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January 15, 2016

TO: BOARD OF DIRECTORS

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

FROM: CALVIN HOLLIS *CH*
INTERIM CHIEF PLANNING OFFICER

**SUBJECT: SEPULVEDA PASS TRANSIT CORRIDOR FINANCING
STRATEGY**

ISSUE

The report in Attachment A presents the findings of an evaluation of financing strategies for the Sepulveda Pass Transit Corridor. The report uses data from prior studies to outline a realistic financial strategy for developing a multi-modal project that may best address the corridor's needs within funding resources that can reasonably be expected to be available. In this manner, the strategy is financially constrained using the planning criteria in federal guidance for such an analysis.

BACKGROUND

The Sepulveda Pass Corridor (I-405 Connector) is one of the 12 transit corridors included in Measure R and our adopted 2009 Long Range Transportation Plan (LRTP) with \$1.7 billion in local funds (year of expenditure) to support a delivery date of 2035. To date Metro has invested more than \$1.9 million for studying the Sepulveda Pass Corridor options, including transportation planning, engineering, modeling, surveys and this financial strategy.

In February 2014, the Metro Board of Directors Garcetti, Antonovich and Dubois approved Motion #66.1 (the "Motion", Attachment B), which required staff, in part, to report on a strategy "to support current acceleration and innovative finance efforts" for three projects, including the Sepulveda Pass Corridor. In response to the motion, staff conducted a Public-Private Partnership (P3) Roundtable.

In October 2014, staff provided a status update to the Board and advised that we would conduct this further financial analysis through the P3 Bench focusing on the most congested segment of the corridor.

Incorporating the report’s Financing Strategy into the working assumptions for the Long Range Transportation Plan (LRTP) and potential ballot measure may encourage P3 delivery strategies to come forward. Per previous Board motion, the Sepulveda Pass Transit Corridor was designated “as a candidate for further consideration as a P3 delivery project without changing Long Range Transportation Plan priorities.”

Findings

Two prior studies have been conducted on the Sepulveda Pass Transit Corridor. The first was a Revenue Forecasts Report completed in July 2012 that was followed by Sepulveda Pass Systems Planning Study Final Compendium Report. The Compendium Report presented to the Metro Board in December 2012 evaluated potential highway and/or transit options and proposed additional preliminary steps needed to advance the project.

The review of prior studies by the Financing Strategy consultant team of Sperry/KPMG/Mazyck assists the Metro Board of Directors as it seeks to identify strategic financial planning options for the project corridor. The Consultants reviewed five options in year of expenditure dollars, as described in Table 1: Summary of Cost Estimates and Potential Fund Sources, as follows:

Table 1: Summary of Cost Estimates and Potential Fund Sources

\$ millions Year of Expenditure	Option 1	Option 2A	Option 2B	Option 3	Option 4	Option 5
Description	Express Lanes	Light Rail Tunnel	Heavy Rail Tunnel	Tolled Highway Tunnel	Tolled Highway Tunnel and Rail Tunnel	Combined Option 1 and 2B
Total Cost	200 – 285	7,109 – 8,643	7,401 – 9,201	16,198 – 20,095	23,599 – 29,296	7,601 – 9,486
Debt Sources	134 – 322	-	-	392 – 756	392 – 756	134 – 322
Programmed Funds	0 – 151	2,260	2,260	1,760	2,260	2,260
Additional Funding Requirement	(123) - 0	4,849 – 6,383	5,141 – 6,941	13,682 – 17,943	20,583 – 26,644	5,019 – 7,092

Notes:

1. YOE = Year of expenditure dollars include inflation at a mid-point of construction in Fiscal Year 2027.
2. The December 2015 LRTP estimate of \$6.78 billion reflects Option 5 in current dollars (not YOE) and includes a 5% unallocated contingency.

Considerations

As noted in Table 1 on the “Programmed Funds” line, the Long Range Transportation Plan Financial Model has up to \$1.76 billion for Option 3 and up \$2.26 billion for the other options, including \$1 billion in Measure R transit funds that are only available in

FY 2030 or beyond. Note that the total cost for project alternatives range from \$285 million for a tolled managed lane to approximately \$30 billion for a highway and rail tunnel. As assumed in the LRTP, a not yet defined project limited in scope could be completed, but with minimal impact on existing and future transportation needs in the corridor.

This study was conducted to determine what would be needed from Metro and others for a realistic and impactful multi-modal solution. The study results show that project alternatives resembling Options 2A, 2B, and 5 could be made to be financially constrained in the context of a new LRTP supported by a potential ballot measure. As studied, Option 5 includes express lanes on the I-405 freeway between the 10 and 101 freeways, as well as a rail tunnel component. When this option was evaluated using potential ballot measure resources and additional State and Federal discretionary fund sources, it complies with federal financial constraint rules for the planning phases. The summary information for this analysis is provided below in Table 2.

Table 1: Summary of Illustrative Funding Plans

\$ millions Year of Expenditure	Option 5 Base Case
Measure R	1,000
Planned New Starts	500
Other LRTP	760
ExpressLane Financing	167
<i>Subtotal of Available Funding</i>	<i>2,427</i>
Potential Local Funding Sources	2,800
Additional Local Funding Requirements	600
Other State/Federal Funding	2,000
Funding Gap for Future Tolling Study	717
<i>Subtotal of Proposed Innovative Financing</i>	<i>6,117</i>
Total Cost	\$8,544

NEXT STEPS

Pursuant to the attached Motion, which requests “feasible revenue and traffic forecasts,” staff will issue a task order under a current contract for a traffic and revenue study, which will incorporate data from a stated preference study conducted in 2015. Upon conclusion, the results of the traffic and revenue study will be presented to the Board, as well as related recommendations.

ATTACHMENT

- Attachment A – Sepulveda Pass Transit Corridor Financing Strategy
- Attachment B – February 2014 Motion by Directors Garcetti, Antonovich and Dubois

Sepulveda Pass Transit Corridor Financing Strategy



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The Consultant Team has completed a review of several existing data sources for the Sepulveda Pass Transit Corridor Project (Project) covering multiple scenarios. The objective of this assessment is to provide Metro Staff with a clearer picture of the alternatives available with respect to the Project improvements, based on the data available, to support and outline financial strategy options for the implementation of the Project.

For the purposes of this analysis the Consultant Team has not developed any new data with respect to the Project or any of the Project cash flow inputs. Any adjustments to existing data that have been made by the Consultant Team in this analysis are noted under Section 3. In addition no assumptions have been made as to eligibility or availability of funding for the uses identified in this report. A more detailed analysis of funding sources, including eligibility, timing and availability will be required as Metro Staff develop and manage the Long Range Transportation Plan.

As Metro Staff move further with the Project development and the Project scope is more fully refined, additional and more detailed analysis will be completed on traffic and revenue projections, costs, financing and procurement options.

1 Executive summary

1.1 Background and Objectives

The Sepulveda Pass Transit Corridor spans a length of approximately 30 miles along I-405 from the I-405/I-5 interchange on the northern end to Los Angeles International Airport (LAX) on the southern end.

Several options for improvements in this corridor have been assessed to date. The initial cost estimates for improvement options in the corridor ranged from a \$285 million alternative that includes a tolled managed lane (e.g., express lane) to over \$30 billion for a rail tunnel with a separate tolled highway tunnel and were presented to the Board of the Los Angeles County Metropolitan Transportation Authority (Metro) on October 23, 2014.

The Sepulveda Pass Transit Corridor Project (Project) would provide a north-south transportation connection between the San Fernando Valley and the Westside. The potential multi-modal Project would consist of a high capacity rail system and a tolled highway segment. It is anticipated the Project would be developed in phases, with the Sepulveda Pass transit connection section coupled with an at-grade toll component as the initial segment. A number of initial high level transportation systems planning studies have been undertaken.

Metro selected the Sperry/KPMG/Mazyck Team (Consultant Team) under a Request for Proposals RFP No. PS2210-3049-06-XX “Independent Analysis of Sepulveda Pass Transit Corridor Financing Strategy” to conduct a review of existing studies to date and assist Metro Staff in identifying strategic financial planning options to consider possible next stages of planning for the project corridor.

1.2 Overview of Scenarios

In November 2012 Metro Staff completed the Sepulveda Pass Corridor Systems Planning Study. This study included six system concepts for providing additional transit and/or highway capacity improvements beyond those currently being constructed as a part of the I-405 Sepulveda Pass Improvements Project. In October 2014 Metro Staff returned to the Board with further refinements and identified four options for further evaluation. In addition to these four options (as detailed below) Metro Staff identified a fifth multi-modal option for the Consultant Team to evaluate which included combining two previously presented options (Option 1 and Option 2B as shown below).

Option 1: At-Grade Express Lanes:

- Two Express Lanes in each direction through the 10 mile section over the pass;
- Direct Access Ramps are not included; and
- Bus Rapid Transit (BRT) improvements are not included.

Option 2A: Light Rail Tunnel:

- Fixed Guideway Light Rail (LRT) connecting the Metro Orange line to the Expo line using a 7.5 mile twin bore tunnel through the pass and two miles of at-grade rail;
- Four tunnel portals, two at grade stations and a maintenance facility.

Option 2B: Heavy Rail Tunnel:

- 8.8 mile underground Heavy Rail (HRT) line connecting the Orange Line to Westwood;
- Four tunnel portals, two below grade stations and a maintenance facility.

Option 3: Tolled Highway Tunnel with Bus Rapid Transit:

- 58' bore highway tunnel for bus and autos. Connecting U.S. 101 and Le Grange Avenue;
- Two portals and BRT routes.

