Job No.: J4I3331
Route: I-635
County: Platte

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

(Job Special Provisions shall prevail over General Special Provisions whenever in conflict therewith.)

Job No.: J4I3331
Route: I-635
County: Platte

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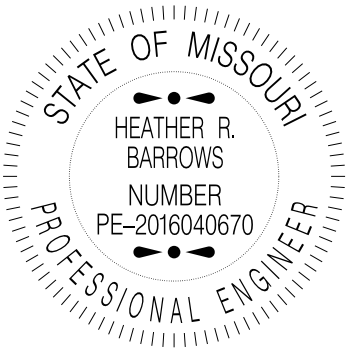
<tr>
<td> 

THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</td>
<td>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 W. CAPITOL AVE.
JEFFERSON CITY, MO 65102
Phone 1-888-275-6636

If a seal is present on this sheet, JSP's have been electronically sealed and dated.

JOB NUMBER: J4I3331
PLATTE COUNTY, MO
DATE PREPARED: Sept. 15, 2021

ADDENDUM DATE:</td>
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<td colspan="2">Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: All</td>
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Job No.: J4I3331
Route: I-635
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JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02G

1.0 Description. The Federal Government is participating in the cost of construction of this project. All applicable Federal laws, and the regulations made pursuant to such laws, shall be observed by the contractor, and the work will be subject to the inspection of the appropriate Federal Agency in the same manner as provided in Sec 105.10 of the Missouri Standard Specifications for Highway Construction with all revisions applicable to this bid and contract.

1.1 This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT", "Contractor Resources". Effective Wage Rates will be posted 10 days prior to the applicable bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

1.2 The following documents are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT"; "Standards and Specifications". The effective version shall be determined by the letting date of the project.

General Provisions & Supplemental Specifications

Supplemental Plans to July 2021 Missouri Standard Plans
For Highway Construction

These supplemental bidding documents contain all current revisions to the published versions and have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

B. Contract Liquidated Damages JSP-13-01B

1.0 Description. Liquidated Damages for failure or delay in completing the work on time for this contract shall be in accordance with Sec 108.8. The liquidated damages include separate amounts for road user costs and contract administrative costs incurred by the Commission.

2.0 Period of Performance. Prosecution of work is expected to begin on the date specified below in accordance with Sec 108.2. Regardless of when the work is begun on this contract, all work shall be completed on or before the date specified below. Completion by this date shall be in accordance with the requirements of Sec 108.7.1.

Notice to Proceed: January 31, 2022
Completion Date: November 4, 2022

2.1 Calendar Days. The count of calendar days will begin on the date the contractor starts any construction operations on the project.

Job Number	Calendar Days	Daily Road User Cost
J4I3331	102	$9,800

3.0 Liquidated Damages for Contract Administrative Costs. Should the contractor fail to complete the work on or before the completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged contract administrative liquidated damages in accordance with Sec 108.8 in the amount of **$1,500** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the above specified completion date or calendar days.

4.0 Liquidated Damages for Road User Costs. Should the contractor fail to complete the work on or before the completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged road user costs in accordance with Sec 108.8 in the amount specified in Section 2.1 for each calendar day, or partial day thereof, that the work is not fully completed. These damages are in addition to the contract administrative damages and any other damages as specified elsewhere in this contract.

C. Liquidated Damages Specified (Ramp NB I-635 to SB MO 9)

1.0 Description. If the closure of Ramp NB I-635 to SB MO 9 for the construction of Permanent Concrete Traffic Barrier and Shoulder Reconstruction is in not complete and open to traffic after 1 week (seven days) then, the Commission, the traveling public, and state and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost, traffic congestion and motorist delay, with its resulting cost to the traveling public. These damages are not reasonably capable of being computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of $2,300 per day for each full day that the closure of Ramp NB I-635 to SB MO 9 is not open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of excess closure time.

1.1 The said liquidated damages specified will be assessed regardless of whether it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction, as amended elsewhere in this contract.

D. Work Zone Traffic Management

1.0 Description. Work zone traffic management shall be in accordance with applicable portions of Division 100 and Division 600 of the Standard Specifications, and specifically as follows.

1.1 Maintaining Work Zones and Work Zone Reviews. The Work Zone Specialist (WZS) shall maintain work zones in accordance with Sec 616.3.3 and as further stated herein. The WZS shall coordinate and implement any changes approved by the engineer. The WZS shall ensure all traffic control devices are maintained in accordance with Sec 616, the work zone is operated within the hours specified by the engineer, and will not deviate from the specified hours without prior approval of the engineer. The WZS is responsible to manage work zone delay in accordance with these project provisions. When requested by the engineer, the WZS shall submit a weekly report that includes a review of work zone operations for the week. The report shall identify any problems encountered and corrective actions taken. Work zones are subject to unannounced inspections by the engineer and other departmental staff to corroborate the validity of the WZS's review and may require immediate corrective measures and/or additional work zone monitoring.

1.2 Work Zone Deficiencies. Failure to make corrections on time may result in the engineer suspending work. The suspension will be non-excusable and non-compensable regardless if road user costs are being charged for closures.

2.0 Traffic Management Schedule.

2.1 Traffic management schedules shall be submitted to the engineer for review prior to the start of work and prior to any revisions to the traffic management schedule. The traffic management schedule shall include the proposed traffic control measures, the hours traffic control will be in place, and work hours.

2.2 The traffic management schedule shall conform to the limitations specified in Sec 616 regarding lane closures, traffic shifts, road closures and other width, height and weight restrictions.

2.3 The engineer shall be notified as soon as practical of any postponement due to weather, material, or other circumstances.

2.4 In order to ensure minimal traffic interference, the contractor shall schedule lane closures for the absolute minimum amount of time required to complete the work. Lanes shall not be closed until material is available for continuous construction and the contractor is prepared to diligently pursue the work until the closed lane is opened to traffic.

2.5 Traffic Congestion. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of 10 minutes to prevent congestion from escalating to 15 minute or above threshold. If disruption of the traffic flow occurs and traffic is backed up in queues of 15 minute delays or longer, then the contractor shall immediately review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable.

2.5.1 Traffic Safety.

2.5.1.1 Recurring Congestion. Where traffic queues routinely extend to within 1000 feet of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet of the ROAD WORK AHEAD, or similar, sign on an undivided highway, the contractor shall extend the advance warning area, as approved by the engineer.

2.5.1.2 Non-Recurring Congestion. When traffic queues extend to within 1000 feet of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet of the ROAD WORK AHEAD, or similar, sign on an undivided highway infrequently, the contractor shall deploy a means of providing advance warning of the traffic congestion, as approved by the engineer. The warning location shall be no less than 1000 feet and no more than 0.5 mile in advance of the end of the traffic queue on divided highways and no less than 500 feet and no more than 0.5 mile in advance of the end of the traffic queue on undivided highways.

3.0 Work Hour Restrictions.

3.1 Except for emergency work, as determined by the engineer, and long term lane closures required by project phasing, all lanes shall be scheduled to be open to traffic during the five major holiday periods shown below, from 12:00 noon on the last working day preceding the holiday until 6:00 a.m. on the first working day subsequent to the holiday unless otherwise approved by the engineer.

Memorial Day
Labor Day
Thanksgiving
Christmas
New Year's Day

3.1.1 Independence Day. The lane restrictions specified in Section 3.1 shall also apply to Independence Day, except that the restricted periods shall be as follows:

12:00 noon July 2, 2021 – 6:00 a.m. July 6, 2021
12:00 noon July 1, 2022 – 6:00 a.m. July 5, 2022
12:00 noon June 30, 2023 – 6:00 a.m. July 5, 2023

3.2 The contractor shall not perform any construction operation on the active lanes, during restricted periods, holiday periods or other special events specified in the contract documents.

3.3 Any work requiring a reduction in the number of through lanes of traffic shall be completed during nighttime hours. Nighttime hours shall be considered to be 7:00 p.m. to 6:00 a.m. for this project.

3.4 The contractor shall not alter the start time, ending time, or a reduction in the number of through lanes of traffic or ramp closures without advance notification and approval by the engineer. The only work zone operation approved to begin 30 minutes prior to a reduction in through traffic lanes or ramp closures is the installation of traffic control signs. Should lane closures be placed or remain in place, prior to the approved starting time or after the approved ending time, the Commission, the traveling public, and state and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost, traffic congestion and motorist delays, with a resulting cost to the traveling public. These damages are not easily computed or quantified. Therefore, the contractor will be charged with liquidated damages

specified in the amount of **$1000 per 15 minute increment** for each 15 minutes that the temporary lane closures are in place and not open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of unapproved closure time.

3.4.1 The said liquidated damages specified will be assessed regardless if it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction, as amended elsewhere in this contract.

4.0 Detours and Lane Closures.

4.1 When a changeable message sign (CMS) is provided, the contractor shall use the CMS to notify motorists of future traffic disruption and possible traffic delays one week before traffic is shifted to a detour or prior to lane closures. The CMS shall be installed at a location as approved or directed by the engineer. The CMS shall be capable of communication with the Transportation Management Center (TMC), if applicable, prior to installation on right of way. All messages planned for use in the work zone shall be approved and authorized by the engineer or its designee prior to deployment. When permanent dynamic message signs (DMS) owned and operated by MoDOT are located near the project, they may also be used to provide warning and information for the work zone. Permanent DMS shall be operated by the TMC, and any messages planned for use on DMS shall be approved and authorized by the TMC at least 72 hours in advance of the work.

4.2 At least one lane of traffic in each direction shall be maintained at all times except for brief intervals of time required when the movement of the contractor's equipment will seriously hinder the safe movement of traffic. Periods during which the contractor will be allowed to interrupt traffic will be designated by the engineer.

5.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials, or time required to fulfill the above provisions, unless specified elsewhere in the contract document. All authorized changes in the traffic control plan shall be provided for as specified in Sec 616.

E. Emergency Provisions and Incident Management

1.0 The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from law enforcement or other emergency agencies for incident management. In case of traffic accidents or the need for law enforcement to direct or restore traffic flow through the job site, the contractor shall notify law enforcement or other emergency agencies immediately as needed. The area engineer's office shall also be notified when the contractor requests emergency assistance.

2.0 In addition to the 911 emergency telephone number for ambulance, fire or law enforcement services, the following agencies may also be notified for accident or emergency situation within the project limits.

Missouri Highway Patrol 816-524-9200	
Riverside, MO	**Platte County Sheriff**
Fire: 816-372-9024	816-858-2232
Police: 816-741-0895	

2.1 This list is not all inclusive. Notification of the need for wrecker or tow truck services will remain the responsibility of the appropriate law enforcement agency.

2.2 The contractor shall notify law enforcement and emergency agencies before the start of construction to request their cooperation and to provide coordination of services when emergencies arise during the construction at the project site. When the contractor completes this notification with law enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

3.0 No direct pay will be made to the contractor to recover the cost of the communication equipment, labor, materials, or time required to fulfill the above provisions.

F. Project Contact for Contractor/Bidder Questions

All questions concerning this project during the bidding process shall be forwarded to the project contact listed below.

Heather Barrows, Project Contact
Kansas City District
600 NE Colbern Road
Liberty, MO 64086

Telephone Number: 816-607-2209
Email: heather.barrows@modot.mo.gov

All questions concerning the bid document preparation can be directed to the Central Office – Design at (573) 751-2876.

G. Supplemental Revisions JSP-18-01R

Compliance with 2 CFR 200.216 – Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment.

The Missouri Highways and Transportation Commission shall not enter into a contract (or extend or renew a contract) using federal funds to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as substantial or as critical technology as part of any system where the video surveillance and telecommunications equipment was produced by Huawei Technologies Company, ZTE Corporation, Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

Stormwater Compliance Requirements

1.0 Description. This provision requires the contractor to provide a Water Pollution Control Manager (WPCM) for any project that includes land disturbance on the project site and the total area of land disturbance, both on the project site, and all Off-site support areas, is one (1) acre or more. Regardless of the area of Off-site disturbance, if no land disturbance occurs on the project site, these provisions do not apply. When a WPCM is required, all sections within this provision shall be applicable, including assessment of specified Liquidated Damages for failure to correct Stormwater Deficiencies, as specified herein. This provision is in addition to any other stormwater, environmental, and land disturbance requirements specified elsewhere in the contract.

