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September 25, 2018

TO: BOARD OF DIRECTORS

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

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

**SUBJECT: METRO BLUE LINE SAFETY, SECURITY, AND
OPERATIONAL ENHANCEMENTS**

ISSUE

This Board Box responds to two separate motions approved by the Board that directed an evaluation of multiple issues be undertaken to enhance safety, security, and operations on the Metro Blue Line (MBL). Periodic updates on certain issues were provided to Board Committees in August 2016 and July 2017, while work progressed on the remaining elements. This report presents the results of a study, conducted by AECOM, of additional grade separations along the entire Blue Line alignment.

DISCUSSION

While the scope of the 2016 motion was limited to evaluating the feasibility of a grade separation at the Wardlow Station in Long Beach, the subsequent 2017 motion expanded the scope to evaluate all crossings on the MBL for grade separations. In order to conduct the evaluations, staff procured the services of an engineering firm through a competitive process afforded by a bench contract. Two separate studies were conducted by AECOM, who was selected as the most qualified and responsive firm.

The first study (Attachment A) focused on safety improvements that could be made at the Wardlow Station, and prioritized the Wardlow grade crossing (which is equipped with flashing lights, bells, and crossing gates) for grade separation in relation to the other twenty-six similarly equipped at-grade gated crossings. The prioritization was done using a prioritization formula unique for the MBL. It is important to note that there are no industry formula or guidelines that inform the development of a formula that can

be utilized to determine the prioritization of grade separations for existing light rail at-grade crossings. A formula therefore had to be developed by AECOM, and was based on a combination of safety factors, vehicle and pedestrian volumes, MBL-specific accident data, and engineering judgment and experience.

Based on the application of the formula, Wardlow Station ranked number 7 on the priority list of the 27 gated crossings. The top 10 crossings for grade separations are shown in Table 1 below.

TABLE 1 (FIRST STUDY - FORMULA APPROACH)

Priority	Crossing
1	Florence Ave.
2	103 rd St.
3	Wilmington Ave.
4	Vernon Ave.
5	Century Blvd.
6	Gage Ave.
7	Wardlow Rd.
8	Nadeau St.
9	Compton Blvd.
10	El Segundo Blvd.

This first study also made various recommendations to improve safety at the Wardlow crossing. These recommendations were in addition to the recently installed pedestrian gates and swing gates. Staff worked jointly with City of Long Beach staff to implement the following recommendations made in the report:

1. Installation of new regulatory signs and warning signs;
2. Refurbishment of pavement markings, limit lines, and legends;
3. Removal of outdated and non-standard signs;
4. Installation of railings to channelize pedestrians and deter jaywalking;
5. Installation of retroreflective delineators in between tracks to prevent illegal U-turns; and
6. Closure of Cedar Ave to mitigate the risk of motorists stopping on the tracks.

Staff is continuing to work with Long Beach City staff to review and modify if necessary the interface between the traffic signal timing and active gate warning.

The second study (Attachment B), which included an evaluation of all 78 at-grade crossings, included prioritizing gated as well as non-gated crossings. The prioritization for this second study was done using two distinct methods - using Metro’s Board adopted Grade Crossing Safety Policy, and using the same MBL-specific prioritization formula used in the first study, with some adjustments to account for the addition of the non-gated crossings.

