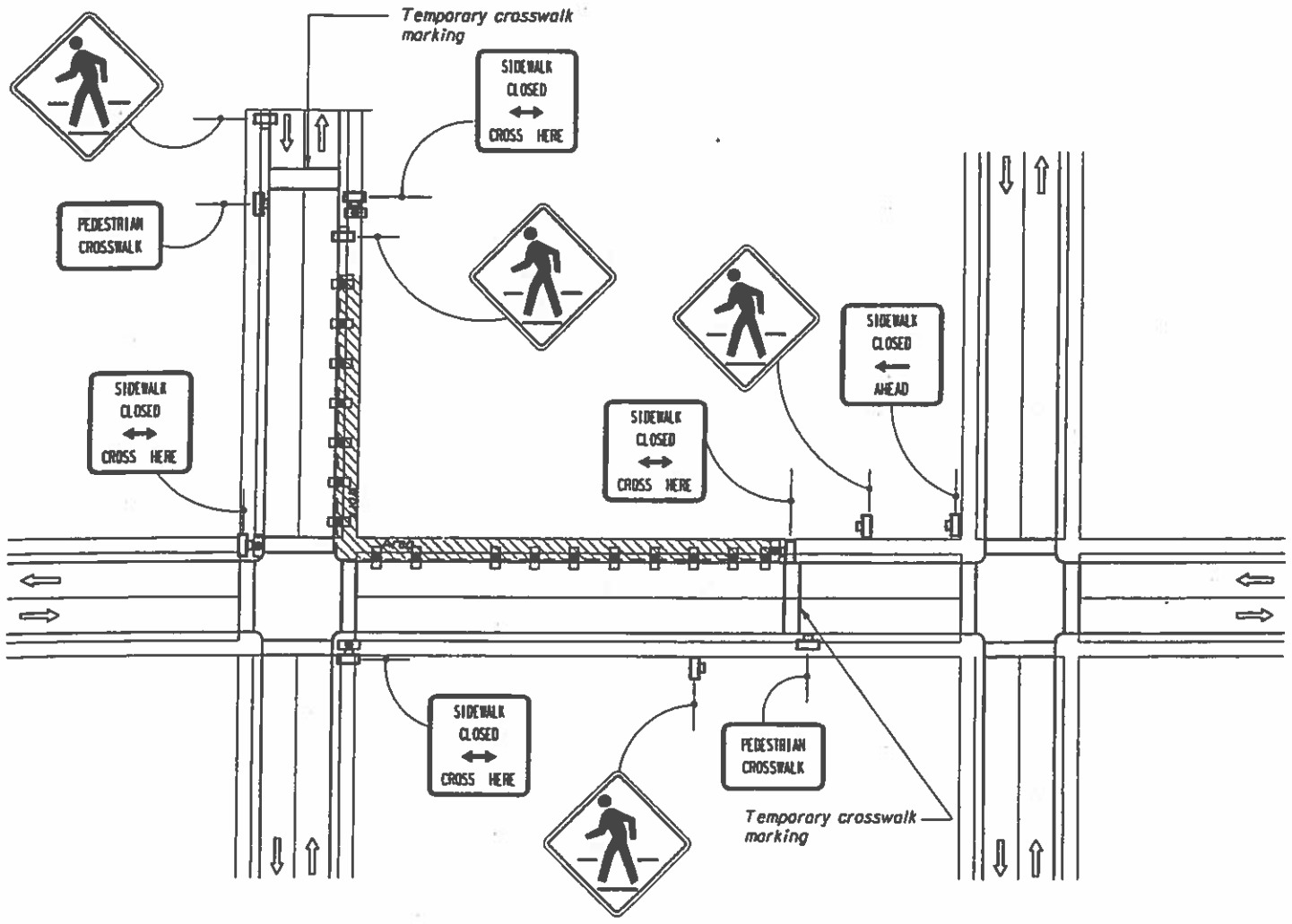
SYMBOLS

- Sign With 18" x 18" (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only.
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Stop Bar

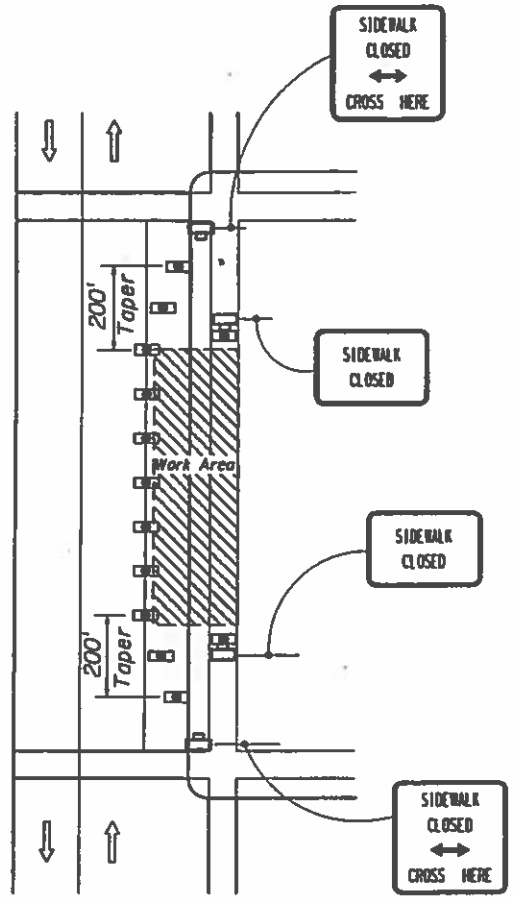
LEGEND

- Phase I Construction
- Phase II Construction
- Phase III Construction

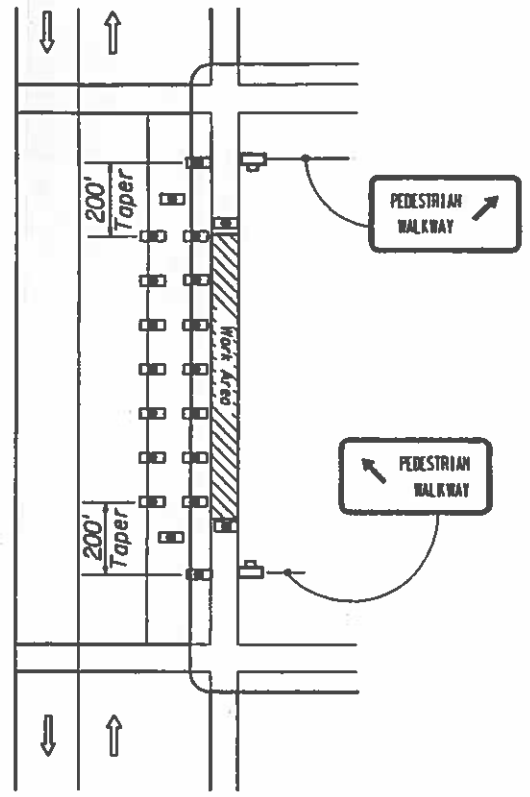
URBAN LANE CONVERSION



CORNER SIDEWALK CLOSURE
WITH TEMPORARY CROSSWALKS



MID-BLOCK SIDEWALK
CLOSURE



MID-BLOCK SIDEWALK CLOSURE
WITH TEMPORARY WALKWAY

SYMBOLS

▨ Work Area

Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
(Tubular Markers May Be Used During Daylight Only. Cones May Be Used [redacted]).

Work Zone Sign

GENERAL NOTES

1. Arrows denote direction of traffic only and do not reflect pavement markings.
2. Only the signs controlling pedestrian flows are shown. Other work zone signs will be needed to control traffic on the streets.
3. For spacing of traffic control devices and general TCZ requirements refer to [redacted] Maximum spacing between barricades, vertical panels, drums or tubular markers shall not be greater than 25'.
4. Street lighting should be considered.
5. For nightime closures use Type A flashing warning lights on barricades supporting signs and closing sidewalks. Use Type C steady-burn lights on channelizing devices seperating the work area from vehicular traffic.
6. Pedestrian traffic signal display controlling closed crosswalks shall be covered or deactivated.
7. Temporary walkways shall be a minimum of 4' wide and kept free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials and etc. ([redacted])
8. Post Mounted Signs located near or adjacent to a sidewalk shall have a 7' minimum clearance from the bottom of sign to the sidewalk.
9. When construction activities involve sidewalks on both sides of the street, efforts should be made to stage the construction so that both sidewalks are not out of service at the same time.
10. In the event that sidewalks on both sides of the street are closed, then pedestrians shall be guided around the construction zone.

TYPICAL APPLICATIONS

Sidewalk Repair
Pavement Widening
Utility Work

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT WORKERS OR THEIR ACTIVITIES ENCROACH ON THE SIDEWALK FOR A PERIOD OF MORE THAN 60 MINUTES

PEDESTRAIN CONTROL

IV. SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

As a result of this Value Engineering Study, the Value Engineering Team identified the following areas where current MOT practices may be improved:

Training

1) Reactivate the Traffic Control on Construction and Maintenance Project Committee, revise the name to Maintenance of Traffic (MOT) Committee, expand the membership to include construction, maintenance, Traffic Engineering, Design, Safety, and FHWA and expand the committee scope to include minimum work zone traffic and certification training requirements.
2) Establish a three (3) level MOT Training program for the Department, consultants, contractors and Utility personnel.
3) Utilize available and approved MOT Training course such as those prepared and presented by the American Traffic Safety Services Association (ATSSA), International Municipal Sign association (IMSA), and National Highway Institute (NHI). Capitalize on the training capabilities of the Kentucky Technology Transfer Center.

Specifications

1) Revise Standard Specifications to require contractors to provide a qualified individual as the Worksite Traffic Control Supervisor (WTCS), who shall be responsible for selecting, installing, and maintaining all traffic control devices in accordance with the plans, specifications and the MUTCD.
2) Specify in the Traffic Control Plans wherever there is a need for Uniformed Law Enforcement Officer for MOT enforcement.
3) Include a typical section for each construction work phase in the Traffic Control Plans.
4) Develop additional individual pay items covering work currently included in the Lump Sum Maintenance of Traffic item.
5) Provide additional guidance in the Department's Design Guidance Manual for the use of variable message signs on construction projects.
6) Revise the sign post splicing detail to limit the splicing overlap to 4" above ground, which has been crash tested in accordance with NCRP Report 350 and meets AASHTO Standard Specifications for Structural Supports for Highway Signs.
7) Develop a special provision for later inclusion in the Standard Specifications, requiring the contractor to provide trained Flaggers to direct single lane traffic on two lane, two way roadways or other situations which require stopping traffic.

Policy and Procedures for Traffic Control

1) Include a list of traffic control considerations to be reviewed at the Preliminary Line and Grade Inspection Meeting.
2) Develop a list of MOT design considerations and phasing criteria for inclusion in the MOT section of the Highway Design Manual.
3) Require major TCP changes submitted by the contractor be signed and sealed by a professional engineer registered in the State of Kentucky.
4) Develop a definition of Major and Minor Changes to TCP.
5) Ensure that all TCP activities are coordinated with all involved entities at the Project Preconstruction Meeting and Weekly Project Coordination Meetings.
6) Require all utilities performing work within the highway R/W to comply with the Departments Standard Drawings and TCP training requirements
7) Require mandatory participation at the Post Construction Review meeting of project personnel involved in the project (Contractor, Construction Project Engineer, Design Engineer, etc.)
8) Continue bi-annual District Traffic Control and annual traffic control reviews.

Typical Traffic Control Plan Applications

1) Use regulatory speed limit signs in highway work zones in addition to advisory speed limit panels to provide more enforceable speed limit control.
2) Develop eight (8) additional standard drawings covering traffic control in work zone situations not now included in the Departments standard TCP drawings.

STATEWIDE
MAINTENANCE OF TRAFFIC
V.E. STUDY PRESENTATION
AUGUST 25, 2000

NAME	AFFILIATION	PHONE
Jerry Love	Ventry Engineering	850/627-3900
Steve Farmer	KYTC - D7	850/627-3900
Ananias Calvin III	KYTC – CO	502/564-3280
Bill Madden	KYTC – D6	859/341-2700
Lester Jones	Ventry Engineering	850/627-3900
Lowell Filsinger	Ventry Engineering	850/627-3900
Bruce Nicholson	Ventry Engineering	850/627-3900
Joette Fields	KYTC – CO	502/564-3280
Dennis LaBelle	Ventry Engineering	850/627-3900
Gordon Burleson	Ventry Engineering	850/627-3900
Robert Farley	FHWA	502/223-6744
John Ballantyne	FHWA	502/223-0747
Robert Semones	KYTC – CO	502/564-3280
Siamak Shafaghi	KYTC – CO	502/564-3280
Duane Thomas	KYTC – CO	502/223-8558
Chuck Knowler	KYTC – CO	502/564-4556
Dexter Newman	KYTC – CO	502/564-4780
Jeff Jasper	KYTC – CO	502/564-3280
Gary W. Sharpe	KYTC – CO	502/564-3280
Andre Johannes	KYTC – CO	502/564-3280
Trevor Booker	KYTC – CO	502/564-4780
Jeff Wolfe	KYTC – CO	502/564-3020
Cass Napier	KYTC – CO	502/564-3020
Larry Irish	KYTC – CO	502/564-3020

V. APPENDICES

V.(A) NCHRP SYNTHESIS OF HIGHWAY PRACTICE 208

National Cooperative Highway Research Program

Synthesis of Highway Practice 208

Development and Implementation of Traffic Control Plans for Highway Work Zones

JERRY L. GRAHAM, P.E.
and
JAMES MIGLETZ
Graham-Migletz Enterprises, Inc.
Independence, Missouri

Topic Panel

GERALD A. DONALDSON, *Advocates for Highway and Auto Safety*
DAN S. ESKIN, *Pennsylvania Department of Transportation*
CHUNG ENG, *Federal Highway Administration*
FRANK N. LISLE, *Transportation Research Board*
MICHAEL E. ROBINSON, *Federal Highway Administration*
SHASHIKANT C. SHAH, *Strategic Highway Research Program*
FRANK D. SHEPARD, *Virginia Transportation Research Council*
CHARLIE V. TRUJILLO, *New Mexico State Highway and Transportation Department*
MAURICE E. WITTEVEEN, *Michigan Department of Transportation*
J. RICHARD YOUNG, JR., *Mississippi Department of Transportation*

Transportation Research Board
National Research Council

Research Sponsored by the American Association of State Highway and Transportation Officials in Cooperation with the Federal Highway Administration

NATIONAL ACADEMY PRESS
Washington, D.C. 1994

Subject Areas
Maintenance, and Highway Operations, Capacity, and Traffic Control

CHAPTER FOUR

IMPLEMENTATION OF TRAFFIC CONTROL PLANS

The implementation phase occurs when the TCP is installed in the field. The FAPG specifies that a highway agency shall designate a qualified person at the project level who will have primary responsibility and sufficient authority to ensure that the TCP and other safety aspects of the contract are efficiently administered. One of the primary duties of the "responsible person" is to conduct inspections of the work zone traffic controls at regular intervals and to make any necessary changes.

Preconstruction meetings can be very useful in establishing inspection schedules prior to traffic controls being installed in the field. The meetings are also good opportunities to make sure everyone understands the TCP. At these meetings the contractor may also submit an alternative TCP. In the second state survey, 30 of 36 (83 percent) responding states said they allowed contractors to develop their own TCPs; only 4 states, however, said that contractors often actually develop TCPs.

RESPONSIBLE PERSON

A "responsible person" is defined as a person involved with the work zone project or incident area whose primary responsibility is traffic control. This person should be trained in work zone traffic control and safety engineering. He or she should be a staff professional with the authority to ensure that directives concerning the implementation of the traffic control strategy are obeyed.

The second state survey found that 20 states assign this duty to the project engineer, 18 assign it to the resident engineer, 13 appoint a subprofessional (e.g., a project inspector) for this duty, and 13 assign it to "other." (Some of the states vary this assignment.)

One of the chronic problems with the development of work zone TCPs relates to the responsible person. Individuals assigned the duties of the responsible person often have other pressing responsibilities. A project or resident engineer typically is so busy with the construction and coordination aspects of managing a work project that traffic control is often relegated to a secondary concern. To counter this, some states assign special TCP inspectors for larger, more complex projects.

If the TCP process is to improve, a project must involve a person whose primary concern is traffic control or else traffic control concerns will continue to be dismissed or given short shrift.

The *FY 1989 Annual Work Zone Traffic Safety Report (5)* states:

> A responsible person is normally assigned to each project. But some have not received training or adequate on-the-job experience. States are requiring certification or training of their responsible persons. Some states require the contractors to designate a person trained or certified in work zone traffic control. Certification and training of project personnel does not guarantee the traffic control will be satisfactory. States should be cautioned that the specification should be written to limit the number of projects a certified person can be responsible for monitoring.

The second state survey revealed that in 24 of the 36 (67 percent) responding states, contractors are required to have a responsible person, but only 7 (19 percent) require that this person be certified or have other special training.

The New Mexico State Highway and Transportation Department *(22)* requirements for contractor's responsible persons are addressed under the following special provision for traffic control management:

> This work shall consist of providing Traffic Control Management in strict compliance with the contract documents and the *Manual on Uniform Traffic Control Devices* (MUTCD), including installation, supervision, inspection, and maintenance of all traffic control devices on the project.
>
> Prior to commencing any work requiring Traffic Control Management, the Contractor shall provide a certification for the designated Traffic Control Supervisor. The Traffic Control Supervisor shall be American Traffic Safety Services Association (ATSSA) certified or certified by an agency approved by the Department.
>
> If certified by an agency approved by the Department, the minimum requirements for certification are as follows:
>
> 1. Successful completion of an approved work zone traffic control course.
> 2. Passing a written examination on the work zone traffic control course.
> 3. A minimum of one (1) year field experience in work zone traffic control.
>
> Duties: The Traffic Control Supervisor shall provide management and supervision services including, but not limited to, the following:
>
> a. Prepares all revisions requested by the Contractor to the Traffic Control Plan established in the Plans and submits the new Traffic Control Plan to the Project Manager for approval by the District Engineer.
>
> b. Direct supervision of project flag and signing personnel.
>
> c. Coordinating all traffic control operations, including those of subcontractors and suppliers.
>
> d. Coordinating project activities with appropriate law enforcement and fire control agencies.
>
> e. Preparing and submitting Statement 5 concerning road closures, delays and other project activities to news media as required.
>
> f. Maintaining a project traffic control diary in a bound book in a format approved by the Project Manager which will become a part of the Department's project records. A copy of the diary shall be submitted to the Project Manager on a bi-weekly basis. The traffic control diary shall be kept current on a daily basis and shall be available for inspection at all times.
>
> g. Inspecting traffic control devices every calendar day that traffic control devices are in use and providing for the repair or replacement of traffic control devices not functioning as required. Traffic control devices shall be inspected during working and non-working hours on a schedule approved in writing by the Project Manager. Inspections shall take place at times in

addition to the beginning and end of the working day. Traffic control devices in use longer than seven days shall be inspected at least once a week during nighttime periods.

h. Overseeing all requirements covered by the contract plans, specifications and special provisions which provide for the convenient, safe and orderly movement of traffic.

Traffic Control Management shall be provided by the Contractor throughout the duration of the project. Traffic control supervision shall be provided by the Contractor on a 24-hour per day basis. The Contractor shall ensure that the Traffic Control Supervisor is available on every calendar day, "on call" at all times, and available upon the Project Manager's request at other than normal working hours. The Contractor shall at all times be able to respond within one (1) hour of notification by the Project Manager.

