240 Transportation Management Plan

240.1 General

A Transportation Management Plan (TMP) is required for minimizing activity-related traffic delay and crashes. All TMPs share the common goal of congestion relief during the construction phase by managing traffic flow and balancing traffic demand with highway capacity through the project area. TMPs are required for significant projects which are defined as:

(1) A project that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts.

(2) All Interstate system projects within the boundaries of a designated Transportation Management Area (TMA) that occupy a location for more than three days with either intermittent or continuous lane closures.

For significant projects, a multi-discipline TMP team may be formed to handle the planning, coordination, implementation, monitoring, and evaluation details of the TMP elements. Depending on the project logistics, the team composition may vary from project to project. The TMP team may include representatives from the entities as follows:

- PD&E
- Design
- Traffic Operations
- Construction
- District Bicycle/Pedestrian Coordinator
- Transit
- FHWA
- Local government (county or city)
- Public Information
- Others as deemed necessary (e.g., State Police, hospitals)

A TMP consists of strategies to manage the work zone impacts of a project. Its scope, content, and degree of detail may vary based upon the expected work zone impacts of the project.

An effective TMP provides safe construction zones with minimum delay for all traffic modes; including motor vehicles, transit, bicyclists and pedestrians. The TMP must comply with the requirements contained in the following documents:

(1) Manual on Uniform Traffic Control Devices for Streets and Highways, (***MUTCD***), Part VI

For highways, roads and streets off the State Highway System, the local agency (city/county) having jurisdiction, may adopt requirements based on the minimum requirements provided in the ***MUTCD***.

Modification for Non-Conventional Projects:
Delete the above sentence and see the RFP for requirements.

(2) Policy on Geometric Design of Highways and Streets, AASHTO

(3) Roadside Design Guide, AASHTO, Chapter 9

(4) ***Standard Plans***, ***Indexes 102-100***, ***102-110***, ***102-120***, the ***102-600 Series***, and ***711-002***

(5) FDOT Standard Specifications for Road and Bridge Construction (***Standard Specifications***)

(6) ***Basis of Estimates Manual***

(7) FDOT Accessing Transit Handbook, Chapter 4.6.

(8) AASHTO Guide for the Development of Bicycle Facilities, 4th Edition, Chapter 7

The ***Index 102-600 Series***, contains information specific to the Federal and State guidelines and standards for the preparation of temporary traffic control plans and for the execution of traffic control in work zones, for construction and maintenance operations and utility work on the State Highway System.

240.1.1 Emergency Shoulder Use (ESU)

This section is currently under development.

240.2 TMP Components

A TMP includes three components:

(1) Temporary Traffic Control (TTC) plan

The Temporary Traffic Control plan component describes TTC measures to be used for facilitating road users through a work zone or an incident area. The TTC plan plays a vital role in providing continuity of reasonably safe and efficient road user flow and highway worker safety when a work zone, incident, or other event temporarily disrupts normal road user flow. The scope of the TTC plan is determined by the project characteristics. The TTC plan must either be a reference to specific ***Standard Plans*** Index drawing(s) or be designed specifically for the project.

(2) Transportation Operations

The Transportation Operations component of the TMP must include the identification of strategies that will be used to mitigate impacts of the work zone on the operation and management of the transportation system within the work zone impact area. Typical Transportation Operations strategies include, but are not limited to, demand management, corridor/network management, safety management and enforcement, and work zone traffic management. The scope of the Transportation Operations component must be determined by the project characteristics.

(3) Public Information

The Public Information component of the TMP must include communications strategies that seek to inform affected road users, the general public, area residences and businesses, and appropriate public entities about the project, the expected work zone impacts, and the changing conditions on the project. This may include traveler information strategies. The Public Information component should be integrated into the project's Community Awareness Plan (CAP) when the CAP is to include communications strategies.

When multiple projects are in the same corridor or on corridors within the same traffic area:

(1) Coordinate the individual TMPs, or

(2) Develop a single corridor or regional TMP that address all the projects.

240.3 TMP Considerations

Development of a TMP begins during the Project Development and Environmental (PD&E) phase. Impacts on traffic, traffic handling options, constructability, and design features and constraints, as they affect traffic and transit operations, are evaluated for

each alternate alignment studied. As the TMP from the PD&E phase is carried forward into the design phase, consider the following as the plan continues to develop:

(1) Design features and constraints.

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

(2) Contract specifications.

Provisions such as time restrictions on construction activities; incentive-disincentive clauses; daily, weekly and seasonal restrictions and special materials may be necessary. Time restrictions could include work stoppages for Manatee (or other endangered/protected species) inhabitation, sporting events, holidays or other special considerations. Coordinate with local agencies as to the dates of local events or other community sensitive issues. Specify public relations activities such as media releases, television and radio spots, and handbills.

Modification for Non-Conventional Projects:
Delete the last sentence and replace with the following: Public relations activities such as media releases, television and radio spots, and handbills will be specified in RFP.

(3) 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, notification of changes to pedestrian and bicycle routes and facilities, service patrols, improvements to alternate routes, coordination with other projects and maintenance activities, and special inspection requirements.

(4) Public input.

On very large and complicated projects, it will 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 will be necessary. Citizen and business advisory committees may be established as sources of input.

(5) Utility work.

If contract utility work is anticipated in conjunction with or during the highway construction, the Temporary Traffic Control plan 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 TTC plan by FHWA. This requires early and effective coordination with utilities.

240.4 TTC Plan

A Temporary Traffic Control (TTC) plan is required anytime work is being performed within, or adjacent to highways, roads and streets as specified by Florida Statute and Federal regulations. A TTC plan is comprised of specific plan sheets, references to standard (typical) layouts, and notes on roadway plans describing how traffic will be controlled through a work zone.

