



# MASSTR

## MEADOWLANDS ADAPTIVE SIGNAL SYSTEM FOR TRAFFIC REDUCTION

REQUEST FOR PROPOSAL FOR MASSTR MAINTENANCE

December 2018



*New Jersey Sports and Exposition Authority*  
One DeKorte Park Plaza • Lyndhurst, NJ • 07071 • 201.460.1700 • njsea.com

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**SECTION 1: ADVERTISEMENT FOR REQUEST FOR PROPOSAL**

**STATE OF NEW JERSEY  
NEW JERSEY SPORTS AND EXPOSITION AUTHORITY  
ADVERTISEMENT FOR Request for Proposals**

Notice is hereby given that sealed Proposals will be received by the New Jersey Sports and Exposition Authority (NJSEA), P.O. Box 640, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071 for the following:

**MEADOWLANDS ADAPTIVE SIGNAL SYSTEM FOR TRAFFIC REDUCTION  
MAINTENANCE CONTRACT**

Proposals must be submitted in the Proposal Form contained in the Section 4 of the package and must be enclosed in a sealed envelope plainly marked on the outside with the name of project and the name of Respondent. Proposals will be received at the above address until 2:00 PM prevailing time, on **Friday, February 15, 2019**. Proposals will **not** be accepted after 2:00 PM on that day. The Request for Proposal (RFP) will be available for review on the NJSEA website (<http://www.njsea.com/njmc/land/public-notices.html>) starting on **Friday, December 28, 2018, after 10:00 AM**. **Respondents must register their contact information with the NJSEA in order to receive notices and responses to questions regarding the RFP.** Contact information, as well as any technical and administrative questions regarding this RFP shall be submitted in writing to [nmoini@njsea.com](mailto:nmoini@njsea.com) at or before **2:00 PM, Friday, January 18 2019**. The written responses to all questions will be circulated among all registered Respondents and posted on the NJSEA website on **Friday February 1, 2019**.

The Scope of Work under this Contract consists of providing all plants, labor, equipment, materials, tools, and services necessary for maintenance of a fully operational adaptive traffic control system. The maintenance of this multi-jurisdictional system requires coordination and collaboration with NJDOT, Bergen County, Hudson County, and municipalities under which jurisdiction intersections are located and operated. The project includes the overall maintenance of the MASSTR system and sub-systems including vehicle detection units, travel time sensors, antenna/transceiver assemblies, advanced traffic control units, fiber optic cables/parts, and associated infrastructure. Work under this Contract shall continue for three (3) years from the date specified in the Notice to Proceed, with the option to be extended for a maximum of two (2) additional periods of one (1) year each.

The RFP Documents contain specific requirements for submission of a proposal. The attention of all Respondents is particularly called to the State requirements regarding equal employment opportunity, affirmative action, New Jersey business registration, public works contractor registration, and prevailing wages. For more information see the instructions section of the RFP. If awarded a contract, your company/firm shall be required to comply with the requirements of **N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27**. The NJSEA reserves the right to reject any or all Proposals and to waive minor Proposal defects.

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NEW JERSEY SPORTS AND EXPOSITION AUTHORITY  
Nadereh Moini Ph.D., PE, PTOE  
Chief of Transportation

**SECTION 2: PROJECT BACKGROUND**

## 2.1. Definition and Terms

Addendum(a) - written instructions issued prior to the acceptance of Proposals which clarify, correct or change the Proposal requirements or the Contract documents;

ATCS - Adaptive Traffic Control System, a key subsystem of MASSTR;

Contract Documents - the contract and all documents contained in Section 5 of this RFP along with any addenda thereto, including all technical specification, Standards and regulation, MASSTR map, and other referenced materials or incorporated therein;

Contract Period - the Contract Period defined in Section 5 of the Maintenance Contract;

Contractor - the winning Respondent whose Proposal is selected by the NJSEA and who is responsible for providing the maintenance, inspection, and emergency services set forth in the Scope of Work in Section 3;

Cost Proposal - the proposal of the Respondent setting forth the prices for the maintenance of MASSTR components and the work to be performed;

CS - Communication System, a dedicated wireless and shared fiber optic communication network, a key subsystem of MASSTR;

Evaluation Committee - a committee established by the NJSEA to review and evaluate Proposals submitted in response to this RFP and to recommend a contract award to the NJSEA;

VDS - Vehicle Detection System, a key subsystem of MASSTR;

Joint Venture - a business undertaking by two or more entities to share risk and responsibility for a specific project;

MASSTR - Meadowlands Adaptive Signal System for Traffic Reduction;

NJDOT - New Jersey Department of Transportation;

NJSEA - New Jersey Sports & Exposition Authority;

Project - the work required to perform MASSTR Maintenance under this Contract, including all labor, materials, and equipment necessary for repair, diagnosis, inspection, preventive maintenance, and on-call/emergency services;

Proposal(s) - the response of the Respondent submitted on the prescribed forms for the maintenance of all MASSTR equipment;

Proposal Documents - all documents contained in Section 4 of this RFP along with any addenda thereto, including all Appendices, plans, or materials referenced or incorporated therein;

## **NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018**

Request for Proposal (RFP) - this document and all Appendices, as a whole; which establishes the Proposal and Contract requirements and solicits Proposals to meet the needs of the NJSEA for the maintenance of all MASSTR equipment;

Respondent - Any corporation, partnership, or individual submitting a Proposal to this RFP;

Specifications - the technical specifications contained in Appendix A of this RFP along with any addenda thereto, including all Appendices, plans, or materials referenced or incorporated therein;

Subcontractor - an entity having an arrangement with a Contractor, where the Contractor uses the products and/or services of that entity to fulfill some of its obligations under its Contract, while retaining full responsibility for the performance of all of the Contractor's obligations under the contract, including payment to the subcontractor. The subcontractor shall have no legal relationship with the NJSEA, only with the Contractor;

TTS - Travel Time Collection System, a subsystem of the VDS.

## 2.2. PROJECT OVERVIEW

MASSTR is an Intelligent Transportation System (ITS) that integrates adaptive traffic control, vehicle detection, and wireless communication technologies to optimize the operating efficiency of existing roadway infrastructure in the Hackensack Meadowlands District and surrounding roadways. MASSTR incorporates all of the region's traffic signals into one interconnected system that will achieve maximum roadway capacity and avoid unnecessary roadway widening by reducing inconsistencies and improving the coordination and communication between intersections.

MASSTR consists of three major components: an Adaptive Traffic Control System (ATCS), a real-time Vehicle Detection System (VDS), and a wireless Communication System (CS). The ATCS provides algorithmic intelligence to overcome the limitations of pre-timed signal control; and adjusts the signal timing and phasing on a cycle-by-cycle basis in response to the real-time traffic conditions with minimal manual interference. The VDS provides real-time vehicle detection and surveillance; and measures traffic volume, classification, and speed. The CS provides a communication between the ATCS, VDS, local traffic signal controllers, and central server.

The MASSTR maintenance work shall focus on restoring equipment failures, performing preventive maintenance, responding to emergency calls, and providing the overall maintenance of MASSTR equipment including ATCS, CS, VDS, and Travel Time Sensors (TTS). The contractor shall perform all scheduled preventive, regular and on-call maintenance services, and respond to all emergency call for MASSTR equipment. The regular work comprises routine maintenance of MASSTR equipment and all structures and supports to uphold and work efficiently as designed per their specification. **The Contractor shall provide on call 24/7 maintenance services for diagnosis and response to emergency calls and problems as notified by the NJSEA Engineer or received by the system.**

The MASSTR maintenance work is divided into three categories: 1) Replacement and Repair (RR), 2) Preventive Maintenance (PM), and 3) Maintenance and Protection of Traffic (MPT).

## 2.3. Systems Overview

### 2.3.1. Adaptive Traffic Control System (ATCS)

ATCS utilizes local traffic controllers to perform tactical signal controls such as phase calling, extension, and termination, as well as local data collection. The strategic adaptive decisions such as the optimization of phase sequencing, cycle lengths, splits, and green bandwidth are accomplished by a central server located in the NJSEA traffic management center (TMC), by a local area network (LAN) of workstations, or by the local controllers.

The ATCS supports the centralized monitoring and management of local controllers. Utilizing this topology, the traffic controllers are connected to a central server via point-to-point, multi-drop, or a mix of point-to-point and multi-drop configurations. The central server resides in the NJSEA Administration Building and can be accessed simultaneously by multiple workstations

either locally or remotely. The central server uses the data connection provided by the wireless and fiber communication network to access and supply data to the traffic signal controllers. The central server also supervises and commands the local controllers to execute traffic signal control decisions including cycle lengths, phase sequencing, split timing, and timing offsets, which are all formulated on real-time traffic volume information provided by each intersection's VDS.

### ***2.3.2. Vehicle Detection System (VDS)***

The VDS features a least-intrusive vehicular detection system that is reliable, consistent, and proven to out-perform other detection methods including traditional inductive loop detectors. The vehicle detection system supports the standard Ethernet networking of system components through a variety of infrastructures that are commercially available in the traffic industry. The VDS meets the detection requirements of MASSTR and is compatible with all the other components of MASSTR.

The VDS is capable of providing cumulative traffic statistics including static detection, volume, occupancy, classification, and speed on an internal embedded non-volatile memory. Additionally, the VDS provides dynamic system surveillance with real-time video streaming of the cameras over the dedicated MASSTR communication network. The VDS also includes a subsystem named TTS. The TTS monitors and measures vehicular flows by sampling anonymous wireless signals, such as Bluetooth MAC (Media Access Control) addresses, from vehicles in the traffic flow. The TTS is capable of providing accurate and real-time information on travel time, speed, and origin-destination by matching such signals between two points along a roadway.

### ***2.3.3. Communication System (CS)***

The CS is a centralized system operating on a dedicated network server that is capable of managing and monitoring the entire communication network within an intuitive user based interface. The CS architecture includes a primary wireless and fiber communication paths and at least one secondary wireless communication path providing additional levels of redundancy. In order to increase the communication strength of the system, the NJSEA connects the wireless system to NJDOT fiber-optic network via a number of fiber-optic meter cabinets and/or communication hubs throughout the region.

The CS transfers all traffic control data between the ATCS central server and intersection controllers with minimal latency. Latency of any data transfer related to traffic control does not exceed 0.5 seconds between the ATCS central server and any intersection controller. Latency of image data transfer does not exceed 1.0 second between the control center and any intersection vehicle detection camera. In addition, the CS is capable of simultaneously transferring all live video streams back to the control center located at the NJSEA Administration Building. At 30 frames per second, each video stream requires up to 3 Mbps throughput. When there is a bottleneck in the network, the CS shall be capable of giving traffic control data transfer a higher priority over the image data transfer. The CS provides a set of layered security options in order to ensure multilevel data integrity, access control, and intrusion protection both across the CS and to users.

**SECTION 3: REQUEST FOR PROPOSAL**

### 3.1. Objective

This RFP is issued by the New Jersey Sports & Exposition Authority (NJSEA) to solicit proposals and qualifications for the maintenance of ATCS, VDS, and CS components as a part of MASSTR subsystems. The purpose of this RFP is to select a qualified RFP Respondent to maintain MASSTR, a fully operational adaptive traffic signal system. Technical Specifications of the System components can be found in the Appendix A. The intent of this RFP is to award a Contract to the Respondent whose qualifications, Proposal, and Cost Proposal are conforming to this RFP, and are most advantageous to the NJSEA, price and other factors considered. However, the NJSEA reserves the right to separately procure individual requirements and components that are the subject of the Contract during the Contract Term.

### 3.2. SCOPE OF WORK

The maintenance work shall focus on restoring and repairing equipment failures and the overall maintenance of MASSTR field equipment. The Contractor shall perform preventive, regular and on-call maintenance service for MASSTR field equipment. Maintenance and minor repair of MASSTR subsystem components includes communications elements (e.g. radios, antenna, modems, switches, and repeaters), VDS equipment (e.g. Autoscope detection cameras, Terra Interface Panel - TIP, Terra Access Point -TAP, travel time sensors and antenna), ATCS components (e.g. controller, conflict monitor, D-Panel, and traffic signal cabinet), signal timing, electronic parts (e.g. wiring, fiber optic cables, fiber optic splice enclosures and patch panels, splices, couplings, connectors, meters, pull boxes, junction boxes, fuses, power cables, circuit breakers, power distribution units, SFP, uninterruptible power supplies, solar controllers, batteries), conduit, structures, supports, foundations, poles, and all related appurtenances. The list of all MASSTR equipment and parts along with required directions to repair, maintain, and be approved by NJSEA is itemized in the Technical Specification, Appendix A. The Contractor shall travel to a field equipment location in response to a call from the NJSEA Engineer or its representative and perform troubleshooting, diagnosis, repair or assessment of damage on equipment, materials, and parts described subsequently.

The Contractor shall provide 24/7 on-call maintenance services for diagnosis or repair of emergency problems as notified by the NJSEA Engineer or received from the system. The Contractor shall repair, or make every attempt to resolve the issue within 48 hours after the notification. The maintenance and protection of traffic and police traffic directors shall be provided as defined in the Technical Specification, as necessary.

The "materials" to be used by the Contractor consist of testing equipment, electronic parts and equipment, and any special tools needed to perform the work. MASSTR also contains a wide variety of active data communications devices and software subsystems. The Contractor shall understand these software subsystems and coordinate with the Software Contractor. When the Contractor supplies equipment from manufacturers other than those used for original equipment, the Contractor shall provide a sample of such equipment to the NJSEA Chief of Transportation for acceptance testing. The equipment to be examined and tested shall be accompanied by an installation guide, schematic diagrams, maintenance manual, and operation manual. These documents shall remain in the possession of NJSEA. The NJSEA Engineer will

furnish the result (approval/rejection) of the tested equipment to the Contractor. The replaced parts and equipment shall be returned to NJSEA after the completion of diagnosis and repair procedure.

### ***3.2.1. Maintenance***

This work comprises routine maintenance to ensure that all equipment operates as designed and all structures and supports are in the conformance with their specification. This includes but is not limited to checking, testing, tuning, lubricating, tightening, cleaning and adjusting which are essential for the purpose of routine maintenance and repairs to ensure proper functioning of all equipment, all parts of a field equipment, and robustness of all structures. The Contractor shall be responsible to perform all scheduled preventive maintenance and repairs and respond to all emergency/on call service of the systems and the equipment. The Contractor shall submit an inspection schedule and plan for approval of the work from the NJSEA Chief of Transportation prior to the start of the routine maintenance. The Contractor shall be responsible to coordinate with the facility owners (state, county, and municipality) to perform such work.

### ***3.2.2. Repairs and/or Replacements***

Repairs typically involve the replacement of damaged, defective, unstable, weak, or worn parts. Repairs involve troubleshooting in the field or on the Contractor's bench, replacement of modules/parts, and replacement of malfunctioning or nonfunctioning components. Repairs also include the adjustment, straightening, and cleaning of equipment, parts, and structures. Repairs also include resetting, configuring and/or programming of microprocessor-based equipment. Damages caused by power surges shall be repaired at the Contractor's expense.

The following items identify typical repairs/replacements and shall not to be construed as an all-inclusive list:

- Repair and/or replacement of Vehicle Detection Units (VDUs)
- Replacement of VDS equipment
- Replacement of travel time antenna
- Repair and/or replacement of travel time data collector and transmitting devices
- Replacement of vehicle detection cable 3/C#18
- Replacement of Ethernet Switch, Power Supply, and SFP Optical Transceiver
- Replacement of Power over Ethernet (POE) injectors
- Replacement of Remote Power Management
- Replacement of Transceiver and Antenna Assemblies
- Replacement of Ethernet cable, Cat 5e & 6
- Replacement of Antenna/Jumper, Vehicle Detection, and Transceiver power Cables
- Replacement of Fiber Optic Links and Fiber Optic Enclosure & Patch Panel
- Repair and/or replacement of ITS cabinet and its AC systems
- Repair and/or replacement of antenna pole (Type A, B, and C)

- Repair and/or replacement of pole extension (T-pole, C-pole, K-pole, and Steel)
- Repair and/or replacement of roof mounted antenna tower (6' and 20')
- Repair and/or replacement of adaptive traffic signal controller
- Restart and Turn on Controller
- Repair and/or replacement of PSE&G, repeater, and ITS Cabinets (if installed by NJSEA)
- Repair and/or replacement of conflict monitor (if installed by NJSEA)
- Repair and/or replacement of junction boxes (if installed by NJSEA)
- Major/Minor emergency repairs as ordered by the NJSEA Engineer

All repair work shall include "safe-off" condition where live wires must be terminated properly and/or debris removed from the site. Upon the conclusion of repair, the Maintenance Report shall be submitted to NJSEA Chief of Transportation. This report shall include the procedure of repair and event recording details (e.g. repair action process description, replaced/repairs parts/equipment, warranty).

Additionally, the preventive maintenance work shall include the following inspections and services:

- Annual inspection and service of video detector units and system
- Annual inspection of communication system
- Annual inspection and service of cabinet
- Annual inspection of cabinet equipment
- Clearing detection and transmission line/zone
- Annual contingency work

All repair work shall include "safe-off" condition where live wires must be terminated properly and/or debris removed from the site.

### ***3.2.3. Major Repairs***

Major repairs shall be performed as a result of damage caused by an outside contractor, utility company, vandalism, motor vehicle, civilian, accident or unusual cause, or natural disaster, and involve replacement, reconstruction, or modification of major system components. The Contractor shall perform all required repairs in accordance with the work order issued by the NJSEA Engineer. The work order will include a completion date for the work. The Contractor shall have qualified personnel on board to perform all necessary work.

### ***3.2.4. On Call Services***

The Contractor shall provide 24/7 On-Call Emergency Services to diagnose, troubleshoot, and address emergency problems, as notified by the NJSEA Engineer or received by the system. The procedure for On-Call Emergency Services response shall follow the "On-Call Emergency Service Plan", which shall be submitted within 30 days of the contract execution to the NJSEA Chief of Transportation for approval. The "On-Call Emergency Service Plan" (the

Service Plan) shall include the procedures for repair and maintenance, event recording details (repair action process description, parts/equipment manufacturer, and warranty), inspection schedule, and the details of inspected components as described in the Technical Specification - Appendix A. The Service Plan shall include the inventory of required spare parts for maintaining the existing system. The Service Plan shall specify the notification information (telephone and email) and service ticket tracking system. The Service Plan shall explicitly identify the emergency crew and corresponding contact information for immediate contact by NJSEA Engineer and/or traffic signal owner. A major equipment failure impacting the network performance and the mobility of intersections is considered an emergency outage and must be addressed immediately based on NJDOT standards.

The Contractor shall repair, or provide every attempt to resolve, all system equipment problems and failures within 48 hours after notification. If the issue cannot be resolved fully within 48 hours, an alternative and reasonable time frame will be set by NJSEA Engineer. If the Contractor cannot complete the repairs within the time specified by the NJSEA Engineer, the NJSEA may repair the system and recover the cost of the repair from the Contractor. The on-call maintenance service shall include all required MPT services.

### ***3.2.5. Inspection***

Upon the completion of work, including but not limited to changes in wiring and timing, on-call services, preventive maintenance, and major repairs, the NJSEA Engineer or its representative shall inspect the work performed by the Contractor on site unless the NJSEA Engineer notifies the Contractor otherwise. All work shall follow the technical specifications and NJDOT, IMSA, AASHTO, and MUTCD standards.

### ***3.2.6. Materials***

All replaced materials and equipment shall follow the technical specifications noted in appendices, NJDOT, MUTCD, or AASHTO standards. The NJSEA Engineer shall further define the specification of materials required to be retrofitted to improve their functionalities, as necessary. All materials including equipment, parts, cables, physical hardware supplied, constructed, assembled, or installed shall be new, corrosion resistant, and in exact accordance with the equipment manufacturer requirements and guidelines.

### ***3.2.7. Material Storage/On Site***

At no time shall any vendor be permitted to surrender custody of equipment to the NJSEA without written approval of NJSEA Engineer in response to written request from the Contractor. Material may pass from vendor directly to Contractor without written approval of Engineer.

No payment shall be made for any material or on site claims of the vendor without a complete systems burn-in test witnessed by a NJSEA Engineer or a NJSEA designated representative. Designation of representative shall only be in writing from NJSEA Engineer.

No payment shall be made for any material supplied greater than \$500 in value that is not accompanied by a test report documenting that it is fully functional and that all pre

configuration is complete and verified. A notarized certification letter may be submitted in place of the test report attesting to the same information.

### ***3.2.8. Wiring and Timing Changes***

Any change to an intersection Wiring or Timing that is deemed major by the NJSEA Engineer shall require that this intersection have a full final inspection procedure "Turn On" in compliance with NJDOT and IMSA specifications. This shall be paid for under the "Turn On" pay item. This pay item shall also include all MPT required for the duration of the "Turn On." If for any reason of workmanship or installed material defect the "Turn On" must be performed a second time, it shall be done at no cost to NJSEA.

### ***3.2.9. Construction Details***

The Contractor shall update and revise all as-built plans or plans provided by NJSEA as necessary based on the maintenance work. The drawing shall be revised and referenced to the dated maintenance record services. The drawing shall be reported and presented to the NJSEA Chief of Transportation for review and approval.

### ***3.2.10. Documentation and Submittals***

Any necessary changes to predetermined plans, configuration, directives, and wiring in the field must be documented and reported to the NJSEA by the Contractor prior to payment. A minimum of 60 days prior to the contract close out, the Contractor shall furnish NJSEA with three (3) tabbed, complete bound sets of the System Maintenance Manual, which shall consist of maintenance instructions for all equipment and its component parts, including the manufacturer's certifications/warranties, descriptive brochures/catalogs, product specifications/performance sheets, and maintenance/operating instructions. The Maintenance Manual shall have a chapter allocated to the spare parts lists. The Contractor shall provide the Material Safety Data Sheets (MSDS) for all materials in use. The MSDS shall be maintained at the project site for each material that is present.

The Contractor shall send the quarterly, or other NJSEA-directed time frame, on-call service invoice including equipment, materials, labor, police traffic directors, and/or other third parties costs for review and approval to the NJSEA Chief of Transportation. The monthly invoice shall be submitted with the Maintenance Report and Preventive Maintenance forms (when necessary).

### ***3.2.11. Standards***

In the absence of clear direction from the Engineer or specifications contained in the contract documents, the Contractor shall follow the standards and specification of the intersection owner. If the intersection owner does not possess written standards, then IMSA, NJDOT, MUTCD, and AASHTO standards shall govern all work and plans.

## **3.3. Project Coordination and Management**

The Contractor shall work collaboratively with the Software Maintenance contractor during the contract period in all stages of repair, testing, preventive maintenance, and troubleshooting as necessary. The Contractor shall be responsible to maintain all subsystems of MASSTR described above. The Contractor shall carefully examine the requirements set forth in the Technical Specifications as attached in the Appendix. The Contractor shall report any problems (e.g. usage, access, and run) with the systems to NJSEA Chief of Transportation and the Software Maintenance contractor. Also, the Contractor shall report any necessary updates advised by vendors to the NJSEA Engineer and Software Maintenance contractor. It is noted that the maintenance of central server is not included in this Contract.

No installation or rehabilitation work may be performed without approval from the NJSEA Chief of Transportation. The Contractor will be responsible to obtain all necessary approval for the installation or rehabilitation work. The Contractor shall maintain the visibility and accessibility of all equipment and cabinets at all times.

### **3.4. Qualifications and Team Organization**

The NJSEA may perform investigations that it deems necessary to determine the ability of the Respondent to perform the Work. In particular, the Respondent's business and technical qualifications will be objectively evaluated against the evaluation criteria set forth in the next subsection.

The Respondent shall furnish all such information and data for this purpose as the NJSEA may request. The NJSEA reserves the right to reject any Proposal if the evidence submitted by (or the investigation of) such Respondent fails to satisfy it that such Respondent is properly qualified to carry out the obligations of the Contract, and to complete the Work contemplated therein.

Respondents shall be experienced in the kind of work to be performed, have the necessary equipment therefore, and possess sufficient capital to properly execute the Work within the time allowed. Proposals received from Respondents who have previously failed to complete contracts within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A Proposal may be rejected if the Respondent cannot show that it has the necessary ability, plant, and equipment to commence the work at the time prescribed, and thereafter to prosecute and complete the Work at the rate or within the time specified. A Proposal may also be rejected if the Respondent is already obligated for the performance of other work that would delay the commencement, prosecution, or completion of the Work.

The Respondent shall identify and submit with the Proposal any actual or potential conflicts of interest with respect to this RFP and MASSTR. Any actual, potential, or perceived conflict of interest may disqualify the Respondent from participating in this project. Any such disclosure shall be supplemented as necessary on an ongoing basis. The response forms and qualification criteria are specified below. The forms may be reproduced either electronically or photocopied, as long as the format remains the same.

### ***3.4.1. Respondent Qualification***

The Respondent shall provide an overview of its experience including the following information:

- The number of years that the Respondent has been involved in ITS deployment, troubleshooting, and maintenance;
- Respondent's staff experience in the role of system and communication Engineering, and management of similar size and type of project; and
- Respondent's experience in the role of managing field operations and emergency responses.

The Respondent shall also provide written references from three (3) different entities that have contracted with respondent for ITS maintenance and support in the United States. Those systems shall be similar in size and nature to MASSTR. The reference letters shall provide feedback on the following aspects of the System:

- Name and contact of entity/agency that owns the system;
- Percent of time that the system is operating;
- The entity/agency's feedback on the overall operation of system; and
- The entity/agency's feedback on the maintenance of system while under contract with Respondent.

If the NJSEA is unable to contact one or more references for a Respondent, the NJSEA will allow the Respondent to provide alternative references within three (3) business days of the NJSEA's request for alternative references. To be compliant, alternative references must be provided if the required minimum number of references is no longer met due to the inability to contact original references.

### ***3.4.2. Personnel Qualification***

All personnel supplied to do work on site on this project, with the exclusion of fiber splicing or testing, shall have an International Municipal Signal Association (IMSA) certification of at least Level 1 Technician. All work on the project shall be overseen by a IMSA Level 2 Technician or higher. The Contractor shall also be able to supply a IMSA Level 3 Technician upon direction of the NJSEA Engineer for tasks specified by the Engineer.

All personnel involved in wireless based communication work shall be required to submit for approval a certification by at least 2 manufacturers who show proof of passing certification training for installation of those vendors' products. One of these certifications must be the product to be supplied on this project.

All personnel involved in any fiber optic work shall have Fiber Optic Association (FOA) certification of certified Fiber Optic Technician. Equivalent certification may be submitted for approval of NJSEA engineer, but shall be equal to or greater than program specified. All personnel taking part in splicing shall be certified by the splicing equipment manufacturer and shall have a minimum of 5 years full-time experience in fiber splicing and termination.

All personnel taking part in network internet protocol activities shall submit résumés for approval of NJSEA Chief of Transportation along with all relevant certification. They must have at least 5 years of experience in integration of traffic signal communications.

### ***3.4.3. Number and Qualification of Subcontractors/Vendors***

To streamline contract payment and administration, the contractor is strongly recommended to use as few sub-contractors or vendors as possible. Combining items into one vendor is strongly recommended but should not compromise the quality of work or material.

The Respondent must provide information on the Respondent's internal organization. If the Respondent's solution involves subcontractors, the response must indicate the following information for the prime Respondent and its anticipated subcontractors. Financial statements are not required for subcontractors performing less than ten percent of the total Cost Proposal.

This information must include:

- Name of the firm(s) submitting the proposal;
- Mailing address;
- Contact person and title;
- Contact email address;
- Contact telephone number(s) and fax number(s);
- Brief history and background about the Respondent's company;
- Services and products offered by the Respondent's company;
- Number of employees;
- Office locations;
- General information about the Respondent's organization;
- Identification of whether the firm is the prime Respondent or subcontractor on this project;
- A description of any affiliation or connection between the Respondent and subcontractor(s); and
- Financial statements (income statement, balance sheet, and statement of cash flows) and/or annual report for last fiscal year of Respondent.

The prime contractor shall be solely responsible for the quality, timeliness and safety of all subcontractors and vendors used on this contract. If the vendor or subcontractor demonstrates the lack of quality, timeliness and safety, the NJSEA may direct the prime contractor to replace the vendor or subcontractor at no additional charge to NJSEA. Therefore, it is recommended that the contractor select vendors and subcontractors carefully based on workmanship quality standard, responsibility and professionalism.

At the start of the contract, the list of all vendors and subcontractors shall be submitted to NJSEA for approval. Resumes and work experience as well as references may be required if directed by NJSEA. If the NJSEA Engineer feels that a vendor or a subcontractor is not qualified to perform the work, the Contractor shall be notified in writing, after which the Contractor shall have seven (7) working days to replace the vendor or the subcontractor or provide a corrective action plan in writing to resolve deficiencies. Once the corrective action plan is approved, any further deficient work shall be documented in writing to the Contractor. After 2 full rounds of documentation and corrective action plans if the vendor or the subcontractor is still performing

deficient work and the Contractor has not yet replaced the vendor or the subcontractor, the NJSEA Chief of Transportation will direct the Contractor to make replacement in writing at which time the Contractor will have 14 days to provide a new vendor or a subcontractor for approval.

#### ***3.4.4. Project Team Organization and Staffing***

The project team shall demonstrate strong knowledge and experience in system engineering and intelligent transportation systems (ITS). Detailed resumes of the following key personnel that will be assigned to conduct this Project shall be provided.

- Project Manager
- Team Leader for field operation
- Team Leader for communication and troubleshooting
- Team Leader for ITS and Advanced Controller Programming
- Team Leader for vehicle detection
- Team Leader for ongoing emergency response

Resumes of key personnel shall be limited in length to no more than three (3) pages per person. The resumes of the key personnel shall, at a minimum, address the following areas:

- Number of years of experience as a dedicated Project Manager or Team Leader;
- Types of projects in management or team leader role;
- Project lifecycle experience in management or team leader role, i.e., design, development, implementation, etc.;
- Utilization of structured project management methodology techniques;
- Specific System related experience involving system design, installation, testing, integration, training, and ongoing technical support;
- Educational background; and
- Professional certification held.

### **3.5. Proposal Evaluation**

#### ***3.5.1. Overview***

In evaluating the Proposals, the NJSEA shall consider the qualifications of the Respondents, and whether or not the Proposals comply with the prescribed requirements. The NJSEA will also consider the qualifications and experience of subcontractors. Maintenance performance, emergency response time, and guarantees of materials and equipment will also be considered. Final determination will be at the sole discretion of the NJSEA and will be made after receipt of Proposals.

#### ***3.5.3. Clarification of Proposal***

All inquiries regarding the clarifications of proposal shall be submitted in writing to the Chief of Transportation and will be answered at the discretion of the NJSEA in the form of written addendum to this RFP. After the submission of Proposals, unless initiated by the NJSEA,

contact with the NJSEA is limited to status inquiries only and such inquiries are only to be directed to the Chief of Transportation.

A Respondent may be required to give an oral presentation to the NJSEA concerning its Proposal. The NJSEA may also require a Respondent to submit written responses to questions regarding its Proposal.

The purpose of such communication with a Respondent, either through an oral presentation or a letter of clarification, is to provide an opportunity for the Respondent to clarify or elaborate on its Proposal. Original Proposals submitted, however, cannot be supplemented, changed, or corrected in any way. No comments regarding other Proposals are permitted.

Respondents may not attend presentations made by their competitors.

It is within the NJSEA's discretion whether to require a Respondent to give an oral presentation or require a Respondent to submit written responses to questions regarding its Proposal. Action by the NJSEA in this regard shall not be construed to imply acceptance or rejection of a Proposal. The Chief of Transportation shall be the sole point of contact regarding any request for an oral presentation or clarification.

### ***3.5.4. Evaluation Criteria***

The proposals will be evaluated based on the following two key criteria:

#### ***3.5.4.1. Qualifications of Respondent (60 total points)***

Qualifications of the Respondent will be evaluated based on the following aspects:

1. Respondent History and Viability **(10 points)**
  - (a) Experience of the firm and designated project team on projects of similar size and/or complexity;
  - (b) Respondent's adherence, on previous projects, to the project schedules, maintenance plans, timeliness of emergency response.
2. Respondent Experience and References **(35 points)**
  - (a) Experience and knowledge of the firm and designated project team with respect to System Engineering, Intelligent Transportation Systems (ITS), maintenance, and repairs;
  - (b) Experience and capability of the firm and designated project team with respect to any special technologies, techniques, or expertise the project may require.
3. Project team organization and staffing **(15 points)**
  - (a) Experience and expertise of the staff and Team Leaders;
  - (b) Experience and expertise of subcontractors and work history on similar projects.

#### ***3.5.4.2. Cost Proposal (40 total points)***

The total project cost provided by each respondent will be utilized for evaluation purposes only, in order to assess proposed project pay item and labor costs and will be scored for each respondent based on the following formula:

Total Project Cost Score (TPCS) in points =  $40 * [1 - \frac{PTPC-LTPC}{ATPC}]$

Where,

*PTPC*: The Proposed Total Project Cost submitted by the respondent

*LTPC*: The Lowest Total Project Cost of all the submitted Proposals

*ATPC*: The Average Total Project Cost of all the submitted Proposals

The PTPC is the sum of the total estimated flat rate replacement pay items annual cost (TPIC) and the total estimated repair labor annual cost (TLAC) from Section 4.3.10. Appendix A provides details of associated Pay Items. Respondents are required to provide costs of each flat rate pay item and specified hourly labor rates in the Cost Proposal Form.

As noted above, the Proposed Total Project Cost (PTPC) developed by the Respondent, will exclusively be utilized in the selection phase, for evaluation and comparison purposes only.

It is noted that the selected contractor shall be compensated based on the unit prices provided for those pay items included in the Flat Rate Replacement Proposal Form in Section 4.3.10.1, which were developed for work inclusive of the replacement, readjustment, and reconfiguration of MASSTR equipment/parts/materials, preventive maintenance and services. Those Pay Item costs not covered in the Flat Rate Replacement Cost Proposal Form in Section 4.3.10.1 shall be compensated based on an hourly labor rate cost provided in the Hourly Labor Rate Proposal Form in Section 4.3.10.2, plus costs of materials and equipment to perform repair on MASSTR equipment and systems.

### **3.6. Contract Negotiation and Award**

The NJSEA will award the Contract to the most qualified, responsible Respondent whose Proposal conforms in all respects to the requirements set forth in the Proposal Documents and is deemed to be most advantageous to the NJSEA, price and other factors considered.

Pursuant to N.J.S.A. 52:34-12, after the Proposals are evaluated and ranked, the NJSEA reserves the right to negotiate the cost and contract terms of a proposed contract award with the potential winning Respondent. Such negotiations shall remain confidential until Notice of Award. The NJSEA reserves the right to seek a Best and Final Offer (BAFO) from the winning Respondent. The BAFO may refine any portion of its original Proposal, including pay unit prices; however, all of the mandatory requirements of the RFP must be met and cannot be supplemented through the BAFO process. In response to the negotiation and BAFO process, the Respondent shall submit, in writing, any required revisions to its Proposal along with its BAFO submittal.

The award of the Contract will be made at the conclusion of the cost and contract term negotiation. The Contract shall be awarded by written notice to that responsible qualified Respondent, whose Proposal conforming to the RFP will be most advantageous to the NJSEA, price and other factors considered.

**NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018**

Within 14 days of the date of the Notice of Award, the Contractor shall properly and duly execute the Contract and deliver to the NJSEA the insurance certificate as detailed in this RFP.

The Award is not binding upon the NJSEA until the NJSEA has executed the Contract. The NJSEA will issue an official Notice to Proceed (NTP) to the Contractor. No person shall perform any Work in furtherance of the Contract until the Contract has been executed and the official NTP has been received.

**SECTION 4: PROPOSAL TERMS, CONDITIONS, FORMS AND DOCUMENT**

#### 4.1. INSTRUCTIONS

##### *4.1.1. New Jersey Business Registration*

Pursuant to N.J.S.A. 52:32-44, the New Jersey Sports & Exposition Authority (“Contracting Agency”) is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in a bid/proposal/contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to the contract award or authorization, the contractor shall provide the Contracting Agency with its proof of business registration and that of any named subcontractor(s).

Subcontractors named in a bid or other proposal shall provide proof of business registration to the bidder, who in turn, shall provide it to the Contracting Agency prior to the time a contract, purchase order, or other contracting document is awarded or authorized.

During the course of contract performance:

- 1) the contractor shall not enter into a contract with a subcontractor unless the subcontractor first provides the contractor with a valid proof of business registration.
- 2) the contractor shall maintain and submit to the Contracting Agency a list of subcontractors and their addresses that may be updated from time to time.
- 3) the contractor and any subcontractor providing goods and performing services under the contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-Reg and be filed online at <http://www.state.nj.us/treasury/revenue/busregcert.shtml>.

Before final payment is made under the contract, the contractor shall submit to the Contracting Agency a complete and accurate list of all subcontractors used and their addresses.

Pursuant to N.J.S.A 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000, for each proof of business registration not properly provided under a contract with a contracting agency.

##### *4.1.2. Ownership Disclosure*

N.J.S.A. 52:25-24.2 provides that no corporation or partnership shall be awarded any contract for the performance of any work or the furnishing of any goods and services, unless, prior to the receipt of the Proposal or accompanying the Proposal of said corporation or partnership, Respondents shall submit a statement setting forth the names and addresses of all stockholders in the corporation or partnership who own ten percent or more of its stock of any class, or of all individual partners in the partnership who own a ten percent or greater interest therein. This requirement applies to all forms of corporations and partnerships, including, but not limited to,

limited partnerships, limited liability corporations, limited liability partnerships and Subchapter S corporations.

The included Ownership Disclosure Form in Section 4 shall be completed and attached to the Proposal. Failure to submit such document is a non-waivable defect and the submittal will be deemed non-responsive and rejected.

***4.1.3. Public Law 2005, Chapter 51, N.J.S.A. 19:44a-20.13-25 (Formerly Executive Order 134) and Executive Order 117 (2008)***

4.1.3.1. In order to safeguard the integrity of State government procurement by imposing restrictions to insulate the negotiation and award of State contracts from political contributions that pose the risk of improper influence, purchase of access, or the appearance thereof, then-Governor James E. McGreevey issued Executive Order 134 on September 22, 2004. To this end, Executive Order 134 prohibited State departments, agencies and authorities from entering into contracts exceeding \$17,500 with individuals or entities that made certain political contributions. Executive Order 134 was superseded by Public Law 2005, c. 51, which was signed into law on March 22, 2005 (“Chapter 51”).

On September 24, 2008 Governor Jon S. Corzine issued Executive Order No. 117 (“E.O. 117”), which is designed to enhance New Jersey’s efforts to protect the integrity of procurement decisions and increase the public’s confidence in government. The Executive Order builds upon the provisions of Chapter 51.

Pursuant to the requirements of this Legislation, the terms and conditions set forth in this section are material terms of any contract resulting from this RFP:

4.1.3.2. Definitions - For the purpose of this section, the following shall be defined as follows:

1) Reportable Contributions - contributions, including in-kind contributions, in excess of \$300.00 in the aggregate per election made to or received by a candidate committee, joint candidates committee, or political committee; or per calendar year made to or received by a political party committee, legislative leadership committee, or continuing political committee.

2) Business Entity - means any natural or legal person, business corporation, professional services corporation, Limited Liability Company, partnership, limited partnership, business trust, association or any other legal commercial entity organized under the laws of New Jersey or any other state or foreign jurisdiction. The definition also includes (i) if a business entity is a for-profit corporation, any officer of the corporation and any other person or business entity that owns or controls 10% or more of the stock of the corporation; (ii) if a business entity is a professional corporation, any shareholder or officer; (iii) if a business entity is a general partnership, limited partnership or limited liability partnership, any partner; (iv) if a business entity is a sole proprietorship, the proprietor; (v) if the business entity is any other form of entity organized under the laws of New Jersey or any other state or foreign jurisdiction, any principal, officer or partner thereof; (vi) any subsidiaries directly or indirectly controlled by the business entity; (vii) any political organization organized under 26 U.S.C.A. § 527 that is directly or indirectly controlled by the business entity, other than a candidate committee, election fund, or political party committee; and (viii) with respect to an individual who is included within the

definition of “business entity”, that individual’s spouse or civil union partner and any child residing with that person. Contributions made by a spouse, civil union partner or resident child to a candidate for whom the contributor is eligible to vote or to a political party committee within whose jurisdiction the contributor resides are permitted.

3) Officer - a president, vice president with senior management responsibility, secretary, treasurer, chief executive officer, or chief financial officer of a corporation or any person routinely performing such functions for a corporation. Please note that officers of non-profit entities are excluded from this definition.

4) Partner - one of two or more natural persons or other entities, including a corporation, who or which are joint owners of and carry on a business for profit, and which business is organized under the laws of this State or any other state or foreign jurisdiction, as a general partnership, limited partnership, limited liability partnership, limited liability company, limited partnership association, or other such form of business organization.

4.1.3.3. Breach of Terms of the Legislation - It shall be a breach of the terms of the contract for the Business Entity to (i) make or solicit a contribution in violation of the Legislation, (ii) knowingly conceal or misrepresent a contribution given or received; (iii) make or solicit contributions through intermediaries for the purpose of concealing or misrepresenting the source of the contribution; (iv) make or solicit any contribution on the condition or with the agreement that it will be contributed to a campaign committee or any candidate or holder of the public office of Governor, or to any State or county party committee; (v) engage or employ a lobbyist or consultant with the intent or understanding that such lobbyist or consultant would make or solicit any contribution, which if made or solicited by the business entity itself, would subject that entity to the restrictions of the Legislation; (vi) fund contributions made by third parties, including consultants, attorneys, family members, and employees; (vii) engage in any exchange of contributions to circumvent the intent of the Legislation; or (viii) directly or indirectly through or by any other person or means, do any act which would subject that entity to the restrictions of the Legislation.

4.1.3.4. Certification and Disclosure Requirements:

1) The State shall not enter into a contract to procure from any Business Entity services or any material, supplies or equipment, or acquire, sell or lease any land or building, where the value of the transaction exceeds \$17,500, if that Business Entity has solicited or made any contribution of money, or pledge of contribution, including in-kind contributions, to a candidate committee and/or election fund of any candidate for or holder of the public office of Governor or Lieutenant Governor, to any State, county, municipal political party committee, or to any legislative leadership committee during certain specified time periods.

2) Prior to awarding any contract or agreement to any Business Entity, the Business Entity proposed as the intended awardee of the contract shall submit the Certification and Disclosure form, certifying that no contributions prohibited by either Chapter 51 or Executive Order 117 have been made by the Business Entity and reporting all contributions the Business Entity made during the preceding four years to any political organization organized under 26 U.S.C. 527 of the Internal Revenue Code that also meets the definition of a “continuing political committee” within the mean of N.J.S.A. 19:44A-3(n) and N.J.A.C. 19:25-1.7. The required form and

instructions, available for review on the Purchase Bureau website at <http://www.state.nj.us/treasury/purchase/forms.shtml#eo134>, shall be provided to the intended awardee for completion and submission to the Purchase Bureau with the Notice of Intent to Award. Upon receipt of a Notice of Intent to Award a Contract, the intended awardee shall submit to the Division, in care of the Purchase Bureau Buyer, the Certification and Disclosure(s) within five (5) business days of the State's request. Failure to submit the required forms will preclude award of a contract under this RFP, as well as future contract opportunities.

3) Further, the Contractor is required, on a continuing basis, to report any contributions it makes during the term of the contract, and any extension(s) thereof, at the time any such contribution is made. The required form and instructions, available for review on the Purchase Bureau website shall be provided to the intended awardee with the Notice of Intent to Award.

4.1.3.5. State Treasurer Review - The State Treasurer or his designee shall review the Disclosures submitted pursuant to this section, as well as any other pertinent information concerning the contributions or reports thereof by the intended awardee, prior to award, or during the term of the contract, by the contractor. If the State Treasurer determines that any contribution or action by the contractor constitutes a breach of contract that poses a conflict of interest in the awarding of the contract under this solicitation, the State Treasurer shall disqualify the Business Entity from award of such contract.