The Traffic Control Supervisor shall have a set of traffic control plans and an up-to-date copy of the MUTCD available at all times.

Prior to commencing any work requiring Traffic Control Management, the contractor shall, in writing, certify that the Traffic Control Supervisor meets the minimum requirements given above. Along with this certification, the contractor shall submit the certificate verifying successful completion of the course and examination and a summary of the Traffic Control Supervisor's field experience in the operation of work zone traffic control.

At TxDOT, the responsible person's duties are divided into the department responsible person (DRP) and the contractor responsible person (CRP). Their duties and responsibilities are specified in the *Inspectors Training Manual for Traffic Control Through Construction (23).*

The Engineer appoints the Project Manager, and Inspector, or some other Department employee trained in traffic control to serve as the DRP.

DRPs are responsible for at least one daytime and one nighttime inspection per month for each construction project under their supervision.

Note: The DRP must not conduct the formal daytime and nighttime inspections within the same 24-hour period. However, the DRP may make informal inspections at his/her discretion.

The DRP has the authority to:

- oversee the setup and maintenance of the TCP,
- instruct the Contractor to correct hazards and deficiencies,
- ensure that Contractors correct hazards and deficiencies at the time of inspection if possible,
- halt work if necessary until the Contractor makes the needed corrections, and
- make minor or emergency changes to the TCP, documenting the changes according to the district's documentation procedures.

Note: Some districts may require the Engineer's approval for *any* TCP change.

The Contractor must designate one person to be responsible for traffic control on the project.

The CRP may be the Contractor's project superintendent, an engineer, or a safety specialist.

The CRP has authority to:

- implement and maintain traffic control devices as the contract specifies,
- take corrective measures or direct the Contractor's other employees to correct deficiencies as soon as possible after their discovery, and
- halt work until the Contractor's employees make the necessary changes.

The CRP:

- makes daily traffic control inspections, reporting any deficiencies to the DRP;
- reports corrections of any TCP deficiencies to the DRP,
- accompanies the DRP on formal bi-monthly inspection; and
- makes other inspections at his/her discretion or at the Department's request.

FIELD INSPECTIONS OF TRAFFIC CONTROL PLANS

Highway tort liability has become increasingly important in recent years as the number of lawsuits against highway agencies has increased. For this reason, Dudek and Richards point out, good inspection practices have become an integral part of the TCP management process *(8)*. They recommend daily inspections of traffic control and written records of these inspections, kept in the project diary or on a separate report form.

In many of the surveyed states there is a hierarchy of inspections and inspectors. In New Mexico, the responsible person conducts daily inspections and at least one nighttime inspection each week. In Texas, the CRP is responsible for daily traffic control inspections; the DRP must make at least one daytime and one nighttime inspection per month. In TxDOT's Houston District, a district traffic control coordinator reviews the inspections of the DRP and also reviews and inspects traffic control with the resident engineer on a quarterly basis. The overall schedule for inspection is shown in Table 4.

Inspections in Texas are documented on Form 599, which provides a record of the discovery and correction of traffic control deficiencies. Both the DRP and CRP must sign Form 599 in case a liability claimant uses the form as evidence.

The DRP uses Form 599 for the following tasks:

- Document deficiencies he or she discovers during traffic control inspections
- Recommend corrections
- Record the dates and times the contractor makes the corrections.

District and residency policies for distribution of Form 599 vary. Typically, the DRP completes Form 599 during official DRP

TABLE 4
TEXAS TCP INSPECTION SCHEDULE

Responsible Person(s)	*Frequency*	*Comments*
Project	Daily	Inspectors may also make any number of inspections.
DRP	At least twice monthly (one in daytime, one at night) and after major TCP changes	The two inspections may not be within the same 24-hour period. The CRP accompanies the DRP.
CRP	Daily	The CRP accompanies the DRP's inspections and makes additional night inspections at his or her own discretion and the Department's request.
District Safety Review Team	Occasional, if at all	The team announces its reviews in advance.

V.(B) KYTC HIGHWAY DESIGN GUIDANCE MANUAL

61-03.0500 TRAFFIC CONTROL AND DETOURS

.0510 Traffic Control Plan -The Department of Highways approved a policy and procedure on traffic control through highway and street work zones to provide consideration to motorists, pedestrians and construction workers. When reconstructing or relocating any existing highway, conduct a study to determine the requirements for a detour. Consider and discuss traffic control procedures at the preliminary line and grade inspection and address them in the inspection report. The designer shall compile a detailed suggested sequence of construction for presentation and review at the plans-in-hand inspection. Develop and place drawings and notes on traffic control sheets within the plans. If limited notes are required, place these notes on the General Notes sheet for the project. The Traffic Control Plan is to be developed using the Standard Specifications and Standard Drawings as a basis. Write only those requirements not provided in the Standard Specifications required for maintaining and controlling traffic into the Traffic Control Plan. The Traffic Control Plan will clearly indicate all required phasing, method of traffic control, and any time or placing construction limitations on the contractor. Give attention to developing strategies that will limit impact to the traveling public. As much as possible, maintain the existing number of lanes throughout a construction project, particularly on the interstates and other major routes. Where it is determined that lane restrictions are necessary, make decisions on the best manner to assure limited closures. Considerations for these decisions will include restricting work during peak periods of traffic flow on the route and demanding the use of nighttime construction. The Traffic Control Plan should also take into account other adjacent roadway sections that may be under construction and avoid conflict between competing phases of adjacent projects. Approval of the Traffic Control Plans is the responsibility of the Project Development Team. The Project Development Team will agree upon an appropriate documentation for each plan and will consist as a minimum of the signatures of the District Branch Managers for Pre-Construction, Construction and Traffic and FHWA on Interstate or other special projects. Keep the documentation in the project file within the District. Must send approved plans involving road or lane closures to the Traffic Control Coordinator in the Central Office at least 90 days in advance of the project letting with an indication of expected dates for closures. The Traffic Control Coordinator is posting all information with the American Automobile Association and making it available to the Public Information Office for new bulletins in local newspapers or other media. The Project Development Team should consider making critical information available through special sources, such as handing out pamphlets in public locations. Approval of standard design features are the responsibility of the Project

Development Team, with guidance provided by the Central Office Division of Highway Design, Division of Construction, and Division of Traffic. An approved Traffic Control Plan is required on all projects.

The Designer should read the Standard Specifications and familiarize themselves with the requirements for each bid item. Section 112 of the Standard Specifications specifically involves maintenance of traffic issues. Bid temporary or permanent signs required for a project on a square foot basis. This includes those signs shown routinely in the Standard Drawings. A lump sum bid item for "MAINTAIN AND CONTROL TRAFFIC" shall be included for every project with no exceptions.

The Project Development Team is now responsible for developing all permanent and temporary striping plans including the use of pavement markers required for each project. Adequate striping and other traffic control devices shall be determined for each phase of a contract. Other traffic control devices, such as message boards and flashing arrows, must also be identified and bid in adequate numbers for each project.

.0520 **Geometric Design** - On-site detours (diversions) should desirably be constructed to the standards, design speed and pavement widths that are present on the existing facility. Where this is not feasible, the appropriate speed warning signs shall be included in the Traffic Control Plan. Detours involving road closures shall consider the shortest route possible, condition, safe load limit of structures, cost of conditioning and maintaining the detour for traffic and capacity. Depending upon site conditions, the traffic control plan will be determined on a project-by-project basis.

.0530 **Maintaining Traffic** - If maintaining traffic through a project during construction, the proposal for handling traffic must be approved by the Project Development Team. On projects where maintaining through traffic and detailed detour plans are not provided, the following note applies:

> "All main line detours and specified cross roads constructed to maintain through traffic that are to be used for a period of seven days or more shall be paved as directed by the engineer. Pay the paving at the contract unit prices for the respective materials used. Detours constructed as a convenience to the contractor that are to be used for a period of seven days or greater shall be paved also; however, the contractor shall bear the total cost."

.0540 **Maintenance of Traffic Bid Items** - All projects shall include a bid item for "Maintain and Control Traffic". The unit shall be lump sum. All roadway projects that contain a detour in the plans shall also include a bid

item for "Diversions (By-Pass Detours)". The lump sum bid shall include all necessary grading, culverts and bridges to construct the detour and shall include removal. Compute earthwork for all detours shown on the plans and note quantities of excavation and embankment on the plans for the Contractor's information only, and shall not be included in the total project earthwork calculations. Note the opening for drainage structures in square feet for the Contractor's information. Plan Note Code No. 185 will also be required.

As traffic control plans become more extensive and complex, separate pay items shall be required. These pay items apply to traffic signals, stationary signs, flashing arrows, temporary barrier walls, temporary guardrail, temporary crash cushions, temporary pavement markers and, temporary removable striping tape. Other pay items may include variable message signs and any other special or unusually expensive items peculiar to the project, in addition to the "Maintain and Control Traffic" item. Bid all traffic control items in accordance with the ***Standard Specifications for Road and Bridge Construction,*** current edition. A plan note, "TRAFFIC CONTROL ITEMS", identified as Code No. 182, dealing with ownership of salvageable traffic control items, shall be placed on the plans or in the proposal.

.0550 Innovative Bid Processes -The designer should carefully consider the impacts of construction on the motorists. Do not routinely use innovative bid processes. Use these processes where the public will experience extreme disruption and delays. May also use these processes where the time of completion of a project or an individual phase is particularly critical. Should the designer choose to use this methodology, a well-developed traffic control plan with all phases well thought out and developed is mandatory. Base the rates applicable in each of the following described processes on established practices for benefit/cost ratios based on road user delay costs. The Division of Multi-modal Programs may help in the development of these ratios.

.0551 Incentive/Disincentive - To charge liquidated damages against all project completion dates is common. Liquidated damages may also be charged in excess of rates established in the Standard Specifications when deemed appropriate and when the expected impacts to the public may be considered to be greater than the damages established by specification. Liquidated damages may also be charged against individual phases of a contract, particularly when the phase is deemed to be particularly critical to the operation of the highway or for the safety of the motoring public. However, the use of incentives/disincentives described in the next paragraph is probably a more effective method to handle the impacts of individual phases.

Commonly use incentive/disincentives on projects with high traffic volumes and involving construction requirements that will greatly restrict or even shift traffic away from the existing facility. The incentive/disincentive contract compensates a contractor the same per day for early completion of a contract or phase as penalizing him for late completion. If deciding some reason to apply a different incentive and disincentive cost, the incentive rate shall not be greater than the disincentive. Base the amount applied for the incentive/disincentive on estimates of such items as traffic safety, traffic maintenance, and road user delay costs. Generally apply, incentive/disincentives only to work that directly affects the motorist and therefore frequently does not replace normal contractual liquidated damages. The incentive/disincentive provision should be of an adequate amount to motivate a contractor to complete the project or phase ahead of schedule. In considering the use of incentive/disincentives or any of the other innovative practices that follows, the Designer must assure that the work zone will be free of delays that will be beyond the contractor's control- i.e., utility work. Normally base the use of incentive/disincentive contracts on a calendar day completion rather than a workday. Therefore, must address or waive any contractual language that suggests a conflict with the times established for the incentive/disincentive. This includes the end of construction seasons or other seasonal construction limitations and impacts by holidays. Incentive/disincentive contracts should take into account a contractor working beyond a normal forty-hour workweek to accomplish the work. Expectancy for this type of work would be for making a much greater effort by the contractor to complete the project or phase.

.0552 **Cost Plus Time Bidding (A+B Bidding)** - Cost plus time bidding is utilized where it is desired for the contractor to develop the most timely method of completing a project. Develop bidding for this type of project by the formula

$$A+B=C$$

Where A = the traditional bid for contract items and is the actual contractual amount and B= the total number of calendar days required to complete the project times a road user cost/day established by the Project Development Team. Then award the contract based on the total bid C made by the contractor. Then place a disincentive in the contract based on the established road user costs which is placed in effect if the number of days bid by the contractor is exceeded. Similarly, an incentive cost is usually included in the contract to reward the contractor if completing the work earlier than the time bid. Use A+B bidding for specific major phases of a contract rather than the entire contract, if desired.

.0560 **Construction Practices** - The Transportation Research Board completed a series of studies that measured the actual flow of traffic in work zones. The following chart is an indication of expected impacts to traffic flow when lane reductions occur:

NORMAL LANES	OPEN LANES	AVERAGE VPH	CAPACITY HPHPL
2	1	1340	1340
3	2	2980	1490
3	1	1170	1170
4	3	4560	1520
4	2	2960	1480
5	2	2740	1370

The average capacities shown are for the expected total traffic on the open lanes in the construction zone and traffic per vehicle lane. As shown in these charts and as should be expected, the more merging that is required in a construction zone the less traffic can pass through the work area. Use these numbers for a rough prediction of encountering expected delays because of lane closures. Obviously, having the presence of ramps within the construction zone increases the impact to the traffic flow.

The impact to traffic occurs at the merge point. As traffic flows into the reduced lanes, traffic counts as shown above may be expected. Length of closure has no impact on the amount of traffic that can pass any roadway segment as the reduced lanes controls the number of vehicles that may pass. However, avoid lengthy lane closures - particularly if no apparent work is visible to the motorist because they are frustrating to travelers. Establish lengths of closures based on a reasonable period to accomplish work activities. As discussed previously, lane rentals based on a per mile basis of closure may be an effective method to permit the contractor the maximum closure he deems feasible in an established period. The designer may consider complete closures of roadways or ramps to finish construction in the shortest periods possible where alternate routes exist. Another consideration would be to permit closures on only one side of the highway at a time. The appearance of work occurring on one side while the other side is restricted with little activity may be discouraging to the motorist.

Use two-lane, two-way operation (TLTWO) on one roadway of a normally divided highway only after careful consideration of other available methods of traffic control. On the interstates, TLTWO will require the use of median barrier wall for positive separation of traffic. On other roadway systems, the use of median barrier wall should always be a first consideration. Generally, a TWTLO should be used on urban type streets or other low speed operations and where the driver can see the transition

Cost plus time bidding is effective when multiple bidders will be involved. If the designer determines that there is a likelihood that a single bidder will be involved for a project, it is more appropriate that one of the other two described innovative bidding processes be utilized for that project.

.0553 **Lane Rental** - The lane rental concept is used to encourage contractors to minimize road user impacts during construction while permitting him the greatest flexibility in deciding the appropriate time frames for lane closures and restrictions. In this concept, there is no specific bid item for lane rental. Rather, base the award of the project solely on the contractor's estimated bid price. However, a provision for a lane rental fee assessment based on a road user cost is included in the contract and is assessed against the contractor's contract on his monthly contract payments. Assess the fee for the time that the contractor occupies or obstructs any part of the roadway or may be specific to certain segments of the contract.

The designer may base rental fees on weekly, daily, hourly, or even fractions of an hour. Also, consider the lengths of lane closures. Greater fees may be charged for certain times when traffic may be greater; i.e., during rush hours when hourly rates are bid or during holidays when a daily rate is bid. May still make restrictions on lane closures for special events or holidays. Generally the Department should limit the restrictions placed on the contractor and leave the decision of the best periods for his actions within the contractor's decision making. Obviously, CPM scheduling of this type of an operation is very critical for the contractor to assure the economic impact to his contract and for the Department completely understanding the schedule on which he will complete his work. Neither the Department nor the contractor will give any indication in the project bid as to the anticipated time for which assessments may occur.

Particularly consider this concept on projects where mostly affecting the traveling public. Major urban projects are prime candidates. The intent of lane rentals is to encourage contractors to schedule their work to keep lane restrictions to a minimum, both in terms of length of duration and the number of closures or other obstructions that occur.

Consider pre-bid Conferences whenever using innovative bidding methods. This allows the contractor to understand the established restrictions, the time frames involved in the overall project and specific phases that require extra control and effort.

back to normal one way operations. There may still be some reason why the Project Development Team may choose using TWTLO in circumstances other than those cited without the use of barrier wall. In these cases, separate the lanes by tubular markers, paying for on an each basis. In that past, there has been a general recommendation to use a raised bituminous median on which the markers would be mounted. It has now been determined that the raised bituminous median is not desirable and should be eliminated from use on future projects.

.0570 **Traffic References** - The designer is referred to the ***Traffic Control Through Highway and Street Work Zones Manual,*** the ***Standard Drawings Manual*** and the ***Manual on Uniform Traffic Control Devices.***

KENTUCKY TRANSPORTATION CABINET
DIVISION OF DESIGN
Frankfort, Kentucky 40622

Agreement Between Kentucky Transportation Cabinet, Department of Highways and_____, City, Regarding Traffic and Safety Regulations _____Project

WHEREAS the Transportation Cabinet, Department of Highways of the Commonwealth of Kentucky, hereinafter referred to as the "Department," contemplates the construction of _____Road, more specifically described as _____, a street project-urban area-in the City of _____, hereinafter referred to as the "City"; and

WHEREAS the City and the Department wish to assure the preferential, safe and efficient movement of traffic on the completed street and prevent local speed restrictions not in keeping with the through traffic service provided by the highway project: and

WHEREAS the Commissioner on Highways has directed all employees of the Department of Highways with administrative responsibility regarding traffic on public highways to comply with the Manual on Uniform Traffic Control Devices for the regulation of traffic on streets and highways as such may be amended from time to time.

NOW THEREFORE, in consideration of the benefits to be derived by the City and the Commonwealth from the proposed improvement, it is hereby agreed by and between the parties:

SPECIFIC REGULATIONS

1. Traffic *(check one)*

   ☐ One lane of traffic in each direction shall be maintained throughout the project construction.

   ☐ One lane of traffic shall be maintained at all times with appropriate signing and/or flagman as specified in the project Maintenance of Traffic Plan.

   ☐ One-way traffic only shall be permitted between designated points as specified in the Maintenance of Traffic Plan.

   ☐ The project will be closed to through traffic as specified in the Maintenance of Traffic Plan and detoured as shown in the plan.

2. Parking within the limits of the project will be allowed/not be allowed as specified in the Maintenance of traffic Plan.

3. Construction will be allowed between the hours of_____ and _____.

GENERAL REGULATIONS

1. The Department and the City agree that when the project is completed and open to traffic no traffic control devices such as, but not limited to, signals, signs, island and pavement markings or a sign of any sort shall be located within the right of way of the subject project except by the Department or by authority of the Department and that the Department shall have the right to locate, install and maintain all such devices.

2. The City agrees to prescribe by ordinance pursuant to Paragraph 5 fines and other reasonable sanctions for violation of parking regulatory signs and other traffic control devices as may be installed by the Department upon authority of the Department.

3. The City agrees through its own forces, including peace officers and other personnel, to enforce compliance of the traffic control.

4. The City agrees it will enact no ordinances to abrogate the provisions of this agreement until and unless such proposed ordinance has been submitted to the Department and approved by it with concurrence of the Federal Highway Administration.

5. It is understood by the parties hereto that all ordinances necessary to effect the before listed procedures will be enacted prior to the initiation of this project and be effective when the project is completed and open to traffic.

In witness whereof the parties hereto have caused the agreement to be executed the year, month and day below written by the proper officers.

The City:

_____ the _____ day of _____, 19 ____

Mayor of _____ _____
Mayor's Signature

I,_____, City Clerk of the City of _____, Kentucky, do hereby certify that the Mayor of _____, whose signature appears above, was authorized to execute this agreement by action of the City legislative body on the _____ day of _____ , 19 _____, as appears in the official records of the City legislative body of _____.

