

# Work Zone Safety & Mobility Implementation Guide

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## List of Acronyms

<b>AASHTO</b>	American Association of State Highway and Transportation Officials
<b>ATSSA</b>	American Traffic Safety Services Association
<b>CCTV</b>	Closed-Circuit Television
<b>CFR</b>	Code of Federal Regulations
<b>CMS</b>	Changeable Message Sign
<b>EOP</b>	Emergency Operating Procedures
<b>FHWA</b>	Federal Highway Administration
<b>FR</b>	Federal Register
<b>HAR</b>	Highway Advisory Radio
<b>HOV</b>	High Occupancy Vehicle
<b>ITE</b>	Institute of Transportation Engineers
<b>ITS</b>	Intelligent Transportation System(s)
<b>MASH</b>	Manual for Assessing Safety Hardware
<b>MOTAA</b>	Maintenance of Traffic Alternative Analysis
<b>MOT</b>	Maintenance of Traffic
<b>MUTCD</b>	Manual on Uniform Traffic Control Devices
<b>NCHRP</b>	National Cooperative Highway Research Program
<b>NDOT</b>	Nevada Department of Transportation
<b>NEPA</b>	National Environmental Policy Act
<b>PI</b>	Public Information
<b>PPCBR</b>	Portable Precast Concrete Barrier Rail
<b>QA</b>	Quality Assurance
<b>TRB</b>	Transportation Research Board
<b>TTC</b>	Temporary Traffic Control
<b>TMA</b>	Transportation Management Area
<b>TMC</b>	Transportation Management Center
<b>TMP</b>	Transportation Management Plan
<b>TO</b>	Transportation Operations
<b>USDOT</b>	United States Department of Transportation

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# Work Zone Safety and Mobility Implementation Guide

## 1.0 Introduction

### 1.1 Authority

The Federal Highway Administration (FHWA) published the Work Zone Safety and Mobility Rule (the Rule) on September 9, 2004 in the Federal Register (69 FR 54562). This Rule updates and renames the former regulation on “Traffic Safety in Highway and Street Work Zones” in 23 CFR 630, Subpart J referred to as “Work Zone Safety and Mobility Rule” and Subpart K referred to as “Temporary Traffic Control Devices Rule”. The Safety and Mobility Rule was effective January 1, 2008 and subpart K was effective March 1, 2009. The Nevada Department of Transportation is authorized by N.R.S. 408.100 (Declaration of legislative intent.), N.R.S. 408.210 (Powers of director: Closing and construction of highways; removal of encroachments.) and N.R.S. 408.423 (Permit required to excavate state highway; exception; fee.) to implement the Rule.

### 1.2 Purpose

Establish the fundamental principles, roles, responsibilities and procedures for systematically addressing the safety and mobility impacts of work zones and developing strategies to help manage these impacts. The principals and procedures of the Rule and Work Zone Safety and Mobility Implementation Guide are to be followed by each District and Division.

The Work Zone Safety and Mobility Implementation Guide supersede all policies and procedures previously established for Temporary Traffic Control and Temporary Traffic Control Zones (Work Zones).

### 1.3 Scope

While the Rule applies specifically to Federal-aid highway projects, it is the Nevada Department of Transportation’s intent to follow this rule for all work zones on state maintained roadways. These procedures shall be implemented on all federal and non-federal aid construction and maintenance projects, including those administered by Local Public Agencies (LPA) anticipated to have work zone impacts.

### 1.4 Audience

The purpose of these guidelines is to provide information and guidance to all individuals engaged in the planning, design, construction, permitting, inspecting or maintenance of work zones on State maintained roadways on how to develop, implement and evaluate Transportation Management Plans.

### **1.5 Update Procedure**

A process review will be performed as a minimum once every two years. The review team will consist of the following individuals or their appointed representative:

Chief Road Design Engineer	Project Management
Chief Construction Engineer	District Engineers
Chief Traffic Operations Engineer	FHWA Transportation Engineer

The process review will be conducted by the Chief Traffic Operations Engineer and will be in charge of scheduling, setting the agenda, and conducting the biennial review meeting. The process review will assess the effectiveness of the work zone safety and mobility procedures contained within this guide. The agenda will include a discussion on the effectiveness of the work zone process at the agency level. Consideration should be made for the following agenda items:

- How are work zones performing with respect to mobility and safety?
- Are customer expectations being met with respect to maintaining safety and mobility and minimizing business and community impacts both, in and around the work zone?
- How have areas for improvement that were identified in the past been addressed?
- What has worked/not worked – which strategies have proven the most/least effective in improving the safety and mobility of work zones?
- What other strategies can be considered for implementation?
- Have any work zone safety and mobility trends been identified, at the national level or local level? What can be done to address identified trends?
- How do work zone performance, the effectiveness of strategies, or areas of improvement vary between day work and night work?
- Should policies or agency procedures be adjusted based on what has been observed or measured?

It is left to the discretion of the Department to update this document at any time as policy and procedures change.

### **1.6 Fundamental Principles**

Improving highway safety and mobility are two key performance measures for NDOT's Strategic Plan. Consideration of the following principles will enhance the performance of work zones:

#### **Provide a safe work zone for all workers and road users.**

- Provide safe work zone design by using positive protection measures where possible and practical.
- Provide safe work zone design by using the same basic safety principles used to design permanent roadways when designing work zones.

- Utilize available intelligent transportation systems (ITS) and enforcement strategies to enhance safety.
- Employ incident management strategies during design and construction.
- Conduct investigations on work zone accidents and implement improvements where appropriate.
- Follow guidelines for speed limit reductions in work zone.
- Provide a continuous, safe working environment by monitoring and maintaining work zone devices during construction.
- Provide public information for work zones.

**Consider mobility and access.**

- Pursue innovative technologies, including ITS, for advancement of mobility in work zones.
- Consider all possible alternatives in order to minimize work zone delay and perpetuate flow.
- Maintain bicycle, pedestrian and ADA access through and around work zones.

**Plan, design, and construct projects for an economical and timely delivery.**

- Consider work zone impacts during design by developing transportation management plans (TMPs)
- Use innovative technologies and techniques to accelerate project construction.
- Coordinate work zone activities and operations with public agencies and other stakeholders.

**Communicate project information to stakeholders.**

- Provide and disseminate useful and essential information to keep all stakeholders informed of work zone activities.
- Coordinate operations with those who have jurisdiction over any impacted operations, including other roads, railroads, transit facilities, emergency operations, school bus operations, etc.
- Build relationships and provide customer support on work zone related issues to internal and external customers.

**Continuously assess and improve work zone strategies, practices, and procedures.**

- Assess, document, and implement successes via work zone inspections, crash data, and performance monitoring of work zone impact management strategies.
- Provide and disseminate essential temporary traffic control design and operations information to traffic control professionals.
- Provide work zone personnel with training commensurate to their level of responsibility.

## 1.7 Definitions

**Significant Project** - Is defined as one that, alone or in combination with other concurrent projects nearby is anticipated to cause sustained work zone impacts greater than what is considered tolerable based on NDOT guidelines and engineering judgment. All **Significant Projects** require a Transportation Management Plan (TMP) consisting of a Temporary Traffic Control plan, a Transportation Operations plan and Public Information strategies.

**Transportation Management Area (TMA)** - Is an urbanized area with a population of more than 200,000 residents. In Nevada these areas are Las Vegas and Reno. The following counties will also be considered as a TMA urbanized area: Clark, Carson, Douglas, Lyon, Storey and Washoe. In the TMA urbanized areas, any project located on an interstate or US designated roadway will be considered significant.

**Transportation Management Plan (TMP)** - Lays out a set of coordinated transportation management strategies and describes how they will be used to manage the work zone impacts. A TMP is required on all projects and may be comprised of one or more of the following elements; a Temporary Traffic Control (TTC) plan, Transportation Operations (TO) strategies and Public Information (PI) strategies. These elements are integrated into a single document that demonstrates an understanding of site specific issues and project requirements. A TMP shall make provision for updates and revisions throughout the project lifecycle to address issues as they occur.

**Temporary Traffic Control (TTC) Plan** - TTC plan is used for managing traffic through a work zone. The TTC will follow NDOT and Federal Standards and Guidance for the layout and placement of traffic control devices, signs, and related equipment for the project. The degree of detail in the TTC would depend on the project complexity and traffic interference with construction activity.

**Temporary Traffic Control Zone (Work Zone)** – The area of a roadway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last TTC device.

**Transportation Operations (TO) Strategies** - The TO component addresses transportation operations strategies that will be used to ease work zone impact areas. The TO component contains agreements or instructions between stakeholders that describe how a transportation asset is to be used or modified during the construction of a project.

**Public Information (PI) Strategies** - The PI component consists of strategies that address communication with the public and concerned stakeholders, before and during the project. The PI plan will inform those affected by the project of anticipated work zone impacts and changing conditions.

**Incident Management Plan** - An Incident Management Plan is intended to address unplanned events or incidents for significant projects to ensure incident response operations within the work site are managed effectively. It identifies priorities and procedures for detection and response to incidents with the goal of safeguarding the public and restoring traffic flow as

quickly as possible. The plan should define a process of regular review and analysis to identify actions that will reduce incident frequency and severity.

## **1.8 Responsibility**

### **a. Project Management**

1. Coordinate with team members in determining whether a project is significant.
2. Coordinating the development of the TMP, organizing the TMP team, organizing TMP meetings, and managing TMP documentation.
3. Providing the Public Information Office with information for the development of the PI strategies.
4. Lead the TMP team in developing a consultant scope of services (as needed), to include a TMP that reflects efforts to comply with this document.
5. Collecting and retaining TMP documentation.
6. Participating in the biennial work zone safety and mobility review.

### **b. Traffic information Systems**

1. Obtaining and providing current traffic data for the project.
2. Approve the traffic volumes for the project.

### **c. Traffic Operations is responsible for:**

1. Participating in the development of the TMP
2. Participating in the development of TO strategies.
3. Participating in the development of TTC Plan.
4. Evaluating effectiveness of the TMP during the post construction review meeting.
5. Participating in the coordination and implementation of the PI strategies.
6. Participating in the biennial work zone safety and mobility review.
7. Review and approval of the TMP to comply with the Work Zone Safety and Mobility Implementation Guide.

### **d. Roadway Design**

1. Compile project material for the TMP.
2. Coordination and development of the TTC Plan.
3. Participating in the development of TO strategies.
4. Participating in the development of the PI strategies.
5. Participating in the biennial work zone safety and mobility review.

**e. Construction**

1. Participating in the development of the TMP.
2. Participating in the development and implementation of the TTC Plan.
3. Participating in the development and compliance of TO strategies.
4. Participating in the coordination of the PI strategies.
5. Evaluating effectiveness of the TMP during the post construction review meeting.
6. Participating in the biennial work zone safety and mobility review.

**f. District**

1. Participating in the development of the TMP.
2. Participating in the development and compliance of the TTC Plan.
3. Participating in the development and compliance of TO strategies.
4. Participating in the development of the PI strategies.
5. Approving TMP for all permits, District contracts, and maintenance projects.
6. Ensuring that all permits, which fall within the limits of the project and/or will require concurrent work, are forwarded to the Project Manager for inclusion in the TMP.
7. Participating in the biennial work zone safety and mobility review.
8. Developing and maintaining a work zone incident management plan.

**g. Resident Engineer**

1. Ensuring compliance with contract documents, policies and guidelines
2. Participating in post construction review meetings.
3. Recommending and implementing traffic control improvements to address field conditions pertaining to traffic flow, visibility, and work and motorist safety.

