



Board Report

File #: 2015-0805, File Type: Project

Agenda Number: 50.

CONSTRUCTION COMMITTEE JULY 16, 2015

SUBJECT: METRO BLUE LINE PEDESTRIAN SAFETY ENHANCEMENTS AT GRADE CROSSINGS

ACTION: ADOPT LIFE-OF-PROJECT BUDGET

RECOMMENDATION

CONSTRUCTION COMMITTEE FORWARDED WITHOUT RECOMMENDATION:

- A. adopting Life-of-Project (LOP) budget for Project 205104 (**Metro Blue Line (MBL) Pedestrian Active Grade Crossing Improvements Installation**) of \$30,175,000;
- B. increasing the Fiscal Year 2016 Budget for Project 205104 in Cost Center, 3960 - Rail Transit Engineering, by \$12,897,000 to fund the FY 2016 cash flow for these pedestrian grade crossing safety enhancements; and
- C. authorizing the CEO to negotiate and execute a Public Highway at-Grade Crossing Improvement Agreement with Union Pacific Railroad (UPRR) according to the Term Sheet (Attachment B).

ISSUE

The existing MBL light rail transit system is over 25 years old and pedestrian crossing protections needs updating to be consistent with Metro's current design standards. The installation of safety devices, such as pedestrian gates and emergency exit swing gates at rail pedestrian crossing intersections is expected to provide similar safety performance to our other light rail lines with at-grade crossings.

BACKGROUND

The Board adopted a motion by Director Yaroslavsky in July 2012 that was subsequently amended by Director Ridley-Thomas in August 2012, directing the CEO to convene a MBL Task Force and report back to the Board for all causes of accidents, including reviewing the design elements of the crossings, developing potential suicide prevention strategies, and to provide solutions for improving

pedestrian safety.

The Task Force was comprised of staff from Metro, the California Public Utilities Commission (CPUC), UPRR, the Cities of Los Angeles and Long Beach (although the City of Compton was invited, staff from the City of Compton was not present at the meetings) and the County of Los Angeles. UPRR was included because the MBL tracks run parallel to their tracks in close proximity along most of the alignment. Therefore, some of the pedestrian improvements will need to be made on UPRR's side of the right of way (ROW). The Task Force members agreed in concept to include pedestrian gates and swing gates on the Metro portion of the shared right of way, and based on feedback from UPRR, only swing gates on the UPRR side of the alignment. Nineteen (19) intersections were considered for improvement in the original project with only eleven (11) active pedestrian gates. An estimate of this project based on this scope resulted in the MBL Pedestrian and Swing Gates Project 205063 being approved by the LACMTA Board with a life of project budget (LOP) of \$7.7 million in November 2012. When Project 205063 was established, the original scope of work and LOP was intended to cover the cost for preliminary engineering (PE) and construction as a design-build contract based on the agreed-upon scope by the Task Force members. The CPUC, subsequently, required active pedestrian gating at all of the intersections (i.e. 27 intersections and 108 active pedestrian gates), dramatically changing the scope of the project, necessitating a new project and new project LOP budget. The prior MBL Grade Crossing Improvement Project 205063 will be cancelled having expended an estimated \$2,865,000 of \$7,700,000 through FY 2015 to complete all of the necessary design work for the new project and for third-party coordination. The balance of the remaining LOP funding for Project 205063 will be transferred to the new Project 205104.

DISCUSSION

Original Project Estimates

Having completed final design for Project 205104, we now have improved estimates on the costs necessary to complete the original MBL pedestrian crossing Project 205063 as well as the greatly expanded new project 205104 which includes many more active pedestrian gates. A table reconciling the original Project 205063 LOP with the costs to complete the much larger Project 205104 is included as Attachment C. We now know that the original LOP budget for Project 205063, established in November of 2012 for the now cancelled project omitted some elements which were identified during the final design of the new project. Specifically, the original project did not account for the following activities totaling \$2,013,954.

- Additional costs of \$350,132 associated with Metro labor were not identified in the original LOP.
- Metro Design costs were underestimated by of \$389,359.

- Metro grade crossing panels were overestimated by \$147,100.
- Flagging on Metro's side of the right-of-way was underestimated by \$74,119.
- Potential for utilities conflict was underestimated by \$125,000.
- Design support during construction, requests for information, and submittal reviews were underestimated by \$545,588.
- Construction Management costs did not account for \$545,588.
- Other agency soft costs such as Project Control, and Procurement were underestimated by \$409,191.
- The Contract Modification Authority (CMA) was overestimated by \$277,922.

External Agency Requirements - Design Changes Required by CPUC and City of Los Angeles

After completing the preliminary design and additional field diagnostic meetings with the Task Force members to refine the design, additional requests from most third parties resulted in a significant increase in the scope of the project. In late 2014, the CPUC informed Metro that the original project scope was no longer feasible as Metro will have to install pedestrian gates in addition to the swing gates on the UPRR side of the alignment to maintain uniformity with the devices proposed to be installed on Metro's side of the alignment. In that regard, CPUC staff urged Metro to continue to work with UPRR to overcome their original resistance to installing pedestrian gates on their side of the alignment. In subsequent discussions with UPRR, Metro was able to reach consensus to include the pedestrian gates on the UPRR side, in addition to only the swing gates as originally agreed at 23 crossings. This change required by the CPUC to now install active gating as well as swing gates on the UPRR side of the right of way was a material, design and construction change to the original scope of the project. Metro staff concurs with the change request by the CPUC because it brings the MBL up to our current design standard. We also believe the change reduces future legal liability risks.