4.1.3.6 Additional Disclosure Requirement of P.L. 2005, C. 271 - Contractor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to P.L. 2005, c. 271, section 3 if the contractor receives contracts in excess of \$50,000 from a public entity in a calendar year. It is the contractor's responsibility to determine if the filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at [www.elec.state.nj.us](http://www.elec.state.nj.us).

#### ***4.1.4. Joint Venture***

If a joint venture is submitting a Proposal, the agreement between the parties relating to such joint venture should be submitted with the joint venture's Proposal. Authorized signatories from each party comprising the joint venture must sign the Proposal. Each party to the joint venture shall submit with the Proposal all completed documents listed in Section 3.6.

#### ***4.1.5. Subcontractor***

The Respondent shall provide name of all subcontractors to whom the Respondent anticipates to subcontract if awarded a Contract. The included Subcontractor Identification Form in Section 4 shall be completed and attached to the Proposal.

Consent of the NJSEA to allow work to be subcontracted does not relieve the Contractor of its responsibility for the Work, nor does it relieve the Surety of its obligations under the bond. The Contractor is responsible for the work of subcontractors. Ensure that the work performed by subcontractors conforms to the Contract.

The NJSEA's consent to subcontract any part of the Work shall not be construed as approval of the subcontract or its terms, but only as approval of the Contractor's request to subcontract to its chosen subcontractor.

Any and all subcontractors to a Contractor shall submit with the Proposal all completed documents listed in Section 3.6, except the Proposal Forms.

**4.1.6. Cost Proposal**

The Cost Proposal shall be submitted on the Cost Proposal Forms, attached herein Section 4.

**4.1.7. Price Alteration**

Pay Item prices and hourly labor rates must be typed or written in ink. Any price change (including "white-outs") must be initialed. Failure to initial price changes shall preclude a contract award from being made to the Respondent.

**4.1.8. Proposal Delivery and Identification**

All Proposal submittals must be received by the NJSEA no later than **2:00 PM prevailing time, Friday, February 15, 2019**. Proposal submittals will NOT be accepted after the aforementioned date and time. Respondents are advised to follow all instructions contained in this RFP, and allow adequate delivery time to ensure timely delivery of proposals.

If made by a corporation (joint venture, associated firms, etc), the Proposal shall be signed by a corporate officer authorized to do so. If made by an individual, that individual shall sign it. If the Respondent is a company or partnership, one or more of the partners shall sign.

The Proposal submittals shall be furnished in a sealed envelope addressed to:

Nadereh Moini, Ph.D., PE, PTOE  
Chief of Transportation  
New Jersey Sports & Exposition Authority  
One DeKorte Park Plaza  
Lyndhurst, New Jersey 07071

The sealed envelope shall contain one (1) hard copy of the complete Proposal, including Cost Proposal Forms, all documents required by this RFP, and all complete forms attached hereto in Section 4. An electronic copy must be submitted on a flash drive included with the written proposal.

The following information shall be clearly indicated on the outside of the envelope: the name, address, email contact, and telephone number of the Respondent; and the title "MASSTR Maintenance Contract Proposal". Overnight express deliveries must include the following telephone number: (201) 460-1700.

Any Proposal Submittal may be withdrawn prior to the aforementioned closing time for receipt of Proposal Submittals.

**4.1.9. Document Examination**

Respondents must carefully examine the RFP and Contract Documents contained in this RFP, and completely familiarize themselves with the actual conditions under which the Work is to be performed, as well as the extent and requirements of the Work. The Respondent understands

and agrees that its Proposal is submitted on the basis of the specifications prepared by the NJSEA. Respondents accept the obligation to examine the specifications, system engineering analysis, and related RFP documents with care and observe all their requirements.

Respondents are also obliged to carefully examine the requirements set forth in the Technical Specifications as attached in the Appendix. Respondents shall use complete sets of Proposal and Contract Documents in preparing the Proposal. The NJSEA assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Proposal and Contract Documents.

In the event the Respondent discovers a discrepancy, error, omission, or ambiguity in the Proposal and Contract Documents, or if the Respondent has any doubt or question as to the intent or meaning of the RFP, the Respondent must immediately notify the NJSEA. In the event the Respondent fails to notify the NJSEA of such ambiguities, errors or omissions, the Respondent shall be bound by the requirements of the RFP and the Respondent's Proposal.

The Respondent assumes sole responsibility for the complete effort required in submitting its Proposal in response to this RFP. No special consideration will be given after Proposals are opened because of a Respondent's failure to be knowledgeable as to all of the requirements of this RFP.

#### ***4.1.10. Interpretation and Addenda***

No oral interpretation and or clarification of the meaning of this RFP including all appendices will be made to any Respondent. All technical and administrative questions regarding this RFP shall be submitted in writing to NJSEA Chief of Transportation, Nadereh Moini, via email to: nmoini@njsea.com at or before 2:00 PM Friday, January 18, 2019.

Changes to the RFP may be made only by the NJSEA via written addenda. Only the interpretations and/or corrections issued as a written Addendum to the RFP by the NJSEA, shall be binding. No other source is authorized to give information regarding any explanation or interpretation of the RFP. The NJSEA's interpretations or corrections issued via addenda shall be final unless superseded by subsequent addenda. All addenda so issued shall become part of this RFP and part of any Contract awarded as a result of this RFP.

All addenda shall be posted on the NJSEA's website at: [www.njsea.com](http://www.njsea.com). **Respondents are required to register their contact information with the NJSEA in order to receive notices and responses to questions regarding the RFP.** Respondents shall email contact information to [nmoini@njsea.com](mailto:nmoini@njsea.com). It is the sole responsibility of the Respondent to be knowledgeable of all addenda related to this procurement.

Receipt of Addenda must be acknowledged in the space provided for such purpose in the Proposal Submittal Form. Compliance by the Respondent with issued addenda is required whether or not receipt is acknowledged.

#### ***4.1.11. Discrepancies in Proposals***

In evaluating Proposals, discrepancies between words and figures will be resolved in favor of words. Discrepancies between unit prices and totals of unit prices will be resolved in favor of

unit prices. Discrepancies between labor rates and the total labor costs will be resolved in favor of the labor rates. Discrepancies between the indicated total of multiplied unit prices, and labor costs and the actual total will be resolved in favor of the actual total.

#### ***4.1.12. Causes for Rejection***

Proposal Submittals may be rejected for any or all of the following reasons:

- Failure to provide a valid New Jersey Business Registration Certificate;
- Not responsive to this RFP;
- Determination of an actual or perceived conflict of interest;
- Failure to include any required information with the submittal; and/or
- Failure to disclose a potential conflict of interest.

The NJSEA reserves the right to reject any and all Proposals if it determines that it is in the best interest of the NJSEA to do so. In addition, the NJSEA reserves the right to reject any Proposal that does not conform to the requirements set forth in the Contract Documents.

The NJSEA reserves the right to waive any and all irregularities and informalities in the submission of Proposals, and to request clarification of Proposals.

#### ***4.1.13. Cost Liability***

The NJSEA assumes no responsibility and bears no liability for costs incurred by a Respondent in the preparation and submittal of a Proposal in response to this RFP.

In the event the NJSEA rejects any or all Proposals for any reason whatsoever, any rejected Respondent shall not be entitled to compensation in connection with the preparation and submittal of the Proposal or compensation for profits anticipated had the Contract been awarded to the Respondent.

#### ***4.1.14. Contents of Proposal***

Subsequent to the Award by the NJSEA, all information submitted by the Respondent in its Proposal and Cost Proposal is considered public information, except as may be exempted from public disclosure under the law including the Open Public Records Act, N.J.S.A. 47:1A-1 et seq.

All Proposal and Cost Proposal responses are confidentially opened on the date such responses are due under this RFP. Only the names of the Respondents submitting Proposals will be publicly announced. The contents of the Proposals shall remain confidential until the Award is issued by the NJSEA.

Interested parties can make an appointment with the NJSEA to inspect the submissions received in accordance with this schedule.

#### ***4.1.15. Sales Tax***

Sales taxes should NOT be included in the Cost Proposal. The winning respondent will receive a copy of the New Jersey State Sales Tax Form ST-13 Contractor's Exempt Purchase Certificate. The contents of the form may be viewed at:

[http://www.state.nj.us/treasury/taxation/pdf/other\\_forms/sales/st13.pdf](http://www.state.nj.us/treasury/taxation/pdf/other_forms/sales/st13.pdf)

**4.2. PROPOSAL DOCUMENT CHECK LIST**

The following documents must be included in the Proposal. The NJSEA reserves the right to reject a Proposal for failure to submit any of the following forms or documents. Identical forms do **not** need to be duplicated when a Respondent submit Proposals for multiple Systems.

	<b>PROPOSAL SUBMISSION REQUIREMENT</b>	<b>Respondent's Initials</b>
1.	Proposal Submittal Form	
2.	Affidavit of Authorization (must be notarized)	
3.	Non-Collusion Affidavit (must be notarized)	
4.	Moral Integrity Affidavit (must be notarized)	
5.	Copy of Contractor's and all subcontractors' valid Public Works Contractor Certificate(s), pursuant to N.J.S.A. 34:11-56.25	
6.	Corporate Resolution Form	
7.	Public Work Certificate	
8.	MacBride Principals Form	
9.	Set-off for State Tax	
10.	Subcontractor Identification Form	
11.	Cost Proposal Forms	

**4.3. FORMS**

***4.3.1. STATE OF NEW JERSEY – NJSEA Proposal Submittal Form***

TO: New Jersey Sports & Exposition Authority (NJSEA)  
RE: NJSEA MASSTR MAINTENANCE RFP

This Proposal Submittal will not be accepted after 2:00 p.m. prevailing time, Friday, February 15, 2019. The Respondent agrees that this Proposal Submittal will not be withdrawn for a period of ninety (90) calendar days after the closing time for receipt of Proposal Submittals.

\_\_\_\_\_, the Respondent presenting this Proposal Submittal, hereby proposes and agrees to furnish all labor, equipment, materials, tools, and work necessary to perform all services.

The undersigned hereby acknowledges receipt of the following addenda:

ADDENDUM NUMBER/DATE \_\_\_\_\_  
\_\_\_\_\_

No addenda were received.

The undersigned hereby acknowledges receipt and review of the complete RFP and all appendix documents.

**NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018**

The Respondent declares that this Proposal Submittal is made without connection to any other person or persons making a submittal for the same work and is, in all respects, fair and without collusion or fraud.

The Respondent understands that the NJSEA reserves the right to reject any or all Proposal Submittals, or to waive any informality or technicality in any Proposal Submittal, if it deems such rejection or waiver to be in the best interest of the NJSEA.

The Respondent has determined the quantity and quality of equipment and materials required, has investigated the location and determined sources of supply, has investigated labor conditions, and has arranged for the continuous prosecution of the Work of this Contract.

The Respondent agrees that the Cost Proposal prices shall apply to all labor, equipment, tools, materials and services approved and used during the Work.

The Respondent agrees to be bound by the award of the Contract, and if awarded the Contract, to execute the Contract, to furnish the required insurance certificates, and to furnish all other information required by the Contract Documents within 14 days of the date of the Notice of Award.

The Respondent has examined the Contract Documents and the location of the MASSTR intersections, equipment, poles, and Cabinets and is familiar with the local conditions, where the Work is to be performed.

The Respondent agrees to perform all of the Work described in the RFP, Proposal/Contract Documents, and Technical Specification; and to provide all labor, equipment, tools, materials, and services necessary for the maintenance of MASSTR. The Respondent further agrees to complete all work as specified and/or directed to a fully acceptable condition for the pay item unit prices negotiated and agreed between the NJSEA and the Respondent.

**If a Corporation:**

Typed Name of Corporation: \_\_\_\_\_

Typed Business Address:

\_\_\_\_\_  
\_\_\_\_\_

Typed Telephone Number: \_\_\_\_\_

FEIN/SSN: \_\_\_\_\_

Incorporated under the laws of the State of \_\_\_\_\_ (if not New Jersey, then Respondent has enclosed authorization to do business in New Jersey).

**NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018**

I am authorized and hereby do sign this Proposal Submittal:

\_\_\_\_\_

Typed Name of Signer: \_\_\_\_\_

Typed Title of Signer: \_\_\_\_\_

Typed Name of President: \_\_\_\_\_

Typed Name of Secretary: \_\_\_\_\_

Typed Name of Treasurer: \_\_\_\_\_

Dated: \_\_\_\_\_ (Affix Corporate Seal)

**If a Partnership, Individual, or Non-Incorporated Organization:**

Typed Name of Company: \_\_\_\_\_

Typed Address: \_\_\_\_\_

\_\_\_\_\_

Typed Telephone Number: \_\_\_\_\_ FEIN/SSN: \_\_\_\_\_

I am authorized and hereby do sign this Proposal Submittal:

Typed Name of Signer: \_\_\_\_\_

Typed Title of Signer: \_\_\_\_\_

Dated: \_\_\_\_\_

**4.3.2. STATE OF NEW JERSEY - NJSEA Affidavit Of Authorization**

State of \_\_\_\_\_

ss:

County of \_\_\_\_\_

\_\_\_\_\_, being duly sworn, deposes and says that he resides at

\_\_\_\_\_, that he is the (TITLE)

\_\_\_\_\_ who signed the Proposal for this Contract, that he was duly authorized to sign, that the Proposal is a true offer of the Respondent, that the seal attached is the seal of the Respondent, and that all declarations and statements contained in the Proposal are true to the best of his knowledge and belief.

\_\_\_\_\_  
\_\_\_\_\_

(Type or print name of affiant under signature)

Subscribed and sworn to

before me this \_\_\_\_\_ day

of \_\_\_\_\_ 20\_\_\_\_.

\_\_\_\_\_

(Notary Public)

My commission expires \_\_\_\_\_, 20\_\_\_\_\_

**4.3.3. STATE OF NEW JERSEY - NJSEA Non-Collusion Affidavit**

STATE OF \_\_\_\_\_

ss:

COUNTY OF \_\_\_\_\_

I, \_\_\_\_\_, the (TITLE) \_\_\_\_\_ of  
\_\_\_\_\_ in the County of \_\_\_\_\_ and  
the State of \_\_\_\_\_, of full age, being duly sworn according to law,  
on my oath depose and say that:

I am (NAME) \_\_\_\_\_ in the firm of  
\_\_\_\_\_, the Respondent making the  
Proposal for this Contract;

I execute the said Proposal with full authority to do so;

Said Respondent has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action to restrain free, competitive bidding in connection with the above named Project; and,

All statements contained in said Proposal and in this affidavit, are true, correct, and made with the full knowledge that the NEW JERSEY SPORTS & EXPOSITION AUTHORITY relies upon the truth of the statements contained in the Proposal and this affidavit in awarding the Contract for the Project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such Contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by

\_\_\_\_\_  
(Name of Respondent)

\_\_\_\_\_  
(Type or print name of affiant under signature)

Subscribed and sworn to  
before me this \_\_\_\_\_ day  
of \_\_\_\_\_ 20 \_\_\_\_.

\_\_\_\_\_  
(Notary Public)  
My commission expires \_\_\_\_\_ 20\_\_\_\_\_

**4.3.4. STATE OF NEW JERSEY - NJSEA Moral Integrity Affidavit**

STATE OF \_\_\_\_\_

ss:

COUNTY OF \_\_\_\_\_

I, \_\_\_\_\_, the (TITLE) \_\_\_\_\_ of  
(COMPANY)

\_\_\_\_\_, hereinafter called the Respondent, being first duly  
sworn; deposes and says that:

1. The Respondent has submitted a Proposal to the New Jersey Sports & Exposition Authority regarding this Contract on (DATE) \_\_\_\_\_.

2. The Respondent wishes to demonstrate moral integrity to the satisfaction of the New Jersey Sports & Exposition Authority.

3. As of the date of signing this affidavit, neither the Respondent, nor any of his employees, officers, or directors are involved in any federal, state or other governmental investigations concerning criminal or quasi-criminal violations, except as follows (if none, so state):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Neither the Respondent nor any of his employees, officers or directors have ever committed any violation of a federal or state or quasi-criminal statute, except as follows (if none, so state):

\_\_\_\_\_.

5. The Respondent is incorporated in the State of \_\_\_\_\_.

6. If the answer to question #5 is other than New Jersey, that the Respondent has received from the Secretary of the State of New Jersey, a certificate authorizing the corporation to conduct business in New Jersey.

7. The names and addresses of the principals, shareholders and officers of the Respondent are as follows:

**Moral Integrity Affidavit (Continued)**

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(Use additional sheets, as required)

8. He is personally acquainted with the operations of the Respondent, has full knowledge of the factual basis comprising the contents of this Affidavit, and knows the contents are true.

9. This Affidavit is made to the New Jersey Sports & Exposition Authority to accept the Proposal for this Contract, knowing that the New Jersey Sports & Exposition Authority relies upon the truth of the statements contained herein.

\_\_\_\_\_  
(Name of Respondent)

\_\_\_\_\_  
(Type of print name of affiant under signature)

Subscribed and sworn to  
before me this \_\_\_\_\_ day  
of \_\_\_\_\_ 20\_\_\_\_\_.

\_\_\_\_\_  
(Notary Public)

My commission expires \_\_\_\_\_, 20\_\_\_\_\_

**4.3.5. STATE OF NEW JERSEY - NJSEA Proof Of Valid New Jersey Public Works  
Contractor Certificate(s)**

**CONTRACT NJSEA PROJECT: MASSTR MAINTENANCE**

The Contractor and all subcontractors shall provide proof of Public Works Contractor Certificate certifying that all employees employed by the Contractor or by any subcontractor have been paid wages not less than those required by the Contract in compliance with N.J.S.A. 34:11-56.25 et seq.

If the Contractor is a joint venture, each party relating to such joint venture shall provide a copy of the Public Works Contractor Certificate

Copies of the Public Works Contractor Certificate(s) shall be attached to this form.

**4.3.6. STATE OF NEW JERSEY - NJSEA Corporate Resolution Form**

BE IT RESOLVED, By the Board of Directors of \_\_\_\_\_ that the President (\_\_\_\_\_) be and hereby is authorized to make, execute and deliver a contract FOR:

Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR) Maintenance, with the NEW JERSEY SPORTS & EXPOSITION AUTHORITY (NJSEA) and that the Secretary (\_\_\_\_\_) be and hereby is authorized to attest to the execution of the same and affix the corporate seal thereto.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
BOARD OF DIRECTORS

\_\_\_\_\_  
SECRETARY (Corporate Seal)

I HEREBY CERTIFY that the foregoing is an exact copy of a Resolution by the BOARD of Directors of (\_\_\_\_\_) adopted at a (\_\_\_\_\_) meeting held on \_\_\_\_\_ at which quorum was present.

IN WITNESS WHEREOF, I have hereunto set my hand and the seal of (\_\_\_\_\_) this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

\_\_\_\_\_  
SECRETARY  
(SEAL)

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

\_\_\_\_\_  
(Notary Public)  
My commission expires \_\_\_\_\_, 20\_\_

**4.3.7. STATE OF NEW JERSEY - MACBRIDE Principals Form**

	<p>STATE OF NEW JERSEY                  DEPARTMENT OF THE TREASURY                  DIVISION OF PURCHASE AND PROPERTY</p> <p>33 WEST STATE STREET, P.O. BOX 230                  TRENTON, NEW JERSEY 08625-0230</p>
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**MACBRIDE PRINCIPALS FORM**

BID SOLICITATION #: \_\_\_\_\_ VENDOR/BIDDER: \_\_\_\_\_

**VENDOR'S/BIDDER'S REQUIREMENT  
 TO PROVIDE A CERTIFICATION IN COMPLIANCE WITH THE  
 MACBRIDE PRINCIPALS AND NORTHERN IRELAND ACT OF 1989**

Pursuant to Public Law 1995, c. 134, a responsible Vendor/Bidder selected, after public bidding, by the Director of the Division of Purchase and Property, pursuant to N.J.S.A. 52:34-12, must complete the certification below by checking one of the two options listed below and signing where indicated. If a Vendor/Bidder that would otherwise be awarded a purchase, contract or agreement does not complete the certification, then the Director may determine, in accordance with applicable law and rules, that it is in the best interest of the State to award the purchase, contract or agreement to another Vendor/Bidder that has completed the certification and has submitted a bid within five (5) percent of the most advantageous bid. If the Director finds contractors to be in violation of the principals that are the subject of this law, he/she shall take such action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

I, the undersigned, on behalf the Vendor/Bidder, certify pursuant to N.J.S.A. 52:34-12.2 that:

**CHECK THE APPROPRIATE BOX**

The Vendor/Bidder has no business operations in Northern Ireland; or

*OR*

The Vendor/Bidder will take lawful steps in good faith to conduct any business operations it has in Northern Ireland in accordance with the MacBride principals of nondiscrimination in employment as set forth in section 2 of P.L. 1987, c. 177 (N.J.S.A. 52:18A-89.5) and in conformance with the United Kingdom's Fair Employment (Northern Ireland) Act of 1989, and permit independent monitoring of its compliance with those principals.

**CERTIFICATION**

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor/Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor/Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification to be void and unenforceable.

\_\_\_\_\_  
 Signature Date

\_\_\_\_\_  
 Print Name and Title

**4.3.8. STATE OF NEW JERSEY - NJSEA Notice To All Bidders Of Set-Off For State Tax**

**FOR CONTRACT WITH  
NEW JERSEY SPORTS AND EXPOSITION AUTHORITY**

Please be advised that, pursuant to L. 1995, c. 159, effective January 1, 1996, and codified at N.J.S.A. 59:49-19 and N.J.S.A. 59:49-20, and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S corporation under contract to provide goods or services or construction projects to the state of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods and services or construction projects, at the same time a taxpayer, partner or shareholder of that entity is indebted for any State tax, which pursuant to N.J.S.A. 43:21-14.4 also includes any indebtedness greater than or equal to \$300 that is due to the Unemployment Compensation Fund, the State Disability Benefits Fund, and the Family Temporary Disability Leave Account, the Director of the Division of Taxation or the Office of Management and Budget shall seek to set off that taxpayer's, partner's or shareholder's share of the payment of that indebtedness. The amount set off shall not allow for the deduction of any expenses or other deductions which might be attributable to the taxpayer, partner or shareholder subject to set-off.

The Division of Taxation may initiate procedures to set off the tax debt of a specific vendor upon the expiration of ninety (90) days after either the issuance by the Division of a notice and demand for payment of any state tax owed by the taxpayer or the issuance by the Division of a final determination on any protest filed by the taxpayer against an assessment or final audit determination. A set-off reduces the contract payment due to a vendor by the amount of that vendor's state tax indebtedness or, in the case of a vendor-partnership or vendor-S corporation, by the amount of state tax indebtedness of any member-partner or shareholder of the partnership or S-corporation, respectively. N.J.A.C. 18:2-8.3.

The Director of the Division of Taxation shall give notice of the set-off to the taxpayer, partner or shareholder and shall provide an opportunity for a hearing within 30 days of such notice under the procedures for protest established under N.J.S.A. 54:49-18. No requests for conference, protest, or subsequent appeal to the Tax Court from any protest permitted under N.J.S.A. 59:49-19 shall stay the collection of the indebtedness. Interest that may be payable by the State to the taxpayer, pursuant to L. 1987, c. 184 (N.J.S.A. 52:32-35) shall be stayed.

"I HAVE BEEN ADVISED OF THIS NOTICE"

Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Print or Type Name of Signer: \_\_\_\_\_

Print or Type Title of Signer: \_\_\_\_\_

Date: \_\_\_\_\_



**4.3.10. STATE OF NEW JERSEY - NJSEA COST PROPOSAL FORMS**

**Estimated Annual Cost for Proposal Purposes Only**

**4.3.10.1. Total Estimated Replacement Pay Items Annual Cost - TPIC**

PAY ITEM NO.	PAY ITEM DESCRIPTION	PAY UNIT	PAY UNIT PRICE	ESTIMATED ANNUAL UNIT QUANTITY	ESTIMATED ANNUAL COST
Replacement (Repl.)					
Example	ABCD		x	q	TC = x*q
RR-101	Repl. Vehicle Detection Unit	Unit		10	
RR-102	Repl. Vehicle Detection Modules	Each		12	
RR-102a	Reprogramming the Detection Zone	Each VDU		5	
RR-102b	Adjusting the Mounting Angle of VDU	Each VDU		8	
RR-103	Repl. Vehicle Detection Cable 3/C#18	Linear Foot		800	
RR-104	Repl. Travel Time Data Collector	Each Module		3	
RR-105	Repl. Travel Time Antenna	Unit		3	
RR-106	Repl. Ethernet Cable, Cat 5e and 6	Linear Foot		1000	
RR-107	Repl. Ethernet Switch, 10/100 BASE-TX	Unit		5	
RR-108	Repl. Ethernet Switch, 10/100 BASE-TX, 10/100/1000BASE-T	Unit		5	
RR-109	Repl.t Ethernet Switch, 10/100/1000 BASE-T, 10/100/1000BASE-X	Unit		5	
RR-110	Repl. Switch Ext. Power Supply	Unit		4	
RR-111	Repl. SFP Optical Transceiver	Unit		5	
RR-112	Repl. Power Over Ethernet - POE Injector	Unit		25	
RR-113	Repl. Remote Power Management Unit	Unit		10	
RR-114	Repl. Antenna Assembly	Unit		5	
RR-114a	Repl. Antenna Panel	Unit		5	
RR-114b	Adjusting Mounting Angle of Antenna Panel	Unit		5	
RR-115	Repl. Transceiver Assembly	Unit		10	
RR-116	Repl. Fiber Optic Link	Linear Foot		400	

NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018

PAY ITEM NO.	PAY ITEM DESCRIPTION	PAY UNIT	PAY UNIT PRICE	ESTIMATED ANNUAL UNIT QUANTITY	ESTIMATED ANNUAL COST
Replacement(Repl.)					
Example	ABCD		x	q	TC = x*q
RR-117a	Repl. Fiber Optic Splice Enclosure	Unit		3	
RR-117b	Repl. Fiber Optic Patch Panel	Unit		5	
RR-118	Repl. Antenna Cable	Linear Foot		500	
RR-119	Repl. Antenna Jumper Cable	Linear Foot		500	
RR-120	Repl. Vehicle Detection Cable	Linear Foot		2000	
RR-121	Repl. Transceiver Power Cable, 3/C#12	Linear Foot		500	
RR-122	Repl. Antenna Poles Type A (75')	Unit		1	
RR-123	Repl. Antenna Poles Type B (55')	Unit		1	
RR-124	Repl. Antenna Poles Type C (40')	Unit		1	
RR-125	Repl. T-Pole Extension	Unit		1	
RR-126	Repl. C-Pole Extension	Unit		1	
RR-127	Repl. K-Pole Extension	Unit		1	
RR-128	Repl. Steel Pole Extension	Unit		1	
RR-129	Repl. Roof Mount Antenna Tower, 20'	Unit		1	
RR-130	Repl. Roof Mount Antenna Tower, 6'	Unit		1	
RR-131	Repl. Adaptive Traffic Signal Controller	Unit		8	
RR-132	Repl. Conflict Monitor	Unit		5	
RR-133	Repl. Miscellaneous Controller Accessory	Unit		2	
RR-134	Repl. Foundations of Poles, Pull Boxes, or Junction Boxes	Unit		2	
RR-135	Repl. PSE&G and ITS Cabinet	Unit		3	
RR-136	As Directed Work	Varies	No Entry Required		
RR-137	On-Call Emergency Services - Regular	Hour		100	
RR-137a	On-Call Emergency Services - Overtime	Hour		30	
RR-138	Controller Restart	Each		10	
RR-139	Controller Turn On	Each		5	

NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018

PAY ITEM NO.	PAY ITEM DESCRIPTION	PAY UNIT	PAY UNIT PRICE	ESTIMATED ANNUAL UNIT QUANTITY	ESTIMATED ANNUAL COST
Example	ABCD		x	q	TC = x*q
Preventive Maintenance					
PM-140	Annual Inspection of Vehicle Detectors	Each		490	
PM-141	Annual Inspection of Communication System - Fiber	Link		45	
PM-141a	Annual Inspection of Communication System - Wireless I	Link		75	
PM-141b	Annual Inspection of Communication System - Wireless II	Link		20	
PM-142	Annual Inspection of Cabinet	Unit		140	
PM-142a	Annual Inspection of Cabinet Equipment	Unit		140	
PM-143	Clearing Detection and Transmission Line/Zone	Line/Zone		5	
PM-144	Annual Contingency Work	Each	No Entry Required		
Maintenance and Protection of Traffic					
MPT-145	Roadway Closure and Detour	Each	No Entry Required		
MPT-146	Police/Traffic Directors	Each	No Entry Required		
<b>Total Estimated Repl. +PM Pay Items Annual Cost [TPIC] (See Section 3 for Equation)</b>					Sum of all rows

- 1) Refer to Technical Specification (Appendix A) for the details of replacement pay items, required materials/tools, and labor.
- 2) The Estimated Replacement Annual Quantities are estimated projections for the purpose of evaluation of Cost Proposals only and do not reflect actual requirements. Actual quantities required as part of this Contract will vary based on maintenance needs to be determined in the future.

**4.3.10.2. Total Estimated Repair Labor Annual Cost - TLAC**

LABOR ITEM NO.	LABORER CATEGORY	LABOR UNIT	LABOR RATE	ESTIMATED ANNUAL LABOR HOURS	ESTIMATED ANNUAL LABOR COST
Labor					
Example		H	R	N	R*N
LF_R	Foreman Electrician (Regular)	Hour		200	
LF_O	Foreman Electrician (Overtime)	Hour		30	
LJ_R	Journeyman Electrician (Regular)	Hour		350	
LJ_O	Journeyman Electrician(Overtime)	Hour		70	
LT_R	Traffic Controller Technician (Regular)	Hour		150	
LT_O	Traffic Controller Technician (Overtime)	Hour		25	
LC_R	Fiber/Communication Technician (Regular)	Hour		85	
LC_O	Fiber/Communication Technician (Overtime)	Hour		15	
<b>Total Estimated Repair Labor Annual Cost - TLAC</b>					Sum of all rows

1. Refer to Technical Specification (Appendix A) for the details of labor associated with the repair of MASSTR equipment.
2. The Estimated Repair Annual Labor Hours are estimated projections for the purpose of evaluation of Cost Proposals only and do not reflect actual requirements. The actual number of labor hours required under this Contract will vary based on repair needs to be determined in the future.

**Respondent’s Proposed Total Project Cost [PTPC] (See Section 3.5.4.2 for input into Total Project Cost Score [TPCS] Equation):**

$$PTPC = TPIC + TLAC$$

**End of Section**

**SECTION 5: CONTRACT TERMS, CONDITIONS, FORMS, AND DOCUMENTS**

## 5.1. Contract Documents Examination

The Contractor must carefully examine the Contract Documents and completely familiarize themselves with the actual conditions, under which the Work is to be performed, as well as the extent and requirements of the Work.

In the event the Contractor discovers a discrepancy, error, omission, or ambiguity in the Contract Documents, or if the Contractor has any doubt or question as to the intent or meaning of the Contract Documents, the Contractor must immediately notify the NJSEA. The Contractor is not relieved of the obligation to complete work because of a discrepancy, error, omission, or ambiguity.

## 5.2. Payment, Inspection, and Completion

### 5.2.1. Review of Applications for Quarterly/As Directed Payments

The NJSEA's recommendation for payment of any application for Quarterly or NJSEA directed time frame payment shall constitute a representation by the NJSEA (based on the NJSEA's observations of any completed work for Quarterly or as directed payments as an experienced and qualified professional and on the NJSEA's review of the application and attached information) that:

- The Work has been completed to the point indicated.
- To the best of the NJSEA's knowledge, information, and belief the quality of the Work is in accordance with the requirements of the technical specifications and the Contract Documents.
- The Contractor is entitled to payment in the amount recommended.

However, by making any such recommendation, the NJSEA will not be representing that:

- Exhaustive or continuous on-site inspections were made to check the quality or quantity of the Work.
- The means, methods, techniques, sequences, and procedures of the Contractor were reviewed.
- Titles of any works, materials, or equipment have passed to the NJSEA free and clear of any liens, claims security interests, and encumbrances (hereafter in this Section referred to as liens).

The NJSEA may also refuse to recommend any such payment (eg. because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended) to such extent as may be necessary, in the NJSEA's opinion, to protect the NJSEA from loss. Reasons for refusing to recommend payment, or for nullifying payments previously made, include but are not limited to the following:

- Unacceptable Work not remedied.
- Failure to coordinate Work with other contractors or entities.
- Claims filed or reasonable evidence indicating probable filing of claims.
- Failure of the Contractor to make payments properly to subcontractors, manufacturers, or suppliers.
- Failure to provide a status report on all complaints/deficiencies.

- Failure to satisfactorily prosecute the Work in accordance with the Contract Documents.
- Liens filed in connection with the Work.
- Failure to comply with Affirmative Action goals and objectives in accordance with the requirements of both N.J.S.A. 10-5-31 et seq. and N.J.A.C. 17:27.
- Failure to submit any items required by the Contract Documents in the time frame specified.
- Failure to maintain insurance and/or to provide proof of insurance.

### ***5.2.2. Contractor's Warranty of Title***

The Contractor warrants and guarantees that title to all work, materials, and equipment included in any and all of his applications for payment (whether or not incorporated in the Work), shall pass to the NJSEA at the time of payment free and clear of all liens.

### ***5.2.3. Acceptance of the Work for Quarterly/As Directed Payment***

After the Contractor has addressed all required quarterly or NJSEA directed time frame tasks including replacement, repair, diagnosis, emergency responses, and preventive maintenance to the satisfaction of the NJSEA and in accordance with the Contract and Technical Specifications Documents, the NJSEA shall notify the Contractor in writing that the Work is acceptable and eligible for payment, subject to the provisions of Section 5.9 Contractors' Compliance.

### ***5.2.4. Review of Application for Final Payment***

After the NJSEA has notified the Contractor of the acceptance of the final Work at the end of the Contract's period in accordance with Section 5.2.3, Acceptance of the Work for Quarterly/as directed Payment, the Contractor shall then submit its application for the final payment, following the Technical Specifications to perform the last procedures of the preventive maintenance. The application for final payment shall be accompanied by the System Maintenance Manual, warranties of all replaced equipment, date of all performed preventive maintenance, emergency contact information from State, Counties, and Municipalities, and all other specified documentation as the NJSEA may reasonably request. The application for final payment shall also be supplemented with complete and legally effective releases or waivers of all liens arising out of, or filed in connection with, the Work. Said releases or waivers must be satisfactory to the NJSEA. If any subcontractor, supplier, manufacturer, fabricator or distributor fails to furnish a release or receipt in full, the Contractor may furnish a bond or other collateral (satisfactory to the NJSEA) to indemnify the NJSEA against any lien. Final payment shall not be made by the NJSEA unless the Contractor supplies all releases or waivers of liens.

### ***5.2.5. Acceptance of Final Payment Application***

At the end of the three years contract period, the NJSEA will review all required documentations such as maintenance plans, preventive maintenance inspection forms inspection schedules, and warranty documentations to be fulfilled by the Contractor during the Contract period. Upon NJSEA acceptance that the Contractor has satisfied all its obligations, the NJSEA shall give the written notice to the Contractor that the Work has been completed, subject to the provisions of Section 5.2.6 Waiver of Claims, and the Contractor shall present the final payment application to the NJSEA.

If the NJSEA's review indicates the application or any of the accompanying documentation is not in order, the NJSEA shall return the application for final payment to the Contractor, indicating in writing the reasons for not recommending payment. The Contractor shall address all the NJSEA's concerns, make the necessary additions and/or corrections, and resubmit the application.

***5.2.6. Waiver of Claims***

The issuance of payment by the NJSEA, and the acceptance of same by the Contractor, shall not constitute a waiver by the NJSEA of any rights with respect to the Contractor's continuing obligations under the Contract Documents.

The Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. The recommendation of the NJSEA to pay any application for payment, any use or acceptance of the Work by the NJSEA or a failure to do so, or the NJSEA's correction of any defective work shall not constitute acceptance of work not in accordance with the Contract Documents or a release of the Contractor's obligation to perform the Work in accordance with same.

***5.2.7. Suspension of Work & Termination***

Upon seven days written notice to the Contractor, the NJSEA may elect to abandon the Work and terminate the Contract without cause and without prejudice to any other right or remedy. In such case, the Contractor shall be paid for all completed Work, plus reasonable termination expenses.

***5.2.8. NJSEA Right to Deduct Monies***

The Contractor shall pay to the NJSEA, and the NJSEA shall have the right to deduct the full amount of all expenses, losses, damages and costs from all monies due, or to become due, the Contractor under this Contract for any defect, omission, or mistake of the Contractor or his employees, and the repairs of same, as determined by the NJSEA.

**5.3. Financial Records**

The Contractor and all subcontractors shall maintain their books, records, financial documents and all financial records relevant to the Project pursuant to the Contract Documents in accordance with generally accepted accounting principles.

**5.4. Ethics Standards**

The Contractor must not pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any NJSEA employee, or agent as defined by N.J.S.A. 52:13D-13b. and N.J.S.A. 52:13D-13e., or to any member of the immediate family, as defined by N.J.S.A. 52:13D-13i., of any such officer or employee or agent, or any partnership, firm or corporation with which they are employed or associated, or in which such employee or agent has an interest within the meaning of N.J.S.A. 52:13D-13g.

## 5.5. Applicable Laws - General

This Contract shall be construed and governed by the laws of the State of New Jersey. It is the Contractor's responsibility to be aware of and comply with Federal, State, and local laws, ordinances, rules, and regulations, and orders and decrees of bodies or tribunals having jurisdiction or authority that affect those engaged or employed on the Work, or that affect the conduct of the Work.

The Contractor shall observe and comply with, and ensure the Contractor's agents and employees observe and comply with, laws, ordinances, rules, regulations, orders, and decrees.

The Contractor shall defend and indemnify the NJSEA and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's agents or employees, subcontractors of any tier, or suppliers.

If discrepancies or inconsistencies are discovered between any document of the Contract and any law, ordinance, regulation, order, or decree, the Contractor shall immediately notify the NJSEA in writing.

The Contractor shall obtain permits, grants, licenses, authorizations, certifications, and other approvals for the prosecution of the Work, except where the NJSEA has already procured such permits, grants, licenses, authorizations, certifications, and other approvals.

The Contractor shall comply with all required permits, grants, licenses, authorizations, certifications, and approvals. The NJSEA reserves the right to suspend the Work if the Contractor fails to comply with required permits, grants, licenses, authorizations, certifications, and approvals.

The Contractor shall provide to the NJSEA, whenever requested, documentation pertaining to any noncompliance by the Contractor and related corrective actions taken.

The Contractor is responsible to pay fines levied against the Contractor, its agents, employees, and subcontractors that arise out of or are alleged to arise out of noncompliance with permits, grants, licenses, authorizations, certifications, or approvals.

The NJSEA will recover from the Contractor costs due to fines levied against the NJSEA that arise out of, or are alleged to arise out of, noncompliance by the Contractor, its agents, employees, and subcontractors with permits, grants, licenses, authorizations, certifications, or other approvals.

The NJSEA may hold the Contractor responsible for all engineering, inspection, permits, and administration costs (including overhead) incurred because of the Contractor's noncompliance.

Regarding any claim arising from a breach of Contract, tort (including negligence), or otherwise, the NJSEA will not be liable to the Contractor for any special, consequential,

incidental, or penal damages, including, but not limited to, loss of profit or revenues, loss of rental value for Contractor-owned equipment, damages to associated equipment, cost of capital, or interest.

There shall be no liability upon the NJSEA or authorized representatives of the NJSEA, either personally or as officials of the State, in carrying out any of the provisions of the Contract or in exercising any power or authority granted to them by or within the scope of the Contract, it being understood that in all such matters they act solely as agents and representatives of the State.

## **5.6. Equal Employment Opportunity**

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided to the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer advising the labor union of the contractor's commitments under this chapter and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq. as amended and supplemented from time to time and the Americans with Disabilities Act.

The contractor or subcontractor agrees to make good faith efforts to meet targeted county employment goals established in accordance with N.J.A.C. 17:27-5.2.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, labor unions, that it does not discriminate on the basis of age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personal testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

- Letter of Federal Affirmative Action Plan Approval
- Certificate of Employee Information Report
- Employee Information Report Form AA302 (electronically provided by the Division and distributed to the public agency through the Division's website at [www.state.nj.us/treasury/contract\\_compliance](http://www.state.nj.us/treasury/contract_compliance).)

The Contractor and its subcontractor shall furnish such reports or other documents to the Division of Purchase and Property, CCAU, EEO Monitoring Program as may be requested by the Division from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Purchase and Property, CCAU, EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1et seq.

## **5.7. Prevailing Wage Act**

The New Jersey Prevailing Wage Act, N.J.S.A. 34: 11-56.26 et seq. is hereby made part of every contract entered into on behalf of the NJSEA, except those contracts which are not within the contemplation of the Act. The Respondent's signature on this proposal is his guarantee that neither he nor any subcontractors he might employ to perform the work covered by this proposal has been suspended or debarred by the Commissioner, Department of Labor for violation of the provisions of the Prevailing Wage Act and/or the Public Works Contractor Registration Acts; the Respondent's signature on the proposal is also his guarantee that he and any subcontractors he might employ to perform the work covered by this proposal will comply with the provisions of the Prevailing Wage and Public Works Contractor Registration Acts, where required. Additional information is available at:

[www.state.nj.us/labor/lssc/lspubcon.html](http://www.state.nj.us/labor/lssc/lspubcon.html).

## **5.8. The Public Works Contractor Registration Act**

The New Jersey Public Works Contractor Registration Act requires all contractors, subcontractors and lower tier subcontractors who submit proposals on or engage in any contract for public work as defined in N.J.S.A. 34:11-56.26 be first registered with the New Jersey Department of Labor and Workforce Development. Any questions regarding the registration process should be directed to the Division of Wage and Hour Compliance at (609) 292-9464 or

<http://www.nj.gov/labor/lssc/lspubcon.html>.

## **5.9. Contractor's Compliance**

The Contractor and all subcontractors shall provide the NJSEA with a Public Works Contractor Certificate certifying that all employees employed by the Contractor or by any subcontractor have been paid wages not less than those required by the Contract in compliance with N.J.S.A. 34:11-56.25, et seq.

The Contractor shall be responsible for obtaining and paying all permits and licenses and shall pay all inspection fees associated with the prosecution of the Work. The Contractor shall also schedule and pay for all utility connections required for the Work. The Contractor shall perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of his work. The Contractor shall be responsible for the finished Work complying accurately with the Contract Documents.

The Contractor shall provide a competent representative, who shall not be replaced without written notice to the NJSEA, except under extraordinary circumstances. Contractor's representative shall have the authority to act on behalf of the Contractor. All communications given to the representative shall be as binding as if given to the Contractor.

The Contractor shall be responsible for providing competent, suitably qualified personnel to perform the Work required by the Contract Documents. The Contractor shall be responsible for removing any person from the site who appears to be incompetent, unfaithful, disorderly or otherwise unsatisfactory. Said person shall not again be employed at the site without the written consent of the NJSEA.

The Contractor shall be responsible for the proper and timely submittal of the required documents for all equipment and materials so as to not delay the progress of the Work. The Contractor shall be fully responsible to the NJSEA for all acts and omissions of his subcontractors, suppliers, organizations, and other persons performing or furnishing any of the Work. Nothing in the Contract Documents shall create any contractual relationship between the NJSEA, and any such subcontractor, supplier, organization or other person.

The Contractor shall give all notices and comply with all laws and regulations applicable to furnishing and performing the Work. If the Contractor performs any work that is contrary to such laws and/or regulations, he shall be responsible for all costs arising thereof. If the Contractor observes that the Contract Documents are at variance with these laws and/or regulations, he shall promptly notify the NJSEA in writing.

If the Contractor elects to remove, replace or relocate any non-MASSTR poles, utilities or structures during the performance of the Work, the Contractor shall be responsible for making all the necessary arrangements and obtaining all the necessary permits and approvals without the involvement of the NJSEA.

