Georgia Department of Transportation

Transportation Products Qualified Products List (QPL)

Detection Systems Standard Operating Guide

Field Evaluation Process for Traffic Signal and ITS Vehicle Detection Systems



Georgia Department of Transportation 935 United Avenue, Building 24 Atlanta, GA 30316

> Revised: November 18, 2022 Version 1.0

REVISION HISTORY

Section No.	Effective Date	Description
Cover	11-2022	Internal review draft v1.0
1	11-2022	Internal review draft v1.0
2	11-2022	Internal review draft v1.0
3	11-2022	Internal review draft v1.0
4	11-2022	Internal review draft v1 0
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F	44 0000	Internal review draft v.4.0
5	11-2022	Internal review draft v1.0
6	11-2022	Internal review draft v1.0
7	11-2022	Internal review draft v1.0
8	11-2022	Internal review draft v1.0
9	11-2022	Internal review draft v1.0

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1. Purpose

The Georgia Department of Transportation (Department or GDOT) Product Evaluation Program provides a well-defined and organized system for considering a variety of products for use on Georgia roadway facilities.

This Standard Operating Guide (SOG) provides vendors or manufacturers with a process to evaluate and calculate the percentage of accuracy for vehicle detection systems specifically for use within the GDOT traffic signal and Intelligent Transportation System (ITS) networks. These definitions are supplemental to the SOP 42, which governs the Qualified Products List (QPL) 48 – Traffic Signal & ITS Equipment.

This supplemental SOG serves as additional guidance for submissions of Detection Systems and applies only to devices listed under Section 937 of the GDOT Standard Specifications – Detection Systems.

2. Scope

GDOT follows the processes listed under SOP 42 for product evaluation depending on the type of request. GDOT may request additional material and have different requirements depending on the type of submission: either for traffic signal applications or for ITS applications.

The GDOT Office of Traffic Operations (OTO) will evaluate only those products that fully meet the requirements as documented in the SOP 42 and are covered by the current edition of the GDOT Standard Specifications.

3. Policy

Participation in the Product Evaluation Program is required for vendors/manufacturers (Applicant) who seek to supply their detection systems for use in GDOT construction and maintenance projects. To be eligible for acquisition and installation during a construction project, the product shall be listed on the GDOT QPL 48.

Other local municipalities are encouraged to review these requirements for potential adoption by their respective agency. GDOT will provide technical assistance to local agencies in Georgia upon request.

The current version of SOP 42 is available free of charge and online on GDOT's website.

This SOG and SOP 42 are subject to periodic review and revisions without notification. It is the responsibility of the Applicant to meet current requirements contained in SOP 42.

4. Definitions/Acronym

4.1 Key Words

Applicant: Manufacturer, or vendor, applying for product qualification on the GDOT QPL 48. Responsible for representing the manufacturer's quality management system and product warranty.

Accuracy Test Plan: A document developed by the Applicant explaining the proposed plan for accuracy testing that includes site location, detector zone configuration, map overlay of detection zones, estimated test completion timeline, and contact information for data collection vendor.

Corrective Action: An action taken to eliminate the cause of an existing nonconformity, defect, or other undesirable situation to prevent recurrence.

Data Collection Vendor: GDOT-approved, third-party vendor that will perform the traffic counting for collecting the ground truth data.

Detection System Processor Actuation Data (Actuation Data): Data captured through the detection system processor of the product being evaluated to show the quantity of vehicles traveled in each lane of an intersection approach.

Ground Truth Data (Manual Count Data): Data collected to show the quantity of vehicles traveled in each lane of an intersection approach. This data is verified by means of human analyzation and not by a detection device.

Network Compatibility: Seamless communication across GDOT's ITS communication network and the ability to directly feed or exchange video or data required of that device.

Product Evaluation Program: Provides a well-defined and organized system within the Department to handle requests from various sources for consideration of new products developed for use in road and bridge construction or maintenance.