The requirement for active pedestrian gating on the UPRR side of the tracks now required the negotiation of a contract with them to design and install the active gating, to widen and improve crosswalks, and to engineer gating/signal systems in coordination with our own. Further, consistent with their practice, UPRR will not agree to perform this work with a firm completion schedule nor to a firm fixed price. The Public Highway at-Grade Crossing Improvement Agreement with UPRR will be written on a time and material (T&M) basis only and the estimates included in the term sheet may change. Metro has entered into such T&M type agreements with UPRR in the past including the original MBL Construction and Maintenance Agreement and the highly successful MBL four-quadrant

gate improvement agreement. The Alameda Corridor Agency, Caltrans and other public entities have also entered into such agreements with UPRR. However, absent a fixed price and a firm UPRR schedule, a material risk exists for another LOP increase on this project.

Another significant increase in the scope of the project, as a result of CPUC's requirement, was the increase in the number of crossings that needed to be enhanced on Metro's side of the alignment. The field reviews concluded that with additional civil improvements, Metro would be able to improve 8 additional crossings, increasing the number to 27 crossings. Furthermore, the civil improvements would enable Metro to install both pedestrian and swing gates at all 27 crossings, instead of only installing certain improvements at 19 crossings included in the original scope.

Another much smaller improvement to the project was required by the City of Los Angeles and relates to curb cuts along both sides of the right-of-way to facilitate improved access to the mobility impaired. The City believes that such street overlay improvements and reconstruction of existing curb ramps are necessary to comply with current Americans with Disabilities Act Access Guidelines (ADAAG), and their own standards. The reconstruction of curbs, which was not identified in the original estimate, was an added requirement. The incremental costs for all of the improvements not contemplated at the time of the original LOP are as follows with a complete reconciliation of these items is provided in Attachment C.

- Design/installation of pedestrian gates at all 27 crossings on Metro's side of the alignment instead of only 19. In addition, the original project only contemplated 11 active pedestrian gates rather than the 62 active gates now planned. Active gating at these other intersections will include the installation of concrete pedestrian crosswalk panels at many intersections and other associated implementation costs. The significant increase in the number of active pedestrian other civil improvements and systems integration and testing to accommodate them cost an additional \$7,262,711.
- Additional costs of \$375,000 associated with potential utilities conflicts as a result of significant increase in the original scope of work.
- In order to comply with the City's ADA standards, street-resurfacing was required. The work associated with curb cuts and street resurfacing added an extra cost of \$468,518 to the LOP.
- Extend existing railroad concrete panels for pedestrian crosswalks and replace existing deteriorated timber crossings and impacted rubber crossings within the UPRR right of way. As a condition of enhancing their ROW, the UPRR required Metro to implement these crosswalk improvements in the amount of \$1,830,190.
- Design/installation of pedestrian gates at 23 railroad crossing intersections on the UPRR side of the alignment, in addition to the swing gates proposed during the initial preliminary engineering and planning stage. These 46 new active pedestrian gates were not included in

the original scope. This change, required by the CPUC, necessitated Metro to redesign and reconfigure the finalized drawings that included the addition of a substantial amount of civil and signal work in order to accommodate pedestrian gates, increases costs by \$6,371,826.

- Construction activity on the UPRR side of the right of way will require UPRR flagging services in the amount of \$600,000.
- The original project did not take into consideration the costs of obtaining easement rights for the UPRR right-of-way needed to install the added swing and pedestrian gates and panels in the amount of \$470,000.
- Contingency for UPRR work in an amount of \$1,391,000.
- Design support during construction, submittal review, and Construction Management costs, which included Third Party, Project Control, and Procurement costs were increased due to the expanded construction activities as a result of the external agency requirements. The costs associated with these services amounted to \$1,783,370.
- The Contract Modification Authority (CMA) in the amount of \$810,623 was increased due to additional construction activities as a result of the external agency requirements.
- Since this was a Design Bid Build contract and as a result of the external agency requirements in increased scope of work, the design contractor's cost and design review costs for the City of Los Angeles, City of Long Beach, City of Compton, County of Los Angeles, and UPRR was increased by \$1,958,641.

In summary the new design concept improves on the safety of the initial design with the required improvements mandated by the CPUC. The new Project will cost \$30,175,000 to construct, the old project having funded design and third-party coordination and oversight at an estimated cost of \$2,865,000. Both projects together are estimated to cost \$33,040,000.

Mitigation of Potential Utility Conflicts

To reduce the probability of the project being affected by an overrun due to unknown utilities, Metro has completed investigation and potholing for potential impact to the project. Metro identified and notified all public and private utilities for utility conflicts within the project limits. As part of this effort, we obtained as-built and record drawings, field surveyed all the visible manholes, hand holes and above ground utilities, opened Dig Alert tickets for all grade crossings, and back checked as-built utility drawings against the paint marks located through Dig Alert tickets for every crossing. We also performed subsurface utility location services to determine all potential utilities conflicts; employed radar penetrating detection equipment to identify underground utilities conflicts. Resolution of utilities

conflict will be accomplished by using one of the following methods a) protecting the existing utility in place by installation of shallow foundations or encasement of existing underground utility, b) design around the existing utility, c) relocating the conflicted utility. Review of the utility information shows that the grade crossing pedestrian gate installations may conflict with existing signal cables or traffic signal cables at approximately 35 locations. Metro is identifying each conflict to solicit a cost from the construction contractor for relocating or working around the conflicting cable prior to construction work starting, thus reducing cost and schedule impact due to utilities conflicts.

DETERMINATION OF SAFETY IMPACT

Blue Line	FY10	FY11	FY12	FY13	FY14	FY15 Jan, YTD	Total
Train vs. Ped Accidents	10	5	15	7	10	4	51
Train Miles	1,650,286	1,653,894	1,929,804	2,001,290	2,122,893	1,233,546	10,591,713
Fatalities (*)	5	3	4	3	2	3	20
Accident Rate per 100,000 Train Miles	0.61	0.30	0.78	0.35	0.47	0.32	0.48

Gold Line + EXPO Line	FY10	FY11	FY12	FY13	FY14	FY15 Jan, YTD	Total
Train vs. Ped Accidents	3	6	2	0	2	2	15
Train Miles	1,311,236	1,479,204	1,658,395	2,386,628	2,482,027	1,604,431	10,921,921
Fatalities (*)	0	0	0	0	1	0	1
Accident Rate per 100,000 Train Miles	0.23	0.41	0.12	0.00	0.08	0.12	0.14

*Excludes suicides.