TTC plan sheets detail the proper delineation of traffic through the work zone during all construction phases. The complexity of the TTC plan 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 the ***Standard Plans***, ***Index 102-600 Series***. Specific TTC plan sheets are 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 ***Standard Plans***, as well as specific TTC plan sheets, will likely be necessary.

A TTC plan provides the following information:

(1) The location of all advance warning signs.

(2) Temporary pavement markings, (including raised pavement markers (RPMs) and Shared Lane Markings).

(3) Location of temporary barriers and end treatments.

(4) Temporary drainage design.

(5) Channelizing devices at special locations.

(6) Locations for special devices such as portable changeable message signs (PCMS), arrow panels, radar speed display units (RSDU), portable regulatory signs (PRS), and temporary signals.

(7) PCMS messages for each phase.

(8) Signal timing for each phase, including temporary actuation, to maintain all existing actuated or traffic responsive mode signal operations for main and side street movements for the duration of the Contract (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) References to specific ***MUTCD*** or ***Standard Plans***, ***Index 102-600 Series*** drawings. Do not make a general reference to ***Standard Plans***, ***Index 102-600*** in the plan notes as ***Section 102-9*** of the ***Standard Specifications*** includes a general reference to the Index.

(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; e.g., service patrol, law enforcement, public service announcements, night work.

(16) General notes.

(17) Address the need for maintaining existing roadway lighting.

(18) Work area access plan.

(19) Temporary traffic control for bicyclists and pedestrians.

(20) Address the need for transit operations to safely stop along the roadway to board and discharge passengers, and to maintain transit stop signage.

(21) Provide temporary business and residential access as needed.

Modification for Non-Conventional Projects:
Delete item (13) in the above list.

FDM 321 provides the requirements for TTC Plan sheets.

Consideration must also be given to adjoining, intersecting or sequential work zones; i.e., coordinate the TTC plan with maintenance operations, bridge or roadway projects under different contracts, and operations of other jurisdictions or utilities. When overlapping

work cannot be avoided, it is desired that the motorist encounters one, consistently designed, work zone.

240.4.1 TTC Plan Development

The following step-by-step process should be followed when developing a TTC plan:

Step #1 Understand the Project

(1) Review the scope.

(2) Field reviews. Examine the plans early in the plans development process.

(3) Look at plan-profiles and cross sections for general understanding.

(4) Review PD&E study for any constraints.

(5) Consider transit and bicycle/pedestrian needs during construction.

(6) Coordinate with the District Bicycle/Pedestrian Coordinator.

(7) For complex projects consider developing a TTC plan study and other possible strategies such as public awareness campaigns, alternate route improvements, service patrols.

Step #2 Develop Project Specific Objectives

Establish specific objectives that may include:

(1) Use temporary barrier to separate workers from traffic (See ***FDM 215***).

(2) Close road if adequate detour exists.

(3) Maintaining 2-way traffic at all times.

(4) Maintaining roadway capacity during peaks.

(5) Maintaining business/resident access.

(6) Maintaining transit operations.

(7) Maintain existing bicycle and pedestrian access.

(8) Minimize wetland impacts.

(9) Expedite construction.

Step #3 Investigate TTC Plan Alternatives

(1) Develop some rough alternatives considering what could be used to accomplish the work, such as constructing temporary pavement or temporary diversions, using auxiliary lanes, placing 2-way traffic on one side of divided facility, using detour routes.

(2) Check the condition of any proposed detour routes. If the detour route is off the state system, additional documentation of the agreements with local agencies will be required. The design should minimize interruption of local transit operations.

Step #4 Develop a Construction Phasing Concept

(1) Establish a sequence of construction specific to the project objectives and conditions of existing facility.

(2) Involve the bridge designer, and District Construction and Maintenance Staff in the development of TTC concepts.

(3) Color or mark the plan-profile and cross section sheets to show existing roadway versus new construction. Make notes on plan sheets as to drop-offs or other problems. Use profile grade lines or centerlines for reference points.

(4) List out major tasks to be completed, such as:

- Construct new WB Roadway
- Construct new EB Roadway
- Construct frontage roads
- Construct bridge/flyover

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

Step #5 Evaluate Each Alternative (for each phase)

Evaluate proposed alternatives that meet the stated objectives:

(1) Examine pros and cons of various alternatives.

(2) Consider how much work and expense is involved for each alternative.

(3) Consider detour/transition locations, signal operations during construction, how to handle buses, bicycles, pedestrians, and service vehicles.

Step #6 Develop Detailed TTC Plan

Select the alternatives that meet the objectives of the overall plan. Add details such as:

(1) Detour and transition geometrics and locations.

(2) If lane closures are needed, use the lane closure technique discussed in ***FDM 240.4.2.7*** to determine time frame for closures.

(3) 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, crossroads and ramps.

(4) Need for portable traffic signals, changeable message signs, and barriers.

(5) How existing operations will be maintained side streets, businesses, residents, bikes, pedestrians, buses bus stops, etc.

(6) Revisions to signal phasing and timing during each TTC plan phase.

(7) Regulatory speed desired for each phase.

(8) All pay items and quantities needed for TTC plan.

(9) How existing auxiliary lanes will be used and any restriction necessary during construction.

(10) Typical sections for each phase.

(11) Outline key strategies to be used:

- Service patrol
- Law Enforcement
- Public service announcements
- Night work
- Motorist Awareness System (MAS)

(12) Need for alternate route improvements.

240.4.2 TTC Plan Details

The ***Standard Plans*****, *Indexes 102-601*** through ***102-670***, provide layouts of work zone traffic control for typical conditions. Reference these indexes only if project conditions are nearly the same as the typical layout; otherwise, prepare specific plan sheets or details. Some conditions that will require specific plan sheets include:

(1) Work not covered by a typical layout.

(2) Construction work zones near railroad crossings.

(3) Detours and signing to reroute vehicles exceeding legal weights where temporary ACROW panel bridges are present.

(4) Night time work requiring special lighting, oversized or additional devices.