4. Reviewing and approving TTC Plans submitted by the contractor.
5. Re-evaluate /Revise the TMP Plan.
6. Implementing the TMP Plan.
7. Monitor the performance of the TMP and update/revise as needed.

**h. Public Information Office is responsible for:**

1. Ensuring the proper information is communicated to the appropriate individuals, emergency and public safety departments, businesses and organizations.
2. Development, review and approval of the PI strategies of the TMP.

## **1.9 References**

### Current Editions

#### **Design Guidance**

*AASHTO Policy on Geometric Design of Highways and Streets*

*AASHTO Roadside Design Guide*

*ADAAG American's with Disabilities Act Accessibility Guidelines*

*Construction Manual, NDOT*

*Highway Capacity Manual, TRB*

*Manual on Uniform Traffic Control Devices for Streets and Highways*

*FHWA Standard Highway Sign Book*

*Nevada Standard Sign Book*

*Planning and Scheduling Work Zone Traffic Control, USDOT*

*Road Design Guide (2010 Edition), NDOT*

*Standard Plans for Road and Bridge Construction*

*Standard Specifications for Road and Bridge Construction*

*Access Management System and Standards, NDOT*

#### **Supporting Information**

*Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects, FHWA*

*Developing and Implementing Transportation Management Plans for Work Zones, FHWA*

*American Traffic Safety Services Association (ATSSA)*  
<http://www.atssa.com/default.asp>

*Crashworthy Work-Zone Traffic Control Devices Report 553, NCHRP*

*FHWA Work Zone Operations Best Practices*

<http://ops.fhwa.dot.gov/wz/practices/practices.htm>

*FHWA Work Zone Safety and Mobility*  
<http://ops.fhwa.dot.gov/wz/index.asp>

*ITE Temporary Traffic Control Device Handbook*

*ITS in Work Zones, AASHTO*  
<http://ssom.transportation.org/pages/itsinworkzones.aspx>

*Manual for Assessing Safety Hardware (MASH)*

*Work Zone and Traffic Analysis*  
[http://www.ops.fhwa.dot.gov/wz/traffic\\_analysis.htm](http://www.ops.fhwa.dot.gov/wz/traffic_analysis.htm)

*NDOT State Level Emergency Operations Plan (EOP)*

*Highway Safety Manual, AASHTO*

## **2.0 Policy**

### **2.1 Applicable NRS for Work Zones**

The following is a list of the most relevant Nevada Revised Statutes concerning work zones. Other NRS may be applicable depending on circumstances.

NRS 408.100 Declaration of legislative intent.

NRS 408.210 Powers of director: Closing and construction of highways; removal of encroachments

NRS 408.313 Manner of Construction

NRS 408.319 Report of projects for construction and maintenance: Preparation; contents; revision; public inspection.

NRS 408.403 Freeways

NRS 408.423 Permit required to excavate state highway; exception; fee.

NRS 484B.330 Obedience to signal of authorized flagman; prosecution of violations; penalties.

NRS 484B.130 Double penalty for certain traffic violations committed in work zones.

### **2.2 Transportation Policy Referenced**

Copies of all transportation policies can be obtained through the Administrative Service Division. Relevant transportation policies to work zone safety include TP 1-7-4, Protective Clothing and TP 1-6-9, Flagging Certification.

### **2.3 Transportation Management Plan Approval**

Projects will require a certification approval memo by the Chief Traffic Operations Engineer certifying the TMP meets the requirements of the Work Zone Safety and Mobility Implementation Guide. The Approval memo for the projects' Transportation Management Plan will be forwarded to Roadway Design in preparation of the processing memo.

### **2.4 Standard Specifications Applicable to Work Zones**

- 2.4.1 Uniform Traffic Control Officers** –Subsection 624.03.07
- 2.4.2 Public Traffic Delay** –Subsection 107.07 and Subsection 108.04
- 2.4.3 Detour Routes** –Subsection 624.03.02
- 2.4.4 Signal Management Operations** –Subsection 623.01.06
- 2.4.5 Temporary Lighting** –Subsection 107.07
- 2.4.6 Flagger Illumination** –Subsection 624.03.03
- 2.4.7 Temporary Traffic Signals** –Subsection 623.01.06
- 2.4.8 Business Access** –Subsection 624.03.01

## **2.5 Policies Applicable to Work Zones**

### **2.5.1 Temporary Speed Reduction**

Existing speed limits shall remain in effect through work zones on state highways except where those work zone activities would create a condition that would be aggravated by retaining the existing speed limits.

A temporary speed reduction on projects may be requested. Projects with an existing speed limit greater than 55 MPH may be temporarily reduced by 10 MPH or to 55 MPH, whichever is lower with the concurrence from the Chief Traffic Operations Engineer. If approved, the limits and operational benefits of the temporary reduced speed limit shall be incorporated into the TMP.

Any temporary reductions to a speed lower than 55 mph may be reduced with concurrence from the Chief Traffic Operations Engineer and a recommendation forwarded by Traffic Operations to the Director for approval.

A temporary reduction in the regulatory speed limit may be established as part of the traffic control plan, including those furnished by contractors. Temporary regulatory speed limit signs shall not be erected or uncovered until all appropriate work zone signs have been placed in accordance with the approved traffic control plans.

The temporary regulatory speed limit should not be left in effect beyond the daily hours of operations unless the condition for which the speed reduction was implemented continues to exist, or channeling devices are required to route traffic through the work zone area.

If a project is shut down for the winter or if no substantial work on the project takes place for 30 days or more, unless otherwise approved by the Director, the project area shall be left so that the original regulatory speed limit may be reinstated without a significant safety hazard to motorists.

The original regulatory speed limit shall be resumed by posting new signs at the end of the work zone for each direction of traffic.

All merge and shifting tapers shall be designed based on pre-work zone speeds.

### **2.5.2 Positive Protection Devices**

Positive protection devices should be used to manage work zone exposure and reduce the risks of crashes resulting in fatalities or injuries to workers and road users. Positive protection devices shall be used to prevent the intrusion of motorized traffic into the work space and other potentially hazardous areas in the work zone. Positive Protection Devices means devices that contain and/or redirect vehicles and meet the crashworthiness evaluation criteria contained in MASH.

Positive protection devices shall be considered in work zone situations that place workers at increased risk from motorized traffic and offer the highest potential for increased safety for workers and road users, such as:

1. work zones that provide workers no means of escape from motorized traffic e.g. tunnels, bridges, etc)
2. long duration work zones (two weeks or more) resulting in substantial worker exposure to motorized traffic

3. projects with high anticipated operating speeds (45mph or greater) especially when combined with high traffic volumes
4. work operations that place workers close to travel lanes open to traffic
5. roadside hazards, such as drop-offs or unfinished bridge decks that will remain in place overnight or longer

The need for positive protection devices shall be based on an engineering study. The engineering study may be used to develop positive protection guidelines for the agency or to determine measures to be applied on an individual project. The engineering study should be based on consideration of factors and characteristics such as:

1. Project scope and duration
2. Anticipated traffic speeds and volume through the work zone
3. Vehicle mix
4. Type of work (as related to worker exposure and crash risks)
5. Distance between traffic and workers and extent of worker exposure
6. Escape paths available for workers to avoid a vehicle intrusion into the work space
7. Time of day (e.g. night work)
8. Work area restrictions (including impact on worker exposure)
9. Consequences from/to road users resulting from roadway departures
10. Potential hazard to workers and road users presented by device itself and during device placement and removal
11. Geometrics that may increase crash risks (e.g. poor sight distance, sharp curves)
12. Access to/from work space
13. Roadway classification
14. Impacts on project cost and duration

### **2.5.3 Uniformed Law Enforcement**

A number of conditions may indicate the need for or benefit of uniformed law enforcement in work zones. The presence of a uniformed law enforcement officer and marked law enforcement vehicle in view of motorized traffic on a highway project can affect driver behavior, helping to maintain appropriate speeds and improve driver alertness through the work zone.

The use of uniformed law enforcement shall be considered on Federal-aid projects. The need for law enforcement is greatest on projects with high traffic speeds and volumes and where the work zone is expected to result in substantial disruption to or changes in normal traffic flow patterns. Project conditions should be examined to determine the need for or potential benefit of law enforcement, such as:

1. Frequent worker presence adjacent of high-speed traffic without positive protection devices.
2. Traffic control setup or removal that presents significant risks to workers and road users.
3. Complex or very short term changes in traffic patterns with significant potential for road use confusion or worker risk from traffic exposure.
4. Night work operations that create substantial traffic safety risks for workers and road users.
5. Existing traffic conditions and crash histories that indicate a potential for substantial safety and congestion impacts related to the work zone activity and

that may be mitigated by improved driver behavior and awareness of the work zone.

6. Work zone operations that require brief stoppage of all traffic in one or both directions.
7. High-speed roadways where unexpected or sudden traffic queuing is anticipated, especially if the queue forms a considerable distance in advance of the work zone or immediately adjacent to the work space.
8. Other work site conditions where traffic presents a high risk for workers and road users, such that the risk may be reduced by improving road user behavior and awareness.
9. Locations where traffic conditions and crash history indicate substantial problems may be encountered during the project.

### **3.0 Training Requirement**

#### **3.1 General**

All individuals engaged in the planning and design, construction and maintenance, permitting or inspecting of work zones must be trained in the following courses:

- ATSSA Traffic Control Technician
- ATSSA Traffic Control Supervisor
- Other courses as needed

## **4.0 Development of Traffic Management Plan (TMP)**

### **4.1 Planning Development of TMP**

#### **4.1.1 General**

Transportation Management Plan (TMP) development begins during the planning phase and progresses through the design phase of a project. A full TMP document is not developed until the intermediate design phase. A TMP scope analysis during planning and preliminary engineering ensures that the TMP development and implementation costs are included in the project budget. This makes it essential that the design engineer and the Project Manager work together to develop an effective TMP. The National Environmental Policy Act (NEPA) process should be considered a key source for inputs or constraints on the project.

#### **4.1.2 Development**

**4.1.2.1 Project Budget** –The Project Management Division will establish project budgets that reflect the expected efforts for developing and implementing the TMPs.

**4.1.2.2 Scope of work** –\_The Project Manager will develop a consultant scope of work (as needed), including a TMP that reflect efforts to comply with this document.

### **4.2 Preliminary Development of TMP**

#### **4.2.1 General**

TMP development continues in the preliminary engineering phase of a project. During this phase, a design strategy will be developed based on the project significance. Critical construction work will be identified and evaluated as having either large public impact or schedule impact. Adjacent projects will be considered in this evaluation.

#### **4.2.2 Develop TMP**

**4.2.2.1 Create TMP Team** – a well-balanced TMP team consisting of a variety of disciplines and stakeholders is important for developing a successful TMP. It is essential that personnel from appropriate divisions and the district(s) be involved to provide their specialty input. The team composition may vary from project to project. The Project Manager will assess the needs of the project and determine the team's composition.

**4.2.2.2 Identify Stakeholders** - Once the project type is known, appropriate stakeholders should be identified. The TMP team and the Project Manager will need to work together to identify the stakeholders. The Project Manager will need to insure that the stakeholders are contacted and that they provide critical input into development of the preliminary TMP. Stakeholders may include FHWA, other public agencies, the railroad, trucking associations, community groups, schools, enforcement agencies, emergency services, convention and visitor authority, local public works, the local chamber of commerce, home owner associations, and businesses.

**4.2.2.3 Compile Project Material** - Obtain current conditions by use of aerial photos, "as-built" plans and survey data. Concepts should be drawn to scale for further refinement. *For in-house design projects, this task is accomplished by Roadway Design.* The level of detail for these layouts should be sufficient to convey and validate the concepts. Aerial photography, mapping files, street maps, photographs, previous contracts, field notes and maintenance records should be used to insure that the layouts fit actual site conditions.

