Chapter Thirteen

WORK ZONE TRANSPORTATION MANAGEMENT PLANS

BUREAU OF DESIGN AND ENVIRONMENT MANUAL

Chapter Thirteen

WORK ZONE TRANSPORTATION MANAGEMENT PLANS

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Chapter Thirteen

WORK ZONE TRANSPORTATION MANAGEMENT PLANS

Chapter 13 discusses the goals and objectives of a Transportation Management Plan (TMP). The Bureau of Safety Engineering policies, Chapter 13, Chapter 55, the *Standard Specifications for Road and Bridge Construction*, and the *Highway Standards* provide the criteria to be used when developing a TMP.

13-1 GENERAL

13-1.01 Goals

The goal of a TMP is to address the following safety and mobility issues early in project development:

1. Safety.
   - Zero worker fatalities for traffic-related work zone crashes.
   - Reduce the number of motorist fatalities in traffic-related work zone crashes by 10% each year with the eventual goal of eliminating all of these fatalities.
   - Eliminate crashes and resulting fatalities and serious injuries caused by queuing.
   - Reduce the number of work zone crashes by 5% from each prior year.
2. Mobility.
   - Delays caused by work zones should not exceed more than 5 minutes per mile (3 minutes per km) of project length with a maximum of 30 minutes above the normal recurring traffic delay.
   - Queues caused by work zones should be no more than 1.5 miles (2.4 km) beyond pre-existing queues.

13-1.02 Definitions

1. Impact Analysis. An analysis of the safety and mobility impacts of a road construction or maintenance project.

2. Mobility. Moving road users efficiently through or around a work zone area (site specific or regionally) with a minimum of delay compared to baseline travel when no work zone is present, while not compromising safety.

3. Non-Significant Route. Work on a roadway that is not considered a significant route and that impacts the traveling public to a small degree due to low traffic volume, low public interest, and short to moderate duration.

4. PIP (Public Information Plan). A plan that consists of strategies to inform those affected road users, including the surrounding community, of the expected impact of a project, of changing conditions, and available travel options.

5. PLCM (Permitted Lane Closure Map (List)). Developed by the district, the PLCM defines the allowable times a lane(s) may be closed on Significant Routes within each district. The PLCM is based upon district knowledge and should be updated as traffic conditions warrant. The intent of the PLCM is to allow minor short-term work to be completed with as little impact to the motorist as possible and to aid the district in complying with mobility requirements.

6. Safety. For work zones, safety refers to minimizing potential hazards to travelers and highway workers in the vicinity of a work zone.

7. Significant Project – Long Term. Roadway segments identified on the Significant Route Location Maps involving work greater than three days duration are considered as Significant Projects – Long Term. A Significant Project – Long Term requires an Impact Analysis be performed and requires a TMP.

8. Significant Project – Short Term. (Operations, Permit, Utility, and other short-term work.) Roadway segments identified on the Significant Route Location Maps involving work of three days or less.

9. Significant Route. Roadway segments where a lane closure on the roadway is expected to cause sustained work zone impacts that are not considered tolerable based on work zone mobility goals or public opinion.

10. TCP (Traffic Control Plan). A plan to safely guide traffic through a construction project through the use of traffic control devices and project coordination. The TCP focuses on the mobility and protection of traffic within the construction zone.

11. TMP (Transportation Management Plan). An integrated strategy to manage work zone impacts of a project. The possible components of a TMP are a TCP, TOP, and PIP.

12. TOP (Transportation Operations Plan). A plan that consists of strategies which mitigate work zone impacts through the use of improved transportation operations and management of the transportation system.

13. Work Zone Impacts. Deviation from normal mobility and safety of the roadway due to the presence of a work zone.

13-1.03 Guideline for Work Zone Mobility Strategies

A well-planned method for maintaining traffic flow is critical for meeting the Department's mobility goals, minimizing complaints from the traveling public, residents, and businesses, and reducing unnecessary capital costs. Each Phase I report should contain a Transportation Management Plan (TMP) indicating an overall strategy for work zone safety and mobility during construction.

For projects not requiring a Phase I report (e.g., 3P, traffic signals) and for projects where the application of the *Highway Standards* and *Standard Specifications* will provide the TCP, a TMP is not required except for projects on significant routes. The goals of the Work Zone Safety and Mobility Rule for queuing and delay should be addressed. If the goals can be met, the district may approve the TMP. If the goals cannot be met, then submit a "Request for Exception to Compliance" to the Bureau of Safety Engineering; see Section 13-1.05.

Figure 13.1-A presents the Work Zone Safety and Mobility Process Flow Chart to determine the level of significance of a project. Significant Route Location Maps (see Bureau of Safety Engineering's Programs and Policies Website for maps) are Statewide and district maps that show those State routes where a lane closure on the roadway is expected to cause sustained work zone impacts that are not considered tolerable based on the goals and objectives of this policy or public opinion. Roadways marked in red are considered as Significant Routes. Roadways marked in yellow are approaching Significant Route designation and should be evaluated for potential impacts. These maps will be revised as additional information becomes available through process reviews and district feedback.

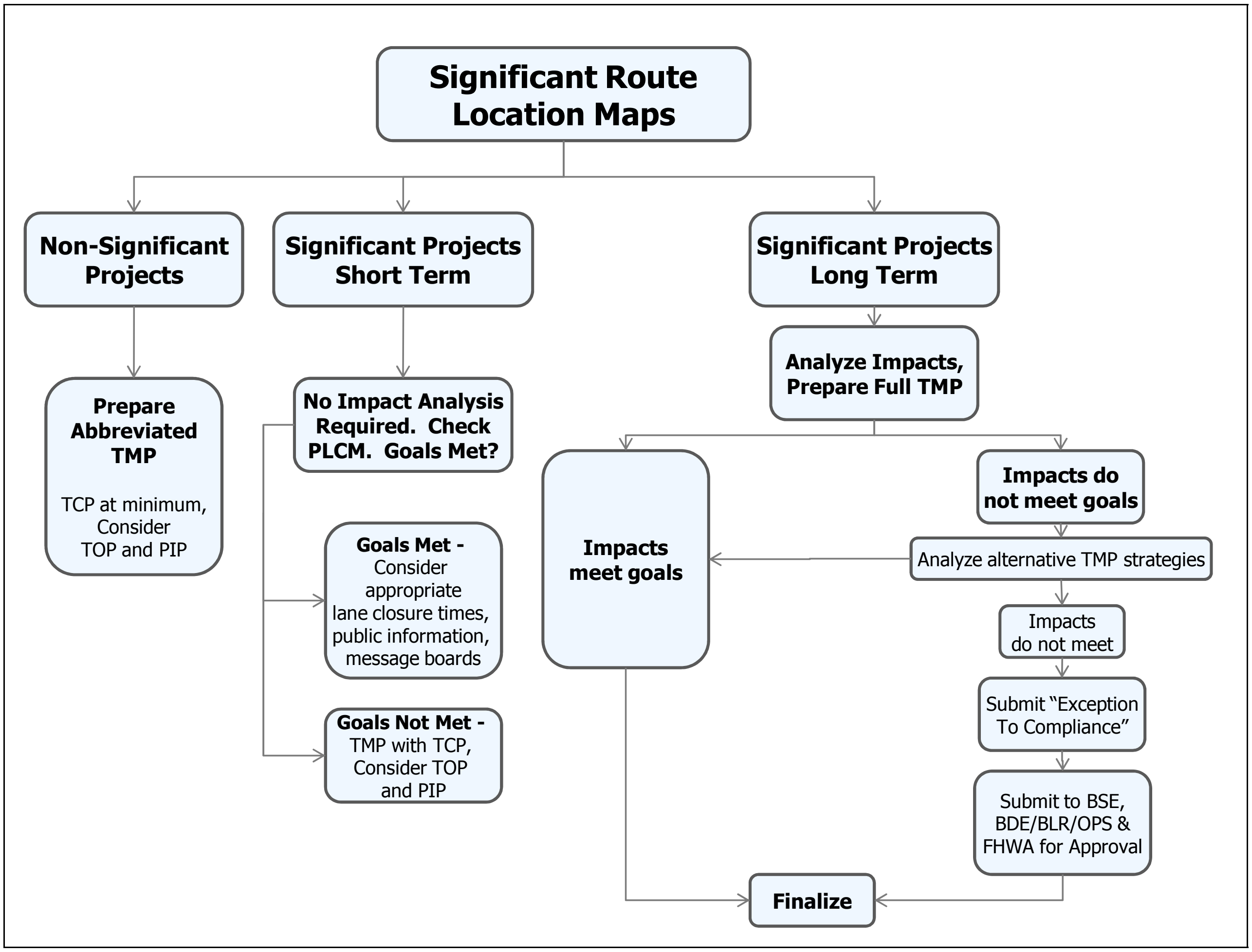
Use the Significant Route Location Maps and the Work Zone Safety and Mobility Process Flow Chart to determine if a project is considered Non-Significant, Significant – Short Term (Less Than Three Days), or Significant – Long Term.

13-1.03(a) Non-Significant Projects

If the proposed project is on a roadway that is not considered a Significant Route, then it is a Non-Significant Project. Work is considered to impact the traveling public to a small degree. Traffic volumes are low, public interest is low, and duration is short to moderate. For Non-Significant Projects, an Impact Analysis is not required. The final design may proceed with a TMP that consists of only a TCP. However, appropriate TOP and PIP strategies are encouraged to be considered as well.

13-1.03(b) Significant Projects – Short Term

Roadway segments identified on the Significant Route Location Maps involving work of three days or less are considered Significant Projects – Short Term. A Permitted Lane Closure Map/List (PLCM) are to be developed by the district, based on the Significant Route Location Maps and district knowledge. The PLCM should be updated as traffic conditions warrant.



WORK ZONE SAFETY AND MOBILITY PROCESS FLOW CHART

Figure 13-1.A

The PLCM map defines the allowable times a lane(or lanes) may be closed on Significant Routes within each district to assist in meeting mobility goals. It allows minor short time work to be accomplished with as little impact to the motorist as possible. If mobility goals cannot be met, plan the work in advance to minimize impacts. However, emergency repairs/work is allowed. The project may proceed with a TMP that consists of only a TCP. However, consider appropriate TOP and PIP strategies to ensure the project achieves the Department's stated safety and mobility goals.

13-1.03(c) Significant Projects – Long Term

Routes identified on the Significant Route Location Maps involving work greater than three days are considered Significant Projects – Long Term. Because of their duration, work zones for these projects have a much greater impact on motorists. Consider every reasonable effort to mitigate these impacts. Identify Significant Projects as early as possible in the development process to help allocate resources more effectively to projects that are likely to have greater impacts. A Significant Project – Long Term requires an Impact Analysis. The Impact Analysis is the process of understanding the safety and mobility impacts of a road construction/ maintenance project.

During the planning and design phase of a Significant Project – Long Term, consider various TMP strategies and the resulting impacts to delays and queuing should be analyzed to determine which are acceptable or unacceptable based upon safety and mobility goals.