_____

Commonwealth of Kentucky
Department of Highways

_____ the _____day of _____, 19 _____.
Assistant State Highway Engineer for Preconstruction

KENTUCKY TRANSPORTATION CABINET
DIVISION OF DESIGN
FRANKFORT, KENTUCKY 40622

AN ORDINANCE RELATING TO A PROPOSED HIGHWAY PROJECT WITHIN THE CITY LIMITS OF _____, KENTUCKY PERTAINING TO A TRAFFIC AGREEMENT BETWEEN THE CITY OF _____ AND THE COMMONWEALTH

WHEREAS, the Kentucky Transportation Cabinet, Department of Highways (hereinafter referred to as "Cabinet") has made a survey and prepared plans on Highway Project, _____, in the City of _____, (hereinafter referred to as "City") and described as follows:

_____
_____
_____
_____
_____

Including therein all of the right, title and interest held by the City in the approaches to all other city streets crossed by said project.

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF _____, KENTUCKY,

That the following be ratified and approved by this Board:

Section I. That the City recognizes that certain traffic regulations will be required by the construction of the project within the city limits and hereby grants to the Mayor authority to enter into a contract (designated as TC 61-39) on behalf of the City with the Cabinet putting into effect the provision of this section.

Section II. Any ordinances or parts of ordinances in conflict herewith are hereby repealed to the extent of such conflict.

Section III. This Ordinance shall be introduced and considered by the City Council with relation to pertinent Kentucky Statutes and ordinances of _____, Kentucky.

_____
MAYOR

V.(C) FLORIDA DOT PLAN PREPARATION MANUAL

Chapter 10

WORK ZONE TRAFFIC CONTROL

10.1 General

The need to improve the capacity of, and to rehabilitate Florida's highways, has greatly increased the frequency of highway construction taking place immediately adjacent to or under traffic. The traveling public, as well as construction and inspection personnel, are exposed to conflicts that may become hazardous. In addition to the safety issue, the potential delays to the public, as traffic is interrupted by construction, can be significant. As a result, the Department places a great deal of emphasis upon ensuring that all traffic, including motorists, bicyclists and pedestrians can be accommodated through construction zones with minimum delay and exposure to unsafe conditions.

10.2 References

The following references contain the basic criteria and other required information for work zone traffic control in Florida:

- The ***Manual on Uniform Traffic Control Devices for Streets and Highways, (MUTCD),*** Federal Highway Administration. Part VI of the ***MUTCD*** deals specifically with work zone traffic control. Other parts of the ***MUTCD*** may also be useful in designing a traffic control plan.
- ***Policy on Geometric Design of Highways and Streets, AASHTO***
- ***Roadside Design Guide, AASHTO, Chapter 9***
- ***Roadway and Traffic Design Standards, Index Series 600, 415***
- ***Standard Specifications for Road and Bridge Construction***
- ***Basis of Estimate Handbook***

10.3 Comprehensive Work Zone Traffic Control Planning

Consideration of traffic control must begin at the Project Development and Environmental (PD&E) study stage. Impacts on traffic, traffic handling options, constructability, and design features and constraints, as they affect traffic, are to be evaluated for each alternate alignment studied. The preliminary engineering report must specifically address work zone traffic control.

Traffic control considerations must begin in the early stages of design, using the work zone traffic control material from the PD&E study as the basis. As the design progresses, the following should be considered:

Design features and constraints. Length of the project, lane configuration, bike lanes, sidewalks and grade differentials between existing and proposed, interchanges and intersections, pavement materials, storm sewers, roadway lighting, utilities and bridge features are some of the design element decisions that might be influenced by work zone traffic control considerations.

Contract specifications. Provisions such as time restrictions on construction activities; incentive-disincentive clauses; daily, weekly and seasonal restrictions and special materials may be necessary. Public relations activities such as media releases, television and radio spots, handbills, and highway advisory radio may be specified.

Other actions. Actions may need to be taken by the Department prior to or during construction that may not be a contract requirement. Examples are dealing with the media and local businesses, provisions for mass transit options to commuters, service patrols, improvements to alternate routes, coordination with other projects and maintenance activities, and special inspection requirements.

Public input. On very large and complicated projects, it may be necessary to involve the public through informal public meetings to be held early in the design of a project. Close coordination with city and county officials may be necessary. Citizen and business advisory committees may be established as sources of input.

Utility work. If contract utility work is anticipated in conjunction with or during the highway construction, the Traffic Control Plan (TCP) must account for and adequately protect all work activities. The phasing of construction activities must be compatible with the utility work. Utilities, whose work affects traffic, are required to have a TCP by FHWA. This requires early and effective coordination with utilities.

10.4 Traffic Control Plans (TCP)

A TCP is a set of specific plan sheets, references to standard (typical) layouts, and/or notes on roadway plans describing how traffic will be controlled through a work zone. All projects and work on highways, roads and streets shall have a traffic control plan, as required by Florida Statute and Federal regulations. All work shall be executed under the established plan and Department approved procedures. The TCP is the result of considerations and investigations made in the development of a comprehensive plan for accommodating traffic through the construction zone. These considerations include the design itself, contract specifications, and plan sheets.

TCP sheets detail the proper delineation of traffic through the work zone during all construction phases. The complexity of the TCP varies with the complexity of the traffic problems associated with a project. Many situations can be covered adequately with references to specific sections from the ***Manual on Uniform Traffic Control Devices (MUTCD)***, or ***Roadway and Traffic Design Standards, Series 600***. Specific TCP sheets

shall be required in the plans set whenever project conditions are not specifically addressed in a typical layout from the manuals noted above. This is usually the case for complex projects; therefore references to the ***Roadway and Traffic Design Standards***, as well as specific TCP sheets, will likely be necessary.

A traffic control plan should address the appropriate following information ~~for the mainline~~ and any affected cross roads, side streets, and ramps:

1. the location of all advance warning signs and lighting units
2. temporary pavement markings, (including RPM's)
3. location of temporary barriers and attenuators
4. temporary drainage design
5. channelizing devices at special locations
6. locations for special devices such as variable message signs (VMS), arrow panels, and temporary signals
7. VMS messages for each phase
8. signal timing for each phase, including method of temporary actuation if needed (Check with Traffic Operations Engineer)
9. location and geometry for transitions, detours, and diversions
10. typical sections for each phase of work on all projects, except simple resurfacing projects, in order to show lane widths, offsets, barrier locations and other features influencing traffic control
11. the proposed regulatory speed(s) for each phase
12. reference to appropriate ***Roadway and Traffic Design Standards*** or ***MUTCD*** drawings whenever applicable
13. appropriate quantities, pay items and pay item notes
14. resolve any conflicts between permanent signing and markings and work zone signing and markings
15. key strategies such as service patrol, police, public service announcements, Highway Advisory Radio, night work, etc.
16. good plan notes
17. address the need for maintaining existing roadway lighting
18. work area access plan

Chapter 19, Volume II, Plans Preparation and Assembly, explains the required information for specific TCP sheets.

Consideration must also be given to adjoining, intersecting or sequential work zones. This can be a particular problem with maintenance operations, bridge or roadway projects under

different contracts, operations of other jurisdictions or utilities. When such work must take place, the operations must be coordinated and taken into account in the TCP so that the motorist encounters one, consistently designed, work zone.

TCP's for project designs "on the shelf" must be updated prior to contract letting.

10.5 TCP Development

The following step-by-step process should be followed by designers when preparing traffic control plans.

STEP #1 Understand the Project

- Field reviews by designers should be required
- Review the scope
- Examine the plans (Phase I to Phase II)
- Look at plan-profiles and cross-sections for general understanding
- Review PD&E study for any constraints
- Consider bicycle/pedestrian needs during construction
- For complex projects consider developing a TCP study and other possible strategies such as public awareness campaigns, alternate route improvements, service patrols, etc.

STEP #2 Develop Project Specific Objectives

What are your objectives? Examples might be:

- use barrier wall to separate workers from traffic
- close road if adequate detour exists
- maintaining 2-way traffic at all times
- maintaining existing roadway capacity during peaks
- maintaining business/resident access
- provide bike/pedestrian access
- minimize wetland impacts
- expedite construction

STEP #3 Brainstorm TCP Alternatives

Develop some rough alternatives considering what could be used to accomplish the work, such as constructing temporary pavement and/or temporary detours, using auxiliary lanes, placing 2-way traffic on one side of divided facility, using detour routes, etc. Also, south side as opposed to north side on an east-west roadway. Don't worry that an alternate doesn't meet all objectives.

Designers should check condition of any proposed detour routes. If off state system, may need agreement with locals.

STEP #4 Develop a Construction Phasing Concept

- Examine existing facility versus what is to be built. This is a major task on jobs other than resurfacing
- Coordinate with bridge designers
- Color or mark the plan and profile sheets to show existing roadway versus new construction. Then, check station by station, the plan sheet against cross-section sheets. Make notes on plan sheets as to drop offs or other problems. Use profile grade lines or centerlines for reference points
- List out major tasks to be completed, such as:

  construct new WB Roadway

  construct new EB Roadway

  construct frontage roads

  construct bridge/flyover

NOTE: The designer may need input from construction personnel or even contractors representatives in determining construction phases

- Make notes on plan sheets or notepad as to "decisions" that you make along the way.

STEP #5 Examine/Analyze Alternatives Which Meet Objectives (for each phase).

Next, consider how you could achieve the proposed alternatives and meet the stated objectives.

- Examine pros and cons of various alternatives
- Consider how much work and expense is involved for each alternative
- Consider detour/transition locations, signal operations during construction, how to handle buses, bicycles, pedestrians, service vehicles, etc.

STEP #6 Develop Detailed TCP

Select the most feasible alternative for each phase. Add details such as:

- detour/transition geometrics and locations

- if lane closures are needed, use the lane closure technique discussed in **Section 10.14.7** to determine time frame for closures
- advanced signing scheme and locations, revisions needed to existing signs - including guide signs, and proposed signs for all work activities - lane closures, detours, etc., on mainline, side roads, cross-roads and ramps
- need for portable traffic signals, variable message signs, and barriers
- how existing operations will be maintained - side streets, businesses, residents, bikes, pedestrians, buses - bus stops, etc.
- revisions to signal phasing and/or timing during each TCP phase
- regulatory speed desired for each phase
- all pay items and quantities needed for TCP
- how existing auxiliary lanes will be used and any restriction necessary during construction
- typical sections for each phase
- outline key strategies to be used
  a. service patrol
  b. police
  c. public service announcements
  d. Highway Advisory Radio
  e. night work
- need for alternate route improvements

10.6 Coordination

Work zone traffic control can be a complex undertaking that requires the coordination of a number of agencies and other interested parties. Planning and coordination must begin early in a project design.

Traffic control is a joint responsibility of design (both roadway and bridge), construction and traffic operations personnel. Coordination is necessary by all three parties in the development of TCPs. Both traffic operations and construction personnel must routinely review TCPs during Initial Engineering (Phase I to Phase II plans) to ensure that the plan is sound and constructable and bid items are complete and quantities reasonable. With subsequent reviews of Phase III plans, Designers are also encouraged to contact contractors for ideas on Traffic Control Plans.

Traffic control plans should also be reviewed with other appropriate offices such as maintenance, FHWA, community awareness teams, public, businesses, freeway

coordinator management teams, and local agencies. **Initial reviews should be made by construction and traffic operations no later than the Phase II plans stage with subsequent reviews of Phase III plans.** Input from local engineering and law enforcement agencies should be obtained early in the process, such as during the PD&E study and the Phase I plans stage.

Adjoining work zones may not have sufficient spacing for standard placement of signs and other traffic control devices within their traffic control zones. These situations can occur when separate contracts adjoin each other (separate bridge and roadway contracts are a typical example), utility work performed separately from roadway work or when maintenance activities are performed adjacent to a construction project. Where such restraints or conflicts occur, or are likely to occur, the designer should try to resolve the conflicts in order to prevent misunderstanding on the part of the traveling public.

10.6.1 Phase Submittals

TCP phase submittals should include the following:

- **Phase I** - a typical section for each phase as well as a description of the phasing sequence and work involved
- **Phase II** - a majority of the TCP completed (75-90%), including the information outlined in **Section 10.4** of this chapter, and a list of the pay items needed
- **Phase III** - a final TCP, including all notes, pay items and preliminary quantities

(**Note:** The construction office estimates the duration for each phase of construction during Phase III review. The designer will finalize the quantities in the plans, comp book, and CES after receiving the estimated durations for construction.)

10.7 Work Zone Traffic Control Training

10.7.1 Background

Work zone traffic control is an important function affecting the safety of the traveling public, contractor personnel and equipment, and department employees. Every reasonable effort should be made to eliminate or reduce involvement in crashes within work zones. Proper traffic control training is vital to achieving this objective.

The Department's Maintenance of Traffic Committee consists of representatives from Roadway Design, Construction, Safety, Maintenance, Traffic Engineering, Value Engineering and FHWA. Its purpose is to develop, review or revise procedures, standards and specifications regarding work zone traffic control to maximize efficiency and enhance safety of motorists, bicyclists, pedestrians, and workers within the work zone.

10.7.2 Training Requirements

The Department's Maintenance of Traffic Committee has prescribed work zone traffic control training requirements for Department employees and shall furnish training course information and requirements to each District's Human Resource Development Manager.

Every employee, including consultants, whose activities affect maintenance and construction work zone safety, from upper-level management through construction and maintenance field personnel, shall complete appropriate training as prescribed above and as required by ***Department Procedure Number 750-030-006***.

District Design, Construction, and Maintenance Engineers shall ensure that employees, including consultant personnel, who are responsible for traffic control plan design, implementation, inspection or supervision of the design, selection, placement, or maintenance of traffic control schemes and devices in work zones have been certified under the provisions of this procedure.

10.8 Traffic Control Devices

Traffic control devices/methods that are available for use include:

- Signs (warning, regulatory and guide)
- Lighting units (arrow panels, barricade and sign lights, illumination devices, temporary signals and variable message signs)
- Channelizing devices (cones, tubular markers, plastic drums, vertical panels, and Types I, II and III barricades)
- Markings (pavement markings, raised pavement markings, delineators, and removal of conflicting markings)
- Safety appurtenances (portable concrete barriers, guardrail and crash cushions) - See ***AASHTO Roadside Design Guide*** (Chapter 9)
- Flaggers
- Law Enforcement
- Guardrail attached to barrels for work zones < 45 mph - See ***AASHTO Roadside Design Guide.***

The ***MUTCD*** contains detailed instructions on the use of traffic control devices. Special design considerations applicable to Florida are discussed in the following sections.

Traffic control devices should not be placed in locations where they will block sidewalks or bike lanes.

10.9 Signs

Sign messages for speed limits and distances are to be posted in English units.

10.9.1 Advance Warning Signs

The TCP should identify the advance construction warning signs, including legends and location. These include signs such as "Road Work Ahead" and "Road Work One Mile". The TCP should provide the advanced warning signs, legends and locations for all proposed operations which require signing. These include diversions, detours, lane closures, and lane shifts, on the mainline as well as crossroads. The sequence for advance signing should be from general to more specific. As an example: Road Work Ahead (general), Left Lane Closed Ahead (more specific), Merge Right (specific).

10.9.2 Length of Construction Sign

The length of construction sign (G20-1) bearing the legend "Road Work Next Miles" is required for all projects of more than 2 miles in length. The sign shall be located at begin construction points.

10.9.3 Existing Signs

Existing (regulatory, warning, etc.) signs that conflict with the TCP shall be removed or relocated to complement the work zone conditions (i.e. if a stop sign on an existing side road is needed, use the existing sign and show the location that it is to be relocated to). Existing guide signs should be modified as necessary. It is good practice to revise existing guide signs by using black on orange panels to show changes made necessary by the construction operations.

If permanent guide signs are to be removed during construction, provisions should be made for temporary guide signing. The temporary sign should be black on orange with the legend designed in accordance with ***MUTCD*** requirements for permanent guide signing whenever possible.

10.10 Lighting Units

10.10.1 Warning Lights

Warning lights shall be in accordance with the ***Roadway and Traffic Design Standards, Index 600.***

Type A Flashing

To be mounted on Vertical Panel, Barricade, or Drums to mark an obstruction adjacent to or in the intended travel way. It is to be paid for as part of the device that it is mounted on.

Type B Flashing

To be mounted on the first and second advanced warning signs where two or more signs are used, as well as on advanced warning signs of intersecting roads. Type B Warning lights are to be paid for as High Intensity Flashing Lights (Temporary- Type B).

Steady-Burn Type C

Steady Burn lights are to be placed on channelizing devices and barrier wall to delineate the traveled way on lane closures, lane changes, diversion curves and other similar conditions. On channelizing devices (Vertical Panels, Barricades, and Drums), their payment is included as part of the device. For use on Barrier wall, they are to be paid for separately as Lights, Temporary, Barrier Wall Mount (Type C, Steady Burn). Their spacing on barrier wall is as follows:

Transitions - 50 ft. on center

Curves - 100 ft. on center

Tangents - 200 ft. on center (Note: Curves flat enough to maintain a normal 2% cross-slope are to have steady burn lights placed at the same spacing as tangents)

10.10.2 Advance Warning Arrow Panels

Arrow panels shall be used to supplement other devices for all lane closures on high-speed (55 mph or greater) and high-traffic density multilane roadways. The use of arrow panels should be considered for all other multi-lane closures. These devices are also useful for short-term operations, such as during work zone installation and removal. Arrow panels should not be used in lane shift situations. Research has shown that motorists tend to change lanes (on multi-lane facilities) whenever an arrow panel is used to indicate a lane shift. Since this "response" is not desired, the arrow panel should not be used for lane shift situations on multi-lane roadways. Refer to current ***MUTCD*** for further information.

Arrow panel locations shall be shown on the TCP, along with any necessary notes concerning the use of this device.

10.10.3 Variable Message Signs

Variable message signs (VMS) may be used to supplement a traffic control zone. As a supplemental device, it cannot be used to replace any required sign or other device. These devices can be useful in providing information to the motorist about construction schedules, alternate routes, expected delays, and detours. Variable message signs should be considered for use in complex, high-density work zones. Messages must be simple, with a minimum number of words and lines and should require no more than two displays of no more than three lines each with 8 characters per line. The TCP shall include the location and messages to be displayed.

The message displayed should be visible and legible to the motorist at a minimum distance of 900 ft. on approach to the signs. All messages should be cycled so that two message cycles are displayed to a driver while approaching the sign from 900 ft. at 55 mph.

The VMS units may be used:

- To supplement conventional traffic control devices in construction work areas and should be placed approximately 500 to 800 ft. in advance of potential traffic problems, or
- 0.5 to 2 miles in advance of complex traffic control schemes which require new and/or unusual traffic patterns for the motorists.

A VMS is required for night time work that takes place within 4 ft. of the traveled way.