The table above summarizes the pedestrian collision rates and the number of non-suicide fatalities that have occurred on our primarily at grade light rail lines. The pedestrian collision rate on the MBL is more than 3 times higher (i.e., .48 vs .13) than the Pasadena Gold Line (PGL) and Expo Line combined. The number of non-suicide fatalities from FY10 through January 2015 on the MBL is twenty times higher than the PGL and Expo Lines given very similar numbers of train miles operated. While the PGL and Expo lines have more grade separation and other different service characteristics, they also have the most up-to-date pedestrian gating (active and swing) that exists in our light rail system. Metro staff does not believe that the difference in pedestrian gating technology is coincidental to the various lines’ pedestrian safety records.

Since the MBL opened, Metro’s costs of defense and payments to injured pedestrians or survivors have been very small, because of the comparative negligence of decedents and injured parties as well as existing statutory immunities for rail design. The average annual costs total \$679,448, with \$310,424 spent on Workers’ Compensation and \$369,024 spent on third parties. These costs include legal expenses, payments to third parties, temporary and permanent disability payments to Metro

workers, and medical costs, but exclude other unallocated expenses such as Metro staff time to administer or investigate the incident, Sheriff costs and others. Therefore, expected financial benefits to Metro from safety improvements on the MBL today are relatively small, although risks are growing.

The Federal Department of Transportation (DOT) provides guidance as to appropriate evaluation procedures for safety improvements and requires such use by the FAA and others when evaluating policy alternatives and regulations. The DOT requires its member agencies to value the *public* benefit of safety improvements which we follow here. Guidance in 2008 values a statistical life saved (VSL) at \$5.8 million. When adjusted by changes in consumer prices to 2015, that estimated VSL increases to \$6.32. The DOT guidance also provides valuation methods for non-fatal injuries ranging from minor to critical. We have rated our non-fatal MBL train collision injuries very conservatively as serious, which is below critical and severe, but above minor or moderate because of the risk of significant brain injury, amputation, other orthopedic trauma and internal injuries. A serious injury is rated as 5.75% of a fatal injury, or \$360,000 in public benefit if prevented. These estimates are not the savings to Metro from reducing legal liabilities associated with pedestrian fatalities on the MBL.

Although we have not monetized them, other significant benefits exists to reducing fatal and non-fatal pedestrian collisions including fewer service disruptions, the opportunity cost of investigation and administration and the significant expense of providing medical care and disability benefits to highly traumatized rail operators, some of whom never return to work. In an extreme case, lifetime medical care and disability benefits to a rail operator involved in a fatal accident with a pedestrian could exceed \$250,000 or more.

An offset to these expected benefits is the cost to maintain and replace damaged pedestrian gates and swing gates over time. While the obligation to maintain the equipment would be split between Metro and UPRR with UPRR maintaining their pedestrian gates and Metro maintaining the rest, Metro would be responsible for all costs to maintain and replace all the pedestrian and swing gates. We expect Metro's cost to be approximately \$150,000 annually and UPRR's according to their estimate \$200,000 annually, which will be reimbursed by Metro, for a total maintenance cost of \$350,000 every year.

If active pedestrian gating reduces the MBL pedestrian collision rate by half, the expected number of fatalities on the MBL would be reduced from 3.58 annually to 1.79 annually and the number of non-fatal collisions would be reduced from 5.55 annually to 2.78. The annual public benefit of this fatal and non-fatal injury reduction is estimated at \$12.33 million. Subtracting the costs of annual operations and maintenance, the net annual public benefit is roughly \$11.98 million. Over a 25 year useful life, the Net Present Value (NPV) benefits of the pedestrian gating project, using appropriate discounting methods, is roughly \$202 million, far exceeding the sum of the now cancelled project's design costs and the construction costs for the new project of \$33.04 million. A detailed summary of these calculations are included in Attachment D.

FINANCIAL IMPACT

The new Project 205104 will require adopting an FY16 Budget for the project of \$12,897,000 in Cost Center 3960 - Rail Transit Engineering. This increase will be partially offset by eliminating the FY16 Budget for cancelled Project 205063 in Cost Center 3960 - Rail Engineering. The net increase to the FY16 Budget in Cost Center 3960 will be \$7,894,000. Annual operating and maintenance expenses will be required beginning approximately in Fiscal Year 2018. These operating and maintenance costs will be addressed in future years' budgets and will likely require an FTE increase at that time. Since this is a multi-year project, the Project Manager, Cost Center Manager, and Executive Director of Engineering and Construction will ensure that costs will be budgeted in future years.

Impact to Budget

The source of fund for this action is from Prop C 25% Cash and/or Bond funds. These funds are eligible to be used for transit capital improvement to existing rail rights-of-way. No other sources of funds were considered for this procurement. This action will not impact on-going operating expenses.

ALTERNATIVES CONSIDERED

The Board may choose not to authorize the new project budget. This alternative is not recommended since rejecting this project would prohibit staff from capitalizing on a good bid for installation of pedestrian and swing gates to enhance the pedestrian safety at 27 intersections along the Metro Blue Line corridor. The rejection would also result in additional cost and time to rebid the project in the future, extending impact to pedestrian safety if this safety enhancement project is not implemented. The current bids expire at the end of September 2015.

NEXT STEPS

Upon approval of the additional funding, staff will work with Procurement for awarding the Contract C1086 Pedestrian and Swing Gates Installation to the most responsive responsible contractor. Staff anticipates issuing a contract under the CEO's Authority in September 2015, and roughly estimates that the improvements can be completed within 24 months from issuance of Notice to Proceed, provided the UPRR completes their portion of the work concurrent with our schedule.

