



Board Report

File #: 2020-0437, **File Type:** Informational Report

Agenda Number: 21.

OPERATIONS, SAFETY, AND CUSTOMER EXPERIENCE COMMITTEE AUGUST 20, 2020

SUBJECT: CROSSING GATES

ACTION: RECEIVE AND FILE

RECOMMENDATION

RECEIVE AND FILE status report on Metro's Light Rail gate down time for at-grade crossings for a six-month period covering May through October 2019.

ISSUE

During the June 18, 2020 Operations, Safety, and Customer Experience Committee, Director Fasana requested a report back on crossing gates.

BACKGROUND

Metro's light rail system has a total of 75 highway grade crossings, all of which are located on the A, Expo, and Gold Lines with 27, 15, and 33 grade crossings respectively.

The highway grade crossings have active traffic control devices which consist of bells, flashing lights, and gates to inform motorists of the presence of trains, either approaching or occupying a crossing. The warning system activates when an approaching train occupies a segment of track designated to provide a minimum advanced warning time and deactivates after the last train clears the roadway.

At highway traffic signalized intersections, the highway traffic controller is interconnected to the crossing signal system and is part of the traffic control system at the crossing. Traffic preemption is activated by an approaching train occupying a segment of track selected to provide the designed preemption time required to clear vehicular and pedestrian traffic in advance of the train approaching the roadway crossing.

Maintenance of the highway grade crossing system occurs regularly in accordance with Metro's procedures as well as the requirements of the CPUC General Order 75C and FRA Title 49 part 234. Metro employees perform inspections and testing of the gate mechanisms (e.g., flashers, bells, grounds, batteries, control circuits and relays) on a monthly and quarterly basis.

DISCUSSION

An analysis of all grade crossings was performed utilizing supervisory control and data acquisition system (SCADA) information for a six-month period, May 1, 2019 through October 31, 2019. The table below was completed per Motion 47 and summarizes the total number of events for a six-month period where gate down times occurred for less than 3 minutes, 3 to 5 minutes, 5 to 10 minutes, and above 10 minutes.

Grade Crossing Gate Down Time Occurrences - May 1, 2019 to October 31, 2019

Down Time	E Line (Expo)	L Line (Gold)	A Line (Blue)	All Lines
< 3 Min	587,994	1,251,580	280,490*	2,120,064
	99.19 %	99.57 %	98.86 %	99.37 %
3 to 5 Min	3,958	4,450	2,128	10,536
	0.69 %	0.35 %	0.75 %	0.49 %
5 to 10 Min	757	749	746	2,252
	0.13 %	0.06 %	0.26 %	0.11 %
>10 Min	69	238	347	654
	0.01 %	0.02 %	0.12 %	0.03 %
Total Events	592,778	1,257,017	283,711	2,133,506
Total Gates	15	33	27	75

*A Line grade crossing gate down times influenced by A Line closure during 2019.

Overall Grade Crossing Down Time Analysis

Metro's light rail system has a total of 75 grade crossings as follows:

- A Line (Blue) - 27
- E Line (Expo) - 15
- L Line (Gold) - 33

Primary reasons that grade crossing down times range for 3-10 minutes include:

- Multiple trains travelling through E Line (Expo), L Line (Gold), and A Line (Blue) crossings concurrently
- Metro and Union Pacific (UP) trains travelling through the A Line (Blue) concurrently
- Metro hi-rail vehicles going through crossings for maintenance purposes
- Trains pulling in and out of the yard close to crossings

Primary reasons that grade crossing down times are above 10 minutes include:

- Equipment failures
- Broken arm gates
- Vehicle accidents
- Adjacent UP railroad operations

- Vandalism

Efforts to Reduce Extended Gate Crossing Down Times

Metro has implemented the following to reduce gate crossing down times, while maintaining safety as top priority for train operations:

- Installation of motorman lights for train operators which allow for operators to maintain cab speeds on approach to grade crossings, thus reducing gate down times
- Installation of raised push buttons (on signal cases adjacent to grade crossings) which allow for active grade crossings to be de-activated during equipment failures
- Partnerships with cities to reduce signal preemptions at grade crossings
- Proactive grade crossing gate mechanism maintenance and inspections per CPUC General Order 75C and FRA Title 49 part 234

L (Gold) Line Grade Crossing Analysis

For the L (Gold) Line, there were three grade crossings with slightly higher downtime instances which were above 1% of the total instances (see attachment A). They were:

- Mountain and Myrtle Crossing
 - Both grade crossings are in close proximity to the (L) Gold Line yard, so the activation of the gates are more frequent due to the trains entering and exiting the yard.
- Ave. 45
 - Because there is a blind curve heading Northbound, a speed restriction of 30 MPH was placed on Track 1 and 2 on the approach and through the grade crossing.

