

## 16.0 TRANSPORTATION MANAGEMENT PLAN

This Section 16 includes the requirements for the Transportation Management Plan Work for the US 550/160 Connection South Design Build Project (Project). This Work shall be completed in accordance with the Contract Documents.

The Transportation Management Plan (TMP) defines the strategies for managing the Work zone impacts of the Project. The TMP shall include a Maintenance of Traffic (MOT) Plan, a Traffic Operations Plan (TOP), and Traffic Control Plans (TCP); and shall incorporate the coping elements of the Public Information Plan (PIP) detailed in Book 2, Section 4.

### 16.1 Administrative Requirements

#### 16.1.1. Standards

The Contractor shall design and construct the Project in accordance with the requirements of the standards in the documents listed in Table 16-1 and those referenced in Book 3. The Contractor shall use the latest adopted edition at the time of the Proposal Due Date.

**Table 16-1 Standards**

<b>Author or Agency</b>	<b>Title</b>
American Association of State Highway and Transportation Officials (AASHTO)	<i>Roadside Design Guide</i>
American Traffic Safety Services Association (ATSSA)	<i>Quality Guidelines for Work Zone Traffic Control Devices</i>
ATSSA	<i>Guidelines on the Use of Positive Protection in Temporary Traffic Control Zones</i>
Colorado Department of Transportation (CDOT)	<i>Guidelines for the Use of Positive Protection in Work Zones</i>
CDOT	<i>M&amp;S Standard Plans</i>
CDOT	<i>Standard Specifications for Road and Bridge Construction (CDOT Standard Specifications)</i>
CDOT	<i>Roadway Design Guide</i>
CDOT	<i>Guidelines for Developing Traffic Incident Management Plans for Work Zones</i>
CDOT	<i>The Colorado Supplement to the Federal Manual on Uniform Traffic Control Devices</i>
CDOT	<i>Sign Design Manual</i>
CDOT	Work Zone Safety and Mobility Program: <a href="http://www.codot.gov/library/traffic/lane-close-work-zone-safety/work-zone-safety">http://www.codot.gov/library/traffic/lane-close-work-zone-safety/work-zone-safety</a>
CDOT	Work Zone Safety and Mobility Rule
Federal Highway Administration (FHWA)	<i>Manual on Uniform Traffic Control Devices (MUTCD)</i>
FHWA	<i>Standard Highway Signs (with supplements)</i>

## **16.2 Transportation Management Plan**

The Contractor shall prepare a TMP that defines the strategic plan for traffic management on the Project. The TMP shall address major aspects of the Work for individual construction areas, phases, and stages as defined herein. These aspects shall include, but are not limited to, US 550 and US 160 closures, county Road and local Road closures, Bridge closures, construction phasing and staging, numbers and type of major traffic shifts, detours, typical section requirements, pullout requirements, emergency and construction access, pedestrian and trail impacts, and detours. The TMP is a planning and policy guide that the Contractor shall use to develop and execute the Project MOT program.

The TMP shall be submitted to CDOT (and the respective Local Agency[ies] where local Streets are affected) for CDOT Acceptance prior to the Second Notice to Proceed (NTP2). No Work that impacts traffic shall commence until the TMP is Accepted.

The major aspects of the TMP shall include, but are not limited to:

1. An overview and description of the proposed construction, including maintenance of traffic during construction, and major traffic shifts.
2. A detailed approach to the development of TCPs and Methods of Handling Traffic (MHT) on the Project per Book 2, Section 3. MHT plans shall be submitted to CDOT for Approval 5 Days prior to the implementation of each MHT.
3. A list of known or potential Roadway, ramp, and lane closures and traffic shifts, including the following information:
  - A. Description of traffic shift.
  - B. Description of detour:
    - i. Specific routes used.
    - ii. Identification of detour limits to be used in each construction phase.
    - iii. Contractor's identification and coordination with other construction projects within the vicinity of the proposed detour route. The impact of these construction projects shall be incorporated into the detour route planning and scheduling.
  - C. Number of shifts expected.
  - D. Duration of shifts and detours.
4. An approach to the use of existing and temporary Variable Message Sign (VMS) boards and traffic signals, including coordination with CDOT and the Contractor's representative.
5. The Contractor's plan for coordinating the TMP Activities with those Activities required under Book 2, Section 4.
  - A. A checklist identifying specific items that shall be provided both to the Contractor's Public Information Manager (PIM) and to CDOT every Thursday by 10:30 a.m. for public information data collection and management Activities on the Project. The checklist shall include supporting information relevant to coping messages and public awareness and shall be included in the PIP required in Book 2, Section 4.
6. An approach to night Work that addresses the night work requirements of Book 2, Section 5. Any night Work will require written preapproval from La Plata County and Approval from CDOT.
7. Additional elements

