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TO: BOARD OF DIRECTORS

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

FROM: RICHARD CLARKE *REC*
EXECUTIVE DIRECTOR, PROGRAM MANAGEEMNT

SUBJECT: METRO GOLD LINE I-210 FREEWAY BARRIER
REPLACEMENT
PROJECT STATUS REPORT

ISSUE

This Board Box is intended to provide a project status for the replacement of the concrete barrier along the I-210 freeway that separates freeway vehicular traffic from Metro Gold Line.

The Metro Gold Line I-210 median barrier replacement project proposes to replace the existing deficient barrier for a six-mile section of the I-210 freeway to prevent intrusion of freeway vehicular traffic into the Metro Gold Line right-of-way. The limits of the project extend from about Marengo Avenue at the west end to the Iconic Bridge structure at the east end. A location map is provided in Attachment A. The project limits includes twelve bridge crossings, retaining walls, signal cabinets, bungalows and cases, duct banks as well as three Metro Gold Line Stations (Lake, Allen and Sierra Madre Village).

BACKGROUND

Since 2007 there have been nine recorded intrusions of freeway vehicular traffic into the Metro Gold Line right-of-way. Except for the January 2018 incident when a midsize sedan crossed over the concrete barrier, all other vehicular intrusions involved tractor trailers or high profile vehicles. Attachment A also provides a summary and location of these intrusions.

We have provided the board with two board boxes on this issue; one on May 7, 2014 and another one on December 3, 2015. In these board boxes, we explained that Metro staff provided the basis for proceeding with replacement of the existing barriers and have been working on developing a plan to do so. We recommended using 56" high, the tallest barriers available with the highest available level of crash test worthiness, Test Level 5 (TL-5) for the design of the replacement barriers.

On May 19, 2016, the Board approved a recommendation to award a contract to CH2M Hill, Inc. (now Jacobs) to prepare the Project Report, Environmental Documents, Final Plans, Specifications and Estimates for the replacement of the I-210 barrier.

The project is located in a very physically constrained area, both on Caltrans side and Metro side. The barriers are within Caltrans right of way and must meet the Caltrans technical and freeway operational and maintenance requirements. Since all but one of the intrusions into Metro right of way have been high profile vehicles, it was clear from beginning that we needed to design the barriers to have the tallest possible configuration and strength to withstand the highest crash load. The tallest Caltrans standard barrier is 56" high. But this 56" high barrier can only be placed on ground. The tallest Caltrans barrier that can be placed on structures such as bridges and retaining walls are 42" high. About 60% of the project involves placement of barriers on structures.

Also, the Caltrans standard barriers have been tested for TL-4 loading. Since both the height and crash worthiness of the barriers being proposed for this project exceeded the Caltrans standard barriers, they are considered as being non-standard. Through extensive coordination with Caltrans a shape of barrier and design approach was approved by Caltrans that would allow modification of the 42" high barrier on structures to 56" without compromising its crash worthiness and designing all the barriers on the project for loading values used for TL-5 rated barriers.

The I-210 Freeway has several existing non-standard features. There are currently mitigation measures in place for each of those non-standard features. Since this barrier replacement project will change the cross section of the freeway, we had to revisit each of those existing non-standard features and verify if current mitigation measures or justifications for the non-standard features can still be carried forward or if we need to implement new mitigation measures. For example, the freeway is on a curved alignment between Altadena Drive and Sierra Madre Villa Ave. This portion of the freeway currently does not meet the standard stopping site distance requirement and this non-standard feature is currently being mitigated by tail light requirements. By increasing the height of the barrier we will not meet the tail light requirement (a requirement that following vehicles can observe the tail light on a preceding vehicle with adequate braking distance) either and a new mitigation measure must be implemented. Through close coordination with Caltrans, we have agreed to use a 36" high

barrier within that section of the freeway. Even though this is a shorter barrier, it has the newer barrier shape that would deflect vehicles back into the freeway in case of a collision. Similarly, we have coordinated with Caltrans to address or outline a path forward for remaining non-standard features.

Because of the very tight physical constraint of the project site, the replacement of the existing barrier will require closure of the existing HOV lane for the entire duration of construction. Closure of a general purpose lane at night and during weekends will also be necessary. These lane closures are expected to have substantial traffic impacts on freeway during construction of the project. To do due diligence, Metro has agreed to perform a traffic micro-simulation modelling and to quantify the amount of delays and identify alternative routes to reduce traffic congestion during construction. This is a major endeavor and will extend the project schedule. Recently, Metro had a very fruitful scoping meeting with Caltrans to determine the approach that would be acceptable to both the agencies to move the project forward as expeditiously as possible while doing due diligence to address all the issues on the project. One of the major agreements reached in this meeting was to convert the outside freeway shoulder into a general purpose lane between Michillinda and Iconic Bridge in both directions during construction.

This will eliminate the need for any long term lane closure or traffic impacts during construction in this segment. It was agreed to move forward and complete the environmental studies for this portion of the project that could be done relatively faster and prepare the design documents for bid while all the required studies are being conducted for the remaining portion of the project. Executing the project in this manner with the portion between Michillinda and Iconic Bridge moving forward first and starting construction on that segment while environmental and design work is being done on the remaining segment of the project will allow the project to start on an expedited manner.

Furthermore, to expedite the traffic micro-simulation study for the portion of the project that will lag behind, we have brought in the services of University of California at Berkeley who are working on the Connected Corridors Program and already have a traffic model for the region that covers our project area. This will allow us to use many of their existing models without having to create them from scratch. It should also be noted that dividing the project into segments will allow for securing the funding needed to construct the entire project. Construction activities will also affect the Gold Line operations. Single tracking or closure of the Gold Line operations will be needed during construction. It may not be feasible to disrupt the train operations for very long stretches of the line and phasing the construction as described above will be advantageous from the operations stand point as well.