(5) Ramps and intersections that interrupt the standard layout.

(6) Sight distance restrictions such as horizontal or vertical curves.

(7) Lane or shoulder configurations that do not match the ***Standard Plans***.

(8) Special considerations during installation, intermediate traffic shifts and removal.

(9) Complex projects, including add-lane projects, which involve many phases, traffic shifts, entrances and exits.

(10) Special plan and notes detailing bus pullover bay/bus stop configuration.

240.4.2.1 Taper Lengths

The ***FDM Section 210.2.5***, contains criteria and details for roadway transitions based on a 12-foot width reduction (W=12). When ***FDM 210.2.5*** is not used, calculate the minimum taper length by the formulas shown below in ***Table 240.4.1***.

Table 240.4.1 Taper Length 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

Formulas for L are as follows:

L = WS for regulatory speed of 45 mph or greater

$L = WS^2/60$ for regulatory speed or 40 mph or less

Where: L = length of taper, feet
W = width of reduction, feet
S = design speed, mph

240.4.2.2 Intersecting Road Signing and Signals

Signing for the control of traffic entering and leaving work zones by way of intersecting roadways must be adequate to inform drivers, cyclists and pedestrians of work zone conditions. At a minimum, provide a "Road Work Ahead" sign. Include these signs in the estimated quantity for work zone signs.

Modification for Non-Conventional Projects:
Delete the last sentence of the above paragraph.

Adjust signal heads to maintain proper position when lane shifts are necessary and determine the need for temporary traffic detection. Coordinate required modifications to existing traffic signal operations with the District Traffic Operations Engineer and show all signal adjustments in the TTC plans.

Modification for Non-Conventional Projects:
Delete the last sentence of the above paragraph and see RFP for requirements.

240.4.2.3 Sight Distance

See ***FDM 210*** for required sight distance using the regulatory speed.

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

Traffic control devices at intersections must provide sight distances for the road user to perceive potential conflicts and to traverse the intersection safely.

240.4.2.4 Bicycle and Pedestrian Accommodations

TTC plans must provide safe, continuous, and ADA compliant routes for pedestrians, bicyclists, and transit users. Except on Limited Access facilities, all roadways are considered bikeways regardless of whether a bicycle-specific facility is present.

When existing pedestrian facilities are disrupted, closed or relocated in a TTC zone, the temporary facility or route must be detectable and include accessibility features consistent with the features present in the existing facility. See ***Chapter 6D of the MUTCD*** for additional guidance.

Pedestrian Requirements

Requirements for pedestrian safety in work zones are as follows:

(1) Do not lead pedestrians into direct conflicts with worksite vehicles, equipment, or operations.

(2) Do not lead pedestrians into direct conflicts with mainline traffic moving through or around the work site.

(3) Provide positive protection where necessary.

(4) Maintain or replicate existing pedestrian access ways to the greatest extent practical. Pedestrian access ways through work zones must include provisions for the disabled at the same level of accessibility as the existing facility or greater.

(5) Ensure passengers have the ability to access transit stops, and to board and depart transit vehicles safely. Temporary transit access must include provisions for the disabled at the same level of accessibility as the existing facility or greater. See FDOT's ***Accessing Transit*** for guidance on transit stops.

Use pedestrian Longitudinal Channelizing Devices (LCDs) in the following situations:

- At each closed pedestrian way location, for the full width of the pedestrian way.
- In locations where a drop-off hazard exists (see ***FDM 222, Figure 222.4.1)***
- In locations where the active work zone is within 2 feet of the sidewalk or pedestrian walkway.
- When creating a temporary pedestrian walkway. When this is done, use pedestrian LCDs on both sides of the temporary pedestrian walkway.
    - There may be locations where an existing permanent object that meets the height and detection requirements for pedestrian LCDs in ***Standard Plans, Index 102-600*** (e.g., a retaining wall) is adjacent to one side of

the temporary walkway. In these locations, pedestrian LCDs are required only on the exposed side of the temporary pedestrian walkway.

When pedestrian LCDs are used, include plan details to show their locations in the TTC plans, and include quantities in the Summary of Quantities in accordance with the ***Basis of Estimates*** and ***FDM 307.***

Do not specify or quantify temporary walkway materials. Temporary walkway materials are addressed in the ***Standard Specifications***.

Place work zone signs and pedestrian LCDs in accordance with ***Standard Plans*****,** ***Indexes 102-600 and 102-660.***

Bicycle Requirements

Requirements for cyclist's safety in work zones are as follows:

(1) Do not lead cyclists into direct conflicts with mainline traffic, worksite vehicles, or equipment moving through or around traffic control zones.

(2) Cyclists should be provided with a travel route that replicates the most desirable characteristics of a wide paved shoulder or bicycle lane through or around the work zone.

(3) If the work zone interrupts the continuity of an existing shared use path or bike route system, provide signs directing cyclists through or around the work zone and back to the path or route.

(4) The cyclist should not be directed onto the same path used by pedestrians unless the path is designed for bicycle traffic.

240.4.2.5 Superelevation

See ***FDM 210*** for required superelevation using the regulatory speed. Horizontal curves constructed in conjunction with work zone diversions, transitions, and crossovers should have the necessary superelevation.

The minimum radii where superelevation is not necessary are provided in ***Table 240.4.2.***

Table 240.4.2 Minimum Radii for Normal 0.02 Cross Slopes

Minimum Radii For Normal Cross Slopes (Feet)									
Based on Regulatory Speed (mph)									
25	30	35	40	45	50	55	60	65	70
290	430	610	820	1080	1390	1840	2400	3130	4090

240.4.2.6 Lane Widths

Provide travel lane widths through work zone that replicate existing lanes widths wherever practical. The minimum widths for work zone travel lanes is 10 feet for all roadways other than Interstate and freeways. The minimum lane width for work zone travel lanes is 11 feet on Interstate and freeway facilities, except at least one 12 ft. lane in each direction must be provided.