1.1 Definitions. The project site is defined as all areas designated on the plans, including temporary and permanent easements. The project site is equivalent to the "permitted site", as defined in MoDOT's State Operating Permit. An Off-site area is defined as any location off the project site the contractor utilizes for a dedicated project support function, such as, but not limited to, staging area, plant site, borrow area, or waste area.

1.2 Reporting of Off-Site Land Disturbance. If the project includes any planned land disturbance on the project site, prior to the start of work, the contractor shall submit a written report to the engineer that discloses all Off-site support areas where land disturbance is planned, the total acreage of anticipated land disturbance on those sites, and the land disturbance permit number(s). Upon request by the engineer, the contractor shall submit a copy of its land disturbance permit(s) for Off-site locations. Based on the total acreage of land disturbance, both on and Off-site, the engineer shall determine if these Stormwater Compliance Requirements shall apply. The Contractor shall immediately report any changes to the planned area of Off-site land disturbance. The Contractor is responsible for obtaining its own separate land disturbance permit for Off-site areas.

2.0 Water Pollution Control Manager (WPCM). The Contractor shall designate a competent person to serve as the Water Pollution Control Manager (WPCM) for projects meeting the description in Section 1.0. The Contractor shall ensure the WPCM completes all duties listed in Section 2.1.

2.1 Duties of the WPCM:

(a) Be familiar with the stormwater requirements including the current MoDOT State Operating Permit for construction stormwater discharges/land disturbance activities; MoDOT's statewide Stormwater Pollution Prevention Plan (SWPPP); the Corps of Engineers Section 404 Permit, when applicable; the project specific SWPPP, the Project's Erosion & Sediment Control Plan; all applicable special provisions, specifications, and standard drawings; and this provision;

(b) Successfully complete the MoDOT Stormwater Training Course within the last 4 years. The MoDOT Stormwater Training is a free online course available at MoDOT.org;

(c) Attend the Pre-Activity Meeting for Grading and Land Disturbance and all subsequent Weekly Meetings in which grading activities are discussed;

(d) Oversee and ensure all work is performed in accordance with the Project-specific SWPPP and all updates thereto, or as designated by the Engineer;

(e) Review the project site for compliance with the Project SWPPP, as needed, from the start of any grading operations until final stabilization is achieved, and take necessary actions to correct any known deficiencies to prevent pollution of the waters of the state or adjacent property owners prior to the engineer's weekly inspections;

(f) Review and acknowledge receipt of each MoDOT Inspection Report (Land Disturbance Inspection Record) for the Project within forty eight (48) hours of receiving the report and ensure that all Stormwater Deficiencies noted on the report are corrected as soon as possible, but no later than stated in Section 5.0.

3.0 Pre-Activity Meeting for Grading/Land Disturbance and Required Hold Point. A Pre-Activity meeting for grading/land disturbance shall be held prior to the start of any land disturbance operations. No land disturbance operations shall commence prior to the Pre-Activity meeting except work necessary to install perimeter controls and entrances. Discussion items at the pre-activity meeting shall include a review of the Project SWPPP, the planned order of grading operations, proposed areas of initial disturbance, identification of all necessary BMPs that shall be installed prior to commencement of grading operations, and any issues relating to compliance with the Stormwater requirements that could arise in the course of construction activity at the project.

3.1 Hold Point. Following the pre-activity meeting for grading/land disturbance and subsequent installation of the initial BMPs identified at the pre-activity meeting, a Hold Point shall occur prior to the start of any land disturbance operations to allow the engineer and WPCM the time needed to perform an on-site review of the installation of the BMPs to ensure compliance with the SWPPP is met. Land disturbance operations shall not begin until authorization is given by the engineer.

4.0 Inspection Reports. Weekly and post run-off inspections will be performed by the engineer and each Inspection Report (Land Disturbance Inspection Record) will be entered into a web-based Stormwater Compliance database. The WPCM will be granted access to this database and shall promptly review all reports, including any noted deficiencies, and shall acknowledge receipt of the report as required in Section 2.1 (f.).

5.0 Stormwater Deficiency Corrections. All stormwater deficiencies identified in the Inspection Report shall be corrected by the contractor within 7 days of the inspection date or any extended period granted by the engineer when weather or field conditions prohibit the corrective work. If the contractor does not initiate corrective measures within 5 calendar days of the inspection date or any extended period granted by the engineer, all work shall cease on the project except for work to correct these deficiencies, unless otherwise allowed by the engineer. All impact costs related to this halting of work, including, but not limited to stand-by time for equipment, shall be borne by the Contractor. Work shall not resume until the engineer approves the corrective work.

5.1 Liquidated Damages. If the Contractor fails to complete the correction of all Stormwater Deficiencies listed on the MoDOT Inspection Report within the specified time limit, the Commission will be damaged in various ways, including but not limited to, potential liability, required mitigation, environmental clean-up, fines and penalties. These damages are not reasonably capable of being computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of $2,000 per day for failure to correct one or more of the Stormwater Deficiencies listed on the Inspection Report within the specified time

limit. In addition to the stipulated damages, the stoppage of work shall remain in effect until all corrections are complete.

6.0 Basis of Payment. No direct payment will be made for compliance with this provision.

COVID-19 Safety

1.0 Description. The coronavirus disease 2019 or COVID-19 has reached a pandemic stage across the United States, including the State of Missouri. To reduce the impact of COVID-19 outbreak conditions on businesses, workers, customers and the public, the contractor shall be aware of all COVID-19 guidance from the Center for Disease Control (CDC) and other government health mandates. The contractor shall conduct all operations in conformance with these safety directives. The guidance may change during the project construction and the contractor shall change and adapt their operation and safety protocols accordingly.

2.0 Safety Plan. The contractor shall include these procedures in the project safety plan as called for in the contract documents and revise the safety plan as needed.

3.0 Essential Work. In accordance with any state or local Stay at Home Order, care for the infrastructure has been deemed essential and MoDOT is moving forward with construction projects, this project is considered essential and the contractor and their employees, subcontractors and suppliers are considered essential business and performing essential functions.

4.0 Basis of Payment. Compliance with regulations and laws pertaining to COVID-19 is covered under Sec 107 of the Missouri Standard Specifications for Highway Construction. No direct payment will be made for compliance with this provision.

Anti-Discrimination Against Israel Certification

By signing this contract the Company certifies it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel, companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel, or persons or entities doing business in the State of Israel as defined by Section 34.600 RSMo. This certification shall not apply to contracts with a total potential value of less than One Hundred Thousand Dollars ($100,000) or to contractors with fewer than ten (10) employees.

H. Contractor Quality Control and Daily Reporting

1.0 The contractor shall perform Quality Control (QC) testing and reporting in accordance with the specifications and as specified herein. The contractor shall submit a Quality Control Plan (QC Plan) to the engineer for approval that includes all items listed in Section 2.0, prior to beginning work.

2.0 Quality Control Plan.

(a) The name and contact information of the person in responsible charge of the QC testing.

(b) A list of the QC technicians who will perform testing on the project, including the fields in which they are certified to perform testing.
(c) A proposed independent third party testing firm for dispute resolution, including all contact information.
(d) A list of Hold Points, when specified by the engineer.
(e) The MoDOT Standard Inspection and Testing Plan (ITP). This shall be the version that is posted at the time of bid on the MoDOT website (www.modot.org/quality).

3.0 Quality Control Testing and Reporting. Testing shall be performed per the test method and frequency specified in the ITP. All personnel who perform sampling or testing shall be certified in the MoDOT Technician Certification Program for each test that they perform.

3.1 Reporting of Test Results. All QC test reports shall be submitted as soon as practical, but no later than the day following the test. Test data shall be immediately provided to the engineer upon request at any time, including prior to the submission of the test report. No payment will be made for the work performed until acceptable QC test results have been received by the engineer and confirmed by QA test results.

3.1.1 Test results shall be reported on electronic forms provided by MoDOT. Forms and Contractor Reporting Excel2Oracle Reports (CRE2O) can be found on the MoDOT website. All required forms, reports and material certifications shall be uploaded to a Microsoft SharePoint® site provided by MoDOT, and organized in the file structure established by MoDOT.

3.2 Non-Conformance Reporting. A Non-Conformance Report (NCR) shall be submitted by the contractor when the contractor proposes to incorporate material into the work that does not meet the testing requirements or for any work that does not comply with the contract terms or specifications.

3.2.1 Non-Conformance Reporting shall be submitted electronically on the Non-Conformance Report form provided on the MoDOT Website. The NCR shall be uploaded to the MoDOT SharePoint® site and an email notification sent to the engineer.

3.2.2 The contractor shall propose a resolution to the non-conforming material or work. Acceptance of a resolution by the engineer is required before closure of the non-conformance report.

3.3 Contractor Daily Work Reporting. The contractor shall submit to the engineer a Contractor Daily Work Report (CDWR) for each calendar day that work is performed. The CDWR shall include all information listed in 3.3.2.

3.3.1 The CDWR information may be provided on the MoDOT-provided form or an approved contractor form. Each CDWR shall be digitally signed by the contractor and uploaded to the MoDOT SharePoint® site no later than two (2) business days following the end of each week.

3.3.2 CDWR information:
(a) Date and Contract Identification Number
(b) Weather conditions, rainfall amounts, high/low ambient temperatures
(c) List of subcontractors who performed work
(d) Description of all work performed, including general location (ex. Sta, offset, log mile, etc.), and any testing performed.
(e) Date range of days when no work was performed since the previous DWR

(f) Pertinent traffic control information (changes, delays, accidents, etc.)
(g) Statement: “All items installed meet or exceed contract requirements.”

4.0 Work Planning and Scheduling.

4.1 Two-week Schedule. Each week, the contractor shall submit to the engineer a schedule that outlines the planned project activities for the following two-week period. The two-week schedule shall detail all work and traffic control events planned for that period and any Hold Points specified by the engineer.

4.2 Weekly Meeting. When work is active, the contractor shall hold a weekly project meeting with the engineer to review the planned activities for the following week and to resolve any outstanding issues. Attendees shall include the engineer, the contractor superintendent or project manager and any foreman leading major activities. This meeting may be waived when, in the opinion of the engineer, a meeting is not necessary. Attendees may join the meeting in person, by phone or video conference.

4.3 Pre-Activity Meeting. A pre-activity meeting is required in advance of the start of each new activity, except when waived by the engineer. The purpose of this meeting is to review construction details of the new activity. Discussion topics should include: safety precautions, QC testing, traffic impacts, and any required Hold Points.

4.4 Hold Points. Hold Points are events that require approval by the engineer prior to continuation of work. Hold Points occur at definable stages of work when, in the opinion of the engineer, a review of the preceding work is necessary before continuation to the next stage.

4.4.1 A list of typical Hold Point events is available on the MoDOT website. Use of the Hold Point process will only be required for the project-specific list of Hold Points, if any, that the engineer submits to the contractor in advance of the work. The engineer may make changes to the Hold Point list at any time.

4.4.2 Prior to all Hold Point inspections, the contractor shall verify the work has been completed in accordance with the contract and specifications. If the engineer identifies any corrective actions needed during a Hold Point inspection, the corrections shall be completed prior to continuing work. The engineer may require a new Hold Point to be scheduled if the corrections require a follow-up inspection. Re-scheduling of Hold Points require a minimum 24-hour advance notification from the contractor unless otherwise allowed by the engineer.

5.0 Quality Assurance Testing and Inspection. MoDOT will perform quality assurance testing and inspection of the work, except as specified herein. The contractor shall utilize the inspection checklists provided in the ITP as a guide to minimize findings by MoDOT inspection staff. Submittal of completed checklists is not required, except as specified in 5.1.

5.1 Inspection and testing required in the production of concrete for the project shall be the responsibility of the contractor. Submittal of the 501 Concrete Plant Checklist is required.

6.0 Basis of Payment. No direct payment will be made for compliance with this provision.

I. Traffic Signal Controller

1.0 Description. The Kansas City district is developing a plan to update all signal controllers in the district to utilize TransSuite.