Developing a TMP is a process that involves identifying applicable strategies to manage the impacts of the work zone, and budgeting costs to ensure that funding is available. A full TMP is required for Significant Projects – Long Term. The TMP should lay out a set of coordinated transportation management strategies and describe how they will be used to manage the work zone impacts of a road project. As the project evolves, it is important to reassess the TMP, including the transportation management strategies, to ensure the work zone impacts are mitigated and the necessary budget for the project is available. Incident management and emergency services should also be considered.

A full TMP includes a TCP, TOP, and PIP. A relatively small project on a significant route may follow the outline in Section 13-8 for a simple full TMP. Larger projects will require a more extensive examination. See Figure 13-1.B for the components of large project TMP.

13-1.04 Impact Meet Goals – TMP Approval

If the prepared TMP meets the mobility and/or queueing goals, present the project as follows:

1. Federal Funds. Present at the periodic joint FHWA/IDOT coordination meeting.

2. No Federal Funds. Present at the district project coordination meeting.

The TMP may be approved by the appropriate bureau (Bureau of Design and Environment, Bureau of Local Roads, or Bureau of Operations). Once the TMP is approved, include the TMP in the Phase I report and incorporate it into plan development.

Note that delays or time lapse from Phase I to Phase II in project development or changes made during the preparation of the TCP may affect the overall TMP. For example, a lane closure that precipitates unavoidable large queues on a freeway may cause traffic to divert to a nearby urban arterial. This may require signal coordination, lane widening, turn restrictions, etc., on the arterial to improve its capacity. Review the TMP from Phase I to Phase II to ensure that it is still applicable.

TMP Component	**Complete**
1. Executive Summary	________
2. Request for Exception to Compliance (If Needed)	________
3. Project Description:	________
a. Background	________
b. Project Description	________
c. Location Map	________
d. Construction Staging/Phasing	________
e. Construction Schedule/Timeline	________
f. Interaction with other projects	________
4. Existing Conditions	________
a. Existing traffic data, counts and queues	________
b. Incident, crash data and analysis	________
c. Local community and business concerns	________
d. Traffic growth rates (anticipate future construction dates)	________
5. TCP (Traffic Control Plan) Strategies	________
a. Describe Traffic Control Plan (and alternatives, if considered)	________
i. Safety impacts of TCP alternatives	________
ii. Mobility – Predicted queues and delays, method used	________
iii. Costs associated with TCP alternatives	________
b. Evaluation and Selection of TCP alternative	________
c. Traffic Control Plan Sheets for selected alternative	________
6. PIP (Public Information Plan)	________
a. Strategies to inform the public of construction activities	________
b. Strategies to inform motorists on and around the project	________
c. Promotion of alternative transportation nodes	________
7. TOP (Transportation Operations Plan)	________
a. Work zone safety management strategies	________
b. Traffic and incident management, enforcement strategies	________
8. TMP Implementation and Monitoring	________
a. Monitoring plan	________
b. Contingency plans for incidents, excessive queue or delay	________

TRANSPORTATION MANAGEMENT PLAN COMPONENTS CHECKLIST
(For Large Projects)

Figure 13-1.B

13-1.05 Impacts Do Not Meet Goals – Exception to Compliance

Once all reasonable and cost-effective TMP strategies have been evaluated and incorporated into the project and mobility and/or queue goals still cannot be met, the district prepares an exception to compliance (see Section 13-7). All strategies, including those in the full TMP, an explanation of why it is not feasible to meet the goals of this policy, and the proposed strategies to mitigate work zone impacts are submitted with the exception to compliance.

Submit the request to the Bureau of Safety Engineering for review, and routing for additional reviews to the appropriate bureau (i.e., Bureau of Design and Environment, Bureau of Local Roads, or Bureau of Operations) and FHWA for approval. Upon approval, final development of the TMP may proceed. Include the final TMP in the Phase I report and incorporate the into plan development.

13-1.06 Implementation

During Phase II, it will be the designer's responsibility to implement the recommendations from the approved TMP into a detailed Traffic Control Plan (TCP), which is included in the construction plans and special provisions. Design standards, special provisions, traffic volume or movement, etc., may have changed if there is a significant time lapse between Phase I and Phase II. The designer may be required to collect additional data and conduct additional analyses. Coordination with the Phase I author is recommended when possible.

Any significant changes to the TMP proposed by Construction or the contractor should be reviewed with the TMP author or team prior to implementation. For larger projects, a public relations campaign as documented in the PIP may be required prior to construction. If an approved marked detour route must be altered, it must be coordinated with the District Detour Committee for approval of the new detour route. During construction, TMP performance will be assessed as per Safety Engineering Policy 3-07.

13-1.07 TMP Corridor Considerations

The TMP should not only address traffic mobility alternatives confined to the project site, but it should also evaluate the impact traffic will have on the entire corridor. Conduct an evaluation of the entire corridor on projects that have one or more of the following characteristics:

- where the project scope of work consists of major reconstruction or new construction;
- where there are high traffic volumes;
- where there may be significant detrimental impacts on mobility for either through or local trips in the corridor;
- where the facility's capacity will be significantly reduced (e.g., lane, ramp, or interchange closures);

- where alternative routing will be necessary (e.g., detour routing for hazardous materials, wide loads);
- where there will be significant impacts on local communities and businesses (e.g., emergency vehicles, school buses, postal service);
- where timing (e.g., special events) and seasonal impacts may be significant;
- where there will be significant grade changes; and/or
- where no alternative routes are available.

Where a series of proposed projects are along the same corridor or along corridors of close proximity, consider coordinating individual TMPs into a Unified TMP for the corridor. The Unified TMP is authored by a TMP Team, a group organized during Phase I to study the traffic control alternatives and their effect on the corridor. The TMP Team and selection is discussed in Section 13-1.08.

13-1.08 TMP Team

A TMP Team may be created for a project that is large in scope or impact. It may be beneficial to write a Unified TMP for a series of TMPs created for several projects along the same corridor, or along corridors of close proximity. A TMP Team allows the designer to bring in stakeholders to aid in “buy-in” of the project and may avoid changes to plans in Phase II and Phase III.

For projects that the Regional Engineer has determined will use the principles of Context Sensitive Solutions (CSS), the public should be involved with the TMP Team. See Section 19-3.01 for more information on CSS.

If it has been determined that a TMP team is required for the project, the district will initially recommend the TMP team representatives. This determination will be based on the purpose, goals, and constraints of the TMP. A well-balanced TMP team is an important ingredient for a successful project. The variety of disciplines represented presents an effective liaison group to meet the various needs of a TMP. Depending on the project logistics, the team composition will vary from project to project. The TMP team may include representatives from:

- Design;
- Operations;
- Construction;
- Local Roads and Streets;
- Safety Engineering;
- Maintenance Operations;
- Traffic Operations;
- Planning and Programming;
- Public Transportation;
- FHWA;

- local government (county and/or city);
- State or local enforcement;
- major employers (e.g., factories, shopping malls); and/or
- others as deemed necessary (e.g., emergency responders, hospitals).

The anticipated work zone impacts will dictate the extent and nature of the TMP team's responsibilities. This is especially true for those projects on significant routes. These may include all or part of the following functions:

- collecting data (e.g., traffic counts, crash history, roadway geometrics, proposed developments, operating speeds);
- conducting analyses (e.g., capacity analyses, traffic impact studies, safety studies, queuing analysis, geometric adequacy);
- addressing safety (see Safety Engineering Policy 4-08):
  - + Positive Protection Devices,
  - + Design Policy to Minimize Drop-off Exposure, and
  - + Law Enforcement in Work Zones;
- reviewing design alternatives;
- reviewing traffic control alternatives;
- reviewing the adequacy of alternative routes (e.g., geometrics, capacity, safety, structural, roadway widths);
- reviewing on-site and off-site traffic operational improvements (e.g., signal improvements, parking restrictions, radius improvements);
- reviewing construction phasing and scheduling alternatives;
- determining the cost of various options and improvements;
- determining which options are the most cost effective;
- coordinating with local officials and businesses;
- researching local traffic demand for effects of seasonal and special events;
- coordinating funding and timing with other projects within the corridor;
- coordinating the design with other TMP plans in the region that may be under construction before, during, and after the project(s);
- planning for emergency responses (incident management);

- planning rideshare and transit strategies;
- providing recommendations for the Phase I report;
- reviewing design and TMP changes made by the designer to ensure they meet the TMP objectives;
- reviewing proposed changes made by the contractor or resident engineer during construction; and
- where necessary, developing a final report on the successes and problems of the TMP.

13-2 TRAFFIC CONTROL MANAGEMENT

13-2.01 Terminology

The following definitions are used to define the time length for work zones:

1. Long-Term Stationary Work Zone. A construction, maintenance, or utility work site that requires traffic control in the same location and where the activity requires longer than three days.

2. Intermediate-Term Stationary Work Zone. A construction, maintenance, or utility work site that requires traffic control in the same location and occupies a location from overnight to three days.

3. Short-Term Stationary Work Zone. A construction, maintenance, or utility work site that requires traffic control in the same location and where the activity takes from one to twelve hours.

4. Short-Duration Work Zone. A construction, maintenance, or utility work site that occupies a location up to one hour.

5. Mobile Work Zone. A construction, maintenance, or utility work site that is continuously moving during the period when work is actively in progress.

13-2.02 Work Zone Type

There are several basic work zone types that may be considered in a TMP. The main function of these work types is to “relocate traffic flow” so that the construction work can proceed with minimum interruption and hazard to the workers and to the motorists. The most common projects where relocating traffic flow may be a factor include:

- bridge reconstruction, rehabilitation, or replacement;
- major pavement rehabilitation of existing highways;
- pavement removal and replacement;
- horizontal alignment change; and
- vertical alignment change.

The following presents a description for several work zone applications:

1. Lane Constriction. This work zone type is configured by reducing the width of one or more lanes to retain the number of lanes normally available to traffic. An example of lane constriction is shown in Figure 13-2.A. This application is the least disruptive of all work zone types, but it is generally only appropriate if the work area is mostly outside the normal traffic lanes. Note that narrow lane widths may reduce the facility’s capacity, especially where there is significant truck traffic. The use of shoulders as part of the lane width helps reduce the amount of lane width reduction that may be required; however, check the structural adequacy of the shoulders. Where this application is

applied to long-term work zones, it will require the removal of the current lane markings to avoid motorist confusion. Chapter 55 discusses the minimum lane widths that must be provided.

2. Lane Closure. This work zone type closes off one or more normal traffic lanes. A lane closure example is shown in Figure 13-2.B. Capacity and delay analyses may be required to determine whether serious congestion will result from lane closures. In some cases, use of the shoulder or median area as a temporary lane will help mitigate the problems arising from the loss in capacity. Upgrading or replacement of existing pavement or shoulder, or placement of temporary pavement may be necessary.