240.4.2.7 Lane Closure Analysis

Lane closure analysis is a process used 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 be allowed and the time period a lane closure could occur without excessive travel delay.

Many 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 or create very short allowable lane closure periods. If a separate lane closure analysis is calculated for inbound and outbound separately, night work may be avoided and longer lane closure periods may be allowed.

When a lane closure is necessary, provide an allowable lane closure period of at least eight hours. Allowable lane closure periods less than eight hours require approval by the State Roadway Design Engineer.

A lane closure in excess of one work day on interstate and freeway facilities is prohibited where only two traveled lanes in one direction exist. If a lane closure in excess of one work day on interstate and freeway facilities is unavoidable, provide sufficient documentation to justify approval by the District Secretary.

For widening and reconstruction projects on interstate and freeway facilities, provide the same number of open travel lanes that are provided with the existing facility; i.e., reduction in number of travel lanes is prohibited throughout the construction of the project.

See ***FDM 241*** for illustrations of lane closure analysis worksheets.

240.4.2.8 Traffic Pacing Design

A traffic pacing design is prepared to provide adequate work time for overhead construction on interstate and freeway facilities. Traffic pacing is a traffic control technique that facilitates short duration overhead work operations by pacing traffic at a slow speed for a predetermined distance upstream of the work area. The Department frequently allows this technique for:

- Installing overhead sign structures and cantilever trusses,
- Replacing sign panels
- Placing bridge beams
- Installing utility crossings

Based on the required work time and other inputs such as traffic volumes, regulatory speed and pacing speed, prepare a traffic control plan that defines the allowable pacing hours, pacing distance, location of warning signs, interchange ramp closures and other critical information.

The Traffic Control Plan will document the layout and required resources for the pacing operation. Assess the geometric conditions to ensure that sight distance and other geometric conditions are addressed. ***Standard Plans*****, *Index 102-655*** illustrates the traffic pacing operation. ***Index 102-655*** also provides details of the four stages of a pacing operation and additional information related to:

- Signing
- Use of changeable message signs and attenuators
- Use of traffic control officers
- Contractor requirements

Concurrence from the Captain of the Florida Highway Patrol troop who will assist in the operation must be obtained.

See ***FDM 242*** for the procedure for calculating the pacing distance and the time intervals during which a pacing operation will be allowed.

240.4.2.9 Detours, Diversions, and Lane Shifts

Detour: a redirection of traffic onto an alternate route, using state roads or local (county or city) roads, to bypass the work zone. Requirements for detours include the following:

- Detour signing must convey clear direction allowing drivers to safely traverse the entire detour and return to the original roadway
- Consider the type of traffic being routed when developing detour geometry
- The structural capacity of the detour pavement should also be considered.
- Concurrence from the local agency is required when detours are to utilize local roadways
- Minimize interruption of local transit operations and coordinate with emergency services

Diversion: a redirection of traffic onto a temporary roadway adjacent to the existing or permanent roadway.

Lane Shift: the redirection of traffic onto a different section of the permanent roadway or shoulder.

Special Detour: a diversion or lane shift that requires temporary pavement.

- Cross sections (which only show geometric information) may be included in the TTC Plan for complex detours; e.g., a special detour within a superelevated section
- Payment for the work of constructing, maintaining, and subsequently removing the special detour (e.g., pavement design, earthwork, base, asphalt) will be paid for as a Special Detour, Pay Item 102-2 (Lump Sum)
- Traffic control devices, warning devices, barriers, signing, and pavement markings for special detours are to be tabulated in the plans and paid for under their respective pay items

Modification for Non-Conventional Projects:
Delete the three bullets above related to Special Detours.

Requirements for detours, diversions, and lane shifts include the following:

(1) Provide sufficient detail for diversion geometry and temporary drainage in TTC plans. Show the radius of curvature and taper lengths.

(2) Provide a minimum 2-foot paved shoulder for diversions and lane shifts

(3) For offsets to barriers and special considerations (i.e. refuge areas or emergency vehicle access), see ***FDM 215***.

(4) Diversions must be designed and posted as close to the normal speed as possible. When speed reductions are necessary, the reduction must be in accordance with the ***Standard Plans, Index 102-600***.

(5) Diversions from a divided highway to an undivided condition must separate opposing traffic using either temporary barrier or temporary traffic separators in accordance with the ***Standard Plans, Index 102-600***. The use of striping, RPMs, and complementary signing, either alone or in combination is not considered acceptable for separation purposes.

240.4.2.10 Roadside Hazards

See ***FDM 215*** and ***Standard Plans, Index 102-600*** for information on the shielding of roadside hazards.

240.4.2.11 Drop-offs in Work Zones

See ***FDM 215*** for requirements related to drop-offs in work zones.

240.4.2.12 Narrow Bridges and Roadways

See ***FDM 215*** for requirements for placing temporary barrier.

240.4.2.13 Highway Lighting

If a project has existing highway lighting, preserve existing lighting levels throughout construction. When practical, install and place in service the new lighting system before the existing lighting system is removed or taken out of service. Comply with the following when temporary lighting is required to preserve lighting levels:

(1) Meet minimum lateral offset criteria in ***Table 215.2.2***.

(2) Utilize structural supports that are crashworthy or shielded by a crashworthy barrier that was installed for other purposes.

(3) Utilize structural supports that are attached to and located behind permanent or temporary concrete barriers (or traffic railings) as follows:

(a) Do not install temporary barrier for the sole purpose of supporting or protecting the temporary lighting system.

(b) Do not locate structural supports for temporary lighting on the back side of permanent or temporary barriers/traffic railings; i.e., which face away from traffic, where the back side of the barriers/traffic railings are within the work zone clear zone (per ***Standard Plans*, *Index 102-600***) of other traffic lanes.

