# STATE OF MICHIGAN
# CENTRAL PROCUREMENT SERVICES
Department of Technology, Management, and Budget
320 S. WALNUT ST., LANSING, MICHIGAN 48933
P.O. BOX 30026 LANSING, MICHIGAN 48909

## CONTRACT CHANGE NOTICE

Change Notice Number **1**

to

Contract Number **230000001291**

| CONTRACTOR | |
|---|---|
| | Kapsch TrafficCom USA, Inc. |
| | 2855 Premiere Parkway |
| | Duluth, GA 30097 |
| | David Hernandez |
| | 845-220-7802 |
| | david.hernandez2@kapsch.net |
| | VS0008701 |

| STATE | | | |
|---|---|---|---|
| | Program Manager | Various | MDOT |
| | | | |
| | | | |
| | Contract Administrator | Robin Lampert | DTMB |
| | | (517) 582-2746 | |
| | | lampertr1@michigan.gov | |

| CONTRACT SUMMARY | | | |
|---|---|---|---|
| CONNECTED VEHICLE – ADVANCED TRAFFIC MANAGEMENT SYSTEM (CV-ATMS) | | | |
| **INITIAL EFFECTIVE DATE** | **INITIAL EXPIRATION DATE** | **INITIAL AVAILABLE OPTIONS** | **EXPIRATION DATE BEFORE** |
| July 25, 2023 | July 24, 2028 | 5 - 1 Year | July 24, 2028 |
| **PAYMENT TERMS** | | **DELIVERY TIMEFRAME** | |
| | | | |
| **ALTERNATE PAYMENT OPTIONS** | | | **EXTENDED PURCHASING** |
| ☐ P-Card | ☐ PRC | ☐ Other | ☒ Yes ☐ No |
| **MINIMUM DELIVERY REQUIREMENTS** | | | |
| | | | |

| DESCRIPTION OF CHANGE NOTICE | | | | |
|---|---|---|---|---|
| **OPTION** | **LENGTH OF OPTION** | **EXTENSION** | **LENGTH OF EXTENSION** | **REVISED EXP. DATE** |
| ☐ | | ☐ | | July 24, 2028 |
| **CURRENT VALUE** | **VALUE OF CHANGE NOTICE** | **ESTIMATED AGGREGATE CONTRACT VALUE** | | |
| $5,557,655.00 | $0.00 | $5,557,655.00 | | |

**DESCRIPTION**

Effective February 13, 2024, the following amendments are incorporated into this Contract per attached Statement of Work. This change includes the following:
• replacement of DYNAC module with EcoTraffiX to meet additional business needs
• revised schedule and milestone dates
• clarification of deliverables and payment timing

Please note the Contract Administrator has been changed to Robin Lampert.

All other terms, conditions, specifications, and pricing remain the same. Per contractor and agency agreement, DTMB Central Procurement Services approval,
and State Administrative Board approval on February 13, 2024.

**Program Managers**
**for**
**Multi-Agency and Statewide Contracts**

| AGENCY | NAME | PHONE | EMAIL |
|---|---|---|---|
| DTMB | Dave Work | 517-719-2250 | WorkD@michigan.gov |
| MDOT | Elise Feldpausch | 517-636-0036 | FeldpauschE1@michigan.gov |

# STATEMENT OF WORK -
## IT CHANGE NOTICE

| | |
|---|---|
| **Project Title:**<br>CV-ATMS (IMP) | **Period of Coverage:**<br>2/12/24 – 1/31/25 |
| **Requesting Department:**<br>DTMB | **Date**:<br>1/3/24 |
| **Agency Project Manager:**<br>Elise Feldpausch | **Phone**:<br>(517) 636-0036 |
| **DTMB Project Manager:**<br>Dave Work | **Phone**:<br>(517) 719-2250 |

**BACKGROUND:**

The State of Michigan (SOM) is deploying a new Connected Vehicle – Advanced Traffic Management System (CV-ATMS) that must provide the following high-level functionality to improve transportation safety, mobility, and system performance:

**Connected Vehicles**

- Integrate and configure field devices through a map-based, user interface. Remotely operate, monitor, and manage field devices.
- Collect, ingest, store, and analyze data generated from field devices.
- Enhance MDOT's use of field device, mobile, and fixed data.
- Manage data, data exchange, certificate management, security, and message assembly.
- Provide a solution that provides the following functions:
    - Basic processes to generate MAP, Traveler Information Message (TIM), and Basic Infrastructure Message (BIM) messages.
    - Process for converting Signal Phase and Timing (SPaT) from traffic signal controllers into Society of Automotive Engineers (SAE) SpaT. Michigan.gov/MiProcurement
    - Basic Simple Network Management Protocol (SNMP) manager for interfacing to field devices.

**Security Credentials Management System (SCMS)**

- Provide a message credential solution for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication using a Public Key Infrastructure (PKI)-based approach that employs emerging industry standards, as developed by CAMP and others, of encryption and certificate management to facilitate trusted communication.

- The SCMS solution is anticipated to be a Software as a Service (SaaS) solution which supplies certificates and other elements to MDOT devices. MDOT does not intended to own the SCMS solution provided by the CV-ATMS Contractor.
- The supplied SCMS solution is not intended to be integrated into the CV-ATMS (i.e., it shall be a stand-alone system)

**Applications**

- Provide an application development platform that allows for scalability as new needs are discovered.
- Provide a collection of applications that share and disseminate solution information to the users of the system.
- Lane Closure Request Application – to provide a system capable of managing MDOT's lane closure request process. The process includes collecting, mapping, communicating, and reporting planned closures associated with road work, special events, or other circumstances that require closing lane(s) along MDOT roadways.
    - MDOT's Lane Closure Notification/Request Form is used for input into the CVBO.
- Weather Application – to provide a system that ingests various near real-time weather and environmental data points, observations, and feeds capable of the following functionality:
    - Converting the information into a geospatial shape with associated weather attributes to distribute notifications to users within the affected area.
    - Identifying active and predictive roadway flooding.
- Smart Work Zone Application – to collect work zone data from temporary infrastructure and field devices to assess various factors such as work zone limits, if work zone workers are present, active/deactive work zones, etc. Michigan.gov/MiProcurement
    - This application includes a Work Zone Data Exchange (WZDx) module

**Interfaces**

- Manage inbound/outbound interfaces using APIs to facilitate sharing data with internal and external systems.
- Provide an expandable data ingestion methodology for accepting data from a variety of data sources.
- Provide processes capable of processing, converting, translating, securing, and storing data that is ingested.
- Ingest and analyze data generated from interfaces.

**General Requirements**

- Provide system administration, monitoring, notifications, dashboards, and reports.

- Provide the ability to accommodate multiple sources and types of data.
- Provide data storage that is expandable to include a variety of data types as they become available.
- Include processes to translate data into useable formats, and to move data to other systems where needed.
- Provide a means for accessing data from the database.
- Provide a collection of web services that can access and process the stored data to provide information and share the data

**DEFINITIONS**

The following terms have the meanings set forth below. All initial capitalized terms that are not defined in this Schedule shall have the respective meanings given to them in Section 1 of the Contract Terms and Conditions.

| Term | Definition |
|---|---|
| CMCC | Connected Mobility Control Center |
| CV-ATMS | Connected Vehicle – Advanced Traffic Management System, a System being delivered by the Contractor |
| CVBO | Connected Vehicle Back Office |
| DYNAC | DYNAC is the trademark name of one of the Contractor's products. |
| ETX | EcoTraffiX |
| TRIP | Traffic Intelligence Platform |

**Refinement of Initial Plan**

Kapsch recommended implementing EcoTraffiX (ETX) in place of DYNAC. ETX supports some additional Business Specifications that were not supported in the original Contract's **Schedule A – Table 1 – Business Specification Worksheet**. These changes are described in **Schedule A – Business Specification Changes** of this Statement of Work (SOW). In addition, this change requires fewer virtual servers and will save the State's internal costs may potentially facilitate future enhancements.

Changes to the milestones, deliverables, and schedule are incorporated into **Schedule B – Deliverables, Milestones, and Payments**.

Business Specifications that were included in the initial Contract as Optional will be incorporated or removed as determined during the Requirements Verification.

**PROJECT OBJECTIVE:**

- Configuration, customization, testing, and implementation of the functionality identified in the CV-ATMS Contract project using ETX in place of DYNAC.
- Interface with relevant MDOT systems and databases.

- Contractor provided training.
- Contractor provided user manuals and technical documentation.

**SCOPE OF WORK:**

CV-ATMS integrates several Contractor applications into one platform.

- ETX: Operational GUI + Applications
- CMCC: Connected Vehicle Manager
- MDP: Mobility Data Platform, data repository, exchange, and analytics subsystems

**Software**

Deploy ETX as the operational console for the CV-ATMS Solution.

**Infrastructure**

The table below outlines the current infrastructure needs to deploy the CV-ATMS solution per environment. The final design and server counts will be defined in the System Architecture and Design Plan.

| Infrastructure Currently Under Implementation / Newly Proposed Solution | | | | |
|---|---|---|---|---|
| **Component** | **CPU - Cores** | **Memory in GB** | **Storage** | **Type** |
| ETX Operational Console and Application Servers | 20 | 128 | 4 TB | Kubernetes Cluster |
| Qlik Sense Server | 5 | 16 | .5 TB | Windows Virtual Machine |
| Mobility Data Platform | 40 | 60 | 20 TB | Kubernetes Cluster |
| MDOT Connectors | 4 | 8 | .5 TB | Kubernetes Cluster |
| CMCC | 16 | 64 | 2.5 TB | Kubernetes Cluster |

Section 27. Maintenance Releases; New Versions of the Software Contract Terms and Conditions will continue to apply to the Connected Vehicle – Advanced Traffic Management System (CV-ATMS).

**DELIVERABLES:**

Deliverables will not be considered complete until the Agency Project Manager has formally accepted them. Deliverables include the CV-ATMS system, project management and system documentation, training, testing, go-live, a warranty period, and on-going maintenance and support. Each deliverable associated with a payment is described in **Schedule B – Deliverables, Milestones, and Payments**.

## ACCEPTANCE CRITERIA:

Acceptance criteria for the system is defined in Schedule I of the Contract. Acceptance criteria for documentation is defined is the Terms and Conditions, section 10. Documentation will follow the State's SUITE standards or substitute formats, which have to be agreed to in writing by the State. Required project documents are listed in **Schedule B – Deliverables, Milestones, and Payments.**

## PROJECT CONTROL, MEETINGS, AND REPORTS:

**Weekly Project Status Meetings**: After the project kickoff, the Contractor Project Manager will schedule weekly project status meetings for the duration of the development phase. Contractor personnel will distribute the agenda for each meeting and a weekly report at least three business days in advance. Contractor will capture meeting minutes, action items, risks, decisions, issues, accomplishments, and track actions in a rolling action item list, and publish the data within three business days after each meeting. Each agenda will include a two-week outlook for upcoming deliverables, progress report update, discussion of issues and risks, action items, and schedule milestones and re-baselines.

A **weekly progress report** must be submitted by the Contractor to the Agency and DTMB Project Managers throughout the life of this project. The contents for these reports are documented in the Contract's Statement of Work, section 22.

A **monthly status report** must be created and submitted by the Contractor throughout the term of the project prior to a monthly Project Status Meeting. The Relationship Manager and MDOT/DTMB Project and Program Managers will be members of the Monthly Project Status Meetings and include others as determined by the State's Program Managers and the Relationship Manager and documented in the Communications Plan. Monthly Status Meetings will be held monthly for the duration of the project, or at a modified frequency as mutually agreed in writing by both parties. The Relationship Managers may also utilize other meetings as agreed in the Communication Plan. If escalation is required, the appropriate roster is listed in the Communication Plan.

The Contractor with meet with the State of Michigan/MDOT's team at minimum **quarterly to discuss the product roadmap** and the direction of the Kapsch TRIP system development as described in the Statement of Work, section 9.

Other meetings as documented in the Contract's Statement of Work section 21 will still apply. Meetings can be cancelled by mutual agreement in writing.

Contractor will coordinate and provide the schedule of meetings with the integration 3rd parties.

**PAYMENT SCHEDULE:**

Payment will be made on satisfactory acceptance of each deliverable. DTMB will pay Contractor upon receipt of properly completed invoice(s) which shall be submitted to the billing address on the State issued delivery order not more often than monthly. DTMB Accounts Payable area will coordinate obtaining Agency and DTMB Project Manager approvals. All invoices should reflect actual work completed by payment date and must be approved by the Agency and DTMB Project Manager prior to payment. The invoices shall describe and document to the State's satisfaction a description of the work performed, the progress of the project, fees, and the delivery order number.

Payment shall be considered timely if made by DTMB within forty-five (45) days after receipt of properly completed invoices.

**EXPENSES:**

The State will NOT pay for any travel expenses, including hotel, mileage, meals, parking, etc.

**PROJECT CONTACTS:**

The Contractor Relationship Manager will be one of the Key Personnel until the end of the warranty period. The designated Kapsch Relationship Manager is:

Frank Meehan
910-232-2834
Frank.Meehan@kapsch.net

The SOM Program Managers will serve in the role of Relationship Managers for SOM. They are

Elise Feldpausch (MDOT)
517-636-0036
FeldpauschE1@michigan.gov

Dave Work (DTMB)
517-719-2250
WorkD@michigan.gov

The Relationship and Program Managers will serve as the primary points of contact for addressing escalations for programmatic issues with the project. The Relationship Manager and Program Managers will be responsible for facilitating communication, resolving conflicts, and ensuring alignment between the State and Contractor.

**This delivery order is a release from Contract Number 230000001291. This delivery order, statement of work, and the terms and conditions of Contract Number 230000001291** constitute the entire agreement between the State and the Contractor.

# SCHEDULE A – BUSINESS SPECIFICATION CHANGES

Business Specification Type is R for Required or O for Optional.

| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Description of What Will Be Provided |
|---|---|---|---|
| 1.4 | The CV-ATMS must have documented Application Program Interface(s) (APIs) that supports current recognized industry standards that will enable all data collected through the CV-ATMS to be shared and integrated with other systems. | R | CV-ATMS offers two standards-based APIs that allow publishing and consuming information.<br>a. There is a synchronous REST API that facilitates administration and consultation tasks (registration of new datasets and topics, consultation of available topics, consultation of schemas and formats, etc.), as well as synchronous publication and consumption of data.<br>b. Additionally, an asynchronous API based on STOMP over WebSocket is also offered, which allows systems to subscribe to topics and receive information events as soon as they are published.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>The two APIs mentioned are available as they are provided by MDP component. In addition to that, ETX component compliments those two APIs with a third one (called ETX External API) focused on ITS devices operation (sending/receiving commands), assets, etc. |
| 1.5 | The CV-ATMS must be able to scale without a decrease in performance (map lag, field device layer displays, display of lists, execution of queries, etc.) with increased operational demands. | R | CV-ATMS is virtualized and scaling system architecture/hosting platform will support increased operational demands with no degradation in performance. The software application has no limits on the data demands.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>With ETX component the CV-ATMS can be fully deployed using containers orchestrator (Kubernetes). This approach enhances scalability and reduces cost of ownership. |

| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Description of What Will Be Provided |
|---|---|---|---|
| 1.8 | The CV-ATMS must allow for the implementation of new software components (e.g., firmware, server, etc.) without disruption to the rest of the system. | R | The CV-ATMS Solution runs in a redundant system architecture that supports updating software modules on one set of virtualized servers while the other is running.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>Kubernetes deployments of replicated services are coordinated with a load-balancer, which redirects traffic to the different running replicas while one of them is stopped and replaced by the new version.<br>If the service is not replicated, the download of the new version (new image) is done without interrupting the execution of the service to be replaced, and only when the new container is ready to execute, the old one is stopped and the new one is executed, resulting in minimal service downtime.<br>The various components that use the service to be replaced re-establish the connection as soon as the replaced service is available. |
| 4.1 | The CV-ATMS must comply with Access Control and Authentication of the statement of work regarding login and authentication capabilities. | R | Kapsch supports external user authentication (SAML, SSO, etc.) and will enhance and extend existing user authentication per MDOT Access Control and Authentication requirements.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>With ETX, all components in the CV-ATMS will use a shared Keycloak instance that provides multiple authentication mechanisms.<br>Due to the change to ETX, this requirement no longer requires customization and can be achieved with configuration. |

| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Description of What Will Be Provided |
|---|---|---|---|
| 4.2 | The CV-ATMS must provide role-based access controls and allow authorized users to define and assign different user access levels which enable and/or restrict all features, functions and/or data available based on permissions of the user. | R | The user permissions application in CV-ATMS contains role-based permissions that allow defining access levels based on specific system features.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>ETX has a users management & roles module that provides roles and permission profiles that can be managed by organizations, even allowing cross-organization roles. |
| 4.4 | The CV-ATMS must provide the ability to generate automated emails to users regarding access information for their user accounts, such as notifications to update a password. | R | The current functionality in our user permissions application does not include email notifications. This will be added during this project.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>This is standard functionality in Keycloak. The business specification is now a current capability and does not require customization. |
| 5.14 | The CV-ATMS must provide the ability for individual users to update, edit, and save user preference settings of the initial page entry and display within the system. Once saved, those settings must apply only to the individual's user account. | R | This is standard functionality in the Kapsch solution.<br>An ETX implementation exceeds the original Kapsch response for this requirement.<br>Map rotation is supported with the change to ETX. |
| 6.4 | The CV-ATMS map must include intuitive map navigation controls, including a compass if the map can be rotated. | R | This is standard functionality in the Kapsch solution. An ETX implementation exceeds the original Kapsch response for this requirement with support for map rotation. Note that the compass is not visualized in the map, but there is a quick button to reset the north orientation. |

| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Description of What Will Be Provided |
|---|---|---|---|
| 6.6 | The CV-ATMS map should have an interactive (point and click) distance measurement tool. | O | This optional feature is one is lost in the new configuration, but will be added in a future enhancement. |
| 19.4 | The CV-ATMS should be configurable so that notification recipients can receive notifications based on their permissions, area of responsibility, and other user attributes. | O | An ETX implementation exceeds the original Kapsch response for this requirement.<br>Due to the change to ETX, this requirement no longer requires customization. ETX notification functionality includes notifications based upon permissions and areas of responsibility as current capability. |

# SCHEDULE B – DELIVERABLES, MILESTONES, AND PAYMENTS

Each milestone, with its deliverables, is defined in more detail below the table. With the exception of the Go Live, dates may be modified by mutual agreement of the Program Managers in writing.

**On-Going Project Costs**

| ID | Milestone | Deliverable | Frequency | Payment |
|---|---|---|---|---|
| 1 | General Project Management | Kick-Off<br>Project Status Meetings<br>Updates to Project Documentation | Monthly for 15 months | $42,744.07 / month<br>$641,161.05 total |
| 2 | Training | Initial Trainings | 3 Sessions | $5,333.33 / session<br>$16,000 / total |
| 3 | Acceptance of Initial Project Documentation | Baseline Project Schedule<br>Risk Management Plan<br>Quality Management Plan | 4/16/2024<br>Paid on initial acceptance | $19,809.40/ document<br>$59,428.20 / total |

**1 General Project Management**

To be paid monthly for the anticipated project term of 15 months.

**2 Training**

Three sessions, scheduled every four months for 12 months, beginning 60 days prior to Software Testing and Acceptance

**3 Initial Project Documentation**

Paid on initial approval; updated as needed throughout the project.

- **Project Schedule**

The Contractor's Project Schedule will include

- project tasks, including inputs, approach, outputs, constraints, and critical path items.
- a Work Breakdown Structure (WBS) in chart format illustrating tasks, sub-tasks, predecessors, meetings, trainings, workshops, and deliverables on a timeline.

- After the Kick-off meeting a plan with the total number for business specifications and assignment to deployments and releases will be delivered within 1 month. An updated baseline Schedule, including the plan of software/application deployments, will be made available for State's approval upon the completion of the Requirements Validation Milestone.
- detail through all project phases, including documentation, software development, testing, integration, transition, and training.

- **Risk Management Plan**

The Contractor's Project Schedule will

- address the processes for identifying, assessing, mitigating, and monitoring the risks expected or encountered during the project's life cycle.
- identify the roles and responsibilities of all participating organizations for risk management.
- identify 1) risks; 2) assess the relative level of risk as either: likely, probable, improbable, and impossible; 3) prioritize risks; 4) identify risk mitigation for likely, probable, and improbable risks, 5) define methods for monitoring risks, and 6) identify risk owner/lead.

- **Quality Management Plan**

The Contractor's Quality Management Plan will

- define how the Contractor will demonstrate compliance with the Contract business specifications and/or standards.
- describe the self-check process and/or procedures performed to ensure deliverables meet business specifications and the documentation and/or records are maintained.
- define quality staff and demonstrate that all quality staff are qualified, experienced, and have the proper skills/background.
- define procedures that ensure any and all failures, malfunctions, deficiencies, defects, deviations, etc., are corrected and/or documented according to the Quality Management Plan and Contract requirements.

**Project Deliverables**

| ID | Milestone | Deliverable | Due Date | Payment |
|---|---|---|---|---|
| 4 | Validate Requirements | Requirements Confirmation Document | 4/25/2024 | $19,809.40 |
| 5 | System Architecture, Installation and Operations Planning | System Architecture and Design Plan<br>System Installation Guide<br>SCMS Operations Plan | 4/26/2024<br>10/1/2024<br>10/14/2024 | $19,809.40/ document<br>$59,428.20 / total |
| 6 | System User Doc | System User Doc | 8/30/2024 | $19,809.40 |
| 7 | Software Development Plan | Software Development Plan | 5/14/2024 | $19,809.40 |
| 8 | Interface Control Plan | Interface Control Plan | 7/18/2024 | $19,809.40 |
| 9 | Data Dictionary | Data Dictionary | 8/15/2024 | $19,809.40 |
| 10 | Configuration Management Plan | Configuration Management Plan | 8/21/2024 | $19,809.40 |
| 11 | Transition Plan | Transition Plan to Production Environment<br>(Note: Initial Draft 6/27/2024) | 12/1/2024 | $19,809.40 |
| 12 | Standards Document | Standards Document<br>(Note: Initial Draft 6/31/2024) | 10/18/2024 | $19,809.40 |
| 13 | Provision Environments | Validate Test and Production Environments | Development – 4/15/2024<br>Training/QA – 11/25/2024<br>Production 2/1/2025 | n/a |

| | | | | |
|---|---|---|---|---|
| 14 | Software and Application Development, Configuration, and Testing | Software Development, Configuration, and Testing<br>Kapsch will conduct multiple deployments to the development environment as interfaces are developed and configured. The deployment schedule will be determined as part of the Project Schedule. Each deployment would be paid proportionally to a total of 50% of the Software development and configuration as part of release 1.<br>User Acceptance Testing Plan | 12/19/24 | $ 1,056,613.00 / total |
| | | Acceptance of User Acceptance Testing (UAT) Results | 3/3/2025 | $528,306.50 |
| | | Release 1 Go-Live | By 3/31/2025 | $528,306.50 |
| 15 | Incorporated Optional Business Specifications Development, Configuration, and Testing | This milestone includes the Business Specifications that were noted as optional in the Contract and included into the requirements during Requirements Verification. Each deployment would be paid proportionally to a total of 50% of the Software development and configuration as part of release 2. | 3/12/2025 | $275,350.00 / total |
| | | Acceptance of User Acceptance Testing (UAT) Results | 5/19/2025 | $ 137,675.00 |
| | | Release 2 Go-Live | 6/25/2025 | $ 137,675.00 |

| | | | | |
|---|---|---|---|---|
| 16 | Project Close Out | Updates to Documentation<br>Requirements Confirmation Document, System Architecture and Design Plan, SCMS Operations Plan, Systems User Documentation, System Installation Guide, Interface Control Plan, Data Dictionary, Configuration Management Plan, Standards Documentation<br>During the course of the project, Kapsch will work closely with DTMB/MDOT to determine which documents need updating as the system delivery progresses | 6/24/2025 | $19,805,65 |
| 17 | Solution Integration and Acceptance | Integration of Field Devices<br>Successful Burn-In Period<br>Warranty Period & Final Acceptance | 5/1/2025<br>7/3/2025<br>10/2/2025 | $148,357.50<br>$49,452.50<br>included |

**4. Validate Requirements**

- Contractor will organize meetings where the Contractor must review each business specification and demonstrate how each will be met. Any adjustments and/or proposed workarounds must be approved by the State.
- Once the business specifications have been reviewed and approved, they will all be required and may also be referred to as requirements.
- At the conclusion of the requirement confirmation meetings a Draft Requirements Confirmation Document deliverable must be provided to the State to document the results of the validation sessions, requirement revisions, and/or approved workarounds.

**5. System Architecture, Installation and Operations Planning**

- **System Architecture and Design Plan**

The Contractor will include the following in the System Architecture and Design Plan:

- detailed design plans of the network components, including physical and logical cores, physical and logical servers, physical and logical access, Virtual Local Area Networks (VLANs), Virtual Private Network (VPN) users, equipment vicinity, and rack layout as applicable.

- detailed descriptions of:
  - All servers such as application servers, database servers, communication servers, directory servers, clock servers, test servers, backup servers, Internet Information Services (IIS) servers, and others;
  - Typical workstations configurations including monitors and printers;
  - Uninterruptible Power Supplies (UPS), switches, power switches, routers, firewalls; and
  - Field devices that will be managed or monitored by the system.
- interfaces between subsystems and external systems.
- security compliance.
- information requested by the State during the Enterprise Architecture Solution Assessment (EASA).

- **System Installation Guide**

  The System Installation Guide (SIG) developed by the Contractor will define the installation, integration, and configuration of all CV-ATMS hardware, software, and modules, supporting operating systems, databases, 3rd party software, and any other software as needed for a full and complete solution.

- **SCMS Operations Plan**

  The SCMS Operations Plan developed by the Contractor will

  - detail all functionality of the SCMS solution, including all interfaces for MDOT personnel.
  - detail the process for initial bootstrapping of all devices by MDOT, including RSU and OBU.
  - detail the process for initial bootstrapping of all devices by MDOT partners in a separate, stand-alone appendix, that can be provided to MDOT partners as needed.
  - document the method for certificate revocation, both automated and manual.
  - document the method for decommissioning of devices.
  - document the process for certificate reloading on all devices, including the requirements for the MDOT system (e.g., IPv6, tunnels, firewalls, Internet access).

**6. System User Documentation**

The System User Documentation (SUD) developed by the Contractor will

- detail all functionality of the CV-ATMS.
- include user guides for each specific application within the CV-ATMS.
- include troubleshooting techniques and other user help information.
- be updated in conjunction with each system update/release and include an update log.

**7. Software Development Plan**

Contractor will include narrative descriptions and screenshots for phasing, software development, downstream impacts (detailed in the Risk Management Plan), configuration, and/or customization of the Commercially Off the Shelf (COTS) product(s).

**8. Interface Control Plan**

Contractor will include

- the physical, functional, and content characteristics of both internal and external interfaces to a system, and the responsibilities of the organizations on both sides of the interface.
- 3rd party vendors and other existing hardware and software providers that the CV-ATMS will interface and integrate with.

**9. Data Dictionary**

The Data Dictionary delivered by the Contractor will contain the information necessary to describe CV-ATMS and API data elements, including name, type, max length, description, mandatory/optional.

**10. Configuration Management Plan**

The Configuration Management Plan delivered by the Contractor will

- define the set-up and configuration of maps, user access, alerts, logs, standard reports, dashboards, schedules, etc.
- define the set-up and configuration of devices for each device type, make, and model to be integrated and the associated standards and protocols being used.
- outline processes, procedures, and responsibilities for documenting and implementing changes, modifications, and enhancements. This includes the design requirements, acceptance, and approval authorities.

**11. Transition Plan (see Schedule G for transition requirements)**

Contractor will define the transition sequence, schedule, cutover timeline, and responsibilities of the Contractor's team and the State team from pre-transition through post go-live. In addition, the document will describe roll back plans in case something goes wrong during the cutover process. As part of this document, Contractor will work with the State to identify and document all specific requirements/constraints (e.g., minimize disruptions to operations, avoid transitioning during major or special events, etc..) that would impact scheduling and planning.

**12. Standards Documentation**

Based on the use cases, the Standards Documentation will define the relevant industry standards being used, any interpretation of the standards, and deviations to the standards, including but not limited to:

- SAE Standards (i.e. J2540, J2735, J2945, etc)
- IEEE Standards (i.e. 1609, 802.11, etc.)
- CTI 4001 Roadside Unit (RSU) Standard

**13. Provision Environments**

Includes the collaborative effort between Kapsch and MDOT/DTMB to standup the different environments so that they are ready for deployment of the CV-ATMS rolling deployments and final production versions.

**14. Release 1 - Software and Application Development, Configuration, and Testing**

- At Kick-off (milestone 1) and during Requirements Verification (milestone 4), the number of deployments and releases may be adjusted. The adjustments will be documented in the baseline project schedule.
- Contractor will develop, configure, and test the software with at least one deployment to the development environment per quarter beginning once the requirements are validated (milestone 4).
- Contractor will report which business specifications have been met in each deployment.
- Software development, configuration and testing includes the waterfall approach of rolling deployments to the Development and QA Environments as interfaces are developed to be integrated into the overall CV-ATMS package.
- Application development, configuration and testing includes the waterfall approach of rolling deployments to the Development and QA Environments as interfaces are integrated and configured to specific MDOT

business specifications. This application configuration takes place soon after the software development for the interface has been completed.

- Payments will be proportional to the business specifications delivered and will be calculated based on a different total depending on whether they were defined in the Contract as required or optional.
    - The total payment for all the required business specifications is $2,113,226.00. The total payment for optional business specifications is $550,000.00.
    - Half of the payment for business specifications deployed to the development environment is due at acceptance. Acceptance will be based on a demonstration of the capabilities.
    - At acceptance of UAT in the QA environment, an amount equal to a quarter of the amount for the released business specifications will be due.
    - After Go-Live is accepted, the final quarter for the proportion of the released business specification types will be due.

**15. Release 2 – Incorporated Optional Business Specifications Development, Configuration, and Testing**

During requirements validation (Milestone 4), the Contractor and SOM will confirm which of the Business Specifications that are identified as optional in the Contract are now part of the requirements. These additional Business Specifications will be included in the CV-ATMS by the end of release 2. The required steps for Release 2 and any other Deployments or Releases under this Change Notice will be the same as documented in milestone 14 Release 1.

**16. Updates to System Documentation**

Documentation requiring updates after initial submission and review will be determined as the project progresses.

**17. Solution Integration and Acceptance**

- Successful deployment in the Production Environment with 100% of field device = 75% of the payment.
    - Phases to be determined.
- Successful burn-in with 100% of Software in Production Environment = 25% of the payment.
    - Phases to be determined.

- A burn-in period is required with each release.
- This milestone refers to 100% of the Field Devices as defined at 60 days prior to Go-Live for Release 1.

**Post Project Payments**

| ID | Description | Unit of Measure | Unit Cost | Anticipated Quantity | Payment |
|---|---|---|---|---|---|
| **Prorated for Year 2; Years 3-5** | | | | | |
| 18 | Licensing Subscription | Year | $265,000.00 | 3.5 | $927,500.00 |
| 19 | Operations and Maintenance | Month | $16,085.93 | | |
| 20 | Basic Training Course | Session | $6,000.00 | 1 | $6,000.00 |
| 21 | New Software Build Training | Session | | | included |
| **Optional Contract Renewals (Years 6-10)** | | | | | |
| 22 | Annual Project Management - Contract Renewals - Years 6-10 | Year | $56,233.00 | 5 | $281,165.00 |
| 23 | Annual License and Hosting - Contract Renewals - Years 6-10 | Year | $265,000.00 | 5 | $1,325,000.00 |
| 24 | Annual Support & Maintenance - Contract Renewals - Years 6-10 (billed monthly) | Month | $12,281.25 | 60 | $736,875.00 |

**18. Licensing**

Licensing costs will be paid after installation, configuration, and State testing and acceptance of the Software in Release 1. Number of Years may vary – will be pro-rated based upon implementation schedule.

**19. Operations and Maintenance**

Number of Years may vary – will be pro-rated based upon implementation schedule – billed monthly. Partial payment will begin upon the end of warranty for Release 1 proportional to the percent of business specifications identified as required in the Contract.

**20. Basic Training Course**

Contractor will conduct a basic training course annually or upon request, which includes at least one 4-hour day of basic training for up to 20 users. These trainings are intended for new users with little to no familiarization of the system and may, at the discretion of the State, be recorded for future use or replay. The State may request these trainings to be focused on specific functions of the system or to cover all aspects of the system.

21. **New Software Build Training**

    The Contractor must provide a new software build training course, to be conducted within 30 calendar days of each major software enhancement and/or build, which includes at least one 4-hour new software/major software enhancement training for up to 40 users. These trainings must cover all aspects and functions of the software system enhancement and/or build.

22. **Annual Project Management – Contract Renewals – Years 6-10**

    On-going project management and communication. Administrative management of the Contract; update meetings.

23. **Annual License and Hosting – Contract Renewals – Years 6-10**

    Annual licenses and hosting billed annually in advance.

24. **Annual Support & Maintenance – Contract Renewals – Years 6-10**

    Billed monthly.

Other items including additional RSU charges and the Rate Card for Ancillary Professional Services remain as documented in the base Contract – **Schedule B – Pricing**.

# STATE OF MICHIGAN PROCUREMENT

Department of Technology, Management, and Budget
320 South Walnut Street
PO Box 30026
Lansing, MI 48909

## NOTICE OF CONTRACT

NOTICE OF CONTRACT NO. **230000001291**
between
THE STATE OF MICHIGAN
and

| CONTRACTOR | |
|---|---|
| | Kapsch TrafficCom USA, Inc. |
| | 2855 Premiere Parkway |
| | Duluth, GA 30097 |
| | David Hernandez |
| | 845-220-7802 |
| | David.Hernandez2@kapsch.net |
| | VS0008701 |

| STATE | | | |
|---|---|---|---|
| | Program Manager | Multi | Multi |
| | | Multi | |
| | | Multi | |
| | Contract Administrator | Christopher Martin | DTMB |
| | | 517-643-2833 | |
| | | martinc20@michigan.gov | |

| CONTRACT SUMMARY | | | |
|---|---|---|---|
| **DESCRIPTION: Connected Vehicle – Advanced Traffic Management System (CV-ATMS)** | | | |
| **INITIAL EFFECTIVE DATE** | **INITIAL EXPIRATION DATE** | **INITIAL AVAILABLE OPTIONS** | **EXPIRATION DATE BEFORE CHANGE(S) NOTED BELOW** |
| 7/25/2023 | 7/24/2028 | 5, One-Year | 7/24/2028 |
| **PAYMENT TERMS** | | **DELIVERY TIMEFRAME** | |
| **Net 45** | | | |
| **ALTERNATE PAYMENT OPTIONS** | | | **EXTENDED PURCHASING** |
| ☐ P-card ☐ Payment Request (PRC) ☐ Other | | | ☒ Yes ☐ No |
| **MINIMUM DELIVERY REQUIREMENTS** | | | |
| | | | |
| **MISCELLANEOUS INFORMATION** | | | |
| | | | |
| **ESTIMATED CONTRACT VALUE AT TIME OF EXECUTION** | | | **$5,557,655.00** |

## Program Managers

## for

## Multi-Agency and Statewide Contracts

| AGENCY | NAME | PHONE | EMAIL |
|---|---|---|---|
| DTMB | Dave Work | 517-719-2250 | workd@michigan.gov |
| MDOT | Elise Feldpausch | 517-636-0036 | Feldpausche1@michigan.gov |

## FOR THE CONTRACTOR:

**Company Name**

**Authorized Agent Signature**

**Authorized Agent** (Print or Type)

**Date**

## FOR THE STATE:

**Signature**

**Name & Title**

**Agency**

**Date**

# SOFTWARE CONTRACT TERMS AND CONDITIONS

These Terms and Conditions, together with all Schedules (including the Statement(s) of Work), Exhibits and any other applicable attachments or addenda (Collectively this "Contract") are agreed to between the State of Michigan (the "**State**") and Kapsch TrafficCom USA, Inc. ("**Contractor**"), a Delaware corporation. This Contract is effective on 7/25/2023 ("**Effective Date**"), and unless terminated, will expire on 7/24/2028 (the "**Term**").

This Contract may be renewed for up to five additional one-year period(s). Renewal is at the sole discretion of the State and will automatically extend the Term of this Contract. The State will document its exercise of renewal options via a Change Notice.

**1. Definitions**. For the purposes of this Contract, the following terms have the following meanings:

"**Acceptance**" has the meaning set forth in **Schedule I.**

"**Acceptance Tests**" means such tests as may be conducted in accordance with **Schedule I** and a Statement of Work to determine whether the Software meets the requirements of this Contract and the Documentation.

"**Affiliate**" of a Person means any other Person that directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, such Person. For purposes of this definition, the term "control" (including the terms "controlled by" and "under common control with") means the direct or indirect ownership of more than fifty percent (50%) of the voting securities of a Person.

"**Allegedly Infringing Materials**" has the meaning set forth in **Section 17.2(b)**.

"**Approved Third Party Components**" means all third party components, including Open-Source Components, that are included in or used in connection with the Software and are specifically identified by Contractor in the Contractor's Bid Response or as part of the State's Security Accreditation Process defined in Schedule E – Data Security Requirements.

"**Authorized Users**" means all Persons authorized by the State to access and use the Software under this Contract, subject to the maximum number of users specified in the applicable Statement of Work.

"**Business Day**" means a day other than a Saturday, Sunday or other day on which the State is authorized or required by law to be closed for business.

"**Business Requirements Specification**" means the initial specification setting forth the State's business requirements regarding the features and functionality of the Software, as set forth in a Statement of Work.

**"Change"** has the meaning set forth in **Section 2.2.**

**"Change Notice**" has the meaning set forth in **Section 2.2(b).**

**"Change Proposal**" has the meaning set forth in **Section 2.2(a).**

**"Change Request**" has the meaning set forth in **Section 2.2.**

**"Confidential Information**" has the meaning set forth in **Section 22.1.**

"**Configuration**" means State-specific changes made to the Software without Source Code or structural data model changes occurring.

"**Contract**" has the meaning set forth in the preamble.

"**Contract Administrator**" is the individual appointed by each party to (a) administer the terms of this Contract, and (b) approve any Change Notices under this Contract. Each party's Contract Administrator will be identified in Schedule A or subsequent Change Notices.

"**Contractor**" has the meaning set forth in the preamble.

"**Contractor's Bid Response**" means the Contractor's proposal submitted in response to the RFP.

"**Contractor Hosted**" means the Hosted Services are provided by Contractor or one or more of its Permitted Subcontractors.

"**Contractor Personnel**" means all employees of Contractor or any subcontractors or Permitted Subcontractors involved in the performance of Services hereunder.

"**Contractor Project Manager**" means the individual appointed by Contractor and identified in Schedule A or subsequent Change Notices to serve as the primary contact with regard to services, to monitor and coordinate the day-to-day activities of this Contract, and to perform other duties as may be further defined in this Contract, including an applicable Statement of Work.

"**Customization**" means State-specific changes to the Software's underlying Source Code or structural data model changes.

"**Deliverables**" means the Software, and all other documents and other materials that Contractor is required to or otherwise does provide to the State under this Contract and otherwise in connection with any Services, including all items specifically identified as Deliverables in a Statement of Work and all Work Product.

"**Deposit Material**" refers to material required to be deposited pursuant to **Section 28.**

**"Disaster Recovery Plan"** refers to the set(s) of documents, instructions, and procedures which enable the Contractor to respond to accidents, disasters, emergencies, or threats without any stoppage or hindrance in its key operations and to the actions the Contractor takes to meet the Recovery Point and Recovery Time Objectives.

"**Documentation**" means all user manuals, operating manuals, technical manuals and any other instructions, specifications, documents or materials, in any form or media, that describe the functionality, installation, testing, operation, use, maintenance, support, technical or other components, features or requirements of the Software.

"**DTMB**" means the Michigan Department of Technology, Management and Budget.

"**Effective Date**" has the meaning set forth in the preamble.

"**Fees**" means the fees set forth in the Pricing Schedule attached as **Schedule B**.

"**Financial Audit Period**" has the meaning set forth in **Section 23.1.**

"**Harmful Code**" means any software, hardware or other technologies, devices or means, the purpose or effect of which is to: (a) permit unauthorized access to, or to destroy, disrupt, disable, encrypt, modify, copy, or otherwise harm or impede in any manner, any (i) computer, software, firmware, data, hardware, system or network, or (ii) any application or function of any of the foregoing or the integrity, use or operation of any data Processed thereby; or (b) prevent the State or any Authorized User from accessing or using the Services as intended by this Contract, and includes any virus, bug, trojan horse, worm, backdoor or other malicious computer code and any time bomb or drop dead device.

"**HIPAA**" has the meaning set forth in **Section 21.1.**

"**Hosted Services**" means the hosting, management and operation of the Operating Environment, Software, other services (including support and subcontracted services), and related resources for remote electronic access and use by the State and its

Authorized Users, including any services and facilities related to disaster recovery obligations.

"**Implementation Plan**" means the schedule included in a Statement of Work setting forth the sequence of events for the performance of Services under a Statement of Work, including the Milestones and Milestone Dates.

**"Integration Testing**" has the meaning set forth in **Schedule I.**

"**Intellectual Property Rights**" means all or any of the following: (a) patents, patent disclosures, and inventions (whether patentable or not); (b) trademarks, service marks, trade dress, trade names, logos, corporate names, and domain names, together with all of the associated goodwill; (c) copyrights and copyrightable works (including computer programs), mask works and rights in data and databases; (d) trade secrets, know-how and other confidential information; and (e) all other intellectual property rights, in each case whether registered or unregistered and including all applications for, and renewals or extensions of, such rights, and all similar or equivalent rights or forms of protection provided by applicable law in any jurisdiction throughout the world.

"**Key Personnel**" means any Contractor Personnel identified as key personnel in the Contract.

"**Loss or Losses**" means all losses, including but not limited to, damages, liabilities, deficiencies, claims, actions, judgments, settlements, interest, awards, penalties, fines, costs or expenses of whatever kind, including reasonable attorneys' fees and the costs of enforcing any right to indemnification hereunder and the cost of pursuing any insurance providers.

"**Maintenance Release**" means any update, upgrade, release or other adaptation or modification of the Software, including any updated Documentation, that Contractor may generally provide to its licensees from time to time during the Term, which may contain, among other things, error corrections, enhancements, improvements or other changes to the user interface, functionality, compatibility, capabilities, performance, efficiency or quality of the Software.

"**Milestone**" means an event or task described in the Implementation Plan under a Statement of Work that must be completed by the corresponding Milestone Date.

"**Milestone Date**" means the date by which a particular Milestone must be completed as set forth in the Implementation Plan under a Statement of Work.

"**New Version**" means any new version of the Software, including any updated Documentation, that the Contractor may from time to time introduce and market generally as a distinct licensed product, as may be indicated by Contractor's designation of a new version number.

"**Nonconformity**" or **"Nonconformities"** means any failure or failures of the Software to conform to the requirements of this Contract, including any applicable Documentation.

"**Open-Source Components**" means any software component that is subject to any open-source copyright license agreement, including any GNU General Public License or GNU Library or Lesser Public License, or other obligation, restriction or license agreement that substantially conforms to the Open Source Definition as prescribed by the Open Source Initiative or otherwise may require disclosure or licensing to any third party of any source code with which such software component is used or compiled.

"**Operating Environment**" means, collectively, the platform, environment and conditions on, in or under which the Software is intended to be installed and operate, as set forth in a Statement of Work, including such structural, functional and other features, conditions and components as hardware, operating software, system architecture, configuration, computing hardware, ancillary equipment, networking, software, firmware, databases, data, and electronic systems (including database management systems).

**"PAT"** means a document or product accessibility template, including any Information Technology Industry Council Voluntary Product Accessibility Template or VPAT®, that specifies how information and software products, such as websites, applications, software and associated content, conform to WCAG 2.0 Level AA.

"**Permitted Subcontractor**" means any third party hired by Contractor to perform Services for the State under this Contract or have access to State Data.

"**Person**" means an individual, corporation, partnership, joint venture, limited liability company, governmental authority, unincorporated organization, trust, association or other entity.

"**Pricing Schedule**" means the schedule attached as **Schedule B.**

**"Process"** means to perform any operation or set of operations on any data, information, material, work, expression or other content, including to (a) collect, receive, input, upload, download, record, reproduce, store, organize, combine, log, catalog, cross-reference, manage, maintain, copy, adapt, alter, translate or make other

improvements or derivative works, (b) process, retrieve, output, consult, use, disseminate, transmit, submit, post, transfer, disclose or otherwise provide or make available, or (c) block, erase or destroy. **"Processing"** and **"Processed"** have correlative meanings.

"**Representatives**" means a party's employees, officers, directors, partners, shareholders, agents, attorneys, successors and permitted assigns.

"**RFP**" means the State's request for proposal designed to solicit responses for Services under this Contract.

"**Services**" means any of the services, including but not limited to, Hosted Services, Contractor is required to or otherwise does provide under this Contract.

"**Service Level Agreement**" means the schedule attached as **Schedule D**, setting forth the Support Services Contractor will provide to the State, and the parties' additional rights and obligations with respect thereto.

"**Site**" means the physical location designated by the State in, or in accordance with, this Contract or a Statement of Work for delivery and installation of the Software.

"**Software**" means Contractor's software as set forth in a Statement of Work, and any Maintenance Releases or New Versions provided to the State and any Customizations or Configurations made by or for the State pursuant to this Contract, and all copies of the foregoing permitted under this Contract.

"**Source Code**" means the human readable source code of the Software to which it relates, in the programming language in which the Software was written, together with all related flow charts and technical documentation, including a description of the procedure for generating object code, all of a level sufficient to enable a programmer reasonably fluent in such programming language to understand, build, operate, support, maintain and develop modifications, upgrades, updates, adaptations, enhancements, new versions and other derivative works and improvements of, and to develop computer programs compatible with, the Software.

"**Specifications**" means, for the Software, the specifications collectively set forth in the Business Requirements Specification, Technical Specification, Documentation, RFP or Contractor's Bid Response, if any, for such Software, or elsewhere in a Statement of Work.

"**State**" means the State of Michigan.

"**State Data**" has the meaning set forth in **Section 21.1.**

"**State Hosted**" means the Hosted Services are not provided by Contractor or one or more of its Permitted Subcontractors.

"**State Materials**" means all materials and information, including but not limited to documents, data, know-how, ideas, methodologies, specifications, software, content and technology, in any form or media, directly or indirectly provided or made available to Contractor by or on behalf of the State in connection with this Contract.

**"State Program Managers**" are the individuals appointed by the State, or their designees, to (a) monitor and coordinate the day-to-day activities of this Contract; (b) co-sign off on Acceptance of the Software and other Deliverables; and (c) perform other duties as may be specified in a Statement of Work Program Managers will be identified in Schedule A or subsequent Change Notices.

**"State Systems"** means the information technology infrastructure, including the computers, software, databases, electronic systems (including database management systems) and networks, of the State or any of its designees.

"**Statement of Work**" means any statement of work entered into by the parties and incorporated into this Contract. The initial Statement of Work is attached as **Schedule A**.

"**Stop Work Order**" has the meaning set forth in **Section 15.**

"**Support Services**" means the software maintenance and support services Contractor is required to or otherwise does provide to the State under the Service Level Agreement.

"**Technical Specification**" means, with respect to any Software, the document setting forth the technical specifications for such Software and included in a Statement of Work.

"**Term**" has the meaning set forth in the preamble.

"**Testing Period**" has the meaning set forth in **Schedule I.**

"**Transition Period**" has the meaning set forth in **Section 16.3.**

"**Transition Responsibilities**" has the meaning set forth in **Section 16.3.**

"**Unauthorized Removal**" has the meaning set forth in **Section 2.5(b).**

"**Unauthorized Removal Credit**" has the meaning set forth in **Section 2.5(c).**

"**User Data**" means all data, information and other content of any type and in any format, medium or form, whether audio, visual, digital, screen, GUI or other, that is input, uploaded to, placed into or collected, stored, Processed, generated or output by any device, system or network by or on behalf of the State, including any and all works, inventions, data, analyses and other information and materials resulting from any use of the Software by or on behalf of the State under this Contract, except that User Data does not include the Software or data, information or content, including any GUI, audio, visual or digital or other display or output, that is generated automatically upon executing the Software without additional user input without the inclusion of user derived Information or additional user input.

"**Warranty Period**" means the ninety (90) calendar-day period commencing on the date of the State's Acceptance of the Software and for which Support Services are provided free of charge.

**"WCAG 2.0 Level AA"** means level AA of the World Wide Web Consortium Web Content Accessibility Guidelines version 2.0.

"**Work Product**" means all State-specific deliverables that Contractor is required to, or otherwise does, provide to the State under this Contract including but not limited to Customizations, application programming interfaces, computer scripts, macros, user interfaces, reports, project management documents, forms, templates, and other State-specific documents and related materials together with all ideas, concepts, processes, and methodologies developed in connection with this Contract whether or not embodied in this Contract.

**2. Duties of Contractor**. Contractor will provide Services and Deliverables pursuant to Statement(s) of Work entered into under this Contract. Contractor will provide all Services and Deliverables in a timely, professional manner and in accordance with the terms, conditions, and Specifications set forth in this Contract and the Statement(s) of Work.

2.1 Statement of Work Requirements. No Statement of Work will be effective unless signed by each party's Contract Administrator. The term of each Statement of Work will commence on the parties' full execution of a Statement of Work and terminate when the parties have fully performed their obligations. The terms and conditions of this Contract will apply at all times to any Statements of Work entered into by the parties and incorporated into this Contract. The State will have the right to terminate such Statement of Work as set forth in **Section 16.** Contractor

acknowledges that time is of the essence with respect to Contractor's obligations under each Statement of Work and agrees that prompt and timely performance of all such obligations in accordance with this Contract and the Statements of Work (including the Implementation Plan and all Milestone Dates) is strictly required.

2.2 Change Control Process. The State may at any time request in writing (each, a "**Change Request**") changes to a Statement of Work, including changes to the Services and Implementation Plan (each, a "**Change**"). Upon the State's submission of a Change Request, the parties will evaluate and implement all Changes in accordance with this **Section 2.2.**

(a) As soon as reasonably practicable, and in any case within 20 Business Days following receipt of a Change Request, Contractor will provide the State with a written proposal for implementing the requested Change ("**Change Proposal**"), setting forth:

(i) a written description of the proposed Changes to any Services or Deliverables;

(ii) an amended Implementation Plan reflecting: (A) the schedule for commencing and completing any additional or modified Services or Deliverables; and (B) the effect of such Changes, if any, on completing any other Services under a Statement of Work;

(iii) any additional State Resources Contractor deems necessary to carry out such Changes; and

(iv) any increase or decrease in Fees resulting from the proposed Changes, which increase or decrease will reflect only the increase or decrease in time and expenses Contractor requires to carry out the Change.

(b) Within 30 Business Days following the State's receipt of a Change Proposal, the State will by written notice to Contractor, approve, reject, or propose modifications to such Change Proposal. If the State proposes modifications, Contractor must modify and re-deliver the Change Proposal reflecting such modifications, or notify the State of any disagreement, in which event the parties will negotiate in good faith to resolve their disagreement. Upon the State's approval of the Change Proposal or the parties' agreement on all proposed modifications, as the case may be, the parties will execute a written agreement to the Change Proposal ("**Change Notice**"), which Change Notice will be signed

by the State's Contract Administrator and will constitute an amendment to a Statement of Work to which it relates; and

(c) If the parties fail to enter into a Change Notice within 15 Business Days following the State's response to a Change Proposal, the State may, in its discretion:

(i) require Contractor to perform the Services under a Statement of Work without the Change;

(ii) require Contractor to continue to negotiate a Change Notice;

(iii) initiate a Dispute Resolution Procedure; or

(iv) notwithstanding any provision to the contrary in a Statement of Work, terminate this Contract under **Section 16**.

(d) No Change will be effective until the parties have executed a Change Notice. Except as the State may request in its Change Request or otherwise in writing, Contractor must continue to perform its obligations in accordance with a Statement of Work pending negotiation and execution of a Change Notice. Contractor will use its best efforts to limit any delays or Fee increases from any Change to those necessary to perform the Change in accordance with the applicable Change Notice. Each party is responsible for its own costs and expenses of preparing, evaluating, negotiating, and otherwise processing any Change Request, Change Proposal, and Change Notice.

(e)The performance of any functions, activities, tasks, obligations, roles and responsibilities comprising the Services as described in this Contract are considered part of the Services and, thus, will not be considered a Change. This includes the delivery of all Deliverables in accordance with their respective Specifications, and the diagnosis and correction of Non-Conformities discovered in Deliverables prior to their Acceptance by the State or, subsequent to their Acceptance by the State, as necessary for Contractor to fulfill its associated warranty requirements and its Support Services under this Contract.

(f) Contractor may, on its own initiative and at its own expense, prepare and submit its own Change Request to the State. However, the State will be under no obligation to approve or otherwise respond to a Change Request initiated by Contractor.

2.2 Contractor Personnel.

(a) Contractor is solely responsible for all Contractor Personnel and for the payment of their compensation, including, if applicable, withholding of income taxes, and the payment and withholding of social security and other payroll taxes, unemployment insurance, workers' compensation insurance payments and disability benefits.

(b) Prior to any Contractor Personnel performing any Services, Contractor will:

(i) ensure that such Contractor Personnel have the legal right to work in the United States;

(ii) upon request, require such Contractor Personnel to execute written agreements, in form and substance acceptable to the State, that bind such Contractor Personnel to confidentiality provisions that are at least as protective of the State's information (including all Confidential Information) as those contained in this Contract; and

(iii) upon request, or as otherwise specified in a Statement of Work, perform background checks on all Contractor Personnel prior to their assignment. The scope is at the discretion of the State and documentation must be provided as requested. Contractor is responsible for all costs associated with the requested background checks. The State, in its sole discretion, may also perform background checks. Pursuant to Michigan law, all agencies subject to IRS Pub. 1075 are required to ask the Michigan State Police to perform fingerprint background checks on all employees, including Contractor and subcontractor employees, who may have access to any database of information maintained by the federal government that contains confidential or personal information, including, but not limited to, federal tax information. Further, pursuant to Michigan law, any agency described above is prohibited from providing Contractors or subcontractors with the result of such background check. For more information, please see Michigan Public Act 427 of 2018.

(c) Contractor and all Contractor Personnel will comply with all rules, regulations, and policies of the State that are communicated to Contractor in writing, including security procedures concerning systems and data and remote access, building security procedures, including the restriction of access by the State to certain areas of its premises or systems, and general health and safety practices and procedures.

(d) The State reserves the right to require the removal of any Contractor Personnel found, in the judgment of the State, to be unacceptable. The State's

request must be written with reasonable detail outlining the reasons for the removal request. Replacement personnel for the removed person must be fully qualified for the position. If the State exercises this right, and Contractor cannot immediately replace the removed personnel, the State agrees to negotiate an equitable adjustment in schedule or other terms that may be affected by the State's required removal.

2.3 Contractor Project Manager. Throughout the Term of this Contract, Contractor must maintain a Contractor employee acceptable to the State to serve as Contractor Project Manager, who will be considered Key Personnel of Contractor.

(a) Contractor Project Manager must:

(i) have the requisite authority, and necessary skill, experience, and qualifications, to perform in such capacity;

(ii) be responsible for overall management and supervision of Contractor's performance under this Contract; and

(iii) be the State's primary point of contact for communications with respect to this Contract, including with respect to giving and receiving all day-to-day approvals and consents.

(b) Contractor Project Manager must attend all regularly scheduled meetings as set forth in the Implementation Plan and will otherwise be available as set forth in a Statement of Work.

(c) Contractor will maintain the same Contractor Project Manager throughout the Term of this Contract, unless:

(i) the State requests in writing the removal of Contractor Project Manager;

(ii) the State consents in writing to any removal requested by Contractor in writing;

(iii) Contractor Project Manager ceases to be employed by Contractor, whether by resignation, involuntary termination or otherwise.

(d) Contractor will promptly replace its Contractor Project Manager on the occurrence of any event set forth in **Section 2.4(c).** Such replacement will be subject to the State's prior written approval.

2.4 Contractor's Key Personnel.

(a) The State has the right to recommend and approve in writing the initial assignment, as well as any proposed reassignment or replacement, of any Key Personnel. Before assigning an individual to any Key Personnel position, Contractor will notify the State of the proposed assignment, introduce the individual to the State Program Managers or their designees, and provide the State with a resume and any other information about the individual reasonably requested by the State. The State reserves the right to interview the individual before granting written approval. In the event the State finds a proposed individual unacceptable, the State will provide a written explanation including reasonable detail outlining the reasons for the rejection.