1.1 All traffic signal controllers purchased and installed on this project shall be selected from the list below and match the cabinet type indicated on the Quantity Sheets for each intersection(s). These are the only controllers that are fully functional with the version of TransSuite that the Kansas City district is currently operating (TCS 16.2.2):

Controller/Firmware Type	Firmware Supported	Cabinet Type
Eagle SEPAC	4.57	NEMA
Econolite Cobalt	2.65.30 or newer	NEMA
Econolite ASC/3	2.65.30 or newer	NEMA
Intelight X1	1.9.6	NEMA
Intelight X1L	1.9.6	NEMA
Intelight X2	1.9.6	NEMA
Intelight X3	1.9.6	NEMA

1.2 The contractor shall install a new 18-inch riser on the new cabinet. There will be no direct pay for said riser.

2.0 Basis of Payment.

Payment will be made, at the contract unit bid price, for each of the pay items shown in the contract. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

J. Accessible Pedestrian Signals (Pushbuttons)

1.0 General. Furnish weatherproof, vandal resistant Accessible Pedestrian Signals (Pushbuttons) that are secure from electrical shock to the user and conform to the following:

A. Manual on Uniform Traffic Control Devices (MUTCD) Chapter 4E.
B. PROWAG 2007 R306.

2.0 Materials. The items furnished and installed under this contract shall be new and the latest product in production for commercial trade, and shall be of the highest quality as to materials used and workmanship. Manufacturer(s) furnishing these items shall be experienced in design and construction of such items and shall furnish evidence of having supplied similar items which have been in successful operation. The bidder shall be an established supplier of the items bid.

Service information shall be furnished consisting of schematics, parts locators, parts lists and trouble-shooting guide.

3.0 System Operations Requirements.

3.1 Shall have confirmation of button activation (Push) via latching LED, sound, and vibrotactile bounce.

3.2 Shall have a standard locating tone with a nominal duration of 0.15 seconds repeated at 1 second intervals which automatically adjusts to ambient background noise.

3.3 Shall be able to program the device to broadcast a beaconing tone during the pedestrian clearance phase.

3.4 Shall broadcast a percussive tone which consists of multiple frequencies with dominant component at 880Hz or broadcast a standard voice message during the walk interval.

3.5 Shall have a Vibrating button during the walk interval.

3.6 Shall be capable of a standard locating tone, custom sound, or verbal count down during the pedestrian clearance phase.

3.7 Shall support custom voice messages, tones, and sounds.

3.8 Shall support up to two (2) languages for speech messages.

3.9 Shall have all sounds adjust automatically to ambient noise levels up to a maximum volume of 100dBA.

3.10 Shall have minimum and maximum levels independently set for all audible features on each button.

3.11 Shall have all sounds emitted by the APS at an intersection synchronized.

3.11.1 Push button locate tones are exempt from this requirement.

3.12 May provide the capability that an extended button push can turn on, boost and /or mute all sounds except those on activated crosswalk.

3.13 Shall provide for emergency messages.

3.14 The tone or voice message shall be provided during the walk display as indicated on the plans or as directed by the Traffic Engineer.

3.15 The bolt pattern of the push button station shall be compatible with older push buttons.

4.0 Mechanical Requirements Push Button Station.

4.1 Shall have a housing constructed of aluminum.

4.2 Actuator shall be of the pressure-activated type with essentially no moving parts.

4.3 Shall be black in color, shaped to fit the curvature of the post to which it is attached and shall provide a rigid installation.

4.4 Actuator shall be a minimum of 2 inches in diameter, raised, contrast visually with the housing, and be made of brass or corrosion-resistant metal alloy or non-metallic material.

4.5 Tactile arrows shall be located on the pushbutton, have high visual contract, shall be aligned parallel to the direction of travel and be made of brass or corrosion-resistant metal allow or non-metallic material.

4.6 Maximum force of 3.5 pounds shall be required to activate the switch.

4.7 Shall have a solid state, piezo type switch rated at a minimum of 20 million actuations.

5.0 Environmental Requirements Push Button Station.

5.1 Shall be fully operational between -30° F to +165°F (-34° C to +74° C).

5.2 Shall not allow ice to form such to impede the operation of the button.

5.3 Shall have a weatherproof speaker.

5.4 Shall have been field tested in a traffic signal application for a period of at least one (1) Year.

6.0 Electrical Requirements Push Button Station.

6.1 Shall operate at a voltage no greater than 24 volts.

6.2 Shall require only 2 wires to connect to the traffic signal cabinet.

7.0 Pedestrian Information Sign.

7.1 Shall have a pedestrian information sign that is integral to the Pedestrian Push Button Station.

7.2 Shall be 9''x15" R10-3e.

7.3 Shall be in accordance with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) and the Standard Highway Signs and Markings publication.

7.4 Shall be fabricated in accordance with all applicable sections of MoDOT's Standard Specifications for Construction and Standard Plans.

7.5 Shall use flat sheet SH sheeting

8.0 Interface Connection Panel.

8.1 Shall have an interface panel located in the traffic signal cabinet for connecting external APS button connecting wires to the traffic signal cabinet.

9.0 Method of Measurement.

9.1 This item will be measured per each for bid Item No. 902-99.02, "Accessible Pedestrian Signals (Pushbuttons)" and per square foot for Item No. 902-08.33, "SH-Flat Sheet, Signal Sign".

10.0 Basis of Payment.

10.1 The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid at the unit price bid for 902-99.02, "Accessible Pedestrian Signals (Pushbuttons)", per each and 902-08.33 SH-Flat Sheet, per square foot. This price shall be full compensation for furnishing, assembling, and installing the Accessible Pedestrian Signal (Pushbutton), and for all mounting attachments, labor, tools, equipment, and incidentals necessary to complete the work.

K. Pavement Marking Log

1.0 Description. The contractor shall log the locations of existing pavement marking prior to any construction operations that may affect the existing pavement marking. The log shall contain all existing pavement marking and shall include center stripes, no passing stripes, lane lines, turn arrows, hash bars, cross walks, and stop bars. The contractor shall provide a copy of the existing pavement marking log to the engineer. The contractor shall place the new pavement marking at the same locations as the existing pavement marking, unless otherwise directed by the engineer or shown on the plans.

2.0 Basis of Payment. No direct payment will be made for logging of existing pavement marking.

L. Disposition of Existing Signal/Lighting and Network Equipment JSP-15-05A

1.0 Description. All controllers, cabinets, cabinet equipment, network equipment, DMS equipment, antennas, radios, modems, and other equipment noted in the plans shall be removed by the contractor and delivered to the following location:

9101 E. 40th Terrace
Kansas City, MO 64133.
Phone: (816) 356-4748

2.0 Signal Equipment. All equipment removed is to be transported to the address listed above. The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling the phone number listed above and ask for the field traffic supervisor.

3.0 The contractor shall exercise reasonable care in the handling of the equipment during the removal and transportation. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense. The contractor shall dispose of any other equipment. Delivery shall be within 2 working days of removal. All items returned shall be tagged with the date removed, project number and location/intersection.

4.0 Basis of Payment. Payment for removal, handling and transportation of all equipment specified shall be considered completely covered by the contract unit price for 202-20.10, Removal of Improvements, per lump sum.

M. Temporary Short-Term Rumble Strips JSP-13-05E

1.0 Description. The work shall include furnishing, installing, maintaining, removing, and relocating the short-term rumble strips, as shown in the plans, or as designated by the engineer.

2.0 Material.

2.1 The short-term rumble strips shall be 10 to 12 feet in length, minimum of 8 inches wide, ¾ to 1¼ inch thick, fabricated from a polymer material, and orange in color.

2.2 The short term-rumble strips shall not curl or deform across the width of the strip, maintaining its rigidity.

3.0 Construction.

3.1 Each set shall consist of three individual strips spanning a single lane, spaced in accordance with the plans or as directed by the engineer. The short-term rumble strips shall be installed and removed in accordance with manufacturer's recommendation.

3.2 The contractor shall monitor, maintain alignment, and repair if needed the short-term rumble strips during construction. Short-term rumble strips shall not be placed on roadways when there are no workers present.

3.3 Strips shall not extend onto the shoulder without the approval of the Engineer.

4.0 Method of Measurement. Measurement of short-term rumble strips will be based per each set.

5.0 Basis of Payment. The accepted quantity of Temporary Short-Term Rumble Strips sets will be paid for at the contract unit price for 616-20.04, Temporary Short-Term Rumble Strips, per each set. The short-term rumble strips unit bid price shall include the cost of all labor, equipment, and materials to install, maintain, remove, and relocate the rumble strips during the construction of the project.

N. Intelligent Compaction NJSP-18-08C

1.0 Description. This work shall consist of collecting location, temperature, speed, and intelligent compaction measurement values (ICMV) from properly instrumented rollers within the mainline paving limits and then submitting the Intelligent Compaction (IC) Data in the defined format. This provision shall apply for each lift of mainline pavement. This work shall be completed in accordance with the general principles set forth in AASHTO PP81-18 Standard Practice for Intelligent Compaction Technology for Embankment and Asphalt Pavement Applications, and specifically as stated in the following sections.

2.0 IC Asphalt Rollers. All asphalt rollers with the exception of the finish roller shall be properly instrumented. These instrumented rollers will be referred to as IC Rollers. Steel wheel rollers shall be self-propelled double-drum vibratory rollers equipped with accelerometers mounted to acquire signals from the vibratory response in the drum measuring the interactions between the rollers and compacted materials in order to evaluate the applied compaction effort known as the ICMV. Rubber tire rollers will not be required to collect the ICMV. IC Rollers shall

be equipped with non-contact temperature sensors for measuring pavement surface temperatures as well as a Global Positioning System (GPS) to map the roller position history.

3.0 Equipment Accuracy. IC Roller accuracy shall be in accordance with the following.

Operating Parameter	Accuracy
Global Positioning System	±50 mm (±2 in.) in the X and Y Direction
Rolling Speed	±0.5 kph (±0.3 mph)
Frequency	±2 Hz
Amplitude	±0.2 mm (±0.008 in.)
Temperature	±1.5°C (±2.7°F)

4.0 Onboard Unit. The IC Rollers shall include an integrated on-board documentation system that is capable of displaying real-time color-coded maps of IC measurement values including the stiffness response values, roller location, number of roller passes, pavement surface temperatures and line work (alignment file) if applicable. The unit shall display the current value for roller speeds, vibration frequencies and vibration amplitude of the roller drums. The operator shall have the ability to label or select each Layer ID. The display unit shall be capable of transferring the data by means of a USB port to a removable media device or wirelessly to the manufacturer's Cloud storage.

5.0 Software Requirements. The manufacturer's Intelligent Compaction software, or cloud computing, shall map and export gridded all-pass data and resemble PP81 section 4.3.5.2 as much as possible. At minimum, the exported data shall consist of the required fields in Table 5 of PP81 in order to allow adequate filtering in Veta.

6.0 Global Positioning System (GPS). Radio and receiver units shall be mounted on each IC roller to monitor the drum locations and track the number of passes of the rollers. The GPS system shall also meet the following requirements:

(a) Set all GPS devices to the Universal Transverse Mercator (UTM) coordinate system No.15 except for portions of the SE District which are No. 16, regardless of whether GPS or Grid data are originally recorded. If UTM coordinates are not available, use the State Plane coordinate system and designate the appropriate State Plane zone. The recorded coordinates shall be in US survey feet. If an alternate coordinate system is established for the construction of the project, it may be used for the IC.

(b) Provide a GPS system that can be a ground-based base station or Virtual Reference Station (VRS) to achieve Real Time Kinematic Global Positioning Systems (RTK-GPS) accuracy.

(c) Provide GPS receivers on IC Rollers and a hand-held GPS rover that reference to the same ground-based base station channel or have the same VRS subscription.

(d) Provide the recorded GPS data, whether from the IC Rollers or hand-held GPS rovers, in the following formats:

    (i) The time stamp shall be in military format (HHMMSS.SS) in local time zone. Accuracy of 0.01 second is necessary to differentiate sequence of Intelligent Compaction data points during post processing.

(ii) Provide GPS latitudes and longitudes in DDMM.MMMMMMMM or decimal degrees (DD.DDDDDDDD).

(iii) Provide grid coordinates in feet to the nearest 0.1 foot.

7.0 Rover. The contractor shall provide one fully equipped survey grade hand-held GPS rover with RTK for the duration of the contract. The rover may remain in the possession of the contractor but shall be available to the engineer as needed.