Metro Engineering has also conducted a risk analysis study and have identified high, moderate and low risk areas within the Metro facilities along the entire length of the project. A summary of this analysis is provided in Attachment B. In

identifying high risk areas, factors such as potential for human injury, impact to Gold Line equipment, locations for potential vertical drops and effect on congestion were taken into consideration. It may be noted that the area between Michillinda and Iconic Bridge contains areas of high to moderate risk.

Funding for construction of this project must still be identified. A detail project cost estimate is being developed. Upon completion of this estimate, potential funding sources will be identified.

NEXT STEPS

The next steps for this project include the following:

1. For the Segment between Michillinda and Iconic Bridge:
 - a. Complete the environmental studies and the Project Study Report/Project Report (Estimated Completion Date: June 2019)
 - b. Prepare Plans, Specifications and Estimate (PS&E) (Estimated Completion Date: June 2019)
 - c. Prepare bid documents(Estimated Completion Date: December 2019)
2. For the segment between Marengo Avenue and Michillinda:
 - a. Perform traffic micro-simulation studies(Estimated Completion Date: April 2019)
 - b. Purpose mitigation measures should traffic delays be more than 30 minutes (Estimated Completion Date: May 2019)
 - c. Coordinate with the cities and communities affected by the traffic delays(Estimated Completion Date: August 2019)
 - d. Complete the environmental studies and prepare the Project Study Report/Project Report (Estimated Completion Date: November 2019)
 - e. Prepare Plans, Specifications and Estimate (PS&E) (Estimated Completion Date: April, 2020)
 - f. Prepare bid documents (Estimated Completion Date: October, 2020)
3. For the entire project:
 - a. Perform right-of-way survey(Estimated Completion Date: February 2019)
 - b. Relinquish portions of the Metro right-of-way to Caltrans such that the entire cross section of the new barrier is within Caltrans right-of-way. (Estimated Completion Date: March, 2023)

Attachment A – Project Location and Intrusion Summary Map
Attachment B – Summary of Risk Analysis Study

Attachment A – Project Location and Intrusion Summary Map:



Metro Gold Line: I-210 Median Barrier Crash Confirmed Incident Summary

This summary includes all confirmed cases where vehicles have breached the barrier and entered into Metro's Operating ROW.

	Date:	Time:	Direction:	Location:	Vehicle Type:	Aggravations:		Δ Time: (months)
						Sun:	Rain:	
1	10/13/2007	1:20 A.M.	Unrecorded	Allen Station	Tractor Trailer			N/A
2	11/21/2013	2:57 A.M.	East Bound	Betw. Allen and Sierra Madre Villa Stations	Tractor Trailer			73
3	4/24/2014 ¹	1:00 P.M.	East Bound	Near Corson St. on ramp	Tractor Trailer			5
4	8/11/2014	2:30 P.M.	West Bound	West of Michillinda Ave.	Tractor Trailer			4
5	3/6/2016	3:00 A.M.	West Bound	Near Sierra Madre Villa Station	Tractor Trailer		X	19
6	12/22/2016	4:52 A.M.	East Bound	I-210 near San Gabriel Blvd.	Tractor Trailer		X	9
7	1/17/2018	11:45 A.M.	East Bound	200 feet west of N. Lake Avenue	Midsized Sedan			13
8	4/26/2018	1:30 A.M.	West Bound	800 feet west of N. Lake Avenue	Tractor Trailer			3
9	10/13/2018	7:00 A.M.	West Bound	800 feet east of San Gabriel Blvd.	Tractor Trailer		X	6
Δ Time = This is the time elapsed from the previous incident in months						Average Frequency of Last 7 known incidents = 8 months		

Attachment B - Summary of Risk Analysis Study

I-210 RISK ASSESSMENT STUDY: SUMMARY OF FINDINGS



Summary of Priorities
Relative Priority (Red is Highest) for Barrier Implementation

Table 1. Summary of Priorities
Relative Priority Implementation by Segment

Location	Westbound	Eastbound
east of Lake Avenue <-> Allen Avenue (approximate)	Lowest	Lowest
Allen Avenue <-> Rosemead Boulevard (approximate)	Moderate	Highest
Rosemead Boulevard <-> east of Baldwin Avenue (approximate)	Highest	Moderate

Details on the approach and results are provided in the remainder of this memorandum.

Overview of the Analysis Approach

The technical analysis was a quantitative assessment of the relative importance of implementing barrier improvements on individual freeway segments. Five factors were considered for each location:

- Potential for Human Injury/Fatality : locations with a higher likelihood of barrier breaches crashes that could result in fatalities or injuries to Gold Line personnel or travelers (at stations) were deemed higher priority.
- Impact to Gold Line Equipment/Service: locations with critical train equipment, where a crash would result in an extended outage/disruption to Gold Line service, were deemed higher priority.
- Effect on Congestion/Incident Management: locations with higher traffic volumes and more congestion (in conjunction with crash likelihood) were deemed higher priority.
- Construction Cost: locations with a lower relative cost for median replacement were deemed higher priority.
- Location: segments on a bridge, adjacent to a vertical drop in the median, and/or at a location with sufficient sight distance were deemed higher priority.

A comprehensive decision analysis scheme was developed for applying these five factors. For each factor, historical and engineering data analyses were conducted to predict the likelihood of different types of crashes and the data associated with each factor for each segment.