Option 4: Tolled Highway Tunnel and Private Heavy Rail Tunnel:

- Option 3 scope for highway improvements;
- Option 2B scope HRT Tunnel connecting Orange Line to Westwood.

Option 5: Combined Option 1 and 2B:

- Option 1 scope for two Express Lanes in each direction over the pass;
- Option 2B scope HRT Tunnel connecting Orange Line to Westwood.

1.3 Summary Results

The Consultant Team has conducted a review of the scenarios and studies completed to date. In reviewing the options for the Project, Metro Staff requested analysis of any existing funding gaps for each option to understand the funding needs, as well as the identification of and implications for any possible additional sources of funding. The Consultant Team has included an analysis of potential debt sources where appropriate (for options which include express lanes tolling) as a means of reducing the funding needs for the Project.

A summary of the funding outcomes for each option is shown below.

\$ millions Year of Expenditure	Option 1	Option 2A	Option 2B	Option 3	Option 4	Option 5
Description	Express Lanes	Light Rail Tunnel	Heavy Rail Tunnel	Tolled Highway Tunnel	Tolled Highway Tunnel and Rail Tunnel	Combined Option 1 and 2B
Total Cost	200 – 285	7,109 – 8,643	7,401 – 9,201	16,198 – 20,095	23,599 – 29,296	7,601 – 9,486
Debt Sources	134 – 322	-	-	392 – 756	392 – 756	134 – 322
Programmed Funds	0 – 151	2,260	2,260	1,760	2,260	2,260
Additional Funding Requirement	(123) - 0	4,849 – 6,383	5,141 – 6,941	13,682 – 17,943	20,583 – 26,644	5,019 – 7,092

Table 1: Summary of Results

As shown in the table, Option 1 is the only option estimated to require no additional funding, based on the data available and current funding plans. Options 2A and 2B collectively show a funding gap range of between \$4.8 billion and \$6.9 billion, which may be reduced through the inclusion of new local dollars and additional Federal or State funds such as FTA New Starts grants funding. Options 3 and 4 show funding gaps of more than \$13 billion and \$20 billion respectively and may present a significant funding challenge for completion.

Option 5, as shown, presents a potential phased delivery of the initial length for the Project which includes express lanes and a rail tunnel component requiring additional funding of between \$5.0 billion and \$7.1 billion. A more detailed proposed capital plan for option 5 based on the mid-range costs estimates was further developed to illustrate possible sources of funds for this option to be used to meet the additional funding requirements identified above.

Approximately \$3.4 billion (in FY 2016 year dollars) of additional local money would need to be identified for this option in combination with other Federal/State sources of funding, including financing. The funding sources for each are summarized in the table below and periodic pro-forma cash flows are included in Appendix E to this report. The estimated funding gap may be further reduced through value engineering, alternative delivery methods (including design-build, finance, operate and maintain (DBFOM) or

other alternative delivery), and toll maximization approaches to be explored in a next phase of Project analysis.

\$ millions Year of Expenditure	Option 5 Base Case
Measure R	1,000
Planned New Starts	500
Other LRTP	760
ExpressLane Financing	167
<i>Subtotal of Available Funding</i>	<i>2,427</i>
Potential Local Funding Sources	2,800
Additional Local Funding Requirements	600
Other State/Federal Funding	2,000
Funding Gap for Future Tolling Study	717
<i>Subtotal of Proposed Innovative Financing</i>	<i>6,117</i>
Total Cost	\$8,544

Table 2: Summary of Illustrative Funding Plans

**Includes cost of interest of funds accelerated through capital grant bonding approach repaid by Other State/Federal funding sources.*

In addition to the upfront funding needs shown above, the Consultant Team reviewed available operating cost data. Operating costs for BRT, LRT and HRT exceed the expected fare revenue in each option. The first year operating shortfall for these options ranges from approximately \$62 million to \$105 million. While the potential for excess revenues from highway tolling is approximately \$14 million in the first year for an at-grade express lanes option or approximately \$40 million for a highway tunnel option.

Under Option 5 the operating cost of the express lanes is expected to be met with toll revenues. Excess toll revenues, after the payment of operating costs and debt service, are expected to be approximately \$14 million in the first year of operations. However, the cost of operations of the HRT component exceeds the expected revenues in the first year of operations by approximately \$83 million.

The impact of additional transit options for the corridor on the future potential toll revenues has not been fully explored at this time. The addition of an HRT mode may reduce toll revenues and as a result the ability to raise toll revenue backed debt to pay for construction of the Project. This may therefore increase the amount of upfront funding required to develop the Project under this scenario.

1.4 Recommended Next Steps

The next steps for the Project are recommended as follows:

- The next stage of analysis will be to explore alternative delivery methods for options included in this report. With the inclusion of alternative delivery methods (including Public-Private Partnerships) there may be significant value in cost reduction and leveraging additional toll backed financing.
- Under the existing options shown in this report, Option 5 appears to offer an approach that allows for both modes of transportation through the pass at a cost that may be realistically achieved by Metro through the inclusion of tolling and potential new sales tax revenues. The next stage of analysis will need to further explore such a modular approach and the potential phasing for this option, including the impact on the LRTP and other local, state or federal funding sources.
- Metro will need to consider the approach to gaining environmental approvals for the Project, typically a critical path for project delivery. A strategy will need to be explored and developed that meets Metro's needs for the Project scope, timing and potential phasing.
- A more defined Project description, including greater details on Project scope, such that the development of next phase work streams under traffic and revenue projections (T&R), environmental and delivery assessment may be initiated.
- As noted, additional T&R analysis including framing questions to optimize project feasibility and modular approach.
- Metro Staff will need to address the requirements of the Metro Board and regional stakeholders impacted by the Project.
- As part of an environmental strategy, the process of procuring an environmental consultant should also be initiated and Metro may need to explore the need for additional Metro resources, which may be required, in order to deliver the appropriate documentation for the environmental process.

2 Project Background

The Sepulveda Pass corridor (I-405 Corridor) is one of the 12 transit corridors included in Measure R and the adopted 2009 Long Range Transportation Plan (LRTP) with approximately \$1.7 billion in local funds to support a delivery date of 2035. Metro Staff have been exploring delivery options for several modes in the corridor.

The full Sepulveda Pass Transit Corridor spans a length of approximately 30 miles along I-405 from the I-405 / I-5 interchange on the northern end, to LAX on the southern end. The proposed Project contemplated in this report would provide a shorter “initial” segment north-south transportation connection between the San Fernando Valley and the Westside, offering passenger connections to east-west transit lines already under development in Los Angeles County.

The potential multi-modal Project may consist of a high capacity rail system and/or a tolled highway segment and may be developed in phases, including a Sepulveda Pass transit connection section coupled with an at-grade toll component as an initial segment.

To date Metro has undertaken a number of initial high level transportation systems planning studies including a review of potential costs and revenues for several modes in the full 30 mile corridor and an “initial” segment (10 miles through the pass component contemplated in this report – the Project). A recent summary of these results were presented to Metro Board on October 15th, 2014 (Public Private Partnership (P3) Program) Update on Sepulveda Pass Transit Corridor). At that time Metro Staff presented four main options for delivery of the Corridor including:

- BRT in Managed Lanes: cost ranging from \$1.9 billion to \$2.9 billion (YOE);
- Rail Tunnel: cost ranging from \$8.4 billion to \$13.5 billion (YOE);
- Toll Highway tunnel with BRT: cost ranging from \$16.9 billion to \$21.9 billion (YOE); and
- Toll highway Tunnel with Private Rail: cost ranging from \$33.7 billion to \$64 billion (YOE).



Figure 1: Corridor summary (source: Sepulveda Pass Corridor Systems Planning Study)

The purpose of this assessment is to review existing studies and identify strategic financial planning options for Metro to proceed to the next stages of planning for the corridor. The Project evaluated in this report is for an initial segment of approximately 10 miles within the corridor.

3 Objectives and Methodology

3.1 Objectives

The Consultant Team has completed a review of several existing data sources for the Project covering multiple scenarios. The objective of this assessment is to provide Metro Staff with a clearer picture of the alternatives available with respect to the Project improvements and help Metro Staff formulate a financial strategy for the implementation of the Project.

For the purpose of this analysis the Consultant Team has not developed any new data with respect to the Project or any of the Project cash flow inputs. Some refinements or clarifications to existing data have been made by the Consultant Team in consultation with Metro Staff to address potential concerns related to scope and timing for the Project. In addition, no determinations have been made by the Consultant Team as to eligibility or availability of funding for the uses identified in this report. A more detailed analysis of funding sources, including eligibility, timing and availability will be required as Metro Staff develop and manage the LRTP.

As Metro Staff moves forward with the Project development and the Project scope is more fully refined, additional analysis will be necessary to refine traffic and revenue projections, costs, financing and procurement options.

3.2 Methodology

The assessment was conducted in several phases as described below.

- 1 **Data review and assessment:** The first phase of the assessment was to identify all existing analyses completed by Metro to date for the Corridor and confirm the quality of the available data sets and any gaps in the data sets requiring further analysis or the development of additional inputs.
- 2 **Confirmation of scope and options:** During this phase of the assessment, Metro Staff confirmed the scope and options for inclusion in the assessment (based on the October 15th, 2014 Metro Board Update). At the direction of Metro Staff, several refinements to scope were made as described below.
 - Option 1: Express lanes scope was adjusted to 10 miles in length. No costs for direct access ramps are included in the cost estimate in this option. In addition no BRT costs or revenues were included in the analysis for this option.
 - Option 2A: Revised scope to include a 9.5 mile initial segment (7.5 miles underground, 2 miles at-grade) between connections at the Orange Line and Expo Lines. Underground transit stations were removed.
 - Option 2B: Revised scope to include 8.8 mile initial segment between Orange Line and Westwood with the inclusion of two underground stations.