Qualified Product List (QPL): A listing of qualified products that GDOT has reviewed and found compliant with specifications and authorized for use on the streets and highways of Georgia. The published information concerning the qualified product consists of the following:

- Product specification to which conformity has been qualified (first three digits in qualification number)
- Product type
- Product description/model number
- Qualification number
- Applicant name/address/web site address/phone number
- Applicants contact name/e-mail address/phone number

The list is available at http://www.dot.ga.gov/PartnerSmart/Materials/Documents/qpl48.pdf.

QPL Products Evaluation Committee (Committee): Qualified group of SMEs from the OTO and other Department offices that reviews traffic control signal and ITS products for use within GDOT's Right-of-Way and evaluates proposed products for inclusion on the QPL 48.

Quality Assurance (QA): The act of providing fact-based evidence to verify quality products, services, and information are being delivered.

Standard Specifications: Specifications written to the bidder, prior to award of a contract, and to the contractor. Contain requirements setting out or relating to the method or manner of performing work or to the quantities and qualities of materials and labor for GDOT contracts. The specifications are also used for the evaluation and qualification of official ITS and traffic control signals and devices, and ancillary devices for use on Georgia streets and highways. The

GDOT Standard Specifications are available at:

http://www.dot.ga.gov/PartnerSmart/Business/Source/Pages/Specifications.aspx.

Subject Matter Experts (SME): Persons within GDOT with the highest level of familiarity and expertise with the matter at hand.

Third-Party Product Testing: Testing by a party independent of GDOT and the Applicant that verifies the product conforms to applicable specifications.

4.2 Definitions of Detection Types

Continuous Count Station System: Provides monitoring of existing traffic conditions at a permanent location on a continuous basis throughout the year.

Inductive Loop Detection System: A rack-mounted card inserted into the cabinet input file that supplies an electric current to a coil of wire embedded in the travel lane, which measures changes in the inductance (magnetic field) when vehicles pass over the coil of wire.

Type A: A rack-mounted inductance loop detector card that sends a contact closure to the controller.

Type B: An IP addressable rack-mounted vehicle detector card.

Microwave Vehicle Detection System (MVDS): Uses low power microwave radar beam technology to detect vehicle presence, volumes, occupancy, and speed.

Type A: A microwave radar unit used for ITS mainline freeway installations.

Type B: A microwave radar unit used for traffic signal and ramp meter applications.

Pedestrian Detection System: A manual pushbutton positioned at pedestrian crossings that actuates a traffic control device controller.

Type A: a piezo driven solid-state switch used to send pedestrian actuations (contact closures) to the traffic signal controller.

Type B: an accessible pedestrian detector with electronic control equipment, wiring, mounting hardware, pushbuttons, and pedestrian actuation signs designed to provide a pushbutton with a raised, vibrating tactile arrow and audible indications for differing pedestrian signal functions.

Temporary Vehicle Detection System: Provides temporary actuation via a non-invasive vehicle detection system for projects such as resurfacing projects. The contractor will be responsible for installing and removing the temporary vehicle detection system.

Video Detection System (IVDS or VDS): Captures and processes video images to detect the presence of vehicles, vehicle counts, vehicle classification, detector occupancy, and/or speed information.

Type A: A visual spectrum camera capable of capturing the images within the range of wavelengths of electromagnetic radiation normally visible to the human eye, which is typically between 380 nm and 760 nm.

Type B: An infrared sensor that detects and converts infrared energy (heat) into an electronic signal and processed as a thermal image (video).

Wireless Magnetometer Detection System (WMDS): A wireless in-pavement sensor that analyzes changes in the magnetic field to detect the presence of vehicles, collect vehicle counts, roadway occupancy, vehicle classification, and/or speed information.

Type A: Provides vehicle actuation (contact closure) and data collection functions such as vehicle counts, occupancy, and classification.

Type B: Provides vehicle presence actuation only.