(c) Attach structural supports to the back face of temporary and permanent barriers/traffic railings using brackets that do not protrude above the top of the barrier/traffic railing.

(d) Use undercut anchor systems designed in accordance with ***Structures Design Guidelines Section 1.6*** to attach brackets to barriers/traffic railings. Position anchors so as to avoid the reinforcing steel within the barrier/traffic railing.

(e) Design the luminaire pole, support brackets, and anchors for an 80 mph wind speed.

(f) Do not design luminaire pole, support brackets and anchors for vehicular impact loads.

(g) For structural supports attached behind permanent concrete barriers/traffic railings, provide a minimum setback distance from the top edge of the traffic face of the barrier/traffic railing to the traffic face of the luminaire pole in accordance with ***FDM 215***.

(h) For structural supports attached to and located behind ***Standard Plans*, *Index 102-110*** (Type K Temporary Concrete Barriers), provide a minimum setback distance of 1'-6" from the top edge of the traffic face of the barrier to the traffic face of the luminaire pole. To minimize the potential for damaging reinforcing steel during the installation of the anchors, attach brackets within the middle portion, where there is large spacing between the vertical steel reinforcing bars, of the Type K Barrier Unit.

(i) Structural supports for temporary lighting may be attached to and located behind Type K Temporary Concrete Barrier that is bolted or staked down utilizing the details shown on the standard.

(j) The supports attached to Type K Temporary Concrete Barrier must not encroach into the required deflection distance when the barrier is protecting an above ground hazard.

240.4.2.14 Work Area Access

Determine the need for work area access to get materials and equipment into the work area safely. This is a critical issue on high-speed facilities where temporary barrier may have been used to protect median work areas. Consider temporary acceleration and deceleration lanes for the construction equipment at these access points. Evaluate the following in the design, planning and operation of work zones:

(1) Anticipate types of work zones likely to create ingress/egress problems. Examples are median work spaces requiring work vehicles to merge into/out of high-speed traffic and work activities that will generate frequent delivery of materials such as paving projects and the delivery of fill material.

(2) Include access to the work area in TTC Plan. When operations require access and it is not addressed in the plan, the Worksite Traffic Supervisor in the field must address the issue within the limits of their authority.

(3) Consider construction vehicle size, configuration and turning path/radius requirements in addressing ingress/egress.

(4) See ***Standard Plans***:

- ***Index 102-606*** for haul route crossing details
- ***Index 102-630*** and ***102-631*** for non-limited access facilities crossover details
- ***Index 102-665*** for limited access facilities
- ***Index 102-600*** for warning signs for truck ingress/egress

(5) Adequate acceleration/deceleration space for work vehicles should be provided.

(6) The location of access openings must provide good sight distance for oncoming traffic.

(7) In extreme conditions, lane closures should be considered.

(8) Openings in temporary barriers must be planned to ensure that ends are properly protected and that the barriers do not create sight problems.

(9) Ingress/egress condition may justify reducing the regulatory speed.

(10) Evaluate the use of portable changeable message signs.

240.4.2.15 Railroads

Ensure that the TTC plan does not cause queuing of traffic across railroad tracks. Evaluate the Plan's signal timing, tapers, lane closures and distance to intersections as compared to projected peak traffic volumes. Evaluate the effects of the TTC plan on interconnected traffic signals and railroad signals to avoid conflicting or ineffective signal controls.

240.4.2.16 Temporary Raised Rumble Strip Sets

When temporary raised rumble strips are required, comply with ***Standard Plans***, ***Index 102-603***.

240.4.3 TTC Plan Phase Submittals

TTC plan phase submittals typically include the following:

(1) **Phase I:** a typical section for each phase as well as a description of the phasing sequence and work involved.

(2) **Phase II:** a majority of the TTC plan completed (75-90%), including the information outlined in ***FDM 240.4***, and a list of the pay items needed.

(3) **Phase III:** a final TTC plan, including all notes, pay items and preliminary quantities. The construction office estimates the duration for each phase of construction during Phase III review.

(4) **Phase IV:** finalize the quantities in the plans and Designer Interface.

Modification for Non-Conventional Projects:

Delete ***FDM 240.4.3*** and replace with the following:

240.4.3 TTC Plan Phase Submittals

TTC plan phase submittals include the following:

(1) **Technical Proposal**: a typical section for each phase as well as a description of the phasing sequence and work involved.

(2) **90% Component Plans Submittal**: a majority of the TTC plan completed, including the information outlined in ***FDM 240.4***.

(3) **Final Plans:** a final TTC plan, including all notes.

240.5 Transportation Operations

Transportation Operations strategies can be used to:

(1) Minimize traffic delays

(2) Improve mobility

(3) Maintain or improve motorist, cyclist and pedestrian safety

(4) Improve work zone access and safety

(5) Complete road work in a timely manner

(6) Maintain access for businesses and residents

Table 240.5.1 presents strategies by category. This set of strategies is not meant to be all-inclusive, but offers a large number to consider, as appropriate, in developing TMPs.

Table 240.5.1 Transportation Operations Strategies

Category			
Demand Management	**Corridor/Network Management**	**Work Zone Traffic Management**	**Safety Management and Enforcement**
Transit services improvements	Signal timing/ coordination improvements	Speed limits reduction or variable speed limits	ITS for traffic monitoring and management
Transit incentives	Temp. traffic signals	Temp. traffic signal	Transportation Management Center (TMC)
Shuttle services	Intersection improvements	Temp. barrier	Aerial surveillance
Ridesharing/ carpooling incentives	Bus turnouts	Crash Cushions	Milepost markers
Park-and-Ride promotion	Turn restrictions	Automated flagger assistance devices (AFAD)	Service patrol
HOV lanes	Truck restrictions	On-site safety training	Local detour routes
Variable work hours	Dynamic lane close system	TMP inspection team meetings	Contract support for incident management
Telecommuting	Ramp closures		Incident/emergency response plan
	Railroad crossing controls		Law enforcement

240.5.1 Regulatory Speeds

Establish regulatory speeds to route vehicles safely through the work zone as close to normal highway speeds as possible. Include specific regulatory speeds for each phase of work in the TTC plans. In accordance with ***Florida Statute 316.187***, regulatory speeds are to be established on the basis of a traffic and engineering investigation. Reduction in regulatory speed should only be made when TTC geometry makes it necessary. Include the justification for reduction in regulatory speed in the project file. The TTC plan and the project file will suffice as the traffic and engineering investigation.