For the original project, a final LOP could not be estimated until third-party discussions were concluded with LABOE, the CPUC and UPRR. Despite verbal agreement from third parties in 2012 regarding conceptual design, no design had been fully vetted and approved by all of the parties. Going forward, staff will make clear to the Board of Directors when requesting an LOP of possible risks of an increase related to third-party approvals. Staff is also exploring significant change in our LOP process by instituting design LOPs only. A design-only LOP for this project would have eliminated the significant construction LOP increase on this project at the cost of returning to the Board a second time for approval of the construction LOP.

ATTACHMENTS

Attachment A - Funding/Expenditure Plan

Attachment B - UPRR Term Sheet for Public Highway At-Grade Crossing Improvement Agreement
(the "Agreement")

Attachment C - Reconciliation of Estimates Related To Projects

Attachment D - Incremental Costs and Benefits for Improvements

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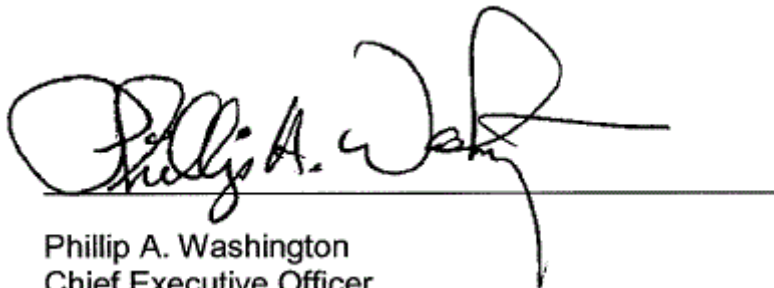
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Phillip A. Washington
Chief Executive Officer

**ATTACHMENT A
FUNDING/EXPENDITURE PLAN
Project 205104 – MBL Pedestrian Safety Enhancement At-Grade Crossings**

Use of Funds	FY16	FY17	FY18	Capital Costs Total
Construction Phase (By Metro and Contractor)				
Construction Contract Bid (C1086-205063)	4,967,000	5,956,000	989,000	11,912,000
-Concrete Panels (By Metro)	561,000	673,000	112,000	1,346,000
-Flagging (By Metro)	250,000	300,000	50,000	600,000
-Utilities Conflicts (Allowance)	209,000	250,000	41,000	500,000
-Outside Curb ADA Compliance	237,000	285,000	47,000	569,000
Subtotal Metro Construction Phase	6,224,000	7,464,000	1,239,000	14,927,000
Construction Phase (By Union Pacific)				
-UPRR Concrete Panels	763,000	915,000	152,000	1,830,000
-UPRR Active Warning Devices	2,657,000	3,186,000	529,000	6,372,000
-UPRR Flagging	250,000	300,000	50,000	600,000
-UPRR ROW Acquisition/Easement	470,000	-	-	470,000
-Contingency on UP Work (T & M) @15%	621,000	660,000	110,000	1,391,000
Subtotal Union Pacific Construction Phase	4,761,000	5,061,000	841,000	10,663,000
Construction Soft Costs				
Engineering (DSDC, RFI, Submittals Review)	498,000	597,000	99,000	1,194,000
Construction Management	498,000	597,000	99,000	1,194,000
Third Party (City of LA et al.)	126,000	151,000	25,000	302,000
Agency Costs: Project Control, Procurement support, Safety, Communications, etc.	249,000	299,000	49,000	597,000
Contract Modification Authority (C1086-205063)	541,000	649,000	108,000	1,298,000
Subtotal Soft Costs	1,912,000	2,293,000	380,000	4,585,000
Construction Phase Total	12,897,000	14,818,000	2,460,000	30,175,000

Note: All itemized costs have been rounded up to a thousand
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Total Project Cost	12,897,000	14,818,000	2,460,000	30,175,000
Source of Funds	FY16	FY17	FY18	Capital Costs Total
Prop C 25% Bond	7,636,000	9,257,000	1,419,000	18,312,000
Prop C 25% Cash	5,261,000	5,561,000	1,041,000	11,863,000
				-
	-	-	-	-
Total Project Funding	12,897,000	14,818,000	2,460,000	30,175,000

Note: Union Pacific costs are not eligible for Prop C 25% Bonds. Includes \$10,663,000 and \$1,200,000 estimated Union Pacific related soft costs, equaling \$11,863,000 in Prop C 25% Cash.

ATTACHMENT B (page 1 of 2)
ESTIMATED COST FOR UPRR WORK
Project 205104 – MBL Pedestrian Safety Enhancement At Grade Crossings

Term Sheet for

Public Highway At-Grade Crossing Improvement Agreement (the “Agreement”)

The Agreement will allow LACMTA and its contractors entry on Union Pacific Rail Road (“UPRR”) property to install and maintain certain improvements needed for the pedestrian gates project. This Agreement will also obligate UPRR to perform and maintain certain work needed for the pedestrian gates project.

The work to be performed by UPRR includes signal design of the automatic pedestrian gates and installation of the grade crossing panels and the automatic pedestrian gates at 23 specified crossings (the “UPRR Work”).

LACMTA will reimburse UPRR 100% of UPRR’s actual costs (and 50% of certain other UPRR work) incurred in performing the UPRR Work.

LACMTA will purchase easement rights in the amount of \$470,000, which rights are needed –for pedestrian crossing use and for LACMTA to use and maintain certain equipment on UPRR property.

Current estimated costs to reimburse UPRR to perform the UPRR Work is approximately \$8,202,000 plus LACMTA estimated UPRR flagging cost in the amount of \$600,000. Adding in the acquisition cost of needed easement rights, and a 15% contingency, the total cost for UPRR Work is approximately \$10,663,000; provided, however such amount is an estimate only and may be subject to change.

UPRR will provide LACMTA with a heads up if UPRR believes the actual costs will exceed the above estimate. LACMTA can then decide to return to the Board for additional funds or rescope the project.

LACMTA will have rights to audit UPRR’s invoices.

