

**PROPOSED RESOLUTION**

**PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

RAIL SAFETY DIVISION  
RAIL TRANSIT SAFETY BRANCH

Resolution ST-245  
August 19, 2021

**RESOLUTION**

**RESOLUTION ST-245 GRANTING APPROVAL OF THE  
SANTA CLARA VALLEY TRANSPORTATION AUTHORITY LIGHT  
RAIL SIGNAL PRIORITY DETECTION PROJECT SAFETY AND  
SECURITY CERTIFICATION PLAN**

**SUMMARY**

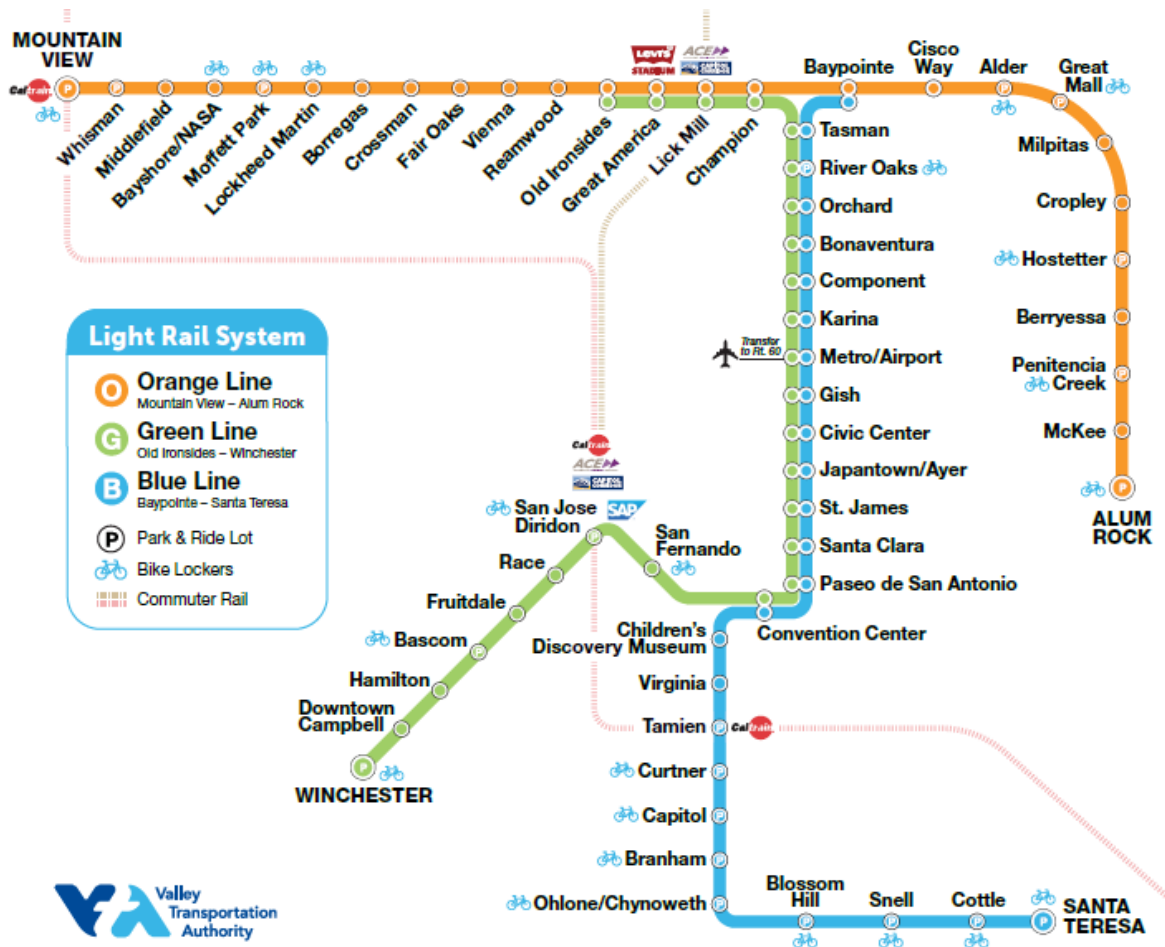
This Resolution grants the request of the Santa Clara Valley Transportation Authority for approval of the Safety and Security Certification Plan for their Light Rail Signal Priority Detection Project.