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- A. An approach to coordination and cooperation with construction being performed by other projects along US 160 and US 550.
  - B. Approach to coordination and cooperation with construction being performed by Utility Companies or other Utility Relocations, as required in Book 2, Section 7.
  - C. Approach to coordination and cooperation with construction being performed by Local Agency projects that are occurring on possible detour routes.
  - D. An approach to traffic access management, including restrictions.
  - E. Relevant portions of the Incident Management Plan (IMP) described in Section 16.2.2.2.
  - F. An approach to handle oversized loads through the Project.
  - G. If needed, approach to coordinate La Plata County pit access route via existing interchange.
8. Typical section requirements.
  9. Emergency requirements:
    - A. Pull-out locations.
    - B. Emergency access.
  10. Temporary closure scenarios:
    - A. Location.
    - B. Time and duration.
  11. Access:
    - A. Business/home/property.
    - B. Work Site (area).
    - C. Colorado State Patrol (CSP).
  12. Construction zone temporary speed reduction.
    - A. The Contractor shall submit a Form 568 to CDOT for Approval 7 Days prior to the date when speed reduction is to be implemented.
  13. MHT requirements.
  14. Traffic control device maintenance:
    - A. A Work plan to meet the requirements of Section 16.4.2 shall to be provided to CDOT. This Work plan shall include, at a minimum, detailed staff commitments and contacts, along with a plan to deploy equipment and resources.

### **16.2.1. Maintenance of Traffic Plan**

The following elements shall be considered part of the MOT plan and shall be addressed in the TMP.

#### **16.2.1.1 Transportation Management Plan Task Force**

The Contractor shall establish a TMP task force to assure proper coordination with affected Local Agencies. The TMP Task Force shall include, at a minimum, the Contractor's PIM, the Contractor's TCS, the Contractor's superintendent, CDOT, La Plata County, City of Durango, and others as needed if Local Agency facilities are impacted. The Contractor shall submit the proposed list of TMP task force members to CDOT for Acceptance within 30 Days after NTP1.

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The TMP task force shall be included in the weekly status meetings as required in Book 2, Section 2.

In addition to regular weekly status meetings, the Contractor shall schedule and conduct TMP task force meetings to present and discuss Contractor-prepared narratives identifying processes and critical elements of all full closures and coordination Activities.

Within 14 Days after CDOT's Acceptance of the TMP task force members, the Contractor shall convene a TMP kick-off meeting. The meeting shall be used to develop an agreed-upon level of detail required for the TMP, as described in this Section 16.

#### **16.2.1.2 Business and Private Access**

The Contractor shall maintain public and private access to the local Street and Highway systems at all times. Temporary signage to business entrances shall be provided during construction to draw attention to Highway access points. TCPs and MHTs shall incorporate Stakeholder information from the PIP outlined in Book 2, Section 4, available surveys, and other pertinent studies relating to business and private access to the local Street system and the Highway. At a minimum, the Contractor shall communicate and document the following information relevant to business and private access:

1. Access points impacted by a particular construction phase or stage.
2. All notifications of affected businesses and land owners.
3. Schedule of closures and estimated durations.
4. Site-specific access or delivery requirements for local businesses (deliveries, wide load vehicles, etc.).
5. Proposed access mitigation efforts.