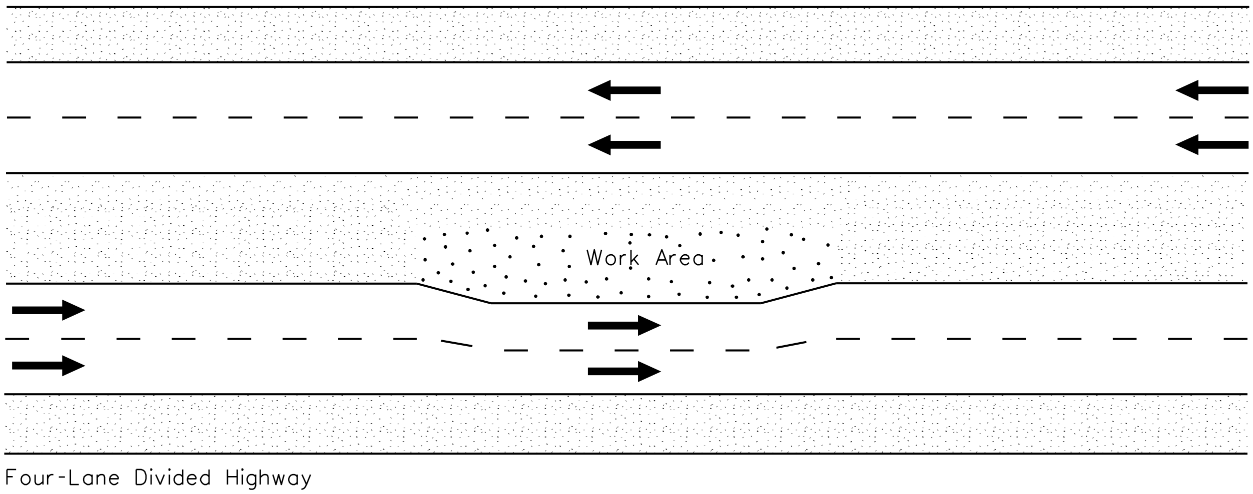
3. One-Lane, Two-Way Operation. This work zone type involves utilizing one lane for both directions of traffic. Figure 13-2.C illustrates a one-lane, two-way operation work zone. This work zone type is typically only used on bridges or small, short-term projects. Flaggers or traffic signals are normally used to coordinate the two directions of traffic.

4. Runaround. This work zone involves the total closure of the roadway (one or both directions) where work is being performed and the traffic is rerouted to a temporary roadway constructed within the highway right-of-way. A runaround example is shown in Figure 13-2.D. This application may require the acquisition of a temporary easement and usually requires extensive preparation of the temporary roadway. Generally, temporary runarounds are designed for a posted speed reduction of no more than 5 mph to 15 mph below the existing posted speed of the route. Chapter 55 discusses the minimum geometric design criteria for runarounds.

5. Intermittent Closure. This work zone type involves stopping all traffic in one or both directions for a relatively short period to allow the work to proceed. This application is illustrated in Figure 13-2.E. After a specific time, depending on traffic volumes, the roadway is re-opened and all vehicles can travel through the area. This application is normally only appropriate on low-volume roadways or during periods where there are very low volumes (e.g., Sunday morning, nighttime).

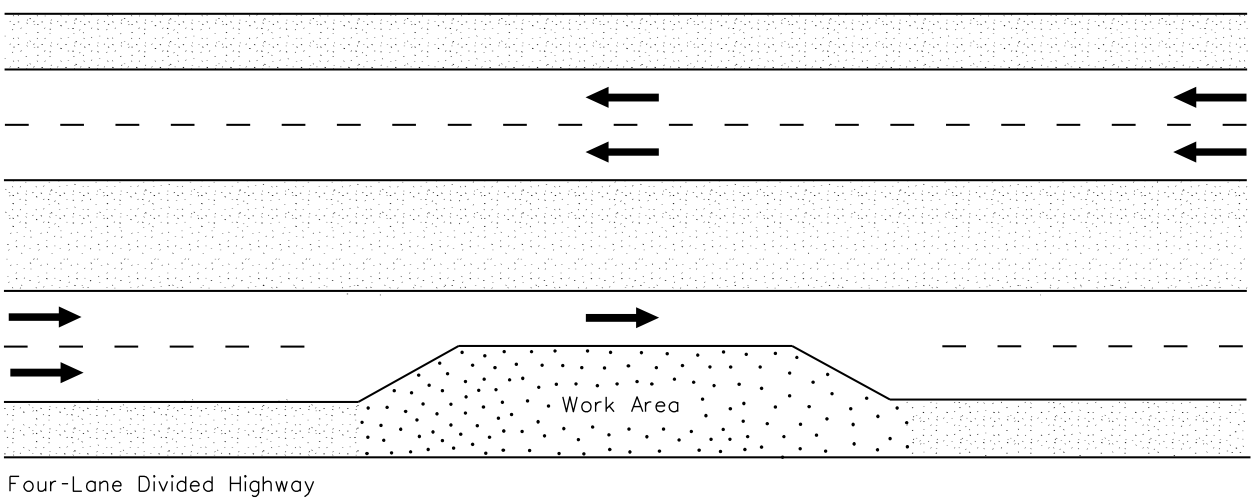
6. Use of Shoulder or Median. This work zone type involves using the shoulder or the median as a temporary traffic lane. Figure 13-2.F illustrates an example of using the shoulder and median. To use this technique for more than a short period, it will be necessary to evaluate the shoulder and subgrade to see if it is adequate to support the anticipated traffic loads. This technique may be used in combination with other work zone types or as a separate technique.

7. Two-Way Traffic on Median Divided Facility with Crossover. This work zone type involves routing one direction of the traffic stream across the median to the opposite traffic lanes. This application might also incorporate the use of shoulders and/or lane constrictions to maintain the same number of lanes. Figure 13-2.G illustrates examples of crossovers. Due to the inherent high traffic volumes and, in most cases, higher speeds, it will be necessary to consider higher geometric criteria due to the higher motorist expectations.