The Contractor shall be responsible for all damages resulting from the performance of the Work. Should any claim be made against the NJSEA as a result of the performance of the Work, the Contractor shall attempt to promptly settle with such other party. The Contractor shall be responsible for damage caused to the Work and to adjacent property, subject to said dangerous stresses or pressures.

The Contractor shall be responsible for initiating, maintaining, and supervising all safety programs and precautions regarding the Work. The Contractor shall comply with all applicable laws and regulations for the safety and protection of persons and property; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall remedy all damage, injury or loss to any persons or property caused by the Contractor or any of his subcontractors, suppliers, organizations or other persons directly or indirectly employed by any of them. The Contractor's duties and responsibilities for safety and protection shall continue until the Work is deemed completed and is acceptable by the NJSEA.

The Contractor shall be responsible for repairing any damage caused by his operations that could affect public health and safety, within four hours of the occurrence. If the Contractor has failed to repair the damage, the NJSEA may have the repairs made by others at the expense of the Contractor. The Contractor shall repair all other damage expeditiously. Until such time as said other damage is repaired by the Contractor and approved by the NJSEA, twice the amount of the cost estimate for the repairs will be withheld from the Contractor's payment.

In the event of an emergency affecting the safety or protection of persons, the Work, the site or adjacent property; the Contractor shall be responsible to act to prevent threatened damage, injury or loss without special instruction or approval from the NJSEA.

The Contractor and his subcontractors shall protect the Work against any damage caused by the weather. If the NJSEA determines that any portion of Work has been damaged or injured by a failure on the part of the Contractor or his subcontractors to protect the Work, it shall be repaired or removed and replaced at the expense of the Contractor.

The Contractor shall be responsible for proceeding with the Work and adhering to the on-call emergency services, maintenance, troubleshooting, and inspection schedule during all disputes or disagreements with the NJSEA. No Work shall be delayed or postponed pending resolution of any disputes or disagreements.

The Contractor shall coordinate with the software Contractor to perform maintenance, repair, replacement works efficiently as stated in the Technical Specification. The NJSEA chief of Transportation shall be informed on any and all communications between the Contractor and Software Contractor.

If the Work is defective, the Contractor fails to supply sufficiently skilled workers, suitable materials or equipment or fails to furnish or perform the Work in a manner that will guarantee conformance with the Contract Documents, the NJSEA may order the Contractor to stop the Work until the cause for such order has been eliminated. However, this right of the NJSEA to stop the Work shall not give rise to any duty on the part of either to exercise this right for the benefit of the Contractor or any other party.

The Contractor shall maintain books, records, and other documents pertinent to the performance of the Work, in accordance with accepted procedures and practices defined in the Technical Specification. The NJSEA and/or any of their duly authorized representatives shall have access to such books, records, and other documents for the purpose of inspection, auditing, and copying. The Contractor shall provide proper facilities for such access and inspection, and agrees to the disclosure of all information and reports resulting from access of the above records to any of the above agencies. Records shall be maintained and made available until three years from the date of final payment for the Project. Records which relate to any dispute, appeal, litigation or settlement of claims arising out of such performance (or costs or items to which an audit exception has been taken), shall be maintained and made available until three years after the date of the resolution of each dispute, appeal, litigation, claim or exception.

The Contractor shall constantly give his personal attention to the faithful prosecution of the Work and shall keep the Work under his personal control. The Contractor shall not sublet the Work as a whole or substantial part of the whole, without the previous written consent of the NJSEA. The Contractor shall not assign any of the Work, or any monies payable under this Contract (or his claim thereto), without the written consent of the NJSEA.

While performing the Work, the Contractor shall not encumber the premises with materials or equipment and shall keep the premises free from accumulations of waste materials. At the completion of the Work, the Contractor shall remove all waste and surplus materials, tools, equipment, and machinery and shall restore to original condition all property not designated for alteration by the Contract Documents.

The Contractor warrants and guarantees to the NJSEA that all Work will be performed in accordance with the Contract Documents and that the completed Project will not be defectively or improperly installed. The Contractor agrees that all work improperly performed shall be remedied, all defective Work shall be repaired or replaced, and all improperly installed Work shall be reinstalled correctly in accordance with the Contract Documents.

#### **5.10. Insurance**

The Contractor shall furnish the NJSEA with satisfactory proof that he/she has obtained the insurance described below from insurance companies or underwriters licensed to do business in

the States of New Jersey and satisfactory to the NJSEA. All insurance that will be required to be maintained by the Contractor shall be in the amounts and for the coverage's specified herein.

The Contractor shall keep such insurance in force through the end of Contract Period. The NJSEA shall be named as additional insured under all the policies, except the Compensation Insurance.

All insurance certificates shall stipulate that the insurance will not be changed or canceled without giving at least thirty (30) days written notice to the NJSEA by certified mail.

The Contractor shall furnish to the NJSEA certificates for the following types of insurance showing the type, amount, and class of operations insured, and the effective and expiration dates of the policies. The certificates shall be submitted with the executed Contract(s). Work on the Contract will not be permitted to proceed until the certificate has been received and verified. Specific reference to the Contract shall be made in all policies.

***5.10.1. Public Liability and Property Damage Insurance***

The Contractor shall provide a Public Liability and Property Damage Insurance including the Independent Contractor's Completed Operations and Contractual Liability Insurance with combined single limits of not less than one million dollars (\$1,000,000) each occurrence and with an annual aggregate of three million dollars (\$3,000,000) with respect to bodily/personal injury and property damage. Said policies of insurance shall contain a provision or endorsement providing insurance protection against property damage caused by explosion or collapse; and against damage to or interference with other facilities.

***5.10.2. Vehicle Liability Insurance***

The Contractor shall provide a Vehicle Liability Insurance for "any auto/vehicle" for the duration of the contract for bodily injury/property damage with a combined single limit of one million dollars (\$1,000,000).

***5.10.3. Excess Liability Insurance***

The Excess Liability Insurance must be in the amount of five million dollars (\$5,000,000) and is to be provided in addition to the above requirements.

***5.10.4. Compensation Insurance, Coverage "B"***

The Contractor shall obtain a Compensation Insurance, Coverage "B", as required by state law for all employees who will be engaged in the work associated with this Contract. The Contractor shall require all subcontractors to provide similar workmen's compensation insurance for all of their employees, unless those employees are covered under the Contractor's insurance. If any employees engaged in hazardous work under this Contract are not protected under the workmen's compensation statute; the Contractor (and any subcontractors) shall also provide adequate employer's liability insurance for the protection of these employees.

**5.10.5. Subcontractors**

The Contractor shall not permit any subcontractor to commence work on his subcontract until all similar insurance (as listed above) required of the subcontractor has been obtained and approved. Copies of all Subcontractors certificates are to be forwarded to the NJSEA.

**5.10.6. Professional Liability Insurance**

The Contractor shall carry Errors and Omissions, Professional Liability Insurance and/or Professional Liability Malpractice Insurance sufficient to protect the Contractor from any liability arising out the professional obligations performed pursuant to the requirements of the contract. The insurance shall be in the amount of not less than \$5,000,000 and in such policy forms as shall be approved by the State. If the Contractor has claims made coverage and subsequently changes carriers during the term of the contract, it shall obtain from its new Errors and Omissions, Professional Liability Insurance and/or Professional Malpractice Insurance carrier an endorsement for retroactive coverage.

**5.11. Contract Document Check List**

	<b>Contract Submission Requirement</b>	<b>Initial each item submitted</b>
1	Public Liability and Property Damage Insurance Certificate	
2	Vehicle Liability Insurance Certificate	
3	Excess Liability Insurance Certificate	
4	Compensation Insurance Certificate	
5	Affirmative Action Compliance Form: Letter of Federal Affirmative Action Plan Approval; or Certificate of Employee Information Report; or Employee Information Report Form AA302	
6	Respondent's and all subcontractor's valid Certificate(s) of Business Registration or Interim Registration, pursuant to N.J.S.A. 52:32-44	
7	Ownership Disclosure Form, pursuant to N.J.S.A. 52:25-24.2	
8	Public Law 2005, Chapter 51 and Executive Order 117 (2008) Disclosure Form	
9	Public Law 2005, Chapter 271 Disclosure Form	
10	Disclosure of Investment Activities in IRAN Form	
11	New Jersey Equal Pay Act (submitted to D.O.L. - State of NJ)	
12	Signed and Completed Contract	

## 5.12. Forms

### 5.12.1. STATE OF NEW JERSEY – NJSEA Affirmative Action Compliance

This form is a summary of the Contractor's requirement to comply with N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

#### **Goods and Services (including professional services) Contracts**

The Contractor shall submit to the public agency, after notification of award but prior to execution of this contract, one of the following three documents as forms of evidence:

- A photocopy of a valid letter that the Contractor is operating under an existing Federally approved or sanctioned affirmative action program (good for one year from the date of the letter); OR
- A photocopy of a Certificate of Employee Information Report approval, issued in accordance with N.J.A.C. 17:27-4; OR
- A photocopy of an Employee Information Report (Form AA302) provided by the State of New Jersey Department of Treasury Division of Public Contracts and Equal Employment Compliance (NJPCEEC) and distributed to the public agency to be completed by the Contractor in accordance with N.J.A.C. 17:27-4.

The Contractor(s) must submit the copies of the AA302 Report to the NJSEA and NJPCEEC. The Public Agency copy is submitted to the public agency, and the Contractor copy is retained by the Contractor.

The undersigned Contractor certifies that he/she is aware of the commitment to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27.1 et seq. and agrees to furnish the required forms of evidence.

The undersigned Contractor further understands that the Contract shall be declared null and void if said Contractor fails to comply with the requirements of N.J.S.A. 10:5-31 and N.J.A.C. 17:27-1 et seq.

#### **Maintenance Contract**

After notification of award, but prior to signing the Contract, the Contractor shall submit to the public agency compliance officer and the NJPCEEC an initial project workforce report (Form AA201) provided to the public agency by the NJPCEEC for distribution to and completion by the Contractor, in accordance with N.J.A.C. 17:27-7.

The Contractor shall also submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of the contract to the NJPCEEC and to the public agency compliance officer. The Contractor shall also cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the job and/or off-the-job programs for outreach and training of minorities and women.

**NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018**

COMPANY: \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

**Note: This notice must be completed, signed and returned with your signed contract.**

***5.12.2. STATE OF NEW JERSEY - NJSEA Proof of Valid Business Registration Certificate***

**FOR STATE AGENCY AND CASINO SERVICE CONTRACTS  
DEPARTMENT OF TREASURY - DIVISION OF REVENUE  
FOR CONTRACT NJSEA PROJECT: MASSTR MAINTENANCE**

The Respondent shall provide proof of valid Business Registration Certificate or Interim Registration with the New Jersey Department of Treasury, Division of Revenue.

If the Respondent is a joint venture, each party relating to such joint venture shall provide a copy of the Respondent's Business Registration Certificate (or Interim Registration). If subcontractors are anticipated to be involved in the Work, each subcontractor relating to the Contract shall provide a copy of the Respondent's Business Registration Certificate (or Interim Registration).

Copies of the Business Registration Certificate(s) shall be provided prior to award of contract.

5.12.3. STATE OF NEW JERSEY - Ownership Disclosure Form

	<p><b>STATE OF NEW JERSEY</b>  <b>DEPARTMENT OF THE TREASURY</b>  <b>DIVISION OF PURCHASE AND PROPERTY</b></p> <p>33 WEST STATE STREET, P.O. BOX 230          TRENTON, NEW JERSEY 08625-0230</p>
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**OWNERSHIP DISCLOSURE FORM**

BID SOLICITATION #: \_\_\_\_\_ VENDOR/BIDDER: \_\_\_\_\_

**PART 1**

PLEASE COMPLETE THE QUESTIONS BELOW BY CHECKING EITHER THE "YES" OR THE "NO" BOX. ALL PARTIES ENTERING INTO A CONTRACT WITH THE STATE ARE REQUIRED TO COMPLETE THIS FORM PURSUANT TO N.J.S.A. 52:25-24.2. PLEASE NOTE THAT IF THE VENDOR/BIDDER IS A NON-PROFIT ENTITY, THIS FORM IS NOT REQUIRED.

	YES	NO
1. Are there any individuals, corporations, partnerships, or limited liability companies owning a <b>10% or greater</b> interest in the Vendor/Bidder?	<input type="checkbox"/>	<input type="checkbox"/>
IF THE ANSWER TO QUESTION 1 IS "NO", PLEASE SIGN AND DATE THE FORM. IF THE ANSWER TO QUESTION 1 IS "YES", PLEASE ANSWER QUESTIONS 2 – 4 BELOW.		
2. Of those parties owning a 10% or greater interest in the Vendor/Bidder, are any of those parties individuals?	<input type="checkbox"/>	<input type="checkbox"/>
3. Of those parties owning a 10% or greater interest in the Vendor/Bidder, are any of those parties <b>corporations, partnerships, or limited liability companies</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
4. If your answer to Question 3 is "YES", are there any parties owning a <b>10% or greater</b> interest in the corporation, partnership, or limited liability company referenced in Question 3?	<input type="checkbox"/>	<input type="checkbox"/>

IF ANY OF THE ANSWERS TO QUESTIONS 2 - 4 ARE "YES", PLEASE PROVIDE THE REQUESTED INFORMATION IN PART 2 BELOW.

**PART 2**

PLEASE PROVIDE FURTHER INFORMATION RELATED TO QUESTIONS 2 – 4 ANSWERED AS "YES".

If you answered "YES" for questions 2, 3, or 4, you must disclose identifying information related to the individuals, corporations, partnerships, and/or limited liability companies owning a 10% or greater interest in the Vendor/Bidder. Further, if one or more of these entities is itself a corporation, partnership, or limited liability company, you must also disclose all parties that own a 10% or greater interest in that corporation, partnership, or limited liability company. This information is required by statute.

**INDIVIDUALS**

NAME _____	DATE OF BIRTH _____
ADDRESS 1 _____	
ADDRESS 2 _____	
CITY _____	STATE _____ ZIP _____

NAME _____	DATE OF BIRTH _____
ADDRESS 1 _____	
ADDRESS 2 _____	
CITY _____	STATE _____ ZIP _____

NAME _____	DATE OF BIRTH _____
ADDRESS 1 _____	
ADDRESS 2 _____	
CITY _____	STATE _____ ZIP _____

*Attach Additional Sheets If Necessary.*



5.12.4. STATE OF NEW JERSEY – NJSEA Public Law 2005, Chapter 51 and Executive Order 117 (2008) Disclosure Form


 State of New Jersey  
 Department of the Treasury  
**Division of Purchase and Property**  
 Two-Year Chapter 51/Executive Order 117 Vendor Certification and  
 Disclosure of Political Contributions

<b>FOR STATE AGENCY USE ONLY</b>	
Solicitation, RFP, or Contract No. _____	Award Amount _____
Description of Services _____	
State Agency Name _____	Contact Person _____
Phone Number _____	Contact Email _____
<input type="checkbox"/> Check if the Contract / Agreement is Being Funded Using FHWA Funds	

**Please check if requesting  
recertification**

**Part 1: Business Entity Information**

Full Legal Business Name \_\_\_\_\_  
 (Including trade name if applicable)

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone \_\_\_\_\_

Vendor Email \_\_\_\_\_ Vendor FEIN (SS# if sole proprietor/natural person) \_\_\_\_\_

**Check off the business type and list below the required information for the type of business selected.  
MUST BE COMPLETED IN FULL**

- Corporation: LIST ALL OFFICERS and any 10% and greater shareholder
- Professional Corporation: LIST ALL OFFICERS and ALL SHAREHOLDERS
- Partnership: LIST ALL PARTNERS with any equity interest
- Limited Liability Company: LIST ALL MEMBERS with any equity interest
- Sole Proprietor

Note: "Officers" means President, Vice President with senior management responsibility, Secretary, Treasurer, Chief Executive Officer or Chief Financial Officer of a corporation, or any person routinely performing such functions for a corporation.

**All Officers of a Corporation or PC**

**10% and greater shareholders of a corporation  
or all shareholder of a PC**

_____ _____ _____ _____	_____ _____ _____ _____
----------------------------------	----------------------------------

**All Equity partners of a Partnership**

**All Equity members of a LLC**

_____ _____ _____ _____	_____ _____ _____ _____
----------------------------------	----------------------------------

If you need additional space for listing of Officers, Shareholders, Partners or Members, please attach separate page.

**IMPORTANT NOTE: You must review the definition of "contribution" and "business entity" on the Information and Instructions form prior to completing Part 2 and Part 3. The Information and Instructions form is available at: <http://www.state.nj.us/treasury/purchase/forms.shtml#eo134>**

**Part 2: Disclosure of Contributions by the business entity or any person or entity whose contributions are attributable to the business entity.**

1. Report below all contributions solicited or made during the 4 years immediately preceding the commencement of negotiations or submission of a proposal to any:

Political organization organized under Section 527 of the Internal Revenue Code and which also meets the definition of a continuing political committee as defined in N.J.S.A. (See Information and Instructions form.)

2. Report below all contributions solicited or made during the 5 ½ years immediately preceding the commencement of negotiations or submission of a proposal to any:

Candidate Committee for or Election Fund of any Gubernatorial or Lieutenant Gubernatorial candidate  
State Political Party Committee  
County Political Party Committee

3. Report below all contributions solicited or made during the 18 months immediately preceding the commencement of negotiations or submission of a proposal to any:

Municipal Political Party Committee  
Legislative Leadership Committee

Full Legal Name of Recipient _____ Address of Recipient _____ Date of Contribution _____ Amount of Contribution _____ Type of Contribution (i.e. currency, check, loan, in-kind) _____ Contributor Name _____ Relationship of Contributor to the Vendor _____ <b>If this form is not being completed electronically, please attach additional contributions on separate page.</b> Click the "Add a Contribution" tab to enter additional contributions.
--

Check this box only if no political contributions have been solicited or made by the business entity or any person or entity whose contributions are attributable to the business entity.

**Part 3: Certification**

- I am certifying on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity as listed on Page 1 under **Part 1: Vendor Information**.
- I am certifying on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity as listed on Page 1 under **Part 1: Vendor Information**, except for the individuals and/or entities who are submitting separate Certification and Disclosure forms which are included with this submittal.
- I am certifying on behalf of the business entity only; any remaining persons or entities whose contributions are attributable to the business entity (as listed on Page 1) have completed separate Certification and Disclosure forms which are included with this submittal.
- I am certifying as an individual or entity whose contributions are attributable to the business entity.

I hereby certify as follows:

1. I have read the Information and Instructions accompanying this form prior to completing the certification on behalf of the business entity.
2. All reportable contributions made by or attributable to the business entity have been listed above.

NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018

3. **The business entity has not knowingly solicited or made any contribution of money, pledge of contribution, including in-kind contributions, that would bar the award of a contract to the business entity unless otherwise disclosed above:**
- a) Within the 18 months immediately preceding the commencement of negotiations or submission of a proposal for the contract or agreement to:
    - (i) A candidate committee or election fund of any candidate for the public office of Governor or Lieutenant Governor or to a campaign committee or election fund of holder of public office of Governor or Lieutenant Governor; OR
    - (ii) Any State, County or Municipal political party committee; OR
    - (iii) Any Legislative Leadership committee.
  - b) During the term of office of the current Governor or Lieutenant Governor to:
    - (i) A candidate committee or election fund of a holder of the public office of Governor or Lieutenant Governor; OR
    - (ii) Any State or County political party committee of the political party that nominated the sitting Governor or Lieutenant Governor in the last gubernatorial election.
  - c) Within the 18 months immediately preceding the last day of the sitting Governor or Lieutenant Governor's first term of office to:
    - (i) A candidate committee or election fund of the incumbent Governor or Lieutenant Governor; OR
    - (ii) Any State or County political party committee of the political party that nominated the sitting Governor or Lieutenant Governor in the last gubernatorial election.
4. **During the term of the contract/agreement the business entity has a continuing responsibility to report, by submitting a new Certification and Disclosure form, any contribution it solicits or makes to:**
- (a) Any candidate committee or election fund of any candidate or holder of the public office of Governor or Lieutenant Governor; OR
  - (b) Any State, County or Municipal political party committee; OR
  - (c) Any Legislative Leadership committee.

The business entity further acknowledges that contributions solicited or made during the term of the contract/agreement may be determined to be a material breach of the contract/agreement.

5. **During the two-year certification period the business entity will report any changes in its ownership structure (including the appointment of an officer within a corporation) by submitting a new Certification and Disclosure form indicating the new owner(s) and reporting said owner(s) contributions.**

I certify that the foregoing statements in Parts 1, 2 and 3 are true. I am aware that if any of the statements are willfully false, I may be subject to punishment.

Signed Name \_\_\_\_\_ Print Name \_\_\_\_\_  
Title/Position \_\_\_\_\_ Date \_\_\_\_\_

**Procedure for Submitting Form(s)**

**The contracting State Agency should submit this form to the Chapter 51 Review Unit** when it has been required as part of a contracting process. The contracting State Agency should submit a copy of the completed and signed form(s), to the Chapter 51 Unit and retain the original for their records.

**The business entity should return this form to the contracting State Agency.** The business entity can submit this form directly to the Chapter 51 Review Unit only when it -

- Is approaching its two-year certification expiration date and wishes to renew certification;
- Had a change in its ownership structure; OR
- Made any contributions during the period in which its last two-year certification was in effect, or during the term of a contract with a State Agency.

**Forms should be submitted either electronically to: [cd134@treas.nj.gov](mailto:cd134@treas.nj.gov) , or regular mail at: Chapter 51 Review Unit, P.O. Box 230, 33 West State Street, Trenton, NJ 08625.**

5.12.5. STATE OF NEW JERSEY - NJSEA Public Law 2005, Chapter 271 Disclosure Form

	<p><b>STATE OF NEW JERSEY</b>  <b>DEPARTMENT OF THE TREASURY</b>  <b>DIVISION OF PURCHASE AND PROPERTY</b></p> <p>33 WEST STATE STREET, P.O. BOX 0230          TRENTON, NEW JERSEY 08625-0230</p>
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**VENDOR/BIDDER CERTIFICATION AND POLITICAL CONTRIBUTION DISCLOSURE FORM**  
**PUBLIC LAW 2005, CHAPTER 271**

**CONTRACT #:** \_\_\_\_\_ **VENDOR/BIDDER:** \_\_\_\_\_

At least ten (10) days prior to entering into the above-referenced Contract, the Vendor/Bidder must complete this Certification and Political Contribution Disclosure Form in accordance with the directions below and submit it to the State contact for the referenced Contract.

**NOTE** that the disclosure requirements under Public Law 2005, Chapter 271 are separate and different from the disclosure requirements under Public Law 2005, Chapter 51 (formerly Executive Order 134). Although no Vendor/Bidder will be precluded from entering into a contract by any information submitted on this form, a Vendor's/Bidder's failure to fully, accurately and truthfully complete this form and submit it to the appropriate State agency may result in the imposition of fines by the New Jersey Election Law Enforcement Commission.

**DISCLOSURE**

The following is the required Vendor/Bidder Disclosure of all Reportable Contributions made in the twelve (12) months prior to and including the date of signing of this Certification and Disclosure to: (i) any State, county, or municipal committee of a political party, legislative leadership committee, candidate committee of a candidate for, or holder of, a State elective office, or (ii) any entity that is also defined as a "continuing political committee" under N.J.S.A. 19:44A-3(n) and N.J.A.C. 19:25-1.

The Vendor/Bidder is required to disclose Reportable Contributions by: the Vendor/Bidder itself; all persons or other business entities owning or controlling more than 10% of the profits of the Vendor/Bidder or more than 10% of the stock of the Vendor/Bidder, if the Vendor/Bidder is a corporation for profit; a spouse or child living with a natural person that is a Vendor/Bidder; all of the principals, partners, officers or directors of the Vendor/Contractor and all of their spouses; any subsidiaries directly or indirectly controlled by the Vendor/Bidder; and any political organization organized under section 527 of the Internal Revenue Code that is directly or indirectly controlled by the Vendor/Bidder, other than a candidate committee, election fund, or political party committee.

"Reportable Contributions" are those contributions that are required to be reported by the recipient under the "New Jersey Campaign Contributions and Expenditures Reporting Act," P.L. 1973, c. 83 (C.19:44A-1 et seq.), and implementing regulations set forth at N.J.A.C. 19:25-10.1 et seq. As of January 1, 2005, contributions in excess of \$300 during a reporting period are deemed "reportable."

Name and Address of Committee to which a Reportable Contribution was made	Date of Reportable Contribution	Amount of Reportable Contribution	Contributor's Name
<i>Indicate "NONE" if no Reportable Contribution was made.</i>			
		\$	
		\$	
		\$	
		\$	

*Attach additional sheets if necessary.*

**CERTIFICATION**

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor/Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor/Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of any agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Date

\_\_\_\_\_  
 Print Name and Title

**5.12.6. Disclosure of Investment Activities in IRAN Form**

	<p>STATE OF NEW JERSEY                  DEPARTMENT OF THE TREASURY                  DIVISION OF PURCHASE AND PROPERTY</p> <p>33 WEST STATE STREET, P.O. BOX 230                  TRENTON, NEW JERSEY 08625-0230</p>
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**DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM**

BID SOLICITATION #: \_\_\_\_\_ VENDOR/BIDDER: \_\_\_\_\_

**PART 1**  
**CERTIFICATION**  
**VENDOR/BIDDER MUST COMPLETE PART 1 BY CHECKING ONE OF THE BOXES**  
**FAILURE TO CHECK ONE OF THE BOXES WILL RENDER THE PROPOSAL NON-RESPONSIVE**

Pursuant to Public Law 2012, c. 25, any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must complete the certification below to attest, under penalty of perjury, that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the Department of the Treasury's Chapter 25 list as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at <http://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf>. Vendors/Bidders must review this list prior to completing the below certification. **Failure to complete the certification will render a Vendor's/Bidder's proposal non-responsive.** If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

**CHECK THE APPROPRIATE BOX**

A. I certify, pursuant to Public Law 2012, c. 25, that neither the Vendor/Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the N.J. Department of the Treasury's list of entities determined to be engaged in prohibited activities in Iran pursuant to P.L. 2012, c. 25 ("Chapter 25 List"). Disregard Part 2 and complete and sign the Certification below.

**OR**

B. I am unable to certify as above because the Vendor/Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the Department's Chapter 25 list. I will provide a detailed, accurate and precise description of the activities in Part 2 below and sign and complete the Certification below. Failure to provide such information will result in the proposal being rendered as nonresponsive and appropriate penalties, fines and/or sanctions will be assessed as provided by law.

**PART 2**

**PLEASE PROVIDE ADDITIONAL INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN**

If you checked Box "B" above, provide a detailed, accurate and precise description of the activities of the Vendor/Bidder, or one of its parents, subsidiaries or affiliates, engaged in the investment activities in Iran by completing the boxes below.

ENTITY NAME: \_\_\_\_\_  
 RELATIONSHIP TO VENDOR/BIDDER: \_\_\_\_\_  
 DESCRIPTION OF ACTIVITIES: \_\_\_\_\_  
 DURATION OF ENGAGEMENT: \_\_\_\_\_  
 ANTICIPATED CESSATION DATE: \_\_\_\_\_  
 VENDOR/BIDDER CONTACT NAME: \_\_\_\_\_  
 VENDOR/BIDDER CONTACT PHONE No.: \_\_\_\_\_

*Attach Additional Sheets If Necessary.*

**CERTIFICATION**

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor/Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor/Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

Signature \_\_\_\_\_ Date \_\_\_\_\_  
 Print Name and Title \_\_\_\_\_

*5.12.7.STATE OF NEW JERSEY- Equal Pay Act*

**New Jersey Equal Pay Act**

“Please be advised that in accordance with P.L. 2018, c. 9, also known as the Diane B, Allen Equal Pay Act, which was signed in to law by Governor Phil Murphy on April 24, 2018, a contractor performing “qualifying services” or “public work” to the State or any agency or instrumentality of the State shall provide the Commissioner of Labor and Workforce Development a report regarding the compensation and hours worked by employees categorized by gender, race, ethnicity, and job category. For more information and report templates see <https://nj.gov/labor/equalpay/equalpay.html>.”

**End of Section**

**MEADOWLANDS ADAPTIVE SIGNAL SYSTEM  
FOR TRAFFIC REDUCTION (MASSTR)**

**MAINTENANCE CONTRACT**

Prepared By  
New Jersey Sports & Exposition Authority  
One DeKorte Park Plaza, Lyndhurst New Jersey 07071  
[www.njsea.com](http://www.njsea.com)

**STATE OF NEW JERSEY  
NEW JERSEY SPORTS & EXPOSITION AUTHORITY  
CONTRACT**

This Contract, effective on the latest date of signature at the last page, by and between the New Jersey Sports & Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey, 07071, hereinafter called the NJSEA, the party of the first part, and:

---

hereinafter called the Contractor, the party of the second part.

WITNESSETH, that whereas the NJSEA intend to have the Contractor perform replacement, repair, preventive maintenance, on-call/emergency, and inspection activities for all subsystems of MASSTR including:

- NJSEA MASSTR Adaptive Traffic Control System (ATCS)
- NJSEA MASSTR Vehicle Detection System (VDS)
- NJSEA MASSTR Communication System (CS)

hereinafter called the Project or the Work.

NOW, THEREFORE, the NJSEA and the Contractor, in exchange for the mutual consideration set forth herein, agree as follows:

### **1. PARTS OF CONTRACT**

The parties agree that the conditions contained in the following documents, which comprise and are hereinafter called the Contract Documents, are made part of this Contract and are binding on both parties as if all conditions contained in the Contract Documents were set forth in this Contract:

- A. The entirety of this Request for Proposal (RFP), Proposal Documents, Contract Documents, Technical Specifications, and Standards.
- B. Addenda
- C. Proposal
- D. Cost Proposal
- F. Any other Contract Amendments

### **2. SCOPE OF WORK**

The Contractor shall furnish all labor, materials, equipment, tools, and services necessary for maintenance of a fully operational MASSTR including but not limited to the current 124 signalized intersections located in the Hackensack Meadowlands region of New Jersey, in accordance with the Contract Documents.

### **3. CONTRACT TERM**

Work under this Contract shall continue for three (3) years from the date specified in the Notice to Proceed, with the option to be extended for a maximum of two (2) additional periods of one

(1) year each. The option to extend the contract term may be exercised by the NJSEA, at its sole discretion. The maximum contract term cannot exceed five years.

#### **4. CONTRACTOR**

The Contractor shall have sole responsibility for the complete effort specified in the Contract. Payment will be made only to the Contractor. The Contractor shall have sole responsibility for all payments due to any subcontractor. The Contractor is responsible for the professional quality, technical accuracy and timely completion of the Work and submission of all deliverables, services or commodities required to be provided under this Contract. The Contractor shall, without additional compensation, correct or revise any errors, omissions, or other deficiencies in its deliverables and other services. The approval of deliverables furnished under this Contract shall not in any way relieve the Contractor of responsibility for the technical adequacy of its work. The review, approval, acceptance or payment for any of the services shall not be construed as a waiver of any rights that the State may have arising out of the Contractor's performance of this Contract.

#### **5. SUBCONTRACTORS**

The Contractor agrees to bind every subcontractor by the terms of the Contract Documents. The Contract Documents shall not be construed as creating any contractual relations between any subcontractor and the NJSEA. Relations between the Contractor and subcontractors are further defined in the General Instructions (Section 4 and 5)

#### **6. WORK**

The Contractor agrees to furnish all the necessary labor, materials, equipment, tools, personnel, maintenance and protection of traffic, and services necessary to perform and complete all work and services in strict compliance with the Contract Documents.

#### **7. PRICES FOR WORK**

The Contractor will be compensated based on the negotiated and agreed upon pay unit price of each Maintenance Pay Item and Preventive Maintenance Pay Item provided in the Flat Rate Replacement Cost Proposal Form in Section 4.3.10.1. Those Pay Item costs not covered in the Flat Rate Replacement Cost Proposal Form in Section 4.3.10.1 shall be compensated based on an hourly labor rate cost provided in the Hourly Labor Rate Proposal Form in Section 4.3.10.2, plus costs of materials and equipment. Material markups shall not exceed 20 percent of the supplier's invoice price (cost) that will be furnished to the NJSEA.

The Contractor shall be compensated based on the prices stipulated in the Cost Proposal Forms as discussed herein. The Contractor shall not be compensated separately for any loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of the work, or for any expenses incurred by or in consequence of the suspension or discontinuance of the work.

## 8. AVAILABILITY OF FUNDS

The NJSEA's obligation to pay the Contractor is contingent upon the availability of funds.

## 9. PAYMENTS

9.1. Payments shall be made to the Contractor on a reimbursable basis in response to invoices submitted.

9.2. The Contractor shall submit a detailed quarterly/as directed invoice accompanied by an NJSEA invoice for completed and accepted work. The NJSEA invoice shall show the total invoiced amount of the Pay Item as classified in the Cost Proposal Form and Technical Specification document and a reference to the Contractor's detailed invoice. The Contractor's detailed invoice shall contain an itemized accounting of all charges accompanied by supporting documents and invoices furnished by subcontractors or third parties.

9.3. The NJSEA shall notify the Contractor of any questions with respect to the quarterly/as directed invoice. The NJSEA and the Contractor shall designate representatives to resolve any disputes, as necessary. In the event that disputes remain unresolved for an extended period, the NJSEA will pay the portion of the invoice not in dispute. All duties, responsibilities, and obligations assigned to, or undertaken by the Contractor in the performance of the Work, shall be at the Contractor's expenses.

9.4 The cost to redo or replace work deemed deficient by the NJSEA Chief of Transportation, as well as any additional cost for repair of damage caused by deficient work, shall not be reimbursable under this contract. Classification of work as deficient shall be the sole determination of the NJSEA Chief of Transportation and shall not be subject to request for explanation or appeal.

## 10. WAIVERS

Neither the inspection by the NJSEA nor any of its agents, nor any orders, measurements of certificate by the NJSEA, nor any order by the NJSEA for the payment of money nor payment for, nor acceptance of, the whole nor any part of the work by the NJSEA nor any extension of time nor any possession taken by the NJSEA or its employees, shall operate as a waiver of any provision of this Contract, or of any power herein reserved to the NJSEA, or any right to damages herein provided, nor shall any waiver of any breach of this Contract be held to be a waiver of any other or subsequent breach. Any remedy provided in this Contract shall be taken and construed as cumulative, that is, in addition to each and every other remedy herein provided, and in addition to all other suits, actions, or legal proceedings, the NJSEA shall also be entitled as of right to writ of injunction against any breach of any of the provisions of this Contract.

## 11. INDEMNIFICATION

11.1. The Contractor shall defend, indemnify, protect and save harmless the NJSEA, servants, and employees from and against any and all suits, claims, losses, demands, or damages of whatever kind or nature to the extent arising out of any act, error or omission in the performance of this Contract including, but limited to negligence, gross negligence, willful misconduct, intentional tort, fraud, bad faith, or criminal behavior of the Contractor, his agents, servants, employees, or subcontractors. The Contractor shall, at his own expense, appear, defend and pay all charges for attorneys and all costs and other expenses arising from such suit or claim incurred in connection therewith. If any judgment shall be rendered against the NJSEA for which indemnification is provided under this paragraph, the Contractor shall, at his own expense, satisfy and discharge the same.

11.2. The NJSEA shall, as soon as practicable after a claim has been made against it, give written notice thereof to the Contractor, along with full and complete particulars of the claim. If the suit is brought against the NJSEA or any of its servants and employees, the NJSEA shall expeditiously forward or have forwarded to the Contractor every demand, complaint, notice, summons, pleading or other process received by the NJSEA or its representatives.

11.3. It is expressly agreed and understood that any approval by the NJSEA of services performed and/or reports, plans, or specifications provided by the Contractor shall not operate to limit the obligations of the Contractor assumed in this Section or in the other provisions of this Contract.

## 12. NJSEA REQUIREMENTS

12.1. The NJSEA Chief of Transportation shall be the initial interpreter of the Contract Document requirements and judge of the acceptability of the Work thereof. Any claims, disputes and/or other matters relating to the above or to changes in a contract price will initially be referred to the NJSEA, in writing. Any changes in the material terms of the Contract, including changes in price or schedule of service, shall be made only by mutually agreed upon written amendment to this Contract.

12.2 The NJSEA may authorize minor variations in the Work, which do not involve an adjustment in a contract price or a schedule of service and are consistent with the overall intent of the Contract Documents. If the Contractor believes that a variation issued as minor justifies an increase in a contract price, the Contractor may make a claim therefore.

12.3. The NJSEA may reject the Work believed to be defective. The NJSEA also has the authority to require special inspection and testing of the Work, whether or not it has been fabricated, installed or completed.

12.4. The NJSEA shall not be responsible for the means, methods, techniques, sequence or procedures of the Contractor's performance of the work, or the safety programs and precautions incident thereto. The NJSEA will not be responsible for the failure of the Contractor to furnish or perform the Work in accordance with the Contract Documents.

12.5. The NJSEA will not be responsible for acts of omission by the Contractor or any of his subcontractors or suppliers furnishing or performing any of the Work.

### **13. SUCCESSORS AND ASSIGNS**

This Contract and all of the covenants hereof shall inure to the benefit of and be binding upon the NJSEA and the Contractor respectively and his partners, successors, assigns and legal representatives. Neither the NJSEA nor the Contractor shall have the right to assign, transfer or sublet his interests or obligations hereunder without notice to and written consent of the other party.

### **14. TERMINATION**

The NJSEA may, upon seven days written notice to the Contractor, and at any time after the execution of this contract, terminate or limit the services of the Contractor furnished hereunder for any reasons; including but not limited to the unavailability of monies to perform maintenance, repair, scheduled inspections, or any other services.

### **15. GUARANTEE AND CORRECTION OF DEFECTIVE WORK**

15.1. The Contractor warrants and guarantees to the NJSEA that all Work will be performed in accordance with all federal, state, and local laws, standards, and regulations and these Contract Documents; and that the Work will not be defective.

15.2. The Warranty period for any new installed equipment and components follows the manufacturer warranty period defined in the technical specification. The warranty period starts after the acceptance date. If any equipment is found to be defective the Contractor shall promptly correct the defective equipment, or remove and replace it with non-defective one; as directed by the NJSEA, and at no additional cost to the NJSEA.

**16. ADVERTISING**

The Contractor shall not use the NJSEA’s name, logos, images, or any data or results arising from this contract without first obtaining the prior written consent of the NJSEA.

IN WITNESS THEREOF, \_\_\_\_\_ and the NJSEA have executed this Contract at the place and on the date immediately adjacent to their respective signatures.

FOR THE CONTRACTOR:

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Typed Name of Firm)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Typed Name)

\_\_\_\_\_  
(Typed Title)

FOR THE NJSEA:

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
Vincent Prieto  
President & CEO

**APPENDIX A: TECHNICAL SPECIFICATION**



**MASSTR**

**REQUEST FOR PROPOSAL FOR MASSTR MAINTENANCE - APPENDIX A**

## **MASSTR Maintenance Contract Requirements**

### **Description**

Work shall focus on restoring and repairing equipment failures and the overall maintenance of MASSTR field equipment. The Contractor shall perform regular, preventive, and on-call maintenance service for MASSTR field equipment. Maintenance and minor repair of MASSTR subsystem components include communications elements (e.g. radios, antenna, switches, and repeaters), VDS equipment (e.g. Autoscope detection cameras, Terra Interface Panel - TIP, Terra Access Point -TAP, travel time sensors and antenna), ATCS components (e.g. Controller, Conflict monitor, and traffic signal cabinet), signal timing, electronic parts (e.g. wiring, fiber optic cables, fiber optic splice enclosures and patch panels, splices, couplings, connectors, meters, pull boxes, junction boxes, fuses, power cables, circuit breakers, power distribution units, uninterruptible power supplies, solar controllers, batteries), conduit, structures, supports, foundations, poles, and all related appurtenances. An itemized list of all MASSTR equipment, parts, and directions for repair, maintenance, and approval by the NJSEA is included in this contract. The Contractor shall travel to a field equipment location in response to a call from the NJSEA Engineer or its representative and perform troubleshooting, diagnosis, repair or assessment of damage on equipment, materials, and parts described subsequently. Maintenance and protection of traffic and police/traffic directors shall be provided, as necessary.

The “materials” to be used by the Contractor consist of testing equipment, electronic parts and equipment, and any special tools needed to perform the work. MASSTR also contains a wide variety of active data communications devices and software subsystems. The Contractor shall understand these software subsystems and coordinate with the Software Contractor to perform repairs on the system. If and when the Contractor supplies equipment from manufacturers other than those used for original equipment, the Contractor shall provide a sample of such equipment to the NJSEA Chief of Transportation for acceptance testing. The equipment to be examined and tested shall be accompanied by an installation guide, schematic diagrams, maintenance manual, and operation manual. These documents shall remain in the possession of NJSEA. The NJSEA Engineer will furnish the result (approval/rejection) of the tested equipment to the Contractor.

### **Repairs & Replacement**

Repairs typically involve the restoration of equipment to working condition, which may include the replacement of damaged, defective, unstable, weak, or worn parts. Repairs involve troubleshooting in the field or on the Contractor’s bench, replacement of modules/parts, and replacement of malfunctioning or nonfunctioning components. Repairs also include the adjustment, straightening, and cleaning of equipment, parts, and structures. Repairs also

include resetting, configuring and/or programming of microprocessor-based equipment. Damages caused by power surges shall be repaired at the Contractor's expense.

The following items identify typical repairs/replacements and shall not to be construed as an all-inclusive list:

- Repair and/or replacement of Vehicle Detection Units (VDUs)
- Replacement of VDS equipment
- Replacement of travel time antenna
- Repair and/or replacement of travel time data collector and transmitting devices
- Replacement of vehicle detection cable 3/C#18
- Replacement of Ethernet Switch, Power Supply, and SFP Optical Transceiver
- Replacement of Power over Ethernet (POE) injectors
- Replacement of Remote Power Management
- Replacement of Transceiver and Antenna Assemblies
- Replacement of Ethernet cable, Cat 5e & 6
- Replacement of Antenna/Jumper, Vehicle Detection, and Transceiver power Cables
- Replacement of Fiber Optic Links and Fiber Optic Enclosure & Patch Panel
- Repair and/or replacement of ITS cabinet and its AC systems
- Repair and/or replacement of antenna pole (Type A, B, and C)
- Repair and/or replacement of pole extension (T-pole, C-pole, K-pole, and Steel)
- Repair and/or replacement of roof mounted antenna tower (6' and 20')
- Repair and/or replacement of adaptive traffic signal controller
- Restart /or Turn on Controller
- Repair and/or replacement of PSE&G, repeater, and ITS Cabinets (if installed by NJSEA)
- Repair and/or replacement of conflict monitor (if installed by NJSEA)
- Repair and/or replacement of junction boxes (if installed by NJSEA)
- Major/Minor emergency repairs as ordered by the NJSEA Engineer

All repair work shall include "safe-off" condition where live wires must be terminated properly and/or debris removed from the site. Upon the conclusion of repair, the Maintenance Report shall be submitted to NJSEA Chief of Transportation. This report shall include the procedure of repair and event recording details (e.g. repair action process description, replaced/repared parts/equipment, warranty).

## Major Repairs

Major repairs shall be performed as a result of damage caused by an outside contractor, utility company, vandalism, motor vehicle, civilian, accident or unusual cause, or natural disaster, and involve replacement, reconstruction, or modification of major system components. The Contractor shall perform all required repairs in accordance with the work order issued by the NJSEA Engineer. The work order will include a completion date for the work. The Contractor shall have qualified personnel on board to perform all necessary work.