LACMTA will have rights to enter UPRR property to construct, install, maintain, use and repair certain improvements needed to complete the pedestrian gates project.

UPRR will maintain the UPRR Work at an estimated cost of \$200,000 per year. LACMTA is in the process of negotiating a fixed annual maintenance fee with UPRR for these services.

ATTACHMENT B (page 2 of 2)
Estimated Cost for UPRR Work
Project 205104 – MBL Pedestrian Safety Enhancement At Grade Crossings

Crossing	Track & Surface						Install Automatic Flashing Light Crossing Signals					Real Estate	Annual Maintenance Cost
	Engineering	Signal Work	Surface Work	Recollectable	UPRR's Share	Surface Work Total	Engineering	Signal Work	Recollectable	UPRR Share	Signal Work Total		
20th St													
24th St													
41st St	\$15,408	\$89,988	\$28,994	\$134,390	\$0	\$134,390	\$25,026	\$123,292	\$148,318	\$0	\$148,318		\$3,910
Vernon	\$14,293	\$90,969	\$16,596	\$121,858	\$0	\$121,858	\$25,026	\$123,295	\$148,321	\$0	\$148,321		\$3,910
48th Pl	\$13,732	\$82,592	\$23,284	\$119,608	\$0	\$119,608	\$25,026	\$123,295	\$148,321	\$0	\$148,321		\$3,910
55th	\$16,665	\$91,739	\$54,728	\$163,132	\$0	\$163,132	\$49,831	\$385,053	\$434,884	\$0	\$434,884		\$18,190
Gage Ave	\$0	\$0	\$0	\$0	\$0	\$0	\$37,057	\$332,794	\$369,851	\$0	\$369,851		\$6,800
Florence Ave	\$0	\$0	\$0	\$0	\$0	\$0	\$35,685	\$344,339	\$380,024	\$0	\$380,024		\$12,750
Nadeau St	\$15,199	\$87,971	\$31,235	\$134,405	\$0	\$134,405	\$51,068	\$344,705	\$395,773	\$0	\$395,773		\$17,000
92nd	\$14,941	\$87,905	\$28,660	\$131,506	\$0	\$131,506	\$33,624	\$277,983	\$311,607	\$0	\$311,607		\$12,750
Century Blvd	\$9,806	\$107,182	\$17,787	\$134,775	\$0	\$134,775	\$25,026	\$163,724	\$188,750	\$0	\$188,750		\$8,160
103rd	\$13,341	\$95,226	\$15,990	\$124,557	\$0	\$124,557	\$39,832	\$317,342	\$357,174	\$0	\$357,174		\$17,850
108th	\$7,481	\$43,846	\$3,802	\$55,129	\$0	\$55,129	\$37,608	\$294,772	\$332,390	\$0	\$332,390		\$11,390
Wilmington	\$0	\$0	\$0	\$0	\$0	\$0	\$29,503	\$286,267	\$315,770	\$0	\$315,770		\$8,840
119th St	\$6,379	\$36,333	\$19,289	\$62,001	\$62,108	\$124,109	\$30,878	\$253,656	\$284,544	\$0	\$284,544		\$9,520
124th St	\$7,277	\$36,317	\$17,954	\$61,548	\$61,657	\$123,205	\$32,250	\$274,078	\$306,328	\$0	\$306,328		\$9,860
El Segundo	\$8,411	\$36,542	\$29,891	\$74,844	\$74,956	\$149,800	\$42,745	\$345,886	\$388,631	\$0	\$388,631		\$9,860
130th	\$1,670	\$35,802	\$18,474	\$55,896	\$56,005	\$111,901	\$32,250	\$259,333	\$291,583	\$0	\$291,583		\$7,310
Stockwell	\$7,638	\$36,386	\$21,546	\$65,570	\$65,683	\$131,253	\$29,503	\$245,924	\$275,427	\$0	\$275,427		\$8,500
Elm St	\$6,312	\$48,614	\$10,179	\$65,105	\$0	\$65,105	\$23,654	\$240,056	\$263,710	\$0	\$263,710		\$3,570
Compton Blvd	\$7,431	\$38,953	\$7,106	\$53,490	\$0	\$53,490	\$21,593	\$104,270	\$125,863	\$0	\$125,863		\$1,870
Myrrh St	\$7,431	\$38,953	\$7,106	\$53,490	\$0	\$53,490	\$23,683	\$151,802	\$175,485	\$0	\$175,485		\$3,910
Alondra Blvd	\$14,283	\$90,662	\$18,032	\$122,977	\$0	\$122,977	\$23,654	\$152,969	\$176,623	\$0	\$176,623		\$3,910
Greenleaf Blvd	\$11,844	\$903	\$83,162	\$95,909	\$0	\$95,909	\$23,654	\$151,684	\$175,338	\$0	\$175,338		\$3,570
Manville St	\$0	\$0	\$0	\$0	\$0	\$0	\$38,762	\$338,349	\$377,111	\$0	\$377,111		\$9,860
Wardlow Rd													
Spring St													
Sub Total	\$199,542	\$1,176,883	\$453,815	\$1,830,190	\$320,409	\$2,150,599	\$736,938	\$5,634,868	\$6,371,826	\$0	\$6,371,826	\$470,000	\$197,200
UPRR Estimated Total				\$1,830,190					\$6,371,826			\$470,000	TBD