(b) Contractor will not remove any Key Personnel from their assigned roles on this Contract without the prior written consent of the State. The Contractor's removal of Key Personnel without the prior written consent of the State is an unauthorized removal ("**Unauthorized Removal**"). An Unauthorized Removal does not include replacing Key Personnel for reasons beyond the reasonable control of Contractor, including illness, disability, leave of absence, personal emergency circumstances, resignation, or for cause termination of the Key Personnel's employment. Any Unauthorized Removal may be considered by the State to be a material breach of this Contract, in respect of which the State may elect to terminate this Contract for cause under **Section 16.1.**

(c) It is further acknowledged that an Unauthorized Removal will interfere with the timely and proper completion of this Contract, to the loss and damage of the State, and that it would be impracticable and extremely difficult to determine and remedy the actual damage sustained by the State as a result of any Unauthorized Removal. Therefore, Contractor and the State agree that in the case of any Unauthorized Removal in respect of which the State does not elect to exercise its rights under **Section 16**, Contractor will issue to the State an amount equal to $25,000 per individual (each, an "**Unauthorized Removal Credit**").

(d) Contractor acknowledges and agrees that each of the Unauthorized Removal Credits assessed under **Subsection 2.5(c)** above: (i) is a reasonable estimate of and compensation for the anticipated or actual harm to the State that may arise from the Unauthorized Removal, which would be impossible or very difficult to accurately estimate; and (ii) may, at the State's option, be credited or set off against any Fees or other charges payable to Contractor under this Contract.

2.5 Subcontractors. Contractor must obtain prior written approval of the State, which consent may be given or withheld in the State's sole discretion, before engaging any Permitted Subcontractor to provide Services to the State under this Contract. Third parties otherwise retained by Contractor to provide Contractor or other clients of contractor with services are not Permitted Subcontractors, and therefore do not require prior approval by the State. Engagement of any subcontractor or Permitted Subcontractor by Contractor does not relieve Contractor of its representations, warranties or obligations under this Contract. Without limiting the foregoing, Contractor will:

(a) be responsible and liable for the acts and omissions of each such subcontractor (including such Permitted Subcontractor and Permitted Subcontractor's employees who, to the extent providing Services or Deliverables, will be deemed Contractor Personnel) to the same extent as if such acts or omissions were by Contractor or its employees;

(b) name the State a third-party beneficiary under Contractor's Contract with each Permitted Subcontractor with respect to the Services;

(c) be responsible for all fees and expenses payable to, by or on behalf of each Permitted Subcontractor in connection with this Contract, including, if applicable, withholding of income taxes, and the payment and withholding of social security and other payroll taxes, unemployment insurance, workers' compensation insurance payments and disability benefits; and

(d) notify the State of the location of the Permitted Subcontractor and indicate if it is located within the continental United States.

**3. Notices.** All notices and other communications required or permitted under this Contract must be in writing and will be considered given and received: (a) when verified by written receipt if sent by courier; (b) when actually received if sent by mail without verification of receipt; or (c) when verified by automated receipt or electronic logs if sent by facsimile or email.

| If to State: | If to Contractor: |
|---|---|
| Christopher Martin<br>320 South Walnut Street<br>PO Box 30026<br>Lansing, MI 48909<br>martinc20@michigan.gov<br>517-643-2833 | Thomas Kramek,<br>Vice President and General Manager, NE Region, Kapsch TrafficCom USA.<br>300 Lighting Way, Suite 302<br>Secaucus, NJ 07094<br>thomas.kramek@kapsch.net<br>571-205-6605 |

**4. Insurance.** Contractor must maintain the minimum insurances identified in the Insurance Schedule attached as **Schedule C**.

**5. Software License**.

**5.1 RESERVED**

**5.2 Subscription License.** If the Software is Contractor Hosted and Contractor is providing the State access to use its Software during the Term of the Contract only, then:

(a) Contractor hereby grants to the State, exercisable by and through its Authorized Users, a nonexclusive, royalty-free, irrevocable right and license during the Term and such additional periods, if any, as Contractor is required to perform Services under this Contract or any Statement of Work, to:

(i) access and use the Software, including in operation with other software, hardware, systems, networks and services, for the State's business purposes, including for Processing State Data;

(ii) generate, print, copy, upload, download, store and otherwise Process all GUI, audio, visual, digital and other output, displays and other content as may result from any access to or use of the Software;

(iii) prepare, reproduce, print, download and use a reasonable number of copies of the Specifications and Documentation for any use of the Software under this Contract; and

(iv) access and use the Software for all such non-production uses and applications as may be necessary or useful for the effective use of the Software hereunder, including for purposes of analysis, development, configuration, integration, testing, training, maintenance, support and repair, which access and use will be without charge and not included for any purpose in any calculation of the State's or its Authorized Users' use of the Software, including for purposes of assessing any Fees or other consideration payable to Contractor or determining any excess use of the Software as described in **Section 5.2(c)** below.

(b) License Restrictions. The State will not: (a) rent, lease, lend, sell, sublicense, assign, distribute, publish, transfer or otherwise make the Software available to any third party, except as expressly permitted by this Contract or in any Statement of Work; or (b) use or authorize the use of the Software or

Documentation in any manner or for any purpose that is unlawful under applicable Law.

(c) Use. The State will pay Contractor the corresponding Fees set forth in a Statement of Work or Pricing Schedule for all Authorized Users access and use of the Software. Such Fees will be Contractor's sole and exclusive remedy for use of the Software, including any excess use.

5.3 **Certification**. To the extent that a License granted to the State is not unlimited, Contractor may request written certification from the State regarding use of the Software for the sole purpose of verifying compliance with this **Section 5.** Such written certification may occur no more than once in any 24 month period during the Term of the Contract. The State will respond to any such request within 45 calendar days of receipt. If the State's use is greater than contracted, Contractor may invoice the State for any unlicensed use (and related support) pursuant to the terms of this Contract at the rates set forth in **Schedule B**, and the unpaid license and support fees shall be payable in accordance with the terms of the Contract. Payment under this provision shall be Contractor's sole and exclusive remedy to cure these issues.

5.4 **State License Grant to Contractor**. The State hereby grants to Contractor a limited, non-exclusive, non- transferable license (i) to use the State's (or individual agency's, department's or division's) name, trademarks, service marks or logos, solely in accordance with the State's specifications, and (ii) to display, reproduce, distribute and transmit in digital form the State's (or individual agency's, department's or division's) name, trademarks, service marks or logos in connection with promotion of the Services as communicated to Contractor by the State. Use of the State's (or individual agency's, department's or division's) name, trademarks, service marks or logos will be specified in the applicable Statement of Work**.** Contractor is provided a limited license to State Materials for the sole and exclusive purpose of providing the Services.

**6. Third Party Components**. At least 30 days prior to adding new Third Party Components, Contractor will provide the State with notification information identifying and describing the addition. Throughout the Term, on an annual basis, Contractor will provide updated information identifying and describing any Approved Third Party Components included in the Software.

**7. Intellectual Property Rights**

7.1 Ownership Rights in Software

(a) For purposes of this **Section 7** only, the term "Software" does not include Customizations.

(b) Subject to the rights and licenses granted by Contractor in this Contract and the provisions of **Section 7.1(c):**

(i) Contractor reserves and retains its entire right, title and interest in and to all Intellectual Property Rights arising out of or relating to the Software; and

(ii) none of the State or Authorized Users acquire any ownership of Intellectual Property Rights in or to the Software or Documentation as a result of this Contract.

(c) As between the State, on the one hand, and Contractor, on the other hand, the State has, reserves and retains, sole and exclusive ownership of all right, title and interest in and to State Materials, User Data, including all Intellectual Property Rights arising therefrom or relating thereto.

7.2 The State is and will be the sole and exclusive owner of all right, title, and interest in and to all Work Product developed exclusively for the State under this Contract, including all Intellectual Property Rights. In furtherance of the foregoing:

(a) Contractor will create all Work Product as work made for hire as defined in Section 101 of the Copyright Act of 1976; and

(b) to the extent any Work Product, or Intellectual Property Rights do not qualify as, or otherwise fails to be, work made for hire, Contractor hereby:

(i) assigns, transfers, and otherwise conveys to the State, irrevocably and in perpetuity, throughout the universe, all right, title, and interest in and to such Work Product, including all Intellectual Property Rights; and

(ii) irrevocably waives any and all claims Contractor may now or hereafter have in any jurisdiction to so-called "moral rights" or rights of *droit moral* with respect to the Work Product.

**8. Software Implementation**.

8.1 Implementation. Contractor will as applicable; deliver, install, configure, integrate, and otherwise provide and make fully operational the Software on or prior to the applicable Milestone Date in accordance with the criteria set forth in a Statement of Work and the Implementation Plan.

8.2 Site Preparation. Unless otherwise set forth in a Statement of Work, Contractor is responsible for ensuring the relevant Operating Environment is set up and in working order to allow Contractor to deliver and install the Software on or prior to the applicable Milestone Date. Contractor will provide the State with such notice as is specified in a Statement of Work, prior to delivery of the Software to give the State sufficient time to prepare for Contractor's delivery and installation of the Software. If the State is responsible for Site preparation, Contractor will provide such assistance as the State requests to complete such preparation on a timely basis.

**9. Software Acceptance Testing**.

9.1 Acceptance Testing. Unless otherwise specified in a Statement of Work, acceptance testing of the Software will be conducted pursuant to Schedule I - Acceptance Testing

Notwithstanding anything provided herein or in Schedule I. Contractor shall not be precluded from an equitable adjustment on a pro rata basis reflecting applicable rates at the time of Acceptance, for the State's beneficial use of the Software prior to Acceptance.

**10. Non-Software Acceptance.**

10.1 All other non-Software Services and Deliverables are subject to inspection and testing by the State within 30 calendar days of the State's receipt of them ("State Review Period"), unless otherwise provided in the Statement of Work. If the non-Software Services and Deliverables are not fully accepted by the State, the State will provide written notification to Contractor by the end of the State Review Period that either: (a) the non-Software Services and Deliverables are accepted but noted deficiencies must be corrected; or (b) the non-Software Services and Deliverables are rejected. If the State finds material deficiencies, it may: (i) reject the non-Software Services and Deliverables without performing any further inspections; (ii) demand performance at no additional cost; or (iii) terminate this Contract in accordance with **Section 16.1**, Termination for Cause. In no event shall the State terminate the Contract due to material deficiencies of any Non-Software Deliverables or Services without allowing Contractor a period of 30 calendar days from the date of the State's written notification to cure material deficiencies.

10.2 Within 30 calendar days from the date of Contractor's receipt of notification of acceptance with deficiencies or rejection of any non-Software Services and

Deliverables, Contractor must cure, at no additional cost, the deficiency and deliver unequivocally acceptable non-Software Services and Deliverables to the State. If acceptance with deficiencies or rejection of the non-Software Services and Deliverables impacts the content or delivery of other non-completed non-Software Services and Deliverables, the parties' respective Program Managers must determine an agreed to number of days for re-submission that minimizes the overall impact to the Contract. However, nothing herein affects, alters, or relieves Contractor of its obligations to correct deficiencies in accordance with the time response standards set forth in this Contract.

10.3 If Contractor is unable or refuses to correct the deficiency within the time response standards set forth in this Contract, the State may cancel the order in whole or in part. The State, or a third party identified by the State, may provide the non-Software Services and Deliverables and recover the difference between the cost to cure and the Contract price plus an additional 10% administrative fee.

**11. Assignment.** Contractor may not assign this Contract to any other party without the prior approval of the State. Upon notice to Contractor, the State, in its sole discretion, may assign in whole or in part, its rights or responsibilities under this Contract to any other party. If the State determines that a novation of the Contract to a third party is necessary, Contractor will agree to the novation and provide all necessary documentation and signatures.

**12. Change of Control.** Contractor will notify the State, within 30 days of any public announcement or otherwise once legally permitted to do so, of a change in Contractor's organizational structure or ownership. For purposes of this Contract, a change in control means any of the following:

(a) a sale of more than 50% of Contractor's stock;

b) a sale of substantially all of Contractor's assets;

(c) a change in a majority of Contractor's board members;

(d) consummation of a merger or consolidation of Contractor with any other

entity;

(e) a change in ownership through a transaction or series of transactions;

(f) or the board (or the stockholders) approves a plan of complete liquidation.

A change of control does not include any consolidation or merger effected exclusively to change the domicile of Contractor, or any transaction or series of transactions principally for bona fide equity financing purposes. In the event of a change of control, Contractor must require the successor to assume this Contract and all of its obligations under this Contract.

**13. Invoices and Payment**.

13.1 Invoices must conform to the requirements communicated from time-to-time by the State. All undisputed amounts are payable within 45 days of the State's receipt. Contractor may only charge for Services and Deliverables provided as specified in Statement(s) of Work. Invoices must include an itemized statement of all charges.

13.2 The State has the right to withhold payment of any disputed amounts until the parties agree as to the validity of the disputed amount. The State will notify Contractor of any dispute within a reasonable time. Payment by the State will not constitute a waiver of any rights as to Contractor's continuing obligations, including claims for deficiencies or substandard Services and Deliverables. Contractor's acceptance of final payment by the State constitutes a waiver of all claims by Contractor against the State for payment under this Contract, other than those claims previously filed in writing on a timely basis and still disputed.

13.3 The State will only disburse payments under this Contract through Electronic Funds Transfer (EFT). Contractor must register with the State at http://www.michigan.gov/SIGMAVSS to receive electronic fund transfer payments. If Contractor does not register, the State is not liable for failure to provide payment.

13.4 Right of Setoff. Without prejudice to any other right or remedy it may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

13.5 Taxes. The State is exempt from State sales tax for direct purchases and may be exempt from federal excise tax, if Services or Deliverables purchased under this Contract are for the State's exclusive use. Notwithstanding the foregoing, all Fees are exclusive of taxes, and Contractor is responsible for all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state, or local governmental entity on any amounts payable by the State under this Contract.

13.6 Pricing/Fee Changes. All Pricing set forth in this Contract will not be increased, except as otherwise expressly provided in this Section.

(a) The Fees will not be increased at any time except for the addition of additional licenses, the fees for which licenses will also remain firm in accordance with the Pricing set forth in the Pricing Schedule.

(b) Excluding federal government charges and terms. Contractor warrants and agrees that each of the Fees, economic or product terms or warranties granted pursuant to this Contract are comparable to or better than the equivalent fees, economic or product term or warranty being offered to any similarly situated commercial or government customer (including any public educational institution within the State of Michigan) of Contractor with equivalent work complexity and volume. If Contractor enters into any arrangements with another customer of Contractor to provide the products or services, available under this Contract, under more favorable prices, as the prices may be indicated on Contractor's current U.S. and International price list or comparable document, then this Contract will be deemed amended as of the date of such other arrangements to incorporate those more favorable prices, and Contractor will immediately notify the State of such Fee and formally memorialize the new pricing in a Change Notice.

**14. Liquidated Damages**.

14.1The parties understand and agree that delayed or failed performance may damage the State, but, by their nature, such damages are difficult to ascertain at the time of the contract. Liquidated damages are not intended as a penalty and are solely intended to compensate for such damages. Any liquidated damages (which includes but is not limited to applicable credits) set forth in this Contract are reasonable estimates of the State's damages in accordance with applicable law.

14.2 The parties acknowledge and agree that Contractor could incur liquidated damages for more than one event.

14.3 The assessment of liquidated damages will not constitute a waiver or release of any other remedy the State may have under this Contract for Contractor's breach of this Contract, including without limitation, the State's right to terminate this Contract for cause under **Section 16.1** and the State will be entitled in its discretion to recover actual damages caused by Contractor's failure to perform its obligations under this Contract. However, the State will reduce such actual damages by the amounts of liquidated damages received for the same events causing the actual damages.

14.4 Amounts due the State as liquidated damages may be set off against any Fees payable to Contractor under this Contract, or the State may bill Contractor as a separate item and Contractor will promptly make payments on such bills.

**15. Stop Work Order**. The State may suspend any or all activities under the Contract at any time. The State will provide Contractor a written Stop Work Order detailing the suspension. Contractor must comply with the Stop Work Order upon receipt. Within 90 calendar days, or any longer period agreed to by Contractor, the State will either:

(a) issue a notice authorizing Contractor to resume work, or

(b) terminate the Contract or delivery order. The State will not pay for activities that have been suspended, Contractor's lost profits, or any additional compensation during a stop work period.

**16. Termination, Expiration, Transition**. The State may terminate this Contract, the Support Services, or any Statement of Work, in accordance with the following:

16.1 Termination for Cause. In addition to any right of termination set forth elsewhere in this Contract:

(a) The State may terminate this Contract for cause, in whole or in part, if Contractor, as determined by the State:

i) endangers the value, integrity, or security of State Systems, State Data, or the State's facilities or personnel;

(ii) becomes insolvent, petitions for bankruptcy court proceedings, or has an involuntary bankruptcy proceeding filed against it by any creditor; or

(iii) breaches any of its material duties or obligations under this Contract. Any reference to specific breaches being material breaches within this Contract will not be construed to mean that other breaches are not material.

(b) If the State terminates this Contract under this **Section 16.1**, the State will issue a termination notice specifying whether Contractor must:

(i) cease performance immediately. Contractor must submit all invoices for Services accepted by the State within 30 days of the date of termination. Failure to submit an invoice within that timeframe will constitute a waiver by Contractor for any amounts due to Contractor for Services accepted by the State under this Contract, or

(ii) continue to perform for a specified period. If it is later determined that Contractor was not in breach of this Contract, the termination will be deemed to have been a termination for convenience, effective as of the

same date, and the rights and obligations of the parties will be limited to those provided in **Section 16.2**.

(c) The State will only pay for amounts due to Contractor for Services accepted by the State on or before the date of termination, subject to the State's right to set off any amounts owed by the Contractor for the State's reasonable costs in terminating this Contract. Contractor must promptly reimburse to the State any Fees prepaid by the State prorated to the date of such termination, including any prepaid Fees. Contractor must pay all reasonable costs incurred by the State in terminating this Contract for cause, including administrative costs, attorneys' fees, court costs, transition costs, and any costs the State incurs to procure the Services from other sources.

16.2 Termination for Convenience. The State may immediately terminate this Contract in whole or in part, without penalty and for any reason or no reason, including but not limited to, appropriation or budget shortfalls. The termination notice will specify whether Contractor must:

(a) cease performance immediately. Contractor must submit all invoices for Services accepted by the State within 30 days of the date of termination. Failure to submit an invoice within that timeframe will constitute a waiver by Contractor for any amounts due to Contractor for Services accepted by the State under this Contract, or

(b) continue to perform in accordance with **Section 16.3**. If the State terminates this Contract for convenience, the State will pay all reasonable costs, as determined by the State, for State approved Transition Responsibilities to the extent the funds are available.

16.3 Transition Responsibilities.

(a) Upon termination or expiration of this Contract for any reason, Contractor must, for a period of time specified by the State (not to exceed 90 calendar days; the "**Transition Period**"), provide all reasonable transition assistance requested by the State, to allow for the expired or terminated portion of the Contract to continue without interruption or adverse effect, and to facilitate the orderly transfer of the Services to the State or its designees. Such transition assistance may include but is not limited to:

(i) continuing to perform the Services at the established Contract rates;

(ii) taking all reasonable and necessary measures to transition performance of the work, including all applicable Services to the State or the State's designee;

(iii) taking all necessary and appropriate steps, or such other action as the State may direct, to preserve, maintain, protect, and comply with **Section 22.5** regarding the return or destruction of State Data at the conclusion of the Transition Period; and

(iv) preparing an accurate accounting from which the State and Contractor may reconcile all outstanding accounts (collectively, the "**Transition Responsibilities**"). The Term of this Contract is automatically extended through the end of the Transition Period.

(b) Contractor will follow the transition plan attached as **Schedule G** as it pertains to both transition in and transition out activities.

## 17. Indemnification

17.1 General Indemnification. Contractor must defend, indemnify and hold the State, its departments, divisions, agencies, offices, commissions, officers, and employees harmless, without limitation, from and against any and all actions, claims, losses, liabilities, damages, costs, attorney fees, and expenses (including those required to establish the right to indemnification), arising out of or relating to:

(a) any breach by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable) of any of the promises, agreements, representations, warranties, or insurance requirements contained in this Contract;

(b) any infringement, misappropriation, or other violation of any Intellectual Property Right or other right of any third party;

(c) any bodily injury, death, or damage to real or tangible personal property occurring wholly or in part due to action or inaction by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable); and

(d) any negligent acts or omissions of Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable).

17.2 Indemnification Procedure. The State will notify Contractor in writing if indemnification is sought; however, failure to do so will not relieve Contractor, except to the extent that Contractor is materially prejudiced. Contractor must, to the satisfaction of the State, demonstrate its financial ability to carry out these obligations. The State is entitled to:

(a) regular updates on proceeding status;

(b) participate in the defense of the proceeding;

(c) employ its own counsel; and to

(d) retain control of the defense, at its own cost and expense, if the State deems necessary. Contractor will not, without the State's prior written consent (not to be unreasonably withheld), settle, compromise, or consent to the entry of any judgment in or otherwise seek to terminate any claim, action, or proceeding. Any litigation activity on behalf of the State or any of its subdivisions, under this **Section 17**, must be coordinated with the Department of Attorney General. An attorney designated to represent the State may not do so until approved by the Michigan Attorney General and appointed as a Special Assistant Attorney General.

17.3 The State is constitutionally prohibited from indemnifying Contractor or any third parties.

**18. Infringement Remedies**.

18.1 The remedies set forth in this Section are in addition to, and not in lieu of, all other remedies that may be available to the State under this Contract or otherwise, including the State's right to be indemnified for such actions.

18.2 If any Software or any component thereof, other than State Materials, is found to be infringing or if any use of any Software or any component thereof is enjoined, threatened to be enjoined or otherwise the subject of an infringement claim, Contractor must, at Contractor's sole cost and expense:

(a) procure for the State the right to continue to use such Software or component thereof to the full extent contemplated by this Contract; or

(b) modify or replace the materials that infringe or are alleged to infringe ("**Allegedly Infringing Materials**") to make the Software and all of its components non-infringing while providing fully equivalent features and functionality.

18.3 If neither of the foregoing is possible notwithstanding Contractor's best efforts, then Contractor may direct the State to cease any use of any materials that have been enjoined or finally adjudicated as infringing, provided that Contractor will:

(a) refund to the State all amounts paid by the State in respect of such Allegedly Infringing Materials and any other aspects of the Software provided under a Statement of Work for the Allegedly Infringing Materials that the State cannot reasonably use as intended under this Contract; and

(b) in any case, at its sole cost and expense, secure the right for the State to continue using the Allegedly Infringing Materials for a transition period of up to 6 months to allow the State to replace the affected features of the Software without disruption.

18.4 If Contractor directs the State to cease using any Software under **Section 18.3,** the State may terminate this Contract for cause under **Section 16.1**. Unless the claim arose against the Software independently of any of the actions specified below, Contractor will have no liability for any claim of infringement arising solely from:

(a) Contractor's compliance with any designs, specifications, or instructions of the State; or

(b) modification of the Software by the State without the prior knowledge and approval of Contractor.

**19. Disclaimer of Damages and Limitation of Liability.**

19.1 Disclaimer of Damages. NEITHER PARTY WILL BE LIABLE, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT FOR CONSEQUENTIAL, INCIDENTAL, INDIRECT, OR SPECIAL DAMAGES, INCLUDING WITHOUT LIMITATION LOST PROFITS AND LOST BUSINESS OPPORTUNITIES.

19.2 The State's Limitation of Liability. IN NO EVENT WILL THE STATE'S AGGREGATE LIABILITY UNDER THIS CONTRACT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT, EXCEED THE MAXIMUM AMOUNT OF FEES PAYABLE UNDER THIS CONTRACT.

19.3 Contractor Limitation of Liability. IN NO EVENT WILL CONTRACTOR'S AGGREGATE LIABILITY TO STATE UNDER THIS CONTRACT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT, EXCEED THE MAXIMUM AMOUNT OF FEES PAYABLE UNDER THIS CONTRACT.

THE LIMITATIONS OF LIABILITY SET FORTH IN THIS SECTION DO NOT APPLY TO CONTRACTOR'S CONTRACTUAL OBLIGATIONS RELATED TO, STATE DATA, INFRINGEMENT, AND/OR INDEMNIFICATION; NOR WILL ANY SUCH LIMITATION OF LIABILITY APPLY TOANY ACTS OF GROSS NEGLIGENCE, AND/OR WILLFUL MISCONDUCT OF CONTRACTOR (TO INCLUDE ANY EMPLOYEE, SUBCONTRACTOR OR AGENT THEREOF).

**20. Disclosure of Litigation, or Other Proceeding.** Contractor must notify the State within 14 calendar days of receiving notice of any litigation, investigation, arbitration, or other proceeding (collectively, "**Proceeding**") involving Contractor, a Permitted Subcontractor, or an officer or director of Contractor or Permitted Subcontractor, that arises during the term of the Contract, including:

(a) a criminal Proceeding;

(b) a parole or probation Proceeding;

(c) a Proceeding under the Sarbanes-Oxley Act;

(d) a civil Proceeding involving:

(i) a claim that might reasonably be expected to adversely affect Contractor's viability or financial stability; or

(ii) a governmental or public entity's claim or written allegation of fraud; or

(e) a Proceeding involving any license that Contractor is required to possess in order to perform under this Contract.

**21. State Data**.

21.1 Ownership. The State's data ("**State Data**"), which will be treated by Contractor as Confidential Information, includes:

(a) User Data; and

(b) any other data collected, used, Processed, stored, or generated in connection with the Services, including but not limited to:

(i) personally identifiable information ("**PII**") collected, used, Processed, stored, or generated as the result of the Services, including, without limitation, any information that identifies an individual, such as an individual's social security number or other government-issued identification number, date of birth, address, telephone number, biometric data, mother's maiden name, email address, credit card information, or an individual's name in combination with any other of the elements here listed; and

(ii) protected health information ("**PHI**") collected, used, Processed, stored, or generated as the result of the Services, which is defined under the Health Insurance Portability and Accountability Act ("**HIPAA**") and its related rules and regulations.

21.2 State Data is and will remain the sole and exclusive property of the State and all right, title, and interest in the same is reserved by the State.

21.3 Contractor Use of State Data. Contractor is provided a limited license to State Data for the sole and exclusive purpose of providing the Services, including a license to collect, process, store, generate, and display State Data only to the extent necessary in the provision of the Services. Contractor must:

(a) keep and maintain State Data in strict confidence, using such degree of care as is appropriate and consistent with its obligations as further described in this Contract and applicable law to avoid unauthorized access, use, disclosure, or loss;

(b) use and disclose State Data solely and exclusively for the purpose of providing the Services, such use and disclosure being in accordance with this Contract, any applicable Statement of Work, and applicable law;

(c) keep and maintain State Data in the continental United States and

(d) not use, sell, rent, transfer, mine, distribute, commercially exploit, or otherwise disclose or make available State Data for Contractor's own purposes or for the benefit of anyone other than the State without the State's prior written consent. Contractor's misuse of State Data may violate state or federal laws, including but not limited to MCL 752.795.

21.4 Discovery. Contractor will immediately notify the State upon receipt of any requests which in any way might reasonably require access to State Data or the State's use of the Software and Hosted Services, if applicable. Contractor will notify the State Program Managers or their designees by the fastest means available and also in writing. In no event will Contractor provide such notification more than twenty-four (24) hours after Contractor receives the request. Contractor will not respond to subpoenas, service of process, FOIA requests, and other legal requests related to the State without first notifying the State and obtaining the State's prior approval of Contractor's proposed responses. Contractor agrees to provide its completed responses to the State with adequate time for State review, revision and approval.

21.5 Loss or Compromise of Data. In the event of any act, error or omission, negligence, misconduct, or breach on the part of Contractor that compromises or is suspected to compromise the security, confidentiality, integrity, or availability of State Data or the physical, technical, administrative, or organizational safeguards put in place by Contractor that relate to the protection of the security, confidentiality, or integrity of State Data, Contractor must, as applicable:

(a) notify the State as soon as practicable but no later than 24 hours of becoming aware of such occurrence;

(b) cooperate with the State in investigating the occurrence, including making available all relevant records, logs, files, data reporting, and other materials required to comply with applicable law or as otherwise required by the State;

(c) in the case of PII or PHI, at the State's sole election:

(i) with approval and assistance from the State, notify the affected individuals who comprise the PII or PHI as soon as practicable but no later than is required to comply with applicable law, or, in the absence of any legally required notification period, within 5 calendar days of the occurrence; or

(ii) reimburse the State for any costs in notifying the affected individuals;

(d) in the case of PII, provide third-party credit and identity monitoring services to each of the affected individuals who comprise the PII for the period required to comply with applicable law, or, in the absence of any legally required monitoring services, for no less than 24 months following the date of notification to such individuals;

(e) perform or take any other actions required to comply with applicable law as a result of the occurrence;

(f) pay for any costs associated with the occurrence, including but not limited to any costs incurred by the State in investigating and resolving the occurrence, including reasonable attorney's fees associated with such investigation and resolution;

(g) without limiting Contractor's obligations of indemnification as further described in this Contract, indemnify, defend, and hold harmless the State for any and all claims, including reasonable attorneys' fees, costs, and incidental expenses, which may be suffered by, accrued against, charged to, or recoverable from the State in connection with the occurrence;

(h) be responsible for recreating lost State Data in the manner and on the schedule set by the State without charge to the State; and

(i) provide to the State a detailed plan within 10 calendar days of the occurrence describing the measures Contractor will undertake to prevent a future occurrence. Notification to affected individuals, as described above, must comply with applicable law, be written in plain language, not be tangentially used for any solicitation purposes, and contain, at a minimum: name and contact information of Contractor's representative; a description of the nature of the loss; a list of the types of data involved; the known or approximate date of the loss; how such loss may affect the affected individual; what steps Contractor has taken to protect the affected individual; what steps the affected individual can take to protect himself or herself; contact information for major credit card reporting agencies; and, information regarding the credit and identity monitoring services to be provided by Contractor. The State will have the option to review and approve any notification sent to affected individuals prior to its delivery. Notification to any other party, including but not limited to public media outlets, must be reviewed and approved by the State in writing prior to its dissemination.

21.6 The parties agree that any damages relating to a breach of this **Section 21** are to be considered direct damages and not consequential damages.

**22. Non-Disclosure of Confidential Information**. The parties acknowledge that each party may be exposed to or acquire communication or data of the other party that is confidential, privileged communication not intended to be disclosed to third parties.

22.1 Meaning of Confidential Information. For the purposes of this Contract, the term "**Confidential Information**" means all information and documentation of a

party that: (a) has been marked "confidential" or with words of similar meaning, at the time of disclosure by such party; (b) if disclosed orally or not marked "confidential" or with words of similar meaning, was subsequently summarized in writing by the disclosing party and marked "confidential" or with words of similar meaning; and, (c) should reasonably be recognized as confidential information of the disclosing party. The term "Confidential Information" does not include any information or documentation that was: (a) subject to disclosure under the Michigan Freedom of Information Act (FOIA); (b) already in the possession of the receiving party without an obligation of confidentiality; (c) developed independently by the receiving party, as demonstrated by the receiving party, without violating the disclosing party's proprietary rights; (d) obtained from a source other than the disclosing party without an obligation of confidentiality; or, (e) publicly available when received, or thereafter became publicly available (other than through any unauthorized disclosure). For purposes of this Contract, in all cases and for all matters, State Data is deemed to be Confidential Information.

22.2 Obligation of Confidentiality. The parties agree to hold all Confidential Information in strict confidence and not to copy, reproduce, sell, transfer, or otherwise dispose of, give or disclose such Confidential Information to third parties other than employees, agents, or subcontractors of a party who have a need to know in connection with this Contract or to use such Confidential Information for any purposes whatsoever other than the performance of this Contract. The parties agree to advise and require their respective employees, agents, and subcontractors of their obligations to keep all Confidential Information confidential. Disclosure to the Contractor's subcontractor is permissible where:

(a) the subcontractor is a Permitted Subcontractor;

(b) the disclosure is necessary or otherwise naturally occurs in connection with work that is within the Permitted Subcontractor's responsibilities; and

(c) Contractor obligates the Permitted Subcontractor in a written contract to maintain the State's Confidential Information in confidence. At the State's request, any of the Contractor's and Permitted Subcontractor's Representatives may be required to execute a separate agreement to be bound by the provisions of this **Section 22.2**.

22.3 Cooperation to Prevent Disclosure of Confidential Information. Each party must use its best efforts to assist the other party in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limiting the foregoing, each party must advise the other party immediately in the event either

party learns or has reason to believe that any person who has had access to Confidential Information has violated or intends to violate the terms of this Contract. Each party will cooperate with the other party in seeking injunctive or other equitable relief against any such person.

22.4 Remedies for Breach of Obligation of Confidentiality. Each party acknowledges that breach of its obligation of confidentiality may give rise to irreparable injury to the other party, which damage may be inadequately compensable in the form of monetary damages. Accordingly, a party may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies which may be available, to include, in the case of the State, at the sole election of the State, the immediate termination, without liability to the State, of this Contract or any Statement of Work corresponding to the breach or threatened breach.

22.5 Surrender of Confidential Information upon Termination. Upon termination or expiration of this Contract or a Statement of Work, in whole or in part, each party must, within 5 Business Days from the date of termination, return to the other party any and all Confidential Information received from the other party, or created or received by a party on behalf of the other party, which are in such party's possession, custody, or control. Upon confirmation from the State, of receipt of all data, Contractor must permanently sanitize or destroy the State's Confidential Information, including State Data, from all media including backups using National Security Agency ("NSA") and/or National Institute of Standards and Technology ("NIST") (NIST Guide for Media Sanitization 800-88) data sanitization methods or as otherwise instructed by the State. If the State determines that the return of any Confidential Information is not feasible or necessary, Contractor must destroy the Confidential Information as specified above. The Contractor must certify the destruction of Confidential Information (including State Data) in writing within 5 Business Days from the date of confirmation from the State.

**23. Records Maintenance, Inspection, Examination, and Audit**.

23.1 Right of Audit. Pursuant to MCL 18.1470, the State or its designee may audit Contractor to verify compliance with this Contract. Contractor must retain and provide to the State or its designee and the auditor general upon request, all financial and accounting records related to this Contract through the Term of this Contract and for 4 years after the latter of termination, expiration, or final payment under this Contract or any extension ("**Financial Audit Period**"). If an audit, litigation, or other action involving the records is initiated before the end of the

Financial Audit Period, Contractor must retain the records until all issues are resolved.

23.2 Right of Inspection. Within 10 calendar days of providing notice, the State and its authorized representatives or designees have the right to enter and inspect Contractor's premises or any other places where Services are being performed, and examine, copy, and audit all records related to this Contract. Contractor must cooperate and provide reasonable assistance. If financial errors are revealed, the amount in error must be reflected as a credit or debit on subsequent invoices until the amount is paid or refunded. Any remaining balance at the end of this Contract must be paid or refunded within 45 calendar days.

23.3 Application. This **Section 23** applies to Contractor, any Affiliate, and any Permitted Subcontractor that performs Services in connection with this Contract.

**24. Support Services**. Contractor will provide the State with the Support Services described in the Service Level Agreement attached as **Schedule D** to this Contract. Such Support Services will be provided:

(a) Free of charge during the Warranty Period.

(b) Thereafter, for so long as the State elects to receive Support Services for the Software, in consideration of the State's payment of Fees for such services in accordance with the rates set forth in the Pricing Schedule.

**25. Data Security Requirements.** Throughout the Term and at all times in connection with its actual or required performance of the Services, Contractor will maintain and enforce an information security program including safety and physical and technical security policies and procedures with respect to its Processing of the State's Confidential Information that comply with the requirements of the State's data security policies as set forth in **Schedule E** to this Contract.

**26. Training**. Contractor will provide, at no additional charge, training on all uses of the Software permitted hereunder in accordance with the times, locations and other terms set forth in a Statement of Work. Upon the State's request, Contractor will timely provide training for additional Authorized Users or other additional training on all uses of the Software for which the State requests such training, at such reasonable times and locations and pursuant to such rates and other terms as are set forth in the Pricing Schedule.

**27. Maintenance Releases; New Versions**

27.1 Maintenance Releases. Provided that the State is current on its Fees, during the Term, Contractor will provide the State, at no additional charge, with all Maintenance Releases, each of which will constitute Software and be subject to the terms and conditions of this Contract.

27.2 New Versions. Provided that the State is current on its Fees, during the Term, Contractor will provide the State, at no additional charge, with all New Versions, each of which will constitute Software and be subject to the terms and conditions of this Contract.

27.3 Installation. The State has no obligation to install or use any Maintenance Release or New Versions. If the State wishes to install any Maintenance Release or New Version, the State will have the right to have such Maintenance Release or New Version installed, in the State's discretion, by Contractor or other authorized party as set forth in a Statement of Work. Contractor will provide the State, at no additional charge, adequate Documentation for installation of the Maintenance Release or New Version, which has been developed and tested by Contractor and Acceptance Tested by the State. The State's decision not to install or implement a Maintenance Release or New Version of the Software will not affect its right to receive Support Services throughout the Term of this Contract.

**28. Source Code Escrow**

28.1 Escrow Contract. The parties may enter into a separate intellectual property escrow agreement. Such escrow agreement will govern all aspects of Source Code escrow and release. The cost of the escrow will be the sole responsibility of Contractor.

28.2 Deposit. Within 30 business days of the Effective Date, Contractor will deposit with the escrow agent, pursuant to the procedures of the escrow agreement, the Source Code for the Software, as well as the Documentation and names and contact information for each author or other creator of the Software. Promptly after release of any update, upgrade, patch, bug fix, enhancement, new version, or other revision to the Software, Contractor will deposit updated Source Code, documentation, names, and contact information with the escrow agent.

28.3 Verification. At State's request and expense, the escrow agent may at any time verify the Deposit Material, including without limitation by compiling Source Code, comparing it to the Software, and reviewing the completeness and accuracy of any and all material. In the event that the Deposit Material does not conform to the requirements of **Section 28** above:

(a) Contractor will promptly deposit conforming Deposit Material; and

(b) Contractor will pay the escrow agent for subsequent verification of the new Deposit Material. Any breach of the provisions of this **Section 28.3**will constitute material breach of this Contract, and no further payments will be due from the State until such breach is cured, in addition to other remedies the State may have.

28.4 Deposit Material License. Contractor hereby grants the State a license to use, reproduce, and create derivative works from the Deposit Material, provided the State may not distribute or sublicense the Deposit Material or make any use of it whatsoever except for such internal or governmental uses as necessary to maintain and support the Software. Copies of the Deposit Material created or transferred pursuant to this Contract are licensed, not sold, and the State receives no title to or ownership of any copy or of the Deposit Material itself. The Deposit Material constitutes Confidential Information of Contractor pursuant to **Section 22** (Non-disclosure of Confidential Information) of this Contract (provided no provision of **Section 22.4** calling for return of Confidential Information before termination of this Contract will apply to the Deposit Material). The State will only receive Deposit Materials for use in accordance with this license, pursuant upon release of the Deposit Materials under the applicable escrow agreement.

**29. Contractor Representations and Warranties**.

29.1 Authority. Contractor represents and warrants to the State that:

(a) It is duly organized, validly existing, and in good standing as a corporation or other entity as represented under this Contract under the laws and regulations of its jurisdiction of incorporation, organization, or chartering;

(b) It has the full right, power, and authority to enter into this Contract, to grant the rights and licenses granted under this Contract, and to perform its contractual obligations;

(c) The execution of this Contract by its Representative has been duly authorized by all necessary organizational action; and

(d) When executed and delivered by Contractor, this Contract will constitute the legal, valid, and binding obligation of Contractor, enforceable against Contractor in accordance with its terms.

(e) Contractor is neither currently engaged in nor will engage in the boycott of a person based in or doing business with a strategic partner as described in 22 USC 8601 to 8606.

29.2 Bid Response. Contractor represents and warrants to the State that:

(a) The prices proposed by Contractor were arrived at independently, without consultation, communication, or agreement with any other Bidder for the purpose of restricting competition; the prices quoted were not knowingly disclosed by Contractor to any other Bidder to the RFP; and no attempt was made by Contractor to induce any other Person to submit or not submit a proposal for the purpose of restricting competition;

(b) All written information furnished to the State by or for Contractor in connection with this Contract, including Contractor's Bid Response, is true, accurate, and complete, and contains no untrue statement of material fact or omits any material fact necessary to make the information not misleading;

(c) Contractor is not in material default or breach of any other contract or agreement that it may have with the State or any of its departments, commissions, boards, or agencies. Contractor further represents and warrants that it has not been a party to any contract with the State or any of its departments that was terminated by the State within the previous 5 years for the reason that Contractor failed to perform or otherwise breached an obligation of the contract; and

(d) If any of the certifications, representations, or disclosures made in Contractor's Bid Response change after contract award, the Contractor is required to report those changes immediately to the Contract Administrator.

29.3 Software Representations and Warranties. Contractor further represents and warrants to the State that:

(a) it is the legal and beneficial owner of the entire right, title and interest in and to the Software, including all Intellectual Property Rights relating thereto, or the licensee with sufficient rights and authority to provide all Software, Services, Deliverables, and otherwise perform all Contractor obligations required under the terms of this Contract;

(b) it has, and throughout the license term, will retain the unconditional and irrevocable right, power and authority to grant and perform the license hereunder;

(c) it has, and throughout the Term and any additional periods during which Contractor does or is required to perform the Services will have, the unconditional and irrevocable right, power and authority, including all permits and licenses required, to provide the Services and grant and perform all rights and licenses granted or required to be granted by it under this Contract;

(d) the Software, and the State's use thereof, is and throughout the license term will be free and clear of all encumbrances, liens and security interests of any kind;

(e) neither its grant of the license, nor its performance under this Contract does or to its knowledge will at any time:

(i) conflict with or violate any applicable law;

(ii) require the consent, approval or authorization of any governmental or regulatory authority or other third party; or

(iii) require the provision of any payment or other consideration to any third party;

(f) when used by the State or any Authorized User in accordance with this Contract and the Documentation, the Software, the Hosted Services, if applicable, or Documentation as delivered or installed by Contractor does not or will not:

(i) infringe, misappropriate, or otherwise violate any Intellectual Property Right or other right of any third party; or

(ii) fail to comply with any applicable law;

(g) as provided by Contractor, the Software and Services do not and will not at any time during the Term contain any:

(i) Harmful Code; or

(ii) Third party or Open-Source Components that operate in such a way that it is developed or compiled with or linked to any third party or Open-Source Components, other than Approved Third Party Components specifically described in a Statement of Work.

(h) all Documentation is and will be complete and accurate in all material respects when provided to the State such that at no time during the license term will the Software have any material undocumented feature; and

(i) it will perform all Services in a timely, skillful, professional and workmanlike manner in accordance with commercially reasonable industry standards and practices for similar services, using personnel with the requisite skill, experience and qualifications, and will devote adequate resources to meet its obligations under this Contract.

(j) when used in the Operating Environment (or any successor thereto) in accordance with the Documentation, all Software as provided by Contractor, will be fully operable, meet all applicable specifications, and function in all respects, in conformity with this Contract and the Documentation;

(k) Contractor acknowledges that the State cannot indemnify any third parties, including but not limited to any third-party software providers that provide software that will be incorporated in or otherwise used in conjunction with the Services, and that notwithstanding anything to the contrary contained in any third-party software license agreement or end user license agreement, the State will not indemnify any third party software provider for any reason whatsoever;

(l) no Maintenance Release or New Version, when properly installed in accordance with this Contract, will have a material adverse effect on the functionality or operability of the Software.

(m) all Configurations or Customizations made during the Term will be forward-compatible with future Maintenance Releases or New Versions and be fully supported without additional costs.

(n) If Contractor Hosted:

(i) Contractor will not advertise through the Hosted Services (whether with adware, banners, buttons or other forms of online advertising) or link to external web sites that are not approved in writing by the State;

(ii) the Software and Services will in all material respects conform to and perform in accordance with the Specifications and all requirements of this Contract, including the Availability and Availability Requirement provisions set forth in the Service Level Agreement;

(iii) all Specifications are, and will be continually updated and maintained so that they continue to be, current, complete and accurate and so that they do and will continue to fully describe the Hosted Services in all material respects such that at no time during the Term or any additional periods during which Contractor does or is required to perform the Services will the Hosted Services have any material undocumented feature;

(o) During the Term of this Contract, any audit rights contained in any third-party software license agreement or end user license agreement for third-party software incorporated in or otherwise used in conjunction with the Software or with the Hosted Services, if applicable, will apply solely to Contractor or its Permitted Subcontractors. Regardless of anything to the contrary contained in any third-party software license agreement or end user license agreement, third-party software providers will have no audit rights whatsoever against State Systems or networks.

29.4 Disclaimer. EXCEPT FOR THE EXPRESS WARRANTIES SET FORTH IN THIS CONTRACT, CONTRACTOR HEREBY DISCLAIMS ALL WARRANTIES, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, WITH RESPECT TO THIS CONTRACT.

**30. Offers of Employment**. During the first 12 months of the Contract, should Contractor hire an employee of the State, without prior written consent of the State, who has substantially worked on any project covered by this Contract. The Contractor will be billed for 50% of the employee's annual salary in effect at the time of separation.

**31. Conflicts and Ethics**. Contractor will uphold high ethical standards and is prohibited from: (a) holding or acquiring an interest that would conflict with this Contract; (b) doing anything that creates an appearance of impropriety with respect to the award or performance of the Contract; (c) attempting to influence or appearing to influence any State employee by the direct or indirect offer of anything of value; or (d) paying or agreeing to pay any person, other than employees and consultants working for Contractor, any consideration contingent upon the award of the Contract. Contractor must immediately notify the State of any violation or potential violation of these standards. This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any Permitted Subcontractor that provides Services and Deliverables in connection with this Contract.

**32. Compliance with Laws**. Contractor, its subcontractors, including Permitted Subcontractors, and their respective Representatives must comply with all laws in connection with this Contract.

**33. Nondiscrimination**. Under the Elliott-Larsen Civil Rights Act, 1976 PA 453, MCL 37.2101, *et seq*., the Persons with Disabilities Civil Rights Act, 1976 PA 220, MCL 37.1101, *et seq*., and Executive Directive 2019-09, Contractor and its subcontractors agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex (as defined in Executive Directive 2019-09), height, weight, marital status, partisan

considerations, any mental or physical disability, or genetic information that is unrelated to the person's ability to perform the duties of a particular job or position. Breach of this covenant is a material breach of the Contract.

**34. Unfair Labor Practice**. Under MCL 423.324, the State may void any Contract with a Contractor or Permitted Subcontractor who appears on the Unfair Labor Practice register compiled under MCL 423.322.

**35. Governing Law**. This Contract is governed, construed, and enforced in accordance with Michigan law, excluding choice-of-law principles, and all claims relating to or arising out of this Contract are governed by Michigan law, excluding choice-of-law principles. Any dispute arising from this Contract must be resolved in the Michigan Court of Claims. Complaints against the State must be initiated in Ingham County, Michigan. Contractor waives any objections, such as lack of personal jurisdiction or *forum non conveniens*. Contractor must appoint an agent in Michigan to receive service of process.

**36. Non-Exclusivity**. Nothing contained in this Contract is intended nor is to be construed as creating any requirements contract with Contractor, nor does it provide Contractor with a right of first refusal for any future work. This Contract does not restrict the State or its agencies from acquiring similar, equal, or like Services from other sources.

**37. Force Majeure**

37.1 Force Majeure Events. Neither party will be liable or responsible to the other party, or be deemed to have defaulted under or breached the Contract, for any failure or delay in fulfilling or performing any term hereof, when and to the extent such failure or delay is caused by: acts of God, flood, fire or explosion, war, terrorism, invasion, riot or other civil unrest, embargoes or blockades in effect on or after the date of the Contract, national or regional emergency, or any passage of law or governmental order, rule, regulation or direction, or any action taken by a governmental or public authority, including imposing an embargo, export or import restriction, quota or other restriction or prohibition (each of the foregoing, a "**Force Majeure Event**"), in each case provided that: (a) such event is outside the reasonable control of the affected party; (b) the affected party gives prompt written notice to the other party, stating the period of time the occurrence is expected to continue; (c) the affected party uses diligent efforts to end the failure or delay and minimize the effects of such Force Majeure Event.

37.2 State Performance; Termination. In the event of a Force Majeure Event affecting Contractor's performance under the Contract, the State may suspend its performance hereunder until such time as Contractor resumes performance. The State may terminate the Contract by written notice to Contractor if a Force Majeure Event affecting Contractor's performance hereunder continues substantially

uninterrupted for a period of 5 Business Days or more. Unless the State terminates the Contract pursuant to the preceding sentence, any date specifically designated for Contractor's performance under the Contract will automatically be extended for a period up to the duration of the Force Majeure Event.

37.3 Exclusions; Non-suspended Obligations. Notwithstanding the foregoing or any other provisions of the Contract or this Schedule:

(a) in no event will any of the following be considered a Force Majeure Event:

(i) shutdowns, disruptions or malfunctions of Hosted Services or any of Contractor's telecommunication or internet services other than as a result of general and widespread internet or telecommunications failures that are not limited to the Hosted Services; or

(ii) the delay or failure of any Contractor Personnel to perform any obligation of Contractor hereunder unless such delay or failure to perform is itself by reason of a Force Majeure Event.

(b) no Force Majeure Event modifies or excuses Contractor's obligations under **Section 21** (State Data), **22** (Non-Disclosure of Confidential Information), or **17** (Indemnification) of the Contract, Disaster Recovery and Backup requirements set forth in the Service Level Agreement, Availability Requirement (if Contractor Hosted ) defined in the Service Level Agreement, or any data retention or security requirements under the Contract.

**38. Dispute Resolution**. The parties will endeavor to resolve any Contract dispute in accordance with this provision. The dispute will be referred to the parties' respective Contract Administrators or Program Managers. Such referral must include a description of the issues and all supporting documentation. The parties must submit the dispute to a senior executive if unable to resolve the dispute within 15 business days. The parties will continue performing while a dispute is being resolved, unless the dispute precludes performance. A dispute involving payment does not preclude performance. Litigation to resolve the dispute will not be instituted until after the dispute has been elevated to the parties' senior executive and either concludes that resolution is unlikely or fails to respond within 15 business days. The parties are not prohibited from instituting formal proceedings: (a) to avoid the expiration of statute of limitations period; (b) to preserve a superior position with respect to creditors; or (c) where a party makes a determination that a temporary restraining order or other injunctive relief is the only adequate remedy. This Section does not limit the State's right to terminate the Contract.

**39. Media Releases**. News releases (including promotional literature and commercial advertisements) pertaining to this Contract or project to which it relates must not be

made without the prior written approval of the State, and then only in accordance with the explicit written instructions of the State.

**40. Severability**. If any part of this Contract is held invalid or unenforceable, by any court of competent jurisdiction, that part will be deemed deleted from this Contract and the severed part will be replaced by agreed upon language that achieves the same or similar objectives. The remaining Contract will continue in full force and effect.

**41. Waiver**. Failure to enforce any provision of this Contract will not constitute a waiver.

**42. Survival**. Any right, obligation, or condition that, by its express terms or nature and context is intended to survive, will survive the termination or expiration of this Contract; such rights, obligations, or conditions include, but are not limited to, those related to transition responsibilities; indemnification; disclaimer of damages and limitations of liability; State Data; non-disclosure of Confidential Information; representations and warranties; insurance and bankruptcy.

**43. Administrative Fee and Reporting.** Contractor must pay an administrative fee of 1% on all payments made to Contractor under the Contract for transactions with MiDEAL members and other states (including governmental subdivisions and authorized entities). Administrative fee payments must be made online by check or credit card at: https://www.thepayplace.com/mi/dtmb/adminfee

Contractor must submit an itemized purchasing activity report, which includes at a minimum, the name of the purchasing entity and the total dollar volume in sales. Reports should be mailed to MiDeal@michigan.gov.

The administrative fee and purchasing activity report are due within 30 calendar days from the last day of each calendar quarter.

**44. Extended Purchasing Program**. This contract is extended to MiDEAL members. MiDEAL members include local units of government, school districts, universities, community colleges, and nonprofit hospitals. A current list of MiDEAL members is available at www.michigan.gov/mideal.

Upon written agreement between the State and Contractor, this contract may also be extended to: (a) other states (including governmental subdivisions and authorized entities) and (b) State of Michigan employees.

If extended, Contractor must supply all Contract Activities at the established Contract prices and terms. The State reserves the right to impose an administrative fee and negotiate additional discounts based on any increased volume generated by such extensions.

Contractor must submit invoices to, and receive payment from, extended purchasing program members on a direct and individual basis.

**45. Contract Modification**. This Contract may not be amended except by signed agreement between the parties (a "**Contract Change Notice**"). Notwithstanding the foregoing, no subsequent Statement of Work or Contract Change Notice executed after the Effective Date will be construed to amend this Contract unless it specifically states its intent to do so and cites the section or sections amended.

**46. HIPAA Compliance**. The State and Contractor must comply with all obligations under HIPAA and its accompanying regulations, including but not limited to entering into a business associate agreement, if reasonably necessary to keep the State and Contractor in compliance with HIPAA.

**47. Accessibility Requirements**.

47.1 All Software provided by Contractor under this Contract, including associated content and documentation, must conform to WCAG 2.0 Level AA. Contractor must provide a description of conformance with WCAG 2.0 Level AA specifications by providing a completed PAT for each product provided under the Contract. At a minimum, Contractor must comply with the WCAG 2.0 Level AA conformance claims it made to the State, including the level of conformance provided in any PAT. Throughout the Term of the Contract, Contractor must:

(a) maintain compliance with WCAG 2.0 Level AA and meet or exceed the level of conformance provided in its written materials, including the level of conformance provided in each PAT;

(b) comply with plans and timelines approved by the State to achieve conformance in the event of any deficiencies;

(c) ensure that no Maintenance Release, New Version, update or patch, when properly installed in accordance with this Contract, will have any adverse effect on the conformance of Contractor's Software to WCAG 2.0 Level AA;

(d) promptly respond to and resolve any complaint the State receives regarding accessibility of Contractor's Software;

(e) upon the State's written request, provide evidence of compliance with this Section by delivering to the State Contractor's most current PAT for each product provided under the Contract; and

(f) participate in the State of Michigan Digital Standards Review described below.

47.2 State of Michigan Digital Standards Review. Contractor must assist the State, at no additional cost, with development, completion, and on-going maintenance of an accessibility plan, which requires Contractor, upon request from the State, to submit evidence to the State to validate Contractor's accessibility and compliance with WCAG 2.0 Level AA. Prior to the solution going-live and thereafter on an annual basis, or as otherwise required by the State, re-assessment of accessibility may be required. At no additional cost, Contractor must remediate all issues identified from any assessment of accessibility pursuant to plans and timelines that are approved in writing by the State.

47.3 Warranty. Contractor warrants that all WCAG 2.0 Level AA conformance claims made by Contractor pursuant to this Contract, including all information provided in any PAT Contractor provides to the State, are true and correct. If the State determines such conformance claims provided by the Contractor represent a higher level of conformance than what is actually provided to the State, Contractor will, at its sole cost and expense, promptly remediate its Software to align with Contractor's stated WCAG 2.0 Level AA conformance claims in accordance with plans and timelines that are approved in writing by the State. If Contractor is unable to resolve such issues in a manner acceptable to the State, in addition to all other remedies available to the State, the State may terminate this Contract for cause under **Section 16.1**.

47.4 Contractor must, without limiting Contractor's obligations of indemnification as further described in this Contract, indemnify, defend, and hold harmless the State for any and all claims, including reasonable attorneys' fees, costs, and incidental expenses, which may be suffered by, accrued against, charged to, or recoverable from the State arising out of its failure to comply with the foregoing accessibility standards

47.5 Failure to comply with the requirements in this **Section 47** shall constitute a material breach of this Contract.

**48. Further Assurances**. Each party will, upon the reasonable request of the other party, execute such documents and perform such acts as may be necessary to give full effect to the terms of this Contract.

**49. Relationship of the Parties**. The relationship between the parties is that of independent contractors. Contractor, its employees, and agents will not be considered employees of the State. No partnership or joint venture relationship is created by virtue

of this Contract. Contractor, and not the State, is responsible for the payment of wages, benefits and taxes of Contractor's employees and any subcontractors. Prior performance does not modify Contractor's status as an independent contractor. Neither party has authority to contract for nor bind the other party in any manner whatsoever.

