Louisiana
Department of Transportation
and
Development

Traffic Operations Approved Products List Number 46

Combination Video and Radar Vehicle Tracking and Detection System

Revised October 29th, 2024

DESCRIPTION

This specification sets forth the minimum requirements for a Combination Video and Radar Vehicle Tracking and Detection System (VRVTDS). The multi-sensor tracking and detection system must be compatible with both Type 1 and Type 2 NEMA TS 2 Cubic/TrafficWare Series 900 ATC, Model No. 980-B240 controller units (Traffic Signal Controller) and a NEMA TS 2 Cabinet (Signal Cabinet) as described within this specification. Controllers shall not be provided with the system. NEMA TS 2 Cabinets shall not be provided with the system.

NOTE: National Electrical Manufacturers Association (NEMA) specifications are referred within this specification.

REQUIREMENTS

General Functionality

The VRVTDS must detect traffic facility users in real time as they travel across each detection zone using a Detection Processor(s). Traffic facility user, at a minimum, is defined as all vehicular traffic. The VRVTDS traffic facility user detection shall have at least a 95% accuracy for detection based on third party testing, with only slight degradation possible under adverse weather conditions which reduce detection. Traffic facility user detection shall be capable across eight (8) vehicular lanes, at a minimum.

Once a traffic facility user is detected, the VRVTDS shall be capable of providing the Traffic Signal Controller with vehicle detection inputs (outputs from the VRVTDS) via the Signal Cabinet detection rack or Synchronous Data Link Control (SDLC). The VRVTDS outputs to the Traffic Signal Controller shall be 64 outputs at minimum. When communicating to the Traffic Signal Controller and Signal Cabinet, the VRVTDS shall comply with the applicable standards stated in the Traffic Controller Assemblies with National Transportation Communication for Intelligent Transportation System Protocol (NTCIP) Requirements Version 1202 v03b.

The VRVTDS must be capable of changing detection characteristics based on external inputs provided from the Traffic Signal Controller or Signal Cabinet. When these inputs are received, the VRVTDS must change the characteristics of a detection zone based on the external inputs such as signal phase state. Each detection zone must be able to switch from one zone type (i.e. presence, extension, pulse, etc.) to another zone type based on the signal phase state. At a minimum, the system must include detection zone types for presence, extension, count and pulse. For example, a zone may be a “count” zone when the phase state is green but change to a “presence” zone type when the phase state is not green.

The VRVTDS must default to a safe condition, such as a constant call on each active detection channel, in the event of unacceptable interference or detection sensor communication failure.

The VRVTDS shall have the ability to count motor vehicles. When a detection zone is set to count, the count value must be either stored internally or externally for later retrieval. External storage may be done via a USB Storage device or the currently approved LADOTD Traffic Signal Controller. The VRVTDS must also have the capability to calculate and store average speed and lane occupancy at bin intervals of 15 min., 30 min., and 60 min. VRVTDS must be capable of internal storage and must, at a minimum, have enough built in data storage for at least seven (7) days of data.

At a minimum, the VRVTDS shall have a User Interface that allows the operator to program detection zones, detection zone parameters, VRVTDS settings, retrieve stored data, view any reports generated by the VRVTDS, traffic signal phasing status in real time (green, yellow, and red indication) for at least 8 phases, and see a real time status of the VRVTDS. The operator must be able to, at a minimum, toggle the display for detection zone phases and zone identifiers. When creating a detection zone, the operator must be allowed, at a minimum, to select and modify zone parameters such as channel output assignments, zone type, input status, and zone identifiers. Detection zone programming is to be done visually within the User Interface. When drawing the detection zone, the visual interface must use the image provided by the VRVTDS sensor cameras, as appropriate, for each approach being programmed. When the operator is programming detection zones, the VRVTDS must aid the user in drawing zones. This aid must include drawing additional detection

zones by automatically drawing and placing zones at appropriate locations with a single mouse click. The VRVTDS must utilize geometric extrapolation from the parent zone when creating any child zones. The process must also automatically accommodate lane marking angles and any zone overlaps. The VRVTDS User Interface must allow for the modification of existing detection zones. These detection zone modifications include changing the zone shape or zone parameters.

The VRVTDS User Interface shall be accessible via web browser (Google Chrome or Microsoft Edge at minimum) or capable of being installed on a Windows-based PC that is running Windows 10, at minimum. If the User Interface requires a web browser it shall not require internet access. The VRVTDS User Interface must be capable of being accessed remotely from within the LADOTD Network when connected to the LADOTD Network.