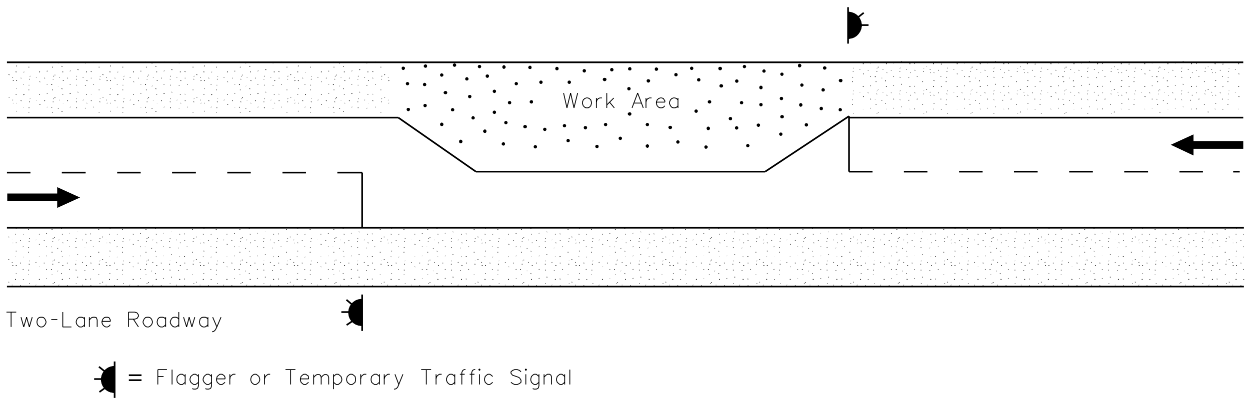
LANE CONSTRICTION WORK ZONE

Figure 13-2.A



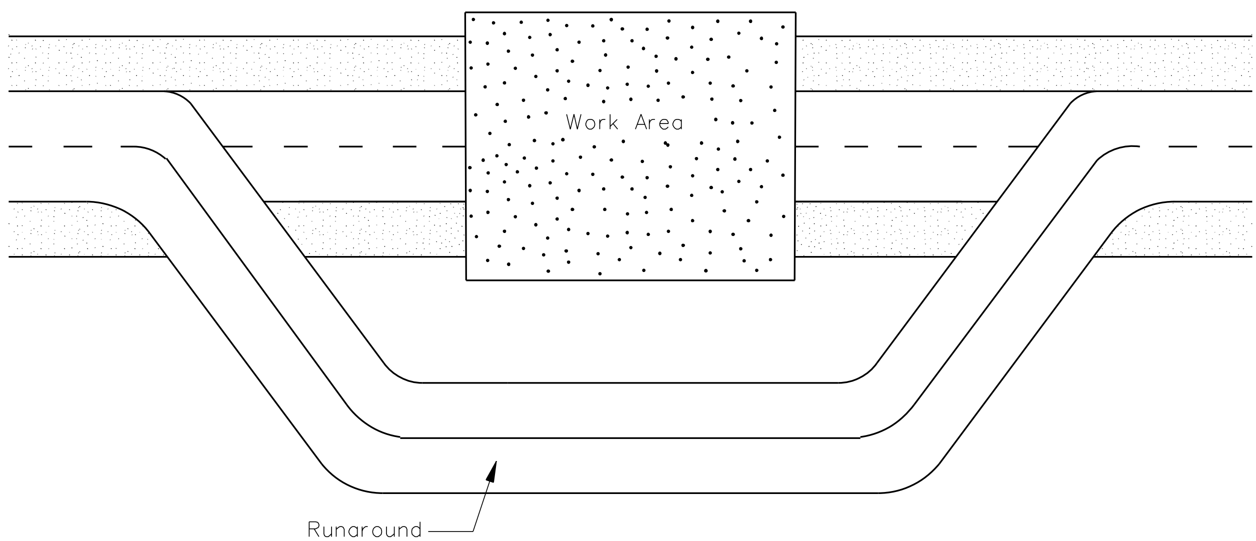
LANE CLOSURE WORK ZONE

Figure 13-2.B



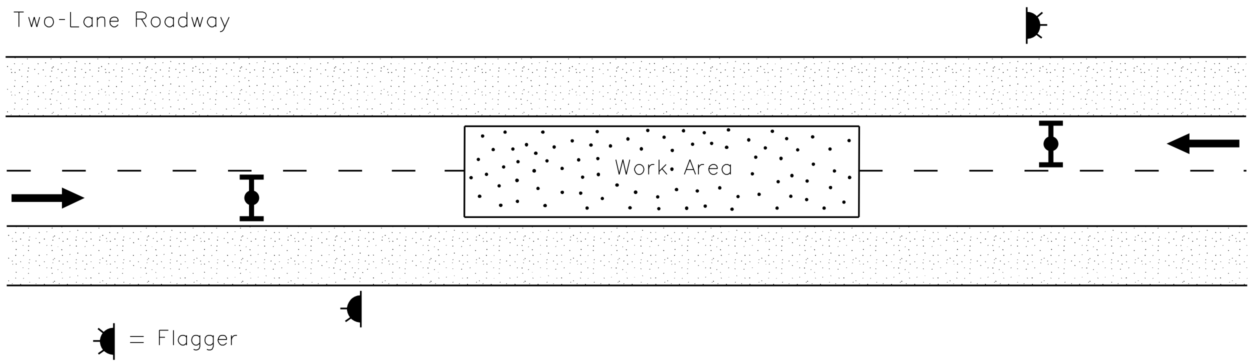
ONE-LANE, TWO-WAY OPERATION WORK ZONE

Figure 13-2.C



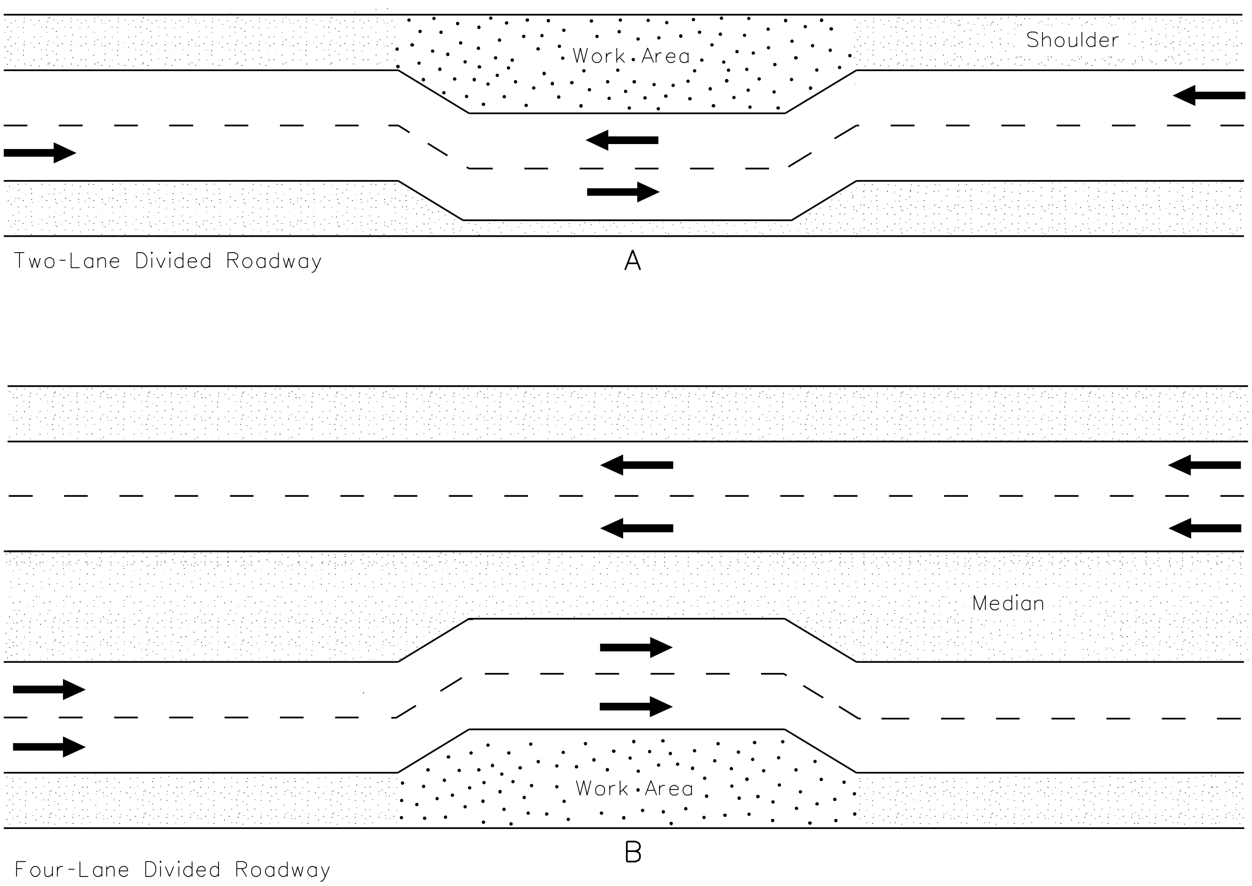
RUNAROUND WORK ZONES

Figure 13-2.D



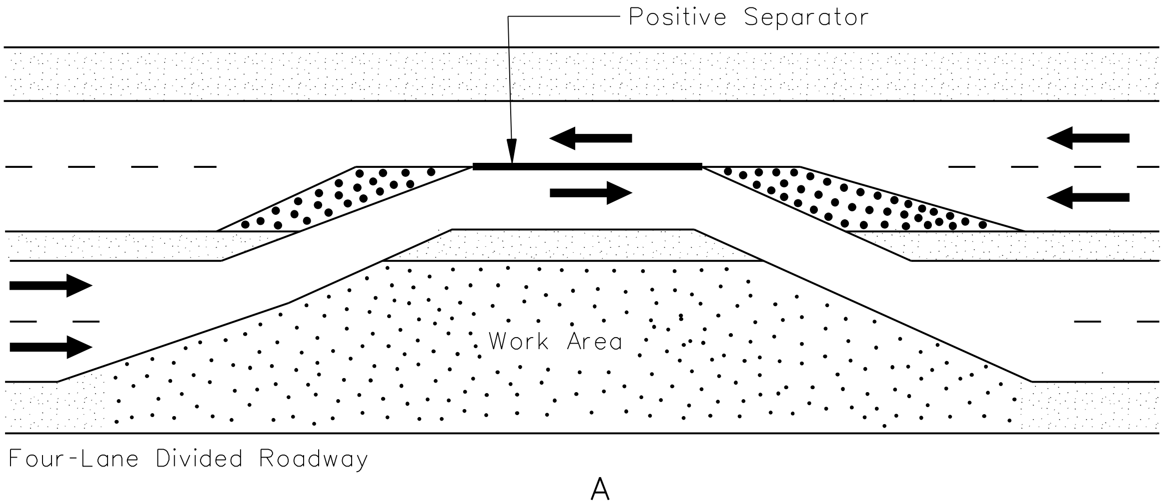
INTERMITTENT CLOSURE

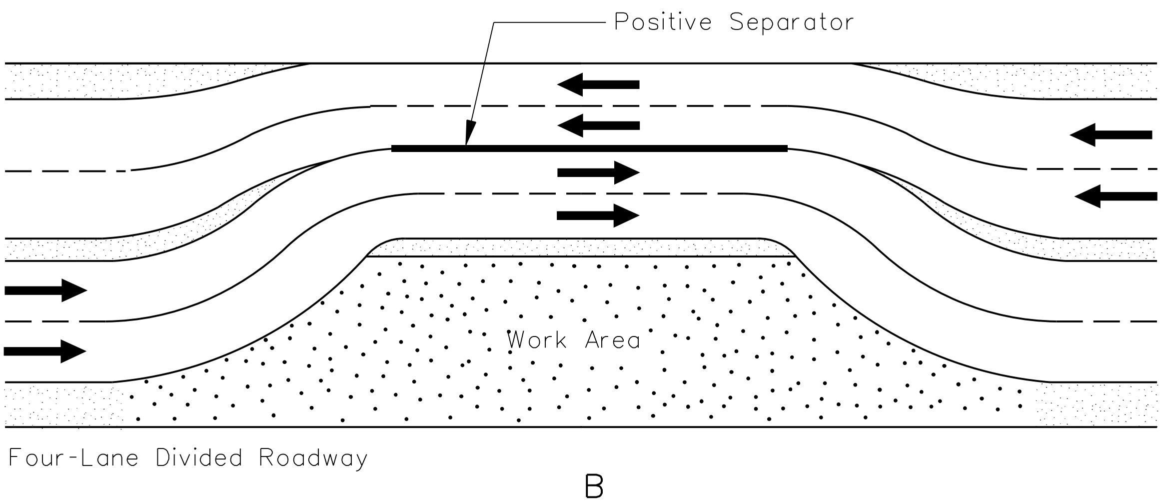
Figure 13-2.E



SHOULDER OR MEDIAN USE WORK ZONES

Figure 13-2.F





CROSSOVER WORK ZONES

Figure 13-2.G

The use of this application is encouraged under the following conditions:

- all safety issues can reasonably be addressed,
- construction time can be reduced,
- pavement and shoulder structures can be reasonably upgraded, and
- roadway geometrics allow crossover construction.

Chapter 55 and the *Highway Standards* discuss the design issues relative to designing two-way applications and crossovers (e.g., maximum length, pavement widths, pavement design, speed reductions). If this application is used, separate opposing traffic on high-speed facilities (i.e., posted speeds of 45 mph or greater) with positive barriers throughout the length of the two-way operation. Drums, cones, or vertical panels may be substituted for positive barriers in low-speed urban situations. The *Highway Standards* also depict the channelization devices that may be used with this layout. Consider also the option of reconstructing the shoulder to allow it to be used as a travel lane.

8. Detour. This work zone type involves total closure of the roadway, one or both directions, when work is being performed and rerouting the traffic to existing alternative facilities. This application is particularly desirable when there is unused capacity on roads running parallel to the closed roadway. When considering detours, evaluate the following:

   a. Local Route Detours. Local route detours are generally used in conjunction with the rehabilitation or reconstruction of two-lane, two-way State-maintained highways having an ADT less than 5000 vpd. However, a local route (e.g., county highway, township road, municipal street) may require upgrading (structurally and/or geometrically) or extraordinary maintenance to carry the anticipated temporary increase in traffic and to restore it subsequent to the detour. When investigating the practical use of a local road as a detour route, note that the detour route only will be temporarily serving the through traffic. If the local route detour will be an economically reasonable alternative, make every effort to use the existing roadway width, the existing right-of-way, and to minimize any contemplated utility adjustments. Also, investigate the local route to determine the safe detour speed. Where the posted speed of the detour route is less than that of the detoured route, additional speed signs and warning devices may be required. Contact officials having jurisdiction over the local route and obtain their concurrence prior to using the route for a temporary detour.

   b. Marked State Routes. For marked State routes with ADTs greater than 5000 vpd, locate the detour along other marked State routes. Note that the adverse effects listed below and those for local detour routes also may apply to these detour routes.

c. Location. The beginning and end of all detours should coincide as near as possible with the beginning and end of the construction project. Where practical, avoid long detours that will bypass entire communities.

d. Pedestrians. Evaluate pedestrian traffic concerns and methods of eliminating or minimizing any other adverse effects when closing a road. Adverse effects could include inadequate access to buildings, private property, or businesses along the closed road.

e. Railroad Crossings. Examine railroad crossings to see if existing protective devices, sight distances, geometrics, and crossing surfaces are adequate for the proposed traffic.

f. Wide Load Restrictions. Determine if there will be a need to post advance signs to prohibit wide loads from using the detour.

g. Split Detours. In some cases, it may be advantageous to provide two detours routes — a marked State route detour and a local route detour. Through traffic and heavy-truck traffic is detoured onto State-marked, high-type surface highways. The local route detour is for local traffic and vehicles weighing less than 25,000 pounds (11,000 kg). This limit will allow school buses to use the local route detour.

h. Benefits. Note that improvements to local routes provide a permanent benefit for the public, whereas runarounds provide only temporary benefits that cease when the construction project is completed.