7.1 Rover Specifications. The Rover shall read GPS signals L1 C/A, L1/L2 P-Code, and L2C and Glonass signals L1/L2 CA, L1/L2 P-Code. It shall achieve horizontal accuracies of 10mm + 1 ppm RMS and vertical accuracies of 15 mm + 1 ppm RMS in RTK surveys. It shall support Network RTK using NTRIP and have an internal modem with cellular service provided. Single Baseline RTK shall also be supported with an internal UHF Radio. Training shall be provided to ensure that MoDOT personnel shall have enough knowledge of software and hardware to operate the GPS rover.

8.0 Control Points. The contractor shall establish control points on the project at locations necessary to ensure compliance with the outlined provisions.

9.0 Data Management. All submitted files shall be adequately labeled prior to submission as defined in the MoDOT IC-PMTPS Project Protocol.

9.1 Trial Section Data. The results from the trial section shall be recorded on the appropriate spreadsheet and submitted to the engineer within 24 hours of completing the trial section.

9.2 Unfiltered Raw Data. The raw IC data shall be downloaded twice per day day and uploaded to the appropriate MODOT IC SharePoint site before the start of the next day's production.

9.3 Formatted Raw Data. The formatted raw IC data shall be submitted to the engineer before the start of the next day's production. The formatted raw IC data shall be compatible with the latest version of Veta. The data shall include IC data files, core locations/data, and coordinates of daily production boundaries. The GPS and temperature verification data shall be submitted as well in a separate file. Each file shall be labeled in accordance with the current IC-IR naming protocol posted on the IC SharePoint Site.

9.4 Veta Project File. The Veta project file shall include the day's production data and be submitted to the engineer within 36 hours after completion of the day's paving. The valid Veta project file shall contain the day's IC data, core locations and paving boundaries. The IC Data shall include at a minimum roller locations, temperatures, amplitudes, frequencies and speeds as well as ICMV if the accelerometer is used.

9.5 Loss of Data. If data collection ceases as a result of circumstances reasonably beyond the control of the contractor, the contractor will be allowed to continue the days paving without jeopardizing a portion of the lump sum payment for that day. The engineer must be notified immediately of the issue and determine if the contractor has made a reasonable effort to resolve the issue. A meeting with the engineer shall be held to determine how to proceed if the issue is expected to extend into the next day's paving. Failure to notify the engineer of the issue at hand will result in deduction from the lump sum pay item based on the percentage of the data which is lost.

9.6 Summary Report. The Summary Report shall be furnished to the engineer by the contractor two days prior to the 1st and 15th of each month which includes the roller coverage results, classification for each segment, any qualifying GPS obstructions and the mean temperature at the optimum pass count. A copy of the specific version of the Summary Report used for the current construction season can be downloaded from the Construction Forms folder on the IC SharePoint page.

10.0 Daily Verification. The surface temperature sensor and GPS on each IC Roller shall be verified each day, although a record needs only be submitted for the measurements at the start of each week. IC Roller GPS verification shall include verifying a point established by the rover for both X and Y position to an accuracy of +/- 6 Inches. The rover shall be verified for both X and Y position with a control point at the start of each day. The IC roller temperature sensor verification shall be compared with a temperature gun which has been calibrated within the past year. The IC temperatures shall compare to be within 5°F of the temperature gun measurement. A record of each verification shall be submitted to the engineer electronically as soon as possible but no later than the start of the next day's production.

11.0 IC Segments. Each IC Segment shall consist of one day's production.

12.0 Technical Support. Technical Support from the IC roller manufacturer shall include availability on an as-needed basis for the duration of the project at no cost to the Commission. The manufacturer's representative shall provide assistance with setup, verification, data management, operation, and analysis.

13.0 Training. IC training materials are available online and located on the IC SharePoint Site. The IC Quality Control Technician shall review the training materials prior to the start of the project. Equipment operators shall be knowledgeable of the equipment that will be used and trained as needed by the contractor or equipment supplier.

14.0 IC Quality Control Plan. A pre-activity meeting shall be required prior to mainline paving. The IC Quality Control Plan shall be submitted to the engineer at least 2 weeks prior to the mainline paving pre-activity meeting. The plan at minimum shall include the following:

(a) A list of personnel previously trained
(b) Detailed daily verification procedure for checking the RTK-GPS of both the IC roller(s) and rover(s)
(c) Procedure for the construction of the trial section and establishment of the optimum compaction pass count and target IC-MV value
(d) Procedure for downloading IC data from the roller(s)
(e) The procedure for training operators or other project staff
(f) Detailed daily verification procedure for checking the temperature sensor on the IC Roller(s)
(g) The name of the designated IC Quality Control Technician
(h) Procedure for submitting data
(i) Contact information for technical support staff
(j) A list of the control points with either UTM or State Plane Coordinates established by the contactor
(k) The date range when the IC component of the project will be taking place.

15.0 Coring. Cores shall be taken as typically required by the Missouri Standard Specification for acceptance of the pavement. The GPS coordinates of each core shall be collected with an accuracy of +/- 2 inches and submitted to the engineer by the start of the next day's production.

16.0 Daily Production Boundaries. The paving limits of the freshly placed mat shall be collected with an accuracy of +/- 2 inch. The edge of the new paved mainline surface shall be collected at least every 100 feet for curves and every 200 feet for tangent sections. These points shall be used to define the boundaries of each segment.

17.0 Software Access. The contractor shall supply the engineer with the manufacturer's Intelligent Compaction Computer Software 14 days prior to beginning work and until ninety days after completion of all work. If Cloud Storage or Cloud Computing is used, the engineer shall be supplied one user ID with full access for the same time period specified.

18.0 GPS Obstructions. Isolated areas influenced by a GPS obstruction may be excluded from % roller coverage computation provided that the following conditions are satisfied:

1) The position data is present
2) The GPS Reception Mode as recorded by the onsite equipment indicates that a obstruction is present
3) The location is properly flagged in the Veta project file and the location is identified in the bi-weekly report
4) The total of these areas are no more than 5% of any single day's production.

19.0 Trial Section. Mainline paving shall begin with the construction of a trial section for each mix type. One trial section may be constructed for each mix design. The engineer shall be notified at least 48 hours prior to construction of the trial section. The trial section shall be constructed and compacted with the same equipment, progression and methods which will be used during production. The roller speed and frequency used on the trial section shall be maintained during the construction of the project. The trial section shall be constructed with sufficient passes to determine the optimum density. The trial section shall typically be 1000 feet in length, with the last 400 feet being utilized for testing, the width of one lane and shall be constructed as part of the project. Within the 400 feet long testing portion, one Evaluation Location shall be identified for each 100 feet. Flexibility will be allowed up a maximum combined length of 1500 feet in order to facilitate the construction of the trial section. Areas needed beyond the 1500 feet will be assessed as deficient. Each Evaluation Location shall be positioned away from the center of the lane due to potential overlap of roller passes during compaction. After each of the passes, the contractor shall collect a density measurement with a nuclear gauge or an approved alternate density gauge at each Evaluation Location. When approved by the engineer, initial pairs or pass groups may be completed between density measurements. The passes shall be continued until either the pavement density begins to decrease or the density measurement on two consecutive passes are within 0.2%. Following completion of the trial section, a compaction curve shall be constructed from the pass vs. density information. From this curve the optimum number of passes and optimum IC-MV shall be determined from either the peak density versus pass value or from the 0.2% increase pass versus density values. If the 0.2% increase is the determining factor, the pass prior to the 0.2% increase will be used. Cores shall be collected at each Evaluation Location after completion of the recorded passes. The density of each core shall be determined by the contractor and used to correlate with the final density collected from the nuclear gauge. If the density at the optimum pass count is determined to be outside the required acceptance range, then a new trial section shall be initiated. The trial section will not be considered for IC incentive or disincentive

payment up to the 1500 feet maximum length. Acceptance of this area will be made in accordance with section 403.23.7.4 regarding density.

19.1 Optimum Pass Count Refinement. Once the project is underway, changes in operation or roadway characteristics may require refinement of the optimum pass count. With approval of the engineer, an optimum pass count refinement may be scheduled at a predetermined time when the inspector can be in attendance. The refinement shall follow the criteria established in section 19.0 and the results from this refinement will be effective starting the day that the optimum pass count refinement takes place.

20.0 Segment Classification. Passing Segments shall have a minimum of 90% coverage at or above the optimum number of passes. Segments with between 90% and 70% coverage will be called moderate segments. Any segment with less than 70% coverage at the optimum number of passes shall be a Deficient Segment, including areas where data is lost. If 70% of the target IC-MV is not obtained, the segment shall be flagged accordingly in the Veta project file. All segments with a mean temperature of less than 180 F at the optimum pass shall be considered deficient.

21.0 Quality Assurance. Quality Assurance will be performed by means of a Commission-furnished, Commission-retained magnetic GPS system attached to the top of any IC roller. Thermal Sensors may also be installed by means of a magnetic mount. The units will be solar-powered. The contractor shall provide the engineer access to these systems and accommodate the presence of the device on the IC Roller. The engineer will conduct a QA analysis according to the NJSP1808-Form-01-DataQA-Instructions and provide the contractor pass or fail results to be recorded in the Summary Sheet. In the event that a favorable comparison is not obtained, the accuracy of each system shall be verified prior to conflict resolution being initiated. The contractor shall be responsible for not damaging the QA GPS System while on their equipment and in their possession. In the event that the unit is damaged, the contractor shall be responsible for repair or replacement up to $500.

22.0 Basis of Payment. Payment for compliance with this provision will be made at the contract unit price for Item No. 403-10.58, Intelligent Compaction, lump sum. In addition, an incentive payment of $75 per 1000 feet will be made on all Passing Segments and a disincentive deduct of $75 per 1000 feet will be made on all Deficient Segments. No additional payment will be made for the equipment, software, training, survey, analysis, trial section, trial section cores or any other incidentals necessary to complete the work.

Incentive or Disincentive Payment = ((Length of Days Run) / 1000) x $75

O. Paver-Mounted Thermal Profiles NJSP-18-09B

1.0 Description This work shall consist of collecting the paving location, surface temperature and paver stops with a Contractor supplied, Contractor retained Paver-Mounted Thermal Profile System (PMTPS) for each lift of mainline asphalt pavement. The PMTPS shall be used to continually monitor the surface temperature of the mat immediately behind the paver screed during paving operations in order to determine the thermal segregation levels for each sublot. Data from the PMTPS shall be automatically uploaded and processed through a wireless data connection or exported to an USB drive. This work shall be completed in accordance with the general principles set forth in AASHTO PP 80-17 “Standard Practice for Continuous Thermal Profile of Asphalt Mixture Construction”, and specifically as stated in the following sections.

2.0 PMTPS Equipment. The PMTPS shall consist of a temperature scanner/camera, wheel speed/distance sensor, GPS antenna, control panel and necessary cabling. The PMTPS shall measure the surface temperature over the complete paving width. The current position shall be recorded via the GPS antenna. The control panel shall feature the keys and screen displays necessary to control the system as well as the software for data recording and visualization during the paving process. The system shall provide a real-time map of the temperature readings, as well as the total number of sublots in each temperature segregation category. The system shall store the data locally on a memory stick and also upload the data directly to cloud-based software which shall be supplied by the contractor for use on this project. Logon information shall be provided to the engineer for direct access to the cloud storage. In addition, the equipment shall meet the following requirements;

Parameter	**Requirement**
Longitudinal and Lateral Surface	≤ 12.0 inch intervals at all paving speeds
Temperature Readings Footprints	Tolerance: ±1 inch
Surface Temperature Readings	Range: 32°F to 480°F
	Accuracy: ± 6° F
Location (x and y)	Accuracy: ± 4 feet
Ground Distance Sensor	Accuracy: ± 1/1000 feet

3.0 Verification. The system shall have a documented verification before beginning construction and a minimum of once per week for Travel Distance and Temperature.

4.0 PMTPS Training. The PMTPS Technician and individuals performing daily setup of the equipment shall be properly trained. If trained personnel are unavailable PMTPS scanning and mainline paving shall not be performed. The PMTPS Technician shall have completed a qualifying Veta training within the last 2 years.

5.0 Thermal Profile Sublots For each run, the thermal profiles shall be divided into sublots that are 150 ft. in length and of the width placed. Sublots shall not extend over multiple days, different lifts or directions.

6.0 Thermal Segregation Exclude the following surface temperature readings from each sublot: (1) Surface temperature readings less than 180°F; and (2) Surface temperature readings within 2 ft. prior to and 8 ft. after paver stops that are greater than 1 minute in length. The temperature differential is the difference between the surface temperature readings at the 98.5 and 1 percentile in each 150 ft. sublot. The thermal segregation categories are based on the temperature differential as shown in the table below.