#### **16.2.1.3 Maintenance of Traffic Variance Process**

The Contractor may request a MOT variance for any closure, detour, or other restriction beyond the specified limits defined herein. The following information shall be included in each MOT variance request:

1. Summary of the variance request.
2. Justification for the variance request, including a list of the criteria that cannot be met and the reason(s) for not being able to meet them.
3. Public notification methods and schedule.
4. List of affected emergency services and the schedule for notification.
5. List of affected Local Agencies or private owners and the method(s) and schedule for notification.
6. Description of additional public information surveys to be performed, if required.
7. List of any potential safety hazards to which the public may be exposed.
8. Proposed revisions to the Accepted TCP or current MHT.
9. Proposed duration of closure, detour, or phasing change for which a variance is requested.

The Contractor shall allow CDOT a minimum of 14 Days for Review and Approval of any MOT variance requests. The Contractor shall obtain Local Agency approval for detours utilizing non-State-owned facilities. If Local Agency approvals are necessary, they shall be obtained prior to submittal of the MOT to CDOT.

#### **16.2.1.4 Detour Routes**

Detour routes must be Approved by CDOT. Detour routes shall be the shortest, most direct routes feasible and shall not utilize county Roads, with adequate signing to limit additional travel to the greatest extent possible.

Detour routes shall be video-recorded by the Contractor prior to and after construction. The Contractor and CDOT shall be present for video-recording. Any damage to the routes as a result of the use of the route shall be repaired by the Contractor in a time and manner as negotiated with CDOT and the Contractor. All repairs associated with damage to the detour route shall be done at no additional cost to the Project.

#### **16.2.1.5 Trail and Bicycle Impacts**

Existing trail systems and bicycle accommodations along US 160 shall be maintained at all times. There is no anticipated need to impact the existing trail system along Wilson Gulch and therefore no closures will be allowed unless otherwise Approved by CDOT and the City of Durango 14 Days prior to implementation of the closure.

### **16.2.2. Traffic Operations Plan**

The TOP shall address the operations and management of the transportation system in the Work zone impact area. The TOP shall address the components described below.

#### **16.2.2.1 Variable Message Signs**

Public notices shall be provided through VMS boards to warn motorists of major traffic shifts, detours and Road closures 1 week prior to and 2 weeks after a change in the traffic pattern. The VMS boards shall be placed on the affected route in advance of the construction zone.

Routine requests to use the CDOT Traffic Management Center (CTMC) VMS boards' shall be submitted to CDOT by 10:30 a.m. on Thursday of the week prior to when the VMS boards will be needed (Monday through Sunday of the following week). Requests for routine use of the CTMC VMS boards' will be Reviewed by noon Friday of the same week of the submittal. The Contractor shall coordinate directly with the CTMC following Review by CDOT.

The CTMC is available to the Contractor to modify VMS messages 24 hours a day, 7 days a week, and may be contacted at (303) 512-5826.

The Contractor shall coordinate with CDOT and the CTMC for emergencies in accordance with the Accepted IMP.

#### **16.2.2.2 Incident Management Plan (IMP)**

The Contractor shall develop a detailed IMP as a companion to the TOP to manage traffic incidents and emergency operations on the Project Site. Emergency service providers shall be contacted and provided an access plan during construction to minimize delays and response times for emergency services.

The IMP shall comply with the CDOT *Guidelines for Developing Traffic Incident Management Plans for Work Zones*.

At a minimum, the IMP shall include the following components:

1. Coordination with the PIP, as described in Book 2, Section 4.

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2. Incident detection and identification.
3. Incident response.
4. Incident Site management.
5. Incident clearance.
6. Dissemination of traveler information regarding incidents.
7. Emergency services notification, including local area police departments, the Colorado State Patrol, local area fire departments, ambulance services, and any other emergency response providers.
8. Notification of local school districts about possible impacts to school bus routes, student drop-offs, and/or pedestrian facilities.
9. Geographic and other special constraints.
10. Available resources.
11. Operational procedures.

The IMP shall be submitted to CDOT for Acceptance within than 30 Days after NTP2. No Work that impacts traffic shall commence until the IMP is Accepted.