**PROJECT DESCRIPTION**

The Santa Clara Valley Transportation Authority (SCVTA/VTA) Light Rail Transit Signal Priority (TSP) Detection Upgrades project originally proposed to implement the following at 89 signalized intersections with active TSP in the Cities of Milpitas, San Jose, Santa Clara, Sunnyvale, and the County of Santa Clara:

- Install a Global Positioning System based TSP detection as a primary detection method to detect an approaching light rail vehicle and send a request to a nearby equipped signalized intersection that would trigger an appropriate TSP treatment (e.g., do nothing if a light rail approaching on a green indication, extend the green time if a light rail vehicle approaches at end of the green time, or truncate the side street green times if a light rail vehicle approaches on a red indication);

- The existing loop-based detection system to trigger TSP requests would be retained as a backup system if the primary detection fails.



VTA Light Rail System Map

On January 23, 2015, CPUC Staff met with VTA at River Oaks Office in San Jose to discuss the Light Rail's TSP system and VTA's plan to upgrade their entire system. The TSP system has been implemented in Houston, Texas for more than 4 years and has been successful as per VTA. Approximately 89 intersections will be modified to the TSP system.

VTA leads a grant-funded effort to upgrade the light rail vehicle detection for the Light Rail's TSP system. VTA conducted a series of discussions with both internal and external stakeholders that maintain and operate the traffic signals along the light rail corridor, including VTA Operations staff. These discussions

resulted in the Systems Engineering Management Plan (SEMP) which documented the need to upgrade VTA's light rail vehicle detection. The need stemmed from the following the maintenance and operational issues with the existing detection (in-pavement wired loops):

- Often with aging wired loops, false TSP service calls are placed in the traffic controller and TSP signal timing is implemented even when Light Rail Vehicles are not present. Numerous complaints have been received from the motoring public regarding these false calls causing delays to side street traffic. These false calls could also delay an approaching light rail vehicle, where light rail vehicle could lose an opportunity to trigger the TSP service call if the light rail vehicle approaches an equipped intersection during same cycle where a false TSP signal was received. The logic in the traffic signal controller will only allow one disruption per traffic signal cycle.
- If failed aging loop is identified, VTA rail maintenance staff installs the replacement loops in between light rail vehicle headways or during the non-operational hours. This installation effort requires a supervisor, electrical technician, and flagger to warn workers to clear the work area within the track way and to warn oncoming train that worker is present. Extensive person-hours may be needed, and potential delays are incurred on approaching trains when active construction is in the track way to replace these loops.

The SEMP document recommended upgrading the detection from a wired loop system to a wireless loop system to address these maintenance and operational issues.

Wireless loop detection systems are not new technology to light rail operations and have been successfully deployed and operational for more than four years in Houston, Texas on their Metrorail line. This deployment, including pilot testing of the technology by VTA staff, demonstrated the following benefits of the technology:

- Wireless loop systems provide greater flexibility in the placement of the detection zone and do not require any personnel to be within the track way to move or relocate a detection zone.
- In both field testing conducted by VTA staff and in actual operations in Houston, wireless loop systems are not prone to electrical magnetic interference from the overhead electrical power lines that are used to power and propel a light rail vehicle.
- Wireless loop systems are not prone to false TSP calls like other technologies and allow TSP calls from specially equipped vehicles only.
- Reduced delay to motorists and transit riders because of less in-track maintenance activities.
- Improved safety for rail workers and public because of less in-track maintenance activities.

As backup, in the situation where the TSP wireless detection system does not function to detect a light rail vehicle or requires maintenance during operating hours, the existing in-pavement detection loops would be retained as backup system and could be made functional again.

The Safety and Security Certification Plan addresses an upgrade in the light rail TSP detection of the entire light rail system. The upgrades will span through several cities. A CPUC GO-88B application will be prepared, signed, and submitted for each City to cover all the light rail – highway intersections within that City’s jurisdiction for CPUC approval by the Rail Crossings Engineering Branch.

The work involved will replace the Train-to-Wayside hard-wired system with a new GPS-based Light Rail Vehicle (LRV) detection system to act as primary detection system for requesting TSP at non-gated signalized intersections on VTA’s street and median-running light rail lines. The work is considered a functional replacement of the transit signal priority detection system, and the existing loop-based system will be eventually abandoned after a period where it

is maintained and both systems are in place. The necessary equipment for the work would be installed on 98 of VTA’s light rail vehicles and would be installed at 89 signalized intersections as shown in Table 1.