**4.2.2.4 Determine TMP needs** –Before work can begin on the TMP, preliminary information needs to be obtained on the project. Project scope will need to be determined, geometrics set and the structural section known. The roadway classification will need to be known and the traffic data collected. Appendix B has been developed to assist the project team in determining if the project is significant. Other projects in the area should also be considered when determining if the project is significant.

**4.2.2.5 Preliminary Traffic Control meeting** The TMP team members will need to discuss the overall traffic control strategies for the project. The team should strive towards work zone safety, and construction productivity with minimal impacts to the traveling public. Concepts need to be developed on how to accomplish individual construction activities anticipated on the project. The considerations listed in this section should be evaluated and incorporated into the conceptual traffic control accordingly.

**Identify critical areas** –Some potential critical areas are:

- Airport proximity - If the project is within one mile of an airport, the Project Manager will need to apply to the Federal Aviation Authority (FAA) for construction permits.
- Critical vertical clearances – Any vertical clearance over the traveled way of less than 16.
- Critical horizontal clearances – Travel lanes that have 14-foot or less physical clearance from fixed object to fixed object and turning movements which cannot accommodate the roadway design vehicle.
- Critical closures – minimum number of lanes to remain open versus time of day / day of week.
- Restricted working days – Certain special events and holidays may require that no lane restrictions are present.
- Environmental restrictions such as noise and dust may impact the construction activities.
- Seasonal restrictions – placement of open graded material is restricted to time of year. Temperature restrictions may apply in paving or other activities.
- Utility and railroad conflicts.
- Encroachment permits from a neighboring state.
- Bikes and Pedestrians

**Preliminary TTC Design** - The TTC can either be designed “up front”, and included in the plan set, or submitted by the contractor for approval. Specific construction staging or constructability issues may necessitate that traffic control plan sheets be provided. The decision to provide Lump Sum Contractor Supplied traffic control or traffic control plan sheets should be determined during preliminary traffic control review meetings.

#### **4.2.3 Outcome**

**4.2.3.1 Determine Project Significance** - Project traffic impact has been reviewed and resources allocated accordingly. The TMP team has determined the projects' significance.

**4.2.3.2 Preliminary work zone strategies** - Overall traffic control strategies have been agreed upon. Documentation of TTC has been determined (supplied with the contract or submitted by the contractor). The Project Manager will need to take the meeting minutes and distribute them to the team and all interested outside entities. The Project Manager will need to prepare a summary of Maintenance of Traffic Alternative Analysis (MOTAA). The MOTAA will include a list of alternative work zone strategy options considered and the justification for the selected alternative.

#### **4.2.4 Resources**

Requests for traffic information used in determining traffic control issues are to be coordinated with the Traffic Operations Division. The District Traffic Engineer needs to be contacted for local information when developing a TMP.

### **4.3 Intermediate development of TMP**

#### **4.3.1 General**

Maintenance of Traffic concepts have been fully considered and developed. During this stage, the TTC plans sets (when required) should be created for review. The initial PI and TO strategies are created for review. The attention of the TMP team will now need to focus on finalizing the TTC plans, developing the TO and PI strategies, and developing various sections in the special provisions.

#### **4.3.2 Develop TMP**

On a few projects, it is possible for the department to use a design-build and/or contractor supplied process. A performance-based specification will be developed for the project with the contractor being responsible for developing a TMP that best meets the performance specification. The TMP is subject to approval by the TMP team.

**4.3.2.1 TTC Intermediate Plan Development** - All unresolved issues need to be addressed at this time. The Traffic Operations Division should determine limitations of operations for lane closures and times. The Traffic Operations Division will need to provide input on the TTC plans regarding compliance to the MUTCD and standard practices. The Construction Division will need to provide input and make recommendations to address any potential construction problems with the TTC. It will be the responsibility of the District Engineer, or his or her representative, to review the traffic control plans at the intermediate level. There should be meetings with the local entities to gain their support. Stakeholders should be consulted during this development phase to seek their input and concurrence.

Recommendations regarding the constructability of the traffic control plans will be provided to the designer. Information to be shown includes, but is not limited to:

- Devices – types, locations and spacing of traffic control devices used
- Work zone – area to be occupied by the work forces, equipment and materials.
- Roadside hazards – identification and mitigation as required
- Lane assignments – number of lanes, directions of travel and turning movement
- Flagger/pilot car operation – location and pilot car route

- Work zone access– ingress/egress, business and ramp access.
- Temporary striping – number of lanes, widths, and markings.
- Detours – complete plan to reroute traffic
- Phasing and Staging plans – based on preliminary work zone strategy outcome
- Bike and Pedestrian access

Additional considerations can be found in table 1 of Appendix A.

**4.3.2.2 TO Strategies Development** - The TO strategies should include all of the mandatory and/or prohibited requirements that involve temporary traffic control during construction and for coordination with other projects and/or other agencies. Typical TO strategies include demand management, corridor/network management, work zone safety management, and traffic/incident management and enforcement.

The Project Manager along with the representative from the Traffic Operations Division will need to coordinate the TO items with the local agencies. It is recommended that a letter of understanding and/or an agreement be drafted between the state and the local agency addressing relevant items. Specifications need to be discussed and addressed. Information to be shown includes, but is not limited to:

- Critical clearance – inform Administrative Services (Over-dimensional Permits) of critical clearance issues and time frames
- Closures - inform Administrative Services of planned closures and time frames
- Signal timing - Special attention should be given to the signal timing coordination along with ITS components of the TMP
- Local agency representative - A contact number for the local representative along with how many days prior notification is required to the local representative will be included in the contract special provisions
- Limitations on construction operations will be documented.

Additional considerations can be found in table 2 of Appendix A.

**4.3.2.3 PI Strategies Development** - Early public involvement, particularly by the impacted stakeholders, is essential in the intermediate development of the TMP. Coordination by the design team and the public information officer helps to ensure success that effective mitigation strategies are developed and implemented. The strategies include both public awareness and motorist information. It will be the responsibility of the public information office to prepare the Public Information (PI) strategies. The Project Manager, along with representatives from the Design, Construction and Traffic Operation Divisions will provide input into the PI plan. These Divisions will educate the Public Information Officer on the project. This will allow the Public Information Officer to develop strategies that best inform the public regarding pending road construction.

Additional considerations can be found in table 3 of Appendix A.

#### **4.3.3 Outcome**

At the end of the intermediate TMP process, the TTC plan, TO and PI strategies have been reviewed by headquarters and district management and the construction sequence has been

reviewed and validated by the construction division. Documentation of the traffic control meetings has been placed in the project workbook.

- **TTC needs identified** - preliminary traffic control plans are drafted. Input has been obtained and addressed from stakeholders.
- **TO needs identified** - Limitations on the contractor's operations have been established. Input has been obtained and addressed from stakeholders. The Traffic Operations Division will need to document their analysis as outlined in section 4.5 and provide copies of this documentation will need to be provided to the Project Manager. Agreements concerning the TO have been drafted and coordinated with the local agencies and/or law enforcement.
- **PI needs identified** – Public Information Office has reviewed information provided by the Project Manager and preliminary strategies have been developed.

#### **4.3.4 Resources**

Local agencies should be contacted for local development and/or street closure considerations. Requests for traffic information used in determining traffic control are to be coordinated with the Traffic Operations Division. Review the district work program, the NDOT project status report and other local agencies for other projects that may have an impact on the project.

### **4.4 Final Development of TMP**

#### **4.4.1 General**

During final development of the TMP, all comments and new design issues need to be addressed. The quality assurance and specifications submittals will need to be developed. The TTC, TO, and PI documents will be completed.

During final development of the TMP, focus should also be on the coordination and agreement of the TMP with local entities.

#### **4.4.2 Finalize TMP**

- **TTC Final Plan Development** - It will be the responsibility of the designer to make the necessary changes to the TTC from the intermediate review meeting. The designer will need to insure that the TTC is in conformance with drafting and plan preparation standards.

The designer will review the comments made by the QA reviewer and incorporate those changes agreed upon. Once the QA comments have been incorporated, the Project Manager will need to determine if additional meetings are necessary. The TTC plans will need to be finalized.

- **TO Final Strategies Development** - In the development of the TO, the TMP team must finalize any constraints and requirements that are needed for the TTC plan. These constraints and requirements will be included to Specifications or otherwise addressed in the contract documents. The TMP team should consider:

1. A requirement to furnish minimum quantities of certain traffic control devices such as changeable message boards, traffic drums, arrow boards, etc.
2. Requiring the use of traffic barriers, such as portable concrete barriers, to shield traffic from longitudinal drop-offs, excavations and other construction activities.
3. Any constraints affecting traffic operations such as reducing the number of lanes, lowering the speed limit, diminishing the lane widths, working days and hourly limitations based on traffic volume.
4. The impacts to adjacent property owners such as restricted access, hours of operation, pollution control, etc.

Additional considerations can be found in table 2 of Appendix A.

- **NDOT advertised contract plans** - On projects administered by NDOT, the Roadway Design Division is responsible for writing the specifications. All TO information is addressed in the specifications. The Construction Division will provide the number of working days, project completion date, flagger hours and liquidated damages.

Specific sections and items of the special provisions that need to be addressed are:

- **Limitation of Operations (Section 108.04):** This section of the specifications limits the contractor's construction operations. The operations are usually limited by working hours, conditions of the work and the size of the construction zone.

- **Liquidated Damages (Section 108.09):** This section of the specifications tells the contractor what he will be assessed in withheld payment in the event that the conditions of the contract are not met.

- **Accommodations for Public Traffic (Section 624):** This section of the specifications tells the contractor what items or personnel to use to safely pass traffic through the work zone. It will address the use of detours, flaggers, traffic control supervisor, uniformed traffic control officer and pilot car or a combination of these methods.

#### **4.4.3 Outcome**

Once the specifications have been incorporated and the TTC plan, TO and PI strategies finalized, the TMP will be considered complete. Documentation of decisions made in the development of the TMP along with TMP meeting minutes will be placed in the project workbook and copies of all TMP documentation will have been forwarded to the Project Manager.

- **Receive Approvals** – The Chief Traffic Operations Engineer will approve the project meets the provisions set forth in the Work Zone Safety and Mobility Implementation Guide. The Chief Traffic Operations Engineer will provide a certification memo in order to produce the processing memo. All permits will comply with the Work Zone Safety and Mobility Implementation Guide and will be certified by the District Traffic Engineer prior to the notice to proceed.

## 4.5 TMP Documentation

### 4.5.1 General

This section contains a comprehensive list of the components that **may** be included in a TMP report. The order, terminology and inclusion of components may vary from project to project. The level of detail of the TMP will reflect the level of work zone impacts of the project.

### 4.5.2 Responsibilities

The State and contractor are required to designate a person at the project level who has the primary responsibility and sufficient authority for implementing the TMP and other safety and mobility aspects of the project. The individual designated to be the State's representative shall be the Resident Engineer assigned to the project. It will be the Project Managers responsibility to submit the completed TMP along with any supporting documentation to the Resident Engineer prior to the project being advertised for construction.

### 4.5.3 Elements in a TMP Document

The components discussed in this section include elements of the TMP document, as well as elements for TMP implementation and evaluation. The following table summarizes the components that may be included in the TMP document. Individual TMP components are described in more detail in the subsections that follow the table.