#### **16.2.2.3 Contractor Response Time**

The Contractor shall have at least 1 employee on call 24 hours a day, 7 days a week via cell phone, who shall respond to an incident within 30 minutes. Upon arrival at the incident site, that employee shall assess the situation, shall be empowered to direct Work, and shall immediately notify the appropriate personnel to implement the IMP. Upon notification of the incident, the Contractor shall immediately undertake actions necessary to restore traffic operations to the maximum extent practicable.

#### **16.2.2.4 Coordination with Adjacent Projects**

Other projects along US 550 may occur during the construction of this Project. The Contractor shall coordinate construction traffic and detour impacts with CDOT and contractors on those projects to minimize simultaneous closures or impacts to adjacent or alternate routes.

#### **16.2.2.5 Coordination with Adjacent Neighborhoods**

No construction traffic shall be allowed in residential neighborhoods adjacent to the Project.

#### **16.2.3. Communications Plans**

The TMP shall reference the appropriate sections of the PIP and the CCP developed in accordance with Book 2, Section 4.

### **16.3 Design Requirements**

#### **16.3.1. Submittals**

All submittals shall be prepared, Reviewed, and submitted in accordance with the requirements set forth in Book 2, Section 3.

The Contractor’s Engineer in responsible charge of the MOT design shall prepare, review, and approve the TCP, Released for Construction (RFC) Documents, Field Design Changes, and the MHT plans. These plans shall be in conformance with the TMP described in this Section 16.

**16.3.2. Traffic Control Plans**

The Contractor shall prepare TCPs to control traffic on the Project. The TCPs shall conform to the requirements specified herein, the CDOT *Standard Specifications for Road and Bridge Construction (CDOT Standard Specifications)*, and the most current version of the *Manual on Uniform Traffic Control Devices (MUTCD)*. The TCPs shall generally describe all lane and Shoulder configurations, including widths, traffic control signing, pavement markings, traffic control devices, temporary signalization, flagger locations, construction access, construction parking, emergency access, Work areas, and pedestrian/bicycle requirements necessary for each construction phase.

Flaggers shall be placed immediately adjacent to Work areas to optimize traffic flow during periods of construction activities and to reduce delays.

The TCP shall be submitted to CDOT for Acceptance 14 Days prior to implementation of the particular TCP.

Any major revision to a TCP, as determined by CDOT, shall require submission of a new TCP for Acceptance.

**16.3.3. Design Vehicle**

The design vehicle shall be WB-67.

**16.3.4. Design Speed and Posted Speed**

Minimum design and posted speeds for Work zones shall conform to those listed in Table 16-2.

Design speeds shall in all cases be equal to or greater than the posted speed. The Contractor shall provide existing design and posted speed whenever it can be reasonably maintained. In the event speed reductions are required, the Contractor shall submit Form 568 to CDOT for allowable speed reductions as shown in Table 16-2.

**Table 16-2 Design and Posted Speeds for Work Zones**

Location	Design Speed (mph)	Construction Posted Speed (mph)
US 550 and US 160	Match construction posted speed	If existing posted speed is greater than or equal to 40 mph, then a 10-mph reduction. If existing posted speed is less than 40 mph, then no reduction.

**16.3.5. Minimum Lane and Shoulder Requirements**

**16.3.5.1 Lane and Shoulder Restrictions**

Before any travel lanes or Shoulders are closed, the Contractor shall submit an appropriate MHT or TCP to CDOT for Acceptance.

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The Contractor shall submit lane restrictions to CDOT by Thursday 10:30 a.m. of the week prior to the Work (for Work Sunday through Saturday), unless required by construction emergencies or other reasonably unforeseen events.

Minimum lane and Shoulder widths during construction shall be according to Table 16-3.

**Table 16-3 Minimum Lane and Shoulder Widths**

Location	Travel Lanes	Shoulders	
		Inside	Outside
All State Highways	11 ft.	2 ft.	2 ft.
All County Roads	10 ft.	0 ft.	0 ft.

Short-term modifications of existing traffic signals in conjunction with construction phasing may be needed and shall be the responsibility of the Contractor to build and maintain through the construction phase. Where signal detection and communications are present, they shall be maintained.

