Work Zone Safety & Mobility Implementation Guide

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List of Acronyms

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

Informal Project - A project estimated to cost less than $250,000. Approval for informal TMPs may be granted by the District Traffic Engineer residing over the area where the project is constructed.

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.

1.5 Project Significance Assessment

In accordance with the Rule and NDOT's objectives, all projects necessitating work zone establishment under NDOT jurisdiction and oversight shall follow the procedures in this Manual. A project that is deemed "significant" requires a high level of work zone impact

mitigation including Temporary Traffic Control Strategies, Transportation Operations Strategies, and Public Information Strategies. A project that is not found to be “significant” requires fewer mitigation strategies. The most basic projects require only a work zone traffic control plan.

The first step in developing a Transportation Management Plan (TMP) for a work zone is to determine the level of TMP to be applied. This is referred to as the Project Significance Determination. This procedure determines whether a project is defined as Significant or Non-Significant. It should be noted that if a project is determined to be Significant, it does not necessarily mean that the development of the TMP will be a time-consuming or exhausting effort. If a project is determined to be Significant, it simply means that additional mitigation strategies should be implemented to reduce congestion and improve safety within the work zone. Often, these strategies are things that NDOT is already doing for many work zones. Excluded projects and types of work for which standing TMPs may be used are discussed in 1.5.2 below.

In order to complete the TMP, the project is categorized into one of three separate groups:

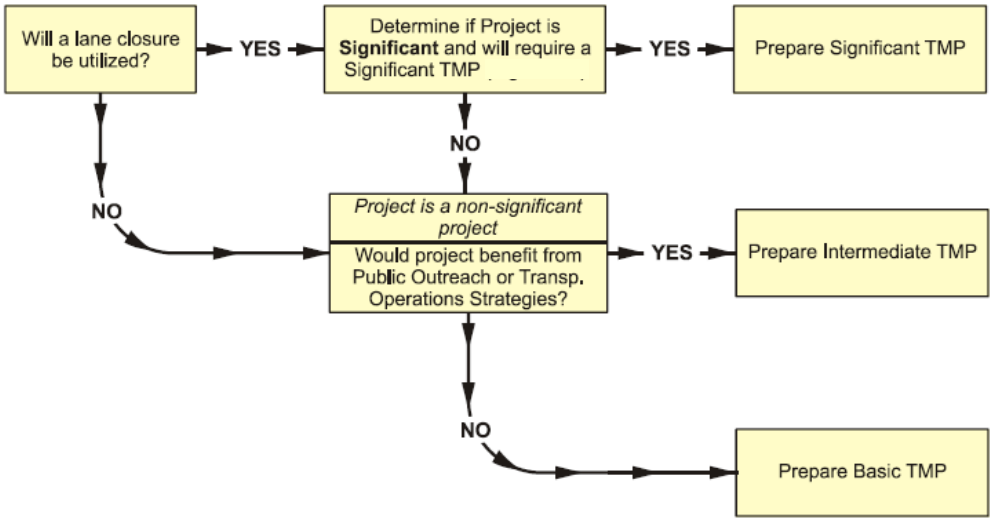
a) **Significant Project** - Requires a high level of work zone impact mitigation. Requires consideration and use of all three TMP strategies to help mitigate the impacts of a significant project:
   - Temporary Traffic Control Strategies (TTC)
   - Transportation Operations Strategies (TO)
   - Public Information Strategies (PI)

b) **Intermediate Project** - Requires additional planning, coordination, etc, but not required to be at the same level of a Significant TMP. Requires one or more TMP strategies beyond a basic TTC plan.

c) **Basic Project** - Typical work zone TTC plan is implemented alone. Refer to NDOT standard drawings, standard notes, and MUTCD. No additional TMP strategies

The basic process of significance determination is outlined in Figure 1.1:

Transportation Management Plan (TMP) Development Process



1.5.1 Determination of Project Significance

In order to effectively manage the impacts of the work zones, a project's characteristics are reviewed and judged against minimum criteria to determine if it is to be designated a "significant" project.

If a project's traffic control will not involve a lane closure, the project will not be considered significant. In this case, the project is **non-significant** and will either be an **Intermediate project** or a **Basic project**. If the project is expected to benefit from public information or transportation operation strategies, an Intermediate TMP is to be developed per NDOT procedures. Otherwise, the project will utilize a Basic TMP consisting of only a TTC plan.

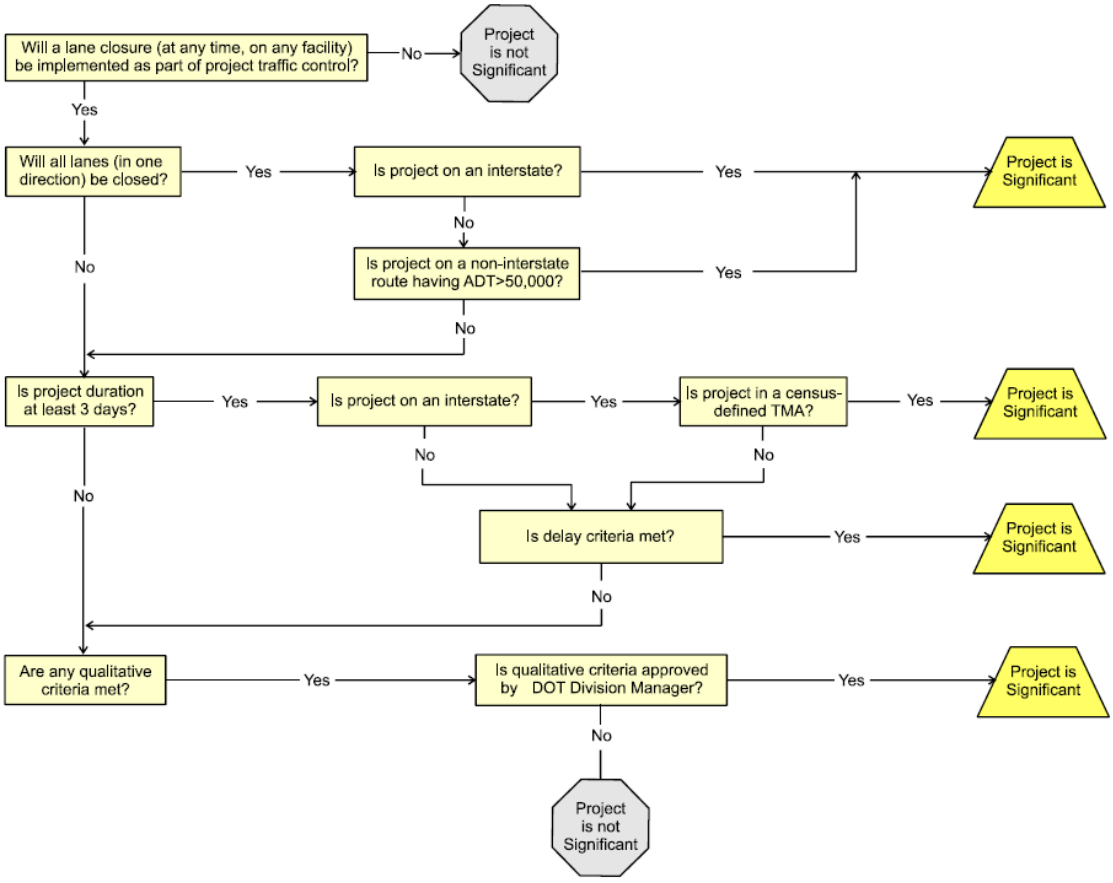
A **Significant Project** is one for which any of the following criteria exist:

a) Any project on the interstate system located within a recognized Transportation Management Area (TMA) that occupies a given location for at least three days duration with either continuous or intermittent lane closures.

b) Any project of any duration on an interstate route or any route with an AADT of at least 50,000 vehicles per day for which all lanes in one direction will be closed to traffic.

c) Any project for which the delay through the limits of the work zone is at least 30 minutes above the normal delay under typical non-work conditions.

d) Any project deemed Significant by extraordinary qualitative characteristics. This determination may be made on the basis of conditions such as high levels of public interest, business/community impacts, or long work zone duration. All Significant Projects defined in this manner shall only be done with careful consideration and strategic decision making.



Significance Determination Diagram

All projects requiring work zones will be classified as either Significant or Non-Significant. These two broad classifications provide the basis upon which the project's work zone requirements are to be based. Having defined a project as either Significant or Non-Significant will help determine what mitigation of work zone impacts should be considered.
The NDOT Work Zone Safety and Mobility Implementation Guide uses a TMP to define the strategies to be used in the mitigation of work zone impacts. Whether defined as Significant or Non-Significant, a TMP must be completed for all projects having a work zone, unless classified as exempt.

The Significance determination helps to ensure the appropriate level of TMP strategies to be applied to each work zone.

Classification as a Significant Project distinguishes a project as one requiring a high degree of work zone impact mitigation. Having met the criteria given, the project is anticipated to affect large numbers of roadway users, cause excessive delays, and/or present at least one of several qualitative impacts to the transportation system or affected community. Due to the impacts introduced by a Significant Project, special consideration must be made to minimize its negative effects.
This special consideration translates into specific efforts that must be made in a Significant Project's TMP. Identified as a Significant TMP, designers are required to establish and plan for the safe temporary control of traffic, methods for promoting efficient traffic operations, and ways to best inform the public of the work. Guidance for the development of a project TMP can be found in Part 4 of this guide.

When a project fails to meet the criteria of Significance, the project will not be categorized as being a Significant project. This designation does not mean that its work zone impacts are unimportant or should be disregarded. Rather, the TMP of a Non-significant project will generally not provide mitigation strategies at the same level as the Significant TMP. Additionally, some components of a Non-Significant project's TMP may be pre-defined or standardized to simplify the TMP development for common small-scale work zones.
For a Non-Significant Project, either a Basic TMP or Intermediate TMP will be developed. A **Basic TMP** is to be used when only a TTC plan is needed to successfully implement a safe and efficient work zone. An **Intermediate TMP** adds some additional measures to address improved mobility and/or public information when called for.

The FHWA's Rule allows a project defined as a Significant Project to be excluded from the requirements of a Significant TMP. If a project meets the definition of a Significant Project, but careful consideration of either qualitative or quantitative work zone characteristics predicts minor impacts, completion of a TMP may not be required.
A TMP exclusion may be initiated by the Project Manager and corroborated by the Division Manager.

FHWA approval is required for all Federal Aid Highway projects classified as Significant and proposed to be exempt. For a Significant Project to be exempt from TMP completion, a written request must be submitted to FHWA's Nevada Division office.
This request should come from the appropriate NDOT Division Manager and detail the expected impacts of the work zone and an explanation of why the project will not have sustained work zone impacts. The justification should include specific and quantifiable measures of effectiveness documenting how the project would not be expected to create sustained work zone impacts.

For multiple projects of the same type that are not expected to exhibit considerable safety or mobility impacts, a blanket exemption request may be submitted. A blanket exemption should be filed in the same manner as an individual project request.

1.5.2 Types of TMPs

Transportation Management Plans (TMPs) will be used to plan transportation management strategies to meet both NDOT's performance measures goals and the requirements of the Rule. The impacts that a work zone are excepted to have on a roadway or a community vary from project to project, so no two TMPs will be exactly the same. The level of planning required for an individual TMP will depend on the project's anticipated impacts.

The first step in developing a TMP for a work zone is to determine the appropriate level of TMP to be utilized. Projects can be divided into three separate groups:

- **Significant TMP Projects** require a higher level of work zone impact mitigation and require consideration of various TMP strategies to help mitigate the impacts of a significant project.

- **Intermediate TMP Projects** require additional planning, coordination, etc. beyond a basic Temporary Traffic Control (TTC) plan, but not to the level of a Significant TMP.

- **Basic TMP Projects** require no additional TMP Strategies beyond a typical TTC plan.

- **"Standing" TMP for Routine, Recurring Activities/Projects**
  This additional class of activities/projects has been identified as those that are typical and routinely performed by Design staff or contracted workforces. The projects are characterized as having the potential to impact traffic operations due to required lane closures or roadside/shoulder work. They may include, but are not limited to Resurfacing, Noise Wall and Slope Repair projects, Bridge Inspection, Bridge Painting, Deck Patching, and Joint Repair.

  The "standing" TMP methodology **SHALL NOT** be considered for a project/activity that meets the following conditions:

  - ✓ On an Interstate system or US designated route within a Transportation Management Area (TMA), AND
  - ✓ Having a project/activity duration longer than three days, AND
  - ✓ Includes use of lane closures (intermittent or continuous).