4.3 Application Function Definitions

4.3.1 Definitions for Traffic Signal and Ramp Meter Application

Detection, Pulse Mode, and Presence Mode for traffic signal and ramp meter applications are defined in Section 937.1.04.A.3.a of the GDOT Standard Specifications as follows:

Detection: Identification of a motor vehicle passing over an in-pavement sensor or equivalent non-intrusive system actuation zone and delivery of a contact closure or SDLC data input to the controller.

Pulse Mode: The actuation starts with the arrival of the vehicle to the detection zone and ends after a fixed duration contact closure.

Presence Mode: The actuation starts with the arrival of the vehicle to the detection zone and ends when the vehicle leaves the detection zone.

4.3.2 Definitions for ITS Freeway Applications

Volume, Occupancy, and Speed for freeway applications are defined in Section 937.1.04.A.3.b of the GDOT Standard Specifications as follows:

Volume: Number of vehicles crossing a detector within a user-selected period of time.

Occupancy: Time that a detector held a presence call as a percentage of the total time within a user-selected period of time.

Speed: Calculated average value of vehicle velocity that crossed a detector within a user-selected period of time.

4.3.3 Definitions for ITS Continuous Count Station Applications

Vehicle Classification, Vehicle Volume, and Vehicle Speed for freeway applications are defined in Section 937.1.04.A.3.c of the GDOT Standard Specifications as follows:

Vehicle Classification: Assignment of vehicle type to each vehicle that crosses a detector, as defined by the Traffic Monitoring Guide, FHWA, Appendix C.

Vehicle Volume: Number of vehicles crossing a detector within a user-selected period of time.

Vehicle Speed: Calculated average value of vehicle velocity that crossed a detector within a user-selected period of time.

4.4 Accuracy Definitions

4.4.1 Definitions for Vehicle Detection

Accuracy for vehicle detection is defined in Section 937.1.03.B.3.a of the GDOT Standard Specifications as follows:

- a. The total number of detected vehicles identified and tabulated as individual events, for stop bar and set back detectors or detection zones.
- b. The total number of unique actuation events, identified and tabulated as individual events, shall not deviate from the number of actuation events by more than the minimum system accuracy percentage. The deviation represents the total of the over-counting and the under-counting actuation events, representing the absolute value of the deviation.

4.4.2 Definitions for Vehicle Binned Data Collection Functions

Accuracy for vehicle binned data collection functions is defined in Section 937.1.03.B.3.b of the GDOT Standard Specifications as follows:

- a. Each vehicle shall be defined as an individual event.
- b. The total number of unique events, identified and tabulated as individual events, shall not deviate from the actual events by more than the minimum system accuracy percentage. The deviation represents the total of the over-counting and the under-counting actuation events, representing the absolute value of the deviation.
- c. Speed shall be defined as the measured velocity of each event in mph.
- d. Occupancy shall be defined as the measured amount of time each event occupied the detector or detection zone.

4.4.3 Definitions for Vehicle Classification

Accuracy for vehicle classification is defined in Section 937.1.03.B.3.c of the GDOT Standard Specifications as follows:

- a. Each vehicle shall be defined as an individual event and assigned to a vehicle classification as defined by FHWA.
- b. The total number of unique events, identified and tabulated as individual events, shall not deviate from the actual events by more than the minimum system accuracy percentage. The deviation represents the total of the over-counting and the under-counting actuation events, representing the absolute value of the deviation.

5. Roles

The QPL Products Evaluation Committee (Committee) reviews traffic control signal and ITS products for use within GDOT's Right-of-Way. The Committee is composed of SMEs from the OTO and other Department offices with expertise to evaluate proposed products for inclusion on QPL 48.

The Committee operates in accordance with the guidelines and procedures documented in SOP 42 and in this SOG.

The SOP 42 can be found here:

http://www.dot.ga.gov/PartnerSmart/Materials/Documents/qplproducts/SOP42.pdf

6. Procedure

The procedure for the review and testing of Detection Systems is unique based on whether submitted for Traffic Signal or ITS products.

6.1 Submissions of Detection Systems for Traffic Signal Products

6.1.1 Product Application

The product application procedure for detection devices is identical to that of other Traffic Signal devices and can be found in Section 6.1.1 of the SOP 42.

