Louisiana
Department of Transportation
and
Development

Traffic Control Standard
Number 46

Video and Radar Vehicle Tracking and Detection System (VRVTDS)

Revised May 20, 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.

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 at a minimum be capable across 8 vehicular lanes.

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 internally stored for later retrieval. The VRVTDS must also have the capability to calculate and store average speed and lane occupancy at bin intervals of 10 sec., 20 sec., 1 min., 5 min., 15 min., 30 min. and 60 min. The VRVTDS

must use the radar sensors to count traffic facility users, while also calculating and storing the average speed and lane occupancy across the approach. There must be at a minimum enough built in data storage in the VRVTDS to store at least a week's (7 days) worth of data. The VRVTDS shall have the ability to expand storage via SD Card or USB Drive.

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) 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 to select and modify zone parameters such as channel output assignments, zone type, input status, and zone identifiers at a minimum. 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 includes 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. Modifying existing detection zones must be possible either on a single zone, multiple zones, or all zones at one time.

The VRVTDS User Interface shall be accessible via web browser (Google Chrome or Microsoft Edge at minimum) or capable of being installed on a Window 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

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

- Detection Processor
- Video and Radar Sensor Unit
- Cabinet Components

The VRVTDS cabinet components must operate in the conditions of a NEMA TS 2 signal cabinet, meet all applicable requirements of NEMA Standards Publication TS 2-2021 including but not limited to shock, vibration, and temperature. All VRVTDS components shall have a minimum temperature operating range of -30°F to +160°F.

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

Detection Processor

The capabilities for the Detection Processor(s) are described within the General Functionality section of this specification as those capabilities relate to the VRVTDS overall performance. 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 32 detection zones for each VRSU. The 32 detection zones provided by the Detection Processor(s) shall include at a minimum 20 detections zones from the video sensor and a minimum 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 (National Electrical Manufacturers Association) specifications. Additionally, the VRSU enclosure 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, at minimum, shall have a forward facing detection range of 10ft to 600ft when installed at any height between 17ft to 30ft above the road surface.

The VRSU video sensor shall provide at a minimum a 720p video feed to the Detection Processor(s). The VRSU video sensor shall allow for the accurate video feed under all roadway lighting conditions, regardless of time of day. 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 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. The VRSU mount shall include all hardware to install the VRSU to a traffic signal support with a diameter ranging from 4 inches to 20 inches. The VRSU mount must be capable of being used on a vertical or horizontal traffic signal support.

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.

CABINET COMPONENTS

The VRVTDS Cabinet Components shall include all hardware and components required for a fully operational system to meet this specification. This includes but is not limited to power supplies, surge protection, VRSU communication components and Signal Cabinet interface components. VRVTDS Cabinet Components 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 10 inches, depth of 10 inches, and width of 30 inches.

The VRVTDS Cabinet Components 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 Components shall have at a minimum one Ethernet port to allow connection to the LADOTD Network so that the entire system can be accessed remotely.

DOCUMENTATION

The following documentation shall be provided with the VRVTDS:

- VRVTDS Manuals
- VRVTDS Third Party Accuracy Test and Certification
- VRVTDS Detection Height Certification
- FCC Certification for Radar frequency compliance

WARRANTY

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

TRAINING

At no additional cost to the Department, Contractor shall provide DOTD personnel, as designated by the State Traffic Signal Engineer, with both formal and informal "hands-on" training courses, inclusive of all course materials.

Each formal training course shall take place at the Traffic Services facility in Baton Rouge, LA and consist of sixteen (16) hours of instruction over a two (2) day period. Classroom instruction shall not exceed eight (8) hours per day, number of formal courses shall not exceed two (2) courses per year. Contractor shall supply copies of course materials that will be retained by each attendee. Training shall include but not limited to detection system function, hands-on detections zone set up, trouble shooting and communication set up from field devices to computers.

Each informal "hands-on" shall take place at LADOTD District Offices located throughout the State and shall consist of a one (1) eight (8) hour on-site field visit per District. Contractor shall

provide up to nine (9) field visits to the Department on an annual basis. Hands-on training shall be informal and tailored to the field technician's needs for each District.

Contractor shall coordinate the annual training schedule with the State Traffic Signal Engineer.