- Option 3: BRT lines included for the length of the initial segment and not the full length of the routes proposed in the Corridor System Planning Study. In addition the cost of vehicles for BRT was based on a refurbishment cost of the existing fleet.
 - Option 4: Revised transit scope to include an 8.8 mile initial segment with inclusion of two underground stations.
 - Option 5: Metro staff requested the combination of Options 1 and 2B including the adjustments described for these options as above.
- 3 **Development of a cash flow pro-forma for each option required:** For each option a cash flow pro-forma was then developed based on the selected scope and using available data. Cash flow scenarios were created for each option to reflect a “High Funding requirement”; “Low Funding requirement” and “Base” scenario. Cash flows include costs for construction, operations and forecast revenue inputs for transit and highway elements, adjusted to YOE dollars.
 - 4 **Debt capacity analysis:** Where options showed positive cash flow after operations (i.e. highway tolling options) an assessment of the debt capacity for those options was then conducted. High level assumptions for debt terms were included and assumed the inclusion of both senior toll revenue bonds and subordinate TIFIA debt.
 - 5 **Assessment of funding gap range:** For each option the results were then presented in the form of a range based on the additional funding required for that option.
 - 6 **Presentation of funding plans:** For those options selected by Metro Staff, cash flows were developed including sources and uses of funds for the Project development. Metro Staff provided additional terms for capital grant loans to support the funding plans for these options.

Document Title	Date Created
Revenue Forecasts Report	July 2012
Executive Summary	September 2012
Preliminary Cost Report	September 2012
Attachment A	September 2012
Final Compendium Report	September 2012
Sepulveda Pass Corridor Systems Planning Study	September 2012
Sepulveda Pass Corridor Program Industry Forum	May 2013
Traffic and Revenue Forecasts – Supplemental Analysis	September 2013
Sepulveda Pass Survey Design	June 2014
P3 Update on the Sepulveda Pass Transit Corridor	October 2014
Mobility Matrices Report	March 2015
San Fernando Cost Estimates	March 2015
Westside Cost Estimates	March 2015
LRTP Update	March 2015
Public-Private Partnership Program - Preliminary Schedule to Procure a PDA	N/A
2014 Metro ExpressLanes O&M Budget	2014
Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report	November 2012
Sepulveda Pass Corridor Project Preliminary Public-Private Partnership Concept	N/A

Figure 2: Summary of Data Sources

4 Project Options

4.1 Overview of Project Options

As requested by Metro Staff, the analysis of options focused on the “initial” segment of approximately 10 miles through the corridor pass, connecting the two major east-west routes, U.S. 101 and I-10. The options included in the analysis are described below. Project scope options were based on existing data included in the Sepulveda Pass Corridor Systems Planning Study; Project Cost Report Appendix 3, dated November 2012.

4.1.1 Option 1: At-Grade Express Lanes

The first option includes the development of two express lanes in each direction (2x2) through the approximate 10 mile section over the pass. The express lanes in this option represent an expansion of the existing single HOV 2+ lanes already running in each direction over the pass. The improvements in this Option 1 scope would be limited to the development of the express lanes within existing right of way (ROW) for the Project, and the installation of signage, electronic toll collection equipment, and enforcement areas. Work is expected to be limited to developing the median of the existing freeway and restriping.

For the purposes of the analysis construction is assumed to start in 2021 and continue for a five year duration. However, as noted later in this report, the schedule for delivery of the express lanes may be accelerated given the limited scope of the option.

For the purposes of this analysis and as directed by Metro Staff, Option 1 does not include BRT improvements or direct access for the express lanes to the U.S. 101 or I-10 freeways. As the Project proceeds through the development phase, such elements may or may not be included in a future scope iteration.



Figure 3: Illustration of Express Lanes Corridor (source: Sepulveda Pass Corridor Systems Planning Study)

4.1.2 Option 2A and 2B: Rail Tunnel

A rail tunnel option is presented under two different modes, LRT and HRT.

4.1.2.1 Option 2A: LRT

Option 2A includes the development of a fixed guideway light rail connection between the Metro Orange line and the Expo line. The option would include developing two 20 foot diameter tunnels for approximately 7.5 miles, including four 20 foot portals and an additional mile of at-grade light rail connecting above grade to the Orange and Expo lines. Further improvements included in his option are two at-grade LRT stations and a maintenance facility. For the purposes of the analysis construction is assumed to start in 2024 and continue for a seven year duration.

4.1.2.2 Option 2B: HRT

Option 2B includes the development of a heavy rail connection between the Metro Orange line and Westwood. The option would include developing two 20 foot diameter tunnels for approximately 8.8 miles, including four 20 foot portals and two underground transit stations at the connecting lines. Further improvements include a maintenance facility. For the purposes of the analysis, construction is assumed to start in 2024 and continue for a seven year duration.

4.1.3 Option 3: Tolled Highway Tunnel with Bus Rapid Transit

Option 3 includes the development of a tolled highway tunnel connecting U.S. 101 north of the Sepulveda Pass to I-10 south of the Sepulveda Pass on the Westside. The proposed option would include BRT routes connecting the San Fernando Valley and the Westside and would not allow the use of trucks. The option would include the development of one 58 foot diameter tunnel for approximately 9.2 miles, including two portals and associated approaches at both northern and southern ends. For the purposes of the analysis, construction is assumed to start in 2024 and continue for a seven year duration.



Figure 4: Illustration of Rail Corridor (source: Sepulveda Pass Corridor Systems Planning Study)

4.1.4 Option 4: Tolled Highway Tunnel and Private Heavy Rail Tunnel

Option 4 includes a combination of Options 2B and Option 3 under which the heavy rail would be privately operated.

4.1.5 Option 5: At-Grade Express Lanes and Heavy Rail Tunnel

Option 5 includes a combination of Options 1 and Option 2B.

4.2 Summary of Cost Inputs

4.2.1 Summary Construction Costs

Construction costs for the options were derived from the Sepulveda Pass Corridor Systems Planning Study: Preliminary Cost Report, Appendix 3 and adjusted to take into account refinements suggested by Metro Staff. The construction cost data for each option is summarized in the table below and provided in more detail in the appendix.

Option	Mode	\$M YOE	\$M 2015	Comments
Option 1	At-Grade Express Lanes	200-285	157 – 224	At-grade highway includes 50% uplift for management and oversight. Metro per lane mile cost estimate of \$12 million / mile was adjusted to \$15.7 million in the Base cost (2015\$). Does not include BRT costs.
Option 2A	LRT	7,109 – 8,643	4,977 – 6,053	Twin bore cost per mile approx. \$551 million (2015\$). Four portals at \$54.6 million (2015\$). Maintenance facility included \$109.3 million (2015\$).
Option 2B	HRT	7,401 - 9,201	5,181 – 6,441	Twin bore cost per mile approx. \$551 million (2015\$). Four portals at \$54.6 million (2015\$). Maintenance facility included \$109.3 million (2015\$).
Option 3	Highway Tunnel with BRT	16,203 – 20,101	11,344 – 14,073	58' bore at approx. \$1.141 billion (2015\$) per mile. Two portals at \$163.9 million (2015\$).
Option 4	Highway Tunnel with Private HRT	23,600 – 29,297	16,523 – 20,512	58' bore at approx. \$1.141 billion (2015\$) per mile. Two portals at \$163.9 million (2015\$). Twin bore cost per mile approx. \$551 million (2015\$). Four portals at \$54.6 million (2015\$). Maintenance facility included \$109.3 million (2015\$).
Option 5	Express Lanes and HRT Tunnel	7,601 - 9,486	5,339 – 6,667	Option 1 and Option 2B as above.

Table 3: Summary of Constructions Costs

4.2.2 Summary Operating Costs

Operating costs for the options were derived from the sources noted below. Based on existing data and assessments to date, only limited analysis of operations has been completed for the corridor and costs for operations have been based on entity wide reporting metrics, such as total cost per passenger mile.

- Rail operating costs were derived from the Sepulveda Pass Corridor Systems Planning Study: Preliminary Cost Report, Appendix 3 which includes costs per passenger mile based on Metro financial reports;
- Highway tunnel operating costs were also derived from the Sepulveda Pass Corridor Systems Planning Study: Preliminary Cost Report, Appendix 3 which includes costs per passenger mile based on Metro financial reports; and
- At-grade express lanes operating costs were derived from data provided by Metro Staff relating to the existing I-10/I-110 ExpressLanes.

Option	Mode	\$ M YOE 2035	\$ M YOE 2045	Comments
Option 1	At-grade Express Lanes	20	27	Based on existing operating data for I-10/I-110 express lanes.
Option 2A	LRT	184	273	2015 operating cost per passenger mile of \$0.61
Option 2B	HRT	145	215	2015 operating cost per passenger mile of \$0.61
Option 3	Highway	60	82	Concept 4 O&M from the original report data less BRT cost estimates.
	BRT	107	160	2015 operating cost per passenger mile of \$0.69
Option 4	Highway	60	82	Same as Option 3 inputs.
	HRT	145	215	HRT operating cost assumed the same as option 2B.
Option 5	Express Lanes	20	27	Same as Option 1 inputs.
	HRT	145	215	HRT operating cost assumed the same as option 2B.