E (Expo) Line Grade Crossing Analysis

For the E (EXPO) line, there were three grade crossings which had a higher number of downtimes which were above 1% of the total instances (see attachment B). They were:

- Stewart St., 26th St. and 20th St.
 - The grade crossings are in close proximity to the 26th St. Station and E (EXPO) Line yard, so the activation of the gates is more frequent due to the trains entering and exiting the yard.
 - There is a motorman platform south of the Bundy Station which can activate the Stewart St. grade crossing more frequently due to train operator exchanges.

Actions Taken to Date

As noted above, further investigation will be performed to improve the gate downtimes for the outlier grade crossings for the L (Gold) and E (EXPO) Lines. Although the Barrington Ave. grade crossing was not one of the outlier crossings, the percent of downtime instances for gate activations was .91% between the 3 to 5 minutes. Therefore, a detailed assessment will be conducted on the E (EXPO) Line Barrington Ave. grade crossing.

For the A (Blue) Line, another 6-month review of the grade crossings will be conducted since full

service was restored on November 1, 2019.

DETERMINATION OF SAFETY IMPACT

Improving gate down at the highway grade crossings will have a positive impact on the safety of our customers and employees.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

This receive and file report supports the following Metro Strategic Plan Goal 2: To deliver outstanding trip experiences for all users of the transportation system.

NEXT STEPS

Staff will continue to monitor gate down times and equipment failures to identify problem crossings with excessive down times. Crossings with excessive down times will be studied and any feasible recommendations to reduce gate down times will be implemented. Staff will also continue to work with the cities where necessary, for modifications and improvements to the highway traffic control system.

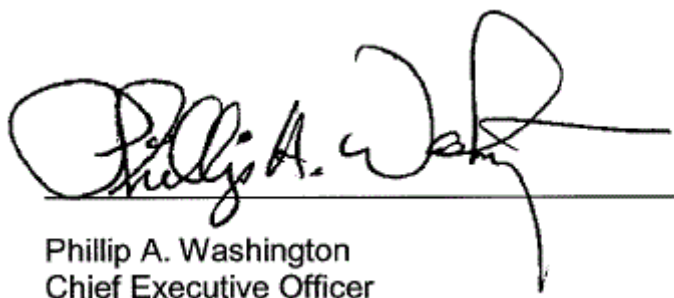
ATTACHMENTS

Attachment A - Gold Line Grade Crossings

Attachment B - Expo Line Grade Crossings

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Phillip A. Washington
Chief Executive Officer

GOLD LINE

SANTA CLARA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	37078	99.64%
3:00 to 4:59	107	0.29%
5:00 to 9:59	22	0.06%
10:00 or more	5	0.01%
Total Instances	37212	

DALTON CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	41909	99.75%
3:00 to 4:59	87	0.21%
5:00 to 9:59	15	0.04%
10:00 or more	3	0.01%
Total Instances	42014	

PASADENA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39061	99.03%
3:00 to 4:59	328	0.83%
5:00 to 9:59	40	0.10%
10:00 or more	14	0.04%
Total Instances	39443	

AZUSA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39025	99.42%
3:00 to 4:59	193	0.49%
5:00 to 9:59	21	0.05%
10:00 or more	15	0.04%
Total Instances	39254	

HIGHLAND CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	41774	99.82%
3:00 to 4:59	46	0.11%
5:00 to 9:59	20	0.05%
10:00 or more	8	0.02%
Total Instances	41848	

SAN GABRIEL CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	42073	99.86%
3:00 to 4:59	31	0.07%
5:00 to 9:59	12	0.03%
10:00 or more	16	0.04%
Total Instances	42132	