  If a project/activity developed by the Design Division or District Office meets the above criteria, the project shall follow NDOT's TMP procedures as previously described. Otherwise the "standing" TMP will consist of the following:

  A. Temporary Traffic Control Plans per current NDOT standard drawings which should follow the current version of the Manual on Uniform Traffic Control Devices, Part VI (a custom traffic control plan may be developed as deemed necessary).

  B. Work Zone Standard General Notes shall be considered and followed per current NDOT procedures.

  C. Where lane closures will be necessary as part of work effort, **Public Information Outreach** and/or **Time-of-Day Restrictions** on lane closures should be considered. The decision to utilize these strategies will be considered by the Department as part of its lane closure procedure.

An opportunity occurs later in the project development process for a project's significance determination to be verified. Projects that are the responsibility of NDOT's Design and Project Management Division, are to undergo a secondary significance determination since there is potential for a project's scope to change during preliminary design.

The following maintenance activities are examples of ROUTINE, RECURRING projects/activities that may qualify for "standing" TMP consideration:

- ➢ Pavement Patching/Pot-Hole Repair Joint Repair
- ➢ Pavement Marking Work Sign Repair/Replacement
- ➢ Attenuator Installation/Repair Guardrail Installation/Repair
- ➢ Shoulder Repair/Construction "No Plans" Contract Activities
- ➢ "On Call" Contract Activities Tunnel Maintenance

*These types of projects **will not** require completion of the Project Significance Determination or TMP development.* A custom TMP for each occurrence of these activities will not be required. However, these projects/activities must include provisions for appropriate Temporary Traffic Control Plans as outlined and shall follow NDOT's Public Involvement Plan where deemed necessary by the Assistance District Maintenance Engineer and interested division managers (particularly where lane closures are implemented).

- ❖ **Maintenance Division or District Maintenance Projects/Activities**

It has been determined that projects originating within the Maintenance Division or

District Maintenance Office should have a different approach. This is because of the repetitive nature of much of the work and the fact that many of the activities are not considered actual "projects" with planning and design phases. Many Maintenance Division or District Maintenance Office activities have minimal impact on motorists. In addition, there are many instances where repair and rehabilitation activities must be completed within a short period of time.
To address these issues, two groups of activities/projects have been identified that will either be exempt from the TMP process or be covered by existing Temporary Traffic Control and Public Outreach procedures. The latter will be addressed using a "Standing TMP" approach.

- **Exempt Activities**

The following list of NDOT Maintenance activities identifies typical work that is exempt from the TMP requirement. This list may be revised by adding or removing activities as the department deems appropriate.
The following maintenance activities are proposed for exclusion; *project significance determination and TMP development not required*:

- Brush Control/Mulching (Roadside) Vegetation Spraying (Roadside)
- Litter Removal Sweeping/Debris Removal
- Fence Repair Erosion Control
- Drainage Structure Repair Ditch Repair
- Brine/Snow Removal Mowing

For all exempted projects/activities, NDOT will implement appropriate temporary traffic control and advanced warning signage per existing Department processes and procedures for a given project. Due to their short-term nature and relative low impact on highway operations, the exempt projects will not require Significance Determination or TMP Development.

In certain cases, projects which are normally exempt may require development of an original TMP. An example of this case is a culvert replacement, which may be considered drainage structure repair, which requires closing a road. In special cases such as these, the significance determination should be completed and a TMP developed. The Division or District Maintenance Engineer will be responsible for making this judgment.

- **"Special" Maintenance Division or District Maintenance Projects**

These projects are outside the routine activities completed by the Maintenance Division.
In general, these projects have greater scopes and last for longer durations.
Consequently, these projects may have greater impact on motorists and traffic operations.
"Special" projects include road lane additions, intersection modifications, major pavement construction/repair (i.e. interstate concrete pavement installation/repair), individually-contracted/site specific projects, etc.
The projects described above and other projects that are identified as "Special" by NDOT Maintenance Division or District Maintenance Offices shall be analyzed by NDOT's TMP process as described on section 1.5.1 above.

1.6 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.

1.7 Update Procedure

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

Chief Road Design Engineer	District Engineers
Chief Construction Engineer	Safety Engineering
Chief Traffic Operations Engineer	Public Information
FHWA Transportation Engineer	Project Management

The process review will be conducted by the Chief Traffic Operations Engineer who 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.

1.8 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.

1.9 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.
8. Compile TMP report.

d. Roadway Design

1. Provide work zone assessment report to Traffic Operations for inclusion into TMP report.

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. Provide technical guidance.
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.

1.10 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

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 Statues 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

Informal projects with TMPs can be approved by the District Traffic Engineer responsible for oversight of the district where the project is constructed. Formal 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 **Public Traffic Delay** –Subsection 107.07 and Subsection 108.04
2.4.2 **Detour Routes** –Subsection 624.03.02
2.4.3 **Signal Management Operations** –Subsection 623.01.06
2.4.4 **Temporary Lighting** –Subsection 107.07
2.4.5 **Flagger Illumination** –Subsection 624.03.03
2.4.6 **Temporary Traffic Signals** –Subsection 623.01.06
2.4.7 **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. The MUTCD recommends a maximum speed reduction of 10 mph. 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.

When workers are exposed to live traffic, **do not assume that a lower speed limit will improve worker safety**. Reduce worker exposure and traffic speeds using these effective safety strategies:

- Use a pilot car for two lane paving operations to effectively control traffic speed past workers.
- Provide positive protection such as barriers and Truck Mounted Attenuators.
- Provide a lateral buffer space between workers and live traffic, defined by channelization devices, to allow space for minor traffic intrusions or occasional encroachment by workers. A half to full lane width is an acceptable lateral buffer for high speed conditions.
- Use closely spaced drums or tall channelizing devices to improve work area separation and motorist guidance.
- Additional warning devices such as temporary rumble strips, portable changeable message signs, or an automated flagger assistance device may improve flagger protection.

If a speed reduction is proposed, consider these justifying factors together to determine if a work zone speed limit reduction is needed:

1. **Roadway Factors**
    - Roadway surface is rough, uneven, gravel, has abrupt edges, etc.
    - Temporary Concrete Barrier (TCB) is 2 feet or closer to high speed traffic (45 mph or more).
    - Traffic lanes are less than 11 feet wide.
    - Shoulders are less than 4 feet wide.
    - Work zone elements such as temporary road approaches, intersections, or intersection control (such as a temporary signal) have changed the roadway or roadside environment.