**50. Headings**. The headings in this Contract are for reference only and do not affect the interpretation of this Contract.

**51. No Third-party Beneficiaries**. This Contract is for the sole benefit of the parties and their respective successors and permitted assigns. Nothing herein, express or implied, is intended to or will confer on any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of this Contract.

**52. Equitable Relief**. Each party to this Contract acknowledges and agrees that (a) a breach or threatened breach by such party of any of its obligations under this Contract may give rise to irreparable harm to the other party for which monetary damages would not be an adequate remedy and (b) in the event of a breach or a threatened breach by such party of any such obligations, the other party hereto is, in addition to any and all other rights and remedies that may be available to such party at law, at equity or otherwise in respect of such breach, entitled to equitable relief, including a temporary restraining order, an injunction, specific performance and any other relief that may be available from a court of competent jurisdiction, without any requirement to post a bond or other security, and without any requirement to prove actual damages or that monetary damages will not afford an adequate remedy. Each party to this Contract agrees that such party will not oppose or otherwise challenge the appropriateness of equitable relief or the entry by a court of competent jurisdiction of an order granting equitable relief, in either case, consistent with the terms of this Section.

**53. Effect of Contractor Bankruptcy**. All rights and licenses granted by Contractor under this Contract are and will be deemed to be rights and licenses to "intellectual property," and all Software and Deliverables are and will be deemed to be "embodiments" of "intellectual property," for purposes of, and as such terms are used in and interpreted under, Section 365(n) of the United States Bankruptcy Code (the "**Code**"). If Contractor or its estate becomes subject to any bankruptcy or similar proceeding, the State retains and has the right to fully exercise all rights, licenses, elections, and protections under this Contract, the Code and all other applicable bankruptcy, insolvency, and similar laws with respect to all Software and other Deliverables. Without limiting the generality of the foregoing, Contractor acknowledges and agrees that, if Contractor or its estate will become subject to any bankruptcy or similar proceeding:

(a) all rights and licenses granted to the State under this Contract will continue subject to the terms and conditions of this Contract, and will not be affected, even by Contractor's rejection of this Contract; and

(b) the State will be entitled to a complete duplicate of (or complete access to, as appropriate) all such intellectual property and embodiments of intellectual property comprising or relating to any Software or other Deliverables, and the same, if not already in the State's possession, will be promptly delivered to the State, unless Contractor elects to and does in fact continue to perform all of its obligations under this Contract.

**54. Schedules**. All Schedules that are referenced herein and attached hereto are hereby incorporated by reference. The following Schedules are attached hereto and incorporated herein:

| | |
|---|---|
| **Schedule A** | Statement of Work |
| **Schedule B** | Pricing Schedule |
| **Schedule C** | Insurance Schedule |
| **Schedule D** | Service Level Agreement |
| **Schedule E** | Data Security Requirements |
| **Schedule F** | Disaster Recovery Plan (if Contractor Hosted) |
| **Schedule G** | Transition Plan |
| **Schedule H** | Federal Funding Addendum |
| **Schedule I** | Acceptance Testing |

**55. Counterparts**. This Contract may be executed in counterparts, each of which will be deemed an original, but all of which together are deemed to be one and the same agreement and will become effective and binding upon the parties as of the Effective Date at such time as all the signatories hereto have signed a counterpart of this Contract. A signed copy of this Contract delivered by facsimile, e-mail or other means of electronic transmission (to which a signed copy is attached) is deemed to have the same legal effect as delivery of an original signed copy of this Contract.

**56. Entire Agreement**. These Terms and Conditions, including all Statements of Work and other Schedules and Exhibits (again collectively the "Contract") constitutes the sole and entire agreement of the parties to this Contract with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings and agreements, representations and warranties, both written and oral, with respect to such subject matter. In the event of any inconsistency between the statements made in the Terms and Conditions, the Schedules, Exhibits, and a Statement of Work, the following order of precedence governs: (a) first, these Terms and Conditions and (b) second, Schedule E – Data Security Requirements and (c) third, each Statement of Work; and (d) fourth, the remaining Exhibits and Schedules to this Contract. NO TERMS ON

CONTRACTOR'S INVOICES, WEBSITE, BROWSE-WRAP, SHRINK-WRAP, CLICK-WRAP, CLICK-THROUGH OR OTHER NON-NEGOTIATED TERMS AND CONDITIONS PROVIDED WITH ANY OF THE SERVICES, OR DOCUMENTATION HEREUNDER, EVEN IF ATTACHED TO STATE'S DELIVERY OR PURCHASE ORDER, WILL CONSTITUTE A PART OR AMENDMENT OF THIS CONTRACT OR IS BINDING ON THE STATE OR ANY AUTHORIZED USER FOR ANY PURPOSE. ALL SUCH OTHER TERMS AND CONDITIONS HAVE NO FORCE AND EFFECT AND ARE DEEMED REJECTED BY THE STATE AND THE AUTHORIZED USER, EVEN IF ACCESS TO OR USE OF SUCH SERVICE OR DOCUMENTATION REQUIRES AFFIRMATIVE ACCEPTANCE OF SUCH TERMS AND CONDITIONS

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# SCHEDULE A – STATEMENT OF WORK

## 1. DEFINITIONS

The following terms have the meanings set forth below. All initial capitalized terms that are not defined in this Schedule shall have the respective meanings given to them in Section 1 of the Contract Terms and Conditions.

| Term | Definition |
|---|---|
| AID | Automated Incident Detection |
| ANPR | Automatic Number Plate Recognition |
| API | Application Programming Interface |
| ASOS | Automated Surface Observation System |
| AWOS | Automated Weather Observing Systems |
| BIM | Basic Infrastructure Message |
| BSM | Basic Safety Messages |
| CAV | Connected and Automated Vehicles |
| C-ITS | Connected Intelligent Traffic System |
| CV | Connected Vehicle |
| DSRC | Dedicated Short-Range Communication |
| ESS | Environmental Sensor Station |
| FCD | Floating Car Data |
| GUI | Graphic User Interface |
| I2V | Infrastructure-to-Vehicle |
| ID | Identification |
| IP | Internet Protocol |
| ITE | Institute of Transportation Engineers |
| ITIS | International Traveler Information Systems |
| ITS | Intelligent Transportation System |
| JSON | JavaScript Object Notation, a format for data interchange |
| LPR | License Plate Recognition |
| MAP | Intersection Geometry Message |
| MDOT | Michigan Department of Transportation |
| MDP | Contractor's Mobility Data Platform |
| MDSS | Maintenance Decision Support System |
| NTCIP | National Transportation Communications for ITS (Intelligent Transportation System) Protocol |
| NTP | Network Time Protocol |
| NWS | National Weather Service |
| OBU | On-Board Unit |
| PKI | Public Key Infrastructure |
| PSID | Provider Service Identifier |

| Term | Definition |
|---|---|
| PSM | Pedestrian Safety Message |
| PTP | Precision Time Protocol |
| REST | Representational State Transfer, an architectural style for API |
| RSM | Road Safety Message |
| RSU | Roadside Unit |
| SaaS | Software-as-a-Service |
| SAE | Society of Automotive Engineers |
| SCADA | MDOT's Supervisory Control And Data Acquisition pump station system |
| SCMS | Security Credentials Management System |
| SNMP | Simple Network Management Protocol |
| SOM | State of Michigan |
| SPaT | Signal Phase and Timing |
| TIM | Traveler Information Message |
| TMC | Traffic Message Channel |
| TOC | Transportation Operations Center |
| UI | User Interface |
| V2I | Vehicle-to-Infrastructure |
| V2V | Vehicle-to-Vehicle |
| V2X | Vehicle-to-Everything |
| WYSIWYG | What you see is what you get |
| WZDx | Work Zone Data Exchange |

## 2. BACKGROUND

The State of Michigan (SOM) is deploying a new Connected Vehicle – Advanced Traffic Management System that must provide the following high-level functionality to improve transportation safety, mobility, and system performance:

- Connected Vehicles
  - Integrate and configure field devices through a map-based, user interface.Remotely operate, monitor, and manage field devices.
  - Collect, ingest, store, and analyze data generated from field devices.
  - Enhance MDOT's use of field device, mobile, and fixed data.
  - Manage data, data exchange, certificate management, security, and message assembly.
  - Provide a solution that provides the following functions:
    - Basic processes to generate MAP, Traveler Information Message (TIM), and Basic Infrastructure Message (BIM) messages.
    - Process for converting Signal Phase and Timing (SPaT) from traffic signal controllers into Society of Automotive Engineers (SAE) SPaT.

        - Basic Simple Network Management Protocol (SNMP) manager for interfacing to field devices.

- Security Credentials Management System (SCMS)
    - Provide a message credential solution for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication using a Public Key Infrastructure (PKI)-based approach that employs emerging industry standards, as developed by CAMP and others, of encryption and certificate management to facilitate trusted communication.
    - The SCMS solution is anticipated to be a Software as a Service (SaaS) solution which supplies certificates and other elements to MDOT devices. MDOT does not intended to own the SCMS solution provided by the CV-ATMS vendor.
    - The supplied SCMS solution is not intended to be integrated into the CV-ATMS (i.e., it shall be a stand-alone system)

- Applications
    - Provide an application development platform that allows for scalability as new needs are discovered.
    - Provide a collection of applications that share and disseminate solution information to the users of the system.
    - Lane Closure Request Application – to provide a system capable of managing MDOT's lane closure request process. The process includes collecting, mapping, communicating, and reporting planned closures associated with road work, special events, or other circumstances that require closing lane(s) along MDOT roadways.
        - MDOT's Lane Closure Notification/Request Form is used for input into the CVBO.
    - Weather Application – to provide a system that ingests various near real-time weather and environmental data points, observations, and feeds capable of the following functionality:
        - Converting the information into a geospatial shape with associated weather attributes to distribute notifications to users within the affected area.
        - Identifying active and predictive roadway flooding.
    - Smart Work Zone Application – to collect work zone data from temporary infrastructure and field devices to assess various factors such as work zone limits, if work zone workers are present, active/deactive work zones, etc.

        - This application includes a Work Zone Data Exchange (WZDx) module

- Interfaces
    - Manage inbound/outbound interfaces using APIs to facilitate sharing data with internal and external systems.
    - Provide an expandable data ingestion methodology for accepting data from a variety of data sources.
    - Provide processes capable of processing, converting, translating, securing, and storing data that is ingested.
    - Ingest and analyze data generated from interfaces.

- General
    - Provide system administration, monitoring, notifications, dashboards, and reports.
    - Provide the ability to accommodate multiple sources and types of data.
    - Provide data storage that is expandable to include a variety of data types as they become available.
    - Include processes to translate data into useable formats, and to move data to other systems where needed.
    - Provide a means for accessing data from the database.
    - Provide a collection of web services that can access and process the stored data to provide information and share the data.

See Schedule A – Table 1 – Business Specifications for system requirements that the Contractor will be responsible for delivering.

The goal in deploying a new CV-ATMS is to maintain and enhance current system functionality while providing a platform capable of accommodating future functionality and system needs. MDOT's CAV Strategic Plan provides additional background and is available at the following link:

MDOT Connected and Automated Vehicle Program Strategic Plan
https://www.michigan.gov/mdot/-/media/Project/Websites/MDOT/Travel/Mobility/Mobility-Initiatives/Connected-Vehicles/Documents/MDOT-CAV-Strategic-Plan.pdf

**Field Devices**

The CV-ATMS must be capable of integrating a variety of field device types and manufacturers. As of September 2022, MDOT has the following devices integrated into the existing CV-ATMS:

- Roadside Units (RSU), with the following manufacturers:
  - Arada
  - COHDA
  - Danlaw
  - KAPSCH
  - Lear
  - LOCOMATE
  - Siemens
  - TRAFFICAST

  *Note: for RSUs at traffic signal locations, MDOT currently uses Econolite and Siemens controllers; however, the signal controllers are not directly integrated into the CV-ATMS.

The State anticipates the list of field device types and associated quantities to change prior to the deployment of the new CV-ATMS and throughout the contract term as the connected vehicle industry continues to advance and pilots turn into scalable deployments. In addition, MDOT continues to expand its CAV program and the CV-ATMS must be capable of integrated new devices types and must not limit the number of field devices that can be integrated. Proposed system integrations as defined in the Statement of Work and Business Requirements may require additional device types/manufacturers to be integrated.

**Field Device Model and Firmware Updates**

The State expects existing field device models and firmware updates to occur throughout the duration of the contract. These updates are not anticipated to impact the device operation, functionality, or communication standards. The configuration and testing costs for the accommodation of these updates must be included in the Operations and Maintenance costs in Schedule B – Pricing.

**Field Device Manufacturer Additions**

The State expects the need to integrate new field device manufacturers for existing device types throughout the duration of the contract. The Contractor must accommodate adding up to two new field device manufacturers per year. These additions are anticipated to operate, function, and use communication standards that align with the existing device type. The configuration and testing costs for the

accommodation of these additions must be included in the Operations and Maintenance costs in Schedule B – Pricing. New field device manufacturer additions exceeding two per year will be paid for at the optional unit price provided in Schedule B – Pricing.

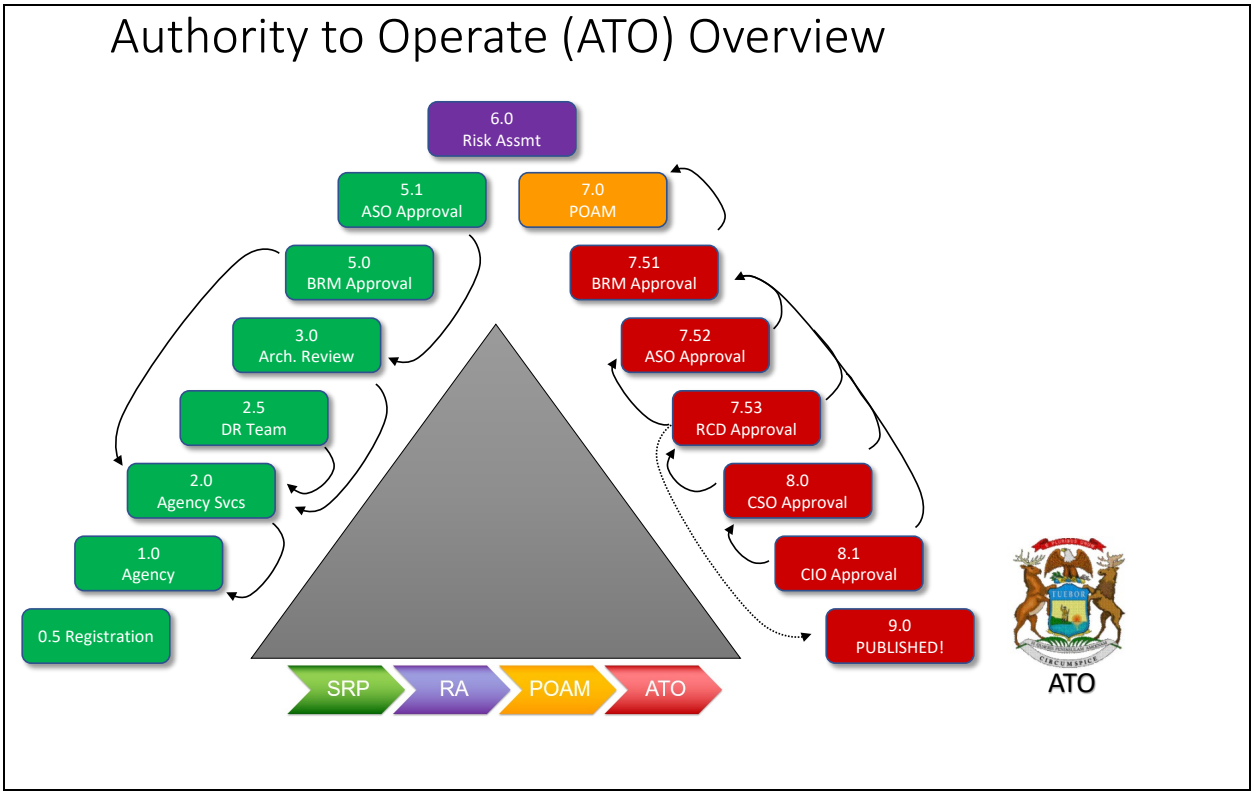
### 3. PURPOSE

The State is implementing a *State Hosted* Software, and Applicable Services.

### 4. IT ENVIRONMENT RESPONSIBILITIES

Contractor will collaborate with SOM's IT group to configure and deploy a virtualized CV-ATMS platform.

Included in SCHEDULE E – Data Security Agreement; the Contractor will be required to follow, participate, and be responsive during DTMB's Authority to Operate (ATO) process, which is shown in the below diagram. Depending on the results of 6.0 Risk Assessment this process can take months before ATO is achieved, which is required prior to the integration of any ITS devices. Contractor must accommodate this process in their project schedule.



In addition to the committed Contractor Security Officer, Contractor will designate (where needed) one Project Information Security Manager (P-ISM) resource to be assigned to the MDOT project to ensure proper security strategy, planning, and maintenance over the life of the project. The initial phase of the project post-NTP will include requirements analysis and DTMB PSP reconciliation with what Contractor natively provides in the solution vs what may be needed to be developed specific to MDOT's requirements.

**For a State Hosted Software Solution:**

**Definitions:**

**Application** – Software programs which provide functionality for end user and Contractor services.

**Development** - Process of creating, testing and maintaining software components.

| **Component Matrix** | Identify contract components with contractor and/or subcontractor name(s), if applicable |
|---|---|
| Application | CV-ATMS – Kapsch<br>SCMS – ISS |
| Development | All Kapsch |

Integrity Security Services, Inc. (ISS) will be the sole subcontractor on the project. ISS will provide the SCMS.

Contractor needs state data to ensure that system applications, road topology and device locations, and configuration elements can be accurately represented in CV-ATMS. The types of information that will be requested from State includes:

- List of device types, device IDs, firmware versions, location details and IP addresses.
- Road network details
- Existing UI standards, color preferences
- Alarm categories and priorities
- Existing examples of any required data reports and dashboards
- User Roles and permissions
- Existing intersection MAP files and configurations
- Existing signal controller phasing and preemption/priority plans

- Existing messaging such as TIM, RSM, and others expected to be incorporated into the system
- Information on any existing CV management systems

### 5. ADA COMPLIANCE

The State is required to comply with the Americans with Disabilities Act of 1990 (ADA) and has adopted standards and procedures regarding accessibility requirements for websites and software applications. All websites, applications, software, and associated content and documentation provided by the Contractor as part of the solution must comply with Level AA of the World Wide Web Consortium (W3C) Web Content Accessibility Guidelines (WCAG) 2.0.

### 6. USER TYPE AND CAPACITY

| Type of User | Access Type | Number of Users | Number of Concurrent Users |
|---|---|---|---|
| State Employee | R, W, A | 250 | 40 |
| State Contractors | R, W | 100 | 50 |
| Third Party Users | R | 50 | 10 |

Contractor Software must meet the expected number of concurrent Users.

The Software will support double the expected number of concurrent users without degradation of performance within the specifications of the hardware platform specified hardware. The solution has no limitations on the number of configured users. If the system requires more than 200 concurrent users, the hardware configuration will be expanded to accommodate this load.

The CV-ATMS UI page load is dependent on the level of detail and applications that are configured in the user layout. The CV-ATMS UI allows each user to create multiple customized layouts including a default layout, which will display on login. Each layout can be configured to open the applications, map layers, video windows, etc., that are saved by the operator. The UI with a map is typically fully opened within three seconds after login. A map showing the sign WYSIWYG icons typically opens within five seconds on a standard workstation. The CV-ATMS UI only loads what is configured to be displayed by the operator and does not prevent the operator from using the main tab if subsequent tabs are loading in the background. Similarly, report page loads are also

dependent on the amount of data retrieved and the time period of the report. During deployment Contractor will create report and dashboard design documents to identify the queries necessary and to optimize the queries to be performant based on the desired needs of the State. Generally, the maximum time to generate and display a report in CV-ATMS is 20 seconds, typical daily reports for specific functions do not reach the maximum time and would be expected to load faster than the 20 second maximum.

**Network Connectivity:** Contractor recommends at least Gigabit Ethernet (GbE), with 10 GbE preferred for network devices. The latency described above is from a typical 10GbE network on a statewide scale system.

CMCC and MDP Server Specifications (per environment)
4-core
16GB memory
Ubuntu Server 22.04 LTS or newer
Database, 1TB SSD
App server, 512GB SSD
2TB storage

CV-ATMS Server Specifications is provided in **Table 2**.

**Table 2. CV-ATMS Server Specifications**

| Server Type | vCore | vRam (GB) | vHDD (GB) | vVolume in DataStore (GB) |
|---|---|---|---|---|
| Application | 12 | 16 | 85 | |
| Gateway | 8 | 16 | 85 | |
| Deployment | 4 | 8 | 95 | |
| Load Balancer | 4 | 4 | 75 | |
| GIS | 16 | 64 | 45 | 100 |
| Configuration Database | 8 | 32 | 35 | 110 |
| Data Platform | 40 | 60 | 1TB SSD | 2 TB SSD |
| App Server | 4 | 16 | 512 SSD | |

The system can run under Linux RedHat.

## 7. ACCESS CONTROL AND AUTHENTICATION

The Contractor's solution must integrate with the State's IT Identity and Access Management (IAM) environment as described in the State of Michigan Digital Strategy ( 1340.00.020.08 Enterprise Identity and Access Management Services Standard (michigan.gov) ,which consist of:

7.1 MILogin/Michigan Identity, Credential, and Access Management (MICAM). An enterprise single sign-on and identity management solution based on IBM's Identity and Access Management products including, IBM Security Identity Manager (ISIM), IBM Security Access Manager for Web (ISAM), IBM Tivoli Federated Identity Manager (TFIM), IBM Security Access Manager for Mobile (ISAMM), and IBM DataPower, which enables the State to establish, manage, and authenticate user identities for the State's Information Technology (IT) systems.

7.2 MILogin Identity Federation. Allows federated single sign-on (SSO) for business partners, as well as citizen-based applications.

7.3 MILogin Multi Factor Authentication (MFA, based on system data classification requirements). Required for those applications where data classification is Confidential and Restricted as defined by the 1340.00 Michigan Information Technology Information Security Policy (i.e. the proposed solution must comply with PHI, PCI, CJIS, IRS, and other standards).

7.4 MILogin Identity Proofing Services (based on system data classification requirements). A system that verifies individual's identities before the State allows access to its IT system. This service is based on "life history" or transaction information aggregated from public and proprietary data sources. A leading credit bureau provides this service.

To integrate with the SOM MILogin solution, the Contractor's solution must support SAML, or OAuth or OpenID interfaces for the SSO purposes.

System access control is typically managed via a centralized Active Directory server, and in some cases an external third-party authentication tool. CV-ATMS supports LDAP version 2 protocol and SAML version 2 for managing user account authentication with a Customer or Project provided user management and authentication system. When a system user provides his/her credentials to request login to CV-ATMS, the credentials are sent to the external service for authentication and user role assignment, and once authorized CV-ATMS will allow the login process to be completed. With this native CV-

ATMS user management functionality, Contractor will interface with MiLogin for fully integrated access control and authentication.

## 8. DATA RETENTION AND REMOVAL

The Software will need to retain all data for the entire length of the Contract unless otherwise direct by the State.

The State will need the ability to delete data, even data that may be stored off-line or in backups.

The State will need to retrieve data, even data that may be stored off-line or in backups.

The CV-ATMS must retain and store data collected by the CV-ATMS in accordance with Attachment 2 – MDOT-TOC-Retention Schedule redacted.pdf.

The main component supporting CV-ATMS transportation data layer and so-called “data lake” is the DataBus component. DataBus is based on a streaming platform on top of which it deploys a series of services and APIs, as well as a Common Data Model. The current version of DataBus uses Apache Pulsar technology, although the next product release will migrate to Kafka technology, with the main objective of facilitating the use of PaaS services from the main cloud infrastructure providers (Azure, AWS). Apart from that, it can also be deployed on-prem.

This tool allows managing data transportation between services or applications that generate information and other services and applications that consume it, following the event-driven architecture design philosophy. Data is organized in different data channels (called topics), which manage blocks of information in the form of messages (also called data events) with a header and content. The content published in a channel (topic) always follows a data model, called schema, associated with that channel (topic). Applications and services can publish or consume information in the topics to which they are given access, usually asynchronously (the consumer subscribes to a topic and receives the new information when it is published), although it is also possible to do so synchronously. Topics are organized and grouped by datasets (also called namespaces), and the authentication and authorization control (by dataset) is carried out by means of the OAuth2 protocol, provided by default by the Keycloak component.

The Streaming platform is the hub for the transportation, storage and sharing of data, both integrated from internal sources (e.g., connected vehicles data received from the RSUs and external sources (e.g. traffic data providers, etc.)), as well as data generated or calculated by internal services (e.g. incidents detected, etc.).

The streaming platform used (Pulsar/Kafka) provides by default the necessary functionalities to cover the data retention, deletion, and retrieval requirements. The streaming platform allows configuring per dataset the data retention time, as well as the actions to be performed when this time expires (for each message or block of information published): delete the data, archive it into a cold storage, etc.

The streaming platform is complemented by different types of databases that are used depending on the needs of the use cases that are implemented. This may include relational databases (PostgreSQL), columnar databases (Vertica or ClickHouse), or big data repositories (Cassandra). These databases are fed through microservices called "data sinks" that consume data from specific topics (according to configuration) and store them where appropriate. The archiving, elimination or purging of data is done through procedures configured in the databases or by means of maintenance scripts.

Data retrieval can be carried out through different mechanisms: directly using the client of the streaming platform (Pulsar/Kafka client), through the synchronous REST API or the asynchronous API, or by reading the database in case it has been stored in a database. All this occurs using the authentication and authorization control mechanism mentioned before.

Finally, the performance and status of all the aforementioned components is controlled through the monitoring solution that is deployed as part of the platform. This solution is based on Prometheus and Grafana (monitoring dashboards), using Loki for log management. In addition to the dashboards, alerts are also configured which, as well as notifying the situation, can trigger automated or manual actions.

## 9. END USER AND IT OPERATING ENVIRONMENT

The SOM IT environment includes X86 VMware, IBM Power VM, MS Azure/Hyper-V and Oracle VM, with supporting platforms, enterprise storage, monitoring, and management running in house and in cloud hosting provides.

Contractor must accommodate the latest browser versions (including mobile browsers) as well as some pre-existing browsers. To ensure that users with older browsers are still able to access online services, applications must, at a minimum, display and function correctly in standards-compliant browsers and the state standard browser without the use of special plugins or extensions. The rules used to base the minimum browser requirements include:

• Over 2% of desktop and mobile & tablet site traffic, measured using Michigan.gov sessions statistics and
• The current browser identified and approved as the State of Michigan standard

This information can be found at https://www.michigan.gov/browserstats. Please use the most recent calendar quarter to determine browser statistics. For those desktop and mobile & tablet browsers with over 2% of site traffic.

Contractor must support the current and future State standard environment at no additional cost to the State.

Contractor will deploy the CV-ATMS in the State-hosted IT environment to run on a VMware-based platform. The solution is based around several subsystems including the map-based GUI, connected vehicle capabilities, integrated applications, and big data repository and exchange. The CV-ATMS will be deployed on a virtualized platform as shown in **Figure 1**.

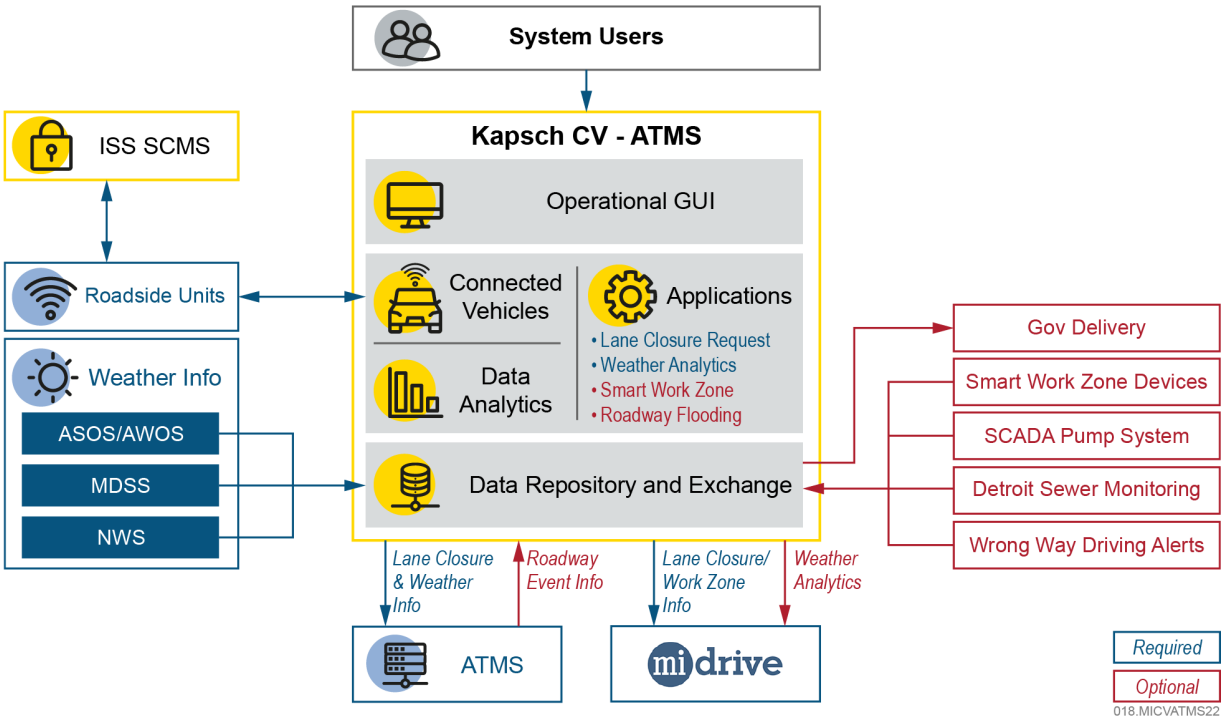



**Figure 1. MDOT Architecture**

In addition to the VMware-based platform, Tanzu will be required for the deployment of the data platform component.

The CV-ATMS solution design is based around several subsystems, as seen below:

***Connected vehicle subsystem:*** manages the messaging between the CV-ATMS and existing roadside units, pushing received messages and data to the data platform

***Data Platform Subsystem***: provides both and data repository and the analytics and business intelligence framework

***Operational GUI***: Browser based map-centric operational user interface that shows situational awareness and provides access to the CV Subsystem and other browser-based applications.

The CV-ATMS components will require secured, 1Gb (minimum) access to all field devices and external data providers for near-real-time exchange of messages and data as well as support of both local and remote users with secure and performant connections. To address fault tolerance and resilience, each virtual server should be provisioned with redundant network connections using shared IP addresses.

User access should be secured via VPNs, Citrix gateways, or other similar security methodology. Contractor will rely upon MDOT and DTMB to provide the IT environment and communications infrastructure, collaborating on detailed design for all required system environments.

Contractor's CV-ATMS solution is based upon a Common Data Model (CMD) and associated APIs for the various data types. The most cost-effective options for future interfaces and data sharing between SOM and external systems/providers are to either provide the APIs and CMD to the external system providers for implementation and interfacing, or to extend the CV-ATMS CMD and APIs to accommodate new data types and 3rd-party APIs. Each new system/provider interface will be reviewed on a case-by-case basis in order to determine at the most cost-effective design and implementation. From an IT environment perspective a secured, public-facing connection to 3rd-party systems would be required in each case.

Contractor staff coordinate with DTMB IT personnel. Once provisioned on the State-provided host server, Contractor will have read-only access to SOM environment and will work alongside DTMB staff via a visual MS Teams meeting (if necessary) for deployment, support and maintenance.

Contractor will coordinate with DTMB IT personnel to review, discuss and agree upon how to manage any required environment changes.

Contractor's Product Managers will work closely with the Contractor's Project Manager to communicate all product roadmap updates to the State. The Project Manager is responsible for informing the State of all changes to software and architecture and through the change control process, work with the State to determine if and when new features should be incorporated into the MDOT code branch.

Contractor is generally on a 6-month product release cycle. The Product Managers and Project Manager will meet with the State on a similar frequency, ahead of product release availability in order to discuss all product enhancements and extensions planned for any given release. In order to maintain clients in lock-step with product

release cycle, it is normally recommended that each release be deployed. However, each enhancement and extension will be reviewed, including costs for deployment, integration of enhanced or extended features, and regression testing. This product release approach is outside the scope of normal O&M support for issue resolution.

The solution does not require any plug-ins.

Contractor must provide a development environment, hosted by the Contractor. Contractor must provide environments for SOM training, testing, and production. The testing and production environments must have redundancy with automatic failover for all infrastructure resources (per environment), including database, application server, and other required infrastructure such that if a single server fails, the environment (testing or production) continues to function without human intervention. All CV-ATMS development must be conducted by the Contractor in the Contractor's development environment before being published to the State's testing environment.

- The ATMS testing environment must be available for testing and demonstrating all system functionalities and upgrades prior to being moved to the SOM production environment, without impacting the performance or functionality of the production system.
- The ATMS training and testing environment must be available without impacting the performance or functionality of the production system.
- The ATMS must have a production environment that provides the most recent version of all approved and tested system functionalities.

The solution will utilize 3 environments: Testing, Training, and Production. All development will be done on local Contractor servers.

## 10. SOFTWARE

Software requirements are identified in **Schedule A – Table 1 Business Specification Worksheet.**

Contractor must provide a list of any third party components, and open source component included with or used in connection with the deliverables defined within this Contract. This information must be provided to the State on a quarterly basis and/or if a new third party or open source component is used in the performance of this Contract.

**Look and Feel Standards**

All software items provided by the Contractor must adhere to the State of Michigan Application/Site standards which can be found at https://www.michigan.gov/standards.

**Mobile Responsiveness**

If the software will be used on a mobile device as define in Schedule A – Table 1, Business Specification Worksheet, the Software must utilize responsive design practices to ensure the application is accessible via a mobile device.

**SOM IT Environment Access**
Contractor must access State environments using one or more of the following methods:

State provided VDI (Virtual Desktop Infrastructure) where compliant.
State provided and managed workstation device.
Contractor owned and managed workstation maintained to all State policies and standards.
Contractor required interface with State systems which must be maintained in compliance with State policies and standards as set forth in **Schedule E – Data Security Requirements**.
From locations within the United States and jurisdiction territories.

CV-ATMS integrates several Contractor applications into one integrated platform.

- DYNAC: Operational GUI + Applications (version 16.3)
- CMCC: Connected Vehicle Manager (version 2.15.3)
- MDP: Data repository, exchange, and analytics subsystems (version 1.2)

Third-party components, including open source components included with or used in connection with the Solution.

CV-ATMS:
- Streaming platform:
  - Apache Pulsar
  - Apache Kafka
- Visualization layer:
  - Business Intelligence: Qlik Sense
  - NGINX
  - GeoServer
  - OpenLayers
- Data processing and analytics:
  - Apache Spark and Apache Spark Streaming
  - In memory cache: Redis
  - Rules engine (DSS): Drools libraries
  - Data catalogue: Datahub (datahubproject.io)
- Data Storage layer:
  - Relational database: PostgreSQL
  - Historical databases (columnar): Vertica, ClickHouse
  - NoSQL: Cassandra
- Administration and monitoring:
  - Identity Management: Keycloak

  - API manager: Kong
  - Services monitoring: Prometheus and Grafana
  - Logs Management: Loki
- Scalable deployment:
  - Docker containers
  - Kubernetes
  - Vmware Tanzu
  - Rancher
- Red Hat Enterprise Linux
- Apache Tomcat
  - PostgreSQL
  - SymmetricDS
    - OpenJDK

Contractor's mobile services function in both the iOS and Android platform environments. Given the nature of functionality and scale of the mobile services, the services are best utilized on a tablet hardware form factor.

The CV-ATMS functions with full features in desktop, laptop, or mobile device form factors.

The CV-ATMS enables MDOT to manage the State's CV ecosystem and develop applications for testing safety and mobility user cases:

- Managing CV roadside units and connected roadside controllers
- Creating and transmitting J2735 standard messages (e.g., MAP, TIM, RSM)
- Receiving, ingesting, processing, and analyzing messages received from system users
- Integrating CV data and other third-party data
- Providing data exchange through standard APIs to support application development
- Displaying live data through an interactive, map-centric Graphical User Interface (GUI)

The CV-ATMS is a modular, open-architected software platform, as illustrated in **Figure 2** and summarized in Table A.

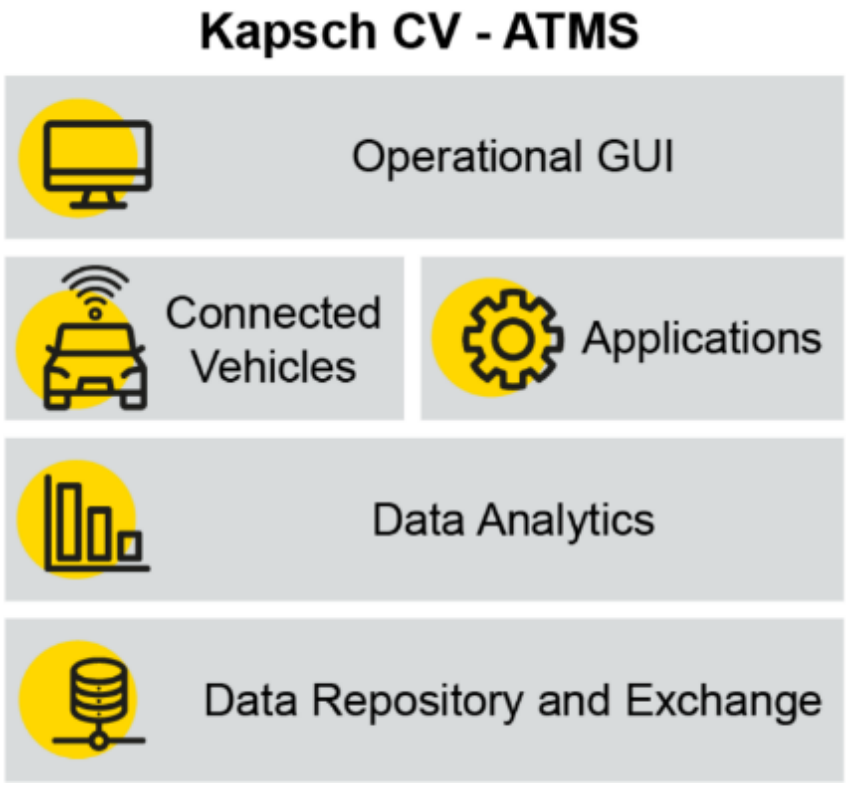



**Figure 2. CV-ATMS Functional Architecture**

**Table 1. CV-ATMS Subsystems**

| Subsystem | Description |
|---|---|
| **Operational GUI** | **Map-centric GUI, traffic monitoring, planned and unplanned event data entry and management.** |
| **Connected Vehicle** | **Advanced capability for managing, configuring and monitoring of V2X roadside units (RSUs).**<br>**Meets all requirements for managing and integrating RSUs including device configuration, assembling, sending and ingesting SAE 2735 messages, generating alerts, and reporting on device status.** |
| **Data Repository, Exchange, and Analytics** | **Includes big data ingestion, fusion and processing, data exchange, and a toolbox of business intelligence and analytics services. Supports integration with third party data providers and agency partners and comes with a standard set of interfaces** |

| | |
|---|---|
| **Applications** | **Safety and mobility applications to test applicability of CV Data including Lane Closure, Smart Work Zones, and Weather.** |

## OPERATIONAL GUI

CV-ATMS provides an intuitive and easy to use HTML5 browser-based GUI. The primary user facing display is a dynamic, interactive map that presents system data and devices in an intuitive, layered manner. Menus and controls follow Google Material UI design standards to provide a modern, easy-to-use solution. **Figure 3** depicts the default map-centric view of the GUI. The GUI includes:

Advanced mapping engine that integrates multiple map sources

Configurable Modern HTML5 user interface with independent drawer control

Fully interactive display with intuitive controls for map navigation, displaying map layers and elements, creating and managing map extents, and displaying information when hovering over icons

Visual and audible notifications and alerts

Ability to create dynamic schematics of key areas in the network.

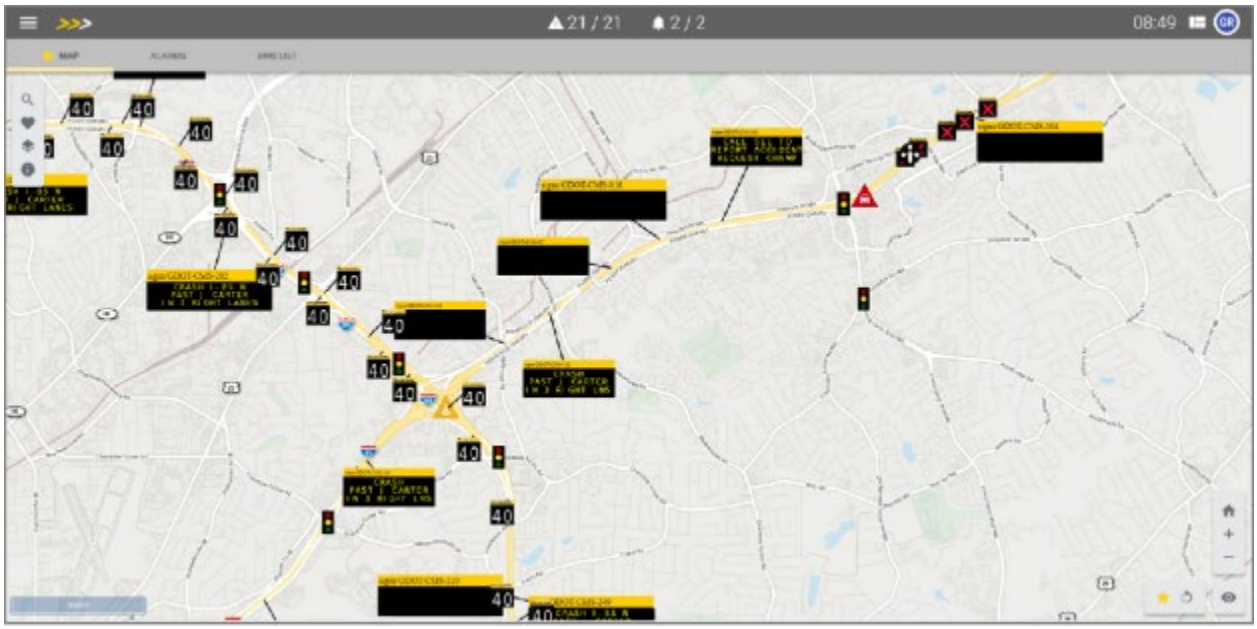
- 


**Figure 1. Standard Map-Centric View**

### Base Maps and Map Layers

CV-ATMS mapping engine and HTML5 web interface accommodates a variety of base maps and mapping services. Kapsch's primary mapping library is OpenLayers, a widely used open-source JavaScript library for displaying map data in our web-based GUI. OpenLayers allows for DYNAC to render maps and map themes provided in a standard format from various web-based sources. In addition, CV-ATMS has been configured to integrate commercial base maps from HERE, Google, ESRI and other providers.

Geospatial data to be displayed on the map are grouped and organized into layers. The GUI accommodates a wide range of layers including base maps, ITS devices (e.g., signs, cameras, detectors, RWIS), colored overlays (e.g., travel times or road conditions), geographical boundaries (e.g., counties, cities, zip codes, TMC regions), and traffic events (e.g., incidents, planned events, weather events, Amber alerts). Users control the visible set of layers through the interactive layer selector on the left side of the window (**Figure 4**).

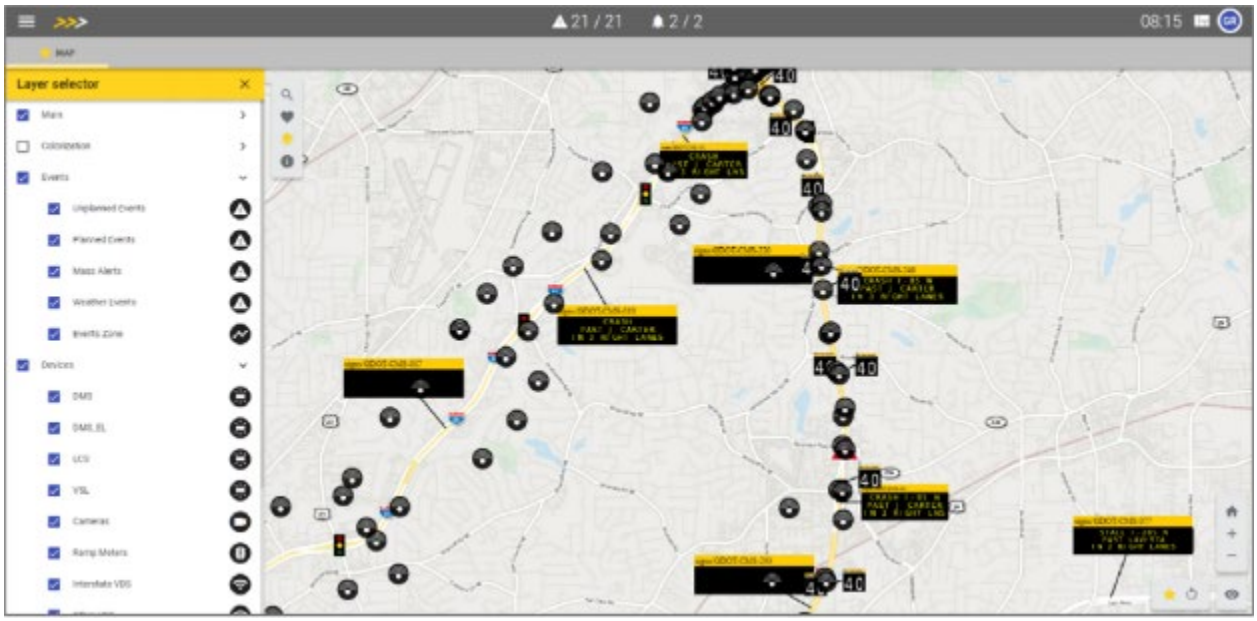
- 


**Figure 2. Map View with Layer Selector**

### Configuring the GUI Layout

The GUI layout is easily configurable and supports the use of multiple monitors. Our approach is based on the concept of "viewports." Viewports are a method to divide the monitor screen into two or more separate application frames.

The viewport selector is accessed by selecting an application tab. The selected application can then be dragged to a specific viewport. Any application can be dragged to any viewport.

#### USING VIEWPORTS

Users may easily divide the GUI by dragging and dropping application tabs to individual viewports. Clicking on an application tab and dragging that tab element will bring up the window viewport controls (**Figure 5** yellow boxes on all 4 sides of the GUI).

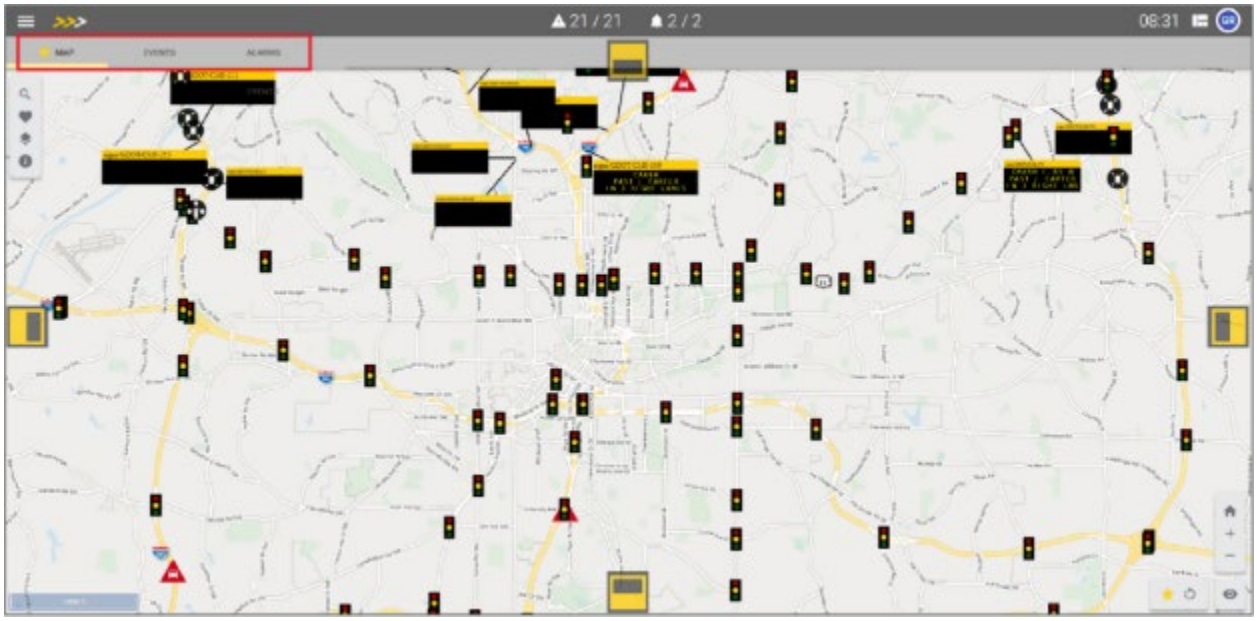
- 

**Figure 3. Dividing GUI into Multiple Viewports**

Releasing the mouse button on one of these boxes will rearrange the GUI with the new window placement. **Figure 6** depicts a GUI with two viewports, map and events, that was created by dragging the event tab header to the viewport control on the right side of the screen. You will notice that the event tab is no longer available on the map viewport.

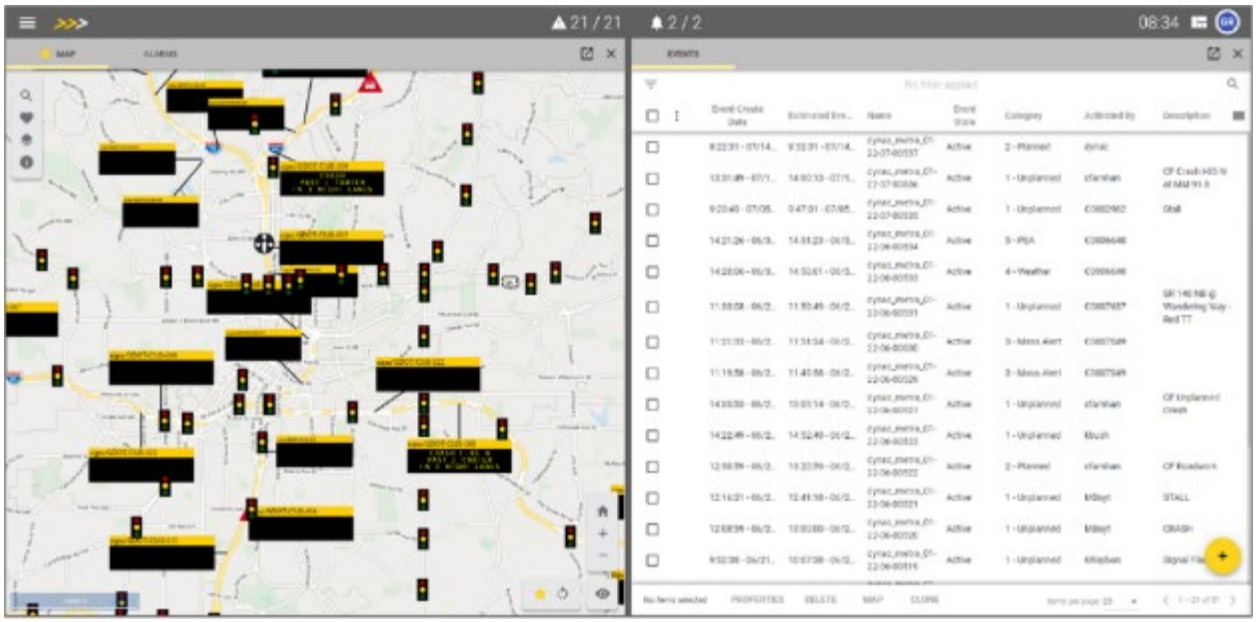
- 

**Figure 4. Layout with Two Viewports**

### PERSONAL LAYOUTS

Users may save multiple GUI layouts within CV-ATMS. Clicking on the Layout icon in the upper right corner, as shown in **Figure 7**, opens the layout selector where users can quickly change their view to a specific layout and/or manage the set of personal layouts.

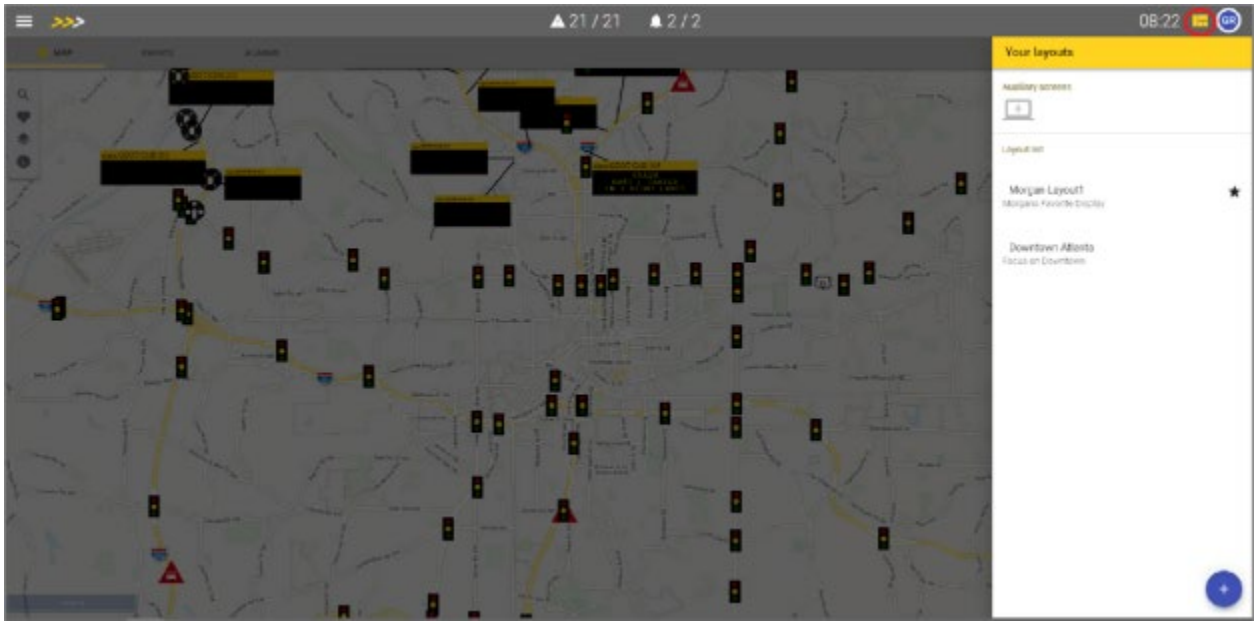
- 


**Figure 5. Saved Layouts**

## CONNECTED VEHICLE SUBSYSTEM

The Connected vehicle subsystem manages deployment of and integrating with CV Roadside Units. The CV Subsystem pulls data from all connected, active RSUs (Kapsch and Non-Kapsch units) and creates and pushes J2735 message sets to the RSUs. Functionality within the CV Subsystem includes:

**Automated Monitoring and Alert**. Provides the ability to monitor all devices within the network to detect any issues in connectivity or messaging. Users can register for alerts and notifications regarding issues with equipment, system functions, or recorded data.

**Asset Management**. Each location and its associated equipment can be defined and information on it maintained. Most configurations are set at the location level, rather than the device level. This allows equipment to be swapped out quickly and easily with minimal setup required.

**Automated Device Configuration**. Provides fast, easy device setup. Once all configurations are set, RSUs can be swapped out quickly and easily with minimal re-configuration required.

**Advanced Message Configuration and Scheduling**. Extends basic RSU messaging functionality by providing robust scheduling capabilities. This includes the ability to set specific times, days of the week, and intervals in which messages should be transmitted. Configurations are granular enough to allow special messages to be sent only on specific dates or during specific times of day; for example, it can accommodate messages that only repeat July 4 from 5:00pm to midnight. Updated messages and message scheduling are applied immediately.

**MAP Message Builder**. Provides the ability to build MAP messages quickly and easily via an intuitive GUI and format directly on a map view of the intersection or road segment.