Lump Sum Value per David LaPlante on June 04, 2015

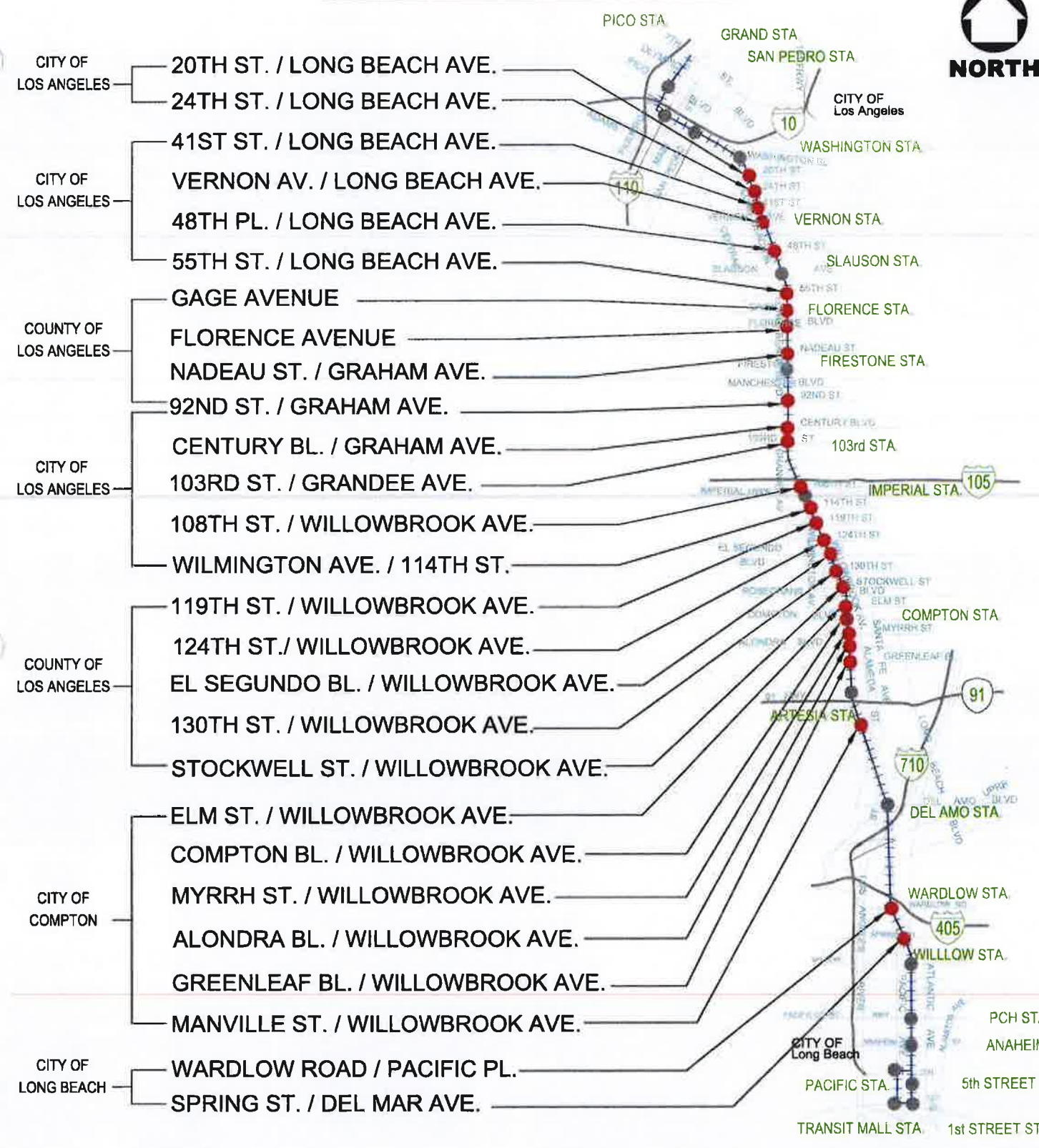
All Recollectable Costs and Real Estate Costs (Excluding Annual Maintenance Costs) **\$8,672,016**
Metro Estimated UPRR Flagging Cost **\$600,000**
Metro 15% Contingency **\$1,390,802**

Total Estimated Cost for UPRR Work **\$10,662,818**

ATTACHMENT C
RECONCILIATION OF ESTIMATES RELATED TO PROJECTS
205063 and 205104 - MBL Pedestrian Safety Enhancement At Grade Crossings

Use of Funds	Original Project Estimate (19 intersections; 11 active gates)	Revised Original Project Estimate (19 intersections; 11 active gates) After Final Design	Difference	Incremental Costs for New Safety Upgrades (27 intersections, 108 active gates)	Total Costs New MBL Project (Projects 205104 and 205603)	
Design Phase						
Engineering Facilities and Systems	\$166,868	\$327,000	(\$160,132)		\$327,000	
Other Metro Departments	\$0	\$190,000	(\$190,000)		\$190,000	
Outside Consultants	\$0	\$389,359	(\$389,359)	\$1,958,641	\$2,348,000	
Design Phase Total	\$166,868	\$906,359	(\$739,491)	\$1,958,641	\$2,865,000	
Construction Phase (By Metro and Contractor)						
Crossing Panels (By Metro)	\$1,493,100	\$1,346,000	\$147,100		\$1,346,000	
Flagging (By Metro)	\$525,881	\$600,000	(\$74,119)		\$600,000	
Construction Contract Bid (C1086-205063)	\$4,648,595	\$4,648,595	\$0	\$0	\$4,648,595	
Construction Contract Bid (C1086-205063) due to CPUC Requirements	\$0	\$0	\$0	\$7,262,711	\$7,262,711	Increase in cost due to CPUC requirements for installing active pedestrian gates at all grade crossings
Utilities Conflicts (Allowance)	\$0	\$125,000	(\$125,000)	\$375,000	\$500,000	Potential utilities conflict due not anticipated in the original budget
Outside Curb ADA Compliance	\$100,250	\$100,250	\$0	\$468,518	\$568,768	
Subtotal Metro Construction Phase	\$6,767,826	\$6,819,845	(\$52,019)	\$8,106,229	\$14,926,074	
Construction Phase (By Union Pacific)						
UPRR Concret Panels	\$0	\$0	\$0	\$1,830,190	\$1,830,190	UPRR grade crossing cost required by UPRR and was not anticipated in the original estimate (See UPRR letter dated 03/12/15)
UPRR Active Warning Devices	\$0	\$0	\$0	\$6,371,826	\$6,371,826	UPRR active warning devices required by CPUC and was not anticipated in the original estimate (See UPRR letter dated 03/12/15)
UPRR Flagging	\$0	\$0	\$0	\$600,000	\$600,000	
UPRR ROW Easement	\$0	\$0	\$0	\$470,000	\$470,000	UPRR Right-of-Way cost was not anticipated in the original budget (See UPRR letter dated 03/12/15)
Contingency on UP Work (T&M) @15%	\$0	\$0	\$0	\$1,391,000	\$1,391,000	
Subtotal Union Pacific Construction Phase	\$0	\$0	\$0	\$10,663,016	\$10,663,016	
Construction Soft Cost						
				\$0		
Engineering (DSDC, RFI, Submittals Review) @8%	\$0	\$545,588	(\$545,588)	\$648,498	\$1,194,086	Soft Cost were not anticipated in the original budget
Construction Management @8%	\$0	\$545,588	(\$545,588)	\$648,498	\$1,194,086	Soft Cost were not anticipated in the original budget
Third Party @2%	\$0	\$136,397	(\$136,397)	\$162,125	\$298,521	Soft Cost were not anticipated in the original budget
Agency Costs: Project Control, Procurement, etc. 4%	\$0	\$272,794	(\$272,794)	\$324,249	\$597,043	Soft Cost were not anticipated in the original budget
Contract Modification Authority (CMA) @10%	\$765,306	\$487,385	\$277,922	\$810,623	\$1,298,007	Higher due to increase in construction cost
Subtotal Soft Costs	\$765,306	\$1,987,750	(\$1,222,444)	\$2,593,993	\$4,581,744	Higher due to increase in construction cost
Construction Phase Total	\$7,533,132	\$8,807,595	(\$1,274,463)	\$21,363,238	\$30,170,834	
Total Project cost	\$7,700,000	\$9,713,954	(\$2,013,954)	\$23,321,879	\$33,035,834	

