IMPROVE 81

PROGRAM SUPPORT SERVICES

I-81 Corridor Improvement Program

Corridor-wide Transportation Management Plan (TMP) Guidance Document

December 12, 2022

VDOT

Virginia Department of Transportation

Table of Contents

Appendices

List of Figures

List of Tables

Acronyms

Reference	Description
ACE	Area Construction Engineer
ATMS	Advanced Traffic Management System
CCTV	Closed Caption Television
CIP	Corridor Improvement Plan
CMS	Changeable Message Sign
CRM	Customer Relationship Management
CTB	Commonwealth Transportation Board
DHRM	Department of Human Resource Management
DRPT	Department of Rail and Public Transportation
DTE	District Traffic Engineer
DTOD	District Traffic Operations Director
DTOM	District Traffic Operations Manager
DWZSC	District Work Zone Safety Coordinator
EPDO	Equivalent Property Damage Only
FHWA	Federal Highway Administration
Final Rule	Work Zone Safety and Mobility Rule (FHWA Regulation)
I-81	Interstate 81
IIM	Instructional and Informational Memorandum
IM	Incident Management
ITS	Intelligent Transportation System
LCAMS	Lane Closure Advisory Management System
LD	Location and Design Division
MOT	Maintenance of Traffic
PCMS	Portable Changeable Message Sign
PCP	Public Communications Plan
Program	Capital Improvement Program
RITIS	Regional Integrated Transportation Information System
SSP	Safety Service Patrol
SYIP	Six-Year Improvement Program
TCP	Traffic Control Plan
TCS	Traffic Control Supervisor
TDM	Transportation Demand Management
TE	Traffic Engineering
TMP	Transportation Management Plan
TO	Traffic Operations
TOC	Traffic Operations Center
TOP	Transportation Operations Plan
TRIP	Towing and Recovery Incentive Program
TSP	Transit Signal Priority
VITA	Virginia Information Technologies Agency
VDOT or Department	Virginia Department of Transportation
VSL	Variable Speed Limit
VSP	Virginia State Police

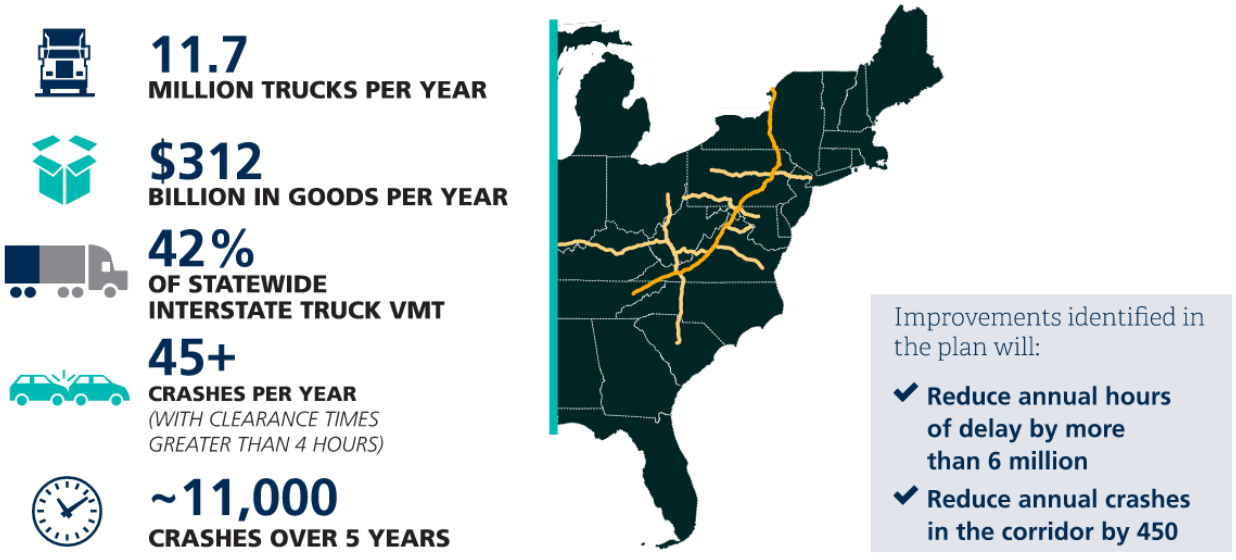
1 Executive Summary

This Transportation Management Plan (TMP) is being prepared in accordance with the Virginia Department of Transportation (VDOT or Department) Instructional and Informational Memorandum (IIM)-LD-241.7 (or IIM-TE-351.5) - Transportation Management Plan Requirements, Federal Highway Administration (FHWA) rule on Work Zone Safety and Mobility, and best practices. The TMP lays out a set of coordinated transportation management strategies and describes how they might be used to manage work zone impacts. Transportation management strategies for a work zone include temporary traffic control measures and devices, public information/outreach, and operational strategies such as travel demand management, signal retiming, and traffic incident management. **This TMP will be used by project specific design teams as a guidance document to assist in preparation of project specific Traffic Control Plans (TCP) and project specific TMPs for projects identified in the Interstate 81 (I-81) Corridor Improvement Plan (CIP)**.

2 Introduction

I-81 is a critical north-south corridor in the eastern part of the United States that plays a vital role in moving people and goods throughout New York, Pennsylvania, Maryland, Virginia, and Tennessee. Within Virginia, I-81 traverses 21 cities and towns, 13 counties, and 25 colleges and universities. The I-81 corridor is a major backbone of Virginia's transportation system. In 2018, the Corridor moved more than 11.7 million trucks per year, accounting for more than one-third of all truck traffic and nearly half of the state's goods. It was estimated that $312 billion in goods were moved along the corridor each year. Refer to **Figure 1** for additional statistics for the Virginia segment of I-81.

Figure 1: I-81 Corridor Significance in Virginia



Source: I-81 Corridor Improvement Plan, December 2018

The corridor also plays a major role in moving people and serves as a primary route for many people living in western Virginia as well as a major artery connecting people to metropolitan areas, colleges and universities, and tourist destinations. Competing travel demands have created a corridor that is plagued by significant safety and reliability issues. Travel delay due to crashes is unpredictable and

has major impacts on both heavy commercial vehicles and passenger vehicles. In 2018, the Commonwealth Transportation Board (CTB) developed and adopted the I-81 CIP to:

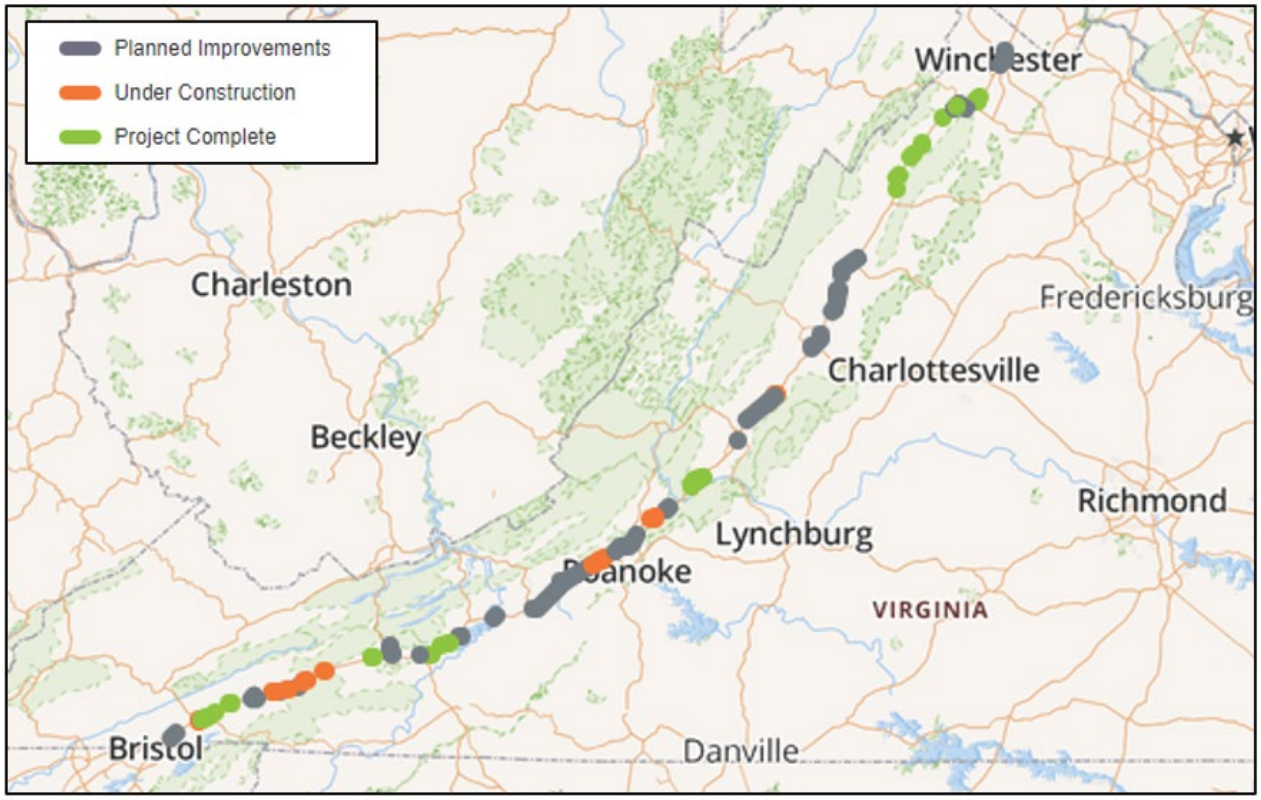
- Enhance safety
- Reduce congestion
- Support economic development

The CIP identified 64 capital improvement projects for a total of $2 billion, spanning three VDOT districts: Bristol, Salem, and Staunton.

2.1 Program Overview

The I-81 CIP consists of 64 projects that fit into one of the following eight types of infrastructure and operational improvements categories: **widening**, **acceleration/deceleration extension**, **curve improvement**, **truck climbing lane**, **auxiliary lane**, **shoulder widening**, **operational improvements** (such as changeable message signs (CMS), closed caption television (CCTV) cameras, etc.), and **multimodal improvements**. Figure 2 shows a map of the CIP projects along the I-81 corridor and their status.

Figure 2: I-81 Corridor Map of Capital Improvement Projects

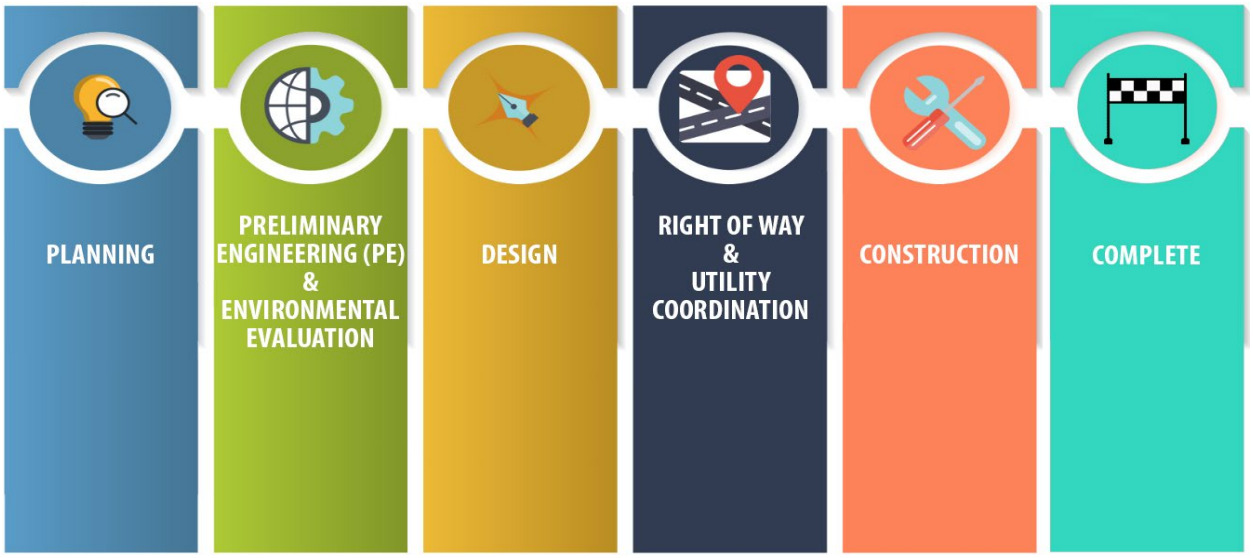


Source: Virginia Department of Transportation, 2022

As of December 2022, all the operational improvement projects (five projects) and 26 capital improvement projects (i.e., shoulder widening) have been completed. VDOT has completed 31 projects with 31 of the remaining 33 projects included in the Six-Year Improvement Plan (SYIP). Many of these projects are already in the design-phase and most of them are expected to be

completed before the end of 2033. **Figure 3** summarizes the number of projects by stage as of December 2022.

Figure 3: Project Development Status by Stage



Status					
6 Projects	5 Projects	15 Projects	1 Project	6 Projects	31 Projects

Source: Virginia Department of Transportation, 2022

For current I-81 CIP updates and information refer to www.improve81.org.

2.2 Purpose of Corridor-wide TMP

Construction along the I-81 corridor is expected to have a major impact on travelers. In addition to annual maintenance activities, there will be multiple CIP projects being constructed at the same time creating the potential for overlapping work zones, major travel disruptions, and impacts across multiple Districts and municipalities. To help minimize delay to travelers, the supply chain, and to maintain safety in and around work zones, this Corridor-wide TMP will be available for project specific design teams in support of a coordinated and holistic approach to managing the impacts of construction. A coordinated Corridor-wide TMP will enable VDOT and other agencies responsible for operating the transportation network to deploy more efficient strategies that maximize resources to achieve the greatest public benefit to allow for a seamless user experience.

The I-81 Corridor-wide TMP is a living document consisting of transportation management strategies and descriptions on how the strategies can be used to manage work zone impacts on individual projects. The work zone strategies will be used to inform the project specific TMPs. Additionally, the Corridor-wide TMP will be updated regularly based on performance monitoring so subsequent projects reflect lessons learned. A coordinated approach is essential to delivering an effective TMP along this corridor. There are many different agencies, stakeholders, and users along the I-81 corridor, and effective and consistent communication enables VDOT to:

- Manage impacts
- Utilize resources

- Minimize conflicts in roles and responsibilities
- Minimize additional costs

2.3 Project Specific TMP Guidelines

A project specific TMP lays out a set of coordinated strategies and describes how these strategies will be used to manage the work zone impacts of a project. The scope, content, and level of detail varies based on work zone policies and the anticipated work zone impacts of the project. The project specific TMPs address work zone safety and mobility impacts from a broader (than just the work zone) perspective by estimating traffic impacts and developing plans to mitigate the effects of construction. This approach often results in:

- Improved safety for construction workers and the traveling public
- Reduced traffic delay and travel time
- Reduced lane closure hours
- More satisfied road users
- Reduced agency cost

Work zone management on a corridor like I-81 is challenging due to the cross-section of road users. In urbanized areas, where the corridor is used for commuting, the weekday morning and afternoon peak periods may last several hours, and there may be a mid-day peak. Between these urban areas, the corridor is heavily utilized by commercial vehicles transporting billions of dollars' worth of goods every year. I-81 already suffers from the highest incident-related delay among interstates in Virginia, so closing lanes and staging construction is especially challenging.

Project specific TMP development begins in the early planning stages of the project. The TMP is then updated as the project goes through different stages of planning and design. Once the TMP is implemented during construction, it needs to be monitored. If any major work zone adjustments are needed, the TMP must be revised to reflect the changes. Even with a well-planned TMP, unexpected issues can result if traffic increases due to an unplanned event. It is important to consider the impacts of other construction projects or regional events in the area. The TMP process can help foster this coordination by bringing stakeholders together.

All projects included in the I-81 CIP must be developed in accordance with federal and state policies and procedures and in consideration of this document.

2.3.1 Federal Policies and Procedures

Since October 12, 2007, FHWA has required all state and local transportation agencies that receive Federal aid to comply with the guidelines for TMPs. This guideline document is known as the Work Zone Safety and Mobility Rule (Final Rule), which was published in September 2004 (as a proposed new Rule) in the Federal Register (69 FR 54562). The Final Rule updates and renames the former regulation on "Traffic Safety in Highway and Street Work Zones" in 23 CFR 630 Subpart J.

One of the primary elements of the Final Rule calls for the development of procedures to address the work zone impacts of individual projects. These procedures include: (1) identifying projects that an agency expects will cause a relatively high level of disruption, and (2) developing and implementing TMPs for all projects. The components that constitute a TMP are:

- **Temporary Traffic Control Plan (TCP)**
  - Traffic control devices
  - Control strategies

  - Project coordination
  - Innovative construction techniques
- **Transportation Operations Plan (TOP)**
  - Transportation Demand Management (TDM)
  - Incident Management (IM)
  - Traffic Operations (TO)
  - Work zone safety
- **Public Communications Plan (PCP)**
  - Public awareness strategies
  - Motorist information

According to the Final Rule, a TMP shall contain a TCP, while the requirement for the TOP and PCP components varies based on the scope and scale of the project. The Final Rule expands work zone impacts management beyond traffic safety and control by using transportation management strategies, as applicable to the project. Inclusion of these strategies helps reduce traffic and mobility impacts, improve safety, and promote coordination within and around the work zone.

Refer to Work Zone Safety and Mobility Rule for additional details.

2.3.2 Statewide Policies and Procedures

In addition to the federal requirements, VDOT issued IIM-LD-241.7 (provided in **Appendix A**). The memorandum required that, beginning in October 2007, a TMP shall be prepared for projects in Virginia, regardless of the funding source. The memorandum defines specific project level requirements for plan content by project type.

I-81 CIP projects could be classified as a Type A, Type B, Type C project (see Appendix A) ranging from a simple project like a No-Plan or Minimum Plan project to a complex project that is anticipated to cause sustained and substantial work zone impacts. The type and complexity of a project will be identified during project scoping in cooperation with the FHWA. An assessment of the Work Zone Traffic Impact should be completed using a traffic analysis tool recommended in the VDOT Traffic Operations and Safety Analysis Manual (TOSAM). Lane closures and detour routes shall comply with VDOT District operation lane closure policies, with any deviations requiring the approval of the District Traffic Operations Director (DTOD).

Some road projects may impact the transportation network more adversely than other projects. The effort to plan for and manage these impacts should be scalable to the project. As such, the scope, content, and level of detail of a TMP will vary based on the project cost and size and the anticipated work zone impacts of the project. A project expected to have more impacts will require a more extensive TMP. The purpose of identifying significant projects is to "flag" higher-impact projects earlier in the design process.

In Virginia a TMP must include a TCP. For Type B and Type C projects, a TMP must also contain a TOP and PCP. To encourage coordination and promote consistent communications throughout the corridor, a PCP template is provided in **Appendix B** for use by the project specific design teams when developing a TMP. The project specific design team should coordinate the development of the PCP with District Communications.

2.4 Document Overview

This document is organized into the following eight sections.

- **Section 1. Executive Summary.** Summary of requirements and purpose.
- **Section 2. Introduction.** This section provides background information about the I--81 CIP and discusses the purpose, polices, and procedures of TMPs.
- **Section 3. Existing Conditions.** This section describes the existing transportation network and traffic conditions that led to the development of the I-81 CIP.
- **Section 4. Goals and Organizational Structure.** This section defines the goals and objectives for the I-81 Corridor-wide TMP. It also describes the organizational structure—including the Steering Committee and Technical Subcommittees—and their roles and responsibilities.
- **Section 5. Project Specific Roles and Responsibilities.** This section describes the roles and responsibilities of the individual project teams.
- **Section 6. Communications Strategies.** This section describes the Communications strategies identified by the stakeholders.
- **Section 7. Traffic Operations Strategies.** This section describes Traffic Operations strategies identified by the stakeholders.
- **Section 8. Performance Monitoring.** This section describes how the transportation management strategies will be monitored during construction.
- **Section 9. Contingency Plans.** This section describes the requirement for the contractor to create a contingency for unplanned events.

3 Existing Conditions

In April 2019, the Virginia General Assembly enacted legislation that Governor Ralph Northam signed into law establishing the I-81 Corridor Improvement Program (Program) and Fund, which advances the projects identified in the I-81 CIP for implementation. The CIP was approved by the CTB in December 2018 following an evaluation of the corridor. Chapters 837 and 846 of the 2019 Virginia Acts of Assembly specify the roles and responsibilities of the CTB and the I-81 Advisory Committee to enact the I-81 Program and Fund. Section 33.2-3602 of the legislation requires the CTB, in consultation with the I-81 Advisory Committee, to report to the General Assembly by December 15 of each year “regarding the status and progress of implementation of the Program.” This report is mandated to include:

- The safety and performance of the I-81 corridor including:
  - Crash frequency and severity per mile, expressed in equivalent property damage only (EPDO) crashes
  - Person-hours of delay per mile
  - Frequency of lane-impacting incidents per mile
  - Duration of a lane closure
- An assessment of the effectiveness of the operational strategies and capital projects implemented and funded through the Program
- The status of capital projects funded through the Program
- The current and projected balances of the Fund

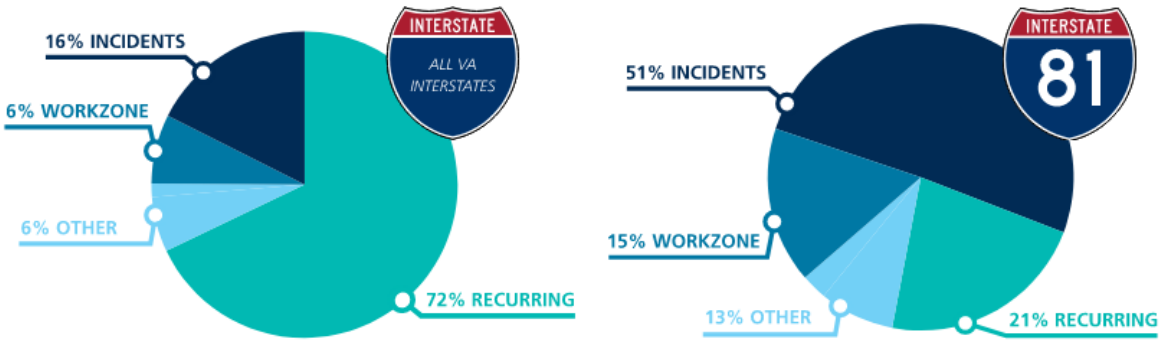
An initial assessment (2018) was completed in support of the development of the I-81 CIP projects. Following the initial assessment, as required by law, annual progress reports regarding the conditions along I-81 are submitted to the General Assembly.