6.1.2 Production Evaluation

The product application procedure for detection devices is identical to that of other Traffic Signal devices and can be found in Section 6.1.2 of the SOP 42.

6.1.3 Product Testing

The product testing procedure for detection systems differs from other Traffic Signal devices. Upon acceptance, the Applicant shall be notified in writing to provide an Accuracy Test Plan to the Committee for review and approval.

The accuracy requirements for traffic signal applications are listed under Table 2 in Section 937 of the GDOT Standard Specifications. For a Stop-Bar detection zone(s) of 6 ft. x 20 ft. (1.8 m x 6.1 m) to 6 ft. x 40 ft. (1.8 m x 12.2 m) and a Set-Back detection zone(s) of 6 ft x 6 ft (1.8 m x 1.8 m) for inductance loops or equivalent virtual zone(s):

a. Detection accuracy of the traffic signal detection device will meet or exceed 99% of the manual count of vehicular traffic.

6.1.3.1 Step 1: Submit Accuracy Test Plan

The Applicant is required to submit an Accuracy Test Plan for traffic signal devices. Submit an Accuracy Test Plan to the Committee for review and approval, including the following elements:

- a. Provide a data collection site for accuracy testing. The test site should include free-flowing and congested traffic conditions. Upon request, the Committee will provide established testing sites for consideration.
- b. Provide contact information for a ground truth data (manual count data) collection vendor.
- c. Provide a test design plan with detection zones identified on a single intersection approach to include at least two through lanes and one left turn lane. All detection zones shall be stop bar or post stop bar and identified appropriately to facilitate and compare to ground truth data.
- d. For vehicle detection systems, include a map overlay for proposed zone/detector configuration in the test plan.
- e. Submit Accuracy Test Plan to the Committee for review.
- f. Address comments provided by the Committee regarding the Accuracy Test Plan.
- g. Make requested revisions to the Accuracy Test Plan and submit the results to the Committee for review and approval.

The Committee will provide the Applicant with detector assignments and IP addresses for configuration.

6.1.3.2 Step 2: Field Installation/Configuration

Whether a product is installed at a test site location or if an existing device is being reconfigured for accuracy testing, follow the steps outlined below:

- a. Walk through configuration process with Committee either on-site or through virtual application.
- b. If new installation is required, coordinate traffic control and installation contractor at the Applicant's expense.
- c. For accuracy test, the Applicant or contractor is not permitted to modify existing traffic signal devices, timings, or configurations.
- d. Schedule a 24-hour ground truth data collection with approved traffic data collection vendor. Upon inclement weather the Applicant will be allowed to reschedule data collection with Committee approval.

The Committee or maintaining agency will modify signal detector assignments in the controller software to accommodate Applicant's detector system settings.

6.1.3.3 Step 3: Accuracy Test Requirements

A product must have the ability to function and communicate as outlined below:

- a. Verify network compatibility and that the detection system enables local and remote configuration and monitoring, including data retrieval, using computers on the GDOT Network.
- b. Verify the detection system operates with the current controller software/firmware.
- c. Actuations obtained for each vehicle phase shall be within -1% and +3% of ground truth data over a continuous sample size of a 24-hour period.

6.1.3.4 Step 4: Test Instructions

The calculation of the Accuracy Percentage(s) shall be determined using the method outlined below:

- a. Provide vendor certified 24-hour ground truth raw data documentation.
- b. Provide detection processor actuation data. Applicant will coordinate retrieval of detection system processor actuation data with Committee.
- c. Committee will provide the Detector Comparison Report indicating accuracy results. Accuracy percentage will be calculated per phase using the following mathematical functions:
 - 1) Subtract the ground truth data from the processor data.
 - 2) Divide the summation of data by the ground truth data.
 - 3) Multiply result by 100 to obtain accuracy percentage.
- d. Take corrective action to adjust detection configuration and provide 24-hour counts as needed to meet required accuracy percentage. Refer to GDOT SOP 42 for allotted product testing timeline and completion.