General Hardware and Components

The VRVTDS shall come complete with all required equipment, hardware and components for a fully operational system. At a minimum, the following shall be provided:

- Detection Processor(s)
- Video and Radar Sensor Unit
- Cabinet Component(s)

All VRVTDS Cabinet Component(s) must operate in the conditions of a NEMA TS 2 signal cabinet and meet all applicable requirements of NEMA Standards Publication TS 2-2021, Section 2 including but not limited to shock, vibration, and temperature. All VRVTDS components outside of the cabinet shall have a minimum operating temperature range of -30°F to +165°F.

The VRVTDS shall operate using a voltage input of 120 VAC at 60 Hz.

Detection Processor(s)

The capabilities of the Detection Processor(s) as they relate to the VRVTDS overall performance are described within the General Functionality section of this specification. The Detection Processor(s) itself may be stored within the Video and Radar Sensor Unit (VRSU) or the Signal Cabinet. The Detection Processer(s) shall be onsite and not require internet access to perform the required functions.

The Detection Processor(s) must be capable of providing a minimum of thirty-two (32) detection zones for each VRSU. The thirty-two (32) detection zones provided by the Detection Processor(s) shall include, at a minimum, twenty (20) detection zones from the video sensor and six (6) detection zones from the radar sensor.

Video and Radar Sensor Unit (VRSU)

The VRSU must not exceed a total weight of 25 pounds. The VRSU enclosure must meet the latest NEMA-4 specifications and shall be designed to minimize the effects of adverse weather conditions and prevent ice and condensation formation on the lens. The VRSU enclosure shall be rated for up to 95% relative humidity without internal condensation. Any plastics used for the VRSU enclosure must include ultraviolet inhibitors. Any required connectors to the VRSU shall be weather sealed.

Each VRSU shall have a forward facing detection range that includes 45 feet to 600 feet from the installation when mounted any height between 17 feet to 30 feet above the road surface.

The VRSU video sensor shall provide, at a minimum, a 720p video feed or equivalent to the Detection Processor(s). The VRSU video sensor, regardless of time of day, shall allow for the accurate video feed under all roadway lighting conditions. The scene luminance over which the camera shall produce a useable video image shall be from nighttime to daytime, but not less than the minimum range 0.1 lux to 10,000 lux. The camera shall include an electronic shutter and/or auto-iris lens to compensate for light changes.

The VRSU radar sensor shall be forward fired, and report vehicle presence in lanes with a minimum 90-degree arc from the centroid of the radar sensor face. The degree distribution shall be equidistant from the centroid. The VRSU radar sensor shall be FCC certified under CFR 47, part 15 and operate at a frequency allowed by the FCC for short range radar. The VRSU radar signal shall not interfere with any existing or proposed traffic signal equipment.

The VRSU shall include a mount capable of being used on a vertical or horizontal traffic signal support. The VRSU mount shall include all necessary hardware to install the VRSU to a traffic signal support with a diameter ranging from 4 inches to 20 inches.

The VRSU shall be connected to the VRVTDS Cabinet Component(s) for power. The VRSU shall transfer data to the VRVTDS Cabinet Component(s) via a wired connection. Connection cables shall be provided with each VRSU.

Cabinet Component(s)

The VRVTDS shall be provided with all Cabinet Component(s) and hardware required for a fully operational system meeting the requirements of this specification including but not limited to power supplies, surge protection, VRSU communication components and Signal Cabinet interface components. VRVTDS Cabinet Component(s) may either be rack mounted or shelf mounted. Any shelf mounted components shall be capable of fitting on a shelf with the following dimensions: height of 11 inches, depth of 11 inches, and width of 30 inches.

The VRVTDS Cabinet Component(s) shall include, at a minimum, all power cables, jumpers and terminal blocks needed to connect the detection system to the Signal Cabinet and Traffic Signal Controller. VRVTDS Cabinet Component(s) shall have at least one (1) Ethernet port to allow connection to the LADOTD Network so that the entire system can be accessed remotely.

DOCUMENTATION

The following shall be provided with each VRVTDS:

- Operation Manual(s)
- FCC Certification for Short Range Radar Frequency Compliance
- External Storage Setup Documentation, as applicable

The following may be required prior to delivery and/or acceptance:

- Third Party Testing Certification of 95% or Greater Detection Accuracy
- Confirmation of Installation Height Detection Range

WARRANTY

The VRVTDS shall come complete with a minimum two (2) year manufacturer’s warranty against defects in design, material, function, and workmanship for all parts, materials, components, equipment, wiring, etc. Warranty period will begin on the date of delivery.