3.1 Basis of Improvement Program

I-81 suffers from the highest incident-related delay among interstates in Virginia, largely due to the high percentage of trucks, incidents involving trucks, and rolling terrain. Delay, typically expressed in minutes, is generally classified as recurring delay and non-recurring delay. Recurring delay is often encountered during the morning or evening commute and people who travel the area frequently know to plan on stop-and-go traffic conditions. On the other hand, non-recurring delay is associated with random factors, such as incidents (crashes and/or disabled vehicles on the shoulder and short-term work zones). Travelers cannot plan for non-recurring delay; therefore, such events can be more disruptive to travelers than recurring delay. Refer to I-81 Program Progress Report – December 2021 and the supporting Appendices to review current performance data.

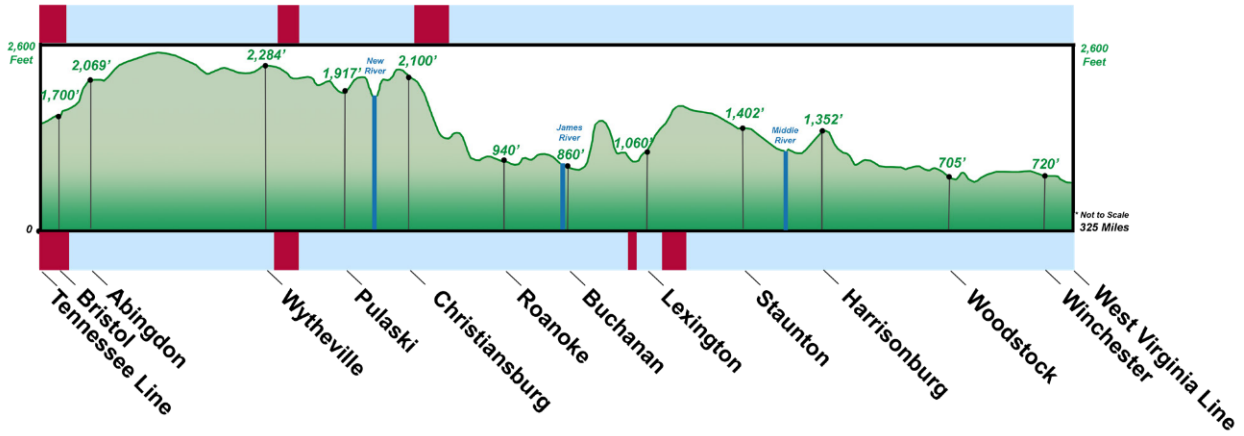
Recurring congestion (i.e., bottlenecks) accounts for 72 percent of the delay along all interstates in Virginia, except I-81. Non-recurring congestion (incidents, work zones, and other (i.e., weather, debris)) accounts for the remaining 28 percent of delay, of which, incidents account for 16 percent. For I-81, recurring congestion only accounts for 21 percent of the delay but non-recurring congestion creates the remaining 79 percent. It should be noted that 51 percent of all delay along I-81 is caused by incidents. This shows that non-recurring congestion has a significant impact on the traveler experience along this corridor. These conditions lead to highly unreliable travel times on this vital interstate, impacting both citizens' daily lives and the movement of freight. **Figure 4** summarizes the differences between the delay characteristics on I-81 versus all other interstates in Virginia.

Figure 4: Delay Experienced on Virginia Interstates Versus I-81



I-81 was constructed as a four-lane interstate in the 1960s, since then limited sections have been widened to six lanes near Bristol and Wytheville. With the highest per capita interstate truck traffic volume in Virginia and rolling terrain over much of the corridor, truck climbing lanes also have been constructed at strategic locations, such as near Christiansburg and Fairfield, providing an additional lane to traverse uphill grades. The rolling terrain on I-81 causes significant degradation in speed and performance along the corridor, and its impact is particularly borne by trucks (see **Figure 5** for terrain details). From a traffic flow and congestion standpoint, a single tractor-trailer truck accounts for the equivalent of as many as four passenger cars on certain segments of the corridor when truck percentage and terrain are considered.

Figure 5: Elevation of Travel Lanes Along the I-81 Corridor



Note: red denotes 3-lane section

There are several sections of the corridor that are currently operating at or near capacity, generally focused in areas with higher populations, such as Winchester, Harrisonburg, Staunton, and between Roanoke and Christiansburg. National projections show that over the next 20 years, miles traveled by trucks will continue to increase annually faster than autos. Given the anticipated growth in truck trips on I-81, travel times along the corridor are expected to continue increasing.

From a safety perspective, from 2013 through 2017, there were more than 11,000 crashes along the corridor, translating to more than 2,000 crashes annually—26 percent involving heavy trucks, the highest percentage for any interstate in Virginia. On average, more than 45 incidents per year require VDOT and emergency responders to mobilize for more than four hours to clear the roadway to restore operation to all travel lanes. When a truck crash occurs on I-81, the chance of a lane closure or the need for specialized equipment increases, which contributes to longer incident delay.

To learn more about the existing conditions used to develop the CIP refer to the Resources and Documents section of the Program website: www.improve81.org. An I-81 Progress Report was recently submitted and approved in December 2021.

4 Goals and Organizational Structure

The I-81 Corridor-wide TMP identifies strategies for enhancing mobility and safety during construction. The strategies identified in the TMP have been developed by a multi-jurisdictional team of stakeholders using a coordinated approach to communications and operations. This corridor-wide TMP focuses on addressing three major elements:

- A plan to support safety and mobility within the immediate construction zone, using both work zone safety and construction management strategies, referred to as the TCP, to be developed by the project specific design teams and approved by VDOT.
- A comprehensive PCP, involving the project specific design teams, contractors, and VDOT, outlining a communications strategy to convey the potential impacts of construction in a timely manner to minimize confusion and maximize the opportunity for the traveling public to make suitable travel choices.
- A broad effort led by VDOT to minimize traffic disruptions through the management of the

transportation system and emphasis on transportation options, including the use of transit vanpool, carpool, and other TDM strategies, improvements to local road networks, and enhanced traffic monitoring and incident management.

While the TCP focuses primarily on the construction zone, the TMP strategies also provide cost-effective mobility options to commuters, businesses, and residents of the broader corridor and region so that they can move safely and efficiently through the construction zones for the duration of construction. Many of the TMP strategies described in the following sections will be implemented based on the anticipated construction schedule, which means that TMP strategies may be more involved at the peak of construction. As construction activities begin to wind down, services provided under the TMP will also taper off. Ultimately, the TMP is intended to reduce or alleviate congestion and enhance mobility throughout the corridor during construction.

4.1 Goals and Objectives

The primary goals of the I-81 Corridor-wide TMP Guidance Document are:

- **Goal #1:** Create safer work zones for construction workers and the traveling public
- **Goal #2:** Maximize mobility for all users within and around work zones
- **Goal #3:** Manage traffic demand through public awareness
- **Goal #4:** Coordinate planned activities between stakeholders
- **Goal #5:** Enhance situational awareness to monitor performance of the transportation network

In support of the program goals, a set of objectives were developed. **Table 1** depicts the program goals and the supporting objectives for the Corridor-wide TMP.

Table 1: I-81 TMP Goals and Objectives

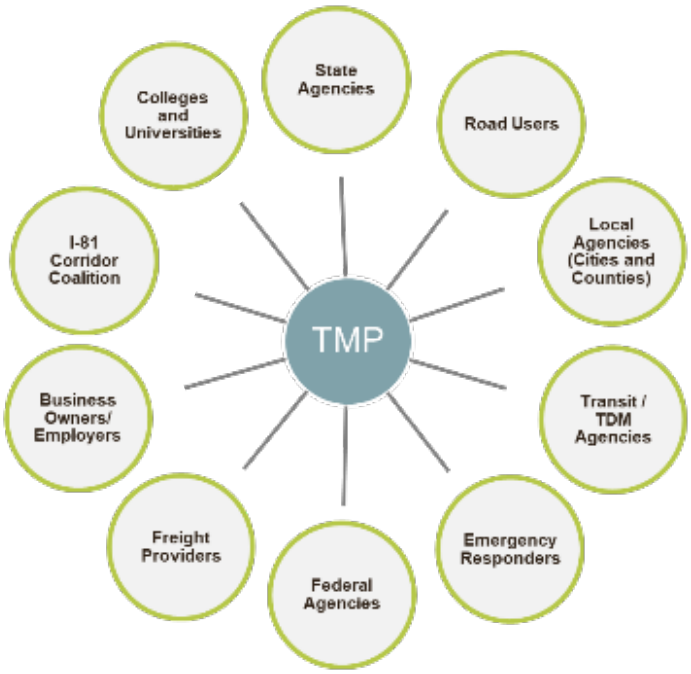
GOAL	OBJECTIVES
Goal #1: Create safer work zones for construction workers and the traveling public	▪ Minimize the number of construction worker incidents within the work zone ▪ Minimize the total number of crashes within the work zone
Goal #2: Maximize mobility for all users within and around work zones	▪ Minimize work zone-related delays on the interstate ▪ Minimize work zone-related delays on the arterial network ▪ Reduce mobility impacts due to incidents in the work zone ▪ Minimize mobility impacts to transit service providers
Goal #3: Manage traffic demand through public awareness	▪ Promote awareness of the program ▪ Promote awareness of planned lane closures ▪ Promote awareness of other modes ▪ Promote awareness of real-time traffic data
Goal #4: Coordinate planned activities through stakeholders	▪ Provide access to relevant work zone information with stakeholders (other agencies, utilities, emergency responders, cities, towns, etc.) responsible for operating within the network through a technology-based scheduling solution

GOAL	OBJECTIVES
Goal #5: Enhance situational awareness to monitor performance of the transportation network	▪ Enable access to data and information and develop tools to better understand how the transportation system is operating

4.2 Organizational Structure and Roles and Responsibilities

Within Virginia, I-81 is largely a rural corridor with brief overlaps with I--77 and I-64. The corridor parallels the Appalachian Mountains for much of its route through Virginia and connects with five other interstates. It traverses 21 cities and towns, 13 counties, and 25 colleges and universities between the Tennessee and West Virginia borders. The corridor parallels its older counterpart, Route 11, for most of the route in Virginia. In development of the organzational structure it was imperative to solicit and include representatives from across this diverse landscape. **Figure 6** illustrates the different stakeholders that make up the Steering Committee and technical subcommittees.

Figure 6: I-81 Corridor Stakeholders



The overall organizational structure of the I-81 Corridor-wide TMP is depicted in **Figure 7**. The structure includes an overall Steering Committee and two technical subcommittees. Also represented in the structure are the Project Specific Design Teams for each individual project.

The work zone management strategies were developed and prioritized by the technical subcommittees and formally adopted by the overall Steering Committee. A list of the stakeholders is provided in **Appendix C**.

Steering Committee

The Steering Committee consists of approximately 15 members representing VDOT (I-81 Program, Traffic Operations, Traffic Engineering, Construction, Maintenance, and Communications), FHWA, and select cities and towns along the corridor (see **Figure 8**). VDOT will lead the committee and coordinate all the I-81 Corridor-wide TMP efforts. VDOT will be supported by the I--81 Program team that offers expertise in traffic operations and engineering. The Program Support Services Team will

be responsible for providing day-to-day technical and logistical assistance to the Steering Committee and technical subcommittees.

A key role of the Steering Committee is to facilitate support of and prioritization of the strategies to be implemented. The Steering Committee will work with leadership and associated technical subcommittees to advance the strategies and monitor their performance eliminating silos or overlaps in strategies, accordingly. The Steering Committee will also be responsible for coordination with project specific TMP efforts to ensure collaboration and a seamless experience.

Figure 7: I-81 TMP Organizational Structure

Figure 8: Steering Committee Members

Project-Specific Design Team

Each capital improvement project completed along the I-81 corridor will have a Project Specific Design Team. This team will be responsible for coordinating with the I-81 Corridor-wide TMP Team to allow for consistency and soliciting feedback. This Project-Specific Design Team typically consists of the Project Manager, VDOT staff, consultant designers, and (possibly) a contractor. The primary roles and responsibilities of the TCP designer are:

- Ensure VDOT processes for lane closures are followed
- Coordinate lane closures with appropriate VDOT staff
- Develop TCP plan:
  - Detail all phases of work
  - Lane closures and detours
  - Construction zone ingress and egress

Additional detail on the roles and responsibilities of the Project Specific Design Team is provided in **Section 5. Project Specific Roles and Responsibilities**.

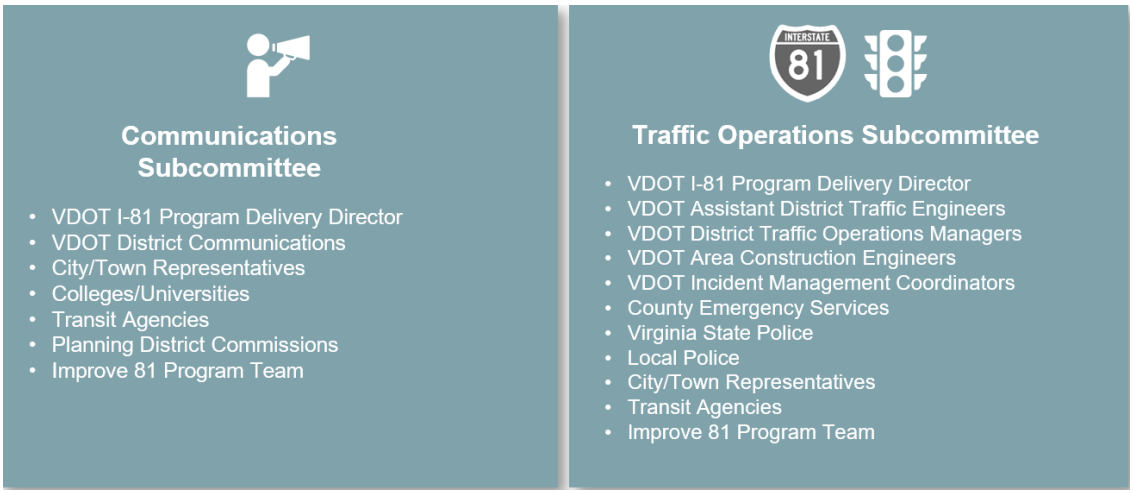
Technical Subcommittees

Technical Subcommittees are responsible for facilitating specific strategy groups of the I-81 Corridor-wide TMP. Activities include identifying and implementing approaches, techniques, and programs to manage congestion, maintain traffic during the construction of the project, reduce vehicles in the construction zone, and keep the affected communities informed. Based on the transportation needs of the region and the construction activities that will be occurring on or adjacent to the roadways, the efforts have been grouped into two strategy areas:

- Communications
- Traffic operations (including TDM and transit)

VDOT staff will lead each of the technical subcommittees, but these groups also include technical staff from local, county and state departments/agencies. Each subcommittee will develop strategies within their respective purviews, as well as budgets for each strategy. The implementation phase associated with these TMP strategies will include the development and use of performance measures to ensure effectiveness of efforts. Review by the Steering Committee on a regular basis will provide the opportunity to reassess resources and strategies to maximize the effectiveness of the I-81 Corridor-wide TMP. **Figure 9** identifies the agencies that are participating in each of the technical subcommittees.

Figure 9: Technical Subcommittee Members



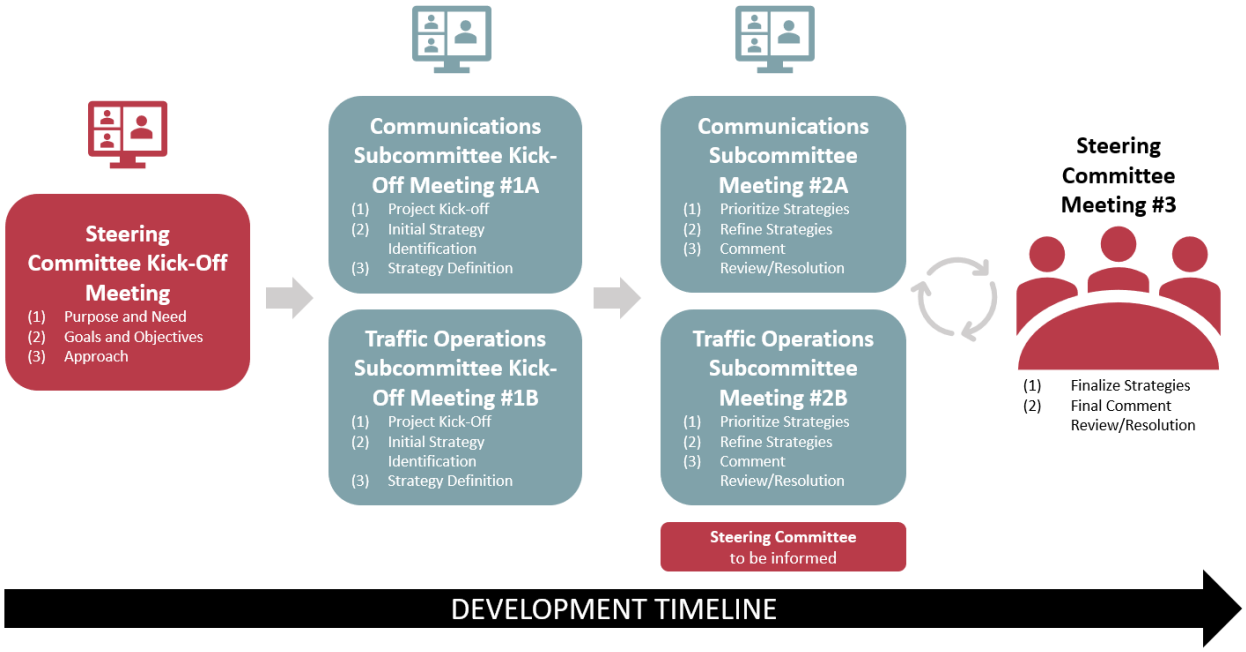
4.3 Development Process

A stakeholder-driven process guided the development of this Corridor-wide TMP. Over several months, VDOT conducted a series of coordination meetings to develop and solicit support from a variety of internal and external stakeholders. Following confirmation of the Steering Committee and technical subcommittee members, a kick-off meeting was held with the Steering Committee to convey, and agree to, the purpose, need, goals, objectives, and approach of the I-81 Corridor-wide TMP. Following the Steering Committee kick-off meeting, the technical subcommittees (Communications and Traffic Operations) convened, separately, to kick-off the project and discuss

the purpose, need, goals, and objectives of the TMP. Additionally, work zone management strategies for the I-81 CIP projects were identified and defined.

A second round of meetings with the technical subcommittees was held to prioritize and refine the work zone management strategies to identify the tactics that will have the greatest impact to safety and mobility along the corridor. Additionally, comments on the preliminary I-81 Corridor-wide TMP were reviewed and discussed. The I-81 Corridor-wide TMP was completed and presented to the Steering Committee meeting (Meeting #3). A summary of the approach is depicted in **Figure 10**.

Figure 10: TMP Strategy Development Process



This TMP includes potential strategies identified by the technical subcommittees. These strategies will be reviewed by the Steering Committee and costs/budgets will be identified for each strategy. Once the strategies are implemented, the technical subcommittees will continue to convene, quarterly, to advance implementation of the strategies and track TMP performance.

5 Project Specific Roles and Responsibilities

Each capital improvement project identified in the I-81 CIP will have a project specific design team responsible for preparing the TCP and project specific TMP. **This I-81 Corridor-wide TMP does not relieve any requirements for any project in the I-81 CIP**. The project specific design team(s) will follow current VDOT policies and procedures for project delivery. In development of the project specific TMP for the I-81 CIP projects, the following roles and responsibilities are recommended to replace those described in the IIM-LD 241.7.

According to the 2020 Road and Bridge Specifications (including revisions), Section 105.03– Authorities of Project Personnel, Communication and Decision Making, the project team shall define and agree upon the field decision-making process during the pre-construction conference. The intent of this provision is to establish procedures, processes, and guidelines for making decisions and managing communications during construction. In development of the contract documents, the

designer should consider modifying this specification to allow for communication through appropriate construction support field personnel regarding TMP performance.

5.1 Project Manager (PM)

The VDOT Project Manager is responsible for following the current Project Management Procedures established by the Project Management Office. In accordance with the Project Management Procedures, the Project Manager will be responsible for ensuring that the TMP type (Type A, Type B, or Type C) for the project is defined at the scoping meeting. The Project Manager is responsible for providing oversight during the creation of the plan and facilitating incorporating elements of the TMP into the contract documents, monitoring the performance of the TMP, and reporting its performance to the I-81 Program Manager. The intent is for the Project Manager to obtain feedback regarding TMP performance from constriction oversight field personnel, work zone safety coordinators, and/or others responsible for monitoring work zone performance.

5.2 District Traffic Engineer (DTE)

The responsible DTE shall consider various temporary traffic management strategies and provide the project team with recommendations during the design process.

DTE responsibilities during the construction phase:

- Coordinating with the Project Manager, Area Construction Engineers (ACE), District Work Zone Safety Coordinators (DWZSC), and Traffic Control Supervisor (TCS) (Contractor) on the TMP performance.
- Provide review/approval of changes to the TMP to improve safety and mobility. Also, includes detours, devices, and modifications of the TMP prior to implementation.
- Review and approve the TMP Post Construction Performance Assessment Report.
- Coordinate with and provide support to the Project Manager on conveying performance assessments to the I-81 Program Manager.

5.3 District Traffic Operations Manager (DTOM)

The responsible DTOM shall consider various transportation management strategies and provide the roadway designer and the project team with recommendations during the design process.