Table 4: Summary of Operating Costs

Operating costs for Express Lanes, derived from Metro's existing operations, were then deducted from forecast revenues in order to determine a cash flow available for debt service line upon which a potential debt capacity was then calculated.

Note that lifecycle costs and refurbishment had not been specifically included in any of Metro's previously developed data or analyses for the corridor. Consequently, lifecycle and refurbishment costs have not been addressed during this analysis. As Metro explores project delivery options further, the analyses should address lifecycle costing and include an assessment of the useful life of each option.

4.3 Funding sources

Several funding sources have been included as potentially available to contribute to the costs for each option and are described below.

4.3.1 Summary of Toll Revenues

The data set for the Project includes two sources of revenue forecasts for the Project: “Sepulveda Pass Systems Planning Study, Revenue Forecasts Report”, prepared by AECOM in July 2012; and “Sepulveda Pass Systems Planning Study, Traffic and Revenue Forecasts – Supplemental Analysis”, prepared by PB in September 2013.

In the first study, by AECOM, the traffic forecasts were based on the 2008 SCAG model for traffic in the region. In addition two approaches were taken to forecasting revenues:

- AECOM Low approach based on average toll rate; and
- AECOM High approach included variable pricing distribution up to a \$1.40 maximum.

In the second study, by PB, the traffic forecasts were based on Caltrans 2012 data and the revenue forecast was derived using variable pricing distribution. The second set of forecasts included forecasts for both HOV 2+ and HOV 3+. Only HOV 3+ forecast

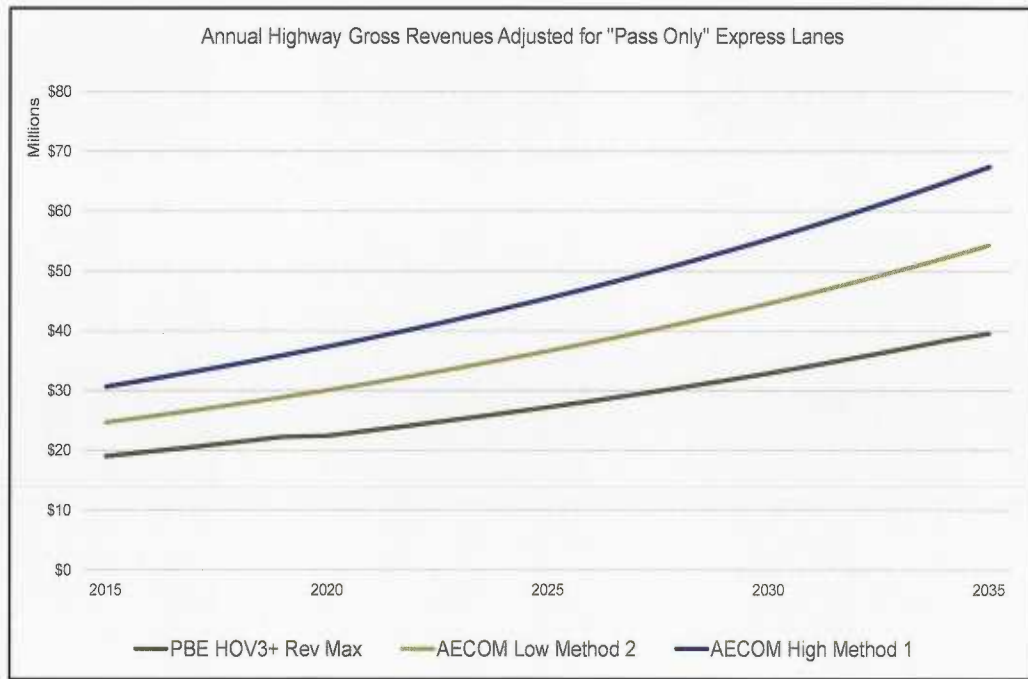


Figure 5: Summary Forecast Revenues

revenues were used as HOV 2+ resulted in reduced level of service in the lanes.

Revenue forecasts data from these sources was then used to develop a continuous forecast for year of expenditure revenues for the initial scope defined for a 35 year operating period following expected construction completion. High, low and base forecasts used in the analysis are shown in the figure above.

4.3.2 Summary of Transit Revenues

Transit fare income included in the analysis was assumed to be in line with Metro’s target 33% long term farebox recovery objective for revenues. Transit revenues have therefore been included in the cash flows at 33% of the operating costs shown.

4.3.3 Summary of LRTP

Existing programmed funds for the Project included in the LRTP are shown in the table below.

Funding Source (\$M YOE)	LRTP Programmed
Measure R 35%	1,000
New Starts	500
Proposition C 25%	116
Proposition C 40% Cash	510
Local Agency Funds	62
CMAQ	72
TOTAL	2,260

Table 5: Summary LRTP funding

4.4 Summary of Financing

Non-recourse debt secured solely with toll revenues has been used in those options with highway toll revenue sources of funding. Two debt facility types were included: Toll revenue backed bonds; and Transportation Infrastructure Finance and Innovation Act (TIFIA) debt. Detailed term sheets for these debt instruments are provided in the Appendix. In addition Metro Staff provided debt terms for other facilities described below.

4.4.1 Tax-Exempt Toll Revenue Bonds

Tax exempt bonds are a typical form of public agency infrastructure financing. The bonds are typically long term debt issued by a public agency, exempt from Federal and State income tax. Non-recourse toll revenue bonds, used in this analysis, are secured solely with the toll revenues from the express lanes and as a result carry a higher cost of debt and a lower rating than typical sales tax backed debt issued by Metro. A typical rating for such bonds is BBB.

4.4.2 TIFIA Loans

TIFIA loans are provided by the USDOT at competitive rates of interest (State and Local Government Securities rate plus one basis point) and allow for flexible repayments to be made, extremely beneficial to toll projects which face a “ramp-up” in revenues during the early years of operations limiting their ability to use conventional financing sources. In addition, TIFIA financing is drawn as needed which reduces the cost funds during construction. TIFIA loans are subordinate facilities and as a result have lower debt service coverage requirements, allowing greater flexibility in the financial structuring of the project.

Financing Sources	Summary Terms
Toll Revenue Backed Bonds	Maximum available based on revenues and 1.75x DSCR All in rate ‘AAA’ MMD +113 bps Buffer 150 bps
Toll Revenue Backed Subordinated Debt	Maximum available based on revenues and 1.3x Global DSCR FHWA published rate 2.76% Buffer 150 bps

Table 6: Summary Debt Terms

4.4.3 Other Debt Facilities

Metro Staff provided terms for an additional debt facility to be used in the development of more detailed capital plans. Capital Grant Revenue Bonds were used to provide upfront funds during construction which would be repaid with New Starts and Other Federal/State Funding over time. An assumed rate of interest of 3.5% was provided by Metro Staff for this facility.

5 Summary Results of the Assessment

For each option a “high” and “low” range is shown representing a high and low funding requirement for that option. A summary of the inputs used to develop these ranges is included in the appendix to this report.

5.1 Option 1: At-Grade Express Lanes

The results of Option 1 are shown in the table below. Based on the analysis an initial segment delivery of at-grade express lanes may be achievable with existing programmed funding and toll revenue backed non-recourse debt. Excess revenues from tolling, and unused existing programmed funds, may be reinvested in the corridor to pay for operations and ongoing capital improvements.

SM YOE	<i>Express Lanes</i>
Cost of Option	200-285
<i>Total Uses of Funds</i>	<i>200-285</i>
Toll-backed financing (Senior)	58 – 139
Toll-backed TIFIA Loan (Subordinate)	76 – 183
Programmed Measure R	0-151
Programmed New Starts	-
Programmed Other LRTP	-
<i>Total Sources of Funds</i>	<i>200-285</i>
<i>Additional Capital Funding Requirement/(Surplus)</i>	<i>(123) - 0</i>

Table 7: Summary Results for Option 1

Under this scenario, the cost of operations for the express lanes is assumed to be met with toll revenues. The operating cost in the Base Case is approximately \$15 million in the first year of operations (2026).

5.2 Option 2A: Light Rail Tunnel

The results of Option 2A, including the development of a Light Rail Tunnel, are shown in the table below. Based on the analysis this option will require additional funding of approximately \$4.8 billion to \$6.3 billion.

Sources of these funds may include additional local, state and federal sources such as New Starts funding. Appendix E includes a potential funding plan for this option. Note that further reductions in the funding gap may be achieved through additional refinements in scope and value engineering as the Project is developed further.

\$M YOE	<i>LRT tunnel</i>
Cost of Option	7,109 – 8,643
<i>Total Uses of Funds</i>	<i>7,109 – 8,643</i>
Toll-backed financing (Senior)	-
Toll-backed TIFIA Loan (Subordinate)	-
Programmed Measure R	1,000
Programmed New Starts	500
Programmed Other LRTP	760
<i>Additional Capital Funding Requirement</i>	<i>4,849 – 6,383</i>
<i>Total Sources of Funds</i>	<i>7,109 – 8,643</i>

Table 8: Summary Results for Option 2A

In addition to further capital funding for construction of the project, the cost of operations for transit exceeds the expected revenues to be received from fares. Based on the data reviewed in this analysis, the expected shortfall is approximately \$105 million in the first year of operations (2031).

5.3 Option 2B: Heavy Rail Tunnel

The results of Option 2B, including the development of a HRT, are shown in the table below. Based on the analysis this option will require additional funding of approximately \$5.1 billion to \$6.9 billion.

Sources of these funds may include additional local, state, and federal sources such as New Starts funding. Appendix E includes a potential funding plan for this option. Note that further reductions in the funding gap may be achieved through additional refinements in scope and value engineering as the Project is developed further.