**Table 1 – Light Rail TSP Detection Upgrades – List of Traffic Signals in Scope of Work**

	<b>Street</b>	<b>Intersection</b>	<b>US-DOT crossing #</b>	<b>CPUC crossing #</b>
1	Tasman	Calle Del Sol	TBD	082B-5.58
2	Tasman	Centennial	TBD	082B-5.94
3	Tasman	Convention Center	TBD	082B-6.27
4	Tasman	Great America	TBD	082B-6.41
5	Tasman	Lick Mill	TBD	082B-5.44
6	Tasman	Alder	TBD	082C-6.00
7	Tasman/Great Mall	McCarthy	TBD	082C-5.70
8	Tasman/Great Mall	NB I-880	TBD	082C-6.26-B
9	Tasman/Great Mall	SB I-880	TBD	082C-6.23
10	Auzerais	Woz	TBD	082A-2.48
11	Capitol	680	TBD	082C-8.75
12	Capitol	Alum Rock	TBD	082C-12.60
13	Capitol	Autumnvale	TBD	082C-8.10
14	Capitol	Berryessa	TBD	082C-10.00
15	Capitol	Capitol Square	TBD	082C-11.50
16	Capitol	Cinco de Mayo	TBD	082C-8.40
17	Capitol	Cropley	TBD	082C-8.20
18	Capitol	Florence	TBD	082C-12.80
19	Capitol	Gay	TBD	082C-12.40
20	Capitol	Giannotta	TBD	082C-11.20
21	Capitol	Gilchrist	TBD	082C-10.60
22	Capitol	Greengate	TBD	082C-9.20
23	Capitol	Hostetter	TBD	082C-9.00
24	Capitol	Longford	TBD	082C-9.10
25	Capitol	Mabury	TBD	082C-10.80
26	Capitol	Madden	TBD	082C-12.50
27	Capitol	McKee	TBD	082C-12.00
28	Capitol	Ohlone	TBD	082C-9.80

29	Capitol	Penitencia	TBD	082C-10.40
30	Capitol	Rainfield	TBD	082C-11.00
31	Capitol	Sierra	TBD	082C-9.40
32	Capitol	Wilbur	TBD	082C-13.00
33	First	Rio Robles	TBD	082B-4.06
34	First	River Oaks	TBD	082B-3.73
35	First	Orchard	TBD	082B-3.17
36	First	Plumeria	TBD	082B-2.88
37	First	Bonaventura	TBD	082B-2.62
38	First	Trimble	TBD	082B-2.46
39	First	Component	TBD	082B-2.20
40	First	Charcot	TBD	082B-1.91
41	First	Karina	TBD	082B-1.61
42	First	Brokaw	TBD	082B-1.44
43	First	Technology Pl	TBD	082B-1.26
44	First	Metro	TBD	082B-1.13
45	First	Skyport	TBD	082B-0.95
46	First	Sonora	TBD	082B-0.72
47	First	Gish	TBD	082B-0.53
48	First	Rosemary/SB I-880	TBD	082B-0.29
49	First	Burton/NB I-880	TBD	082B-0.16
50	First	Hedding	TBD	082A-0.24
51	First	Mission	TBD	082A-0.31
52	First	Taylor	TBD	082A-0.40
53	First	Jackson	TBD	082A-0.66
54	First	Rankin	TBD	082B-0.73
55	First	Hawthorne	TBD	082B-0.85
56	First	Julian	TBD	082A-1.17
57	Park	Delmas	TBD	082D-2.70
58	San Carlos	Market	TBD	082A-1.97
59	San Carlos	Alamaden	TBD	082A-2.18
60	San Carlos	Convention Center	TBD	082AS-1.96
61	First	St. James	TBD	082A-1.29
62	First	St. John	TBD	082A-1.40
63	First	Santa Clara	TBD	082A-1.52