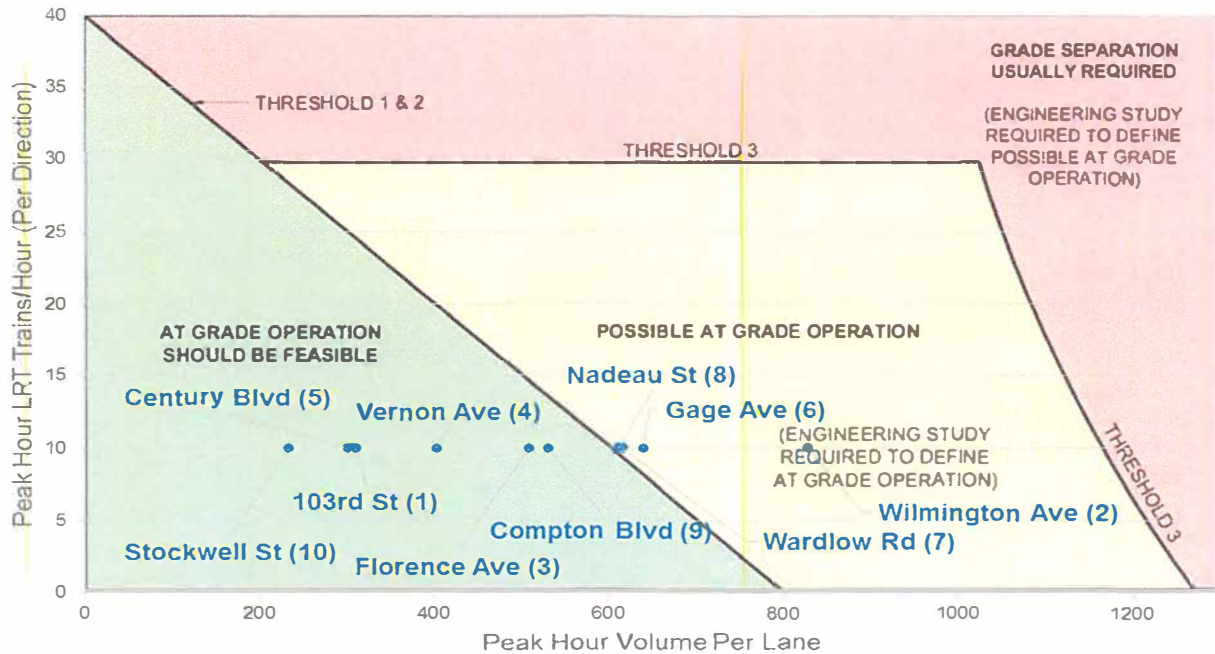
Although Metro’s Policy is applicable only to new projects or extensions and not designed for use on operating lines, it was nevertheless utilized to compare the outcomes with the results of the formula-based approach. The priority order for the top 10 crossings for grade separations using the formula are shown below in Table 2. As can be seen, with the exception of El Segundo Blvd., which was replaced with Stockwell St., the rankings of the top 10 crossings did not change significantly in the second study, with the majority of the crossings retaining the same rankings as in the first study. The El Segundo Blvd. crossing ranked 13 in the second study.

TABLE 2 (SECOND EXPANDED STUDY - FORMULA APPROACH)

Priority	Crossing
1	103 rd St.
2	Wilmington Ave.
3	Florence Ave.
4	Vernon Ave.
5	Century Blvd.
6	Gage Ave.
7	Wardlow Rd.
8	Nadeau St.
9	Compton Blvd.
10	Stockwell St.

The application of Metro’s Policy requires at-grade crossings to be evaluated using a three step process. Step 1 assesses roadway volumes and train frequencies leading to an initial categorization of crossings into 3 groups: “At Grade Should be Feasible,” “Possible At Grade Operation,” or “Grade Separation Usually Required.” The results of this step are plotted on a nomograph, adapted from the Institute of Transportation Engineers, and included in the Policy. The nomograph is divided into three colored zones – Green, Yellow, and Red that coincide with the three categories described above. Crossings in the Red zone must be grade separated. The nomograph for the top 10 crossings using the formula approach is shown below in Figure 1.

FIGURE 1 (SECOND STUDY – POLICY APPROACH, CURRENT VOLUMES)



It is important to note that none of the crossings, including the ones on the top 10 list, using the formula approach lie in the Red zone of the nomograph (i.e., require grade separation). This suggests that the policy relies heavily on determining traffic impacts to decide whether a grade separation is necessary but does not well predict safety risks at the crossings once a line commences operations.