Typical Conditions

Consistent with the factors described above, VMS messages should be considered under the following conditions:

1. Road closures
2. Ramp closures
3. Delays one hour or longer created by:
   a. congestion
   b. crashes
   c. lane closures
   d. two-way traffic on divided highway
   e. multiple lane closures
   f. unexpected shifts in alignment

Message Selection

Programmed messages should provide appropriate messages for the conditions likely to be encountered. A worksheet is provided and may be placed in the TCP. The following items must be carefully considered in the development of a message:

1. **Message elements - not necessarily in order**
   a. problem statement (where?)
   b. effect statement (what?)
   c. attention statement (who?)
   d. action statement (do?)
2. **Message format**
   a. will vary depending on content
   b. "where" or "what" will generally lead
   c. "who" and "do" follow in that order
   d. "who" often understood from "where"
3. **Display format**
   a. discrete, with entire message displayed at once is most desirable
   b. sequential is OK, 2 part maximum
   c. run-on moving displays prohibited
   d. one abbreviation per panel display desirable, two abbreviations are maximum. Route designation is considered as one abbreviation and one word. Guidelines for abbreviations are provided on the following pages.

10.10.4 Traffic Signals

Frequently portable or temporary traffic signals will be a preferred alternative to a flagger. Also, existing signal operations may need to be revised to accommodate the construction operations. The TCP should identify the specific alterations (physical location and timing) necessary for existing signals and the location and timing of portable signals. It shall include signal installation plans for each phase of construction. The signal installation plan shall include both the initial signal operation plan and the initial timing adjustments. Traffic control signal requirements or responsibilities shall be included in the Technical Special Provisions. Signal displays and location must meet ***MUTCD*** requirements. If temporary signals are used where a pedestrian crossing is present, either existing or temporary, the pedestrian must be accommodated in the signal timing.

Temporary Signal Plans or modification to existing signals should be reviewed by the appropriate section in the district for structural soundness and signal function.

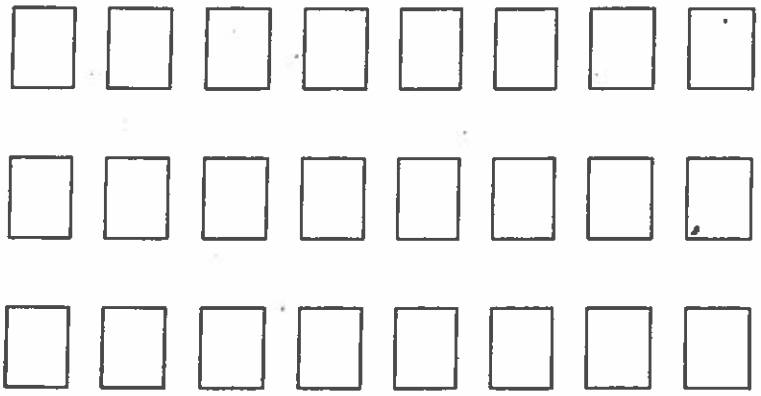
VARIABLE MESSAGE SIGNS WORKSHEET

Location of board:_____

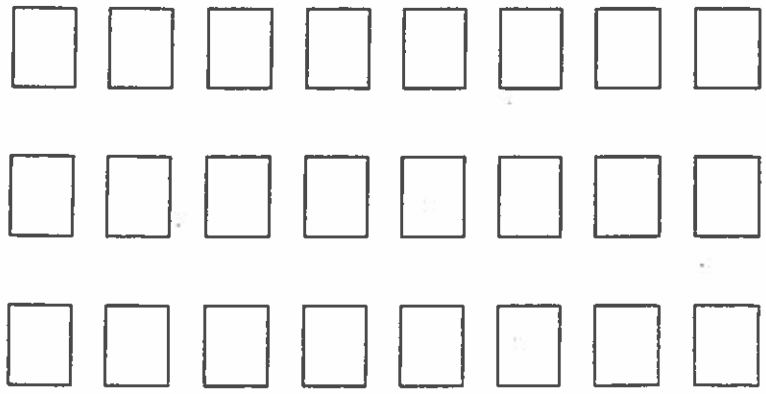
Used: from_____-_____-_____ at _____:_____am/pm
to _____-_____-_____ at _____:_____am/pm

Message programmed by:_____

MESSAGE 1



MESSAGE 2



Timing:

Message 1 will run _____._____ seconds.
Message 2 will run _____._____ seconds.

STANDARD ABBREVIATIONS FOR USE ON VARIABLE MESSAGE SIGNS

Standard abbreviations easily understood are:

WORD	ABBREV.	WORD	ABBREV.
Boulevard	BLVD	Normal	NORM
Center	CNTR	Parking	PKING
Emergency	EMER	Road	RD
Entrance, Enter	ENT	Service	SERV
Expressway	EXPWY	Shoulder	SHLDR
Freeway	FRWY, FWY	Slippery	SLIP
Highway	HWY	Speed	SPD
Information	INFO	Traffic	TRAF
Left	LFT	Travelers	TRVLRS
Maintenance	MAINT	Warning	WARN

Other abbreviations are easily understood whenever they appear in conjunction with a particular word commonly associated with it. These words and abbreviations are as follows:

WORD	ABBREV.	PROMPT
Access	ACCS	Road
Ahead	AHD	Fog*
Blocked	BLKD	Lane*
Bridge	BRDG	[Name]*
Chemical	CHEM	Spill
Construction	CONST	Ahead
Exit	EX, EXT	Next*
Express	EXP	Lane
Hazardous	HAZ	Driving
Interstate	I	[Number]
Major	MAJ	Accident
Mile	MI	[Number]*
Minor	MNR	Accident
Minute(s)	MIN	[Number]*
Oversized	OVRSZ	Load
Prepare	PREP	To Stop
Pavement	PVMT	Wet*
Quality	QLTY	Air*
Route	RT	Best*
Turnpike	TRNPK	[Name}*
Vehicle	VEH	Stalled*
Cardinal Directions	N,E,S,W	[Number]
Upper, Lower	UPR, LWR	Level

*** = Prompt word given first**

The following abbreviations are understood with a **prompt** word by about 75% of the drivers. These abbreviations may require some public education prior to usage.

WORD	ABBREV.	PROMPT
Condition	COND	Traffic*
Congested	CONG	Traffic
Downtown	DWNTN	Traffic
Frontage	FRNTG	Road
Local	LOC	Traffic
Northbound	N-BND	Traffic
Roadwork	RDWK	Ahead [Distance]
Temporary	TEMP	Route
Township	TWNNSHP	Limits

*** = Prompt word given first**

Certain abbreviations are prone to inviting confusion because another word is abbreviated or could be abbreviated in the same way. **DO NOT USE THESE ABBREVIATIONS:**

ABBREV.	INTENDED WORD	WORD ERRONEOUSLY GIVEN
WRNG	Warning	Wrong
ACC	Accident	Access (Road)
DLY	Delay	Daily
LT	Light (Traffic)	Left
STAD	Stadium	Standard
L	Left	Lane (Merge)
PARK	Parking	Park
RED	Reduce	Red
POLL	Pollution (Index)	Poll
FDR	Feeder	Federal
LOC	Local	Location
TEMP	Temporary	Temperature
CLRS	Clears	Colors

10.11 Channelizing Devices

10.11.1 Type III Barricades

Two Type III barricades should be used to block off or close a roadway. Whenever two barricades are used together, only one warning light is required on each barricade.

10.11.2 Separation Devices

Placing two lane two-way operations (traffic) (TLTWO) on one roadway of a normally divided highway should be a last resort (see ***MUTCD***) and should be done with special care.

When traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated either with portable barrier wall or Temporary Traffic Separators (see the ***Roadway and Traffic Design Standards, Index 614***). The use of striping, raised pavement markers, and complementary signing, either alone or in combination is not considered acceptable for separation purposes.

10.11.3 Channelizing Device Alternates

It is intended that cones, Type I and II barricades, vertical panels, drums and tubular markers be considered as alternative channelizing devices to be used at the contractor's option. The only exceptions to this are that tubular markers are not allowed at night and the use of cones at night is restricted. (See the ***Roadway and Traffic Design Standards, Index 600 & 614***). The designer should not further restrict the options of channelizing devices.

10.12 Pavement Markings

10.12.1 Removing Pavement Markings

Existing pavement markings that conflict with temporary work zone traffic patterns must be obliterated where operations will exceed one work period. Painting over existing pavement markings is not permitted.

10.12.2 Reflectorized Raised Pavement Marker (RPM)

Raised Pavement Markers (RPM) are required as a supplement to all lane lines during construction. For further direction on the use of RPM's in the work zone the designer should refer to the ***Roadway and Traffic Design Standards, Index 600.***

10.12.3 Work Zone Markings

Markings for work zones include "Removable" and "Non-Removable" markings. ***Section***

102-3.3 of the Specifications describes when each type is required. A separate pay item number is used for each. The designer should be aware of this information and provide appropriate pay items in the plans.

The designer should also consider using Type S Asphalt and/or milling with Type S Asphalt for covering/removing unneeded markings, especially in areas such as diversions or crossovers. Some construction phase durations may be long enough to require use of interim friction courses. When these type issues arise, the designer should work with the District Pavement Design Engineer, to determine what combination of pavement options best complements the Maintenance of Traffic with the final pavement design.

10.13 Safety Appurtenances for Work Zones

10.13.1 Traffic Barriers

Work zone traffic barriers are designed either as permanent barriers or as temporary barriers that can be easily relocated. They have four specific functions: to protect traffic from entering work areas, such as excavations or material storage sites; to provide positive protection for workers; to separate two-way traffic; and to protect construction such as false work for bridges and other exposed objects. The designer should anticipate when and where barriers will be needed and include this information and the quantities on the plans.

10.13.2 Portable Concrete Safety Shape (Temporary Barrier Walls)

Portable concrete safety shape barriers, also known as portable concrete barriers (PCB's), are widely used in work zones to protect motorists as well as workers. However, improper use of these barriers can provide a "false sense of security" for both the motorist and the worker. Therefore, care must be taken in their design, installation and maintenance. Installation instructions and flare rates are given in the ***Roadway and Traffic Design Standards, Index 415 and Index 600.***

To perform properly and redirect vehicles, the PCB system must be capable of withstanding severe impacts. The PCB's weakest point is its connector which includes the physical connection and mating faces of adjoining barriers or guardrail. When a PCB system is used to mitigate a dropoff condition, the surface that the PCB is placed on shall have a cross-slope of 1:10 or flatter carried a minimum of 2 ft. behind the barrier. When the designer proposes temporary barrier walls, the cross-slope should be checked and temporary earthwork shown in the plans if necessary for the proper placement of the barrier system. When PCB's are used on bridges, it should connect to the bridge deck as shown by the special detail on the ***Roadway and Traffic Design Standards, Index 415.***

The designer should show or note the location of all temporary barrier wall in the plans. The plans should also include a work area access plan for those projects with median work which is shielded with barrier wall.

10.13.3 End Treatments

The desirable treatments for exposed ends of barriers are:

- connecting to an existing barrier (smooth, structural connections are required - Refer to the ***Roadway and Traffic Design Standards, Indexes 410 and 415***) or
- attaching a crashworthy terminal such as a crash cushion or
- flaring away to the edge of the clear zone (For Work Zone Clear zones, see The ***Roadway and Traffic Design Standards, Index 600***)

10.13.4 Modifications of Existing Barriers

When 2-way traffic is placed on a facility that is normally one-way, the existing permanent or temporary barriers will be modified as necessary to ensure their proper crashworthiness during the temporary situation. This will include eliminating non-crashworthy end treatments, snag points or other protrusions normally angled away or hidden from approaching vehicles.

10.13.5 Crash Cushions

Crash cushions in work zones may be used in the same manner as at permanent highway installations. Crash cushions are used to protect the motorists from the exposed ends of barriers, fixed objects and other hazards within the clear zone. Two types of stationary crash cushions are commonly used; Inertia Attenuators (i.e sand filled plastic barrel systems); and redirective systems such as the QuadGuard or the REACT 350.

The designer must determine the need for crash cushions, select the appropriate type, and provide the necessary details and quantities in the plans. Selection of a system should be the result of an analysis of site condition (i.e. space and need). The GREAT and REACT 350 will shield a hazard by redirecting vehicles or absorbing end-on hits. Sand barrels do not have redirection capability and can only shield a hazard by absorbing end-on hits. End protection other than approved redirective crash cushions must be custom engineered for each independent installation and detailed in the plans. The ***Roadway and Traffic Design Standards*** and the ***AASHTO Roadside Design Guide*** can be consulted for more information.

10.13.6 Temporary Curb

In work zones where the posted speed is 45 mph or less, Temporary Curb (refer to the ***Roadway and Traffic Design Standards, Index 600***) may be used to protect drop-offs to depths of 4 ft.. In urban conditions with frequent driveways, temporary curb may be desirable over temporary barrier wall due to its lower profile, thus allowing for better sight distance. Also, the ends of temporary curb do not require crash cushions for protection.

10.14 Traffic Control Plan Details

The ***Roadway and Traffic Design Standards, Indexes 601 through 660,*** are layouts of work zone traffic control for typical conditions. These indexes should be referenced only if project conditions are nearly the same as the typical layout. Otherwise, specific plan sheets or details must be prepared. Some conditions that will require specific plan sheets include:

- Construction work zones near railroad crossings.
- Work not covered by a typical layout.
- Nighttime work requiring special lighting, oversized or additional devices.
- Ramps and intersections that interrupt the standard layout.
- Sight distance restrictions such as horizontal or vertical curves.
- Lane or shoulder configurations that do not match the standards.
- Special considerations during installation, intermediate traffic shifts and removal.
- Complex projects, including add-lane projects, that involve many phases, traffic shifts, entrances and exits.

When designing layouts, the following shall be considered:

10.14.1 Taper Lengths

Minimum taper lengths shall be calculated by the formulas for transition distances given on the ***Roadway and Traffic Design Standards, Index 600.***

"L" is the length of the taper, "W" is the width of the closed lane and "S" is the posted regulatory speed for the work zone. Both L and W are measured in feet. Speeds are given in the Index.

Table 10.14.1 (taken from ***MUTCD***) gives the criteria for the lengths of the various taper types:

Table 10.14.1 Taper Length Criteria for Work Zones

Type of Taper	Taper Length
UPSTREAM TAPERS	
Merging Taper	L Minimum
Shifting Taper	1/2 L Minimum
Shoulder Taper	1/3 L Minimum
Two-way Traffic Taper	100 ft. Maximum
DOWNSTREAM TAPERS	
	100 ft. per lane (use is optional)

10.14.2 Intersecting Road Signing and Signals

Signing for the control of traffic entering and leaving work zones by way of intersecting highways, roads and streets shall be adequate to make drivers aware of work zone conditions. Under no condition will intersecting leg signing be less than a "Road Work Ahead" sign for approaching vehicles and an "End Construction" sign for departure vehicles. The designer should remember to include these signs in the estimated quantity for Construction warning signs.

Existing traffic signal operations that require modification in order to carry out work zone traffic control shall be as approved by the District Traffic Operations Engineer (DTOE). If lane shifts occur, signal heads may have to be adjusted to maintain proper position. The DTOE should also determine the need for temporary loops for traffic actuated signals. The TCP should include all necessary signal adjustments.

10.14.3 Sight Distance To Delineation Devices

Merging (lane closure) tapers should be obvious to drivers. If restricted sight distance is a problem (e.g., a sharp vertical or horizontal curve approaching the closed lane), the taper should begin well in advance of the view obstruction. The beginning of tapers should not be hidden behind curves.

10.14.4 Pedestrians and Bicyclists

10.14.4.1 Pedestrian Considerations

Where an existing pedestrian way is located within a work zone, it must be maintained.

There are three threshold considerations in planning for pedestrian safety in work zones on highways and streets:

- Pedestrians should not be led into direct conflicts with work site vehicles, equipment or operations.
- Pedestrians should not be led into direct conflicts with mainline traffic moving through or around the work site.
- Pedestrians should be provided with a safe, convenient travel path that replicates as nearly as possible the most desirable characteristics of sidewalks or footpaths.

Pedestrian accommodations through work zones must include provisions for the disabled. Temporary traffic control devices for vehicular traffic should not be allowed within the pedestrians' travel path.

Signing should be used to direct pedestrians to safe street crossings in advance of an encounter with a work zone. Signs should be placed at intersections so pedestrians, particularly in high-traffic-volume urban and suburban areas, are not confronted with mid-block crossings.

10.14.4.2 Bicycle Considerations

When an existing bicycle way is located within a work zone, it must be maintained.

There are several considerations in planning for bicyclists in work zones on highways and streets:

- Bicyclists should not be led into direct conflicts with mainline traffic, work site vehicles, or equipment moving through or around traffic control zones.
- Bicyclists should be provided with a travel route that replicates the most desirable characteristics of a wide paved shoulder or bike lane through or around the work zone.
- If the work zone interrupts the continuity of an existing shared use path or bike route system, signs directing bicyclists through or around the work zone and back to the path or route should be provided.
- The bicyclist should not be directed onto the same path used by pedestrians.

10.14.5 Superelevation

Horizontal curves constructed in conjunction with temporary work zone diversions, transitions, and crossovers should have the required superelevation. Under conditions where superelevation is not used, the minimum radii that can be applied are listed in the **Table 10.14.2.** Superelevation must be included with the design whenever the minimum radii cannot be achieved.

Table 10.14.2 Minimum Radii for Normal 0.02 Cross Slopes

SPEED (mph)	MINIMUM RADIUS (feet)
65	3130
60	2400
55	1840
50	1390
45	1080
40	820
35	610
30	430

10.14.6 Lane Widths

Existing lane widths of through roadways should be maintained through work zone travel ways wherever practical. The minimum widths for work zone travel lanes shall be 10 ft. for all roadways other than Interstate. On Interstate highways the minimum width for work zone travel lanes shall be 11 ft. except at least one 12 ft. lane in each direction shall be provided.

10.14.7 Lane Closure Analysis

The lane closure analysis is a process used by designers to calculate the peak hour traffic volume and the restricted capacity for open road and signalized intersections. The analysis will determine if a lane closure should or should not be allowed and the time of day or night a lane closure could occur without excessive travel delay.

For all projects under reconstruction, the existing number of lanes shall remain open to traffic when construction is not active.

For construction on Limited Access facilities, the Traffic Control Plan will keep the existing number of traffic lanes open at all times throughout the duration of the construction project. No lane closures in excess of one work day shall be permitted on Limited Access construction where only two traveled lanes in one direction exist. If it becomes necessary to have a long term lane closure on a four lane Interstate, sufficient documentation shall be provided to the District Secretary for her/his approval.

Exhibit 10-A includes the **Lane Closure Analysis Worksheets** and two sample analyses. The **Sample Lane Closure Worksheet (Exhibit 10-A, sheet 3 of 11)** has been cross-referenced to the **Lane Closure Symbols and Definitions Sheet (Exhibit 10-A, sheets 1 & 2 of 11)** with circled numbers. The circled numbers correspond to the numbers of the symbols and definitions. The symbols and definition sheet shows the designer where to find the necessary information to fill out the Lane Closure Worksheet.

Fill out the top part of the Lane Closure Worksheet and complete the formulas to calculate the hourly percentage of traffic at which a lane closure will be permitted. Transfer these percentages to the graph on the **Lane Closure 24 Hour Counts Sheet (Exhibit 10-A, sheet 5 of 11)**. Draw a line across the graph representing the percentage for both open road and signalized intersections (see **Exhibit 10-A, sheet 7 of 11**). Plot the hourly percentages (hourly volume divided by total volume) on the graph. Any hourly percentage extending above the restricted capacity percentage lines for open road or signalized intersections indicated lane closure problems. The bottom of the graph gives times for AM and PM. By coordinating the lane closure problem areas to the time of day, a designer knows when to restrict lane closure.