VIRGINIA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	40519	99.86%
3:00 to 4:59	32	0.08%
5:00 to 9:59	9	0.02%
10:00 or more	15	0.04%
Total Instances	40575	

BUENA VISTA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38531	99.32%
3:00 to 4:59	221	0.57%
5:00 to 9:59	28	0.07%
10:00 or more	13	0.03%
Total Instances	38793	

Attachment A

GOLD LINE GRADE CROSSING DOWNTIMES		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	1251580	99.57%
3:00 to 4:59	4450	0.35%
5:00 to 9:59	749	0.06%
10:00 or more	238	0.02%
Total Instances	1257017	

MOUNTAIN CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38950	98.94%
3:00 to 4:59	403	1.02%
5:00 to 9:59	12	0.03%
10:00 or more	3	0.01%
Total Instances	39368	

CALIFORNIA (FOOTHILL) CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	36681	99.33%
3:00 to 4:59	228	0.62%
5:00 to 9:59	18	0.05%
10:00 or more	0	0.00%
Total Instances	36927	

MAGNOLIA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38298	99.82%
3:00 to 4:59	61	0.16%
5:00 to 9:59	5	0.01%
10:00 or more	2	0.01%
Total Instances	38366	

MAYFLOWER CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38128	99.91%
3:00 to 4:59	27	0.07%
5:00 to 9:59	6	0.02%
10:00 or more	3	0.01%
Total Instances	38164	

S.MYRTLE CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	35066	98.83%
3:00 to 4:59	354	1.00%
5:00 to 9:59	54	0.15%
10:00 or more	8	0.02%
Total Instances	35482	

ARROYO VERDE CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39454	99.93%
3:00 to 4:59	15	0.04%
5:00 to 9:59	7	0.02%
10:00 or more	4	0.01%
Total Instances	39480	

AVE 33 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38012	99.74%
3:00 to 4:59	51	0.13%
5:00 to 9:59	29	0.08%
10:00 or more	18	0.05%
Total Instances	38110	

AVE 45 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	36265	98.55%
3:00 to 4:59	486	1.32%
5:00 to 9:59	40	0.11%
10:00 or more	8	0.02%
Total Instances	36799	

AVE 50 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38210	99.74%
3:00 to 4:59	89	0.23%
5:00 to 9:59	7	0.02%
10:00 or more	2	0.01%
Total Instances	38308	

AVE 59 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38208	99.72%
3:00 to 4:59	79	0.21%
5:00 to 9:59	24	0.06%
10:00 or more	4	0.01%
Total Instances	38315	

AVE 60 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38402	99.72%
3:00 to 4:59	80	0.21%
5:00 to 9:59	23	0.06%
10:00 or more	5	0.01%
Total Instances	38510	

AVE 61 CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	35992	99.16%
3:00 to 4:59	255	0.70%
5:00 to 9:59	43	0.12%
10:00 or more	7	0.02%
Total Instances	36297	

CALIFORNIA (Pasadena) CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	35647	99.30%
3:00 to 4:59	166	0.46%
5:00 to 9:59	66	0.18%
10:00 or more	18	0.05%
Total Instances	35897	

DEL MAR CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	34784	99.62%
3:00 to 4:59	108	0.31%
5:00 to 9:59	17	0.05%
10:00 or more	9	0.03%
Total Instances	34918	

EL CENTRO CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38240	99.83%
3:00 to 4:59	42	0.11%
5:00 to 9:59	18	0.05%
10:00 or more	6	0.02%
Total Instances	38306	

FIGUEROA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	35926	99.19%
3:00 to 4:59	242	0.67%
5:00 to 9:59	45	0.12%
10:00 or more	6	0.02%
Total Instances	36219	

FREMONT CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	37921	99.75%
3:00 to 4:59	65	0.17%
5:00 to 9:59	26	0.07%
10:00 or more	5	0.01%
Total Instances	38017	

FRENCH CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38447	99.73%
3:00 to 4:59	59	0.15%
5:00 to 9:59	33	0.09%
10:00 or more	14	0.04%
Total Instances	38553	