**TIM and RSM Message Generation**. Builds and distributes standard messages (e.g., RSM and TIM messages).

**Capabilities**

The CV Subsystem serves as gate-keeper to the CV environment, consisting of RSUs, OBUs and personal mobile devices (depending on extension options chosen). The CV Subsystem provides advanced features for managing, configuring and monitoring of V2X roadside equipment. CV Subsystem is the connecting node for all C-ITS field devices. It monitors the health status of fixed (stationary) RSUs, connected via a given network infrastructure, and mobile RSUs, connected via cellular communication link, allowing a constant up-to-date status information of the full C-ITS infrastructure. CV Subsystem also provides access for IP-based communication between mobile devices (hybrid OBUs, Personal Information Device (PIDs)) to directly exchange information with the CV Subsystem.

The implemented GUI allows real-time visualization of C-ITS infrastructure and data on a map or in a list-based fashion, serving both the purpose of message interpreter for received messages to be displayed on the UI and event creation tool. CV Subsystem's UI offers a dedicated graphical message creator, allowing operators to manually craft C-ITS messages in an easy and intuitive way, while simultaneously received information from a connected ATMS would be transformed into standardized C-ITS messages as well.

Once the user management and connections to the CV environment are set up, the generic process allows creation of the locations for the Roadside equipment, i.e., where the RSUs are located (typically at intersections or selected road segments or gantries or poles on highways). The appropriate RSU devices are subsequently associated with the created locations, in order to receive and transmit the desired information to the road users.

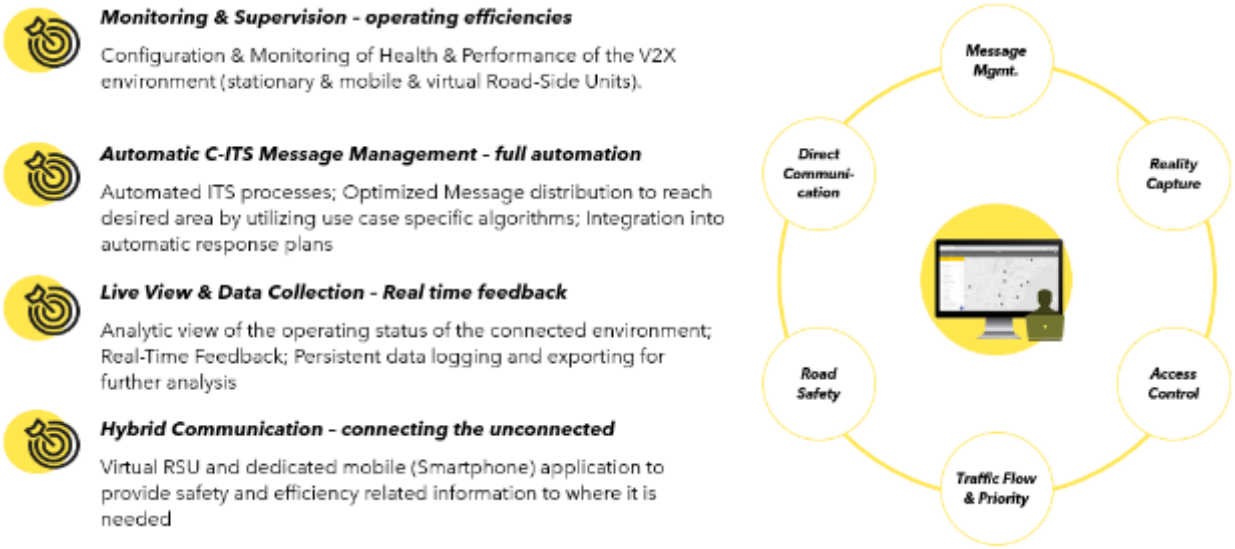



**Figure 6. CV Subsystem Functionality**

## User Interface

The CV-ATMS provides a series of interactive pages for an authenticated user to monitor, operate, and administer the complete CV infrastructure. Some examples are illustrated in **Figure 9** below.

Managing RSU locations and associated devices (view, create, add, edit, remove, delete)
Managing C-ITS messages (view, create, edit, delete, schedule, de/activate, schedule)
Map illustration for live data visualization of incoming vehicle movement data
Providing a monitoring dashboard for system and RSU performance and health checks


**Figure 7. CV Subsystem GUI Examples**

## Message Dissemination System

CV Subsystem provides the capability for manual and automatic message dissemination, based on the reference position of the to-be broadcasted event. In this context, event is meant to cover all kind of information, covered in the supported standards and a road user should be informed about, like a speed limit indication or

work zone warning. The term “message dissemination” refers to the active routing of relevant information to the correct spatial area. In the distributed C-ITS infrastructure, this implies the selection of an appropriate subset of available roadside units in order to broadcast the information accordingly.

**Event Manager**

The event manager cares about all C-ITS messages and information, regardless of the reporter/origin of the message, like an ATMS or directly entered via the CV Subsystem UI). Its main responsibility is to ensure active messages, i.e., messages which are needed to broadcasted at the defined time, are transmitted to the connected RSUs, in order to be broadcasted via 5.9GHz air link and in case of active hybrid extension package to the virtualRSU for interfacing with IP-connected mobile devices.

Additionally, the messages will be kept active and available for their full validity duration by the event manager. Any CV Subsystem user console entered or modified messages or update from a connected ATMS will update the existing messages accordingly at any time if needed.

**Device Management**

CV Subsystem as supervision solution enables the operator to maintain and monitor the health status of all connected C-ITS field devices (roadside units). It utilizes the V2XII protocol to serve these functions.

The Device Management permanently reflects the status to all created locations and their associated devices. It provides an indication if the devices are connected and operational or are faulty (Ok, Warning, Error indication). The status is visualized in the CV Subsystem UI for each location and device. Device Management provides functionality including device configuration, status and health monitoring and (if supported by the device) software update.

Parameters like disk-space, network information, storage and load capacity and usage as well as health information about temperature of the device or the position determined by GNSS module can be retrieved.

***Note:*** Only C-ITS field devices, which are connected to CV Subsystem (stationary and mobile RSUs) are supervised and monitored by the CV Subsystem. Other C-ITS participants like OBUs or subscribed mobile devices are not managed centrally.

**Message Broker**

The message broker and its V2X based data layer is the core communication node to field devices. RSUs and OBUs connect to the message broker for sending and receiving of relevant information. The message broker is a publish-subscribe based, topic-oriented solution, which enables different, separated information streams to different connected devices.

## DISPLAYING FIELD DEVICES ON THE MAP GUI

The CV-ATMS contains a RSU device layer to display all available RSUs on the map GUI as shown below.

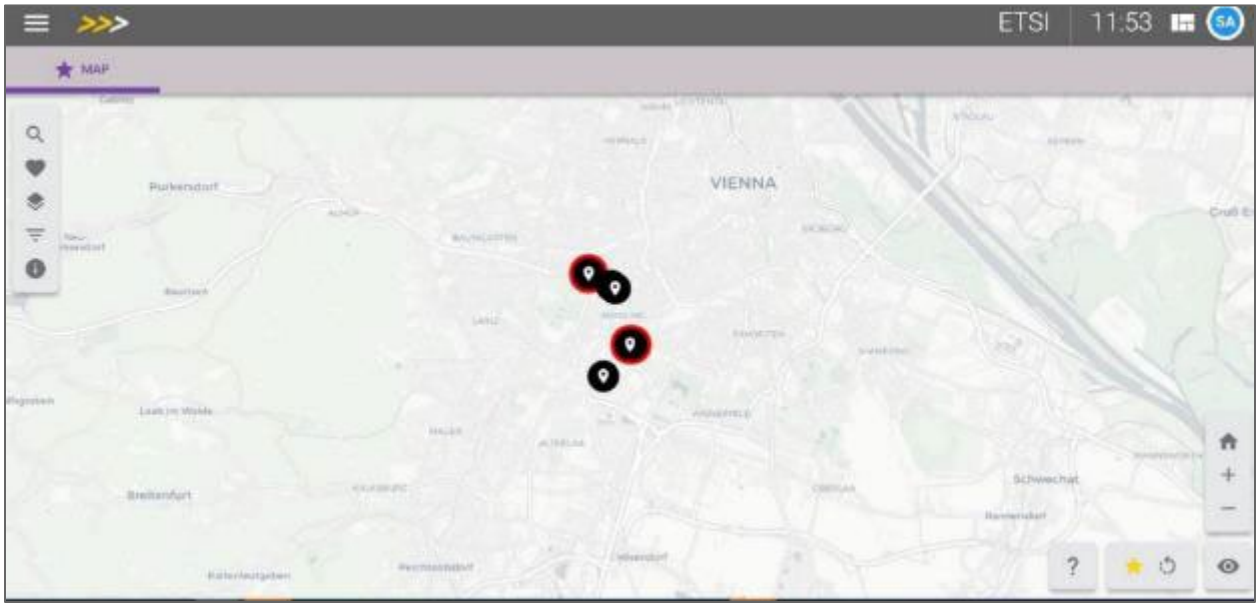



**Figure 8. Display of RSU Field Devices**

## DEVICE STATUS AND CONFIGURATION

The CV-ATMS contains a list view of all field devices to support device monitoring and configuration

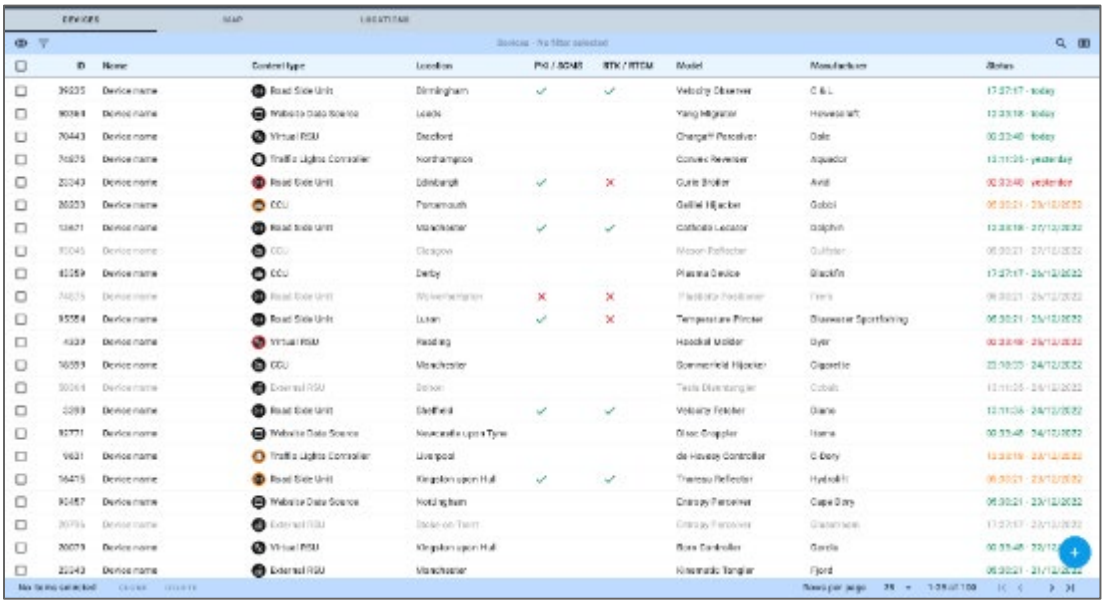
- 

**Figure 9. RSU List View**

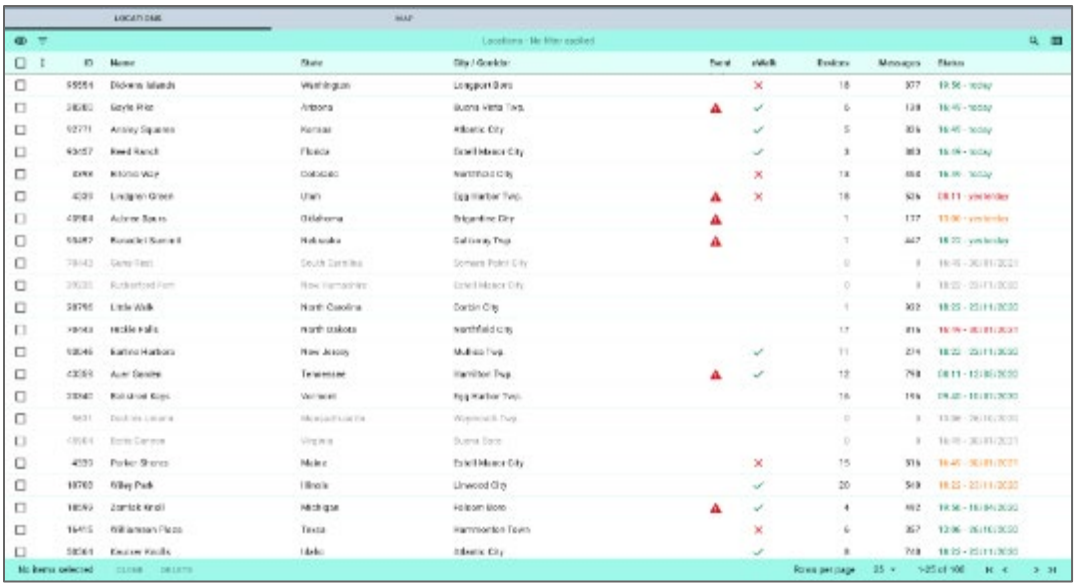
- 

**Figure 10. RSU Location View**

## DEVICE DETAILS

Users may click on a device icon from the map view or a device in the list view to access the details view of the field device. This device card enables users to view the details of the device, status of the device, manage key settings, and view the messages.

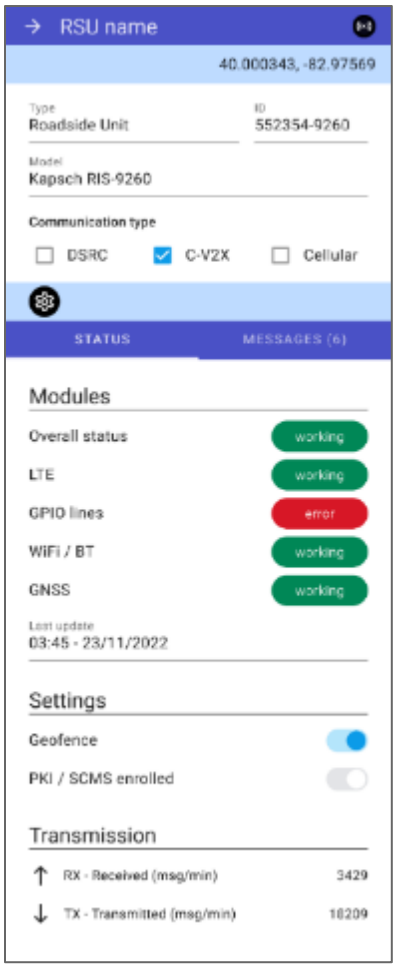



**Figure 11. Device Detail View**

## LIVE DATA

The GUI provides detailed live visualizations of system users, map configurations, and various message types. **Figure 14** below depicts the instrumented intersection with connected equipment (signals and RSUs), connected system users (vehicles, pedestrians), and details of the MAP message. This enables SOM staff to view live data for MAP messages, SPaT messages, and any messages coming from vehicles (BSMs) and pedestrians (PSMs). To view select a location and then press the Monitor button on the bottom right of the screen.

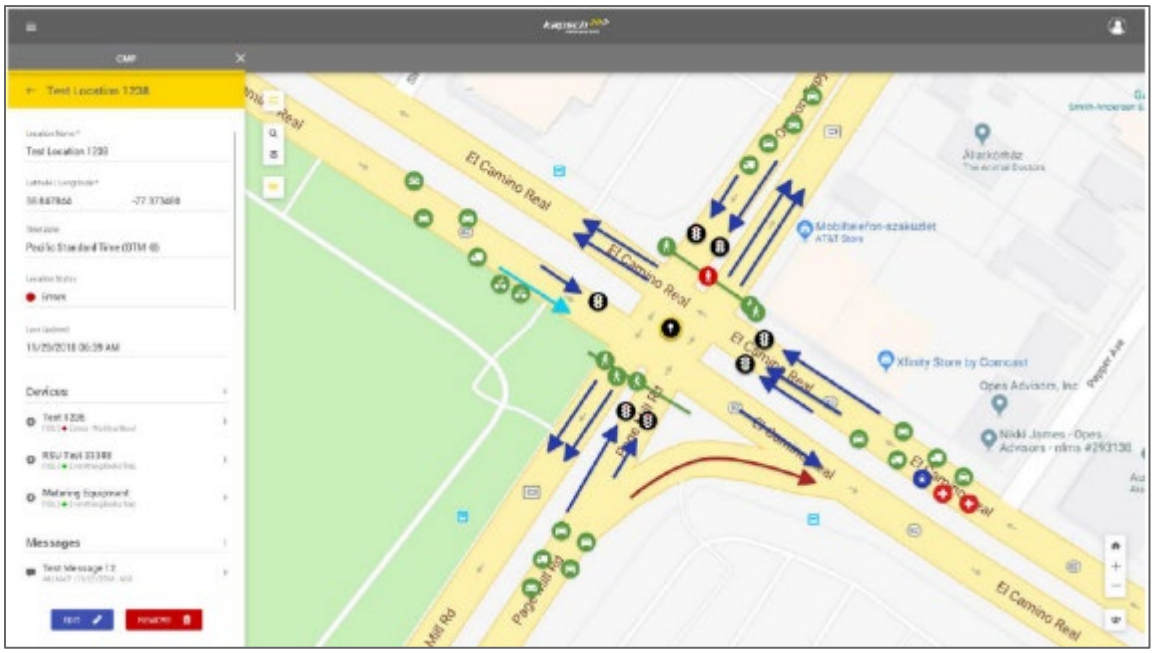
- 


**Figure 12. Depicting MAP Messages**

## MANUALLY CREATING TIM MESSAGE

The CV-ATMS allows users to create messages interactively on the map. For example, right clicking on the area on the map that applies to the message and select TIM message

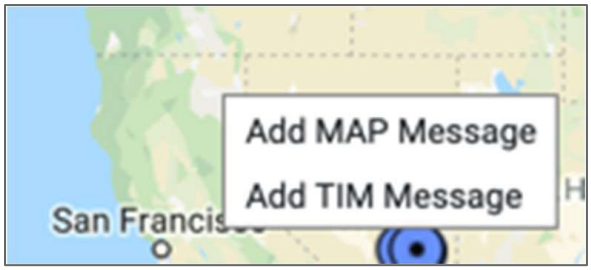



**Figure 13. Initiating creation of a new Messages**

Creating a TIM message follows a logical and intuitive process:

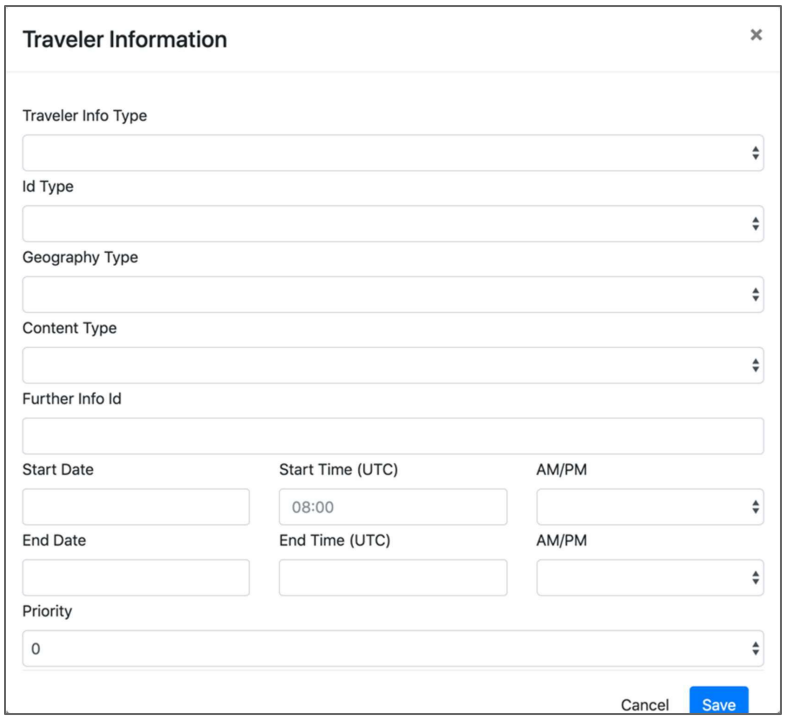



**Figure 14. Configuring a new Message**

Upon entering the message parameters, the user can select the geography for the message determination. The system permits selection of a radial area or a linear (lane-based) extent.

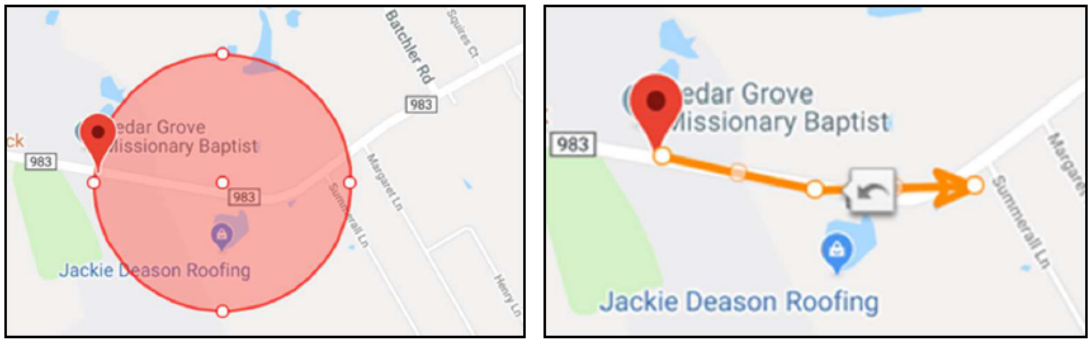



**Figure 15. Message Geography**

At this point, multiple ITIS codes and text can be entered

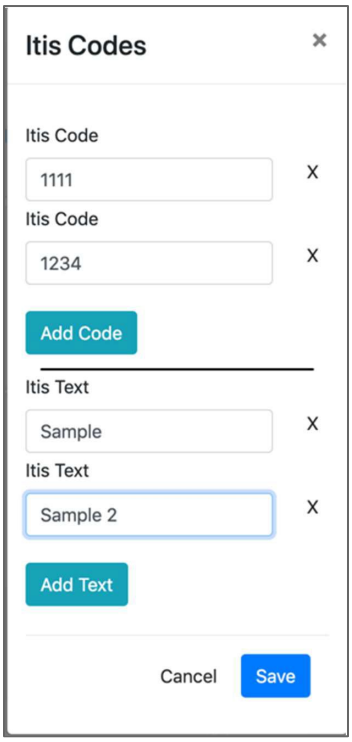



**Figure 16. Entering ITIS Codes**

## INTERSECTIONS

CV-ATMS provides interactive workflow to create intersection geometries for Map messages.

***Step 1: Set up Intersection***: The GUI presents a data entry screen for providing an ID (numeric), name (again, use the cross streets to name an intersection), default lane width (how wide each lane is in meters).


**Figure 17. Intersection Details**

***Step 2: Add intersection attributes (approaches or Crosswalk):*** CV-ATMS displays a visual view of the intersection to help the user define overlay properties.

- 


**Figure 18. Creating Intersection Attributes**

Selecting “Add Approach” will place a stoplight icon on the map.

Right clicking on the stoplight icon allows you to add lanes or delete the approach.

Selecting “Add lane” will put a blue arrow on the map representing a lane. You can select (left click) and hold the lane and drag it to wherever you want it to be.

If you right click on the lane you can delete it, or you can select Edit Location to edit the lat/lon points for more accuracy.

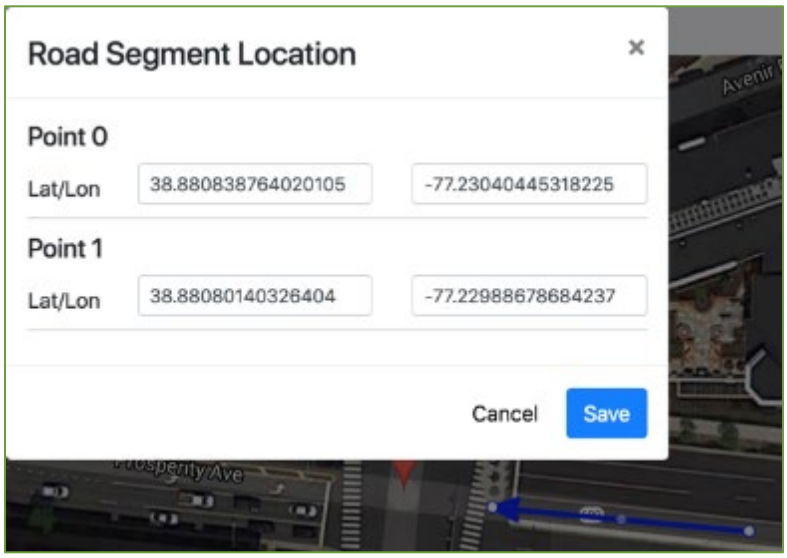



**Figure 19. Creating Road Segments**

Users can then add lane attributes


**Figure 20. Entering Lane Attributes**

## MESSAGE SCHEDULING

Users can manage the scheduling of a message through the scheduler interface.

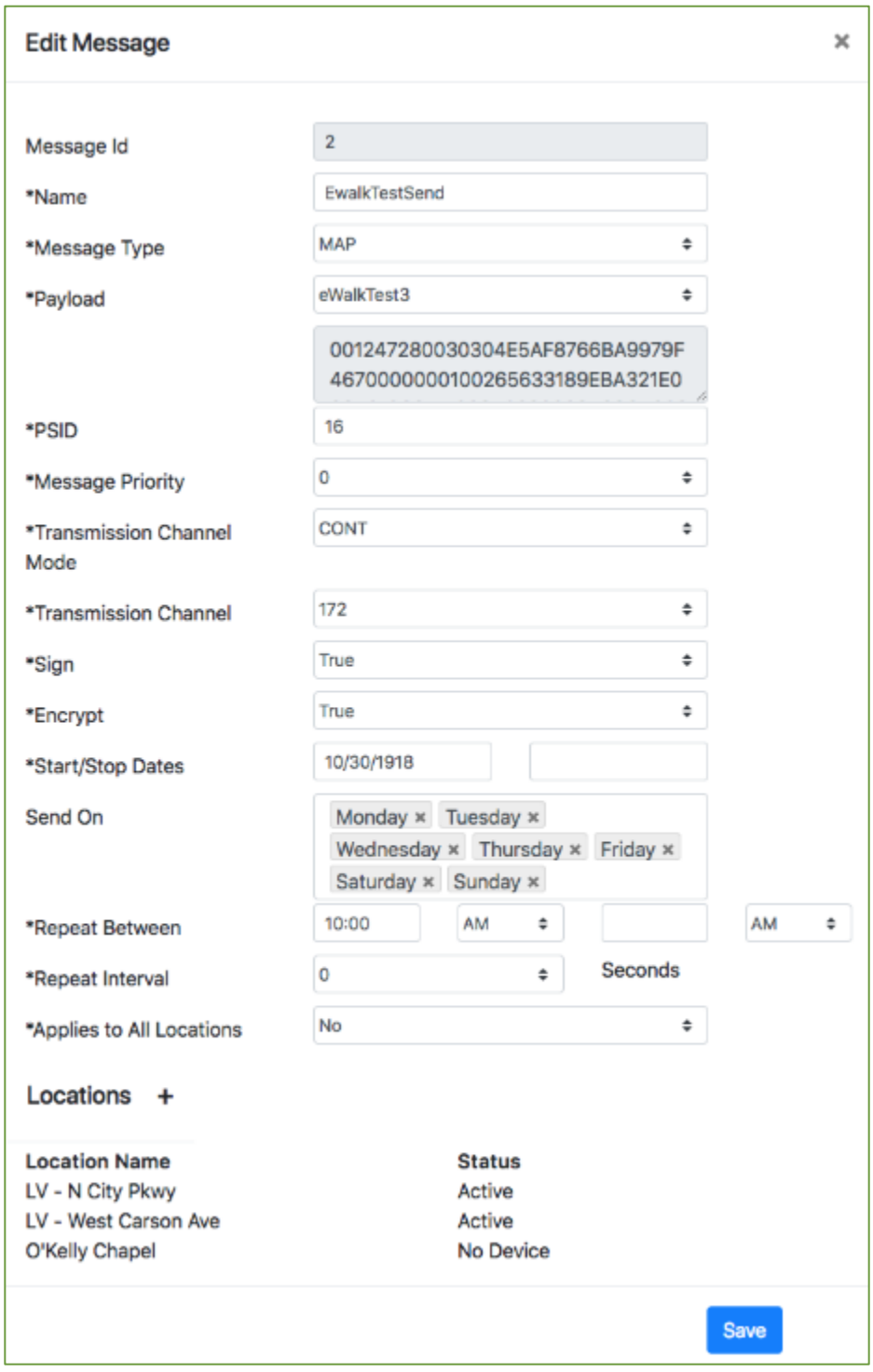



**Figure 21. Scheduling a Message**

## CV DASHBOARDS

CV-ATMS provides dashboards and analytics that report on the status of the field devices. **Figure 24** presents a dashboard for RSU communications (BSM Throughput).


**Figure 22. Dashboard for RSU Communications**

## DATA REPORITORY AND EXCHANGE

CV-ATMS makes use of Contractor's Mobility Data Platform as its big data repository and data exchange platform for supporting TMC operations. It integrates third-party solutions and services and making data easily accessible through standard APIs to agencies users and their partners. MDP also includes a suite of offline and real-time analytical tools for generating operational insights.

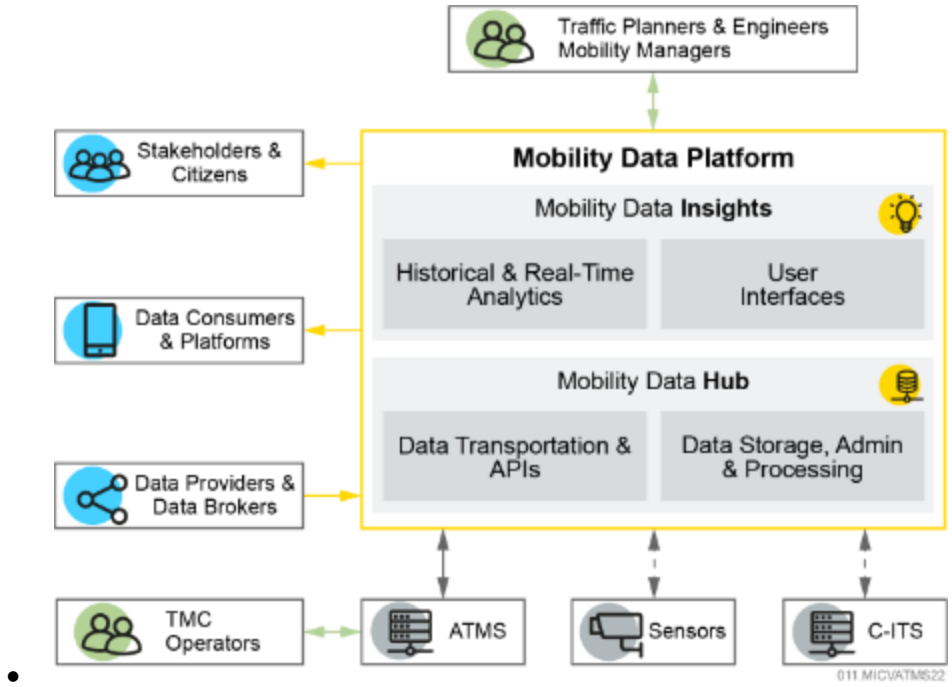



**Figure 23. Mobility Data Platform**

### Architecture and Components

The MDP architecture covers the different conceptual layers that would be applicable to such a product: data ingestion layer, data transportation layer, storage layer, data analytics (batch & streaming) and services layer, visualization layer, publishing and APIs layer, administration, monitoring and security layer, and infrastructure layer. However, to facilitate the understanding of the specific MDP architecture, a high-level data flow and module diagram is shown in **Figure 26**. The Mobility Data Platform is the combination of MDI and MDH. MDI refers to Mobility Data Insights and MDH refers to the Mobility Data Hub. MDI are the User Interfaces and the Data Analytics portion of MDP whereas the MDH is the data acquisition, storage and administration.

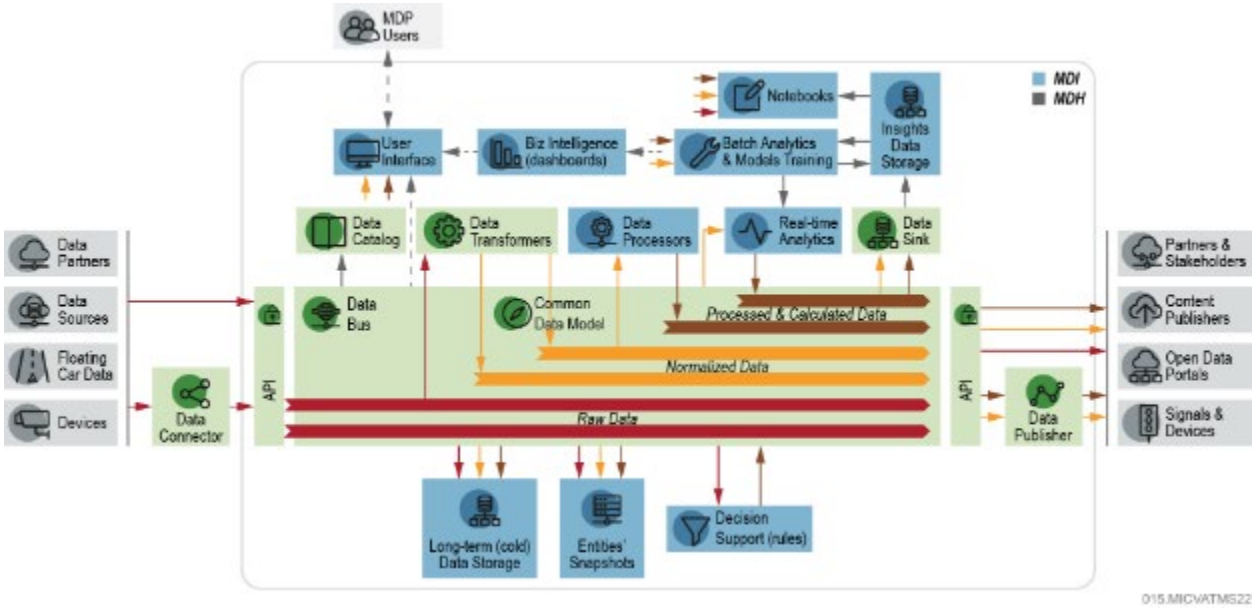


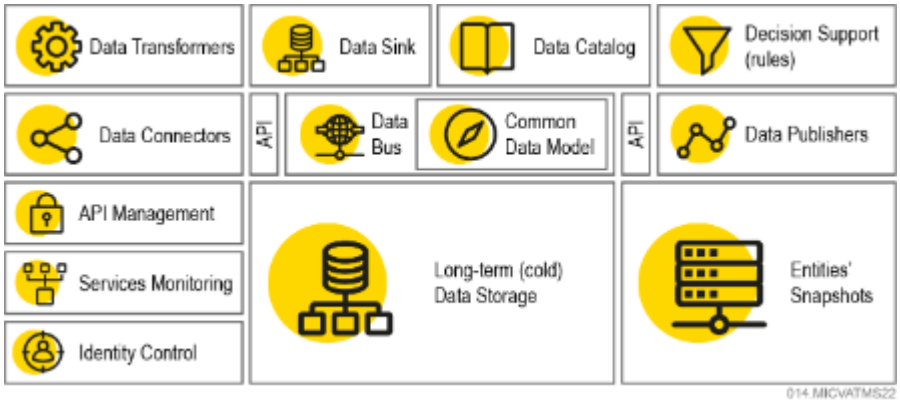

**Figure 24. Mobility Data Platform Architecture Diagram**

## Data Hub

MDP Data Hub is a set of tools, services and data models that build the infrastructure of an open and extendable traffic and mobility data hub. The main characteristics are as follows:

Open

- Use APIs to publish/consume data.
- Explore the data catalogue.
    - Analyze the data.




Expandable:

- Add your new data channels.
- Develop data connectors.
    - Create rules in the DSS.

Scalable (performance and functional).

Benefiting from cloud services.

## Integration Capabilities

One of the key aspects of the Mobility Data Platform is the ability to facilitate the integration with the State's systems, as well as with external systems.

For integration with other systems, as shown in the architecture diagram, MDP uses the DataBus component, which is one of the main elements of the Data Hub. The DataBus, is a module specially designed to facilitate integration tasks (both data consuming and publishing), as well as the reuse of analytics functionalities and processes. This is because DataBus consists of three main elements:

**DATA AND EVENTS STREAMING PLATFORM**

The main component supporting DataBus is the Streaming platform. The current version of DataBus uses Apache Pulsar technology, although the next product release will migrate to Kafka technology, with the main objective of facilitating the use of Platform as a Service (PaaS) services from cloud infrastructure providers.

This tool allows managing data transportation between services or applications that generate information and other services and applications that consume it, following the event-driven architecture design philosophy. Data is organized in different data channels (called topics), which manage blocks of information in the form of messages (also called data events) with a header and content. The content published in a channel (topic) always follows a data model, called schema, associated with that channel (topic). Applications and services can publish or consume information in the topics to which they are given access, usually asynchronously (the consumer subscribes to a topic and receives the new information when it is published), although it is also possible to do so synchronously.

The Streaming platform is the hub for the transportation and sharing of data, both integrated from internal sources (e.g. traffic data from ITS equipment, ATMS, etc.) and external sources (e.g. traffic data from Floating Car Data provider), as well as data generated or calculated by internal MDP services (e.g. prediction data, congestion detection, anomaly detection, etc.).

**MDP DATABUS SERVICES**

Consists of a set of APIs and services developed by Contractor to facilitate the development of use cases related to traffic management systems.

To facilitate the integration and increase the functionalities of the Streaming platform with services needed for use cases development, Contractor has built a set of services around the platform, called DataBus Services. These services extend a general purpose tool, such as the Kafka platform, by adding particular aspects related to traffic and mobility management needs, as well as geopositioned information processing. The main services included are the following:

Generic APIs for publication and consumption of information. DataBus provides two APIs: generic REST API for data publication and consumption, and asynchronous API for consumption by subscription using STOMP protocol over Websockets.

Simplification of administrative tasks: The REST API has a group of administration methods that allow services to simplify datasets, topics creation, and registration processes, among others.

DataBus implements additional security services both in communications (HTTPS) and identity management, allowing to control the access permissions of the different users (applications and services).

**Data cache and "snapshot" function**. Related to the previous point, DataBus allows the configuration of specific topics for which it is desired to maintain an independent cache with the last value of each entity, so that the last snapshot of data can be offered without latency.

**Advanced filters**. DataBus offers advanced filtering mechanisms, such as filtering data corresponding to entities by geographic location, as well as by specific values of schema fields.

**Data Governance**

In order to support the State's data governance strategy and policies, Contractor will include, as part of the MDP product deployment, a data catalogue tool. Contractor uses the open source tool called DataHub (https://datahubproject.io), which provides the following functionalities (more information is available on their website):

- Organize the list of domains and datasets
- Explore data schemas
- Automated ingestion of datasets, tables and schemas
- Manage the metadata associated to a dataset: owner, contact information, additional documentation, etc.
- Access control integrated with MDP identity management.

This tool allows management of the data catalogue within MDP, but also allows addition of external datasets to MDP, so that it can serve the State as a centralized repository of this information. Additionally, to facilitate the updating of the information, Contractor has developed a plugin that allows the data catalogue to automatically update the list of topics available in DataBus and their corresponding schemas. **Figure 27** shows an example of a screenshot of the data catalogue integrated in MDP:

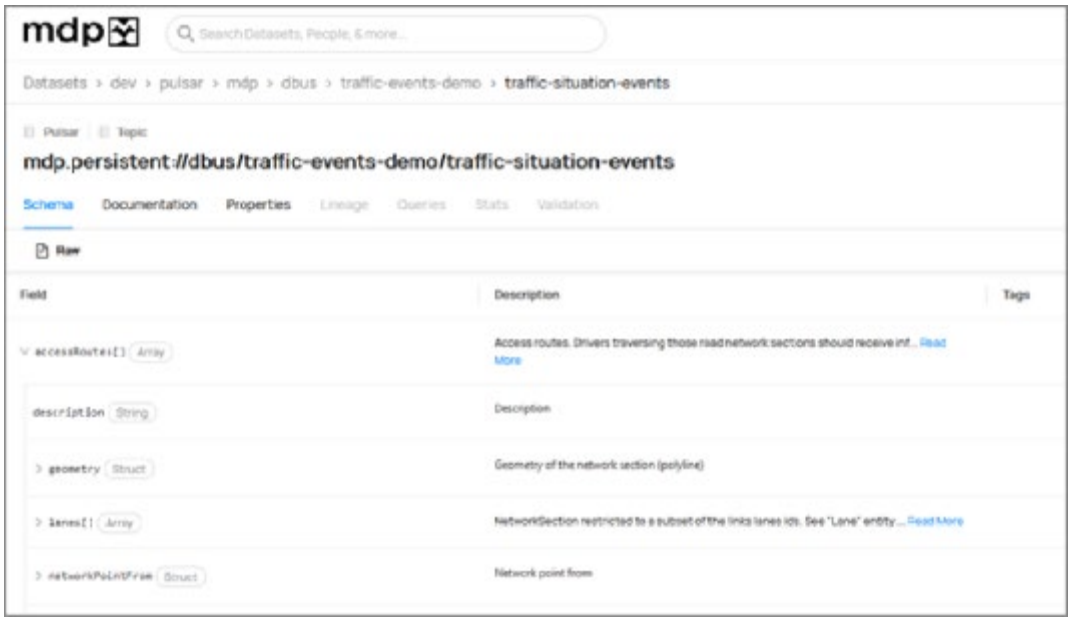



**Figure 25. MDP Data Catalog Tool**

### Insights

MDP Insights is a set of already developed use cases ready to deliver value from day one. The main characteristics are as follows:


- Developed by Contractor on top of the data hub
- Modular microservices to build the best solution for each customer
- Customizable through configuration (areas of analysis, routes, etc.)
- Analysis user interface (dashboards, maps, etc.)
- Integrated with the ATMS (traffic management system)

### Performance Measures and Descriptive Analytics

MDP includes a series of high-value dynamic dashboards to know where and when to act. These dashboards enable the authorities to:

- Combine and analyze historical data using dynamic dashboards & study KPIs and results.
- Analyze distribution of events and discover hotspots.
- Understand impact of incidents.
- Study evolution of traffic conditions.

- Monitor major routes and detect potential problems and deviations.

A commercial business intelligence (BI) tool, Qlik, is used to develop the dashboards. This allows the development of new specific dashboards if included in the scope of the project. However, what is important is that MDP has a library of dashboards in the product that provide value right out of the box and have proven their relevance in previous projects and customers. The dashboards can be divided between historical analysis dashboards, which are the majority, and operational dashboards, which have a high refresh rate and are designed for continuous display (e.g. on a video wall).

**HISTORICAL DASHBOARDS**

The historical analysis dashboards included in the product are the following:

- **Events**: Global analysis of traffic incidents and events (Figure 28).
- **Event Details**: Detailed analysis of events and incidents, including the analysis of one specific incident by location.
- **Events by Roadway**: Analysis of events and incidents by roadway (Figure 29).
- **Event Comparison**: Comparative analysis of incidents (time periods, days of the week, peak hour, etc. (Figure 30)
- **Speed Heatmap**: Analysis of traffic conditions (speed) by day or by segment of the road (for one day), combined with incidents data (Figure 31)
- **Traffic Speed and Travel Times**: Comparative analysis of speeds and travel times for a road or route, combined with incident data. Allows up to three comparison sets. (Figure 32)

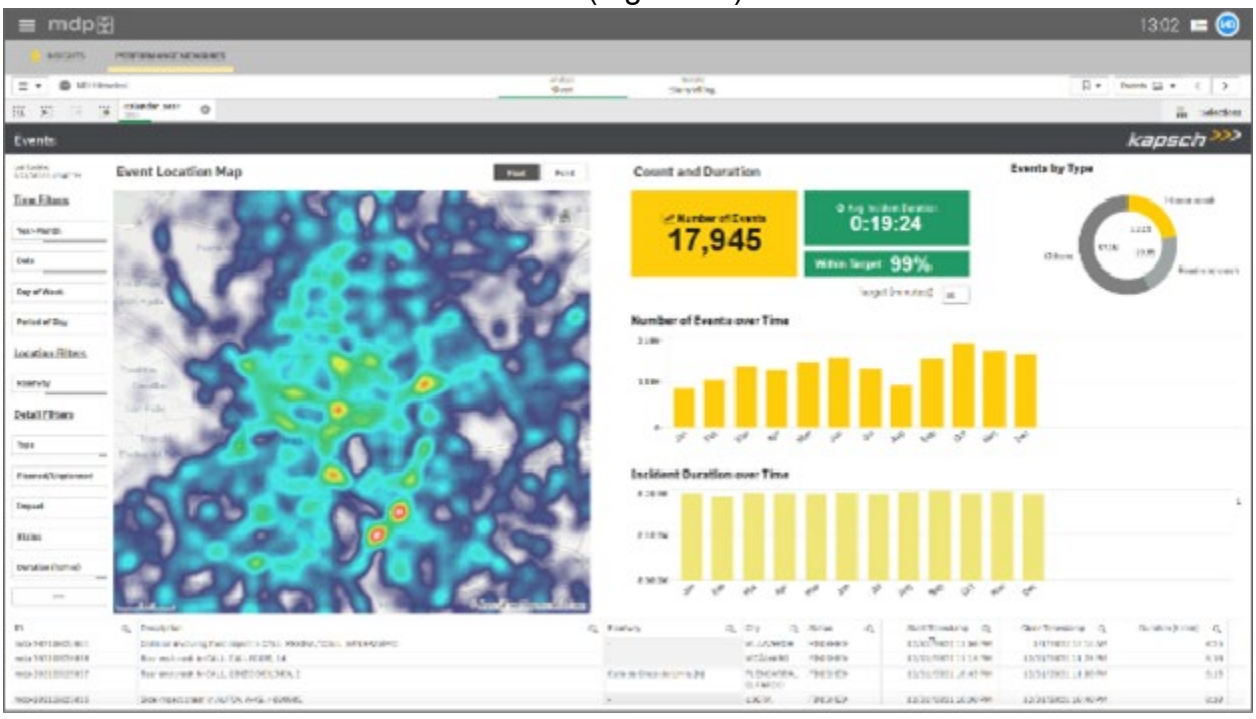



**Figure 26. Events Dashboard**

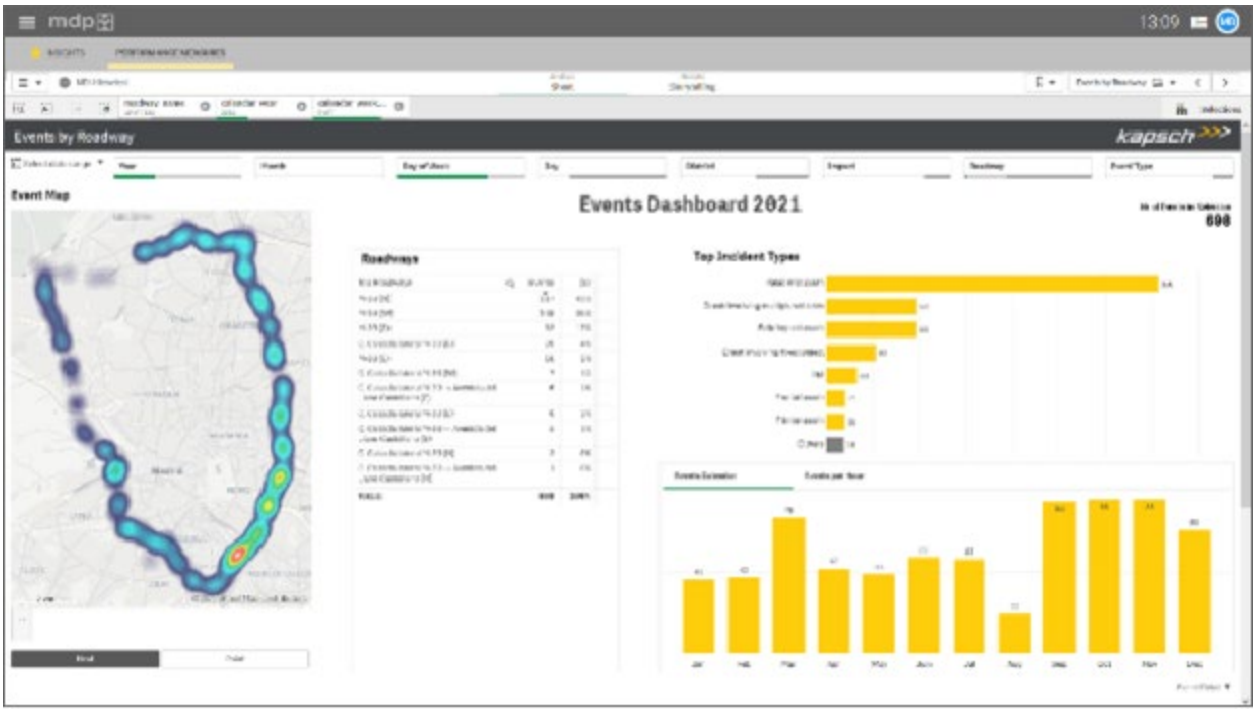



**Figure 27. Event Details dashboard incidents analysis in a specific highway**

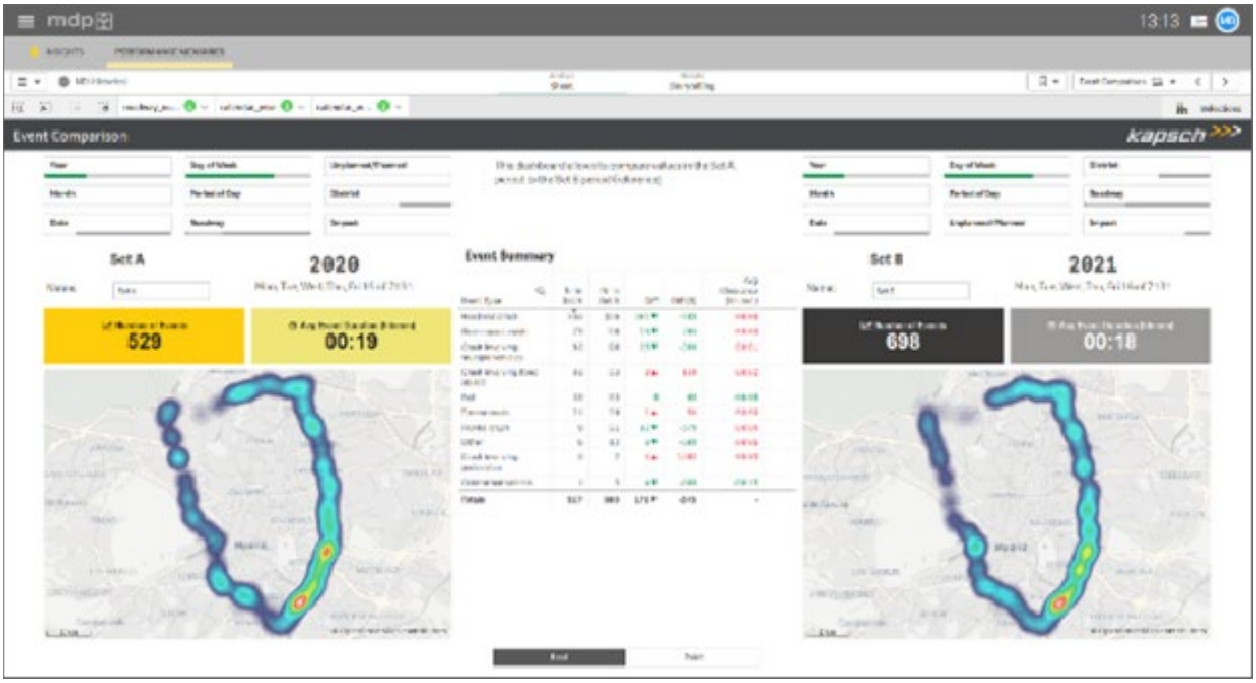



**Figure 28. Event Details dashboard showing 2-year comparison for a specific highway**

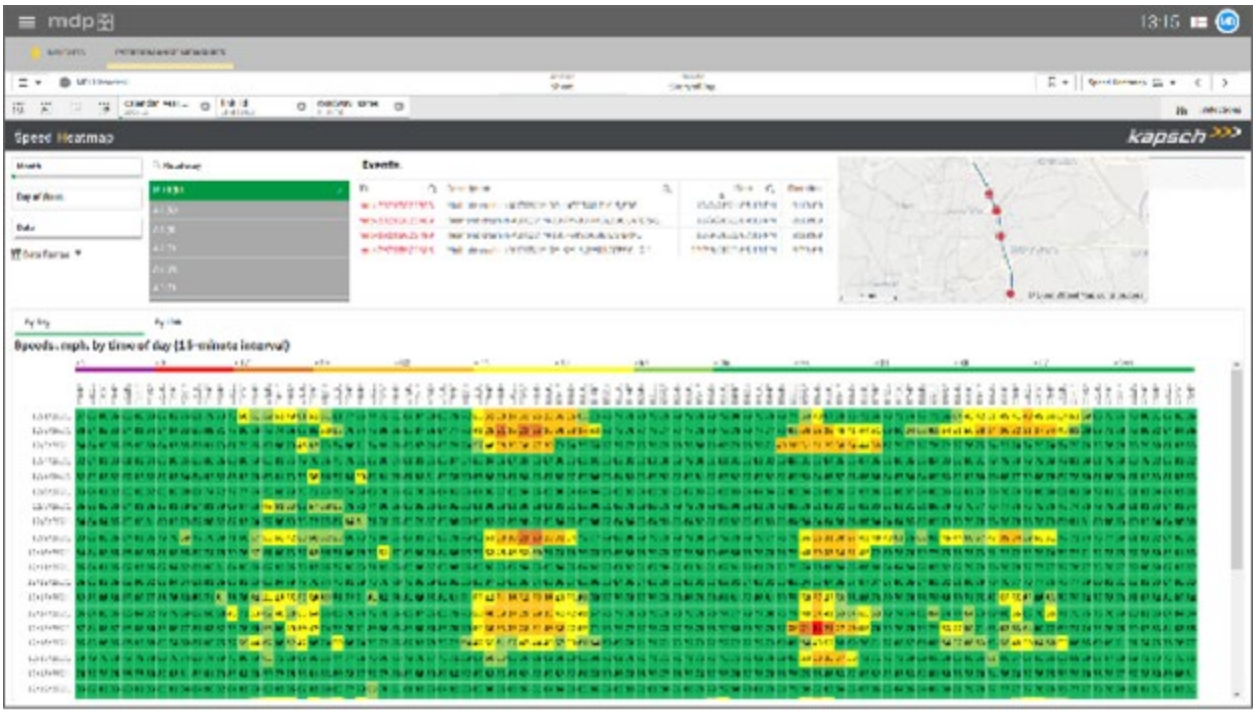



**Figure 29. Speed Heatmap Dashboard over one month for a road section**

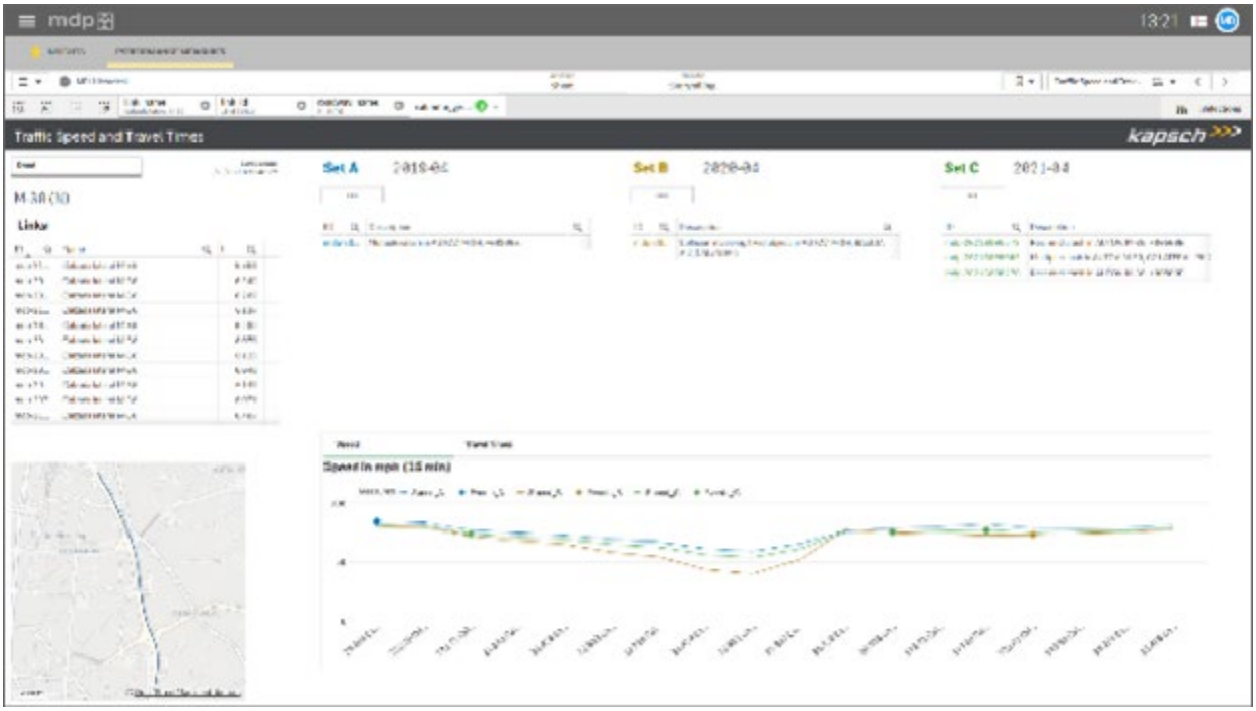



**Figure 30. Traffic Speed and Travel Times dashboard**

## OPERATIONAL DASHBOARDS

MDP incorporates an operational dashboard for the analysis of route information in real time (data update every two minutes, configurable). It is designed to be displayed on a video wall or on an operating console. This dashboard can include information from the analytics module by comparing with the prediction or expected value of the route.