DTOM responsibilities during the construction phase:

- Coordinating with the Project Manager, ACE, DWZSC, and TCS (Contractor) on the TMP performance.
- Provide review/approval of changes to the TMP to improve safety and mobility. Also, includes detours, devices, and modifications of the TMP prior to implementation.
- Provide review/approval of communication through ITS devices (i.e., CMS).
- Review and approve the TMP Post Construction Performance Assessment Report.
- Coordinate with and provide support to the Project Manager on conveying performance assessments to the I-81 Program Manager.

5.4 Area Construction Engineers (ACE)

The ACE leads and guides construction inspection staff and managers to achieve district contract goals for safety, quality, schedule, and budgeting for construction and maintenance contracts. In

addition, ACEs provide direction, leadership, and professional engineering advice to construction managers and inspectors and serve as the responsible charge engineer for highway construction functions.

ACE responsibilities during the construction phase:

- Make sure that TMPs are implemented in the district in accordance with the plans, specifications, Virginia Work Area Protection Manual, and any other pertinent documents.
- Support the TCS (Contractor) and the DWZSCs (VDOT) in performing their assigned project duties.
- Verify that all contractor personnel are trained and hold valid certifications as required by the Department.
- Advise the appropriate VDOT personnel, as noted in IIM-LD 241.7 and the contract documents of work requiring lane shifts, lane closures, and/or phase changes at the following intervals prior to implementing the activity:
  - Ten working days in advance
  - Two hours in advance
    - Only required if there are changes to the planned activity (i.e., weather, material delivery, previous activity completed a head of schedule, etc.)
  - Actual time of the activity
  - Actual time when the activity is complete
- Make sure that the assigned TCS (Contractor) completes and submits the TMP Post Construction Performance Assessment Report.
  - To be submitted annually if project extends past one construction season.

5.5 District Work Zone Safety Coordinators (DWZSC)

The DWZSC are a resource to support the district staff to ensure that work zones operate safely and efficiently with the least amount of inconvenience and impact to the traveling public.

DWZSC responsibilities during the construction phase:

- Provide district staff, the Project Manager, and the I-81 Program Manager with guidance and recommendations on work zone design and operation.
- Performing work zone reviews to promote consistency and ensure compliance with work zone procedures, work zone management strategies, standards, and guidance.
- Monitoring work zone inspections conducted by field personnel and identifying areas that need improvement.
- Assisting and supporting the assigned TCS (Contractor) in performing their assigned duties.

5.6 Residency Engineers/Administrators (RE/RA)

RE and RA responsibilities during the construction phase for projects administered by the residency:

- Make sure that residency staff receives the appropriate training related to their duties in the development, implementation, and review of a TMP.
- Support TCS (Contractor) and DWZSCs (VDOT) in performing their assigned duties.
- Notify the DTOD of work requiring lane closures at the following intervals prior to implementing the lane closure:
  - Ten working days in advance
  - Two hours in advance

    - Only required if there are changes to the planned activity (i.e., weather, material delivery, previous activity completed a head of schedule, etc.)
  - Actual time of the activity
  - Actual time when the activity is complete
- Notify the DTOD of height, width, and weight restrictions ten working days prior to the imposition of restrictions.

5.7 District/Residency Permit Staff

District and Residency permit staff responsibilities during the construction phase:

- Make sure that the permittee's temporary traffic control plan follows this document, VDOT specifications, Virginia Work Area Protection Manual, and any other pertinent documents.
- Coordinate lane closure needs and height, width, and weight restrictions with the permittee and reporting any requests to the DTOD at the following intervals prior to implementing the activity:
  - Ten working days in advance
  - Two hours in advance
    - Only required if there are changes to the planned activity (i.e., weather, material delivery, previous activity completed a head of schedule, etc.)
  - Actual time of the activity
  - Actual time when the activity is complete
- Make sure that proposed lane closures comply with the district lane closure policy.

5.8 Contractor

According to the 2020 Road and Bridge Specifications (including revisions), Section 105.07– Cooperation of the Contractor, the Contractor shall give the work the constant attention necessary to facilitate quality and progress, and shall fully cooperate with the Engineer, Inspector, and other contractors involved in the prosecution of the work.

Specific responsibilities of the contractor:

- Designate a person assigned to the project (TCS) who will have the primary responsibility, with sufficient authority, for implementing the TMP to comply with the contract documents and established specifications and standards. The TCS shall:
  - Coordinate all traffic control installations, phase changes, and removals.
  - Inspect long-term traffic control devices and patterns each working day.
  - Inspect each short-term traffic control pattern that is set up.
  - Document the details of these inspections (items inspected, deficiencies discovered, and action taken to correct the deficiencies).
  - Program temporary portable CMS (PCMS).
  - Verify that temporary PCMS are operational and being utilized appropriately.
  - Verify that Intelligent Transportation System (ITS) devices (permanent and/or temporary) are operational and being utilized appropriately.
  - Perform duties related to data collection (e.g., excessive queuing), data sharing, and performance monitoring. Maintain a daily record of crashes, work zone incidents, and complaints related to the project.
  - Perform duties as required by the TOP.
  - Alert the Virginia State Police (VSP) and Traffic Operations Center (TOC) of any crashes

within the project work zone(s).
    - Coordinate with the ACEs and report all the above to the DTE at a regular interval.
    - Complete and submit the TMP Post Construction Performance Assessment Report annually and at project completion, or as directed by the ACE.
- Make sure that contractor personnel assigned to the project are trained in traffic control to a level corresponding with their responsibilities in accordance with the VDOT work zone traffic control training guidelines.
- Advise appropriate VDOT personnel, as noted in this guidance, work requiring lane shifts, lane closures and/or phase changes at the following intervals prior to implementing the activity:
    - Ten working days in advance
    - Two hours in advance
        - Only required if there are changes to the planned activity (i.e., weather, material delivery, previous activity completed a head of schedule, etc.)
    - Actual time of the activity
    - Actual time when the activity is complete
- Advise appropriate VDOT personnel, as noted in this guidance, of height, width, and weight restrictions ten working days prior to the imposition of such restrictions.
- Recommend traffic control improvements to the appropriate VDOT personnel to address field conditions pertaining to traffic flow, visibility, and worker, motorist, and pedestrian safety.
- Prepare a monthly progress report that is stored electronically in a collaborative system (i.e., Bluebeam or SharePoint) and shared with appropriate VDOT project staff: The progress report should include the following, at a minimum:
    - Work zone crashes, incidents, and excessive queue lengths
    - Record of any complaints related to the work zone
    - A list of work zone enhancements/improvements implemented to address performance and a short description of the outcome.

In development of the contract documents, the designer should consider modifying standard specifications to require the contractor to perform duties related to TMP performance as listed within this guidance document or determined by the project specific design team and to ensure integration of the actual TMP into the contract. The designer should consider, at a minimum, adding or modifying contractor requirements to the following specifications:

- Section 103.06 – Contract Documents
- Section 105.07 – Cooperation of Contractor
- Section 105.08 – Corporation with Regard to Utilities
- Section 105.09 – Cooperation among Contractors
- Section 105.12 – Coordination of Plans, Standard Drawings, Specifications, Supplemental Specifications, Special Provisions, and Special Provision Copied Notes
- Section 105.14 – Maintenance during Construction

A sample Work Zone Traffic Control Management Special Provision is provided as **Appendix D**. This sample special provision incorporates the suggested roles, responsibilities, and performance monitoring requirements of the contractor that are listed above and within this guidance document. Additionally, payment for work zone management services is contingent upon submission of monthly progress reports and other deliverables. Use of this Standard Special Provision should be discussed with the VDOT Project Manager.

5.9 Traffic Engineering Division

The Central Office Traffic Engineering Division is responsible for providing temporary traffic control standards, maintaining work zone guidance and recommendations, and identifying and communicating issues related to the design and usage of temporary traffic control devices.

Responsibilities of this division:

- Conduct annual process reviews of each District each year.
- Evaluate work zone safety by tracking the number of fatalities and injuries in work zones annually.
- Review TMP Post Construction Performance Assessment Reports to ascertain the effectiveness of the TMP and noting the resolution of work zone and/or temporary traffic control problems.
- Evaluate ITS deployments and their effectiveness as well as provide guidance on use.
- Coordinate with the Project Manager(s) on the TMP performance and effectiveness.
- Revise temporary traffic control standards, procedures, and guidance based on collected data to improve work zone safety and mobility.
- Define the appropriate work zone safety training for VDOT personnel, design consultants, construction workers, flaggers, and others working in and around the work zones.

5.10 Communications

Responsibilities of the District Communication Officers:

- Coordinate activities included in the PCP.
- Coordinate activities with the I-81 Communications Coordinator.

5.11 Transportation Operations Center

Responsibilities of the District TOC:

- Coordinate activities included in the TOP.
- Manage planned work zones that are entered into the Lane Closure Advisory Management System (LCAMS) and enter data into VATraffic.
- Estimate incident duration using input from emergency service providers.
- Notify the Contractor of incidents that affect the project so CMS messages can be maintained and/or changed.
- Coordinate with adjacent TOCs.

6 Communications Strategies

Construction of the I-81 capital improvement projects requires a robust, coordinated approach to effectively communicate information to the traveling public and corridor-wide stakeholders. Such an approach will help to ensure that there are opportunities for all travelers to receive consistent, comprehensive, and timely project information, construction updates, and lane closure alerts. In addition, it is also important to promote information about transit, TDM strategies, and traffic operations strategies being implemented along the corridor.

During construction, clear and consistent communications serve to promote awareness of the I-81 CIP, planned lane closures and other impacts, use of other modes, and real time traffic information.

Travelers should be informed about traffic shifts, lane and shoulder closures, and other activities that disrupt traffic flow on the interstate or adjacent roadways whenever possible. Travelers need up-to-date information about the construction projects, associated lane closures, and need to be made aware of alternative travel options to help minimize demand in the corridor. In support of this, VDOT has formed a communications team that is responsible for responding to and monitoring all communication, media relations, public involvement, and community outreach throughout the program. The program communications team has developed a *I-81 Corridor Improvement Program Communications Plan* that outlines communications tools and tactics that will be used to target the:

- I-81 Advisory Committee
- Commonwealth Transportation Board
- Elected officials
- Residents
- Businesses
- Schools
- Community organizations
- Users
  - Truck drivers
  - Tourists
  - Commuters
  - Emergency responders
  - Students
- VDOT employees
  - Customer Service Center
  - Field employees
- District and statewide media

VDOT will oversee the communications program and serve as the communication lead and public face of each project. The role of the I-81 Corridor-wide TMP Communications Subcommittee is to support VDOT communications activities in an integrated outreach program that maximizes the efficiency of the communications program and the TMP. It is expected that this subcommittee will provide guidance/recommendations on work zone management strategies, debrief lessons learned, and assist with monitoring performance.

The following four strategies were identified and prioritized by the Communications Subcommittee. These strategies are intended to serve as crosscutting, regional strategies, that build on project-level strategies. Regional TMP strategies enhance coordination between project-level strategies and/or fill the gaps to ensure that regional needs are accommodated. For each strategy, the following items are included: a description of the strategy, identification of the lead agencies, expected benefits, planning level costs, and complexity of deployment.

Communications and Outreach Strategies

- C-01: Public Outreach and Advertising
- C-02: Website and Social Media
- C-03: Customer Relationship Management Tool
- C-04: Surveys

C-01: Public Outreach and Advertising

DESCRIPTION
Push notifications, media announcements, and other advertising to alert the public of construction impacts. Advertising methods such as radio, traffic sponsorships, and digital ads will be explored. Outreach and advertising would also be directed through tourism bureaus, economic development districts, neighboring states, other websites, and social media outlets. Earned broadcast and print media can be used as tools to inform a wide range of audiences of construction updates and alternative travel options. Display boards and/or electronic boards may be used at rest areas and welcome centers on the corridor to provide the latest travel information. VDOT District Communications will use an earned media approach supported with a wide array of media channels and public outreach to effectively communicate project updates to the community. The team will contact media and special interest outlets specializing in transportation issue stories, such as traffic reporters, to maximize earned media potential. Paid media can also be used to complement earned media assuring that project messages most efficiently reach the communities and employers along the corridor. Paid media buys provide critical project information and drive the affected audience to the website where more detailed information on the project will be available. The team will also explore advertisements on social media (e.g., Facebook) using geo-targeted ads to inform commuters on the corridor of construction activities and commuting options.
LEAD AGENCY
VDOT, partnered with local municipalities.
EXPECTED BENEFIT
High. This strategy is expected to improve awareness and information about the project, work zones, and TMP strategies.
POTENTIAL LOCATIONS
N/A
PLANNING-LEVEL COST
Project costs will be developed based on the project specific PCP.
IMPLEMENTATION COMPLEXITY
Medium.
COORDINATION CONTACTS
TBD

C-02: Website and Social Media

Description
The program website will serve as the gateway to basic information about projects, alternative travel options, public meetings, and lane closure updates. The website could also include an interactive map that allows users to find lane closures and detour information. Program information might be shared quarterly in a podcast format on the program website, which may be integrated with the Improve81.org website. VDOT team members could consider recording a mini-series that includes interviews with program management, communications, and construction team members. VDOT also has a YouTube channel which can be updated with quarterly video segments featuring VDOT I-81 program leaders discussing relevant topics on the program. Users could also sign up for project information on the website which would be integrated into the CRM tool. A call-in number can be provided for VDOT Customer Service. Social media will be leveraged to communicate project information. The VDOT District Communications will leverage existing social media channels (e.g., Twitter, Facebook) where appropriate, rather than creating new channels. In developing social media messages, proper planning will be conducted so that messages created by VDOT can be leveraged by partner agencies to ensure that messaging is consistent. Staff will also monitor various social media channels to gain insights and respond or update messages, as needed. This information could also be directed through stakeholder websites, social media outlets, and through neighboring states.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to improve awareness and information about the project, work zones, and TMP Strategies.
Potential Locations
N/A
Planning-Level Cost
Costs are embedded in VDOT budget.
Implementation Complexity
Low. Assuming website and social media accounts already exist.
Coordination Contacts
TBD

C-03: Customer Relationship Management Tool

DESCRIPTION
A tool for managing relationships and interactions with citizens, major stakeholders, employers, etc. The Customer Relationship Management (CRM) tool would help the project team stay connected to relevant stakeholders, streamline processes, and improve efficiency. The VDOT District Communications would leverage the tool to provide construction updates to subscribers. In the event of an urgent news release, the team could distribute information to relevant stakeholders and partners to spread the word. A CRM tool allows stakeholders to sign up, so they receive project information via email or social media platform.
LEAD AGENCY
VDOT
EXPECTED BENEFIT
High. This strategy is expected to improve and enhance coordination activities for efficient and consistent communications with employers, citizens, and other users of the facility.
POTENTIAL LOCATIONS
N/A
PLANNING-LEVEL COST
It is expected that a web-based or cloud-based CRM software would be used. Costs are embedded in VDOT budget for improve81.org.
IMPLEMENTATION COMPLEXITY
Low.
COORDINATION CONTACTS
TBD

C-04: Surveys

Description
Surveying of citizens and employers affected by construction. Surveys would be conducted before construction to get public feedback on the suggested strategies. In addition, surveys may be conducted during construction to solicit input on the effectiveness of the strategies and communications program in publicizing and conveying critical, timely, and accurate information to the public. Surveys are expected to be qualitative.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to enable VDOT to develop and deploy more effective TMP strategies.
Potential Locations
N/A
Planning-Level Cost
$3,000 to $5,000 per set of surveys conducted, assessed, and reported. $3,000 per individual survey. Assumes using a third-party service.
Implementation Complexity
Low.
Coordination Contacts
TBD

7 Traffic Operations Strategies

During construction, the projects in the I-81 CIP have the potential to increase congestion and create safety challenges on the already congested I-81 and adjacent arterial networks. The focus of the Traffic Operations Subcommittee is to support the implementation of strategies, such as deploying ITS and augmenting existing IM strategies, that will maintain and enhance traffic flow and improve safety. In addition, strategies were defined to improve the flow of traffic and minimize potential bottlenecks on arterials to support increased traffic volumes that may divert from the freeway to adjacent arterials.

Minor incidents can have significant impacts on traffic if not removed quickly, particularly during peak traffic hours. The strategies identified in this document will enable incident responders to quickly detect, verify, respond, and clear incidents (See IIM-OD-14-02.3). The I-81 Corridor-wide TMP will facilitate coordination for lane closures and TCP activities for the I-81 CIP projects with other regional and local projects affecting the I-81 corridor, thus creating safer construction zones for travelers and workers.

The following strategies were identified and prioritized by the Traffic Operations Subcommittee. Each strategy includes a brief description, the identification of the lead agency or agencies, expected benefits, planning level costs, and complexity of deployment. Project specific design teams should consider leveraging strategy groups that support other strategy groups. For example, data collection and monitoring strategies could support incident management or traveler information strategies.

Traffic Operations Strategies

TCP and Work Zone Coordination Strategies

- T-01: Temporary Traffic Control Plans
- T-02: Contracting Strategies to Manage Delays
- T-03: Lane Closure Management Process/Conflict Resolution

Data Collection and Monitoring Strategies

- T-04: Temporary Data Collection
- T-05: Portable CCTV Cameras
- T-06: CCTV Cameras on Safety Service Patrol/Incident Management Clearance Vehicles
- T-07: Real-Time Data and Monitoring
- T-08: Enhanced Monitoring on Arterials

Incident Management Strategies

- T-09: Supplemental Safety Service Patrols
- T-10: Supplemental Virginia State Police
- T-11: Dedicated Wreckers
- T-12: Supplemental Local/County Police
- T-13: Updated Incident Response and Detour Plans
- T-14: Emergency Pull-Offs Within the Construction Area

Traveler Information Strategies

- T-15: PCMS (Integrated into Advanced Traffic Management System)
- T-16: Automated Work Zone Information System
- T-17: Geo-Fenced Alerts with V2I Communications to Smartphones or Text Notifications
- T-18: Work Zone Data Exchange Data Feeds

Local Operations Strategies

- T-19: Local Spot Improvements
- T-20: Updated Traffic Signal Timing

Advanced Work Zone Strategies

- T-21: Queue Detection and Warning System
- T-22: Variable Speed Limit System/Work Zone Advisory System
- T-23: Automated Work Zone Speed Enforcement
- T-24: Smart Cones
- T-25: Temporary Ramp Metering
- T-26: Dynamic Merge Control/Zipper Merge (Late Merge)

Other Traffic Operations Strategies

- T-27: Turnkey Services to Pre-Position/Relocate Portable ITS Equipment
- T-28: Maintain Existing ITS Functionality During Construction
- T-29: Ongoing Operations-Focused Meetings

Transportation Demand Management (TDM) Strategies

Vanpool and Carpool Formation Strategies

- TDM-01: Carpool and Vanpool Incentive Programs

Telework Strategies

- TDM-02: Telework!VA

Commuter and Local Transit Strategies

- TDM-03: Transit Fare Subsidies on Existing Commuter Routes
- TDM-04: Supplemental Bus Services
- TDM-05: New/Enhanced Employer Shuttles (Universities/Major Employers)

TDM Outreach/Coordination Strategies

- TDM-06: Transit and Transportation Demand Management Incentive Program Promotion
- TDM-07: University/Major Employer Transit and Transportation Demand Management Outreach and Promotion

Other TDM Strategies

- TDM-08: Promote Employers to Provide Parking Cash Out
- TDM-09: Promotion of Park and Ride Lots with Available Capacity
- TDM-10: Construction-Related Rerouting
- TDM-11: Transit Signal Priority
- TDM-12: Real-Time Next Bus Information with Alerts
- TDM-13: Dynamic Bus-on-Shoulder

Other Work Zone Management Strategies

Other Work Zone Management Strategies

- O-01: Truck Lane Restrictions
- O-02: Work Zone Road Safety Audits

7.1 TCP and Work Zone Coordination Strategies

T-01: Temporary Traffic Control Plans

Description
TCPs sealed by a Professional Engineer in Virginia with an Advanced Work Zone Traffic Control Certification and approved by VDOT will be submitted prior to lane closure requests in accordance with the Technical Requirements. All construction TCP plans will be completed in accordance with the latest editions of the Virginia Work Area Protection Manual (VWAPM), as well as the MUTCD, and the Virginia Supplement to the MUTCD.
Lead Agency
Project teams
Expected Benefit
High. This strategy is expected to increase mobility and safety.
Potential Locations
All projects.
Planning-Level Cost
Cost depends on the size of the project.
Implementation Complexity
Low/Medium. Depending on the need for temporary traffic signal timing plans for signals along detour routes.
Coordination Contacts
TBD

T-02: Contracting Strategies to Manage Delays

Description
These strategies typically involve agreements to reduce duration or traffic impacts including: • **Design-build.** This strategy involves using a single contract to design and build the project, thus reducing project duration by allowing construction to begin prior to design completion. • **A+B bidding.** A+B bidding encourages contractors to minimize construction impacts by reducing construction time. Part A refers to the contractor's bid for the actual items of work, and Part B is the total number of days bid to complete the project multiplied by the daily road user cost stipulated in the contract. The combined values of the A and B portions determine the winning bid. The contractor's payment is based on both Part A and the actual number of days used under Part B. • **Incentive/disincentive clauses.** This strategy involves using incentives and/or disincentives in the construction contract to minimize construction duration. Contract language could include clauses that incentivize contractor performance to effectively manage queues and delays associated with the construction project. Targets would be established, and delays and queues monitored accordingly.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to minimize or manage the extent of traffic control impacts and shorten construction delays.
Potential Locations
Any construction project that impacts lane capacity.
Planning-Level Cost
TBD
Implementation Complexity
Low. Alternative contracting mechanisms are more common.
Coordination Contacts
TBD