Many of Florida's roadways have directional peak hour traffic volumes, with inbound morning traffic and outbound afternoon traffic. Doing a composite lane closure analysis would in many cases require night work. However, if a separate lane closure analysis is calculated for inbound and outbound separately, a lane closure may be allowed and the contractor could work in daylight hours. (See **Exhibits 10-A, sheet 10 of 11** and **10-A, sheet 11 of 11**.)

8. **C** = Capacity of a 2L, 4L or 6L roadway with one lane closed, and the remaining lane(s) unrestricted by lateral obstructions. The capacity of a 4L or 6L roadway is based on lane closure in only one direction (see Lane Closure Capacity Table on **Exhibit 10-A, sheet 3 of 11**).

9. **RC** = Restricting Capacity of the above facilities by site specific limitations detailed in the Traffic Control Plans (TCP) which apply to travel lane width, lateral clearance and the work zone factor. The work zone factor only applies to two lane roadways (see the tables on **Exhibit 10-A, sheet 4 of 11** to obtain the Obstruction Factor and Work Zone Factor).

10. **OF** = Obstruction Factor which reduces the capacity of the remaining travel lane(s) by restricting one or both of the following components: Travel lane width less than 12 ft. and lateral clearance less than 6 ft. (see TCP and Obstruction Factor Table in **Exhibit 10-A, sheet 4 of 11**).

11. **WZF** = Work Zone Factor (WZF) is directly proportional to the work zone length (WZL). The capacity is reduced by restricting traffic movement to a single lane while opposing traffic queues. The WZF and WZL only apply to a two lane roadway converted to two way, one lane (see the Work Zone Factor Table on **Exhibit 10-A, sheet 4 of 11**).

12. **TLW** = Travel Lane Width is used to determine the obstruction factor (see TCP and the Obstruction Factor Table on **Exhibit 10-A, sheet 4 of 11**).

13. **LC** = Lateral Clearance is the distance from the edge of the travel lane to the obstruction. The lateral clearance is used to determine the obstruction factor (see MOT plans and Obstruction Factor Table on **Exhibit 10-A, sheet 4 of 11**).

Exhibit 10-A, Sheet 2 of 11

LANE CLOSURE WORKSHEET

FINANCIAL PROJECT ID._____ STATE PROJECT NO.:_____

FAPNO.:_____

WPI NO.:_____COUNTY:_____DESIGNER: _____

NO. EXISTING LANES:_____ SCOPEOFWORK:_____

Calculate the peak hour traffic volume (V)

V=ATC *1* X P/D *2* X D *3* X PSCF *4* X RTF *5* = *7*

LANE CLOSURE CAPACITY TABLE

Capacity© of an Existing 2 Lane-Converted to 2 Way, 1 Lane = 1400 VPH
Capacity© of an Existing 4 Lane-Converted to 2 Way, 1 Lane = [illegible] VPH
Capacity© of an Existing 6 Lane-Converted to 1 Way, 2 Lane = 3[illegible]0VPH

Factors restricting capacity:

TLW *12* LC *13* W[illegible] _____ C *6*

Calculate the Restricted Capacity (RC) at the Lane Closure by multiplying the appropriate 2L, 4L, or 6L Capacity © from the Table above by the Obstruction Factor (OF) and the Work Zone Factor(WZF). If the Lane Closure is through or within 600 ft. of a signalized intersection, multiply the RC by the G/C Ratio.

RC (Open Road) = C *8* [illegible]0 X WZF *11* = *9*

RC (Signalized) = RC (Open Road) [illegible]9 X G/C *6* = *9*

If V < RC, there is no restriction on Lane Closure
If V > RC, calculate the hourly percentage of ADT at which Lane Closure will be permitted

RTF (Open Road) *9*

% = _____ = _____
%

ATC *1* X D *3* X PSCF *4* X RTF *5*

Signalized % = Open Road % _____ X G/C *6* = _____

Plot 24 hour traffic to determine when Lane Closure permitted. (See Exhibit 10-A, Sheet 5 of 11)

NOTE: For Existing 2 Lane Roadways, D = 1.00.
Work Zone Factor (WZF) applies only to 2 Lane Roadways.
For RTF < 1.00, briefly describe alternate route_____

_____

_____

SAMPLE

Exhibit 10-A, Sheet 3 of 11

Lane Closures - Capacity Adjustment Factors PSCF Sample

WK	DATES	SF	PSCF	WK	DATES	SF	PSCF
18	04/26 - 05/02/98	0.89	1.11	27	06/28 - 07/04/98	0.69	0.90
19	05/03 - 05/09/98	0.88	1.15	28	07/05 - 07/11/98	0.67	0.87
20	05/10 - 05/16/98	.091	1.19	29	07/12 - 07/18/98	0.65	0.85
21	05/17 - 05/23/98	0.86	1.12	30	07/19 - 07/25/98	0.70	0.91
22	05/24 - 05/30/98	0.89	1.16	31	07/26 - 08/01/98	0.75	0.98
23	05/31 - 06/06/98	0.83	1.08	32	08/02 - 08/08/98	0.81	1.06
24	06/07 - 06/13/98	0.78	1.02	33	08/09 - 08/15/98	0.86	1.12
25	06/14 - 06/20/98	0.73	0.95	34	08/16 - 08/22/98	0.91	1.19
26	06/21 - 06/27/98	0.71	0.92	35	08/23 - 08/29/98	0.92	1.20

Note: The week of 08/23/98 is the Peak Week for the construction period.

Obstruction Factors (OF)

Lateral Clearance (LC) (feet)	Travel Lane Width (TLW) (feet)			
	12	11	10	9
6	1.00	0.96	0.90	0.80
4	0.98	0.94	0.87	0.77
2	0.94	0.90	0.83	0.72
0.0	0.86	0.82	0.75	0.65

Work Zone Factors (WZF)

WZL (ft.)	WZF	WZL (ft.)	WZF	WZL (ft.)	WZF
200	0.98	2200	0.81	4200	0.64
400	0.97	2400	0.80	4400	0.63
600	0.95	2600	0.78	4600	0.61
800	0.93	2800	0.76	4800	0.59
1000	0.92	3000	0.74	5000	0.57
1200	0.90	3200	0.73	5200	0.56
1400	0.88	3400	0.71	5400	0.54
1600	0.86	3600	0.69	5600	0.53
1800	0.85	3800	0.68	5800	0.51
2000	0.83	4000	0.66	6000	0.50

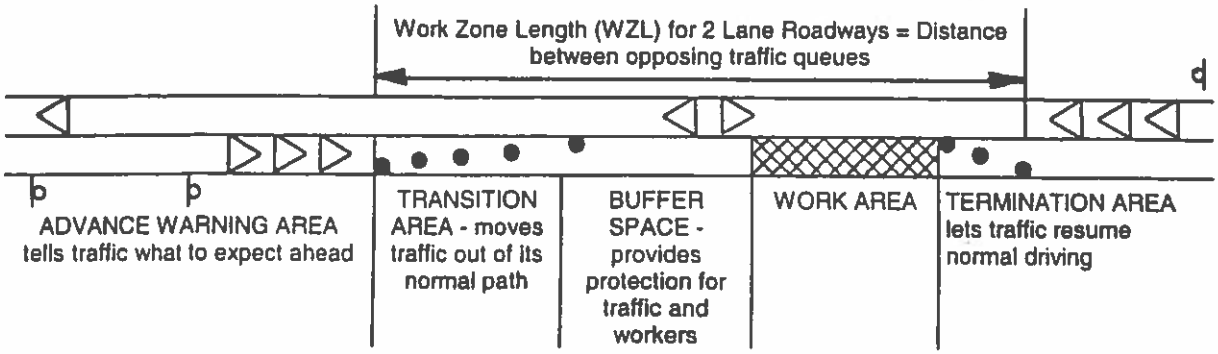


Exhibit 10-A, Sheet 4 of 11

LANE CLOSURES

24 HOUR COUNTS

TIME	AM HOURLY VOLUME	ATC %	PM HOURLY VOLUME	ATC %
12 - 1				
1 - 2				
2 - 3				
3 - 4				
4 - 5				
5 - 6				
6 - 7				
7 - 8				
8 - 9				
9 - 10				
10 - 11				
11 - 12				
TOTAL				

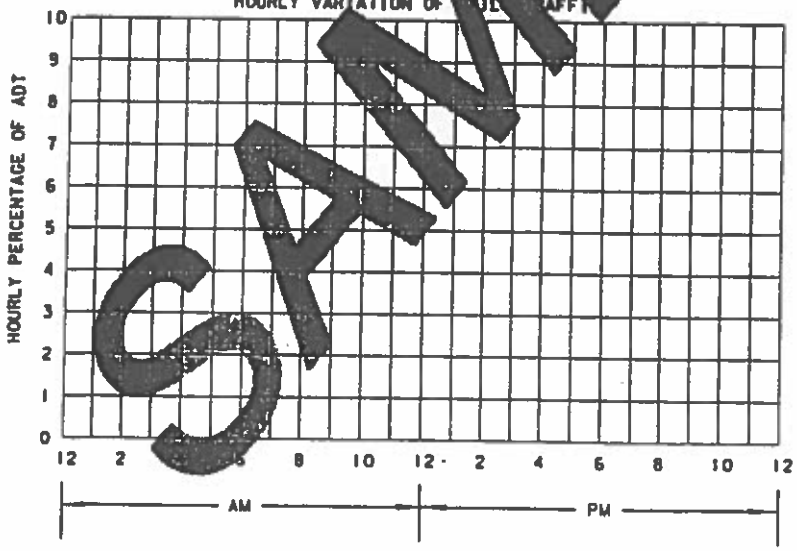
DATE

DES ER

PROJ NO.

OCA N

HOURLY VARIATION OF TRAFF



-CONCLUSION-

ROUND TO THE NEAREST 1/2 HOUR CONSERVATIVELY

OPEN ROAD LANE CLOSURE

SIGNALIZED LANE CLOSURE

SAMPLE

Exhibit 10-A, Sheet 5 of 11

LANE CLOSURE WORKSHEET

FINANCIAL PROJECT ID. _____ STATE PROJECT NO.: *12345-6789*

FAP NO.: *NA*

WPI NO.: *1234567* COUNTY: *TROPIC* DESIGNER: *YATES*

NO. EXISTING LANES: _____ SCOPE OF WORK: *Widen and Resurface*

Calculate the peak hour traffic volume (V)

V=ATC *15000* X P/D *0.083* X D *NA* X PSCF *1.20* X RTF *0.75* = *1120*

LANE CLOSURE CAPACITY TABLE

Capacity© of an Existing 2 Lane-Converted to 2 Way, 1 Lane = 1400VPH
Capacity© of an Existing 4 Lane-Converted to 1 Way, 1 Lane = 1800VPH
Capacity© of an Existing 6 Lane-Converted to 1 Way, 2 Lane = 3600VPH
Factors restricting Capacity:

TLW *10* LC *4* WZL *2100* G/C *0.64*

Calculate the Restricted Capacity (RC) at the Lane Closure Site by multiplying the appropriate 2L, 4L, or 6L Capacity © from the Table above by the Obstruction Factor (OF) and the Work Zone Factor (WZF). If the Lane Closure is through or within 600 ft. of a signalized intersection, multiply the RC by the G/C ratio.

RC (Open Road) = C *1400* X OF *0.87* X WZF *0.82* = *999*

RC (Signalized) = RC (Open Road) *999* X G/C *0.64* = *639*

If V ≤ RC, there is no restriction on Lane Closure.

If V > RC, calculate the hourly percentage of ADT at which Lane Closure will be permitted

RC (Open Road) *999*

% = _____ = *7.40* %

ATC *15000* X PSCF *1.20* X RTF *0.75*

Signalized % = Open Road % *7.40* X G/C *0.64* = *4.74*

Plot 24 hour traffic to determine when Lane Closure permitted. (See Exhibit 10-A, Sheet 5 of 11)
NOTE: For Existing 2 Lane Roadways, WZF = 1.00.
Work Zone Factor (WZF) applies only to 2 Lane Roadways.

For RTF < 1.00, briefly describe alternate route: *25% of existing traffic diverted on Bullard Blvd., north on Newhall Lane, then east on Xanders Expressway.*

SAMPLE

Exhibit 10-A, Sheet 6 of 11

LANE CLOSURES

24 HOUR COUNTS

TIME	AM HOURLY VOLUME	ATC %	PM HOURLY VOLUME	ATC %
12 - 1	160	1.1	960	6.4
1 - 2	90	0.6	830	5.5
2 - 3	30	0.2	810	5.4
3 - 4	25	0.2	1060	7.2
4 - 5	30	0.2	1190	7.9
5 - 6	130	0.9	1240	8.3
6 - 7	525	3.5	930	6.2
7 - 8	1135	7.6	680	4.5
8 - 9	910	6.1	530	3.5
9 - 10	870	5.8	425	2.8
10 - 11	825	5.5	365	2.4
11 - 12	960	6.4	270	1.8
		TOTAL	15,000	100

P/D .083

DATE FEB - 1988

DESIGNER [illegible]TES

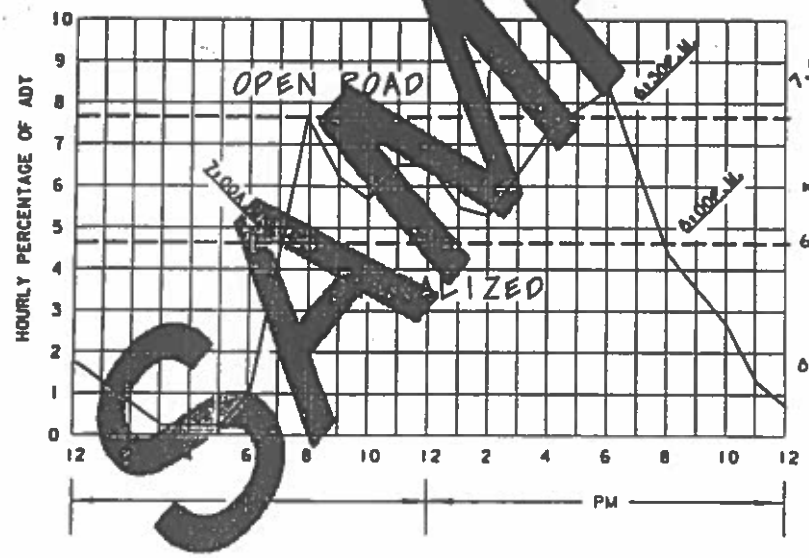
[illegible]JECT

[illegible]45-[illegible]89

LOCATION

BUC[illegible] LAKE RD.

HOURLY VARIATION [illegible]



-CONCLUSION-

7.40

ROUND TO THE NEAREST 1/2 HOUR CONSERVATIVELY

8.7%

OPEN ROAD LANE CLOSURE
6:30P.M. - 7:00P.M.

SIGNALIZED LANE CLOSURE
6:00P.M. - 7:00A.M.

SAMPLE

Exhibit 10-A, Sheet 7 of 11

LANE CLOSURE WORKSHEET

FINANCIAL PROJECT ID. _____ STATE PROJECT NO.: *12345-6789*

FAP NO.: *NA*

WPI NO.: *1234567* COUNTY: *Tropic* DESIGNER: *Giddens*

NO. EXISTING LANES: *4* SCOPE OF WORK: *Resurface*

Calculate the peak hour traffic volume (V)

V=ATC *30000* X P/D *0.083* X D *0.55* X PSCF *1.20* X [illegible] *1.00* = *1643*

LANE CLOSURE CAPACITY TABLE

Capacity© of an Existing 2 Lane-Converted to 2 Way, 1 Lane = 1400VPH
Capacity© of an Existing 4 Lane-Converted to 1 Way, 1 Lane = 1800VPH
Capacity© of an Existing 6 Lane-Converted to 1 Way, 2 Lane = [illegible]00VPH

Factors restricting Capacity:

TLW *11* LC *6* WZL *NA for 4L* G/C *0.74*

Calculate the Restricted Capacity (RC) at the Lane Closure by multiplying the appropriate 2L, 4L, or 6L Capacity © from the Table above by the Observation Factor (OF) and the Work Zone Factor(WZF). If the Lane Closure is through or within 600 ft. of a signalized intersection, multiply the RC by the G/C Ratio.

RC (Open Road) = C *1800* X OF *0.96* X WZF *1.00* = *2817*

RC (Signalized) = RC (Open Road) *1728* X G/C *0.74* = *1279*

If V ≤ RC, there is no restriction on Lane Closure
If V > RC, calculate the hourly percentage of ADT at which Lane Closure will be permitted

$$\% = \frac{\text{RC (Open Road)}\ 1728}{\text{ATC}\ 30000 \times \text{D}\ 0.55 \times \text{PSCF}\ 1.20 \times \text{RTF}\ 1.00} = 8.73\ \%$$

Signalized % = Open Road % *8.73* X G/C *0.74* = *6.46*

Plot 24 hour traffic to determine when Lane Closure permitted. (See Exhibit 10-A, Sheet 5 of 11)

NOTE: For Existing 2 Lane Roadways, D = 1.00.
Work Zone Factor (WZF) applies only to 2 Lane Roadways.
For RTF < 1.00, briefly describe alternate route: NA

SAMPLE

Exhibit 10-A, Sheet 8 of 11

LANE CLOSURES

24 HOUR COUNTS

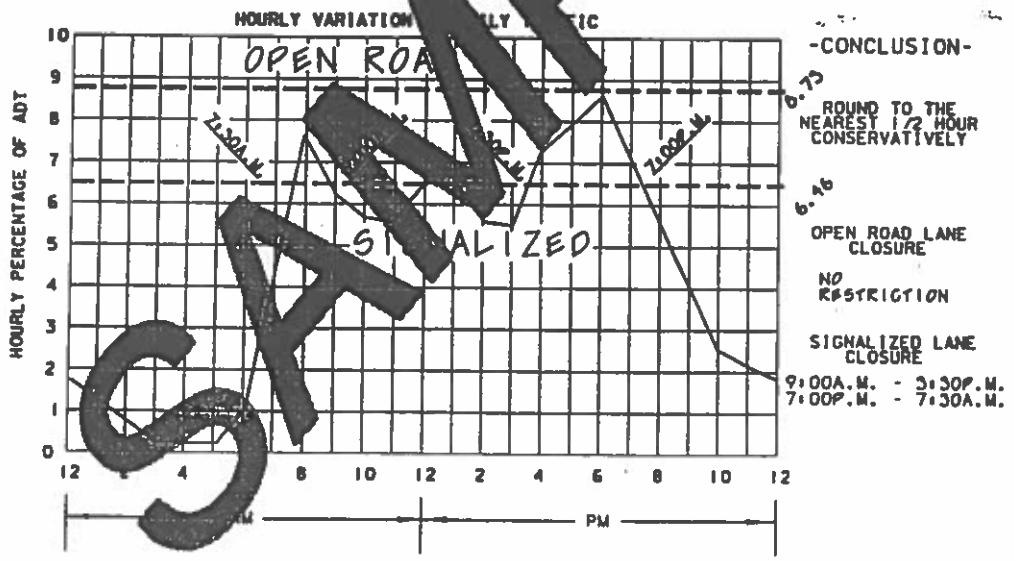
TIME	AM HOURLY VOLUME	ATC %	PM HOURLY VOLUME	ATC %
12 - 1	320	1.1	1920	6.4
1 - 2	180	0.6	1660	5.5
2 - 3	60	0.2	1620	5.4
3 - 4	50	0.2	2160	7.2
4 - 5	60	0.2	2380	7.9
5 - 6	260	0.9	2480	8.3
6 - 7	1050	3.5	1860	6.2
7 - 8	2270	7.6	1360	4.5
8 - 9	1820	6.1	1060	3.5
9 - 10	1740	5.8	850	2.8
10 - 11	1650	5.5	730	2.4
11 - 12	1920	6.4	540	1.8
		TOTAL	30,000	100

DATE:
FEB - 1988

DESIGNER
ADDENS

NUMBER
345 6789

LOCATION
BUCK LAKE RD.