**Figure 31. Real-Time Travel Time Dashboard**

### Predictive Analytics

MDP includes a Predictive Analytics module that uses machine learning algorithms and advanced statistical analysis to provide predictive functionalities on items (links, routes, sensors) with associated time series data (historical and real-time), and applicable to different measures (speed, flow, travel time, occupancy, etc.). The module can train models for different data sources: FCD from data providers, traffic sensors (e.g. volume prediction) or LPR routes from the State, among others.

These functionalities and use cases allow to improve both planning and operation, promoting a more proactive approach, and answering questions such as:

- Predict traffic for the next hours and days.
- Analyze traffic patterns and recurrent behavior.
- Detect unexpected behaviors and pro-act earlier.

Batch analytics procedures are used for the training of models, which once trained are fed with actual data to generate prediction values continuously, as well as to perform other detections (e.g. anomaly detection). And the visualization of the results is done both in the ATMS operation console (map layers, detail data, etc.) and through specific

dashboards. Below is a description of the use cases and algorithms available in this module:

**TRAFFIC PATTERNS**

Traditionally, and generally in the industry, traffic patterns are made by calculating average profiles by type of day of the week (Monday to Sunday) or special days. While Contractor provides this type of information as well, it uses an innovative methodology for calculating patterns based on machine learning.

Contractor has developed a series of clustering algorithms that provide data-driven traffic pattern generation for all traffic network elements (sensors, links, routes, etc.) and all time-series type data variables (e.g., speed, flow, travel time, occupancy, etc.). All this is done using an approach focused on maximizing the accuracy of traffic prediction. Therefore, traffic patterns are actually obtained by training prediction models.

The module generates a forecast of the different variables (time series of data), for each element, from the data of a training window. Forecasting is understood as the expectation of the variables based on a list of predictors such as calendar (day of the week, day of the month, week of the month, month of the year), and other extra predictors such as holidays, school vacations, weather conditions, etc.

In addition, this module also assigns to each of the days of the forecast window, for each element, its characteristic daily pattern, for each of the variables. In terms of modelling, this module is based on two decoupled sub-models: (1) clustering to obtain the optimal number of daily patterns needed to describe the traffic data in the training window, and (2) a classification that relates the daily pattern to the predictor vector.

The pattern data is published in DataBus and stored in the storage layer. They are also available for analysis through the Traffic Patterns dashboard as shown in **Figure 34**.

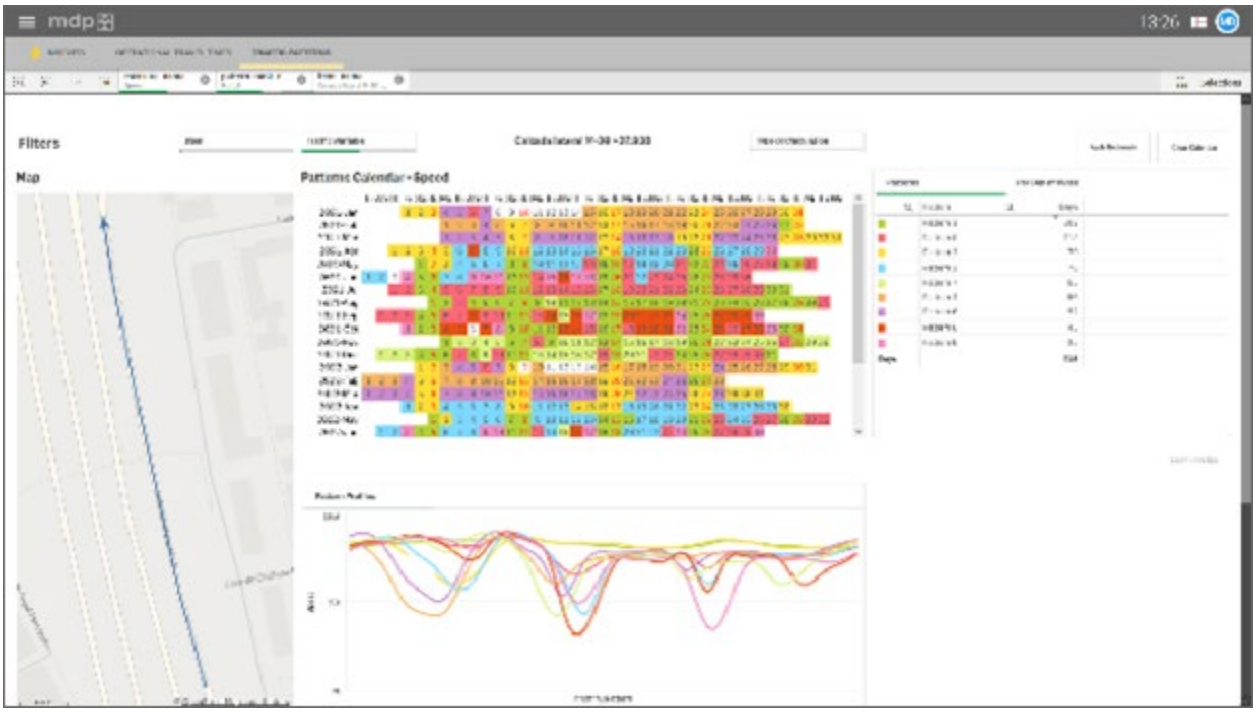



**Figure 32. Traffic Patterns dashboard showing speed patterns for a road segment**

## TRAFFIC PREDICTION

As explained in the previous section, traffic patterns and traffic prediction are intimately related as they are complementary use cases that are obtained from a single training process of prediction models.

When the models are trained and available, they are fed with the current known data to provide the prediction for the next hours or days.

The predicted values are published on DataBus to make them available to services that need to consume them (e.g., ATMS) but are also available for analysis through the "Traffic in 10 days" dashboard. (**Figure 35**)


**Figure 33. Speed and flow prediction dashboard**

## ANOMALY DETECTION

MDP is able to detect anomalous situations in traffic, understanding an anomaly as a situation that deviates significantly from the expected or predicted values. For this purpose, specific anomaly detection models are trained to provide dynamic and individual threshold values, considering the particular case of each item in terms of data variability, in order to reduce false positives. The ultimate goal is to provide operators with valuable information about unexpected situations.

Anomaly detection is based on the identification of outliers with respect to the expected behavior of a given variable or type of measurement (e.g., flow, speed). In this sense, the expectation of the variables can be provided based on a list of predictors (e.g., the previous prediction module). Thus, an instant is considered potentially anomalous when its traffic values statistically deviate from the expected values.

the anomaly detection module obtains the necessary probability distribution functions from the data corresponding to the training window, and inference is performed on the detection window. The module can be applied to anomalies in both historical and real-time data (see **Figure 36**). An anomaly is detected where the deviation at that point is greater than what could statistically be considered within normal (configurable percentiles are used).

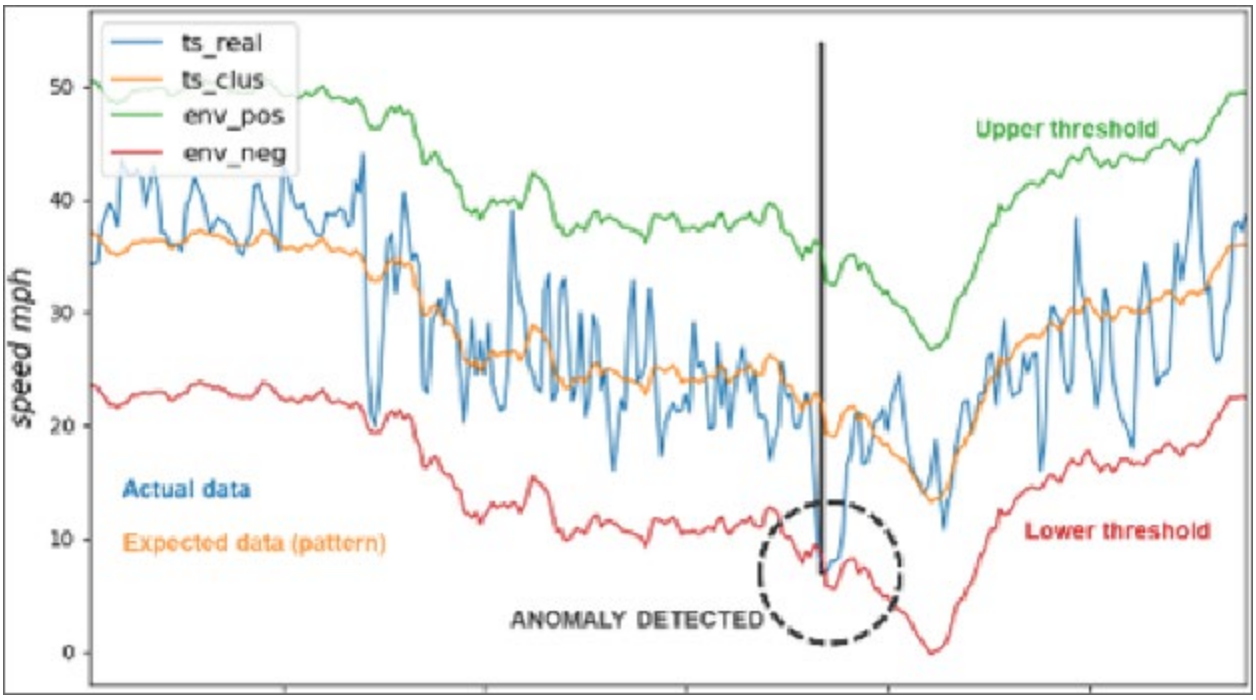



**Figure 34. Example of (speed) anomaly detected**

## APPLICATIONS

CV-ATMS offers a comprehensive set of applications to enter, monitor, and manage various types of events (planned and unplanned) in a roadway network. The system provides a single event management interface for managing planned, unplanned (incidents), severe weather, and other types of events that require operators to generate and activate a response plan.

The system leads users through a uniform workflow to detect/initiate and verify the event, generate a response plan, monitor/update, and terminate the event. The basic event management interface is shown in **Figure 37**. There are three elements in the GUI:

- Control Sidebar (1): These are a set of controls available for this event type
- Data Entry Window (2): Set of fields that a user can fill in to describe the event. These fields ate configurable by authorized users
- Map Window (3): Shows the location and extent of the event (point, line, area).

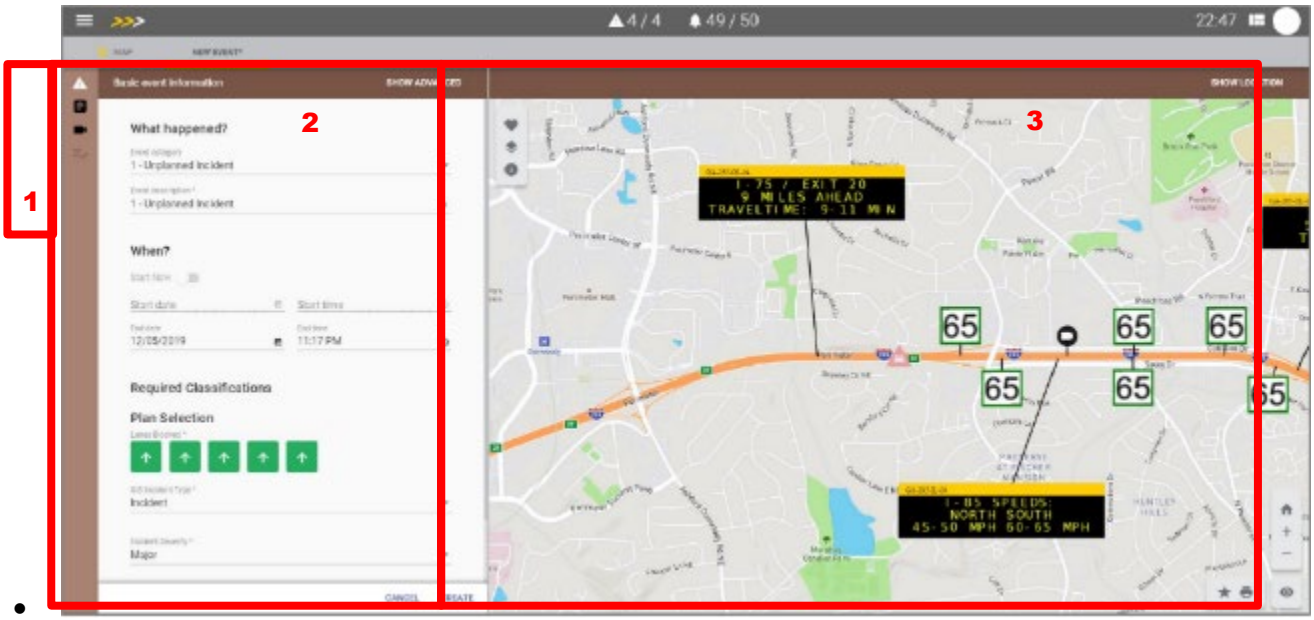



**Figure 35. Event Management Interface**

Every activity and observation related to an event (whether taken by the system or an operator) is stored in a timestamped database. This data can be used to construct an exhaustive log of all actions taken in response to an event. The log is available directly from the event control screen and can also be output as a report. See example in **Figure 38**.

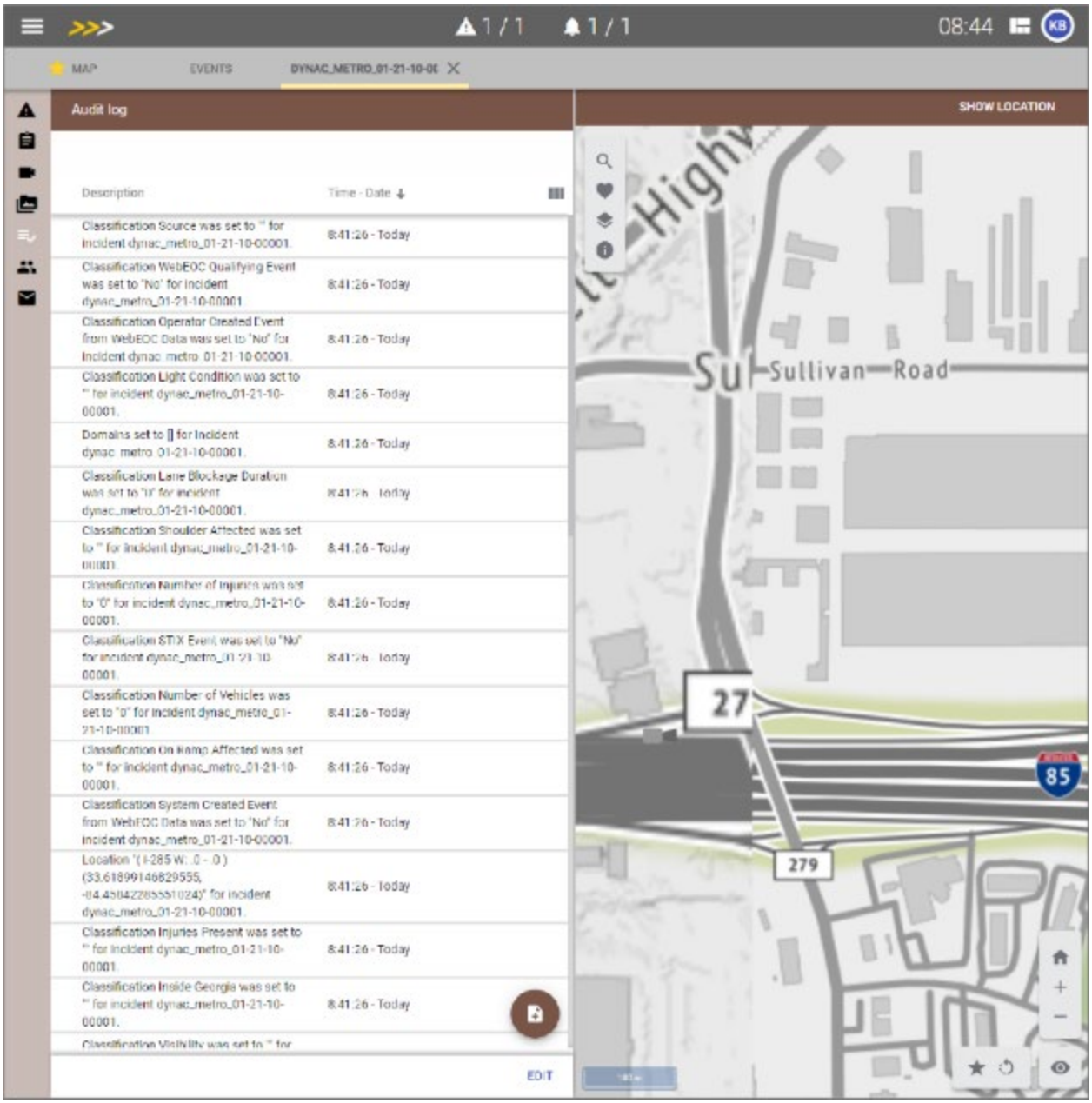



**Figure 36. Event Audit Log**

## Lane Closure Requests

The Lane Closure Request Application manages an agencies request process. Users can can manually create new events via the Event Summary window's "Create New" button or by right clicking on the map in the desired location as shown in **Figure 39**. Either option will open a New Event tab.

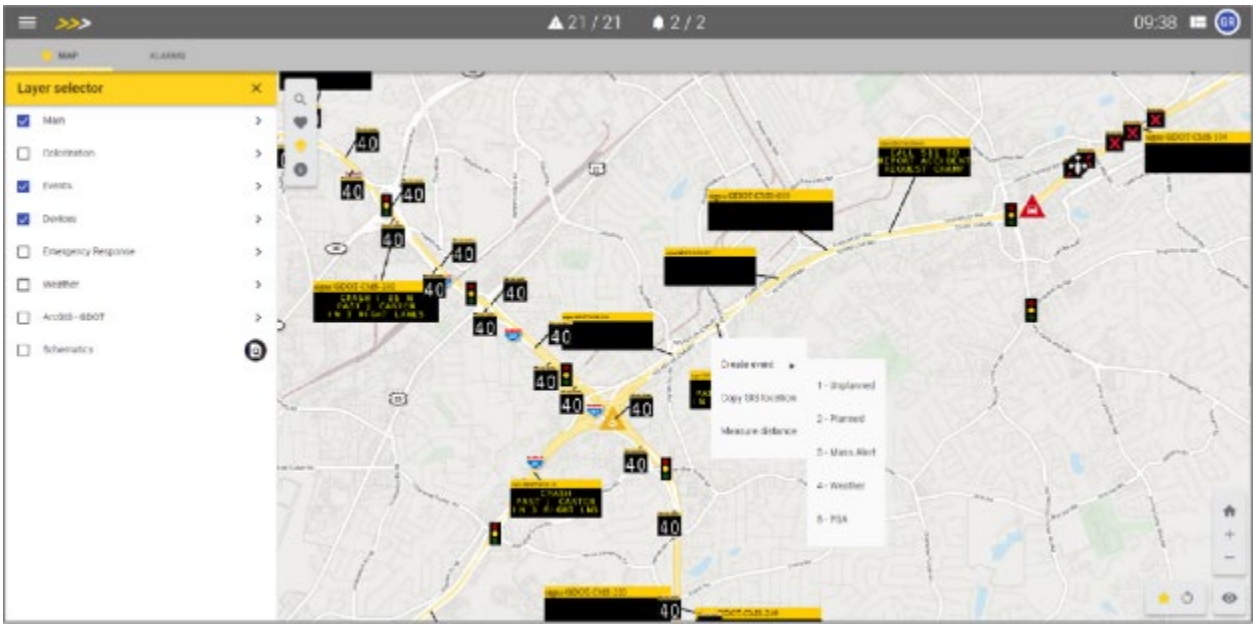



**Figure 37. Create Event from the Map**

The application provides a data entry screen for users to enter all of the lane closure properties. **Figure 40** illustrates the basic UI for data entry. Kapsch will work with the agency to configure the fields required to capture all of the lane closure attributes.

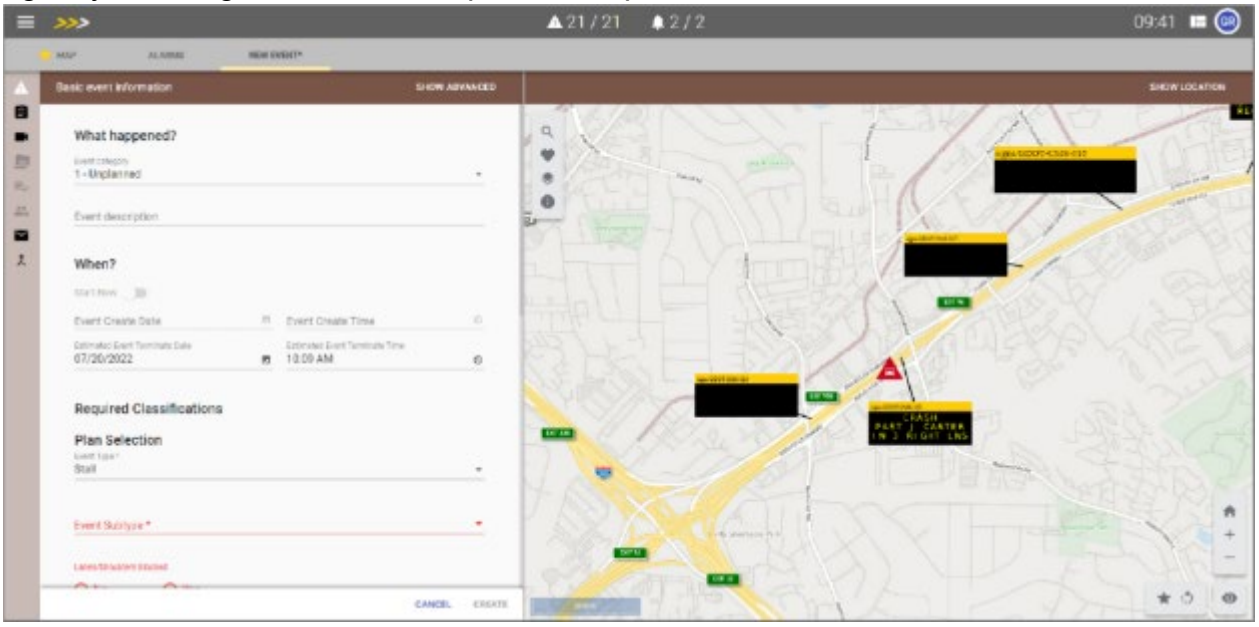



**Figure 38. Editing Event Details**

Users can use the map view to view all active and planned closures.

### Weather Application

Weather events are a variation of special events and are handled through a similar user interface. CV-ATMS will integrate weather data from MDSS, NWS, ASOS, and AWOS to populate the weather event attributes and generate the geospatial shape to define the scope of the event.

Standard APIs in CV-ATMS will make the special event data available to external parties.

## 11. INTEGRATION

### Required Data Integrations

Contractor shall integrate their solution to the following technologies. Integration details may change prior to the new CV-ATMS deployment, such as a change in the current provider listed. The frequency of data transfer must be system configurable unless otherwise stated in Table 1 – Business Specifications. The data elements being transferred and associated functionality are defined in Table 1 – Business Specification. The State expects API updates to occur and costs for configuring and testing these updates are included in Schedule B – Pricing.

| Required CV-ATMS Data Integrations* | | | | | |
|---|---|---|---|---|---|
| Data Integration Title | Inbound / Outbound** | Internal (SOM) vs External System | | Anticipated Type of Connection | Current Provider |
| Lane Closure Information | Outbound | Internal | | WZDx API*** | Internal (SOM) – MiDrive |
| | Outbound | Internal | | WZDx API*** | ATMS (Vendor TBD) |
| Weather Information | Outbound | External | | API | ATMS (Vendor TBD) |
| | Inbound | External | | API | MDSS (for ESS data) |
| | Inbound | External | | API | National Weather Service |
| | Inbound | External | | API | Automated Surface Observation System (ASOS) and Automated Weather Observing System (AWOS) |

*ITS device information can be made available by MDOT if needed for the functionality of the CV-ATMS.

**Inbound/Outbound refers to the direction of data flow to/from the CV-ATMS.
***WZDx API link - https://www.transportation.gov/av/data/wzdx

The interfaces with outbound data (i.e., from CV-ATMS to another system) should be accomplished using the CV-ATMS API that supports current recognized industry standards (REST and JSON) that will enable all data collected through the CV-ATMS to be shared and ingested by other systems. The CV-ATMS should not limit the number of systems accessing the outbound API.

The State anticipates future enhancements that may update and/or change the above CV-ATMS integrations, including but not limited to changing/transferring the primary source, updating standard protocols, updating APIs (e.g., WZDx), etc. For example, the State is in the process of developing a centralized, application agnostic platform for the continuous exchange of real-time transportation data. The goal of the Real Time Data Exchange (RIDE) project is to replace the current methods for transportation data exchange with a single solution that unifies the State's real time data exchange needs. Therefore, the State anticipates consolidating data feeds identified in the above table to a single solution before, during, and/or after the deployment of the Contractor's CV-ATMS. Once active, The CV-ATMS must interface (e.g., pull, ingest, display, and share data) with MDOT's RIDE to send and receive transportation data. The data elements will remain the same but the primary data source may change. For Contractor's cost structure to accommodate future enhancements and modifications to the primary source of each data feed - See Schedule B – Pricing.

The CV-ATMS provides standard JSON and REST APIs that will enable all data to be shared and ingested by other systems. During the project's lifecycle, as industry standards change and/or Michigan's data needs evolve, Contractor will proactively work with MDOT to identify and implement updates to the CV-ATMS APIs

**Lane Closures:** Within the CV-ATMS, Contractor will create a new WZDx API in the Mobility Data Platform that will support outbound integrations of lane closure data with MiDrive and ATMS. Contractor will maintain this API over the life of the project including making changes to the API should the standard change.

**Weather:** CV-ATMS has an API to exchange NWS weather data. During this project, Contractor will extend the API to support ingesting data from MDSS, ASOS, and AWOS. Contractor will coordinate with the ATMS vendor on the exchange of weather data.

Other relevant interfaces available

- Waze API (consuming from Waze) and Waze events feed (publishing to Waze)
- HERE traffic data

Contractor will use the following process for remapping existing integrations to another primary source:

For its creation and evolution, Contractor analyses the main models and protocols available (e.g., DATEX II, TMDD, NTCIP, GTFS, GBFS, MDS, WZDx, etc.) to ensure compatibility without being limited to them. These models are not a limiter but a facilitator when developing connections and services, so CV-ATMS can be extended by incorporating any data model (topic schema) that may be necessary. All topics and their schemas will be made available to SOM through the system documentation.

The latest version of the common data model includes models such as the following: traffic situation (incidents and events), traffic measurements (flow, speed, travel time, occupancy, etc.), weather and environmental measurements, ITS device data (statuses and alarms, signal and message status, etc. ), data calculated from time series analysis (patterns, anomalies, predictions), mobile traffic objects (e.g., vehicle detections, camera detections, Automated Number Plate Reader (ANPR), AID video analytics alerts, etc.), connected vehicles data and C-ITS messages, as well as other components and sub-models shared by the above: local calendars, traffic network, points of interest (POI), etc. It should be noted that applications and services benefit from this common model both when using MDP APIs and when accessing the streaming platform (Pulsar/Kafka) directly.

Typically, taking into account this common data model, data connectors are developed in two steps (as separated microservices): raw data ingestion, and transformation to the common model (normalization). The integration of raw data is of interest as it allows the reconstruction of information, or future processing with new algorithms. However, where applicable, ingestion is done directly into the normalized model, reducing the number of services and steps.

**Figure 41** is a flow and component diagram detailing the above.

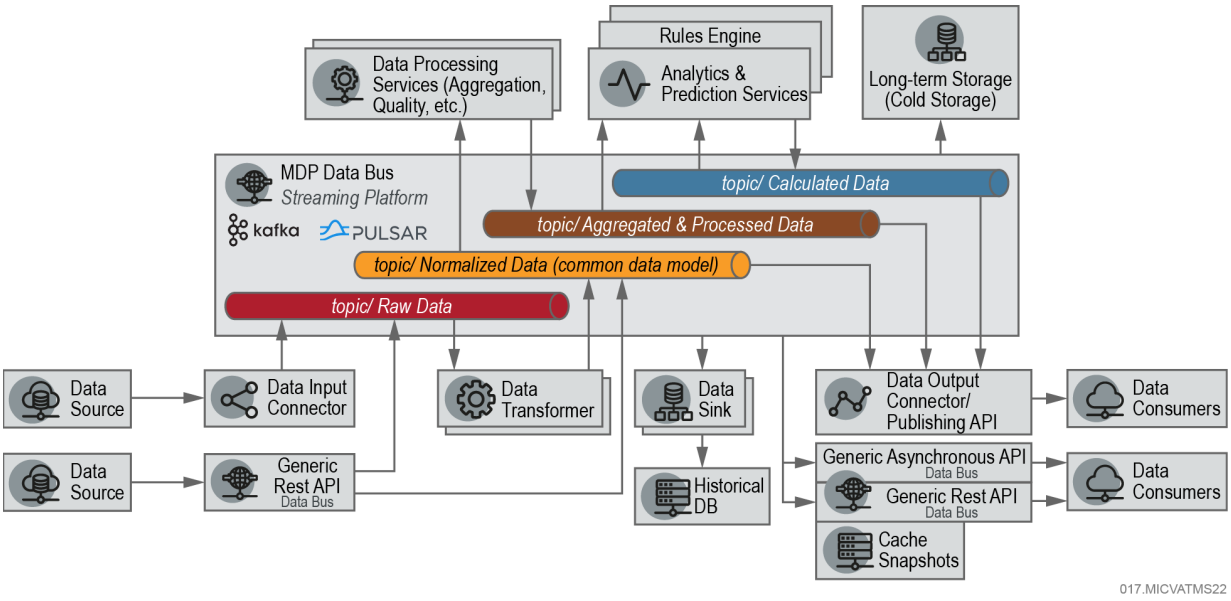



**Figure 41. Flow and Component Diagram**

Once the technological environment used for the integrations has been detailed, Contractor can explain the process for remapping existing integrations to another primary source. It is important to note that remapping to a new data source does not affect the services and systems that consume the data from CV-ATMS, since those services will be consuming the normalized information (Common Data Model). Therefore, it is simply necessary to modify the data input connector, either at ingestion (e.g., if the source API has changed, or when changing to a different data source service), or at normalization (if the format of the raw source data has changed).

In addition, this separation of the connectors into two steps (raw data ingestion and normalization) also makes it possible to facilitate cases where it is necessary to evolve data formats while maintaining compatibility with active consumers, by being able to add new transformers that normalize to an evolved format while maintaining the previous ones for the agreed upon time.

### Potential Future Integrations

The following technologies are being considered by the State for potential integration with the Contractor's solution. The potential future integrations are further defined in Table 1 – Business Specifications as optional requirements since they are not an existing connection to the State's CV-ATMS and the data elements being transferred and associated functionality have not been determined.

| Potential Future CV-ATMS Integrations* | | | | |
|---|---|---|---|---|
| Integration Title | Inbound / Outbound* | Internal (SOM) vs External System | Anticipated Type of Connection | Current Provider |
| Roadway Event Information | Inbound | External | API | ATMS (Vendor TBD) |
| SCADA Pump Station Information | Inbound | External | API | MultiSmart hardware, with software provided by Kennedy Industries (KI System Master Software) |
| | Inbound | External | API | City of Detroit Sewer Monitoring System |
| City of Detroit Sewer Monitoring System | Inbound | TBD | TBD | TBD |
| Wrong Way Driving Alerts | Inbound | External | API | Various |
| Email and Text | Outbound | External | GovDelivery API* | GovDelivery |

*http://developer.govdelivery.com/

Contractor will apply a standard methodology for all new connections into CV-ATMS:

- Investigate new primary data source
  - Interface methodology
  - Data elements required
  - Functional use cases
- Design new interface
  - Software requirements specification
  - Software design document
- Develop and test new interface
  - Coding
  - Unit testing
- Deploy and integrate new interface
  - Deploy to test environment
  - Enable interface to new primary source
  - Test and verify new interface
- Validate new interface
  - Deploy to production environment
    - Test and validate new interface

## 12. MIGRATION

No data migration services are requested at this time.

## 13. TRAINING SERVICES

The Contractor must provide administration and end-user training for implementation, go-live support, and transition to customer self-sufficiency. These trainings can be in the form of online classes, videos, built-in help, tutorials, etc. The Contractor will be responsible for delivering training and knowledge transfer services. All training classes must be virtual, unless approved by the State, for end users, administrator, or other types. The total number of end users expected to need training is up to 350 individuals and approximately 10 administrators.

The Contractor will be responsible for developing all training materials which must be available prior to each training. The State prefers that the System User Documentation and/or "desktop reference" be used to conduct training if the appropriate level of detail is provided in the subject document(s). These documents must be updated to include new functionality as it is added to the CV-ATMS.

The Contractor must provide initial trainings, during the first 12 months of the contract, which consist of one 4-hour training every four months for up to 40 users at each session. These trainings should cover all aspects and functions of the system. The State may request different functions be covered at each of the initial trainings to accommodate staff that may only use portions of the system.

The Contractor must provide a basic training course, to be conducted annually or upon request, which includes at least one 4-hour day of basic training for up to 20 users. These trainings are intended for new users with little to no familiarization of the system and may, at the discretion of the State, be recorded for future use or replay. The State may request these trainings to be focused on specific functions of the system or to cover all aspects of the system.

The Contractor must provide a new software build training course, to be conducted within 30 calendar days of each major software enhancement and/or build, which includes at least one 4-hour new software/major software enhancement training for up to 40 users. These trainings must cover all aspects and functions of the software system enhancement and/or build.

Contractor will offer a variety of training options including on-site and virtual classes as well as agency "train the trainer" training. Contractor has a dedicated training director who is supported by product experts to design and deliver all trainings.

1. For on-site training, the training team can train up to 50 people in a class. Class size is usually dependent on the training venue provided by the State.

2. On-line or virtual training can accommodate many users/administrators although is capped at 50 to allow for smaller breakout rooms led by members of the training staff. Contractor will record virtual training classes for the State to use later on. Internet training will be available using Teams remote access.

3. "Train the trainer" training is capped at 5 participants at one time.

Contractor will design the training plan around the requested training requirements:

- ***Initial Training (During first 12 months)***: one 4-hour training every four months for up to 40 users at each session
- ***Basic Training (annually or upon request)***: includes at least one 4-hour day of basic training for up to 20 users
- ***New Software Training***: to be conducted within 30 calendar days of each major software enhancement and/or build, which includes at least one 4-hour new software/major software enhancement training for up to 40 users

Contractor will work with MDOT to tailor the training based on the schedule and availability of staff.

Contractor has a library of training modules for the CV-ATMS. The training modules are presented in a specific order to guide users through a logical, easy-to-follow explanation of each subsystem and application of the project. Training modules progress through varying levels of complexity to provide a guide for many levels of understanding. These training modules can later be used to remind users of the capabilities of each application or subject and can be used as a quick reference guide for navigating and using the system. During the training, the training modules are available as printed handouts and/or as electronic copies of the PDF documents or MS PowerPoint files. Training modules are also available to administrative personnel as PDFs, MS Word documents, or MS PowerPoint files. All materials are provided in an electronic, searchable format.

***Initial Trainings:*** The Initial trainings program is aimed at teaching MDOT staff how to use, operate, and administer the CV-ATMS to support acceptance testing and live operations. These training will be scheduled monthly for 12 months beginning prior to the testing phase of the project. As part of the planning for training, Contractor will work together with MDOT to determine the optimal setting (live or virtual) and schedule of these sessions.

***Post Deployment Trainings***: Once the system is operational, Contractor will provide, as required, three additional training courses per MDOT's requirements:

**Basic Training**: This training is geared toward new MDOT staff who have limited or no exposure to the ATMS. This basic training will be similar to the initial trainings and serve to instruct new users on how to operate and/or administer the system

**Advanced Training**. This ongoing training program is for current system users to expand and reinforce their capabilities.

**New Software Build Training**. Contractor will create and deliver a new training course for all new major software releases. The planning and delivery of these new training sessions is incorporated into the project's change management program and coordinated with MDOT.

## 14. TRANSITION RESPONSIBILITIES

Please reference – Schedule G – Transition In and Out Plan.

## 15. DOCUMENTATION

Contractor must provide all user manuals, operating manuals, technical manuals and any other instructions, specifications, documents or materials, in any form or media, that describe the functionality, installation, testing, operation, use, maintenance, support, technical or other components, features or requirements of the Software.

Contractor must develop and submit for State approval complete, accurate, and timely Software documentation to support all users, and will update any discrepancies, or errors through the life of the contract.

The Contractor's user documentation must provide detailed information about all software features and functionality, enabling the State to resolve common questions and issues prior to initiating formal support requests.

Contractor will prepare and deliver a full set of user and administrator manuals to accompany the CV-ATMS solution that describe the functionality, installation, testing, operation, use, maintenance, support, technical or other components, features, or requirements of the Software.

## 16. ADDITIONAL PRODUCTS AND SERVICES

No additional products or services are necessary to implement and support this solution.

## 17. CONTRACTOR PERSONNEL

**Contractor Contract Administrator**. Contractor resource who is responsible to(a) administer the terms of this Contract, and (b) approve and execute any Change Notices under this Contract.

| **Contractor** | |
|---|---|
| **Name** | Eddy Elissaint |
| **Address** | 300 Lighting Way, Suite 302, Secaucus, NJ 07094 |
| **Phone** | O: +1 201-520-9129 M: +1 347-923-0132 |
| **Email** | Eddy.Elissaint@kapsch.net |

**Contractor Security Officer**. Contractor resource who is responsible to respond to State inquiries regarding the security of the Contractor's Solution. This person must have sufficient knowledge of the security of the Software and the authority to act on behalf of Contractor in matters pertaining thereto. Contractor must inform the State of any change to this resource.

| **Contractor** | |
|---|---|
| **Name** | Jason Crane |
| **Address** | 2855 Premiere Parkway, Suite F, Duluth, GA 30097 |
| **Phone** | O: +1 470-473-6400 M: +1 770-314-6960 |
| **Email** | Jason.Crane@kapsch.net |

| **Classification** | **Skill Set** | **Years of Experience** |
|---|---|---|
| **System Development Lead (includes software, database design, and interfaces/integration)** | 1. Experience designing system architectures that incorporate a variety of data sources and inputs into a single system.<br>2. Experience in integrating data and developing interfaces to streamline external application interactions. | 5 years of software development experience for projects of similar size and complexity. |
| **CAV Applications Development Lead** | 1. Experience in the planning, design and development of CV back-end applications.<br>2. Experience implementing and | |

| | | |
|---|---|---|
| | demonstrated awareness of CV data standards.<br>3. Use of the systems engineering process to develop CAV applications. | |
| **CAV Field Messaging and Standards Lead** | 1. Experience in the planning, design and development of CV V2I and I2V applications.<br>2. Experience in working with industry on end-to-end applications using various communication methods and CV standards.<br>3. Experience interacting with field devices (e.g., DSRC RSUs, CV2X RSUs, traffic signal controllers). | |

## 18. CONTRACTOR KEY PERSONNEL

**Contractor Project Manager.** Contractor resource who is responsible to serve as the primary contact with regard to services who will have the authority to act on behalf of the Contractor in matters pertaining to the implementation services, matters pertaining to the receipt and processing of Support Requests and the Support Services.

| **Contractor** | |
|---|---|
| **Name** | David Meier, PMP |
| **Address** | 300 Lighting Way, Suite 302, Secaucus, NJ 07094 |
| **Phone** | O: +1 201-528-9814 M: +1 201-304-1664 |
| **Email** | David.Meier@kapsch.net |

| **Contractor** | |
|---|---|
| **Name** | Steve Sprouffske |
| **Address** | Home based |
| **Phone** | M: +1 760-525-5454 |

| | |
|---|---|
| **Email** | Steve.Sprouffske@kapsch.net |

(a) **19. CONTRACTOR PERSONNEL REQUIREMENTS**

**Background Checks.** Contractor must present certifications evidencing satisfactory Michigan State Police Background checks, ICHAT, and drug tests for all staff identified for assignment to this project.

In addition, proposed Contractor personnel will be required to complete and submit an RI-8 Fingerprint Card for the National Crime Information Center (NCIC) Finger Prints, if required by project.

Contractor will pay for all costs associated with ensuring their staff meets all requirements.

**Offshore Resources**. Not allowed for this project.

Contractor is a global company with offices and software development teams around the world. Contractor maintains global application centers with software development teams around the US and Europe. CV-ATMS requires collaboration between teams in Duluth (GA), Spain, and Austria. Contractor does not subcontract work to offshore companies.

**Disclosure of Subcontractors.** If the Contractor intends to utilize subcontractors, the Contractor must disclose the following:

- The legal business name; address; telephone number; a description of subcontractor's organization and the services it will provide; and information concerning subcontractor's ability to provide the Contract Activities.
- The relationship of the subcontractor to the Contractor.
- Whether the Contractor has a previous working experience with the subcontractor. If yes, provide details of that previous relationship.
- A complete description of the Contract Activities that will be performed or provided by the subcontractor.

Contractor is a global company with offices around the world. Contractor has software development teams in the US and Europe. Contractor's DYNAC ATMS development is done out of the Duluth, Georgia office. The primary development group for MDP is located in Spain. The CMCC team is in both the US and Vienna.

| Contractor must provide detailed information as requested in the above requirement(s). | |
|---|---|
| **The legal business name, address, telephone number of the subcontractor(s).** | Integrity Security Services, Inc. (ISS)<br>30 W Sola Street<br>Santa Barbara, CA 93101<br>Murray Egan, Director of Sales<br>+1 847-877-0844 |
| **A description of subcontractor's organization and the services it will provide and information concerning subcontractor's ability to provide the Contract Activities.** | INTEGRITY Security Services (ISS) is a wholly owned subsidiary of Green Hills Software LLC., established to provide best practice embedded security products and services for the protection of smart devices in all industries from cyber security attacks. ISS's experience in cryptographic engineering and embedded development enables ISS to assemble an exceptional team of experienced resources to meet the State's needs.<br>ISS is working as a valued Security Credentials Management System (SCMS) supplier today on ConnDOT.<br>ISS will provide the SCMS. |
| **The relationship of the subcontractor to the Contractor.** | ISS will serve as a subcontractor to Kapsch. |
| **Whether the Contractor has a previous working experience with the subcontractor.<br>If yes, provide the details of that previous relationship.** | Contractor has worked with ISS on several past and ongoing projects including Smart Columbus and Ohio Route 33 (Ohio), CT FastTrack Automated Bus (Connecticut), Pinellas County (Florida), Keys COAST (Florida), Gwinnett County Smart Corridor (Georgia). For all the projects ISS was the SCMS provider. Contractor worked with ISS on configuring and integrating their SCMS with RSUs/OBUs. |
| **A complete description of the Contract Activities that will be performed or provided by the subcontractor.** | ISS will provide the SCMS. |
| **Of the total bid, the price of the subcontractor's work.** | ISS:<br>Base: $390K<br>Base + Option: $840K |

## 20. STATE RESOURCES/RESPONSIBILITIES

The State will provide the following resources as part of the implementation and ongoing support of the Solution.

**State Contract Administrator**. The State Contract Administrator is the individual appointed by the State to (a) administer the terms of this Contract, and (b) approve and execute any Change Notices under this Contract.

| **State Contract Administrator** |
|---|
| **Name:** Christopher Martin<br>**Phone:** 517-643-2833<br>**Email:** martinc20@michigan.gov |

**Program Managers**. The DTMB and Agency Program Managers (or designee) will jointly approve all Deliverables and day to day activities.

| **DTMB Program Manager** |
|---|
| **Name:** Dave Work<br>**Phone:** 517-719-2250<br>**Email:** workd@michigan.gov |

| **Agency Program Manager** |
|---|
| **Name:** Elise Feldpausch<br>**Phone:** 517-636-0036<br>**Email:** feldpausche1@michigan.gov |

## 21. MEETINGS

At start of the engagement, the Contractor Project Manager must facilitate a project kick off meeting with the support from the State's Project Manager and the identified State resources to review the approach to accomplishing the project, schedule tasks and identify related timing, and identify any risks or issues related to the planned approach. From project kick-off until final acceptance and go-live, Contractor Project Manager must facilitate weekly meetings (or more if determined necessary by the parties) to provide updates on implementation progress. Following go-live, Contractor must facilitate monthly meetings (or more or less if determined necessary by the parties) to ensure ongoing support success.

The Contractor must attend the following meetings, at a location and time as identified by the state, at no additional cost to the State.

The Contractor Project Manager, David Meier, will be the single point of contact and coordination between the State and Contractor. The Contractor Project Manager will manage the project team resources and staffing to meet project objectives, manage project issues, risks, and the operation and maintenance support for the solution. The Contractor Project Manager will develop and manage the baseline project schedule and subsequent revisions. The Contractor Project Manager will be available via email, phone call, text, and person-to-person communication.

The Contractor Project Manager will coordinate project-related meetings with MDOT, including agendas, invitations, meeting minutes, and monthly status reports. The Contractor Project Manager will attend all required meetings at a location and time as identified by the state. The following sections describe how Contractor will meet the meeting requirements for the project.

**Project Initiation/Kickoff**: Project initiation sets the tone for the collaborative partnership between the Contractor and the State. Upon contract award, the Contractor Project Manager will prepare and submit a draft Project Management Plan including baseline schedule and milestone delivery due dates and a compilation of any outstanding questions regarding the software functional requirements. The Contractor Project Manager will also facilitate the formal project Kickoff Meeting with support from the State's PM and identified state resources.

A two-day in person kickoff meeting/workshop is recommended. Objectives for the kickoff workshop include reviewing the draft project management plan; discussing baseline project schedule and milestone/completion dates; identifying initial risks and issues related to the planned approach. Within two weeks after the kickoff meeting, Contractor will deliver to the State the final draft of the project management plan and baseline project schedule.

**Weekly Project Status Meetings:** After the project kickoff, the Contractor Project Manager will schedule weekly project status meetings for the duration of the development phase. Contractor personnel will distribute the agenda for each meeting and a weekly report at least three business days in advance. Contractor will capture meeting minutes and action items, track actions in a rolling action item list, and publish the data within three business days after each meeting. Each agenda will include a two-week outlook for upcoming deliverables, progress report update, discussion of issues and risks, action items, and schedule milestones and re-baselines.

**Technical (System Engineering) Meetings:** This project requires many types of technical meetings between Contractor and the State's subject matter experts, including but not limited to requirements review, design scoping, IT architecture, software development progress review, test planning, and transition planning. In addition, Contractor will hold technical meetings to review comments on draft deliverables. All

meetings will be coordinated with the State's PM to ensure meeting schedules and availability.

**Third Party Integration Meetings**: To facilitate the integration of third party data sources and systems, Contractor and the State will coordinate and facilitate technical meetings between Contractor technical staff, State technical experts, and if needed, representatives from third parties.

**O&M Support Meetings**: Each month, starting with the Warranty Period, Contractor will convene an O&M support meeting with the State. Prior to the meeting, Contractor will prepare and submit a Monthly Service Level Report that summarizes the O&M activities for the previous month including status of the issue pipeline and effectiveness of the support services along with key KPIs and performance metrics.

These monthly meetings will also be used to discuss change management activities including planned upgrades, enhancement requests, and upcoming Contractor product releases.

The strategy for meetings is presented in **Table 3** below.

**Table 3. Communication and Meeting Plan**

| Communication Type | Objective | Frequency | Owner | Audience |
|---|---|---|---|---|
| Kick-off Meeting | Introduce the Project Team; support a mutual understanding of the project goals, objectives, and schedule; build communication and coordination | During Project Initiation | Contractor Project Manager | SOM Project Management & Stakeholders; Contractor Project Key Resources |
| Design and Build (D&B) Phase Weekly Project Management Meetings | Discuss cost, schedule, budget, scope, personnel, and other similar topics. Review the progress report, update the status of tracked and open action items, and obtain clarifications and information. | Every week starting after the kickoff meeting until acceptance. | Contractor Project Manager | SOM PM or designated representative and others as assigned |

| Communication Type | Objective | Frequency | Owner | Audience |
|---|---|---|---|---|
| CV-ATMS Stakeholder Meetings | High-level project status update for project stakeholders | Bi-Weekly starting after kickoff meeting | SOM PM | Stakeholders and Contractor PM |
| Technical (Systems Engineering) Meetings | Meetings between Contractor and MDOT to support system engineering tasks (e.g., requirements validation, design, planning, testing, review of project document submissions) | As needed | Contractor PM | SOM PM and SMEs |
| Third Party Integration Meetings | Meetings between Contractor, MDOT, and potentially third parties to support systems integration needs | As needed | Contractor PM | SOM PM and SMEs, Third Party stakeholders if needed |
| O&M Phase support meetings | Review operations report, aspects of system operations, maintenance, and support. Discuss change management and enhancement requests | Monthly | Contractor PM | SOM PM, additional resources |

## 22. PROJECT CONTROL & REPORTS

Once the Project Kick-Off meeting has occurred, the Contractor Project Manager will monitor project implementation progress and report on a weekly basis to the State's Project Manager. Contractor will submit a weekly progress report two working days prior to each weekly status meeting. The will detail the following:

- Progress to complete milestones, comparing forecasted completion dates to planned and actual completion dates
- Accomplishments during the reporting period, what was worked on and what was completed during the current reporting period

- Estimated percent complete of the project milestones and analysis of forecasted vs planned completion date.
- Tasks planned for the next reporting period
- Identify any existing issues which are impacting the project and the steps being taken to address those issues
- Identify any new risks and describe progress in mitigating high impact/high probability risks previously identified
- A current schedule with explanations of any potential deviations from the Baseline Schedule. The explanation will include the anticipated impact of any delays and a plan for returning to the target schedule. Contractor will clearly identify all changes to the schedule since the last progress report.
- A status of all tracked documents, correspondence relating to submittals, deliverables, and other project-critical items – including relevant dates.
- Updated control log with updated status of risks and issues along with proposed action plan / mitigation strategy
- A list of all vendor and MDOT action items with status, responsible party(s), and required resolution dates.
- The status of unresolved contract questions and change requests.

## 23. PROJECT MANAGEMENT

The Contractor Project Manager will be responsible for maintaining a project schedule (or approved alternative) identifying tasks, durations, forecasted dates and resources – both Contractor and State - required to meet the timeframes as agreed to by both parties.

Changes to scope, schedule or cost must be addressed through a formal change request process with the State and the Contractor to ensure understanding, agreement and approval of authorized parties to the change and clearly identify the impact to the overall project.

**SUITE Documentation**
In managing its obligation to meet the above milestones and deliverables, the Contractor is required to utilize the applicable State Unified Information Technology Environment (SUITE) methodologies, or an equivalent methodology proposed by the Contractor.

This section summarizes how Contractor will meet the intent of the requirements.

### PROJECT MANAGEMENT

Contractor follows PMI best practices and Contractor's Project Management Methodology is rooted in strong project controls and systems engineering best practices. Project controls include a project management plan, control log for tracking

project issues and risks, and change management process as illustrated in **Figure 43** below.

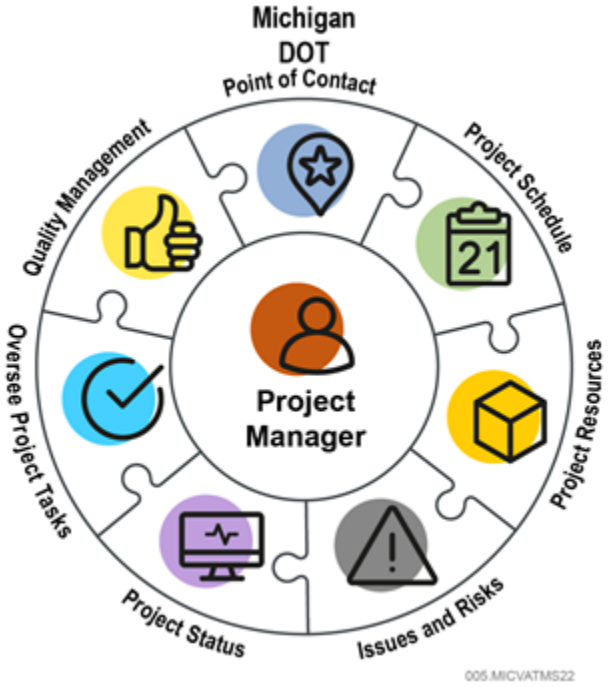



**Figure 43. Project Management Methodology**

## SYSTEM ENGINEERING:

Contractor adheres to the systems engineering process for all ATMS design-build projects. Contractor will follow an agile-waterfall hybrid approach whereby Contractor will perform requirements definition and functional design for the system as a whole then apply an agile methodology for system implementation (customization and configuration)followed by testing, training, deployment, validation (burn-in and warranty), and operations/maintenance as depicted in **Figure 44**.

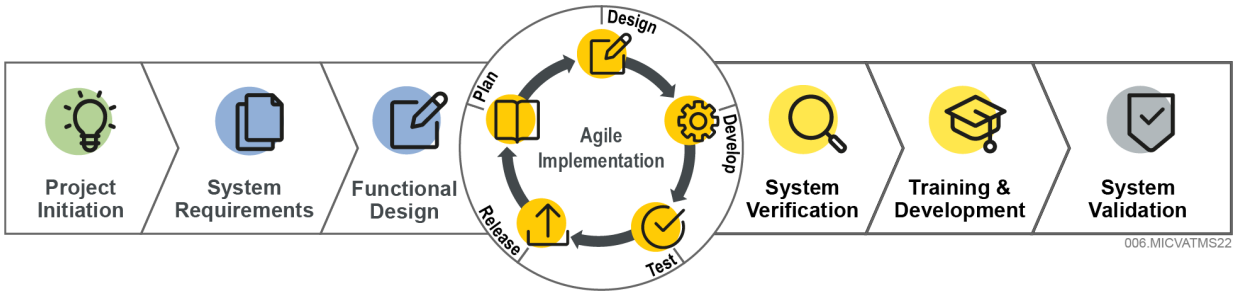



**Figure 44. Agile-Waterfall Hybrid Approach**

Contractor will generate key planning documents for each stage (e.g., functional design, system design, test plan, training plan, etc.). Contractor will create a requirements traceability matrix at the conclusion of the system requirements phase and it will guide all of the project activities through deployment.

Each stage of a project will follow a formal approach:

***Stage Initiation***. Each project stage will begin with a kickoff meeting to ensure a mutual understanding between Contractor and the State. At this meeting, Contractor will achieve agreement of the schedule, activities, milestones, and deliverables for the stage along with resource requirements from Contractor and the State. For each document deliverable, Contractor and the State will review the state standard template and Contractor standard template and agree on the document format. Contractor and the State will also establish the exit criteria and required approvals for the stage.

***Stage Execution***. Contractor will execute the activities of the task and generate all required deliverables and meet the milestones

***Stage Approval and Closeout***. The stage will conclude when approvals for the required documentation is granted and all milestones are successfully achieved.