**16.3.5.2 Lane Closures**

Before any lanes are closed, an appropriate MHT shall be approved by the Contractor’s Engineer and Accepted by CDOT. Lane closures shall be submitted to CDOT for Acceptance at least 7 Days in advance of the closure per the US-550/US-160 Final Connection Design Build Lane Closure Strategy Report, unless required by construction emergencies or other reasonably unforeseen events. Allowable lane closures for the Project shall be in accordance with Table 16-4 until Notice of Final Acceptance.

Lane closures greater than 2000 feet in length will not be allowed. Single lane closures less than 2000 feet will be allowed during the times listed in Table 16-4.

During lane closures, the Contractor shall monitor travel time delays and the queue length. If delays exceed 20 minutes, the lane shall be opened to traffic until the queue has dissipated.

**Table 16-4 Allowed Hours for Lane Closures**

Route	Allowed Hours
US 550	Anytime
US 160	7PM to 7AM
County Roads	Anytime

When a state Highway is reduced to a single lane, the Contractor shall provide a minimum clear width of 16 feet to accommodate oversized vehicles. When a county Road is reduced to a single lane, the Contractor shall provide a minimum clear width of 12 feet.

Ramp B (the ramp onto eastbound US 160) and the existing two-lane Bridge over US 550 may be closed for the duration of the project.



### **16.3.5.3 Local Roads**

Any and all variances for local Street lane closures and lane reductions shall be approved by the respective jurisdiction.

## **16.4 Construction Requirements**

### **16.4.1. Temporary Traffic Control Devices**

The Contractor shall install, maintain, and remove all temporary traffic control devices.

#### **16.4.1.1 Construction Signing**

Construction signing within the Project limits and all detours shall comply with CDOT *Standard Specifications*, the MUTCD, and all other applicable standards. The Contractor shall maintain all existing guide signs, warning signs, and regulatory signs during construction. Construction signing and construction signing maintenance shall be the responsibility of the Contractor.

All signs in place for more than 3 Days shall be post-mounted.

#### **16.4.1.2 Temporary Barriers**

The Contractor shall maintain a clear zone in accordance with the AASHTO *Roadside Design Guide*. When clear zone cannot be obtained, the Contractor shall use barriers to positively separate traveled lanes from Work zones. All Work zone traffic control devices, barriers, crash cushions, and impact attenuators shall meet National Cooperative Highway Research Program (NCHRP) 350 Test Level 3 requirements.

Temporary barriers within the Project limits and all detours shall comply with CDOT *Standard Specifications*, CDOT *M&S Standards*, and the AASHTO *Roadside Design Guide*. All barrier termini within the clear zone shall have an end treatment. A barrier is to be installed per CDOT Standard M-606-14 when adjacent to roadside Work zone, obstructions, obstacles, hazards, and vertical drop-offs. Temporary barriers shall be located so as to not negatively affect temporary drainage in current or future phases. Pinning of temporary barriers into new permanent pavement will not be allowed.

#### **16.4.1.3 Temporary Marking Paint and Signs**

The Contractor shall furnish, apply, and remove temporary pavement marking paint in accordance with CDOT *Standard Specifications*. Temporary paint striping shall meet the conformity of lines (including no overspray), dimensions, patterns, locations, retroreflectivity, and details established in the Contractor's TCP and MHT.

All temporary edge line shall be a minimum of 4 inches wide.

1. Temporary pavement paint striping shall be restriped as required to meet retroreflectivity standards and maintain safe traffic operations.
2. Hydroblasting, or other methods that do not result in scaring of permanent pavements shall be used for removal of temporary striping.
3. For temporary alignments in place for 3 months or more, modified epoxy striping shall to be used.

Barrier reflector strips shall be installed on all temporary barrier when barrier is within 4 feet of the traffic, per the CDOT Standard S-612-1. The spacing between each 3-foot panel shall be no more than 50 feet.

Delineation shall be placed and maintained through all phases of Work, including lighted areas.

#### **16.4.1.4 Temporary Traffic Signals**

Temporary traffic signals shall comply with the Project Special Provisions in Section 16.6.