The regulatory speed must not be reduced more than 10 mph below the current 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.

For projects with interspaced work activities (such as interstate resurfacing), speed reductions must be located in proximity to those activities which merit a reduced speed, and not “blanketed” for the entire project.

When conditions warrant speed reductions different from those shown in the TTC plan, the contractor must submit to the construction project engineer for approval by the Department, a signed and sealed study to justify the need for further reducing the regulatory speed. Otherwise, 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)***.

Modification for Non-Conventional Projects:
Delete last two sentences in the above paragraph.

Regulatory speed signs are to be preceded by a "Reduced Speed Ahead" sign typically located as follows:

(1) 1000 ft. in advance for Interstate or Freeway

(2) 500 ft. in advance for arterials and collectors

(3) Arterials and collectors located within the urban boundary ordinarily do not require an advance sign.

(4) Regulatory speed and “Reduced Speed Ahead” signs are paid for under the pay item for Work Zone Signs (per each per day).

Modification for Non-Conventional Projects:
Delete item (4) above.

If the existing regulatory speed is to be used, consideration should be given to supplementing the existing signs when the location of the work zone is between existing regulatory speed signs.

Where speed reduction is proposed for a work zone greater than one mile in length, regulatory speed signs are to be placed at no more than one mile intervals. For arterials and collectors located within the urban boundary, regulatory speed signs are to be placed at no more than 1000-foot intervals.

Engineering judgment should be used in the placement of additional regulatory speed signs.

240.6 Public Information

See the following for additional information on public involvement and CAP requirements:

(1) ***FDM 104***

(2) ***Public Involvement Handbook***

(3) ***PD&E Manual***

240.7 Coordination

Work zone traffic control requires the coordination of a number of agencies and other interested parties. Begin planning and coordination early in a project design.

An effective TCC plan required collaboration between designers and Department design, construction and traffic operations staff. Both traffic operations and construction staff routinely review TMPs during Phase I and Phase II plans to ensure that the plan is sound and constructible and bid items are complete and quantities reasonable.

Modification for Non-Conventional Projects:
Delete the last two sentences of the above paragraph and replace with the following: Both traffic operations and construction staff routinely review TMPs during plans preparation to ensure that the plan is sound and constructible.

TTC plans should also be reviewed Department Maintenance staff, FHWA, community awareness teams, general public, transit agencies, 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 governmental and law enforcement agencies should be obtained early in the process, such as during the PD&E study and the Phase I plans stage.

Modification for Non-Conventional Projects:
Delete the last two sentences of the above paragraph and replace with the following: Initial reviews should be made by construction and traffic operations no later than the 90% Component Plans. Input from local governmental and law enforcement agencies should be obtained early in the process, such as during the PD&E study and the Technical Proposal 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, resolve the conflicts in order to meet driver expectations.

240.7.1 Bridge Construction

To facilitate the development of an optimal design minimizing traffic disruption and construction costs, the roadway engineer and structures engineer must collaborate with each other prior to completion of Phase II roadway plans or the Bridge Development Report (BDR), whichever is earlier. For very complex urban projects, this collaboration should begin as early as the PD&E phase of the project.

Modification for Non-Conventional Projects:

Delete ***FDM 240.7.1*** and replace with the following:

240.7.1 Bridge Construction

To facilitate the development of an optimal design minimizing traffic disruption and construction costs, collaboration between the roadway engineer and structures engineer is required.

240.7.1.1 Overhead Bridge Related Construction Activities

In accordance with ***Standard Plans***, ***Index 102-600*** there are several overhead work activities that must be executed in the absence of traffic below. ***Table 240.7.1*** provides work durations and corresponding traffic control techniques for several common overhead bridge related work activities. The work activity durations given in the table assume a best case scenario in which the Contractor has optimized resources and work planning in advance to minimize traffic disruption.

Table 240.7.1 Overhead Work Activities Requiring the Removal of Traffic Below

Work Activity	Duration	Traffic Control Technique
Bridge Demolition	2 to 3 days per span	Detour or Median Crossover
Beam Placement Simple Span	30 minutes per beam	Traffic Pacing, Detour, or Median Crossover
Beam Placement Continuous Steel I-Beam	60 minutes per beam	Detour or Median Crossover
Beam Placement Continuous Steel Box Girder	90 minutes per girder, depending on the complexity of the connections	Detour or Median Crossover
Form Placement	4 hours per lane	*Lane Shift, Lane Closure, Detour or Median Crossover
Deck Concrete Placement	3 hours per span	*Lane Shift, Lane Closure, Detour or Median Crossover
Span Sign Structure Placement	20 to 25 minutes per structure	Traffic Pacing, Detour or Median Crossover
Segment Placement from Land Based Cranes (Balanced Cantilever)	2.5 hours per segment	*Lane Shift, Lane Closure, Detour or Median Crossover
*The decision to close the entire roadway using a detour or median crossover versus closing a lane with a lane shift or lane closure is largely a function of the project geometry; e.g., skew angle, segment length. Develop a plan view showing the segment layout, temporary towers, traffic lanes, and shoulders to determine which traffic control configuration is appropriate.		

240.7.1.2 Temporary Structures

The use of temporary structures is often required to allow for the installation of the permanent structure. Temporary structures commonly used for the construction of highway structures include temporary stability towers and temporary sheet pile walls.