Temperature Differential (TD)	**Thermal Segregation Category**
TD ≤25.0 F	Low
25.0 F < TD ≤ 50.0 F	Moderate
TD > 50.0 F	Severe

7.0 Data Management. All of the header inputs shall be correctly entered by the contractor at the start of each run. The Veta Thermal Segregation Report shall be generated and electronically submitted to the engineer for each day before the start of the next day's production, along with the Veta file. Each file shall be labeled with the corresponding production date, direction, starting and ending log mile, and lane according to the MoDOT IC-PMTPS

Protocol. The contractor shall provide to the engineer a Summary Report of the daily Thermal Segregation Reports two days prior to the 1st and 15th of each month for verification. A blank copy of the Summary Report can be found in the construction forms folder on the IC SharePoint page.

8.0 Incentive/Disincentive. Incentive/disincentive adjustments shall be made for each sublot in accordance with the following:

Thermal Segregation Category	Adjustment per 150 ft. Sublot
Low	$7 Incentive
Moderate	No Pay Adjustment
Severe	$7 Disincentive

9.0 Quality Assurance (QA) Testing. The Engineer will record spot temperature readings with a calibrated infrared thermometer. 2 QA test sets each consisting of 3 spot readings at the lane quarter points will be taken for each full production day. The test sets will be taken at random locations. The contractor shall assist the engineer with determining the GPS location of each spot reading location. The recorded temperature shall be within 12°F of the temperature recorded by the thermal scanner for each location. If 4 readings from any 2 consecutive test sets fall outside of the 12°F range, then conflict resolution shall be initiated to determine corrective action.

10.0 Basis of Payment. Payment for compliance with this provision will be made at the Lump Sum Price for Item 403-10.59, Paver-Mounted Thermal Profiles. No additional compensation will be provided to the contractor for any direct or indirect cost, including scheduling delays, associated with the installation of the noted equipment, training or the affiliated data processing.

P. Balanced Mix Design Performance Testing for Job Mix Approval NJSP-21-08

1.0 Description. This work shall consist of providing asphalt mixture in accordance with Sec 403 that meet the minimum Balanced Mix Design (BMD) performance requirements of cracking and rutting resistance. The BMD performance requirements will be applied to SuperPave mainline wearing surface mixtures only. Bituminous binder and base, level course, shoulder, and pavement repair mixtures are excluded from the BMD requirements.

2.0 Performance Testing. Acceptable test results meeting the performance requirements for both Cracking Tolerance Index (CT_{Index}) and Hamburg Wheel Track (HWT) shall be submitted with the mix design for approval. No incentive/disincentive payment will be imposed during production. The performance requirements for each mix type are detailed in the table below:

Performance Criteria / Mix Type	Cracking Tolerance Index (CT_{Index})	Hamburg Wheel Track (HWT)
Non SMA Mixtures	45 minimum	12.5 mm maximum rut depth @ designated wheel passes in Section 5
SMA Mixtures	135 minimum	12.5 mm maximum rut depth @ designated wheel passes in Section 5

Quality Control (QC) and Quality Assurance (QA) sampling and testing shall be conducted and reported. The results will be used for informational purposes only.

The contractor shall conduct Quality Control (QC) testing for the CT_{Index} and HWT at a frequency of 1/10,000 tons for the mainline pavement. The random testing location will be determined by the engineer. The engineer will conduct performance testing at a frequency of 1/20,000 tons for Quality Assurance (QA).

Gyratory compacted samples for the Asphalt Material Performance Tester (AMPT) shall be fabricated at a minimum of once per project or as directed by the engineer.

3.0 Mix Sampling and Preparation. Laboratory mixed samples for mix design submittal shall be short term conditioned in accordance with AASHTO R30 prior to conducting performance testing. Loose mix samples shall be taken from the plant in accordance with AASHTO R 97 and split to the appropriate size in accordance with AASHTO R 47. No conditioning is required on plant mixed samples. Samples shall then be heated to the compaction temperature +/- 3° C prior to compacting necessary samples for QA/QC testing. QA personnel shall be present during the sampling, splitting, and molding process. QC shall fabricate all test specimens. QA will randomly select the specimens to submit to the MoDOT Central Laboratory for performance testing. The following table details the minimum number of specimens required when sampled:

Performance Test	QC Frequency	QA Frequency	Minimum Number of Specimens per Set	Molded Specimen Height (mm)
Cracking Tolerance Index (CT_{Index})	1/10,000 tons	1/20,000 tons	3	62
Hamburg Wheel Track (HWT)	1/10,000 tons	1/20,000 tons	4	62
AMPT Samples	N/A	1/Project	5	180

AMPT samples for BMD research shall be fabricated in accordance with AASHTO PP 99-19, carefully following the exceptions noted herein:

1) Pour the mixture into the center of the mold to minimize air void variation between samples. Pouring material down the sides of the mold will result in lower air voids on that side of the mold.
2) Charge the mold in two equal lifts. After each lift, use the spatula to scrape the walls of the mold, inserting the spatula 8-10 times around the circumference of the mold. Insert the spatula into the center of the mixture 10-12 times in an evenly distributed pattern. Insert the spatula as far as possible into the mixture without damaging aggregates.

3.1 Molding Samples. The specimens shall be compacted to an air void content of 7.0 +/- 0.5% or 6.0 ± 0.5% for SMA mixtures. The gyratory specimen weight for each performance test shall be submitted with the mix design. The compacted test specimens shall be allowed to cool to 25 +/- 3° C prior to determining the air void content.

3.2 Determining Air Voids. The bulk specific gravity of the test specimen will be determined in accordance with AASHTO T166. Specimens shall be air dried for 24 +/- 3 hours before preconditioning the test specimens for CT_{Index} testing. Test specimens shall be preconditioned as specified in the test methods. If a water bath is utilized, it is critical that samples are kept dry.

3.3 Records. Compaction temperature, times in and out of the oven, gyratory specimen weight, and sample identification shall be recorded. The samples shall be shipped in the appropriate containers and submitted to the MoDOT Central Laboratory for performance testing.

4.0 Cracking Tolerance Index (CT_{Index}) Testing. The CT_{Index} testing shall be completed in accordance with ASTM D8225 and at a test temperature of 25 C +/- 1° C.

5.0 Hamburg Wheel Track (HWT). HWT testing will be completed in accordance with AASHTO T324 at test temperature of 50 C and 62 mm specimen height. The following table details the minimum number of wheel passes required.

PG Grade High Temperature *	Minimum Wheel Passes	Maximum Rut Depth (mm)
58S-xx	5,000	12.5
64S-22	7,500	12.5
64H-22	15,000	12.5
64V-22	20,000	12.5

*Determined by the binder grade specified in the contract.

6.0 Basis of Pavement. Payment for compliance with this provision will be made at the contract unit price for Item No. 403-10.57, Asphalt Performance Testing Reporting, lump sum.

Q. Special Consideration of Change Orders and Value Engineering JSP-21-07

1.0 Description. Increased Federal Share has been approved by the FHWA for an innovative technology or practice. The Commission will receive an additional five percent Federal Share of the overall contract value due to innovations within the following pay item(s).

Pay Item Number	Pay Item Description	Innovation
4031058	Intelligent Compaction, lump sum	Intelligent Compaction

Due to the increased Federal Share, the project components related to the innovation(s) described above must be constructed with the materials, quantities, methods and innovations as shown on the project plans and specifications. If the contractor requests materials, quantities, methods, or innovations other than those included in the plans and specifications, the request must be reviewed and approved by the Commission and FHWA. Approved changes to the innovation items above shall be at no additional cost to the Commission and shall not increase the contract time.

2.0 Special Consideration of Change Orders and Value Engineering Change Proposals (VECP). Change ordering and/or value engineering the pay item(s) listed in section 1.0 jeopardize the ability for the Commission to receive an additional Federal Share for the overall contract value. Special consideration should be given to the change order value for removing or modifying such item(s) from the contract ensuring the benefit outweighs the cost.

3.0 Contacting Financial Services. If it is determined that the proposed change order and/or VECP outweighs the additional overall five percent Federal Share value, the Engineer shall notify the MoDOT project manager.

R. Guardrail Grading Requirements JSP-17-02B

1.0 Description. Guardrail installation and grading shall be in accordance with Missouri Standard Specifications for Highway Construction, Missouri Standard Plans for Highway Construction, and as described herein.

2.0 Construction Requirements. When guardrail and/or end treatment removal and replacement requires grading of the shoulder and/or slopes, Section 606.3.1(b), (c), and 606.3.1.1 of the Missouri Standard Specifications shall be waived and the following shall apply:

a) Along roadways and shoulders, remove no more guardrail than can be reconstructed within seven (7) calendar days, including weekends and holidays. The seven day counting period shall start when the first piece of safety hardware is removed.

b) The active work zone area that encompasses the guardrail and/or end treatment reconstruction, shall not exceed one (1) mile in length. The contractor shall be required to provide and maintain approved channelizing devices adjacent to the reconstruction area.

c) Only one-side of the roadway shall be worked on at the same time. Divided facilities shall be limited to work on one-side of each direction at the same time.

d) When the removal of any existing safety hardware device exposes non-breakaway obstacles, the reconstruction of the safety hardware device protecting the obstacle shall be replaced within 48 hours of removal or an approved temporary crashworthy device shall be provided, installed and maintained at the contractor's expense until the non-breakaway obstacle is permanently protected. The 48 hour counting period shall start when the first piece of safety hardware is removed.

e) Areas where guardrail and/or end treatments have been removed, but not yet replaced, shall be delineated in accordance with plans or as directed by the Engineer.

3.0 Non-Compliance. Non-compliance with this provision shall result in the immediate suspension of work in accordance with Sec 105.1.2. No work, including but not limited to additional guardrail removal and grading, shall be allowed to proceed except for work necessary to restore guardrail installation.

4.0 Basis of Payment. No direct payment will be made for compliance with this provision. Guardrail items, grading, and temporary traffic control devices will be paid for as provided in the contract.

S. Modified Linear Grading, Class 2

1.0 Description. This work shall consist of grading work necessary to bring the roadway to the required grade and cross section within reasonable tolerances. The work shall also include the following:

(a) Construction of all inlet and outlet ditches and ditch blocks within the linear grading limits unless otherwise provided for in the contract.

(b) Construction of entrances and approaches.

(c) Breaking up and satisfactory removal or incorporation into the roadway of all gravel, macadam, or bituminous surfaces.

(d) Compaction of the roadway subgrade within linear grading limits.

1.1 Modified Linear Grading, Class 2, shall consist of grading where it is necessary to excavate and haul contractor supplied material to bring the roadway to the desired grade and may involve work on high banks and side hills.

1.2 The class of linear grading designated on the plans will apply only to those sections that have been specifically indicated as such on the plans and will not be subject to change unless approved by the engineer.

2.0 Construction Requirements.

2.1 The roadway shall be brought to the required grade and cross section within reasonable tolerances by backsloping, ditching, removing stone and boulders from the roadbed surface, or any other work necessary, including drifting and hauling of any excavated material. A reasonable tolerance in alignment will be defined as a maximum gradual deviation of 2 feet, free of sharp breaks, to take advantage of favorable topography. Gradual deviation in alignment will be permitted, if necessary, to center an existing drainage structure that is to be used in place. A reasonable tolerance in grade will be defined as a final grade that is uniform in appearance, free of sharp breaks or humps, and within 6 inches of plan grade.

2.2 Stumps, roots, rubbish, or any other deleterious material shall not be placed in embankments. Where an embankment less than 2 feet high is to be constructed, all vegetative matter shall be cut and removed from the surface upon which the embankment is to be placed. The cut-over surface shall be thoroughly broken. All ditches, including inlet and outlet ditches, shall be cut to grades that will properly drain. The required cross section for inlet and outlet ditches leading to or from structures shall be of a width no less than the width of the floor or the diameter of the structure being served. Finishing operations shall continue until the roadbed is free from sharp breaks in alignment and grade, and until the roadbed has been shaped to the required cross section. Material considered unsuitable for the subgrade shall be disposed of on nearby slopes or as otherwise directed by the engineer.