## Preventive Maintenance

This work is comprised of routine maintenance to ensure that all equipment operates as designed and all structures and supports are in conformance with their specifications. This includes but is not limited to any checking, testing, tuning, lubricating, tightening, cleaning and adjusting, which are essential for the purpose of routine maintenance and repairs to ensure proper functioning of all equipment, all parts of a field equipment, and robustness of all structures. The Contractor shall be responsible to perform all scheduled preventive maintenance. The Contractor shall be responsible to coordinate with the facility owners (state, county, municipality, and private property) to perform such work. The preventive maintenance work shall include the following inspections and services:

- Annual inspection and service of video detector units and system
- Annual inspection of communication system
- Annual inspection and service of cabinet
- Annual inspection of cabinet equipment
- Clearing detection and transmission line/zone
- Annual contingency work

The Contractor shall submit an inspection schedule and Preventive Maintenance Plan (the Plan) within 30 days of the contract execution to the NJSEA Chief of Transportation for approval, prior to the start of the routine maintenance. The Plan shall include the procedures and schedule of repair, maintenance, and inspection. The Plan shall include the inventory of required spare parts for maintaining the existing system. The Plan shall specify the notification (telephone and email) information and service ticket tracking system. The Plan, along with the list of equipment and spare parts, shall be approved by the NJSEA Chief of Transportation.

## On Call Services

The Contractor shall provide 24/7 On-Call Emergency Services to diagnose, troubleshoot, and address emergency problems, as notified by the NJSEA Engineer or received by the system. The procedure for On-Call Emergency Services response shall follow the "On-Call Emergency Service Plan", which shall be submitted within 30 days of the contract execution to the NJSEA Chief of Transportation for approval. The "On-Call Emergency Service Plan" ( the Service Plan) shall include the procedures of repair and maintenance, event recording details (repair action process description, parts/equipment manufacturer, and warranty), inspection schedule, and the details of inspected components as described in this Technical Specification.

The Service Plan shall include the inventory of required spare parts for maintaining the existing system. The Service Plan shall specify the notification (telephone and email) information and service ticket tracking system. The Service Plan shall explicitly identify the emergency crew and corresponding contact information for immediate contact by NJSEA Engineer and/or traffic signal owner. A major equipment failure impacting the network performance and the mobility of intersections is considered an emergency outage and must be addressed immediately based on NJDOT standards.

The Contractor shall repair, or provide every attempt to resolve, all system equipment problems and failures within 48 hours after notification. If the issue cannot be resolved fully within 48 hours, an alternative and reasonable time frame will be set by NJSEA Engineer. If the Contractor cannot complete the repairs within the time specified by the NJSEA Engineer, the NJSEA may repair the system and recover the cost of the repair from the Contractor.

### **Inspection**

Upon the completion of work, including but not limited to changes in wiring and timing, on-call emergency services, preventive maintenance, and major repairs, the NJSEA Engineer or its representative shall inspect the work performed by the Contractor on site unless the NJSEA Engineer notifies the Contractor otherwise. All work shall follow these technical specifications and NJDOT, IMSA, AASHTO, and MUTCD standards.

### **Materials**

All replaced materials and equipment shall follow the technical specifications noted in this Appendix, and NJDOT, MUTCD, or AASHTO standards. The NJSEA Engineer shall further define the specification of materials required to be retrofitted to improve their functionalities, as necessary. All replaced materials including equipment, parts, cables, physical hardware supplied, constructed, assembled, or installed shall be new, corrosion resistant, and in exact accordance with the equipment manufacturer requirements and guidelines.

### **Material Storage/On Site**

Material shall pass from the vendor directly to the Contractor, and shall not be subject to the written approval of NJSEA Engineer. At no time shall any vendor be permitted to surrender custody of equipment to the NJSEA without written approval of the NJSEA Engineer in response to written request from the Contractor.

No payment shall be made for any material or on site claims of the vendor without a complete systems burn-in test witnessed by the NJSEA Engineer or an NJSEA designated representative. Designation of an NJSEA representative shall require written approval of the NJSEA Chief of Transportation.

No payment greater than \$500 in value shall be made for any material that is not accompanied by a test report documenting that it is fully functional and that all pre configuration is complete

and verified. A notarized certification letter may be submitted in place of the test report attesting to the same information.

### **Wiring and Timing Changes**

Any change to an intersection Wiring or Timing that is deemed major by the NJSEA Engineer shall require that the intersection have a full final inspection procedure "Controller Turn On" in compliance with NJDOT and IMSA specifications. This shall be paid for under the "Controller Turn On" Pay Item. This pay item shall also include all MPT required for the duration of the "Controller Turn On." If for any reason of workmanship or installed material defect the "Controller Turn On" must be performed a second time, it shall be done at no cost to the NJSEA.

### **Construction Details**

The Contractor shall update and revise all as-built plans or plans provided by NJSEA as necessary based on the repair and replacement work. The drawing shall be revised and referenced to the dated maintenance record services. The drawing shall be reported and presented to the NJSEA Chief of Transportation for review and approval.

### **Documentation and Submittals**

Any necessary changes to predetermined plans, configuration, directives, and wiring in the field must be documented and reported to the NJSEA by the Contractor prior to payment. A minimum of 60 days prior to the contract close out, the Contractor shall furnish NJSEA with three (3) tabbed, complete bound sets of the System Maintenance Manual, which shall consist of maintenance instructions for all equipment and its component parts, including the manufacturer's certifications/warranties, descriptive brochures/catalogs, product specifications/performance sheets, and maintenance/operating instructions. The System Maintenance Manual shall have a chapter allocated to the spare parts list. The Contractor shall provide the Material Safety Data Sheets (MSDS) for all materials in use. The MSDS shall be maintained at the project site for each material that is present.

The Contractor shall send the quarterly, or other NJSEA-directed time frame ,invoice including equipment, materials, labor, police traffic directors, and/or other third parties costs for review and approval to the NJSEA Chief of Transportation. The invoice shall be submitted with the Maintenance Report and Preventive Maintenance forms (when necessary).

### **Standards**

In the absence of clear direction from the NJSEA Engineer or specifications contained in the contract documents, the Contractor shall follow the standards and specification of the intersection owner. If the intersection owner does not possess written standards, then IMSA, NJDOT, MUTCD, and AASHTO standards shall govern all work and plans.

## **Coordination**

The Contractor shall work collaboratively with the Software Maintenance contractor during the contract period in all stages of repair, testing, preventive maintenance, and troubleshooting as necessary. The Contractor shall be responsible to maintain all subsystems of MASSTR described in this contract. The Contractor shall carefully examine the requirements set forth in this Appendix. The Contractor shall report any problems (e.g. usage, access, and run) with the systems to NJSEA Chief of Transportation. Also, the Contractor shall report any necessary updates advised by vendors to the NJSEA Chief of Transportation.

No installation or rehabilitation work may be performed without approval from the NJSEA Chief of Transportation. The Contractor will be responsible to obtain all necessary approval for the installation or rehabilitation work. The Contractor shall maintain the visibility and accessibility of all equipment and cabinets at all times.

## **Personnel Qualification**

All personnel supplied to do work on site on this project, with the exclusion of fiber splicing or testing, shall have an International Municipal Signal Association (IMSA) certification of at least Level 1 Technician. All work on the project shall be overseen by a IMSA Level 2 Technician or higher. The Contractor shall also be able to supply a IMSA Level 3 Technician upon direction of the NJSEA Engineer for tasks specified by the Engineer.

All personnel involved in wireless based communication work shall be required to submit for approval a certification by at least two manufacturers who show proof of passing certification training for installation of those vendors' products. One of these certifications must be the product to be supplied on MASSTR.

All personnel involved in any fiber optic work shall have Fiber Optic Association (FOA) certification of certified Fiber Optic Technician. Equivalent certification may be submitted for approval to the NJSEA Engineer, but shall be equal to or greater than program specified. All personnel taking part in splicing shall be certified by the splicing equipment manufacturer and shall have a minimum of 5 years full-time experience in fiber splicing and termination.

All personnel taking part in network internet protocol activities shall submit résumés for approval of the NJSEA Chief of Transportation along with all relevant certification. They must have at least 5 years of experience in integration of traffic signal communications.

<b>PAY ITEM SPECIFICATION SUMMARY</b>	
<b>PAY ITEM NUMBER</b>	<b>PAY ITEM NAME</b>
<b>Repair &amp; Replacement (RR)</b>	
RR-101	Repl. of Vehicle Detection Unit
RR-101a	Repair of Vehicle Detection Unit
RR-102	Repl. of Vehicle Detection Cards/Modules
RR-102a	Reprogramming the detection Zone
RR-102b	Adjusting the Mounting Angle of VDU
RR-102c	Auxiliary Equipment
RR-103	Repl. of Vehicle Detection Cable 3/C#18
RR-104	Repl. of Travel Time Data Collector
RR-104a	Repair of Travel Time Data Collector
RR-105	Repl. of Travel Time Antenna
RR-106	Repl. of Ethernet Cable, Cat 5e and 6
RR-107	Repl. of Ethernet Switch, 10/100 BASE-TX
RR-108	Repl. of Ethernet Switch, 10/100 BASE-TX, 10/100/1000 BASE-T
RR-109	Repl. of Ethernet Switch, 10/100/1000 BASE-T, 10/100/1000 BASE-X
RR-110	Repl. of Switch External Power Supply
RR-111	Repl. of SFP Optical Transceiver
RR-112	Repl. of Power Over Ethernet-POE Injector
RR-113	Repl. of Remote Power Management Unit
RR-114	Repl. of Antenna Assembly
RR-114a	Repl. of Antenna Panel
RR-114b	Adjusting Mounting Angle of Antenna panel
RR-115	Repl. of Transceiver Assembly
RR-116	Repl. of Fiber Optic Link
RR-117a	Repl. of Fiber Optic Splice Enclosure
RR-117b	Repl. of Fiber Optic Patch Panel
RR-117c	Repair of Fiber Optic Communication Connection
RR-118	Repl. of Antenna Cable
RR-119	Repl. of Antenna Jumper Cable
RR-120	Repl. of Vehicle Detection Cable
RR-121	Repl. of Transceiver Power Cable, 3/C#12
RR-122	Repl. of Antenna Poles Type A (75')
RR-122a	Repair of Antenna Poles Type A (75')
RR-123	Repl. of Antenna Poles Type B (55')
RR-123a	Repair of Antenna Poles Type B (55')
RR-124	Repl. of Antenna Poles Type C (40')
RR-124a	Repair of Antenna Poles Type C (40')

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RR-125	Repl. of T-Pole Extension
RR-125a	Repair of T-Pole Extension
RR-126	Repl. of C-Pole Extension
RR-126a	Repair of C-Pole Extension
RR-127	Repl. of K-Pole Extension
RR-127a	Repair of K-Pole Extension
RR-128	Repl. of Steel Pole Extension
RR-128a	Repair of Steel Pole Extension
RR-129	Repl. of Roof Mount Antenna Tower, 20'
RR-129a	Repair of Roof Mount Antenna Tower, 20'
RR-130	Repl. of Roof Mount Antenna Tower, 6'
RR-130a	Repair of Roof Mount Antenna Tower, 6'
RR-131	Repl. of Adaptive Traffic Signal Controller
RR-131a	Repair of Adaptive Traffic Signal Controller
RR-132	Repl. of Conflict Monitor
RR-132a	Repair of Conflict Monitor
RR-133	Repl. of Miscellaneous Controller Accessory
RR-133a	Repair of Miscellaneous Controller Accessory
RR-134	Repl. of Foundation of Poles, Pullboxes, or Junction Boxes
RR-134a	Repair of Foundation of Poles, Pullboxes, or Junction Boxes
RR-135	Repl. of PSE&G and ITS Cabinet
RR-135a	Repair of PSE&G and ITS Cabinet
RR-136	As Directed Work
RR-137	On-Call Emergency Services-Regular
RR-137a	On-Call Emergency Services-Overtime
RR-138	Controller Restart
RR-139	Controller Turn On
<b>Preventive Maintenance (PM)</b>	
PM-140	Annual Inspection of Vehicle Detectors
PM-141	Annual Inspection of Communication system - Fiber
PM-141a	Annual Inspection of Communication system - Wireless I
PM-141b	Annual Inspection of Communication system - Wireless II
PM-142	Annual Inspection of Cabinet
PM-142a	Annual Inspection of Cabinet Equipment
PM-143	Clearing Detection and Transmission Line/Zone
PM-144	Annual Contingency Work
<b>Maintenance and Protection of Traffic (MPT)</b>	
MPT-145	Roadway Closure and Detour
MPT-146	Police / Traffic Directors

**ITEM RR-101: Replacement of Vehicle Detection Unit (VDU)**  
**ITEM RR-101a: Repair of Vehicle Detection Unit (VDU)**

**1. Description**

This work shall include replacement or repair of a VDU, which is mounted and installed on signal mast arms and poles, in accordance with the manufacturer’s recommendations. Installation and repair procedures shall comply with the installation and maintenance instructions provided by VDU manufacturer. The installation shall comply with the current NJDOT Standard Specifications for Roads and Bridges Construction and the maintenance and deployment testing procedure. The Contractor shall furnish any and all auxiliary equipment as deemed necessary for safe and reliable replacement or repair of the system including but not limited to: mounting brackets, screws, and washers. Splices of cables shall not be allowed anywhere, without the Engineer’s approval.

**2. Materials**

Each VDU has an integrated imaging color CCD array with zoom lens optics bundled into a sealed rugged enclosure. The camera has high sensitivity and provides optimum image in all lighting and weather conditions. The cameras contain built-in, Ethernet-ready, Internet Protocol (IP) address, so that the cameras are addressable for setup, maintenance, and digital streaming via the industry standard Internet web browsers with no plug in devices or converters required. The camera can either be accessed directly through its own IP-address, or be accessed by means of IP-addressing the detector cards/ modules that are mounted inside the control cabinet. Zoom and focus adjustments of the cameras are performed on the ground and do not require the use of a bucket truck or additional wiring. The VDU operates on 110/220 VAC, 50/60Hz, and draws less than 30W. All existing vehicle detection units that are replaced by the Contractor shall be returned to the NJSEA.

**3. Construction Details**

A defective VDU shall be removed and the replacement shall be installed on the mast arms and poles as shown on the plans or as directed by the Engineer.

**4. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-101	Replacement of VDU	Each
RR-101a	Repair of VDU	Each

The quantity of the Pay Item RR-101 shall be measured as the number of replaced VDU and shall be paid at the Contract Unit price for each fully configured and accepted VDU. Price and payment shall constitute full compensation for furnishing VDU, programming the detection

zone settings of the cameras, adjusting the mounting angle of VDU on signal mast arms and poles, and reintegrating the replaced VDU into MASSTR, inclusive of all labor, materials, equipment, and tools required to complete the replacement.

The quantity of the Pay Item RR-101a shall be measured as the number of VDU repaired. Payment shall be comprised of all equipment, tools, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-102: Replacement of Vehicle Detection Cards/Modules**

**ITEM RR-102a: Reprogramming the Detection Zone**

**ITEM RR-102b: Adjusting the Mounting Angle of VDU**

**ITEM RR-102c: Auxiliary Equipment**

**1. Description**

This work shall consist of replacement of defective Vehicle Detection System Component and mounting all in-cabinet detection cards and/or modules in traffic control cabinets; mounting any auxiliary hardware on signal poles and mast arms when necessary; pulling drop cables, supplied by Vehicle Detection System (VDS) manager, through mast arm and pole; pulling cables in existing or empty conduits. The installation, reconfiguration, and repair shall comply with the instructions provided by the manufacturer and comply with the current NJDOT Standard Specifications for Road and Bridge Construction. The Contractor shall furnish any and all auxiliary equipment (Item RR-102c) as deemed necessary for safe and reliable installation of the system, including but not limited to: mounting brackets, screws, and washers. Splices of cables shall not be allowed anywhere without the Engineer's approval. Also, this item includes reprogramming the detection zone settings of the VDU (Item RR-102a), adjusting the mounting angle of the VDU (Item RR-102b), replacing and reconfiguring the existing in-cabinet detection cards and modules and reintegrating the VDU into MASSTR, without physically changing the location of the VDU (Item RR-102), or adding any auxiliary hardware/software (Item RR-102C). All major components shall be identified with a metal plate containing the serial number and bar code identification.

The work shall be integrated and tested with ATCS and CS to ensure that all the detection requirements of the ATCS are met, and the VDS interacts with the ATCS and CS in a seamless manner.

**2. Materials**

The Vehicle Detection System shall meet or exceed the environmental and interface requirements of the NEMA TS2 standards, and shall be downward compatible to the NEMA TS1 standard. The VDS shall be compatible with the existing TS1 and TS2- Type 2 controller cabinets in MASSTR. Operating temperatures shall be from -20 °F to +140 °F at 10% to 90% relative humidity, non-condensing. The VDS shall be compatible with the traffic controller as specified in Pay Item RR-130.

## 2.1. Data Communication Requirements

The VDS shall fully support the standard Ethernet networking of system components through a variety of infrastructures that are commercially available in the traffic industry. The data communication shall support direct connect, modem, and multi-drop interconnects. Both video streaming and data communication shall be capable of being interconnected over long distances through fiber optic, wireless, and other commonly used digital communications transport configurations. The VDS shall support a minimum of 10 Mbps Ethernet communications at each intersection.

## 2.2. Detection Requirements

### 2.2.1. Normal Operation

The VDS shall be able to emulate at least the following detector types:

- Stop-line detectors
- Presence detectors
- Speed trap detectors
- Vehicle classification detectors.

The VDS shall detect vehicles passing through the individual lanes of travel within the detection zones and shall be capable of indicating the current real-time detector or alarm states (on/off). The vehicle detection results shall be provided as simple contact closure outputs to a traffic signal controller and comply with the NEMA Type C or D detector rack or 170 input file rack standards.

### 2.2.2. Detection Zone Programming

The VDS shall allow for placing, sizing, and orienting detection zones to provide optimal road coverage for vehicle detection. It shall be capable of downloading, retrieving and backing up detector configurations either remotely or via removable storage media.

For vehicle detection the user shall be able to divide the camera field-of-view into multiple detection zones. Each detection zone shall be capable of viewing either the approaching or receding traffic with user-defined sensitivity. An image-based VDS shall not be required to have the cameras directly mounted over the roadway to function. The cameras placed at a mounting height that minimizes vehicle image obstruction shall be able to simultaneously monitor a minimum of five (5) traffic lanes when mounted at the road-side or a minimum of six (6) traffic lanes when mounted in the center with four lanes on each side.

## 2.3. Embedded VDS Software

The VDS shall have software embedded in the vehicle detection units or the in-cabinet detection cards and/or modules that perform vehicle detection. The software shall be capable of

performing a variety of diagnostic, installation, and fault tolerant operations; managing data communications; and providing digital video streaming. The software shall permit standard internet browsers to connect and remotely perform basic configuration, maintenance, and video streaming services.

**2.4. Data Characteristics and Storage**

It is desirable that the VDS provide summary traffic statistics including volume, occupancy and speed, which can be retrieved remotely or locally via embedded non-volatile memory that have at least eight (8) megabytes for traffic data storage. The non-volatile memory can either be built in the VDU, or in the in-cabinet detection cards and/or modules.

For each time interval and detection zone, it is desirable that the VDS retain at least the following cumulative traffic statistics:

- Count of vehicles passing the detection zone during a selected time interval
- Occupancy measured as the percentage of time that the detection zone is occupied, during a selected time interval, reported as a decimal number between 0.00 and 1.00
- Classification of vehicles detected
- Vehicle speeds as they pass through the detection zone, accumulated into speed bins of small increments (e.g. 5 mph), so that arithmetic mean speed, 85th percentile speed and 10 mph pace speed band can be reported for a selected time period

The time interval used for data storage shall be user-selectable and shall include 30 seconds, 1 minute, 5 minutes, 10 minutes, 15 minutes, 30 minutes, and 60 minutes.

**3. Construction Details**

The defective panel, board, or cable shall be removed and the replacement shall be installed as directed by the Engineer. All defective panel, board, or cable that is replaced by the Contractor shall be returned to the NJSEA. The Contractor shall follow the manufacturer guidelines to perform the regular/preventive maintenance per Item RR-139.

**4. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-102	Replacement of Vehicle Detection Cards/Modules	Each
RR-102a	Reprogramming the Detection Zone	Each VDU
RR-102b	Adjusting the Mounting Angle of VDU	Each VDU
RR-102c	Auxiliary Equipment	Each VDU

The quantity of the Item RR-102 shall be measured as the actual number of Vehicle Detection Cards in the cabinet replaced, reconfigured, adjusted, and accepted and shall be paid at the Contract unit price for each replacement. Price and payment shall constitute full compensation

for furnishing Cards/Modules, all labor, materials, equipment, and tools required to complete the replacement.

The quantity of the Item RR-102a and RR-102b shall be measured as the actual number of VDU detection zones that are reprogrammed and VDU mounting angle that are adjusted, respectively. Price and payment shall constitute full compensation for all labor, equipment, and tools required to complete the reprogramming and adjusting the VDU.

The quantity of Item RR-102c shall be measured as auxiliary equipment required for repair of each VDU. The quantity of the Pay Item RR-102c shall be measured as the number of VDU repaired, and the payment shall be comprised of auxiliary equipment, materials, and labor hours required for reinstalling and readjusting of each VDU, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

#### **5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-103: Replacement of Vehicle Detection Cable 3/C#18**

**1. Description**

This work includes the replacement of Vehicle Detection Cable (VDC) based on the manufacturer guidelines. According to NJDOT Specifications, the connections of all cables from the camera to the control units must have no splice. The installed and existing cable utilizes the broadband-over-powerline (BPL) technology so that the impact on the conduit fill percentage of existing conduits is minimized. The VDC shall be designed for 110 Volt AC use and shall be extremely durable and easy to install in underground conduit systems in order to accommodate the water-resistant requirements and low pulling tension necessary for conduit applications. The power cables provide a connection between camera and TIP that is located in a traffic controller cabinet or weather proof junction box.

**2. Materials**

The VDC shall consist of three conductors 18 AWG with an overall UV-resistant Low Density Polyethylene jacket and shall comply with the following:

- Fully compatible with detector supplied;
- Direct burial rated or IMSA rated;
- Conductor Insulation: extruded polyethylene 200 with nominal 0.030" wall thickness ;
- Colors: black, green, and white;
- Jacket: extruded black polyethylene 0.040" to 0.050" wall thickness, UV-resistant;
- Finished diameter: 0.330" to 0.354";
- Electrical: 600 volts (rms);
- Operating temperature range: -20 °F to +140 °F

**3. Construction Details**

The cable identification shall be printed with the manufacturer's part number, number of conductors, conductor size, voltage rating, jacket material, and an indication that it is conduit rated. During the replacement procedure, each Cable shall be labeled on both ends with a distinctive number, in the format of "VDU-#", where the value of the # shall correspond to the VDU numbering scheme on the Plans.

**4. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-103	Replacement of Vehicle Detection Cable 3/C#18	Linear Foot

The quantity of the Cable shall be measured as the actual linear feet replaced, installed, and accepted and shall be paid at the Contract unit price for each linear foot. Price and payment

shall constitute full compensation for all labor, removal and disposal of the replaced cables, equipment, tools and incidentals required to complete the replacement.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-104: Replacement of Travel Time Data Collector**  
**ITEM RR-104a: Repair of Travel Time Data Collector**

**1. Description**

This work includes the replacement and repair of the Travel Time Data Collector (Collector) that is located on the traffic signal pole. The Travel Time Data Collector is the storage and a transmission device that receives and stores the real-time data (traffic speed and volume) from the Antenna and delivers them to a dedicated NJSEA server housing the travel time data processing software to estimate and report travel time information. The Collector connects directly to the dedicated MASSTR communication network via an Ethernet switch located inside the traffic control cabinet.

Following the manufacturer and vendor guidelines, the Contractor shall perform standard testing procedures for Collectors, Antennas, and the server Software to demonstrate that the replaced and repaired equipment is working properly and as expected. The standard shall comply with the current NJDOT Standard Specifications for Road and Bridge Construction (704.03.05). A standard bench testing of the Collectors and Antennas shall be included to ensure that the installed equipment is developed without any problems. The contractor shall be responsible for conducting all such testing.

**2. Materials**

The Collector contains advanced features designed to allow the unit to operate efficiently in a remote environment. Diagnostic heartbeat information such as voltage and temperature monitoring as well as software stability information should be periodically sent along with the MAC addresses so that the health of the Collector is known. The system is designed to be able to be automatically rebooted if a condition is detected that requires such action. In the rare case when a total system recovery is required, the Collector is designed to automatically re-image the system memory. In addition, the Collector has the ability to download software patches and upgrades over the air without the need to physically visit the unit.

The system also includes, but is not limited to, the electronic and electrical equipment, wiring, central system database configurations, communication and electric service connections, service charges, software, grounding, and surge protection.

**3. Construction Details**

The Collector is housed inside a NEMA 4X enclosure that is mounted on the appropriate roadside pole. The Collector is powered via a single Power over Ethernet (PoE) shielded Ethernet CAT-5e cable that is connected to a 110/220 VAC PoE power injector inside the controller cabinet. The Collector has, at a minimum, one Ethernet 10Base-T/100Base-T port supporting static of DHCP IP addressing. The Collector shall connect to the Ethernet switch installed inside the controller cabinet as part of MASSTR. Serial to Ethernet converter is not acceptable. The maintenance, warranty, and placement shall comply with the instructions

provided by the manufacturer and comply with the current NJDOT-TSM Procedures and Standards Manual Standard. All defective Travel Time Data Collectors that are replaced by the Contractor shall be returned to the NJSEA.

A standard bench testing of the Travel Time Antenna (RR-105) and Collector (RR-104) shall be included to ensure that the replaced and repaired equipment is deployed without any problems. The Contractor shall be responsible for conducting all such testing. Once the acceptance test has been completed, a 30-day burn in period will commence. If any of the system equipment fails during this period it will be repaired or replaced and the 30-day clock will restart for that piece of equipment.

**4. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-104	Replacement of Travel Time Data Collector	Each
RR-104a	Repair of Travel Time Data Collector	Each

The quantity of Pay Item RR-104 shall be measured as the actual number of Travel Time Data Collectors replaced and accepted by NJSEA Engineer and shall be paid for at the Contract unit price for each Collector. Price and payment shall constitute full compensation for furnishing Travel Time Data Collector, including connection cables, completely installed, configured and accepted, all labor, materials, equipment, and tools required to complete the replacement.

The quantity of Pay Item RR-104a shall be measured as the actual number of Travel Time Data Collectors repaired and accepted by NJSEA Engineer. The payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-105: Replacement of Travel Time Antenna**

**1. Description**

This work involves the replacement of a Travel Time Antenna. The Travel Time Antenna is the sensor device installed at specific locations along a roadway to pick up the wireless signals from devices in passing by vehicles. Such a sampling method is anonymous by using signals not associated with any specific user account or any specific vehicle, and not linked to any specific person through any type of central database tracked through the sales chain. The sampling of traffic flow is of sufficient size to deliver accurate average travel time and speed with proven statistical significance (95%).

**2. Construction Details**

The Travel Time Antenna shall be attached to the same NEMA 4X enclosure housing as the Travel Time Data Collector. The Antenna shall be an industrial grade capable of picking up usable signals within a minimum of a 150-foot diameter range. The Antenna shall meet the environmental requirements defined by the National Electrical Manufacturers Association (NEMA) TS1 and TS2 specifications. The Antenna shall operate at temperatures from -20 °F to +140 °F at 10% to 90% relative humidity, non-condensing.

The Contractor shall follow the vendor’s installation and testing procedure for Travel Time Antenna and Collector. These procedures will be conducted during the replacement process to provide confirmation that the system works as expected. A standard bench testing of the Travel Time Antenna and Collector shall be included to ensure that the installed equipment is deployed without any problems. The Contractor shall be responsible for conducting all such testing. Once the acceptance test has been completed, a 30-day burn in period will commence. If any of the system equipment fails during this period it will be repaired or replaced and the 30-day clock will restart for that piece of equipment. All defective Travel Time Antennas that are replaced by the Contractor shall be returned to the NJSEA.

**3. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-105	Replacement of Travel Time Antenna	Each

The quantity of Item RR-105 shall be measured as the actual number of Travel Time Antennas replaced (RR-105) and shall be paid for at the Contract unit price for each Travel Time Antenna replaced. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the replacement, inclusive of the connection cables, completely configured and accepted.

**4. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

## ITEM RR-106: Replacement of Ethernet Cable, Cat 5e and 6

### 1. Description

This specification sets forth the minimum requirements for the replacement of a Cat 5e and 6 Ethernet cable (Cable) that is used for the communication system of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR).

### 2. Materials

The Ethernet Cables shall comply with IEEE 802.3 standard and support 10/100/1000 Base-T network standard. The cable shall follow the Telecommunications Cabling Standard:

- TIA/EIA 568-B.2
- ISO/IEC 11801
- RoHS

The Cat 5e and 6 ethernet cable shall consist of eight (8) 24 and 23 AWG solid bare copper conductors respectively, each covered with a color coded, premium grade, flame retardant polyethylene (PE) jacket. The insulated conductors shall be twisted into four pairs. The Cable shall have an inner layer of Mylar (PET) or polyester shield wrap, an outer layer of aluminum foil shield wrap, and a black premium grade PE or FR-LSZH outer jacket. The Cable shall have a solid tinned copper wire inserted between the PET or polyester wrap and the aluminum wrap, and a 200Dx3 rip cord inserted between the aluminum wrap and the outer jacket. Flooding compound between the twisted conductors shall be grease. Each complete run of cable shall include compatible P8C8 (RJ45) Ethernet connectors at both ends. The copper wire insert shall be adequately grounded to the P8C8, or the Ethernet cable shall be grounded by an alternate NJSEA approved method. The cable shall have a nominal jacket outside diameter less than 0.30 inches.

### 3. Construction Details

The Cable shall be outdoor rated and suitable to the harsh, non-enclosed environment, and shall be Gasoline and Oil Resistant II and UV Resistant. The Cable shall be extremely durable and easy to install in underground conduit systems in order to accommodate the water-resistant requirements and low pulling tension necessary for conduit applications. The Contractor shall follow NJDOT standards and guidelines for testing of all communication and Ethernet cables.

The Cable identification shall be printed with the manufacturer's part number, number of conductors, conductor size, voltage rating, jacket material, and an indication that it is outdoor rated and conduit rated.

During construction, each Ethernet Cable shall be labeled on both ends in the format of "E-#", where the value of the # shall be distinctive.

**4. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-106	Replacement of Ethernet Cable, Cat 5e and 6	Linear Foot

The quantity of the Ethernet Cable, Cat 5e and 6, shall be measured as the actual linear feet of Ethernet Cable installed and accepted and shall be paid for at the Contract unit price per linear foot of the installed Ethernet Cable. Price and payment shall constitute full payment for all labor, equipment, tools and incidentals required to complete the replacement, including the removal of the replaced cables.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-107: Replacement of ETHERNET SWITCH, 10/100 BASE-TX**

**ITEM RR-108: Replacement of ETHERNET SWITCH, 10/100 BASE-TX, 10/100/1000 BASE-T**

**ITEM RR-109: Replacement of ETHERNET SWITCH, 10/100/1000 BASE-T, 10/100/1000 BASE-X**

**ITEM RR-110: Replacement of Switch External Power Supply**

**ITEM RR-111: Replacement of SFP Optical Transceiver**

**ITEM RR-112: Replacement of Power over Ethernet Injector – POE Injector**

**ITEM RR-113: Replacement of Remote Power Management Unit**

## **1. Description**

This specification sets forth the minimum requirements for the replacement of various Ethernet Switches (Switches) that are used for the communication system built by the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR). The Ethernet switch is a networking device that provides switched Ethernet to equipment enclosed within a traffic control cabinet, such as traffic controllers and real-time vehicle detection systems. The Switches shall be environmentally hardened and compliant with IEEE 802.3 (10Mbps), IEEE 802.3u (100 Mbps), IEEE 802.3z (1000 Mbps, GigE), and IEEE 802.3ab (1000 Mbps, GigE). Power over Ethernet Injector – POE Injector that carries both power and data connects to switches.

SFP Optical Transceivers are available with a variety of transmitter and receiver types, allowing users to select the appropriate transceiver for each link to provide the required optical reach over the available optical fiber type. SFP sockets are connected to the Ethernet Switch. POE Injector installed in cabinet close to the Switch inserts a DC voltage on to Cat 5e/6 Ethernet cable. Remote Power Management supplies a secure remote power source management using TCP/IP networks.

All equipment furnished under this specification must be current production equipment and of recent manufacture and version, similar models of which are in field operation in not less than three locations in the United States or Canada. Untried or prototype units shall not be considered for acceptance.

## **2. Materials**

The Switches shall at a minimum meet the following Standards:

### **2.1. Network Standards**

The Ethernet Switches shall support the following advanced layer 2 functions:

- IEEE 802.1Q VLAN, with support for up to 255 VLANs and 4096 VLAN ID's
- IEEE 802.1p priority queuing
- IEEE 802.1w rapid spanning tree
- IEEE802.1Q-2005 MSTP (formerly 802.1s)
- IEEE 802.1Q-2005 standard GMRP
- IEEE 802.3x flow control
- IEEE.802.3ad-Link Aggregation

- IGMPv2 with 256 IGMP groups
- Port Rate Limiting
- Configuration via test file which can be modified through standard text editor
- Forwarding/filtering rate shall be 14,880 packets per second (PPS) for 10Mbps, 148,800 for 100Mbps, 1,488,000 for 1000Mbps
- DHCP Option 82
- Automatic address learning of up to 8192 MAC addresses

## 2.2. Network Interface

The Ethernet Switch 10/100 BASE-TX, Pay Item RR-107, shall have a minimum of eight (8) fast Ethernet ports (10/100BASE-TX). The ports shall support the following requirements and options:

10/100BASE-TX ports, IEEE 802.3u--

- RJ45 connectors
- Cable type: Category 5, unshielded twisted pair (CAT 5 UTP)
- Segment length: 300 ft
- Auto-negotiation support (10/100Mbps)
- Auto MDIX crossover capability
- Transient voltage suppression (TVS) between Line +/-, Line +/--ground, to protect the circuitry
- Full duplex operation (IEEE 802.3x)
- Unmanaged

The Ethernet Switch 10/100/1000 BASE-T, Pay Item RR-108, shall have a minimum of eight (8) copper Gigabit Ethernet ports (10/100/1000BASE-T). The ports shall support the following requirements and options:

10/100BASE-TX ports, IEEE 802.3u and 1000BASE-T GigE copper ports, 802.3ab--

- RJ45 connectors
- Cable type: Category 5, 5e, or 6 unshielded twisted pair (UTP)
- Segment length: 300 ft
- Auto-negotiation support (10/100/1000Mbps)
- Auto MDIX crossover capability
- Transient voltage suppression (TVS) between Line +/-, Line +/--ground, to protect the circuitry
- Full duplex operation (IEEE 802.3x)
- Managed

The Ethernet Switch 10/100/1000 BASE-T and 10/100/1000 BASE-X, Pay Item RR-109, shall have a minimum of four (4) copper Gigabit Ethernet ports (1000 BASE-T); and four (4) combined copper Gigabit Ethernet ports (10/100/1000 BASE-T) and fiber optic Gigabit Ethernet ports (10/100/1000BASE-X). The ports shall support the following requirements and options:

- 1000BASE-T GigE copper ports, 802.3ab and 1000BASE-X fiber optical ports, 802.3z--
- 1000BASE-T GigE, 1000BASE-X GigE, RJ45/SFP ports

- Auto-negotiation support (10/100/1000Mbps)
- SFP Pluggable optics
- LC and SC connector interface
- Fixed (soldered on) optics
- Optical characteristics: 850 nm multi-mode, 1310 nm single-mode, 1550nm single-mode
- Supports fiber type: 62.5/125 um multi-mode fiber, 9/125 um single-mode fiber
- Segment length: 2 km with multi-mode fiber, 70 km with single-mode fiber
- Minimum optical budget 14 dB @ 850 nm
- Optical budget: minimum 14 dB @ 850 nm for multi-mode fiber, minimum 17 dB @ 1310 nm for single-mode fiber
- Full duplex operation (IEEE 802.3x)
- Managed

The Switch External Power Supply, Pay Item RR-110, shall support the following requirements and options:

- AC/DC input/full range, DC output
- Can be installed on DIN rail of controller cabinet
- Current range 0-3.33 Amp.
- Shut down in over power voltage and repower on to recover
- Working temperature -20 to +70°C

The Small Form Factor Pluggable (SFP) Optical Transceivers, Pay Item RR-111, shall support the following requirements and options:

- 1 GigE Ethernet
- Duplex LC connector interface ( simplex allowed with approval)
- Physical contact (PC) connector polish
- Operational wavelengths: 850nm multi-mode, 1310 nm single-mode, 1550nm single-mode
- Complaint with 1000 BASE-X standard, IEEE 802.3z
- Compliant with SFP multi-source agreement (MSA)
- Compliant with EEPROM with serial bus interface
- RoSH-6 compliant
- Must be supplied by Switch manufacturer

Any accessories required for the fiber optic-Ethernet switch connection shall be part of the SFP Optical Transceiver pay item, including but not limited to hybrid adapters, connectors, jumper cable.

### 2.3. Optional Network Management Functionality

The Ethernet Switches may provide the following network management functions:

- SNMPv2, SNMPv3
- RMON
- GVRP
- Port Mirroring

- 802.1x port security
- SSL - Secure Socket Layer
- SSH - Secure Shell
- TFTP
- NTP - Network Time Protocol
- SNTP - Simple Network Time Protocol
- Management via web or Telnet
- Built-in Protocol Analyzer which enables traces to be run from within the switch operating system. The Switch may be able to forward traces to an IP address or UDP port. Traces may include but not be limited to the following: STP, MAC, Link, IGMP, GVRP, PPP, Transport, DHCPRA, 802.1X, WEBS, SNMP, IP, TacPlus, Radius, FORW, IPASSIGN, TRANSPORT
- Provide sub 15 ms failover per switch hop in a ring topology

2.4. Power over Ethernet (POE) Injector

All switches supplied on this project must have at least 4 ports of Power over Ethernet (POE) capability, compliant with IEEE 802.3at having minimum of 30W that can be compatible with 802.3af systems if required. If IEEE POE standard changes to provided capability for 60W then that shall be the minimum port standard with 802.3at/af backwards compatibility required.

POE injectors, Pay Item RR-112, shall meet same power supply standard as above but also shall meet all applicable requirements of the switch listed in this specification including but not limited to environmental, electrical and communications requirements. Port speed shall match the maximum of the device it will be connected to.

2.5. Programmable Critical Failure Relay

The Switches shall provide a programmable critical failure out relay that may be configured to activate upon critical error detection such as loss of link or detection of critical system errors. This function shall be user enabled and programmable. The output contacts shall be available in a Form-C configuration with maximum current at 2A@250 VAC, .15A@125VDC, and 2A@20VDC.

2.6. Auxiliary Equipment

All parts supplied with switches shall be manufactured by the switch manufacturer unless notified in writing by Engineer. This shall include but not be limited to power supplies SFP modules, relays.

2.7. Environmental Requirements

The Switches shall be capable of operating properly over an ambient temperature range of -40°C to +140°C without the use of internal or external cooling fans in accordance with IEC 60068-2-1 and 60068-2-2. The Switch shall be capable of operating properly in relative humidity conditions of 95% non-condensing at 55°C in accordance with IEC 60068-2-30. The Switch shall meet the environmental requirements of traffic control equipment in accordance with NEMA TS 2 (1998), Section 2: Environmental Requirements, specifically NEMA TS 2 1998 (Section 2.2.8):

- Vibration in each of the 3 mutually perpendicular planes.
- Vibration frequency sweep of 5 to 30 Hz
- Vibration strength = 0.5g
- Duration = 3 hours, 1 hour at each plane

The manufacturer shall provide evidence of independent testing verifying that performance. In general, the Switches shall comply with the environmental requirements outlined in Environmental Requirements – Table 1. The Switches shall be capable of operating properly when exposed to radiate electric fields of up to 10V/m continuously and magnetic fields of up to 40A/m continuously. In general, the Switches shall comply with the EMI immunity requirements given in IEC 61850-3 and IEEE1613. The Switches shall also pass the minimum EMC immunity requirements of EN61800-3. EN61800-3 A11 is the IEC standard for EMC emissions and immunity requirements for Adjustable Speed Power Drive Systems.

The Switches shall comply with the atmospheric, vibration, shock and bump requirements outlined in Table 1. This compliance shall be demonstrated by type withstands tests (i.e. ‘type tests’) as outlined in Table 1 and summarized in a Type Test Report per the test report requirements of each of the standards given in Table 1.

Table 1: Environmental Type Tests				
TEST	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 deg. C, 16 Hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85 deg. C, 16 Hours	N/A
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55 deg C, 6 cycles	N/A
IEC 60255-21-1	Vibration	Tests Fc		Class 1
IEC 60255-21-2	Shock	Tests Ea		Class 1
IEC 60255-21-2	Bump	Tests Eb		Class 1

**2.8. Power Supply**

The Switches shall be supplied with provisions for operation using DC and AC power supply inputs. The power supply, under Pay Item RR 110, shall have two-stage isolation accomplished via two transformers which step down from primary AC/DC to VDC. A power cord of not less than 5 feet in length shall be supplied as well. The Switches shall require no more than 15W of power. Power supply shall be manufactured by same manufacturer as switch unless notified in writing by engineer.

Remote Power Management, Pay Item RR-113, shall be supplied to provide secured remote power source management operation and AC current monitoring via TCP/IP networks. All power outlets have to be fully controlled via telnet, web, local or via external Modem. This item has to have Autoping feature to constantly monitor an IP address for a remote system and executes power reboot whenever the remote system is down.

**2.9. Mounting Requirements**

The Switches shall provide options for DIN Rail mounting or panel mounting via brackets. Also, the Switches shall be capable of being mounted in standard 19" rack with additionally supplied hardware.

**2.10. Safety Requirements**

The Switches shall comply with the following electrical safety requirements or equivalents: UL60950 or CSA C22.2 No. 60950 (safety requirements for IT equipment). The Switches shall also have CE (Europe) qualification. The Switches shall also comply with FCC Part15 Class A for EMI emissions.

**2.11. Software**

The embedded software that allows the Switches to function appropriately according to the specifications herein shall be provided with the Switches.

**3. Installation Details**

The NJSEA Engineer or its agent shall be on-site to supervise the replacement and configuration of the Switch. The replacement shall at a minimum include mounting the Switch in traffic control cabinets and connecting all transceivers, signal controllers, MMUs, vehicle detection cameras, and SFP optical transceivers to the Switch. The Switch shall be configured appropriately to meet all requirements detailed in this specification. The Contractor shall furnish the Switch and the internal power supply and all auxiliary equipment which they deem necessary for safe and reliable replacement of the Switch, including but not limited to: all required custom connections, mounting brackets, screws, and washers, etc. Splices of cables shall not be allowed anywhere. All defective equipment that is replaced by the Contractor shall be returned to the NJSEA.

All major components shall be identified with a metal plate containing the serial number with bar code identification. The Contractor shall provide the NJSEA with standard testing

procedures for the Switch. These procedures shall be conducted during the replacement process to provide confirmation that the Switch works as required. The Contractor shall be responsible for conducting all such testing. The Switch shall allow for dielectric strength ('hipot') tests in the field, in accordance with IEC 60255-5, by trained personnel. It shall be capable of enduring a test voltage of at least 2kVrms on power supply inputs above 60V and 0.5kVrms on power supply inputs below 60V. A removable grounding wire shall be provided to allow disconnecting of any transient suppression circuitry at the power supply input to allow for 'hipot' testing without activating the transient suppression circuitry.

The Contractor shall maintain all furnished equipment and software in good working condition and shall provide replacement, at no additional cost to the state, due to breakdown, damage, or theft within ten (10) working days after installation and standard testing procedure. The Contractor shall provide the following documents to support operation and maintenance of the Switch:

- Field documentation test sheets
- User's manual
- Maintenance manual
- Troubleshooting manual

All components to be supplied under this specification shall be warranted for a minimum of two-years from the conclusion of the system standard test. This warranty shall include repair and/or replacement of all failed components via a factory authorized depot repair service. All items sent to the depot for repair shall be returned within two weeks of the date of receipt at the facility. The depot location shall be in the United States. Repairs shall not require more than two weeks from date of receipt and the provider of the warranty shall be responsible for all return shipping costs. The depot maintainer designated for each component shall be authorized by the original manufacturer to supply this service. A warranty certificate shall be supplied for each component from the designated depot repair site indicating the start and end dates of the warranty. The certificate shall be supplied at the conclusion of the system standard test and shall be in effect for a two years subsequent to that date. The certificate shall name NJSEA as the recipient of the service.