- Work zone has unusual or reduced roadway geometrics such as lane shifts, ramps, and acceleration/deceleration tapers.

2. **Operational Factors**
   - Sight distance is restricted due to traffic barriers, temporary alignment, or intersection locations.
   - Unprotected work activities or workers are closer than 10 feet to high speed traffic.
   - Work zone has detours or alignment changes designed for speeds below the existing limit.

3. **Human Factors**
   - When considering a speed limit reduction be aware that drivers generally do not slow down until there is a perceived reason to do so. If motorists do not see the reason for a reduced speed limit, it is often ignored. In addition, note these factors when assessing the need for a speed limit reduction
   - A “Reduced Speed Limit” sign is not automatically noticed or effective in slowing traffic. Most drivers determine their speed by observing visual cues from their surroundings, including the visible work activity, specific warning signs, pavement markings, and other traffic control devices.
   - Studies show that drivers slow down more in work zones with PCMS’s, electronic driver feedback signs (“Your Speed Is XX”) and flashing warning lights.
   - Most drivers do not voluntarily reduce their speed more than 10 mph unless law enforcement is active.
   - Work zone speed limit reductions of more than 10 mph show an increase in crashes due to a wider speed differential between vehicles.

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.

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 may 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 may 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 may be based on an engineering study or by reference to AASHTO Roadside Design Guide. 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 Transportation 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 feet.
- Critical horizontal clearances – Travel lanes that have 16-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 ensure 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 and informal projects 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 Potential 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	✓
1. Introductory Material	
▪ Cover Page	□
▪ Table of Contents	□
▪ List of figures	□
▪ List of tables	□
2. Executive Summary	□
3. TMP Roles and Responsibilities	
▪ Project Manager	□□
▪ TMP Team	□□
▪ TMP Implementation Task Leaders	□□
▪ Emergency Contacts	□□
4. Project Description	
▪ Project background	□□
▪ Project type	□□
▪ Project area/corridor	□□
▪ Project goals and constraints	□□
▪ Proposed construction phasing/staging	□□
▪ General schedule and timeline	□□
▪ Need for detours	□□
▪ Related projects	□□
5. Existing and Future Conditions	
▪ Data collection and modeling approach	□□
▪ Existing roadway characteristics	□□
▪ Existing and historical traffic data	□□

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

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, lane 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 may be 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 511 phone line and nvroads.com 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 an ATSSA certified 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 624.03.06 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 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)		
A. Control Strategies	**B. Traffic Control Devices**	**C. Project Coordination, Contracting, and Innovative Construction Strategies**
IA1. Construction phasing/staging IA2. Full roadway closures IA3. Lane shifts or closures: ▪ Reduced lane widths to maintain number of lanes (construction) ▪ Lane closures to provide worker safety ▪ Reduced shoulder width to maintain number of lanes ▪ Shoulder closures to provide worker safety ▪ Lane shift to shoulder/median to maintain number of lanes 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	IB1. Temporary signs: ▪ Warning ▪ Regulatory ▪ Guide/Information IB2. Message signs ▪ Dynamic (DMS) ▪ Changeable (CMS) IB3. Arrow panels IB4. Channelizing devices IB5. Temporary pavement markings IB6. Flaggers and uniformed traffic control officers IB7. Temporary traffic signals IB8. Lighting devices	IC1. Project coordination: ▪ Coordination with other projects ▪ Utilities coordination ▪ Right-of-Way coordination ▪ Coordination with other transportation infrastructure IC2. Contracting strategies: ▪ Design-build ▪ A+B bidding ▪ CMAR ▪ Incentive/Disincentive clauses ▪ Lane rental IC3. Innovative construction techniques (pre-cast members, rapid cure materials)

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

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

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

II-A1. Brochures and mailers	II-B1. Traffic radio
II-A2. Press releases/media alerts	II-B2. Changeable message signs (CMS)
II-A3. Paid advertisements	II-B3. Temporary motorist information signs
II-A4. Public information center	II-B4. Dynamic speed message sign
II-A5. Telephone hotline	II-B5. Highway advisory radio (HAR)
II-A6. Planned lane closure web site	II-B6. Extinguishable signs
II-A7. Project web site	II-B7. Highway information network (web-based)
II-A8. Public meetings/hearings	II-B8. 511 traveler information systems (wireless, handhelds)
II-A9. Community task forces	II-B9. Freight travel information
II-A10. Coordination with media, schools, businesses, and/or emergency services	II-B10. Transportation management center (TMC)
II-A11. Work Zone education and safety campaigns	II-B11. Social Media (Facebook, Twitter)
II-A12. Work Zone safety highway signs	
II-A13. Rideshare promotions	
II-A14. Visual information (videos, slides, presentations) for meetings and website	

Appendix B

TMP Examples

US 50 Cave Rock
Extend Westbound Tunnel
MP DO 7.11
And
US 50 Water Quality
MP DO 9.56 – 11.67
MP DO 8.48 – 8.65

Transportation Management Plan

November 2015

Prepared by

Chris Petersen, Roadway Design

Nevada Department of Transportation

1263 S. Stewart Street

Carson City, NV 89712

Executive Summary

This project is comprised of two scopes of work within the US-50 corridor in Lake Tahoe. The first being the tunnel extension at Cave Rock, which is located on the East shore of Lake Tahoe in the Lake Tahoe Basin. US-50 has two lanes in each direction running directly through the Cave Rock tunnels. The purpose of this portion of the project is to construct an approximately 60 foot long tunnel extension on the north side of the existing westbound Cave Rock Tunnel at milepost DO 7.11. This extension will act as a rock shelter, protecting the traveling public from hazardous rock fall that has been identified as a problem at this location. Road users will be affected by long term lanes closures, reduced speed limits, and intermittent one lane roadway closures.

The second part of this project constructs erosion control and water quality enhancements along US-50 near Logan Shoals, and from Glenbrook to one mile south of the SR-28 Junction. This project widens paved shoulders with curb, gutter, and barrier rail along the mountainside to minimize sediment and direct flow to inlets. New drainage inlets with media treatment, sediment cans, and sediment basins will be constructed along with hillside revegetation treatments for erosion control. New cured in place pipe lining will be applied to existing culvert pipes, and one new culvert will be installed crossing US-50 north of Glenbrook.