GLENARM ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	36263	99.75%
3:00 to 4:59	72	0.20%
5:00 to 9:59	16	0.04%
10:00 or more	2	0.01%
Total Instances	36353	

HOPE ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38586	99.92%
3:00 to 4:59	22	0.06%
5:00 to 9:59	6	0.02%
10:00 or more	2	0.01%
Total Instances	38616	

INDIANA CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39170	99.96%
3:00 to 4:59	10	0.03%
5:00 to 9:59	3	0.01%
10:00 or more	3	0.01%
Total Instances	39186	

MISSION CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	34272	99.53%
3:00 to 4:59	137	0.40%
5:00 to 9:59	19	0.06%
10:00 or more	5	0.01%
Total Instances	34433	

ORANGE GROVE CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	37350	99.72%
3:00 to 4:59	78	0.21%
5:00 to 9:59	18	0.05%
10:00 or more	8	0.02%
Total Instances	37454	

PASADENA WEST CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	34550	99.20%
3:00 to 4:59	236	0.68%
5:00 to 9:59	36	0.10%
10:00 or more	7	0.02%
Total Instances	34829	

STATE ST. PED CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38788	99.87%
3:00 to 4:59	40	0.10%
5:00 to 9:59	11	0.03%
10:00 or more	0	0.00%
Total Instances	38839	

EXPO LINE

ARLINGTON AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39311	99.77%
3:00 to 4:59	77	0.20%
5:00 to 9:59	9	0.02%
10:00 or more	3	0.01%
Total Instances	39400	

7TH AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39601	99.65%
3:00 to 4:59	125	0.31%
5:00 to 9:59	11	0.03%
10:00 or more	4	0.01%
Total Instances	39741	

11TH AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	41420	99.95%
3:00 to 4:59	15	0.04%
5:00 to 9:59	1	0.00%
10:00 or more	5	0.01%
Total Instances	41441	

FARMDALE AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	43196	99.51%
3:00 to 4:59	190	0.44%
5:00 to 9:59	20	0.05%
10:00 or more	2	0.00%
Total Instances	43408	

BUCKINGHAM RD.CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38575	99.84%
3:00 to 4:59	57	0.15%
5:00 to 9:59	3	0.01%
10:00 or more	1	0.00%
Total Instances	38636	

HAUSER BLVD. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39164	99.87%
3:00 to 4:59	27	0.07%
5:00 to 9:59	16	0.04%
10:00 or more	9	0.02%
Total Instances	39216	

BAGLEY AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	40466	99.97%
3:00 to 4:59	11	0.03%
5:00 to 9:59	1	0.00%
10:00 or more	0	0.00%
Total Instances	40478	

OVERLAND AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	36137	99.38%
3:00 to 4:59	187	0.51%
5:00 to 9:59	33	0.09%
10:00 or more	7	0.02%
Total Instances	36364	

WESTWOOD BLVD. CROSSING		
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Attachment B

E LINE (EXPO) GRADE CROSSING DOWNTIMES		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	587994	99.19%
3:00 to 4:59	3958	0.67%
5:00 to 9:59	757	0.13%
10:00 or more	69	0.01%
Total Instances	592778	

Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39019	99.73%
3:00 to 4:59	88	0.22%
5:00 to 9:59	12	0.03%
10:00 or more	6	0.02%
Total Instances	39125	

MILITARY AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39968	99.79%
3:00 to 4:59	65	0.16%
5:00 to 9:59	12	0.03%
10:00 or more	6	0.01%
Total Instances	40051	

BARRINGTON AVE. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38762	98.97%
3:00 to 4:59	356	0.91%
5:00 to 9:59	39	0.10%
10:00 or more	9	0.02%
Total Instances	39166	

STEWART ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	40269	98.57%
3:00 to 4:59	528	1.29%
5:00 to 9:59	56	0.14%
10:00 or more	1	0.00%
Total Instances	40854	

26TH ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	34577	94.78%
3:00 to 4:59	1409	3.86%
5:00 to 9:59	480	1.32%
10:00 or more	14	
Total Instances	36480	

20TH ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	38165	98.49%
3:00 to 4:59	540	1.39%
5:00 to 9:59	44	0.11%
10:00 or more	1	0.00%
Total Instances	38750	