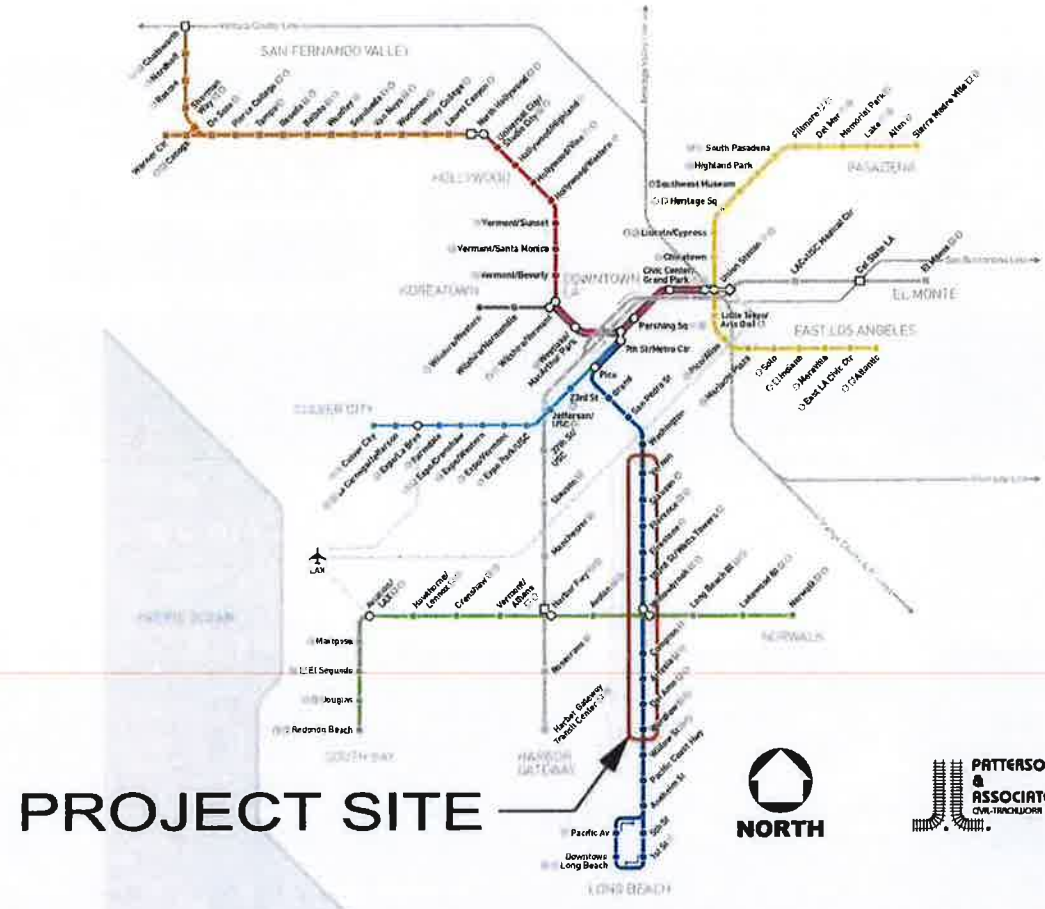
PROJECT SITE LOCATION MAP



METRO BLUE LINE
PEDESTRIAN AND SWING GATE
INSTALLATION

CONTRACT NUMBER - C1086

JUNE 25, 2014



PATTERSON & ASSOCIATES, INC.
 725 TOWN & COUNTRY RD
 SUITE 300
 ORANGE, CA 92868



LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

[Signature]
 RECOMMENDED
 7/28/14
 DATE

[Signature]
 APPROVED
 7/29/2014
 DATE

TYPICAL GRADE CROSSING IMPROVEMENT

UPRR GRADE CROSSING PANEL EXTENSION BY UPRR FORCES

ACTIVE PEDESTRIAN GATE REQUIRED BY CPUC (UPRR INSTALLED)