-CONCLUSION-

ROUND TO THE NEAREST 1/2 HOUR CONSERVATIVELY

OPEN ROAD LANE CLOSURE
NO RESTRICTION

SIGNALIZED LANE CLOSURE
9:00A.M. - 3:30P.M.
7:00P.M. - 7:30A.M.

SAMPLE

Exhibit 10-A, Sheet 9 of 11

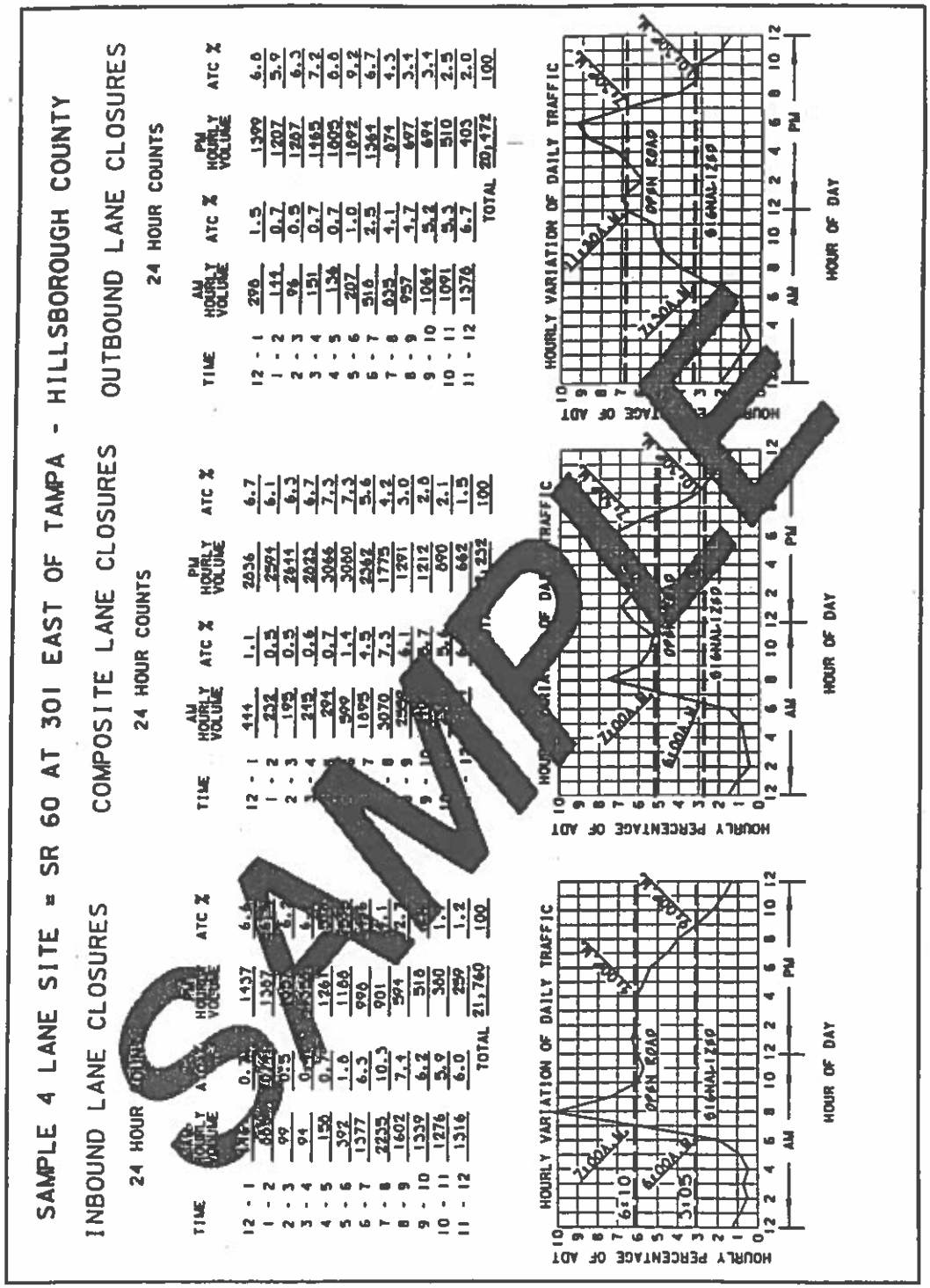


Exhibit 10-A, Sheet 10 of 11

LANE CLOSURE WORKSHEET SUMMARY

LANE SAMPLE WITH SIGNIFICANT AM-PM PEAKS

SAMPLES = INBOUND (WB), COMPOSITE (EB & WB), OUTBOUND (EB)

SITE = SR 60 @ US 301 EAST OF TAMPA, HILLSBOROUGH CO.

COMPONENT	INBOUND	COMPOSITE	OUTBOUND
ADT	21 760	42 232	20 472
P/D	0.103	0.073	0.092
D	1.00	0.60	1.00
PSCF	1.17	1.17	1.17
RTF	1.00	1.00	1.00
V	2622	64	2203
TLW	12		12
LC	0	0	0
C	1800	00	1800
OF	0.86	.86	0.86
RC (OPEN ROAD)	1548	1548	1548
G/C	0.50	0.50	0.50
RC (SIGNAL)	774	774	774
% OPEN ROAD	6.	5.20	6.50
% SIGNAL	3.0	2.60	3.25
LANE CLOSURE (OPEN ROAD)	7:00 A.M. 4:00 P.M.	7:00 A.M. 7:30 P.M.	11:30 A.M. 7:30 P.M.
LANE CLOSURE (SIGNAL)	6:00 9:0 P.M.	6:00 A.M. 10:30 P.M.	7:30 A.M. 10:30 P.M.

SAMPLE

Exhibit 10-A, Sheet 11 of 11

10.14.8 Detours, Diversions, & Lane Shifts

A **detour** is the redirection of traffic onto an alternate route, using state roads, county roads, or city streets, to bypass the work zone. A **diversion** is a special detour onto a temporary roadway adjacent to the existing or permanent roadway. A **lane shift** is the redirection of traffic onto a section of the permanent roadway or shoulder.

Detour signing is usually done under the direction of the traffic engineer who has authority over the roadway to be used. The detour should be signed clearly so drivers can traverse the entire detour and return to the original roadway. When detours are required, the geometry of the detour route should be compared against the type of traffic being routed through the detour. For example, detouring of traffic which includes large trucks will require certain pavement widths, turning radius, and overhead clearance (including low power lines, span wires, and low hanging tree limbs). The structural capacity of the detour pavement should also be considered.

The designer has two methods of paying for diversions: by (1) using the "special detour" lump sum pay item or (2) using the lump sum Maintenance of Traffic (MOT) pay item. When the special detour pay item is used, the work and quantities included for pay under the item are to be tabulated and noted in the plans. The special detour pay item is intended to be used in all situations where traffic is shifted one lane width or more onto temporary pavement.

A Diversion, which is to be signed as a lane shift, will be paid for under Special Detour, Pay Item 102-2 (Lump Sum). The ***Basis of Estimates Handbook*** should be referenced to make sure that the appropriate items are included in this lump sum.

TCPs shall include sufficient detail for diversion geometry. Diversions should be designed with shoulders (2 ft. min) whenever practical. The radius of curvature and taper lengths shall be shown. Diversions should be designed and operated as close to the normal speed as possible. When speed reductions are necessary, the reduction should be in 5 mph increments. The recommended minimum radius of curvature (without superelevation) for diversions is shown in **Table 10.14.2**.

10.14.9 Above Ground Hazards

An above ground hazard is anything that is greater than 4 inches in height and is firm and unyielding or doesn't meet breakaway requirements. For treatment of an above ground hazard, see the ***Roadway and Traffic Design Standards, Index 600.***

10.14.10 Drop-offs in Work Zones

Acceptable warning and barrier devices for traffic control at drop-offs in work areas are detailed in the ***Roadway and Traffic Design Standards, Index 600.***

The designer should anticipate dropoffs which are likely to occur during construction and provide the appropriate devices. For those projects where barrier wall would be needed and yet it is not practical, such as highly developed urban areas where numerous driveways exist, the designer should consider adding plan notes that require conditions be returned to acceptable grade by the end of the day's operation.

10.14.11 Narrow Bridges and Roadways

Simultaneously working on both sides of a bridge (bridge widening, etc.) Or roadway may be hazardous due to the narrow widths of some bridges and roads. Consideration should be given to specifying that work be done only on one side at a time, particularly on high speed roadways. In some situations, the installation of barrier wall on both shoulders can totally eliminate any shoulder or refuge area. The designer should consider whether or not this restriction of the effective width is acceptable and consistent with the desired operational ability of the facility.

10.14.12 Existing Highway Lighting

If the project has existing roadway lighting, the designer shall prepare a specification that completely describes what is to be done with the existing lighting during all phases of construction. Give detailed information on any poles that have to be relocated or any new conduit or conductors that would have to be installed. A field survey should be conducted to establish the condition of the existing system and what responsibility the contractor will have in bringing the existing lighting system back to an acceptable condition.

The designer should use the appropriate pay items and quantities for all work to be done for maintaining existing lighting throughout construction.

10.14.13 Work Area Access

The TCP may need to include a work area access plan, if necessary. This is a constructability issue in which the designer addresses the question of how the contractor is to get materials and equipment into the work area safely. This is a particularly critical issue on high speed facilities (such as the Interstate) where barrier wall is used to protect median work areas. Some consideration may be given to the design and construction of temporary acceleration and deceleration lanes for the construction equipment.

10.14.14 Railroads

Railroad crossings that are affected by a construction project must be evaluated to ensure that the Traffic Control Plan does not cause queuing of traffic across the railroad tracks. Evaluate the Plan's signal timing, tapers, lane closures and distance to intersections as compared to projected peak traffic volumes. The effects of the traffic control plan on interconnected traffic signals and railroad signals must be evaluated to avoid conflicting or ineffective signal controls.

10.14.15 Pay Items and Quantities

The ***Basis of Estimates Handbook*** has been updated to provide better instructions on calculating many of the MOT quantities.

10.15 Speed Zoning

10.15.1 Regulatory Speeds in Work Zones

Regulatory speeds should be established to route vehicles safely through the work zone as close to normal highway speed as possible. Traffic Control Plans (TCPs) for all projects must include specific regulatory speeds for each phase of work. This can either be the posted speed or a reduced speed. The speed shall be noted in the TCPs: this includes indicating the existing speed if no reduction is made. By virtue of ***Florida Statute 316.187***, all regulatory speeds must be established on the basis of a traffic and engineering investigation. Designers should only reduce speed when the temporary geometry requires it. The justification for establishing work zone regulatory speeds different from normal speed limits must be included in the project file. The TCP and the project file will suffice as the traffic and engineering investigation.

When field conditions warrant speed reductions different from those shown in theTCP, the contractor may submit to the project engineer for approval by the Department, a signed and sealed study to justify the need for further reducing the posted speed or the engineer may request the District Traffic Operations Engineer (DTOE) to investigate the need. It will not be necessary for the DTOE to issue regulations for regulatory speeds in work zones due to the revised provisions of ***Florida Statute 316.0745(2)(b)***.

Regulatory speed signs in rural areas (Interstate and Non-Interstate) are to be preceded by a "Reduce Speed Ahead" sign positioned as follows:

Interstate (Rural)	-	1000 ft. in advance
Non-Interstate (Rural)	-	500 ft. in advance

Urban areas, ordinarily do not require an advance sign, however, the sign may be included at the designer's option.

The "Regulatory Speed" and "Reduce Speed Ahead" signs are to be paid for under the pay item for Construction Work Zone Signs (per each per day).

If the existing regulatory speed is to be used, consideration should be given to supplementing the existing signs when the construction work zone is between existing regulatory speed signs. For projects where the reduced speed conditions exist for greater than 1 mile in rural areas (Non-Interstate) and on Rural or Urban Interstate, additional regulatory speed signs are to be placed at no more than 1 mile intervals. Engineering judgement should be used in the placement of additional signs. For urban situations (Non-Interstate), additional regulatory speed signs are to be placed at a maximum of 1000 ft. apart.

The regulatory speed should not be reduced more than 10 mph below the posted speed, and never below the minimum statutory speed for the class of facility, without the approval of the District Traffic Operations Engineer and the appropriate District Director. (See the

Roadway and Traffic Design Standards, Index 600).

To ensure credibility with motorists and enforcement agencies, temporary regulatory speed signs shall be removed or covered as soon as the conditions requiring the reduced speed no longer exist. Once they are removed or covered, the speed existing prior to construction will automatically go back into effect unless new speed limit signing is provided for in the plans. On projects with interspaced work activities (such a interstate resurfacing) speed reductions should be located in proximity to those activities which merit a reduced speed, and not "blanketed" for the entire project.

The TCP phase notes shall indicate when to remove the regulatory reduced speed limit signs.

When the regulatory speed is changed in a work zone, the permanent speed limit signs are to be removed or covered during the period when the work zone regulatory speed zones are in effect.

10.16 Law Enforcement Services

Work zones may require law enforcement services to protect both the workers and motorists during construction or maintenance activities. The need for these services should be considered during the development of the Traffic Control Plans. The service needed could involve On-duty FHP for speed enforcement, Off-duty law enforcement for traffic control, or a combination of the two.

A contractual agreement between the FDOT and the Florida Department of Highway Safety and Motor Vehicles (DHSMV) was entered into for the use of On-duty FHP to exclusively enforce the speed limit in specified work zones. (REF. Contract #B-8970)

Off-duty law enforcement services are to be used for traffic control only. The Off-duty law enforcement officers may be acquired from local law enforcement agencies or by the hire-back of Off-duty Florida Highway Patrol officers. Such Off-duty law enforcement services shall not include patrolling or speed enforcement. It should never be assumed that the presence of Off-duty law enforcement will deter speeding. The use of Off-duty law enforcement may be called for on a project which also uses On-duty FHP.

10.16.1 Use of On-Duty FHP

The Department has determined that construction or maintenance activities on limited access facilities that divert, restrict, or significantly impair vehicular movement through work zones may require patrolling of On-duty FHP specifically for speed enforcement to provide a safer environment for both workers and motorists. Speed enforcement by On-duty FHP may also be warranted, for the safety of the motorists, through some work zones during times when construction or maintenance activities are not in progress.

Conditions on limited access facilities to consider for the use of On-duty FHP may include, but not be limited to:

- a work zone requiring reduced speeds
- work zones where barrier wall is used adjacent to through traffic
- night time work zones
- areas with intense commuter use where peak hour traffic will require speed enforcement
- a work zone in which workers are exposed to nearby high speed traffic
- work zones similar to the ***Roadway and Traffic Design Standards, Indexes 609, 613, 616, and 651*** as they would apply to limited access facilities.

10.16.2 Use of Off-Duty Law Enforcement

There are certain construction activities that impede traffic flows such that supplemental **traffic control** is desirable. Uniformed law enforcement officers are respected by motorists; therefore, it may be in the best interest of the situation to utilize Off-duty law enforcement officer(s) as a supplement to traffic control devices to assist the motorists and provide a safer work zone.

Conditions to consider for the use of Off-duty law enforcement may include, but not be limited to:

- work within high use signalized intersections
- high volume urban roadways with lane closures during peak hour traffic
- any work zone in highly congested urban areas, including areas where traffic is in close proximity to construction workers and equipment

10.16.3 Coordination, Documentation and Payment

On each individual project, the designer and/or the project manager shall coordinate with the district construction office to determine if law enforcement services will be justified. On limited access projects, the associated FHP Troop commander shall also be included in the coordination.

Once the determination has been made that law enforcement will be used on a project, the designer/project manager and the construction engineer shall develop supporting documentation for each MOT phase including the conditions requiring the law enforcement services, the number of personnel, the man-hours, and any other requirements that may be established. The supporting documentation for On-duty FHP

and Off-duty law enforcement will be kept separate.

The documentation for On-duty FHP will be shown in the Computation Book only and there will be no reference made to these services in the plans except as shown on the CES.

On-duty FHP can be used on non-limited access highways provided that the District Director of Operations has approved its use.

On-duty FHP will be paid for under pay item 999-1.

For Off-duty law enforcement, the TCP shall clearly indicate the intended use of the officer(s) during each phase of construction, the need for the service, the number of officers needed, and the required man-hours. Off-duty law enforcement will be paid for under pay item or 102-10. Complete documentation that complies with the TCP shall be included in the Computation Book.

The initial coordination between the designer/project manager and construction shall take place prior to Phase II. The final determination of man-hours and final documentation shall be accomplished at the same time that construction days are set.

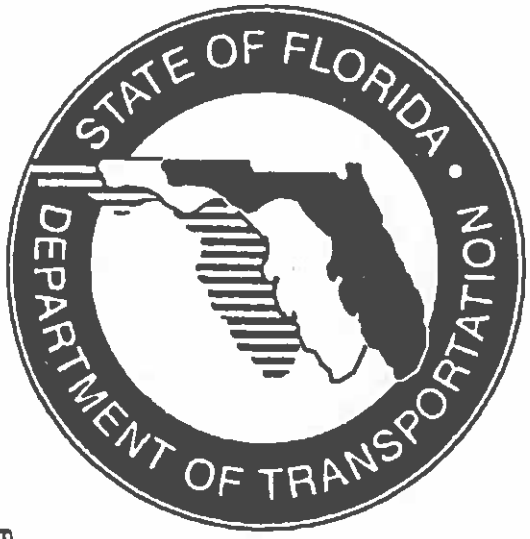
10.16.4 Other Uses of Law Enforcement

The contractor may choose to use law enforcement services beyond the details of the TCP for situations that assist with mobilization, de-mobilization, MOT set-up, and other instances where he prefers the use of law enforcement.

The contractor is responsible for the coordination of these uses and will be included under the Lump Sum Maintenance of Traffic pay item. These contractor required services are not to be included in the Department's contract pay items for law enforcement services.

V.(D) FLORIDA DOT OFFICE OF CONSTRUCTION MANUAL

OFFICE OF CONSTRUCTION



CONSTRUCTION PROJECT ADMINISTRATION MANUAL

C P A M

CHAPTER 6 - MAINTENANCE OF TRAFFIC

SECTION 1 - MAINTENANCE OF TRAFFIC

SECTION 2 - MAINTENANCE OF TRAFFIC (MOT) TEAM

SECTION 3 - REGULATORY SPEEDS IN WORK ZONES

Section 4 - MAINTENANCE OF TRAFFIC SPECIAL DETOUR (LUMP SUM) - PROGRESS PAYMENT TECHNIQUE

SECTION 5 - REPORTING OF TRAFFIC ACCIDENTS IN CONSTRUCTION WORK ZONES

SECTION 1

MAINTENANCE OF TRAFFIC

PURPOSE

To establish a uniform standard for inspection and review of traffic control used in maintenance of traffic operations on construction projects.