#### **4. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-107	Replacement of Ethernet Switch, 10/100 BASE-TX	Unit
RR-108	Replacement of Ethernet Switch, 10/100 BASE-TX, 10/100/1000 BASE-T	Unit
RR-109	Replacement of Ethernet Switch, 10/100/1000 BASE-T, 10/100/1000 BASE-X	Unit
RR-110	Replacement of Switch External Power Supply	Unit
RR-111	Replacement of SFP Optical Transceiver	Unit
RR-112	Replacement of POE Injector	Unit
RR-113	Replacement of Remote Power Management Unit	Unit

The quantity of Pay Items RR-107, RR-108, RR-109, RR-110, RR-111, RR-112, and RR-113, Replacement of Ethernet Switches, Switch External Power Supply, SFP Optical Transceiver, POE Injector, and Remote Power Management Unit shall be measured as the actual number of equipment units furnished, replaced, and installed by the Contractor and accepted by the NJSEA Engineer, and shall be paid for at the Contract unit price for each Ethernet Switch, Switch External Power Supply, SFP Optical Transceiver, POE Injector, and Remote Power Management Unit. Price and payment shall constitute full compensation for completing the replacement, inclusive of all labor, materials, equipment, peripheral equipment such as internal power supplies, tools, and incidentals required for the safe and secure placement and configuration, including, but not limited to, all required custom connections, mounting brackets, screws, and washers, all user manuals and instructions, and all warranty, service and support.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, NJ.

**Item RR-114: Replacement of Antenna Assembly**  
**Item RR-114a: Replacement of Antenna Panel**  
**Item RR-114b: Adjusting Mounting Angle of Antenna Panel**  
**Item RR-115: Replacement of Transceiver Assembly**

**1. Description**

This specification sets forth the minimum functional requirements for the replacement of Antenna Assembly, Antenna Panel, and Transceiver assembly and the adjustment of the mounting angle of Antenna Panel. All equipment and software furnished under this specification must be current production equipment and of recent manufacture and version, similar models of which are in field operation in not less than five locations in the United States or Canada. Untried or prototype units shall not be considered for acceptance.

The Antenna Assembly, under Pay Item RR-114, consists of one or multiple (generally two) Antenna Panel necessary to transmit the required data from one (1) Transceiver Assembly. Each Antenna Panel, Pay Item RR-114a, is a physical transducer that transmits or receives electromagnetic waves carrying desired information, and converts such waves into electrical currents to feed into a transceiver and vice versa. The Adjusting the Mounting Angle of Antenna Panel, under Pay Item RR-114b, shall contain the readjustment of mounting angle of the antenna panel as indicated by the communication Line of Sight (LOS) Plans and directed by NJSEA Engineer. The Contractor shall furnish all processes necessary for safe and reliable adjustment of the antenna panel including Maintenance and Protection of Traffic, under Pay Item MPT-145 and MPT-146.

The Transceiver Assembly, under Pay Item RR-115, shall at a minimum include connecting the assembly to the Ethernet switch and configuring the Transceiver assembly to meet all requirements detailed in this specification. The Transceiver Assembly, under Pay Item RR-115, constitutes a node in the CS and consists of one individual radio device (i.e. Transceiver). However, a transceiver assembly can incorporate multiple radio devices within one enclosure to meet the specifications herein. Each Transceiver consists of transmitters and receivers, which utilize a source of electrical energy to generate and receive electrical currents carrying desired signals, and transfer the currents to and from an antenna. The Contractor shall furnish the Transceiver Assembly and all auxiliary equipment which they deem necessary for safe and reliable replacement and connection of the Assembly, including but not limited to mounting brackets, screws, and washers, etc. Splices of cables shall not be allowed anywhere.

**2. Assembly Requirement**

This specification sets forth the minimum requirements for replacing Antenna Assembly, Pay Item RR-114, Antenna Panel, Pay Item RR-114a, and Transceiver Assembly, Pay item RR-115, to form one complete link, that is part of the Communication System (CS).

The replacement of defective equipment shall at a minimum include removing the defective radio, radio panel, demounting radio assembly or/and transceiver, mounting the assemblies as directed by the NJSEA Engineer, and pulling cables in existing conduits. Each Ethernet cable shall have a distinctive number labeled at both ends for identification, in compliance with NJDOT traffic signal cable labeling standards. Splices of cables shall not be allowed anywhere. This item shall also cover the calibration and adjustment of unit for optimal performance. A report shall be submitted with radio survey values to document correct configuration and optimization. All connections outside of the signal cabinet shall be made water/weather tight rated; all connections in soil, conduit or junction boxes shall direct burial rated.

The Antenna Assembly shall be suitable to the harsh non-enclosed environment. The antennas shall have DC grounding for lightning protection in addition to a quality lightning arrestor that is installed between the antenna and the transceiver. All antennas shall be rugged and highly sun and weather resistant, with an expected service life in excess of ten years. All cable assemblies and connectors shall be weatherproof. The operating temperatures shall be from -40 °F to +140 °F and at 10% to 90% relative humidity, non-condensing.

The Antenna Pannel, under Pay Item RR-114a, and Antenna Assembly , under Pay Item RR-114, shall meet at a minimum the following functional requirements:

- System Compatibility
  - The Assembly shall be fully compatible with the wireless transceiver assembly to achieve the required distance between network nodes detailed on the wireless communication map.
  - The Assembly shall utilize smart antenna technology (e.g. multiple-input multiple-output (MiMo)) conforming to the IEEE 802.11n-2009 standard.
  - The Assembly shall use at a minimum 3x3 MIMO smart antennas with at least 2 spatial streams.
- Frequency Bandwidth
  - The antennas within the Assembly shall operate in unlicensed radio frequencies in the 2.4 GHz or 5 GHz spectrum.
  - The Antenna Assembly shall be designed to operate with the Transceiver Assembly.
- Gain

The antenna gain in the 2.4 GHz and 5 GHz spectrum shall be at least 16 dBi and 23 dBi, respectively.
- Polarization

The Antenna shall be capable of being mounted at a minimum of two different polarizations, in order to limit interference in signal transmission. In the 2.4 GHz spectrum, the antenna shall have linear, horizontal, or vertical polarization. In the 5 GHz spectrum, the antenna shall have linear and vertical polarization.

- **Beam Width**  
In the 2.4 GHz spectrum, both the vertical beam width and horizontal beam width shall at a minimum be 20°. In the 5 GHz spectrum, both the vertical beam width and horizontal beam width shall at a minimum be 10°.
- **Impedance**  
The antenna shall have 50 ohms nominal impedance.
- **Antenna Power Supply**  
The antenna shall be directly powered by the transceivers that are connected to the antenna via an N-to-N cable assembly. The antenna cable is specified and paid as separate items under NJSEA Specification for Pay Item RR-118.

The Transceiver Assembly, under Pay Item RR-115, shall be capable of handling external AC and DC input. The Transceiver Assembly shall be suitable to the harsh non-enclosed environment. The Assembly enclosure shall be rugged NEMA 4X/IP67 rated for outdoor deployments. All connectors shall be weatherproof. The operating temperatures shall be from -40 °C to +60 °C at 100% relative humidity, non-condensing. The Transceiver Assembly shall support the following requirements and options:

- The Assembly shall provide a minimum data rate of 300 Mbps.
- The Assembly shall operate in unlicensed radio frequencies in the 2.4 GHz and/or 5 GHz spectrum.
- The Assembly shall provide the flexibility to operate in channel widths of 5, 10, 20 and 40 MHz.
- The minimum Receive Signal Level (RSL) shall be in the range of -70 to -95 dBm.
- The Assembly shall support 3x3 MIMO smart antennas with at least 2 streams.

The Transceiver Assembly, under Pay Item RR-115, shall meet at a minimum the following functional requirements:

- **IEEE 802.11 Standards**  
The Assembly shall comply with the IEEE 802.11 family of protocols for wireless networking. More specifically, the transceiver shall utilize the multiple-input multiple-output (MIMO) technology conforming to the 802.11n standard.
- **IEEE 802.3 Standards**  
The Assembly shall provide true Ethernet connectivity and comply with all Ethernet transport standards and protocols. The MASSTR wireless communication system is a stand-alone network; however it shall be non-proprietary and be capable of being interconnected with other Ethernet networks.

- **Ethernet Interface**

The Assembly shall provide multiple GigE 10/100/1000 Base-T Ethernet ports using weatherproof connectors. The network ports shall be IEEE 802.3 compliant, featuring 10/100/1000 auto-negotiation, and offering POE over at least 2 ports in compliance with at least IEEE 802.3af. The Assembly shall provide LED activity indicators for the network ports.
  
- **Reliability and Interference Susceptibility**

The Assembly shall provide error free data transfer with minimum interference susceptibility with any and all other wireless networks in use in the installation area. The Assembly shall also implement a CSMA/CD and/or CSMA/CA in conjunction with IEEE 802.11 RTS/CTS access method to minimize transmission collision and packet dropping. Proprietary protocols can be used to improve interface avoidance. For each intersection controller, the total duration when the adaptive control mode is forced off due to data transfer failure shall not exceed 96 hours over the course of any calendar year.
  
- **Security**

The Assembly shall contain the following security features:

  - User name and password security from all Ethernet and serial interfaces
  - Hardware based encryption
  - Capability of distinguishing between transceivers that are part of the CS from transceivers that are not.
  - Digitally signed firmware files
  - Ability to lockout malicious users as they try to access the network
  - Support 128-bit WPA2 encryption keys
  - Complaint with IEEE 802.11i, 802.1x, RADIUS.
  - Support ESSID encryption
  - Support MAC address filtering
  - Provide for physical security via a lockable mounting bracket
  
- **Latency**

Latency of any data transfer related to traffic control shall not exceed 0.5 seconds between the ATCS central server and any intersection controller. Latency of image data transfer shall not exceed 1.0 second between the control center and any intersection image detection camera. Latency across a wireless link measured from Ethernet interface to Ethernet interface shall be less than 10ms.
  
- **Operational Requirements**
  - The Assembly shall support a reliability of at least 99.995% over at least 0.25 miles.
  - The Assembly shall provide a fade margin of at least 20dbm.
  - The Assembly shall support Dynamic Frequency Selection (DFS).
  - The Assembly shall support Dynamic Channel Allocation (DCA) in order to be able to configure any channel.
  - The Assembly shall support Transmit Power Control (TCP).

- The Assembly shall be able support multiple band operations (e.g. Dynamic Spectrum Access).
  - The Assembly shall be capable of supporting 5.15-5.35GHz, 5.47-5.725GHz, 5.725-5.825GHz and 5.85-5.925GHz DSRC.
  - The Assembly shall support a Jitter Correction Algorithm.
  - Adjusts jitter timing to avoid delay fluctuation in high quality video stream
  - The Assembly shall support QOS enabled by default.
  - Ensure latency control and efficient bandwidth share between multiple client devices
  - The Assembly shall support Dynamic uplink vs. downlink bandwidth allocation top optimize application performance.
  - The Assembly shall support Data burst transmission which maximizes throughput capacity
  - The Assembly shall support Multicast Video
  - The Assembly shall support IGMP snooping
  - The Assembly shall be capable of transmitting and receiving signal from another Assembly over the distances as depicted in the NJSEA MASSTR Communication Map.
- **Build-In Software**
    - The Assembly shall have embedded software that performs a variety of management functions.
    - The Assembly shall support remote software upgrade ability and telnet access.
    - The Assembly shall support automatic transceiver recovery.

The Contractor shall provide the following system documents, including hard copies and electronic copies, to support the operation and maintenance of the Antenna and Transceiver:

- Field documentation sheets
- As-built documentation including antenna mapping diagrams and communication network diagrams
- System operations/configuration manual
- User's manual
- Maintenance manual
- Troubleshooting manual

### **3. Assembly, Replacement, and Angle Adjustment Details**

The Contractor shall furnish all auxiliary equipment and processes necessary for safe and reliable replacement of the Antenna, including but not limited to mounting brackets, screws, washers, etc. Splices of cables shall not be allowed anywhere except for the connection between the antenna cable and the antenna jumper cable. The antennas shall be configured appropriately to meet all requirements detailed in this specification. All major components shall be identified with a metal plate containing the serial number with bar code identification.

After all antenna/feed-line connections have been made, and before sealant has been applied to antenna connections, the Contractor shall perform an "Antenna /Feed-line test." The first part of this procedure shall be a "Standing Wave Ratio" (SWR) test of the antenna, feed-line, and coaxial cable protector. For this test, a calibrated watt meter and Reflectometer shall be used for

measurements. Under Pay Item RR-114, and Pay Item RR-114a & RR-114b, the Contractor shall keep a record of the results of each antenna feed-line SWR test and provide the engineer with a written report documenting the results. A SWR reading of 1.2:1 or better shall be obtained. Adjustments and corrections shall be implemented by the contractor until an acceptable SWR reading is obtained. After that point and under Pay Item RR-114 and RR-114a, all antenna connectors shall be sealed with heat shrink tubing secured with an epoxy sealant, such as 3M brand CCT tubing.

After the antenna feed-line test has been successfully completed, all directional antennas shall be properly aligned for maximum signal strength. The Contractor shall determine from the LOS plan set the general direction that each spread spectrum radio antenna shall be aimed to. After the initial directional setup is made, the procedure outlined below shall be implemented to maximize the signal strength for each radio link. The Contractor shall adjust the output power to optimize the receive signal level at the slaves in compliance with FCC regulations. The master radio shall then be setup to transmit a continuous signal. The radio technician shall then adjust the beam heading at each slave location by measuring the radio signal level monitor output while adjusting the antenna beam heading for maximum signal. The Contractor shall make a record of the channel settings and power levels to which each radio is set and measured signal level measurement received at each radio. These test results shall be submitted to the NJSEA engineer in a written report.

Once the Antenna/feed-line and Antenna alignment tests have been completed, an Operational Stand-Alone test shall be initiated. For this test, the spread spectrum radios to be tested shall be connected to the designated RS232 port at each field location. The contractor shall program the radios to the appropriate serial communications protocol for the intended device and the radios shall be adjusted for proper operation. The Contractor shall then connect a portable computer to the master radio. Utilizing basic communication software to be provided by the Contractor, each slave unit shall be addressed and successful two-way communications shall be demonstrated. Message throughput shall exceed 99% over at least a fifteen minute period. The contractor shall keep an accurate record of each Operational Subsystem Test and shall provide a written report to the NJSEA engineer.

All components to be supplied under this specification shall be warranted for a minimum of two-years from the conclusion of the system acceptance test. This warranty shall include repair and/or replacement of all failed components via a factory authorized depot repair service. All items sent to the depot for repair shall be turned within two weeks of the date of receipt at the facility. The depot location shall be in the United States. Repairs shall not require more than two weeks from date of receipt and the provider of the warranty shall be responsible for all return shipping costs. Any repairs made by a manufacturer or system manager representative shall be documented when repaired under warranty. This documentation shall include an explanation

of the exact repairs made and identification of parts replaced by part number and circuit number. All warranty repairs must be made within thirty days upon receiving a request.

The depot maintainer designated for each component shall be authorized by the original manufacturer to supply this service. A warranty certificate shall be supplied for each component from the designated depot repair site indicating the start and end dates of the warranty. The certificate shall be supplied at the conclusion of the system acceptance test and shall be for a minimum of two years after that point. The certificate shall name NJSEA as the recipient of the service. One copy of all operations and maintenance manuals for each spread spectrum radio transceiver components shall be delivered for each assembly installed.

The Transceiver Assembly shall support flexible and scalable network. The Contractor shall provide a description of how and to what extent this scalability will be achieved. This includes support for DSRC V2I 5.9GHz so that intersections can be equipped for evolving connected vehicle applications. The Contractor shall be on site until the replacements and connections are accepted by the NJSEA Engineer or its representative.

**4. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-114	Replacement of Antenna Assembly	Unit
RR-114a	Replacement of Antenna Panel	Unit
RR-114b	Adjusting Mounting Angle of Antenna Panel	Unit
RR-115	Replacement of Transceiver Assembly	Unit

The quantity of Pay Item RR-114, Replacement of Antenna Assembly, shall be measured as the actual number of replaced Antenna Assemblies that are furnished and meet the specifications herein completely configured and accepted, and shall be paid at the Contract Unit Price for each Antenna Assembly. Price and payment shall constitute full compensation for furnishing each replaced Antenna Assembly and removal of any damaged Antenna Assembly, inclusive of all labor, equipment, tools and incidentals required to complete the replacement. All replaced Antenna Assembly shall carry a two (2) years warranty from the date of acceptance.

The quantity of Pay Item RR-114a, Replacement of Antenna Panel, shall be measured as the actual number of replaced Antenna Panels that are furnished and meet the specifications herein completely configured and accepted, and shall be paid at the Contract Unit Price for each Antenna Panel. Price and payment shall constitute full compensation for furnishing each replaced Antenna Panel and removal of any damaged Antenna Panel, inclusive of all labor, equipment, tools and incidentals required to complete the replacement.

The quantity of Pay Item RR-114b, Adjusting Mounting Angle of Antenna Panel, shall be measured and paid as the actual number of Antenna Panels that are readjusted, corrected, tested, and accepted at the Contract unit price for each antenna panel adjusted. Price and payment will constitute full compensation for the adjustment, inclusive of all labor, tools, incidentals, all auxiliary equipment and materials necessary for safe and reliable adjustment of antenna panel, including but not limited to mounting brackets, screws, washers, etc.

The quantity of the Pay Item RR-115, Replacement of Transceiver Assembly, shall be measured as the actual number of Transceiver Assemblies that are furnished, connected and configured and meet the specifications herein, and shall be paid for at the Contract unit price for each Transceiver Assembly. Price and payment will constitute full compensation for furnishing, configuring, and setting up the Assembly, pre-assembling the transceiver when necessary, and removal of a damaged Transceiver Assembly, inclusive of all labor, equipment, tools and incidentals required to complete the replacement, user manuals, instructions, and all warranty, service and support for a minimum of two (2) years from the date of acceptance.

#### **5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-116: Replacement of Fiber Optic Link**  
**ITEM RR-117a: Replacement of Fiber Optic Splice Enclosure**  
**ITEM RR-117b: Replacement of Fiber Optic Patch Panel**  
**ITEM RR-117c: Repair of Fiber Optic Communication Connection**

**1. Description**

This work includes the Replacement of Fiber Optic Link, under Pay Item RR-116, the Replacement of Fiber Optic Splice Enclosure (FSE), under Pay Item RR-117a, the Replacement of Fiber Optic Patch Panel (FPP), under Pay Item RR-117b, and Repair of Fiber Optic Communication Connection, under Pay Item RR-117c. The specification sets forth the minimum operational requirements of fiber-optic network, which is a part of the Communication System built as part of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR). In addition to a robust wireless communication system, MASSTR also uses portions of NJDOT's fiber-optic communication network. Furthermore, NJSEA installed Fiber Optic Link between NJ Route 3 East Ramp/NJ Route 17/Polito Ave. and NJSEA Administration Building to enhance the redundancy of communication connections through establishing fiber optic connections among all nodes and NJSEA Building.

In order to increase the communication strength of the system, the NJSEA connected the wireless system to NJDOT fiber-optic network via a number of fiber-optic meter cabinets and/or communication hubs throughout the region on US Route 1&9, NJ Route 3, and US Route 46. The Contractor shall refer to the map in the appendix for more information regarding the locations of NJSEA and NJDOT meter cabinets and/or communication hubs. In addition, NJSEA will enhance the reliability of communication connections by establishing the fiber optic connections between major hubs and NJSEA Administration Building. This link leverages NJDOT, New Jersey Turnpike Authority (NJTA), and NJSEA Fiber Optic Communication Networks. The contractor shall follow national and NJDOT standards and guidelines for Fiber-Optic Splice enclosure and fiber optic patch panel materials. The contractor is responsible for the replacement of the fiber-optic line and Fiber Optic Links, and a replacement and/or repair of FSE, and FPP, if and where necessary.

The communication network has the following functional requirements:

- The wireless communication system have the capability to differentiate, restrict, and control the flow of data separately across both the wireless and fiber-optic communication links.
- The wireless communication system allows NJSEA personnel to separately control the system use of both the wireless network and the fiber-optic network.
- Both streaming video and data communications are capable of being interconnected over long distances through fiber-optic, wireless, and other commonly used digital communications transport configurations.
- Optical single mode or multi-mode 1000 BASE-X interface.

**2. Materials**

The Contractor shall follow NJDOT specification for materials, installation, testing, and maintenance for Replacement of Fiber Optic Link, Pay Item RR-116, as referenced in Appendix B.

The replaced FSE, under Pay Item RR-117a, shall be in accordance with electronic industry, ANSI, ATSM, FDDI, or UL standards. The FSE shall be a rigid non-filed case molded out of polyester/polycarbonate blend. The FSE installation shall follow the manufacturer temperature standards and shall not be performed under -22°F. FSE shall be certified by manufacturer that it can be installed underground and in junction box. Splice requirements and general standards shall follow NJDOT specification referenced in Appendix B.

The replaced FPP, under Pay Item RR-117b, shall have the following accessories:

- Mounting bolts
- Jumper cables
- Fiber drawers
- Storage for fiber
- Cable clamps with strain relief
- Flipcard for easier record keeping

FPP general standards and installation requirements shall follow NJDOT specification referenced in Appendix B.

**3. Construction Details**

The NJSEA Engineer or its representative is responsible for the configuration of the fiber-optic lines to the components in the meter cabinet and the traffic control cabinet. The Contractor shall follow national and NJDOT standards and guidelines for the replacement and repair of splicing, FSE, FPP, connection setting, and testing of all fiber lines. The contractor is responsible for conducting an Optical Time Domain Reflector (OTDR) test on each fiber in order to verify the system design parameters per NJDOT Standards. The contractor shall report to the NJSEA all findings regarding the replacement and testing of fiber-optic link.

**4. Measurement and Payment**

The following NJSEA pay item shall be paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-116	Replacement of Fiber-Optic Link	Linear Foot
RR-117a	Replacement of Fiber Optic Splice Enclosure	Unit
RR-117b	Replacement of Fiber Optic Patch Panel	Unit
RR-117c	Repair of Fiber-Optic Communication Connection	Unit

The quantity of Pay Item RR-116, Replacement of Fiber-Optic Link, shall be measured as the linear foot of Fiber-Optic Link, furnished by the Contractor, inclusive of setup, testing, and

inspection, satisfying the specifications herein, and approved by the NJSEA. The measurement of a link constitutes an end-to-end fiber optic line measured from the meter cabinet or FSE to the traffic control cabinet including any slack in Splice boxes or in cabinets. The item shall be paid for at the contract unit price for each linear foot of Fiber-Optic Link. Price and payment shall constitute full compensation for all labor, removal and disposal of replaced cable, equipment, tools, and incidentals required to complete the replacement.

The quantity of Item RR-117a, Replacement of Fiber Optic Splice Enclosure, shall be measured as the number of replaced Fiber-Optic Splice Enclosure (FSE), and shall be paid at the contract unit price for each FSE. Price and payment shall constitute full compensation for a FSE replacement, inclusive of all labor, equipment, tools and incidentals required for furnishing, setup, testing, inspection, and disposal of damaged equipment, satisfying the specifications herein, as approved by the NJSEA.

The quantity of Item RR-117b, Replacement of Fiber Optic Patch Panel, shall be measured as the number of replaced Fiber-Optic Patch Panels (FPP) and shall be paid at the contract unit price for each FPP. Price and payment shall constitute full compensation for a FPP replacement, inclusive of all labor, equipment, tools, incidentals, and disposal of damaged equipment, required for establishing the fiber optic communication connection satisfying the specifications herein, as approved by the NJSEA.

The quantity of Item RR-117c, Repair of Fiber-Optic Communication Connection, shall be measured as the number of repaired Fiber-Optic Communication Connections, including FSE and FPP, satisfying the specifications herein, as approved by the NJSEA. The payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

## **5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-118: Replacement of Antenna Cable**  
**ITEM RR-119: Replacement of Antenna Jumper Cable**  
**ITEM RR-120: Replacement of Vehicle Detection Cable**  
**ITEM RR-121: Replacement of Transceiver Power Cable, 3/C#12**

**1. Description**

This specification sets forth the minimum requirements for the replacement of Antenna Cable, Antenna Jumper Cable, Vehicle Detection Cable, and Transceiver Power Cable that is used for the communication system as part of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR).

**2. Materials**

The cables required under Pay Items RR-118, RR-119, and RR-120 shall be a coaxial type and shall from inside out consist of one copper clad aluminum inner conductor, one physical foam polyethylene (PE) dielectric layer, one bonded aluminum foil and tinned copper braid outer conductor, and one black premium grade flame retardant PE outer jacket. The dimensions of each layer shall comply with the following:

	Material	Diameter	
		Pay Item RR-118	Pay Item RR-119 & RR-120
Inner Connector	Copper clad aluminum	0.176"±0.001"	0.108"±0.001"
Dielectric Layer	Physical foam polyethylene	0.455"±0.012"	0.285"±0.005"
Outer Connector	Bonded Aluminum Foil & Tinned Copper Braid	Nominal 0.492"	Nominal 0.320"
Outer Jacket	Black Polyethylene	0.590"±0.008"	0.40"±0.008"

The Cable required under Pay Item RR-121 shall consist of a three 12 AWG THHN/THWN conductors, twisted and covered with a color coded premium grade flame retardant polyvinyl chloride (PVC) outer jacket. The traffic signal cable shall conform to UL subject 1277. The cable shall be rated for 600 volts. The conductors shall be soft annealed copper wire per ASTM B-3, and standards per ATSM B-8. The insulation shall be high dielectric polyvinyl chloride covered with an insulation armor of nylon conforming to UL83 for type THHN/THWN insulation. The insulated conductors shall be twisted and covered with a helically applied suitable binding tape.

Antenna Cables, Antenna Jumper Cables, and Vehicle Detection Cables shall be extremely durable and easy to install with maximum flexibility where curves, bends and twists rule out the use of standard hard-line transmission cables. All Vehicle Detection Cables connections

shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. Antenna Cable shall have a minimum bend radius of 3.0". Antenna Jumper Cable and Vehicle Detection Cable shall have a minimum bend radius of 2.1".

All four cables shall be outdoor rated and suitable to the harsh, non-enclosed environment, and shall be Gasoline and Oil Resistant II and UV Resistant. The operating temperature range shall be from -40 °F to +140 °F at 10% to 90% relative humidity, non-condensing. All cables shall carry a minimum of 5 years warranty and a minimum of 20 years life expectancy for outdoor use.

The cables provided under Pay Items RR-118, RR-119, and RR-120 shall meet the following electrical characteristics:

	Item RR-118	Item RR-119 & RR-120
Capacitance	23.4 pF/ft	23.9 pF/ft
Impedance	50 Ω	50 Ω
Inductance	0.058 uH/ft	0.060 uH/ft
Velocity	87%	85%
Inner Conductor DC Resistance	< 0.53 (Ω/1000ft)	< 1.39 (Ω/1000ft)
Outer Conductor DC Resistance	< 1.2 (Ω/1000ft)	< 1.65 (Ω/1000ft)
Shielding Effectiveness	> 90dB	> 90dB
Jacket Spark	5000 VAC	5000 VAC
Cut Off Frequency	10.3 GHz	16.2 GHz
Peak Power	40 kW	16 kW

The Transceiver Power Cable (Pay Item RR-120) shall have the following standards:

- ASTM B-3 and B-8
- UL Standard 83 - THHN/THWN-2
- NEMA WC5/ICEA S-61-402
- Federal Specification JC-30B
- OSHA acceptable
- NEPA 70 (NEC)
- NEPA 79 AWM 600V 105°C (75°C in oil)

### 3. Construction Details

Each installed strand of the Antenna Cable, Antenna Jumper Cable, and Vehicle Detection Cable shall include two Type N-style female (plug) connectors that meet all standards detailed in this specification. The Type N-style connectors shall be either straight or right-angle depending on the specific installation requirements.

All four cables' identification shall be printed with the manufacturer's part number, voltage rating, jacket material, and an indication that it is out-door rated and conduit rated.

During the replacement, each Vehicle Detection Cable, under Pay Item RR-120, shall be labeled on both ends with a distinctive number, in the format of "VDU-#", where the value of the # shall correspond to the VDU numbering scheme on the Plans.

**4. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Item Description	Pay Unit
RR-118	Replacement of Antenna Cable	Linear Foot
RR-119	Replacement of Antenna Jumper Cable	Linear Foot
RR-120	Replacement of Vehicle Detection Cable	Linear Foot
RR-121	Replacement of Transceiver Power Cable, 3/C#12	Linear Foot

The quantity of the cables provided under Pay Item RR-118, Replacement of Antenna Cable, Pay Item RR-119, Replacement of Antenna Jumper Cable, Pay Item RR-120, Replacement of Vehicle Detection Cable, and Pay Item RR-121, Replacement of Transceiver Power Cable, 3/C#12, shall be measured as the actual linear feet installed and accepted by the Engineer and shall be paid for at the Contract unit price per linear foot. Price and payment shall constitute full compensation for all labor, removal and disposal of damaged cable, equipment, tools and incidentals required to complete the replacement.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

- ITEM RR-122: Replacement of Antenna Pole, Type A (75')
- ITEM RR-122a: Repair of Antenna Pole, Type A (75')
- ITEM RR-123: Replacement of Antenna Pole, Type B (55')
- ITEM RR-123a: Repair of Antenna Pole, Type B (55')
- ITEM RR-124: Replacement of Antenna Pole, Type C (40')
- ITEM RR-124a: Repair of Antenna Pole, Type C (40')

### 1. Description

This specification sets forth the minimum requirements for the replacement and repair of Antenna Poles, Type A, B and C, (Pole) that are used to mount antennas, transceivers, and cameras as part of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR). Three types of Pole(s) are specified within this document:

- Antenna Pole, Type A (75')
- Antenna Pole, Type B (55')
- Antenna Pole, Type C (40')

### 2. Design Specifications

For the replaced poles under Pay Items RR-122, RR-123, and RR-124, the pole(s) shall conform to the 2015 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6<sup>th</sup> edition, incorporated herein by reference, as amended and supplemented. The design shall utilize the following parameters:

- Design wind velocity - 80 mph
- Design ice load - 3 P.S.F.
- Fatigue category - 2
- Design Life - 50 years

All loads applied to all members shall be taken into account for strength design, and all welded structural details shall be analyzed against fatigue. The design shall consider, at a minimum the pole, hand hole, base plate, pole-to-base connection, anchor bolts and embedment.

Maximum horizontal deflection at the top of the pole completely assembled with wireless antennas, transceivers and all fixtures attached shall not exceed 2 inches from the center line due to a 40 mph (gust factor 1.3) wind speed.

Submit detail plans and design calculations of Pole(s), manufacturer specified antenna/transceiver weight and projection area, and anchor bolt assembly for approval. Ensure the design calculations and working drawings are signed and sealed by a professional engineer licensed in the State of New Jersey.

### 3. Materials

For Items RR-122 and RR-123, the steel pole shall be tapered and consist of a maximum of two individual steel sections. The lower section shall be a minimum of 40 feet and maximum of 50

feet long with a minimum thickness of ¼ inches and contain only one longitudinal seam weld. However if the pole diameter is greater than 24 inches, two longitudinal seam welds will be permitted. Either slip joints or full penetration weld joints are acceptable. Laminated tubes are not permitted. For Item RR-124, the steel pole shall be tapered and consist of one steel segment and contain only one longitudinal seam weld. Laminated tubes are not permitted.

For Items RR-122 and RR-123, the pole and tenon material shall conform to ASTM Specification A595, Grade A (minimum yield point 55 ksi) or Grade B (minimum yield point 60 ksi). If the pole consists of two segments, they shall be of the same material. As an alternative, the pole (18 sided minimum) and tenon may be formed from steel conforming to ASTM A572 Grade 55 or Grade 60. All other steel shall conform to ASTM Specification A709 (AASHTO M270) Grade 36 or Grade 50. All Pole(s) regardless of thickness and all steel plates greater than ½ inches thickness shall meet the AASHTO requirements for notch toughness (charpy testing) Zone 2. Tenon and both segments of the pole shall be galvanized per ASTM A123 after fabrication.

For Item RR-124, the pole material shall conform to ASTM Specification A595, Grade A (minimum yield point 55 Ksi. As an alternative, the pole (18 sided minimum) may be formed from steel conforming to ASTM A36 or A572 Grade 55. All other steel shall conform to ASTM Specification A709 (AASHTO M270) Grade 36 or Grade 50. All poles regardless of thickness and all steel plates greater than ½ inches thickness shall meet the AASHTO requirements for notch toughness (charpy testing) Zone 2. The pole shall be galvanized per ASTM A123 after fabrication.

Anchor bolt materials shall conform to ASTM F1554, Grade 55. The anchor bolts shall be galvanized per ASTM A153, Class C after threading for the full length of the bolt, as well as nuts and washers. For items RR-122 and RR-123, high strength bolts, nuts, and washers shall be galvanized per ASTM A153, Class C.

Stainless steel fasteners (including bolts, nuts and washers) shall conform to ASTM A320, Grade B8, Class 2 (ANSI Type 304) and strain hardened. Ensure all nuts lock type with sealing all threads. The foundation shall conform to the New Jersey Department of Transportation (NJDOT) ITS Details ITSD-704-15. All concrete shall be "Class B" as defined in the NJDOT Standard Specifications for Road and Bridge Construction, 2007, as amended and supplemented, unless otherwise specified by the Engineer.

#### **4. Installation and Repair Details**

Installation of the Pole(s) shall comply with the NJDOT Standard Specifications for Road and Bridge Construction, 2007, as amended and supplemented.

- The Pole(s) shall be installed in the area beyond recovery distance or behind the guide rail.
- Provide neoprene door gasket.

- Provide a galvanized screen, double rap around the base of pole. The galvanized screen shall have an opening of no more than ½ inches wide and be held together with stainless steel nuts, bolts and flat washers.
- Grouting under the pole shall not be permitted.
- Provide one (1) leveling hex nuts, two (2) hold-down hex nuts and one (2) flat washer per anchor bolt. Determine the proper length of the anchor bolt for projection and embedment. The clearance between the top of the foundation and the bottom of the leveling nut shall not exceed 1½ inches. The projection length shall be a minimum of 9 inches.
- All welding shall conform to the ANSI/AWS D1.1 Structural Welding Code-Steel, with NJDOT amendments in NJDOT Standard Specifications. Welding inspection and full penetration weld nondestructive testing shall conform to AWS D1.1. All welding shall be done with E-80T-1 wire.
- For items RR-122 and RR-123, locate the top, center and bottom electrical cable guides within the pole and align with each other. Position the bottom cable guide 2 inches below the hand-hole and top cable guide 1 inch directly below the top of tenon. Position two parking stands a maximum of 2¾ inches below the top of the hand-hole and located at the 90 degree and 270 degree from the handhole. Ensure each cable guide is 3/8 inches wire eye bolt having 1" internal diameter for wire tie off.
- Refer to manufacturer's specifications for the weight and projection area of wireless antennas and wireless transceivers.
- The tightening procedure for anchor bolts shall follow Section 6.9 of the 2005 FHWA "Guidelines for the Installation, Inspection, maintenance and Repair of Structural Supports for Highway Signs, Luminaries and Traffic Signals", as amended and supplemented.
- The Manufacturer or Contractor shall furnish any and all auxiliary equipment which they deem necessary for safe and reliable installation of the Pole(s), including but not limited to foundation, stainless steel bolts, anchor bolts, nuts, washers and fasteners.

The repair of the pole shall follow Section 16.3 of the 2005 FHWA "Guidelines for the Installation, Inspection, maintenance and Repair of Structural Supports for Highway Signs, Luminaries and Traffic Signals", as amended and supplemented, and inspected and accepted by NJSEA Engineer.

**5. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-122	Replacement of Antenna Pole, Type A, (75')	Unit
RR-122a	Repair of Antenna Pole, Type A, (75')	Unit
RR-123	Replacement of Antenna Pole, Type B, (55')	Unit
RR-123a	Repair of Antenna Pole, Type B, (55')	Unit
RR-124	Replacement of Antenna Pole, Type C (40')	Unit
RR-124a	Repair of Antenna Pole, Type C (40')	Unit

The quantity of Pay Items RR-122, RR-123, and RR-124, Replacement of Antenna Pole, Type A, Type B, and Type C, respectively, will be measured and paid as the actual number of Antenna Pole(s) that are completely replaced and accepted by the NJSEA, and shall be paid for at the Contract unit price per unit. Price and payment shall constitute full compensation for all labor, equipment, tools, materials, and incidentals required to complete the replacement and the disposal of all defective parts, and all necessary auxiliary materials/equipment such as foundation, stainless steel bolts, anchor bolts, nuts, washers and fasteners.

The quantity of Pay Items RR-122a, RR-123a, and RR-124a, Repair of Antenna Pole, Type A, Type B, and Type C, respectively, will be measured as the number of Antenna Poles repaired. Payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**6. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

- ITEM RR-125: Replacement of T-Pole Extension**
- ITEM RR-125a: Repair of T-Pole Extension**
- ITEM RR-126: Replacement of C-Pole Extension**
- ITEM RR-126a: Repair of C-Pole Extension**
- ITEM RR-127: Replacement of K-Pole Extension**
- ITEM RR-127a: Repair of K-Pole Extension**
- ITEM RR-128: Replacement of Steel Pole Extension**
- ITEM RR-128a: Repair of Steel Pole Extension**

## **1. Description**

This specification sets forth the minimum requirements for the replacement and repair of traffic signal pole extensions (Extensions) that are used to mount antennas and transceivers, as part of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR). Four types of Extensions are specified within this document:

- T-Pole Extension- 13.7 Feet
- C-Pole Extension- 8.0 Feet
- K-Pole Extension- 22.5 Feet
- Steel Pole Extension- 19.0 Feet

## **2. Materials/Design Specifications**

The Extensions shall conform to the 2015 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6<sup>th</sup> edition, incorporated herein by reference, as amended and supplemented.

If a replacement is necessary, the pole shall be designed to consider all loads applied to all members for strength design, and analyze all welded structural details against fatigue. The design should consider, but is not limited to the traffic pole and mast arm. Maximum horizontal deflection at the top of the pole completely assembled with wireless antennas, transceiver assembly and all fixtures attached shall be determined in accordance with the abovementioned AASHTO specifications.

Submit detail plans and design calculations of replaced extensions including manufacturer specified antenna/transceiver weight and projection area. Ensure the design calculations and working drawings are signed and sealed by a professional engineer licensed in the State of New Jersey.

The extensions material shall be similar to the material of the traffic signal pole where the extensions are being attached, unless otherwise stated. For more information about the traffic signal poles refer to NJDOT electrical specifications and details.

**3. Construction Details**

Installation of the Extensions shall comply with the NJDOT Specifications for Road and Bridge Construction. All welding shall conform to the ANSI/AWS D1.1 Structural Welding Code-Steel, with NJDOT amendments in NJDOT Specifications. Welding inspection and full penetration weld nondestructive testing shall conform to AWS D1.1. All welding shall be done with E-80T-1 wire. Refer to manufacturer’s specifications for the weight and projection area of wireless antennas and wireless transceivers.

The tightening procedure for anchor bolts shall follow Section 6.9 of the 2005 (or the latest edition) FHWA “Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaries and Traffic Signals.” The repair of the extension shall follow Section 16.3 of the 2005 (or the latest edition) FHWA “Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaries and Traffic Signals” and shall be inspected and accepted by NJSEA Engineer.

The Manufacturer or Contractor shall furnish any and all auxiliary parts and equipment which they deem necessary for safe and reliable installation and repair of the Extensions, including but not limited to friction ring, stainless steel bolts, hex nuts, washers and fasteners.

**4. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-125	Replacement of T-Pole Extension	Unit
RR-125a	Repair of T-Pole Extension	Unit
RR-126	Replacement of C-Pole Extension	Unit
RR-126a	Repair of C-Pole Extension	Unit
RR-127	Replacement of K-Pole Extension	Unit
RR-127a	Repair of K-Pole Extension	Unit
RR-128	Replacement of Steel Pole Extension	Unit
RR-128a	Repair of Steel Pole Extension	Unit

The quantity of Pay Item RR-125, Replacement of T-Pole Extension, Pay Item RR-126, Replacement of C-Pole Extension, Pay Item RR-127, Replacement of K-Pole Extension, and Pay Item RR-128, Replacement of Steel Pole Extension, will be measured as the actual number of pole extensions that are completely replaced and accepted by the NJSEA Engineer and shall be paid for at the Contract unit price per unit. Price and payment shall constitute full compensation for all labor, equipment, tools, materials and incidentals, including but not limited to foundation, friction ring, stainless steel U-bolts, anchor bolts, hex nuts, washers and fasteners, and disposal of all defective parts, required to complete the replacement.

The quantity of Pay Item RR-125a, Repair of T-Pole Extension, Pay Item RR-126a, Repair of C-Pole Extension, Pay Item RR-127a, Repair of K-Pole Extension, and Pay Item RR-128a, Repair of Steel Pole Extension, will be measured as the actual number of pole extensions that are completely repaired and accepted by the NJSEA Engineer. Payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-129: Replacement of Roof Mount Antenna Tower, 20'**

**ITEM RR-129a: Repair of Roof Mount Antenna Tower, 20'**

**ITEM RR-130: Replacement of Roof Mount Antenna Tower, 6'**

**ITEM RR-130a: Repair of Roof Mount Antenna Tower, 6'**

**1. Description**

This specification sets forth the minimum requirements for the replacement/repair and disposal of non-penetrating roof mount antenna tower that is used to mount antennas, transceivers, and cameras as part of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR).

**2. Design Construction**

*a. Design Standards*

The antenna tower is designed conforming to the ANSI/TIA 222 Rev-G, the national standard for Steel Antenna Towers and Antenna Supporting Structures (the latest revision), incorporated herein by reference, as amended and supplemented. The tower structure can be either a truss or a mast pipe with a diameter in the 2" - 6" range. All loads applied to all members shall be taken into account for strength design, and all welded structural details shall be analyzed against fatigue. The design should consider, but is not limited to tower sections, non-penetrating roof mount, joints, and bolts.

For the Replacement of Roof Mount Antenna Tower, under Pay Items RR-129 & RR-130, the detail plans and design calculations of the antenna tower, maximum allowable antenna/transceiver weight and effective projection area, non-penetrating roof mount, and ballast shall be submitted for approval by NJSEA Engineer. Ensure the design calculations and working drawings are signed and sealed by a professional engineer licensed in the State of New Jersey.

*b. Height*

For Item RR-129, Replacement of Roof Mount Antenna Tower, 20', the tower has a minimum height of twenty (20) feet measured from the bottom of the non-penetrating roof mount to the top of the tower. The tower structure consists of a maximum of two sections using double bolted joints. Using horizontal welding to connect the two sections is not permitted. The tower includes a climber safety device.

For Item RR-130, Replacement of Roof Mount Antenna Tower, 6', the tower has a minimum height of six (6) feet measured from the bottom of the non-penetrating roof mount to the top of the tower. The tower structure is one section with no joint or welding allowed.

*c. Roof Antenna Tower Mount*

The antenna tower is a self-supporting type installed on top of the roof with a non-penetrating roof mount. The roof mount base has a 16" tray to fit standard concrete blocks (8" x 8" x 16") used

as ballast. The dead load of the roof mount should not exceed 20 psf. The roof mount has a protective barrier between the mount and the roof.

In addition, the contractor shall secure the 20' antenna tower to the roof structure using multiple security cables to ensure stability.

### **3. Materials**

The main frames of the replaced tower truss or the antenna pole, and the base plate of the roof mount shall be formed from steel conforming to ASTM A572 Grade 50, whereas the replaced braces of the tower truss can be formed from steel conforming to ASTM A36. All poles regardless of thickness and all steel plates greater than ½ inches thickness shall meet the AASHTO requirements for notch toughness (Charpy testing) Zone 2. The complete replaced antenna tower shall be galvanized per ASTM A123 after fabrication.