Electronic submission of the Accuracy Test Plan and results shall be in Portable Document Format (PDF) and e-mailed to <u>QPL48@dot.ga.gov</u>.

6.1.3.5 Step 5: Device Removal/Product Retention

The qualified product sample will become the property of GDOT. Some products, due to size and practicality, may be deemed unnecessary to retain and will be returned to the Applicant. If the product sample submitted for qualification does not meet the current GDOT specifications, the Applicant will have 60 calendar days to retrieve the sample. After such time, the OTO reserves the right to dispose of the unclaimed sample(s). Product samples used for field testing and GDOT evaluation shall remain the property of the Applicant. GDOT assumes no liability for damage or loss during the field-testing period. Upon successful completion of the field test, GDOT shall have the option to purchase the products in place or have the Applicant remove them at no cost to the Department.

6.2 Submissions of Detection Systems for ITS Products

6.2.1 Step 1: Product Application

The product application procedure for detection devices is identical to that of other ITS devices and can be found in Section 6.1.1 of the SOP 42.

6.2.2 Step 2: Product Evaluation

The product application procedure for detection devices is identical to that of other ITS devices and can be found in Section 6.1.2 of the SOP 42.

6.2.3 Step 3: Product Testing

The product testing procedure for detection systems differs from other ITS devices listed in SOP 42. Upon acceptance, the Applicant shall be notified in writing to provide a third-party accuracy test for either freeway applications and/or for continuous count station applications. The third-party accuracy test must be able to show data and results that meet the accuracy requirements listed below, *for (Vehicle) Volume and (Vehicle) Speed only*. If the Applicant is unable to provide a third-party test as requested, the Applicant will be instructed to submit an Accuracy Test Plan to the Committee for review and approval (See Section 6.2.3.1 of the SOG).

The accuracy requirements for ITS freeway applications are listed under Table 3 in Section 937 of the GDOT Standard Specifications. For a detection zone of 6 ft x 6 ft (1.8 m x 1.8 m) for inductance loops or equivalent virtual zone:

- a. Volume accuracy of the ITS detection device will meet or exceed 90% of the actual count of vehicular traffic.
- b. Speed accuracy of the ITS detection device will meet or exceed 90% of the actual speed of vehicular traffic.

The accuracy requirements for ITS continuous count station applications are listed under Table 4 in Section 937 of the GDOT Standard Specifications. For a detection zone of user-defined size:

- a. Vehicle volume accuracy of the ITS detection device will meet or exceed 90% of the actual count of vehicular traffic.
- b. Vehicle speed accuracy of the ITS detection device will meet or exceed 90% of the actual speed of vehicular traffic.

6.2.3.1 Step 1: Submit Third-Party Accuracy Test

The third-party test will need to demonstrate that the ITS detection device meets or exceeds accuracy requirements listed in Section 937 of the GDOT Standard Specification, *for (Vehicle) Volume and (Vehicle) Speed only* (See Section 6.2.3 of this SOG). The testing parameters are left to the Applicant to decide, but the Applicant must provide justification for steps taken to attain their results. The third-party test must be performed by an independent testing facility or laboratory, with written approval from the OTO. At the discretion of the Committee, the OTO may request additional information or supporting documentation to support accuracy results, or may deny the third-party test.

Electronic submission of the third-party accuracy test shall be in Portable Document Format (PDF) and e-mailed to <u>QPL48@dot.ga.gov</u>.