T-03: Lane Closure Management Process/Conflict Resolution

Description
This strategy would be to provide access to relevant work zone information with stakeholders (other agencies, utilities, emergency responders, cities, towns, etc.) responsible for operating within the network through a technology-based scheduling solution. Access to scheduled work zone information is currently provided to the public through the 511 portal. This strategy includes leveraging and enhancing existing lane closure management systems and processes. Lane closure conflict resolution is currently processed, manually, according to IIM-OD-16-03. A contractor has been procured to upgrade the existing LCAMS system; however, this strategy will be applicable to the new tool once complete. The current LCAMS system will alert the user if there is a conflict upon data entry, and conflicts are resolved through email or other coordination.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to enable VDOT to effectively manage the extent of traffic control impacts.
Potential Locations
Any work zones with lane closures.
Planning-Level Cost
Statewide procurement is underway for new lane closure system. Costs associated with this strategy are not specific to the I-81 projects.
Implementation Complexity
Medium. LCAMS (or equivalent) is already in place; this strategy may need to focus on enhancing interagency coordination with localities.
Coordination Contacts
TBD

7.2 Data Collection and Monitoring Strategies

T-04: Temporary Data Collection

Description
Temporary devices to collect traffic data such as travel speeds and traffic volumes in areas where localized and detailed data would be beneficial. A variety of technologies may be considered, and this strategy would typically be paired with another strategy (i.e., supplemental ITS equipment).
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to enable VDOT to maintain accurate information about travel conditions and delays since lane shifts and closures may cause inaccurate/delayed probe or crowd sourced data.
Potential Locations
All projects with impacts to travel lanes. Could also be used along the arterial network in areas near special/regional events (i.e., state fair, football games, etc.).
Planning-Level Cost
$1,000 to $5,000 per week per location, depending on complexity.
Implementation Complexity
Medium. Equipment will need to be positioned in the field and integrated with an existing central system.
Coordination Contacts
TBD

T-05: Portable CCTV Cameras

Description
Portable CCTV cameras to augment existing permanent CCTV coverage, especially along arterials, detours, and exits identified near work zones. CCTV cameras allow TOC operators to detect, verify, and monitor incidents. VDOT broadcasts these images primarily through its website and through the 511 mobile phone application. A new 511 system is under development, so additional features may be available once completed. VDOT also shares video images with the Virginia State Police and could make it available to other agencies in the first responder community via OneView. Portable CCTV cameras can serve as short-term monitoring solutions in areas with nonrecurring congestion (e.g., work zones). The devices would use wireless modems for communication and solar panels for power. The cameras would also be integrated into the ATMS.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to expand coverage for monitoring real-time conditions.
Potential Locations
Locations where permanent ITS devices are not available or along the corridor where ITS devices may be removed during construction activities.
Planning-Level Cost
$35,000 to $50,000 per unit depending on the operational life span of the unit.
Implementation Complexity
Medium. Cameras must be integrated with existing video management system; first attempt should be to require the contractor to maintain existing ITS devices during construction.
Coordination Contacts
TBD

T-06: CCTV Cameras on Safety Service Patrol/Incident Management Clearance Vehicles

Description
This strategy includes the installation of CCTV cameras on Safety Service Patrol (SSP) vehicles and/or Incident Management Clearance (IMC) vehicles that would result in mobile camera coverage along the corridor. Streaming images from these cameras would be sent wirelessly back to the TOC allowing operators to view the images and gain better situational awareness when an SSP or IMC vehicle is present at an incident. This strategy would be particularly beneficial when incidents occur in areas that are not covered by existing permanent CCTV cameras on freeways that lack camera coverage. Video feeds from CCTV cameras installed on SSP or IMC vehicles would not be made available to the public through 511 or other sources.
Lead Agency
VDOT
Expected Benefit
Low. This strategy is expected to provide enhanced information and awareness at the incident scene.
Potential Locations
TBD. Implementation strategies are under development.
Planning-Level Cost
TBD. Cost based on ongoing deployment discussions.
Implementation Complexity
Medium. This strategy relies on an adequate number of SSP vehicles being present within the project area. Also, visibility from a vehicle will have obstructions from adjacent vehicles.
Coordination Contacts
TBD

T-07: Real-Time Data and Monitoring

Description
Use of third-party crowd-sourced data to monitor real-time conditions on freeway and adjacent routes. This does not need to integrate with existing systems. These tools will allow VDOT, local agencies, and other stakeholders to understand the performance of the system. It is expected that tools currently available to VDOT will be leveraged, including Regional Integrated Transportation Information System (RITIS) and/or other propriety software systems. Additional data sources may need to be procured by VDOT or the Contractor. This strategy also includes resources dedicated to analyzing and producing performance reports and sharing those reports with relevant stakeholders. Performance information obtained from other strategies can be used to supplement performance reports.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to use data to adapt work zone traffic management and operational strategies.
Potential Locations
All projects. Could be considered where localized impacts are not anticipated or if impacts are only expected along I-81.
Planning-Level Cost
$175,000 to $250,000. Planning-level costs assume dedicated staff to leverage existing tools and monitor and report results of the analysis every two weeks. It is assumed that it will take approximately 16 to 20 hours to produce a report and conduct meetings. Planning level costs do not assume funding for additional data sources. The extent of data collection and reporting will influence level of deployment effort.
Implementation Complexity
Low/Medium. Third party systems usually have an existing interface or dashboard. The extent of data collection and reporting will influence the level of deployment effort.
Coordination Contacts
TBD

T-08: Enhanced Monitoring on Arterials

Description
Speed monitoring, traffic monitoring, CCTV cameras, and PCMS on key arterials and at key intersections as needed during construction. Probe and crowd sourced data could be used to assist in monitoring the arterial network.
Lead Agency
VDOT with support from local agencies
Expected Benefit
Medium. This strategy is expected to maintain accurate information about travel conditions and delays, increase understanding of construction impacts on the performance of the transportation network, and increase opportunities to implement strategies that proactively mitigate construction impacts.
Potential Locations
Intersections and arterials along incident detour routes.
Planning-Level Cost
Monitoring cost: $175,000 to $250,000. Planning-level costs assume dedicated staff to leverage existing tools to monitor and report results of analysis every two weeks. It is assumed that it will take approximately 16-20 hours to produce a report and conduct meetings. Planning-level costs do not assume funding for additional data sources. The extent of the data collection and reporting will influence the level of deployment effort. Equipment costs (CCTV and PCMS): $1,100,000 to $1,375,000. Planning-level costs assume 16-24 portable CCTV cameras and 16-24 PCMS and includes the costs for integrating these devices into the ATMS and other operations costs. Average cost is about $37,000 per CCTV installation and $32,500 per PCMS installation.
Implementation Complexity
Medium. Implementation requires development of metrics and identifying tools and datasets. Equipment will need to be positioned in the field and integrated with an existing central system.
Coordination Contacts
Local agencies: TBD based on affected localities.

7.3 Incident Management Strategies

T-09: Supplemental Safety Service Patrols

Description
Supplemental SSPs and/or expanded SSP hours can be implemented to enhance response to incidents or disabled vehicles within construction work zones. The SSP have proven to be highly visible and effective in assisting motorists. The SSP will work with first responders to remove disabled vehicles from the lanes and assist with incident response. The supplemental SSPs and/or expanded SSP hours would provide additional coverage throughout the active construction zones along the corridor. Assistance provided by the SSP includes warning protections for disabled vehicles, simple mechanical help such as jump-starting vehicles, providing fuel, and changing tires, and assisting with incident response and detection
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to lead to faster vehicle clearance, leading to reduced delay.
Potential Locations
Locations with high-crash frequency, areas with high congestion, and or complex construction projects.
Planning-Level Cost
$500,000 for SSP staff and vehicles over one year.
Implementation Complexity
Medium. Work force of SSP may be limited and difficult to deploy additional vehicles. Staffing up to meet demand and provide training will likely require extra lead time during the planning stage. May consider establishing a minimum percentage of normal coverage before implementing supplemental staffing.
Coordination Contacts
TBD

T-10: Supplemental Virginia State Police

Description
Supplemental VSP coverage to assist with incident detection, securing the incident scene, directing traffic at the incident scene, and supporting clearance. VSP Troopers would be paid overtime for their services.
Lead Agency
Virginia State Police
Expected Benefit
High. This strategy is expected lead to faster vehicle clearance, leading to reduced delay. In addition, VSP presence would significantly reduce speeding within the work zone.
Potential Locations
Locations with high crash frequency and/or areas with high congestion.
Planning-Level Cost
$90 per hour used per trooper needed. *For example, if one trooper is dedicated to the project limits 16 hours per day, 7 days per week, for two years, the planning level cost would be approximately $1,000,000.*
Implementation Complexity
High. Work force of VSP is generally already limited and may be difficult to deploy additional troopers.
Coordination Contacts
TBD

T-11: Dedicated Wreckers

Description
Dedicated wreckers pre-positioned along the construction zone to provide rapid response to incidents, expediting the removal of disabled or wrecked vehicles. Prompt clearance of disabled or wrecked vehicles is crucial to continuing and maintaining traffic flow in the construction zone. Wreckers are used to support emergency relocation of immobile vehicles that are impeding a travel lane and/or the normal flow of traffic. VDOT has successfully implemented the Towing and Recovery Incentive Program (TRIP) for quick clearance of commercial vehicles. This program can be leveraged to have pre-positioned wreckers in work zones at specific locations and during certain time periods, which would require the local construction manager to email weekly planned closures in advance to the TOC and District IMCs so TRIP partners can develop preplanned staging areas within their assigned zones if activated. Alternatively, a light duty wrecker, outside of the TRIP program, could be staged in work zone areas with little shoulder area. It is anticipated that this staging will be the responsibility of the contractor based on MOT phases, lane shifts and/or closures, events, weather, etc.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to lead to faster vehicle clearance, leading to reduced delay.
Potential Locations
Project specific criteria based upon the work zone (and staging), topography, travel characteristics, special events, and other factors should be established to determine a cost-benefit of pre-staged/dedicated wreckers. Some examples of locations and times for implementation include work zones on grades where trucks may be stopped and overheat or have difficulty restarting, horizontal curves, or different phases of construction that provide geometric or sight distance issues. Specific times may include holidays, special events, or during inclement weather.
Planning-Level Cost
$1,000 cost per unit per day or based on fees negotiated by the contractor.
Implementation Complexity
Low. Station vehicles in advance or within construction zone during congested periods for rapid removal of vehicles. During project development the project specific design team should evaluate the needs for staged wreckers and options for implementation.
Coordination Contacts
TBD

T-12: Supplemental Local/County Police

Description
The local/county police department would support incident management on arterials and respond to speeding and other violations on local neighborhood roads resulting from the construction spillover effects. Under an MOU between the local jurisdictions and VDOT, funding for supplemental police officer support would be provided on an as-needed basis. VDOT has an agreement with the Virginia State Police (VSP) who has the first right of refusal, so local/county police forces would only be used when the VSP is unavailable.
Lead Agency
Local and/or county police departments
Expected Benefit
High. This strategy is expected to provide increased enforcement on arterials, reduced incident clearance times on arterials, reduced incident delays on arterials, and reduced secondary incidents on arterials. It is also expected to reduce speeds and violations on local streets.
Potential Locations
Intersections and arterials along incident detour routes.
Planning-Level Cost
$200,000 to $400,000. Planning-level costs assume funding for local and/or county police officers to support incident management and enforcement as needed.
Implementation Complexity
Medium. Staffing supplemental positions will be a challenge since many local and/or county police agencies are currently understaffed and these positions will likely require overtime for existing officers.
Coordination Contacts
Local police departments: TBD based on affected localities.

T-13: Updated Incident Response and Detour Plans

Description
Review and update existing incident management response and detour plans to assure optimum response capacity during construction. Incident response and detour plans are used to direct traffic around temporary full or partial roadway closures for incidents or construction. Plans will be assessed by the VDOT incident response team, VDOT and local traffic engineering staff, first responders (i.e., police, fire, and medical), and relevant staff from the project teams. Most TOCs have standard layouts for incident management detours, so they will need to be reviewed periodically as construction projects along the published detour routes may have restrictions and/or lane closures in place. Additionally, plans would be updated to account for the finished construction project.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to reduce incident delay and work zone delay and travel times on I-81. This strategy may also reduce delay and travel time on arterials as compared to situations where coordinated response plans are not implemented.
Potential Locations
All projects.
Planning-Level Cost
These have been recently updated throughout the corridor. No assumed costs.
Implementation Complexity
Low/High. Depending on whether detour plans already exist.
Coordination Contacts
Virginia State Police, local police, fire, rescue, counties, and cities.

T-14: Emergency Pull-Offs Within the Construction Area

Description
Work within the construction project to ensure that there are adequate or dedicated emergency pull-offs within the construction area for disabled vehicles.
Lead Agency
VDOT
Expected Benefit
High. This strategy is expected to provide refuge for disabled vehicles to minimize blockage and reduce congestion.
Potential Locations
Emergency pull-off locations should be evaluated for each work zone. Pull-off spacing of about 0.5 miles is desirable. Spacing of 1.0 mile is acceptable and spacing of 2.0 miles should be considered the maximum acceptable.
Planning-Level Cost
No cost (part of TCP setup).
Implementation Complexity
Low. To be included in traffic control plans.
Coordination Contacts
TBD

7.4 Traveler Information Strategies

T-15: PCMS (Integrated into Advanced Traffic Management System)

DESCRIPTION
PCMS used to provide motorists with real-time traffic conditions and road closure information as well as advise motorists of alternative routes when appropriate. PCMS units would augment the permanent CMS already in the corridor. The devices would use wireless modems for communication and solar panels for power. PCMS would be controlled remotely by TOC operators to provide unique messages that alert motorists and support standard signing for: speed reduction, advance notice of lane closures and shifts, diversion to a different route, and advance notice of ramp closures. It is expected that the portable devices would be made available as part of a turnkey solution that includes support staff available to install, maintain, move, relocate, and configure the devices along the corridor. In addition, VDOT may decide to pre-stage equipment near high-incident locations or other strategic locations to enable faster deployment of these devices during incidents and other events.
LEAD AGENCY
VDOT
EXPECTED BENEFIT
High. This strategy is expected to increase awareness and provide traveler information on work zones, delays, incidents, and other information to motorists traveling in the corridor.
POTENTIAL LOCATIONS
Locations where permanent ITS devices are not available or along the corridor where ITS devices may be removed during construction activities. Can be used to supplement existing ITS infrastructure.
PLANNING-LEVEL COST
$550,000 to $687,500. Planning level costs assume 16-24 PCMSs including operations costs. Average cost is $32,500 per PCMS.
IMPLEMENTATION COMPLEXITY
Medium. Must be integrated with existing Advanced Traffic Management System (ATMS). May require corridor evaluation if not an approved emergency detour route.
COORDINATION CONTACTS
TBD

T-16: Automated Work Zone Information System

Description
Standalone portable Automated Work Zone Information Systems that include equipment to collect traffic data and convey travel time and speed advisories through work zones on PCMS.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to increase awareness and provide traveler information on work zones, delays, incidents, and other information to motorists traveling in the corridor.
Potential Locations
Any work zone where congestion is anticipated.
Planning-Level Cost
Refer to T-15. Planning-level costs assume VDOT uses INRIX data and additional sensors are not required. It is assumed that INRIX data can be applied in certain situations, and it is the responsibility of the design team to determine its appropriate use.
Implementation Complexity
High. Must procure the solution and may need to integrate with existing ITS systems.
Coordination Contacts
TBD

T-17: Geo-Fenced Alerts with V2I Communications to Smartphones or Text Notifications

Description
Geofenced alerts provide opportunities to notify drivers, residents – and other communities – of events occurring on or near the freeway. Geo-located personalized alerts and alarms may be sent to in-vehicle systems (i.e., DriveWyze) or safely displayed on vehicles with Apple CarPlay and Android Auto. Geofenced alerts can be used to alert drivers of incidents, queue warnings, zipper merges, congestion/delays, major events, work zones, and other events. Technology changes rapidly, so new systems and options are continually being developed and deployed.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to increase awareness and provide work zone-related information directly to a user's smart phone or vehicle.
Potential Locations
This strategy would leverage a corridor-wide social media management platform to gather input and send out alerts using social media. Geofenced alerts would not require infrastructure and could be pushed to geofenced areas along the I-81 corridor.
Planning-Level Cost
TBD. Implementation approaches are ongoing.
Implementation Complexity
High. The new tool would need to be developed or integrated into the existing VA511 system. It is expected that this tool would be automated and would not require additional TOC operator action. Virginia has been hands-free since January 2021 and the Department has been at the forefront of promoting hands-free use in a vehicle. The ultimate strategy should discourage interaction with a handheld mobile device to be consistent with Department safety initiatives.
Coordination Contacts
TBD

T-18: Work Zone Data Exchange Data Feeds

Description
VDOT was recently awarded a USDOT Grant to produce WZDx-compliant work zone data feeds. These data feeds would be made available to third-party data providers through the SmarterRoads open data platform. Third-party data providers (e.g., Apple, Google, WAZE) could consume these data feeds for use in their apps.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to increase awareness of work zone-related information through private/third-party applications.
Potential Locations
All work zones.
Planning-Level Cost
No cost to the project.
Implementation Complexity
Low. VDOT received a USDOT grant to implement.
Coordination Contacts
TBD

7.5 Local Operations Strategies

T-19: Local Spot Improvements

Description
Physical roadway improvements may be funded to mitigate the negative impacts of construction on the local network. These improvements may include a turning lane, new signals to better control traffic flow, new signage, and pavement markings to enhance roadway and intersection functionality, and installation of devices to slow traffic or deter illegal or undesirable driver behavior.
Lead Agency
VDOT and local agencies
Expected Benefit
High. This strategy is expected to reduce delays, speeds, incidents, and other impacts on local networks.
Potential Locations
Intersections along incident detour routes.
Planning-Level Cost
$600,000 to $1,000,000
Implementation Complexity
Medium. Spot improvements will require minor physical improvements including restriping, signing, extension of turn lanes, traffic calming strategies, etc.
Coordination Contacts
TBD

T-20: Updated Traffic Signal Timing

Description
Updated traffic signal timing on arterials to respond to spillover or detoured traffic from construction work zones and to improve traffic flow along key arterials adjacent to the construction work zone. This strategy includes the activities to collect data, create updated timing plans, and implement the timing plans. Updated signal timing plans would need to be developed for key adjacent arterials. Agency coordination would be required to confirm software compatibility.
Lead Agency
VDOT and local agencies
Expected Benefit
High. This strategy is expected to reduce delays and queues at signalized intersections.
Potential Locations
Interchanges and intersections along incident detour routes.
Planning-Level Cost
$6,000 to $10,000 to update the traffic signal timing plan for an intersection.
Implementation Complexity
High. New timing plans would need to be developed. Who is responsible for developing new timings would vary depending on different traffic plans and timeframes. In addition, traffic volumes may vary during construction.
Coordination Contacts
TBD

7.6 Advanced Work Zone Strategies

T-21: Queue Detection and Warning System

DESCRIPTION
Queue warning systems use real-time traffic detection and warning signs to inform drivers of stopped or slow traffic ahead. By providing early information, a queue warning system helps drivers anticipate an upcoming slowdown from incidents, congestion, or work zones. These systems would use roadside sensors to detect queues and portable changeable message signs (PCMS) upstream from the queue to provide warnings to drivers. As queues are dynamic, particularly in advance of work zones, multiple PCMS may need to be installed to accommodate queues as they grow.
LEAD AGENCY
VDOT
EXPECTED BENEFIT
Medium. This strategy is expected to reduce incidents resulting from queues.
POTENTIAL LOCATIONS
While these systems are expected to be portable – and could move within the project limits – these systems would be most useful upstream of areas with higher levels of expected recurring congestion.
PLANNING-LEVEL COST
The cost for a single portable queue warning system is between $360,000 and $400,000 with annual O&M costs of roughly $50,000. Costs would be less if VDOT contracted with a third-party vendor to provide service throughout the corridor.
IMPLEMENTATION COMPLEXITY
High. Requires concept definition, procurement, and testing prior to implementation.
COORDINATION CONTACTS
TBD

T-22: Variable Speed Limit System/Work Zone Advisory System

Description
Portable variable speed limit (VSL) systems to enhance mobility and safety in work zones. These systems would harmonize traffic flow in work zones by providing advisory/regulatory speed limits to motorists.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to improve safety and traffic flow.
Potential Locations
Projects with anticipated impacts to lane capacity. Areas susceptible to significant weather events.
Planning-Level Cost
$10,000 per portable unit.
Implementation Complexity
High. Requires concept definition, engineered study, procurement, and testing prior to implementation. Since there are existing systems on the market today, it is assumed that existing software packages can be used.
Coordination Contacts
TBD

T-23: Automated Work Zone Speed Enforcement

Description
Speeding is especially dangerous when workers are present in the work zone. Automated Work Zone Speed Enforcement (AWZSE) systems are used to enhance the enforcement of work zone speed limits. These systems consist of speed activated photo radar devices that capture the image of license plates for vehicles exceeding the speed limit. Violators are identified in coordination with the state motor vehicle division, based on vehicle ownership and a quality review of radar/photo data. This information is then used to process citations which are issued to drivers through the mail. Systems typically include advisory signage that is placed well before the speed camera installation, clearly indicates that systems are in use, specifies the posted speed limit in effect through the work zone, and frequently incorporates the speed feedback display function informing drivers of their measured speed as they approach the enforcement area. HB 1442 in Virginia allows state and local police to post speed cameras in highway work zones and in school zones. Automated tickets may be generated for vehicles exceeding the posted speed limit in affected areas by more than 10 mph. Violators would be mailed citations not to exceed $100. Signs will be required to be posted within 1,000 feet of any speed camera. Several states have contracted with private companies to receive information on vehicles in violation. The company is in return responsible for sending out tickets after a law enforcement officer reviews each summons.
Lead Agency
VDOT, VSP, and Virginia Information Technologies Agency (VITA)
Expected Benefit
High. This strategy is expected to reduce speeds in work zones and reduce incidents.
Potential Locations
All projects.
Planning-Level Cost
$3,500,000 to $3,850,000. Planning-level costs assume a turnkey solution. Note: funding from citations may offset the operating costs.
Implementation Complexity
High. Requires VDOT to stand up an AWSZE program and to process and procure a turnkey solution from a vendor.
Coordination Contacts
TBD