TMP Roles and Responsibilities

TMP Coordinator

The Nevada Department of Transportation's (NDOT) TMP coordinator for this project is Devin Cartwright. He will also serve as the Transportation Management Plan (TMP) Project Manager, and is responsible for the overall development of the TMP.

Devin Cartwright
Office: (775) 888-7660
dcartwright@dot.state.nv.us

TMP Team

The TMP Team is comprised of individuals who have been involved in the development and review of the traffic control and plans. The TMP team consists of the following individuals:

Devin Cartwright, Roadway Design
Kimberly Diegle, Roadway Design
Alma Piceno-Ramirez, Constructability
John Angel, Construction Crew 911
Jenna Schonlau, Traffic Operations
Casey Sylvester, Traffic Operations
David Hutchinson, Traffic Operations

TMP Implementation Task Leaders

The following are some of the implementation responsibilities of Task Leaders as defined in this TMP:

NDOT Resident Engineer

1. Identify emergency contacts.
2. Approve staging areas.
3. Enforce construction avoidance areas.
4. Coordinate with other construction activity in the general area of this project (if it exists).
5. Enforce the contract limitations of operations.
6. Review the safety of in-place traffic control and contractor operations.
7. Provide construction information to District 2 so that they can place it on the 511 website.
8. Submit restriction reports to the NDOT's Over-dimensional Permitting section so that oversize loads will be rerouted or restricted as necessary.

Contractor

1. Choose staging areas.
2. Coordinate with other construction activity in the general area of this project.
3. Contact businesses in the general area of this project.
4. Provide traffic control supervision and inspection.

Emergency Contacts

Douglas County Sheriff Dispatch (non-emergency): Office: (775) 782-5126
NHP: Carson City Office: (775) 687-5300
NDOT: Resident Engineer: John Angel Office: (775) 687-3376 Cell: (775) 720-4528
NDOT: Asst. Resident Engineer: Jerry Vradenburg Office: (775) 687-3376
NDOT: Eng. Services Manager: Janelle Thomas Office: (775) 834-8300
NDOT: Asst. District 2 Engineer: Rick Bosch Office: (775) 834-8300 Cell: (775)-434-4810

Additional emergency contacts will be identified at the Pre-Construction Meeting.

Project Description

The project consists of the following design elements:

CAVE ROCK:

- Construction of a Tunnel Extension.
- Addition of updated Bike/Ice overhead warning signs.
- Replacement of existing signing in the vicinity.
- Mill and Overlay a portion of the West bound lanes near the Tunnel.

- Paving a median drainage ditch south of Cave Rock.
- Adding low lumen lighting and white paint inside both tunnels.
- Staining the existing EB tunnel portal external surfaces.

WATER QUALITY:

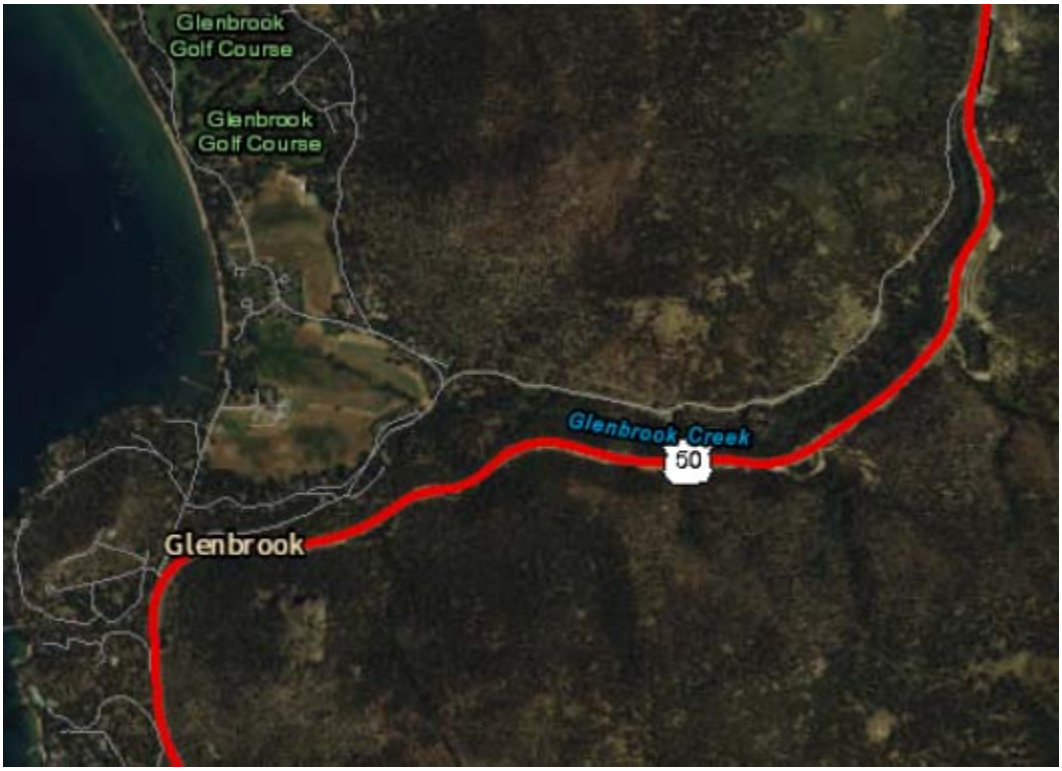
- Widening of existing paved shoulders.
- Construction of curb, gutter, and barrier rail.
- Construct drainage inlets with media treatments, sediment cans, and sediment basins.
- Placement of hillside vegetation.
- Installation of new cured in-place pipe lining in existing culvert pipes.
- Construction of new culvert.

Project Area/Corridor

The project area includes US-50 within the Lake Tahoe Basin. The length of project is:

CAVE ROCK: approximately 1,500 feet.

WATER QUALITY: Two locations at .17 miles and 2.11 miles.



Project Goals and Constraints

The goal of the proposed project is to provide:

CAVE ROCK: The tunnel extension will act as a rock shelter, protecting the traveling public from hazardous rock fall that is expected to persist at this location for the foreseeable future.

WATER QUALITY: The water quality improvements are components of the department's commitment to maintaining the clarity of Lake Tahoe.