TMP Component	✓
<b>1. Introductory Material</b>	
▪ Cover Page	<input type="checkbox"/>
▪ Table of Contents	<input type="checkbox"/>
▪ List of figures	<input type="checkbox"/>
▪ List of tables	<input type="checkbox"/>
<b>2. Executive Summary</b>	<input type="checkbox"/>
<b>3. TMP Roles and Responsibilities</b>	
▪ Project Manager	<input type="checkbox"/>
▪ TMP Team	<input type="checkbox"/>
▪ TMP Implementation Task Leaders	<input type="checkbox"/>
▪ Emergency Contacts	<input type="checkbox"/>
<b>4. Project Description</b>	
▪ Project background	<input type="checkbox"/>
▪ Project type	<input type="checkbox"/>
▪ Project area/corridor	<input type="checkbox"/>
▪ Project goals and constraints	<input type="checkbox"/>
▪ Proposed construction phasing/staging	<input type="checkbox"/>
▪ General schedule and timeline	<input type="checkbox"/>
▪ Need for detours	<input type="checkbox"/>
▪ Related projects	<input type="checkbox"/>

<b>5. Existing and Future Conditions</b>	
▪ Data collection and modeling approach	<input type="checkbox"/>
▪ Existing roadway characteristics	<input type="checkbox"/>
▪ Existing and historical traffic data	<input type="checkbox"/>
▪ Existing traffic operations	<input type="checkbox"/>
▪ Crash data	<input type="checkbox"/>
▪ Stakeholder concerns/issues	<input type="checkbox"/>
▪ Traffic Mobility Issues	<input type="checkbox"/>
▪ Traffic predictions during construction	<input type="checkbox"/>
<b>6. Work Zone Impacts Assessment Report</b>	
▪ Qualitative summary of anticipated work zone impacts	<input type="checkbox"/>
▪ Summary of Maintenance of Traffic Alternative Analysis (MOTAA)	<input type="checkbox"/>
▪ Impacts assessment of alternative project design and management strategies	<input type="checkbox"/>
▪ Construction approach/phasing/staging strategies	<input type="checkbox"/>
▪ Work zone impacts management strategies	<input type="checkbox"/>
▪ Traffic analysis strategies	<input type="checkbox"/>
▪ Measures of effectiveness	<input type="checkbox"/>
▪ Selected Alternative	<input type="checkbox"/>
<b>7. TMP Monitoring</b>	<input type="checkbox"/>
▪ Monitoring requirements	<input type="checkbox"/>
▪ Evaluation report	<input type="checkbox"/>
<b>8. Public Information and Outreach Plan</b>	<input type="checkbox"/>
<b>9. Incident Management</b>	<input type="checkbox"/>
<b>10. Special Considerations (As Needed)</b>	<input type="checkbox"/>
<b>11. Attachments (As Needed)</b>	<input type="checkbox"/>

**Introductory Material** - Components may include:

- **Cover Page** –Should contain the title/project name, date, and the name of the agency and/or person responsible for the report with contact information.
- **Table of Contents** –Lists the sections and subsections of the report with their page numbers.
- **List of Figures**
- **List of Tables**

**Executive Summary** - The executive summary should include a brief overview and summary of the project, general approach, selected construction phasing and staging approach(es), anticipated work zone impacts of the project, the chosen TMP strategies, and conclusions/recommendations for the project.

**TMP roles and responsibilities** - The roles and responsibilities for the development, implementation, monitoring and evaluation of the TMP should be documented. These may include, but are not limited to:

- **Project Manager** – The person responsible for the overall development of the TMP.

- **TMP Team** –stakeholders and other in departmental members who were involved in the development and review of the TMP.
- **TMP Implementation Task Leaders** – These are the individuals responsible for implementing specific tasks recommended by the TMP. This should include contact information for the person in the Public Information Office who is responsible for PI&O support during construction.
- **Emergency Contacts** – List of known contact persons for each emergency service agency, including police, fire, and ambulance.

**Project Description** - Lists the scope and definition of the project. Much of this information will have already been gathered as part of Project Planning and Preliminary Engineering. It may include:

- **Project Background** –Includes a brief description of the project, its purpose, and its developmental history. It may also include additional information related to the project, roadway, or study area.
- **Project Type** – The nature of the project, which may range from capital projects, new construction, rehabilitation, major maintenance, to routine maintenance.
- **Project Area/Corridor** –Describes physical extents of the construction or maintenance work, as well as the estimated region(s) and corridor(s) that may be affected by the project. Using a map to show this information is recommended.
- **Project Goals and Constraints** – A brief listing of the goals, benefits, and challenges that are expected by this project.
- **Proposed Construction Phasing/Staging** – This includes the project phasing, land and/or facility closure strategies, whether HOV/temporary lanes/shoulders will be used for general traffic, ramp/interchange closures, construction strategies, lane closure hours, duration, etc. Identify holiday, event, seasonal and/or night time restrictions. The Sequence of Construction and Traffic Control Plans should be provided.
- **General Schedule and Timeline** – The start and finish dates for the project and phasing schedule (if appropriate), including all major milestones and planned shut down times for events for winter, environmental windows, special events, etc.
- **Need for Detours** – Include where detours are identified for staging purposes or for alternate routes. Detour plans should be provided separately from TTC plans.
- **Related Projects** – Other on-going or planned projects in the vicinity of the project area that may cause cumulative impacts to the region(s) and corridor(s).

**Existing and future conditions** - Provides information on existing and anticipated future (i.e. during construction) conditions in the project area including traffic, safety, and business and community access. While the level of detail will vary based on the project, it should consider:

- **Data Collection and Modeling Approach** – A brief discussion on how existing traffic data and information was obtained and what approach was used to estimate conditions during construction. Include a brief discussion on the growth rates used for analysis, including the source and any assumptions.
- **Existing Roadway Characteristics** – This includes a history of roadways in the study area, roadway classification(s), and number of lanes, geometrics, and urban/suburban/rural.
- **Existing and Historical Traffic Data** – This includes measures such as volumes, speed, capacity, volume to capacity ratio, truck percentage, queue length, peak

traffic hours, through versus local traffic, etc. Historical traffic data should be no more than three (3) years old.

- **Existing Traffic Operations** – This includes signal timing, delay, and traffic control types.
- **Crash Data** – An accident history including number and type of crashes should be documented.
- **Stakeholder Concerns/Issues** – Include a list of project stakeholders and others potentially impacted by the project. Input from the community and business representatives and other stakeholders should be included and prioritized to address local concerns.
- **Traffic Mobility Issues** – List major events that have the potential to impact mobility during the project.
- **Traffic Predictions During Construction (Volume, Delay, Queues)** - Based on existing and historical data, traffic growth rates, and the modeling/estimating approach used, estimates of traffic and safety during construction should be developed and documented. Future estimates should be compared to the existing data.

**Work Zone assessment** - The work zone impacts may include:

- **Qualitative Summary of Anticipated Work Zone Impacts** – This involves a brief discussion on how the project is expected to impact its vicinity, including major corridors, local streets, how traffic patterns are expected to change, and an estimate on how traffic demand might change due to the project.
- **Summary of Maintenance of Traffic Alternative Analysis (MOTAA)** – Summary of the MOTAA conducted during planning should include a List of staging/phasing and traffic control options investigated for the selected alternative only.

Summarize constraints of each MOT option, anticipated impacts, and costs.

- **Impacts Assessment of Alternative Project Design and Management Strategies** – This is a discussion on how the project's work zone design and other mitigation efforts would impact the project area, how they would affect each other, and how they might adversely impact specific areas, if any.
- **Construction Approach/Phasing/Staging Strategies** – Include any additional staging/phasing/MOT options investigated since the completion of the MOTAA. As the design evolves, there may be a need to revise construction strategies. Impacts should be investigated for new strategies in a similar approach as was taken in the MOTAA. Minimally, the new construction strategies should be investigated for impacts on:
  1. Access to communities and businesses
  2. Decision sight distance (especially at on-ramps)
  3. Ramp capacity
  4. Right-of-way
  5. Environment (wetlands, noise, dust control, BMP's, historical, etc.)
  6. Bridge widths
  7. Earthwork, retaining walls, pier clearances, profile differences, etc.
  8. Ability to maintain existing drainage, utility, and lighting systems
  9. Pedestrian and bicycle facilities
  10. Construction duration
  11. Constructability and construction equipment access
  12. Emergency services (fire, ambulance, police, hospitals)
  13. Over-height, over-weight vehicles

14. Public safety (workers and traveling public)
15. Traffic and mobility (see Traffic Analysis)
16. Construction and MOT costs

**Work Zone Impacts Management Strategies** – List work zone impact management strategies considered (recommended, and considered but rejected) and discuss feasibility and anticipated traffic or safety impacts. In table 2 of Appendix A of this document lists a variety of work zone impact management strategies for consideration. A determination of the pros and cons of each strategy should be considered to determine whether the strategies are likely to improve mobility and/or safety. Strategies may include:

- Temporary traffic control and devices
- Project coordination, contracting and accelerated construction
- Demand management
- Corridor/network management
- Work zone safety
- Work zone ITS
- Police traffic
- Public awareness
- Motorist information
- Incident management

For cost effectiveness, constructability needs to be balanced with the work zone transportation management strategies in order to best serve the public, construction workers, and agency. There maybe more than one option for addressing safety and mobility during construction. In order to decide which option is appropriate, the benefits and costs of the strategies should be estimated and compared. The cost evaluation may consider on-site costs (e.g. strategy implementation, right-of-way, environmental, delay, safety, accessibility to businesses and community, user costs), and detour costs, both capital and operating. Comparing the cost to implement work zone impact management strategies to the reduction in user delay costs may be an effective measure. Where appropriate, strategies should be documented on plan sheets, in separate plans (PI), in specifications and/or special provisions, and in construction estimates.

**Traffic Analysis Strategies** – A brief description on how the expected future (construction) traffic conditions were determined. Any traffic reduction factors or other parameters assumed for the calculations should be documented.

**Measures of Effectiveness** – List the measure of effectiveness used for the analysis, such as capacity, volume queue, speed, travel time, diversion, safety, noise, environmental, adequacy of detour routes, cost effectiveness, etc.

**Selected Alternative** – Plans, specifications, and estimates should be developed for the selected alternative. Describe the selected construction approach, including the construction phasing/staging strategy selected and the work zone impact management strategies selected. Any work hour restrictions should be documented for each stage (e.g., night work, peak hour restrictions, etc.). The following documents will need to be developed:

- Construction phasing/staging plans - Provide the construction approach/phasing/staging strategy on plan sheets.
- Work zone impact management strategies should be documented on plan sheets where possible (e.g. geometric improvements, control devices, etc.). If

not on the plans, strategies should be listed with text describing any restrictions, usage, or other considerations in the contract documents.

- Detour Plans (if required)
- Temporary Traffic Signal Plans, including any timing modifications (if required)
- Temporary Lighting Plans (if required)
- Public Information and Outreach Plan
- Necessary Special Provisions covering TMP elements

**TMP monitoring / evaluation criteria** - Develop project specific criteria and methods for measuring and evaluating the TMP and determine how it will be modified if improvements are needed.

- **Monitoring Requirements** – Monitoring requirements for the TMP should be included in the TMP and be made part of the contract documents. The evaluation should consider both the performance of individual TMP strategies as well as overall performance of the work zone and work zone impact area. This may include, but is not limited to:

1. Verification of work zone set-up
2. Identification and process for monitoring TMP performance (e.g. volume counts, queue length, crashes, complaints and feedback, surveys, etc.)
3. Tracking TMP implementation costs and comparing them to the budgeted costs
4. Approach for corrective action when TMP performance requirements are not met
5. Submission of revised/alternative TMPs and the approval process
6. Person(s) responsible for each component of the TMP monitoring

- **Evaluation Report for the TMP** – The TMP should include reference to the development of an evaluation report upon completion of construction to document lessons learned and provide recommendations on how to improve the TMP process and/or modify guidelines. The Evaluation Report should be completed by the Project Manager.