T-24: Smart Cones

Description
Smart cones and other technology-enabled with global positioning system (GPS) that can be used to identify the location of the work zone and provide information back to the TOC when the work zone starts and ends. This information is useful to 3rd party applications (Apple Maps, Google Maps, and WAZE) and VA511.
Lead Agency
VDOT
Expected Benefit
Low. This strategy is expected to increase awareness of the location of a work zone – when it starts and when it ends.
Potential Locations
All projects.
Planning-Level Cost
Approximately $2,100 per smart cone, including annual subscription fee per device. Does not include ATMS integration nor software costs.
Implementation Complexity
Medium. Smart zone technology must be integrated into existing systems to be beneficial.
Coordination Contacts
TBD

T-25: Temporary Ramp Metering

Description
Temporary ramp metering systems to control the frequency at which vehicles enter the flow of traffic on the freeway. Ramp metering reduces overall freeway congestion by managing the amount of traffic entering the freeway and by breaking up platoons that make it difficult to merge onto the freeway.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to enhance safety at interchanges.
Potential Locations
Projects located at interchanges and/or rest areas.
Planning-Level Cost
More than $200,000 per application. Planning-level costs assume temporary signals and sensors for the duration of the project.
Implementation Complexity
High. A specialized contractor may need to be used to operate and maintain the system. In addition, specific communications plans may be required to educate drivers.
Coordination Contacts
TBD

T-26: Dynamic Merge Control/Zipper Merge (Late Merge)

Description
A strategy encouraging motorists to use either the open or closed lane(s) until they reach the merge point at the closure taper, rather than merging as soon as possible into the open lane. Zipper merges leverage PCMS and static signing to assist in providing information to travelers. These signs may be used to dynamically manage the entry of vehicles into merge areas with a series of advisory messages (e.g., displayed on a PCMS) approaching the merge point that prepares motorists for an upcoming merge and then directing a consistent merging behavior. Consider use of animated signs well in advance of merge point. Alternatively, opportunities may exist to push geofenced alerts to motorists as they approach an area with a lane reduction. The alerts may prompt drivers to continue to the merge point and take their turn when merging. This strategy may also include an educational component to increase awareness of the benefits of zipper merges, since drivers typically see this behavior as rude, and truckers often block a lane to prevent it. Zipper merges can also be challenging for larger vehicles to merge, since other motorists may be reluctant to be trapped behind them.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to reduce delays at merge points and has the potential to reduce the number of incidents.
Potential Locations
Zipper merges may be implemented throughout the I-81 corridor where technology provides a benefit to that situation. Potential locations include work zones and other locations where a lane closure occurs – including locations where an incident blocks a lane.
Planning-Level Cost
$300,000 per deployment, with annual O&M costs roughly $75,000.
Implementation Complexity
High. Requires signs and a promotional and educational component.
Coordination Contacts
TBD

7.7 Other Traffic Operations Strategies

T-27: Turnkey Services to Pre-Position/Relocate Portable ITS Equipment

DESCRIPTION
To augment portable ITS deployments, this strategy includes a turnkey solution that includes support staff available to move/relocate and configure the devices along the corridor. An alternative is for VDOT to own the equipment and for the contractor to configure and deploy, along with troubleshooting and maintenance.
LEAD AGENCY
VDOT
EXPECTED BENEFIT
High. This strategy provides additional resources to pre-position and configure devices.
POTENTIAL LOCATIONS
All projects using supplemental ITS devices.
PLANNING-LEVEL COST
$120,000 per year. Planning-level costs assume costs for an ITS contractor to implement relocations.
IMPLEMENTATION COMPLEXITY
Low. Requires trained staff to relocate, pre-position, and configure portable devices.
COORDINATION CONTACTS
TBD

T-28: Maintain Existing ITS Functionality During Construction

Description
Construction contractors should be encouraged to maintain existing ITS devices (CCTV cameras, detection, CMS, etc.) during construction, if possible, or keep the devices operational as long as possible before being impacted by construction. This involves ensuring devices are not removed or obstructed, and that power is maintained to devices and communications.
Lead Agency
VDOT
Expected Benefit
High. Maintaining situational awareness is key for incident detection and monitoring.
Potential Locations
All existing locations where ITS infrastructure exists.
Planning-Level Cost
No direct additional cost.
Implementation Complexity
Low. Would require temporary ITS plans as part of project delivery.
Coordination Contacts
Designers and contractors

T-29: Ongoing Operations-Focused Meetings

Description
Recurring operations-focused meetings to continually review and enhance operational strategies. Operations should be discussed at monthly status meetings and at quarterly regional stakeholder meetings. This could include project meetings with incident management meetings with EMS personnel conducting tabletop exercises. Allows removal and/or adaption of work zone designation in non-activity areas.
Lead Agency
VDOT
Expected Benefit
High. Allows for emergency responders to understand the construction staging, understanding accessibility issues, and reducing incident durations.
Potential Locations
All projects.
Planning-Level Cost
No direct cost to project. Costs involve time charges for staff and stakeholders.
Implementation Complexity
Low. Meeting preparation.
Coordination Contacts
TBD

7.8 Vanpool and Carpool Formation Strategies

TDM-01: Carpool and Vanpool Incentive Programs

DESCRIPTION
Promote and advance existing carpool/vanpool programs that provide benefits (financial vouchers, other incentives) to get people to use carpool or vanpool instead of single occupancy vehicles.
LEAD AGENCY
Department of Rail and Public Transportation (DRPT)
EXPECTED BENEFIT
Low. This strategy may reduce volume and congestion and increase person throughput.
POTENTIAL LOCATIONS
Locations with commuter traffic.
PLANNING-LEVEL COST
$10,000 per pool per year; or $0.04 per vehicle mile traveled per pool.
IMPLEMENTATION COMPLEXITY
Low. Promote services through existing programs such as Vanpool!VA.
COORDINATION CONTACTS
TBD

7.9 Telework Strategies

TDM-02: Telework!VA

Description
The COVID pandemic has illustrated the benefits of remote work and telework that an employee can be just as or more productive working from home. Whether we are in a "new normal" or will return to "old normal", construction in the corridor may be used in support of continuing telework polices through construction to help reduce work zone congestion. The Department of Human Resource Management (DHRM) Telework!VA program provides resources for transitioning to a hybrid workplace and could be used to help private companies and other employers who demonstrate that a significant number of affected employees are using the corridor for their regular commute to work.
Lead Agency
DHRM and DRPT
Expected Benefit
Low. This strategy is expected to reduce volume and congestion and increase person throughput. Due to the recent pandemic, there is limited need to incentivize teleworking.
Potential Locations
Locations with commuter traffic.
Planning-Level Cost
Cost included in existing VDOT programs.
Implementation Complexity
Low. Most private companies have already transitioned into a hybrid workplace. However, should we return to "old normal" many businesses and employees already have the polices and infrastructure necessary to implement remote working.
Coordination Contacts
TBD

7.10 Commuter and Local Transit Strategies

TDM-03: Transit Fare Subsidies on Existing Commuter Routes

DESCRIPTION
This subsidy is intended to retain existing and promote new transit riders during construction and to provide a meaningful incentive to new riders to ride the bus rather than drive. The reduced fare will also provide incentive to discourage single occupancy vehicles during construction. Consider eliminating transit fares unless revenue exceeds 5% of annual operating costs.
LEAD AGENCY
Local transit agencies and DRPT
EXPECTED BENEFIT
Medium. This strategy is expected to increase ridership and reduce congestion.
POTENTIAL LOCATIONS
Locations that are served by transit.
PLANNING-LEVEL COST
$0.50 per passenger-mile
IMPLEMENTATION COMPLEXITY
Medium. Start process as soon as possible.
COORDINATION CONTACTS
TBD

TDM-04: Supplemental Bus Services

Description
This strategy includes supplementary local or commuter bus services. To encourage the formation of new commuter bus service in the corridor, the TMP may subsidize new private bus service for a limited time (i.e., 6 months). To improve capacity along detour and/or parallel corridors, a TMP may provide resources to expand transit service to help relieve potential overcrowding and/or subsidize service as conditions warrant.
Lead Agency
Local transit agencies and DRPT
Expected Benefit
Medium. This strategy is expected to increase person throughput and reduce congestion.
Potential Locations
Locations that are served by transit or locations with commuter traffic.
Planning-Level Cost
$200 per hour per bus being operated. Assumes existing fleet buses are used.
Implementation Complexity
Medium. Start process as soon as possible; already planning additional buses.
Coordination Contacts
TBD

TDM-05: New/Enhanced Employer Shuttles (Universities/Major Employers)

Description
Deploy shuttles or smaller, on-demand coordinated transit services from specific locations (park and ride, transit stations, large housing communities, intercity connectors) to major destinations (attractions, employment centers, universities.)
Lead Agency
VDOT and DRPT
Expected Benefit
Medium. This strategy is expected to increase person throughput and reduce congestion.
Potential Locations
Locations near Universities or major employers and locations with commuter traffic.
Planning-Level Costs
$200 per hour per shuttle.
Implementation Complexity
Medium. Base circulator does not yet exist.
Coordination Contacts
TBD

7.11 TDM Outreach/Coordination Strategies

TDM-06: Transit and Transportation Demand Management Incentive Program Promotion

DESCRIPTION
Promote the various TDM incentive programs to travelers through a variety of channels in collaboration with the Communications and Outreach team.
LEAD AGENCY
VDOT and DRPT partnering with county and local municipalities, as applicable.
EXPECTED BENEFIT
Medium. This strategy is expected to yield indirect benefits from implementing other strategies.
POTENTIAL LOCATIONS
Locations that are served by transit or locations with commuter traffic.
PLANNING-LEVEL COST
$3 per household or 1% of program cost.
IMPLEMENTATION COMPLEXITY
Low. Promotion via local municipalities and transit providers.
COORDINATION CONTACTS
TBD

TDM-07: University/Major Employer Transit and Transportation Demand Management Outreach and Promotion

Description
Promote transit and TDM strategies to universities and large employers in the region. This strategy would implement an outreach team to promote the implementation of telework programs, the formation of new vanpools and carpools, transit and commuter bus options, etc.
Lead Agency
VDOT and DRPT
Expected Benefit
Medium. This strategy is expected to yield indirect benefits from implementing other strategies.
Potential Locations
Locations near Universities or major employers, locations with commuter traffic, locations with transit providers.
Planning-Level Cost
$30,000 to establish outreach team
Implementation Complexity
Low. Promotion via local municipalities and transit providers.
Coordination Contacts
TBD

7.12 Other TDM Strategies

TDM-08: Promote Employers to Provide Parking Cash Out

Description
Employers would offer a cash allowance to employees in-lieu of a parking space. This would reduce vehicle commute trips by offering employees the option of "cashing out" their subsidized parking space and taking transit, biking, walking, or carpooling to work. Additionally, this strategy could include the development of an employer provided commuter benefits program.
Lead Agency
VDOT and local employers
Expected Benefit
Low. This strategy is expected to reduce volume and congestion and increase person throughput.
Potential Locations
Corridor-wide
Planning-Level Cost
Estimated program costs: $1,200 per month per employer for worker time and materials.
Implementation Complexity
Low. Employers can efficiently implement benefits programs.
Coordination Contacts
TBD

TDM-09: Promotion of Park and Ride Lots with Available Capacity

Description
Promote park and ride lots with available capacity and use changeable message signs (CMS) and other traveler information and media methods to alert drivers of options. This may require designating additional parking spaces. Consider partnering with the private sector to identify unused parking surfaces away from storefronts to establish additional park and ride options, couples with transportation options, such as vanpool, local transit, intercity bus, etc.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to yield indirect benefits from implementing other strategies.
Potential Locations
Existing park and ride lots.
Planning-Level Cost
$32,000 per CMS.
Implementation Complexity
Low. Requires identification of parking capacity and development of a communications plan.
Coordination Contacts
TBD

TDM-10: Construction-Related Rerouting

Description
If construction activities have an impact on transit routes, re-routing of transit service may be required.
Lead Agency
Local transit agencies
Expected Benefit
Medium. This strategy is expected to maintain current transit ridership and enable use of other transit strategies to increase ridership.
Potential Locations
Locations with transit providers.
Planning-Level Cost
No additional project cost to coordinate with transit agencies.
Implementation Complexity
Medium. Transit agency identifies new routes and deploys temporary signing. A roadway inventory may be required to determine suitability (i.e., ADA).
Coordination Contacts
TBD

TDM-11: Transit Signal Priority

Description
Transit signal priority (TSP) gives special treatment to transit vehicles at signalized intersections.
Lead Agency
VDOT and local transit providers
Expected Benefit
Medium. This strategy would provide incentive to utilize transit in local communities due to decreased travel times.
Potential Locations
Locations with transit providers and traffic signals with TSP capabilities.
Planning-Level Cost
Up to $50,000 per intersection to install necessary equipment and infrastructure, plus $1,000 per vehicle for transponder installation.
Implementation Complexity
High. Depending on system used, this strategy would require deployment of equipment on transit vehicles, intersections, and central system enhancements.
Coordination Contacts
TBD

TDM-12: Real-Time Next Bus Information with Alerts

Description
Real-time next bus information with alerts can be disseminated to travelers. This information may include real-time location and arrival times of transit vehicles. This information helps to enhance the transit experience for travelers.
Lead Agency
Local transit providers
Expected Benefit
Low. This strategy is expected to increase rider confidence and lead to increased ridership.
Potential Locations
Locations with local transit providers
Planning-Level Cost
TBD. Depends heavily on whether there is already a system in place or if an application needs to be developed with equipment installation.
Implementation Complexity
Medium. Many transit providers already deploy technology on vehicle locations and headways. However, this may be a complex strategy to implement if the infrastructure, network, and central system are not in place.
Coordination Contacts
TBD

TDM-13: Dynamic Bus-on-Shoulder

Description
Dynamic bus-on-shoulder strategies may be used to improve bus travel time and reliability by allowing the dynamic use of shoulders for bus operations. This would require shoulders with full depth pavement.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to increase transit reliability, increase ridership, and reduce travel times.
Potential Locations
Locations with local transit providers.
Planning-Level Cost
TBD
Implementation Complexity
High. Generally, policies are not in place to allow shoulder operation. Strengthening shoulders to full pavement depth may be required. Widening, striping, and signing may be required. I-81 corridor may not be ideal for this strategy deployment. May adapt transit vehicle sizes to meet demand of T1 (rural) to T6 (urban).
Coordination Contacts
TBD

7.13 Other Work Zone Management Strategies

O-01: Truck Lane Restrictions

Description
Truck lane restrictions are a means of managing truck traffic on highways by prohibiting trucks from using certain lanes to minimize interaction between trucks and other vehicles. High truck volumes, disparities in vehicle speeds between trucks and passenger vehicles, and the frequency of lane changes and passing maneuvers result in safety challenges and inefficient traffic flows. Prohibiting trucks from using certain lanes on multilane highways allows other vehicles to occupy and attain higher travel speeds on these restricted lanes without any interference from heavy vehicles. This strategy could include enhanced signage and/or pavement markings to convey truck lane restrictions and an educational campaign to increase awareness of existing truck lane restrictions and/or educate on new enhanced signage and pavement markings.
Lead Agency
VDOT
Expected Benefit
Medium. This strategy is expected to lead to improved traffic flow, thereby increasing the throughput.
Potential Locations
This strategy is intended to be a corridor-wide strategy, but opportunities exist to start with solutions in the truck climbing lanes on I-81.
Planning-Level Cost
$295,000 to $369,000. Planning-level costs assume that messages will be posted on PCMS to convey information about truck lane restrictions. Overhead signs on gantries or use of pavement markings are not priced out. Note: per the WAPM, a PCMS or CMS shall not take the place of a static sign, so lane restrictions would require regulatory signs for enforcement. Overhead signs or PCMS would be used to supplement the static signs.
Implementation Complexity
Coordination Contacts
TBD

O-02: Work Zone Road Safety Audits

Description
A Work Zone Road Safety Audit (WZRSA) is a formal safety performance evaluation that can be performed at any stage of a planned or existing work zone (project planning and design, or in active work zones) by an independent, multidisciplinary team. The evaluation includes qualitative cost estimates, identifies potential work zone safety issues, identifies opportunities for improvements in work zone safety for all road users and workers, and culminates in the development and presentation of a final report citing work zone safety enhancement recommendations.
Lead Agency
VDOT
Expected Benefit
Medium. Correcting safety and mobility deficiencies identified by a multidisciplinary team.
Potential Locations
Planning-Level Cost
$1,200 per roadway-mile to hire a team to conduct a WZRSA and compile a report of findings.
Implementation Complexity
Medium.
Coordination Contacts
TBD

8 Performance Monitoring

Implementation and evaluation of the project specific TMP should be in accordance with IIM-LD-241.7 and supplemental procedures and requirements contained herein. Information collected during construction will be "fed-back" to the I-81 Program Manager to establish that project performance is supporting the overall goals and objectives and to update the I-81 Corridor-wide TMP Guidance Document (this document). Therefore, documenting and communicating performance is very important to improving operations on subsequent projects. **The TMP Performance Assessment Report (Type A, Type B, and Type C) shall be completed and submitted by the TCS annually, at a minimum, for all I-81 CIP projects not just at the conclusion of a project**.

As stated previously, the Contractor shall give the work the constant attention necessary to facilitate quality and progress, and shall fully cooperate with the Engineer, Inspector, and other contractors involved in the prosecution of the work. In development of the contract documents, the designer should consider modifying standard specifications to require the contractor to perform duties related to TMP performance and to ensure that the TMP is included as part of the contract. The designer should consider, at a minimum, adding or modifying contractor requirements to the following specifications:

- Section 103.06 – Contract Documents
- Section 105.03 – Authorities of Project Personnel, Communication and Decision Making
- Section 105.07 – Cooperation of Contractor
- Section 105.08 – Corporation with Regard to Utilities
- Section 105.09 – Cooperation among Contractors
- Section 105.12 – Coordination of Plans, Standard Drawings, Specifications, Supplemental Specifications, Special Provisions, and Special Provision Copied Notes
- Section 105.14 – Maintenance during Construction

In addition, a sample Work Zone Traffic Control Management Special Provision is provided as **Appendix D**. This sample special provision incorporates the suggested roles, responsibilities, and performance monitoring requirements of the contractor that are described in this guidance document. Use of this Standard Special Provision should be discussed with the VDOT Project Manager.

Crash data, incidents, travel time data (including detour routes), and excessive queue lengths will be the primary sources of information used to determine the overall effectiveness of the work zone traffic management strategies. The Contractor TCS shall maintain a daily record of crashes, work zone incidents, and maximum daily queue lengths. This information shall be coordinated daily with the VDOT DWZSC and ACE per the communication and decision-making process established for the project. Feedback from the public through phone calls, in person, or in writing is also to be captured by the TCS. In support of the Post Construction TMP Performance Assessment, the contractor should submit monthly progress reports summarizing complaints, work zone crashes and incidents, and excessive queue lengths. The progress report should also include a list of the improvements made to the work zone and a description of the outcome. This information collected should be shared with the Project Manager, DTE, and DTOM. It should be noted that the project specific design team should coordinate with appropriate VDOT staff on strategy implementation related to data collection (i.e., T-04: Temporary Data Collection) to supplement or enhance

performance monitoring. VDOT districts and the I-81 Program Management team may also review third party (I.e., Inrix) travel time and speed data to assess regional performance.

The DWZSC (per job duties) and the TCS (daily) will inspect and document the performance of the TCP and work zone management strategies deployed on the project. All monitoring information will be documented in the project diary. The DWZSC will share this information monthly with the Project Manager, DTE (and staff), and the DTOM (and staff).

The ACE, DWZSC, DTE (or staff), DTOM (or staff), Residency Engineer/Administrator, and TOC Supervisor (or staff) will participate in partnering with the Contractor during stakeholder meetings if requested by the ACE, DTE, or DTOM. Stakeholder meetings can be part of a monthly progress meeting or could be a separate standalone meeting. The purpose of these meetings is to discuss how well the project specific TMP is performing and to verify that the DWZSC, TOC supervisor or staff, and emergency management stakeholders have been receiving timely notifications of incidents as required by the project TOP.