SM YOE	<i>HRT tunnel</i>
Cost of Option	7,401 – 9,201
<i>Total Uses of Funds</i>	<i>7,401 – 9,201</i>
Toll-backed financing (Senior)	-
Toll-backed TIFIA Loan (Subordinate)	-
Programmed Measure R	1,000
Programmed New Starts	500
Programmed Other LRTP	760
<i>Additional Capital Funding Requirement</i>	<i>5,141 – 6,941</i>
<i>Total Sources of Funds</i>	<i>7,401 – 9,201</i>

Table 9: Summary Results for Option 2B

In addition to further capital funding for construction of the project, the cost of operations for transit exceeds the expected revenues to be received from fares. Based on the data reviewed in this analysis, the expected shortfall is approximately \$83 million in the first year of operations (2031).

5.4 Option 3: Tolled Highway Tunnel w/BRT

The results of Option 3, including the development of a Highway Tunnel including BRT, are shown in the table below. Based on the analysis this option will require additional funding of approximately \$13.7 billion to \$17.9 billion.

While reductions in the funding gap may be achieved through additional refinements in scope and value engineering as the Project is developed further, the size of the funding gap presented will likely present a significant challenge in terms of additional funding.

SM YOE	<i>Highway Tunnel w/BRT</i>
Cost of Option *	16,198 – 20,095
<i>Total Uses of Funds</i>	<i>16,198 – 20,095</i>
Toll-backed financing (Senior)	141 – 272
Toll-backed TIFIA Loan (Subordinate)	251 – 484
Programmed Measure R	1,000
Programmed New Starts	–*
Programmed Other LRTP	760
<i>Additional Capital Funding Requirement</i>	<i>13,682 – 17,943</i>
<i>Total Sources of Funds</i>	<i>16,198 – 20,095</i>

Table 10: Summary Results for Option 3

*BRT upgrades to existing vehicles are less than \$5 million

In addition to further capital funding for construction of the project, the cost of operations for BRT exceeds the expected revenues to be received from fares. Based on the data reviewed in this analysis, the expected shortfall is approximately \$62 million in the first year of operations (2031).

5.5 Option 4: Highway Tunnel and Private Rail Tunnel

The results of Option 4, including the development of a Highway Tunnel and Private Rail Tunnel, are shown in the table below. Based on the analysis this option will require additional funding of approximately \$20.5 billion to \$26.6 billion as shown. While reductions in the funding gap may be achieved through additional refinements in scope and value engineering as the Project is developed further, the size of the funding gap presented will likely present a significant challenge in terms of additional funding.

\$M YOE	<i>Highway Tunnel</i>	<i>Private Rail Tunnel</i>	<i>Total</i>
Cost of Option	16,198 – 20,095	7,401 – 9,201	23,599 – 29,296
<i>Total Uses of Funds</i>	<i>16,198 – 20,095</i>	<i>7,401 – 9,201</i>	<i>23,599 – 29,296</i>
Toll-backed financing (Senior)	141 – 272	-	141 – 272
Toll-backed TIFIA Loan (Subordinate)	251 – 484	-	251 – 484
Programmed Measure R	1,000	-	1,000
Programmed New Starts	-	500	500
Programmed Other LRTP	760	-	760
<i>Additional Capital Funding Requirement</i>	<i>13,682 – 17,943</i>	<i>6,901 – 8,701</i>	<i>20,583 – 26,644</i>
<i>Total Sources of Funds</i>	<i>16,198 – 20,095</i>	<i>7,401 – 9,201</i>	<i>23,599 – 29,296</i>

Table 11: Summary Results for Option 4

The cost of operating the highway tunnel element of this option is expected to be paid for from the toll revenues raised. Excess toll revenues, after meeting the cost of operations and debt service, amount to approximately \$40 million in the first year of operations (2031).

However, in addition to further capital funding for construction of the project, the cost of operations for the HRT component exceeds the expected revenues to be received from fares. Based on the data reviewed in this analysis, the expected shortfall is approximately \$83 million in the first year of operations (2031).

5.6 Option 5: Phased Express Lanes and HRT Tunnel

The results of Option 5, including a phased development of Express Lanes over the Sepulveda Pass and a rail tunnel serving the Orange Line and Westwood, are shown in the table below. Funding has been allocated to a first phase development of the Express Lanes (to the extent eligible) and then to the development of a second phase rail tunnel.

Based on the analysis this option will require additional funding of approximately \$5.0 billion to \$7.1 billion as shown. Sources of these funds may include additional local or state dollars and federal sources such as New Starts funding. Appendix E includes a potential funding plan for this option. Note that further reductions in the funding gap may be achieved through additional refinements in scope and value engineering as the Project is developed further.

\$M YOE	<i>Express Lanes</i>	<i>HRT tunnel</i>	Total
Cost of Option	200 – 285	7,401 – 9,201	7,601 – 9,486
<i>Total Uses of Funds</i>	<i>200-285</i>	<i>7,401 – 9,201</i>	<i>7,601 – 9,486</i>
Toll-backed financing (Senior)	58 – 139	-	58 – 139
Toll-backed TIFIA Loan (Subordinate)	76 – 183	-	76 – 183
Programmed Measure R	0-151	849 – 1000	1,000
Programmed New Starts	-	500	500
Programmed Other LRTP	-	760	760
<i>Additional Capital Funding Requirement</i>	-	<i>5,141 – 7,092</i>	<i>5,019 – 7,092</i>
<i>Excess Toll Revenue Bond Proceeds</i>	<i>(123) - 0</i>	-	<i>(123) - 0</i>
<i>Total Sources of Funds</i>	<i>200-285</i>	<i>7,401 – 9,201</i>	<i>7,601 – 9,486</i>

Table 12: Summary Results for Option 5

As noted above, the operating cost of the express lanes is expected to be met with toll revenues. Excess toll revenues, after the payment of operating costs and debt service is expected to be approximately \$14 million in the first year of operations. The cost of operations of the HRT component in Option 5 exceeds the expected revenues in the first year of operations by approximately \$83 million.

The impact of additional transit options for the corridor on the future potential toll revenues has not been fully explored at this time. The addition of an HRT mode may reduce toll revenues and as a result the ability to raise toll revenue backed debt to pay for construction of the Project. Therefore, this may increase the amount of upfront funding required to develop the Project under this scenario.

5.7 Summary

As shown in the summary table the lowest funding requirement is for Option 1 including Express Lanes over the Sepulveda Pass while the largest funding gap is for Option 4, including two tunnels for rail and highway solutions. Option 5, including a phased approach to developing express lanes at-grade and an HRT Tunnel, appears to offer the lowest funding requirement while providing for both a rail and highway combined delivery option.

Delivery Options	Capital Funding Requirement \$M YOY
Option1: Express Lanes	(123) - 0
Option 2A: Light Rail Tunnel	4,849 – 6,383
Option 2B: Heavy Rail Tunnel	5,141 – 6,941
Option 3: Tolled Highway Tunnel w/BRT	13,682 – 17,943
Option 4: Highway Tunnel and Private Rail Tunnel	20,583 – 26,644
Option 5: Phased Express Lanes and HRT Tunnel	5,019 – 7,092

Table 13: Summary of Results

As shown, option 5 presents a potential highway and transit solution with an additional funding requirement that may be met through a combination of refinements in project definition, scope and value engineering, additional local funding dollars, and other Federal/State funding sources. A draft capital plan to illustrate potential funding for this option is included in the Appendix E to this report and a summary is shown below.

\$ millions Year of Expenditure	Option 5 Base Case
Measure R	1,000
Planned New Starts	500
Other LRTP	760
ExpressLane Financing	167
<i>Subtotal of Available Funding</i>	<i>2,427</i>
Additional Potential Local Funding Sources	2,800
Local Funding Sources Escalation	600
Other State/Federal Funding	2,000
Funding Gap for Future Tolling Study	717
<i>Subtotal of Proposed Innovative Financing</i>	<i>6,117</i>
Total Cost	\$8,544

Table 14: Summary of Illustrative Funding Plans

*Includes interest cost of funds accelerated through capital grant bonding approach repaid by other State/Federal funding sources.

The operating cost for BRT, LRT and HRT exceeds the expected fare revenue in each option. The first year operating shortfall for these options ranges from approximately \$62 million to \$83 million. While the potential for excess revenues from highway tolling is approximately \$14 million in the first year for an at-grade express lanes option or approximately \$40 million for a highway tunnel option. As noted above, a more detailed study of the potential impact of transit options on potential toll revenues is required in the next phase of study.

It should be noted that further detailed assessment of costs and revenues will form part of the next phase of Project development and several key areas will require more detailed analysis. This may include:

- More detailed T&R forecast, including potential impacts of a proposed rail tunnel on possible Express Lanes users;
- More detailed assessments of costs and opportunity for cost savings while meeting the project design requirements;
- Understanding the impact of traffic in more detail at both ends of the initial scope Express Lanes component;
- Exploring the potential for variable price tolling and the implications of an increased pricing cap;
- More detailed understanding of use of P3 delivery options and inclusion of private sector innovation in delivery.

6 Next Steps for Project Implementation

6.1 Assessment for Private Sector Involvement

Based on the project size and complexity it is likely that the Sepulveda Pass Project will continue to generate significant interest from the private sector. Potential delivery options and partnering structures should be further explored in a next phase strategic assessment as Metro continues to explore an appropriate delivery and implementation approach. Metro's understanding of its own risk tolerance and preferred allocation of risks will inform a screening of possible alternatives for optimizing a structure with the private sector. At this time the Project implementation may include several different approaches depending on contracting (including Pre-Development Agreement (PDA)) and the environmental process, as outlined in the table below.