**Public Information and outreach strategies** - The public information and outreach strategies serves two main purposes. It informs the public about the overall purpose of the project to generate and maintain public support and encourages changes in travel behavior during the project to minimize congestion. Public awareness and motorist information strategies should be included in the public information and outreach plan. Separate documentation for public information and outreach efforts may be required by the Public Information Office. Refer to table 3 of Appendix A for strategies on how to develop public information and outreach plans as part of the TMP effort.

**TMP Incident management** - Emergency communications should be discussed at the pre-construction meeting. Important elements to discuss include:

- Roles and responsibilities of those who are involved in incident management
- Key contacts and their contact information
- Emergency and essential services contacts

**Special considerations (as needed)** - Any special considerations related to the project that have not been included in a previous section should be identified here. This may include reiterating special provisions, highlighting considerations that may need to be included in contracting documents, identifying work zone management strategies that require implementation prior to construction, etc.

**Attachments (as needed)** - Appendices may be included in the TMP document to include information that may be relevant or of interest to the TMP reviewer, implementer, or other stakeholders. This could include, but is not limited to:

- Observed, historical, and/or estimated traffic volumes, speeds travel times, level-of service, delay, and crashes.
- Maps
- TTC Plans
- Detailed analysis methodology, assumptions and parameters used
- Special provision text

## **5.0 Implementation of TMP**

### **5.1 General**

Implementing the TMP consists of providing the processes and personnel required for the placement, inspection, monitoring and documentation of the TMP elements. The implementation of the TMP will start at the pre-construction meeting and continue through the final day of the project.

### **5.2 Processes and Personnel**

**Pre-Construction Meeting** - The pre-construction meeting should be held prior to the Notice to Proceed date. The procedures the contractor plans to use for the handling of traffic through the project will be discussed at the pre-construction meeting. Limitations of operations will be discussed; as well as, the process for providing the public with information regarding lane restrictions, detours and access restrictions.

Communication is vital for the safe and effective use of TMP elements. All contact information for personnel in charge of the aspects discussed in the pre-construction meeting should be documented to help with the communication throughout the life of the project.

TMP Modifications – Substantial changes to the TMP must be agreed upon by both the Resident Engineer and Project Manager before changes can be implemented. On full oversight projects, changes to the TMP must also be agreed upon by the FHWA.

**Highway Restriction Report** - The highway restriction report will be completed by the Resident Engineer 24 hours prior to work that will restrict or change the flow of traffic. This report will be forwarded to the appropriate district to assist in the PI Plan. Information from the report will be used on the Safe Travel Website. The highway restriction report will also be utilized in the operations of emergency response, public transit systems and oversized load permitting.

**Assigning technician's inspection and monitoring duties** - The Resident Engineer will assign a technician the duties of inspection and monitoring of the TTC set up, maintenance and removal. The Resident Engineer should supply the assigned technician all available information, training and equipment necessary for he/she to complete these duties safely and thoroughly. Some of these duties are as follows:

- Attending contractor safety meetings
- Inspection and documentation of TTC set up and removal and the documentation of any identified deficiencies.
- Inspection of in-place TTC and the documentation of any deficient elements identified during inspection
- Monitoring flaggers and documenting their certification, location, hours worked, handling of traffic and compliance with specifications
- Monitoring and assessing the flow of traffic through the project. Discuss all ideas for improvement of the TTC with the resident engineer.
- Driving through the TTC several times throughout the work day/night to assure proper installation and effectiveness.

- Reporting to the Resident Engineer all information documented during the completion of these duties daily

**Assigned Traffic Control Supervisor** - The Traffic Control Supervisor assigned to the TTC will be responsible for the safe and timely flow of traffic through a project. The Traffic Control Supervisor will maintain a current certification through the ATSSA and Subsection 107.07 of the Special Provisions. NDOT Standard Specifications, Subsection 624.03.08 outlines the inspection requirements of the Traffic Control Supervisor. The reports generated by these requirements will be reviewed by the Resident Engineer and included in the contract documentation.

**Uniformed Traffic Control Officer** - A Uniformed Traffic Control Officer may be required for special traffic control situations. Contact information will be listed in Subsection 624.03.07 of the Special Provisions. The contractor will be responsible for contacting the appropriate personnel and scheduling the work to be performed accordingly. Some of the situations that may require a uniformed Traffic Control Officer are as follows:

- Signal repair, signal redesign or new signal construction
- Rolling stop for the placement of overhead signs.
- Emergency closures or detours

**Contractor Generated Traffic Control Plans** – Projects determined to be significant may not have contractor generated TTC. Projects with a Lump Sum TTC bid item will have Contractor generated TTC. The Resident Engineer, with the assistance of the TMP team, will review and accept or reject these TTC plans. The Resident Engineer will work with the contractor and stakeholders in his review of these plans. All TTC plans generated by the contractor will comply with all references listed in this document and the limitations provided in the special provisions.

**Resident Engineer Changes to TTC** - The Resident Engineer can propose changes to the TTC Plan provided in the contract documents or the TTC plan provided by the contractor. These changes may be considered when field conditions are different than what has been planned for or field conditions have changed prior to implementing the TTC.

### **5.3 Outcome**

The proper implementation of a TMP should provide safe and effective work zones. The processes and personnel utilized in the implementation should be instrumental in the evaluations for future projects.

### **5.4 Post Construction Review**

The Construction Division will be responsible for initiating a post construction review on all projects. This review will be an information gathering tool used for modifying procedures and specifications to better our future projects. The Construction Division will produce and distribute a quarterly report. This report will identify the aspects of the TMP that work well and those that did not work well.

## **6.0 Incident Management**

### **6.1 General**

Incident management is a planned and coordinated program that detects and removes incidents from the highway and restores traffic capacity as safely and quickly as possible. This plan should consider emergency response routes, public transit routes, school zones, detour routes and all necessary contact information. It should clearly define the procedures required to meet these concerns.

### **6.2 Development**

The District Engineer shall be responsible for producing, updating and distributing the incident management procedures for their District. The Project Manager, the Resident Engineer and the Contractor shall be responsible for producing, updating and distributing the incident management procedures for the project.

The incident management plan should consider use of incident response vehicles, Freeway Service Patrol, or Work Zone ITS to quickly detect and/or remove incidents from the roadway. The local Traffic Incident Management Plan (TIM), if available, should also be utilized for the project.

### **6.3 Outcome**

- Modified Plan
- Clear and precise procedures
- Current contact list
- Local entity and stakeholder awareness
- Current resource list

## **Appendices**

**Appendix A, (Table 1) Temporary Traffic Control (TTC)**

<b>A. Control Strategies</b>	<b>B. Traffic Control Devices</b>	<b>C. Project Coordination, Contracting, and Innovative Construction Strategies</b>
<p>IA1. Construction phasing/staging            IA2. Full roadway closures            IA3. Lane shifts or closures:</p> <ul style="list-style-type: none"> <li>▪ Reduced lane widths to maintain number of lanes (construction)</li> <li>▪ Lane closures to provide worker safety</li> </ul> <p>▪ Reduced shoulder width to maintain number of lanes</p> <ul style="list-style-type: none"> <li>▪ Shoulder closures to provide worker safety</li> </ul> <p>▪ Lane shift to shoulder/median to maintain number of lanes</p> <p>IA4. One-lane, two-way operation            IA5. Two-way traffic on one side of divided facility (crossover)            IA6. Reversible lanes            IA7. Ramp closures/relocation            IA8. Freeway-to-freeway interchange closures            IA9. Night work            IA10. Weekend work            IA11. Work hour restrictions for peak travel            IA12. Pedestrian/bicycle access improvements            IA13. Business access improvements            IA14. Off-site detours/use of alternate routes</p>	<p>IB1. Temporary signs:</p> <ul style="list-style-type: none"> <li>▪ Warning</li> <li>▪ Regulatory</li> </ul> <p>▪ Guide/Information</p> <p>IB2. Message signs</p> <ul style="list-style-type: none"> <li>▪ Dynamic (DMS)</li> <li>▪ Changeable (CMS)</li> </ul> <p>IB3. Arrow panels            IB4. Channelizing devices            IB5. Temporary pavement markings            IB6. Flaggers and uniformed traffic control officers            IB7. Temporary traffic signals            IB8. Lighting devices</p>	<p>IC1. Project coordination:</p> <ul style="list-style-type: none"> <li>▪ Coordination with other projects               <ul style="list-style-type: none"> <li>▪ Utilities coordination</li> <li>▪ Right-of-Way coordination</li> <li>▪ Coordination with other transportation infrastructure</li> </ul> </li> </ul> <p>IC2. Contracting strategies:</p> <ul style="list-style-type: none"> <li>▪ Design-build</li> <li>▪ A+B bidding               <ul style="list-style-type: none"> <li>▪ CMAR</li> </ul> </li> <li>▪ Incentive/Disincentive clauses               <ul style="list-style-type: none"> <li>▪ Lane rental</li> </ul> </li> </ul> <p>IC3. Innovative construction techniques (pre-cast members, rapid cure materials)</p>

**Appendix A, (Table 2) Transportation Operations (TO)**

<b>A. Demand Management Strategies</b>	<b>B. Corridor/Network Management Strategies</b>	<b>C. Work Zone Safety Management Strategies</b>	<b>D. Traffic/Incident Management and Enforcement Strategies</b>
<p>III-A1. Transit service improvements</p> <p>III-A2. Transit incentives</p> <p>III-A3. Shuttle services</p> <p>III-A4. Ridesharing/carpooling incentives</p> <p>III-A5. Park-and-ride promotion</p> <p>III-A6. High-occupancy vehicle (HOV) lanes</p> <p>III-A7. Toll/Congestion pricing</p> <p>III-A8. Ramp metering</p> <p>III-A9. Parking supply management</p> <p>III-A10. Variable work hours</p> <p>III-A11. Telecommuting</p>	<p>III-B1. Signal timing/coordination improvements</p> <p>III-B2. Temporary traffic signals</p> <p>III-B3. Street/intersection improvements</p> <p>III-B4. Bus turnouts</p> <p>III-B5. Turn restrictions</p> <p>III-B6. Parking restrictions</p> <p>III-B7. Truck/heavy vehicle restrictions</p> <p>III-B8. Separate truck lanes</p> <p>III-B9. Reversible lanes</p> <p>III-B10. Dynamic lane closure system</p> <p>III-B11. Ramp metering</p> <p>III-B12. Temporary suspension of ramp metering</p> <p>III-B13. Ramp closures</p> <p>III-B14. Railroad crossings controls</p> <p>III-B15. Coordination with adjacent construction site(s)</p> <p>III-B16. Bicycle and Pedestrian Access</p>	<p>III-C1. Speed limit reduction/variable speed limits</p> <p>III-C2. Temporary traffic signals</p> <p>III-C3. Temporary traffic barrier</p> <p>III-C4. Movable traffic barrier systems</p> <p>III-C5. Crash-cushions</p> <p>III-C6. Temporary rumble strips</p> <p>III-C7. Intrusion alarms</p> <p>III-C8. Warning lights</p> <p>III-C9. Automated Flagger Assistance Devices (AFADs)</p> <p>III-C10. Project task force/committee</p> <p>III-C11. Construction safety supervisors/inspectors</p> <p>III-C12. Road safety audits</p> <p>III-C13. TMP monitor/inspection team</p> <p>III-C14. Team meetings</p> <p>III-C15. Project on-site safety training</p> <p>III-C16. Safety awards/incentives</p> <p>III-C17. Windshield surveys</p>	<p>III-D1. ITS for traffic monitoring/management</p> <p>III-D2. Transportation Management Center (TMC)</p> <p>III-D3. Surveillance [Closed-Circuit Television CCTV), loop detectors, lasers, probe vehicles]</p> <p>III-D4. Helicopter for aerial surveillance</p> <p>III-D5. Traffic screens</p> <p>III-D6. Call boxes</p> <p>III-D7. Mile-post markers</p> <p>III-D8. Tow/freeway service patrol</p> <p>III-D9. Total station units</p> <p>III-D10. Photogrammetry</p> <p>III-D11. Coordination with media</p> <p>III-D12. Local detour routes</p> <p>III-D13. Contract support for incident management</p> <p>III-D14. Incident/emergency management coordinator</p> <p>III-D15. Incident/emergency response plan</p> <p>III-D16. Dedicated (paid) police enforcement</p> <p>III-D17. Cooperative police enforcement</p> <p>III-D18. Automated enforcement</p> <p>III-D19. Increased penalties for work zone violations</p>