Temporary stability towers are commonly used for the erection of segmental bridges constructed in balanced cantilever, steel plate girders, and steel box girders. Temporary sheet pile walls are commonly used for the construction of pier footings or to facilitate the installation of MSE wall straps. It is important to show the location of all temporary

structures in each phase of the TTC Plan to assure there are no conflicts with temporary traffic patterns. See ***FDM 215*** to determine if temporary structures must be shielded.

240.7.1.3 ACROW Panel Bridge

When using a temporary ACROW panel bridge, include "Legal Weight Only" sign in accordance with ***Standard Plans, Index 700-102*** and ***700-107***. Place "Slippery When Wet" (W8-5) signs in advance of all ACROW panel bridges. All signage must be in place before the temporary structure is opened to traffic. See ***Standard Plans, Index 102-200 Series*** and the associated ***Standard Plans Instructions*** (***SPI 102-200***) for more information.

Because of the limited quantity of Department owned ACROW panel bridging that is available, timely coordination with the State Maintenance Office is required.

240.8 TTC Training

The Department has prescribed temporary traffic control training requirements outlined in the ***Temporary Traffic Control (Maintenance of Traffic) Training Handbook***.

240.9 TTC Devices

Common TTC devices that are available for use include:

(1) Work zone signs
  (a) Warning
  (b) Regulatory
  (c) Guide

(2) Lighted units
  (a) Arrow panels
  (b) Illumination devices
  (c) Changeable message signs
  (d) Temporary traffic signals

(3) Channelizing devices
  (a) Cones

(b) Tubular markers

(c) Plastic drums

(d) Vertical panels

(e) Longitudinal channelizing devices

(f) Type I, II and III barricades

(4) Work Zone Markings

(a) Pavement markings (and removal of conflicting markings)

(b) RPMs

(c) Delineators

(5) Roadside Safety Hardware

(a) Temporary barriers

(b) Guardrail

(c) Crash cushions

(6) Flaggers

(7) Law Enforcement

(8) Motorist Awareness System (MAS)

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

TTC devices should not be placed in locations where they will block or interfere with transit stops, pedestrian sidewalks or paths, and bicycle facilities.

240.9.1 Signs

Work zone signs are typically post mounted in accordance with ***Standard Plans***, ***Index 102-600***. Whether sign is to be mounted on temporary barrier or traffic railing, mount signs per ***Standard Plans***, ***Index 700-013***.

240.9.1.1 Advance Warning and End Road Work

Identify the advance warning signs, including legends and location in the TTC plan. These include signs such as "Road Work Ahead" and "Road Work One Mile". Locations

include mainline as well as crossroads for detours, diversions, lane shifts and lane closures.

The sequence for advance signing should be from general to specific; e.g., “Road Work Ahead” (general), “Left Lane Closed Ahead” (more specific), and “Merge Right” (specific).

The “End Road Work” sign (G20-2) should be installed on all projects, but may be omitted where the work operation is less than one day. The sign is typically located 500 feet beyond the end of a construction.

Consideration any adjoining projects or overlapping work zones when identifying the location of these signs.

240.9.1.2 Length of Construction

The “Length of Construction” sign (G20-1) bearing the legend "Road Work Next __ Miles" is required for all projects of more than two miles in length. Locate the sign at begin construction points.

240.9.1.3 Project Information

The project information sign is required for all projects with a construction contract time of more than 90 days. Placed only on the mainline approaches, this sign is typically located 500 feet in advance of the first advance warning sign, or as close to be beginning of the project as practical. This sign may be omitted if physical constraints prohibit safe placement.

Project information sign details are shown in ***Standard Plans***, ***Index 102-600***. Provide in the TTC plan the information to be used on the sign; SR # (e.g., I-10, SR 5, US 1), completion date and the phone number of the district office responsible to answer project specific questions.

240.9.1.4 Existing Signs

Remove or relocate existing regulatory or warning signs that conflict with the TTC plan in order to complement the work zone conditions; e.g., 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.

Modify existing guide signs to show changes made necessary by the construction operations. If existing guide signs are to be removed during construction, make provisions 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.

240.9.2 Lighted Units

240.9.2.1 Arrow Boards

Use arrow boards to supplement other devices for lane closures on multilane roadways. Do not use arrow boards for lane shifts. Refer to the current ***MUTCD*** for further information. Provide arrow board location any necessary notes concerning the use of this device in the TTC plan.

240.9.2.2 Portable Changeable Message Signs

Use portable changeable message signs (PCMS) as a supplemental device to provide information to the motorist about:

(1) Construction schedules

(2) Alternate routes

(3) Expected delays

(4) Detours, diversions, and lane shifts

A PCMS is not to be used to replace any required sign or other device. See ***FDM 243*** for requirements in determining the appropriate uses and messages for the PCMS.

240.9.2.3 Temporary Traffic Signals

Design, and detail in the TTC plans temporary traffic signals using the following criteria:

(1) Temporary poles and span wire assemblies:

  (a) Design temporary signal supports for an 80 MPH wind speed. See ***Structures Manual, Volume 3*** for additional requirements.

  (b) See Lateral Offset Criteria in ***FDM 215*** for placement of temporary traffic signal supports.

The TTC plan is to provide instruction for specific alterations (physical location, and preliminary phasing and timing) necessary for existing, temporary and portable signals. Include signal installation plans for each phase of construction in the TTC plan. Include

traffic control signal requirements or responsibilities in the Technical Special Provisions. Signal displays and location must meet ***MUTCD*** requirements. If temporary signals are used where a pedestrian crossing is present, the pedestrian must be accommodated in the signal timing.

240.9.3 Channelizing Devices

In accordance with ***Standard Plans***, ***Index 102-600***, the following devices may be used as channelizing devices:

(1) Cones, tubular markers or drums

(2) Type I and II barricades

(3) Vertical panels

(4) Longitudinal channelizing devices (LCDs)

Include the quantity for the number of channelizing devices shown in the plans under the pay item for channelizing devices; i.e., do not assume that cones or tubular markers will be used during construction.