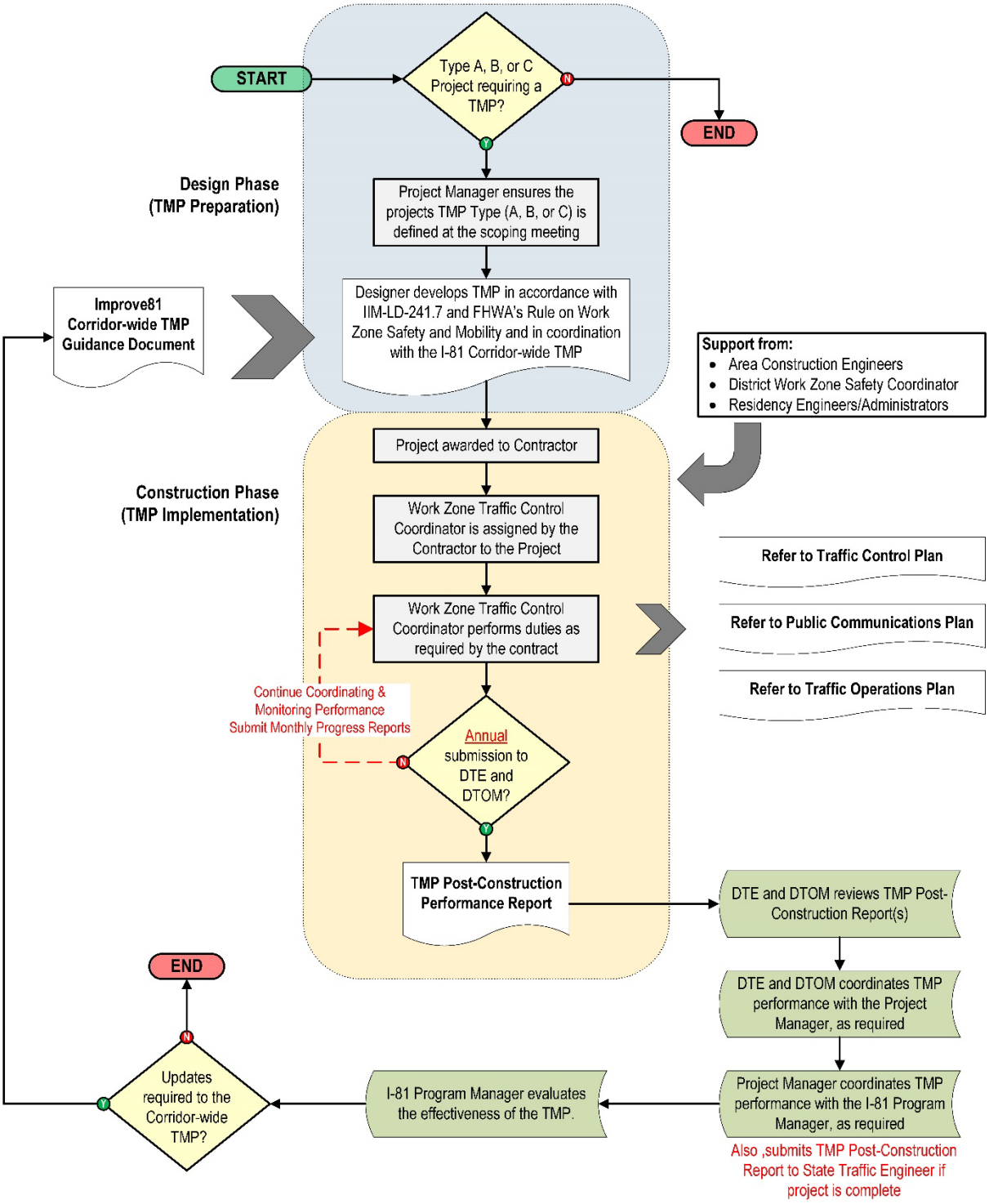
Annually and when the project is complete, the TCS (with cooperation from the DWZSC, ACE, and Residency Engineers/Administrators) shall prepare a TMP Performance Assessment Report which will be forwarded to the Traffic Engineering Division (Central Office), DTE, DTOM, Project Manager, and I-81 Program Manager. The evaluation will summarize the overall project travel delay impacts. Crash data will also be summarized and inclusion of crashes into the crash data analysis system will be verified. The TMP implementation costs and how they compared to budgeted costs will be noted. Local emergency service providers and businesses may be contacted by District Communications for their feedback on any impacts the project had on their operations. Finally, lessons learned will be documented as well as suggested improvements or changes for similar future projects. If the TMP Performance Assessment Report recommends a change to an I-81 Corridor-wide TMP work zone strategy or process, the I-81 Program Management Team will update the TMP accordingly for subsequent I-81 CIP projects.

Figure 11 illustrates the annual performance management feedback process that is required for each I-81 CIP project.

9 Contingency Plans

Contingency plans are to specify activities that should be undertaken to minimize traffic impacts when unplanned/unexpected events such as a major multi-vehicle crash, inclement weather, unforeseen demand (evacuation), etc., occur in the work zone or along the routes noted in the project documents and special provisions. The designer should consider adding/modifying Section 105.14–Maintenance during Construction to require the Contractor develop contingency plans. Contingency plans should be reviewed and approved by the DTOM. Contingency plans are to be implemented in accordance with the protocol established in the TOP which is prepared and approved during the project development process. The Contractor shall provide information to the TOC and VDOT District Communications. Contingency plans shall be developed for each I-81 CIP project.

Figure 11: Annual Performance Management Feedback Process



Appendices

Appendix A: IIM-LD-241.7

VIRGINIA DEPARTMENT OF TRANSPORTATION

LOCATION AND DESIGN DIVISION

INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

GENERAL SUBJECT: Work Zone Safety and Mobility	NUMBER: IIM-LD-241.7 IIM-TE-351.5
SPECIFIC SUBJECT: Transportation Management Plan Requirements	DATE: January 3, 2017
	SUPERSEDES: IIM-LD-241.6 IIM-TE-351.4
LOCATION AND DESIGN DIVISION APPROVAL: B. A. Thrasher, P.E. State Location and Design Engineer Approved December 12, 2016	TRAFFIC ENGINEERING DIVISION APPROVAL: R. J. Khoury, P.E. State Traffic Engineer Approved December 8, 2016

Changes are shaded.

CURRENT REVISION

- This memorandum was revised to replace Regional Traffic Engineer with "responsible District Traffic Engineer", effective January 25, 2017.

EFFECTIVE DATE

- These instructions are effective upon receipt.

POLICY

- The Virginia Department of Transportation is committed in providing safe and efficient movement of motorized and non-motorized traffic through or around roadway work zones as well as providing protection for workers and equipment located within work zones. VDOT will focus on roadway visibility and functionality of temporary traffic control in work zones and traffic flow through the work zone. Emphasis will begin with the preliminary engineering stages and carried through to the completion of all work, including post construction reviews.
- Compliance with this guidance is consistent with the Department's goal of reducing work zone crashes and improving travel time thereby benefiting all citizens of the Commonwealth. This guidance outlines recommended procedures to be followed and identifies responsibilities to achieve safer work zones with minimal impact on the traveling public.

- **VDOT, through this directive, is extending this requirement to all work zone activities within state right of way and on all streets and highways that have been accepted into the State Highway System regardless of the funding source as well as all other projects receiving State and/or Federal funding.**

BACKGROUND

- In September 2004, the Federal Highway Administration (FHWA) published the Final Rule on Work Zone Safety and Mobility, 23 CFR 630 Subpart J. This rule, referred to as Work Zone Safety and Mobility, applies to State and local governments that receive Federal-aid highway funding. Transportation agencies are required to comply with the provisions of the Rule by October 12, 2007. This rule updates and broadens the former regulation, "Traffic Safety in Highway and Street Work Zones," to address present and future work zone issues.

- The policy provisions in the Final Rule on Work Zone Safety and Mobility:
    - Requires agencies to implement a policy for the systematic consideration and management of work zone impacts on all Federal-aid highway projects. Furthermore, it encourages agencies to implement the policy for non-Federal-aid projects and programs.
    - Requires the policy to address work zone impacts throughout the various stages of the project's development and construction. The agency must consider work zone impacts during project development, management of work zone impacts during construction, and assessment of work zone performance after implementation. The agency must also consider communication with the public before and during the project.
    - Recognizes the state policy may vary based on the characteristics and expected work zone impacts of individual projects or classes of projects.
    - Requires the development of transportation management plans.

For additional information on the Final Rule on Work Zone Safety and Mobility, follow these links:
http://www.ops.fhwa.dot.gov/wz/resources/final_rule.htm (Regulation, Guidance and Examples);

http://www.ops.fhwa.dot.gov/wz/practices/factsheets/factsheets.htm (Best Practices).

NCHRP Synthesis 208, Development and Implementation of Traffic Control Plans for Highway Work Zones.

TYPICAL WORK ZONE MANAGEMENT STRATEGIES

Various work zone management strategies may be employed to minimize traffic delays, thereby improving mobility as well as traveler and worker safety and completing the construction work in a timely manner while maintaining access for businesses and residents. The following set of strategies is not meant to be all-inclusive, but to present a number of suggestions for consideration while developing transportation management plans. A more extensive listing and general information on work zone management strategies may be accessed at the following web sites:
http://www.ops.fhwa.dot.gov/wz/rule_guide/sec6.htm#tab62 and
http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf

The strategies are divided into three broad groups which are captioned as: 1) Temporary Traffic Control, 2) Public Information; and 3) Transportation Operations. Each of these groups is further defined by the specific items listed below.

- **Temporary Traffic Control Strategies:**
  - Control strategies
  - Traffic control devices
  - Project coordination, contracting and innovative construction strategies

- **Public Communication Strategies:**
  - Public awareness strategies
  - Motorist information strategies

- **Transportation Operations Strategies:**
  - Demand management strategies
  - Corridor/network management strategies
  - Work zone management strategies
  - Traffic/incident management strategies

GENERAL GUIDELINES

This section provides guidelines to be used by Project Managers, Roadway Designers, Traffic Engineers, Work Zone Safety Coordinators and Communication Managers for acquiring the information to develop a Transportation Management Plan (TMP). Project personnel shall involve the FHWA Area Engineer in each of the project's milestones on federal oversight projects. These guidelines require the evaluation of work zone traffic control and communication strategies beginning at the Scoping Activities and continued throughout the Project Development Process (PDP) and during all phases of construction. For additional information on the PDP, follow this link:
http://www.virginiadot.org/business/resources/Project_Management_Online_Guide.pdf. Also see LD-436 Quality Control Check List, available at:
http://vdotforms.vdot.virginia.gov/SearchResults.aspx?strFormNumber=LD-436

Specific work requirements are noted in the Project Development Process for each milestone, as are the Project Management forms that are to be submitted at the milestones. All Temporary Traffic Control Plans shall be in compliance with the information published in the Virginia Work Area Protection Manual. Any deviations from the Virginia Work Area Protection Manual must be approved by the responsible District Traffic Engineer (DTE) and noted in the plans.

- **Initial Scoping Meeting** – The Project team shall use field observations, available crash data, and other relevant operational information to discuss preliminary work zone management strategies in conjunction with alternative project options and design schemes. Relevant operational information should include but is not limited to, project definition (scope, project's complexity level, roadway and traffic characteristics, and TMP type), construction phasing/staging of equipment and materials, pedestrian and bicycle routes, as well as temporary traffic control, public communications and transportation operations strategies. The Project Manager shall request that the responsible District Traffic Engineer (DTE) begin acquiring traffic and crash data and explore possible alternate/detour routes. A preliminary cost estimate for the project's traffic management plan shall be developed by the Project Manager at this milestone. The Project Manager shall request that a preliminary Public Communications Plan be drafted by the District Communications Manager.

- **Final Scope / Preliminary Field Inspection** – The Project Team shall utilize traffic and crash data and the preliminary Sequence of Construction (SOC) plans to identify safety and mobility issues during the proposed construction and begin developing the project's preliminary TMP. The responsible District Traffic Engineer (DTE), working with the Project Team, shall propose the project's TMP that consists of temporary traffic control, public information, and transportation operations strategies, as appropriate. The Roadway Designer shall incorporate the recommended TMP into the projects initial roadway plans.

- **Public Hearing Team Meeting** – Review of the preliminary TMP as incorporated by the Roadway Designer (includes the Temporary Traffic Control Plan as well as the Public Communications Plan and Transportation Operations Plan if required) must be completed by the responsible District Traffic Engineer (DTE) and Regional Operations Director as applicable. Recommendations/corrections submitted by the responsible District Traffic Engineer (DTE)/Regional Operations Director (ROD) that are accepted by the Roadway Designer in collaboration with the project team are to be incorporated into the preliminary TMP by the Roadway Designer prior to the Public Outreach/Public Hearing and Design Approval.

- **Field Inspection Meeting** – The Roadway Designer shall complete the project's TMP for review by the project team during the Constructability and Work Zone Review stage for the Detailed Design Phase of the Project Development Process. Accepted recommendations/corrections submitted by the project team are to be incorporated into the TMP by the Roadway Designer prior to proceeding to the next phase of the project's development.

The Project Team shall review the TMP to ensure that all comments and concerns have been addressed. The responsible District Traffic Engineer shall review the TMP to check that all safety information and crash data have been incorporated into the TMP.

- **Pre-Advertisement Conference** – The Roadway Designer shall complete the project's final TMP for review during the Constructability, Work Zone and TMP Review stage in the Final Design and ROW Acquisition Phase of the Project Development Process. Accepted recommendations/corrections submitted by the project team shall be incorporated into the final TMP by the Roadway Designer prior to proceeding to the next phase of the project's development. The Project Team shall review the TMP to ensure that all comments and concerns have been addressed. The TMP cost shall be finalized for the constructability review held prior to the Pre-Advertisement Conference milestone.

- **Implementing the Transportation Management Plan** – During the first day of the new work zone traffic pattern, the project's Manager and project's Work Zone Safety Coordinator shall inspect the work zone to ensure compliance with the TMP. On the third to fifth day of implementation of the TMP's new work zone traffic pattern, the Regional Work Zone Safety Coordinator and the project's assigned Work Zone Safety Coordinator shall conduct an on-site review of the work zone's performance and inform the contractor all required changes to the TMP for implementation to enhance the work zone's safety and mobility. All such changes shall be documented. If the project is a federal oversight project, the FHWA Area Engineer shall be afforded the opportunity to review all such changes prior to implementation. An on-site review of the project's work zone traffic control by the Regional Work Zone Safety Coordinator, Project's Manager/Work Zone Safety Coordinator, District Safety Engineer, and the Contractor shall be conducted within 48 hours of any fatal incident/crash within the work zone. This review shall be recorded on the Work Zone Safety Checklist, Form TE-97000.

- **Evaluation of the Transportation Management Plan** – A performance assessment of the project's TMP including area–wide impacts on adjacent roadways should be performed by the project's designated Work Zone Safety Coordinator during construction as circumstances dictate. Any recommendations and comments shall be communicated to the construction inspection team in writing for appropriate changes to the TMP. A review of the overall effectiveness of the project's TMP shall be completed during the Post Construction Meeting and included with the Post Construction Report. A copy of the specific information on the effectiveness of the project's TMP will be forwarded to the State Traffic Engineer for review.

The following guidance is provided to ensure the Project Team understands their role and responsibilities in the development of the project's TMP. Team members from the design disciplines/work group noted below shall have direct responsibilities for the proper development of the TMP during each stage of the Project Development Process.

The Project Manager shall solicit comments from other design disciplines such as Structure and Bridge, Environmental, Materials, etc, as appropriate, to confirm that all safety and mobility concerns are addressed. All team members shall be provided an opportunity to review the TMP prior to each milestone team meeting.

For projects that do not follow the Project Development Process, the Designer, Project Manager or the Contract Administrator will ensure the TMP and the component plans (Temporary Traffic Control, Public Communication and Transportation Operations Plans) are included in the project and contract documents. The development process should be established at scoping with the plans developed based on consultation with, and guidance from, the applicable discipline.

- **Project Team:**

  The Project Manager, with the project team, will review the project at each milestone to ensure appropriate action is taken to reduce work zone impacts on the public. Responsibilities of the project team include a TMP Design Checklist Review Form that is available at: TMP Design Checklist.

- **Responsible District Traffic Engineer (DTE):**

  In order to promote the safety of workers as well as the safe and efficient movement of traffic through the project's work zone, the responsible DTE shall consider various temporary traffic management strategies and provide the project team with the following recommendations. The responsible DTE shall review the TMP to assess that all that the applicable information is included in the project's TMP:

  - Temporary traffic management strategies
  - Lane width(s) and the number of travel lane(s) and turn lane(s) to be maintained
  - Traffic impact assessments/analysis on the temporary traffic control plan
  - Identify all signal phases within the work zone and on all detour/alternate routes
  - Allowable work activity hours
  - On-site and off-site detour routes
  - Information on the use and placement of all temporary traffic control devices including barrier and channelization devices
  - Type and placement of all signs, message boards, arrow boards, and TMA's
  - Type and location of temporary pavement markings and markers
  - Access to all businesses and private dwellings
  - Post construction assessment of the Work Zone Traffic Impact
  - Quantities for all temporary traffic control devices

- **Regional Operations:**
  In order to promote the safety of workers as well as the safe and efficient movement of traffic through the project's work zone, the Regional Operations Director shall consider various transportation management strategies and provide the Roadway Designer and the project team with the following recommendations. The Regional Operations Director shall review the TMP to check that the applicable information is included in the project's TMP:

  - Temporary transportation operations strategies
  - Incident/emergency management plan
  - Use of ITS for traffic monitoring and queue detection
  - Surveillance of work zone traffic using CCTV, loop detectors, etc.
  - Use of safety service patrols
  - Contact information for Transportation Operations Centers (TOC) and incident management
  - Traffic impact assessments/analysis on the temporary traffic control plan
  - Identify all signal phases within the work zone and on all detour/alternate routes
  - Allowable work activity hours

- **Location and Design (or Contract Administrator as appropriate):**

  Shall ensure the proper design and presentation of all aspects of the TMP by providing the following detailed information in the plan assembly:

  - Profile, alignment, superelevation and lane widths for all traffic lanes, turning lanes, lane shifts and diversions not identified on existing roadways
  - Earthwork/grading that must be completed prior to the next construction phase
  - Utility work that can be completed within the project's guidelines for the TMP
  - Ensure that all utilities will not conflict with temporary traffic control and other safety devices for all phases of construction.
  - Identification of all temporary pedestrian and bicycle routes.
  - Identification of all temporary pavement locations and temporary drainage items
  - Illustrations of the placement of all temporary signs, message boards, arrow boards, TMA's, barriers, attenuators, temporary pavement markings and markers, existing pavement marking eradication, and placement of Group I and II devices in the temporary traffic control plans for all construction phases (excluding temporary lane and shoulder closings)
  - Identification of all emergency pull-off areas
  - Identification of all construction vehicle and equipment ingress and egress locations (for Temporary Traffic Barrier applications)
  - Identification and notation of all signal phases within the work zone and all detour routes
  - Complete TMP typical sections
  - Complete special design details, special cross section and insertable sheets if applicable

- Provide quantities for all temporary traffic control devices

- **Structure and Bridge:**

  Shall ensure the proper design and presentation of specific aspects of the TMP pertaining to structures by providing the following:

  - Movement, staging and use of cranes, other large equipment and materials
  - Need for and placement of temporary bridge parapet and traffic barrier service
  - Need for the setting of beams over traffic
  - Use of temporary bridges
  - Need for demolition over traffic
  - Placement of the above information in the plan assembly in narrative or illustrated format

- **Communications**

  Shall ensure that the transportation management plan is communicated to appropriate key audiences (motorists, law enforcement, emergency services, businesses, residents, elected officials and media). Strategies will include:

  - Development of project-specific communications plan to keep key customers informed about construction-related impacts before and during the construction;
  - Communication and promotion of ways commuters can avoid construction-related delays, i.e. rideshare, telework, public transportation;
  - Development of a crisis communications plan which outlines steps to be taken during a major incident and includes emergency contact information; and,
  - Determination of the need for and types of community meetings needed to inform the public on the various aspects of the construction project

- **Right of Way:**

  Shall ensure the proper design and presentation of specific aspects of the TMP by providing the following:

  - All temporary/permanent easements needed for construction are included in the plans

- **Project Constructability Work Group:**

  Shall ensure that the project can be constructed according to the Plan Assembly, the Sequence of Construction and the TMP by reviewing the project documents and ensuring that:

- Right of way is provided for the placement of construction equipment and materials
- Access is provided to the work area(s) for construction equipment and materials
- Consideration has been given for, methods of deep utilities and large diameter pipe construction.
- Adequate time is provided to complete the construction
- Utility plans have been coordinated with all phases of construction
- Adequate drainage is maintained during construction
- Appropriate traffic control and an information campaign is provided for the setting of bridge beams or other operations requiring total roadway closures and detours
- All identified safety and mobility issues have been addressed for any unusual construction methods
- The project can be built as designed with the minimum necessary road closures and detours to avoid major recurring traffic impacts

PLAN REQUIREMENTS

This section provides guidance to Project Managers for establishing a project's TMP requirements based on the project's level of complexity. These guidelines categorize a project into one of three types of transportation management. The project's type identifies the **minimum** TMP requirements and recommendations to be used by Project Managers, Roadway Designers, responsible District Traffic Engineer, Regional Operation Directors and Communications Managers for developing TMP. In general, the TMP shall consist of a traffic control plan and, as required, public information and a transportation operations plan. The specific project level requirements for plan content are listed by project type. Any deviation from the requirements noted below will require the review and approval of the State Traffic Engineer.

- **Work Area Access Considerations:**

The Temporary Traffic Control Plan (TTCP) should address the need for access to the work area. This is a constructability issue in which the designer addresses the question of how the contractor will move materials and equipment into the work area safety with a minimum of disruption to traffic. This is a particularly critical issue on high speed roadways such as Limited Access highways, especially if temporary traffic barrier is used to protect work areas. Consideration should be given to the design and construction of temporary acceleration and deceleration lanes for the construction equipment. The following should be considered in the planning, design and operation of work zones:

- Anticipate types of work zones that typically create ingress/egress problems. Examples are work spaces requiring work vehicles to merge in/out of high-speed traffic and work activities that will generate frequent delivery of materials such as paving projects, bridge projects, and the delivery/movement of fill materials.
- Access into/out of the work space meeting the requirements in the Virginia Work Area Protection Manual shall be included in the Temporary Traffic Control Plan.
- Adequate acceleration/deceleration space for work vehicles should be provided.
- The location of access openings should meet the sight distance requirements listed in Appendix A of the Virginia Work Area Protection Manual. In extreme conditions, lane closures may need to be considered.
- Construction access openings in temporary traffic barrier should be planned per Appendix A of the Virginia Work Area Protection Manual to ensure that the blunt ends of barrier walls are properly protected. The barrier or channelization devices should be planned in a manner as to not create a sight distance problem for equipment operator or motorists.
- Ingress/egress condition may justify a lowering of the speed limit during this activity. Any reduction in the posted speed limit must be authorized by the responsible District Traffic Engineer and based on an engineering study per Traffic Engineering Division Memorandum IIM-TE-350.
- Warning signs ("Construction Entrance X" and "Trucks Entering Highway") are available for ingress/egress conditions at work area accesses and should be used when appropriate. Special warning signs may be necessary. All warning sign(s) noting work zone access activities shall be covered/removed when the daily work activity ceases.

- **Type "A" Projects (Project Management Project Category I & II)**
  - Typical Projects: No-Plan, Minimum Plan, Single Phase Construction, Maintenance Projects, Utility and Permitted Work
  - Project Type: Simple project – widening of pavement or adding turn lanes or entrances. Sequence consists of temporary lane closures and flagging operations with no shifting of traffic onto temporary pavement and with two-way traffic operation maintained at all times or at new construction locations with no existing traffic. Temporary Traffic Control plans that only reference the Work Area Protection Manual do not requiring sealing and signing (refer to Traffic Engineering Division Memorandum IIM-TE-362).
  - Impact on Traffic: Lane closures and time restrictions should comply with the Regional Operation's lane closure policies. If the proposed work cannot be completed within the Regional Operation's allowable lane closure time periods, an assessment of the Work Zone Traffic Impact will be completed using a traffic analysis tool recommended in VDOT's Traffic Operations and Safety Analysis Manual (TOSAM). http://www.virginiadot.org/business/resources/TOSAM.pdf. Lane closures, the use of traffic control devices and their placement, Public Information and Traffic Operations Plans will be approved by the Regional Operations Director with implementation based on the traffic impact evaluation and the Regional Operations Director's approval.