9. Roadway Shifts. This work zone type shifts the proposed roadway alignment laterally, (e.g., 50 ft (15 m), 100 ft (30 m)) so that the existing roadway or bridge can be used as the means to maintain traffic flow at the work site. This is an option that is usually only appropriate at horizontal curve locations, or bridge sites where the roadway profile gradeline must be raised for hydraulic purposes. Note that additional right-of-way or easements will often be necessary for this work zone type.

10. Work During Non-Peak Hours. When high-volume projects do not have good alternatives for 3R type work, consider requiring work during non-peak hours and/or night work.

13-2.03 Work Zone Strategies

13-2.03(a) Relocating Traffic Flow

The desired objectives to consider in relocating traffic flow are:

- Meet safety and mobility goals (see Section 13-1.01) to reduce fatal and serious injury crashes, and to avoid unreasonable adverse travel and public inconvenience.

- Plan for incidents and emergency vehicle access. Ensure that emergency vehicles can move through the work zone with minimal delay.
- Maintain reasonable access for local interests (residents, businesses, agriculture, etc.).
- Maintain marked route continuity to avoid motorist confusion and to enhance safe travel.

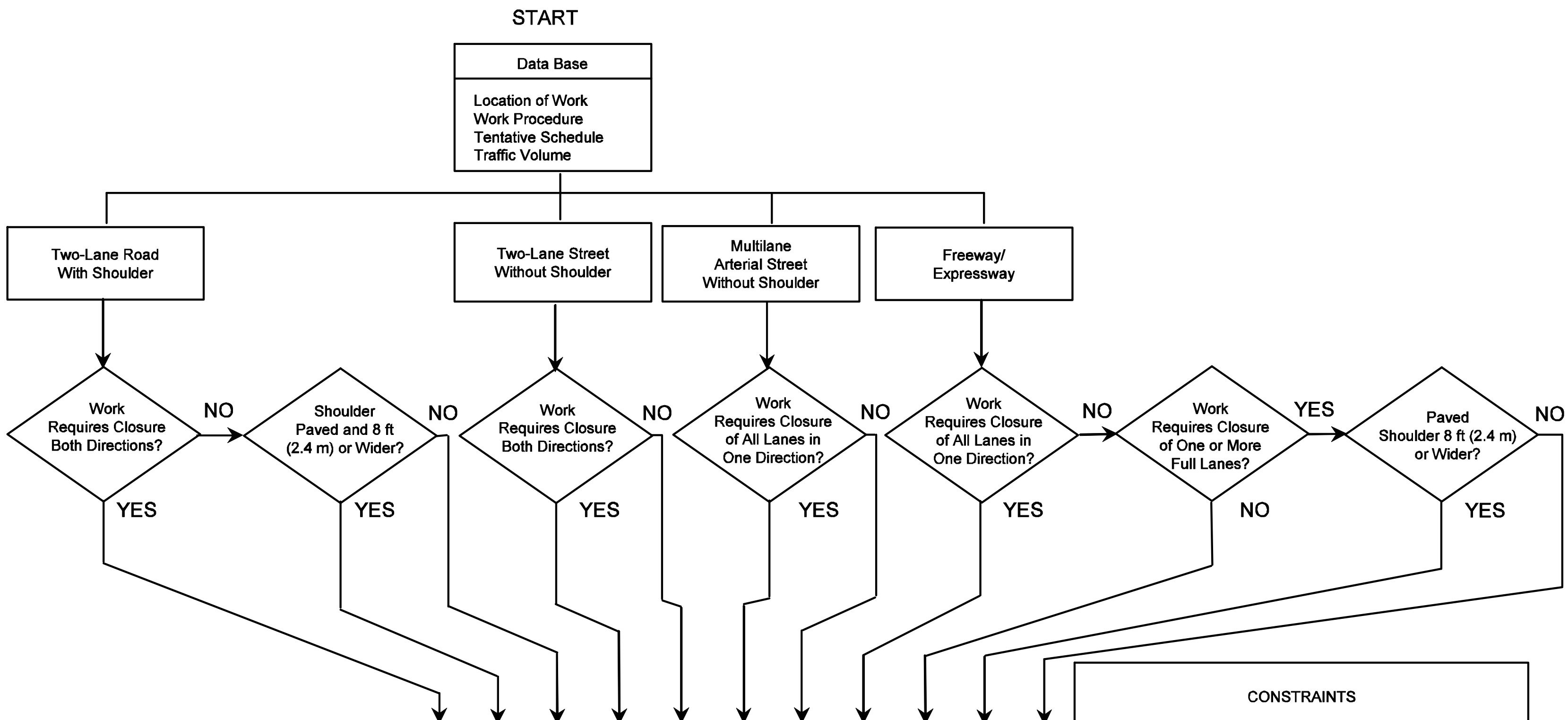
13-2.03(b) Selection of Traffic Control Strategy

Selection of the appropriate work zone type represents one of the most significant elements of a control strategy. Other elements of a control strategy that should be considered include length of the work zone, time of work, number of lanes, width of lanes, traffic speeds, and right-of-way. Considering these and other factors, reasonable alternatives can be narrowed to a selected few for further review. Typically, only a small number of reasonable work zone alternatives will emerge for a particular project. Identification of these alternatives at an early stage in the planning process can reduce significantly the necessary analysis effort.

Figure 13-2.H provides guidelines for identifying practical work zone alternatives based on roadway type, lane closure requirements, shoulder width, traffic volume, and the availability of right-of-way and detour routes. However, every work zone location will have a wide variation of conditions and an all-inclusive selection matrix is not practical. Other issues to consider include the following:

1. Local Regulations. Many jurisdictions have adopted safety regulations and public convenience policies as safeguards against the unacceptable impacts of work zones. These regulations and policies may impose additional constraints regarding the types of control strategies that can be implemented. Knowing these constraints can help eliminate impractical alternatives from consideration. The public convenience policies or local regulations may specify peak-hour restrictions, access requirements, noise level limitations, material storage and handling, excavation procedures, work zone lengths, and number of traffic lanes that must remain open.

2. Multilane Facilities. Traffic on multilane facilities is usually maintained through the use of lane constrictions, lane closures, or median crossovers. Maintaining traffic flow on multilane facilities generally will require higher criteria than those used on the rural two-lane highway system because of the higher speeds and traffic volumes. See the *Highway Standards* and Chapter 55 for recommended design guidelines.



ALTERNATIVE WORK ZONE TYPES													CONSTRAINTS
LANE CONSTRICTION (Use part of the shoulder if necessary)													Restripe lane lanes; keep lanes 10 ft (3.0 m) or wider.
LANE CLOSURE													Will the reduced number of lanes have adequate capacity?.
DETOUR TO EXISTING ROAD													Reasonable detour route(s) available. Maintain local access.
CROSSOVER													Can adequate crossover geometrics be provided?
ALTERNATING ONE-WAY OPERATION													Traffic volume less than 1000 vehicles per hour both directions.
INTERMITTANT TOTAL CLOSURE													Traffic volumes less than 500 vehicles per lane per hour.
RUNAROUND													Sufficient right-of-way available.
USE OF SHOULDER (As a full lane)													Check the structural adequacy of the shoulder.

Practical Altern

IDENTIFICATION OF FEASIBLE WORK ZONE TYPES

Figure 13-2.H

3. Bridges. Traffic maintenance for bridges may consist of crossovers, stage construction (partial closure), detours, runarounds, or split detours. Coordinate all proposed designs with the Bureau of Bridges and Structures early in Phase I to determine possible structural solutions and related costs before writing the TMP. In addition, consider the following:

   a. Crossovers (Full Closure). Consider using crossovers with bridge and superstructure replacements and deck replacements on multilane median divided facilities.

   b. Stage Construction (Partial Closure). Stage construction for bridges will generally consist of lane constrictions, lane closures, or one-lane, one-way operations. However, stage construction may increase unit costs, increase the difficulty of reconstructing the bridge, have inherent hazards due to close proximity of traffic to the construction operations, and generally involves a restricted lateral clearance for vehicles, wide loads, and farm equipment. With lateral restrictions, it is important that these restrictions be adequately marked in advance of the work site. Consider the following factors when determining the feasibility of stage construction for bridges:

      - type, length, and width of present and new structure;
      - beam spacing and location in relation to the desirable staging limits;
      - lane and shoulder widths required during stage operations; this may require using the shoulder as part of the lane;
      - the use of temporary traffic signals; and
      - cost attributable to staging.

      Deck repairs can usually be staged for all structure types. Superstructure and deck replacement, however, is sensitive to the type of structure involved. Existing multi-beam superstructures (e.g., steel I-beams, concrete I-beams) and culverts can usually be adapted to construction staging techniques. Other types of structures (e.g., pony trusses, relatively short-span structures utilizing low trusses without cross bracing) may be staged, but with greater difficulty and expense. Some structures (e.g., through trusses, through girders) cannot practically be staged.

   c. Runarounds. At locations where a through truss, pony truss, or steel through girder is being replaced, consider moving the truss or girder laterally to temporary abutments and using the structure as a part of the runaround.

   d. Split Detours. If significant through traffic is using the road, it may be advantageous to provide a marked detour route around the work site and build a low-water runaround across a stream for local access. This option is usually applicable only on low-volume unmarked rural highways with less than 400 vehicles per day. See the *Bureau of Local Roads and Streets Manual* for design considerations and Section 404 permit requirements.

4. Additional Guidance. For additional guidance in analyzing and preparing a scheme to maintain traffic flow at work sites, see the *Highway Standards*, *Illinois Manual on Uniform Traffic Control Devices*, and *Standard Specifications*.

13-3 TRAFFIC CONTROL PLAN STRATEGIES

The following sections provide brief summaries of the various Traffic Control Plan (TCP) strategies that may be considered during the development of a TCP. These strategies must be reviewed and adjusted to meet each project location and situation. Note that the strategies discussed in these sections are not all inclusive and that other options may be applicable for the location under consideration. Specific work zone traffic control recommendations are discussed in Chapter 55.

13-3.01 Construction Phases

How a project is constructed can greatly impact the traffic flow through the work area. The following sections discuss some of the basic construction phases for freeways.

13-3.01(a) Reconstruction by Halves (Sides)

This approach involves the reconstruction of all lanes in one direction while the opposing lanes share the same roadway with traffic in the other direction. This basic concept is the two-way traffic on a divided facility discussed in Section 13-2.02. For high-volume, four-lane facilities, both shoulders may be rebuilt to provide four reduced-width lanes. For six-lane facilities, traffic is generally restricted to two lanes in each direction. This may require using the shoulders, reducing the lane widths, and/or providing minor widening. Under certain circumstances, depending on the median width and shoulder configuration, the inner lane of the two-way operation may not be readily accessible in the event of emergencies. Providing for emergency turnouts and/or emergency vehicle access at appropriate intervals on the segment under construction may be considered. Some advantages and disadvantages of this strategy include:

Advantages

- It provides an effective work area.
- Generally, workers are well separated from the traffic stream.
- Work site access can be arranged with minimal interference from the general traffic flow.