AUTHORITY

Section 334.044(2), Florida Statutes; Section 102 of Standard Specifications for Road and Bridge Construction

PROCEDURE

A. Selection of Traffic Control Plan

A Traffic Control Plan (TCP) is included with each Department construction contract. The contractor has the option of using the Department designed TCP or proposing one of his own design at anytime. If the contractor's proposed plan is equal to or better than the Department's plan and the cost is not greater, the alternative proposal will be given consideration according to Attachment 1. If accepted, the change will be documented by a supplemental agreement and revised plan drawings issued. The Department must approve the contractor's TCP prior to commencing affected activities.

B. Discussion Of Traffic Control Plan at Preconstruction Conference

The TCP to be utilized on the project as detailed within the contract will be reviewed and discussed at the preconstruction conference. The contractor will furnish a letter stating whether he plans to use the TCP in the plans or will furnish an alternate TCP or modifications to the TCP in the plans.

1. The letter will name the individual who will be responsible for the maintenance of traffic on a 24 hour basis. (Telephone number(s) shall also be provided.) The named individual will be the contractor's project contact person for problems related to maintenance of traffic. The named individual must be one of the

contractor's employees and must be someone other than the project superintendent and be certified by the American Traffic Safety Services Association (ATSSA) as a Worksite Traffic Supervisor.

2. During the preconstruction conference, the Department will also furnish the name and telephone number of the Department individual(s) who will be responsible for reviewing maintenance of traffic on a daily basis, nighttime and on weekends.

C. Inspections

Inspections shall be made by Department personnel to ensure that the following conditions are met:

1. Proper installation and maintenance of adequate traffic control devices, warning devices and barriers for the protection of the traveling public, pedestrians, and workmen, as well as the safeguarding of the work area in general. This will involve daily inspections, including weekends and holidays, as well as night inspection as required.

2. Devices and barriers not applying to existing conditions are removed and covered.

3. Traffic control devices, warning devices, and barriers are kept in the correct position, properly directed, clearly visible, and clean at all times.

4. Damaged, defaced or dirty devices or barriers are immediately repaired, replaced, or cleaned.

5. Safe and continuous access is maintained to residences and businesses.

6. Contractor conformance to approved TCP and Manual On Uniform Traffic Control Devices (MUTCD).

7. Ensure that only approved traffic control devices are used in accordance with the latest version of the Department's Procedure 750-010-013.

D. Other Requirements

1. Modifications to the TCP that become necessary shall also be submitted to the Department for approval according to Attachment 1. No changes to the approved

plan will be allowed, except in an emergency, until such change has been approved. These changes will be documented by supplemental agreement.

2. Department personnel shall inspect maintenance of traffic operations provided by a utility company within the project limits throughout the project duration according to this procedure.

3. Traffic control devices, warning devices and barriers paid for on a "Per Day" basis will be counted by project personnel as described in Attachment 2.

4. Construction personnel shall report accidents occurring within the project limits as described in Chapter 6, Section 5 on Accident Reporting in Construction Zones.

ATTACHMENT 1

APPROVAL OF MODIFICATIONS/CHANGES TO TCP (TRAFFIC CONTROL PLAN)

A. Alternate TCP plans and any significant* change to the original TCP requested by the contractor shall be submitted by the contractor to the Resident Engineer in written form, signed and sealed by a Florida registered Professional Engineer.

B. The submission shall include a minimum of two (2) full size sets of plan sheets which indicate the type and location of all signs, lights, channelizing devices, striping, barriers and geometrics of transitions and detours to be used for the safe passage of pedestrians, bicyclists and vehicular traffic through the project and for the protection of the workers. The plan will indicate conditions and setups for each phase of the contractor's activities.

C. The Resident Engineer will review and approve minor routine submissions as presented. However, complex changes should be reviewed and approved by the District Construction Engineer with input from Design and Traffic Operations Offices.

D. In no case may the contractor begin work until the alternate TCP has been approved in writing by the Department. Modifications to the TCP that become necessary shall also be approved in writing. Except in an emergency, no changes to the approved plan will be allowed until written approval of such plan changes has been received.

E. The following items, as well as other considerations that might be pertinent, will be used to determine TCP approval: price, reduction of congestion, accident potential, ease of implementation, inconvenience to the public, and delay costs.

F. All contemplated changes other than very minor ones will be reviewed and approved by the FHWA Area Engineer on federal non-certification acceptance projects and the Office of Construction Area Engineer on certification acceptance projects.

G. All significant changes will be documented by supplemental agreement.

* Definition: Significant= any deviation of traffic movements from plan.

ATTACHMENT 2

PROCEDURE TO BE USED TO COUNT TRAFFIC CONTROL DEVICES, WARNING DEVICES AND BARRIERS PAID FOR ON THE PER DAY BASIS

A. The contractor and Department representative will meet on the first work day of the week, which is usually Monday through Sunday, to discuss the placement of traffic control devices, warning devices and barriers for that week. If the first work day is not convenient, then the next work day may be used for the discussion of placement.

B. If the number of devices and barriers remain constant for that week, only two counts during the week will be necessary. The first count will be made during the early part of the week while the other count will be made before the contractor ceases work for that week. The count made will be used as the tally for each succeeding day until the next scheduled count except as noted in (C).

C. Additional counts will be made if it is obvious that there is a change in the number of devices and barriers being utilized or deficiencies of the same are observed. This will define a nonconformance day.

D. The counts will be made of those warning devices that are needed, are properly located, are in accordance with the approved TCP and/or Department Standards and Specifications, and are properly maintained.

E. The contractor is to be notified immediately of nonconformance occurring at any time if remedial action is required.

F. Upon encountering a nonconformance day, daily counts will be made until corrective actions have been made and/or counts have stabilized.

G. This procedure is to be discussed with the contractor before the TCP is implemented on his project.

SECTION 2

MAINTENANCE OF TRAFFIC (MOT) TEAM

PURPOSE

To establish independent reviews of traffic control on construction projects.

AUTHORITY

Section 334.044(2), Florida Statutes

PROCEDURE

A. Basic Criteria of Maintenance of Traffic (MOT) Team

1. It is independent of projects reviewed.
2. All projects are routinely reviewed night and day on an established schedule.
3. The review reports are made available to all concerned.
4. Report made of actions taken as a result of reviews.

B. Format of MOT Team

This is to be determined by the District/Turnpike. It may be an approach such as:

1. All Project Engineers in a residency make reviews in a round robin fashion.
2. A designated area team that is composed of engineers.
3. A district wide team of engineers. If this approach is used it is suggested that the team have a number of members and/or alternates. This is necessary because some districts are so large geographically that this task might be difficult for one/two specific individuals to handle regularly.

C. Team Makeup

Any of the team participants may be from other offices such as Design or Traffic Operations.

SECTION 3

REGULATORY SPEEDS IN WORK ZONES

PURPOSE

To standardize a procedure for the placement of regulatory speeds in construction work zones.

AUTHORITY

Sections 334.044(2), 316.0745(2)(b), 337.11(10), Florida Statutes

BACKGROUND

The 1988 Florida Legislature passed two statutes that: (1) Require all contracts to contain Traffic Control Plans (TCPs) using appropriate regulatory speed signs, and (2) eliminate the need to issue a traffic regulation for such signs.

PROCEDURE

A. Upon assignment of a construction project the Project Engineer will review the plans for the presence of regulatory speed signs. If none are present the District Design Office is to be notified so that they can make the appropriate speed determinations.

B. All conflicting regulatory (black and white) speed limit signs are to be removed, including any located between construction warning signs approaching the project.

C. The Project Inspector is to record in the Daily Report of Construction, Form 700-010-13 (Chapter 2, Section 1), the time and location of the placement and removal of regulatory speed limit signs.

D. The District/Turnpike Public Information Office is to be notified when all signs are in place so that the local enforcement agencies and news media may be advised of the situation.

E. In general, these signs will stay up continuously during the periods and conditions specified by the TCP. However, if it appears that speed modifications (either increased or decreased), may be necessary the District/Turnpike Traffic Operations Engineer is to be notified as regulatory speed limit adjustments can only be made through the District/Turnpike Traffic Operations Engineer.

SECTION 4

MAINTENANCE OF TRAFFIC SPECIAL DETOUR (LUMP SUM) - PROGRESS PAYMENT TECHNIQUE

PURPOSE

To establish a technique for making monthly payments when a pay item for a special detour (lump sum) is part of a contract. This is to provide contractors (especially those working in different Districts) and the Department a common method of determining progress payments.

AUTHORITY

Section 334.044(2), Florida Statutes

PROCEDURE

A. Agreement On Unit Prices

The Department and contractor will negotiate and agree on unit prices to be used for the components such as embankment, base, asphalt, drainage structures, etc., within the special detour. This agreement will be made before payment begins.

B. Monthly Payment

The monthly payment will be determined by tabulating the quantities used that month at the agreed unit prices. Maintenance of traffic items and removal costs will be added when appropriate. The final total costs paid cannot exceed the lump sum bid.

C. Other Techniques

A District may utilize another payment method such as the submission of invoices if the contractor concurs with the use of that system.

D. Pay Phases

1. Initial/Early Payments: This is to cover materials brought on site such as embankment, base, asphalt, drainage structures, etc. Negotiations may have to include cost determinations for any of these materials that are stockpiled.

2. Interim Payments: Covers traffic control devices and routine maintenance. Additional materials will also be included as appropriate.

3. Final Payment: Detour removal and cleanup.

SECTION 5

REPORTING OF TRAFFIC ACCIDENTS IN CONSTRUCTION WORK ZONES

PURPOSE

To standardize a procedure for reporting traffic accidents that occur in construction work zones.

AUTHORITY

Section 334.044(2), Florida Statutes
23 CFR 630J

BACKGROUND

The FHWA requires that each State develop a system to report traffic accidents in construction work zones. The accidents are reviewed to locate and isolate problem areas.

PROCEDURE

A. Notification Of Traffic Accident

1. A traffic accident occurring within the work zone is brought to the attention of the Project Engineer through actual observation, notification by others, or through signs of an accident aftermath such as debris, etc. It may also be advisable to conduct a routine inquiry of local police departments for accidents.

2. The Project Engineer will conduct an investigation of the accident. If professional assistance is needed, call upon the District Safety Engineer.

B. Reporting Traffic Accident

1. Fill out the Engineer's Project Accident Report (Form 700-010-064, Attachment 1) along with detailed diagrams and narratives. Diagrams showing traffic control devices in the immediate area of the accident shall be included.

2. Do not fill out the Engineer's Project Accident Form for minor occurrences such as skid marks, damaged barricades, etc. However, if these types of occurrences begin to be localized, then the traffic control plan and traffic movements should be analyzed to determine the cause and subsequent cure. It is recommended that a project file be kept of minor occurrences for future reference.

3. Appropriate corrective action is to be taken immediately and noted on the form.

4. Obtain all supporting documents such as police reports, etc.

5. When a police report contains information contrary to the facts that project personnel are aware of, be sure to make that notation on the Engineer's Project Accident Report.

C. Other Actions

1. If a fatality or any disabling injury occurs, or if there is a serious accident involving three or more people, notify the District Safety Office by telephone immediately.

2. The FHWA "Alert Bulletin Procedure" has certain criteria for immediate reporting of accidents to their office. These are highway accidents or incidents such as those involving the death of five or more persons, those involving more than 15 vehicles, and those involving a school bus where there are fatalities and/or disabling injuries. Report these incidents to the Tallahassee Safety Office which will relay the information to FHWA.

3. The report should be prepared and distributed within two weeks of the accident. Documentation such as police reports and photographs may have to follow and should be collected and forwarded as received.

ENGINEER'S PROJECT ACCIDENT REPORT

Date/Time of Occurrence: _____ Report Date: _____

State Project No.: _____ State Road No.: _____ District: _____

Federal Project No.: _____ County: _____

Contract No.: _____ WPI No.: _____

Define Project Limits: By Milepost: _____
or
By Station No.: _____

Exact Location of accident: Milepost, Station, Or Give Distance from Nearest Roadway Intersection: _____

_____

Resident Engineer: _____ Project Engineer: _____

Prime Contractor: _____

Subcontractor(s) That Are Involved: _____

_____

Description of Damages:

Injuries (Severity Of Ea :n) _____

_____

Property Damage (Vehicular & Other) _____

_____

Police Investigated? ( ) Yes ( ) No. If yes, attach police report.

Others Contributing to this Report (Inspectors, Witnesses, Etc.): _____

_____

Distribution: Original to Project Engineer
Copies to: District Safety Engineer; Contractor

ATTACHMENT 1
6-5-3

DIRECTIONS FOR FORM 700-010-64
ENGINEERS PROJECT ACCIDENT REPORT
(TYPE OR PRINT)

DATE/TIME OF OCCURRENCE: the day-month-year and estimated time am/pm of occurrence
REPORT DATE: the day-month-year the report was written up
PROJECT NO: state project number
federal project number

STATE ROAD NUMBER: the state road number, i.e., SR-8
COUNTY: the county where the mishap occurred
DISTRICT: the district where accident occurred
CONTRACT NO: contract number of project(s)
WPI NO: work program item number of project(s)
DEFINE PROJECT LIMITS: by mile post, by station number
EXACT LOCATION: by milepost or
by physical location - distance from nearest roadway intersection, i.e., 200 ft. west of Apalachee Parkway and Blairstone Road.

RESIDENT ENGINEER: resident engineer's name printed or typed
PROJECT ENGINEER: project engineer's name printed or typed
PRIME CONTRACTOR: name of the prime contractor of project
SUBCONTRACTOR(S) THAT ARE INVOLVED: name(s) of the subcontractors on the project working this date
DESCRIPTION OF DAMAGES: injuries - summarize number & severity of each, i.e., one fatality, one serious injury & two minor injuries
property damage - summarize, i.e., one truck with $1000 damage and seven barricades valued at $100 each destroyed

POLICE INVESTIGATED?: if yes is checked off, there must be a police report attached to the accident/incident report

DIAGRAM: use legend to mark traffic control devices used
also identify if the traffic control used was in accordance with project Traffic Control Plan. Include signal layouts operation if modified by contractor for traffic control. Detailed sketch may be attached

NARRATIVE: comment on anything you believe is pertinent to the accident such as
those items that are needed to supplement police report, any comments that contradict what the police officer has written, description of corrective actions taken, if any, to possibly prevent this type of occurrence in the future
discussion of other accidents occurring of similar nature in this area, if any
primary cause of mishap
include exactly what the contractor was doing at the time of the mishap
list any signs of accident aftermaths
attachments detailing all or part of the above may be necessary

ANALYSIS OF CONDITIONS: IF KNOWN - leave blank if not known
PAVEMENT: make only one selection

VISIBILITY: make two selections
- 1 from night/day
- 1 from clear/limited

ROUTING: make only one selection
- existing pavement - if occurred on job site where the pavement existed before construction
- detour - if occurred on a detour
- approach to construction - if occurred on the approach to the job site (within project limits)

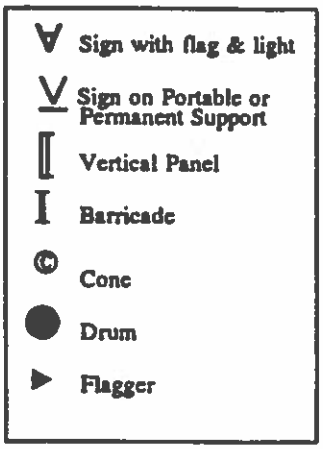
TYPE OF PROJECT: check your selection based on what stage the project is in
- if "other" is chosen, describe briefly what type of project it is

SIGNATURE OF PROJECT ENGINEER: sign here
TELEPHONE NUMBER: telephone number where you can be reached during the day (specify whether Suncom Centrex)

NOTE: provide appropriate pbotographs

DIAGRAM:
Accident Diagram including all traffic control devices present at the time of accident, vehicles involved, etc.

INDICATE NORTH



In addition to the above diagram, if the traffic control plan in effect follows guidelines of MUTCD, Part VI, indicate figure number, standard index sheet number, or plan sheet.

NARRATIVE: (Attachments As Necessary) (Corrective Action taken to prevent reoccurrence)

_____

_____

_____

_____

ANALYSIS OF CONDITIONS: If known

Pavement:
____ Wet
____ Dry
____ Asphalt
____ Concrete
____ Other

Visibility:
_____ Clear
_____ Limited
_____ Night (darkness)
_____ Day (daylight)

Routing:
_____ Existing Pavement
_____ Detour
_____ Approach to Construction

Type of Project:
____ Resurfacing Undivided Median
____ Resurfacing Divided Median
____ Widening Undivided Median
____ Reconstruction Undivided Median, Rural
____ Reconstruction Divided Median, Rural
____ Widening Undivided to Divided
_____ Reconstruction Undivided Median, Urban
_____ Reconstruction Divided Median, Urban
_____ New Construction, Undivided Median
_____ New Construction, Divided Median
_____ Intersection
_____ Other (Describe) _____

_____ Telephone Number

_____ Signature of Project Engineer

ATTACHMENT 1
6-5-3b

DIRECTIONS FOR FORM 700-010-64
ENGINEERS PROJECT ACCIDENT REPORT
(TYPE OR PRINT)

DATE/TIME OF OCCURRENCE: the day-month-year and estimated time am/pm of occurrence
REPORT DATE: the day-month-year the report was written up
PROJECT NO: state project number
federal project number

STATE ROAD NUMBER: the state road number, i.e., SR-8
COUNTY: the county where the mishap occurred
DISTRICT: the district where accident occurred
CONTRACT NO: contract number of project(s)
WPI NO: work program item number of project(s)
DEFINE PROJECT LIMITS: by mile post, by station number
EXACT LOCATION: by milepost or
by physical location - distance from nearest roadway intersection, i.e., 200 ft. west of Apalachee Parkway and Blairstone Road.