**Appendix A, (Table 3) Public Information (PI)**

<ul style="list-style-type: none"> <li>II-A1. Brochures and mailers</li> <li>II-A2. Press releases/media alerts</li> <li>II-A3. Paid advertisements</li> <li>II-A4. Public information center</li> <li>II-A5. Telephone hotline</li> <li>II-A6. Planned lane closure web site</li> <li>II-A7. Project web site</li> <li>II-A8. Public meetings/hearings</li> <li>II-A9. Community task forces</li> <li>II-A10. Coordination with media, schools, businesses, and/or emergency services</li> <li>II-A11. Work Zone education and safety campaigns</li> <li>II-A12. Work Zone safety highway signs</li> <li>II-A13. Rideshare promotions</li> <li>II-A14. Visual information (videos, slides, presentations) for meetings and website</li> </ul>	<ul style="list-style-type: none"> <li>II-B1. Traffic radio</li> <li>II-B2. Changeable message signs (CMS)</li> <li>II-B3. Temporary motorist information signs</li> <li>II-B4. Dynamic speed message sign</li> <li>II-B5. Highway advisory radio (HAR)</li> <li>II-B6. Extinguishable signs</li> <li>II-B7. Highway information network (web-based)</li> <li>II-B8. 511 traveler information systems (wireless, handhelds)</li> <li>II-B9. Freight travel information</li> <li>II-B10. Transportation management center (TMC)</li> <li>II-B11. Social Media (Facebook, Twitter)</li> </ul>
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## Appendix B

### GUIDANCE ON IDENTIFYING SIGNIFICANT PROJECTS

Given the variety and differing complexity of roadway projects, some projects are likely to have much greater effects on traffic conditions than others. Recognizing that not all road projects cause the same level of work zone impacts, it is reasonable to identify those that will have greater impacts such that the appropriate resources can be allocated to these projects. The Work Zone Safety and Mobility Rule ("The Rule", 23 CFR 630 Subpart J) establishes a category of projects called "significant projects". A significant project is defined as one that, alone or in combination with other concurrent projects nearby, is anticipated to cause sustained work zone impacts that are greater than what is considered tolerable based on State policy and/or engineering judgment.

#### What is the purpose of identifying significant projects?

Consideration of work zone impacts at the systems-planning level (either on a network-wide basis or corridor basis) can have several positive effects. For example, in cost estimation and budgeting for projects, an understanding of the expected level of work zone impacts of the road project will help in deciding what transportation management strategies are likely and to what extent a public information campaign is required. This understanding can then serve as the basis for developing reasonable cost estimates that are commensurate with the impacts of the project. Further, the analysis of the cumulative impacts of concurrent road projects will help better schedule construction, thereby minimizing the impacts on road users, businesses, and other affected parties.

#### When should significant projects be identified?

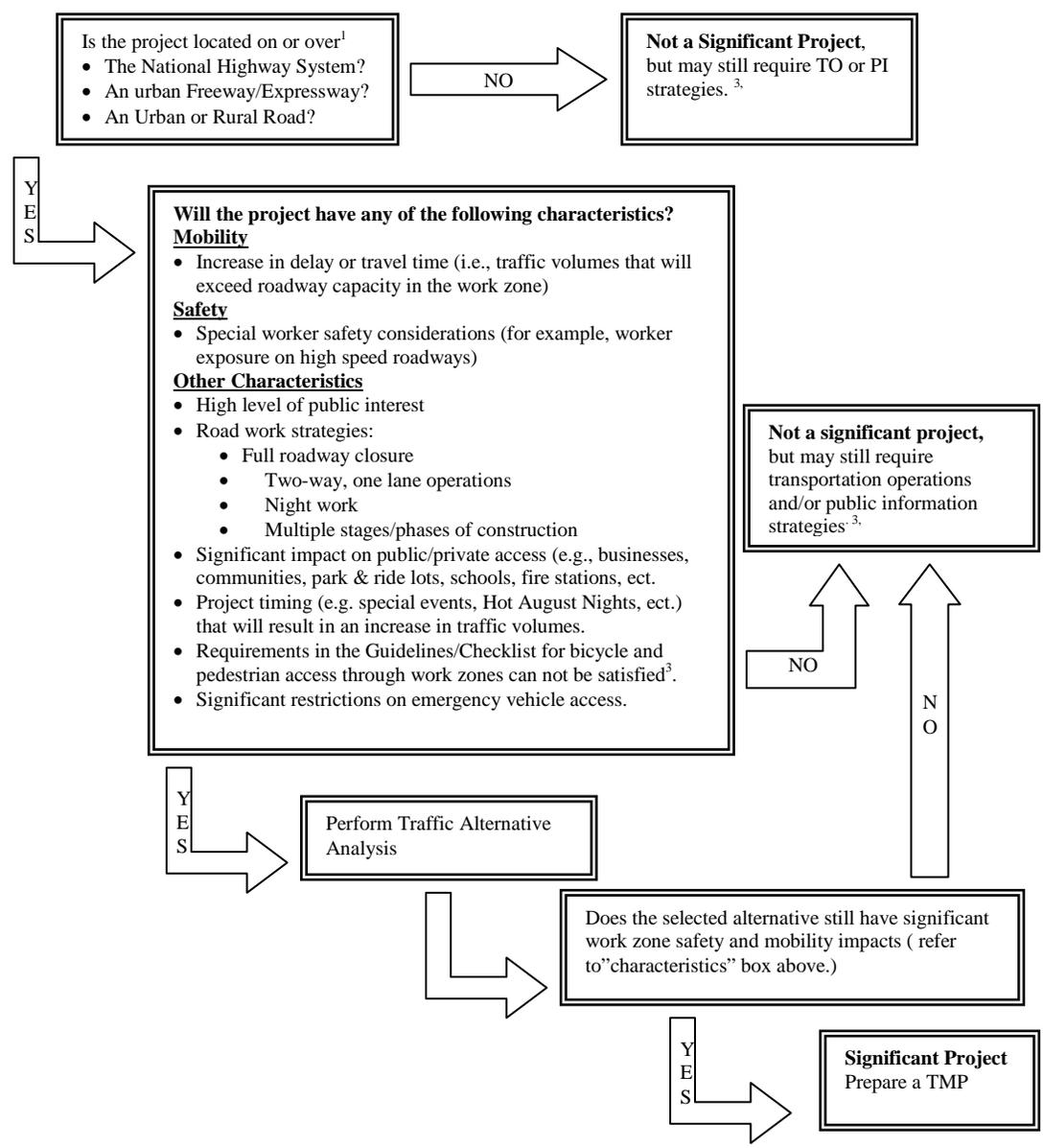
Significant projects should be identified during the planning phase of project delivery, prior to the development of alternatives. During subsequent project development stages, the significant project status should be reconfirmed. As more information becomes available for making project-specific decisions, certain projects that were thought to be significant may no longer be significant as a result of change in certain circumstances, and vice-versa.

#### What happens when a project is identified as a significant project?

For all significant projects, a Transportation Management Plan (TMP) shall be developed. The TMP will consist of the temporary traffic control plan, as well as transportation operations and public information strategies to manage work zone impacts. In addition to work zone impacts management strategies, the TMP may also include contingency plans, incident management plans, detailed roles and responsibilities, and implementation costs.

#### Who is responsible for identifying significant projects?

The Project Manager, including the FHWA, and other appropriate regional and local stakeholders, ideally should work together as a multi-disciplinary team to identify significant projects. A final determination of a project being significant will be determined by the TMP team once assigned.



1) Roadway classification can be found at [http://www.nevadadot.com/About\\_NDOT/NDOT\\_Divisions/Planning/Roadway\\_Systems/Functional\\_Classification\\_Maps.aspx](http://www.nevadadot.com/About_NDOT/NDOT_Divisions/Planning/Roadway_Systems/Functional_Classification_Maps.aspx)

2) Bicycle and Pedestrian access requirements can be obtained through the NDOT bike and ped coordinator.

3) Some projects may not fall under the Significant Project definition, but may still benefit from transportation operation or public information strategies. For example, projects that impact a moderate number of travelers with moderate public interest, such a single lane closures at Lake Tahoe.

## **Appendix C**

### TMP Examples

**I-15, from Tropicana Avenue to  
US-95  
Crumb Rubber Overlay  
Transportation Management Plan**

March 14, 2011

Prepared by  
Chris Petersen, Roadway Design

## Executive Summary

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The purpose of the Transportation Management Plan (TMP) is to document traffic and construction phasing related strategies and public information outreach strategies that have occurred throughout the project planning and design process. The TMP provides documentation of Temporary Traffic Control strategies and describes how the TMP will be used to manage the work zone impacts of a project.

A TMP is required for any project falling within the description stated in NDOT's "*Work Zone Safety and Mobility Implementation Guide*" and The Federal Highway Administration (FHWA) publication of the Work Zone Safety and Mobility Rule on September 9, 2004 in the Federal Register (69 FR 54562). This Rule updates and renames the former regulation on "Traffic Safety in Highway and Street Work Zones" in 23 CFR 630, Subpart J. All State and Local governments that receive Federal-aid highway funding are affected by this updated Rule, and are required to comply with its provisions. These procedures shall be implemented on all federal and non-federal aid construction and maintenance projects anticipated to have significant work zone impacts, known as significant projects. The FHWA defines significant projects as 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."

The purpose of the subject project is to rehabilitate this section of the roadway and remove remnant ghost striping.

This TMP will highlight the transportation management strategies developed throughout the course of this project. The strategies developed include the Maintenance of Traffic Plan, the Transportation Operations Plan, and the Public Information Plan.

## TMP Roles and Responsibilities

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### TMP Coordinator

The TMP Coordinator is Chris Petersen, SRD. Contact info is:

[cpetersen@dot.state.nv.us](mailto:cpetersen@dot.state.nv.us)

(775)888-7652 Office

(775)690-0560 Cell

### TMP Team

The TMP Team consists of Chris Petersen, Dale Keller, Jeannie Drown and Jeff Cobb.

### TMP Implementation Task Leaders

The TMP Implementation Task Leaders are responsible for implementing specific tasks recommended in the TMP. Individuals from Design, Chris Petersen (Senior Roadway Design Engineer), Dean Howard (Senior Traffic Engineer), and Hoang Hong (Senior Traffic Operations

Engineer) will be represented. NDOT will assign a person in the Office of Communications (Public Information Officer) who will be responsible for Public Awareness.

## Emergency Contacts

Emergency contacts will be identified at the Pre-Construction Meeting.

## Project Description

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The proposed project extends the service life of Interstate 15 and will provide new striping on the existing roadway. The scope of this rehabilitation project is a 1" crumb rubber overlay of the existing surface.