6.2.3.2 Step 2: Submit Accuracy Test Plan

If a third-party test was submitted and approved by the Committee, this section may be omitted. Otherwise, an Accuracy Test Plan must be submitted to the Committee for review and approval, including the following elements:

- Provide data collection site for accuracy testing. Test site should include free-flowing traffic conditions (normal freeway speed) and congested traffic conditions (low freeway speed).
 Upon request, the Committee will provide established testing sites for consideration.
- b. Provide a test plan that meets or exceeds accuracy requirements listed in Section 937 of the GDOT Standard Specification, *for (Vehicle) Volume and (Vehicle) Speed only* (See Section 6.2.3 of this SOG).
- c. Provide contact information for a ground truth data (manual count data) collection vendor. The use of in-ground loops to compare device results is also acceptable, if the Applicant provides verification that the loops are maintained, tested, and accurate.
- d. Provide a test plan design with at least one detection zone in a single direction of a freeway or interstate system. All detection zones shall be identified appropriately to facilitate and compare to ground truth data.
- e. Submit Accuracy Test Plan to the Committee for review.
- f. Address comments provided by the Committee regarding the Accuracy Test Plan.
- g. Make requested revisions to the Accuracy Test Plan and submit the results to the Committee for review and approval.

The Committee will provide the Applicant with detector assignments and IP addresses for configuration.

6.2.3.3 Step 3: Field Installation/Configuration

If a third-party test was submitted and approved by the Committee, this section may be omitted. Whether a product is installed at a test site location or if an existing device is being reconfigured for accuracy testing, follow the steps outlined below:

- a. Walk through configuration process with Committee either on-site or through virtual application.
- b. If new installation is required, coordinate traffic control and installation contractor at the Applicant's expense.
- c. For accuracy test, the Applicant or contractor is not permitted to modify existing traffic signal devices, timings, or configurations.
- d. Schedule ground truth data collection with approved traffic data collection vendor for a user-specified amount of time (24-hour is preferred; 12-hour is acceptable). Upon inclement weather the Applicant will be allowed to reschedule data collection with Committee approval.

The Committee or maintaining agency will modify signal detector assignments in the controller software to accommodate Applicant's detector system settings.

6.2.3.4 Step 4: Communications and Compatibility Requirements

A product must have the ability to function and communicate as outlined below:

- a. Verify network compatibility and that the detection system enables local and remote configuration and monitoring, including data retrieval, using computers on the GDOT Network.
- b. Verify the detection system operates with the current controller software/firmware.

6.2.3.5 Step 5: Test Instructions

The calculation of the Accuracy Percentage(s) shall be determined using the method outlined below:

- a. Provide vendor certified ground truth raw data documentation for a user-specified amount of time (24-hour is preferred; 12-hour is acceptable), or comparable data using in-ground loop detection.
- b. Provide device detection processor actuation data. Applicant will coordinate retrieval of detection system processor actuation data with Committee.
- c. Committee will provide the Detector Comparison Report indicating accuracy results. Accuracy percentage will be calculated per phase using the following mathematical functions:
 - 1) Subtract the ground truth data from the processor data.
 - 2) Divide the summation of data by the ground truth data.
 - 3) Multiply result by 100 to obtain accuracy percentage.
- d. Take corrective action to adjust detection configuration and provide user-specified counts as needed to meet required accuracy percentage. Refer to GDOT SOP 42 for allotted product testing timeline and completion.

Electronic submission of the Accuracy Test Plan and results shall be in Portable Document Format (PDF) and e-mailed to <u>QPL48@dot.ga.gov</u>.

6.2.3.6 Step 5: Device Removal/Product Retention

The qualified product sample will become the property of GDOT. Some products, due to size and practicality, may be deemed unnecessary to retain and will be returned to the Applicant. If the product sample submitted for qualification does not meet the current GDOT specifications, the Applicant will have 60 calendar days to retrieve the sample. After such time, the OTO reserves the right to dispose of the unclaimed sample(s). Product samples used for field testing and GDOT evaluation shall remain the property of the Applicant. GDOT assumes no liability for damage or loss during the field-testing period. Upon successful completion of the field test, GDOT shall have the option to purchase the products in place or have the Applicant remove them at no cost to the Department.

7. **QPL Maintenance**

Products on QPL 48 are subject to periodic review for design changes and updates to technology. Conditions for maintaining, suspending, and withdrawing qualification are included in this section.

The Applicant is expected to conduct regular product testing and maintain product control records to verify specification compliance.