Major Components:

- Temporary Traffic Control Plan

  Major components will consist of General Notes, Typical Sections, and if needed Special Details. Each component should provide the following information (this information may be presented in a narrative format with illustrations/sketches as necessary):

  - General Notes which:
    - Identify the project's TMP Type
    - Identify the work zone location.
    - Identify the length and width of the work zone.
    - Identify the lanes affected by the project work.
    - Note the hours the work zone will be active.
    - Identify potential location(s), within the R/W, for construction equipment and material storage.
    - Define the proposed traffic control by referencing the specific Typical Traffic Control Standard(s) listed in Virginia's Work Area Protection Manual and/or by referencing a Special Detail(s).
    - Note any entrances, intersections or pedestrian access points that will be affected by the work zone or by the traffic control devices.
    - Identify the major types of travelers (such as truckers, commuters, residents, etc.)
  - Typical Sections which:
    - Illustrate lane configuration(s) in the work zone.
  - Special Details which:
    - Show schematically the placement of all traffic control devices and locations of safe access into/out of the work space by work vehicles.
    - Place all traffic control devices in accordance with the standards contained in Virginia's Work Area Protection Manual and the Manual on Uniform Traffic Control Devices. Detail for any traffic control device not illustrated in the Virginia Work Area Protection Manual will be included in the plan.
    - Follow symbol conventions for identifying traffic control devices per Virginia's Work Area Protection Manual and the Manual on Uniform Traffic Control Devices.
    - Show all details, dimensions and explanatory notes required to execute the traffic control plan.

- Public Communications Plan

  A Public Communications Plan is recommended for roadways when traffic volumes exceed the minimum number of vehicles/hour/lane or delay times established by the responsible District Traffic Engineer for lane closure periods. The Public Communications Plan shall provide the following information (this information may be presented in a narrative format):

  - A process to notify the Project Manager/Residency Engineer/Administrator of scheduled work plans and traffic delays.
  - A process to notify the Project Manager/Residency Engineer/Administrator, Regional Operations Manager and the Public Affairs staff of any unscheduled traffic delays.

- Transportation Operations Plan

  A Transportation Operations Plan is recommended for roadways when the work space is greater than ½ mile in length and/or with reduced-width travel lanes. The Transportation Operations Plan shall provide the following information (this information may be presented in a narrative format as part of the Temporary Traffic Control Plan):

  - A process to notify the Regional Transportation Operations Center (TOC) to place lane closure information on the 511 system and VA-Traffic.
  - A contact list of local emergency response agencies.
  - Procedures to respond to traffic incidents that may occur in the work zone.
  - A process to notify the Project Maintenance of Traffic Coordinator / Project Manager/Resident Engineer / Administrator, District Work Zone Safety Coordinator / responsible District Traffic Engineer, the Regional Operations Manager and Public Affairs Manager of any incidents and expected traffic delays.
  - Procedures to clear the incident and restore normal project traffic operations.
  - Details of the process to review incidents for the purpose of modifying the Temporary Traffic Control Plan to reduce the frequency and severity of such incidents.

- **Type “B” Projects (Project Management Project Categories III & IV)**

  - Typical Projects: Moderate level of construction activity with the primary traffic impact limited to the roadway containing the work zone.

- Project Type: Moderately complex project – pavement widening or bridges for additional thru lanes and pavement rehabilitation. Sequence consists of lane closures to one or both directions with shifting traffic that may include temporary pavement or detours for the duration of the work. If detour routes are used they typically will remain in place 24 hours per day for the duration of the work. Project will be constructed over several phases and may include bridge replacements or new bridges, new interchanges, modifying existing interchanges or a new construction location with existing traffic crossing the construction area.
- Impact on Traffic: An assessment of the Work Zone Traffic Impact will be completed using a traffic analysis tool recommended in VDOT's Traffic Operations and safety Analysis Manual (TOSAM) http://www.virginiadot.org/business/resources/TOSAM.pdf. Lane closures and detour routes will be implemented based on this evaluation. All lane closures and time restrictions shall comply with the Regional Operation's lane closure policies, with any deviations requiring the approval of the Regional Operations Director.

- Major Components:

  - Temporary Traffic Control Plan

    Major components shall consist of Detail Plans, Typical Sections, and as required Special Details/Cross Sections/Profiles. Each component shall provide the following information per construction phase. This information shall be placed on a plan sheet.

      - Detail Plans which include all the information listed for Type A Projects plus:

        - Detail drawing(s) containing the following information:

          - Identify the project's TMP Type
          - Narrative describing the sequence of construction
          - Type and location of all temporary signs for the work zone and all detour routes
          - Type and location of all temporary pavement markings
          - Type and location of all temporary pavement
          - Type and location of all temporary barriers
          - Type and location of all impact attenuator/end treatments/Fixed-Object-Attachments (FOA)
          - Locations of safe access into/out of the work space by work vehicles.
          - Locations of emergency pull-off areas.

        - Document/detail how all entrances, intersections or pedestrian access points/routes that will be affected by the work zone or by the traffic control devices will be maintained or by providing acceptable alternate routes.

- Identify all road(s) to be used as a detour route.
- Provide notes regarding all traffic control changes such as temporary signals or signal timing changes required within the work zone or the detour route.

- Typical Sections shall contain all the information listed for Type A Projects.
- Special Details/Cross Sections/Profiles shall contain all the information listed for Type A Projects.
- Public Communications Plan

A Public Communications Plan is required for roadways when traffic volumes exceed the minimum number of vehicles/hour/lane or delay times established by the Regional Operations Director for lane closure periods. The Public Communications Plan shall provide the following information (this information may be presented in a narrative format as part of the Traffic Control Plan or as a separate Special Provision Copied Note):

- All the information listed for Type A Projects.
- A process for notifying Public Safety, Emergency Management and mass transit organizations of detour route(s) and available alternate routes during construction.

- Transportation Operations Plan

A Transportation Operations Plan is required for roadways when the work space is greater than ½ mile in length and/or with reduced width travel lanes. The Transportation Operations Plan shall provide the following information (this information may be presented in a narrative format as part of the Traffic Control Plan or as a separate Special Provision Copied Note):

- All the information listed for Type A Projects.

- **Type "C" Projects (Significant Projects – Project Management Category V)**

These types of projects are anticipated to cause sustained and substantial work zone impacts greater than what is considered tolerable based on policy or engineering judgment. They should be identified early in the design process in cooperation with the FHWA.

- Typical Projects: Long duration construction or maintenance projects on Interstate and freeway projects that occupy a location for more than three days with intermittent or continuous lane closures within the following Transportation Management Areas; Northern Virginia (including the counties of Arlington, Alexandria, Fairfax, Loudoun, Prince William, Spotsylvania and Stafford), Richmond (including the City of Richmond, Chesterfield Charles City, Goochland, Hanover, Henrico, New Kent, and

Powhatan Counties as well as the Town of Ashland), Hampton Roads (including the Cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Virginia Beach and Williamsburg as well as James City and York Counties), and Roanoke Valley (including the cities of Roanoke and Salem as well as Roanoke County). Also includes Interstate and Principle Arterial Roadways with complex multi-phase construction, high accident rates, full closures, or multiple work zones (two or more) within two miles of each other.

- Project Type: Complex project – adding additional thru lanes, bridge rehabilitation, interchange construction and reconstruction. Sequence consists of lane closures with several traffic shifts that may include temporary pavement or detours for the duration of the work. Impact of work zone on traffic operations extends beyond the work zone and affects alternate and/or detour routes. Multi phase construction – bridge replacements or new bridges. Rebuilding interchanges with additional ramps or extensive modification to existing ramps.
  - Impact on Traffic: An assessment of the Work Zone Traffic Impact shall be completed using a traffic analysis tool recommended in VDOT's Traffic Operations and Safety Analysis Manual (TOSAM) http://www.virginiadot.org/business/resources/TOSAM.pdf. Lane closures and detour routes shall comply with the Regional Operation's lane closure policies, with any deviations requiring the approval of the Regional Operations Director.

- Major Components:

  - Temporary Traffic Control Plan
    Major components shall consist of Detailed Plans, Typical Sections, and as required Special Details/Cross Sections/Profiles. Each component shall provide the following information per construction phase. This information will be placed on a coordinate plan sheet.
    - Detail Plans which include all the information listed for Type B Projects including the project's TMP Type as well as a list identifying the location of reduced width lane(s) with the width reduction specified.
    - Typical Sections which include all the information listed for Type B Projects.
    - Special Details/Cross Sections/Profiles which include all the information listed for Type B Projects.
  - Public Communications Plan
    The Public Communications Plan is required and shall provide all the information required for Type A and B Projects. This information may be presented in a narrative format as part of the Traffic Control Plan or as a separate Special Provision Copied Note.
  - Transportation Operations Plan
    The Transportation Operations Plan is required and shall provide all the information required for Type B Projects. (This information may be presented in a narrative format as part of the Traffic Control Plan or as a separate Special Provision Copied Note.)

EXAMPLES

The following link will open folders containing examples of TMP recommendations and Temporary Traffic Control Plans for previously developed projects. These examples are for illustrative purposes only and may not totally reflect current policy.

http://www.virginiadot.org/business/resources/traffic_engineering/memos2/Examples_of_Temporary_Traffic_Control_Plans.pdf

RESPONSIBILITIES

The following guidance is provided to ensure that all individuals involved in the planning and construction of all work activities within state right of way and on all streets and highways that have been accepted into the State Highway System understand their role and responsibilities in the development, implementation and review of the project's TMP. VDOT personnel, contractors and permittees from the design and construction disciplines/work groups noted below shall have direct responsibilities for the proper development and implementation of the TMP during each preliminary engineering and construction stage of the project.

- **Project Manager**

  The Project Manager is responsible for following the current Project Management Procedures established by the Project Management Office. In accordance with the Project Management Procedures, the Project Manager will be responsible for ensuring that the project's Transportation Management Plan (TMP) Type for the project is defined at the scoping meeting.

- **Traffic Engineering Division**

  The Traffic Engineering Division is responsible for providing temporary traffic control standards and work zone guidance and recommendations, as well as identifying and communicating issues related to the design and usage of temporary traffic control devices.
  Specific responsibilities of this office include:

  - Conducting annual process reviews of two regions each year.
  - Evaluating work zone safety by tracking the number of fatalities and injuries in work zones annually.
  - Reviewing TMP post-construction reports to ascertain the effectiveness of the TMP and noting the resolution of work zone and/or temporary traffic control problems.

- Revising temporary traffic control standards, procedures and guidance based on the above collected data to improve work zone safety and mobility.
- Defining the appropriate work zone safety training for VDOT personnel, design consultants, construction workers, flaggers, etc.

- **Area Construction Engineers**

  Specific responsibilities of the Area Construction Engineer include:

  - Ensuring that the implementation of all TMPs' in the district is in accordance with the plans, specifications, Virginia Work Area Protection Manual and any other pertinent documents.
  - Supporting the Work Zone Traffic Control Coordinator and the Region's Work Zone Safety Coordinator(s) in performing their assigned duties.
  - Verifying that all contractor personnel are trained and hold valid certifications as required by the Department.
  - Advising the appropriate VDOT personnel, as noted in this guidance, of work requiring lane shifts, lane closures and/or phase changes two working days prior to implementing this activity.
  - Ensuring that the project's assigned Work Zone Traffic Control Coordinator completes and submits the TMP post-construction report.

- **Regional Work Zone Safety Coordinators**

  The regional work zone safety coordinators are a resource to be utilized by the regional and district staff to ensure that work zones operate safely and efficiently with the least amount of inconvenience and impact to the traveling public. Specific responsibilities of the Regional Work Zone Safety Coordinator include:

  - Providing district and regional staff with guidance and recommendations on work zone design and operation.
  - Performing work zone reviews to promote consistency and ensure compliance with work zone procedures, standards and guidance.
  - Monitoring work zone inspections conducted by field personnel and identifying areas that need improvement.
  - Assisting and supporting the project's assigned Work Zone Traffic Control Coordinator in performing their assigned duties

- **Residency Engineers / Administrators**

  Specific responsibilities of the Residency Engineer/Administrator for project's administered by the residency include:

  - Ensuring that residency staff receives the appropriate training related to their duties in the development, implementation and review of Transportation Management Plans (TMP).
  - Supporting the Work Zone Traffic Control Coordinator and the Region's Work Zone Safety Coordinator(s) in performing their assigned duties.

- Notifying the Regional Operations Director of work requiring lane closures two working days prior to implementing the lane closure.
- Notifying the Regional Operations Director of height, width and weight restrictions ten working days prior to the imposition of such restrictions.

- **Regional/District/Residency Permit Staff**

  Specific responsibilities of the Regional/District/Residency permit staff include:

  - Ensuring that the permittee's temporary traffic control plan is in compliance with this document, VDOT specifications, Virginia Work Area Protection Manual and any other pertinent documents.
  - Coordinating lane closure needs and height, width and weight restrictions with the permittee and reporting any requests to the Regional Operations Director two working days prior to the lane closure and ten working days for roadway restrictions before any non-emergency work commences.
  - Ensuring that proposed lane closures are in compliance with the regional lane closure policy.

- **Contractor**

  Specific responsibilities of the contractor include:

  - Designating a person assigned to the project who will have the primary responsibility, with sufficient authority, for implementing the TMP.
  - Ensuring that contractor personnel assigned to the project are trained in traffic control to a level corresponding with their responsibilities in accordance with VDOT's work zone traffic control training guidelines.
  - Advising the appropriate VDOT personnel, as noted in this guidance, work requiring lane shifts, lane closures and/or phase changes two working days prior to implementing this activity.
  - Advising the appropriate VDOT personnel, as noted in this guidance, of height, width and weight restrictions ten working days prior to the imposition of such restrictions.
  - Performing, at a minimum, daily reviews of the work zone to ensure compliance with contract documents and establish specifications and standards.
  - Recommending traffic control improvements to the appropriate VDOT personnel to address field conditions pertaining to traffic flow, visibility, and worker/motorist/pedestrian safety.

- **Permittee**

  Specific responsibilities of the permittee include:

  - Submitting a temporary traffic control plan that prescribes the necessary traffic control measures for the work to be performed. This plan shall have the approval from the appropriate VDOT Permit or Land Development

office for approval prior to the commencement of work activities within VDOT right of way.

- Identifying a point of contact that shall be available at all times that the permittee is working within the public right of way. This person shall have the training and authority to correct any traffic control deficiencies.
- Designating a person assigned to the project that will have the primary responsibility, with sufficient authority, for implementing the temporary traffic control plan and other safety and mobility aspects of the permit work.
- Ensuring that permittee's personnel assigned to the work activity are trained in traffic control to a level corresponding with their responsibilities in accordance with VDOT's work zone traffic control training guidelines.
- Notifying the appropriate VDOT personnel, two days prior to the commencement of work and prior to implementing lane closures' and ten days prior to the imposition of height, width and weight restrictions.
- Maintaining a copy of the temporary traffic control plan at the work site.
- Performing, at a minimum, daily reviews of the work zone to ensure compliance with temporary traffic control plan and establish specifications and standards.

Special Provision Copied Notes

The following Special Provision Copied Notes should be included in a project's contract as noted.

- Contractor Alternate Traffic Control Plan – All Type B & C Projects and select Type A projects.
- Work Zone Traffic Control Management – All Type C Projects and select Type B Projects as determined by the Project Manager. The determination shall be based on traffic volumes, TMP complexity, and need for increased and devoted traffic control management.

TRAINING REQUIREMENTS

The Department has established a Work Zone Safety Training Committee (WZSTC) that will present recommendations on procedures, standards, and specifications involving work zone traffic control training issues. The committee will review for approval training courses submitted in compliance with established procedures. The committee will also review and approve Work Zone Traffic Control Training instructor qualifications. Training courses approved in accordance with this procedure shall be the only training accepted as meeting the standards for qualifying persons to plan, design, implement, inspect, and/or

supervise the selection, placement, or maintenance of work zone traffic control schemes and devices in work zones on streets and highways within the Commonwealth of Virginia State Highway System right of way. The State Traffic Engineer's Office shall maintain a list of approved courses and their sponsors/providers. The official list of approved courses, category descriptions, and addresses of course sponsors/providers and approved instructors are provided on the Department's Web site at: http://www.virginiadot.org/business/trafficeng-WZS.asp .

TRANSPORTATION MANAGEMENT PLAN TYPE A PERFORMANCE ASSESSMENT

Project/Permit/Route No.:	Project's PMP Category:
Report Completed By:	Date of Report:
VDOT Project/Contract Manager:	
Contractor:	

Please check all applicable boxes for the items listed below. All check boxes denoted by an asterisk require comment. This form shall be completed within 30 days of completion of work and submitted to the State Traffic Engineer.

Plan Design

Correct TMP Category Application:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Correct TTC Plan Application:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Correct Public Communications Application:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Correct Traffic Operations Plan Application:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
General Plan Effectiveness:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Comments: _____ _____			

Safety

Crashes*	☐ Yes (Attach FR-300 if available)		☐ No
Complaints*	☐ Yes (Attach separate sheet)		☐ No
Specification Violations	☐ Yes (Attach CQIP Report(s))		☐ No
Work Zone Safety Reviews:	☐ Yes (Attach Form(s) TE-97000)		☐ No
General Effectiveness:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Comments: _____ _____			

Mobility

Driver Expectancy:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Delay & Queue Length* (List time & Length):	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
Travel Times (List time)	☐ Acceptable	☐ Not acceptable*	☐ Not Applicable
Work Hour Restrictions:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable
General Effectiveness:	☐ Acceptable	☐ Changes Required*	☐ Not Applicable

Comments:

_____

_____

Additional Comments

Summarize the most successful and least successful work zone traffic control procedures.

_____

_____

_____

_____

Summarize any suggested improvements or changes to the work zone traffic control procedures for future similar projects.

_____

_____

_____

_____

VIRGINIA DEPARTMENT OF TRANSPORTATION

POST-CONSTRUCTION TRANSPORTATION MANAGEMENT PLAN (TMP) PERFORMANCE ASSESSMENT - TMP Types B and C

This Assessment shall be completed by the project's designated Work Zone Safety Coordinator upon completion of the work and approved by the Project Manager to document lessons learned and provide recommendations on how to improve the TMP process and/or modify guidelines. The responses should allow the reviewer of this completed Assessment to understand the successes/failures of the project TMP and its requirements. Please attach any relevant documents, project logs, etc. as well as any responses which cannot fit within the provided space.

WORK ZONE INFORMATION:
PROJECT TITLE:
WORK ZONE SAFETY COORDINATOR:
LOCATION:
DISTRICT/REGION:
UPC#

1) Summarize/describe all changes necessary to correct oversights in the TMP:

2) Summarize/describe all changes made to the original TMP and their level of success:

3) Describe public reaction to the TMP including the frequency and nature of complaints:

4) Summarize travel times encountered during peak periods (if required):

Starting location:		
Ending location:		
Date	Method Used (i.e., floating car, Bluetooth, etc.)	Average Travel Time

5) Summarize queues encountered during peak periods (if required):

Date	Method Used (i.e., advance warning vehicle)	Queue Length
During-construction average queue length:		
During-construction maximum queue length:		
Predicted average/maximum queue length from impacts analysis:		

6) Summarize/identify the peak traffic periods and any discrepancies in these periods from the pre-construction impacts assessment:

7) Summarize the types and number of crashes that occurred during construction:

	Property Damage Only	Injuries	Fatalities	Total
Rear-End				
Angle				
Side-Swipe				
Fixed-Object				
Off-Road				
Other				
Total				

8) Summarize the types and number of safety service patrol responses (when applicable):

9) Summarize/describe the most successful and least successful strategies from the TMP:

10) Summarize/describe any suggested TMP improvements or changes for future similar projects:

This completed assessment shall be forwarded to the State Traffic Engineer following approval below

Project Manager Approval
Name:
Title:
Unit
Signature
Date:

Appendix B: I-81 Corridor Improvement Program Public Communications Plan (PCP) Template Document

IMPROVE 81

PROGRAM SUPPORT SERVICES

I-81 Corridor Improvement Program

Public Communications Plan (PCP) Template Document

Date

VDOT Virginia Department of Transportation

Table of Contents

Appendices

Appendix A:

Appendix B:

List of Figures

No table of figures entries found.

List of Tables

Acronyms

Reference	Description

This plan should be developed in coordination with VDOT District Communications staff.

1.0. Project Summary

- Provide a project summary narrative which could also reference to the overall TMP.
- Provide links to major project milestones, TCP, TOP, and Special Provisions.
- Provide a summary of major construction impacts and benefits of the project.
- Provide Contractor and VDOT contract information.

2.0. List of Affected Stakeholders

- Provide a list of project stakeholders and organizations impacted by the project.
  - Include phone numbers and emails.
- Provide links to other plans that may include project stakeholders (i.e., TOP).
- Based on the contract documents the Contractor may be responsible for maintaining a list of contact information for impacted stakeholders.

3.0. Communication Plan

This section outlines project concerns, strategies, and milestones. Communications strategies and timeframes should be considered on a project-by-project basis. The elements provided below are samples and are not project requirements.

- The communications plan is a recommended guide for the VDOT District Communications staff to consider when communicating with road users, the public, area residents, local businesses, and public entities about this construction project, and its impacts on safety and mobility. Direct communication to the public should occur through VDOT District Communications staff unless approval is provided by VDOT District Communications.
- Reference the I-81 Corridor Improvement Program Communications Plan

3.1. Local Community and Business Concerns

This section outlines the stakeholder concerns that VDOT communications should be aware of.