#### **16.4.2. Maintenance of Temporary Traffic Control Devices**

The Contractor shall be responsible for the maintenance of all temporary traffic control devices within the Project limits, including the local Street and county Road systems. All traffic control devices shall meet MUTCD requirements, including retroreflectivity standards, and shall meet the acceptable standard as defined by the ATSSA *Quality Guidelines for Work Zone Traffic Control Devices*. All devices shall be cleaned a minimum of every 2 weeks.

#### **16.4.3. Detour Pavement**

The Contractor shall provide a paved surface for all detours. Design and construction of detour pavement shall conform to the requirements of Book 2, Section 10. Detour pavement locations shall be generally described in the Contractor's TMP and detailed in the Accepted TCP.

The Contractor shall maintain the detour pavement for the entire period that it is open to the traveling public, including all temporary approaches, accesses, crossings, and intersections with adjacent Roads and Streets. Detour pavements shall be maintained in good operating condition devoid of potholes, uneven surfaces, and rutting. CDOT may direct the Contractor to repair or replace detour pavements if, at CDOT's sole discretion, detour pavements are determined to be in poor condition. Detours that use existing Roads shall be subject to pavement repair or replacement where it is determined that the condition of the existing pavement has noticeably deteriorated over the duration of its use as a detour.

The Contractor shall be responsible for the complete removal, regrading, revegetation, and disposal of all temporary detour pavement.

#### **16.4.4. Queue Delays During Construction**

The Contractor shall monitor queue lengths and durations on all Roads within the Project limits whenever a lane closure is in effect. If the queue times exceed 20 minutes, the Contractor shall notify CDOT and adjust the detours, lane closures, and traffic control devices, including advanced warning signage, to minimize delay. If queue lengths extend beyond the location of the advance warning signs, the Contractor shall adjust the detours, lane closures, traffic control devices, including advanced warning signage; and shall provide advance warning to motorists of stopped traffic.

#### **16.4.5. Working Time Violation Incidents**

If there is a violation of the working time limitations for traffic control as allowed for in this Section 16, the contractor will first be issued a written notice to stop Work at the start of the next Day. Work shall not resume until the Contractor ensures CDOT, in writing, there will not be a reoccurrence of the working time violation. Subsequent Incidents, beyond this first written notice, will be assessed a price reduction. The working time violation incident (WTVI) price reduction charges shall be reflected on the Contractor's Monthly Invoice. Price reductions will not be considered a penalty, but will be a price reduction for failure to perform traffic control in compliance with the Contract.

A WTVI is any violation up to 30 minutes in duration. Each 30 minutes or increment thereof will be considered a WTVI. A price reduction will be assessed for each successive or cumulative 30-minute period in violation of the working time limitations, as determined by CDOT.

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WTVI charges shall be as follows:

1. \$1,200 per WTVI for US 550 and US 160
2. \$600 per WTVI for CR 220 and CR 219

**16.4.6. Uniformed Traffic Control**

The Contractor shall contract with the Colorado State Patrol for uniform traffic control services and vehicles needed or desired in the execution of the Work. The Contractor shall provide a copy of the Contract with Colorado State Patrol to CDOT for review.

**16.5 Deliverables**

The Contractor shall submit the following to CDOT (and Local Agencies when applicable) for Review, Acceptance, or Approval:

**Table 16-5 Deliverables**

<b>Deliverable</b>	<b>Review, Acceptance, or Approval</b>	<b>Schedule</b>
Transportation Management Plan (TMP)	Acceptance	Prior to NTP2
TMP task force members	Acceptance	Within 30 Days after NTP1
Requests to CDOT for modifications to VMS messages	Review	By 10:30 a.m. on Thursday of the week prior to when the VMS boards will be needed
Incident Management Plan (IMP)	Acceptance	Within 30 Days after ENTP
CDOT Form 568 for temporary speed reduction	Approval	7 Days prior to the date when speed reduction is to be implemented.
Traffic Control Plan (TCP)	Acceptance	At least 14 Days prior to implementation of each TCP
Method of Handling Traffic (MHT)	Acceptance	At least 5 Days prior to implementation of each MHT
Maintenance of Traffic (MOT) Variance request	Approval	14 Days prior to implementation of MOT
Lane closure request	Acceptance	7 Days prior to implementation of closure

**16.6 Project Special Provisions**

The following Project Special Provisions supplement or modify the CDOT *Standard Specifications for Road and Bridge Construction* and take precedence over the CDOT *Standard Specifications* and plans. The Contractor is responsible to have a copy of the CDOT *Standard Specifications* at all times on the Project Site.