240.9.3.1 Type III Barricades

Use Type III barricades to block off, close, or partially close a road or ramp. Two barricades are typically used for a 12-foot roadway.

240.9.4 Work Zone Markings

See ***FDM 230*** for guidance on Work Zone 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.

Removing paint from the roadway final surface creates an undesirable scarring of the pavement. For transition areas in areas with final pavement surface:

(1) May use paint to mark lane lines; however, milling and resurfacing to provide a clean surface (friction course) for the placement of permanent markings will be required.

(2) May use temporary tape.

240.9.4.1 Raised (Retroreflective) Pavement Markers

Raised pavement markers (RPMs) are required as a supplement to lane lines in transition areas. For further direction on the use of RPMs in the work zone, refer to the ***Standard Plans, Index 102-600***.

240.9.5 Roadside Safety Hardware

See ***FDM 215*** for additional information and requirements.

240.9.6 Law Enforcement

Work zones may require law enforcement services to protect both the workers and motorists during construction or maintenance activities. Evaluate the need for these services during the development of the TTC plans. The service needed may involve a Speed and Law Enforcement Officer for speed and traffic enforcement, a Traffic Control Officer for traffic control, or a combination of the two.

FDOT and the Florida Department of Highway Safety and Motor Vehicles (DHSMV) have a contractual agreement for the use of Speed and Law Enforcement Officers (Central Office Statewide Contract) to exclusively enforce the speed limit in specified work zones (see ***Contract #BDT99***). Districts may enter into their own contractual agreements with local law enforcement agencies to provide additional resources for the use of a Speed and Law Enforcement Officer (District Contract).

240.9.6.1 Speed and Law Enforcement Officers

Conditions to evaluate the use of Speed and Law Enforcement Officer include:

(1) A work zone requiring reduced speeds

(2) Work zones where temporary barrier is used adjacent to through traffic

(3) Night time work zones

(4) A work zone in which workers are exposed to nearby high speed traffic

(5) In conjunction with the Motorist Awareness System (MAS)

Use on arterials and collectors require District Director of Transportation Operations approval.

240.9.6.2 Traffic Control Officer

Use Traffic Control Officers when supplemental traffic control is desirable. Uniformed law enforcement officers are respected by motorists, cyclists and pedestrians; therefore, utilize Traffic Control Officers as a supplement to traffic control devices to assist in traffic movements and provide a safer work zone.

In accordance with ***Standard Specification*** ***102***, use Traffic Control Officers for the following conditions:

(1) Directing traffic/overriding the signal in a signalized intersection.

(a) Use ***Standard Plans***, ***Index 102-619*** on limited access facilities (interstates, toll roads, and expressways) at nighttime for work within the travel lane.

(b) Use ***Standard Plans***, ***Index 102-655*** (Traffic Pacing) for overhead work.

(c) When pulling conductor/cable above an open traffic lane on limited access facilities.

(d) Use ***Standard Plans***, ***Index 102-625*** for Temporary Road Closure (5 Minutes or Less.)

240.9.6.3 Coordination, Documentation, and Payment

Coordinate with district construction staff in determining if law enforcement services are required prior to Phase II. If possible, include the associated law enforcement commander in the coordination.

When law enforcement is to be used on a project, develop supporting documentation for each TTC phase, including;

(1) The conditions requiring the law enforcement services,

(2) The number of personnel and man-hours, and

(3) Any other requirements that may be established.

Traffic Control Officer

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 in the TTC plan. Traffic Control Officers will be paid for under pay item 102-14 - Traffic Control Officer (HR). Complete documentation that complies with the TTC plan must be included

in the calculations sub-directory of the project directory. The final determination of man-hours are accomplished at the same time that construction days are set.

Modification for Non-Conventional Projects:
Delete the last three sentences of the above paragraph.

Speed and Law Enforcement Officer

Pay for Speed and Law Enforcement Officer under pay item 999-102-A - Speed and Law Enforcement Officer (Do Not Bid) (HR). Show the Speed and Law Enforcement Officer pay item in the Summary of Pay Item sheet only. Do not make any other reference to these services in the plans. Although the Speed and Law Enforcement Officer is not shown on ***Standard Plans***, ***Index 102-670***, include the Speed and Law Enforcement Officer (DO NOT BID) pay item when using this Index.

Modification for Non-Conventional Projects:
Delete the above paragraph.

240.9.7 Motorist Awareness System

The purpose of a Motorist Awareness System (MAS) is to increase the motorist awareness of the presence of active work zones and provide emphasis on reduced speed limits. A MAS is created by using a combination of several different traffic control devices to draw attention to the regulatory speed and inform the motorist of his vehicle speed.

A MAS is required when all of the following conditions exist:

(1) Multilane facility, and

(2) Regulatory speed limit is 55 mph or greater, and

(3) A lane closure is required for more than 5 days (consecutive or not), and

(4) Workers are present and not protected by barrier.

Standard Plans, ***Index 102-670***, provides requirements and details on Motorist Awareness System (MAS) devices. Include the Speed and Law Enforcement Officer (DO NOT BID) pay item when using this Index.

240.9.7.1 Portable Regulatory Signs

The purpose of portable regulatory signs (PRS) is to highlight the regulatory speed for the work zone. A portable regulatory sign is a portable trailer that has the regulatory speed sign mounted with flashing lights on each side of the sign. The lights are used to draw the driver's attention to the regulatory speed.

240.9.7.2 Radar Speed Display Unit

The purpose of radar speed display unit (RSDU) is to display the motorist's work zone speed. A radar speed display unit is a portable trailer that displays the speed of approaching motorists on a LED display panel. The radar mounted on the unit detects the speed. A regulatory sign with the posted speed is mounted above the LED display panel.