Stainless steel bolts, nuts, washers and fasteners shall conform to ASTM A320, Grade B8, Class 2 (ANSI Type 304) and strain hardened. Ensure all nuts lock type with sealing all threads. All welding shall conform to the ANSI/AWS D1.1 Structural Welding Code-Steel, with NJDOT amendments in NJDOT Standard Specifications. Welding inspection and full penetration weld nondestructive testing shall conform to AWS D1.1. All welding shall be done with E-80T-1 wire.

### **4. Construction Details**

The Replacement of Roof Mount Antenna Tower, Pay Items RR-129 and RR-130, shall be installed and shall replace the existing defective Roof Mount Antenna Tower in accordance with the manufacturer's installation instruction. Refer to manufacturer's specifications for the weight and projection area of wireless antennas and wireless transceivers. The Repair of Roof Mount Antenna Tower, under Pay Items RR-129a and RR-130a, shall follow Section 16.3 of the 2005 (or the latest edition) FHWA "Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaries and Traffic Signals", as amended and supplemented, and shall be inspected and accepted by NJSEA Engineer

The Contractor shall furnish any and all auxiliary equipment which they deem necessary for safe and reliable installation and replacement of the antenna tower, including but not limited to non-penetrating roof mount, security cables, stainless steel bolts, nuts, washers, fasteners, and repair equipment.

### **5. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-129	Replacement of Roof Mount Antenna Tower, 20'	Unit
RR-129a	Repair of Roof Mount Antenna Tower, 20'	Unit
RR-130	Replacement of Roof Mount Antenna Tower, 6'	Unit
RR-130a	Repair of Roof Mount Antenna Tower, 6'	Unit

The quantity of Pay Items RR-129 and RR-130, Replacement of Roof Mount Antenna Towers, will be measured as the actual number of replaced roof mount antenna towers that are completely installed and accepted by the NJSEA and shall be paid for at the Contract unit price for each unit. Price and payment shall constitute full compensation for disposal of damaged antenna towers, all labor, equipment, tools, materials, and incidentals, including but not limited to non-penetrating roof mount, security cables, protective barrier, haul-away materials and poles, and stainless steel bolts, nuts, washers and fasteners, required to complete the replacement.

The quantity of Pay Items RR-129a and RR-130a, Repair of Roof Mount Antenna Towers, will be measured as the number of Roof Mount Antenna Towers repaired and accepted by the NJSEA. Payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**6. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-131: Replacement of Adaptive Traffic Signal Controller**  
**ITEM RR-131a: Repair of Adaptive Traffic Signal Controller**

**1. Description**

This specification sets forth the minimum requirements for a replacement of Adaptive Traffic Signal Controller (Controller), Pay Item RR-131, or the repair of the Adaptive Traffic Signal Controller, Pay Item 131a, required by the Adaptive Traffic Control System (ATCS) implemented by the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR).

As a critical component of the ATCS, Controllers installed at local intersections respond to the adaptive strategies and execute timing, phase sequencing, cycle lengths, offsets and other related timing parameters.

All equipment and software furnished under this specification must be current production equipment and of recent manufacture and version, similar models of which are in field operation in the United States or Canada. Untried or prototype units shall not be considered for acceptance.

This specification is based on providing a Trafficware (Naztec), Siemens, Peak, Safetran (Econolite) or other controller certified for use with SCATS software currently on the MASSTR project by the software vendor. Where local intersection owner has preference, requirement or standard for particular manufacturer of controller, that manufacturer shall be used as a replacement controller under Pay Item RR-131 regardless of manufacturer of currently operating intersection controller, as long as it is a SCATS approved controller for the MASSTR system.

**2. Functional Characteristics**

*a. Controller Standards*

The replaced and repaired controller shall at a minimum conform to the New Jersey Department of Transportation Specifications (NJDOT) for Eight Phase Traffic Signal Controller Assembly, NJDOT Specification No. EB-TSC-TIB-8, as amended and supplemented. It is desirable that the replaced controller has an open architecture and to the maximum extent meets the National AASHTO/ITE/NEMA Advanced Transportation Controller (ATC) Standards Version 5.2b. The replaced and repaired Controller shall meet the environmental requirements defined by the National Electrical Manufacturers Association (NEMA) specifications. The Controller shall operate at temperatures from -20 °F to +140 °F at 10% to 90% relative humidity, non-condensing.

*b. Basic I/O Configuration*

Within the Meadowlands region, a majority of the existing signalized intersections are currently equipped with NEMA TS1 or TS2-Type2 cabinets. Therefore, the replaced controller shall be configurable for NEMA TS1 or TS2-Type2 cabinets. The replaced and repaired controller shall have a functional Synchronous Data Link Control (SDLC) bus and A, B, C and D connectors. The replaced controller shall also minimize the need to install additional hardware, such as connector panels, inside the existing cabinet.

*c. Software Application*

The replaced and repair controller shall be integrated into the ATCS software as per NJSEA Specification. In addition, it is desirable that the Controller has an open operating system platform for maximum flexibility in hosting other independent software applications, if and when required.

*d. Controller Communication*

The replaced and repaired controller shall have built-in Ethernet port so that it can be directly connected to the central server via a dedicated wireless Ethernet communication network built by MASSTR.

**3. Replacement, Repair, and Testing**

This work shall at a minimum include the replacement, repair, and setup of Adaptive Traffic Signal Controller per NJDOT Standards at each intersection. A certified representative from the Controller manufacturer shall be on site to supervise the replacement, repair, and setup of the Controller. A letter from the Controller manufacturer stating that the representative is authorized and qualified to perform the work shall be provided to the NJSEA prior to the work. All field replacement, repair, modification of signal timings, and switching to ATCS shall be conducted during off-peak or weekend hours. The damaged Controller shall be tested to make sure the Controller is beyond repair before disposing the Controller. The test Controller unit shall conform to NJDOT specification EB-TSC-CTU, as amended and supplemented. All disposed Controllers shall be returned to the NJSEA. The replaced controller shall carry a two-year warranty from the date of acceptance against any imperfections in workmanship or materials. The Contractor shall provide the following system documents, including hard copies and electronic copies, to support operation of the Controller:

- Field documentation sheets
- Controller configuration manual
- User's manual
- Maintenance manual
- Troubleshooting manual

All equipment installation shall comply with the NJDOT Standard Specifications for Road and Bridge Construction, 2007, as amended and supplemented. The NJDOT deployment procedure,

as amended and supplemented, shall be adopted for testing, documentation, and approval. The Contractor shall furnish any and all auxiliary equipment which they deem necessary for safe and reliable operation of the Controller, including but not limited to: mounting brackets, cables, cable connections, and etc. Splices of cables shall not be allowed anywhere within the traffic cabinet.

The Contractor shall provide the NJSEA with standard testing procedures for the Controllers replaced. These procedures will be conducted during the replacement process to provide confirmation that the Controllers work as expected. The Contractor shall be responsible for conducting all such testing.

Once the controller has been replaced or repaired and accepted by NJSEA Engineer, a 30-day burn-in period will commence. If the replaced or repaired controller fails during this period, it will be repaired or replaced and the 30-day clock will restart for that piece of equipment. The replced controller shall be identified with a metal plate containing the serial number and bar code identification.

**4. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-131	Replacement of Adaptive Traffic Signal Controller	Unit
RR-131a	Repair of Adaptive Traffic Signal Controller	Unit

The quantity of Pay Item RR-131, Replacement of Adaptive Traffic Signal Controller, shall be measured as the actual number of Controllers that are furnished and accepted by the NJSEA, and shall be paid for at the Contract unit price for each Controller unit. Price and payment shall constitute full compensation for all labor, equipment, materials, tools and incidentals required to furnishing, replacing, and installing the Controller hardware, complete the installation and configuration, including any necessary mounting brackets, screws, cables, and cable connections (excluding the manufacturer software), all user manuals and instructions, and for all warranty, service and support for a minimum of two (2) years from the date of acceptance.

The quantity of Pay Item RR-131a, Repair of Adaptive Traffic Signal Controller, will be measured as the number of Adaptive Traffic Signal Controllers repaired and accepted by NJSEA. The payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**5. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-132: Replacement of Conflict Monitor**  
**RR-132a: Repair of Conflict Monitor**

**1. Description**

This specification sets forth the minimum requirements for the replacement and repair of a conflict Monitor, when a replacement, alteration, or upgrade of an existing conflict monitor is required for the optimal operation of the Adaptive Traffic Control System (ATCS) of the Meadowlands Adaptive Signal System for Traffic Reduction (MASSTR).

The replaced conflict monitor shall at a minimum conform to the NJDOT for Eight Phase Traffic Signal Controller Assembly, NJDOT Specification No. EB-TSC-ITB-8, as amended and supplemented. The conflict monitor shall be compatible with the traffic signal controller and cabinet with in which the conflict monitor is installed.

The conflict monitor must be capable of Ethernet communications. The Conflict Monitor shall be a Trafficware MMU-516L-E LCD with Ethernet, Econolite MMU2-16leIP Smart Monitor, Eberle Design Inc. MMU-16LE(ip) Smart Monitor or approved equal.

All equipment furnished under this specification must be current production equipment and of recent manufacture and version, similar models of which are in field operation in the United States or Canada. Untried or prototype units shall not be considered for acceptance.

**2. Installation and Testing**

This work shall at a minimum include the replacement/repair, setup and turn-on of the conflict monitor at each intersection. The Conflict Monitor shall be connected to the network and configured such that the data is transmitted to the servers at the NJSEA via Ethernet communications.

A certified representative from the conflict monitor manufacturer shall be on site to supervise the replacement and setup of the conflict monitor. A letter from the conflict monitor manufacturer stating that the representative is authorized and qualified to perform the work shall be provided to the NJSEA prior to the work. All field installation shall be conducted during off-peak or weekend hours.

All equipment installation shall comply with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007, as amended and supplemented. The Contractor shall furnish any and all auxiliary equipment which they deem necessary for safe and reliable operation of the conflict monitor, including but not limited to: mounting brackets, cables, cable connections, and etc. Splices of cables shall not be allowed anywhere within the traffic cabinet.

The Contractor shall provide the NJSEA with standard testing procedures for each Conflict Monitor replaced or repaired. These procedures will be conducted during the replacement and repair process to provide confirmation that the Conflict Monitor works as expected. The Contractor shall be responsible for conducting all such testing.

After the replacement and repair of the conflict monitor, a 30-day burn in period will commence. If any of the conflict monitor fails during this period it will be repaired or replaced and the 30-day clock will restart for that piece of equipment. Once the 30 day burn-in period has been completed for all equipment, the NJSEA shall inspect and approve the replacement or repair work. All defective conflict monitors that are removed by the Contractor shall be returned to the NJSEA.

The Contractor shall provide the following system documents, including hard copies and electronic copies, to support training and operation of the conflict monitor:

- Field documentation sheets
- User's manual
- Maintenance manual
- Troubleshooting manual

The replaced Conflict Monitor shall carry a two-year warranty from the date of acceptance against any imperfections in workmanship or materials.

The Conflict Monitor shall be identified with a metal plate containing the serial number and bar code identification.

### **3. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-132	Replacement of Conflict Monitor	Unit
RR-132a	Repair of Conflict Monitor	Unit

The quantity of Pay Item RR-132, Replacement of Conflict Monitor, shall be measured as the actual number of conflict monitors that are replaced and accepted by the NJSEA and shall be paid for at the Contract unit price for each Conflict Monitor unit. Price and payment for Pay Item RR-132 shall constitute full compensation for furnishing and installing the conflict monitor hardware; all labor, equipment, materials, tools, and incidentals required to complete the replacement and configuration, including the disposal of the defective equipment, furnishing any necessary mounting brackets, screws, cables, and cable connections (excluding the manufacturer software); all user manuals and instructions; and all warranty, service and support for a minimum of two (2) years from the date of acceptance.

The quantity of the Pay Item RR-132a, Repair of Conflict Monitor, shall be measured as the number of conflict monitors repaired and accepted by NJSEA. Payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**4. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-133: Replacement of Miscellaneous Controller Accessory**  
**ITEM RR-133a: Repair of Miscellaneous Controller Accessory**

**1. Description**

This specification sets forth the minimum requirements for the replacement or repair of miscellaneous controller accessories that are required by the Adaptive Traffic Control System (ATCS) in order for the traffic controller to function appropriately at each individual intersection. Pay Items RR-133 and RR-133a include any hardware other than the traffic controller and the conflict monitor inside the cabinet, including but not limited to: connectors, panels, mounting racks, detection cards, modules and etc.

All equipment furnished under this specification must be current production equipment and of recent manufacture and version, similar models of which are in field operation. Untried or prototype units shall not be considered for acceptance.

The installation shall comply with the New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction, 2007, as amended and supplemented. The Contractor shall furnish any and all auxiliary equipment which is deemed necessary for safe and reliable replacement and repair of such hardware.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-133	Replacement of Miscellaneous Controller Accessory	Unit
RR-133a	Repair of Miscellaneous Controller Accessory	Unit

The quantity of Pay Item RR-133, Replacement of Miscellaneous Controller Accessory, shall be measured as the actual number of Miscellaneous Controller Accessories replaced and will be paid for at the Contract unit price for each unit. Price and payment shall constitute full compensation for replacing the accessories and disposal of all defective parts, inclusive of all labor, equipment, materials, tools and incidentals required to complete the replacement, including, but not limited to, Detection Cards/Panels, connectors, and modules that are completely replaced, installed, and accepted by the NJSEA.

The quantity of the Pay Item RR-133a, Repair of Miscellaneous Controller Accessory, shall be measured as the number of Miscellaneous Controller Accessories repaired and accepted by NJSEA. Payment shall be comprised of equipment, materials, and labor hours required for the repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-134: Replacement of Foundations of Poles, Pull Boxes, or Junction Boxes**  
**ITEM RR-134a: Repair of Foundations of Poles, Pull Boxes, or Junction Boxes**

**1. Description**

This work comprises the maintenance of foundations of Poles, Pull Boxes, or Junction Boxes including the repair, re-assembly, and replacement of foundations and attached bolts and cover plates inclusive of straightening of poles and anchor bolts, reattachment of devices, cable and wiring connections between the foundations, tightening of connectors and fasteners, the resetting of foundation of Pull-boxes and Junction-boxes their frames and covers, and the performance of other work necessary to keep foundations of poles and boxes in a proper condition. The work includes the replacement and repair of repeater poles, pull boxes and junction boxes, pedestal bases, meter cabinets, poles and all foundations including all adjustments and work necessary to ensure the proper function and appearance of structures supporting cabinets, signals, and signs.

**2. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-134	Replacement of Foundations of Poles, Pull Boxes, and Junction Boxes	Unit
RR-134a	Repair of Foundations of Poles, Pull Boxes, and Junction Boxes	Unit

The quantity of Pay Item RR-134, Replacement of Foundations of Poles, Pull Boxes, and Junction Boxes, shall be measured as the actual number of Foundations of Poles, Pull Boxes, and Junction Boxes replaced as directed by the NJSEA Engineer or its representative, and will be paid for at the Contract unit price for each unit. Price and payment shall constitute full compensation for all labor, equipment, materials, tools, and incidentals required to satisfactorily complete the work in accordance with the contract documents, including reinstallation, mounting fixtures and brackets, supplying all fittings, disposal of all defective parts, and removal of all debris.

The quantity of the Pay Item RR-134a, Repair of Foundations of Poles, Pull Boxes, and Junction Boxes, shall be measured as the number of Foundations of Poles, Pull Boxes, and Junction Boxes repaired and accepted by NJSEA. Payment shall be comprised of equipment, materials, and labor hours required for the repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-135: Replacement of PSE&G and ITS Cabinet**  
**ITEM RR-135a: Repair of PSE&G and ITS Cabinet**

**1. Description**

This work shall consist of replacing and repairing of damaged and/or defective PSE&G (Meter) and ITS Cabinets. This work shall replace or repair damaged and/or defective cabinet fans and broken/missing locks including thermostats. Additionally, paint touchups with appropriate color where scratched and peeled off areas on cabinets shall also be considered part of this item of work.

**2. Construction Details**

The damaged cabinet shall be replaced with the cabinet type approved and accepted by NJSEA Engineer.

**3. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-135	Replacement of PSE&G and ITS Cabinet	Unit
RR-135a	Repair of PSE&G and ITS Cabinet	Unit

The quantity of Pay Item RR-135, Replacement of PSE&G and ITS Cabinet, shall be measured as the number of PSE&G and ITS cabinets replaced and will be paid for at the Contract unit price for each unit. Price and payment shall constitute full compensation for all labor, equipment, materials, tools, and incidentals required to satisfactorily complete the replacement, and shall include the disposal of the damaged cabinet.

The quantity of Pay Item RR-135a, Repair of PSE&G and ITS Cabinet, shall be measured as the number of PSE&G and ITS Cabinets repaired and accepted by NJSEA. Payment shall be comprised of equipment, materials, and labor hours required for repair, utilizing hourly labor rates provided on the Hourly Labor Rate Cost Proposal Form in Section 4.3.10.2.

**4. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-136: As Directed Work**

**1. Description**

This specification sets forth the minimum requirements for As Directed Work for MASSTR related repairs or upgrades. This item shall be for performing work as directed by the NJSEA Chief of Transportation when the work is a non-emergency task or not covered sufficiently by other contract items. Cost for this work shall be negotiated prior to the start of any work; the Contractor shall submit a full price breakdown to the NJSEA for approval, along with the work plan and any non- contract material for approval. NJDOT Standard Specifications for Roads and Bridges-Section 104.03, as amended and supplemented, shall serve as guidance in this process and shall govern where applicable. Wherever possible, contract items shall be used along with or in place of that item.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-136	As Directed Work	Fixed Budget - Varies

The quantity of Pay Item RR-136, As Directed Work, shall be measured as a lump sum price to be negotiated for each as directed work task. Price and payment shall constitute full compensation for all labor, equipment, materials, and incidentals associated with the approved work plan to address and complete each instance of As Directed Work.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-137: On-Call Emergency Services - Regular**  
**ITEM RR-137a: On-Call Emergency Services - Overtime**

**1. Description**

This specification sets forth the minimum requirements for the diagnosis and emergency response for MASSTR-related malfunctions as directed by the Engineer. This item shall also cover any onsite support by equipment’s vendor as directed by the NJSEA Engineer. If both vendor and Contractor are directed to be onsite at same time, it shall not be permitted to double the quantity of the item without the Engineer’s written approval. No minimum hourly charge shall be permitted.

On-Call Emergency Services shall include the cost to perform all such work including the following:

- Performing On-Call Emergency diagnosis, troubleshooting, and response services
- All maintenance documenting, recording, filing, tracking and plan updating
- All required testing equipment, materials, tools, and labor to identify problems and issues in MASSTR equipment and/or other equipment that have resulted in malfunctioning of MASSTR intersections or MASSTR network.
- Providing the required insurance as specified in the contract document

At each time of deployment, the Contractor shall have all parts necessary to conduct test, repairs on MASSTR compatible components, including, but not limited to, approved controller, replacement vehicle detection unit, cabinet detector interface components, replacement cabinet switches for both wireless and fiber intersections, copper/fiber jumpers, SFP, POE injector, radios, one complete wireless link, as well as any other components deemed necessary to accomplish task as directed by the Engineer and noted in the On-Call Emergency Service Plan. If any component is required to be replaced, it shall be paid for under that associated item, and not under this item. All required MPT services for supporting the on-call emergency services shall be paid under Pay Items MPT-145 and MPT-146.

For each location serviced, the Contractor shall submit a detailed form (the form template shall be prepared under On-Call Emergency Service Plan), dated and signed, that individually certifies that each task has been performed and accepted by the Engineer.

**2. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-137	On-Call Emergency Services – Regular	Hr
RR-137a	On-Call Emergency Services - Overtime	Hr

The Contractor shall provide the hourly charging rate and details for staff (e.g. Contractor's Engineer/Supervisor technician) assigned to diagnose and troubleshoot during regular working hours (Pay Item RR-137, On-Call Emergency Services – Regular) and during overtime hours (Pay Item RR-137, On-Call Emergency Services – Overtime), for those positions that are not identified and estimated in the Hourly Labor Rate Cost Proposal Form - Section 4.3.10.2. The number of assigned staff and the proficiency of the staff shall be stated in the On-Call Emergency Service Plan and approved by the NJSEA. The Contractor shall detail the labor rates, both regular and overtime, for troubleshooting and diagnosis as part of the On-Call Emergency Service Plan.

Under Pay Item RR-137a, On-Call Emergency Services – Regular, regular labor rates shall be paid for emergency diagnosis and troubleshooting that occur during during normal working hours (weekdays 08:00-17:00).

Under Pay Item RR-137a, On-Call Emergency Services – Overtime, overtime labor rates shall only be paid for emergency diagnosis and troubleshooting that occur during hours outside the normal working hours, and only if authorized in advance by the NJSEA Engineer. No overtime and no minimum hourly charges shall be paid for Emergency Services performed during normal working hours (weekdays 08:00-17:00).

The Contractor shall be allowed a maximum of one hour of travel time for personnel and equipment regardless of the actual travel time requirements. The Contractor shall be paid for the actual time at the work location, plus one hour of travel time for labor and equipment. Price and payment shall constitute full compensation for all labor and testing equipment to complete the On-Call Emergency Services. Work under any other Pay Item that results from the diagnosis and troubleshooting under Pay Items RR-137 and RR-137a shall be compensated separately under the pay item already listed in this Technical Specification.

### **3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-138: Controller Restart**

**1. Description**

This specification sets forth the minimum requirements for performing a Controller Restart. The Controller Restart shall be performed when the traffic signal is in flash mode or needs a restart to get back to the normal, adaptive operation due to conflict monitor failure, controller malfunction, loss of DC power, and communication/switch failure.

The total time for each Controller Restart shall not exceed one (1) hour. If the problem persists after an hour, the intersection shall operate in the backup mode until the problem is properly addressed without disturbing traffic. Upon resolving the problem and providing the proper MPT, the Controller Restart can be performed as described above to bring back the intersection to the normal, adaptive, operation.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-138	Controller Restart	Each

The quantity of Pay Item RR-138, Controller Restart, shall be measured as the actual number of intersections that require a Controller Restart, completed and accepted by the NJSEA, and will be paid for at the Contract unit price for each intersection. Police/Traffic Directors utilized for work under this item shall be compensated separately under Pay Item MPT-146. Price and payment shall constitute full compensation for all labor, materials, equipment, tools, and incidental required to complete the controller restart.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM RR-139: Controller Turn On**

**1. Description**

This specification sets forth the minimum requirements for performing a traffic signal Controller Turn On as directed by the Engineer. Controller Turn On shall be conducted in compliance with NJDOT specification section 702, as amended and supplemented, as well as NJDOT policy and procedure and IMSA policy, procedures and good practices.

The time required for a Controller Turn On shall not exceed 8 hours. Any issue that causes Controller Turn On to be delayed beyond the 8-hour period will constitute failure of turn on, and turn on must be restarted after issues have been corrected. If Controller Turn On fails due to vendor, Contractor or manufacturer quality issues, Controller Turn On shall be performed again at no additional cost.

All maintenance and protection of traffic required for completion of this item shall be included in this item’s bid cost; no separate compensation shall be paid for maintenance and protection of traffic for any work required during Controller Turn On process.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
RR-139	Controller Turn On	Each

The quantity of Pay Item RR-139, Controller Restart, shall be measured as the actual number of intersections requiring a Controller Turn On, and will be paid for at the Contract unit price for each intersection requiring a Controller Turn On. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the work, as accepted by the NJSEA Engineer, inclusive of all maintenance and protection of traffic. Police/Traffic Directors utilized under this item shall be compensated separately under Pay Item MPT-146.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**Preventive Maintenance**  
**ITEM PM-140: Annual Inspection of Vehicle Detectors**

**1. Description**

This specification sets forth the minimum requirements for the Annual Inspection and Preventive Maintenance (PM) of the vehicle detectors and peripheral equipment of VDS installed in cabinets.

This work shall be performed starting within 4 weeks of the Notice to Proceed (NTP) and after the submission of the Plan, then continuing on a 12-month interval until termination of the contract, plus one application 2 weeks prior to the close of contract, and as otherwise directed by NJSEA Engineer. A schedule for execution of this item shall be submitted for approval prior to start of work that depicts the start and end of each interval, the order of intersection and the duration at each intersection to which this item will be applied. In addition to the interval, this item shall be applied on an as needed basis as directed by the NJSEA Engineer.

This work shall consist of the inspection and cleaning of each detector camera, both lenses and body. The lenses shall be cleaned on the inside and outside if accessible without depressurizing the unit or breaking the warranty seals, if the detector has internal lenses they shall be cleaned as well. The cleanser used on all lenses shall be submitted for approval and shall have a letter from the detector manufacturer or supplier certifying that the cleanser is appropriate for the unit to be serviced. The Contractor shall inspect and adjust all mounting hardware and adjustment fasteners and certify that they are tight and torqued to manufacturer's requirements. All surge suppression equipment shall be checked and replaced if found non-operational, all ground connections shall be checked and replaced if found damaged, replaced or missing.

As part of this item, the Contractor shall also test and replace, if necessary, all fuses, as well as all electrical and communication connections; the Contractor shall also remove all dust build-up from all MASSTR VDS peripheral equipment in cabinet. Just prior to leaving the intersection, the Contractor shall review all detection area placements and adjust the areas for optimal detection. If repositioning of a detector is required to attain optimal detection, then the Contractor shall do this at no additional compensation beyond this item. If any adjustment is required, the Contractor shall recheck the adjustment bolts to ensure that they are tight and torqued to the manufacturer's requirements.

For each location serviced, the Contractor shall fill and submit a detailed form included in Appendix D, electronically dated and signed, that certifies that each task has been performed. Also, the Contractor shall rate the condition of all major components of the VDS and VDU on a scale of 1 to 10 with 10 being new status and 1 being requires immediate replacement.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
PM-140	Annual Inspection of Vehicle Detectors	Each

The quantity of Pay Item PM-140, Annual Inspection of Vehicle Detectors, shall be measured as the actual number of Vehicle Detectors for which inspection and accessory maintenance have been completed and accepted by the NJSEA, and will be paid for at the Contract unit price for each Vehicle Detector inspected. Price and payment shall constitute full compensation for all labor, equipment, materials, tools and incidentals required to complete the inspection and PM work for Vehicle Detectors and any peripheral equipment, including testing, adjustments, and furnishing and placing any accessories.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM PM-141: Annual Inspection of Communication System- Fiber**  
**ITEM PM-141a: Annual Inspection of Communication System- Wireless I**  
**ITEM PM-141b: Annual Inspection of Communication System- Wireless II**

**1. Description**

This specification sets forth the minimum requirements for the Annual Inspection and Preventive Maintenance (PM) of the Fiber and Wireless Communication Systems among MASSTR equipment intersections.

This work shall be performed starting within 4 weeks of Notice to Proceed (NTP) and after the submission of the Plan then continuing on a 12-month interval until termination of the contract, plus one application 2 weeks prior to the close of the contract. A schedule for execution of this item shall be submitted for approval prior to start of work that depicts start and end of each interval, the order of location and the duration at each intersection to which this item will be applied. In addition to the interval, this item shall be applied on as needed basis as directed by the NJSEA Engineer.

This work shall consist of an onsite inspection and review of each fiber and wireless communication link by a qualified technician to ensure that each link is recalibrated to optimize data throughput and link stability. In addition, the Contractor shall inspect switches, radios, repeaters, FPP, FSE, SFP, all mounting hardware, to ensure that all bolts and fasteners are torqued to manufacturer's specification. All electrical and data connections shall also be checked to ensure they are tight, clean and weather tight to manufacturer's specification. All power supplies or POE injectors shall be checked to verify they are supplying correct voltage to manufacturer's specification of the equipment they are supplying power to. If anything is found to be deficient, corrective action shall be taken as needed. As part of this effort, firmware updates will be applied to any equipment that requires an update. All surge suppression equipment shall be checked and replaced if found non-operational; all ground connections shall be checked and replaced if found damaged, replaced or missing.

As part of the first application of this item, all POE injectors and power supplies shall be inspected and replaced with rugged units that are environmentally hardened to same level as the radio unit, in respect to temperature, humidity and dust at a minimum, if these equipment have not been replaced since the initial installation of MASSTR.

This work comprises the annual inspection and preventive maintenance of Fiber Communication System (Pay Item PM-141), and Wireless I and Wireless II Communication Systems, Pay Items PM-141a and PM-141b, respectively. The Communication System- Wireless I, Pay Item PM-141a, includes Radio and Repeater subsystems installed on poles or mast arms with a height less than or equal to 40'. The Communication System - Wireless II, Pay Item PM-

141b, includes Radio and Repeater subsystems installed on poles with a height greater than 40'. Tasks include monitoring the signal strength and Line of Site (LOS), checking of fiber optic and CAT5 cable connection between the radio and Gigabit Ethernet switch or router. Also included is failure diagnosis and repair of transmit and receive module, antenna, power, grounding, and surge suppressor.

For each location serviced, the Contractor shall fill out and submit the detailed form included in Appendix D electronically dated and signed that individually certifies that each task has been performed, as well as rates the condition of all major components of the Communication System on a scale of 1 to 10, with 10 being new condition and 1 requiring immediate replacement.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
PM-141	Annual Inspection of Communication System- Fiber	Link
PM-141a	Annual Inspection of Communication System- Wireless I	Link
PM-141b	Annual Inspection of Communication System- Wireless II	Link

The quantity of Pay Item PM-141, Annual Inspection of Communication System- Fiber, shall be measured as the actual number of fiber links including SFP, switches, FPP, FSE, and cable inspected and tested, and shall be paid at the Contract unit price for each link. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the inspection and perform the preventive maintenance.

The quantity of Pay Item PM-141a, Annual Inspection of Communication System- Wireless I, shall be measured as the actual number of Wireless links including radio/tranceiver assemblies installed on poles and mast arms with the height of under/equal 40', switches, antenna panel, POE, and PDU inspected and tested, and shall be paid at the Contract unit price for each link. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the inspection and perform the preventive maintenance.

The quantity of Pay Item PM-141b, Annual Inspection of Communication System- Wireless II, shall be measured as the actual number of Wireless links including radio/tranceiver assemblies installed on poles with the height of over 40', switches, antenna panel, POE, and PDU inspected and tested, and will be paid at the Contract unit price for each link. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the inspection and perform the preventive maintenance.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM PM-142: Annual Inspection of Cabinet**  
**ITEM PM-142a: Annual Inspection of Cabinet Equipment**

**1. Description**

This specification sets forth the minimum requirements for Pay Item PM-142, Annual Inspection of Cabinet, and Pay Item PM-142a, Annual Inspection of Cabinet Equipment. This work shall be performed starting within 4 weeks of Notice to Proceed (NTP) and after the submission of the Plan then continuing on a 12-month interval until termination of the contract, plus one application 2 weeks prior to the close of the contract. A schedule for execution of these items shall be submitted for approval prior to start of work that depicts the start and end of each interval, the order of intersection location and the duration at each intersection where these items will be performed. In addition to the interval, these items shall be performed on as needed basis as directed by the engineer. When possible, these items shall be applied when Pay Items PM-140, PM-141, PM-141a, and PM-141b are being performed at an intersection, unless directed otherwise by the Engineer.

Under Pay Item PM-142, the work shall consist of inspection and preventive maintenance, including the cleaning of PSE&G and ITS cabinets to remove any debris, dirt, and/or water build up, rodents, or other objects which may diminish or jeopardize the performance of cabinets' equipment. Any source of water infiltration into cabinet shall be identified and corrective action taken as needed. The existing cabinet shall be cleaned to the base of its walls in a competent manner and maintained clean as determined by NJSEA Engineer for the duration of this contract. Under this pay item, the cabinet shall be vacuumed and cleaned by other methods approved by the NJSEA Engineer.

Under Pay Item PM-142a, the work shall consist of inspecting, cleaning, and recalibrating all controller cabinet components at each MASSTR equipped intersection, in compliance with manufacturer specifications. As part of this effort, all firmware updates shall be applied to all MASSTR cabinet equipment that requires an update. Also all electrical connections shall be inspected and repaired as necessary to ensure that they are in line with the manufacturer requirements. Any loose items or connections in cabinet that may affect operation of the system shall be inspected and corrective action taken as needed. Fall back timing in traffic controller shall be verified to ensure it is in compliance with timing directive in cabinet and in compliance with NJDOT rules and regulations. All surge suppression equipment shall be checked and replaced if found non-operational, all ground connections shall be checked and replaced if found damaged or missing. The Contractor shall perform the inspection of Conflict monitor in an annual basis for all MASSTR intersections under this item. The Contractor shall replace non-functional/non-operational Conflict monitor and provide NJSEA with Conflict Monitor certification test report. Replaced Conflict Monitor shall be charged under its pertinent Pay Item.

Under Pay Item 142a, and as part of the first application of this item, all auxiliary hardware and accessories shall be inspected for compatibility to the equipment that they support; any mismatches shall be documented and corrected on next application of this item with the Engineer’s approval. Also as part of the first application, all MASSTR equipment cabinet power tapping shall be verified as tapping the line side of the technician GFI outlet or a spare terminal from the field power breaker (breaker providing power to load switches and flasher.) Beyond outlet terminal tapping shall not share a terminal with any other item, without the Engineer’s approval in writing.

For each location serviced under Pay Item PM-142a, the Contractor shall fill and submit electronically a conflict monitor testing form presented in Appendix D and certify that each task has been performed, as well as provide a rating of the condition of all major components of the Cabinet Equipment on a scale of 1 to 10, with 10 being new status and 1 being requires immediate replacement.

**2. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
PM-142	Annual Inspection of Cabinet	Unit
PM-142a	Annual Inspection of Cabinet Equipment	Unit

The quantity of Pay Item PM-142, Annual Inspection of Cabinet, shall be measured as the actual number of cabinets inspected, cleaned, and maintained, as accepted by the NJSEA Engineer, and shall be paid at the Contract unit price for each unit. Price and payment shall constitute full compensation for all labor, materials, equipment, tools, and incidentals required to satisfy and complete the inspection and any associated maintenance work.

The quantity of Pay Item PM-142a, Annual Inspection of Cabinet Equipment, shall be measured as the actual number of cabinets having equipment inspected and conflict monitor testing performed and accepted by the NJSEA, and shall be paid at the Contract unit price for each cabinet unit. Price and payment shall constitute full compensation for all labor, equipment, tools and incidentals required to complete the inspection, testing, and preventive maintenance work for equipment within a cabinet.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM PM-143: Clearing Detection and Transmission Line/Zone**

**1. Description**

Under this item, the Contractor shall perform clearing, removing and disposing of trees, branches, and vegetation that prevent or diminish the transmission of radio wave or the detection of vehicles, as necessary and directed by NJSEA Engineer. The Contractor shall be responsible for obtaining permission and/or requesting any permits, if necessary, to perform pruning at locations that require such services. The details and extent of clearing required under these items shall be submitted to and approved by the NJSEA Engineer.

**2. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
PM-143	Clearing Detection and Transmission Line/Zone	Line/Zone

The quantity of Pay Item PM-143, Clearing Detection and Transmission Line/Zone, shall be measured as the number of transmission lines/zones cleared, and shall be paid at the Contract unit price for each line/zone. Price and payment shall constitute full compensation for all labor, permits, materials, tools, incidental, transportation, and equipment necessary to satisfactorily complete the work.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**ITEM PM-144: Annual Contingency Work**

**1. Description**

The purpose of this item is to provide for upgrades, maintenance, and/or repairs to the MASSTR system that are not covered under any other items in this specification. This Pay Item is calculated as an amount up to the equivalent of five percent (5%) per year of this RFP ceiling, which is not expected to exceed \$800k annually. This contingency work item will be made available on a year-to-year basis, if necessary, as a maximum amount payable. The Contractor shall provide the Engineer with the upgrade/ maintenance/ repair plan, the Contingency Plan, with associated costs, as requested by NJSEA Engineer. The plan shall be approved by the Engineer prior to any work, and all work must be performed in the presence of an Engineer responsible for verifying labor, equipment and materials expenditures. No work shall be paid for unless verified by the NJSEA Engineer.

**2. Materials**

All equipment and materials used shall be new and of a quality equal to or exceeding the materials utilized in the original installation. All materials shall be approved by the Engineer prior to use.

**3. Measurement and Payment**

The following NJSEA pay item shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
PM-144	Annual Contingency Work	Each

Payment for work performed under Pay Item PM-144, Annual Contingency Work, shall follow the itemized payment plan developed under the Contingency Plan submitted and accepted by NJSEA.

**4. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**Maintenance and Protection of Traffic**  
**ITEM MPT-145: Roadway Closure and Detour**  
**ITEM MPT-146: Police/Traffic Directors**

**1. Description**

This specification sets forth the minimum requirements for providing Maintenance and Protection of Traffic (MPT) services, under Pay Items MPT-145 and MPT-146, to facilitate implementation of work associated with other pay items in Contract. Pay Item MPT-145, Roadway Closure and Detour, shall include all labor, equipment and material necessary to provide for the maintenance and protection of traffic. Under Pay Item MPT-146, Police/Traffic Directors, all traffic control shall be performed in compliance with roadway owner’s policies, specifications, and best practices. It shall be the Contractor’s responsibility to determine these requirements and coordinate with the roadway owner to implement roadway closure. In the absence of roadway owner’s requirements, NJDOT policies, specifications, and best practices shall govern along with requirements of MUTCD. Roadway shall be defined as any roadway that has posted speed limit of 45 mph or less and Highway shall be defined as any roadway with a posted speed limit of more than 45 mph.

Pay Item MPT-145 shall cover the maintenance and protection of traffic as required to perform inspection, repair, replacement, and testing. The Contractor shall follow the roadway owner’s policy, NJDOT, and MUTCD standards to execute the protection of traffic, road closure and detouring. Pay Item MPT-146 shall cover any police traffic directors that are required to perform either work under Pay Item MPT-145 or any other items for which these items will serve.

**2. Measurement and Payment**

The following NJSEA pay items shall be measured and paid for under this specification:

NJSEA Pay Item No.	Pay Item Description	Pay Unit
MPT-145	Roadway Closure and Detour	Each
MPT-146	Police/Traffic Directors	Each

The quantity of Pay Item MPT-145, Roadway Closure and Detour, shall be measured as the actual number of 4-hour periods to complete the assignment as directed and accepted by the Engineer. No overtime shall be paid under this pay item, no compensation shall be paid beyond this item for work to complete the assignment unless approved by the Engineer in writing. Price and payment shall constitute full compensation for all labor, equipment, materials, tools and incidentals required to complete the work, including furnishing and placing any accessories.

The quantity of Pay Item MPT-146, Police/Traffic Directors, shall be measured as the actual number of 4-hour periods to complete the assignment as directed and accepted by the Engineer. Price and payment shall constitute full compensation for all police directors, equipment, tools, and incidentals required to complete the police/traffic director work inclusive of a radio car and any accessories.

**3. Miscellaneous**

No changes or substitutions in these requirements shall be acceptable unless submitted in writing and authorized in writing by the NJSEA. Inquiries regarding this specification shall be addressed to the Chief of Transportation, New Jersey Sports and Exposition Authority, One DeKorte Park Plaza, Lyndhurst, New Jersey 07071.

**APPENDIX B: NJDOT STANDARDS**



**MASSTR**

**REQUEST FOR PROPOSAL FOR MASSTR MAINTENANCE - APPENDIX B**

Pay Item RR-101: Vehicle Detection Unit

Form #: MSE 601- 003



NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING  
IMAGE DETECTION SYSTEM (IDS)

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_  
Route: \_\_\_\_\_ MM \_\_\_\_\_ (NB/SB/EB/WB/Median) Side Street 1 Name: \_\_\_\_\_  
Side Street 2 Name: \_\_\_\_\_

SUBSYSTEM TEST RESULTS: PASS \_\_\_\_\_ FAIL \_\_\_\_\_

Correction Work Items:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

We agree that the Subsystem Testing of the Image Detection System has been performed and that the information above accurately represents the results of the test.

Contractor Name: \_\_\_\_\_

Contractor Representative Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Vendor Name: \_\_\_\_\_

Vendor Representative Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

ITS Inspector Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Resident Engineer Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



NEWJERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING  
IMAGE DETECTION SYSTEM (IDS)

<b>Project Name:</b> _____	<b>Test Date:</b> ____ / ____ / ____
<b>Route:</b> _____ MM _____ (NB/SB/EB/WB/Median)	<b>Side Street 1 Name:</b> _____
<b>Side Street 2 Name:</b> _____	

This procedure outlines the Subsystem Software Test to be performed on the Image Detection Camera System. Perform the following test at the Arterial Management Center (AMC) using NJDOT approved software. Subsystem Testing demonstrates that the software is fully operational.

<b>IDC Software Manufacture's Name:</b> _____	<b>IDC Model:</b> _____
<b>IDC Software Version:</b> _____	<b>Number of IDC:</b> _____

No	Task	Pass	Fail	Comments
1)	Launch the Image detector server.			
2)	Verify if the IDC(s) are in the database.			
3)	Verify if the Detector Access Point for the intersection is in the database.			
4)	Verify that the live image detection feeds can be seen in Genetec system with flashing detector overlay.			
5)	Verify if the properties for all the devices are available in the software.			
6)	Retrieve the configuration file from all IDC.			
7)	Verify the detection zones, length of the zones, phases and direction assignment for each approach as per plans.			
8)	Alter the detection zone programming – change configuration between arrows and detection polygon.			
9)	Save the changes and download the configuration file to the IDC.			
10)	Verify if the changes are reflected in the file using Genetec system.			
11)	Delete an IDC.			
12)	Add an IDC and configure all the necessary parameters.			
13)	Integrate the new IDC into Genetec system.			
14)	Open Archive log reports for the Image detection system and export the log in CSV, XML, and XLSX format.			
15)	Remotely connect the detection feed from the neighboring detectors to intersection.			
16)	EDIT/ ADD the Detector Access Point and configure al the parameters.			
17)	Verify Data Storage on server.			



NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING  
IMAGE DETECTION SYSTEM (IDS)

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_  
 Route: \_\_\_\_\_ MM \_\_\_\_\_ (NB/SB/EB/WB/Median) Side Street 1 Name: \_\_\_\_\_  
 Side Street 2 Name: \_\_\_\_\_

No	Task	Pass	Fail	Comments																																																	
16)	Perform two consecutive 15 minute manual counts and compare lane-by-lane processed counts for Image Detection System against the counts in the field using Genetec viewer for a 30 minute time interval.																																																				
	Observed volume counts using Genetec / Measured counts using IDS																																																				
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17)	Compare lane-by-lane processed counts for image detection system with counts in the CTSS/Adaptive software interface for the same time frame as the preceding test.																																																				
	Measured counts using IDS/ Observed counts in the CTSS/Adaptive Interface																																																				
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18)	Commence the 20 business day testing period																																																				

Pay Item RR-101: Vehicle Detection Unit  
 Pay Item RR-102: Vehicle Detection Module

Project Name: \_\_\_\_\_  
 Contract #: \_\_\_\_\_

MSE-602-002  
 Rev.-0001 | Date:1/21/2015

**IMAGE DETECTOR (CTSS)**

	Units/Format	Accuracy Required	
Camera Latitude	Dec. Degrees	0.000001	
Camera Longitude	Dec. Degrees	0.000001	
Turning Movements Detected			
Route			
Milepost	Miles	0.01	
Location (Mast Arm/Pole)	Ht. Feet		
Municipality/County			
Project Installed Under			
Manufacturer Name			
Model (Analog, Digital)			
Model Number			
Serial Number			
Installer (Contractor/Vendor)			
Testing Date (Tactical/ System Integration)	mm/dd/yyyy		
Software Version			
IP Address			
Communication Mode (Fiber Optic, POTS, Ethernet, T1, 56K, OC, Cable, DSL, Other)			
Support Structure			
Area of View (Distance covered at Max zoom in any one direction )			
Optical Zoom (X)			
Include Digital Photos			
Network IP Address			
Subnet Mask			
Default Gateway			
Detector Port Protocol			
Detector Port Master Type			
Detector Port Master CPU ID			
Time Zone			
Use AC Power Frequency to run clock			
Accept IS2 Time Set Commands			
Warranty	mm/dd/yyyy		Start Date _____ End Date _____
Technical Support	mm/dd/yyyy		Start Date _____ End Date _____

**Certification:**  
 I Heroby Certify That All of the Above Information Is Accurate As  
 Constructed to the Best of My Knowledge.