- VDOT, as part of the project development process, has engaged with its partners throughout the project area. In this section, clearly identify the concerns within the project area and how they were addressed. This will allow VDOT communications to target outreach that addresses each concern.

Sample:

As part of a public meeting held at the Staunton City Hall on February 20, 2023, a preliminary traffic control plan concept was presented to the public. During an initial public meeting, concern was raised that diverted traffic may impact several schools and churches along Route 11, in particular, student loading and unloading. To address this concern temporary traffic signals will be installed at key intersections and Automated Speed Enforcement will be utilized in school zones.

3.2. Communications Strategies

This section lists the strategies that will be used on the project.

- Website, email blasts, social media and advertising, direct stakeholder outreach (meetings, door-to-door outreach), public officials' coordination, printed information materials, media advisories, etc.
- Reference the I-81 Corridor Improvement Program Communications Plan
- Reference the I-81 Corridor-wide TMP Communications Strategies

Sample:

Website

The program website provides timely and clear communication with the public and stakeholders. The existing program site, or a construction and travel-focused project page, or Virginia 511 will be a key factor of the communications program. It will provide a public-facing presence that clearly identifies the project's scope and progress, traveler information, lane closure updates and public meeting opportunities. The website will allow the public to continue signing up electronically to receive project updates via email and provides a site address that can be shared with stakeholders (improve81.org).

3.3. Communications Timelines

This section lists the timeframes when elements of the communication plan will be executed.

- Reference the I-81 Corridor Improvement Program Communications Plan for agreed upon frequencies.

Sample:

Table 1: Communications Timelines

Strategy Name	***Timeframe***
Public Meeting (Pardon our Dust)	*Prior to start of project, periodically based on project*
Website	*Prior to start of project, through project completion*
Email Blasts	*Start of project, through project completion*
Public Officials Meeting	*At least one (1) meeting prior to start of project, through project completion*
Existing ITS Network	*Start of project, through project completion*
Coordination with Contractor	*Start of project, weekly meetings*
Promoting Rideshare/Transit	*Prior to Stage 2, through Stage 2*
…	

Optional Format Combine Section 3.2 and 3.3 into one Section.

Website

The program website provides timely and clear communication with the public and stakeholders. The existing program site, or a construction and travel-focused project page, or Virginia 511 will be a key factor of the communications program. It will provide a public-facing presence that clearly identifies the project's scope and progress, traveler information, lane closure updates and public meeting opportunities. The website will allow the public to continue signing up electronically to receive project updates via email and provides a site address that can be shared with stakeholders (improve81.org).

> ***Timeline:*** *This strategy should be developed prior to the construction and should be maintained throughout construction.*

4.0. Milestones for Updates

This section lists the milestones when communication shall occur, at a minimum, and based on project specific details/requirements. Communications milestones should be considered on a project-by-project basis. The elements provided below are samples and are not project requirements.

Sample:

The Milestones for this Public Communications Plan are as follows:

- *Selection of Contractor*
- *Pre-Construction Conference*
- *Contractor led project stakeholder meeting*
- *Beginning of construction*
- *Major traffic shifts and pattern changes*
- *Interim Milestones/Utilities*
- *Restoration of existing traffic patterns*
- *Completion of Work*

In addition to the listed milestones, communication shall occur for all ramp and/or roadway closures and detours, any 15-minute stoppages, and any onsite emergency or work zone incidents in accordance with the project special provisions. Dissemination of information regarding ramp and/or roadway closures and detours shall emphasize the use of the existing ITS Network devices, temporary PCMS, and press releases in coordination between the Contractor, VDOT District TOC and VDOT District Communications.

5.0. Means of Evaluation

This section lists the performance feedback for communications. Means of Evaluation should be considered on a project-by-project basis and should be established to support the I-81 Corridor-wide TMP goals and objectives.

- Reference the I-81 Corridor Improvement Program Communications Plan
- Reference the I-81 Corridor-wide TMP Guidance Document

Appendix C: Stakeholder List

IMPROVE 81
PROGRAM SUPPORT SERVICES

Stakeholder Contact List

Transportation Management Plan (TMP)

Date: 9/12/2022

Agency/ Municipality	Name		Position/Role	Email	Participation Status
	Last	First			
Steering Committee					
VDOT	Covington	Dave	I-81 Program Delivery Director	dave.covington@vdot.virginia.gov	Confirmed
VDOT	Shiley	Matt	Staunton District Traffic Operations Director	matthew.shiley@vdot.virginia.gov	Confirmed
VDOT	McDonald	Chris	Salem District Traffic Operations Director	cmcdonald@vdot.virginia.gov	Confirmed
VDOT	Holt	Brian	Bristol District Traffic Operations Engineer	brian.holt@vdot.virginia.gov	Confirmed
VDOT	McPherson	Mike	Salem District Traffic Engineer	mike.mcpherson@vdot.virginia.gov	Confirmed
VDOT	Bond	Matt	Staunton District Traffic Engineer	matthew.bond@vdot.virginia.gov	Confirmed
VDOT	Stevens	Todd	Staunton District Construction Engineer	todd.stevens@vdot.virginia.gov	Confirmed
VDOT	Booker	Anne	Salem District Maintenance Engineer	anne.booker@vdot.virginia.gov	Confirmed
VDOT	Slack	Ken	Corridor Communications	Ken.Slack@vdot.virginia.gov	Confirmed
FHWA	Clausen	Steven	Area Engineer (Bristol, Salem, Staunton)	steven.clausen@dot.gov	Confirmed
FHWA	King	Karen	Highway Safety Engineer & Local Assistance Programs Coordinator	karen.king@dot.gov	Confirmed
Wythe County	Kincer	Johnny	County Engineer	jdkincer@wytheco.org	Confirmed
Roanoke County	Caywood	Richard	County Administrator	rcaywood@roanokecountyva.gov	Confirmed
Harrisonburg	Hartman	Tom	Public Works Director	Tom.Hartman@harrisonburgva.gov	Confirmed
Traffic Operations Subcommittee					
VDOT	Covington	Dave	I-81 Program Delivery Director	dave.covington@vdot.virginia.gov	Confirmed
VDOT	Mullins	Jeremy	Bristol Assistant District Traffic Engineer	jeremy.mullins@vdot.virginia.gov	Confirmed
VDOT	Randolph	Brett	Salem Assistant District Traffic Engineer	brett.randolph@vdot.virginia.gov	Confirmed
VDOT	Sharkady	Mike	Work Zone Safety Coordinator (Salem District)	mike.sharkady@vdot.virginia.gov	Confirmed
VDOT	Shoemaker	Alex	Bristol District Traffic Engineer	Alex.Shoemaker@vdot.virginia.gov	Confirmed
VDOT	Simpson	Darin	Staunton Assistant District Traffic Engineer	darin.simpson@vdot.virginia.gov	Confirmed
VDOT	Reid	Roy	Staunton District Traffic Operations Manager	roy.reid@vdot.virginia.gov	Confirmed
VDOT	Martin	Tim	Salem District Traffic Operations Manager	timl.martin@vdot.virginia.gov	Confirmed
VDOT	Bane	Becky	Bristol Area Construction Engineer	becky.bane2@vdot.virginia.gov	Confirmed
VDOT	Repass	Todd	Salem Area Construction Engineer	todd.repass@vdot.virginia.gov	Confirmed
VDOT	Robertson	Jamie	Staunton Area Construction Engineer	jamie.robertson@vdot.virginia.gov	Confirmed
VDOT	Wells	David	Regional Incident Management Coordinator (Salem)	david.wells@vdot.virginia.gov	Confirmed
VDOT	Johnson	George	Regional Incident Management Coordinator (Staunton)	george.johnson@vdot.virginia.gov	Confirmed
VSP Division 4 - Wytheville	Reece	Derek	Lieutenant, Bureau of Field Operations	derek.reece@vsp.virginia.gov	Confirmed
VSP Division 4 - Wytheville	Hafley	Robert	First Sergeant, Bureau of Field Operations (Alternate)	robert.hafley@vsp.virginia.gov	Confirmed
VSP Division 6 - Salem/Roanoke	Knight	Timothy	Lieutenant, Bureau of Field Operations	timothy.knight@vsp.virginia.gov	Confirmed
Botetourt County	Ward	Matthew	Sheriff	mward@botetourtva.gov	Confirmed
Botetourt County	Moyer	David	Deputy, Traffic Safety Program Manager	dmoyer@botetourtva.gov	Confirmed
Botetourt County	Ferguson	Jason	Chief, Department of Fire and EMS	jferguson@botetourtva.gov	Confirmed
Botetourt County	Murray	Daniel	Emergency Manager	DMurray@Botetourtva.gov	Confirmed
Bristol	Daft	Joseph	City Engineer	joseph.daft@bristolva.org	Confirmed
Augusta County	Fitzgerald	Tim	County Administrator	tfitzgerald@co.augusta.va.us	Confirmed
Roanoke	D'Ardenne	Dwayne	Transportation Manager	dwayne.dardenne@roanokeva.gov	Confirmed
Harrisonburg Dept. Public Transit	Gatobu	Gerald	Director	Gerald.Gatobu@harrisonburgva.gov	Confirmed

IMPROVE 81
PROGRAM SUPPORT SERVICES

Stakeholder Contact List

Transportation Management Plan (TMP)

Date: 9/12/2022

Agency/ Municipality	Name: Last	Name: First	Position/Role	Email	Participation Status
Communications Subcommittee					
VDOT	Covington	Dave	I-81 Program Delivery Director	dave.covington@vdot.virginia.gov	Confirmed
VDOT	Earl	Michelle	Bristol District Communications	michelle.earl@vdot.virginia.gov	Confirmed
VDOT	Bond	Jason	Salem District Communications	jason.bond@vdot.virginia.gov	Confirmed
VDOT	Myers	Sandy	Staunton District Communications	sandy.myers@vdot.virginia.gov	Confirmed
Abingdon	Surrett	Michael	Interim Director of Public Works / Assistant Director of Public Works	msurrett@abingdon-va.gov	Confirmed
Bristol	Chandler	Jacob	Public Works Director	Jacob.chandler@bristolva.org	Confirmed
Salem	Simpson	William	City Engineer	wsimpson@salemva.gov	Confirmed
Winchester	Hull	Justin	Public Works Division Manager	justin.hall@winchesterva.gov	Confirmed
Central Shenandoah PDC	Ann	Cundy	Director of Transportation	ann@cspdc.org	Confirmed
Central Shenandoah PDC	Melester	Paula	Regional Planner	paula@cspdc.org	Confirmed
New River Valley PDC	Sharp	Elijah	Deputy Director	esharp@nrvrc.org	Confirmed
Dept. of Rail and Public Transportation	Daugherty	Avery	Statewide Program Manager	avery.daugherty@drpt.virginia.gov	Confirmed
Greater Roanoke Transit/ Valley Metro	Long	William	Director of Planning & Special Projects	wlong@valleymetro.com	Confirmed
Virginia Tech	Alden	Andy	I-81 Corridor Coalition / Division of Freight, Transit, & Heavy Vehicle Safety	aalden@vtti.vt.edu	Confirmed
James Madison University	Vass	Mary-Hope	University Communications, Exec. Dir. of Communications	vassmg@jmu.edu	Confirmed
Shenandoah University	Fauber	Bradley	Media Relations Coordinator	bfauber@su.edu	Confirmed
Roanoke Regional Chamber	King	Austin	Communications Manager	AKing@RoanokeChamber.org	Invited
Program Support					
HDR, Inc.	Estes	Mike	Program Manager	Michael.Estes@hdrinc.com	Confirmed
Kimley-Horn and Associates, Inc.	White	Tim	TMP Project Manager	tim.white@kimley-horn.com	Confirmed
Kimley-Horn and Associates, Inc.	McGinley	Steve	TMP Project Engineer	stephen.mcginley@kimley-horn.com	Confirmed
T3 Design	Morris	Amy	TMP Support	amorris@t3design.us	Confirmed

Appendix D: Sample Special Provision for Work Zone Traffic Control Management

Discuss use of this Special Provision with the Project Manager. Responsibilities of the Contractor in this Special Provision should be consistent with the projects Transportation Management Plan.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
WORK ZONE TRAFFIC CONTROL MANAGEMENT

January 14, 2008; Reissued July 12, 2016

I. GENERAL DESCRIPTION

This work shall consist of providing work zone traffic control management in strict compliance with the contract *[designer to ensure Transportation Management Plan is part of the contract]*, plans, specifications, the Virginia Work Area Protection Manual and the Manual on Uniform Traffic Control Devices (MUTCD), including supervision of personnel and the installation, inspection, and maintenance of all traffic control devices on the project.

II. REQUIREMENTS

The Contractor shall assign a traffic control supervisor (TCS) to provide work zone traffic control management for the project. If the Contractor assigns more than one TCS to provide work zone traffic control management, a weekly schedule identifying who will be in charge of providing work zone traffic control management on a daily basis shall be submitted to the VDOT Area Construction Engineer by the Contractor.

The TCS shall have a set of traffic control plans, the Transportation Management Plan, and a copy of the edition of the Virginia Work Area Protection Manual specified on the plan sheet or in the contract readily available at all times.

A. Certification

Prior to commencing work requiring work zone traffic control management, the Contractor shall submit to the Area Construction Engineer a valid copy of the Traffic Control Supervisor certificate (wallet size card) issued by the American Traffic Safety Services Association (ATSSA), or another similarly accredited agency or firm approved by the Department.

The Department will accept the certification by ATSSA or any approved agency or firm only if all of the following minimum requirements are met:

1. Successful completion of an Intermediate or Advanced work zone traffic control training course approved by the Department.

2. Passing a written examination given by the agency or firm on the approved work zone traffic control training course.

3. A minimum of two years full-time field experience in work zone traffic control. The experience may be verified by the Department at its discretion.

The TCS certification shall be renewed every four years by the TCS taking and passing a recertification test. The recertification test shall be taken through ATSSA or an agency or firm approved by the Department. Recertification shall be done in the fourth year prior to the expiration date.

B. Duties

The TCS's main responsibility shall be work zone traffic control management. The TCS may have other assigned duties on the project as approved in writing by the Area Construction Engineer. The following is a listing of the TCS's primary duties:

1. The TCS(s) shall personally provide work zone traffic control management and supervision services at the project site.

2. The TCS(s) shall coordinate the training of flagging and signing personnel.

3. The TCS(s) shall supervise the flagging and signing personnel.

4. The TCS(s) shall coordinate all work zone traffic control operations for the duration of the contract, including those of subcontractors, utility companies, and suppliers, to ensure that all work zone traffic control is in place and fully operational prior to the commencement of any work. Responsibilities include duties required in the Transportation Management Plan, Public Communications Plan, and Transportation Operations Plan.

   The Department recognizes that the Contractor does not have direct control over the work zone traffic control operations of the utility companies. The coordination provided by the TCS when dealing with utility companies is for the purpose of coordinating concurrent utility work zone traffic control with any other construction/maintenance work zone traffic control to avoid conflicts.

5. The TCS(s) shall perform daily reviews of work zone traffic control when work activities are underway and document in the work zone traffic control daily diary activities taking place and any deviation from the traffic control plan. The TCS(s) shall also document items inspected, deficiencies discovered, and action(s) taken to correct the deficiencies. In addition, the TCS(s) shall perform weekly reviews of the work zone traffic control and document in detail using Forms TE-97001 and 97002. Every other detailed weekly review shall be performed during nighttime hours or as directed by the Area Construction Engineer. The TCS(s) shall recommend traffic control improvements to the Maintenance of Traffic (MOT) Coordinator or designee to address field conditions pertaining to traffic flow, worker visibility and safety, and motorist and pedestrian safety.

   The TCS shall inspect traffic control devices in use for compliance with the ATSSA Quality Standards for Work Zone Traffic Control Devices, the Road and Bridge Specifications, and the Virginia Work Area Protection Manual. The TCS shall provide for the immediate repair, cleaning, or replacement of traffic control devices not functioning as required to ensure the safety of the motorists and construction personnel.

   The traffic control devices shall be inspected by the TCS during working and nonworking hours on a schedule approved in writing by the Area Construction Engineer, but as a minimum at the beginning and end of each workday or night and once during non-working weekends and holidays, and daily on restricted days due to inclement weather or during any work shutdown.

   Traffic control devices in use longer than fourteen (14) days shall be inspected by the TCS at least once every other week during nighttime periods.

   The TCS shall program the temporary portable Changeable Message Signs and verify that the temporary portable Changeable Message Signs are operational and being utilized appropriately. In addition, the TCS shall verify that Intelligent

Transportation System devices (permanent and/or temporary) within the work area, on the approaches, and detour routes are operational and being utilized appropriately.

6. The TCS(s) shall prepare and submit statements concerning road closures, delays, and other project activities to the District Public Affairs office and Traffic Operations Center at the following intervals prior to implementing the activity:

    a. Ten working days in advance

    b. Two hours in advance

        i. Only required if there are changes to the planned activity (i.e., weather, material delivery, previous activity completed a head of schedule, etc.)

    c. Actual time of the activity

    d. Actual time when the activity is complete

7. The TCS(s) shall be responsible for notifying the Virginia State Police, the Traffic Operations Center, and the VDOT project Maintenance of Traffic (MOT) Coordinator or designee of all crashes within the work area, on the approaches, and on detour route(s).

8. The TCS(s) assigned to the project shall attend the preconstruction conference and any other meeting which involves traffic control.

9. The TCS(s) shall be responsible for the maintenance, cleanliness, and replacement of traffic control devices of the existing traffic control plan during working and non-working hours.

10. The TCS(s) shall collect and document in the daily diary work zone incidents (i.e., disabled vehicle or other incident impacting traffic), the length, timing, and mitigation of excessive queues, the time and date of notification of all crashes, and complaints related to the project.

C. Documentation

1. Traffic Control Diary

The TCS shall maintain a project work zone traffic control diary in a bound book. The Contractor shall provide a sufficient number of diaries for his or her use.

The TCS shall keep the work zone traffic control diary current on a daily basis and shall sign each daily entry. Entries shall be made in ink in a format approved by the Area Construction Engineer, and there shall be no erasures or white-outs. Incorrect entries shall be struck out and then replaced with the correct entry. Photographs may be used to supplement the written text.

The work zone traffic control diary shall, at all times, be available for inspection by the VDOT Maintenance of Traffic Coordinator and a copy of the diary shall be submitted to the MOT Coordinator on a weekly basis.

The work zone traffic control diary(s) shall become the property of the Department at the completion of the project. Failure to submit the diary shall result in the withholding of final payment until the diary(s) is submitted.

2. Progress Reports

The TCS(s) shall prepare a monthly progress report for the duration of the contract that is stored electronically in a collaborative system (i.e., Bluebeam or SharePoint) and shared with appropriate VDOT project staff: The progress report should include the following information:

a. Work zone (includes work area, approaches, and detour route(s)) crashes and incidents with associated date, time, duration, and location.

b. Excessive work zone queue lengths with associated date, time, and duration.

c. A record of any complaints related to the work zone.

d. A list of work zone enhancements/improvements implemented to address performance and a short description of the outcome.

3. Annual Report

The TCS(s) shall prepare an Annual Report to be submitted to the VDOT Area Construction Engineer or designee each December (if construction spans over more than one season) and at the contract end date. The Annual Report should reflect work zone performance of the previous construction season.

Refer to IIM-LD-241.7 – Transportation Management Plan Requirements for Type A, Type B, and Type C project report templates. Type A projects use the Transportation Management Plan Type A Performance Assessment template. Type B and Type C projects use the Post-Construction Transportation Management Plan (TMP) Performance Assessment – TMP Types B and C.

D. Availability of TCS

Traffic control management shall be provided under the supervision and direction of the TCS on a 24-hour-per-day basis throughout the duration of the project.

The TCS shall be available on every working day—on call at all times—and available upon the Area Construction Engineer's request during normal working hours and during other than normal working hours in the case of emergency. The provisions for availability of the TCS shall also be met during times of partial or full project suspension. Contact telephone numbers for the TCS(s) shall be provided to Department project personnel, the Area Construction Engineer, the Residency Administrator, and the Traffic Operations Center prior to the Contractor commencing work requiring work zone traffic control management.

E. Failure to Comply

The Area Construction Engineer may suspend all or part of the Contractor's operation(s) for failure to comply with the approved "Traffic Control Plan" or failure to correct unsafe traffic conditions within 24 hours for critical items and 72 hours for non-critical items after such notification is given to the Contractor in writing.

In the event that the Contractor does not take appropriate action to bring the deficient work zone traffic control into compliance with the approved traffic control plan or fails to correct the unsafe traffic conditions, the Department may proceed with the corrective action using its own forces, equipment, and material to maintain the project and such

costs, plus 25 percent for supervisory and administrative personnel, will be deducted from the money owed to the Contractor for the project.

The Contractor shall not be relieved of the responsibility to provide work zone traffic control safety to the traveling public when a project is under full or partial suspension. When a project is under suspension due to the Contractor's failure to comply with this section, or when the contract is under liquidated damages, the Contractor shall continue to provide work zone traffic control management and no additional measurement or payment will be made.

If suspensions or partial suspensions are requested by the Contractor, the additional work zone traffic control management costs will be at the Contractor's expense.

III. MEASUREMENT AND PAYMENT

Work Zone Traffic Control Management will be paid for at the contract lump sum price. This price shall be full compensation for furnishing 24-hour services as specified, including preparing and furnishing Work Zone Traffic Control diaries, Progress Reports, and Annual Report(s).

When work zone traffic control management is paid for by the lump sum, monthly partial payments for work zone traffic control management will be made on a pro rata basis for the estimate period being vouchered for payment.

In the event the contract time is authorized to be extended according to the provisions of Section 108.04 of the Specifications, the provisions of Section 104.02 of the Specifications will not apply. The payment for this item will be compensated on a daily basis by dividing the original lump sum bid amount by the number of calendar days in the original contract time and the resultant daily dollar value assigned to this item.

Monthly payment(s) are contingent upon approval of the monthly progress report by VDOT.

Payment will be made under:

Pay Item	Pay Unit
Work Zone Traffic Control Management	Lump Sum