Following Award, Contractor will be responsible for submitting all detailed plans as defined below. Contractor should meet with the State prior to preparing the requested documentation to discuss the Contractor's approach and receive initial feedback from the State on preferences, restrictions, limitations, and/or changes. The proposed plans must be submitted to the State for review comment and potential modification. Contractor will be responsible for addressing all comments received and resubmitting to the State for acceptance. If a resubmittal is deemed to not adequately address all comments, multiple resubmittals may be required before the plan is accepted by the State. The required submittal timeframe for each plan is provided in the milestone table below. Any need for resubmittal shall not be seen as a cause for delay in completing the project in accordance with the overall Project Milestones. Multiple simultaneous submittals may extend the State's review times.

Acceptance of documents shall not relieve or limit the Contractor's responsibility to provide a system in full compliance with the Contract. Deviations from the requirements that may be contained within the Contractor's submitted documents, even though the document may be accepted by the State, shall not have the effect of modifying Contract requirements. Only specific requests to the State from the Contractor for waivers or specification change that are formally accepted by the State will change requirements in the Contract.

All Plans, Documentation, Manuals, and updates shall be submitted in soft copy (latest version of the appropriate Microsoft application (Word, Excel, Access, Power Point,

Visio, Project) and PDF. Final accepted versions of all documentation shall be delivered in soft copy in a format that is acceptable to the State.

Each plan identified below must include (at a minimum) the following detail.

1. **Project Schedule**
    - Shall include project tasks, including inputs, approach, outputs, constraints, and critical path items.
    - Shall include a Work Breakdown Structure (WBS) in chart format illustrating tasks, sub-tasks, predecessors, meetings, trainings, workshops, and deliverables on a timeline.
    - Shall include detail through all project phases, including documentation, software development, testing, integration, transition, and training.
2. **Risk Management Plan**
    - Shall addresses the processes for identifying, assessing, mitigating, and monitoring the risks expected or encountered during the project's life cycle.
    - Shall identify the roles and responsibilities of all participating organizations for risk management.
    - Shall identify 1) risks; 2) assess the relative level of risk as either: likely, probable, improbable, and impossible; 3) prioritize risks; 4) identify risk mitigation for likely, probable, and improbable risks, 5) define methods for monitoring risks, and 6) identify risk owner/lead.
3. **Quality Management Plan**
    - Shall define how the Contractor will demonstrate compliance with the RFP and Contract requirements and/or standards.
    - Shall describe the self-check process and/or procedures performed to ensure deliverables meet requirements and the documentation and/or records are maintained.
    - Shall define quality staff and demonstrate that all quality staff are qualified, experienced, and have the proper skills/background.
    - Shall define procedures that ensure any and all failures, malfunctions, deficiencies, defects, deviations, etc., are corrected and/or documented according to the Quality Management Plan and Contract requirements.
4. **Requirements Confirmation**
    - Shall include meetings where the Contractor must review each requirement and demonstrate how each requirement will be met. Any requirement adjustments and/or proposed workarounds must be approved by the State.
    - At the conclusion of the requirement confirmation meetings a Draft Requirements Confirmation Document deliverable must be provided to the

State to document the results of the validation sessions, requirement revisions, and/or approved workarounds.

5. **System Architecture and Design Plan**
    - Shall include detailed design plans of the network components, including physical and logical cores, physical and logical servers, physical and logical access, Virtual Local Area Networks (VLANs), Virtual Private Network (VPN) users, equipment vicinity, and rack layout as applicable.
    - Shall include detailed descriptions of:
        - All servers such as application servers, database servers, communication servers, directory servers, clock servers, test servers, backup servers, Internet Information Services (IIS) servers, and others;
        - Typical workstations configurations including monitors and printers;
        - Uninterruptible Power Supplies (UPS), switches, power switches, routers, firewalls; and
        - Field devices that will be managed or monitored by the system.
    - Shall include interfaces between subsystems and external systems.
    - Shall include security compliance.
    - Shall include information requested by the State during the Enterprise Architecture Solution Assessment (EASA).
6. **SCMS Operations Plan**
    - Shall detail all functionality of the SCMS solution, including all interfaces for MDOT personnel.
    - Shall detail the process for initial bootstrapping of all devices by MDOT, including RSU and OBU.
    - Shall detail the process for initial bootstrapping of all devices by MDOT partners in a separate, stand-alone appendix, that can be provided to MDOT partners as needed.
    - Shall document the method for certificate revocation, both automated and manual.
    - Shall document the method for decommissioning of devices.
    - Shall document the process for certificate reloading on all devices, including the requirements for the MDOT system (e.g., IPv6, tunnels, firewalls, Internet access).
7. **System User Documentation (SUD)**
    - Shall detail all functionality of the CV-ATMS.
    - Shall include user guides for each specific application within the CV-ATMS.
    - Shall include troubleshooting techniques and other user help information.

- Shall be updated in conjunction with each system update/release and include an update log.

8. **System Installation Guide (SIG)**
   - Shall define the installation, integration, and configuration of all CV-ATMS hardware, software, and modules, supporting operating systems, databases, 3rd party software, and any other software as needed for a full and complete solution.
9. **Software Development Plan**
   - Shall include narrative descriptions and screenshots for phasing, software development, downstream impacts (detailed in the Risk Management Plan), configuration, and/or customization of the Commercially Off the Shelf (COTS) product(s).
10. **Interface Control Plan**
    - Shall include the physical, functional, and content characteristics of both internal and external interfaces to a system, and the responsibilities of the organizations on both sides of the interface.
    - Shall include 3rd party vendors and other existing hardware and software providers that the CV-ATMS will interface and integrate with.
11. **Data Dictionary**
    - Shall contain the information necessary to describe CV-ATMS and API data elements, including name, type, max length, description, mandatory/optional.
12. **Configuration Management Plan**
    - Shall define the set-up and configuration of maps, user access, alerts, logs, standard reports, dashboards, schedules, etc.
    - Shall define the set-up and configuration of devices for each device type, make, and model to be integrated and the associated standards and protocols being used.
    - Shall outline processes, procedures, and responsibilities for documenting and implementing changes, modifications, and enhancements. This includes the design requirements, acceptance, and approval authorities.
13. **Transition Plan** *(see Schedule G for transition requirements)*
14. **Standards Documentation**
    - Shall define the relevant industry standards being used, any interpretation of the standards, and deviations to the standards, including but not limited to:
      - SAE Standards (i.e. J2540, J2735, J2945, etc)
      - IEEE Standards (i.e. 1609, 802.11, etc.)
      - CTI 4001 Roadside Unit (RSU) Standard

- Work Zone Data Exchange (WZDx) Specification

*(i) Milestones/Deliverables for Implementation*

The State's proposed milestone schedule and associated deliverables are set forth below.

| Milestone | Deliverables | Schedule (calendar days) |
|---|---|---|
| General Project Management | Project Kickoff | Contract Execution + 10 days |
| | Meetings and Meeting Summaries | As Needed |
| Project Documentation | Project Schedule | Contract Execution + 30 days |
| | Risk Management Plan & Quality Management Plan | Contract Execution + 60 days |
| | Requirements Confirmation Document | Contract Execution + 90 days |
| | System Architecture and Design Plan | Contract Execution + 90 days |
| | SCMS Operations Plan | Contract Execution + 150 days |
| | Systems User Documentation | Contract Execution + 150 days |
| | Systems User Documentation Updates | With each system update |
| | System Installation Guide | Contract Execution + 150 days |
| | Software Development Plan & Interface Control Plan | Contract Execution + 150 days |
| | Data Dictionary | Contract Execution + 180 days |
| | Configuration Management Plan | Contract Execution + 180 days |
| | Standards Documentation | Contract Execution + 180 days |
| Provision Environment | Validate Test and Production Environments | Contract Execution + 180 days |
| Software Development, Configuration, and Testing | Deployment Transition Plan | Contract Execution + 100 days |
| | User Acceptance Testing Plan | 90 days prior to UAT |
| | User Acceptance Testing (UAT) Results | 90 days following start of UAT |

| | | |
|---|---|---|
| Application Development, Configuration, and Testing | User Acceptance Testing Plan | 90 days prior to UAT |
| | User Acceptance Testing (UAT) Results | 90 days following start of UAT |
| | Go-live* | December 1, 2023 |
| Solution Integration and Acceptance | Successful integration for 100% of field devices | Based on accepted transition plan |
| | Successful Burn-in Completion for 100% of Solution | 60 days following start of burn-in |
| Training | Initial Trainings | Every four months for 12 months, beginning 60 days prior to Software Testing and Acceptance |
| | Basic Training Course | Annually or upon request |
| | New Software Build Training Course | Within 30 days of each major software enhancement and/or build |
| Operations and Maintenance | Warranty Period (free of charge) | Per approved Burn-In Completion + 90 days |
| | Ongoing after Final Acceptance. | Begin at end of Warranty Period Ongoing |

*At a minimum, the existing Lane Closure Request and Weather Application functionality must be operational in the new CV-ATMS by the identified go-live date.

Contractor will meet all of the requirements for successful delivery of project deliverables. Each project artifact will go through a four step QA/QC process:

**Document Initiation.** As part of the project delivery process, all artifacts to be delivered in that a project stage will be discussed at the kickoff meeting as described above. For each document deliverable, Contractor and the State will discuss the purpose and intent of the document. Contractor will also review the State standard template and Contractor's standard template and agree on the document format.

**Document Outline**. Contractor will prepare an annotated outline of the document for discussion with the SOM PM. This outline will help to confirm that Contractor and the State are aligned as to the approach and content of the document

**Draft Document.** Based on the outline, Contractor will create a draft document for SOM review. The State shall provide Contractor with a consolidated review of the document. Contractor and the State will meet to review the Agency's comments and agree on steps for the final submittal.

**Final Document.** Contractor will address the State's feedback on the draft and prepare the final document for SOM approval.

Contractor understands that additional review cycles is a schedule risk and it is in the interest of both parties to reduce that risk through open communication and being efficient in the delivery and review of all documents. The Contractor PM will commit to having internal project reviews and ensuring the document is properly formatted before submitting any document.

Contractor will submit all documents in either Word or PDF formats as requested by the SOM project manager. If requested, Contractor will provide original sources (e.g., Visio, Excel, PowerPoint) of drawings and/or tables.

## 24. ADDITIONAL INFORMATION

The State reserves the right to purchase any additional services or products from the Contractor during the duration of the Contract.

# SCHEDULE A – TABLE 1 – BUSINESS SPECIFICATION WORKSHEET

**Instructions for Completing the Business Specifications Worksheet**

Contractors must respond to each business Specification on how they will meet the requirements in the document provided. Contractor must not alter the document.

The Business Specifications Worksheet contains columns and is defined as follows:

**Column A**: Business Specification number.

**NOTE:**

- If there is a "**Mandatory Minimum**" section included in the Business Specifications Worksheet, any items listed under this section must be met by the Contractor to avoid disqualification. Further, Contractor must provide adequate documentation to support such Mandatory Minimum requirements.
- The "**Required**" section of the Business Specifications Worksheet lists items that the State requires to be part of the Solution. "Required" items will be evaluated and scored upon per the State evaluation process.
- The "**Optional**" section of the Business Specifications Worksheet lists items that are not required at the time of the solicitation but may be desired by the State in the future. Such "Optional" items will be evaluated and used in a best value award recommendation

**Column B**: Business Specification description.

**Column C**: Business Specification Type. Mandatory, Required, or Optional

**Column D**: Contractor must indicate how it will comply with the business Specification. Contractor must enter **"Y"** to one of the following:

- **Current Capability –** This capability is available in the proposed Software with no additional configuration or cost
- **Requires Configuration –** This capability can be met through Contractor-supported changes to existing settings and application options as part of the initial implementation at no additional cost (e.g., setting naming conventions, creating user-defined fields).

- **Customizations to Software Required** – The requirement can be met through Contractor modifying the underlying source code, which can be completed as part of the initial implementation.
- **Future Enhancement –** This capability is a planned enhancement to the base software and will be available within the next 12 months of contract execution at no additional cost.
- **Not Available –** This capability is not currently available, and a future enhancement is not planned.

**NOTE:** Configuration is referred to as a change to the Software that must be completed by the awarded Contractor prior to Go-Live but allows an IT or non-IT end user to maintain or modify thereafter (i.e. no source code or structural data model changes occurring).

Customization is referred to a modification to the Solution's underlying source code, which can be completed as part of the initial implementation. All configuration changes or customization modifications made during the term of the awarded contract must be forward-compatible with future releases and be fully supported by the awarded Contractor without additional costs.

Contractor shall understand that customizations (i.e. changes made to the underlying source code of the Solution) may not be considered and may impact the evaluation of the Contractor's proposal.

**Column E**: The Contractor must also fully disclose how they will meet the requirements in their proposal response. This column is for Contractor to describe ***how*** they will deliver the business Specification and if the Contractor proposes configurations or customizations, the Contractor must explain the details of the impacted risk that may be caused if configured or customized to meet the business Specification. Description must be no more than 250 words for each business Specification.

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| | **Article II. MANDATORY MINIMUMS** | | | | | | | |
| 1.1 | Article III. The CV-ATMS must include a web browser-based application, the software must run under commonly used web browsers and stay compliant with State of Michigan standards. | M | Y | | | | | The CV-ATMS is a web browser based application that runs on all popular web browsers. Contractor agrees to stay compliant with SOM standards. More description of the solution, including screen shots is provided in Appendix 8. |
| 3.1 | Article IV. The CV-ATMS must support the ability to communicate with field devices via Ethernet/IP Networking. | M | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. More information on the solution is provided in Appendix 8. |
| | **Article V. SOFTWARE** | | | | | | | |
| **1** | Section 5.01 GENERAL | | | | | | | |
| 1.1 | See Mandatory Minimum Requirements | M | Y | | | | | CV-ATMS is a web browser based application that runs on all popular web browsers. Contractor will stay compliant with SOM standards. More description of the solution, including screen shots is provided in Appendix 8. |
| 1.2 | The CV-ATMS must provide users access to the system via a mobile device (phone/tablet) through a remote access method that is compliant with DTMB policies. | R | Y | | | | | The CV-ATMS is accessible via a mobile device, however all functions are not optimized for mobile use, nor is this optimization included in the solution. |
| 1.3 | The CV-ATMS must timestamp and record all activities and commands performed within the software, both manual and automated features. | R | Y | | | | | All transactions and activities are time stamped in CV-ATMS. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 1.4 | The CV-ATMS must have documented Application Program Interface(s) (APIs) that supports current recognized industry standards that will enable all data collected through the CV-ATMS to be shared and integrated with other systems. | R | Y | | | | | CV-ATMS offers two standards-based APIs that allow publishing and consuming information.<br><br>a. There is a synchronous REST API that facilitates administration and consultation tasks (registration of new datasets and topics, consultation of available topics, consultation of schemas and formats, etc.), as well as synchronous publication and consumption of data.<br><br>b. Additionally, an asynchronous API based on STOMP over WebSocket is also offered, which allows systems to subscribe to topics and receive information events as soon as they are published. |
| 1.5 | The CV-ATMS must be able to scale without a decrease in performance (map lag, field device layer displays, display of lists, execution of queries, etc.) with increased operational demands. | R | Y | | | | | The solution is virtualized and scaling system architecture/hosting platform will support increased operational demands with no degradation in performance. The software application has no limits on the data demands. |
| 1.6 | The CV-ATMS architecture must not limit the total number of field devices that can be concurrently integrated, monitored, and controlled. | R | Y | | | | | The CV-ATMS has no limits on the number of field devices that can be concurrently integrated, monitored, and controlled in the system. |
| 1.7 | The CV-ATMS must save all data and end all processes upon shutdown. | R | Y | | | | | This is standard behavior of the CV-ATMS. |
| 1.8 | The CV-ATMS must allow for the implementation of new software components (e.g., firmware, server, etc.) without disruption to the rest of the system. | R | Y | | | | | The solution runs in a redundant system architecture that supports updating software modules on one set of virtualized servers while the other is running. |

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| 1.9 | The CV-ATMS system must have page load-time performance, including processing and handling, of less than 2 seconds. | R | Y | | | | | This is standard behavior of the CV-ATMS. |
| 1.10 | Users, API, or services must not be able to access any system server directly without being previously authenticated. | R | Y | | | | | All users and services are authenticated to manage access to elements of the solution. This is standard behavior of the system. |
| 1.11 | The CV-ATMS must verify the identity and authenticate all of the system's users per account as part of user authentication process/method prior to allowing the user to use its capabilities. | R | Y | | | | | CV-ATMS supports the features and functionality outlined in Section 7 – Access Control and Autherntication including the SSO authentication using SAML. The existing SSO and user management frameworks will be enhanced to interface with the State's IT Identity and Access Management (IAM) environments. |
| **2** | Section 5.02 DATA STORAGE | | | | | | | |
| 2.1 | The CV-ATMS must retain and store data collected by the CV-ATMS in accordance with MDOT's ITS/TOC Retention Schedule. | R | Y | | | | | CV-ATMS provides a data storage repository. Contractor will follow MDOT's ITS/TOC retention schedule. |
| 2.2 | The CV-ATMS must include an active database that stores real time system status data, system events (e.g., alerts), and user activity. | R | Y | | | | | Both DYNAC and CMCC components of CV-ATMS have active databases that complement the long-term storage databases of the solution. |
| 2.3 | The CV-ATMS must provide all the necessary utility operations for backing up and restoring the CV-ATMS databases to an external storage device. | R | Y | | | | | This is standard functionality of the CV-ATMS. Contractor will train Michigan administrators on how to backup and restore the databases. |
| 2.4 | The CV-ATMS should not limit the size of the databases or database record fields other than that imposed by the hardware storage capacity. | O | Y | | | | | The CV-ATMS has no capacity limits other than what is imposed by the hardware. |

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| **3** | Section 5.03 NETWORK PROTOCOLS | | | | | | | |
| 3.1 | See Mandatory Minimum Requirements | M | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. This is described in full detail in Appendix 8. |
| 3.2 | The CV-ATMS must include the ability to communicate with field devices via the following communications protocols, as applicable to each field device: | | | | | | | |
| 3.2.1 | Transmission Control Protocol (TCP) | R | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. This is described in full detail in Appendix 8. |
| 3.2.2 | User Datagram Protocol (UDP) | R | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. This is described in full detail in Appendix 8. |
| 3.2.3 | Simple Network Management Protocol (SNMP) | R | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. This is described in full detail in Appendix 8. |
| 3.2.4 | Internet Group Management Protocol (IGMP) | R | Y | | | | | The CV-ATMS integrates with many types of field devices, including RSUs. It communicates directly with RSUs via Ethernet/IP. This is described in full detail in Appendix 8. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 3.2.5 | National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) | R | | | Y | | | There are 3 CV-related NTCP standards: 1202, 1211, 1218. Today Contractor supports elements of the 1202 and 1211 standards for TSP and EVP applications. The relevant portions of these 3 NTCIP standards are currently being updated in the solution for this project. There is minimal risk for these updates. |
| **4** | Section 5.04 SYSTEM ADMINISTRATION | | | | | | | |
| 4.1 | The CV-ATMS must comply with *Access Control and Authentication* of the statement of work regarding login and authentication capabilities. | R | | | Y | | | Contractor supports external user authentication (SAML, SSO, etc.) and will enhance and extend existing user authentication per MDOT Access Control and Authentication requirements. |
| 4.2 | The CV-ATMS must provide role-based access controls and allow authorized users to define and assign different user access levels which enable and/or restrict all features, functions and/or data available based on permissions of the user. | R | Y | | | | | The user permissions application in CV-ATMS contains role-based permissions that allow defining access levels based on specific system features. |
| 4.3 | The CV-ATMS administration functionality must include user account creation, deletion, and role assignment. | R | Y | | | | | This is standard functionality in the user permissions application. |
| 4.4 | The CV-ATMS must provide the ability to generate automated emails to users regarding access information for their user accounts, such as notifications to update a password. | R | | | Y | | | The current functionality in the user permissions application does not include email notifications. This will be added during this project. |
| 4.5 | The CV-ATMS must provide the ability to automatically disable a user account after a defined duration without system access, adjustable at the system level. | R | | | Y | | | The current functionality for user permissions does not support automated disabling of a user account. This will be added during this project. |

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| 4.6 | The CV-ATMS should provide the ability to track user activity at minimum including login, logout, and login attempts (successful and failed). | R | Y | | | | | CV-ATMS tracks all login activity, this is standard functionality. |
| 4.7 | The CV-ATMS should provide the ability to partition access by authorized users based on the following: | | | | | | | |
| 4.7.1 | Roles | R | Y | | | | | This is standard in the user permission application. |
| 4.7.2 | Geographic area (a minimum of four TOC coverage areas, seven MDOT regions, and all Michigan Counties and Cities) | O | Y | | | | | The solution includes geographic domains that can be applied at the TOC level all the way down to user specific roles and permissions. This functionality allows for the segmentation of operational responsibilities based on geography and role and can be dynamically transferred if necessary. |
| 4.7.3 | Device types | O | Y | | | | | The concept of “Domains” can also be used to establish sets of devices accessible by different users. |
| 4.8 | Authorized users must be able to add devices within the CV-ATMS without vendor support. | R | Y | | | | | CV-ATMS is designed to enable authorized users to manage (add, modify, delete) devices independently. Contractor provide device management training as part of the standard training offering. |
| 4.9 | The CV-ATMS should provide the ability to add multiple devices in batches within the CV-ATMS | O | | | Y | | | CV-ATMS currently supports manual entry and configuration of devices. Pricing includes the development of a batch import capability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 4.10 | The CV-ATMS must provide the ability to assign device input fields that are not system critical as required or optional, where optional fields can be left blank and will not prohibit the device from being added to the CV-ATMS. | R | Y | | | | | This is a standard feature of CV-ATMS. |
| 4.11 | The CV-ATMS must provide the ability to edit field devices within the system without vendor support. | R | Y | | | | | CV-ATMS is designed to enable authorized users to manage (add, modify, delete) devices independently. Contractor provide device management training as part of the standard training offering. |
| 4.12 | In compliance with DTMB published standards, the CV-ATMS must automatically log off users after a system defined and modifiable period of inactivity | R | Y | | | | | This is a standard feature of CV-ATMS, the period of inactivity is set in the user permissions applications. |
| 4.13 | The service provider must use Web services exclusively to interface with the State's data in near real time when possible. | R | Y | | | | | CV-ATMS communicates by web services. |
| 4.14 | The CV-ATMS must provide the ability for system administrators to request and download a report of active/inactive users, roles, and permission assignments. | R | | Y | | | | CV-ATMS has a standard user report that summarizes roles, permissions, and status. These reports need to be configured to the types of devices and users that are set up during initialization. |
| **5** | Section 5.05 GUI | | | | | | | |
| 5.1 | The CV-ATMS user interface must provide the following display capabilities: | | | | | | | |

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| 5.1.1 | Ability to manage multiple windows at a single workstation without multiple logins. | R | Y | | | | | CV-ATMS provides a dynamic layout:<br>1-Users may launch multiple windows;<br>2-Users may configure a single window into a specialized layout with multiple panes;<br>3-It also supports multiple tabs in a single window. |
| 5.1.2 | Ability to simultaneously display multiple windows and have tools for window sizing and arranging without distorting the display. | R | Y | | | | | This is standard part of the customizable layout. |
| 5.1.3 | Ability to monitor and control a field device in a separate window (e.g., pop-up) or within the existing window when a field device is selected on the map display or through a tabular list. | R | Y | | | | | This is a standard within the customizable layout. |
| 5.1.4 | Ability to simultaneously monitor and control multiple field devices, events, and alerts (e.g., pop-up windows). | O | Y | | | | | The solution includes fully integrated event, alarming and device management applications when used in conjunction provide alerts associated with device and other system components both visually and audibly. All operator and system actions are recorded in the system event log for historical analysis. |
| 5.2 | The CV-ATMS user interface must provide the ability to configure and view dashboards that display performance information (e.g., number of active weather events, number of lane closures, status of field devices, etc.). | R | | Y | | | | CV-ATMS integrates QLIK as the dashboard/visualization tool. Contractor will train SOM users on how to use and configure standard dashboards and create new dashboards. |

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| 5.3 | The CV-ATMS user interface must provide the ability to customize and save workstation views and layouts by user profile to be used in subsequent sessions. | R | Y | | | | | CV-ATMS enables users to create and save an unlimited number of layouts. This is described in full detail in Appendix 8. |
| 5.4 | The CV-ATMS must automatically validate input data for free form data fields against syntax and spelling. | R | Y | | | | | CV-ATMS leverages the browser built-in word processing capabilities to check spelling. Misspelled words are highlighted by a red line under the word as is common in browser usage. The solution supports syntax error checking in free-form data entry fields to the extent supported by the built-in browser word processing capabilities. |
| 5.5 | The CV-ATMS must provide standard word processing capabilities within the user interface (e.g., spell check, wrap text, keyboard shortcuts (ctrl-c, ctrl-v, etc.), copy and paste, etc.). | R | Y | | | | | CV-ATMS leverages the browser built-in word processing capabilities. |
| 5.6 | The CV-ATMS must display field devices on the map. | R | Y | | | | | This is a standard part of the map GUI. Contractor willalso support customizing device Icons. |
| 5.7 | The CV-ATMS must provide the ability to navigate to a field device's monitoring and control interface by clicking on the device icon within the map. | R | Y | | | | | The map GUI enables users to click on a device icon to open the control interface. |
| 5.8 | The CV-ATMS must provide the ability to sort, search, and filter all tabular displays by any column. | R | Y | | | | | CV-ATMS contains a table list of devices that may be filtered, sorted, and searched. |
| 5.9 | The CV-ATMS must provide the ability to filter multiple columns. | R | Y | | | | | Users can filter multiple columns. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 5.10 | The CV-ATMS should provide the ability to create tabular displays by selecting devices and associated data fields to be included in the tabular display. | O | | | | | Y | The solution provides a fixed tabular displays optimized for efficient device monitoring and management. The solution does not include dynamic creation of adhoc tabular displays. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 5.11 | The CV-ATMS should provide the ability to turn off auto refresh when viewing a table with live data. | O | | | | | Y | The solution provides realtime updates of all pertinent system data. Events, alerts, system and user actions are also stored the event log. The ability to pause or suspend these updates is not a feature currently available in the solution, nor included in the option pricing. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 5.12 | The CV-ATMS must automatically adjust dropdown menus based on the previously selected information. For example, if the user defines the MDOT region, the subsequent County dropdown must only provide counties within the specified region. | R | Y | | | | | This is standard functionality in the solution. |
| 5.13 | The CV-ATMS must enable CV message assembly via the user interface, including data inputs as specified by each V2X message type. | R | Y | | | | | This is standard functionality in the solution. This is further described in Section 3 of Attachment 8, CV-ATMS Description. |
| 5.14 | The CV-ATMS must provide the ability for individual users to update, edit, and save user preference settings of the initial page entry and display within the system. Once saved, those settings must apply only to the individual's user account. | R | Y | | | | | This is standard functionality in the solution. This is further described in Section 2 of Attachment 8, CV-ATMS Description. Please note that map rotation is not supported. |

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| 5.15 | The CV-ATMS must provide the ability for individual users to update, edit, and save the map display view (selectable zoom, set a center-point location as latitude and longitude, map extent, orientation) and be used as a default login setting per user account. | R | Y | | | | | This is standard functionality in the solution. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.16 | The CV-ATMS must provide a method to display approach instructions within the user interface. | R | Y | | | | | This is standard functionality in the solution. |
| 5.17 | The CV-ATMS must provide a user interface that enables the user to interact dynamically with a map view (user configurable to the extents/regional or geometry boundaries of the display), allowing the user to perform following function: | | | | | | | |
| 5.17.1 | Zoom | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.17.2 | Pan | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.17.3 | Navigate | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.17.4 | Set color themes of included 'assets-devices' | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.17.5 | Toggle map layers 'visibility on and off' | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| 5.17.6 | Set extents | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.17.7 | Change base map views/services interactive | R | Y | | | | | The solution contains a full-featured, map-based user interface. This is further described in Section 2 of Attachment 8, CV-ATMS Description. |
| 5.18 | The CV-ATMS must gray out or not show features that a user is not authorized to access. If grayed out, the CV-ATMS must display a message indicating that the feature is not available for that user. | R | Y | | | | | This is standard functionality in the solution . The GUI hides applications and greys out inaccessible functions, and does not allow operators to click on inaccessible functions. Please note that the GUI does not display a popup message. |
| **6** | **Section 5.06 MAP** | | | | | | | |
| 6.1 | The CV-ATMS must have a geographically accurate map that displays routes within the state. The map must be based on the current version of the Michigan Geographic Framework. | R | | | Y | | | The solution includes support of 3rd-party map sources... Contractor will integrate the current version of the Michigan Geographic Framework into CV-ATMS. There is minimal risk associated with the accuracy of the roadway topology. |
| 6.2 | The CV-ATMS vendor must update the state-approved roads displayed in the vendor provided base map (base map includes both roadway lines and aerial imagery) semi-annually, or when major updates (i.e., annual version of the Michigan Geographic Framework) have been published. | R | | Y | | | | Contractor will work with the State to update the state-approved roadway topology up to twice per year, as updates are published. Configuration will be required to integrate topology changes into the CV-ATMS. The associated risk is minimal. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 6.3 | The CV-ATMS map should include the ability to display satellite aerial imagery, as available in commercially supported mapping products, that increases in fidelity as the user zooms in. | O | Y | | | | | The solution includes a HTML-5 based mapping application that supports the integration and display of third party and commercially available data. The geolocated map application integrates 3rd party map overlays as layers using OpenLayers. OpenLayers is a 3rd party package which support OGC standards. Contractor currently supports data overlay from commercial providers ESRI Rest services, HERE, TomTom and INRIX. The system supports open source GIS data from OpenStreetMap, Mapbox, National Weather Service, ESRI ArcGIS and Open Weather. As all of these options are dependent on various licensing options, internet connectivity, etc., Contractor looks forward to understanding the State's specific needs to provide an optimal solution. |
| 6.4 | The CV-ATMS map must include intuitive map navigation controls, including a compass if the map can be rotated. | R | Y | | | | | This is standard functionality in the solution . This is further described in Section 2 of Attachment 8, CV-ATMS Description. Please note that map rotation is not supported. |
| 6.5 | The CV-ATMS map must have on screen legends that can be toggled on and off. | R | | Y | | | | This is standard Map GUI functionality. Configuration is required for tailored customer legends. The associated risk is minimal. |
| 6.6 | The CV-ATMS map should have an interactive (point and click) distance measurement tool. | O | Y | | | | | This feature is included in the base solution. |
| 6.7 | The CV-ATMS map must show dual direction highways and directionality of travel if appropriate and when zoomed in to the appropriate level. | R | | Y | | | | The solution includes support of dual direction highways and direction of travel, as available from 3rd-party map sources. Contractor will integrate the current version of the Michigan Geographic Framework into CV-ATMS. There is minimal risk associated with the accuracy of the roadway topology. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 6.8 | The CV-ATMS map layers (i.e., field devices, third-party interfaces, etc.) should refresh real-time status and have the ability to refresh on-demand when requested by a user that is appropriate for that element without causing noticeable latency. | O | Y | | | | | This feature is included in the base solution. |
| 6.9 | The CV-ATMS must provide a help feature for commonly used features/functionality. | R | Y | | | | | This is standard Map GUI functionality. |
| 6.10 | The CV-ATMS must provide the ability to modify lane usage designations, based on lane reductions created by construction and other long-term events. | | | | | | | |
| 6.10.1 | Modified lane usage designations must be updated on the system map. | R | Y | | | | | Contractor will work with the State to update the state-approved roadway topology up to twice per year, as updates are published. Configuration will be required to integrate topology changes into the CV-ATMS. The associated risk is minimal. |
| 6.10.2 | MAP files for affected field devices should be amended based on modified lane usage designations. | O | Y | | | | | This feature is included in the base solution. |
| 6.11 | The CV-ATMS map must provide the ability to hover over a field device icon on the map and display device information.<br><br>Vendor to use explanation column to provide overview on the device information displayed for each device type. | R | | Y | | | | This is standard functionality in the solution . Configuration will be required to for specific information to be displayed. The associated risk in minimal. |

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| 6.12 | The CV-ATMS must allow users to view overlapped icons (e.g., devices and events) and select a single icon when multiple icons are stacked at the same location to display associated information. | R | Y | | | | | This is standard functionality in the solution . Where icons are overlapped, a list is dynamically presented to the user for selection. |
| 6.13 | The CV-ATMS should provide the ability to view and navigate maps outside of Michigan, to include at minimum Ohio, Wisconsin, Indiana, Illinois, and Ontario. | O | | Y | | | | This is standard, configurable solution functionality. As stated previously, though this capability is available, the data sources and functionality outside the state need to be discussed with the Department to fully understand the impacts to cost and schedule. |
| 6.14 | The CV-ATMS map must provide the ability for individual users to configure, save, and recall the following map settings: | | | | | | | |
| 6.14.1 | Base map selection (e.g., aerial vs roadmap) | R | | Y | | | | This is standard functionality in the solution . Configuration will be required for available base maps. The associated risk is minimal. |
| 6.14.2 | Bookmark views for location, zoom level, visible layers, etc. | R | Y | | | | | See 5.3 above. |
| 6.14.3 | View prior to last logout | O | Y | | | | | This feature is included in the base solution. |
| 6.14.4 | Layers (i.e., on vs off) | O | Y | | | | | This feature is included in the base solution. |
| 6.14.5 | Color scheme (i.e., light vs dark) | O | | | Y | | | This functionality is largely dependent on the capabilities of the GIS data source/tile layers. Contractor assumes that this capability exists within the source GIS data. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 6.15 | The CV-ATMS should provide the ability to add commercially available GIS map services such as ESRI REST services (for roadway network and traffic segments), JSON, and GeoJSON to display spatial data sets on top of a map view. | O | | | Y | | | The solution includes a HTML-5 based mapping application that supports the integration and display of third party and commercially available data. The geolocated map application integrates 3rd party map overlays as layers using OpenLayers. OpenLayers is a 3rd party package which support OGC standards. Contractor currently supports data overlay from commercial providers ESRI Rest services, HERE, TomTom and INRIX. The system supports open source GIS data from OpenStreetMap, Mapbox, National Weather Service, ESRI ArcGIS and Open Weather. As all of these options are dependent on various licensing options, internet connectivity, etc., Contractor looks forward to understanding the State's specific needs to provide an optimal solution. |
| 6.16 | The CV-ATMS must provide current device operational status of online, off-line, and disabled through a visual indication. | R | | Y | | | | This is standard functionality in the solution . Configuration of for icons/status is required. The associated risk is minimal. |
| 6.17 | The CV-ATMS must provide the ability to configure map settings administratively including the ability to: | | | | | | | |
| 6.17.1 | Modify device icon placement and rotation of the field device in relation to the adjacent roadway (for non-automatically located items) | O | | Y | | | | This feature is included in the base solution and will require configuration based on device location and orientation. |
| 6.17.2 | Change and configure field device icon images | O | Y | | | | | This feature is included in the base solution. |
| 6.17.3 | Change and configure field device status colors, thresholds, and display characteristics | O | | Y | | | | This feature is included in the base solution. |

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| 6.17.4 | Enable/disable map layers | R | Y | | | | | This is standard solution functionality. Layer selection is provided within the standard card of the map GUI. |
| 6.17.5 | Provide map layers for geographical jurisdictions and state freeway mile markers. | R | | Y | | | | This functionality is largely dependent on the capabilities of the GIS data source/tile layers. Contractor assumes that this capability exists within the source GIS data. |
| 6.17.6 | Enable/disable third-party mapping layers, vendor to use explanation column to provide list of existing third-party mapping layers available | O | | Y | | | | The solution includes a HTML-5 based mapping application that supports the integration and display of third party and commercially available data. The geolocated map application integrates 3rd party map overlays as layers using OpenLayers. OpenLayers is a 3rd party package which support OGC standards. Contractor currently supports data overlay from commercial providers ESRI Rest services, HERE, TomTom and INRIX. The system supports open source GIS data from OpenStreetMap, Mapbox, National Weather Service, ESRI ArcGIS and Open Weather. As all of these options are dependent on various licensing options, internet connectivity, etc., Contractor looks forward to understanding the State's specific needs to provide an optimal solution. |
| 6.17.7 | Enable/disable State of Michigan provided mapping layers. | O | | Y | | | | This functionality is largely dependent on the capabilities of the GIS data source/tile layers. Contractor assumes that this capability exists within the source GIS data. |
| 6.18 | The CV-ATMS must enable the user to query, display, 'decode', view/visualize messages (including an ability to display those devices and visualization of messages) that are operating and broadcasting from a site specific Roadside Unit within a spatially accurate map user interface. | R | Y | | | | | CV-ATMS provides the functionality for users to visualize, display, decode CV messages by RSU as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| 6.19 | The CV-ATMS must enable the user to toggle between the following maps: | | | | | | | |
| 6.19.1 | Vector-based street name and labeled base map | R | | Y | | | | This is standard solution functionality. Map selection is provided within the standard card of the map GUI. |
| 6.19.2 | Orthophoto base map | R | | Y | | | | This is standard solution functionality. Map selection is provided within the standard card of the map GUI. |
| 6.19.3 | Grayed out vector-based street name and labeled base map | O | | Y | | | | This functionality is largely dependent on the capabilities of the GIS data source/tile layers. Contractor assumes that this capability exists within the source GIS data. |
| 7 | **Section 5.07 TESTING AND CONFORMANCE / QA** | | | | | | | |
| 7.1 | The CV-ATMS must provide the ability to have the user update, revise, QA, assemble and deploy specific types of CV Messages (during the build process perform Quality Assurance/Check of message, automate the encoding and deployment/push of message to correct RSUs). | R | Y | | | | | CV-ATMS provides the functionality for users to create, edit, and test CV messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 7.2 | The CV-ATMS must enable V2X device and message testing, conformance, and QA evaluation (message capture, processing, extract, decoding, analysis, and rules processing against the standards) for bench testing, mock-up testing, field testing, and pre-operational deployment scenarios. | R | Y | | | | | Contractor has a Connected Vehicle Validator (CVV) that is a stand-alone tablet-based application used in the field to validate and QA messages. This tool was developed for the USDOT CAMP program, utilized by ITE for the Connected Intersection pilot site validation, and numerous other states to validate their pilot sites. This tool, paired with the CV-ATMS is standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 7.3 | The CV-ATMS must provide the ability to initially build, QA, assemble and deploy specific types of CV Messages (during the build process perform Quality Assurance/Check of message, automate the encoding and deployment/push of message to correct RSUs). | R | Y | | | | | CV-ATMS provides the functionality for users to create, edit, and test CV messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 7.4 | The CV-ATMS must provide the ability to update, revise, QA, assemble and deploy specific types of CV Messages (during the build process perform Quality Assurance/Check of message, automate the encoding and deployment/push of message to correct RSUs). | R | Y | | | | | CV-ATMS provides the functionality for users to create, edit, and test CV messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 7.5 | The CV-ATMS must provide the ability to configure and save the user preference for required percentage of received messages to pass the following test parameters: | | | | | | | |
| 7.5.1 | User configurable test parameters | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.5.2 | User configurable rules/standards criteria settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.5.3 | Bench test procedures and settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 7.5.4 | Mock-up test procedures and settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.5.5 | Field/operational acceptance test procedures and settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.6 | The CV-ATMS must save the MDOT preferences for required percentage of received, parsed, properly formed/conforming, stored, rules validated messages to pass the following types of tests: | | | | | | | |
| 7.6.1 | Bench test procedures and settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.6.2 | Mock-up test procedures and settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 7.6.3 | Field/operational acceptance test procedure & settings | R | | | | | Y | CV-ATMS does not assess the passing of test parameters. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| | **Section 5.08 CONNECTED VEHICLES** | | | | | | | |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| **8** | **Section 5.09 FIELD DEVICES** | | | | | | | |
| 8.1 | The CV-ATMS must continuously communicate with field devices at a State-defined and configurable frequency, with a default of once per minute, to determine the current status of online since a configurable timeout threshold, off-line, and disabled. | R | Y | | | | | The Software communicates with the RSU using either USDOT4.1 or NTCIP 1218 SNMP commands. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.2 | The CV-ATMS must provide the ability to set a field device as online or disabled. | R | Y | | | | | This is standard functionality in the solution . This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.3 | The CV-ATMS must be able to designate field devices as retired that are no longer in use. | R | Y | | | | | The Software allows users to mark devices as "inactive". This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.4 | The CV-ATMS must maintain the history of field devices and their status changes in the system in accordance with MDOT's ITS/TOC Retention Schedule. | R | | Y | | | | The Software currently maintains all status changes in an event log. Configuration will be required to support & adhere to the MDOT retention policy. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. There is minimal risk associated with this task. |
| 8.5 | The CV-ATMS must be capable of receiving communication and issuing commands to all field devices under system control. | R | Y | | | | | Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. This is described in full detail in Attachment 5: SOW-Field Devices. |
| 8.6 | The CV-ATMS must integrate with all features of the field devices listed in the Statement of Work. Functionality of the device must not be limited by the CV-ATMS. | R | | | Y | | | Contractor is prepared for some customization which may be required to support non-standard manufacturer specific functions, especially those units which are considered legacy devices. Risk associated with this task is solely based on available documentation and vendor device support if needed. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 8.7 | The CV-ATMS must provide the ability to assign each device to multiple geographical areas including, but not limited to TOC coverage area, MDOT Region, and Michigan Jurisdiction (County and City). | R | Y | | | | | This is standard functionality in the solution . This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.8 | The CV-ATMS must provide, at a minimum, the following device information when requested via the user interface: | | | | | | | |
| 8.8.1 | Location: route, direction (e.g., north, etc.), milepost, GPS coordinates | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.8.2 | ID number | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.8.3 | IP address | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.8.4 | Make and model | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| 8.8.5 | Real-time status | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.8.6 | Time or duration since the last real-time status update | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.9 | The CV-ATMS user interface must provide the ability to select a device from a table, list, and map icon to control the device, expose the device details, enter/edit the device data and obtain real-time information being transmitted by a field device. | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.10 | The CV-ATMS user interface should provide the ability to filter field device icons by type, subtype, designated favorites, and a metric for frequently used devices (e.g., number of times accessed, duration of time the device was actively in use). | O | | | | | Y | The Software does filter devices as suggested in the requirement however it does not include a feature device is access metrics. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 8.11 | The system must be robust to partial data outages and must continue to operate when some data sources are not available. For example, if the temperature sensor at a remote site fails, the CV-ATMS must continue processing all other available sensor data at the site, such as pavement condition. The CV-ATMS must continue to provide response plan recommendations during partial data outages. | R | Y | | | | | The CV-ATMS provides detailed information regarding the RSU location, vendor specific details, network details, and device status as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 8.12 | The CV-ATMS must send and receive the following information between the CV-ATMS and field device: | | | | | | | The CV-ATMS sending and receiving information based on SAE J2735, USDOT 4.1, NTCIP standards and the updated ITE RSU specification. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.12.1 | Pedestrian safety message | R | Y | | | | | The Software currently stores and displays field (RSU, video, etc.) generated PSMs. PSMs are not centrally generated. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 8.12.2 | Signal Phase and Timing (SPaT) map message | R | Y | | | | | The Software has an integrated MAP creator/editor. SPaT data is received, displayed and stored from the RSU. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |
| 8.12.3 | Wrong way driving alert triggers | R | | Y | | | | Wrong way driver alerts are provided from a 3rd party system. CV-ATMS supports wrong way driving alerts but this application must be integrated and configured during implementation. This information can be sent to a field device |
| 8.12.4 | Emergency pre-empt alert triggers | R | | Y | | | | CV-ATMS supports emergency pre-emption. The Pre-emption application is enabled during the RSU loading and configuration process during implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |
| 8.12.5 | Vehicle prioritization (e.g., transit, snowplow) alert triggers | R | | Y | | | | CV-ATMS supports vehicle prioritization. The Prioritization application is enabled during the RSU loading and configuration process during implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 8.12.6 | Oversize/overweight alert triggers | O | | | | | Y | Oversize/overweight driver alerts are provided from a 3rd party system. CV-ATMS supports 3rd party alerts but this application must be integrated and configured during implementation. Contractor has delivered this functionality directly at the device level. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 8.12.7 | Video/image analytics alert triggers | O | | Y | | | | Video/image analytics alert triggers are provided from a 3rd party system. CV-ATMS supports Video/image analytics alert triggers but this application must be integrated and configured during implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |
| **9** | **Section 5.10 DEVICE CONFIGURATION AND MONITORING** | | | | | | | |
| 9.1 | The CV-ATMS must provide the ability to configure and initialize field devices via a Browser-based application. | R | Y | | | | | This is standard functionality in the solution . This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.2 | The CV-ATMS must enable field device configuration and device management using the following methods: | | | | | | | |
| 9.2.1 | NTCIP 1218 v01.38 (or higher as revised standards become published) SNMPv3 OID elements | R | y | | | | | The Software currently supports numerous protocols for the device configuration and management. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.2.2 | SSH | R | | | Y | | | The Software will be enhanced to support a web SSH client. Contractor foresees minimal risk associated with this enhancement. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.2.3 | Uploading a .XML configuration setting file | O | | | Y | | | Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.2.4 | Web Socket/Web URL Service | O | | | Y | | | Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.2.5 | Secure CLI service | O | | | Y | | | Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.2.6 | Secure API service | O | | | Y | | | Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.2.7 | NEMA TS10 standards. | R | Y | | | | | The Software currently supports numerous protocols for the device configuration and management. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.2.8 | ITE/CAMP Intersection CI standards and testing criteria. | O | Y | | | | | The Software currently supports numerous protocols for the device configuration and management. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.3 | The CV-ATMS must support message configuration and deployment onto RSUs for specific message elements and syntax requirements using ITE CTI 4501v1.0 CI (and future standards versions). | R | Y | | | | | The Software currently supports ITE CTI 4501v1.0. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.4 | The CV-ATMS must enable field device configuration and setup for the following minimum settings: | | | | | | | |
| 9.4.1 | Full device configuration setup/changes and configuration control in order to function - meeting standards and operational conformance, message broadcast setup and use. | R | Y | | | | | The CV-ATMS supports numerous device configurations and settings. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.4.2 | Host name, site identification parameters, agency identification parameters. | R | | | Y | | | The Software will be enhanced to support agency id. Contractor foresees minimal risk associated with this enhancement. |
| 9.4.3 | Network elements for LAN IPv4 Interface parameters, including DNS and subnetting assignments. | R | | | Y | | | The Software will be enhanced to support device DNS/sub-net/gateway. Contractor foresees minimal risk associated with this enhancement. |
| 9.4.4 | Network elements for LAN IPv6 Interface parameters. | O | | | Y | | | The Software will be enhanced to support IPv6 addresses where it does not already do so. Contractor foresees minimal risk associated with this enhancement. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.4.5 | WAVE Service Announcement/Routing Advertisement elements for Radio Interface settings and broadcast parameters. | R | Y | | | | | The CV-ATMS supports numerous device configurations and settings. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.4.6 | Radio elements for Radio IPv4/IPv6 Interface parameters, including DNS and subnetting assignments. | R | Y | | | | | The CV-ATMS supports numerous device configurations and settings. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3.. |
| 9.4.7 | Antenna settings for Global Navigation Satellite System (GNSS) components with the necessary elements to support for positioning, position correction using multiple constellation access and configuration and output port/listener parameters on the V2X devices | R | | | Y | | | Antenna settings and configuration are manufacturer-specific and additional development will be required to meet this requirement as part of NTCIP 1218 updates. Contractor foresees minimal risk associated with this enhancement. |
| 9.4.8 | Receive/input of common centralized clock settings via NTP sources /listener and port parameters | R | | | Y | | | The Software will be enhanced to support NTP configuration of the RSU. Contractor foresees minimal risk associated with this enhancement. |
| 9.4.9 | Receive/input of common centralized clock settings via PTP sources /listener and port parameters | O | | | Y | | | The Software will be enhanced to support PTP configuration of the RSU. Contractor foresees minimal risk associated with this enhancement. |
| 9.5 | The CV-ATMS must forward a Real-time Position Correction Message in one of multiple formats (NMEA, SBAS, VRF-RTK) from a State-owned multiple GNSS source with multiple satellite constellations to broadcast to the field device and then outbound from the RSU V2X device to equipped vehicles. | R | | | Y | | | The CV-ATMS supports numerous device configurations and settings. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.6 | The CV-ATMS must provide the ability to automatically download clock updates to field devices to be consumed and utilized as the common clock for V2X broadcast and message handling for time events, processing and time stamping. | R | | | Y | | | The CV-ATMS supports numerous device configurations and settings. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.7 | If the time/date in the field device clock has drifted beyond a user-defined amount, the CV-ATMS must automatically download the true time, as identified through the following external time sources, to the field device clock: | | | | | | | |
| 9.7.1 | Network Time Protocol (NTP) | R | | | Y | | | The Software will be enhanced to support NTP configuration of the RSU. Contractor foresees minimal risk associated with this enhancement. |
| 9.7.2 | Precision Time Protocol (PTP) | O | | | Y | | | The Software will be enhanced to support PTP configuration of the RSU. Contractor foresees minimal risk associated with this enhancement. |
| 9.8 | The CV-ATMS field device configuration functionality for Immediate Forward Messages and Store and Repeat Messages must include: | | | | | | | |
| 9.8.1 | Creation and deletion of messages | R | Y | | | | | The CV-ATMS supports Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.8.2 | Encoding of messages | R | Y | | | | | The CV-ATMS supports Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.8.3 | Loading and removing messages | R | Y | | | | | The CV-ATMS supports Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.8.4 | Broadcast enable/disable of message | R | Y | | | | | The CV-ATMS supports Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.9 | The CV-ATMS must enable field device configuration for SAE J2735 message broadcast elements for Immediate Forward Messages of the following variety: | | | | | | | |
| 9.9.1 | Signal Phase and Timing (SPaT) source and port for listening, receiving, and securely broadcasting via radio interface. | R | Y | | | | | The CV-ATMS supportsfield device configuration of Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. Contractor assumes all SOM devices are standards compliant. |
| 9.9.2 | Signal Request Message (SRM) source and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supportsfield device configuration of Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. Contractor assumes all SOM devices are standards compliant. |
| 9.9.3 | Signal Status Message (SSM) source and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supportsfield device configuration of Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. Contractor assumes all SOM devices are standards compliant. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.9.4 | Pedestrian Safety Message (PSM) source and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supportsfield device configuration of Immediate Forward Messages and Store and Repeat Messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. Contractor assumes all SOM devices are standards compliant. |
| 9.10 | The CV-ATMS must enable manual and automated field device configuration for SAE J2735 message broadcast elements for Store and Repeat Messages of the following variety: | | | | | | | |
| 9.10.1 | Intersection Geometry and required layer/node/maneuver settings required with the Map message broadcasting via radio interface. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.2 | Traveler Information Message - Curve Speed Message (CSW) road geometry/node input and ITIS codes inputs, message source and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.3 | Traveler Information Message - Work Zone Alert (WZA) road geometry/node input and ITIS codes inputs, source, and port for listening, receiving, and securely broadcasting via radio interface. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.4 | Traveler Information Message - Road Sign Alert (RSA) road geometry/node and ITIS codes inputs, source, and port for listening, receiving, and securely broadcasting via radio interface. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.10.5 | Traveler Information Message - Weather Information Alert (Weather Analytics) road geometry/watch box polygon geometry and ITIS codes inputs, source, and port for listening, receiving, and securely broadcasting via radio interface. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.6 | Traveler Information Message / Wrong Way Driver Detection (WWDD) road geometry/node and ITIS codes inputs, source, and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.7 | Traveler Information Message - Vulnerable Road User (VRU)/Pedestrian Safety Message (PSM) zone/ellipse road geometry/node, detected VRU event speed, lane and direction IDs, and ITIS codes input source and port for listening, receiving, and securely broadcasting via radio interface. | O | | | Y | | | The Software supports SAE J2735 compliant VRU and PSM messaging through its vRSU interface as well as those messages received directly from physical RSUs. Configuration and Customization is necessary to integrate 3rd party source data for these messages. The vRSU functionality is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.8 | Traveler Information Message - Emergency Vehicle Pre-empt (EVP), road geometry/node, intersection, and integration configuration with MMITSS, source and port for listening, receiving, and securely broadcasting via radio interface. | O | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.10.9 | Probe Vehicle Data (PVD) to receive, send/forward destination, and port. | O | | | Y | | | Contractor will add the functionality to implement Probe Vehicle Data (PVD) to receive, send/forward destination, and port capability. Contractor foresees minimal risk associted with this task. |
| 9.11 | The CV-ATMS must enable field device configuration and setup for the SAE J2735 message broadcast elements needed to configure, test, and validate the following device broadcast functionality: | | | | | | | |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.11.1 | Adding and forwarding messages configured for Basic Safety Message for receiving, sending/forwarding destination and port. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.11.2 | Disabling and forwarding messages configured for Basic Safety Message for receiving, sending/forwarding destination and port. | O | | | Y | | | Contractor will enhance its standard functionality of BSM forwarding to include disabling the function by RSU. Contractor foresees minimal risk associated with this task. |
| 9.11.3 | Adding and forwarding messages configured for Signal Phasing and Timing messages receiving, sending/forwarding destination and port. | R | Y | | | | | The CV-ATMS supports manual and field device configuration for SAE J2735 message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.12 | The CV-ATMS should enable field device configuration and setup to allow and support firmware updates over the network via automation of load, execute, update, reboot, and restore all functioning services without losing basic device configuration after update/Power-On Self Test (POST) of the field devices and operating system. | O | | | Y | | | CV-ATMS will add support to reboot RSUs using NTCIP1218. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.13 | The CV-ATMS must enable field device configuration and setup to allow and support device configuration (for site, message, device testing & conformance), using current full suite of Industry Standard messages included in the following: | | | | | | | |
| 9.13.1 | SAE J2735/x family of standards | R | Y | | | | | The CV-ATMS supports manual and field device configuration for Industry Standard message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.13.2 | SAE J2945/x family of standards | R | Y | | | | | The CV-ATMS supports manual and field device configuration for Industry Standard message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device |
| 9.13.3 | LTE-V2X V2X messages/testing elements from the SAE J3161 reference architecture | O | Y | | | | | The CV-ATMS supports manual and field device configuration for Industry Standard message sets. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. This information can be sent to a field device. |
| 9.13.4 | ITE Connected Intersection Guidance/Standards. | O | | | Y | | | The Software will be enhanced to support current industry standards as listed. Contractor foresees minimal risk associated with this enhancement for RSUs that are ITS Connected Intersection compatible. |
| 9.14 | The CV-ATMS must enable field device configuration and setup to allow and support device configuration using current Industry Standards for the full suite of V2X message, event logging, GPS, network, ports sources/destination, system/communication logs, and device configuration capabilities in NTCIP 1218. | R | | | Y | | | The Software will be enhanced to support current industry standards as listed and required. Contractor foresees minimal risk associated with this enhancement. |
| 9.15 | The CV-ATMS must enable field device configuration and setup by implementing vendor supplied and system ingested SNMPv3 "customized" MIBs (Management Information Base) and provide system configuration and deployment support of those custom variables by site/supplier device type. | R | | | Y | | | The Software will be enhanced to support SNMPv3 "customized" MIBs from vendors as required. Contractor foresees minimal risk associated with this enhancement. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.16 | The CV-ATMS must enable the field device configuration and setup for the V2X devices to allow and support firmware updates over the network via secure communications, using either SNMPv3 (as preference), WebSocket, SSH, CLI, secure TFTP or API functional methods. | R | | | Y | | | The Software will be enhanced to support secure firmware updates over the network as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.17 | The CV-ATMS must enable field devices to offload to a destination source and port identified in the user interface for existing working configuration settings of the V2X devices on the network (e.g., requesting and downloading the Last Known Working Configuration of the field device to a destination). | R | | | Y | | | The Software will be enhanced to support field device offloading of configuration settings as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.18 | The CV-ATMS should enable, ping, verify, etc. with field devices to store location destination 'endpoint and port number' or file path in the user interface Last Known Working Configuration of the field device to a destination. | O | | | Y | | | The CV-ATMS will ping the device, and can download the latest configuration. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.19 | The CV-ATMS should enable, ping, verify, etc. with field device to store location of the Last Known Working Configuration settings of a Device ID/Site ID to be selected in the user interface loaded to a new device destination (IP4/IP6, local network MAC address, authorized user account settings). | O | | | Y | | | Contractor will enhance its solution to support to store the Last Known Working Configuration. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.20 | The CV-ATMS should enable the storage, retrieval, and redeployment of Last Known Working Configuration settings to a Device ID/Site ID to be tested and validated within the user interface after deployed device POST process to verify the re-deployed device configuration settings to a new user selected field device. | O | | | Y | | | Contractor will enhance its solution to support to store the Last Known Working Configuration. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.21 | The CV-ATMS must support Device Management by allowing users to configure, store, retrieve and re-deploy to a new/separate field device all the Last Known Working Good Configuration settings from field device elements including: | | | | | | | |
| 9.21.1 | Host Name parameters on the field device | R | | | Y | | | The Software will be enhanced to support device management for host name as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.21.2 | Device management Ethernet-enabled LAN TCP/IPv4 Interface parameters settings | R | | | Y | | | The Software will be enhanced to support device management for Ethernet-enabled LAN interface parameters as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.21.3 | Device radio WSA/WRA TCIP/IP4 and TCP/IPv6 Interface parameters settings | O | | Y | | | | Contractor will enhance its solution to support WSA/WRA TCIP/IP4 and TCP/IPv6 Interface parameters settings. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.21.4 | Device radio LAN TCIP/IPv6 Interface parameters settings | R | | Y | | | | The Software will be configured to support device management for radio LAN interface parameters as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.21.5 | DNS parameters settings | R | | | Y | | | The Software will be enhanced to support device management for DNS parameters as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.21.6 | Time source parameters settings | R | | | Y | | | The Software will be enhanced to support device management for time source parameters as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.21.7 | Real-Time Position Correction source and associated settings by supplier (either direct Real-Time Kinematic (RTK) Real-Time Correction Message (RTCM) or alternate fixed position survey locations to be broadcast from the V2X devices securely allowing the OBU devices to compute positional correction in absence of a valid or available RTCM source or service) | R | | | Y | | | The Software will be enhanced to support device management for real-time position correction parameters as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.21.8 | GNSS and multi-constellation position settings by supplier | R | | | Y | | | The Software will be enhanced to support device management for GNSS and multi-constellation parameters as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.21.9 | Usernames/Account settings (usernames/roles/accounts, management ports send and receive) | R | | | Y | | | The Software will be enhanced to support device management for username/account parameters as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.21.10 | Default messages that are setup for Store and Repeat (including date/time settings) | R | Y | | | | | Standard Software functionality. |
| 9.21.11 | Security Certificate Server 'service' settings (QA/Production environment, IP/Port) | R | | | Y | | | The Software will be enhanced to support device management for security certificate server parameters as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.21.12 | Message handling/forward settings | R | | | Y | | | The Software will be enhanced to support device management for message handling/forward parameters as required. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.21.13 | IP/Port source settings for all message broadcast types (SRM and IFM) | R | | | Y | | | The Software will provide this functionality. Contractor foresees minimal risk associated with this enhancement. to support device management for IP/port source parameters as required. |
| 9.22 | The CV-ATMS must provide the ability to perform Device Management and Monitoring to view, summarize, and graph key metrics (CV data, Third Party data, key events, and data/device/broadcast performance evaluations) within the system and support specific report output formats of the data from the system. | R | | | Y | | | The Software will be enhanced to support device management and monitoring as required. Contractor foresees minimal risk associated with this enhancement. |
| 9.23 | The CV-ATMS must provide the ability to perform Device Monitoring by interacting within a map-based GUI to select the field devices and display key attributes such as the following elements at a minimum: | | | | | | | |
| 9.23.1 | Host states | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.2 | Real-time event status | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.3 | Is the field device online | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.23.4 | Is the field device offline | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.5 | Device current Downtime duration | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.6 | Host Name/short site description | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.7 | Field device services and real-time event statuses | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.8 | Status/State changes for all device processes, related service dependencies | O | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.9 | Are all services functional and running correctly | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.10 | Is the service in Warning | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| 9.23.11 | Is the service in Critical | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.12 | Is the service Unreachable | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.13 | Service current Downtime duration | R | | | Y | | | The Software will be enhanced to support Downtime duration as required. Contractor foresees minimal risk with this enhancement. |
| 9.23.14 | GPS status/location/3D fix/number of satellites | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.15 | Is the message broadcasting (by PSID) | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.16 | Is SSH service running | O | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.17 | Current reported uptime, last login date/time/user, last unit reboot time/date | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.18 | Is the field device reachable on IPv4 (ping) | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.23.19 | Is the field device reachable on Ipv6 (ping6) | O | | | Y | | | The Software will be enhanced to support IPv6 (ping6). Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance it's solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.23.20 | Is the field device reachable and responding via SSH | O | | | Y | | | Contractor will add a web-SSH client to CV-ATMS. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.23.21 | Is the device reachable and responding via SNMPv3 | R | Y | | | | | The Software enables active monitoring for a single device and devices within view as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 9.23.22 | What are the field device CPU(s), memory, storage, and process loads | O | | | Y | | | Contractor will add this functionality to its solution. Contactor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 9.23.23 | Current storage free (percentage) | O | | | Y | | | Contractor will add this functionality to its solution. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.24 | The CV-ATMS must enable and provide a method to save, delete and edit the system settings preferences for the following defaults: | | | | | | | |
| 9.24.1 | Per device/site PSID forwarding duration (start/stop dates and times, IP4/IP6 destinations and port numbers from the field equipment to the back office). | R | | | Y | | | The Software will be enhanced to support PSID forwarding duration as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contactor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| 9.24.2 | Per device/site SPaT forwarding duration (start/stop dates and times, IP4/IP6 destinations and port numbers from the field equipment to the back office). | R | | | Y | | | The Software will be enhanced to support SPaT forwarding duration as required. Contractor assumes all RSUs meet prevailing standards such as USDOT 4.1 Spec or NTCIP 1218. Contractor will enhance its solution to address non-standard manufacturer-specific customizations based on the equipment list provided by MiDOT. Risk associated with this task is minimal assuming vendor documentation and support availability. |
| **10** | **Section 5.11 DATA MANAGEMENT AND EXCHANGE** | | | | | | | |