Submitted By: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor: \_\_\_\_\_  
 Contractor Phone #: \_\_\_\_\_

Pay Item RR-104: Travel Time Data Collector

Pay Item RR-105: Travel time Antenna

<b>Project Name:</b> _____	ITS-100-021-Rev.03/15/2011		
<b>Contract #:</b> _____			
<b>Travel Time System</b>			
	<b>Units/Format</b>	<b>Accuracy Required</b>	
<b>Type (RTTR/RTMS)</b>			
<b>Location Latitude</b>	Dec. Degrees	0.000001	
<b>Location Longitude</b>	Dec. Degrees	0.000001	
<b>Route</b>			
<b>Milepost</b>	Miles	0.0001	
<b>Location</b>			
<b>Municipality/County</b>			
<b>Manufacturer Name</b>			
<b>Model Number</b>			
<b>Serial Number</b>			
<b>CLEI Number</b>			
<b>Firmware version</b>			
<b>Project Installed Under</b>			
<b>Installer (Contractor/Vendor)</b>			
<b>Testing Date (Level A/B/C)</b>	mm/dd/yyyy		
<b>Structure</b>			
<b>Connection (Fiber Optic, Ethernet, Other)</b>			
<b>Power Requirements</b>			
<b>Number of Antennas</b>			
<b>Frequency to Transponders</b>			
<b>Interface</b>			
<b>Converter to Ethernet Model</b>			
<b>Number of Antennas</b>			
<b>Number of Lanes Shot</b>			
<b>Side Triggered</b>	Yes/No		
<b>Read Speed</b>	Yes/No		
<b>Read Volume</b>	Yes/No		
<b>Read Occupancy</b>	Yes/No		
<b>Read Classification</b>	Yes/No		
<b>Power Source (Load Center/Pole Number)</b>			
<b>If Metered Provide Details in Meter Table</b>			
<b>If not Metered, Location of Load Center (RL, MP, Location)</b>			
<b>Include Digital Photos</b>			
<b>Warranty</b>	mm/dd/yyyy		Start Date _____ End Date _____
<b>Certification:</b>			
I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.			
<b>Submitted By:</b> _____	<b>Date:</b> _____	<b>Contractor:</b> _____	
		<b>Contractor Phone #:</b> _____	

**The New Jersey Department of Transportation  
TSM Procedure Manual  
Version 1  
November 2015**

**C.2.5. Travel Time System (TTS)**

**C.2.5.3. Location/placement Guidelines**

**C.2.5.3.1. Site Visits**

Perform field investigations of the project sites as needed to determine and verify the type and location of the proposed detection device. Coordinate with Traffic Operations and Mobility Management together if possible, to obtain approval of the proposed locations. Identify the sources for electrical power and communication service drops, and note maintenance accessibility. Placement of detectors varies by application and site.

**C.2.5.3.2. Traffic Operations**

Determine the placement of a TTS detection device in coordination with the manufacture. Typically the Bluetooth radio range is on the order of a 200' radius of the antenna. Verify the radio signal range with the manufacturer to ensure the necessary coverage is achieved at the proposed site location. Only one Bluetooth detector is required per site as they are omnidirectional. Evaluate placement of the device relative to the signal reception envelope and its overlap onto adjacent roadways, in order to minimize the collection of unnecessary data.

Antennas may be installed separately from the reader electronics within a certain distance as permitted by the manufacturer for special cases. Ensure the cabling and operational requirements conform to the manufacturers' instructions.

Bluetooth devices typically utilize wireless cellular communications, can be connected via cable TV drop, or hardwired to New Jersey's Garden State Network. Evaluate and determine the optimum communications medium for each site and ensure the requirements are included in the special provisions. Obtain and confirm communications provider service availability during the conceptual phase of the project development, or as soon as possible from notice to proceed.

The device mounting height is typically 12' - 15' but may vary depending on the equipment's make and model. Verify mounting heights and radio ranges with the manufacturers to accommodate available products and roadway area coverage.

**C.2.5.3.3. Design Considerations**

Evaluate the proposed detection types and locations for TTSs in consideration of the following items. In all cases document important decisions and concerns through the Departments DCR procedures.

1. See Common Design Considerations of Section C.2.1.
2. Layout - Ensure that the proposed detection zones do not contain obstacles, such as chain link fence, that will produce inaccurate data.
3. Spacing and Lane Coverage - Detectors are ordinarily spaced 0.5 to 1.5 miles apart. Generally, all lanes of travel are covered by detector(s) at each detection point.

4. Cost – Co-locate detectors on existing structures (e.g. CCTV poles) where possible to minimize need for new structures.
5. Accuracy – Speed data must be accurate within a range of approximately 5 mph. Preferred accuracy of volume and occupancy is 5%.
6. Configuration – Devices capable of auto configuration are preferred.
7. Queue Detection – Install devices sufficiently upstream of expected queues.
8. Avoided Locations – Avoid locations where double parking is likely to occur. Also, generally avoid any locations with anomalous traffic, geometric or other irregular conditions unless specifically required. Confirm with MSE.
9. Tunnels – Comply with all requirements of National Fire Protection Association (NFPA) 502 - Standard for Road Tunnels, Bridges, and Other Limited Access Highways. If detectors or ancillary equipment are to be exposed to harsh cleaning solvents, verify equipment is impervious to build up or penetration of soot and other common exhaust particles. Avoid microwave radar sensors in tunnels due to spurious wave reflection data.
10. Bridges – Do not place loop detectors on a bridges to avoid invading the deck structure. Install lower depth magnetometers in the under deck configuration so as to not compromise the deck, per manufacturer instructions.
11. Traffic Signal Detection Cameras – When a project includes traffic signal intersections within the limits of the work and these intersections are equipped with image detection cameras, include the cameras in the CSS design and provide for transmission of the video signals to the control center. Verify with Traffic Operations and MSE on a case by case basis.

Pay Item RR-106: Ethernet Cable, Cat5e & 6

NEW JERSEY DEPARTMENT OF TRANSPORTATION

COMMUNICATION CABLE TESTING

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

This procedure outlines tests to be performed on Communication Cable. This test confirms the communication from utility pole or manhole to the controller.

Communication Cable under test runs from:

Utility Pole  OR Manhole   
 Route: \_\_\_\_\_ MM \_\_\_\_\_ NB/SB/EB/WB/Median  
 Nearest Side Street Name: \_\_\_\_\_

TO

ITS Controller  OR ITS Cabinet   
 Route: \_\_\_\_\_ MM \_\_\_\_\_ NB/SB/EB/WB/Median  
 Nearest Side Street Name: \_\_\_\_\_

Length of Communication Cable under test (in feet) \_\_\_\_\_

Cable Manufacturer: \_\_\_\_\_

Cable Model No: \_\_\_\_\_

1: Requirements:

No.	Task	Required Value	Actual Value	Pass	Fail	Comments
I.	Ensure that there are no splices in the section of cable between the terminal block and the device					
II.	Verify that terminal block enclosure on the utility pole is weather tight (if applicable)					
III.	Verify communication between controller and terminal block server					
IV.	Confirm that cable Connections are in compliance with contract documents					
V.	Verify minimum required slack	Cabinet – 3' Manholes – 10' Utility Poles – 10'				
VI.	Verify grouping and identification tags on new and existing conductors					
VII.	Verify ground resistance of all conductors including the shield					
VIII.	Perform continuity of each pair to verify resistance					
IX.	Verify cable tags provides correct information and are secured with nylon cable ties					

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**COMMUNICATION CABLE  
TESTING**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

**LEVEL 1 TEST RESULTS:**

PASS

FAIL

**Correction Work Items:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

We agree that testing of the Communication Cable has been performed and that the information above accurately represents the results of the test.

Contractor Name: \_\_\_\_\_  
Contractor Representative Name: \_\_\_\_\_  
Signature and Date: \_\_\_\_\_

ITS Inspector Name: \_\_\_\_\_  
Signature and Date: \_\_\_\_\_

Resident Engineer Name: \_\_\_\_\_  
Signature and Date: \_\_\_\_\_

**Corrected Work Items:**

**ITS Inspector Signatures & Date**

- |          |       |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |
| 5. _____ | _____ |

Pay Item RR-107: Ethernet Switch 10/100 BASE-TX

Pay Item RR-108: Ethernet Switch 10/100 BASE-TX, 10/100/1000 BASE-T

Pay Item RR-109: Ethernet Switch 10/100/1000 BASE-T, 10/100/1000 BASE-X

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM  
TESTING**

Project Name: \_\_\_\_\_

This test procedure outlines the tests required to measure and prove the Ethernet network performance. The Department will select the test locations to be tested based upon the network. Each test location will consist of two switch nodes. Submit request for test locations to RE 45 days prior to test. Perform all tests using approved network testing equipment. At least 30 days prior to this test, submit to RE for approval catalog cuts for testing equipment, list of software and network protocols to be used to perform the test. Testing equipment must be compliant with RFC, and IEEE standards.

Testing Equipment Device #1:

Manufacturer/Model No.: \_\_\_\_\_  
\_\_\_\_\_

Testing Equipment Device #2:

Manufacturer/Model No.: \_\_\_\_\_  
\_\_\_\_\_

Software \_\_\_\_\_

**Approved Testing Locations:**

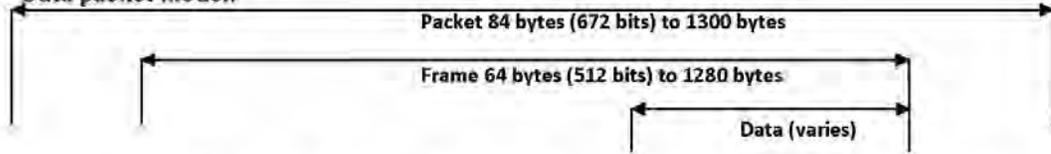
<b>Test Site # 1 - Location A to Location B:</b>			
A)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
B)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
<b>Test Site # 2 - Location C to Location D:</b>			
C)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
D)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
<b>Test Site # 3 - Location E to Location F:</b>			
E)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
F)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
<b>Test Site # 4 - Location G to Location H:</b>			
G)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
H)	Node Name _____	ROUTE _____	MP _____
	IP Address: _____	Test Device IP Address _____	Direction (NB,SB...) _____
Additional sites to be added as required in order to complete the project intent.			
Complete one set of test forms for each Test Site.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM TESTING**

Project Name: \_\_\_\_\_

Data packet model:



Pre-amble	MAC Destination address	MAC Source address	Ethernet Type or length	Frame check sequence	Payload (data)	Inter Packet Gap
8 bytes	6 bytes	6 bytes	2 bytes	4 bytes	46 to 1262 bytes	12 bytes

**1: THROUGHPUT**

Perform throughput testing in accordance with the procedures listed in RFC 2544 for 10Mbps and 100Mbps, and 1Gbps when gigabit ports and/or SFP modules are specified or provided. Upon error, use the "half doubling method" to find the maximum throughput value. See below table for minimum frames per second.

Comments:	PASS
	FAIL

10 Mbps							
Test Frame Size (bytes)	Total Packet Size (bits)	Testing Rate Bits/sec		Frame Throughput bits/sec		This value incorporates a 1% loss of the number of frames transmitted in Frames Per Second*	
		Minimum	Actual	Minimum	Actual	Minimum	Actual
64	672	9899232		7544272		14731	
128	1184	9898240		8560640		8360	
256	2208	9898464		9181184		4483	
512	4256	9895200		9523200		2325	
1024	8352	9897120		9707520		1185	
1280	10400	9890400		9738240		951	

\*For example, at frame size of 64 bytes the maximum fps value is 14880. A 1% loss yields 14731 fps.

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM  
TESTING**

Project Name: \_\_\_\_\_

100 Mbps							
Test Frame Size (bytes)	Total Packet Size (bits)	Testing Rate Bits/sec		Frame Throughput bits/sec		This value incorporates a 1% loss of the number of frames transmitted in Frames Per Second*	
		Minimum	Actual	Minimum	Actual	Minimum	Actual
64	672	98999040		75427840		147320	
128	1184	98998976		85620736		83614	
256	2208	98997888		91824128		44836	
512	4256	98998816		95277056		23261	
1024	8352	98996256		97099776		11853	
1280	10400	98904000		97484800		9510	

1000 Mbps							
Test Frame Size (bytes)	Total Packet Size (bits)	Testing Rate Bits/sec		Frame Throughput bits/sec		This value incorporates a 1% loss of the number of frames transmitted in Frames Per Second*	
		Minimum	Actual	Minimum	Actual	Minimum	Actual
64	672	999999840		754285593		1473214	
128	1184	999999296		856215552		836148	
256	2208	999998784		918259712		448369	
512	4256	999998272		952778752		232612	
1024	8352	999993312		971022336		118533	
1280	10400	999991200		974755840		95191	

**2: LATENCY**

Perform latency testing in accordance with the procedures listed in RFC 2544 to determine the minimum time transmit and receive a given frame.	
Comments:	<b>PASS</b>  <b>FAIL</b>

100 Mbps		Repeat 20 times		
Test Frame Size (bytes)	Total Packet Size (bits)	Latency Time – Round Trip Required Value = ≤10ms Round trip		
		Minimum	Average	Maximum
64	672			
128	1184			
256	2208			
512	4256			
1024	8352			
1280	10400			

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM  
TESTING**

Project Name: \_\_\_\_\_

**3: JITTER**

Determine the difference between the forwarding delay of two consecutive received packets belonging to the same stream. Send evenly spaced data at a constant rate using fixed length packets. Use true real-time jitter measurement method for this test.

Comments:	PASS
	FAIL

100 Mbps		Required Value = $\leq 1ms$				
Test Frame Size (bytes)	Total Packet Size (bits)	No. of Frames Sent	No. of Frames Lost (%)	Jitter	Pass	Fail
64	672					
128	1184					
256	2208					
512	4256					
1024	8352					
1280	10400					

**4: BACK TO BACK TEST**

Perform back-to-back frame testing in accordance with the procedures listed in RFC 1242 to determine the maximum number of frame that the device can transmit and receive without frame loss (%).

Comments:	PASS
	FAIL

100 Mbps		Required Value = No frames lost (0.00%)			
Test Frame Size (bytes)	Total Packet Size (bits)	Number of Frames Sent in 2 seconds	Number of Frames Lost	Pass	Fail
64	672				
128	1184				
256	2208				
512	4256				
1024	8352				
1280	10400				

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM  
TESTING**

Project Name: \_\_\_\_\_

**5: SYSTEM RECOVERY**

At a frame size of 512 bytes, set testing rate to 100Mbps and verify that no frames are dropped for a period of 60 seconds. Gradually increase the rate until frames are lost. Drop the rate back to 100Mbps and verify the frame failures drop to 0.00%. **The Minimum frame per second represents a 1% loss of the number of frames transmitted.**

Comments:	PASS
	FAIL

Test Frame Size (bytes)	Total Packet Size (bits)	Testing Rate Bits/sec		Frame Throughput bits/sec		Frames per second	
		Minimum	Actual	Minimum	Actual	Minimum	Actual
512	4256	10886848		104800256		Induced Failure	
512	4256	98998816		95277056		23261	

**6: RESET**

Press the reset button on the switch and perform the throughput test at 100Mbps for a frame size of 512 bytes. **The Minimum frame per second represents a 1% loss of the number of frames transmitted.**

Comments:	PASS
	FAIL

Test Frame Size (bytes)	Total Packet Size (bits)	Testing Rate Bits/sec		Frame Throughput bits/sec		Frames per second	
		Minimum	Actual	Minimum	Actual	Minimum	Actual
512	4256	98998816		95277056		23261	

NEW JERSEY DEPARTMENT OF TRANSPORTATION - MSE - ITS ENGINEERING

**ETHERNET COMMUNICATION SYSTEM  
TESTING**

Project Name: \_\_\_\_\_

TEST RESULTS		
NUMBER OF TEST SITES #: _____		
Test Site # 1	PASS _____ FAIL _____	COMMENT _____
Test Site # 2	PASS _____ FAIL _____	COMMENT _____
Test Site # 3	PASS _____ FAIL _____	COMMENT _____
Test Site # 4	PASS _____ FAIL _____	COMMENT _____
Test Site # 5	PASS _____ FAIL _____	COMMENT _____
<b>Corrective Action Work Items:</b>		
1.	_____	
2.	_____	
3.	_____	
4.	_____	
5.	_____	

We agree that testing of the Ethernet Communication System has been performed and that the information above accurately represent the results of the test.

Contractor Name: \_\_\_\_\_

Contractor Representative Name: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

ITS Inspector: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

**Corrective Action Work Items:**

Work Items	ITS Inspector Signature	Date
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____

NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018

Project Name: _____	ITS-100-014-Rev.03/15/2011																																																																																																			
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Submitted By: _____	Date: _____																																																																																																			
	Contractor: _____																																																																																																			
	Contractor Phone #: _____																																																																																																			

**Pay Item RR-116: Fiber Optic Link**

**Pay Item RR-117a: Replacement of Fiber Optic Splice Enclosure**

**Pay Item RR-117b: Replacement of Fiber Optic Patch Panel**

Section 704.03.03 of the NJDOT SSRBC 2007; section amended and supplemented August 2016

**Fiber Optic Cable**

**A. Components.** When installing fiber optic cable, provide a complete communications path between 2 or more ITS devices. Installing fiber optic cable includes, but is not limited to, providing and installing conduit, junction boxes, cables, splicing, communication and power connections, service charges, terminations, software, and grounding. At least 30 days before beginning work, submit to the RE for approval a fiber optic installation plan that lists the following items and includes a brief narrative on each:

1. Cable layout with splice locations and linear distances between splice points.
2. Fiber specific connection assignments to devices.
3. Catalog cut of the cable lubricant.
4. The manufacturer's minimum allowable cable and fiber strand bending radii.
5. Pulley wheel sizes.
6. Manufacturer's maximum outer jacket pulling tensions and monitoring device.
7. If using an air pressure system, list the blowing pressures applied to each cable size and conduit type.
8. Provide certifications from the fiber optic splice unit, OTDR, and power meter equipment manufacturer that verify the qualifications of each individual employed to perform the work.

**B. Installation.** Before beginning the work and during the work, comply with the requirements of 701.03.01. The allowable time frame for existing system shutdown and cost of damages for exceeding the allowable time frames will be as specified in 704.03.01.B.

Provide and install the material necessary for a complete, functional installation including cables, cable ties, jumpers, cable identification tags, pigtails, breakout kits, connectors, patch panels, splices, splice enclosures, testing, end caps, consumables, attenuators, and related documentation. Ensure that cable tags follow the industry standard CLEI GR485-CORE format and nomenclature for communications and electronic components. After the connections are completed, provide the minimum amount of slack for each cable that enters a junction box or termination enclosure as specified in Table 701.03.15-1. Provide additional slack as required to meet the proposed installation as follows:

1. For an ITS Junction Box provide a total of sixty (60) feet of slack (30 feet from each entry point.)
2. For a Hub provide 10 feet of slack
3. For a Cabinet provide 3 feet of slack

Attach cable tags to cables at junction boxes that contain multiple cables and at all cabinets. Secure them with nylon cable ties.

For armored cables, install a ground rod, ground and bond all armor casings at any existing or proposed junction box at which electrical power conductors are also present.

Before installing the tracer wire, obtain RE approval of the installation locations of the tracer wire. Install a continuous tracer wire in the conduit. Do not splice tracer wire in the conduit. Provide 10 feet of slack in each junction box. If approved by the RE, the Contractor may splice the tracer wire in the junction box. If more than one conduit is installed in a single trench, the Contractor may install the tracer wire in only one conduit. When installing fiber optic cable in existing conduits, install a tracer wire as specified in 701.03.15.A. Perform testing of existing tracer wires for continuity and perform splicing as required in junction boxes to ensure access to the tracer wire from cabinet to cabinet.

Ensure that splices are fusion splices. Install splices only in ITS junction boxes or ITS cabinets. Use splice enclosures for splices made in junction boxes. For mid-span termination cable entry, cut only those individual fiber bundle/strands needed (ring cut) for connection to the devices. For those fibers designated for trunk line communications, do not cut the fibers or install cables that require splices at lengths less than 2500 feet.

Splice a manufacturer recommended fiber optic breakout kit with connectors to each end of the strands for a cable that terminates at a device cabinet. Label each strand using machine-printed, laminated, self-adhesive labels. Fully document the connections and individual splices in the as-built drawings.

**C. Testing.** Perform wiring and cable testing as specified in 701.03.15.D before performing any other testing. The Department will provide forms detailing the testing requirements for the following tests:

- 1. Level 1.** Test each splice with the fusion splicing unit at the time the splice is made. Record each splice decibel value electronically with the splicing machine at 1310 nanometers. Provide 2 paper copies and 1 electronic copy of the results immediately to the RE for review and approval. Clearly identify each fiber on the report. Ensure that the maximum splice loss does not exceed 0.05 decibels. If the 0.05-decibel value cannot be reached in 3 attempts, the RE may employ a third party vendor to redo the work. The Department will recover the cost as specified in 107.16. Provide the RE with certification from the equipment manufacturer that the splice machine was calibrated within 3 months of its use on the Contract. Recalibrate the splice machine at 6-month intervals from the initial calibration by the manufacturer.

- 2. Level 2.** Perform the following Level 2 tests:

- a. OTDR.** Test each individual fiber after completion of splicing and connections. Perform the testing at 1310 and 1550 nanometers in both directions. Ensure that the maximum decibel loss for any single event is not greater than 0.3 decibels at 1310 nanometers; however, ensure that the OTDR machine threshold

is set to record events greater than or equal in absolute value to 0.05 decibels along the positive and negative axes. Events revealed by the OTDR machine bi-directional trace average to exceed 0.3 decibels are cause for the rejection of the cable. If directed, remove and replace the cable.

Ensure that the net result of the bi-directional trace average at 1310 nanometers across a splice event is not greater than 0.15 decibels. Redo splices revealed by the OTDR machine to be greater than 0.15 decibels up to 2 additional times in order to achieve 0.15 decibels or less. If the 0.15-decibels value cannot be reached in 3 attempts, the RE may employ a third party vendor to redo the work. The Department will recover the cost as specified in 107.16.

Ensure that reflectance at each connector is better than (-55) decibels. Ensure the fiber loss across each fiber segment is not greater than 0.4 decibels per kilometer when tested at 1310 nanometers.

Also test, and include in the report, the dark fiber segments that are not being utilized by the signal transmission equipment. Provide connectors as necessary to test unterminated fibers.

Provide 2 paper copies and 1 electronic copy of the results immediately to the RE for review and approval. Clearly identify each fiber on the report. Provide the RE with certification from the equipment manufacturer that the OTDR was calibrated within 3 months of its use on the Contract. Recalibrate the OTDR at 6-month intervals.

b. **Power Meter.** Measure and record fiber segment optical budgets including each end connector, according to the meter manufacturer instructions. Compile the test results in a binder and submit 2 copies with the final documentation. Perform power meter tests at 1310 nanometers and 1550 nanometers in both directions after completion of cable and connector splicing. Ensure that the maximum connector loss tested at 1310 nanometers is 0.8 decibels with the average of all connectors in the tested fiber segment being 0.5 decibels.

Provide 2 paper copies and 1 electronic copy of the results immediately to the RE for review and approval. Clearly identify each fiber on the report and the work site location of the end points. Provide the RE with a certification from the equipment manufacturer that the power meters were calibrated within 3 months of their use on the Contract. Recalibrate at 6-month intervals.

After completion of Level 1 and 2 tests, perform network communication system testing and demonstrate that the communication system is fully operational to meet the material specifications and project requirements. Complete the testing as specified on the Department provided forms and instructions.

**D. Maintenance.** Perform maintenance as specified in 704.03.01.D.

**E. Final Documentation.** Provide the following:

1. Individual splice connection as-built drawings in the format specified by the Department.
2. Splice machine, OTDR, and power meter readings with manufacturer's software disks to read the test results. Include power meter test results for each individual fiber section showing the optical budget between the termination point connectors. Include all unused fibers. Include OTDR electronic trace files and computer software so that the user can set any threshold values desired for all parameters and can view all ranges of events.
3. Cable identification key sheet.
4. Spreadsheets that identify the file names of the same fiber shot in both directions. Identify the individual common events and calculate the true event loss by averaging the point value of the fiber traces from each direction. Include this calculation in the spreadsheet tables. Supply 2 CD-R copies of the final documentation and 2 paper copies. Compile and organize the test results in 3-ring binders.
5. Licensed copies of splice and test equipment software. Ensure that the software is compatible with Windows XP operating system.
6. Communications system equipment fiber optic interconnections, including patch panel cross connections.
7. Inventory Report on the form provided by the Department.

**F. Equipment Training.** Provide training as specified in 704.03.01.F and in the Special Provisions.

NJDOT Fiber Optic Cable Testing – ITS revised 2011

<b>Project Name:</b> _____	ITS-100-015-Rev.03/15/2011	
<b>Contract #:</b> _____		
<b>Fiber Optic Cable (FOC)</b>		
<b>Route</b>	<b>Units/Format</b>	<b>Accuracy Required</b>
MP_Start	Miles	0.0001
MP_End	Miles	0.0001
FOC Location(Shoulder/Median/Berm/Under Bridge Structure/Submarine)		
FOC Offset from Curb/Edge of Pavement/Center Line		
Municipality/County		
Project Installed Under		
Manufacturer Name		
Installer (Contractor/Vendor)		
Testing Date (Before Installation)	mm/dd/yyyy	
Testing Date (After Installation)	mm/dd/yyyy	
Type (Trunk, Distribution, Termination)		
Armored Cable	Yes/No	
Gel Filled/Gel Free Buffers		
Size (Total Number of Fibers)		
Number of Bundles		
Number of Fibers/Bundle		
Color of Tracing		
Product Part Number for Reordering		
Trace Wire Type/Gauge (If Any)		
No. of Through Splices		
Splice Location MP	Miles	0.0001
Number of Termination Cable Splice Locations (Provide Separate Sheets for Each Location)	Unit	
<b>Certification:</b>		
I Herby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.		
Submitted By: _____	Date: _____	Contractor: _____
		Contractor Phone #: _____

NJDOT Fiber Optic Cable Testing – Level 1 Revised 2009

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 1**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

This procedure outlines Level 1 test to be performed on Fiber Optic Cable. Perform the following tests; at each splice location with the fusion splicing unit at the time the splice is made.

Fiber Optic Cable under test runs from:

ITS Junction Box  OR ITS Cabinet   
Route: \_\_\_\_\_ MM \_\_\_\_\_ . \_\_\_\_\_ NB/SB/EB/WB/Median  
Nearest Side Street Name: \_\_\_\_\_

TO

ITS Junction Box  OR ITS Cabinet   
DMS # \_\_\_\_\_ Route: \_\_\_\_\_ MM \_\_\_\_\_ . \_\_\_\_\_ NB/SB/EB/WB/Median  
Nearest Side Street Name: \_\_\_\_\_

Total Length of FOC under test (in feet): \_\_\_\_\_

Fusion Splicing Unit: \_\_\_\_\_  
(Manufacturer/Model No.)

Cabinet Location/No.: \_\_\_\_\_

Fiber Optic Cable Manufacturer: \_\_\_\_\_

Fiber Optic Cable Model No.: \_\_\_\_\_

Fiber Optic Cable Mode/ Core: \_\_\_\_\_

Fiber Manufacturer: \_\_\_\_\_

Fiber Type: \_\_\_\_\_

**1: SPLICES**

No.	Task	Required Value	Actual Value	Pass	Fail	Comments
I.	Provide certification from the equipment manufacturer that the splice machine was calibrated within 3 months of its use on the contract. Recalibrate the splice machine at 6 months interval					
II.	Certify that splice machine will be recalibrated at every 6 months interval until the completion of successful testing					

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 1**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

III.	Obtain copy of each splice result	2 paper copies and electronic file generated by fusion splice unit				
No.	Task	Required Value	Actual Value	Pass	Fail	Comments
IV.	Verify that each fiber is listed on the report with splice loss for each splice location	<del>                    </del>	<del>                    </del>			
V.	Verify that maximum splice loss for each splice does not exceed required value	0.05 dB @ 1310nm				
VI.	Confirm that fiber assignment for each fiber is in compliance with approved fiber optic installation plan	<del>                    </del>	<del>                    </del>			

**2: OTHER REQUIREMENTS**

No.	Task	Required Values	Actual Value	Pass	Fail	Comments
I.	Verify cable identification tags provide correct information and are secured with nylon ties.	<del>                    </del>	<del>                    </del>			
II.	For cable terminating at a device cabinet, verify that each strand is labeled using machine-printed, laminated, self-adhesive labels.	<del>                    </del>	<del>                    </del>			
III.	Confirm amount of cable slack at each splice location	Minimum Slack- Junction Box- 30' Hub- 10' Cabinet 3'				
IV.	Ensure that cable slack is stored in compliance with minimum bending radius requirement for unloaded application	10 times the cable diameter				
V.	Verify cable grounding and bonding	<del>                    </del>	<del>                    </del>			
VI.	Ensure that all required components including jumpers, pigtails, breakout kits, connectors, patch panels, splice enclosures, and attenuators are properly secured in accordance with industry standards.	<del>                    </del>	<del>                    </del>			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 1**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

**LEVEL 1 TEST RESULTS:**

PASS

FAIL

**Correction Work Items:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

We agree that Level 1 testing of the Fiber Optic Cable has been performed and that the information above accurately represent the results of the test.

Contractor Name: \_\_\_\_\_

Contractor Representative Name: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

ITS Inspector: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

**Corrected Work Items:**

**ITS Inspector Signatures & Date**

- |          |       |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |
| 5. _____ | _____ |

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 2**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

This procedure outlines Level 2 test to be performed on Fiber Optic Cable. Perform the following tests with OTDR and Power Meter on each individual fiber at 1310 nm and 1550 nm in both directions after the completion of all splicing and connections.

Fiber Optic Cable under test runs from:

ITS Junction Box  OR ITS Cabinet   
 Route: \_\_\_\_\_ MM \_\_\_\_\_ . \_\_\_\_\_ NB/SB/EB/WB/Median  
 Nearest Side Street Name: \_\_\_\_\_

TO

ITS Junction Box  OR ITS Cabinet   
 DMS # \_\_\_\_\_ Route: \_\_\_\_\_ MM \_\_\_\_\_ . \_\_\_\_\_ NB/SB/EB/WB/Median  
 Nearest Side Street Name: \_\_\_\_\_

Total Length of FOC under test (in feet): \_\_\_\_\_

OTDR: \_\_\_\_\_  
 Manufacturer /Model No. \_\_\_\_\_

Power Meter: \_\_\_\_\_  
 Manufacturer /Model No. \_\_\_\_\_

Cabinet Location/No.: \_\_\_\_\_

Fiber Optic Cable Manufacturer: \_\_\_\_\_

Fiber Optic Cable Model No.: \_\_\_\_\_

Fiber Optic Cable Model/ Core: \_\_\_\_\_

Fiber Manufacturer: \_\_\_\_\_

Fiber Type: \_\_\_\_\_

**1: OTDR**

No.	Task	Required Value	Actual Value	Pass	Fail	Comments
I.	Provide certification from the equipment manufacturer that the OTDR was calibrated within 3 months of its use on the contract.					
II.	Certify that OTDR equipment will be recalibrated at every 6 months interval until the completion of successful testing					

NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 2**

Project Name: \_\_\_\_\_

Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

III.	Set OTDR threshold to record all events greater than or equal in absolute value to 0.05 dB along the positive and negative axes	X	X			
<b>No.</b>	<b>Task</b>	<b>Required Value</b>	<b>Actual Value</b>	<b>Pass</b>	<b>Fail</b>	<b>Comments</b>
IV.	Perform OTDR testing at 1310 nm and 1550 nm in both directions and verify following parameters from the report:	2 paper copies and electronic file generated by OTDR				
a.	Maximum dB loss for any single event	≤ 0.3 dB @ 1310 nm				
b.	Net result of the bi-directional trace average across each splice event	≤ 0.15 dB @ 1310 nm				
c.	Reflectance at each connector	≤ -55 dB				
d.	Fiber loss across each fiber segment	≤ 0.4 dB/km @ 1310 nm ≤ 0.3 dB/km @ 1550 nm				
IV.	Verify that dark fiber segments not being utilized by the signal transmission equipment are included in OTDR report	X	X			

**2: POWER METER**

<b>No.</b>	<b>Task</b>	<b>Required Value</b>	<b>Actual Value</b>	<b>Pass</b>	<b>Fail</b>	<b>Comments</b>
I.	Provide certification from the equipment manufacturer that the power meter was calibrated within 3 months of its use on the contract.	X	X			
II.	Certify that Power Meter will Be recalibrated at every 6 months interval until the completion of successful testing	X	X			
III.	Perform Power Meter testing at 1310 nm and 1550 nm in both directions and verify following parameters from the report:	2 paper copies and electronic file generated by Power Meter				
a.	Average connector loss for fiber segment under test	≤ 0.5 db@1310nm				
b.	Maximum connector loss for	≤ 0.8dB@1310 nm				



NEW JERSEY DEPARTMENT OF TRANSPORTATION

**FIBER OPTIC CABLE  
TESTING - LEVEL 2**

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_\_

FOC TYPE: \_\_\_\_\_

**LEVEL 2 TEST RESULTS:**

PASS

FAIL

**Correction Work Items:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

We agree that Level 2 testing of the Fiber Optic Cable has been performed and that the information above accurately represent the results of the test.

Contractor Name: \_\_\_\_\_

Contractor Representative Name: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

ITS Inspector: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

Resident Engineer Name: \_\_\_\_\_

Signature and Date: \_\_\_\_\_

**Corrected Work Items:**

**ITS Inspector Signatures & Date**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

September 2011

STATE OF NEW JERSEY BUREAU OF ITS ENGINEERING DEPARTMENT OF  
TRANSPORTATION TRENTON, NEW JERSEY 08625

**MATERIAL SPECIFICATIONS FOR FIBER OPTIC SPLICE ENCLOSURE**  
**(Specification amended and supplemented August 2017)**

**SECTION I - GENERAL**

**Standards**

- Electronic Industry Standards (EIA/TIA)
- International Telegraph and Telephone Consultative Committee (CCITT)
- ANSI
- ASTM standards
- FDDI specifications
- UL

Ensure that the Splice Enclosure is a complete kit for fusion splicing the single mode optical fibers of loose tube fiber optic cables inside underground junction boxes in the field using fusion splicer.

Ensure that the Splice Enclosure is re-enterable and designed to hold spliced fibers packaged in a protective sieving and housing and pass through un-spliced fibers.

Ensure that Splice Enclosure is equipped with terminations for cable strength members and bonding wire.

Ensure that Splice Enclosure is in use for a minimum of three years under weather conditions similar to State of New Jersey and in underground junction boxes.

**SECTION II - SPLICE ENCLOSURE CHARACTERISTICS**

**Mechanical:**

- Nominal size: 8" Dia. x 28" Long
- Nominal weight: 5.0 to 9.0 lb

**Environmental:**

- Ensure that Splice Enclosure has gasket-sealing technology that enables ease of installation and re-entry requiring no special tools.
- Ensure that Splice Enclosure does not allow water entry when sprayed for fifteen minutes from a distance of one meter with water at a flow rate of 25 liters per minute at any angle.

- Ensure that Splice Enclosure does not allow water entry when immersed in a six feet head for seven days.
- Ensure that the Splice Enclosure is manufacturer certified for below ground, junction box (pull box) installation.
- Storage and operation temperature: -40°F to + 158°F
- Installation temperature: -22°F to + 158°F

#### Other Requirements

- Rigid non-filled case molded out of polyester/polycarbonate blend.
- Ensure that splice enclosure provides strain relief around the cable jacket and cable strength member.
- Ensure that splice enclosure is rodent proof, water proof, re-enterable and consist of moisture proof case.
- Ensure that all hardware is corrosion resistant aluminum or stainless steel. – Ensure that splice enclosure is capable of holding hardware made from corrosion resistant aluminum or stainless steel.
- Ensure that splice enclosure is able to re-enter and re-assemble without the use of special tools.
- Ensure the number of cable entries meet project requirement at each location. 2 to 6 cables entries for 0.5" to 1" dia. loose tube single mode fiber optic cables are required.
- Ensure that splice enclosure meets minimum fiber bending radius requirements.
- Ensure grounding strap is provided.
- Ensure that splice enclosure is capable of holding fusion splice trays and slack baskets to organize and store splices.
- Ensure that splice enclosure is equipped with the necessary mounting hardware.
- Ensure that splice enclosure has air valve for flash testing.

#### Splice tray specifications

- Fusion splice trays compatible with fusion splicing single mode optical fibers (No. of Fiber per contract plans).
- Ensure that number of splice trays is sufficient to splice all fibers.
- Ensure that it is compatible with splice enclosure.
- Ensure that splice trays are stackable within the splice enclosure.
- Ensure that splice tray is designed to accommodate loose tube buffers secured with tube guide or channel snap.
- Ensure that no cable ties are required to secure loose tube buffers.

STATE OF NEW JERSEY BUREAU OF ITS ENGINEERING DEPARTMENT OF  
TRANSPORTATION TRENTON, NEW JERSEY 08625

**MATERIAL SPECIFICATIONS FOR FIBER OPTIC PATCH PANEL**  
**(Specification amended and supplemented August 2017)**

**SECTION 1 - GENERAL**

Standards

- Electronic Industry Standards (EIA/TIA)
- International Telegraph and Telephone Consultative Committee (CCITT)
- ANSI
- ASTM standards

Ensure that the Fiber Optic Patch Panel is designed for termination of single mode optical fibers with SC Type connectors inside field equipment cabinets or equipment enclosure racks located within the buildings.

Ensure that the same model of Fiber Optic Patch Panel is in use for a minimum of three (3) years under conditions similar to State of New Jersey.

**SECTION II - PATCH PANEL CHARACTERISTICS 2-1**

2-1 Ensure that the patch panel includes the following accessories for fiber optic cables as required per the contract plans:

- Mounting bolts
- SC Type receptacle, Interconnect sleeve or bulkhead adapter
- Jumper cables
- Fiber drawers
- Storage for fiber
- Cable clamps with strain relief
- Flipcard for easier record keeping

2-2 Ensure that number of ports is as required per the contract plans.

2-3 Ensure that SC Connector is for single mode application, pre-radiused, zirconia ferrule, and metallic or composition body with strain relief boot. Ensure that the SC connector meets the following requirements: - Operating temperature: -40° F to 140° F - Insertion Loss: < 0.25 dB - Reflectance: < -55 dB - Durability: < 0.3dB change for > 200 matings

2-4 Ensure that 12-port fiber patch panel provides for termination of 12 single mode optical fibers in field equipment cabinets. Ensure that the patch panels are wall mountable with a

nominal size of 9" high x 8" wide x 2.5" deep. Ensure that the storage compartment for excess fiber storage is lockable.

2-5 Ensure that 18/24/96 port fiber patch panel is suitable for installation in EIA 19 inch rack. Ensure that the 24 port fiber patch panel does not exceed 6 inches in height and 18 inches in depth and the 48 port fiber patch panel does not exceed 11 inches in height and 18 inches in depth. Ensure that the patch panel is constructed from 24 gauge (minimum) sheet metal, painted gray.

2-6 Ensure that 18/24/96 port fiber patch panel has a clear front cover that is easily removable or opened to provide easy access for cable installation. Ensure that the cover is attached to panel enclosure via hinge or fastened thumbscrews. Ensure that the bottom/back panels provide openings for cable entrance, and provide for strain relief at each entrance point. Ensure that the patch panel provides drawers and other fixtures to maintain the minimum bending radius of fiber cables without strain placed on the cable.

2-7 Ensure that all SC connectors on the patch panel and plug end on jumper cables are capped with an approved cap.

2-8 Ensure that jumper cables (patch cables) are compatible with single mode fiber and provided with factory installed SC type single mode connectors. Ensure that the number of jumper cables is equal to the number of patch panel ports. Ensure that length of jumper cables connecting field equipment is as required for each connection. Ensure that spare jumper cables are 10 feet long. Ensure the fiber optic characteristics of the patch jumper cables meet the same requirements as the ITS Material Specifications for Fiber Optic Cable and manufacturers requirements.

**Pay Item RR-125: T-Pole Extension**

**Pay Item RR-126: C-Pole Extension**

**Pay Item RR-127: K-Pole Extension**

**Pay Item RR-128: Steel Pole Extension**

The NJDOT SSRBC 2007

**702.03.03 Traffic Signal Mast Arm**

Leave the factory installed wrapping on the arm for as long as the manufacturer recommends. Install the arm with the wrapping in place, and maintain it in original factory appearance. Erect mast arms with methods that prevent scratching or abrasions. Install a traffic signal arm on a traffic signal standard with a pole clamp (as required), mast arm hanger, grommet, safety chains, swing sign brackets (as required), and miscellaneous fittings and hardware. Provide for all modifications or adjustments that may be required for staged construction.

Pay Item RR-131: Adaptive Traffic Signal Controller



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

**CTSS/ASCT Testing Forms and Procedures**

**Testing for ASCT:**

All required key personnel shall be in attendance prior to initiating the indicated test. The Resident Engineer will be the point-of-contact for the scheduling of the tests with the key personnel.

**Definitions:**

The term "Business Day" as used in this document is synonymous with the term "Working Day" as used in N.J.S.A. 27:7-31 and N.J.S.A. 27:7-33 and is any day exclusive of Saturdays, Sundays, State recognized legal holidays, and such other holidays or State office closings as declared by the State.

**Documentation/Certification:**

The contractor will provide documentation and certification for the testing of the devices carried out in the lab prior to installation and deployment in the field such as, but not limited to, 168 hour test for controller units, testing for image detector units, testing for system detector units and reference documentation as requested in the Verification Plan in the Special Provisions.

**Deployment Testing:**

The deployment testing period of 14 business days shall be completed prior to the initiation of System Integration Testing. Deployment testing shall include accuracy testing of the field installed detection units (image and system detection) as per Plans, Standard Specifications, and Special Provisions, including the testing of the integration of the detection units with the controller for the designed intersection operation.

Device failures are from the devices or components of the devices in the field. This type of failure requires that the failure be corrected within 24 hours of notification. The testing clock will be stopped when the Contractor is notified of the failure. After the repairs are completed, then the clock will resume at the start of the next business day. Contractor is required to submit the EL-11C form.

If the device failure occurs after the 11<sup>th</sup> business day of the 14 business day testing period, the clock will be stopped when the Contractor is notified. Then the clock will be restarted on the next business day, after the repairs are completed. In addition, five additional business days will be added to the testing period due to the failure occurring after the 11<sup>th</sup> day. The Contractor is required to submit the EL-11C form.

Operational failures will be defined as failure of the operation of the intersection as designed and indicated in the Systems Requirement document and the Verification Plan. This type of failure requires that the issue be corrected within four (4) hours of notification. The clock will be stopped upon notification to the Contractor and restarted on the next business day, after the repairs are completed.



## NEW JERSEY DEPARTMENT OF TRANSPORTATION

### CTSS/ASCT Testing Forms and Procedures

If the testing accumulates five (5) operational failures, then the Contractor will be required to submit a Corrective Action Plan for review and approval by NJDOT. After the repairs are completed, then the clock will be restarted on the next business day. If there is an operational failure number six, then the 14 business day clock will be reset to day zero, after the repairs have been completed.

#### **Subsystem Testing:**

Subsystem testing requires testing of the remote operation of systems installed and integrated on NJDOT's IT network for the corridor, the testing period is 20 business days. Each subsystem will be tested independent of the other.

The Image Detection System, Radar Detection System, and Traffic Control System will be tested for remote access, functionality, monitoring and reporting requirements as specified in the System Requirements and Verification Plan documents, and Special Provisions. The tests will be verified over a period of 20 business days, wherein the operators will monitor and test multiple functionalities of each of the subsystems, including alarms and alerts, if applicable.