The Applicant shall notify the OTO with a letter to <u>QPL48@dot.ga.gov</u> when the following events occur:

- When changes occur to the product design, product features, software/firmware updates, or material composition of QPL products.
- When changes occur to company name, manufacturing location, part number, or product name.

Failure to provide this notification letter will result in removal from the QPL until re-evaluation can be performed. The Applicant's letter shall state the following:

- The event will result in no change to the product quality, reliability, or specification compliance.
- The event will result in no change to design or material or manufacturing process.
- All existing warranties will continue to be honored.

8. Renewal

Products covered in this SOP shall be re-evaluated when significant hardware or firmware upgrades are made, and at prescribed intervals. The OTO also reserves the right to re-evaluate a product at their discretion, at any time.

The OTO may require the Applicant to requalify the product for any of the following reasons:

- To verify that obsolete products are not kept on the list, the OTO may request written confirmation from the Applicant that the product is still available and has not changed design specifications. Failure to respond to the OTO's written request within 14 calendar days will result in the product being removed from the QPL.
- As GDOT updates the standard specifications, the OTO will re-evaluate all QPL 48 products associated with that change.

- GDOT regularly revises specifications to incorporate new technologies, remove legacy items no longer desired, and improve standards. As GDOT's material specifications or functional requirements change, the OTO may require requalification to verify that the product meets the new specifications.
 - If the latest product specification revisions are deemed more stringent than earlier versions, the OTO will notify the Applicant of affected products and specific revisions. A reasonable amount of time will be established, depending upon the extent of revisions, to allow Applicants to implement any necessary product changes.
 - The Applicant shall submit a completed product compliance matrix corresponding to the revised specification. Upon review of the matrix, additional information (documentation and/or a product sample representative of the line or group of products to be requalified) may be required of the Applicant.
 - The product will remain listed on the QPL if it is deemed to meet revised specification(s). In this case, a new qualification letter will not be issued. If not, the product will continue to be listed on the QPL with a disclaimer that it can no longer be used after the effective date of the revised specification (reduction of qualification).
- GDOT may require requalification of QPL listed products to verify compatibility with upgrades to the existing or transitioning ATMS platform.

9. Termination/Withdrawal

Removal from QPL 48 will prohibit the use of the product on GDOT projects and infrastructure until the product has been resubmitted for evaluation and again receives approval.

The Committee will assign a responsible GDOT representative (individual or group) to monitor products covered by this SOP. The Applicant shall provide the GDOT representative with all traffic signal and ITS item updates or changes on an as-needed basis.

OTO representatives may elect to perform unscheduled visits to the manufacturing facility, warehouse, and/or construction or maintenance projects to view, inspect, and/or test items on QPL 48.

The OTO reserves the right to remove or suspend a product from the QPL because of specification or quality issues identified during these reviews, including, but not limited to:

- Product performance that significantly varies from those established by the Applicant as verified by the OTO.
- Failure to notify GDOT in writing of any modification, alteration, or obsolete nature of listed product(s).
- Products that meet the current specifications, but do not perform satisfactorily in the field.
- Products that meet current specifications but were not submitted for scheduled re-evaluation.
- An Applicant is acquired by another company. GDOT may require re-evaluation of any or all products. The same applies if the Applicant goes out of business and its inventory is acquired by another company.
- Failure to address the following deficiencies:
 - Applicant performance (i.e., technical support/customer service, ATMS compatibility)

- Applicant quality assurance
- o Manufacturer production fabrication capabilities and procedures

Depending on the severity of the alleged deficiency or lack of corrective action by the Applicant, GDOT may suspend qualification until the alleged deficiency or issue is resolved.

Certification may be withdrawn at the request of the Applicant.

Upon disqualification, termination, suspension, or withdrawal of qualification, the Applicant shall discontinue use of all product advertising identifying GDOT as a customer.

The Applicant shall discontinue the sale of all products involved in the disqualification, termination, suspension, or withdrawal from the QPL on all active GDOT projects.