All the improvements of this project will affect adjacent business and residential homes during construction. The traffic will be disrupted on US-50.

The proposed improvements are within existing right of way.

Proposed Construction Phasing / Staging

The traffic control for this project will be supplied by NDOT. The phasing sequence is as shown on the traffic control plans and traffic control matrix.

CAVE ROCK:

The construction of the tunnel extension will require the closure of the westbound tunnel for the duration of the project. The traffic will be detoured into the eastbound tunnel and will be reduced to one lane in each direction. A speed reduction from 45 mph to 25 mph will be implemented in this area. Traffic calming measures such as lateral deflection and driver feedback signs will be used to with assist driver compliance for the speed reduction.

WATER QUALITY:

The construction of the water quality improvements will require typical shoulder and one lane closures. There will be conditions where there will be a need to close one half of US-50 at a time for the installation of drainage features underneath the roadway. This will require the reduction to one lane in each direction.

General Schedule and Timeline

Construction is scheduled to begin in May 2nd, 2016. This project is expected to require the entire construction season allowable in the Lake Tahoe Basin. Therefore, construction is expected to be completed by October 15th, 2016. Incentives for early completion will be provided.

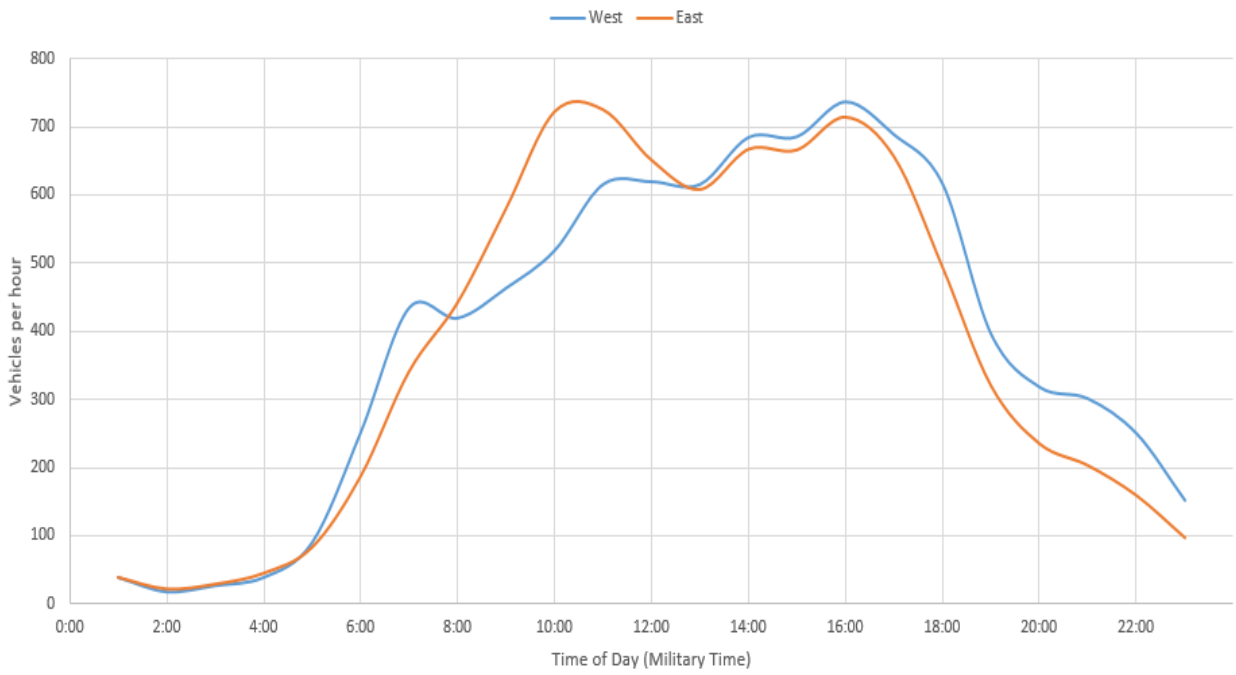
Existing and Future Conditions

Existing Roadway Characteristics

This section of US-50 runs through Lake Tahoe Basin in northwestern Nevada. It serves as a 4-lane mostly undivided principle arterial and possesses an interface between commercial and residential areas.

Existing and Historical Traffic Data

The posted speed limit on this section of US-50 for both directions of travel is 45 mph. The annual average daily traffic (AADT) volume on this portion of US-50 was 13,000 vehicles per day in 2014. The Eastbound AM peak hour volume occurs from 10:00 am – 12:00 pm with 724 vehicles per hour and the Eastbound PM peak hour volume occurs from 3:00 pm – 5:00 pm with 713 vehicles per hour. Westbound AM peak hour volume occurs from 10:00 am – 12:00 pm with 619 vehicles per hour and the Westbound PM peak hour volume occurs from 3:00 pm – 5:00 pm with 736 vehicles per hour. Volumes used are from July, which is typically the highest volume month in this area. The volumes were obtained from NDOT's Traffic Records Information Access (TRINA) web-site (http://apps.nevadadot.com/trina).



Stakeholder Concerns/Issues

Project stakeholders and organizations potentially affected by the project include:

Nevada DOT

Nevada State Parks

Douglas County

Washoe Tribe of Nevada

Adjacent Local Businesses

Adjacent Local Residences

Nevada Highway Patrol

Tahoe Regional Planning Agency

Traffic Predictions during Construction

The anticipated traffic volumes are expected to cause congestion. One open lane, in both directions will accommodate the traffic volumes.

Work Zone Impacts Assessment Report

Qualitative Summary of Anticipated Work Zone Impacts

Work zone impacts will consist of shoulder closures and lane reductions.

Work Zone Impacts Management Strategies

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 1 (temporary traffic control), Table 2 (traffic operations control) and Table 3 (public information) as shown on the next page.