The project consists of the following design elements:

- **Work on I-15:**
  - Crumb rubber overlay of approximately 6 miles of I-15 from Tropicana Avenue to US-95.
  - All Ramps and prior to each structure there will be a 1" milled key-in of crumb rubber overlay.

## Project Type

The project is a rehabilitation/safety project.

## Project Area/Corridor

The project area includes I-15 from Tropicana Avenue to US-95.

## Project Goals and Constraints

The goal of the proposed project is to provide a new surface with new striping on I-15. This will also extend the service life of this section of the Interstate system and will remove remnant ghost striping.

The proposed improvements are within existing right of way.

## Proposed Construction Phasing/Staging

Construction is expected to be completed in a moving phase; there will not be any stages.

## General Schedule and Timeline

Construction is scheduled to begin in September 11, 2011. There will be 30 working days associated with the construction contract. Heavy incentives for early completion will be provided.

## Need for Detours

Ramp closures, which will be between the hours of 8:00 pm and 6:00 am nightly, will require detours. Consecutive ramps closures will not be allowed.

## Related Projects

The I-15 South Design Build is within the project limits and will be coordinated with.

## Existing and Future Conditions

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### Data Collection and Modeling Approach

The traffic information presented in this plan is the most recent information available from the Nevada Department of Transportation's (NDOT) Traffic Information Division.

### Existing Roadway Characteristics

I-15 is a four/five lane freeway with barrier rail in the median.

I-15 is classified as an interstate.

### Existing and Historical Traffic Data

The 2009 average annual daily traffic (AADT) volumes used for this project (information is available from the NDOT website at [http://www.nevadadot.com/reports\\_pubs/traffic\\_report/2009/](http://www.nevadadot.com/reports_pubs/traffic_report/2009/)) and have been summarized for the project area.

- **I-15 south of Tropicana Ave.:** 197,000 AADT.
- **I-15 south of Flamingo Rd.:** 231,000 AADT.
- **I-15 south of Spring Mountain Rd.:** 238,000 AADT.
- **I-15 North of Spring Mountain Rd.:** 246,000 AADT.
- **I-15 North of Charleston Blvd.:** 221,000 AADT.

### Existing Traffic Operations

Since the subject project is a rehabilitation project, no traffic operations analysis was performed. This section of road will perform at the same level of service after the proposed work as it did before any work was performed, however it will be safer since the ghost striping will be removed. The project area will be affected during construction activities, but will resume pre-construction conditions when the proposed work is complete.

### Crash Data

The crash data analyzed were from January, 2004 through January, 2009.

Overall, the crash data suggested extremely high crash rates within the project area.

### Stakeholder Concerns/Issues

Project stakeholders and organizations potentially affected by the project include:

- Nevada DOT
- FHWA
- Clark County

- City of Las Vegas
- Adjacent and local business owners
- Local Residents
- Las Vegas Visitors

Stakeholder traffic concerns and issues, including those by the community and business representatives, known are:

- Impacts during construction

## Traffic Mobility Issues

All restrictions are identified in the project specifications.

## Traffic Predictions During Construction

Existing traffic on I-15 operates at acceptable levels with the expected short horizon for beginning of construction and the maintenance of three lanes in each direction except in two locations where the lanes will be reduced.

## Work Zone Impacts Assessment Report

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### Qualitative Summary of Anticipated Work Zone Impacts

The rehabilitation work is expected to have large impacts on mobility and safety. Roadway construction is expected to maintain 3 lanes in each direction except in two locations described as follows:

Two lanes in each direction:

- Northbound and Southbound from just north of Sahara Avenue to US-95.
- Time restrictions will apply to this work (8:00 pm to 6:00 am).

One lane in each direction:

- Northbound and Southbound from US-95 East/West off ramp to US-95 East Northbound on ramp.
- Time restrictions will apply to this work (8:00 pm to 6:00 am).

Ramp Impacts:

- Ramps will need to be closed briefly to key-in the crumb rubber overlay.
- These impacts will from the hours of (8:00 pm to 6:00 am)
- No consecutive ramps will be allowed to be closed at one time.

### Impacts Assessment of Alternative Project Design and Management Strategies

The project area is over six (6) miles long and is located in the middle of the I-15 Resort Corridor. For this reason, three maintenance of traffic (MOT), plans have been developed.

- Alternative 1: 24 hour operation 7 days a week
  - PROS:
  - Work completed quickly with fewer working days (20)

- Allows contractor to work 24 hour shifts reducing TC setup and takedown
- CONS:
- Significant contractor resources
- Working 24 hours
- Weekend traffic counts would greatly impact traveling public
- Safety risk of weekend work zones will greatly increase
  
- Alternative 2: 7:00 pm to 7:00 am Sunday night through Friday morning
  - PROS:
  - Least impact to traveling public
  - CONS:
  - Working days greatly increase (65)
  - With this increase, contract could stretch to two seasons
  
- Alternative 3 (**preferred alternative**): Sunday 7:00 pm to Thursday 7:00 am. (24 hour operation)
  - PROS:
  - Minimal impacts to traveling public
  - Allows contractor to work 24 hour shifts reducing TC setup and takedown
  - Working days minimal (30)
  - No work on weekends
  - CONS:
  - Working 24 hours
  - Significant contractor resources

### Construction Phasing/Staging Approach

There will be phasing /staging on this project; however this will be developed by the contractor and will be approved by NDOT. Concurrent work on northbound and southbound lanes will be allowed.

### Management Strategies for Work Zone Impacts

A variety of management strategies may be deployed to minimize disruption to traffic and maintain a safe working environment. Suggested strategies to minimize impacts are documented in Table 5-1 (temporary traffic control), Table 5-2 (traffic operations control) and Table 5-3 (public information).

TABLE 5-1  
Temporary Traffic Control Strategies

<b>Control Strategies</b>	<b>Traffic Control Devices</b>	<b>Project Coordination, Contracting, and Innovative Construction Strategies</b>
Lane shifts or closures <ul style="list-style-type: none"> <li>- Reduced lane widths to maintain number of lanes</li> <li>- Lane closures</li> <li>- Reduced shoulder width to maintain number of lanes</li> <li>- Lane shift to shoulder/ median to maintain number of lanes</li> <li>- Ramp closures</li> </ul>	Temporary Signs <ul style="list-style-type: none"> <li>- Warning</li> <li>- Regulatory</li> </ul> Changeable message signs Channelizing devices	

TABLE 5-2  
Transportation Operations Control Strategies

<b>Corridor/Network Management Strategies</b>	<b>Work Zone Safety Management Strategies</b>	<b>Traffic/Incident Management and Enforcement Strategies</b>
Coordination with adjacent construction sites Coordination with the I-15 Resort Corridor	Construction safety supervisor/inspector TMP monitor/inspection team Team meetings Windshield surveys	Tow/freeway service patrol Coordination with media Incident/emergency management coordinator Cooperative police enforcement Increased penalties for work zone violations

TABLE 5-3  
Public Information Strategies

<b>Public Information Management Strategies</b>	
Press releases	Traffic radio
Coordination with media and businesses	Changeable message signs 511 traveler information systems

### Traffic Analysis Strategies

A separate operations analysis has not been performed for construction staging. With the straightforward construction approach and isolated project area, traffic operations expectations were based on discussions with the Project team.

### Measures of Effectiveness

The measures of effectiveness considered in the traffic operations analysis for this project was LOS for the freeway operations.

## **Selected Alternative (Development of the Maintenance of Traffic Plans)**

The Maintenance of Traffic Plans are not included in the Construction Plans. The concepts presented have been discussed and developed throughout the course of the project. The standard Traffic Control Strategy Meetings were held as design progressed. Personnel from Construction, Specifications, Hydraulics, District, Design, and Traffic were in attendance. Design elements were discussed and critical construction elements were outlined. Concepts were brainstormed in order to begin conceptual Maintenance of Traffic layouts. The Special Provisions provide strict limits of operations.

Public safety and construction worker safety were also discussed as a critical element of the traffic control strategy. Separation of the public from construction activities will be achieved through the use of barrels and traffic barricades depending on the location and type of construction.

Ongoing coordination with Traffic, Construction, and Design has occurred throughout the development of the Plans and Specifications.

## **TMP Monitoring**

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### **Monitoring Requirements**

NDOT will monitor the effectiveness of the TMP through general inspection and traffic control supervision.

## **Public Information and Outreach Plan**

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Given the type of project, the public information and outreach plan was to provide project information via the Department website, radio, and TV stations. Changeable Message Signs will be able to provide current construction conditions.

### **Motorist Information Strategies**

As appropriate, portable CMSs will be used to inform drivers of traffic information, such as to alert drivers of possible delays, dates construction will occur, incidents, or alternate routes. The current plan is to deploy CMS messages approximately two weeks prior to the initial project impacts to existing traffic patterns.

NDOT also maintains work zone information for motorists on the Highway Information Line (511) as well as on their website (<http://safetravelusa.com/nv/>). This project will be implemented on NDOT's 511 system.

### **Business Information Strategies**

Business access will be accommodated during construction, as appropriate. Businesses are encouraged to contact the Public Information Office at the Department of Transportation with questions and concerns that may arise.

## **Public Information Strategies**

Project information, such as activities and impacts to the traveling public, will also be posted to existing NDOT websites.

## **Media Relations**

Project announcements will be shared with radio, print, and TV media to inform the public about any ramp closings or expected travel delays during heavily traveled times.

## **Incident Management Plan**

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The Incident Management Plan is to be developed, maintained, and monitored by the District Engineer and will follow the standard for National Incident Command System (ICS) principles. Emergency communications are to be discussed at the pre-construction meeting.

# **US 395 from 1<sup>st</sup> Street in Minden to US 50(Spooner Jct.) Traffic Management Plan**

January 2011

Prepared by

Nick Johnson, Design

## Executive Summary

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The purpose of the Traffic Management Plan (TMP) is to document traffic and construction phasing related strategies and public information outreach strategies that have occurred throughout the project planning and design process. The TMP provides documentation of Temporary Traffic Control strategies and describes how the TMP will be used to manage the work zone impacts of a project.

A TMP is required for any project falling within the description stated in NDOT's "*Work Zone Safety and Mobility Implementation Guide*" and The Federal Highway Administration (FHWA) publication of the Work Zone Safety and Mobility Rule on September 9, 2004 in the Federal Register (69 FR 54562). This Rule updates and renames the former regulation on "Traffic Safety in Highway and Street Work Zones" in 23 CFR 630, Subpart J. All State and Local governments that receive Federal-aid highway funding are affected by this updated Rule, and are required to comply with its provisions. These procedures shall be implemented on all federal and non-federal aid construction and maintenance projects anticipated to have significant work zone impacts, known as significant projects. The FHWA defines significant projects as 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."

The purpose of the subject project is to rehabilitate this section of the US route. This stretch of roadway is considered to be a principal arterial that contains both urban and rural areas. The area of the project through the town of Minden contains small retail, commercial development, and single family residences. The portion of the project north of Minden is mainly rural until you reach Plymouth and South Sunridge Dr., where the surrounding areas contain residential and commercial development.

This TMP will highlight the transportation management strategies developed throughout the course of this project. The strategies developed include the Maintenance of Traffic Plan, the Transportation Operations Plan, and the Public Information Plan.

## TMP Roles and Responsibilities

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### TMP Coordinator

The TMP Coordinator is the party responsible for the overall development of the TMP, typically the NDOT Project Coordinator. The NDOT Project Coordinator for this project Nick Johnson.