UPRR PROPERTY ENCROACHMENT COST

CITY OF LA REQUIREMENT: FARSIDE ADA RAMP CONSTRUCTION

METRO

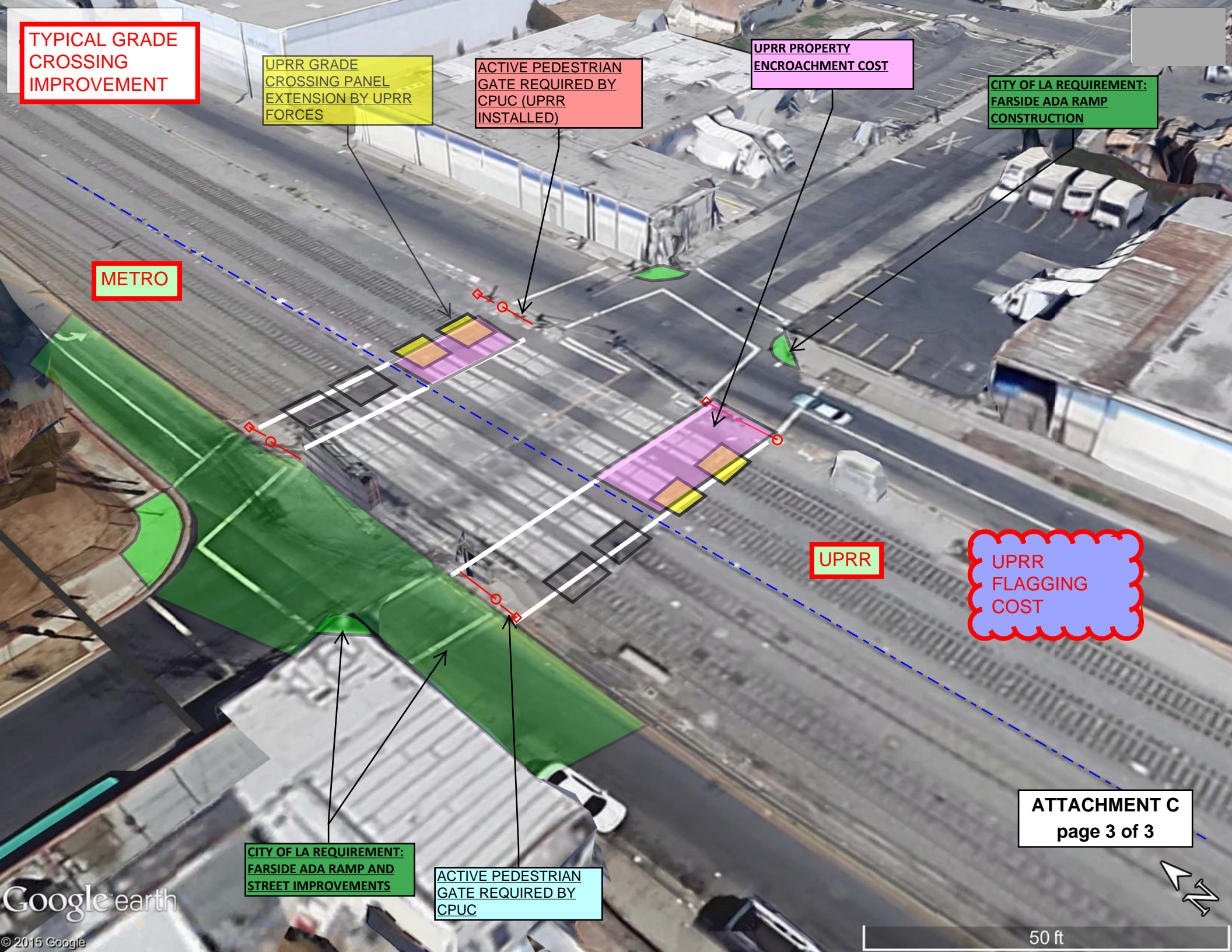
UPRR

UPRR FLAGGING COST

CITY OF LA REQUIREMENT: FARSIDE ADA RAMP AND STREET IMPROVEMENTS

ACTIVE PEDESTRIAN GATE REQUIRED BY CPUC

ATTACHMENT C
page 3 of 3



ATTACHMENT D
INCREMENTAL COSTS AND BENEFITS FOR IMPROVEMENTS
Project 205063 and 205104 – MBL Pedestrian Safety Enhancement at Grade Crossings

Reduction Percentage	50%
Annual Non-Fatal Accidents Before Gating	5.55
Annual Non-Fatal Accidents After Gating	2.78
Annual Reduction in Non-Fatal Accidents	2.78
Value of a Non-Fatal Accident Reduction (millions)	\$ 0.36
Estimated Annual Value of Non-Fatal Accident Reduction from Pedestrian Gating (millions)	\$ 1.01
Annual Fatal Accidents Before Gating	3.58
Annual Fatal Accidents After Gating	1.79
Annual Reduction in Fatal Accidents	1.79
Value of a Fatal Accident Reduction (millions)	\$ 6.32
Estimated Annual Value of Fatal Accident Reduction from Pedestrian Gating (millions)	\$ 11.32
Total Estimated Annual Value of Reduction to Fatal and Non-Fatal Accidents (millions)	\$ 12.33
Estimated Metro Costs for Gating O&M (millions)	\$ 0.15
Estimated UP Costs for Gating O&M (millions)	\$ 0.20
Total Estimated Annual Costs for Gating O&M (millions)	\$ 0.35
Estimated Annual Public Net-Benefit for Pedestrian Gating (millions)	\$ 11.98
NPV of Public Net-Benefit Over 25 Year Life (3% discount rate) (millions)	\$ 202.50
Project Cost (millions)	\$ (33.04)
Public Benefit Net of Project Cost (millions)	\$ 169.46
Payback Period in Months	37 Months
Break Even Collision Reduction	9.35%
Other Benefits	
Reduced occupational injuries	
Improved service reliability	
Lower Metro and other public costs for investigation and administration expenses	