64	First	San Fernando	TBD	082A-1.67
65	Second	St. James	TBD	082AS-1.34
66	Second	St. John	TBD	082AS-1.46
67	Second	Santa Clara	TBD	082AS-1.58
68	Second	San Fernando	TBD	082AS-1.72
69	Tasman	Baypointe	TBD	082C-4.60
70	Tasman	Champion	TBD	082B-4.81
71	Tasman	Cisco	TBD	082C-5.32
72	Tasman	Morgridge	TBD	082C-5.07
73	Tasman	Renaissance	TBD	082B-5.15
74	Tasman	Rio Robles	TBD	082B-4.58
75	Tasman	Vista Montana	TBD	082B-5.06
76	Tasman	Zanker	TBD	082C-4.80
77	Younger	San Pedro	TBD	082Y-0.14
78	First	Montague	TBD	082B-3.37
79	Tasman	Lawrence	TBD	082B-7.40
80	Java	Mathilda	TBD	082B-9.53
81	Java	Bordeaux Ave.	TBD	082B-9.33
82	Java	Borregas	TBD	082B-9.08
83	Java	Geneva	TBD	082B-8.86
84	Java	Crossman	TBD	082B-8.63
85	Fair Oaks Ave.	Fair Oaks Way	TBD	082B-8.30
86	Fair Oaks Ave.	Tasman	TBD	082B-8.20
87	Tasman	Vienna	TBD	082B-7.60
88	Tasman	Adobe	TBD	082B-7.17
89	Tasman	Reamwood	TBD	082B-7.00

\*None of the listed intersections have railroad pre-emption or railroad crossing gates.

The following subsections describes the proposed technology to be implemented; the advantages of the technology; and the works possible impacts to existing detection failover systems, including impacts to light rail crossing electronic blank out warning signage and traffic signal operations.

## **1. Description of Technology and Advantages of Technology Over Existing System**

The work retains the TSP loop functionality of the existing advance call, check in, and check out loops. The replacement system will emulate the function of these loops using a service approach called geofencing. Geofencing is a service that triggers an action when a device enters a set location (a virtual location), and the set location for this project is determined using a global positioning system (GPS) transponder on an equipped light rail vehicle. As an equipped light rail vehicle enters these geofences, the transponder transmits its respective service call wirelessly based on the type of geofence (e.g., advance call, check in, and check out).

The work (the proposed replacement system) has numerous advantages to the stakeholders who maintain and operate the traffic signals along the light rail corridor. Those advantages are:

- Provides greater flexibility in the placement of detection loops due to the technology use of a geofencing functionality which is a virtualized location point.
- No longer requires VTA rail maintenance staff to work in the trackway envelope to install a physical detection loop like the existing system.
- Potentially less maintenance and operating cost for VTA with no physical loops being installed in the trackway, including the labor time to install. The physical loops often require replacement and last between two and five years.
- Less false TSP calls, which often cause VTA's light rail vehicle to lose windows of opportunities for TSP service. This is a common cause of delays to VTA light rail operations.



## **2. Existing Failover Functionality**

In case of a situation that the TSP detection system ceases to detect an approaching light rail vehicle, the traffic signal has a failover mode called “recall.” This traffic signal functionality places a call for TSP service and serves it every traffic signal cycle even if a light rail vehicle is present or not. This operational functionality would be retained and continue to function after this work is implemented.

## **3. Existing Light Rail Crossing Warning Signage and Traffic Signal Operations**

This work does not anticipate any changes in the signal timing, left turn phase sequencing, and/or turn prohibitions, including the light rail crossing electronic blank out warning signage posted at the signalized intersections.

## **DISCUSSION**

Commission General Order 164-E, *Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems*, Section 11, requires that Rail Fixed Guideway Systems prepare a project-specific Safety Certification Plan (SCP) for each major project and ensure that all entities involved in design, construction, operation, and maintenance of the project shall comply with the requirements outlined in the SCP. The SCP describes the organizational authority and responsibilities, safety certification activities and processes, and documentation requirements and responsibilities. The SCP ensures that elements critical to safety are planned, designed, constructed, analyzed, tested, inspected, and implemented. The SCP also ensures that training is provided, and rules and procedures are followed.

Before revenue service can begin, CPUC General Order 164-E requires a written Safety Certification Verification Report (SCVR) to be submitted to the CPUC for review at the end of the project. If the SCVR demonstrates compliance with the SCP and there are no remaining safety concerns, CPUC Staff recommend the Rail

Safety Division Director send an approval letter to the transit agency, allowing the project, or portions of it, to be placed into revenue service.