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| 10.1 | The CV-ATMS must enable users to identify and visualize events (average speed, travel time, threshold brake, locations, time/date, and specific SAE J2735 and high risk or potential incident message events) from Basic Safety Message data analytics. | R | Y | | | | | The solution supports visualization of aggregated BSM message data through dashboards as feasible based upon data received. Specific use cases to be determined in collaboration with MDOT. This is further described in Section 3 of Attachment 8, CV-ATMS Description. |
| 10.2 | The CV-ATMS should enable a user-defined rolling data storage of events. For example, a 48-hour data storage for a user to replay historic data. | O | | | | | Y | The solution includes and event log that maintains event records for a project specific duration. This log is queryable and searchable. This system does not include the replay of historic data nor is this capability included in the solution. |
| 10.3 | The CV-ATMS should permanently remove all data outside of the rolling window and not allow any user (State or Contractor) to retrieve the data. | O | | | Y | | | The solution does included the capability to "trim" historic data after a project specific duration. This duration is determined during system design and is not adjustable at runtime. |
| 10.4 | The CV-ATMS must provide scalable data analysis for the following capabilities: | | | | | | | |
| 10.4.1 | A real-time message processing pipeline for system and data analytics by message/site device. | R | Y | | | | | The solution supports real-time message processing as required. This is further described in Section 4 of Attachment 8, CV-ATMS Description. |
| 10.4.2 | An effective system performance, computationally intensive data processing with the ability to create logic statements for user alerts and actions (e.g., queue warning in specific location based on BSM) | R | Y | | | | | The solution supports effective system performance data processing, including logic statements. Specific use cases to be determined in collaboration with MDOT. One data processing algorithm is included in Pricing. |

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| 10.4.3 | A scalable data parsing, storage and retrieval system architecture for real-time system and data analytics and event driven configurable messaging. | R | Y | | | | | The solution includes an event-driven architecture, based upon Pulsar/Kafka technology, and supports real-time system and data analytics. |
| 10.4.4 | Support the configuration parameters and data exchange in a.JSON format type output from CV-ATMS to other specific MDOT systems (e.g., MiDrive). | R | Y | | | | | The solution supports JSON-based API interfacing for serving and publishing data with external systems. |
| 10.4.5 | Support a standardized data exchange format that functions between the CV-ATMS and multiple MDOT system interfaces using real-time system and data analytics. | R | Y | | | | | The solution employs a Common Data Model (CDM) and supports standardized data exchange with external systems. |
| 10.5 | The CV-ATMS must have the capability of downloading/receiving, processing, parsing, storing, querying (parsed/stored data), performing computation/analytics (in real-time and historically), reading and writing from specific or all field site devices on a real-time basis for the following messages: | | | | | | | The topics in the streaming platform have to be configured. The data schema will be directly based on the message definition in each case (BSM, Probe Vehicle Messages, SPaT, and weather). |
| 10.5.1 | Basic Safety Messages (Part 1 and Part 2). | R | | Y | | | | The topics in the streaming platform have to be configured. The data schema will be directly based on the message definition in each case (BSM, Probe Vehicle Messages, SPaT, and weather). |
| 10.5.2 | Probe Vehicle Messages (if enabled/equipped/responding functionally). | R | | Y | | | | The topics in the streaming platform have to be configured. The data schema will be directly based on the message definition in each case (BSM, Probe Vehicle Messages, SPaT, and weather). |
| 10.5.3 | Signal Phasing and Timing data from equipped sites with Advanced Traffic Controllers, and analysis of the BSM and Fleet datasets. | R | | Y | | | | The topics in the streaming platform have to be configured. The data schema will be directly based on the message definition in each case (BSM, Probe Vehicle Messages, SPaT, and weather). |

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| 10.5.4 | Weather data (from Weather Analytics alerts and polygon watch boxes). | R | | Y | | | | The topics in the streaming platform have to be configured. The data schema will be directly based on the message definition in each case (BSM, Probe Vehicle Messages, SPaT, and weather). |
| 10.5.5 | Fleet and Weather real time dataset alerts processing and analysis of the BSM and Fleet vehicles that are over a user-defined speed warning threshold by location/quantity. | O | | Y | | | | CV-ATMS includes this functionality with thresholds required to be configured during system implementation. |
| 10.5.6 | Curve Speed alert messages by location/site and analysis of BSM vehicles that are over the speed warning threshold by location/quantity. | O | | Y | | | | CV-ATMS includes this functionality with specific locations and speed thresholds required to be configured during system implementation. |
| 10.5.7 | Active Work Zone alert message by location/site/date and analysis of BSM and Fleet data that are over a user-defined speed warning threshold by location/quantity. | O | | Y | | | | CV-ATMS includes this functionality with specific locations and speed thresholds required to be configured during system implementation. |
| 10.6 | The CV-ATMS must be capable of receiving data from all edge processed information. | R | Y | | | | | The solution supports JSON-based API interfacing for serving and publishing data with external systems. The solution employs a Common Data Model (CDM) and supports standardized data exchange with external systems. |

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| 10.7 | The CV-ATMS developer must verify that any Personally Identifiable Information (PII) data within the V2X message structures that is captured, stored, analyzed within the CV-ATMS from equipped vehicles will not be distributed in any and all data extractions and will be cleaned from CV-ATMS and functional tools. If subsequent development or customized tools are required to extend the functionality of the CV-ATMS, the PII data cleaning/anonymizing of the data must occur prior to distribution, storage, or functional use. | R | Y | | | | | Standard solution functionality. No PII is received, captured nor maintained by the CV-ATMS. |
| 10.8 | The CV-ATMS should have the capability of downloading/receiving, processing, parsing, storing, querying (parsed/stored data), reading, and writing from all field site device log files on a user-configurable frequency, at a minimum hourly basis. | O | | Y | | | | CV-ATMS includes this functionality with specific settings to be configured during system implementation. |
| 10.9 | The CV-ATMS should have the capability of integrating a SysLog server processing and management interface (up to and including an API to pull, poll, download, extract, process, and store specific contents) from all field site devices log files at on a user-configurable frequency, at a minimum hourly basis. | O | | Y | | | | CV-ATMS includes this functionality with specific settings to be configured during system implementation. |
| 10.10 | The CV-ATMS must support the user ability to highlight, interact, visualize, configure, assemble/load messages for each site location with a deployed field device with the following methods: | | | | | | | |
| 10.10.1 | Graphically | R | Y | | | | | This is standard functionality in the solution. This is further described in Section 3 of Attachment 8, CV-ATMS Description. |

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| 10.10.2 | From a search feature in the user interface (and allowing user configurable search criteria) | R | Y | | | | | This is standard functionality in the solution. This is further described in Section 3 of Attachment 8, CV-ATMS Description. |
| 10.11 | The CV-ATMS should support data analysis and visualization of real-time fleet data and processed BSM data by vehicle in real time by freeway or arterial roadway corridor, user selected region, or geographic boundary area input over a user configurable map display /base map to provide analysis statistics and key performance measures. | O | | | Y | | | The solution supports real-time visualization of vehicle data. Further, the analytics and performance measures model visualizes historical data. |
| **11** | **Section 5.12 CERTIFICATE MANAGEMENT** | | | | | | | |
| 11.1 | The CV-ATMS vendor must provide a Security Credential Management System (SCMS) solution to supply, maintain and update security certificates on all RSUs. | R | Y | | | | | The ISS SCMS platform is a commercially available service that is supporting 18 state DOTs and pilot programs today. Support for the program RSUs will not require any new development. |
| 11.2 | The SCMS must be compliant with published specifications in IEEE 1609 family of standards and other locations for a certificate-based system to enable trust between mobile devices while maintaining anonymity. | R | Y | | | | | The ISS SCMS platform is fully compliant with CAMP, SAE, and IEEE standards in addition to being fully aligned with the SCMS Manager, the organization that maintains the North American Root CA for V2X. |
| 11.3 | The SCMS should support certificate interoperability in different jurisdictional boundaries (multiple states), allowing trust to be remotely managed as needed. | O | Y | | | | | The ISS SCMS already operates in 18 states and it is currently the only SCMS platform that is authorized under the SCMS Manager Root CA which was established to facilitate regional interoperability. |

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| 11.4 | The SCMS must support misbehavior detection and a methodology for revoking certificates of devices deemed to have significant errors or suspected to be under malicious control | R | Y | | | | | The ISS SCMS supports the CAMP protocols for misbehavior reporting and processing. This has been tested with multiple RSU vendors to confirm interoperability. |
| 11.5 | The SCMS must support both manual and automated enrollment and bootstrapping processes | R | Y | | | | | The ISS SCMS has a REST API that supports automated enrollment. A web portal is also available for manual enrollment and bootstrapping. |
| 11.6 | The SCMS must support multiple communications platforms to remain technology neutral: DSRC, C-V2X, 5G, and any other communication protocol. | R | Y | | | | | The ISS SCMS has been successfully tested at multiple OmniAir plug fests and in live deployments over DSRC and C V2X 5G communications channels. |
| 11.7 | An active web based SCMS dashboard for statistical data both real time and historical must be provided. | R | | | | | | The ISS SMCS DM Dashboards platform provides a detailed dashboard for monitoring and managing the security status of RSUs and OBUs in a complex V2X deployment. |
| **12** | **Section 5.13 SECURITY** | | | | | | | |
| 12.1 | The CV-ATMS must transmit data through a secure communications connection, provided by MDOT, between authorized users, virtual private network connections and between authorized endpoint systems and the CV-ATMS. | R | Y | | | | | The ISS SMCS platform uses TLS secure connections by default. CAMP compliant infrastructure connections use mutually authenticated sessions. The DM Dashboards API and web portal require server side certificates and TLS authentication. ISS can comply with additional VPN requirements as required by MDOT. |
| 12.2 | The CV-ATMS must transmit data through a secure communications connection, provided by MDOT, between authorized users, virtual private network connection and between V2X field devices using the CV-ATMS. | R | Y | | | | | The ISS SMCS platform uses TLS secure connections by default. CAMP compliant infrastructure connections use mutually authenticated sessions. The DM Dashboards API and web portal require server side certificates and TLS authentication. ISS can comply with additional VPN requirements as required by MDOT. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 12.3 | The CV-ATMS must allow the user the ability to Enable Device & Message Security and deploy to V2X devices the messages by PSID and verify the message is loaded. | R | Y | | | | | The ISS SCMS maintains strict control over the issuance of PSIDs and SSPs. Only authorized V2X devices will be issued a validated list of PSIDs to ensure message compliance. |
| 12.4 | The CV-ATMS must support the user ability to Enable Device & Message Security over an encrypted protocol compatible with the V2X devices. | R | Y | | | | | All interactions between the ISS SCMS platform and end entity devices (RSUs and OBUs) is encrypted in a mutually authenticated TLS session. |
| 12.5 | The CV-ATMS must enable the V2X devices configuration and setup for the V2X devices to conform to current security standards of IEEE 1609.2 suite and IEEE 1609.12 and physical layer V2X configuration and use/broadcast of IEEE 802-11 and 802.11p. | R | Y | | | | | The ISS SCMS issues V2X certificates that are fully compliant with the IEEE 1609.2 standard. Interoperability has been extensively tested and validated by OmniAir and through multiple vendor deployments. |
| 12.6 | The CV-ATMS must enable secure communications between the back office and the Vehicle to Everything (V2X) equipped/enabled field devices (up to and including Roadside Units (RSUs), Internet of Things (IoT), Roadside/Infrastructure-based sensors or Edge Computing. | R | Y | | | | | The ISS SMCS is capable of issuing and managing conventional X.509 certificates which may be used to support SSH or SNMPv3 or other secure device management protocols. ISS will work with device vendors and MDOT to select and configure appropriate device options. |
| 12.7 | The CV-ATMS must enable and support the configuration of secure communications for each deployment site. | R | Y | | | | | The ISS SMCS is capable of issuing and managing conventional X.509 certificates which may be used to support SSH or SNMPv3 or other secure device management protocols. ISS will work with device vendors and MDOT to select and configure appropriate device options. |
| 12.8 | The CV-ATMS must enable the secure login to field and network devices. | R | Y | | | | | The ISS SMCS is capable of issuing and managing X.509 certificates for user authentication or digital token management. ISS will work with device vendors and MDOT to select appropriate options. |

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| **13** | **Section 5.14 MESSAGE ASSEMBLER** | | | | | | | |
| 13.1 | The CV-ATMS must enable and allow users the ability to perform the following Device Message Assembly functions by providing support for message build automation - using various methods to leverage both user input criteria, specific data analysis, and build configuration files. | | | | | | | |
| 13.1.1 | Save and retrieve 'draft' messages that additional information may be needed to complete the assembly process, including key data inputs required by each V2X message type. | R | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.1.2 | Encode the messages assembled into the proper message syntax, payload, and data elements by message type. | R | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.1.3 | Encode the messages assembled into the proper ASN.1 encoded format for deployment and loading onto site specific devices using the V2X devices configuration module/functionality of the system. | R | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.1.4 | Message assembly for all V2X standard message types (per SAE J2735, J3161, NTCIP 1218 v01.38 | R | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.2 | The CV-ATMS must support data analytics required for key metrics using IEEE 1609.2 standards suite/SAE J2735 message types – BSM. | R | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| 13.3 | The CV-ATMS should support data analytics required for key metrics using IEEE 1609.2 standards suite/SAE J2735 message types including PVD). | O | Y | | | | | The solution includes static and dynamic message building functionality for SAE J2735 messages as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.4 | The CV-ATMS must enable message assembly and handling for the V2X device configuration and message broadcast in the properly formed configurations settings by device/site per the following standards: | | | | | | | |
| 13.4.1 | SAE J3161/0, /1 and 1A | R | | | | | Y | This requirement is not a current feature of the solution. Contractor believes this requirement is not applicable to CV-ATMS as this standard applies to field device specification. However, with a better understanding of the desired functionality, Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.4.2 | SAE J2945 /1 and 1A | R | | | | | Y | This requirement is not a current feature of the solution. Contractor believes this requirement is not applicable to CV-ATMS as this standard applies to field device specification. However, with a better understanding of the desired functionality, Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |

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| 13.4.3 | SAE J3217 | R | | | | | Y | This requirement is not a current feature of the solution. Contractor believes this requirement is not applicable to CV-ATMS as this standard applies to field device specification. However, with a better understanding of the desired functionality, Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.4.4 | J2945/xx (V2I and V2V messages for /2, /3, /4, RSM, /A, /B, /C, /6, /8, /9) for messages that are implemented by MDOT as CV message priorities and deployment for deployed devices at equipped site locations. | R | | | Y | | | The CV-ATMS satisfies portions of the requirement. Contractor will enhance the CV-ATMS to support all relevant SAEJ2945 messages implemented by MDOT. Contractor foresees minimal risk associated with this enhancement. |
| 13.5 | The CV-ATMS must enable the message build, assembly and encoding to load onto the V2X devices SAE J2735 message broadcast elements for the creation, encoding, and load processes needed to configure, test, and validate device broadcast functionality for Immediate Forward Messages. | R | Y | | | | | The solution includes static and dynamic message assembly and handling functionality for device configuration as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.6 | The CV-ATMS must enable the message build, assembly and encoding to load onto the V2X devices SAE J2735 message broadcast elements for the creation, encoding, and load processes to configure, test, and validate device broadcast functionality for Store and Repeat Messages | R | Y | | | | | The solution includes static and dynamic message assembly and handling functionality for device configuration as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 13.7 | The CV-ATMS must enable and allow the user the ability to automate the encoding and deployment/push of message to device by user selected/input location(s) using SNMPv3 configuration variables and syntaxes, over the management interface of the V2X device on TCP/IP v4. | R | Y | | | | | The solution includes static and dynamic message assembly and handling functionality for device configuration as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.8 | The CV-ATMS should enable and allow the user the ability to automate the encoding and deployment/push of message to device by user selected/input location(s) using SNMPv3 configuration variables and syntaxes, over the management interface of the V2X device on TCP/IP v6. | O | Y | | | | | The solution includes static and dynamic message assembly and handling functionality for device configuration as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.9 | The CV-ATMS must enable and support the storage, retrieval, message/site file names and storage paths for default messages on a site and V2X device basis that are assembled, tested (bench, mock-up, field) and operational (field) including all message parameters by message type, device/site parameters, and all time parameters for start and stop date/time. | R | Y | | | | | The solution includes static and dynamic message assembly and handling functionality for device configuration as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.10 | The CV-ATMS must enable message assembly for all V2X current and future standard message types (per SAE J2735, J3161, NTCIP 1218 v01.38) for intersection Map message and required data elements from the standards (minimally including key attributes with a horizontal real world coordinate accuracy of +/- 4 inches, and vertical accuracy of +/– 6 inches) of the following: | | | | | | | |

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| 13.10.1 | Intersection stop bars, by location and type. | R | Y | | | | | The solution includes MAP message assembly and handling functionality for device configuration as standard functionality. Accuracy is dependent on the source data points and underlying map implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.10.2 | Intersections cross-walks, by location and type. | R | Y | | | | | The solution includes MAP message assembly and handling functionality for device configuration as standard functionality. Accuracy is dependent on the source data points and underlying map implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.10.3 | Required up to six surveyed fixed asset points, by location and type, latitude, and longitude (with a minimum of 9 decimal points of accuracy). | R | Y | | | | | The solution includes MAP message assembly and handling functionality for device configuration as standard functionality. Accuracy is dependent on the source data points and underlying map implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.10.4 | Intersections center line of all travel lanes/turn bays and with sufficient node selections that meet the Crash Avoidance Metrics Partnership (CAMP)/ITE Connected Intersection (CI) lane keeping guidance (accuracy/positioning of nodes and vehicles within lane widths) in real-world widths and coordinate locations, by location and type, latitude, and longitude. | R | Y | | | | | The solution includes MAP message assembly and handling functionality for device configuration as standard functionality. Accuracy is dependent on the source data points and underlying map implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 13.10.5 | Required intersection Map message to process the underlying geometry key feature provisions from high accuracy Mobile LIDAR post processed 'input' file size, type, and format (Site Name, Site ID (unique numbering format by jurisdiction), latitude, and longitude coordinates. | R | | | Y | | | Contractor will enhance message assembly functionality to incorporate Mobile LIDAR post-processed "input" file. Contractor foresees minimal risk associated with this enhancement. |
| 13.11 | The CV-ATMS must enable message assembly for all V2X standard message types (per SAE J2735, J3161, NTCIP 1218 v01.38) for intersection message types that require lane geometry key feature provisions including necessary ITIS codes, message encoding, geometric elements such as center line of lanes, node selection/QA, intersection center points, cross walks, and stop bars. | R | Y | | | | | The solution includes MAP message assembly and handling functionality for device configuration as standard functionality. Accuracy is dependent on the source data points and underlying map implementation. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.12 | The CV-ATMS must include as part of the processing Site Name description, Site ID (unique numbering format by jurisdiction, latitude, longitude - supporting up to a minimum of 9 decimal places), and pre-forming the message payload and syntax correctly for each message type: | | | | | | | |
| 13.12.1 | Support processing of High accuracy Mobile LIDAR post processed 'input' file (.LAS or .LAZ) size, type and format the automated data processing of high accuracy geometry definitions/locations. | R | | | | | Y | This requirement is not a current feature of the solution. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.12.2 | Support processing the underlying geometry key feature provisions from high accuracy GPS/GNSS multi-constellation survey grade units/antenna input file(s) in an automated manner. | R | | | | | Y | This requirement is not a current feature of the solution. However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| 13.12.3 | Support processing the underlying geometry key feature provisions from high accuracy Orthophotography (6" or high horizonal and vertical resolution and GNSS positioning values) include in the .GeoTiff input file(s), data processed in an automated manner. | O | | | | | Y | This requirement is not a current feature of the Software . However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.12.4 | Support processing the underlying geometry key feature provisions from high accuracy GIS Map system (6" or high horizonal and vertical resolution and GNSS positioning values) in an automated manner. | R | | | | | Y | This requirement is not a current feature of the Software . However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.12.5 | Support high accuracy GPS/GNSS post processed 'input' file size, type, and format via API call to the Map pre-processing sub-system for the pre-formatted geometry message variables in an automated manner. | R | | | | | Y | This requirement is not a current feature of the Software . However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.12.6 | Support the processing the underlying geometry key feature provisions from high accuracy 3D native (Autodesk Autocad .dwg or Bentley Microstation .dgn) 3D Design file type or Building Information Model file type data gathered in an automated manner. | R | | | | | Y | This requirement is not a current feature of the Software . However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |
| 13.12.7 | Support the processing of high accuracy CAD/BIM feature assets and locations from the file type provided by using a post processed 'input' file size, type, and format via API call to the Map pre-processing sub-system for the pre-formatted geometry message variables in an automated manner. | R | | | | | Y | This requirement is not a current feature of the Software . However, with a better understanding of the desired functionality Contractor will work with the State to define use cases, requirements and pricing for future integration into the CV-ATMS. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 13.13 | The CV-ATMS must enable message assembly for all V2X standard message types (per SAE J2735, J3161, NTCIP 1218 v01.38 for the following: | | | | | | | |
| 13.13.1 | Intersection Map messages by processing the underlying geometry key feature provisions from user input MDOT Cabinet Wire Diagrams or an API call to the Phase Diagram/Asset Management System sub-system. | R | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. Contractor foresees minimal risk associated with this enhancement. |
| 13.13.2 | Message processing and handling for each intersection Map message that must include at a minimum the new and future changes to support ITE and SAE industry-standard message variables and syntax to meet the requirements for Connected Intersections (CI) | R | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. Contractor foresees minimal risk associated with this enhancement. |
| 13.13.3 | Intersection Map message by processing the underlying geometry key feature provisions from high accuracy Mobile LIDAR post processed 'input' file size, type, and format. | R | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. Contractor foresees minimal risk associated with this enhancement. |
| 13.13.4 | Intersection Map message by enabling user input of MDOT Intersection Phase Diagrams key information and other required variables or settings. | O | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. Contractor foresees minimal risk associated with this enhancement. |
| 13.13.5 | Intersection Map message by processing the underlying geometry key feature provisions from user input MDOT Intersection Phase Diagrams or an API call to the Phase Diagram/Asset Management System sub-system. | O | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. Contractor foresees minimal risk associated with this enhancement. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 13.14 | The CV-ATMS must enable all of the CV message type assemblies and encodings into the proper ASN.1 UPER format for distribution and configuration load onto each specific site V2X device by IP, device settings required to load the messages securely. | R | Y | | | | | The solution includes ASN.1 UPER encodings functionality as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.15 | The CV-ATMS must enable all of the encoded CV message types to be configured and loaded onto each specific site V2X device by IP, device settings required using SNMPv3 to securely load/store the messages assembled and then encoded by the CV-ATMS in previous user/system steps. | R | Y | | | | | The solution includes SNMPv3 protocol as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.16 | The CV-ATMS must enable support standard message load and device configuration using all current and future V2X standards (SAE, ITE, IEEE) for V2X settings of SNMPv3 variables, syntaxes, and variables. | R | Y | | | | | The solution includes support for SAE. IEEE, & ITE SNMPv3 setting as standard functionality. This is described in full detail in Attachment 8: CV-ATMS Description Sec 3. |
| 13.17 | The CV-ATMS must enable all of the encoded CV message types to be configured and loaded onto each specific site V2X device by IP, device settings required using SSH, CLI methods as a secondary process to securely load/store the messages assembled and then encoded by the CV-ATMS in previous user/system steps. | R | | | Y | | | While not a current feature of the Software , Contractor will enhance the V2X message assembler module to implement this functionality. These are manufacturer-specific customizations that would require new development if needed based on RSU type. The risk associated with this requirement resides with the vendor specific documentation and support availability if necessary. |
| | **Section 5.15 APPLICATIONS** | | | | | | | |
| **14** | **Section 5.16 LANE CLOSURE REQUEST** | | | | | | | |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 14.1 | The CV-ATMS must provide a method to add, delete and interact with geometric description of construction work zones and construction lane closures interactively within the system. | R | Y | | | | | Standard Software functionality. |
| 14.2 | The CV-ATMS must provide a method to create add, edit, delete an association of a work zone to a parent project (effectively enabling a relationship between a child construction closure with a parent project and all child construction closure). | R | Y | | | | | Standard Software functionality. |
| 14.3 | The CV-ATMS must provide the ability to send and receive data per the specifications of the Work Zone Data Exchange (WZDx) version 4.0. | R | | | Y | | | Contractor will extend current API and Common Data Model for integration of the Work Zone Data Exchange (WZDx) 4.0 standard. |
| 14.4 | The CV-ATMS must provide the ability to input, at a minimum, all data fields required in the WZDx version 4.0. | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5 | The system must allow for the following data elements to be manually entered for a project/work zone event. Some elements may be auto-filled based on system information such as location. The following data elements must be translated into the appropriate WZDx objects for core details in WorkZoneRoadEvent, DetourRoadEvent, and RestrictionRoadEvent objects: | | | | | | | |
| 14.5.1 | Job Number (matching the MOT Specification JN) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 14.5.2 | County and TSC | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.3 | Affected Roadway Direction | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.4 | Route Number and Roadway Name | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.5 | Type of closure request (shifts, lane, shoulder, structure, and ramp closures) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.6 | Closure Activity Type (Planned, Active, Expired); Expired can only be set if the end date is past current system date/time | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.7 | Type of lane (shoulder, ingress/egress ramp, single lane, multiple lanes, full/complete) closure | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.8 | Quantity of lanes affected/closed (input by direction) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 14.5.9 | Start and End Mileposts (if appropriate based on roadway classification/signage) or alternately exit number or roadway junction of the closure area | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.10 | Quantity of Open Lanes (input by direction) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.11 | Type of closure (intermittent, rolling, long-term, varied schedule) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.12 | Additional information on type of work (flagging, guardrail replacement, sign replacement, bridge, ramp, utility work, rest area closure, carpool lot, temporary traffic signal, traffic signal work) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.13 | Input ramp information if additional type of work specified as ramp | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.14 | Job type and job point of contact information (name, firm, mobile phone, email) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.15 | Lane closure start date and end date | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 14.5.16 | Daily closure times and Holiday closure schedule (closed vs. open dates and times per day) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.17 | Detour (Y/N), Detour Route, Detour Information, and Additional URL info | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.18 | Input weight, height, and width restrictions (yes/no, weight in Tons, height/width restriction in inches) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.19 | Event/Entry Username created | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.20 | Event/Entry date/time created | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.21 | Event/Entry revised by Username | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.22 | Revised Event/Entry date/time | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 14.5.23 | Event Closure ID (to be system generated as a unique identifier) | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.24 | Event notes | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.5.25 | Lane numbering | R | | | Y | | | Contractor will extend current classification functionality for integration of data elements required in the Work Zone Data Exchange (WZDx) 4.0 object definitions. |
| 14.6 | The CV-ATMS must provide the capability to auto-populate work zone event data elements and provide the user a preview of what will be sent and displayed on MiDrive prior to transmitting. | R | | | Y | | | Standard Software functionality. Please note that preview of MiDrive visualization is not included in the solution. |
| 14.7 | The CV-ATMS must provide the user an interactive preview/dynamic method to interact with the work zone/construction closure event attributes, event ids, locations, and all associated setting information within the user interface. | R | Y | | | | | Standard Software functionality. Please note that preview of external system visualization is not included in the solution. |
| 14.8 | The CV-ATMS must provide a method to allow the user to enter and manually select the geometry definition on map to create a construction zone or work zone lane closure and all associated attributes settings per event. | R | Y | | | | | Standard solution functionality. The solution supports selection of beginning / end extent of workzone closures. Detailed attributes are manually entered via event classifications. |
| **15** | **Section 5.17 WEATHER ANALYTICS** | | | | | | | |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 15.1 | The CV-ATMS must provide the ability to analyze data ingested from weather feed(s) to convert the data points into a geospatial shape that defines the impacted area based on user-defined rules. | R | | | Y | | | Contractor will enhance current radial and point-based weather event area definitions to include geospatial shapes to display weather overlay on the map. The associated risk is minimal. |
| 15.2 | The CV-ATMS's weather analytics must utilize data ingested from weather feed(s) and convert into a weather event area (geospatial shape) that defines the impacted area based on user-defined rules. | R | | | Y | | | Contractor will enhance current radial and point-based weather event area definitions to include geospatial shapes to display weather overlay on the map. The associated risk is minimal. |
| 15.3 | The CV-ATMS must continuously update the weather event area and associated attributes based on weather data points. | R | | | Y | | | Contractor will enhance current radial and point-based weather event area definitions to include geospatial shapes to display weather overlay on the map. The associated risk is minimal. |
| 15.4 | The CV-ATMS must provide the ability to analyze weather observations from multiple data sources against each other performing data quality checking to ensure accuracy of the output. | R | Y | | | | | Standard functionality in the solution. The CV-ATMS incudes interfaces to the National Weather service, ESS roadside data and weather data from other sources, such as airports, through MADIS station feeds. |
| 15.5 | The CV-ATMS must assign a confidence level for the key variables used in the weather analytics application, based on a combination of factors, including the number of sources available to verify the data readings. | R | | | Y | | | Standard functionality in the solution. Specific weather-related use cases to be defined with MDOT and developed. The associated risk is minimal. |
| 15.6 | The CV-ATMS must utilize weather observations from multiple data sources to develop the current weather situation for use in providing alerts and weather-based messaging. | R | | | Y | | | Standard functionality in the solution. Specific weather-related use cases to be defined with MDOT and developed. The associated risk is minimal. |

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| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 15.7 | The CV-ATMS must provide the ability to display weather events and distribute notifications of the alerts to users within the affected geographic area. | R | | | Y | | | Contractor will extend current notification functionality to include geographic area. The associated risk is minimal. |
| 15.8 | The CV-ATMS must send events to the ATMS for propagation to affected DMSs and the Mi Drive website. | R | | | Y | | | Contractor will extend current interface capabilities to publish weather events to the ATMS and MiDrive website. The associated risk is minimal. |
| 15.9 | The CV-ATMS must have ability to view historical weather data and events. | R | | Y | | | | Software standard functionality. Configuration required for historical archiving. The associated risk is minimal. |
| **16** | **Section 5.18 SMART WORK ZONE** | | | | | | | |
| 16.1 | The CV-ATMS should provide the ability to associate smart work zone devices with work zone entries using the data standards of the WZDX 4.0 SwzDeviceFeed | O | | | Y | | | Contractor will extend current API and Common Data Model for integration of the Work Zone Data Exchange (WZDx) 4.0 standard.. Additionally, Contractor will extend event classification functionality to include association of smart work zone devices. |
| 16.2 | The CV-ATMS should provide the ability to provide an alert if a smart work zone device is active within a deactivated work zone. | O | | | Y | | | Contractor will extend current API and Common Data Model for integration of the Work Zone Data Exchange (WZDx) 4.0 standard.. Additionally, Contractor will extend event classification functionality to include association of smart work zone devices. |
| 16.3 | The CV-ATMS should provide the ability to provide an alert if a smart work zone device is active within an active work zone. | O | | | Y | | | Contractor will extend current API and Common Data Model for integration of the Work Zone Data Exchange (WZDx) 4.0 standard.. Additionally, Contractor will extend event classification functionality to include association of smart work zone devices. |
| **17** | **Section 5.19 ROADWAY FLOODING** | | | | | | | |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| 17.1 | The CV-ATMS should ingest data from MDOT's supervisory control and data acquisition (SCADA) pump station system. | O | | Y | | | | Standard functionality in solution. Contactor assumes that MDOT's SCADA pump station system supports standard SCADA interface protocols (e.g. MODBUS). |
| 17.2 | The CV-ATMS should utilize, as a minimum, weather analytics and MDOT pump station information to identify flooding based on user-defined thresholds. | O | | | Y | | | Standard functionality in the solution. Specific weather-related use cases to be defined with MDOT and developed. The associated risk is minimal. |
| 17.3 | The CV-ATMS should utilize, as a minimum, weather analytics and MDOT pump station information to predict flooding based on user-defined thresholds. | O | | | Y | | | Standard functionality in the solution. Specific weather-related use cases to be defined with MDOT and developed. The associated risk is minimal. |
| | **Section 5.20 MONITORING** | | | | | | | |
| **18** | **Section 5.21 GENERAL MONITORING** | | | | | | | |
| 18.1 | The CV-ATMS must provide a handler that receives SNMP traps | R | | | Y | | | Contractor will enhance current SNMP interface to receive unsolicited messages. Contractor foresees minimal risk with this enhancement. |
| 18.2 | The CV-ATMS must provide the ability to display alerts, at a minimum, the following conditions: | | | | | | | |
| 18.2.1 | When network links and device communications fail. | R | | Y | | | | Software standard functionality. Configuration of specific alerts will be discussed with Department during design phase. |
| 18.2.2 | When a field device status changes (offline, online). | R | | Y | | | | Software standard functionality. Configuration of specific alerts will be discussed with Department during design phase. |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| 18.2.3 | When a field device data is out of normal range. | O | | Y | | | | Software standard functionality. Configuration of specific alerts will be discussed with Department during design phase. |
| 18.2.4 | When a field device data is not reporting. | R | | Y | | | | Software standard functionality. Configuration of specific alerts will be discussed with Department during design phase. |
| 18.3 | The CV-ATMS must receive field device and subsystem error messages. | R | | Y | | | | Software standard functionality. Configuration of specific alerts will be discussed with Department during design phase. |
| **19** | **Section 5.22 NOTIFICATIONS** | | | | | | | |
| 19.1 | The CV-ATMS should provide the ability to configure notifications as emails. | O | Y | | | | | Standard functionality in the solution. Contractor assumes that MDOT will provide required email server and required IT infrastructure. |
| 19.2 | The CV-ATMS should provide the ability to configure notifications as SMS. | O | Y | | | | | Standard functionality in The solution. Contractor assumes that MDOT will provide required SMS gateway and required IT infrastructure. |
| 19.3 | The CV-ATMS should provide the ability to manage and define specific times specific users or groups of users receive specific notifications. | O | | | Y | | | Contractor will extend current notification functionality to include time-based notifications. The associated risk is minimal. |
| 19.4 | The CV-ATMS should be configurable so that notification recipients can receive notifications based on their permissions, area of responsibility, and other user attributes. | O | | | Y | | | Contractor will extend current notification functionality to include notifications based upon permissions and areas of responsibility. The associated risk is minimal. |
| 19.5 | The CV-ATMS should provide a notification to designated user(s) if any portion of the system is not working and requires reactive maintenance. | O | Y | | | | | Standard functionality in The solution. Configuration of specific alerts and notifications will be discussed with the Department during the design phase. |

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| Bus. Spec. Number | Business Specification | Bus. Spec. Type | Current Capability | Requires Configuration | Requires Customization | Future Enhancement | Not Available | Contractor to explain ***how*** they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification. |
| **20** | **Section 5.23 DASHBOARDS** | | | | | | | |
| 20.1 | The CV-ATMS should provide the ability to configure dashboard performance metrics. | O | | Y | | | | The solution includes the Performance Measures application which supports dashboards for visualization of performance metrics. Configuration of dashboard will be evaluated by the State. |
| 20.2 | The CV-ATMS should provide the ability to adjust which performance metric indicators are displayed and the geographical area included in the dashboard. | O | | Y | | | | The solution includes the Performance Measures application which supports dashboards for visualization of performance metrics. Configuration of dashboard will be evaluated by the State. |
| 20.3 | The CV-ATMS should provide the ability to have multiple dashboards. | O | | Y | | | | The solution includes the Performance Measures application which supports dashboards for visualization of performance metrics. Configuration of dashboard will be evaluated by the State. |
| 20.4 | The CV-ATMS should provide the ability to configure dashboard performance metrics to display based on current system data, such as number of active work zones, system health, and device status. | O | | Y | | | | The solution includes the Performance Measures application which supports dashboards for visualization of performance metrics. Configuration of dashboard will be evaluated by the State. |
| 20.5 | The CV-ATMS should have the ability to provide access to the dashboards while on the internal network without being logged into the CV-ATMS. | O | | Y | | | | The solution includes the Performance Measures application which supports dashboards for visualization of performance metrics. Configuration of dashboard will be evaluated by the State. |
| **21** | **Section 5.24 REPORTS** | | | | | | | |
| 21.1 | The CV-ATMS must provide the ability to prepare templated reports using data collected by the CV-ATMS. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 21.2 | The CV-ATMS must provide the ability to use data collected by the CV-ATMS to be calculated in support of performance monitoring. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.3 | The CV-ATMS must provide the ability to create and save ad-hoc reports using data collected by the CV-ATMS. | R | | Y | | | | This is solution standard functionality. Configuration required for ad-hoc reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.4 | The CV-ATMS must provide the ability to query the database for message status/decoding and encoding and field device status for the use of developing reports. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.5 | The CV-ATMS must provide the ability to include the following attributes in any report: date, time, location, site ID, road ID/road name (main/cross street, freeway/Interstate or DOT Roadway/Segment ID), start and end mile posts, and device ID. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.6 | The CV-ATMS should have the ability to provide a field device report based on any alerts or faults received from the device. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.7 | The CV-ATMS should be able to provide a historical record of an event that indicates the progression of actions taken through the CV-ATMS and its applications, data used in any algorithm-based or automated function, and any triggers that initiate an event. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 21.8 | The CV-ATMS should be able to provide a historical report of all parent/child connected records. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.9 | The CV-ATMS must be capable of assigning a customizable report footer that specifies data classification (e.g., Public, Internal, Confidential, Restricted). | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.10 | The CV-ATMS must allow users to export all reports in CSV, Excel, and PDF format. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.11 | The CV-ATMS should allow users to preview all reports on screen. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.12 | The CV-ATMS should have the capability of providing reports that include hardware configuration information. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.13 | The CV-ATMS should provide the ability to schedule and/or automate reports using data collected by the CV-ATMS and distribute via email. | O | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| 21.14 | The CV-ATMS must have the ability to run reports in any of the CV-ATMS environments (i.e., Testing Environment, Production Environment, etc.) using data collected by the CV-ATMS. | R | | Y | | | | This is solution standard functionality. Configuration required for templated reports. Specific reports will be discussed with the Department during the design phase. The associated risk is minimal. |
| | **Section 5.25 INTERFACES** | | | | | | | |

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| **22** | **Section 5.26 WRONG WAY DRIVING** | | | | | | | |
| 22.1 | The CV-ATMS should interface with Wrong Way Driver systems to receive alert messages by location/site. | O | | | Y | | | Contractor will extend current interface capabilities to receive alert messages from Wrong Way Driver systems. The associated risk is minimal. |
| **23** | **Section 5.27 MI-DRIVE** | | | | | | | |
| 23.1 | The CV-ATMS must push work zone information to Mi Drive using WZDx version 4.0 format in a properly timed data output (based on data changes - add, delete, edit events). | R | | | Y | | | Contractor will extend current API and Common Data Model for integration of the Work Zone Data Exchange (WZDx) 4.0 standard. |
| 23.2 | The CV-ATMS should have the ability to push weather analytics data to Mi Drive. | O | | | Y | | | Contractor will extend current interface capabilities to publish weather events to the ATMS and MiDrive website. The associated risk is minimal. |
| **24** | **Section 5.28 WEATHER** | | | | | | | |
| 24.1 | The CV-ATMS must have the ability to pull and ingest data from the following sources, at a minimum, in support of Weather Analytics: | | | | | | | |
| 24.1.1 | National Weather Service (NWS), including but not limited to radar, sensor data, warnings, alert, and forecast data. | R | | Y | | | | See 15.4 above. Configuration is required for specific data elements required; to be discussed with the Department during the design phase. The associated risk is minimal. |
| 24.1.2 | Automated Surface Observation System (ASOS) and Automated Weather Observing System (AWOS) | R | | | Y | | | Contractor will extend current interface capabilities to pull and ingest data from the ASOS and AWOS systems. The associated risk is minimal. |

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 24.1.3 | ESS data (through a connection to MDOT's MDSS), including but not limited to the following attributes: ambient temperature, pavement surface temperature, roadside surface soil temperature, pavement surface condition, visibility, humidity, barometric pressure, wind speed, wind direction, and precipitation. | R | | | Y | | | Contractor will extend current interface capabilities to pull and ingest data from MDOT's MDSS system. The associated risk is minimal. |
| 24.2 | The CV-ATMS should enable users to visualize weather-related events (pavement condition/weather condition, temperature, roadway salinity, visibility, wind speed, weather event/alerts, watch boxes or potential incident events) on a map from data ingested from weather feed(s). | O | | Y | | | | The solution includes a HTML-5 based mapping application that supports the integration and display of third party and commercially available data. The geolocated map application integrates 3rd party map overlays as layers using OpenLayers. OpenLayers is a 3rd party package which support OGC standards. Contractor currently supports data overlay from commercial providers ESRI Rest services, HERE, TomTom and INRIX. The system supports open source GIS data from OpenStreetMap, Mapbox, National Weather Service, ESRI ArcGIS and Open Weather. As all of these options are dependent on various licensing options, internet connectivity, etc., Contractor looks forward to understanding the Sate's specific needs to provide an optimal solution. |
| 24.3 | The CV-ATMS should enable users to view weather-related events (pavement condition/weather condition, temperature, roadway salinity, visibility, wind speed, weather event/alerts, watch boxes or potential incident events) in list format from data ingested from weather feed(s). | O | | Y | | | | Standard functionality in the solution. All devices and events are viewable from lists. Specific list requirements will be discussed with the State during the design phase. |
| **25** | **Section 5.29 ATMS** | | | | | | | |

| A | B | C | D | | | | | E |
|---|---|---|---|---|---|---|---|---|
| **Bus. Spec. Number** | **Business Specification** | **Bus. Spec. Type** | **Current Capability** | **Requires Configuration** | **Requires Customization** | **Future Enhancement** | **Not Available** | **Contractor to explain *how* they will deliver the business Specification. Explain the details of any configuration/customization and the impacted risk that may be caused if configured or customized to meet the business specification.** |
| 25.1 | The CV-ATMS should enable users to identify and visualize events, time/date, and specific message events in real time as provided by the ATMS interface. | O | | Y | | | | Standard functionality in the solution. Contractor assumes that the ATMS supports NTCIP C2C interface standards based upon TMDD object definitions. Configuration of XML WSDL required. The associated risk is minimal. |
| 25.2 | The CV-ATMS must enable users to identify CV-ATMS generated data to be shared with MDOT's ATMS, including but not limited to BSD derived data, Weather Analytics, and Lane Closure Requests. | R | | Y | | | | Standard functionality in the solution. Contractor assumes that the ATMS supports NTCIP C2C interface standards based upon TMDD object definitions. Configuration of XML WSDL required. The<br><br>associated risk is minimal. |
| **26** | **Section 5.30 SCADA PUMP STATION SYSTEM** | | | | | | | |
| 26.1 | The CV-ATMS should have the ability to pull and ingest data from MDOT's SCADA Pump Station Monitoring System which currently uses MultiSmart hardware, with software provided by Kennedy Industries (KI System Master Software). | O | | Y | | | | Standard functionality in The solution. Contractor assumes that MDOT's SCADA pump station system supports standard SCADA interface protocols (e.g. MODBUS). |

# SCHEDULE B – PRICING

1. Licensing Fees. Contractor offers a subscription, term-based license, which shall cover all intended users and field devices of the Solution.

2. Hosting Fees. All hosting costs to accommodate all intended users and field devices of the solution – N/A SOM Hosted.

Licensing costs will be paid after installation, configuration, and State testing and acceptance of the Software.

3. General Project Management, Project Documentation, and training. All costs associated with project management activities, project documentation, and training as defined in Schedule A – Statement of Work.

4. Software Development, Configuration, and Testing. All costs associated with software development, installation, configuration, customization, testing, and acceptance as defined in Schedule A – Statement of Work, Software Contract Terms and Conditions, and Schedule I – Acceptance Testing.

5. Application Development, Configuration, and Testing. All costs associated with application development, installation, configuration, customization, testing, and acceptance as defined in Schedule A – Statement of Work and Schedule I – Acceptance Testing.

6. Solution Integration and Acceptance. All costs associated with solution integration and acceptance defined in Schedule A – Statement of Work, Software Contract Terms and Conditions, and Schedule I – Acceptance Testing. All costs are firm fixed.

7. Operations and Maintenance. All costs associated with on-going support and maintenance of the Software to meet the requirements of Software Contract Terms and Conditions and Schedule A – Statement of Work.

8. Optional Contract Renewals (Years 6-10).

9. Optional Items. The "Optional" requirements within Schedule A – Table 1 – Business Specifications Worksheet may be desired by the State in the future.

| ID | Description | Unit of Measure | Bid Price | Anticipated Quantity | Extended Price |
|---|---|---|---|---|---|
| | **Initial Five-Year Term (Years 1-5)** | | | | |
| 1, 2 | Licensing and Hosting (Subscription)* (Number of Years may vary – will be pro-rated based upon implementation schedule) | Year | $265,000.00 | 3.75 | $993,750.00 |
| 3 | General Project Management | Job | $641,161.00 | 1 | $641,161.00 |
| 3 | Project Documentation | Job | $297,141.00 | 1 | $297,141.00 |
| 3 | Training | Job | $40,000.00 | 1 | $40,000.00 |
| 4 | Software Development, Configuration, and Testing | Job | 739,629.00 | 1 | $739,629.00 |
| 5 | Application Development, Configuration, and Testing | Job | $1,373,597.00 | 1 | $1,373,597.00 |
| 6 | Solution Integration and Acceptance | Job | $197,810.00 | 1 | $197,810.00 |
| 7 | Operations and Maintenance (Number of Years may vary – will be pro-rated based upon implementation schedule – billed monthly) | Year | $193,031.20 | 3.75 | $723,867.00 |
| | **Total (Initial Five-Year Term)** | | | | **$5,006,955.00** |
| | | | | | |
| | **Optional Contract Renewals (Years 6-10)** | | | | |
| 8 | Annual Project Management - Contract Renewals - Years 6-10 | Year | $56,233.00 | 5 | $281,165.00 |
| 8 | Annual License and Hosting - Contract Renewals - Years 6-10 | Year | $265,000.00 | 5 | $1,325,000.00 |
| 8 | Annual Support & Maintenance - Contract Renewals - Years 6-10 (billed monthly) | Year | $147,375.00 | 5 | $736,875.00 |
| | **Total (Contract Renewal Costs)** | | | | **$2,343,040.00** |

| | | | | | |
|---|---|---|---|---|---|
| | **Optional Items** – Bidder to update and expand the rows below to include any optional item being requested in Schedule A – Statement of Work and Schedule A – Table 1 – Business Specifications. | | | | |
| 9 | Lump Sum Optional Item #1 – See Note** | Job | $550,700.00 | 1 | $550,700.00 |
| 9 | Integration of new manufacturer of existing device type | Ea. | See Note*** | 1 | |
| | **Total (Optional Costs)** | | | | **$550,700.00** |

* Kapsch licensing and hosting is an annual subscription for up to 500 RSU.

Additional RSUs can be added with the following pricing table:

| RSU Quantity | Annual Unit Price | Unit of Measure | Notes |
|---|---|---|---|
| 1-500 | Included in Base Contract | N/A | |
| 501-1000 | $300.00 | Per Additional RSU | (A) |
| 1001+ | $275.00 | Per Additional RSU | (A), (B) |

| Notes: | | |
|---|---|---|
| | (A) | Prices are per RSU device added to CMCC and excludes the purchase and installation of the RSU |
| | (B) | Lowest eligible unit license applies to all RSU licenses above the base contract amount |

**Pricing for Lump Sum Optional Item #1, all requirements marked with O in Schedule A - Table 1 and requiring customization or configuration can be purchased for the indicated price. Pricing is valid for one year from award. After one year the price will be will subject to escalation based upon the CPI or other agreed inflation index.

***Individual items or additional items can be purchased based on hourly rates in the enclosed Rate Card for Ancillary Professional Services or an agreed firm fixed price at time of negotiation for the complete scope of work and delivery time frame.

Postproduction Warranty. The Contractor must provide a 90 calendar days postproduction warranty at no cost to the State. The postproduction warranty will meet all requirements of the contract, including all Support Services identified in Schedule D.

Rate Card for Ancillary Professional Services.

| Resource | On-Site Hourly Rate | On-Shore and Off-Site Hourly Rate |
|---|---|---|
| Sr. Project Manager | $260.00 | $260.00 |
| Project Manager | $210.00 | $210.00 |
| Sr. Software Engineer | $225.00 | $225.00 |
| Software Engineer | $180.00 | $180.00 |
| Sr. Systems Engineer | $225.00 | $225.00 |
| Systems Engineer | $165.00 | $165.00 |
| CV Engineer | $200.00 | $200.00 |
| Field Technician | $155.00 | $155.00 |

If Contractor reduces its prices, or offers a lower price to any other entity, private or public, for any of the software or services during the term of this Contract, the State shall have the immediate benefit of such lower prices for new purchases. Contractor shall send notice to the State's Contract Administrator with the reduced prices within fifteen (15) Business Days of the reduction taking effect.

