

**CONNECTED VEHICLE ROADSIDE EQUIPMENT.
(REV 8-30-24)**

SECTION 995 is expanded by the following new Article:

995-20 Connected Vehicle Roadside Equipment.

995-20.1 General: Meet the applicable national requirements and standards for Connected Vehicle (CV) equipment, including those listed in Table 995-11.

Table 995-11 CV Equipment Requirements and Standards	
Document Identifier	Description
CTI 4001 v01.01 (or later)	Connected Transportation Interoperability (CTI) Roadside Unit (RSU) Standard. A connected intersection-ready Standard of AASHTO, ITE, NEMA, and SAE International (available at www.ite.org).
CTI 4501 v01.00 (or later)	Connected Intersections Implementation Guide (available at www.ite.org).
ISO/TS 19091:2019	Intelligent transport systems – Cooperative ITS – Using V2I and I2V communications for applications related to signalized intersections (ISO/TS 19091:2019)
IEEE 802.11-2012 (or later)	Institute of Electrical and Electronics Engineers (IEEE) Standard for Information technology-- Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
IEEE 1609.2-2022 (or later)	IEEE Standard for WAVE -- Security Services for Applications and Management Messages
IEEE 1609.3-2022 (or later)	IEEE Standard for WAVE -- Networking Services
SAE J2735 SEP2023 (or later)	V2X Communications Message Set Dictionary
SAE J3268 MAR2023 (or later)	Listing of Provider Service Identifiers and Associated Application Technical Reports
IEEE 802.3-2022 (or later)	Standard for Ethernet
FCC Title 47, Parts 2, 15, and 90	Federal Communications Commission (FCC) Code of Federal Regulations (CFR)

CV equipment shall include hardware, software, ancillary devices, and all material necessary to enable wireless V2I communications. Ensure that all assembly

hardware, including nuts, bolts, external screws and locking washers less than 5/8 inch in diameter, is Type 304 or 316 passivated stainless steel. Use stainless steel bolts, screws and studs meeting the requirements of ASTM F593. Use nuts meeting the requirements of ASTM F594. Ensure all assembly hardware greater than or equal to 5/8 inch in diameter is galvanized. Use bolts, studs, and threaded rod meeting the requirements of ASTM A307. Use structural bolts meeting the requirements of ASTM F3125, Grade A325.

CV equipment shall be FCC certified. Ensure that the FCC certification mark is displayed on an external label and that the RSU operates within the licensed frequencies of the 5.9 GHz spectrum granted by the FCC.

CV equipment shall be capable of remote firmware updates performed over the local network. Device manufacturers shall make firmware updates available to the Department and maintaining agency at no cost.

CV equipment, including RSUs, shall be capable of data sharing for third party use by systems such as the FDOT V2X Data Exchange platform and SunGuide®.

995-20.2 Connected Vehicle Applications: CV equipment, including RSUs, shall be capable of performing applications using the following CV messages. All CV messages shall be compliant with Society of Automotive Engineers (SAE)-J2735 and 2945/x standards including:

1. Basic Safety Message (BSM) including position, speed, heading, acceleration, and vehicle size.
2. Personal Safety Message (PSM) including user type, position, speed, and heading.
3. Signal phase and timing (SPAT) messages.
4. MAP messages that describe roadway and intersection geometry.
5. Traveler information messages (TIM).
6. Signal request messages (SRM)
7. Signal status messages (SSM)

995-20.3 Roadside Unit (RSU): The RSU shall be a commercially available production device that provides information and supports public safety operations in a V2I/V2X communication environment. The RSU shall be enrolled and provisioned in the current Florida Department of Transportation Security Credential Management System (FDOT SCMS) by the manufacturer.

The RSU shall support C-V2X operation including direct communication mode without using base stations.

RSUs shall be interoperable with FDOT APL approved Advanced Transportation Controller (ATC) traffic signal controllers.

The RSU shall support web-based user access through a Graphical User Interface (GUI) that provides secure access for device configuration, operation, and maintenance.

The RSU shall be provided with an application programming interface (API) or similar documented interface to the Department at no additional cost. The RSU interface shall allow data exchange with third party systems (e.g., providing a data feed of all messages broadcast and received by the RSU).

The RSU shall automatically recover from a power failure within one minute once power is restored. Ensure that all programmable settings are restored to their previous configurations and that the system resumes proper operation.

995-20.3.1 Antennas: Ensure that antennas are provided for all radio frequency (RF) connectors on the RSU. The RSU shall be provided with omni-directional antennas supplied by the RSU manufacturer and tested with the device to meet FCC requirements.

995-20.3.2 Ports and Connectors: The RSU shall include all necessary ports and connectors for a complete weatherproof assembly. All ports shall be legibly and permanently marked designating their intended use. All labels shall be weather resistant.

995-20.4 Industrial Computer for CV Applications: Provide an industrial computer with a current Linux operating system to serve as a CV application platform. The industrial computer shall provide a platform for hosting and executing CV applications and other software. The industrial computer shall be provided with CV applications including:

1. An application that accepts I/O logic data and produces SAE J2735 compliant TIMs for broadcast by the RSU (e.g., School Zone Warning TIM when associated beacons are active, Advanced Rail Crossing Notification when gates are actuated).
2. An application that can be configured to receive source data from a specified address (i.e., IP and port number) and forward that data to multiple configurable destination addresses.

The industrial computer must automatically recover from power failure within one minute after power is restored. All applications hosted on the industrial computer shall automatically start using their previous configuration and resume proper operation. The industrial computer shall have sufficient processing power, memory, and storage to provide the computing power required for CV applications.

995-20.4.1 Communications: The industrial computer shall include a minimum of one Ethernet communications interface that provides a 10/100/1000 Base TX connection. All unshielded twisted pair/shielded twisted pair network cables and connectors shall comply with TIA 568.

The industrial computer shall include 2 universal serial bus (USB) interfaces for standardized connection and communication between other devices and peripherals.

995-20.5 Configuration and Management: CV equipment shall be provided with all hardware, software, configuration tools and software licenses required for local and remote configuration, operation, and management including access to all user-programmable features as well as health and status monitoring, event logging, and diagnostic utilities. Configuration and management functions shall be password protected.

995-20.6 Mechanical Requirements: CV equipment shall be permanently marked with manufacturer name or trademark as well as part number and serial number. Ensure that the markings are visible after installation.

Do not use self-tapping screws on the exterior of the assembly.

All parts exposed to the elements shall be made of corrosion-resistant materials, such as plastic, stainless steel, anodized aluminum, brass, or gold-plated metal.

The dimensions of the industrial computer shall allow installation in a traffic cabinet.

995-20.7 Electrical Requirements: The RSU shall be provided with a power over ethernet (PoE) injector. Powered ports on the PoE injector shall meet the requirements set forth in IEEE 802.3. The PoE injector shall operate using a nominal input voltage of 120VAC. If the PoE injector requires nominal input voltage other than 120VAC, furnish the appropriate voltage converter. The industrial computer shall operate on a nominal voltage of 120VAC. Supply an appropriate voltage converter for industrial computers that require operating voltages other than 120VAC.

995-20.8 Environmental Requirements: Meet the environmental requirements of CTI 4001. The RSU, mounting hardware, and any other related material that is exposed to the environment shall be designed for 150 mph wind speeds and meet the requirements of the Department's Structures Manual.

Do Not Use Without CO Specs Authorization