Description	Contract approach	Environmental approach*	Schedule	Considerations
Separate contracts under one environmental	Separate contracts for highway and rail	Tiered environmental approach including both elements under one EIS	Potential to accelerate highway delivery	Single project view under one environmental approach; potential risk of delay on tunnel; no contractual link between elements.
Separate contracts and environmental	Separate contracts for highway and rail	Separate EIS for each element	Potential to accelerate highway delivery	Separates project elements completely; potential risk of delay on tunnel; no contractual link between elements.
Full PDA under one contract for both highway and rail tunnel	Single Project Agreement	Private Partner assistance during the process for both elements	Accelerated contract execution	Impacts on competition; CTC view is not clear; pricing; single project agreement for different scopes will be complicated.
Separate contract for highway with a PDA element for rail	Single Project Agreement including 'open' elements for rail	Two step or tiered environmental: clearance for highway first; rail completion under PDA	Potential to accelerate highway delivery and partnering approach on rail	Single contract may be complicated; split environmental; potential risk of delay on tunnel; competition impacts of single contract approach.

Table 15: Summary of Delivery Approaches

**Approaches to Environmental planning and development will need to be confirmed with an environmental consultant*

6.2 Timeline and key milestones

Next steps for the Project delivery will include initiation of the environmental process and the further development of understanding around costs and revenues (including traffic forecasting) for the Project. Additional Metro project delivery staff may be required to assist with the environmental process in order to meet timeline objectives.

The timelines shown below outline potential next steps for the Project implementation under both a single contract approach and an accelerated approach incorporating a PDA into the contracting mechanism.

Example: Single Contracting Approach - Actions and Milestones	Illustrative Timeline (MM/YR)
Initiate procurement for next level Traffic and Revenue Forecasting	7/15
Initiate Strategic Assessment	7/15
Initiate Procurement of Environmental Consultant	10/15
Initiate Business Case Development	1/16
Complete Environmental Consultant Procurement	4/16
Industry Workshop	12/18
Issue Request For Qualifications	6/19
Record of Decision	12/19
Issue Request For Proposals	Early 2020
Construction Start	Early 2021

Table 16: Illustrative Timeline for Procurement

Example: PDA Contracting Approach - Actions and Milestones	Illustrative Timeline (MM/YR)
Initiate procurement for next level Traffic and Revenue Forecasting	7/15
Initiate Strategic Assessment	7/15
Initiate Procurement of Environmental Consultant	10/15
Initiate Business Case Development	1/16
Complete Environmental Consultant Procurement	4/16
Industry Workshop	1/17
Issue Request For Qualifications	1/17
Record of Decision (Express Lanes)	11/17
Issue Request For Proposals	12/17
Select Preferred Bidder	6/18
Financial Close (Express Lanes)	Late 2018
Record of Decision (Rail)	12/19
Negotiation on PDA	6/20
Financial Close (Rail)	Late 2020

Table 17: Illustrative Timeline for Accelerated Procurement

6.3 Recommended Further Steps for Project Advancement

Several “next steps” have been identified for the Project and are summarized below.

- The next stage of analysis will be to explore alternative delivery methods for options included in this report. With the inclusion of alternative delivery methods (including Public Private Partnerships) there may be significant value in cost reduction and leveraging additional toll backed financing.
- Under the existing options shown in this report, Option 5 appears to offer an approach that allows for both modes of transportation through the pass at a cost that may be realistically achieved by Metro through additional new sales tax revenues. The next stage of analysis will need to further explore such a modular approach and the potential phasing for this option, including impact on LRTP and potential future sales tax revenues.
- Metro will need to consider the approach to gaining environmental approvals for the Project, typically a critical path Project delivery. A strategy will need to be explored and developed that meets Metro’s needs for the Project scope, timing and potential phasing.
- A more defined Project description, including greater details on Project scope such that the development of next phase work streams under T&R, environmental and delivery assessment may be initiated.
- As noted, additional T&R analysis including framing questions to optimize project feasibility and modular approach.
- Metro Staff will need to address the requirements of the Metro Board and regional stakeholders impacted by the Project.
- As part of an environmental strategy, the process of procuring an environmental consultant may also be initiated. Additional Metro staff may be required to deliver the appropriate documentation required in the environmental process.

A Construction Costs

All numbers presented in 2015 \$ millions unless stated.

A.1 Option 1 At-Grade Express Lanes

A.1.1 "Base Case"

Item	Unit	Cost	Quantity	Highway
Construction of Express Lanes	Miles	15.7	10	157
			Sub Total	157
			30% Contingency⁽⁷⁾	47
			Total	204

Assumptions from and adjustments to Tables 3-1 & 3-2 Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 No BRT costs assumed for this option per Metro direction.
- 2 Existing HOV lane is converted to Express Lane throughout the project.
- 3 Two Express Lanes through the Sepulveda Pass from US-101 to I-10 within the existing ROW (restriping of exiting GP lanes).
- 4 Metro standard cost of \$12 million per mile for HOT lanes construction has been reduced by 20% for economies of scale and increased by 50% to cover management and programmatic costs.
- 5 No Direct Access Ramps included in estimate per Metro direction.
- 6 All unit costs are pulled from Concept 1 At-Grade Sepulveda BRT Improvements per Metro interoffice memo 11/7/2012.
- 7 A 30% contingency is applied to the sub-total due to the conceptual nature of the study.

A.1.2 "Low Case"

Item	Unit	Cost	Quantity	Highway
Construction of Express Lanes	Miles	15.7	10	157
			Sub Total	157
			30% Contingency⁽⁷⁾	-
			Total	157

Assumptions from, and adjustments to, Tables 3-1 and 3-2 Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 No BRT costs assumed for this option per Metro direction.
- 2 Existing HOV lane is converted to Express Lane throughout the project.
- 3 Two Express Lanes through the Sepulveda Pass from US-101 to I-10 within the existing ROW (restriping of exiting GP lanes).
- 4 Metro standard cost of \$12M per mile for HOT lanes construction has been reduced by 20% for economies of scale and increased by 50% to cover management and programmatic costs.
- 5 No Direct Access Ramps included in estimate per Metro direction.
- 6 All unit costs are pulled from Concept 1 At-Grade Sepulveda BRT Improvements per Metro interoffice memo 11/7/2012.
- 7 A 0% contingency is applied to the sub-total for the low cost estimate.

A.1.3 “High Case”

Item	Unit	Cost	Quantity	Highway
Construction of Express Lanes	Miles	15.7	10	157
			Sub Total	157
			30% Contingency ⁽⁷⁾	47
			10% uplift for High cost Estimate	20
			Total	224

Assumptions from, and adjustments to, Tables 3-1 & 3-2 Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 No BRT costs assumed for this option per Metro direction.
- 2 Existing HOV lane is converted to Express Lane throughout the project.
- 3 Two Express Lanes through the Sepulveda Pass from US-101 to I-10 within the existing ROW (restriping of exiting GP lanes).
- 4 Metro standard cost of \$12M per mile for HOT lanes construction has been reduced by 20% for economies of scale and increased by 50% to cover management and programmatic costs.
- 5 No Direct Access Ramps included in estimate per Metro direction.
- 6 All unit costs are pulled from Concept 1 At-Grade Sepulveda BRT Improvements per Metro interoffice memo 11/7/2012.
- 7 A 30% contingency is applied to the sub-total for the low construction cost estimate.
- 8 10% uplift on total cost estimates for "high" estimate.

A.2 Option 2A Light Rail Tunnel

Item	Unit	Cost (High Range)	Quantity	“Low Case”	“High Case”
Tunnel Segment - Two 20' Tunnels	Miles	551	7.5	3,304	4,131
20' Diameter Portal	Each	55	4	218	219
At-Grade Light Rail	Miles	93	2	186	186
At-Grade Transit Stations	Each	5	2	11	11
Maintenance Facility	Each	109	1	109	109
			Sub Total	3,829	4,655
			30% contingency	1,149	1,397
			Total	4,978	6,052

“Base Case” scenario was based on an average of the range shown above, at a cost estimate of \$5,515 million.

Assumptions from and, adjustments to, Table 3-5A Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Cost is based on average per mile cost for Metro Light Rail Projects and assumes at-grade running section and grade separations at major intersections.
- 2 Tunnel cost is based on Metro Westside Subway Extension.
- 3 Tunnel cost have been reduced by 20% on the Low Range alternative to reflect economies of scale.
- 4 Assume that a maintenance facility will be located in the San Fernando Valley. Cost assumes facility and ROW costs.
- 5 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.
- 6 Base Case Analysis uses the average of "high" and "low" estimates.

- 7 Per Metro Staff, revised scope assumes 9.5 mile initial segment (7.5 miles below grade, 2 miles at-grade) between connections at Sepulveda Orange Line Station and Sepulveda Expo Line connection.
- 8 Per mile cost for tunnel segment was revised to match original AECOM estimate of \$403.2 million per mile (2012\$).

A.3 Option 2B Heavy Rail Tunnel

Item	Unit	Cost (High)	Quantity	"Low Case"	"High Case"
Tunnel Segment - Two 20' Tunnels	Miles	551	8.8	3,877	4,846
20' Diameter Portal	Each	55	4	219	219
Underground Transit Stations	Each	(109)	2	(219)	(219)
Maintenance Facility	Each	109	1	109	109
Sub Total				3,986	4,955
30% contingency				1,195	1,486
Total				5,181	6,441

"Base Case" scenario was based on an average of the range shown above, at a cost estimate of \$5,812 million.