Failure will be defined as the inability of a subsystem to perform the designated function from a remote location, as indicated in the System Requirements, the Verification Plan, and the Special Provisions for the project. If one (1) or more devices fail at a specific time, then this will count as one (1) failure within that individual subsystem.

If there is a failure which requires the system to be offline for less than 12 hours, then this will result in no penalties to the Contractor and the testing clock will not be stopped. If the repairs take greater than 12 hours but less than five (5) business days, then the clock will resume on the next business day after the repairs have been completed. If the failure takes greater than five (5) business days, then the 20 business day testing clock will be reset to day zero.

If a specific subsystem accumulates 20 or more failures, then the Contractor shall submit a Corrective Action Plan which shall be reviewed and approved by NJDOT. After the repairs have been completed, then the 20 business day testing period will be reset at day zero.

#### **System Integration Testing:**

Each subsystem needs to integrate with Adaptive for full system functionality. The testing period will be 20 days. The testing for integration of the subsystems as per System Requirement and Verification Plans, part of Special Provisions, shall be carried out prior to acceptance of the system.

The inputs of the subsystem to the Adaptive System, and the accuracy of the resultant outputs shall be verified. The operational failures are defined as errors of the input from a subsystem, or an erroneous resulting output from the Adaptive System.



## NEW JERSEY DEPARTMENT OF TRANSPORTATION

### CTSS/ASCT Testing Forms and Procedures

If the repair for any failure(s) takes between two (2) and 12 hours, then the testing clock will be stopped upon notification to the Contractor and will resume once the repair is completed. There will be one (1) business day added to the testing period due to this failure.

If the corrective action for any failures takes more than 12 hours, then the testing clock will be stopped upon notification to the Contractor and will resume once the repairs are completed. There will be three (3) business days added to the testing period.

If the failures accumulate to six (6) or more, then the Contractor shall submit a Corrective Action Plan for review and approval by NJDOT. The tasks or repairs will be at the Contractor's expense, and the testing clock will be reset to day zero after the repairs have been completed.

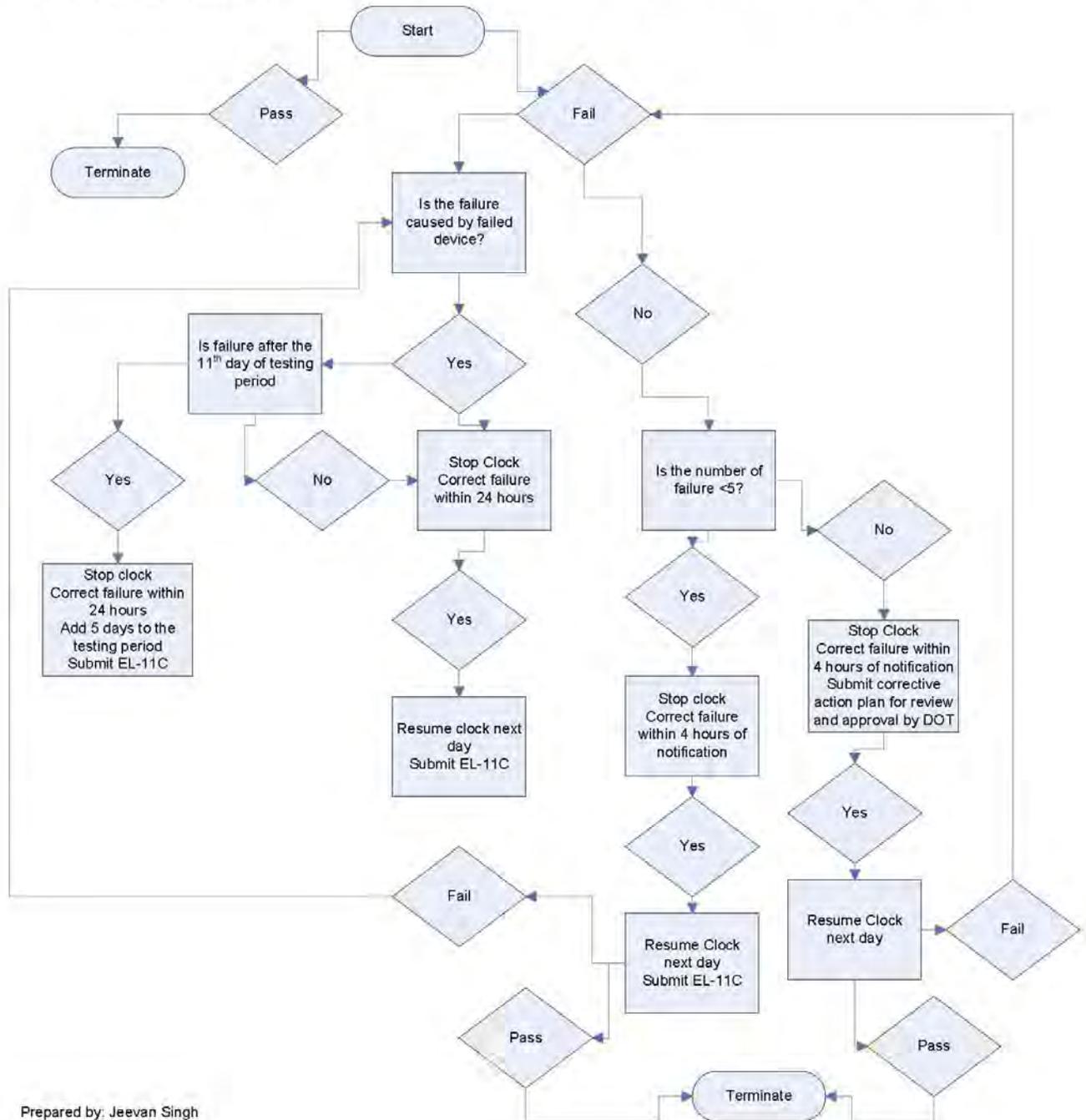
#### **System Acceptance Testing:**

The testing of the system, in accordance with the Validation Plan, part of Special Provisions and the successful completion of the System Integration testing shall be the initiation of System Acceptance. Additional documentation from the contractor will be required prior to Acceptance, as indicated in the As-Built Information forms, warranty, maintenance agreements, and continuing contractual obligations that need to be transferred over from the Contractor to NJDOT.

## Deployment Testing

**Pre-requisites:**

1. Certification for Controller Bench Testing according to Section 702.03.01
2. Certification of Compliance for Image Detection – As per ITS Specifications (reference required – sample attached)
3. Certification of Compliance for Radar Detection – As per ITS Specifications (reference required – sample attached)
4. Installation Certificate from the Inspector on the job, through the RE certifying that "Installation is complete as per Design Plans & Special Provisions for the \_\_\_\_\_ project as designed unless otherwise noted (with approvals) below".
5. Calibration Certificate from the manufacturer certified agent, through the contractor indicating that "System components and devices have been calibrated to meet or exceed requirements in the Special Provisions and Design documents (as applicable) unless otherwise noted (with approvals) below".
6. Wiring and cable testing performed and submitted according to Section 701.03.15 D.
7. Notification of Intent to test (Letter submission by contractor to RE)
8. All required personnel are scheduled to be present at the time of testing in the field, including the required DOT staff, RE's office staff, Contractor's staff and all applicable Vendor staff.



Prepared by: Jeevan Singh



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

**DEPLOYMENT TESTING FORM**

<b>Project Name:</b> _____	<b>Test Date:</b> ____/____/____
<b>Route:</b> _____ <b>MM:</b> _____	<b>Side Street 1 Name:</b> _____
<b>Side Street 2 Name:</b> _____	

This Deployment Test plan will not be initiated until the following requirements stated below have been met:

- Wiring and cable testing is completed according to Section 701.03.15D of the Specifications/Special Provisions.
- Attach the bench testing certification for the Controller Unit. Confirm that the serial number on the Certification document matches the unit that is being tested according to Section 701.03.07 of the Specifications/Special Provisions.
- Attach the material approval for the Image Detector Unit provided by the NJDOT.
- Attach the material approval for the System Detection, Type Radar Unit provided by the NJDOT.
- All the personnel required for the testing are present. This includes providing manufacture certified representative to ensure complete functionality of the system and subsystem. In addition, representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as Mobility and Systems Engineering are present.
- Installation Certificate Letter from NJDOT Designated Inspector stating "Construction at the intersection is complete as per Plans, Specifications and Special Provisions," unless otherwise noted.
- Calibration Completion Letter from the certified vendor or manufacturer's representative stating "Devices have been calibrated as required in the Specifications/Special Provision for the project unless otherwise noted.
- Letter of Intent to initiate the test from the Contractor.



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

**DEPLOYMENT TESTING FORM**

Project Name: _____		Test Date: ___/___/___	
Route: _____ MM: _____		Side Street 1 Name: _____	
Side Street 2 Name: _____		Approach: NB <input type="checkbox"/> SB <input type="checkbox"/> EB <input type="checkbox"/> WB <input type="checkbox"/> _____ <input type="checkbox"/>	

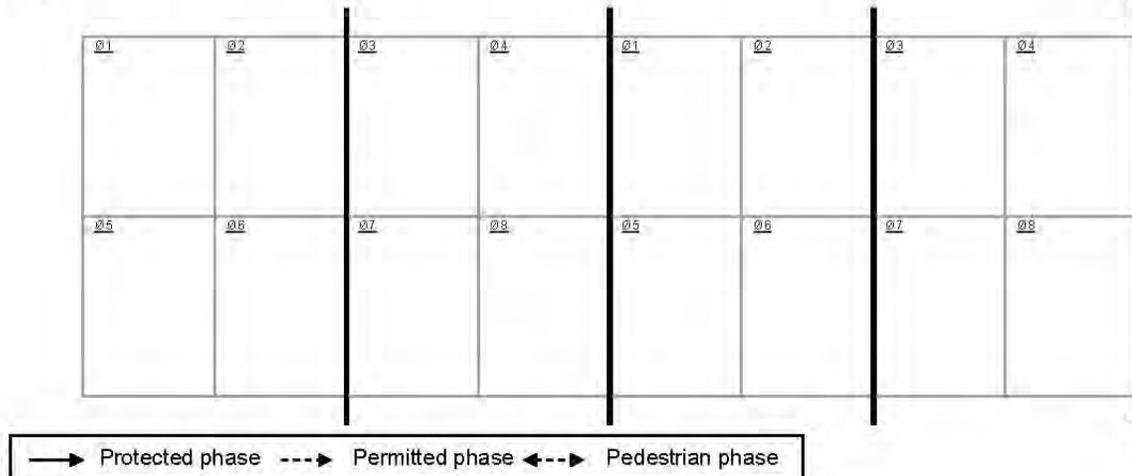
**7: PHASE SETTING PROGRAMMED IN THE CONTROLLER**

Fill out the table below based on the parameters programmed into the controller.

Phase	Direction	Amber	Red	PP	PED	WALK	FDW	Min Green	Max Green
Ø1									
Ø2									
Ø3									
Ø4									
Ø5									
Ø6									
Ø7									
Ø8									

Verify that the intersection is running as per directive

**Sequence:** Populate the ring and barrier diagram based on the phasing sequence, overlaps, and pedestrian operations programmed into the controller which have been field verified. Utilize the legend seen at the bottom of the ring and barrier diagram to complete it.





**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

**DEPLOYMENT TESTING FORM**

<b>Project Name:</b> _____	<b>Test Date:</b> ____/____/____
<b>Route:</b> _____ <b>MM:</b> _____	<b>Side Street 1 Name:</b> _____
<b>Side Street 2 Name:</b> _____	

**DEPLOYMENT TEST RESULTS:**      **PASS** \_\_\_\_\_ **FAIL** \_\_\_\_\_

**Correction Work Items:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

We agree that Deployment testing at the local intersection has been performed and that the information above accurately represents the results of the test.

**Contractor Name:** \_\_\_\_\_

**Contractor Representative Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Vendor Name:** \_\_\_\_\_

**Vendor Representative Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**ITS Inspector Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Resident Engineer Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

Form #: MSE 601- 006

**DEPLOYMENT TESTING  
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)**

<b>Project Name:</b> _____	<b>Test Date:</b> ____/____/____
<b>Route:</b> _____ <b>MM:</b> _____ (NB/SB/EB/WB/Median)	<b>Side Street 1:</b> _____
<b>Side Street 2:</b> _____	

This Deployment Test will not be initiated until all the requirements stated below have been met.

- All Sub-system Testing has been completed
- All the personnel required for the testing are present. This includes providing a manufacturer certified representative to ensure complete functionality of the system and subsystem. In addition, representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility & Systems Engineering are present
- Installation Certificate Letter from NJDOT Designated Inspector stating "Construction at the intersection is complete as per Plans and Special Provisions," unless otherwise noted.
- Calibration Completion Letter from the certified vendor or manufacturer's representative stating "Devices have been calibrated as required in the Special Provisions for the project unless otherwise noted.
- Letter of Intent to initiate the test from the Contractor.



NEW JERSEY DEPARTMENT OF TRANSPORTATION

Form #: MSE 601- 006

DEPLOYMENT TESTING  
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: \_\_\_\_\_ Test Date: \_\_\_\_/\_\_\_\_/\_\_\_\_  
 Route: \_\_\_\_\_ MM: \_\_\_\_\_ (NB/SB/EB/WB/Median) Side Street 1: \_\_\_\_\_  
 Side Street 2: \_\_\_\_\_

This procedure outlines the Deployment Testing to be performed on the Adaptive Signal Controller in the field. Please perform the following tests and/or verifications at the controller cabinet using NJDOT approved software. This Deployment Testing demonstrates that the individual devices at each work site are fully operational.

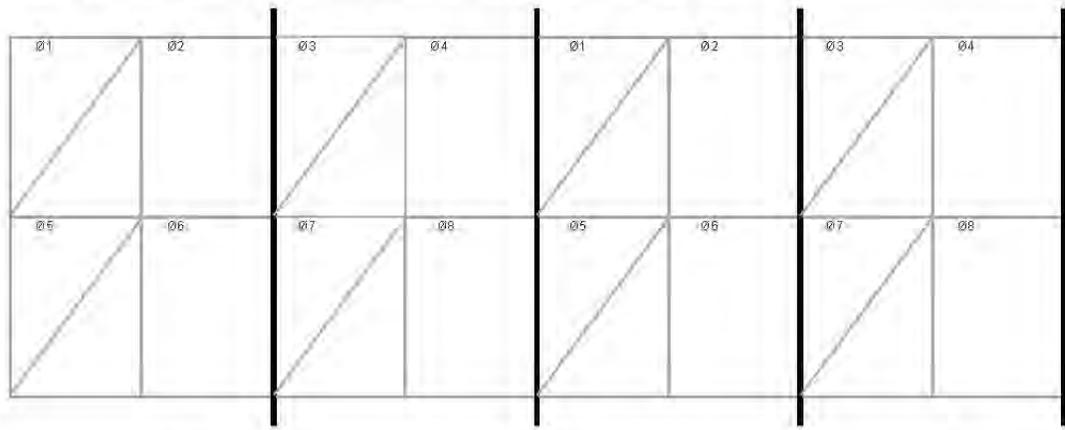
Software version: \_\_\_\_\_

Fill out the table below based on the parameters programmed into the intersection personality and attach a copy of the intersection personality.

Lowest and Highest cycle length programmed: \_\_\_\_\_

Phase	Direction	Time allocation by %/#	Min Green	Max Green	Amber	All Red	EVP	PP	PED	WALK	FDW	Extension time
Ø1												
Ø2												
Ø3												
Ø4												
Ø5												
Ø6												
Ø7												
Ø8												

**Sequence:** Populate the ring and barrier diagram below based on the phasing sequence, overlaps, and pedestrian operations programmed into the controller which have been field verified. Utilize the legend seen at the bottom of the ring and barrier diagram to complete it. Attach an intersection graphic.



→ Protected phase -- → Permitted phase ← -- ← Pedestrian phase



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

Form #: MSE 601- 006

**DEPLOYMENT TESTING  
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)**

Project Name: _____	Test Date: ____/____/____
Route: _____ MM: _____ (NB/SB/EB/WB/Median)	Side Street 1: _____
Side Street 2: _____	

No.	Task	Expected Results	Pass	Fail	Comments
1.	Confirm ASCT shall assign unused time from a preceding phase that terminates early or is skipped to a user-specified phase as follows:				
	• Previous Phase				
	• Next Phase				
	• Next coordinated phase				
	• User – specified phase				
2.	When the force off loop is triggered as per directive, the controller changes phasing to appropriate cycle/plan to prevent queuing. Compare the changes in the controller that indicate these and verify with the field conditions (changes in signal operations).	Adaptive provides green time for the phase for which the force loop was triggered.			
3.	Note down the ADT volumes on the mainline Pre-adaptive and Post-adaptive operation.	Mainline throughput should be maximized by ASCT.			
4.	Verify ASCT works non-adaptively (Isolated mode).	The intersection should be running in fully actuated mode.			
5.	Disable image detectors on the side street.	Parameter programmed in the controller: <input type="checkbox"/> Min Recall <input type="checkbox"/> Max Recall <input type="checkbox"/> Pedestrian Recall Verify to be as programmed			
6.	Disable Call to Non-Actuated (CNA).	Mainline should rest in Green. Minimum Green is equal to pedestrian clearance for non-actuated pedestrian.			
7.	Verify controller time settings can be changed from the ASCT user interface.	The controller time setting is changed from the ASCT system software.			
Define Critical Communication failure					
8.	Critical Communication failure – disable communication link to the center.	ASCT should switch to isolated TOD fallback operation. ASCT should switch back to Adaptive operation after the fallback timer times out or is manually reset.			



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

Form #: MSE 601- 006

**DEPLOYMENT TESTING  
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)**

Project Name: _____	Test Date: ____/____/____
Route: _____ MM: _____ (NB/SB/EB/WB/Median)	Side Street 1: _____
Side Street 2: _____	

Define Software failure				
9.	Critical software failure	ASCT should switch to isolated TOD fallback operation mode/ TOD operation. ASCT should switch back to Adaptive operation after the fallback timer times out or is manually reset.		
10.	Verify if phase failures are occurring and logged	Provide phase failure logs for the testing period		
11.	Observe the reported queues from the phase failures.	ASCT should change operations so that residual delay doesn't occur.		



**NEW JERSEY DEPARTMENT OF TRANSPORTATION**

Form #: MSE 601- 006

**DEPLOYMENT TESTING  
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)**

<b>Project Name:</b> _____	<b>Test Date:</b> ____/____/____
<b>Route:</b> _____ <b>MM:</b> _____ (NB/SB/EB/WB/Median)	<b>Side Street 1:</b> _____
<b>Side Street 2:</b> _____	

No.	Task	Expected Results	Pass	Fail	Comments
12.	Confirm ASCT does not alter the order of the phase at the intersection.	ASCT is running sequential operation.			
13.	Verify Actuated Pedestrian calls are answered.				
14.	Verify Unactuated pedestrian call come up every cycle	Pedestrian Recall			
15.	Verify Cycle lengths and splits change every cycle.	Verify for 15 minutes.			
16.	Verify that signal rest on Mainline.				
17.	Verify Mid-block detector inputs in ASCT.				
18.	Number of Overlaps provided by ASCT.				
19.	Number of rings at each signal.				
20.	Number of phase accommodated at each signal.				
21.	Number of phase accommodated by each ring.				
22.	Number of user defined phases sequence at the intersection.				
23.	Detector channels being utilized by adaptive:				
	• Image detector				
	• System detector (Radar)				
24.	Verify if extension/passage times are assigned to each vehicle.				
25.	Late start : Allowed <input type="checkbox"/> - Verify Not Allowed <input type="checkbox"/>				
26.	List parameters for operation of queue detection system/ Verify parameters.				
27.	Verify/List skipped actuated phases.				

# NJSEA MASSTR Maintenance Contract - Request for Proposals - December 2018

Project Name: \_\_\_\_\_

MSE-602-004

Contract #: \_\_\_\_\_

Rev. - 0001 | Date: 1/21/2015

### CTSS Controller Unit (Controlled Traffic Signal System)

	Units/Format	Accuracy Required	
Cabinet Location Latitude	Dec. Degrees	0.000001	
Cabinet Location Longitude	Dec. Degrees	0.000001	
Route			
Milepost	Miles	0.01	
Location			
Municipality/County			
Cabinet Type & Size (L x W x D)	Inches		
Communication Mode (Fiber Optic, POTS, Wireless, T1, 56K, Cable, DSL, Other)			
Controller Manufacturer			
Controller Model/Type			
Controller Serial Number			
Software Version/ Firmware			
Accessories			
FO Termination			
Ethernet Switch # Provide Details in Ethernet Communication Switch Table			
Project Installed Under			
Installer (Contractor/Vendor)			
Testing Date ( Certification/Tactical)	mm/dd/yyyy		
Heated	Yes/No		
If Heated, Make/Model and Serial Number			
Power Source (Load Center/Pole Number)			
If Metered Provide Details in Meter Cabinet Table			
If not Metered, Location of Load Center (Rt., MP, Location)			
Warranty	mm/dd/yyyy		Start Date _____ End Date _____
Technical Support		Start Date _____	Start Date _____ End Date _____

**Certification:**

I Hereby Certify That All of the Above Information is Accurate As Constructed to the Best of My Knowledge.

Submitted By: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor: \_\_\_\_\_

Contractor Phone #: \_\_\_\_\_

Pay Item RR-135: PSE&G and ITS Cabinet

Project Name: _____	ITS-100-019-Rev.03/15/2011																																																												
Contract #: _____																																																													
<b>Meter Cabinet</b>																																																													
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;"></th> <th style="width: 15%;">Units/Format</th> <th style="width: 15%;">Accuracy Required</th> </tr> </thead> <tbody> <tr> <td>Cabinet Location Latitude</td> <td>Dec. Degrees</td> <td>0.000001</td> </tr> <tr> <td>Cabinet Location Longitude</td> <td>Dec. Degrees</td> <td>0.000001</td> </tr> <tr> <td>Route</td> <td></td> <td></td> </tr> <tr> <td>Milepost</td> <td>Miles</td> <td>0.0001</td> </tr> <tr> <td>Location</td> <td></td> <td></td> </tr> <tr> <td>Municipality/County</td> <td></td> <td></td> </tr> <tr> <td>Size (L x W x D)</td> <td>Inches</td> <td></td> </tr> <tr> <td>Meter Cabinet Type</td> <td></td> <td></td> </tr> <tr> <td>Meter Number/Account Number</td> <td></td> <td></td> </tr> <tr> <td>Service Pole Number</td> <td></td> <td></td> </tr> <tr> <td>Power Requirement</td> <td>Watts</td> <td></td> </tr> <tr> <td>Surge suppressor (Model No.)</td> <td></td> <td></td> </tr> <tr> <td>Power Company</td> <td></td> <td></td> </tr> <tr> <td>Project Installed Under</td> <td></td> <td></td> </tr> <tr> <td>Manufacturer Name</td> <td></td> <td></td> </tr> <tr> <td>Step Up/Down Transformer</td> <td></td> <td></td> </tr> <tr> <td>Installer (Contractor/Vendor)</td> <td></td> <td></td> </tr> <tr> <td>Date Installed</td> <td>mm/dd/yyyy</td> <td></td> </tr> <tr> <td>Date Installed</td> <td>mm/dd/yyyy</td> <td></td> </tr> </tbody> </table>		Units/Format	Accuracy Required	Cabinet Location Latitude	Dec. Degrees	0.000001	Cabinet Location Longitude	Dec. Degrees	0.000001	Route			Milepost	Miles	0.0001	Location			Municipality/County			Size (L x W x D)	Inches		Meter Cabinet Type			Meter Number/Account Number			Service Pole Number			Power Requirement	Watts		Surge suppressor (Model No.)			Power Company			Project Installed Under			Manufacturer Name			Step Up/Down Transformer			Installer (Contractor/Vendor)			Date Installed	mm/dd/yyyy		Date Installed	mm/dd/yyyy	
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Submitted By: _____	Contractor: _____																																																												
Date: _____	Contractor Phone #: _____																																																												

**The New Jersey Department of Transportation  
TSM Procedure Manual  
Version 1  
November 2015**

**C.2.10. ITS Cabinets (Controllers and Electrical Services)**

**C.2.10.1. Warrants**

Cabinets are warranted for all ITS devices. Preference is given to utilization of existing cabinets in order to co-locate equipment of multiple systems when possible. Consult MSE for final approval of the recommended approach.

**C.2.10.2. Cabinet Types**

1. Controller
2. Meter
3. Fiber Optic Cross Connect
4. ITS

**C.2.10.3. Location/Placement Guidelines**

Cabinets of the various types are located per site as described below. Coordinate with MSE to obtain the latest standard construction detail as appropriate. Incorporate important design considerations into the SERF in support of safety, high level design requirements, and communications concepts.

**C.2.10.3.1. Design Considerations**

Evaluate the proposed cabinets types and locations in consideration of the following items. In all cases document important decisions and concerns through the Department's DCR procedures.

1. See Common Design Considerations of Section C.2.1.
2. Controller (cabinet) Placement – Make general observations for high and low topography points at the ITS device site. Avoid areas subject to flooding. If placement of equipment in a flood area is unavoidable, include provision for skirts to be installed under controller and equipment cabinets to be mounted on foundations.
  - a. DMS – Place the controller at approximately 50' in front of the sign (minimum of 25' for ground mounted signs). Avoid placing it in a way that would obstruct the motorist's field of view of the DMS. Position the cabinet door for the maintenance personnel to face the sign when operating the controller electronics. Verify the length of communication cable needed between the sign and the controller with the sign manufacturer. Provide for the appropriate cable length and characteristics in the contract documents.
  - b. VSLS - Place the cabinet in the immediate vicinity of the support standard. When near a DMS, co-locate the controller equipment within the DMS controller cabinet.

- c. CSS - Place the cabinet in the immediate vicinity of the support standard. Avoid areas subject to flooding. When near a DMS, co-locate the controller equipment in the DMS controller cabinet.
  - d. TTS - Co-locate the controller equipment with the DMS or CCTV controller cabinet when possible. Consider replacing the existing controller cabinet if there is not adequate room to add the detector equipment. For stand-alone detection devices, place the proposed controller cabinet in the immediate vicinity of the support standard.
  - e. CTSS - Place the controller cabinet so as to avoid potential turning radius knockdowns, and other such vulnerable layouts.
  - f. WIMS - Place the controller cabinet adjacent to the loop detector/piezo sensor layout per the construction details provided by the Bureau of Transportation Data and Safety (BTDS).
  - g. RWIS - Place the controller cabinet within the enclosed fence protection per the standard ITS construction details.
3. Meter Cabinet - Request and confirm shared use of existing NJDOT owned load centers with other bureaus such as Bureau of Traffic Engineering (BTE), Electrical Maintenance, and BTDS, etc. Present recommended load center use to the MSE PM for approval. Ensure the meter cabinet is placed in a location that is safe from vehicular damage and provides safe access for maintenance personnel.
  4. Uninterruptable Power Supplies - discuss the need for UPS devices with MSE and ITS Maintenance for the project devices. Select and size batteries by amount of time required by maintenance personnel at the device location.
  5. Disconnect Switches - Include a separate disconnect switch between the meter cabinet and the ITS device controller when the load center powering the device is not in plain sight of the ITS device.
  6. Cabinet Size - Refer to the standard construction details for the controller and meter cabinet pay Items.
  7. Cabinet Orientation - Position the controller and meter cabinets to allow maintenance personnel to have view of the oncoming traffic while standing at the open door of the cabinet. Include concrete sidewalk pads for maintenance cabinet access doors. Ensure cabinets with front and back access doors have concrete pads for each door. Provide bollard protection as required in areas subject to close vehicle proximity (i.e. parking lots). Ensure not to infringe upon vehicle clear zones with bollards.
  8. Cabinet Skirt - Include provisions for a standard 18" cabinet skirt at all locations subject to potential water penetration at the base.
  9. Foundations - Refer to the standard construction details for the controller and meter cabinet pay Items.
  10. Cabinet Mounting - When ground mounting is not feasible, consider structure or pole mounting

11. Labeling – Verify that the contract provisions for standard labeling are included in the construction contract documents.

12. Cross connect cabinets – Place Fiber Optic Cross Connect Cabinets at major intersections and interchanges which may be considered as fiber optic arterial communication paths in the future. Design the installation of the cabinets in lieu of junction boxes.

13. Existing Cabinets – Utilize existing ITS cabinets when possible as a cost savings measure. Modify or replace the controller pay Item as necessary in consideration of economic feasibility.

Side of cabinet penetrations may be permitted for special circumstances. Present the proposed design to the PM for approval.

When co-locating controller equipment of different devices in an existing controller ensures the appropriate CONTROLLER MODIFICATION pay Item is included in the construction contract. Include special provisions for additional heating, cooling, lighting, wiring (ratings), etc. if needed.

**Pay Item RR-139: Controller Turn on**

**The NJDOT SSRBC 2007**

**702.03.12 Controller Turn On**

Controller turn-on consists of supplying a technician authorized by the controller manufacturer at the work site when each controller is placed into flash mode and into final operation. Provide the RE a letter, from the controller manufacturer, stating the technician is authorized and qualified to perform the work. Ensure that the technician is available at all times during flash mode testing. Ensure that traffic signals complete a successful flash period for 3 consecutive days as part of the required testing.

Pay Items PM-140: Annual Inspection of Vehicle Detectors

Pay Item PM-141: Annual Inspection of Communication System-Fiber

Pay Item PM-142a: Annual Inspection of Cabinet Equipment

## **The NJDOT-ITS Investment Strategy**

### **10-year program FY 07-16**

#### **ITS Equipment Schedules**

##### **Cameras**

- Clean and calibrate twice a year
- Replace camera and controller every 7 years

##### **Controlled Traffic Signal Systems**

- Replace system loops every 10 years
- Upgrade controllers every 15 years

##### **Fiber Network**

- Upgrade switches/circuits every 10 years
- Replace fiber every 20 years

##### **Operation Centers**

- Replace servers every 5 years
- Upgrade software system as required by each application
- Replace video monitors every 10 years

##### **Travel Time Detection systems**

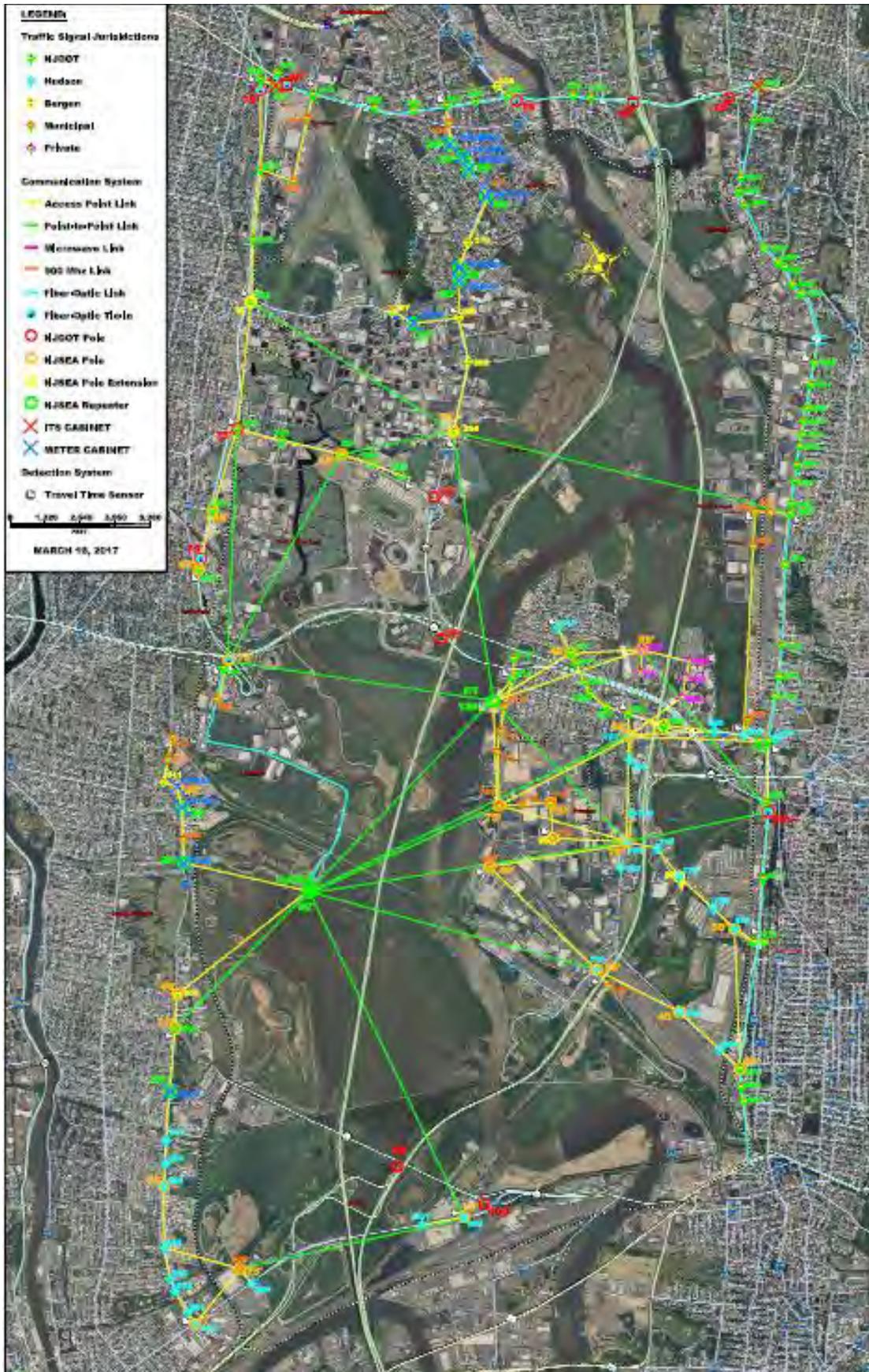
- Calibrate every 2 years

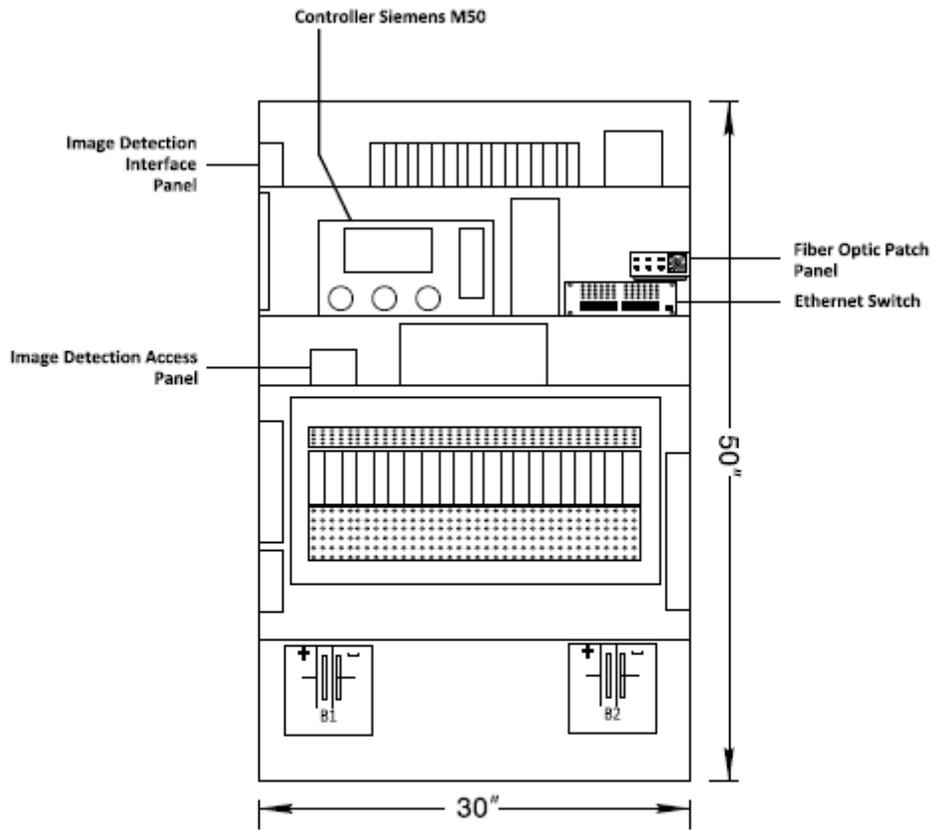
**APPENDIX C: MAP AND DIAGRAMS**



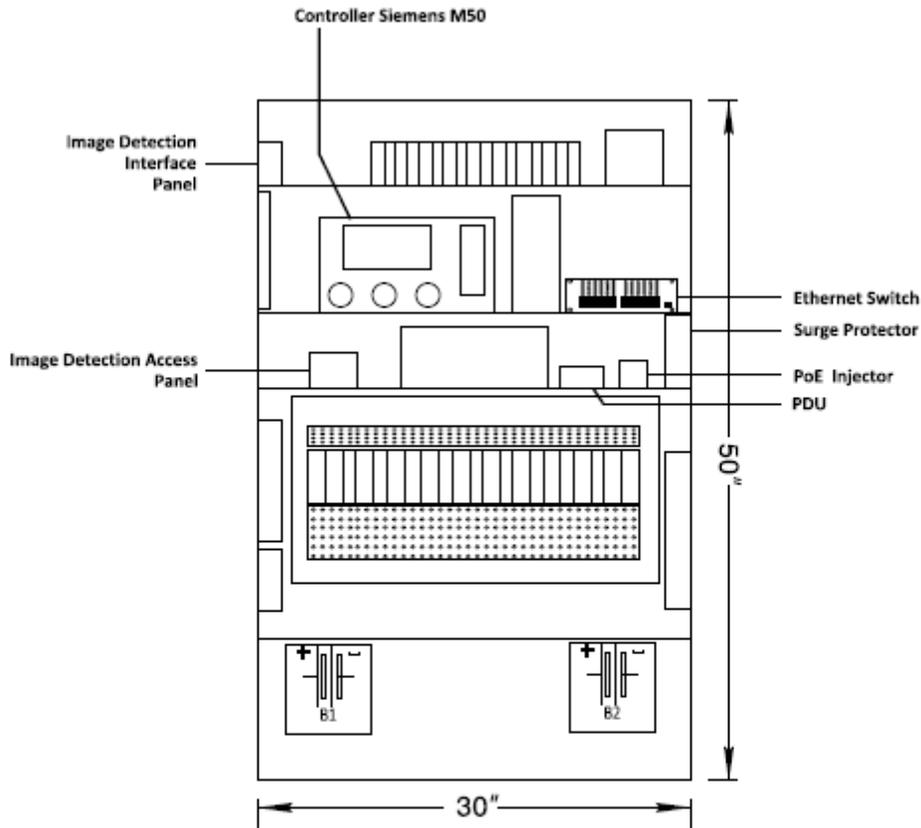
**MASSTR**

**REQUEST FOR PROPOSAL FOR MASSTR MAINTENANCE - APPENDIX C**

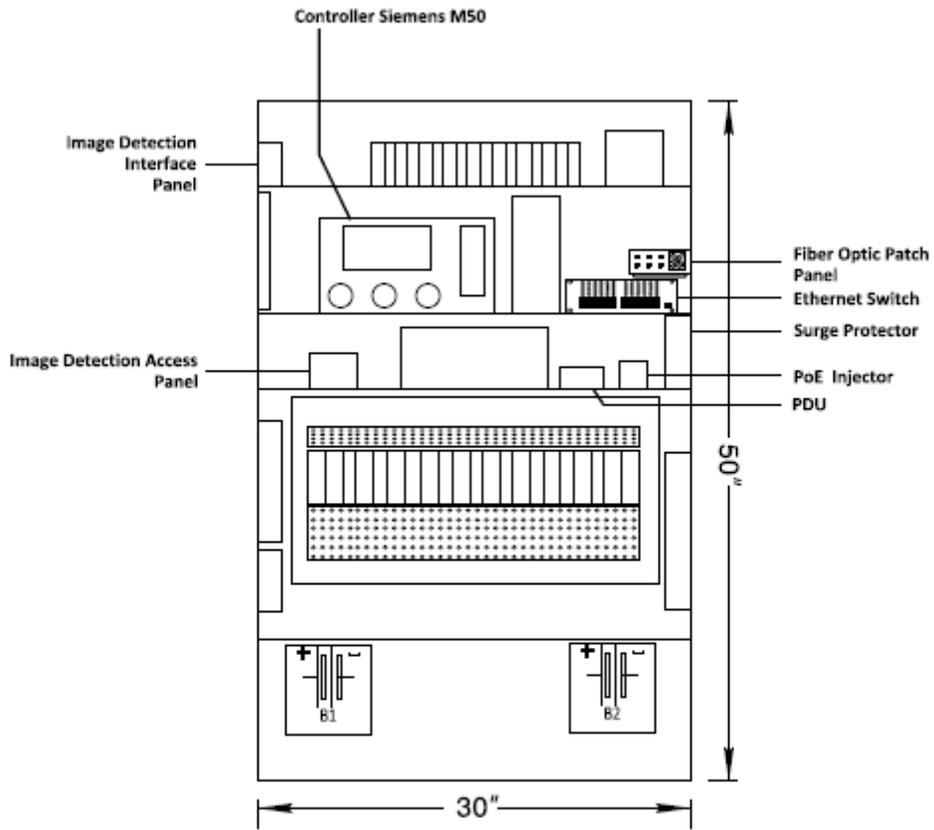




**TYPICAL CABINET EQUIPMENT  
FIBER COMMUNICATION**



**TYPICAL CABINET EQUIPMENT  
WIRELESS COMMUNICATION**



**TYPICAL CABINET EQUIPMENT  
FIBER & WIRELESS COMMUNICATION**

**APPENDIX D: PREVENTIVE MAINTENANCE FORM**



**MASSTR**

**REQUEST FOR PROPOSAL FOR MASSTR MAINTENANCE - APPENDIX D**

## New Jersey Sports and Exposition Authority Meadowlands Adaptive Signal System for Traffic Reduction Maintenance

Date:

MASSTR ID:

Maintenance Site:

Municipality:

Jurisdiction:

Time arrived on Site:

Time left Site:

Was there any lane closure? (Y/N)

How many lanes:

Did Police control traffic? (Y/N)

How many hours were police on site?

Number of workers:

Number of Detectors inspected, cleaned, serviced, and aimed:

- Were there any loose cables, screws, washers, and mounting brackets? (Y/N) If yes, please name them and specify how many.
- How many re-aiming detectors were performed?

Number of Antenna Assembly under 40 feet inspected, serviced, and adjusted:

- Were there any loose cables, screws, washers, and mounting brackets? (Y/N) If yes, please name them and specify how many.
- How many antenna adjustments were performed?

Number of Antenna Assembly over 40 feet inspected, serviced, and adjusted:

- Were there any loose cables, screws, washers, and mounting brackets? (Y/N) If yes, please name them and specify how many.
- How many antenna adjustments Were performed?

Number of Cabinet inspected, cleaned, and serviced:

- Was there any significant dent on the cabinet that needs replacement or repair?
- Was there any sign of rodents in the cabinet?
- Did the cabinet lock need a replacement/repair?

Concerns/Comments:



## New Jersey Sports and Exposition Authority Meadowlands Adaptive Signal System for Traffic Reduction Conflict Monitor Testing

Date:

Time:

Inspector Name:

MASSTR ID:

Intersection Name:

Movement	Observed Time	Compliant	Non-Compliant	Not Applicable	PED Actuation				
A: Green	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Y	N	NA	
Y	N								
NA									
A: Ped clear	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
A: Change	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
A: All Red	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Comment:									
B: Green	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Y	N	NA	
Y	N								
NA									
B: Ped clear	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
B: Change	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
B: All Red	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Comment:									
C: Green	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Y	N	NA	
Y	N								
NA									
C: Ped clear	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
C: Change	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
C: All Red	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Comment:									
D: Green	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td colspan="2">NA</td> </tr> </table>	Y	N	NA	
Y	N								
NA									
D: Ped clear	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					



D: Change	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D: All Red	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comment:				
E: Green	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E: Ped clear	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E: Change	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E: All Red	-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Y	N
NA	

Site is in full compliance with all relevant NJDT Standard governing timing and Operation

Signature -----