On May 5, 2021, VTA submitted a Safety and Security Certification Plan for the TSP project for Staff review and Commission approval. The SCP also includes consideration of security-related issues and the security of the completed and integrated project into VTA's existing system. The SCP objectives ensure the VTA satisfies the following safety requirements:

1. Facilities, systems and equipment have been designed, constructed, installed, inspected and tested in accordance with applicable codes, standards, criteria, and specifications.
2. Certifiable Elements List (CEL): A developed list of elements that include facilities, systems and subsystems subject to safety certification. The CEL is further expanded to develop the design conformance and construction conformance checklists.
3. Plans, procedures, rules, and other documentation have been adequately developed, or reviewed and modified as necessary.
4. VTA Operations and Maintenance personnel have been trained and are certified to perform their respective functions.
5. Emergency response agencies have been adequately prepared and drilled to respond to emergency situations on the system.
6. Identified safety hazards and security vulnerabilities have been eliminated or controlled to acceptable levels.
7. Construction work has been analyzed and hazards associated with the work identified.
8. Appropriate mitigating safety measures, rules, and procedures have been developed to address the identified hazards.

9. Mitigating safety measures, rules, and procedures are incorporated into appropriate contract documents.
10. Ensure that system safety and security decisions are made by appropriate Project Managers, committees, and responsible contractors.

The SCP identifies the certifiable elements of the project, as well as the roles and responsibilities of each party (VTA, its contractors, and CPUC Staff) involved throughout the project. After Commission approval, the SCP may be revised and expanded as the project progresses subject to CPUC review and approval.

The project will commence by August 2021 and VTA will have the primary responsibility for implementation of the SCP. VTA will be responsible for project safety certification and submittal of the SCVRs to Commission Staff.

Staff reviewed and analyzed the content of the project SCP in accordance with General Order 164-E Section 11, Requirements for Safety Certification Plan and the Rail Transit Safety Branch Program Management Standard Procedures Manual, State Safety and Security Oversight of Rail Fixed Guideway Systems (Program Standard), Section 9. Staff finds that VTA's Light Rail Transit Signal Priority Project Safety and Security Certification Plan is in compliance with General Order 164-E and the RTSB Program Standard. Staff from the Rail Transit Safety Branch of CPUC will conduct continuous and ongoing oversight and inspections of the project and SCP implementation as the project progresses.

Based upon the results of the Project's SCP review, Staff recommends that the Commission grant approval of the Santa Clara Valley Transportation Authority Safety and Security Certification Plan for its Light Rail Signal Priority Detection Upgrades Project.

### **NOTICE**

On July 16, 2021, this Resolution was published on the Commission's Daily Calendar.

## COMMENTS

The draft resolution of the Rail Safety Division in this matter was mailed in accordance with Section 311 of the Public Utilities Code and Rule 14.2(d)(1) of the Commission's Rules of Practice and Procedure.

\_\_\_\_\_ comments were received.

## FINDINGS

1. On May 5, 2021, VTA submitted its SCP for the Light Rail transit signal priority (TSP) project for Staff review and Commission approval.
2. The TSP project improves VTA's existing operating system. The work involved will replace the Train-to-Wayside hard-wired system with a new GPS-based Light Rail Vehicle (LRV) detection system to act as primary detection system for requesting TSP at non-gated signalized intersections. VTA will be installing TSP detection system at 89 signalized intersections as shown in Table 1 above.
3. This SCP identifies the process by which the project will be certified as meeting the established safety and security criteria and standards to operate in revenue service.
4. Staff reviewed and analyzed the content of the SCP submitted by VTA and found it to be in accordance with General Order 164-E, Section 11 and the *Rail Transit Safety Branch Program Management Standard Procedures Manual*, State Safety and Security Oversight of Rail Fixed Guideway Systems, Section 9.

## **THEREFORE, IT IS ORDERED THAT:**

1. The request of the Santa Clara Valley Transportation Authority for approval of the Safety and Security Certification Plan for its Light Rail Signal Priority Detection Upgrades Project is granted.

2. Santa Clara Valley Transportation Authority shall submit the Safety Certification Verification Report to CPUC Staff upon the project completion.
3. This resolution is effective today.

I certify that this resolution was adopted by the Public Utilities Commission at its regular meeting held on August 19, 2021. The following Commissioners voting favorably thereon:

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RACHEL PETERSON  
Executive Director