17TH ST. CROSSING		
Downtime (minutes)	# of Instances	% of Total
0:00 to 2:59	39364	99.23%
3:00 to 4:59	283	0.71%
5:00 to 9:59	20	0.05%
10:00 or more	1	0.00%
Total Instances	39668	

Motion 47

Automatic Crossing Gates

Motion 47 Response

- Request for additional information on specific at-grade crossings and the gate downtimes for L (Gold) Line and E (Expo) Line
- June Board Box analysis outlined all grade crossings and gate down instances on the L and E Lines
- Deep Dive focused on most significant gate time instances within 3 to 5 minutes
 - L Line had three grade crossings – Mountain, Myrtle and Ave. 45
 - E Line had three grade crossings – 26th St, Stewart, and 20th St.
- Barrington Ave crossing (E Line) information included

Mountain Ave Grade Crossing



Legend: * Relief Platform

Findings

- Gates down longer due to use of operator relief platform

Actions

- Eliminate routine use of operator relief platform – emergency only
- Cancel gate activation during use of the operator relief platform by using the Train-to-Wayside (TWC) control system
- Implemented change on Dec 15, 2019

Myrtle Ave Grade Crossing



Findings

- Close proximity to Monrovia Station
- Dwell times at station impacting gate down times

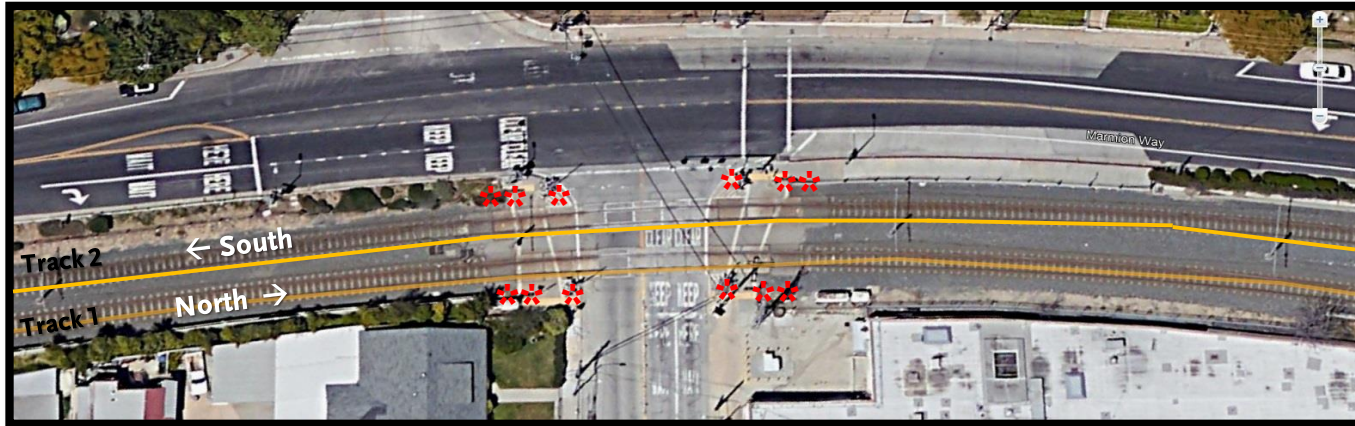
Actions

- Train Operators to consistently use the Train-to-Wayside (TWC) control system to cancel gate activation during long dwell times

Caltrans Traffic Controller Upgrade Project – Target Completion Dec 2020

- Upgrade firmware/timing/controllers for traffic signals
- Prioritize Duarte/Myrtle intersection traffic signal

Ave 45 Grade Crossing



Legend: * Crossing Gates
** PED Gates

Findings

- 30 mph speed restriction on northbound track on approach & through grade crossing
- Current design speed at 45 mph, results in gates being down earlier than necessary

Actions

- Lift speed restriction to reduce gate down times
- Engineering analysis complete
- Field testing complete