Assumptions from, and adjustments to, Table 3-5B Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Tunnel Cost is based on Metro Westside Subway Extension.
- 2 Tunnel cost have been reduced by 20% on the Low Range alternative to reflect economies of scale.
- 3 Assume that a maintenance facility will be located in the San Fernando Valley. Cost assumes facility and ROW costs.
- 4 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.
- 5 Base Case Analysis uses the average of "high" and "low" estimates
- 6 Assumes 8.8 miles between connections at Sepulveda Orange Line Station and Westwood.
- 7 Number of underground stations revised to two per discussions with Metro Staff.

A.4 Option 3 Tolled Highway Tunnel with BRT

A.4.1 "Low Case"

Item	Unit	Cost	Quantity	"Low Case"		
				Transit	Highway	Total
58' Diameter Tunnel	Miles	1,141	9.2		8,396	8,396
58' Diameter Portal & Approaches	Each	164	2		328	328
Sub Total				-	8,724	8,724
30% Contingency ⁽³⁾				-	2,617	2,617
Vehicle Costs ⁽⁴⁾				3		3
Total				3	11,341	11,345

Assumptions from Table 3-4 of Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Cost based on Alaskan Way Viaduct at \$1.044B per mile. The High Range reflects \$1.044B per mile while the low range takes into account a 20% reduction of the tunnel costs to reflect economies of scale
- 2 Portal & Approaches include construction and potential ROW costs.
- 3 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.
- 4 Low vehicle cost - refurbishment, Take mid-point of # of buses for all routes 92 to 196 =144ea @ \$20k per refurbishment per AECOM Preliminary Cost Report Table 2.3.1
- 5 Assumes no BRT cost other than vehicles

A.4.2 "High Case"

Item	Unit	Cost	Quantity	"High Case"		
				Transit	Highway	Total
58' Diameter Tunnel	Miles	1,141	9.2	-	10,495	10,495
58' Diameter Portal & Approaches	Each	164	2	-	328	328
Sub Total				-	10,823	10,823
30% Contingency ⁽³⁾				-	3,247	3,247
Vehicle Costs ⁽⁴⁾				3	-	3
Total				3	14,070	14,073

Assumptions from Table 3-4 of Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Cost based on Alaskan Way Viaduct at \$1.044B per mile. The High Range reflects \$1.044B per mile while the low range takes into account a 20% reduction of the tunnel costs to reflect economies of scale
- 2 Portal & Approaches include construction and potential ROW costs.
- 3 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.
- 4 Low vehicle cost - refurbishment, Take mid-point of # of buses for all routes 92 to 196 =144ea @ \$20k per refurbishment per AECOM Preliminary Cost Report Table 2.3.1
- 5 Assumes no BRT cost other than vehicles

A.4.3 “Base Case”

A “Base Case” scenario for Option 3 was developed using an average of the high and low cases shown above. The “Base Case” cost estimates for this option are:

- Highway Cost Estimate: \$12,706 million
- Transit Cost Estimate: \$3 million
- **Total Cost Estimate: \$12,709 million**

A.5 Option 4 Tolled Highway with Private Shuttle

A.5.1 “Low Case”

Item	Unit	Cost (High)	Quantity	Low Range		
				Transit	Highway	Total
58 ft. Diameter Tunnel	Miles	1,141	9.2	-	8,396	8,396
58 ft. Portal and Approaches	Each	164	2	-	328	328
20' Diameter Portal	Each	57	4	219	-	219
Maintenance Facility	Each	109	1	109	-	109
Underground Stations	Each	(109)	2	(219)	-	(219)
Two 20' Tunnels	Miles	551	8.8	3,877	-	3,877
Sub Total				3,986	8,724	12,710
30% contingency ⁽⁸⁾				1,196	2,617	3,813
Total				5,182	11,341	16,523

Assumptions from, and adjustments to, Table 3-6 of Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Cost is based on average per mile cost for Metro Westside Subway Extension alternative Tunneling Method Study
- 2 Tunnel cost is based on Metro Westside Subway Extension.
- 3 Portal & Approaches include construction and potential ROW costs. 4 portals assumed for transit.
- 4 Adjustment is made for number of stations assuming an underground station cost of \$109M per station.
- 5 Assume that a maintenance facility will be located in the San Fernando Valley. Cost assumes facility and ROW costs.
- 6 Cost based on Alaskan Way Viaduct at \$1.044B per mile. The High Range reflects \$1.044B per mile while the low range takes into account a 20% reduction of the tunnel costs to reflect economies of scale.
- 7 Tunnel cost have been reduced by 20% from the High Range alternative to reflect economies of scale.
- 8 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.

A.5.2 “High Case”

Item	Unit	Cost (High)	Quantity	High Range		
				Transit	Highway	Total
58 ft. Diameter Tunnel	Miles	1,141	9.2	-	10,495	10,495
58 ft. Portal and Approaches	Each	164	2	-	328	328
20' Diameter Portal	Each	55	4	219	-	219
Maintenance Facility	Each	109	1	109	-	109
Underground Stations	Each	(109)	2	(219)	-	(219)
Two 20' Tunnels	Miles	551	8.8	4,846	-	4,846
Sub Total				4,955	10,823	15,778
30% contingency ⁽⁸⁾				1,487	3,247	4,734
Total				6,442	14,070	20,513

Assumptions from, and adjustments to, Table 3-6 of Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Cost is based on average per mile cost for Metro Westside Subway Extension alternative Tunneling Method Study
- 2 Tunnel cost is based on Metro Westside Subway Extension.
- 3 Portal & Approaches include construction and potential ROW costs. 4 portals assumed for transit.
- 4 Adjustment is made for number of stations assuming an underground station cost of \$109M per station.
- 5 Assume that a maintenance facility will be located in the San Fernando Valley. Cost assumes facility and ROW costs.
- 6 Cost based on Alaskan Way Viaduct at \$1.044B per mile. The High Range reflects \$1.044B per mile while the low range takes into account a 20% reduction of the tunnel costs to reflect economies of scale.
- 7 Tunnel cost have been reduced by 20% from the High Range alternative to reflect economies of scale.
- 8 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.

A.5.3 “Base Case”

A “Base Case” scenario for Option 4 was developed using an average of the high and low cases shown above. The “Base Case” cost estimates for this option are:

- Highway Cost Estimate: \$12,706 million
- Transit Cost Estimate: \$5,812 million
- **Total Cost Estimate: \$18,518 million**

A.6 Option 5 Combination of Options 1 and 2B

Costs for Option 1 are as shown above. With respect to the HRT component, Option 2B has been adjusted to reflect a shorter scope (8.8 miles) as shown below.

Item	Unit	Cost (High)	Quantity	"Low Case"	"High Case"
Tunnel Segment - Two 20' Tunnels	Miles	551	8.8	3,877	4,846
20' Diameter Portal	Each	55	4	219	219
Underground Transit Stations	Each	(109)	2	(219)	(219)
Maintenance Facility	Each	109	1	109	109
		Sub Total		3,986	4,956
		30% contingency		1,196	1,487
		Total		5,182	6,442

"Base Case" scenario was based on an average of the range shown above, at a cost estimate of \$5,812 million.

Assumptions from, and adjustments to, Table 3-5B Metro Interoffice Memo dated November 7, 2012 appendix to AECOM Preliminary Cost Report:

- 1 Tunnel Cost is based on Metro Westside Subway Extension.
- 2 Tunnel cost have been reduced by 20% on the Low Range alternative to reflect economies of scale.
- 3 Assume that a maintenance facility will be located in the San Fernando Valley. Cost assumes facility and ROW costs.
- 4 A 30% contingency has been applied to the sub total due to the conceptual nature of the study.
- 5 Base Case Analysis uses the average of "high" and "low" estimates
- 6 Assumes 8.8 miles between connections at Sepulveda Orange Line Station and Westwood.
- 7 Number of underground stations revised to two per discussions with Metro Staff for connections to Orange and Expo LRT lines.