Disadvantages

- Crossovers are typically required.
- Positive separation of the traffic streams is required.
- There are potential emergency access problems throughout the project.
- There may be special problems at interchanges with traffic crossing the work zone.
- Reduced capacity.

13-3.01(b) Parallel/Adjacent Reconstruction

This approach usually involves a variety of lane constriction and lane closure sequences discussed in Section 13-2.02. A typical sequence of this approach is as follows:

1. Phase A. First, the existing shoulders are widened and strengthened if necessary.
2. Phase B. Traffic is shifted to the shoulders to allow construction of the inner lanes and any median reconstruction.
3. Phase C. Traffic is then shifted to the newly constructed inner lanes to allow reconstruction of the outer lanes.
4. Completion. After construction is completed, traffic is returned to the original travel lanes.

A key advantage of this strategy is that traffic is not required to cross over the median and does not operate in a two-way operation. Some of the disadvantages include:

- Typically, it provides a more constrained work area for the contractor.
- Work crews are generally closer to moving traffic.
- Access to the construction zone typically involves entry and exit from the travel lanes.

For six-lane facilities, the facility is generally reduced to two-lanes in each direction and the above sequence is used. When closing the middle lane, it is preferable to keep the two through lanes on the same side of the construction zone (e.g., by using the shoulder) versus splitting the two lanes on either side of the construction zone.

13-3.01(c) Serial/Segmental Reconstruction

This strategy consists of permitting only short segments of the facility to be under construction at one time. This also requires one or more of the other concepts for traffic accommodation. An example of this application may include a shallow culvert replacement where each half can be constructed, backfilled, and opened to traffic within a 12-hour time period.

The advantages of this approach include relatively short work zones and few, if any, interchanges are impacted at any one time. One of the more serious disadvantages of this strategy is that the overall time period that the facility is under construction may be lengthened considerably because the construction for each segment will proceed independently. Therefore, the exposure to the potentially hazardous conditions of a work zone for both the traveling public and the work force may be substantially greater than could be the case with one of the other strategies.

13-3.01(d) Complete Closure (Detour)

In some circumstances, complete closure of the facility or closure of one direction of travel and detouring the traffic onto an alternative route may be an effective strategy. This strategy may also be effective for only certain hours of the day (e.g., 8 p.m. to 6 a.m. on weekdays and from 8 p.m. to 8 a.m. on weekends). Section 13-2.02 discusses other issues relative to detours. Some of the advantages and disadvantages of this strategy include:

Advantages

- Increases the safety for construction workers.
- May provide cost and time savings.
- Reduces the overall travel impacts to the public due to reduced construction time.

Disadvantages

- Potentially significant short-term travel impacts to the public.
- Potential increase in traffic congestion on other routes.
- May need to construct a detour/runaround.
- Potential adverse impact on businesses due to trip suppression (not enough traffic).
- Potential adverse impact to businesses on alternative routes (too much traffic).

13-3.01(e) Combinations

Often, a combination of construction sequences is the best strategy. For example, reconstructing existing shoulders prior to initiating parallel construction activities. The following sequence of construction could be used:

1. Phase A. Reconstruct shoulders as appropriate to allow one side of the roadway to accommodate four lanes.
2. Phase B. Shift traffic to the four available lanes on one side of the roadway.
3. Phase C. Shift traffic to the newly constructed side of the roadway using the additional reconstructed shoulder lane.

Other combination-type construction sequences involve the reconstruction of interchanges where both sequential and parallel activities may occur simultaneously.

13-3.02 On-Site Strategies

13-3.02(a) Traffic Control Devices

Consider the application of the following traffic control devices when developing a TCP:

1. Portable Changeable Message Signs (PCMS). These devices may be used where static sign messages are not sufficient to accommodate the changing conditions of a work zone (e.g., lane closures, ramp closures, to advise motorists of conditions for which they will need to possibly react). These devices are also used to inform the traveling public of road construction activities on site prior to construction. Where numerous PCMS are used on a project, there should be a plan for their use to ensure a consistent and cohesive message. See Section 55-5.01(d) and the *MUTCD* for further guidance.

2. Additional Informational Panel Signs. These signs may be used to give the motorists additional information about a work zone. Ensure the message on these signs is pertinent to the likely conditions the motorist will encounter.

3. Signal Interconnect. Interconnect traffic signals where the benefit of moving traffic through a work zone more efficiently will be enhanced by adding interconnection between the traffic signals on the system.

4. Signal Timing. Revise the timing of traffic signals within a work zone to increase the capacity. Adding or deleting of signal phases may be required for changes in travel patterns.

5. Highway Advisory Radio. Use highway advisory radio where changing work zone conditions make it important to give the motorist a longer, more accurate message than could be obtained through the use of signs or other means. This option requires additional information and signing to alert motorists.

6. Temporary Work Zone Speed Limits. A reduced regulatory speed limit may be warranted where work activity may constitute a hazard to traffic or workers. Direction on alteration of work zone speed limits may be found in the Bureau of Operations "Policy on Establishing and Posting Speed Limits on the State Highway System."

7. Arrow Boards. In construction areas, arrow boards are used to supplement conventional traffic control devices. They typically are warranted where additional warning and directional information is required to assist in merging and controlling traffic through and around the work activity. The *Highway Standards* provide additional guidance on the placement and use of arrow boards in construction zones.

8. Intelligent Information Systems. Investigate new and emerging technology to provide better travel information to the public. Current systems provide real time travel information to the public through PCMS. Other systems that have been used include: variable speed limit signs, early merge and late merge strategies for lane closures, and electronic speed monitoring devices.

13-3.02(b) Capacity

Each construction site will affect the capacity of the existing facility. The extent the roadway is occupied for work and safety purposes will determine the number of strategies required to compensate for the loss of capacity. As well as, a reduction in capacity affects mobility (see Section 13-3.02(c)). Consider the following capacity strategies when developing a TCP:

1. Temporary Parking Restrictions. One option to increase capacity is to restrict on-street parking that can then be used to add an additional lane or to reduce traffic conflicts. These restrictions can be during peak periods or for 24 hours/day. However, ensure that the concerns of on-street parking for local businesses have been addressed. Use of parking lanes for traffic lanes also may require geometric revisions at intersections.

2. Restriction of Trucks. Restriction of trucks may increase the facility's capacity. However, consider local and/or State ordinances and the availability and suitability of alternative routes that the restricted trucks will be required to take.

3. Turn Restrictions. Eliminate or restrict turns at intersections and/or driveways may increase capacity and reduce crashes. Turn restrictions can be during peak periods or for 24 hours/day.

4. Reversible or Contra-Flow Lanes. Reversible or contra-flow lanes may be considered where a large percentage of the traffic moves in one direction during peak periods, and the existing facilities are adaptable. Candidates for reversible flow lanes lack center medians and have continuity in the route and the width of the street. The optimum distribution may be found by dividing the number of lanes operated in the primary direction by the total number of lanes (e.g., 4 lanes primary direction divided by 6 lanes total yields a 67% optimum percent traffic in the primary direction).

   The advantage of reversible lanes is the ability to increase the capacity of the existing facility. However, there are many disadvantages:

   - High cost of reversing direction twice a day.
   - Consider need for positive separation between lanes, which requires movable barrier and the associated equipment.
   - Public information campaign required to educate the traveling public.
   - Resistance from business owners, schools, traffic generators, and emergency service providers.
   - Where applicable:
     + Parking must be time restricted or eliminated.
     + Left turns must be restricted or eliminated.
     + Bus service may cause mobility problems in secondary direction.
   - Incident management may be needed, as a stalled vehicle or crash will severely restrict or stop flow for the secondary direction.

5. Ramp Metering. Consider using or revising ramp metering where it is necessary to control the volume of traffic entering a freeway for capacity and safety reasons. Ramp metering may be used during peak periods or for 24 hours/day. Also, consider the impact ramp metering will have on the intersecting street (e.g., traffic backup).

13-3.02(c) Queue Analysis

Queue analysis is critical not only to meeting mobility goals, but to improving safety for the motorist. The largest category of crashes in work zones is rear end collisions. At highway speeds, the number of rear end collisions increases to nearly 30% of all work zone crashes. These crashes are largely due to the highway not meeting the motorist's expectations – the motorist does not expect a queue, even in a work zone.

Analysis of the peak queue allows the designer to place warning signs (e.g., road construction ahead, static PCMS, dynamic message boards) in advance of possible queues. This practice not only improves the safety of the work zone, but it aids the designer in the placement of signage for suggested alternative routes well ahead of the queue.

Queue analysis methodology should be appropriate to the type of work zone and may include one or more of the following:

- Permitted Lane Closure Maps (PLCM);
- hourly volume maps;
- district knowledge and experience;
- site reviews;
- highway capacity analysis converted into a predicted queue; and
- computer simulation programs (e.g., QUEWZ, TSIS – CORSIM, Quickzone).

Experience with similar construction projects and the effectiveness of the traffic control strategies employed is critical to provide a reality check to any analysis.

Where queues are normally present without lane closures, compare existing queues to expected queues. Discuss how the main and alternative strategies may reduce the impact lane closures, construction, or other work have on the project.

13-3.02(d) Miscellaneous Strategies

In addition to the above sections, consider the following miscellaneous on-site strategies when developing a TCP:

1. Ramp Closures. The following will apply to ramp closures:

    a. Short/Intermediate Term. Short- or intermediate-term ramp closures may be necessary for construction purposes. If closures are required, additional signage will be necessary to forewarn the motorist. It is recommended to post signs on the affected ramp two weeks in advance to advise motorists of the closure date(s) and/or periods of the day the ramp will be closed.

b. Long Term. Long-term ramp closures may be necessary to construct or to improve traffic flow on the mainline road. Consider the effect the ramp closure will have on emergency services, local access, and businesses before deciding on a long-term ramp closure. Also evaluate the user costs for a detour route and the capacity and safety impact of the detour route. Do not close two adjacent ramps at the same time unless necessary for safety reasons.

2. Incident Management. Consider the use of on-site tow trucks for freeway work zones with limited or no shoulders available. They should also be considered where a crash or break-down will seriously impact the roadway and cause significant backups and delays. Consider providing turnarounds for access through temporary concrete barrier and for tow trucks and State Police to park.

3. Special Materials. Examine the use of high early strength concrete, precast items or other special materials where traffic restrictions must be minimized (e.g., ramps, intersections, high-volume roadways). Time and overall cost savings may offset the potentially higher material costs.