2.3 If obliteration of existing roadways or temporary construction is designated in the contract to be performed on a linear grading basis, such obliteration shall include all operations necessary to fill the ditches and blend the old roadbed with the natural ground to provide a pleasing appearance. Excess material removed under modified linear grading, class 2 shall be hauled off commission owned right-of-way at contractor’s expense.

2.4 Any subgrade upon which a paved surface is to be placed shall be compacted in accordance with Sec 203.5.

3.0 Method of Measurement. Measurement of Modified Linear Grading, Class 2, will be made to the nearest 1/10 station.

3.1 If material is encountered that may be classified as other than Class A Excavation as described in Sec 203.2.1, the limits of linear grading will not be underrun. Material classified as other than Class A Excavation will be measured and paid for per cubic yard in accordance with Sec 203.8. Where undergrading 118 is necessary, backfilling of the undergraded area will be considered as a part of the linear grading operation.

4.0 Basis of Payment. The accepted quantities of linear grading will be paid for at the contract unit price for each of the pay items included in the contract, and will be considered as full compensation for all labor, equipment, material or other construction involved to complete the described work. Removal of concrete pavement and concrete base course will be paid for in accordance with Sec 202.30.3. The earthwork for obliteration, including bituminous surfacing, will be included as linear grading.

T. NEMA TS2 Traffic Controller Assemblies JSP-00-04A

1.0 Description. This work shall consist of furnishing and installing a NEMA TS2 traffic controller assembly at the location shown on the plans.

2.0 Training. MoDOT may require training on the maintenance and operation of NEMA TS2 controller assemblies. Maintenance and operation personnel shall be trained on programming, troubleshooting, maintenance and repair of controllers and all serviceable equipment. Training shall include field level troubleshooting and bench repair. This training shall be for a minimum of sixteen hours over two days. Training shall be conducted at a time and location mutually agreeable by the contractor and the engineer.

3.0 Equipment. Delete Secs 902.11, 1092.4.3 and 902.13 in their entirety and substitute the following:

902.11 Traffic Controller Assemblies. Traffic controller assemblies are defined as the complete assembly of all required equipment and components for control of traffic signal indications. Traffic controller assemblies shall conform to the requirements of the latest revision of NEMA Standards Publications No. TS 2, hereafter called NEMA. Each assembly shall consist of a controller cabinet, controller unit, back panel, malfunction management unit, all required wiring, switches and connectors and all other equipment as defined in these specifications and as shown on the plans. Double controller assemblies to control two intersections shall consist of a controller cabinet, two controller units, two back panels, two malfunction management units all required wiring, switches and connectors and all other equipment as defined in these specifications and as shown on the plans.

902.11.1 General.

902.11.1.1 Voltage and Temperature Variations. Variations in the voltage of the power supply from 89 to 135 volts or sustained temperatures inside the cabinet between

–30 F(-34 C) and +165 F (+74 C) shall not change the timing of any functions or cause electrical or mechanical damage. Heater elements shall not be used to attain compliance with these requirements.

902.11.1.2 Fuse Protection. All controllers and other specified auxiliary equipment shall be properly protected with fuses on each applicable unit. Fuses shall be installed in 1/4 twist or screw-in type fuse holders or shall be automotive blade-type fuses. Pop-out fuse holders shall not be used. There shall be no exposed high voltage contacts on the outside of any unit.

902.11.1.3 Manuals and Wiring Diagrams. Three instruction manuals covering all operational and maintenance information shall be furnished with each controller unit, on-street system master, malfunction management unit, for each type of detector, and any other auxiliary unit(s) provided as specified. Four complete cabinet wiring diagrams shall be provided with each controller assembly. The cabinet wiring diagrams shall include labeling for all field terminal connections and shall provide an orientation of the terminal layout that conforms to the intersection information specified.

902.11.1.4 Warranty. All controller units, on-street system masters units, malfunction management units, terminals and facilities, detectors and any other auxiliary unit(s) provided as specified shall be warranted by the manufacturer to be free from defects in workmanship and material for at least one year from the date of project acceptance. Any components found to be defective during the warranty period shall be replaced free of charge. All warranties provided shall be transferred to the Commission upon project acceptance. No direct payment will be made for warranties.

902.11.2 Controller Units (CU). This section supplements NEMA in describing the general specifications for actuated solid state controller units. If requested by the engineer, the contractor shall provide a prototype controller for testing and evaluation.

902.11.2.1 CU Configuration.

(a) CUs shall be NEMA Actuated Type 2 with the following connectors:

Port 1
Port 2
Port 3
Connector A
Connector B
Connector C

(b) CUs shall be capable of operation of a minimum of 12 vehicle and pedestrian phases and 8 overlaps.

(c) All phases and overlaps shall be activated or inactivated by program entry.

902.11.2.2 Actuated Coordination. Actuated coordination shall conform to NEMA and the following:

(a) Signal phases controlling the movements on which signal progression is desired (coordinated phases) shall be serviced during a guaranteed period as specified

by programming. While under coordination, the designated coordinated phase(s) shall be capable of releasing from a hold status and operating in the actuated mode. The CU shall operate in actuated mode from a designated hold release point to the corresponding force off point(s) of the coordinated phase(s). If the coordinated phase(s) gaps out or reaches the force off point and there is a conflicting phase with a call or recall, the CU shall terminate the coordinated phase(s) and service the next phase in the sequence with a call or recall.

(b) For non-coordinated actuated phases, vehicle and pedestrian detectors shall remain active. The non-coordinated actuated phases may gap out prior to the force off point or shall be forced off at the force-off point and the next phase in the sequence with a call or recall shall be serviced. The coordinator shall provide selectable recall by signal plan for non-coordinated phases. The coordinator shall be capable of fixed time operation for any and all active phases by timing plan.

(c) The coordinator shall be capable of generating individual force-off points for each available phase in each timing plan even though it may not be necessary to use all of phases. The position of the force-off points shall be settable at any percentage point or seconds in any selected timing plan. The coordinator shall be capable of placing force-off points at fixed points in the cycle or floating points as selected by programming. With floating force-offs split times govern the force-off point in each cycle regardless of the starting point of the phase.

(d) The coordinator shall have all of the following methods of synchronizing to the master sync pulse:

(1) Dwell. The coordinator shall establish a new offset by stopping the cycle timer in the coordinated phase(s) green, until the new offset value is reached.
(2) Dwell with Interrupt. The coordinator shall establish a new offset by stopping the cycle timer in the coordinated phase(s) green. The maximum time the coordinator can dwell shall be adjustable from 1 to 99 seconds.

(3) Short-way. The coordinator shall establish a new offset by the shortest route possible.

(e) For hardwire systems, if the sync monitor detects a fault the controller shall revert to internal time based control unless no time based control is programmed. In that case, the CU shall revert to free mode.

902.11.2.3 Time Base Control. Time Base Control shall conform to NEMA and the following:

(a) The CU shall be zero time based, settable to the second, programmable for 52 weeks, accommodate at least 3 weekly programs, 12 day programs and not less than 12 exception day programs. Total event changes shall not be less than 160. It shall be possible to interrogate the CU to determine the year, month, day, hour, minute, second, a.m. and p.m., as well as program information programmed in the unit. Indicators shall show the condition of all outputs.

(b) The first program of the day shall be implemented at the beginning of the minute selected. When changing from one cycle length to another while in the coordination mode, the change to the new cycle length shall not occur until the present cycle length has terminated. If the controller is operated in the free mode between cycle lengths, the next cycle length programmed shall begin at the beginning of the minute selected.

(c) The CU shall be capable of generating a daily reference point at which time all coordinated cycles are resynchronized. This daily reference point shall be either 12:00 midnight or a selectable time of which 12:00 midnight could be selected. The resynchronization reference time is an arbitrary point in time which marks the beginning of all cycles on a daily basis.

(d) The CU shall be capable of generating an absolute reference point at which time all coordinated cycles are resynchronized. This absolute reference point shall be a selectable time by date and hour and minute which marks the beginning of all cycles.

(e) Timing base shall be the 60 hertz power line frequency. Timing error shall not exceed plus or minus one second per month from any adjacent CU operating from the same power company substation. Timing error due to power failure or low voltage shall not exceed plus or minus 0.005 percent.

902.11.2.4 Detector Functions. The CU shall allow vehicle and pedestrian detector inputs to be programmed to any available phase. In addition to normal detector operation, the CU shall have the following programmable functions for vehicle detector inputs.

(a) Call Detector. A mode of operation where the detection of a vehicle places a locking call into the assigned phase when the assigned phase is not green.

(b) Detector Switching. Besides the normal assigned phase, the detector input can be programmed to switch to a secondary phase while the secondary phase is green and the assigned phase is not green. In all other conditions the detector input acts as a normal detector input for the assigned phase.

(c) Extend Function. While the assigned phase is green, each detector actuation input is extended a programmed amount of time with a range of at least 0 to 99 seconds.

(d) Delay Function. While the assigned phase is not green each detector actuation input is delayed a programmed amount of time with a range of at least 0 to 99 seconds.

902.11.2.5 Special Functions. Any special functions, special sequences, or modes of operation specified in the plans or required to operate the specified signal phasing and timing shall be included in the programming capability of the CU.

902.11.3 Malfunction Management Unit (MMU). Each controller assembly shall contain a malfunction management unit external to the controller circuitry conforming to NEMA. When the MMU actuates flashing operation, the controller shall freeze or stop

timing with the stop time switch in Normal position in the condition causing the actuation until manually reset.

902.11.3.1 Phases or overlaps with only one signal head shall have load resistors installed across the outputs to prevent a single lamp failure from actuating the MMU.

902.11.4 Terminals and Facilities. All terminals and facilities in the controller assembly shall conform to NEMA TS2 Type 1 and the following requirements. For double controller assemblies, two complete sets of all terminals and facilities shall be provided with all items contained in the same compartment as the associated CU.

902.11.4.1 Wiring and Terminations

(a) Field Wiring. Incoming field circuits shall be routed horizontally from the conduit to the back of the cabinet, then vertically to the terminal block. All field leads shall be identified by means of round aluminum identification tags with a minimum thickness of 0.1 mils (2.5 mm) attached to the cables with a copper wire to

correspond with the plans. The outgoing signal circuits shall be of the same polarity as the line side of the power supply and the common return of the signal circuits shall be of the same polarity as the ground side of the power supply. The power supply shall be provided through three single conductor cables. All field conductors shall be terminated in the controller cabinet on a 600-volt heavy duty one piece mechanical screw connector offset tang assembly attached to a barrier terminal strip. Each mechanical screw connector shall accommodate up to four No. 12 AWG (2.5 mm2) conductors. Each field circuit shall be protected with a 150-volt metal oxide varistor (MOV) with an 80 Joule rating connected to cabinet ground. The MOVs shall be accessible on the front of the back panel and easily replaceable. For double controller cabinets, all wiring for each intersection shall be terminated in the same compartment of the cabinet as the signal controller for that intersection.

(b) Back Panel Wiring. All wiring carrying 120 volts AC shall be discrete insulated

wires and shall be soldered directly to lugs on the back of terminal blocks or sockets. All discrete wiring on the back side of the back panel shall be neatly bundled and secured with plastic cable ties.

(c) Any multi-conductor cable shall be contained in an expandable braided sleeve.

(d) Input/output terminals shall be configured according to the following NEMA configurations:

Specified Operation	NEMA Configuration (NEMA Table 5.3.1-1)
2 through 8 Phases	Configuration 3 (12 Load Switch Positions)
9 through 12 Phases or more than 4 Overlaps or Pedestrian Phases	Configuration 4 (16 Load Switch Positions)

(e) In addition to the minimum NEMA requirements, four pedestrian call input terminals shall be provided.

(f) If hardwire interconnection is specified, the following input/output terminals shall be provided:

Timing Plan A Output
Timing Plan B Output
Timing Plan C Output
Timing Plan D Output
Offset 1 Output
Offset 2 Output
Offset 3 Output
Timing Plan A Input
Timing Plan B Input
Timing Plan C Input
Timing Plan D Input
Offset 1 Input
Offset 2 Input
Offset 3 Input
Interconnect Common

(g) Buss Interface Units (BIU) and BIU racks shall be provided for all required terminals and facilities.

(h) All Port 1 cable connectors shall have positive strain relief latches such that tension on the cable will not disconnect the connector from the unit they are connected to.

902.11.4.2 Switches and Controls. Each controller cabinet shall be furnished with the following switches and controls. For double controller cabinets, two sets of switches and controls are provided, one set for each controller installed in each compartment.