**Index of Project Special Provisions**

Revision of Section 630                      Traffic Signal (Temporary)

**REVISION OF SECTION 630  
TRAFFIC SIGNAL (TEMPORARY)**

Section 630 of the Standard Specifications is hereby revised for projects as follows:

In subsection 630.01 shall include the following:

This work consists of furnishing and installing, temporary, portable traffic signals to control one lane alternating traffic as shown on the Contractor's approved plans or MHTs. The work includes, all equipment, labor, signage and materials to install and maintain a complete and operational system that accommodates the variations in traffic flow and removal of the installation.

The Contractor shall develop a maximum of six traffic signal timing plans based on current traffic count data, for review and approval by CDOT and shall be responsible for implementing the timing and maintaining the traffic signals. Timing plans shall include provisions for weekend and weekday traffic variations and provide sufficient clearance time for vehicles through the work zone.

Subsection 630.04 shall include the following:

The Traffic Signal (Temporary) shall consist of a pair of portable traffic signals capable of radio communication, microwave or video vehicle detection for actuation, hardwire or CDOT approved interconnect method, multiple timing plans, manual operation and a paging system. The signals shall operate by connection to a local power line with a transfer switch connecting the load to the power line when energized and disconnecting from the power line when power fails and connecting to the solar or generator power operation with battery back-up that will provide a minimum of five days of continuous operation. All electrical wiring, including connectors and switch controls necessary to allow all signal functions required by the specification shall be provided with each system. The Contractor shall maintain one operating and parts manual, wiring diagrams, and trouble-shooting guide for each system. The portable traffic signal system shall be capable of maintaining operations at a temperature range of -60 degrees Celsius to 200 degrees Celsius.

The Traffic Signal (Temporary) shall be in satisfactory operating condition prior to installation. The Contractor shall demonstrate the satisfactory operating condition by operating the system prior to closing the road to one lane of traffic. The Contractor shall maintain and replace the Traffic Signal (Temporary) if the unit fails to operate satisfactorily to CDOT and shall be retested until a satisfactorily operating Traffic Signal (Temporary) is obtained and installed. The unit shall be kept in satisfactory operating condition during the duration of its use. The unit shall remain in place or remain available until all the work is completed at each location that requires one-lane operation or as deemed necessary by CDOT. The Traffic Signal (Temporary) shall include adequate spare parts and a source of replacement components such that the system is in operation continuously.

Subsection 630.10 shall include the following:

- (4) MHT's detailing the portable traffic signals for one-lane alternating traffic, shall include provisions for the CDOT prequalified traffic signal contractor to be onsite during initial operation until traffic is serviced to the satisfaction of CDOT. The signal systems shall also be checked a minimum of daily for proper operation. Vehicle queue lengths shall not exceed 1000 feet and queued vehicles should clear the signal within two (2) cycles. The Contractor shall be on-site during both Friday and Sunday afternoons from 12 pm to 8 pm, or as directed by CDOT, during the first month of one-lane alternating traffic for observation, maintenance and troubleshooting, including timing plan adjustments and queue dissipation by manual override. If issues continue beyond the first

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month, the contractor shall be onsite as listed above, until the issues are resolved to the satisfaction of CDOT. The Contractor shall also provide two signs (24 inches x 36 inches) that shall be placed near each signal that provides a 7-day, 24 hour number that can be called if the signal malfunctions. The Contractor shall respond to signal malfunctions and arrive on-site within 1 hour of notification and shall establish traffic control with the use of flaggers. Flagger control of the site shall remain in place until the traffic signal has been restored and demonstrates satisfactory operation.

Flaggers shall control traffic during initial turn on of the signal. The flaggers shall remain on standby for 2 hours after the signal is turned on and operating properly.