4. Police Enforcement. For projects that include complex work zones with high speeds, high traffic volumes, or that would benefit from the presence of enforcement over an extended period of time, consider using planned enforcement. Designers should indicate this need as part of the Phase I and Phase II process in developing the project Transportation Management Plan. Designers should coordinate with Construction, Operations, and Programming Engineers to include this cost as an additional project expense in the highway program, as opposed to using annual allocation of hire-back hours, if it is warranted in order to ensure that dedicated law enforcement is provided in the work zone.

5. Photo Speed Enforcement. Photo Speed Enforcement is another work zone enforcement option allowed by Illinois law. This program is funded by the Transportation Safety Highway Hire-back Fund. The locations of these patrols are coordinated through IDOT and Illinois State Police Districts with the guidance of the Bureau of Safety Engineering.

6. Pedestrians. In urban or suburban areas where pedestrian activity is likely, pedestrian access must also be provided during construction. This may require positive guidance, providing temporary sidewalks, protection from drop offs, adjustment to traffic signals, etc. ADA accessibility requirements shall be applicable to construction zones in urban areas where accessibility is provided by the existing facility. Consult the *MUTCD* and *ADA Standards for Accessible Design* to ensure devices meet accessibility requirements.

13-3.03 Off-Site Strategies

Where construction will significantly impact the traffic flow away from the work zone, consider the following off-site strategies in the TCP:

1. Advance Informational Signs. These signs may be used to give the motorists additional information about a work zone that is ahead or on a different route. Provide these signs where it is advantageous to give this information to a large number of motorists or where it is necessary to inform motorists of an alternative route to avoid a congested work zone.

2. Portable Changeable Message Signs (PCMS). These devices can be used to give the motorists information required to prepare them for upcoming changing conditions or information about how to avoid a condition. These devices may be used to provide more information than feasible on an informational panel sign. See Section 55-5.01(d) for more information.

3. Signal Interconnect. Evaluate interconnecting traffic signals where moving traffic through an alternative route corridor more efficiently is enhanced by adding interconnection between traffic signals on the alternative route system.

4. Signal Timing. Evaluate traffic signal timing changes and/or additional phases for traffic signals on an alternative route because of the added traffic expected to use the route.

5. Capacity Improvements. Additional improvements on the alternative route may be necessary for capacity reasons to accommodate the expected diversion of traffic. Examples of capacity improvements include additional pavement width, adding turn lanes, removal of parking, turn restrictions, and truck restrictions.

6. Trailblazing to Attractions and Points of Interest. Trailblazing may be necessary to guide motorists to attractions and points of interest in those circumstances where the normal route is closed or seriously restricted, or where an alternative route to the attraction or points of interest will assist traffic through the work zone.

13-3.04 Scheduling

Construction time has a direct affect on the cost of the project. A short schedule to minimize construction activities and disruption to traffic may be required if motorist user costs are expected to be high. A schedule that minimizes construction time also limits the exposure for workers and the traveling public to the hazards of the work zone. However, short schedules may increase the cost of the project. A longer schedule of construction activities may be cost effective if it does not significantly increase the adverse impact to motorists. The contractor may bid a lower price for a longer schedule. When determining a construction schedule, consider the following:

1. Strategies for Reducing Construction Time. Incentives/Disincentives and A+B contracts may be used to minimize the time a facility is affected by construction. Contact BDE for

information. See Section 66-2.03 for guidance on estimating the expected construction time for the project.

2. Lane Rental. Lane rental is a contracting technique whereby either the contractor bids the number of days of work requiring lane closures as part of the contract, or the Department sets the number of days for which such closures are allowed. If the contractor finishes early, an incentive is paid. If the contractor exceeds the number of days allowed, a disincentive payment is deducted from the contract for each day the limit is exceeded. This type of contract forces the contractor to schedule resources and perform work in a more timely manner.

   Consider contracts using a lane rental specification on all high-volume, multi-lane projects (e.g., Interstates, expressways). Complete a traffic capacity analysis for these projects to determine the level-of-service to be anticipated during construction. In addition, conduct a queuing analysis to determine the anticipated traffic backups at different times during the day and week. Once a traffic capacity analysis and queuing analysis are complete, a decision may be made on whether or not to use a lane rental specification. If a lane rental specification is used, this information will aid in determining the average road user benefit cost.

   For all Interstate and expressway projects that involve patching, include the lane rental specifications. The lane rental specification must apply to the patching operation and may be applied to the whole project. Prepare a traffic capacity analysis and queuing analysis to determine the anticipated back-ups at different times during the day and week. This information is then used in determining the average road user benefit cost for purposes of developing the lane rental specification.

3. Letting Dates. Projects that can be completed in one construction season should be let and scheduled to be completed prior to winter shutdown. For those projects requiring more than one season, the major phases of construction need to be planned to recommend an appropriate letting date and provide a schedule for winter shutdown. Delays and impacts to the traveling public and adjacent property owners should be minimized. A schedule that minimizes construction time also limits the exposure for workers and the traveling public to the hazards of the work zone. See Chapter 66 for further information for selecting contract letting dates.

4. Time of Day/Day of Week Restrictions. These types of restrictions may be necessary if the work zone capacity will not accommodate the expected demand during the peak periods and other measures are not as cost effective. For example, night work may be required to allow longer work hours than can be provided between morning and afternoon peaks. Night work may also be used to decrease the excessive traffic delays or congestion associated with lane closures during the daytime.

5. Project Phasing. Project phasing or completing smaller portions of a construction project one portion at a time may be necessary to limit disruption to traffic. However, construction activity in the same area over several seasons should be discouraged.

6. Combining with Other Work. Projects within a corridor may be combined or scheduled at the same time where practical, pending available funding, to minimize impacts to the motoring public.

7. Timing. Control the timing of road closures for a certain time of the year by either setting the letting date or by placing restrictions in the special provisions. Also, when closing or restricting widths on rural highways, time the closure to occur after spring planting operations have been completed and ensure that the highway is open to traffic by harvest time.

8. Sequence of Construction. Consider the sequence of construction to reduce any stages of construction when possible. For example, requiring a shoulder and pavement lane to be milled and resurfaced in the same operation would eliminate a second traffic control setup for resurfacing the shoulder. The reduction in traffic control cost, overall reduction in time, the bituminous plant change over from one mix to another, and cost reduction due to increased volume of one mix may offset the additional cost for the increased material cost on the shoulder material, especially in the binder stage. Examine the overall effects of staging and sequence of construction to reduce the exposure time of workers and the traveling public to the hazards of the construction zone.

9. Prohibit Weekend Lane Closures. On roadways with ADT of 25,000 or more, keep all lanes open to traffic from 3:00 P.M. Friday to 12:00 midnight Sunday except where structure construction or major rehabilitation makes it impractical. Where patching and resurfacing are performed on these routes, lane closures are often in place and cause extensive backups. By restricting the work on weekends, all traffic lanes are available to accommodate the higher weekend volumes of traffic.

   Where the ADT exceeds 25,000, provide the ADT on the cover sheet of the construction plans. A traffic capacity analysis and a queuing analysis should still be completed. On some routes ADTs may be lower on weekends and it would be beneficial to allow or require work on weekends. In these cases, contracts should contain specifications to allow this work.

   For projects with less than 25,000 ADT on which traffic volumes are still relatively high, especially Interstates, conduct a traffic capacity analysis and a queuing analysis to evaluate the possible benefit of prohibiting weekend lane closures.

10. Night/Non-Peak Hour Construction. On high-volume roadways, the Traffic Management Analysis (TMA) should consider limiting construction to non-peak or nighttime hours. For all TMAs prepared for roadways with greater than 25,000 ADT, include a traffic capacity analysis and a queuing analysis. Where the one-way VPH exceeds 1700 or the level of service (LOS) drops to E or F, excessive back-ups will occur. Under these situations, restrict work to other times of the day.

    Once the traffic peaks and expected queues have been reviewed, the TCP can be developed. Under the above situations, construction should not be permitted during certain time periods for each direction of travel. This provides the contractor with some flexibility in scheduling work.

Under certain conditions it may be beneficial to require work be done only at night. This decision should be made after close examination of the traffic capacity analysis and queuing analysis. In cases where the traffic volumes remain high throughout the day but drop significantly during the night, where traffic delays would be continuous throughout the day, or to provide longer continuous work periods, consider using night construction.

Before requiring night construction, consider the following factors:

- noise level ordinances that may prohibit certain construction activities at certain times,
- noise and light impacts on the surrounding community,
- neighborhood traffic impacts due to detours or alternative routes,
- impacts to businesses, and
- community resistance.

When night construction is required by the contract, include the following:

- a lighting specification detailing the minimum lighting requirements,
- additional signing and increased use of PCMS to alert traffic,
- increased public relations efforts to notify the surrounding community, and
- restrictions to limit work hours to 7:00 P.M. to 6:00 A.M. Hours may be adjusted according to the traffic analysis.

13-4 PUBLIC INFORMATION PLAN (PIP)

Work zones, particularly those deemed to have a sustained impact on safety and mobility should include a PIP in the TMP. Significant projects are required to have a PIP.

Successful work zone public information and outreach campaigns incorporate three essential messages:

- Safety First.
- Plan ahead to minimize delay.
- We care.

It is important that the public be informed initially and remains informed in a timely manner. Consider the following steps to create a PIP:

1. Scope. The PIP should consist of a plan to inform and reach out to the public. For smaller projects, the PIP may be limited to contacting local EMS and schools, press releases of project scope and duration, and the IDOT website. Larger, more disruptive projects may warrant a more extensive campaign.

2. Identify Resources.

    - Use free media coverage through press releases to local news media (newspapers, radio, television) and the IDOT website.

    - Examine use of existing resources (e.g., highway advisory radio, dynamic message signs).

    - Use town meetings and project hearings to describe the project and gather public support.

    - Coordinate with public officials and law enforcement to help with gaining favorable public opinion.

    - Consider low cost options (e.g., creating brochures to be given to motorists at key locations and for posting at rest areas and welcome centers).

    - Coordinate with other transportation agencies (e.g., local agencies) to identify their construction and maintenance activities and to minimize motorist delays near the project.

    - Major employers and service providers may assist in informing the public. For example, these entities may be willing to incorporate messages in newsletters, web sites, or flyers to employees and customers at no cost to the Department.

    - Business and neighborhood associations have a vested interest in the road network. Buy-in from these groups may result in strategies to offset traveling hours or delivery times and increase the use of local routes by local drivers.

Larger projects may require public information and outreach spending as a part of the project budget.

3. Identify Partners. Identify other affected State and local agencies, major employers, schools, businesses, and neighborhood associations.

4. Identify Target Audience. Examine the project and identify which motorists are most affected by the project. Focus efforts on this audience.

5. Develop the Message.

   - Inform the motoring public that the Department cares about safety and delay in the work zone. For example:

     + Emphasize that safe passage through the work zone is critical.
     + Show that minimizing delay is important to the Department.

   - Indicate which alternate routes are available. Do not simply say “use alternative routes,” be specific as to which route should be taken.

   - Clearly communicate the project start date and plan to update the public throughout the project.

   - Where applicable, communicate hours of work (e.g., 7:00 pm to 5:00 am Monday through Saturday). Encourage travel during off-peak times.