(a) Power Interrupt Switch - A switch located inside the main cabinet shall interrupt electrical power to the controller during maintenance on the controller. Operation of this switch shall not affect the flash operation. This switch shall not be accessible via the police panel.

(b) Flash Switches - The following switches shall place the signal on flash. Operation of these switches shall not affect the electrical power supply to the controller. When the signals are returned to normal operation the external start shall be activated causing the controller to revert to the programmed initialization phase(s).

(1) Each controller cabinet shall be furnished with a clearly labeled flash switch mounted in the access or police panel.

(2) Each controller cabinet shall be furnished with a clearly labeled flash switch mounted on the cabinet door in the inside of the cabinet.

(c) Stop Time Switch - A three position switch mounted inside the main cabinet shall provide the following functions:

(1) Stop Time - Causes the controller to stop time.

(2) Normal - Allows the controller to cycle all phases, but during MMU flash causes the controller to stop time.

(3) Run - Allows the controller to cycle all phases and during any flashing operation allows the controller to continue cycling all phases without displaying them on the signal heads.

(d) Switches or relays which completely interrupt power to the signal heads other than the protective circuit breaker shall not be installed in the cabinet.

(e) If specified, a manual operation push button shall be installed in the police panel. The push button shall be wired for manual operation of the signals. The push button shall be water resistant and designed to protect the user against electrical shock and shall be supplied with a coiled cord with a nominal 6 foot (2-m) stretched length. A clearly labeled switch shall also be installed in the police panel to switch between manual or automatic operation of the controller.

902.11.4.3 Detector Facilities.

(a) At a minimum, one NEMA Configuration 2 detector rack shall be provided with the associated BIU. If more than 16 detector channels are specified, additional NEMA Configuration 1 or 2 detector racks and associated BIU(s) shall be provided for the required number of detectors. Each detector channel shall be assigned to a separate detector input into the CU.

(b) Detector loop connections shall be provided for the total number of detector channels available in the detector racks supplied as specified above.

(c) Two terminals shall be provided for each detector as follows.

(1) Screw terminal strips mounted vertically on the left side of the cabinet approximately 6 inches (150 mm) from the bottom of the cabinet.

(2) All inductive loop detector inputs shall be protected with two 30-volt metal oxide varistors (MOV) with a 30 Joule rating. An MOV shall be connected between each field terminal and cabinet ground.

(d) The detector rack shall be attached to the controller cabinet shelf by an easily removable attachment. Sufficient wire lengths shall be provided for access to the back of the rack. The rack shall not block the back panel or other termination panels.

(e) Unless shown differently on the plans, each detector field input into the card rack shall be associated with the appropriate card position as follows:

Channel	*Card Position*							
	1	2	3	4	5	6	7	8
1	Phase 1	1 or 6	6	6	3	3 or 8	8	8
2	Phase 5	5 or 2	2	2	7	7 or 4	4	4

(f) Each detector channel shall be clearly labeled with detector number, phase and direction.

902.11.4.4 Power Distribution.

(a) Each assembly shall contain a separate aluminum power panel located in the lower right portion of the cabinet containing the following equipment:

(1) Main breaker - one type B circuit breaker conforming to Sec 901.4.4 that shall interrupt power to the controller and signals. The frame size and trip rating is shown on the traffic signal plans or designated in the contract.

(2) Auxiliary breaker - one type B circuit breaker conforming to Sec 901.4.4 that interrupts power to cabinet lamp and receptacle. The frame size and trip rating shall be 15 amperes.

(3) One mercury contactor that controls power to the signal bus.

(4) One radio frequency interference suppresser.

(5) One AC service transient suppression device.

(6) One terminal block for AC power input.

(7) One earth ground bus terminal block.

(8) One isolated AC neutral bus terminal block.

(b) Each controller assembly shall have a fluorescent lighting fixture.

902.11.5 Auxiliary Interfaces for Controllers. Interface panels shall be aluminum panels with de-burred edges and rounded corners installed in the controller cabinet containing the required terminals and equipment. Interface panels shall be neatly laid out, neatly wired and easily accessible. For double controller cabinets, the auxiliary interface shall be located in the same compartment as the associated CU.

902.11.5.1 Pre-emption Interface. The preemption operation and interface shall conform to NEMA. The pre-emption interface shall include any field wire termination panels, relays or isolators, wiring and connectors required for proper operation. Each preemption field input shall be protected with a metal oxide varistor (MOV). For 120 volt inputs, a 150-volt MOV with an 80 Joule rating shall be used and for 24 volt inputs, a 30-volt MOV with a 30 Joule rating shall be used.

902.11.5.2 Hardwire Master and Local Coordination Interface. The coordination interface shall consist of any field wire termination panels, wiring and connectors required

for proper operation. The master coordination interface shall output commands to the local controllers in the system. Local coordination interfaces shall accept command inputs from the master coordination interface. Coordination interfaces shall be connected to one another or to a telephone interconnection unit, by a multi-conductor cable. The

coordination interface shall provide a control terminal strip for 7 or 12 wire interconnect as specified in the plans, vertically or horizontally mounted, that shall be located 6 (150 mm) to 8 (200 mm) inches above the bottom of the cabinet. Control voltages applied to the terminals are associated with the following input/output functions:

7 - Wire	12 – Wire
Neutral	Neutral
Timing Plan A (Dial 2)	Timing Plan A (Dial 2)
Timing Plan B (Dial 3)	Timing Plan B (Dial 3)
Timing Plan C (Split 2)	Timing Plan C (Split 2)
Offset 1	Timing Plan D (Split 3)
Offset 2	Offset 1
Automatic Flash	Offset 2
Automatic Flash	Offset 3

All command voltages applied to these terminals shall be 120 volts AC. Terminals for interconnect cable shall be fused and provided with a 150-volt metal oxide varistor (MOV) with an 80 Joule rating. Interface circuitry between this terminal strip and the controller shall be by solid state or relay logic.

902.11.5.3 Closed Loop System Interface. If the controller assembly will be part of a closed loop system, all components required to interface with the system shall be in accordance with the plans.

902.11.5.4 Dial-Up Modem Interface. This panel shall provide for interfacing of a leased, unconditioned telephone drop to a Hayes compatible modem that connects to the on-street system master or local controller as specified in the plans. The panel shall be mounted on the inside of the cabinet on the right side. A telephone network interface, such as a Siecor CAL3000 or other approved interface acceptable to the local phone company shall be attached to the aluminum panel. The telephone interface shall also include the installation of the necessary cable, connectors, etc. to connect the interface to the telephone drop provided by the local telephone company. The contractor shall be responsible for the installation of the phone line and coordinate this through the local telephone company.

902.11.5.5 Remote "ON - OFF" Switch (Pedestrian Interval Sequence). The following type "On - Off" switches shall be furnished as specified:

(a) Type I. This item shall consist of one manually operated heavy duty switch in a circuit not exceeding 18 volts. Necessary relays shall be located in the controller cabinet for including or excluding the pedestrian phase in the phasing sequence or switching signals between flashing and sequence operation. This shall be accomplished by energizing or de-energizing the pedestrian signal indications and push-button detectors. The switch shall be enclosed in a weatherproof, cast aluminum housing equipped for post mounting. The housing shall have a suitable

lock, the key of which shall not unlock the controller cabinet. The housing shall be tapped for conduit.

(b) Type II. This item is operationally identical to Type I except the switch may be 120 volts and shall be located in the access panel of the controller cabinet.

902.11.5.6 Other Interfaces. Where other interfaces are specified in the plans or required for specified operation, the required circuitry and any other required devices shall be installed on an interface panel or in a suitable metal enclosure.

902.11.6 Auxiliary Devices. Each auxiliary unit shall be enclosed in a suitably finished metal or molded plastic case. It shall be mounted in the controller cabinet unless otherwise specified. The function of each auxiliary unit shall be indicated by an identification plate on the case. Auxiliary equipment cases shall be ventilated. Temperature, voltage and frequency shall meet the requirements of Sec 902.4.5 unless otherwise specified.

902.11.6.1 External Time Switches. External time switches shall be solid state, key board entry and contain filtering and shielding circuitry to protect the unit's operation against electrical interference. Timing shall be based on the 60 Hz power supply frequency. Each unit shall contain a programmable automatic central daylight time compensation feature. Each unit shall contain a back-up power source to maintain time and memory functions during loss of AC power. Each unit shall provide a weekly program with at least 20 event changes per week.

902.11.6.2 Dial-Up Modem. The unit shall be an auto-dial, auto-answer modem and shall be installed in the controller cabinet as specified on the plans. If specified an identical modem shall be installed at the central office computer facility in the MoDOT district office. The modem shall be Hayes compatible capable of responding to the standard "Hayes command set". The modem shall be self-contained. The unit shall be powered by a nominal 120 VAC from the duplex service outlet provided in the cabinet. The modem shall be capable of operating at all standard baud rates from 300 to 56K baud over a standard dial-up, unconditioned telephone line. Installation shall include the appropriate interface cable to connect to an RJ-11 telephone jack on the telephone interface panel, the RS-232 cable from the modem to the system master, all other cabling, connectors and incidental items necessary for operation.

902.11.7 Controller Cabinets. Controller cabinets shall be cast aluminum or 0.125 inch (3.2 mm) reinforced sheet aluminum alloy and be of clean-cut design and appearance. The cabinet shall provide ample space for housing all equipment and components. Controller cabinets housing solid state controllers shall be furnished with unused cabinet space measuring 18 inches (450 mm) wide by 12 inches (300 mm) high by 12 inches (300 mm) deep. Cabinet size shall be not less than 54 inches (1350 mm) high by 38 inches (950 mm) wide by 25 inches (625 mm) deep and support a 12 or 16 position back panel. The cabinet shall contain a rigid shelve of such construction that the CU and auxiliary equipment may be withdrawn from the cabinet without breaking any electrical connections or interrupting normal controller operation.

(a) A hinged door or doors shall provide complete access to the interior of the cabinet. Door holds shall be furnished which shall hold the door in an open position at least 90 degrees from the closed position. The doors shall fit against

a rain tight gasket. Each door shall be provided with a cabinet lock and shall have a stamped or raised outside designation, "Traffic Control" or other approved identification. An auxiliary door, positioned on each main cabinet door, equipped with a rain tight gasket, shall allow access to a switch panel and shall be equipped with a lock whose key will not unlock the main door. Two keys shall be furnished for each type lock used. The door hinges and pins shall be of corrosion resistant metal. Pins shall be rolled or solid rod, at least 1/8 inch (3.18 mm) in diameter, except if continuous hinges are furnished, the pins shall be continuous the full length of the hinges and shall be not less than 1/16 inch (1.59 mm) in diameter.

(c) The back panel in all controller cabinets shall be hinged at the bottom to permit the top of the panel to be rotated forward and down to an angle of not less than 45 degrees with all components, including load switches, attached for maintenance purposes. The bottom of the back panel shall be not less than 6 inches (150 mm) above the bottom of the cabinet.

(c) Cabinets shall have a thermostatically controlled ventilating fan with exhausting capability, in an enclosure, of at least 150 cubic feet per minute (4.25 m3/min)

for cabinets up to 30.5 cubic feet (0.86 m3) and at least 250 cubic feet per minute (7.08 m3/min) for cabinets 30.5 cubic feet (0.86 m3) and more, installed in the top of the cabinet. These cabinets shall be supplied with a replaceable furnace type fiberglass filter of at least one square foot (m2) area mounted behind louvers in the lower one fourth of the door.

(d) Double controller cabinets for two controllers shall be not less than 57 inches (1425 mm) high by 74 inches (1850 mm) wide by 17 inches (425 mm) deep and shall support two 12 position back panels. All double cabinets shall have two doors that are hinged on the outside corners of the cabinet so that the doors open away from each other. Double cabinets shall have a divider between the two halves of the cabinet with an 8-inch (200-mm) opening between the compartments at the bottom of the divider for wiring between the compartments.

1092.4.3 Induction Loop Detectors. Induction loop detectors consist of loop detector cable in the pavement, lead-in cables, and associated conduits, pull boxes and loop detector units. The following section covers loop detector units. Other components of loop detectors are covered in other parts of Sec 902 and Division 1000. Loop detector units shall conform to NEMA. If specified, each channel shall have extension and delay timing features as specified in NEMA. Each detector shall have a regulator for the power input. The regulator shall have the appropriate power and voltage rating for operation of the detector.