Step 2 of the policy requires a detailed analysis of safety issues such as geometry of the crossing, lane configurations, school bus routes, adjacent traffic signalized intersections, speed of trains through the crossing, and the possibility of recurrent queueing across the tracks. This step was carried out for this study to determine whether there were any adverse safety conditions that would suggest/support a grade separation solution. AECOM found that appropriate safety mitigations had been implemented at the crossings, leading to their conclusion that none of the crossings warranted a grade separation. They did however recommend certain modifications at some crossings which staff is pursuing with the local jurisdictions.

Step 3 of the policy requires detailed studies and traffic simulation modeling to be conducted only if there are any outstanding issues from Step 2, or if staff cannot obtain agreement on the crossing design with local jurisdictions or regulatory agencies. Since the MBL is an operating line, this step of the analysis was not needed.

The valuation of safety benefits for a grade separation at 103rd and Century, our highest ranked crossings, are focused primarily on a reduction in fatalities. At 103rd and Century, we have sustained two (2) fatal accidents over the last ten years, each having an expected public cost of \$10 million each (i.e., using USDOT valuation techniques for the value of a statistical life (VSL), or \$2 million annually. These fatal accidents

occurred before the installation of the active pedestrian and swing gating retrofit that has now been completed along the entire Blue Line alignment. Therefore, the estimated safety benefits of \$2 million annually for a grade separation at 103rd and Century are likely less.

In addition to ranking the crossings, the expanded study also evaluated the traffic benefits to motorists and the operational efficiencies to rail passengers if one or more crossings were to be grade separated. For traffic delays, the best case scenario occurs at the Wilmington crossing where a grade separation at that location would reduce the average delay in the AM peak hour by 31 seconds per vehicle. Over the course of a standard workday, roughly 126 hours of vehicle delay occurs at that crossing, which over the course of a year represents less than \$1 million in total costs of delay using accepted USDOT evaluation methods (Departmental Guidance for Conducting Economic Evaluations, 2011, USDOT). The USDOT, however, recognizes difficulty in estimating travel time benefits that are very small across individuals and cites research by J.P. Mackie and others that suggest very small travel time savings, particularly those below five (5) minutes may well have substantially lower benefits than the USDOT evaluations models suggest and could be close to zero.

The operational benefits in terms of reduction in end-to-end run times are less than the best reduction in traffic delays. This is true even if multiple crossings were to be grade separated. AECOM's analysis showed that even if three crossings (Gage, Florence, and Nadeau) on the MBL were to be grade separated, our best case, the run times would improve by only about six (6) seconds. The relatively short distances between stations is the main reason we do not see any significant improvement in run times. There simply isn't sufficient distance between the stations to be able to sustain faster speeds for a long distance to reduce end-to-end run times appreciably. Therefore, the expected benefit to our passengers on the Blue Line in reducing delay through this grade separation along our alignment is low, less than \$800,000 annually using accepted USDOT methods, but given the limitations of this method described above, an average six (6) second improvement in travel time per passenger per day could well have a much lower valuation.

In summary, grade separation benefits related to safety tend to be highest near station locations and/or those with high pedestrian traffic counts. Grade separation benefits to reduce traffic delays are obviously higher at those intersections with higher daily vehicular traffic counts. Grade separation benefits to passengers in the reduction of end-to-end run times are very small, seconds in fact for a single grade separation with similarly small expected value.

Turning our attention to the costs of grade separations, AECOM was also tasked with determining the type of grade separation, and the cost of grade separations for crossings ranked 1 through 10. The estimated costs of these grade separation improvements ranged from \$84 million at Wilmington to the Gage/Nadeau/Florence grade separation at \$428 million, with the costs of grade separation being far more

expensive when at a station location, which unfortunately are the locations in which we expect to accrue the greatest safety benefits.