B Operating Cost Estimates

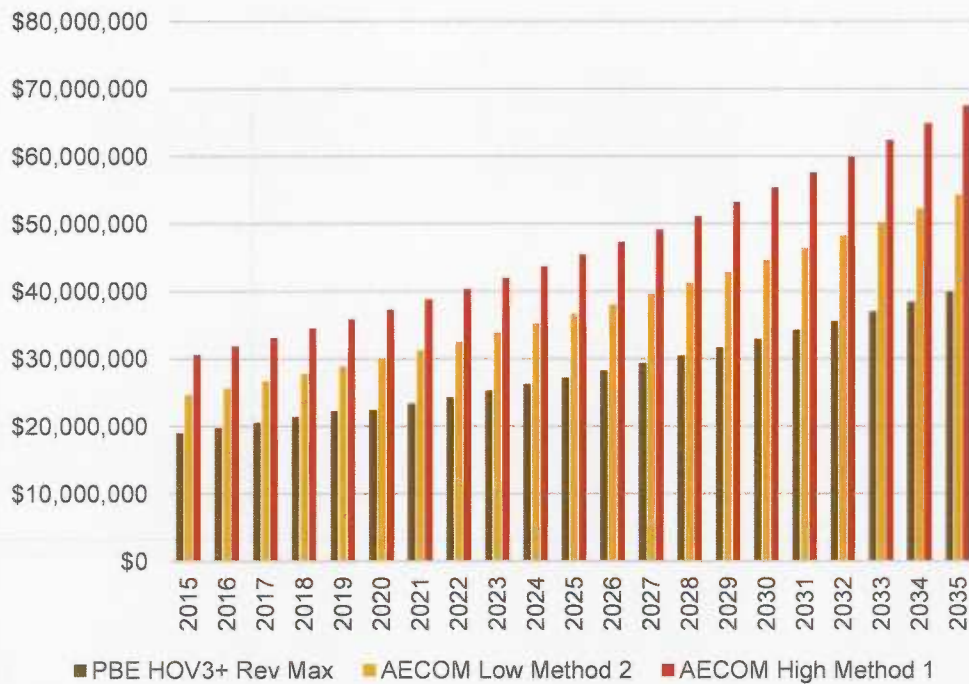
Option	Mode	\$ Millions YOE 2035	\$ Millions YOE 2045	Original Data Source	Adjustments
Option 1	Highway	20	27	Metro Congestion Management	Express Lanes O&M cost estimates based on Metro O&M expenses for I-10/I-110 Express Lanes data (per lane mile cost of \$251,372 x 40 managed lane miles)
Option 2A	LRT	184	273	AECOM Preliminary Cost report (Table 4.1.1)	2015 operating cost per passenger mile of \$0.61 and 2015 forecast daily ridership of 45,167 for Sepulveda/Orange Line to Westwood Expo Line daily boarding's per Figure 12-4 SPCSPS Executive Summary
Option 2B	HRT	145	215	AECOM Preliminary Cost report (Table 4.1.1)	2015 operating cost per passenger mile of \$0.61 and 2015 daily forecast ridership of 38,847 for Sepulveda/Orange Line to Westwood daily boarding's per Figure 12-5 SPCSPS Executive Summary
Option 3	Highway	60	82	AECOM Preliminary Cost report (Table 4.1.1)	Concept 4 AECOM O&M data less BRT cost estimates
	BRT	107	160	AECOM Preliminary Cost report (Table 4.1.1)	2015 operating cost per passenger mile of \$0.69 and 2015 forecast ridership daily ridership of 22,370 for Sepulveda/Orange Line and Sepulveda Expo Line daily boardings per Figure 12-2 SPCSPS Executive Summary
Option 4	Highway	60	82	AECOM Preliminary Cost report (Table 4.1.1)	Same as option 3
	Rail	145	215	AECOM Preliminary Cost report (Table 4.1.1)	HRT operating costs the same as Option 2B.
Option 5	At-Grade Express Lanes	20	27	As above	As above
	HRT	145	215	As above	HRT operating costs the same as Option 2B.

Note: Future analysis may contemplate "bottom-up" costing approach based on a refined scope for the delivery option. In Addition lifecycle costs and refurbishment have not been specifically included in this analysis. Future analysis including an assessment of the useful life of each option will include these cost considerations.

C Toll Revenue Estimates

Gross Annual Revenues for Pass Segment Express Lanes (Does not include BRT revenues)			
Source:	PBE HOV3+ Revenue Maximization	AECOM Low (Method 2)	AECOM High (Method 1)
2015 rev	\$19,012,612	\$24,651,344	\$30,613,944
2020 rev	\$22,419,248	\$30,035,412	\$37,300,295
2035 rev	\$39,593,886	\$54,326,606	\$67,466,976
Annualization	281	318	318
HOV	3+	3+	3+
Pricing Method	Dynamic per RapidTOM	Averages from I-10/I-110	Distribution from I-10/I-110
Max VMT rate	\$1.40	\$1.40	\$1.40
Min VMT rate	\$0.15	\$0.25	\$0.25
Source of traffic volumes	Caltrans PEMS counts in 2012	2008 SCAG Model	2008 SCAG Model
Year Completed	2013	2012	2012
LOS	45mph	45mph	45mph
Toll rate annual growth	Per RapidTOM	3%	3%
Traffic volume annual growth	Per SCAG model	1%	1%

Annual Highway Gross Revenues Adjusted for "Pass Only" Concept 2 ML



D Financing and Economic Inputs

D.1 Toll Revenue Bond

<i>Debt instrument</i>	<i>Toll revenue bond, tax-exempt, non-recourse</i>
<i>Revenue source</i>	<i>Toll revenues from Express Lanes</i>
<i>Facility size</i>	<i>Maximum available dictated by minimum DSCR</i>
<i>Credit rating</i>	<i>BBB-</i>
<i>Maturity</i>	<i>35 years, 10 year principal holiday after SC</i>
<i>Base rate</i>	<i>MMD G.O. AAA as at 4/23</i>
<i>Margin</i>	<i>+113 bps (add additional +100 bps for CABs) as of date of calculation</i>
<i>Buffer</i>	<i>150 bps</i>
<i>Issue costs</i>	<i>1.5% of par amount</i>
<i>Minimum DSCR</i>	<i>1.75x</i>
<i>Repayment structure</i>	<i>(2) Level debt service or ascending debt service @ CPI growth rate [ascending can use CABs for up to 25% {max cap of \$100 million}]</i>
<i>DSRA</i>	<i>Lesser of maximum annual debt service, 10% of par and 125% of average annual debt service</i>

D.2 TIFIA Loan

<i>Debt instrument</i>	<i>TIFIA Loan</i>
<i>Revenue source</i>	<i>Subordinate lien toll revenues from express lanes</i>
<i>Facility size</i>	<i>Maximum available (33% of total eligible project costs, or 50% of Par)</i>
<i>Credit rating</i>	<i>BBB-</i>
<i>Maturity</i>	<i>35 years from substantial completion, 5 year interest holiday after SC, 10 year principal holiday after SC</i>
<i>Base rate</i>	<i>TIFIA published rate 2.76% (as at 4/23)</i>
<i>Margin</i>	<i>1 bps</i>
<i>Buffer</i>	<i>150 bps</i>
<i>Fees</i>	<i>1% of loan amount</i>
<i>Minimum DSCR</i>	<i>1.30x</i>
<i>Repayment structure</i>	<i>(2) Level debt service or ascending debt service @ CPI growth rate</i>

D.3 Inflation inputs

D.3.1 Construction

Historical average rounded to 3% based on supporting data from ENR construction cost index for Los Angeles as shown below.

ENR CCI COST INDEXES IN LOS ANGELES		
		Annual % change
2015	10988.52	2.36%
2014	10734.68	4.33%
2013	10289.18	0.04%
2012	10285.3	2.40%
2011	10044.55	2.79%
2010	9771.69	-0.26%
2009	9797.44	6.44%

2008	9204.69	3.72%
2007	8874.82	3.73%
2006	8555.3	3.49%
2005	8266.63	
	10 year average	2.90%*

D.3.2 Other

Historical average rounded to 3% based on supporting data from Bureau of Labor Statistics for Los Angeles area as shown below.

<i>Year</i>	<i>1985</i>	<i>1986</i>	<i>1987</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>
<i>Annual Index</i>	<i>108.4</i>	<i>111.9</i>	<i>116.7</i>	<i>122.1</i>	<i>128.3</i>	<i>135.9</i>	<i>141.4</i>	<i>146.5</i>	<i>150.3</i>	<i>152.3</i>	<i>154.6</i>	<i>157.5</i>	<i>160.0</i>	<i>162.3</i>	<i>166.1</i>
		<i>3.23%</i>	<i>4.29%</i>	<i>4.63%</i>	<i>5.08%</i>	<i>5.92%</i>	<i>4.05%</i>	<i>3.61%</i>	<i>2.59%</i>	<i>1.33%</i>	<i>1.51%</i>	<i>1.88%</i>	<i>1.59%</i>	<i>1.44%</i>	<i>2.34%</i>
<i>Annual Index</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>
	<i>171.6</i>	<i>177.3</i>	<i>182.2</i>	<i>187.0</i>	<i>193.2</i>	<i>201.8</i>	<i>210.4</i>	<i>217.3</i>	<i>225.0</i>	<i>223.2</i>	<i>225.9</i>	<i>231.9</i>	<i>236.6</i>	<i>239.2</i>	<i>242.4</i>
	<i>3.31%</i>	<i>3.32%</i>	<i>2.76%</i>	<i>2.63%</i>	<i>3.32%</i>	<i>4.45%</i>	<i>4.26%</i>	<i>3.30%</i>	<i>3.53%</i>	<i>0.80%</i>	<i>1.20%</i>	<i>2.67%</i>	<i>2.04%</i>	<i>1.08%</i>	<i>1.35%</i>
															<i>30 year average</i>
															<i>2.82%</i>

February 2014 Board Motion, #66.1

66.1 APPROVED Motion by Directors Garcetti, Antonovich and Dubois that the MTA Board direct the CEO to:

Evaluation

A. convene a one-day roundtable in April 2014 of industry leaders from all sectors to discuss lessons learned on the successful delivery of P3 projects; this includes experts and/or representatives from:

1. Engineering
2. Environmental
3. Finance
4. Construction
5. Federal and State governments

Management

B. report on a strategy and staffing levels to support a robust MTA P3 program to support current acceleration and innovative finance efforts.

Revenue Potential

C. estimate to assess feasible revenue and traffic forecasts for the most advanced P3 Measure R highway and transit projects which include, but not limited to:

1. Sepulveda Pass Transit Corridor
2. High Desert Corridor
3. I-710 South Goods Movement Corridor

Delivery

D. consider, evaluate and report back on the feasibility of creating a P3 County Joint Powers Authority that would include at a minimum MTA, Caltrans and other relevant agencies/parties.

E. present to the Board information from the above no later than the June 2014 MTA Board meeting.