26th St Grade Crossing



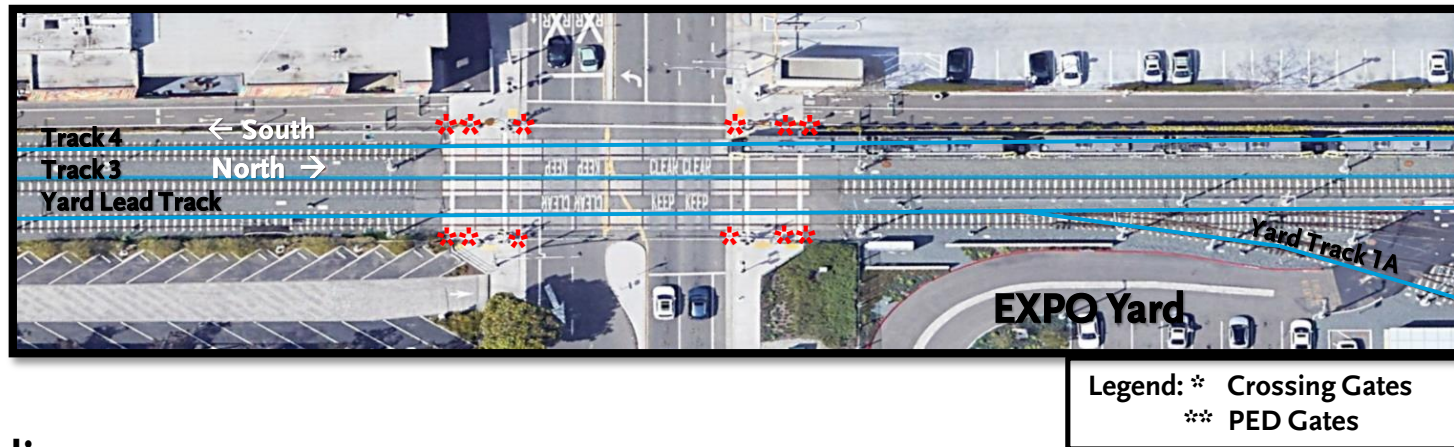
Findings

- Highest amount of gate down instances within 3 to 5 minutes and 5 to 10 minutes
- Proximity to 26th St Station & E Line yard result in longer gate down times
- Crossings activate when southbound trains stop at station & variable dwell times can result in longer gate down times
- Northbound trains from Santa Monica approaching the crossing slow down due to train(s) ahead entering the yard

Actions

- Train Operators to consistently use TWC control system to cancel gate activation during long dwell times
- Change schedule for pull ins to avoid train bunching