AECOM estimated that a single grade separation at a station location tended to cost in excess of \$160 million to construct. The most optimistic value assumptions regarding grade separation benefits for improved safety, cross traffic delay reductions and Blue Line passenger travel time reductions do not exceed \$4 million, annually, and could be substantially lower. Also, we have not included any additional operations and maintenance costs (i.e., elevators, escalators, janitorial, security, etc.) which would, in part, reduce these potential annual benefits from grade separation. Therefore, a new grade separation at a station location would not “pay off” for 40+ years. With a cost of capital at 3%, the benefits of a grade separation at a station location would never produce net positive benefits, even using these favorable benefit assumptions.

This is not to say, that grade separations will never have net positive returns. Lowering the marginal cost of a grade separation below \$160 million, such as by consolidating multiple adjacent grade separations on a brand new line, may well improve this benefit/cost calculus. Grade crossings with substantially higher vehicular counts than we identified on the current Blue Line alignment could also argue more strongly for a grade separation. What the AECOM study did demonstrate was that no single grade crossing along the current Blue Line alignment produced benefits sufficient to warrant further exploration of a grade separation.

NEXT STEPS

None required.

ATTACHMENTS

Attachment A – Metro Blue Line Safety Improvement Study for Wardlow Crossing

Attachment B – Blue Line Improvements - Study of Grade Separations on the Los Angeles Metro Blue Line

Attachment C – 2016 Motion

Attachment D – 2017 Motion

Attachment A:

http://libraryarchives.metro.net/DB_Attachments/180925Attachment%20A%20-%20MBL%20Safety%20Improvement-Wardlow.pdf

Attachment B:

http://libraryarchives.metro.net/DB_Attachments/180925Attachment%20B%20-%20MBL%20Improvements-Grade%20Separations.pdf

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Board Report

File #: 2016-0487, **File Type:** Motion / Motion Response

Agenda Number:

**MAY 26, 2016
REGULAR BOARD MEETING**

Motion by:

Garcetti, Knabe, DuBois and Dupont-Walker

May 26, 2016

**Relating to Item 30; File ID 2016-0357
Blue Line Station & Security Enhancements**

Safety and security will continue to be a top MTA priority in the development of rail projects across Los Angeles County.

The MTA CEO has prioritized safety and security reinvestments along all our existing MTA rail lines throughout the County.

For example, MTA is working on making major investments on the Blue Line to improve safety and security measures, along with State of Good Repair capital improvements. Once complete, close to \$300 million (not including rail vehicles) will be invested in the Blue Line.

A recent study issued by the University of California Berkeley (*Grading California's Rail Station Areas*, October 2015) ranked and graded rail stations from six cities in California for accessibility, connections to housing, walkability, and safety.

The study ranked the Blue Line Wardlow Station as one of the worst stations in Los Angeles County and in the State of California.

The Wardlow Station area is generally auto-dominated and lacks the concentrations of jobs or housing. Additionally, the rail crossing is complex and the parking lots are without significant pedestrian activity.

Better station area development can improve and address the environmental and quality-of-life needs surrounding the station.

Additionally, due to the current station configuration, improvements to the rail crossing intersection are warranted.

WE, THEREFORE, MOVE that the Board direct the CEO to report back on the following:

- A. Provide an update at the June 2016 MTA Board meeting on all Blue Line Safety and Security and State of Good Repair capital projects and enhancement efforts, including, but not limited to, the following:
 - 1. Grade crossing gates
 - 2. Pedestrian safety gates
 - 3. Fare enforcement and security
 - 4. Station maintenance
 - 5. Station fare gate installation
- B. Initiate a feasibility study to improve safety and security for the Blue Line Wardlow Station and a pilot fare gate program at 4 (four) downtown Long Beach stations.
- C. Prioritize the Wardlow Grade Separation project to receive new funding and/or grants and assign this project to be included in MTA's State of Good Repair, Safety Improvements, and Aging Infrastructure program.
- D. Include the Wardlow Station as part of MTA's "Transit Oriented Communities" pilot projects.
- E. Identify Transit Oriented Development and other land use and development opportunities to maximize the use of Wardlow Station.
- F. Provide a response and report back on items B through E at the August 2016 MTA Board meeting.

AMENDMENT by Fasana to include the artwork along the Blue Line.

