Los Angeles County
Metropolitan Transportation Authority

One Gateway Plaza
Los Angeles, CA 90012-2952

213.922.2000 Tel
metro.net

Metro

DECEMBER 6, 2017

TO: **BOARD OF DIRECTORS**

THROUGH: **PHILLIP A. WASHINGTON** PAW
CHIEF EXECUTIVE OFFICER

FROM: **GREGORY G. KILDARE**
CHIEF RISK, SAFETY & ASSET MANAGEMENT OFFICER

SUBJECT: **INVESTIGATION OF INTERFACE BETWEEN TRAFFIC AND TRAIN SIGNALS**

ISSUE

This Board Box responds to an inquiry by Director Fasana, Director Kuehl, and Director Dupont-Walker at the November 16, 2017 System Safety, Security, and Operations Committee meeting regarding the operation of traffic signals adjacent to the following four specific rail intersections.

(1) Duarte Road/Mountain Avenue (which is a shared intersection between the Cities of Duarte and Monrovia),
(2) Olympic Boulevard/Stewart Street in the City of Santa Monica,
(3) Buckingham Road/Exposition Boulevard in the City of Los Angeles, and
(4) Farmdale Avenue/Exposition Boulevard in the City of Los Angeles

It is important to note that the design and operation of the traffic signal phasing and interface with the railroad equipment at each intersection is under the sole purview of and subject to approval by the respective City Traffic Engineers over which they have jurisdiction.

The Directors' question related to the operation of traffic signal phasing for motorists traveling on roads paralleling Metro's light rail tracks at the above intersections. More specifically, in each case, the question was why does the traffic signal system not permit such motorists to concurrently receive a green traffic phase once the railroad gates are in a lowered position, since the motorists are traveling in the same direction as trains. The Directors believe this permissive operation or 'limited service' operation as referred to by traffic engineers, which would not conflict with the train movement, would improve traffic circulation by not unduly delaying motorists. Staff investigated this

issue by discussing the operation with the local City traffic engineers and by conducting field visits to observe and verify the sequence of operations. Staffs' findings for each intersection are discussed below.

DISCUSSION

Duarte Road/Mountain Avenue

At this intersection, Duarte Road parallels the Gold Line tracks in an East/West direction and Mountain Avenue intersects Duarte Road and the tracks in a North/South direction. Based on staffs' observations at this intersection, once the railroad gates, activated by a single train on approach to the intersection are in a lowered position, the traffic signal for motorists waiting to proceed west on Duarte Road and southbound on Mountain Avenue turns green. This in essence allows straight through movements and left turns in one direction. Motorists waiting to proceed east on Duarte Road receive a red traffic signal since it conflicts with left turning motorists from the opposite direction. There isn't sufficient time to transition to a green signal phase for eastbound traffic on Duarte Road because the train clears the intersection prior to the end of the left turn conflicting phase. If however, there is a second train approaching the intersection, the gates are held in the lowered position for a longer period of time, and this scenario does provide sufficient time for the traffic signal controller to allow eastbound traffic on Duarte Road to also receive a green signal at the end of the southbound left turn phase.

Olympic Boulevard/Stewart Street

Olympic Boulevard runs in an east/west direction and parallels the Exposition Line tracks at this intersection. The tracks intersect Stewart Street approximately 110 feet south of Olympic Boulevard. Based on the traffic signal phase diagram and field observations confirming its operation, permissive movements are allowed sequentially once all gates lower – first for motorists traveling east on Olympic Boulevard and north on Stewart Street, and then for motorists traveling west on Olympic Boulevard once the left turn phase for northbound motorists ends. Motorists traveling east on Olympic continue to receive a green traffic signal concurrent with the start of the westbound green traffic signal phase. There are instances however where, based on demand, motorists traveling east/west on Olympic will receive a red traffic signal after the railroad gates are lowered to allow other non-conflicting phases (such as pedestrians and left-turns) that are in the signal timing sequence to occur. The local City traffic engineers balance the sequence of phasing to afford all non-conflicting phases an opportunity to proceed when a train approaches the intersection.

Buckingham Road/Exposition Boulevard

There are two parallel roads that straddle the Expo Line tracks at Buckingham Road. Exposition Blvd west parallels the alignment north of the tracks and Exposition Blvd east parallels the line south of the tracks. Field observations by staff confirm that both the north and south parallel roadways simultaneously receive a green traffic signal

about seven seconds after all railroad gates have lowered. This permits all parallel traffic to proceed along with the train while the gates are down. The seven seconds are required to allow the signal system to transition after confirming there are no conflicting signal phases.

Farmdale Avenue/Exposition Boulevard

The operation of the traffic signal at this intersection is similar to the Buckingham Road intersection. With the exception of a T intersection south of the tracks, where Exposition Boulevard dead ends into Farmdale Avenue, the geometry of this intersection is also similar to Buckingham. Staff observed all non-conflicting movements on both the north and south roadways along Exposition Boulevard transition to limited service operation about 4 seconds after all gates lower.

In summary, staff confirmed that the traffic signal system, which is designed based on a vehicle being detected and based on demand, does allow for limited service operations. In essence, once a vehicle is detected traveling in a direction that does not conflict with train movements, will receive a green traffic signal after the railroad gates lower, either sequentially or simultaneously based on the specific geometry of the intersection and number of movements at the intersection. This design conforms with industry standards and practices to provide safe movements for motorists without creating unnecessary delays and provides a balance of train and vehicle movements that affords efficient intersection control.

NEXT STEPS

Staff will continue to work with the local City traffic Engineering departments to ensure that the design and operation of traffic signal phasing and interface with railroad equipment affords the most efficient means to mitigate delays, consistent with best engineering practices and industry standards.