1092.4.3.1 Card Rack Detectors. All detectors shall be card rack mounted detectors as specified in NEMA unless otherwise specified in the plans.

1092.4.3.1.1 Card Rack Dual Output Detectors. Card rack dual output detectors shall conform to NEMA and the following. Dual output detectors shall provide two relay outputs per induction loop detector. One output shall be capable of pulse detection for the purpose of traffic counting, speed and occupancy measurements. The other output shall

be capable of presence detection. Each detector output shall be assigned to a separate detector input into the CU.

1092.4.3.2 Shelf Mounted Detectors. If shelf mounted detectors are specified, each shelf mounted inductive loop detector unit shall be self-contained. The detector shall conform to the applicable sections of NEMA and the following. The main chassis shall include the power supply for 120 VAC line power, line fuse and MS type connector.

(a) The MS connector shall be a chassis jack, type MS3 102A-18-1P and cable plug, type MS3160A-18-1S, with a type MS3057-10 cable clamp and boot.

(b) Wire size for the cable shall be 18 AWG (1 mm2) minimum and continuous between the connections and the detector panel. Minimum cable length shall be 6 feet (18 m).

(c) The pin connection shall be as follows:

Pin	*Function*
A	120 VAC (Common)
B	Relay Output (Common)
C	120 VAC (Line)
D	Loop Input
E	Loop Input
F	Relay Output (Normally Open)
G	Relay Output (Normally Closed)
H	Chassis Ground
I	Spare
J	Time Control

902.13 Other Detection Devices.

902.13.1 Probe-Type Detectors. Probe-type detectors shall be as specified on the plans and shall conform to the following.

(a) The sensing probes shall be cylindrical having maximum dimensions of 7/8 inch (21.9 mm) diameter by four inches (100 mm) long. The sensing probes shall be suitable for installation in a one inch (25 mm) diameter bored hole. The interconnecting four conductor cable and lead-in cable shall be suitable for installation in a 1/4 inch (6.25 mm) wide pavement sawed slot.

(b) The jacket on the interconnecting cable and the casing on the sensing probe shall be an abrasion resistant polyurethane elastomer. The device shall be impervious to moisture and chemically resistant to all normal motor vehicle petroleum products. Lead-in cables shall be shielded, chemical resistant and completely waterproof.

(c) The combined probe sets, manufacturer specified lead-in cable and detector probe shall detect all vehicles up to a lead-in cable length of 750 feet (228.6 m) with up to 6 probes per set.

(d) The conductor cable from the probes to the detector panel in the controller assembly shall be as specified by the detector manufacturer, shall be continuous and un-spliced and shall be a minimum of 50 feet (15.2 m) in length. Probes shall be assembled in a set to form a vehicle detector as shown on the plans. No more than 6 probes shall be assembled as a set. The cables between probes shall be long enough to provide the spacing shown on the plans plus 5 feet (1.5 m). If no spacing is shown, 15 feet (5 m) of cable shall be provided between probes. Each set of probes shall have one lead-in cable.

(e) Probes installed under bridge decks shall be protected by completely encapsulating them in a conduit system. The probes shall be oriented so that the detection zone is above the bridge deck and shall be installed in junction boxes with gaskets anchored to the bottom of the deck. The junction boxes shall have a minimum size of 6 (150 x 6 (150) x 4 inches (100 mm) and the probes shall be rigidly anchored in the box. The probes shall be no more than 18 inches (450 mm) below the top of the bridge deck. Conduit shall be sized so that the probe and cable can be pulled through the conduit. Any conduit bends shall be such that probe and cable can be pulled through the bend. External conduit on the structure shall conform to Sec 902.5.3.

902.13.1.1 Induction Detector Probes. The encapsulated induction detector probe shall detect the passage or presence of all vehicles with a standard induction loop detector amplifier.

(a) The induction detector probe shall operate in a temperature range from -35 F (-37 C) to +165 F (74 C) with 0 to 100 percent humidity.

(b) The operating field intensity range shall be 0.2 to 1.0 Oersted with a nominal inductance of 20 uH plus 20 uH per 100 feet (30 m) of cable. The nominal DC resistance shall be 0.5 ohms plus 3.2 ohms per 100 feet (30 m) of probe cable.

902.13.2 Push-Button. Pedestrian push-button detectors shall be direct push contact type. Each detector shall be a removable contact assembly mounted in a cast aluminum case. The housing shall be shaped to fit the curvature of the post to which it is attached and shall provide a rigid installation. Contacts shall be normally open, entirely insulated from the case and operating button and have connecting terminals. The case shall have one outlet tapped for 1/2-inch (12.5-mm) pipe. The operating button shall be recessed and made of brass or corrosion resistant metal alloy or non-metallic material. The operating voltage shall not exceed 24 volts. The entire assembly shall be weatherproof, secure against electrical shock to the user and of such construction as to withstand continuous hard usage.

902.13.3 Microwave Vehicle Detectors. The unit shall detect all licensed vehicles moving within the field of detection at speeds from 2 to 80 miles per hour (3.2 km/hr. to 128.4 k/hr.). The unit shall have a minimum detection range from 3 to 200 feet (1 m to 66.7 m) for all licensed vehicles. The pattern spread of the detection field shall be no more than 16 degrees. The unit shall be self-tuning and capable of continuous operation over a temperature range of -35 F (-37 C) to 165 F (74 C). The unit shall be microprocessor based using Doppler microwave at an operating frequency of 10.525 GHz. The unit shall have Federal Communications Commission (FCC) certification and be tested to the applicable FCC specifications. The unit shall be capable of side-fire

mount or overhead mount. The enclosure shall be constructed of aluminum or stainless steel and shall be water resistant. The unit shall be capable of detecting directional traffic and the direction shall be user selectable. All user operated controls and adjustments shall be clearly marked and easily accessible. The unit shall have a relay detection output to the controller with a minimum 5 amp rating and be designed to place a constant call to the controller in the event of any failure. The unit shall have an easily accessible indicator showing activation of detection relay. Required wiring shall be as specified by the manufacturer. Mounting hardware for the type of mounting shown on the plans and power supply equipment shall be as specified by the manufacturer and shall be provided with the unit.

902.13.4 Ultrasonic Presence Detectors. The unit shall detect the continuous presence of any object within the field of detection. The unit shall have a minimum detection range from 3 (1 m) to 24 feet (8 m) from the front face of the unit and the detection range shall be adjustable. The detection pattern shall be conical with a nominal beam width of 20 degrees. The unit shall be capable of continuous operation over a temperature range of -35 F (-37 C) to 165 F (74 C). The unit shall be self-tuning and operate in the ultrasonic frequency range. The unit shall be capable of side-fire mount or overhead mount. The unit shall contain a variable detection time delay up to a minimum of 10 seconds. All user operated controls and adjustments shall be clearly marked and easily accessible. The enclosure shall be constructed of aluminum or stainless steel and shall be water resistant. The detector shall have a relay detection output to the controller with a minimum 5 amp rating and be designed to place a constant call to the controller in the event of any failure. The unit shall have an easily accessible indicator showing activation of detection relay. Required wiring shall be as specified by the manufacturer. Mounting hardware for the type of mounting shown on the plans and power supply equipment shall be as specified by the manufacturer and shall be provided with the unit.

4.0 Construction Requirements. Construction requirements shall conform to Sec 902.

5.0 Method of Measurement. Method of measurement shall conform to Sec 902.

5.1 Measurement of training including all specified training will be made per each.

6.0 Basis of Payment. Accepted NEMA TS2 traffic controller assemblies will be made at the contract unit price per each. Payment will be considered full compensation for all labor, equipment and material to complete the described work.

6.1 If training is required by the engineer, payment for the training will be made at the contract unit price per each. Payment will be considered full compensation for all labor, equipment and material to complete the described training.

6.1.1 If training is not required as determined by the engineer, no payment will be made for training.

6.2 No direct payment will be made for programming the local intersection controllers and the on-street master after installing the system software.

U. Fertilizing, Seeding, and Mulching

Description. All disturbed areas will be fertilized, seeded, and mulched as directed by the engineer.

2.0 Fertilization. In accordance with Section 801 of the Standard Specifications, the contractor shall apply the following to the appropriate areas at the rates specified of application of soil neutralization and commercial fertilizer for this project.

Item Lbs.	Acre
Lime	500
Nitrogen (N)	40
Phosphorus (P_2O_5)	40
Potash (K_2O)	40

3.0 Seed. In accordance with Section 805 of the Standard Specifications, the following mixture shall be applied at the rate specified for this project.

Cool Season Seeding Mixture (All locations)	Pure Live Seed (lbs./Acre)
Tall Fescue	80 lbs.
Annual Ryegrass	10 lbs.
Perennial Ryegrass	5 lbs.
White Clover	5 lbs.
Oats	10 lbs.
Total	110 lbs.

4.0 Mulch. In accordance with Section 802 of the Standard Specifications, mulch overspray shall be applied for this project.

5.0 Basis of Payment. All accepted work and materials for seeding, fertilizing, and mulching shall be considered included in and completely paid for by the contract unit price for Item No. 805-10.00A, Seeding – Cool Season Mixtures, per acre.

V. Temporary Traffic Control

1.0 Description. All work necessary to maintain safe and efficient traffic flow through the work areas shall be provided by the contractor. This will include furnishing, relocating, and removing temporary traffic control devices, truck mounted attenuators and equipment, and the removal and relocation or covering and uncovering of existing signs and other traffic control devices in accordance with the contract documents or as directed by the engineer.

2.0 Work requirements. Work shall be in accordance with Sec 612, 616, 619, 620 and the contract plans.

3.0 Method of Measurement. The quantities shown provided shall be considered an estimate and may be subject to change based on field conditions and the contractor's staging plan and should be bid accordingly. This work will not be measured for payment, but will be considered a lump sum unit. Any Value Engineering proposals to the temporary traffic control will not be paid for through value engineering but will be covered under Temporary Traffic Control, lump sum.

4.0 Basis of Payment.

4.1 Partial payments will be made as follows:

(a) The first partial payment will be made when five percent of the original contract amount is earned. This payment will be the lesser of 50 percent of the contract price for the item of temporary traffic control or 5 percent of the original contract price.

(b) The second partial payment will be made when 50 percent of the original contract amount is earned. This payment will be the lesser of 25 percent of the original contract price for the item of temporary traffic control or 2.5 percent of the original contract price.

(c) The third partial payment will be made when 75 percent of the original contract amount is earned. This payment will be the lesser of 20 percent of the original contract price for the item of temporary traffic control or 2 percent of the original contract price.

(d) When the engineer has accepted the contract for maintenance in accordance with Sec 105, the remaining contract price for the item of temporary traffic control will be paid.

(e) The above partial payment schedule may be adjusted by the engineer if proof of invoices submitted by the contractor demonstrate additional temporary traffic control costs were incurred earlier than the above proposed schedule. The total payment for temporary traffic control will not exceed the bid amount for Temporary Traffic Control, lump sum, unless covered by a cost change order as referenced in the following Section 4.3.

4.1.1 For the purposes of this provision, the term “original contract price” will be construed as the total dollar value of the construction items (excluding temporary traffic control) of the original contract.

4.2 Temporary traffic control will be paid for at the contract lump sum price for Item:

Item No.	Unit	Description
616-99.01	Lump Sum	Temporary Traffic Control

No direct payment will be made for the following:

(a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.

(b) Installing, operating, maintaining, cleaning, repairing, removing, or replacing traffic control devices.

(c) Covering and uncovering existing signs and other traffic control devices.

(d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.

(e) Providing channelizers, directional indicator barricades, moveable barricades, drums, etc.

(f) Worker apparel.

(g) Flaggers, pilot vehicles, and appurtenances at flagging stations.

(h) Furnishing, installing, operating, maintaining, and removing construction-related vehicle and equipment lighting including.

(i) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.

(j) Removing existing pavement markings, installing temporary pavement markings, and removing and relocating temporary pavement markings as necessary for staging operations. Removal of pavement markings shall not mar the surface of the pavement.

4.3 Any additional work deemed necessary by the engineer that requires temporary traffic control and is not covered by the contract plans will be included in the cost change order for the additional work. However, if the added work is required in a stage where temporary traffic control is already in place, no additional traffic control pay will be allowed in this case.