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Board Report

File #: 2017-0091, **File Type:** Motion / Motion Response

Agenda Number: 37.

**REVISED
PLANNING AND PROGRAMMING COMMITTEE
FEBRUARY 15, 2017
CONSTRUCTION COMMITTEE
FEBRUARY 16, 2017**

SUBJECT: MOTION BY GARCETTI, HAHN, GARCIA AND DUPONT-WALKER (BLUE LINE IMPROVEMENTS)

Motion by:

MAYOR ERIC GARCETTI, SUPERVISOR JANICE HAHN, MAYOR ROBERT GARCIA, AND DIRECTOR JACQUELYN DUPONT-WALKER

Item 37: Blue Line Improvements

With 80,000 average weekday boardings, the Blue Line is MTA's highest ridership light rail line and is the highest ridership modern light rail line in the United States. During 2016, the Blue Line saw nearly 25 million total boardings and over 186 million total passenger miles.

Currently, the Blue Line is undergoing a \$1.2 billion state-of-good repair overhaul, including over \$860 million in new and refurbished light rail vehicles. This project seeks to restore the Blue Line to a like-new state of operation.

However, a more comprehensive evaluation of improving service and reliability on the Blue Line is required. Customer satisfaction on the Blue Line has fallen nearly ten percent since 2013, while the Blue Line complaint rate has nearly doubled over the same time period.

There are many opportunities for improvement throughout the length of the Blue Line.

In Downtown Los Angeles, for example, a bottleneck exists at Washington Boulevard, where the Blue Line and Expo Line join in a wye. Recently, MTA increased the frequency of Expo Line trains to every six minutes during peak hours, matching the frequency of Blue Line trains. As a result, a total of 40 trains per hour are passing through the wye, approaching the limits of the wye's capacity.

Both Blue Line and Expo Line depend on this single track segment, any collision or mechanical failure within the segment could significantly delay both rail lines. Grade separating this portion of the Blue and Expo Lines could dramatically improve service reliability, increase capacity, provide better schedule adherence, and facilitate other opportunities, such as undergrounding Pico Station.

Additionally, an opportunity exists to create Blue Line Express service between Long Beach and Downtown Los Angeles. Roughly between the I-710 freeway and Washington Boulevard, extra right-of-way exists which could be used to construct a third track required for express operation.

APPROVE Motion by Garcetti, Hahn, Garcia and Dupont-Walker that the MTA Board direct the CEO to:

- A. evaluate and implement short-term Blue Line and Expo Line improvements, especially service reliability and schedule adherence improvements on at-grade sections of Washington Boulevard, Flower Street, and the downtown wye, including but not limited to signal optimization, signal priority, signal preemption, and consideration of street closures;
- B. study long-term Blue Line improvements, including but not limited to:
 - 1. creating Blue Line Express service between Long Beach and Downtown Los Angeles during peak hours, including:
 - a. provide information on current freight usage along the right-of-way,
 - b. provide a preliminary estimate on upgrading the right-of-way to light rail transit standards,
 - c. provide an operations plan to accommodate express service,
 - d. quantify travel time savings for peak hour trains;
 - 2. optimizing the Washington Boulevard wye by grade separating the Blue Line on Washington Boulevard and the Expo Line on Flower Street, including a full grade separation of Pico Station;
 - 3. explore the feasibility for a full grade separation and/or station relocation including additional parking at Wardlow Station;
 - 4. study of additional grade separations along the entire Blue Line alignment that would improve service reliability and schedule adherence; and

- C. report back on all the above to the Construction Committee during the July 2017 Board cycle.

DUPONT-WALKER AMENDMENT: to extend to the Blue Line the graffiti deterrence program currently in effect on the Gold Line.

GARCIA AMENDMENT: to work with the City of Long Beach to reimagine the last stop on the Blue Line.

GARCETTI AMENDMENT: that the Eco-Rapid Transit Line Project studies incorporate the Blue Line Express concept, so the Blue Line could ultimately run directly to Union Station.