### TMP Team

The TMP Team is comprised of the individuals who have been involved in the development and review of the TMP. The TMP team consisted of Lisa Ouellette (Traffic), Phil Kanegsberg (Roadway Design), Nick Johnson (Roadway Design), Patrick Cassady (Roadway Design), Mike Chmelovsky (Roadway Design), and Jeff Cobb (Construction).

## **TMP Implementation Task Leaders**

The TMP Implementation Task Leaders are responsible for implementing specific tasks recommended in the TMP. Individuals from Design, (Senior Roadway Design Engineer), Traffic Control (Senior Traffic Engineer), and Traffic Operations (Senior Traffic Operations Engineer) will be represented. NDOT will assign a person in the Office of Communications (Public Information Officer) who will be responsible for Public Awareness.

## **Emergency Contacts**

Emergency contacts will be identified at the Pre-Construction Meeting.

## **Project Description**

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The proposed project extends the service life of US 395 between 1<sup>st</sup> Street in Minden to US 50. The project length is 12.3 miles. This is a pavement preservation project with the main scope of work being a 2 ¾ inch cold mill and replacing with 2 inches of dense grade plantmix and 1 inch of open grade. The scope also includes the widening of turn pockets in a various locations throughout the project, upgrading ADA facilities, and reconstructing a drainage channel located by Mica Dr.

## **Project Type**

The project is a pavement preservation project.

## **Project Goals and Constraints**

The goal of the proposed project is to extend the service life of this section of roadway.

Project challenges and constraints stem from portions of the project being located within a highly developed area. While most of the proposed improvements are within existing right of way, many of the ADA improvements extend into Douglas County right of way. All the improvements on this project will affect adjacent businesses during construction and modify access to adjoining properties with project construction. The Traffic will be disrupted on US 395.

## **Proposed Construction Phasing/Staging**

Construction is expected to be completed in four phases. Phases 1 through 3 will each have four stages; Phase 4 will have 5 stages. During construction on US 395, traffic will be constricted to one lane in each direction. During non-working hours both lanes on US 395 will be open for traffic. The width of the travel lanes will be maintained at 12 feet.

Construction staging areas will be chosen by the Contractor with the approval of the Department.

Holiday, event, seasonal and/or night time restrictions are identified in the “First Street in Minden to the Junction with US50 in Carson City” specifications.

## General Schedule and Timeline

Construction is scheduled to begin in April 2011. There are 150 working days associated with the construction contract.

## Need for Detours

There will be no need for detours for the construction of this project.

## Related Projects

Phase 2B of the Carson City Bypass project will be under construction at the same time.

## Existing and Future Conditions

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### Data Collection and Modeling Approach

The traffic information presented in this plan is the most recent information available from the Nevada Department of Transportation’s (NDOT) Traffic Division.

### Existing Roadway Characteristics

US 395 is a four-lane principal arterial running north-south through the project area with cable rail installed as the median barrier. The speed limit varies throughout the limits of the project with the highest speed limit being 65 mph and lowest being 25 mph through the town Minden.

There are many intersections and cross streets throughout this corridor that intersect US 395. The properties abutting US 395 and the cross streets within the project vicinity support a wide mix of uses including commercial, retail, professional, and residential.

### Existing and Historical Traffic Data

The 2009 average annual daily traffic (AADT) volumes used for this project have been summarized below. This information is available in the NDOT Annual Traffic Report ([http://www.nevadadot.com/reports\\_pubs/traffic\\_report/2009/](http://www.nevadadot.com/reports_pubs/traffic_report/2009/)).

#### US 395:

- **US395, 375' north of the Fire Station & 150' South of Sixth St.:** 23,000 AADT
- **US395, 0.69 miles north of Buckeye Rd. and 700' south of SR-88:** 24,000 AADT
- **US395, 0.25 miles South of Muller Ln.:** 28,000 AADT
- **US395, 0.1 miles south of SR-206 (Genoa Ln.):** 28,000 AADT
- **US395, 500' north of SR-206 (Genoa Ln.):** 28,000 AADT
- **US395, 0.9 miles south of Mica Dr.:** 31,000 AADT
- **US395, 0.4 miles north of Jacks Valley Rd.:** 40,000 AADT

- **US395, 0.5 miles north of Johnson Ln at mp DO-28.6:** 27,000 AADT

## Existing Traffic Operations

Since the subject project is a rehabilitation project, minor traffic operations analysis was performed. The areas of analysis focused on storage capacities of many of the left turn storage lanes throughout the project resulting in the widening of US 395 in select locations to extend the length of these left turn lanes. US 395 will perform at the same level of service after the proposed work as it did before any work. The project area will be affected during construction activities, but will resume pre-construction conditions when the proposed work is complete.

## Crash Data

The crash data analyzed were from January, 2006 through January, 2009 for MP DO-22.24 to DO-33.96.

Overall, there were 591 crashes in the period or approximately a crash every other day with 9 fatalities. The three largest crash-types were: 52% rear-end, 23% angle, and 19% single vehicle. It should be noted 11.5% of the crashes during the period were at the Topsy Lane intersection.

## Stakeholder Concerns/Issues

Project stakeholders and organizations potentially affected by the project include:

- Nevada DOT
- Douglas County
- Town of Minden
- Town of Gardnerville
- Town of Carson City
- Adjacent and local business owners

Stakeholder traffic concerns and issues, including those by the community and business representatives, known are:

- Impacts during construction

## Traffic Mobility Issues

Working days may be restricted the day before and after a holiday or major special event. Major special events in the Minden, Gardnerville, and Genoa area include: Carson Valley Days, Minden Street Festival, and the Genoa Candy Dance.

All events and restrictions are identified in the project specifications.

## Traffic Predictions During Construction

Existing traffic on US 395 typically operates at acceptable levels. With the expected short horizon for beginning of construction and the maintenance of one-lane in both directions during construction, traffic operations should be within acceptable levels for a construction zone.

Similarly, the arterial street system will likely operate at levels close to today.

## Work Zone Impacts Assessment Report

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### Qualitative Summary of Anticipated Work Zone Impacts

The US 395 rehabilitation work is expected to have acceptable impacts on mobility and safety. Construction is expected to maintain one lane of travel in each direction. Project construction is not expected to have significant impacts to traffic demand or travel patterns. Changeable message signs will be employed to assist the traveling public during these closures.

### Construction Phasing/Staging Approach

Construction is expected to be completed in four phases. Phases 1 through 3 will each have four stages; Phase 4 will have 5 stages. During construction on US 395, traffic will be constricted to one lane in each direction. During non-working hours both lanes on US 395 will be open for traffic. The width of the travel lanes will be maintained at 12 feet.

Phases 1 and 4 cover the urban area of Minden and Carson City with a stage for each lane. ADA mitigation will take place during these phases. Limitations for Phase 1 are: Beginning of Project to Ironwood Drive. Limitations for Phase 4 are: Jack’s Valley Road to End of Project.

Phases 2 and 3 cover the rural areas of the project with a stage for each lane. Turn pocket lengthening and chain up areas will be included in these phases. Limitations for Phase 2 are: Ironwood Drive to station “XN” 315+00. Limitations for Phase 3 are station “XN” 315+00 to Jack’s Valley Drive.

### Management Strategies for Work Zone Impacts

A variety of management strategies may be deployed to minimize disruption to traffic and maintain a safe working environment. Suggested strategies to minimize impacts are documented in Table 5-1 (temporary traffic control), Table 5-2 (traffic operations control) and Table 5-3 (public information).

The list of strategies may need to be updated as details regarding the construction are finalized and the construction start date is determined.

TABLE 5-1  
Temporary Traffic Control Strategies

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<b>Control Strategies</b>	<b>Traffic Control Devices</b>	<b>Project Coordination, Contracting, and Innovative Construction Strategies</b>
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TABLE 5-1  
Temporary Traffic Control Strategies

<b>Control Strategies</b>	<b>Traffic Control Devices</b>	<b>Project Coordination, Contracting, and Innovative Construction Strategies</b>
Construction phasing/staging	Temporary Signs	Coordination with other projects
Lane shifts or closures	– Warning	
– Lane closures	– Regulatory	
– Reduced shoulder width to maintain number of lanes	Changeable message signs	
– Lane shift to shoulder/ median to maintain number of lanes	Channelizing devices	
Night work	Temporary pavement markings	
Marathon weekend work		

TABLE 5-2  
Transportation Operations Control Strategies

<b>Corridor/Network Management Strategies</b>	<b>Work Zone Safety Management Strategies</b>	<b>Traffic/Incident Management and Enforcement Strategies</b>
Coordination with adjacent construction sites	Speed limit reduction	Tow/freeway service patrol
	Temporary traffic barriers and crash-cushions	Coordination with media
	Construction safety supervisor/inspector	Incident/emergency management coordinator
	TMP monitor/inspection team	Cooperative police enforcement
	Team meetings	Increased penalties for work zone violations
	Windshield surveys	

TABLE 5-3  
Public Information Strategies

<b>Public Information Management Strategies</b>	
Public informational meetings	Traffic radio
	Changeable message signs
	511 traveler information systems

## Traffic Analysis Strategies

A separate operations analysis has not been performed for construction staging. With the straightforward construction approach and isolated project area traffic operations expectations were based on discussions with the Project team. It is reasonable to assume operations at the beginning of construction will be consistent with historic traffic data given traffic volumes are generally steady and construction is anticipated to begin in the near future.

## Selected Alternative (Development of the Maintenance of Traffic Plans)

The Maintenance of Traffic Plans are included in the Construction Plans. The concepts presented have been developed throughout the course of the project. The standard Traffic Control Strategy Meetings were held as design progressed. Personnel from Construction, Specifications, Hydraulics, District, and Design were in attendance. Design elements were discussed and critical construction elements were outlined. Concepts were brainstormed in order to begin conceptual Maintenance of Traffic layouts. During these meetings, the decision to allow concurrent northbound and southbound US 395 work was made.

Public safety and construction worker safety were also discussed as a critical element of the traffic control strategy. Separation of the public from construction activities will be achieved through the use of barrels and traffic barricades depending on the location and type of construction.

Preliminary Maintenance of Traffic plans were prepared based on the discussions and outcomes of the Traffic Control Strategy Meetings. These plans have been incorporated into the plan set and distributed for review by all involved in this project. Ongoing coordination with Traffic, Construction, and Design has occurred throughout the development of the Plans and Specifications.

Plans, specifications and estimate have been developed accordingly for the Phasing/Staging concepts discussed at the Traffic Strategy Meeting.

## TMP Monitoring

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### Monitoring Requirements

NDOT will monitor the effectiveness of the TMP through general inspection and traffic control supervision.

## Public Information and Outreach Plan

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Given the type of project, minimal public information and outreach will be provided for this project. Changeable Message Signs will be able to provide current construction conditions.

### Motorist Information Strategies

As appropriate, portable CMSs will be used to inform drivers of traffic information, such as to alert drivers of possible delays, dates construction will occur, incidents, or alternate routes. The current plan is to deploy CMS messages approximately two weeks prior to the initial project impacts to existing traffic patterns.

NDOT also maintains work zone information for motorists on the Highway Information Line (511) as well as on their website (<http://safetravelusa.com/nv/>). This project will be implemented on NDOT's 511 system.

## **Business Information Strategies**

Business access will be accommodated during construction, as appropriate. Businesses are encouraged to contact the Public Information Office at the Department of Transportation with questions and concerns that may arise.

## **Public Information Strategies**

Project information, such as activities and impacts to the traveling public, will also be posted to existing NDOT websites.

## **Incident Management Plan**

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The Incident Management Plan is to be developed, maintained and monitored by the District Engineer and will follow the standard for National Incident Command System (ICS) principles. Emergency communications are to be discussed at the pre-construction meeting.