RESIDENT ENGINEER: resident engineer's name printed or typed
PROJECT ENGINEER: project engineer's name printed or typed
PRIME CONTRACTOR: name of the prime contractor of project
SUBCONTRACTOR(S) THAT ARE INVOLVED: name(s) of the subcontractors on the project working this date
DESCRIPTION OF DAMAGES: injuries - summarize number & severity of each, i.e., one fatality, one serious injury & two minor injuries
property damage - summarize, i.e., one truck with $1000 damage and seven barricades valued at $100 each destroyed

POLICE INVESTIGATED?: if yes is checked off, there must be a police report attached to the accident/incident report

DIAGRAM: use legend to mark traffic control devices used
also identify if the traffic control used was in accordance with project Traffic Control Plan. Include signal layouts operation if modified by contractor for traffic control. Detailed sketch may be attached

NARRATIVE: comment on anything you believe is pertinent to the accident such as
those items that are needed to supplement police report, any comments that contradict what the police offi.er has written, description of corrective actions taken, if any, to possibly prevent this type of occurrence in the future
discussion of other accidents occurring of similar nature in this area, if any
primary cause of mishap
include exactly what the contractor was doing at the time of the mishap
list any signs of accident aftermaths
attachments detailing all or part of the above maybe necessary

ANALYSIS OF CONDITIONS: IF KNOWN - leave blank if not known

VISIBILITY: PAVEMENT: make only one selection
make two selections - 1 from night/day
- 1 from clear/limited
ROUTING: make only one selection
- existing pavement - if occurred on job site where the pavement existed before construction
- detour - if occurred on a detour
- approach to construction - if occurred on the approach to the job site (within project limits)

TYPE OF PROJECT: check your selection based on what stage the project is in
- if "other" is chosen, describe briefly what type of project it is

SIGNATURE OF PROJECT ENGINEER: sign here
TELEPHONE NUMBER: telephone number where you can be reached during the day (specify whether Sunco Centrex)

NOTE: provide appropriate photographs

ATTACHMENT 1
6-5-3c

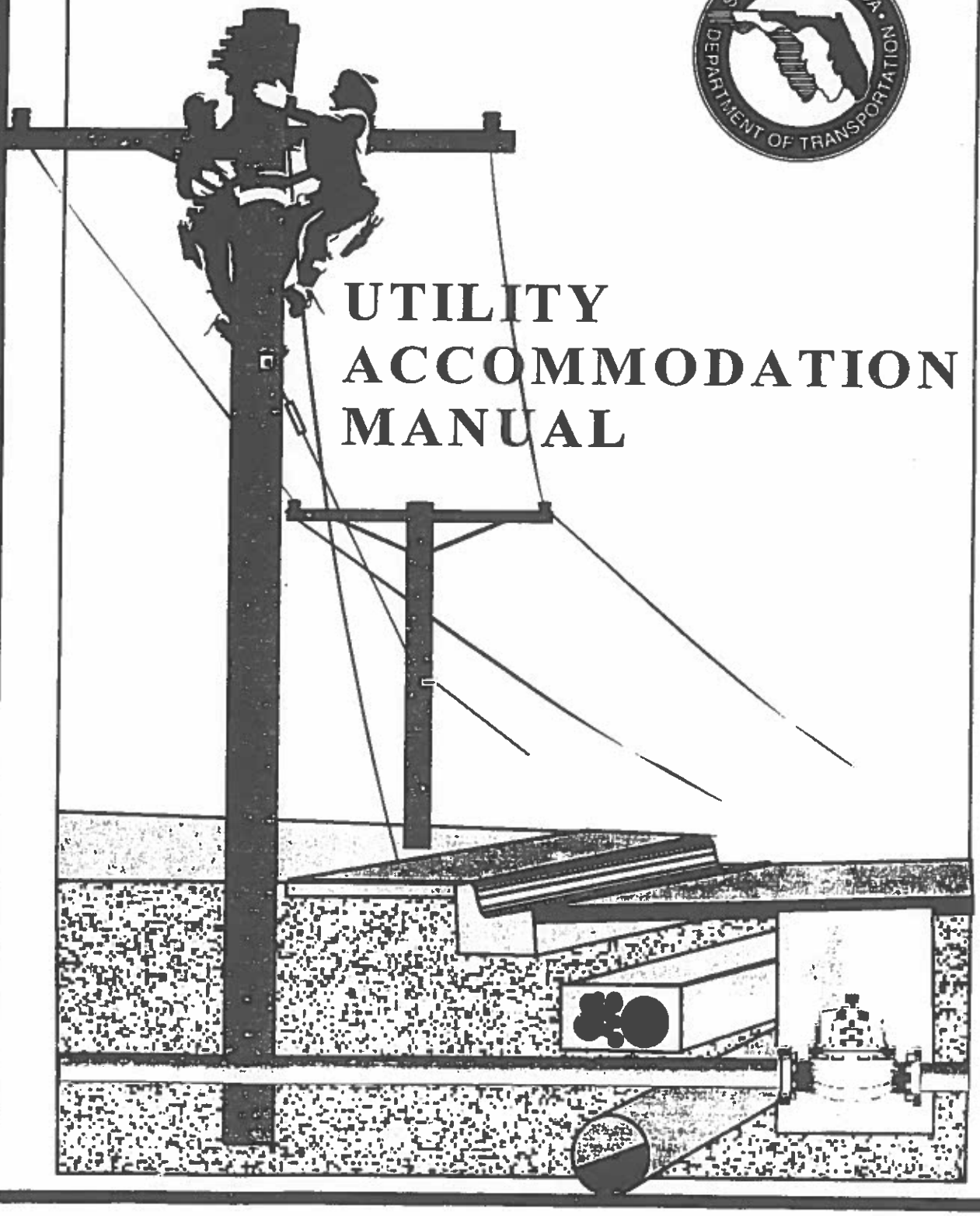
RECYCLED PAPER

V.(E) FLORIDA DOT UTILITY ACCOMMODATION MANUAL

Document No. 710-020-001-d

FLORIDA DEPARTMENT
OF
TRANSPORTATION

UTILITY ACCOMMODATION MANUAL



January 1999

Chapter 3

UTILITY PERMIT

3.1 Utility Permit

A Utility Permit Application (see Exhibit J) must be submitted by the Utility Owner/Agency, per Section 337.401 Florida Statutes. An Engineer or Contractor may prepare and process a permit application for a Utility Owner, but shall not be identified as the Permittee.

A permit must be approved or authorized by the FDOT before any utility is installed on the FDOT rights-of-way, whether it is for aerial or underground installations or attachment onto bridge structures, except as noted in this Manual. Permit Form 710-010-85 (see Exhibit J) may be obtained by the applicant from the Local Maintenance Office, District Maintenance Office, or District Utility Office. Any deviation from the approved permit shall be subject to the approval of the Local Maintenance Engineer, or designee, prior to installation. Deviations from FDOT Design criteria may require an exception.

During an emergency situation, the UAO should protect the public safety by making necessary repairs or adjustments complying as much as is practical with the requirements of this manual. No advance permit approval is required. However, permits for pavement cuts shall be submitted within 5 business days after the repairs are completed. This does not limit any permit requirements by other agencies.

If the Permittee's work operations encounter remains of an archaeological or historic nature, all earth disturbing activity shall be temporarily discontinued in the immediate vicinity of the discovery and the Permittee shall notify the approving Maintenance Engineer's Office of the discovery. The approving Maintenance Engineer shall notify the Staff Archaeologist at the FDOT, Environmental Management Office in Tallahassee to determine the disposition thereof. No work will resume until direction is given by the approving Maintenance Engineer.

A copy of the approved permit application package must be available at the job site at all times.

3.2 Permit Application

3.2.1 Each copy of the permit application shall contain at a minimum, plans or information showing the following:

(A) Schematic plans of the proposed installation (not necessarily to scale)

showing the beginning and ending project limits.

(B) The horizontal offset from a well defined feature of the Transportation Facility (to be determined by the permit Engineer) to the proposed utility installation.

(C) The rights-of-way limits and limited access line.

(D) As applicable, pavement/rail width and distance from edge of pavement/rails to utility.

(E) The roadway/railroad section and mile post numbers, station numbers and bridge number (if applicable).

(F) Material, function, type and size such as 12" HDPE 500 maximum psi plastic gas or sewer pipe, or metal 2X3 foot conduit for (power with voltage).

(G) All utility poles or other aboveground facilities and other pertinent details. With the exception of utility or single pole appurtenances mounted 15 ft or higher above the ground, appurtenances larger than 8 cubic ft must have their location and size, shown on the permit.

(H) One or more typical cross sections to adequately reflect the underground location of the utility facility.

(I) All known involved utilities in the proposed installation area shall be shown. However, if only aerial facilities requiring no additional poles are involved, then only aerial facilities need be shown on the permit drawing.

(J) If overhead or underground facilities involve only one side of the rights-of-way, then only involved utilities on that side of the rights-of-way need to be shown on the permit drawing.

(K) In all cases, the Permittee shall list all known rights-of-way users in the installation area on the permit form and notify each of them by copy of the permit drawing, whether they are involved or not.

(L) The minimum vertical clearance above or below the pavement shall be shown.

(M) The approximate distance and direction to either the nearest town, major road intersection, bridges, or railroad crossings.

(N) Other significant physical features such as vegetation, wetlands or bodies of water shall be indicated on the plans. The District Landscape Manager may be contacted for assistance to determine any potential impact to FDOT

vegetation.

(O) A simple key map showing the location of this proposed facility should be included.

(P) When the proposed utility work requires MOT, the permit application package must include a TCP. See Chapter 8 for specific criteria.

(Q) In order to document existing conditions of the work area prior to any Utility work, a minimum of one and maximum of six pictures, based on the complexity of the project, must be submitted with the application as a remedy for claims or final approval concerns. The number of pictures can be minimized (or the requirement waived) through discussion with the Permit Engineer.

3.2.2 For attachment to structures, the application shall include all applicable construction plans and specifications for the accommodation of the Utility.

3.2.3 When the Permittee is not a corporation, the owner's signature must be on the permit. Signatures must be original. The names and titles of all persons signing the permit application must be typed or printed legibly to the left of their signatures.

3.2.4 When the Permittee is a corporation, the signature of either the owner or an approved representative, whose name or position/title is on file with the Department for that corporation, must appear on the permit. The signatures must be original. The names and titles of all persons signing the permit application must be typed or printed legibly to the left of their signatures.

3.3 Processing

3.3.1 The applicant will submit 2 originals and 2 copies of permit application packages to the FDOT Local Maintenance Office in the area in which the work is to be performed.

3.3.2 The Local Maintenance Engineer or designee is authorized to approve permit applications, except as specified elsewhere in this manual. Those applications on which the Local Maintenance Engineers are not authorized to approve, will be forwarded to the District Maintenance Engineer for action.

Exceptions to the Limited Access Policy must be approved by the State Highway Engineer or designee. Upon approval, executed permits will be distributed to the applicant, permits inspector, the Local Maintenance Engineer or designee and the District Permit Engineer's Office file.

3.3.3 Each permit shall be processed in an expeditious manner, in order to minimize any unnecessary delays for the applicant. The Local Maintenance Office will notify the

applicant if processing is anticipated to exceed 30 days, when installations fall within areas in which no work is scheduled per the Five Year Work Program. In all cases, the permit will be processed in accordance with Florida Statute 120 and requirements found within this Manual. Permits will be approved and issued if all requirements of this manual are met.

3.3.4 For installations in FDOT rights-of-way affected by the FDOT Five Year Work Program or safety improvement projects (excluding permits on projects not in the production cycle which are covered in Section 3.3.4), the Local Maintenance Office will submit the permit application to the District Maintenance Office or designee.

The District Maintenance Office will be responsible for the coordination and tracking of the permit application. Coordination by Maintenance includes the District Utilities Office, Environmental Office (Landscape Manager, Scenic Enhancement, Contamination Impact Coordinator), and the Structures Office as appropriate.

The District Maintenance Office will send the permit application to the District Utility Office for their recommendation. The District Utility Office will consult with all applicable District Offices before making a recommendation back to the District Maintenance Office. The District Maintenance Office will approve or deny the permit application based on the District Utility Office's recommendation and return it to the Local Maintenance Engineer or designee for distribution and entering into the permit database. The District Maintenance Office will notify the applicant if processing is anticipated to exceed 30 days.

The FDOT Maintenance Office will be responsible for coordinating permit requests with the FDOT Construction Office for projects which are scheduled within the Five Year Work Program.

3.3.5 For projects which are in the plans production cycle, all permits are to be submitted to the Local Maintenance Office. The Local Maintenance Office will obtain a permit number and will send the permit package to the District Maintenance Office. The District Maintenance Office will approve or deny the application, based on coordination and review by the District Utility Office and the Local Maintenance Engineer or designee. The Local Maintenance Office will return the application package to the applicant or will notify the applicant if processing is to exceed 30 days.

3.3.6 All permit applications involving scenic enhancement areas are to be reviewed and approved by District Maintenance Engineer or designee upon consultation with the District Scenic Enhancement Coordinator.

3.3.7 All permit applications involving attachment onto bridge structures shall be reviewed and recommended for approval or denial by the District Structures and Facilities Engineer prior to approval by the District Maintenance Engineer or designee.

3.3.8 Where a permit involves the attachment to a structure of a utility facility carrying hazardous material (flammable, toxic or corrosive), the application will be referred to the District Maintenance Engineer and the District Structures Engineer for review and comment prior to approval by the Local Maintenance Engineer or Designee.

3.3.9 The applying Permittee shall notify, in writing, all known involved Utility Agencies using the rights-of-way at the location of the proposed installation. This notification shall state the applicant's intentions in order to determine any objections caused by the proposed installation. Any objections to the applying Permittee's proposed construction by affected Utility Agencies must be made in writing and forwarded to both the applicant and to the applicable Local Maintenance Engineer within 10 days of the applicant's notification letter. Such objections must be specifically defined.

3.3.10 All permit applications for rights-of-way covered by easements from U.S. Forest Service shall be forwarded to the District Maintenance Engineer for coordination with the U.S. Forest Service.

3.3.11 Utility Permits on operating railroad corridors will be handled the same way as other utility permits and subject to prior real estate rights.

For the South Florida Rail Corridor:

(A) Along with the Standard Permit Application, the pertinent standard Railroad Application Package shall become part of the total package. All Permittees must follow the instructions on the Application Package.

(B) The Local Maintenance Engineer or Designee will forward 4 copies of the package to the CSX Railroad for their concurrence/approval.

(C) No permit will be approved by CSX without receipt of their processing fee. Per agreement with CSX, the sole responsibility of the Department is to forward the application package and processing fee when supplied by the Permittee. It will be CSX's responsibility to collect their fee from the Permittee if not included in the application package.

(D) After receipt of approved 4 packages from the CSX and the FDOT permit approval, then the Local Maintenance Engineer or Designee will distribute the permit as appropriate.

Two copies and one original of both the CSX package and the permit will be submitted to:

Florida Department of Transportation - District Four
Manager, South Florida Rail Corridor
3400 West Commercial Blvd.

Fort Lauderdale, Florida 33309-3421
Phone: 1-800-930-3368

3.3.12 The Permittee will notify the approving authority upon completion of the utility construction. The approving authority or designee will complete page 2 of the Permit Form 710-01-85 and file it in the District Permit Engineer's Office with a copy sent to the Permittee.

3.4 Signing & Sealing Utility Plans

The following applies:

(A) Traffic Control Plan (TCP) - When FDOT TCP standards must be significantly compromised and a true, alternate TCP is required, it must be prepared, signed and sealed by a qualified, registered engineer. See Chapter 8.

(B) Any installation which requires a structural modification to an FDOT facility must be signed and sealed. An example of this would be a request to hang a utility facility from an existing bridge.

(C) Joint Participation Agreements (JPA) - Documents for JPA's prepared for Utilities by their own engineers (exempt under Chapter 471, Florida Statutes) do not require signing and sealing. However, documents prepared by an Engineering Consultant for the Utility must be signed and sealed.

Chapter 8

MAINTENANCE OF TRAFFIC (MOT)

8.1 Background

Whenever work is done on or near the roadway, drivers are faced with changing and unexpected traffic conditions. These changes may be hazardous for drivers, workers, and pedestrians unless strict protective measures are taken.

Since drivers do not make a distinction between construction, maintenance or utility operations, proper traffic control and safety are needed for all types of work.

Part VI of the Manual on Uniform Traffic Control Devices$_4$ (MUTCD) is the national minimum standard for all traffic control devices and methods used during construction, maintenance and utility activities.

The State of Florida adopted the MUTCD as the minimum State Standard for use on roadways other than the State Highway System such as city and county roadways.

The State of Florida adopted higher standards for some devices and conditions to be applied on the State Highway System managed by the FDOT. In addition to the MUTCD$_4$, the Standard Specifications for Road and Bridge Construction$_3$ and the "FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS$_2$ FOR DESIGN, CONSTRUCTION, MAINTENANCE AND UTILITY OPERATIONS ON THE STATE HIGHWAY SYSTEM" (Index 600, pages 1-11) shall be used on FDOT rights-of-way. Index 600, pages 1 through 11, provides Department Policy and Standards. Changes are only to be made through Department approved procedures. Indexes 601 through 660 provide typical application for various situations. Modifications can be made to these Indexes as long as the changes comply with the MUTCD and Department Standards.

8.2 Traffic Control Plan (TCP)

When a permit for utility installation, adjustment or maintenance activity is required, a proposed TCP shall be submitted with the permit application for approval.

TCP should be designed and submitted based on actual field conditions. However, when site conditions change significantly and warrant a change to the approved TCP that was submitted with the permit application, the Permittee is required to notify the FDOT. A new TCP which reflects actual conditions shall be designed in accordance with the standards set forth in the MUTCD$_4$, the FDOT Roadway and Traffic Design Standards$_2$ and Standard Specifications for Road and Bridge Construction$_3$.

Almost all maintenance of traffic can be accomplished using the typical applications in Indexes 601 through 660. Some set-ups may require combining indexes or being adjusted to meet field conditions. These are not engineering decisions and therefore do not require signing and sealing. However, if the standards must be significantly compromised an alternate TCP is required and must be prepared, signed and sealed by a qualified, registered Florida Professional Engineer.

All revisions / changes to standards contained on Standard Index 600, pages 1 through 11, that are submitted as part of a TCP require FDOT approval and may require the signature of a qualified registered Florida Professional Engineer. This Standard Index contains criteria adopted specific to the State Highway System and may be different from what is contained in the MUTCD. For example, Index 600 includes but is not limited to: signing size, specific signing language and reflectivity requirements; increased width, length, height and reflectivity requirements for barricades and cones; pavement drop off requirements, etc.

Standard Indexes 601 through 660 were developed with the intent of applying MUTCD guidelines for setting up traffic control devices for many common construction and maintenance scenarios while maintaining the specific criteria contained on Standard Index 600, pages 1 through 11. Actual field conditions or Utility work scenarios may not be identical to those represented in Standard Indexes 601 through 660. The Utility may combine one or more, or use a portion of these specific Standard Indexes as appropriate without the requirement to have a qualified registered Florida Professional Engineer's signature. This is allowed as long as the safety provisions of the MUTCD are maintained and the standard indexes are not taken out of context. This allows for job specific set up revisions based on site conditions. This does not allow changes to devices or items specific to Standard Index 600.

If the Utility elects to use portions of the FDOT's Standard Indexes as their TCP, the permit must include specific reference to the appropriate indexes and sections to be used.

For a TCP, Utility Companies may use drawings in their own manuals and procedures which reflect the conditions and criteria in the Standard Indexes, provided they include a statement such as "in accordance with FDOT Standard Index(es) _____." These drawings do not require signing and sealing.

8.3 Training and Job Control

The Permittee is responsible for insuring that each employee supervising the selection and placement of MOT Control Devices in Utility Work Zones shall be properly trained by attending and successfully completing an FDOT approved MOT training course or the Permittee's approved MOT course.

The Permittee shall have a properly trained employee for the applicable level of MOT at the work site during the initial set-up and when any changes to the TCP are required. The Permittee's employee shall be available at the work site within 45 minutes of the Permittee being notified by the FDOT that problems exist.

When changes are made to the MUTCD$_4$, FDOT Roadway and Traffic Design Standards$_2$ or the FDOT Standard Specification for Road and Bridge Construction$_3$, the Permittee's approved training course, or any other courses approved by the FDOT shall be updated to reflect such changes.

Any person supervising performance of MOT activities on the State Highway System shall at all times have in their possession proof they are certified in MOT setup. A copy (facsimile or reduced) of their training certification will suffice.

8.4 Rail Flagging

All permitted utility work performed on an operating rail corridor shall comply with the flagging requirements of the operating railroad.

8.5 Non-Compliance

Upon notification by the FDOT of deficiencies in the TCP or other matters involving traffic safety, the Permittee shall immediately make improvements as directed by the FDOT. Should the FDOT deem conditions to be such that imminent danger is present, all work shall cease immediately and shall not resume until the conditions are corrected.