   - Advertise alternative modes of transportation (e.g., carpool, share-a-ride, mass transit).

   For larger projects, consider a unified message that revolves around a slogan or mascot (e.g., Jack Hammer (mascot) for the Upgrade 74 (slogan) project in Peoria, Illinois, 2002). A unified approach may aid in gathering positive public support for extensive projects.

6. Determine Communication Strategies and Timing. Develop a plan for how and when to get the word out. For large projects, consider including a thank-you campaign to publicize completion and enhance the Department’s image as focused on the motorist.

7. Evaluate. The TCP author or team should evaluate the effectiveness of the PIP as part of the Department’s long-term efforts to improve safety and mobility in and around work zones.

See the FHWA publication *Work Zone Public Information and Outreach Strategies*, November 2005, for more information.

13-5 TRANSPORTATION OPERATIONS PLAN (TOP)

Work zones, particularly those deemed to have a sustained impact on safety and mobility should include a Transportation Operations Plan (TOP) in the TMP. Significant projects are required to have a TOP.

A TOP is a plan that consists of strategies that mitigate work zone impacts through the use of improved transportation operations and management of the transportation system. The TOP may consist of strategies for:

- demand management,
- corridor/network management,
- work zone safety management,
- traffic and Incident management, and
- enforcement.

13-5.01 Demand Management

Demand management strategies include techniques intended to reduce the volume of traffic traveling through the work zone. These techniques include, but are not limited to:

- mass transit service improvements and incentives,
- shuttle services,
- carpooling incentives,
- park and ride promotion,
- ramp metering, and
- working with local business to promote variable work hours and/or telecommuting.

13-5.02 Corridor/Network Management

Corridor or network management strategies optimize traffic flow through the work zone corridor and adjacent roadways. Strategies include, but are not limited to:

- signal timing and coordination improvements,
- street and intersection improvements on mainline and adjacent roadways,
- bus turnouts,
- truck lanes or truck restrictions,
- turn restrictions,
- parking restrictions, and
- coordination with adjacent construction projects.

13-5.03 Work Zone Safety Management

Work zone safety management strategies address worker and traffic safety. Strategies include, but are not limited to:

- variable work zone speed limits based on traffic volume and/or type of work,
- temporary traffic signals,
- temporary traffic barrier and movable barrier systems,
- trailer or truck mounted attenuator systems,
- temporary rumble strips,
- safety awards/incentives,
- construction safety supervisor/inspectors,
- TMP monitoring/inspection team, and
- work zone safety assessments.

13-5.04 Traffic and Incident Management

Traffic and incident management strategies monitor traffic conditions and make adjustments based on these changing conditions. Strategies include, but are not limited to:

- Intelligent Transportation Systems (ITS) may be used to:

  + detect traffic flow, and automatically relay "real time" travel time to motorists via PCMS, websites, or other outlets; and

  + detect queues, and automatically actuate warning systems.

- gawk screens to reduce driver distraction;

- milepost markers to aid the motorist in locating themselves in an incident;

- tow/service patrol; and

- incident/emergency management plans.

13-5.05 Enforcement

Enforcement is a critical and unique portion of work zone transportation operations planning. The presence of law enforcement, appropriately deployed, has proven effective in gaining compliance with work zone speed limits to enhance work zone safety. See Section 55-6 for more information.

13-6 COST-EFFECTIVE ANALYSES

13-6.01 General

Along with not obtaining mobility goals, failure to maintain traffic flow during construction can cause driver aggravation, add substantial operating cost to motorists or businesses, and cause unfavorable public relations for the Department. However, these considerations must be balanced against the capital costs to the Department, because limited funds are available.

Capital costs include the building and removal of a temporary runaround, using a local route detour and structurally upgrading its roadway, paying for accelerated construction progress, night work, or providing stage construction that may result in increased unit costs. These options can add considerable costs to the overall project.

For many projects, there may be more than one option that will address the problem of traffic during construction. To determine the most appropriate option, the designer or TMP team must compare the benefits and costs of each to determine the most appropriate option.

13-6.02 Cost Evaluations

13-6.02(a) On-Site

When determining the cost for on-site options (e.g., runarounds, lane closures, crossovers, shoulder use), the designer should consider the following:

- right-of-way costs (temporary and permanent);
- additional construction costs;
- environmental effects;
- vehicular delay;
- user costs (including detour user costs; see Section 13-6.02(c)); and
- crash potential.

When determining the effect of each on-site option, the designer may also consider the effect the selected option will have on unofficial detours (i.e., detours which drivers select on their own to avoid the construction area).

13-6.02(b) Detours

For detours, the designer must determine the total cost of the detour. This includes:

- detour user costs; see Section 13-6.02(c);

- the cost for any improvements needed to the detour route (e.g., repaving, pavement widening, signal improvements);

- the effect the detour will have on the community and local businesses; and
- the effect on the local street network.

13-6.02(c) Detour User Costs

Adverse travel is the additional distance that motorists must travel to complete their trips around the work site while a detour is in use. To reduce project construction costs to the Department and to enable these savings to be used for other needed improvements, it is considered in the best interests of the public for road users to directly share in the costs of road and bridge improvements. Road users will bear some of the costs of reasonable adverse travel. Accordingly, this should be reflected during preparation of the TMP. Multiply the computed adverse travel costs by 0.5 before making any comparisons to the costs of other alternative methods of maintaining traffic flow.

Breakout the cost according to the following:

1. <u>Cars, Pickups, and Vans</u>. When computing operating costs for cars, pickups, and vans, *Your Driving Costs* published by the American Automobile Association and available on their website, may be used as a guide to determine the per mile (km) costs.

   Only the operating costs need to be considered in computing per mile (km) costs that include:

   - gasoline and oil (note the gasoline price used for calculation by the publication);
   - maintenance, accessories, parts, and tires; and
   - State and Federal taxes on the above.

   Fixed costs (e.g., insurance, depreciation, license fees, finance charges) need not be considered because they are incurred whether or not a vehicle is driven extra miles (km).

2. <u>Trucks</u>. For truck operation costs, only the operating costs need to be considered in computing per mile (km) costs for trucks. These costs include:

   - diesel fuel for tractor-trailer units and gasoline or diesel fuel for single-unit trucks (note the fuel cost used for calculations by the publication);
   - tires;
   - maintenance (oil, grease, repairs);
   - driver's wages and fringes; and
   - operating depreciation.

Fixed costs (e.g., tractor or trailer replacement costs, Federal highway use tax, license fees, insurance, finance charges) need not be considered because they are incurred whether or not the vehicle is driven extra miles (km).

These costs may be estimated by multiplying the average car, truck, and van operating costs by 4.5 for SU and 5.5 for MU.

For any additional information on adverse travel costs or on the above listed publications, contact BDE.

13-6.02(d) Example Cost Evaluation

Project – Three Span Bridge, Full Structure Replacement

Option 1 – Detour			
Project Costs	1	Widening and Intersection Improvements	$
	2	Signal Improvements	$
	3	Repairs/Improvements of Local Routes	$
	4	Motorist delay/cost in detour	$
Total Project Cost			$
User Costs	1	Effect on Local Businesses	$
	2	Adverse Travel, Cars	$
	3	Adverse Travel, Trucks, 8% SU, 5% MU	$
Total User Costs			$
Option 2 – Temporary Runaround			
Project Costs	1	Right-of-Way	$
	2	Construction and Removal of Runaround	$
	3	Temporary Bridge	$
Total Project Cost			$
User Costs	1	Motorist delay in work zone	$
Total User Cost			$
Option 3 – Stage Construction			
Project Costs	1	Temporary Traffic Barrier	$
	2	Temporary Traffic Signals	$
	3	Increased Structure Cost due to Staging	$
Total Project Cost			$
User Costs	1	Motorist delay in work zone	$
	2	Longer construction time	$
Total User Cost			$

13-7 REQUEST FOR EXCEPTION TO COMPLIANCE

Request for Exception to Compliance with the Work Zone Safety and Mobility Rule:

Region No.: ________________ Route: ________________

District No.: ________________ Section No.: ________________

County: ________________ Project No.: ________________

Program Year: ________________

ADT: ________________ DHV: ________________ Design Speed: _______

Mobility Goals:

1. Delays caused by work zones should not exceed more than 5 minutes per mile of project length, with a maximum of 30 minutes above the normal recurring traffic delay.
2. Queues caused by work zones should be no more than 1.5 miles beyond pre-existing queues.

Based on impact analysis and construction strategies, the stated goals are not expected to be met for the above project. See attachments for details.

Attachments shall:

1. Provide a brief description of the project.
2. Include a brief discussion of all strategies considered. Indicate the preferred strategy. Describe why alternative strategies were not used. Include a listing of pros/cons, cost, delays and queues for each alternative.
3. Describe the recommended strategy for identifying delays, queues, and mitigation measures to reduce the impacts on the project during construction.
4. Include a location map with project limits and applicable parts of the plans.

Submitted by:____ **Date:** ____________
(District Representative)

Approved by:

________________	________________	________________	________________
Bureau of Safety Engineering	**Bureau of Design and Environment**	**Bureau of Local Roads and Streets**	**Bureau of Operations**
Date: ____________	**Date:** ____________	**Date:** ____________	**Date:** ____________

Approved by:

Federal Highway Administration: ________________________ **Date:** ____________

13-8 EXAMPLE TMP FOR SMALL PROJECTS ON SIGNIFICANT ROUTES

A small project on a significant route may follow this full TMP template:

District X Transportation Management Plan

1. Project Description:

   This project consists of …
   This project is located …
   This project is on (or approaching) a significant route.

2. Work Zone Impacts:

   The impacts to the work zone were evaluated by …

   Based on this evaluation and previous experience with similar work in this area, the project is expected to meet safety and mobility goals of less than X mile queue and less than X minute delay.

3. Selected Work Zone Impact Management Strategies:

   A. Traffic Control Plan: A traffic control plan was developed using Standard Specifications, Special Provisions, and Highway Standards. A copy of the Traffic Control Plan is attached.

   B. Public Information Plan: Project information will be communicated to the public at the beginning of work by use of portable changeable message boards (PCMS) two weeks in advance of construction activities. Media outlets will be informed with a press release two weeks in advance. Both static message boards and PCMS will be used to convey real time information to the public.

   C. Transportation Operations Plan: The scope of this project does not warrant extensive transportation operations strategies. Strategies to be utilized include: Limited work hours, etc.

4. TMP Monitoring:

   The TMP will be monitored during the project for queue length and user delay. Monitoring of the TMP will be completed by district personnel as required throughout the duration of the project. Evaluations will be completed daily during work zone activity. Evaluations will be discussed during 50% design reviews with design personnel.

   The Resident overseeing the project will be responsible for evaluating the need to revise traffic control strategies, and will coordinate these revisions with the Supervising Field Engineer. Contingency plans may be developed with the input of the contractor, Bureau of Construction, and the Bureau of Operations.