TABLE 1

Temporary Traffic Control

Control Strategies	Traffic Control Devices	Project Coordination/Construction Strategies
• Construction phasing/staging • Lane shifts or closures • Lane closures to provide worker safety • Day work (WATER QUALITY PROJECT) • Work hour restrictions for peak travel	• Temporary Signs: o Warning o Regulatory o Guide/information • Message signs o Changeable (CMS) = temporary • Arrow Panels	• Project coordination o Utilities coordination o Coordination with other transportation infrastructure

TABLE 2

Transportation Operations Control

Corridor/Network Management Strategies	Work Zone Safety Management Strategies	Traffic/Incident Management and Enforcement Strategies
• Turn restrictions • Coordination with adjacent construction site (s)	• Speed limit reduction • Warning lights • Construction safety supervisors/inspectors • TMP monitor/inspection team • Project on-site safety training	• Transportation Management Center (TMC) • Coordination with media • Incident/emergency response plan • Cooperative police enforcement • Increased penalties for work zone violations

TABLE 3

Public Information

• Press release/media alerts • Public meetings/hearing	• Coordination with BlueGo Transit Center	• Coordination with media, schools, businesses, and/or emergency services

TMP Monitoring

Monitoring Requirements

NDOT Resident Engineer will monitor the effectiveness of the TMP through general inspection and traffic control supervision. If any relevant information is documented such as lessons learned, the NDOT Resident Engineer will document unforeseen events relevant to the TMP as well as lessons learned. If any relevant information is documented, it should be distributed to the TMP Coordinator.

Public Information and Outreach Strategies

As appropriate, portable CMS's will be used to inform road users of traffic information, such as to alert drivers of possible delays, dates construction will occur, incidents, and/or alternate routes. The current plan is to deploy 4 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 511 Traveler Information Line as well as on their website (http://www.nvroads.com). This project will be posted on both the information line and website.

TMP Incident Management

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. The traffic control and incident management strategies employed will be continuously monitored. Incidents occurring in or near construction will be investigated to identify and address contributing causes.

Thor Dyson, (775) 834-8300, from District 2 will be the point of contact for Nevada's Traffic Incident Management (TIM) Coalition. In the event Thor Dyson is unavailable, John Angel, Resident Engineer-Office: (775) 687-3376, Cell: (775) 720-4526, from District 2 will be the point of contact. The TIM Coalition is a partnership of agencies and organizations working together towards common objectives. These common objectives include reducing roadway and incident clearance times and reducing secondary crashes. TIM will also be discussed, planned and reviewed at the bi-weekly meeting with NDOT, contractor and the stakeholders.

Transportation Management Plan

SR-447 at Gerlach Road
Washoe County
MP WA 48.93 to MP WA 74.95
½″ Chip Seal with Fog Seal

January, 2016

Prepared by

Jenna Schonlau & Casey Sylvester
Nevada Department of Transportation

Executive Summary

This project consists of a ½" chip seal with a fog seal. It is located on SR-447 in Washoe County and runs northeast of Pyramid Lake; continuing north through Empire, and Gerlach, from milepost WA 48.93 to milepost WA 74.65, including the areas that run through Pershing County. This section of SR-447 is classified as a rural major collector, with one lane of traffic for each direction of travel. The posted speed limit through most of this project is 70 miles per hour (mph), slowing to 45 mph through the town of Empire, and slowing to 25 mph through the town of Gerlach. This stretch of road is mostly rural, but does run through two small towns with local businesses and residences. It also crosses the UPRR in Gerlach.

This Transportation Management Plan (TMP) will express the transportation management strategies developed throughout the course of this project. The strategies developed include the Maintenance of Traffic Plan and the Transportation Operations Plan.

TMP Roles and Responsibilities

TMP Coordinator

The Nevada Department of Transportation's (NDOT) Project Coordinator for this project is Ambere Angel. She will also serve as the TMP Project Manager, and is responsible for the overall development of the TMP.

Ambere Angel

Office: (775) 888-7097

aangel@dot.state.nv.us

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 Phil Kanegsberg (Roadway Design), Ambere Angel (Roadway Design), Jenna Schonlau (Traffic Operations), Casey Sylvester (Traffic Operations), and Brad Durski (District 2, Resident Engineer).

TMP Implementation Task Leaders

The following are some of the implementation responsibilities of Task Leaders as defined in this TMP:

NDOT Resident Engineer

1. Identify emergency contacts
2. Approve staging areas
3. Enforce the contract limitations of operations
4. Review the safety of in-place traffic control and contractor operations
5. Submit restriction reports to the NDOT Permitting section so that oversize loads will be rerouted or restricted as necessary
6. Provide construction information to District 2 so that they can place it on the 511 website

Contractor

1. Choose staging areas

2. Coordinate with other construction activity in the general area of this project
3. Contact businesses in the general area of this project
4. Provide traffic control supervision and inspection
5. Submit traffic control plans

Emergency Contacts

Rick Bosch, Asst. Chief, District 2 Construction:	7775-834-8300 (Office)	775-434-4810 (Cell)
Brad Durski, Resident Engineer, District 2:	775-888-3025 (Office)	775-443-8652 (Cell)
Ken Oates, Asst. Resident Engineer, District 2:	775-888-3025 (Office)	775-443-5322 (Cell)

Additional emergency contacts will be identified at the Pre-Construction Meeting.

Project Description

This is a state funded project consists of the following design elements:

- ½" Chip Seal
- Fog Seal

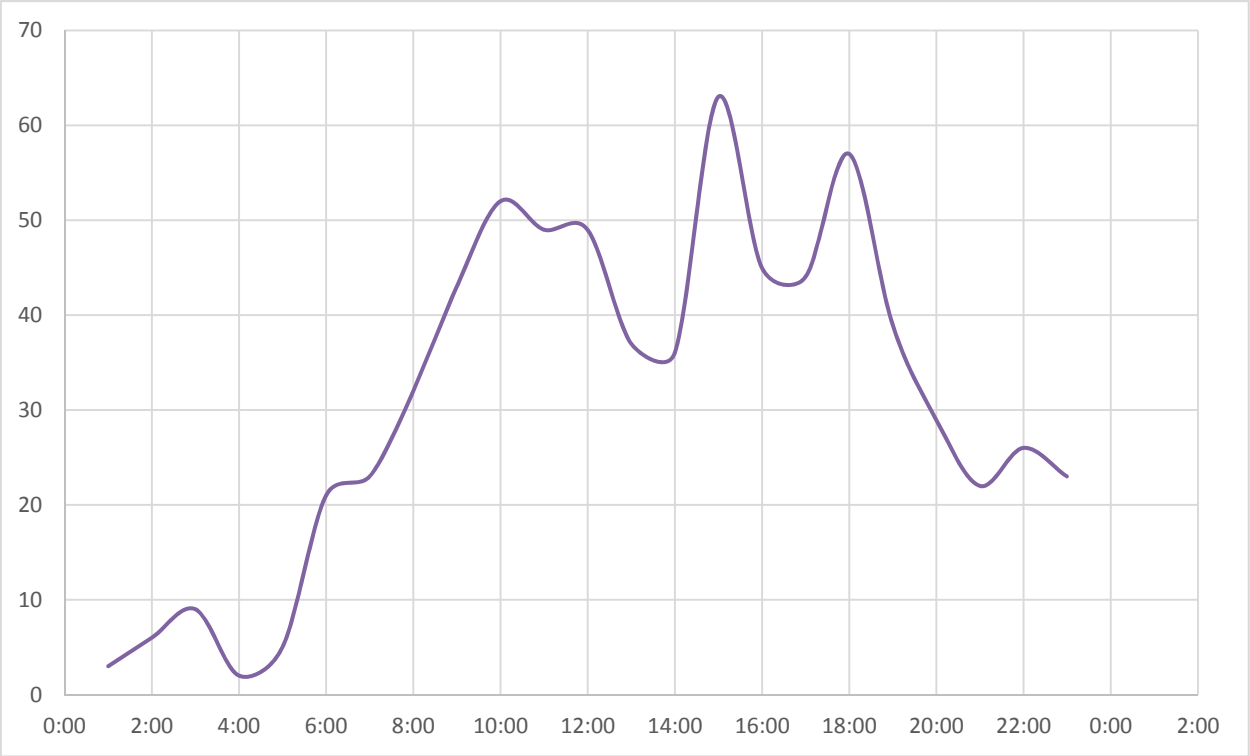
General Schedule and Timeline

This project will be constructed in the summer of 2016. The contractor will be allowed 50 working days for this project.

Existing and Historical Traffic Data

The morning peak hours for SR 447 near Gerlach are 10:00 AM – 12:00 PM (noon) and the evening peak hours are 3:00 PM – 6:00 PM. The morning peak is 52 vph and the evening peak is 63 vph. Directional data is not available. An ATR was not available for this area, but data is from summer months which typically are the peak. Data does not account for Burning Man or other special event traffic.

AADT 200' South of the RR crossing 0.1 mile E of Gerlach: 500



Stakeholder Concerns/Issues

Project stakeholders and organizations potentially affected by the project include:

- Washoe County
- Nevada DOT
- Adjacent Local Business
- Adjacent Local Residences
- Nevada Highway Patrol

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

- Impacts to pedestrians and bicyclists
- Delay to traffic and increased travel time
- Inconvenience to access local businesses
- Inconvenience to access local residences

Work Zone Impacts Assessment Report

Construction Approach/Phasing/Staging Strategies

This project will be completed using lump sum traffic control, submitted by the contractor and approved by the Resident Engineer.

Driver stop time shall not exceed 20 minutes and total work zone delay shall not exceed 30 minutes. During flagging and pilot car operations the lane closure segments are not recommended to exceed 3.75 miles. Work Zone segment may not exceed 5 miles. Other considerations into lane closure length include local business and residential access.

Work Zone Impacts Management Strategies

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 1 (temporary traffic control), Table 2 (traffic operations control), and Table 3 (public information) as shown below.

TABLE 1

Temporary Traffic Control

Control Strategies	**Traffic Control Devices**	**Project Coordination/Construction Strategies**
Construction phasing	Temporary Signs – Warning – Regulatory Changeable message signs Channelizing devices (Drums) Flaggers and uniformed traffic control officers	Project coordination with adjacent construction sites

TABLE 2

Transportation Operations Control

Corridor/Network Management Strategies	**Work Zone Safety Management Strategies**	**Traffic/Incident Management and Enforcement Strategies**
	Construction safety supervisor/inspector Team meetings	Incident/emergency management coordinator Cooperative police enforcement Increased penalties for work zone violations

TABLE 3

TABLE 1		
Temporary Traffic Control		
Control Strategies	**Traffic Control Devices**	**Project Coordination/Construction Strategies**
Public Information		
Press releases (Done by Headquarters)		Changeable message signs 511 traveler information systems

Selected Alternative

The selected alternative for work on SR-447 will be done through the construction limitations as listed below:

- Surface treatment will not be placed on any Portland cement concrete surfaces, structures, or appurtenances.
- Two changeable message signs (CMS) will be provided for the project 10 days prior to construction. Content of the CMS's will be coordinated with the Resident Engineer.
- Uniformed Traffic Control Officer's will be provided to enhance safety on the project.
- Project work zones will be limited to a maximum of five miles in length.
- Flaggers will be used to direct traffic during construction when there are lane closures.
- Traffic stop times will be less than or equal to 20 minutes.
- Total delay time for traffic will be less than or equal to 30 minutes.
- One lane of traffic will be open to the public at all times.
- All lanes of traffic will be open during non-working hours.
- Surface operations will be suspended no later than four hours before local sunset as determined by the National Weather Service.

TMP Monitoring

Monitoring Requirements

NDOT Resident Engineer will monitor the effectiveness of the TMP through general inspection and traffic control supervision. If any relevant information is documented such as lessons learned, the NDOT Resident Engineer will document unforeseen events relevant to the TMP as well as lessons learned. If any relevant information is documented, it should be distributed to the TMP Coordinator.

Public Information and Outreach Plan

As appropriate, portable CMSs will be used to inform road users 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 two CMS messages approximately 10 days prior to construction activities.

NDOT also maintains work zone information for motorists on the 511 Traveler Information Line as well as on their website (http://www.nvroads.com). This project will be posted on both the information line and website.

Incident Management Plan

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. The traffic control and incident management strategies employed will be continuously monitored. Incidents occurring in or near construction will be investigated to identify and address contributing causes.

Brad Durski from District II (775) 443-8652 (cell) will be the point of contact for Nevada's Traffic Incident Management (TIM) Coalition. In the event Brad Durski is unavailable, Ken Oates from District II will be the point of contact. Ken Oates can be reached at (775) 443-5322 (cell). The TIM Coalition is a partnership of agencies and organizations working together towards common objectives. These common objectives include reducing roadway and incident clearance times and reducing secondary crashes. TIM will also be discussed, planned and reviewed at the bi-weekly meeting with NDOT, contractor and the stakeholders.