Stewart St Grade Crossing



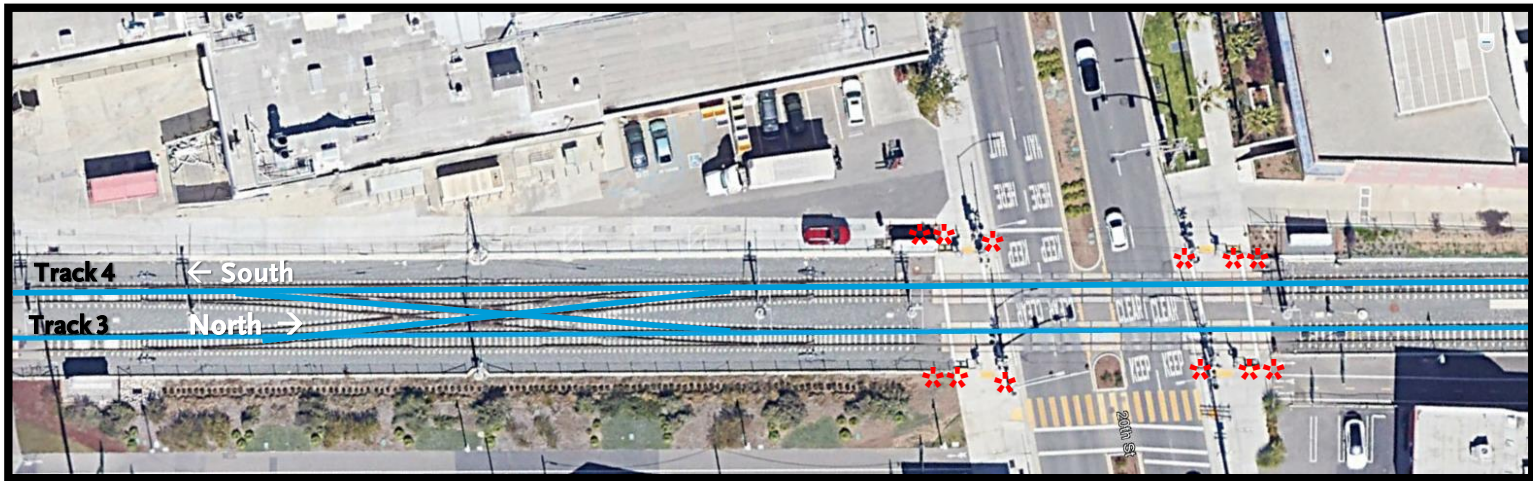
Findings

- Grade crossing within limits of E Line yard and gate activation is more frequent due to trains entering & exiting yard
- 30 mph speed restriction implemented in both directions due to track bed conditions
 - Since design speed is 45 mph, slower southbound trains to Santa Monica will cause longer gate down times

Actions

- Modify train control design – temporary while track bed is being improved
 - Design speed of 35 mph will be provided and start of gate activation will be modified
- Northbound trains headed to the yard should stop before the crossing without activating the gates and only proceed when route into the yard is clear

20th St Grade Crossing



Legend: * Crossing Gates
** PED Gates

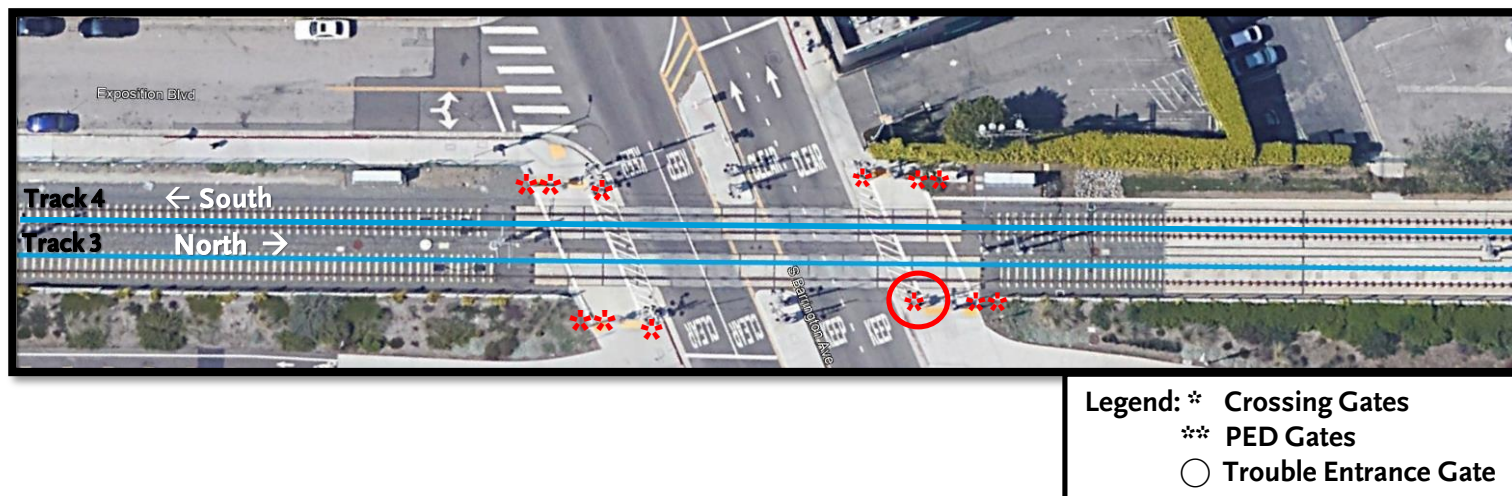
Preliminary Findings

- Frequent train meets
- Northbound trains are bunching

Actions

- Revise schedule for pull ins to avoid train bunching

Barrington Grade Crossing



Findings

- Metro Rail Operations Center (ROC) reported single gate malfunction – 11/14/19
- Metro received complaints of excessive gate down time

Results

- Metro found one gate down, while other 7 gates at grade crossings were up
- Found failure of electronic controller board for gate & replaced