**Travel and Expenses**
The State does not pay for overtime or travel expenses.

Milestone Payments. The State's proposed milestone payment schedule is set forth below, or as approved by the State. Bidder may propose an alternative milestone payment schedule, but Bidder must provide an explanation as to why the State's schedule and associated deliverables is not feasible.

| Milestone | Deliverables | Pricing/Payment Information |
|---|---|---|
| General Project Management | Refer to Project Management Section for a breakdown on the type of activities included within this milestone. | General Project Management – Initial Five-Year Contract Period task will be paid out in equal monthly payments as a percentage of the overall pricing for this task. |
| Project Documentation | Refer to Project Management Section for a breakdown on the documents included within this milestone. | The pricing provided is for all Project Documentation and will be paid out in equal amounts upon the acceptance of each plan. |
| Licensing and Hosting | Base Period Licensing and Hosting for all phases | Licensing and hosting fees will be paid out in annual payments per the Contractor's pricing. |
| Software Development, Configuration, and Testing | Software Development and Configuration<br><br>User Acceptance Testing (UAT) Results | Software Development, Configuration, and Testing - the pricing associated with software development & configuration and completion of UAT will be paid out as follows:<br>1. Software development and configuration = 50%*<br>2. Upon the Department's written acceptance of the successful completion of UAT = 50%**<br><br>*Software development may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan paid out in equal payments for a total of 50%<br>**Software acceptance and payment may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan paid out in equal payments for a total of 50%. |
| Application Development, Configuration, and Testing | Application Development, Configuration, and Event Population | Application Development, Configuration, and Testing - the pricing associated with application development & configuration, event population, and completion of UAT will be paid out as follows: |

| Milestone | Deliverables | Pricing/Payment Information |
|---|---|---|
| | User Acceptance Testing (UAT) Results | 1. Application development & configuration and event population = 50%*<br>2. Upon the Department's written acceptance of the successful completion of UAT = 50%**<br><br>*Application development may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan paid out in equal payments for a total of 50%<br>**Application acceptance and payment may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan paid out in equal payments for a total of 50%. |
| Solution Integration and Acceptance | Successful integration for 100% of field devices<br><br>Successful Burn-in Completion for 100% of Solution | Solution Testing and Acceptance<br>1. Successful deployment in the Production Environment with 100% of field device = 75%*<br>2. Successful burn-in with 100% of Software in Production Environment = 25%**<br><br>*Software and field devices deployed in the Production Environment may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan and paid out in equal payments for a total of 75%.<br>**Software and field device burn-in may be split into multiple phases based on the Contractor's accepted Deployment Transition Plan and paid out in equal payments for a total of 25%. |
| Training | Administrative and End-User Training for Implementation, Go-live Support, and Transition to Customer Sufficiency<br>Initial Trainings<br>Basic Training Course | Training will be paid out in annual payments as a percentage of the Offeror's overall pricing for this task broken down as follows:<br>A. Year 1 = 40% of the Offeror's price for the Training – Five Years Cost<br>B. Years 2 through 5 = 15% per year of the Offeror's price for the |

| Milestone | Deliverables | Pricing/Payment Information |
|---|---|---|
| | New Software Build Training Course | Training – Five Years Cost |
| Operations and Maintenance | Maintenance and Support (free of charge) | N/A |
| | Ongoing after Final Acceptance. | Operations and Maintenance will be paid in equal monthly payments for the remainder of the initial contract period (5-years) commencing with the Department's issuance of a notice of acceptance of the CV-ATMS Acceptance Task. Calculation of monthly payments will be determined from Final Acceptance to the remaining initial 5-year contract term. |
| Optional Pricing Items | Optional Items | The deployment and pricing schedule for Additional Functionality will be negotiated during the creation of tasks to include the additional functionality desired by the Department. Pricing will be based on the Contractor's price proposal and/or job classification and hourly rates (loaded) provided in the Staffing Rates table of the Cost Worksheet associated with this RFP. |
| | Future Enhancements | |
| Project Management - Contract Renewal Option | Project Management - Year 6-10 | Project Management – Contract Renewals – Year 6-10 will be paid in 12 equal monthly payments upon execution of the each one-year renewal option. |
| Licensing and Hosting - Contract Renewal Options | License and Hosting - Year 6-10 | License and Hosting – Year 6-10 will be paid as a lump sum upon execution of the each one-year renewal option. |

| Milestone | Deliverables | Pricing/Payment Information |
|---|---|---|
| Maintenance and Support - Contract Renewal Option | Maintenance and Support - Year 6-10 | Maintenance and Support – Contract Renewals – Year 6-10 will be paid in 12 equal monthly payments upon execution of the each one-year renewal option. |

# SCHEDULE C - INSURANCE REQUIREMENTS

**1. General Requirements.** Contractor, at its sole expense, must maintain the insurance coverage as specified herein for the duration of the Term. Minimum limits may be satisfied by any combination of primary liability, umbrella or excess liability, and self-insurance coverage. To the extent damages are covered by any required insurance, Contractor waives all rights against the State for such damages. Failure to maintain required insurance does not limit this waiver.

**2. Qualification of Insurers.** Except for self-insured coverage, all policies must be written by an insurer with an A.M. Best rating of A- VII or higher unless otherwise approved by DTMB Enterprise Risk Management.

**3. Primary and Non-Contributory Coverage.** All policies for which the State of Michigan is required to be named as an additional insured must be on a primary and non-contributory basis.

**4. Claims-Made Coverage.** If any required policies provide claims-made coverage, Contractor must:

a. Maintain coverage and provide evidence of coverage for at least 3 years after the later of the expiration or termination of the Contract or the completion of all its duties under the Contract;

b. Purchase extended reporting coverage for a minimum of 3 years after completion of work if coverage is cancelled or not renewed, and not replaced with another claims-made policy form with a retroactive date prior to the Effective Date of this Contract.

**5. Proof of Insurance.**

a. Insurance certificates showing evidence of coverage as required herein must be submitted to DTMB-RiskManagement@michigan.gov within 10 days of the contract execution date.

b. Renewal insurance certificates must be provided on annual basis or as otherwise commensurate with the effective dates of coverage for any insurance required herein.

c. Insurance certificates must be in the form of a standard ACORD Insurance Certificate unless otherwise approved by DTMB Enterprise Risk Management.

d. All insurance certificates must clearly identify the Contract Number (e.g., notated under the Description of Operations on an ACORD form).

e. The State may require additional proofs of insurance or solvency, including but not limited to policy declarations, policy endorsements, policy schedules, self-insured certification/authorization, and balance sheets.

f. In the event any required coverage is cancelled or not renewed, Contractor must provide written notice to DTMB Enterprise Risk Management no later than 5 business days following such cancellation or nonrenewal.

**6. Subcontractors.** Contractor is responsible for ensuring its subcontractors carry and maintain insurance coverage.

**7. Limits of Coverage & Specific Endorsements.**

| Required Limits | Additional Requirements |
|---|---|
| **Commercial General Liability Insurance** | |
| **Minimum Limits:**<br>$1,000,000 Each Occurrence<br>$1,000,000 Personal & Advertising Injury<br>$2,000,000 Products/Completed Operations<br>$2,000,000 General Aggregate | Contractor must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 20 10 12 19 and CG 20 37 12 19. |
| **Automobile Liability Insurance** | |
| If a motor vehicle is used in relation to the Contractor's performance, the Contractor must have vehicle liability insurance on the motor vehicle for bodily injury and property damage as required by law. | |

| Required Limits | Additional Requirements |
|---|---|
| **Workers' Compensation Insurance** | |
| **Minimum Limits:**<br><br>Coverage according to applicable laws governing work activities. | Waiver of subrogation, except where waiver is prohibited by law. |
| **Employers Liability Insurance** | |
| **Minimum Limits:**<br><br>$500,000 Each Accident<br><br>$500,000 Each Employee by Disease<br><br>$500,000 Aggregate Disease | |

**8. Non-Waiver.** This Schedule C is not intended to and is not to be construed in any manner as waiving, restricting or limiting the liability of either party for any obligations under this Contract, including any provisions hereof requiring Contractor to indemnify, defend and hold harmless the State.

# SCHEDULE D – SERVICE LEVEL AGREEMENT

The parties agree as follows:

**1. Definitions**. For purposes of this Schedule, the following terms have the meanings set forth below. All initial capitalized terms in this Schedule that are not defined in this Schedule shall have the respective meanings given to them in the Contract Terms and Conditions.

"**Contact List**" means a current list of Contractor contacts and telephone numbers set forth in the attached **Schedule D – Attachment 1** to this Schedule to enable the State to escalate its Support Requests, including: (a) the first person to contact; and (b) the persons in successively more qualified or experienced positions to provide the support sought.

"**Critical Service Error**" has the meaning set forth in the Service Level Table.

"**Error**" means, generally, any failure or error referred to in the Service Level Table.

"**First Line Support**" means the identification, diagnosis and correction of Errors by the State.

"**High Service Error**" has the meaning set forth in the Service Level Table.

**"Low Service Error**" has the meaning set forth in the Service Level Table.

"**Medium Service Error**" has the meaning set forth in the Service Level Table.

"**Resolve**" and the correlative terms, "**Resolved**", "**Resolving**" and "**Resolution**" each have the meaning set forth in **Section 2.4**

"**Service Credit**" has the meaning set forth in **Section 3.1**

"**Second Line Support**" means the identification, diagnosis and correction of Errors by the provision of (a) telephone and email assistance by a qualified individual on the Contact List and remote application support, or (b) on-site technical support at the State's premises by a qualified individual on the Contact List.

"**Service Levels**" means the defined Error and corresponding required service level responses, response times, Resolutions and Resolution times referred to in the Service Level Table.

"**Service Level Table**" means the table set out in **Section 2.4**

"**State Cause**" means any of the following causes of an Error: (a) a State server hardware problem; (b) a desktop/laptop hardware problem; or (c) a State network communication problem.

"**State Systems**" means the State's information technology infrastructure, including the State's computers, software, databases, electronic systems (including database management systems) and networks.

"**Support Hours**" means 24/7, 365 days a year, including holidays..

"**Support Period**" means the period of time beginning 90 days after the date the Software has entered full production mode and ending on the date the Contract expires or is terminated.

"**Support Request**" has the meaning set forth in **Section 2.2.**

**2. Support Services**. The State will provide First Line Support prior to making a Service Request for Second Line Support. Contractor shall perform all Second Line Support and other Support Services during the Support Hours throughout the Support Period in accordance with the terms and conditions of this Schedule and the Contract, including the Service Levels and other Contractor obligations set forth in this **Section 2.**

2.1 Support Service Responsibilities. Contractor shall:

(a) provide unlimited telephone support during all Support Hours;

(b) respond to and Resolve all Support Requests in accordance with the Service Levels;

(c) provide unlimited remote Second Line Support to the State during all Support Hours;

(d) provide on-premise Second Line Support to the State if remote Second Line Support will not Resolve the Error; and

(e) provide to the State all such other services as may be necessary or useful to correct an Error or otherwise fulfill the Service Level requirements, including defect repair, programming corrections and remedial programming.

2.2 Support Requests. Once the State has determined that an Error is not the result of a **State Cause**, the State may request Support Services by way of a Support Request. The State shall classify its requests for Error corrections in accordance with the support request classification and definitions of the Service Level Table set forth in **Section 2.4** (each a "**Support Request**"). The State shall notify Contractor of each Support Request by e-mail or telephone. The State shall include in each Support Request a description of the reported Error and the time the State first observed the Error.

2.3 State Obligations. The State shall provide the Contractor with each of the following to the extent reasonably necessary to assist Contractor to reproduce operating conditions similar to those present when the State detected the relevant Error and to respond to and Resolve the relevant Support Request:

(i) if not prohibited by the State's security policies, remote access to the State Systems, and if prohibited, direct access at the State's premises;

(ii) output and other data, documents and information, each of which is deemed the State's Confidential Information as defined in the Contract; and

(iii) such other reasonable cooperation and assistance as Contractor may request.

2.4 Service Level Table. Response and Resolution times will be measured from the time Contractor receives a Support Request until the respective times Contractor has (a) responded to that Support Request, in the case of response time and (b) Resolved that Support Request, in the case of Resolution time. "**Resolve**", "**Resolved**", "**Resolution**" and correlative capitalized terms mean, with respect to any particular Support Request, that Contractor has corrected the Error that prompted that Support Request and that the State has confirmed such correction and its acceptance of it in writing. Contractor shall respond to and Resolve all Support Requests within the following times based on the State's designation of the severity of the associated Error, subject to the parties' written agreement to revise such designation after Contractor's investigation of the reported Error and consultation with the State:

| Support Request Classification | Definition | Service Level Metric (Required Response Time) | Service Level Metric (Required Resolution Time) |
|---|---|---|---|
| **Critical Service Error** | (a) Issue affecting entire Software system or single critical production function;<br><br>(b) Software down or operating in materially degraded state;<br><br>(c) Data integrity at risk;<br><br>(d) Material financial impact;<br><br>(e) Widespread access interruptions: or<br><br>(f) Classified by the state as a Critical Service Error | Contractor shall acknowledge receipt of a Support Request within thirty (30) minutes. | Contractor shall Resolve the Support Request as soon as practicable and no later than four (4) hours after Contractor's receipt of the Support Request.<br><br>If the Contractor Resolves the Support Request by way of a work-around accepted in writing by the State, the support classification assessment will be reduced to a High Service Error. |

| Support Request Classification | Definition | Service Level Metric (Required Response Time) | Service Level Metric (Required Resolution Time) |
|---|---|---|---|
| **High Service Error** | (a) A Critical Service Error for which the State has received, within the Resolution time for Critical Service Errors, a work-around that the State has accepted in writing; or<br><br>(b) Primary component failure that materially impairs Software's performance;<br><br>(c) Data entry or access is materially impaired on a limited basis; or<br><br>(d) performance issues of severe nature impacting critical processes | Contractor shall acknowledge receipt of a Support Request or, where applicable, the State's written acceptance of a Critical Service Error work-around, within twenty-four (24) hours. | Contractor shall Resolve the Support Request as soon as practicable and no later than two (2) Business Days after Contractor's receipt of the Support Request or, where applicable, the State's written acceptance of a Critical Service Error work-around. |

| Support Request Classification | Definition | Service Level Metric (Required Response Time) | Service Level Metric (Required Resolution Time) |
|---|---|---|---|
| **Medium Service Error** | An isolated or minor Error in the Software that meets any of the following requirements:<br><br>(a) does not significantly affect Software functionality;<br><br>(b) can or does impair or disable only certain non-essential Software functions; or<br><br>(c) does not materially affect the State's use of the Software | Contractor shall acknowledge receipt of the Support Request within two (2) Business Days. | Contractor shall Resolve the Support Request as soon as practicable and no later than ten (10) Business Days after Contractor's receipt of the Support Request. |
| **Low Service Error** | Request for assistance, information, or services that are routine in nature. | Contractor shall acknowledge receipt of the Support Request within five (5) Business Days. | N/A |

2.5 Escalation. If Contractor does not respond to a Support Request within the relevant Service Level response time, the State may escalate the Support Request to the Contractor Project Manager and State Program Managers, or their designees, and then to the parties' respective Contract Administrators.

2.6 Time Extensions. The State may, on a case-by-case basis, agree in writing to a reasonable extension of the Service Level response or Resolution times.

2.7 Contractor Updates. Contractor shall give the State monthly electronic or other written reports and updates of:

(a) the nature and status of its efforts to correct any Error, including a description of the Error and the time of Contractor's response and Resolution;

(b) its Service Level performance, including Service Level response and Resolution times; and

(c) the Service Credits to which the State has become entitled.

**3. Service Credits**.

3.1 Service Credit Amounts. If the Contractor fails to respond to a Support Request within the applicable Service Level response time or to Resolve a Support Request within the applicable Service Level Resolution time, the State will be entitled to the corresponding service credits specified in the table below ("**Service Credits**"), provided that the relevant Error did not result from a State Cause.

| Support Request Classification | Service Level Credits<br><br>(For Failure to Respond to any Support Request Within the Corresponding Response Time) | Service Level Credits<br><br>(For Failure to Resolve any Support Request Within the Corresponding Required Resolution Time) |
|---|---|---|
| **Critical Service Error** | An amount equal to 5% of the then current monthly Support Fee for each hour by which Contractor's response exceeds the required Response time. | An amount equal to 5% of the then current monthly Support Fee for each hour by which Contractor's Resolution of the Support Request exceeds the required Resolution time. |
| **High Service Error** | An amount equal to 3% of the then current monthly Support Fee for each Business Day, and a pro-rated share of such percentage for each part of a Business Day, by which | An amount equal to 3% of the then current monthly Support Fee for each Business Day, and a pro-rated share of such percentage for each part of a Business Day, by which Contractor's |

| Support Request Classification | Service Level Credits<br><br>(For Failure to Respond to any Support Request Within the Corresponding Response Time) | Service Level Credits<br><br>(For Failure to Resolve any Support Request Within the Corresponding Required Resolution Time) |
|---|---|---|
| | Contractor's response exceeds the required Response time. | Resolution of the Support Request exceeds the required Resolution time. |

3.2 Compensatory Purpose. The parties intend that the Service Credits constitute compensation to the State, and not a penalty. The parties acknowledge and agree that the State's harm caused by Contractor's delayed delivery of the Support Services would be impossible or very difficult to accurately estimate as of the Effective Date, and that the Service Credits are a reasonable estimate of the anticipated or actual harm that might arise from Contractor's breach of its Service Level obligations.

3.3 Issuance of Service Credits. Contractor shall, for each monthly invoice period, issue to the State, together with Contractor's invoice for such period, a written acknowledgment setting forth all Service Credits to which the State has become entitled during that invoice period. Contractor shall pay the amount of the Service Credit as a debt to the State within fifteen (15) Business Days of issue of the Service Credit acknowledgment, provided that, at the State's option, the State may, at any time prior to Contractor's payment of such debt, deduct the Service Credit from the amount payable by the State to Contractor pursuant to such invoice.

3.4 Additional Remedies for Service Level Failures. Contractor's repeated failure to meet the Service Levels for Resolution of any Critical Service Errors or High Service Errors, or any combination of such Errors, within the applicable Resolution time set out in the Service Level Table will constitute a material breach under the Contract. Without limiting the State's right to receive Service Credits under this **Section 3**, the State may terminate this Schedule for cause in accordance with terms of the Contract.

**4. Communications**. In addition to the mechanisms for giving notice specified in the Contract, unless expressly specified otherwise in this Schedule or the Contract, the parties may use e-mail for communications on any matter referred to herein.

# SCHEDULE D – ATTACHMENT 1 – CONTACT LIST

## CONTACT LIST FOR ESCALATION

### Tertiary Contact

JB Kendrick, President
2855 Premiere Parkway, Suite F, Duluth, GA 30097
O: +1 470-473-6400
JB.Kendrick@kapsch.net

### Secondary Contact

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705 Grant Avenue, Lake Katrine, NY
M: +1 571-205-6605
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### Initial Contact

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O: +1 201-528-9814  M: +1 201-304-1664
David.Meier@kapsch.net

# SCHEDULE E – DATA SECURITY REQUIREMENTS

**1. Definitions.** For purposes of this Schedule, the following terms have the meanings set forth below. All initial capitalized terms in this Schedule that are not defined in this **Schedule** shall have the respective meanings given to them in the Contract.

"**Contractor Security Officer**" has the meaning set forth in **Section 2** of this Schedule.

"**FedRAMP**" means the Federal Risk and Authorization Management Program, which is a federally approved risk management program that provides a standardized approach for assessing and monitoring the security of cloud products and services.

"**FISMA**" means The Federal Information Security Modernization Act of 2014 (Pub.L. No. 113-283 (Dec. 18, 2014.).

**"Hosting Provider"** means any Permitted Subcontractor that is providing any or all of the Hosted Services under this Contract.

"**NIST**" means the National Institute of Standards and Technology.

"**PCI**" means the Payment Card Industry.

"**PSP**" or **"PSPs"** means the State's IT Policies, Standards and Procedures.

"**SSAE**" means Statement on Standards for Attestation Engagements.

"**Security Accreditation Process**" has the meaning set forth in **Section 6** of this Schedule

**2. Security Officer.** Contractor will appoint a Contractor employee to respond to the State's inquiries regarding the security of the Hosted Services who has sufficient knowledge of the security of the Hosted Services and the authority to act on behalf of Contractor in matters pertaining thereto ("**Contractor Security Officer**").

**3. Contractor Responsibilities.** Contractor is responsible for establishing and maintaining a data privacy and information security program, including physical, technical, administrative, and organizational safeguards, that is designed to:

(a) ensure the security and confidentiality of the State Data;

(b) protect against any anticipated threats or hazards to the security or integrity of the State Data;

(c) protect against unauthorized disclosure, access to, or use of the State Data;

(d) ensure the proper disposal of any State Data in Contractor's or its subcontractor's possession; and

(e) ensure that all Contractor Personnel comply with the foregoing.

The State has established Information Technology (IT) PSPs to protect IT resources under the authority outlined in the overarching State 1305.00 Enterprise IT Policy. In no case will the safeguards of Contractor's data privacy and information security program be less stringent than the safeguards used by the State, and Contractor must at all times comply with all applicable public and non-public State IT policies and standards, of which the publicly available ones are at https://www.michigan.gov/dtmb/policies/it-policies.

This responsibility also extends to all service providers and subcontractors with access to State Data or an ability to impact the contracted solution. Contractor responsibilities are determined from the PSPs based on the services being provided to the State, the type of IT solution, and the applicable laws and regulations.

**4. Acceptable Use Standard.** To the extent that Contractor has access to the State's IT environment, Contractor must comply with the State's Acceptable Use Standard, see https://www.michigan.gov/dtmb/-/media/Project/Websites/dtmb/Law-and-Policies/IT-Policy/13400013002-Acceptable-Use-of-Information-Technology-Standard.pdf. All Contractor Personnel will be required, in writing, to agree to the State's Acceptable Use Standard before accessing State systems or Data. The State reserves the right to terminate Contractor's and/or subcontractor(s) or any Contractor Personnel's access to State systems if the State determines a violation has occurred.

**5. Protection of State's Information.** Throughout the Term and at all times in connection with its actual or required performance of the Services, Contractor will:

5.1 If Hosted Services are provided by a Hosting Provider, ensure each Hosting Provider maintains FedRAMP authorization for all Hosted Services environments throughout the Term, and in the event a Hosting Provider is unable to maintain FedRAMP authorization, the State, at its sole discretion, may either a) require the Contractor to move the Software and State Data to an alternative Hosting Provider selected and approved by the State at Contractor's sole cost and expense without any increase in Fees, or b) immediately terminate this Contract for cause.

5.2 for Hosted Services provided by the Contractor, maintain either a FedRAMP authorization or an annual SSAE 18 SOC 2 Type II audit based on State required

NIST Special Publication 800-53 MOD Controls using identified controls and minimum values as established in applicable State PSPs.

5.3 ensure that the Software and State Data is securely stored, hosted, supported, administered, accessed, and backed up in the continental United States, and the data center(s) in which State Data resides minimally meets Uptime Institute Tier 3 standards (https://www.uptimeinstitute.com/), or its equivalent;

5.4 maintain and enforce an information security program including safety and physical and technical security policies and procedures with respect to its Processing of the State Data that complies with the requirements of the State's data security policies as set forth in this Contract, and must, at a minimum, remain compliant with FISMA and NIST Special Publication 800-53 MOD Controls using identified controls and minimum values as established in applicable State PSPs;

5.5 Throughout the Term, Contractor must not provide Hardware or Services from the list of excluded parties in the System for Award Management (SAM) for entities excluded from receiving federal government awards for "covered telecommunications equipment or services.

5.6 provide technical and organizational safeguards against accidental, unlawful or unauthorized access to or use, destruction, loss, alteration, disclosure, encryption, transfer, commingling or processing of such information that ensure a level of security appropriate to the risks presented by the processing of State Data and the nature of such State Data, consistent with best industry practice and applicable standards (including, but not limited to, compliance with FISMA, NIST, CMS, IRS, FBI, SSA, HIPAA, FERPA and PCI requirements as applicable);

5.7 take all reasonable measures to:

(a) secure and defend all locations, equipment, systems and other materials and facilities employed in connection with the Services against "malicious actors" and others who may seek, without authorization, to destroy, disrupt, damage, encrypt, modify, copy, access or otherwise use Hosted Services or the information found therein; and

(b) prevent (i) the State and its Authorized Users from having access to the data of other customers or such other customer's users of the Services; (ii) State Data from being commingled with or contaminated by the data of other customers or their users of the Services; and (iii) unauthorized access to any of the State Data;

5.8 ensure that State Data is encrypted in transit and at rest using FIPS validated AES encryption modules and a key size of 128 bits or higher;

5.9 ensure the Hosted Services support Identity Federation/Single Sign-on (SSO) capabilities using Security Assertion Markup Language (SAML), Open Authentication (OAuth) or comparable State approved mechanisms;

5.10 ensure the Hosted Services implements NIST compliant multi-factor authentication for privileged/administrative and other identified access.

5.11 Contractor must permanently sanitize or destroy the State's information, including State Data, from all media both digital and nondigital including backups using National Security Agency ("NSA") and/or National Institute of Standards and Technology ("NIST") (NIST Guide for Media Sanitization 800-88) data sanitization methods or as otherwise instructed by the State. Contractor must sanitize information system media, both digital and non-digital, prior to disposal, release out of its control, or release for reuse as specified above.

**6. Security Accreditation Process.** Throughout the Term, Contractor will assist the State, at no additional cost, with its **Security Accreditation Process**, which includes the development, completion and on-going maintenance of a system security plan (SSP) using the State's automated governance, risk and compliance (GRC) platform, which requires Contractor to submit evidence, upon request from the State, in order to validate Contractor's security controls within two weeks of the State's request. On an annual basis, or as otherwise required by the State such as for significant changes, re-assessment of the system's controls will be required to receive and maintain authority to operate (ATO). All identified risks from the SSP will be remediated through a Plan of Action and Milestones (POAM) process with remediation time frames and required evidence based on the risk level of the identified risk. For all findings associated with the Contractor's solution, at no additional cost, Contractor will be required to create or assist with the creation of State approved POAMs, perform related remediation activities, and provide evidence of compliance. The State will make any decisions on acceptable risk, Contractor may request risk acceptance, supported by compensating controls, however only the State may formally accept risk. Failure to comply with this section will be deemed a material breach of the Contract.

**7. Unauthorized Access.** Contractor may not access, and must not permit any access to, State systems, in whole or in part, whether through the Hosted Services or otherwise, without the State's express prior written authorization. Such authorization may be revoked by the State in writing at any time in its sole discretion. Any access to State systems must be solely in accordance with the Contract and this Schedule, and in

no case exceed the scope of the State's authorization pursuant to this Section. All State-authorized connectivity or attempted connectivity to State systems shall be only through the State's security gateways and firewalls and in compliance with the State's security policies set forth in the Contract as the same may be supplemented or amended by the State and provided to Contractor from time to time.

**8. Security Audits.**

8.1 During the Term, Contractor will maintain complete and accurate records of its data protection practices, IT security controls, and the security logs relating to State Data, including but not limited to any backup, disaster recovery or other policies, practices or procedures relating to the State Data and any other information relevant to its compliance with this Contract.

8.2 Without limiting any other audit rights of the State, the State has the right to review Contractor's data privacy and information security program prior to the commencement of Services and from time to time during the term of this Contract. The State, at its own expense, is entitled to perform, or to have performed, an on-site audit of Contractor's data privacy and information security program. If the State chooses to perform an on-site audit, Contractor will, make all such records, appropriate personnel and relevant materials available during normal business hours for inspection and audit by the State or an independent data security expert that is reasonably acceptable to Contractor, provided that the State: (i) gives Contractor at least five (5) Business Days prior notice of any such audit; (ii) undertakes such audit no more than once per calendar year, except for good cause shown; and (iii) conducts or causes to be conducted such audit in a manner designed to minimize disruption of Contractor's normal business operations and that complies with the terms and conditions of all data confidentiality, ownership, privacy, security and restricted use provisions of the Contract. The State may, but is not obligated to, perform such security audits, which shall, at the State's option and request, include penetration and security tests, of any and all Hosted Services and their housing facilities and operating environments.

8.3 During the Term, Contractor will, when requested by the State, provide a copy of Contractor's and Hosting Provider's FedRAMP System Security Plan(s) or SOC 2 Type 2 report(s) to the State within two weeks of the State's request. The System Security Plan and SSAE audit reports will be recognized as Contractor's Confidential Information.

8.4 With respect to State Data, Contractor must implement any required safeguards as identified by the State or by any audit of Contractor's data privacy and information security program.

8.5 The State reserves the right, at its sole election, to immediately terminate this Contract or a Statement of Work without limitation and without liability if the State determines that Contractor fails or has failed to meet its obligations under this **Section 8.**

**9. Application Scanning.** During the Term, Contractor must, at its sole cost and expense, scan all Contractor provided applications, and must analyze, remediate and validate all vulnerabilities identified by the scans as required by the State Secure Web Application and other applicable PSPs.

Contractor's application scanning and remediation must include each of the following types of scans and activities:

9.1 Dynamic Application Security Testing (DAST) – Scanning interactive application for vulnerabilities, analysis, remediation, and validation (may include Interactive Application Security Testing (IAST).

(a) Contractor must either a) grant the State the right to dynamically scan a deployed version of the Software; or b) in lieu of the State performing the scan, Contractor must dynamically scan a deployed version of the Software using a State approved application scanning tool, and provide the State with a vulnerabilities assessment after Contractor has completed such scan. These scans and assessments i) must be completed and provided to the State quarterly (dates to be provided by the State) and for each major release; and ii) scans must be completed in a non-production environment with verifiable matching source code and supporting infrastructure configurations or the actual production environment.

9.2 Static Application Security Testing (SAST) - Scanning source code for vulnerabilities, analysis, remediation, and validation.

(a) For Contractor provided applications, Contractor, at its sole expense, must provide resources to complete static application source code scanning, including the analysis, remediation and validation of vulnerabilities identified by application source code scans. These scans must be completed for all source code initially, for all updated source code, and for all source code for each major release and Contractor must provide the State with a vulnerability assessment after Contractor has completed the required scans.

9.3 Software Composition Analysis (SCA) – Third Party and/or Open Source Scanning for vulnerabilities, analysis, remediation, and validation.

(a) For Software that includes third party and open source software, all included third party and open source software must be documented and the source supplier must be monitored by the Contractor for notification of identified vulnerabilities and remediation. SCA scans may be included as part of SAST and DAST scanning or employ the use of an SCA tool to meet the scanning requirements. These scans must be completed for all third party and open source software initially, for all updated third party and open source software, and for all third party and open source software in each major release and Contractor must provide the State with a vulnerability assessment after Contractor has completed the required scans if not provided as part of SAST and/or DAST reporting.

9.4 In addition, application scanning and remediation may include the following types of scans and activities if required by regulatory or industry requirements, data classification or otherwise identified by the State.

(a) If provided as part of the solution, all native mobile application software must meet these scanning requirements including any interaction with an application programing interface (API).

(b) Penetration Testing – Simulated attack on the application and infrastructure to identify security weaknesses.

**10. Infrastructure Scanning.**

10.1 For Hosted Services, Contractor must ensure the infrastructure and applications are scanned using an approved scanning tool (Qualys, Tenable, or other PCI Approved Vulnerability Scanning Tool) at least monthly and provide the scan's assessments to the State in a format that is specified by the State and used to track the remediation. Contractor will ensure the remediation of issues identified in the scan according to the remediation time requirements documented in the State's PSPs.

**11. Nonexclusive Remedy for Security Breach**.

11.1 Any failure of the Services to meet the requirements of this Schedule with respect to the security of any State Data or other Confidential Information of the State, including any related backup, disaster recovery or other policies, practices or procedures, is a material breach of the Contract for which the State, at its option,

may terminate the Contract immediately upon written notice to Contractor without any notice or cure period, and Contractor must promptly reimburse to the State any Fees prepaid by the State prorated to the date of such termination.

# SCHEDULE F – DISASTER RECOVERY PLAN

The Contractor must provide the State with a detailed Disaster Recovery Plan that include, but not limited to details how the following minimum data security areas will be handled.

- Back-up and Recovery:
  - Organization policy and procedures authorizing this activity.
  - The roles and responsibilities within the organization and the integration of activities with any affiliated organizations also responsible for back-up and recovery.
  - Training and awareness of staff and contractors.
  - The most recent back up/fail-over test date at the time of submission.
  - Priority for the recovery and reconstitution of activities.

  Incident Handling:
  Organization policy and procedures authorizing this activity and covers the areas of preparation, detection and analysis, containment, eradication, reporting and recovery.
  Roles and responsibilities with the organization and affiliated organizations.
  Training and awareness of staff and contractors.
  Description of the implementation of secure communications such as a description of software tool(s) used for tracking and documenting the incident or disaster.
  Disaster Recovery Planning:
  Identification of the organization's business functions, recovery objectives, restoration priorities, and metrics of evaluation.
  Organization policy and procedures authorizing this activity and covers the areas of preparation, detection and analysis, containment, eradication, and recovery.
  Roles and responsibilities with the organization and affiliated organizations.
  Training and awareness practices of staff and contractors.
  The most recent disaster recovery/contingency plan test date at time of submission.
  Methods used to identify deficiencies and corrective actions from the most recent disaster/contingency plan test and the status of corrective actions.
  Description of the implementation of secure communications such as a description of software tool(s) used for tracking and documenting the incident or disaster.
  Identification and use of alternate storage and process sites for business continuity.
  Protections and recovery planning for ransomware attacks.

# SCHEDULE G – TRANSITION IN AND OUT

The Contractor will be responsible for transitioning from MDOT's legacy system to the Contractor's system. The Contractor will be required to coordinate efforts and schedules with the State's current CV-ATMS provider, the State, and any other State contractors. Following Award, Contractor shall develop a Deployment Transition Plan to identify the methodology, procedures, and steps required to transition the new CV-ATMS (software, application, and field device integration) with minimal interruption in services. The Contractor must maintain the State's current equipment programming/configurations for each field device as field changes will not be permitted. It is required that the successful Contractor coordinate closely with the State for development of this transition plan and during all stages of the transition. The plan must clearly identify the roles and responsibilities of all stakeholders, specifically noting any expectations of the State. The Contractor is responsible for submitting the Deployment Transition Plan for review by the State and adequately addressing comments prior to acceptance. The State shall accept the Deployment Transition Plan and schedule for system and software transition prior to the Contractor impacting the existing system.

Elements of the transition plan shall include the following, at a minimum:

1. The assignment of responsibilities and roles of personnel involved in the transition, including but not limited to the Contractor, State of Michigan (MDOT, DTMB), and State of Michigan Contractor(s).

2. Transition readiness assessment, including a risk matrix that identifies transition risks, assesses probability, and proposes mitigation or elimination strategies. Reasonable scenarios of transition problems should be presented, and proposed actions taken to allow transition to continue.

3. Downstream data flow implications, mitigations, and other considerations.

4. Process for transitioning from any existing MDOT systems to the new CV-ATMS platform, including, but not limited to:

    a. Data

    b. Processes

    c. Applications

5. Process of transitioning the system to MDOT at the end of the contract, including, but not limited to:

a. Data

b. Applications

c. Documentation

d. Source Code

e. Cloud service licenses

f. Other licenses for use of the software

6. Document shall include all contracts or agreements, etc. for any cloud systems being used, including a plan to transition cloud contracts.

7. Procedures and milestone dates for the following activities:

    a. Installing all software components and data management systems

    b. Creating and configuring all field devices in the software

    c. Creating and configuring all applications in the software

    d. Transition of software functionality, application functionality, and field device integration. Must include any proposed phasing/releases and document how system functionality will be maintained.

    e. Completion of User Acceptance Testing (UAT)

    f. Completion of Authority to Operate (ATO)

    g. Setup and connection of all onsite hardware and/or cloud-based services and software

    h. Transfer of agreed upon information (e.g., configuration, events) from existing systems, including but not limited to:

        - Field device configuration
        - Active and planned lane closure request events (including all applicable fields associated with each event, for reference the system averages approximately 600 events)
        - Weather event decision tree

    i. Archival of agreed upon information from existing systems

j. Training on new software functionality

k. Decommissioning existing software and equipment

In addition, the Deployment Transition Plan shall be developed to comply with the following requirements:

1. The Contractor shall include anticipated transition dates within the project schedule and coordinate with the State when schedule adjustments are made. The Contractor shall provide a minimum of two week's notice to the State for approval prior to any system, software, and application transition. The State reserves the right to disallow transition activities on specific dates (e.g., holidays, special events, staff availability).

2. The existing Lane Closure Request and Weather Application functionality must go-live and be fully operational by December 1, 2023. New functionality to these applications can be implemented after December 1, 2023. The Contractor shall meet with MDOT to identify the business requirements needed to be met to meet the existing functionality.

### TRANSITION METHODOLOGY

**Stage 1: Transition Planning**: During the implementation phase, Contractor will prepare a transition plan for MDOT that defines the transition sequence, schedule, cutover timeline, and responsibilities of the Contractor's team and the State team from pre-transition through post go-live. In addition, the document will describe roll back plans in case something goes wrong during the cutover process. As part of this document, Contractor will work with the State to identify and document all specific requirements/constraints (e.g., minimize disruptions to operations, avoid transitioning during major or special events, etc..) that would impact scheduling and planning.

**Stage 2**: **Transition Preparations**: This stage begins once acceptance testing has been successfully completed and the project is ready to advance to deployment. This will be carried out in the month prior to go live. During this stage, the production environment is verified and Contractor will facilitate a series of walkthroughs and dress rehearsals with the State and all stakeholders. This will help ensure that any data flows to parallel and existing systems remain in place.

**Stage 3**: **Readiness Assessment**: 48-72 hours prior to launch, Contractor will perform final checks and verification of the production system and will hold final pre-launch communications with all stakeholders involved in the system cutover. The State's confirmation of readiness and approval to proceed is required to advance to go-live.

**Stage 4: Cutover:** Contractor will execute the cutover plan and transition the CV-ATMS into production. Included in this stage is a post-cutover verification process to ensure integrity will not be lost.

**Stage 5: Post-Cutover Support**: Once the system is successfully launched, Contractor will provide expanded support for operations to validate the system is functioning successfully and ensure that the system users are correctly operating the system

### MAINTAINING EXISTING SYSTEM INTEGRITY

During transition planning, Contractor will compile a complete state of the existing system including devices, data sources, system integrations, users, and other elements. The cutover plan will account for each of these elements. During the actual cutover, Contractor and the State will verify that each element has been transitioned. Post-cutover testing will be conducted to ensure system integrity has been maintained.

Device integrations into CV-ATMS do not require any field changes. During the deployment phase, Contractor will integrate each device in collaboration with the State. Contractor will be using existing device protocols already developed for CMCC as well as adding new device protocols if required. All of the RSU integration into CMCC will be software based. However, during the integration activities Contractor may discover cases where there are issues with the field installation and device status that MDOT will have to decide how to handle.

During the cutover to Production, the CV-ATMS system provides the mechanism to upload all devices into the production system ready for deployment but remain in idle mode until the devices are activated for either testing or permanent deployment. During system acceptance testing each individual device will be temporarily put into on mode and after testing revert back to off mode until such time the devices are permanently cutover to CV-ATMS control. For third-party RSUs, the RCU will be put into read config mode. This process allows for the system to be fully integrated without interfering with the current management system or field devices.

# SCHEDULE H – FEDERAL PROVISIONS ADDENDUM

This addendum applies to purchases that will be paid for in whole or in part with funds obtained from the federal government. The provisions below are required and the language is not negotiable. If any provision below conflicts with the State's terms and conditions, including any attachments, schedules, or exhibits to the State's Contract, the provisions below take priority to the extent a provision is required by federal law; otherwise, the order of precedence set forth in the Contract applies. Hyperlinks are provided for convenience only; broken hyperlinks will not relieve Contractor from compliance with the law.

## 1. Equal Employment Opportunity

If this Contract is a "**federally assisted construction contract**" as defined in 41 CFR Part 60-1.3, and except as otherwise may be provided under 41 CFR Part 60, then during performance of this Contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be 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 setting forth the provisions of this nondiscrimination clause.

(2) The Contractor 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 race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of

other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

> Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such

direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

**2. Davis-Bacon Act (Prevailing Wage)**

If this Contract is a **prime construction contracts** in excess of $2,000, the Contractor (and its Subcontractors) must comply with the Davis-Bacon Act (40 USC 3141-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”), and during performance of this Contract the Contractor agrees as follows:

(1) All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.

(2) Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.

(3) Additionally, contractors are required to pay wages not less than once a week.

**3. Copeland "Anti-Kickback" Act**

If this Contract is a contract for construction or repair work in excess of $2,000 where the Davis-Bacon Act applies, the Contractor must comply with the Copeland "Anti-Kickback" Act (40 USC 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"), which prohibits the Contractor and subrecipients from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled, and during performance of this Contract the Contractor agrees as follows:

Contractor. The Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

(2) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA or the applicable federal awarding agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

(3) Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and Subcontractor as provided in 29 C.F.R. § 5.12.

### 4. Contract Work Hours and Safety Standards Act

If the Contract is **in excess of $100,000** and **involves the employment of mechanics or laborers**, the Contractor must comply with 40 USC 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5), as applicable, and during performance of this Contract the Contractor agrees as follows:

(1) Overtime requirements. No Contractor or Subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The State shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the Subcontractors to include these

clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

**5. Rights to Inventions Made Under a Contract or Agreement**

If the Contract is funded by a federal "funding agreement" as defined under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

**6. Clean Air Act and the Federal Water Pollution Control Act**

If this Contract is **in excess of $150,000,** the Contractor must comply with all applicable standards, orders, and regulations issued under the Clean Air Act (42 USC 7401-7671q) and the Federal Water Pollution Control Act (33 USC 1251-1387), and during performance of this Contract the Contractor agrees as follows:

Clean Air Act

1. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.

2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
3. The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

Federal Water Pollution Control Act

(1) The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.

(2) The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

**7. Debarment and Suspension**

A "contract award" (see 2 CFR 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (51 FR 6370; February 21, 1986) and 12689 (54 FR 34131; August 18, 1989), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(1) This Contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the Contractor is required to verify that none of the Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by the State. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the State, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(3) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered

transactions.

**8. Byrd Anti-Lobbying Amendment**

Contractors who apply or bid for an award of **$100,000 or more** shall file the required certification in Exhibit 1 – Byrd Anti-Lobbying Certification below. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

**9. Procurement of Recovered Materials**

Under 2 CFR 200.322, Contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

> (1) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—
>
> a. Competitively within a timeframe providing for compliance with the contract performance schedule;
>
> b. Meeting contract performance requirements; or
>
> c. At a reasonable price.
>
> (2) Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive- procurement-guideline-cpg-program.
>
> (3) The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

**10. Additional FEMA Contract Provisions.**

The following provisions apply to purchases that will be paid for in whole or in part with funds obtained from the Federal Emergency Management Agency (FEMA):

(1) Access to Records. The following access to records requirements apply to this contract:

a. The Contractor agrees to provide the State, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

b. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

c. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

d. In compliance with the Disaster Recovery Act of 2018, the State and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

(2) Changes.

See the provisions regarding modifications or change notice in the Contract Terms.

(3) DHS Seal, Logo, And Flags.

The Contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

(4) Compliance with Federal Law, Regulations, and Executive Orders.

This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives.

(5) No Obligation by Federal Government.

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the State, Contractor, or any other party pertaining to any matter resulting from the Contract."

(6) Program Fraud and False or Fraudulent Statements or Related Acts.
The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract.

# SCHEDULE H – ATTACHMENT 1- BYRD ANTI LOBBYING CERTIFICATION

Contractor must complete this certification if the purchase will be paid for in whole or in part with funds obtained from the federal government and the purchase is greater than $100,000.

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The Contractor,_____ certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

_____
Signature of Contractor's Authorized Official

_____
Name and Title of Contractor's Authorized Official

_____
Date

# SCHEDULE I – ACCEPTANCE TESTING

The parties agree as follows:

1. **Definitions.** For purposes of this Schedule, the following terms have the meanings set forth below. All initial capitalized terms in this Schedule that are not defined in this **Section 1** of Schedule I have the respective meanings given to them in the Contract's Software Terms and Conditions.

**"Acceptance"** has the meaning set forth in **Section 3.7** of this Schedule I, "Accept" and "Accepted" have a correlative meaning.

**"Acceptance Testing"** means the act of performing or conducting Acceptance Tests. Also called "User Acceptance Testing" or "UAT"

**"Acceptance Tests"** means such tests as may be conducted in accordance with **Section 3** of this Schedule and the Statement of Work to determine whether the Software and Applications meet the Requirements.

"**Acceptance Test Plan**" means the Contractor's written plan outlining the schedule, acceptance and integration tests to be conducted, the purpose of each test, the environment in which the test will be conducted, the passing criteria, procedures for logging Non-Conformities and tracking corrections and re-testing status also called "Acceptance Testing Plan" or "User Acceptance Testing Plan" or "UAT Plan."

**"Integration Testing"** means UAT performed on configured, customized, or modified Software and Applications as a whole to ensure full operability, integration, and compatibility among all elements of the Solution.

**"Non-Conformity"** or **"Non-Conformities"** means any failure or failures of the Software and Applications to conform to the Requirements, and any applicable specifications set forth in the Documentation.

**"SUITE"** means the State Unified Information Technology Environment, which was designed and implemented to standardize methodologies, processes, procedures, training, and tools for project management and systems development lifecycle management.

**"Test Data"** means the Contractor's or the State's test data and testing scripts for use during Acceptance Testing.

**"Test Environment"** means the operating environment for purposes of UAT.

**"Testing Period"** has the meaning set forth in **Section 3** of this Schedule.

**"Test Results"** means the pass/fail results that the Contractor or the State observed by processing the Test Data using the Software and Applications compared to what actually happened.

2. **Parties Obligations for Acceptance Testing**.

**2.1 Contractor Acceptance Testing Obligations**. The Contractor will complete the following tasks as part of UAT:

A. Install, configure, and deploy the Software and Applications into the Test and Production Environments;

B. Create and provide to the State, sufficient Test Data to adequately test the Software and Applications, including testing of any hardware for purposes of Integration Testing;

C. Review any State-created Test Data and provide necessary feedback to the State;

D. Assist the State with completing any necessary SUITE documentation;

E. Communicate to the State that the Testing Environment is ready for use prior to initiation of Acceptance Tests.

F. Create written Acceptance Test Plans (ATP) in accordance with **Section 3**.

G. Conduct pre-test using the approved ATP plans. Document pre-test results and submit to the State to show successful completion.

H. Train State staff on how to perform Acceptance Tests using the ATP Plans.

I. Correct Non-Conformities in Test Results in accordance with **Section 3** of this Schedule, which are identified by the Contractor or the State during the Testing Period;

J. Conduct status meetings during Acceptance Testing to assess Test Data and Test Results;

K. Provide a tracking system for Contractor and the State to log Non-Conformities and track corrections and re-testing status;

L. Deliver the Software and Applications with configuration and events pre-programmed and templates populated;

M. Integrate all field devices, systems, and other components to allow Final Acceptance Tests (FAT) to be performed in accordance with Section 3.3; and

N. The Contractor is solely responsible for all costs and expenses related to the Contractor's performance of, participation in, and observation of Acceptance Testing.

**2.2 State Assistance with Acceptance Testing**: The State agrees to assist with the following tasks as necessary:

A. Develop and provide additional tests for the ATP;

B. Execute tests and report Test Results to the Contractor in accordance with the ATP Plans;

C. Participate in testing status meetings;

D. Enter Non-Conformities into the Contractor-provided issue tracking system. Details to be entered include a minimum of: (i) detailed description of the problem (include screenshot(s) if applicable); and (ii) steps needed to reproduce the issue;

E. Perform regular retest of Contractor resolved Non-Conformities based on mutually agreed schedule; and

F Work with the Contractor to prioritize issues that arise during Acceptance Testing.

G. Witness Acceptance Tests conducted by the Contractor.

**3. Acceptance Testing; Acceptance.**

The Contractor shall develop written Acceptance Test Plans (ATP) to validate that the hardware, software, applications, interfaces, and other functionality meets each requirement identified in Schedule A – Statement of Work and Schedule A – Table 1, Business Specification Worksheet. The ATPs must be submitted to the State for review a minimum of thirty (30) calendar days prior to the scheduled testing start date. Testing may not commence until the ATPs are accepted by the State. The Contractor will be responsible for addressing all comments received and resubmitting

to the State for acceptance. If a resubmittal is deemed to not adequately address all comments, multiple resubmittals may be required before the ATPs are accepted by the State.

A phased acceptance testing process may be used to align with a phased implementation approach if agreed to by the State. Unless otherwise specified in the Statement of Work, upon installation of the Software and Applications, Acceptance Tests will be conducted as set forth in this Section 3 to ensure the Software and Applications conform to the requirements of this Contract, including the applicable Specifications and Documentation. Acceptance Tests will be conducted by the party responsible as set forth in the Statement of Work or, if the Statement of Work does not specify, the State, provided that:

(i) for Acceptance Tests conducted by the State, if requested by the State, the Contractor will make suitable for Contractor Personnel to be available to observe or participate in such Acceptance Tests; and

(ii) for Acceptance Tests conducted by the Contractor, the State has the right to observe or participate in all or any part of such Acceptance Tests.

The ATPs will serve as guides to operationally test system hardware, field-to-center communications, software, applications, and integrations as identified in Schedule A – Statement of Work and Schedule A – Table 1, Business Specification Worksheet. The ATPs must include a detailed description of the tests to be conducted, the purpose of each test, the steps to conduct each test, the environment the test will be conducted, and the passing criteria.

The State may suspend Acceptance Tests and the corresponding Testing Period by written notice to the Contractor if the State discovers a material Non-Conformity in the tested Software and Applications or part or feature of the Software and Application. In such event, the Contractor will immediately, and in any case within ten (10) Business Days, correct such Non-Conformity, whereupon the Acceptance Tests and Testing Period will resume for the balance of the Testing Period.

The State may suspend Acceptance Tests and the corresponding Testing Period at their discretion as deemed necessary if unforeseen circumstances arise.

The Contractor must coordinate with the State to agree upon any date and/or time restrictions associated with Acceptance Tests involving active devices.

The State reserves the right to defer any Acceptance Test to a future project phase.

The following ATPs shall be developed:

**3.1 Software User Acceptance Testing (UAT).** Upon completion of approved project tasks and the State's approval of ATP, a start date shall be set for Software UAT which shall be conducted diligently for up to sixty (60) Calendar Days, or such other period as may be set forth in the Statement of Work (the "Testing Period"). The State may, but is not obligated, to perform its own pretest on the Software utilizing the Contractor's UAT Plan. If the State does perform a pretest, and the Contractor's UAT Plan does not successfully pass as described by the Contractor's UAT Plan, the State, at its discretion, is not obligated to move into the formal Acceptance Tests set forth in this Section 3. The State may elect to require the Contractor to correct any problems encountered during the pretest.

Software UAT shall include the following test plans:

A. **Device Confirmation Test plan** – to test each combination of device, make, model, firmware version, and communication configuration to show compatibility with the software. Device confirmation testing will require the integration of each combination using the State's active devices. The Device Confirmation Test must be conducted by the Contractor and witnessed by the State. The Contractor must coordinate with the State to identify which devices will be included in this test. These devices will be disconnected from the State's existing CV-ATMS and connected to the State's Testing Environment with the Contractor's CV-ATMS for testing. Following the Contractor's device confirmation tests, the devices may remain in the testing environment for up to 30 calendar days to allow the State to conduct additional testing. These devices may be reconnected to the State's existing CV-ATMS at the State's discretion.

B. **Integration Test plan** – Integration Testing will take place to verify integration functionality upon delivery and installation of any application programming interface (API), database connection, third-party integration, configuration or customization to the Software under the Statement of Work.

C. **Application Test plan** – Application Testing will take place to verify application functionality upon delivery and installation of any application, configuration or customization to the Software under the Statement of Work.

D. **Software Acceptance Test plan** – to verify complete system functionality in accordance with each requirement in Schedule A – Statement of Work and Schedule A – Table 1, Business Specification Worksheet between the State and the Contractor. The Software Acceptance Test must be conducted by the State with assistance from the Contractor. The Contractor's Software Acceptance Test plan must identify which tests will be conducted using virtual devices, mock-up devices, and/or active State devices and if the test will be conducted using simulated and/or real data.

**3.2 Application UAT.** Upon completion of approved project tasks and the State's approval of ATP, a start date shall be set for Application UAT which shall be conducted diligently for up to sixty (60) Calendar Days, or such other period as may be set forth in the Statement of Work (the "Testing Period"). The State may, but is not obligated, to perform its own pretest on Applications utilizing the Contractor's UAT Plan. If the State does perform a pretest, and the Contractor's UAT Plan does not successfully pass as described by the Contractor's UAT Plan, the State, at its discretion, is not obligated to move into the formal Acceptance Tests set forth in this Section 3. The State may elect to require the Contractor to correct any problems encountered during the pretest.

Application UAT shall include the following test plans:

A. **Unique Application Test Plans** – to test and verify each unique applications complete functionality in accordance with each requirement in Schedule A – Statement of Work and Schedule A – Table 1, Business Specification Worksheet. The Application Tests must be conducted by the State with assistance from the Contractor. The Contractor's Unique Application Test plans must identify if the test will be conducted using simulated and/or real data

B. **Integration Test plan** – Integration Testing will take place to verify integration functionality upon delivery and installation of any application programming interface (API), database connection, third-party integration, configuration or customization that is included in the subject application.

**3.3 Final Acceptance Testing (FAT).** FAT shall be performed in the Production Environment to verify the full functionality of all components of the software and applications with the full integration of all field devices and data feed integrations. The Contractor shall work with the State to install and configure their CV-ATMS in the State's Production Environment. The FAT may occur in phases in accordance with the accepted Transition Plan. All FAT results must

be documented by the Contractor and submitted to the State for review and acceptance after each testing phase.

A. **Final Device Test plan** – performed at a SOM workstation or TOC following the integration of each field device into the new CV-ATMS to confirm the seamless integration and full functionality as defined in the business requirements.

B. **Final System Test plan** – performed at a SOM workstation or TOC following the integration of each system (all devices within a subject system must pass Final Device Test prior to Final System Test) to confirm the seamless integration and full functionality as defined in the business requirements.

C. **Final Integration Test plan** – performed at a SOM workstation or TOC following the integration of each data feed integration to confirm the seamless integration and full functionality as defined in the business requirements.

D. **Final Application Test plan** – performed at a SOM workstation or TOC following the integration of each application to confirm the full functionality as defined in the business requirements.

E. **Burn-in Test –** Burn-In starts following the successful completion of final device, system, and integration testing, as described in this Section. The State will have sixty (60) Business Days to use the Software in the Operating (Production) Environment to confirm the systems overall functionality. There may be no major failures during the burn-in period. If one occurs, the sixty (60) Business Day period will be restarted after the major failure has been corrected to the State's satisfaction. The following criteria constitute a major failure:

   (i) Any failure that requires more than 48 hours to correct after providing notice to the Contractor.

   (ii) Frequent occurrence of minor failures indicating a major system flaw, as determined by the State.

   A minor failure is any other failure that adversely effects the accomplishment of an operational function. The sixty (60) Business Day burn-in period must be stopped when a minor failure occurs and restarted

without resetting to zero after the minor failure is corrected to the satisfaction of the State.

**3.4 Notices of Completion, Non-conformities, and Acceptance.** Within fifteen (15) Business Days following the completion of any Acceptance Tests, including any Integration Testing, the party responsible for conducting the tests will prepare and provide to the other party written notice of the completion of the tests. Such notice must include a report describing in reasonable detail the tests conducted and the results of such tests, including any uncorrected Non-Conformity in the tested Software.

A. If such notice is provided by either party and identifies any Non-conformities, the parties' rights, remedies, and obligations will be as set forth in **Section 3.5** and **Section 3.6**.

B. If such notice is provided by the State, is signed by the State Program Managers or their designees, and identifies no Non-Conformities, such notice constitutes the State's Acceptance of such Software.

C. If such notice is provided by the Contractor and identifies no Non-Conformities, the State will have sixty (60) Business Days to use the Software in the Operating Environment and determine, in the exercise of its sole discretion, whether it is satisfied that the Software contains no Non-Conformities, on the completion of which the State will, as appropriate:

(i) Notify the Contractor in writing of Non-Conformities the State has observed in the Software and of the State's non-acceptance thereof, whereupon the parties' rights, remedies and obligations will be as set forth in **Section 3.5** and **Section 3.6**; or

(ii) Provide the Contractor with a written notice of its Acceptance of such Software, which must be signed by the State Program Managers or their designees.

**3.5 Failure of Acceptance Tests**. If Acceptance Tests identify any Non-Conformities, the Contractor, at the Contractor's sole cost and expense, will remedy all such Non-Conformities and re-deliver the Software, in accordance with the requirements set forth in the Statement of Work. Redelivery will occur as promptly as commercially possible and, in any case, within thirty (30) Business Days following, as applicable, the Contractor's:

A. Completion of such Acceptance Tests, in the case of Acceptance Tests conducted by the Contractor; or

B. Receipt of the State's notice under **Section 3.5(A)** or **Section 3.4(C)(i)**, identifying any Non-Conformities.

The State reserves the right to conditionally accept identified Non-Conformities as follows:

A. A Non-Conformity pending resolution which must be resolved within the next two software releases or within six months, whichever occurs first; or

B. A Non-Conformity resolved through the provision of a workaround that is deemed satisfactory, in the State's sole discretion.

**3.6 Repeated Failure of Acceptance Tests**. If Acceptance Tests identify any Non-Conformity in the Software after a second or subsequent delivery of the Software, or the Contractor fails to re-deliver the Software on a timely basis, the State may, in its sole discretion, by written notice to the Contractor:

A. Continue the process set forth in this **Section 3**;

B. Accept the Software as a nonconforming deliverable, in which case the Fees for such Software will be reduced equitably to reflect the value of the Software as received relative to the value of the Software had it conformed; or

C. The State reserves the right to conditionally accept identified repeat Non-Conformities as follows:

i. A Non-Conformity pending resolution which must be resolved within the next two software releases or within six months, whichever occurs first; or

ii. A Non-Conformity resolved through the provision of a workaround that is deemed satisfactory, in the State's sole discretion.

D. Deem the failure to be a non-curable material breach of this Contract and the Statement of Work and terminate this Contract for cause in accordance with **Section 16.1 of the Contract's Software Terms and Conditions**.

**3.7 Acceptance**. Acceptance ("**Acceptance**" or "**Final Acceptance**") of the Software will occur upon the successful completion of the Burn In Test and the

State's delivery of a notice accepting the Software under **Section 3.4B or 3.4C(ii)**.