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# California State Senate

SENATOR  
CAROL LIU

TWENTY-FIFTH SENATE DISTRICT



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July 7, 2015

Phillip A. Washington  
Chief Executive Officer  
Los Angeles County Metropolitan Transportation Authority  
One Gateway Plaza  
Los Angeles, CA 90012-2952

Re: **Analysis of Costs and Benefits for the SR 710 North Study Alternatives**

Dear Mr. Washington:

Please find attached my comments on the *Analysis of Costs and Benefits for the State Route 710 North Study Alternatives (CBA)* issued by the Los Angeles County Transportation Authority (METRO) on June 19, 2015.

I offer these comments based on a preliminary review conducted by my staff. The comments note deficiencies in the CBA and areas of non-compliance with the National Environmental Policy Act implementing regulation Sec. 1502.23.

I trust that these and the comments of all interested parties will be given full consideration and will be responded to by METRO and Caltrans in the EIR/EIS and ultimate project decision-making processes.

Sincerely,

Handwritten signature of Carol Liu in cursive script.

CAROL LIU  
Senator  
25<sup>th</sup> District

CC: Bryan Pennington, Executive Director, Engineering and Construction  
Malcolm Dougherty, Director of the California Department of Transportation

According to Sec. 1502.23 of the National Environmental Policy Act (NEPA), “If a cost-benefit analysis relevant to the choice among environmentally different alternatives is being considered for the proposed action, it shall be incorporated by reference or appended to the statement as an aid in evaluating the environmental consequences.” The CBA executive summary states that “The CBA will be considered in conjunction with the information provided in Table 2.15 (Summary of Alternatives and Impacts) during the identification of the Preferred Alternative...” (CBA ES-1). Therefore, the CBA should be subject to the same NEPA regulations as the EIS, namely, the CBA should “...rigorously explore and objectively evaluate all reasonable alternatives...” (NEPA Sec. 1502.14(a)). It is my understanding that the CBA should be an objective document to be used as a tool by policymakers during the decision-making process. In the following pages I highlight areas where the CBA fails in these regards.

## Overview:

The CBA adopts the Lifecycle Benefit-Cost Analysis Model (Cal-B/C) as a tool for evaluating the 5 proposed SR 710 plans. The CBA, however, skips several steps included in the Cal-B/C version 5.0 (Cal-B/C template) available on the Caltrans website. This renders the results section incomplete and misleading. Additionally, the sensitivity analysis is discounted as inconsequential, when it contains important results. Lastly, the CBA fails to tailor the Cal-B/C model to address community concerns regarding the proposed projects, including health care costs, seismic risks, aquifer contamination, and funding sources.

## CBA Omissions:

- 1) According to the Cal-B/C template available on the Caltrans website, the cost benefit analysis should present the net present value<sup>1</sup>, return on investment, and benefit/cost ratio for the proposed projects. The CBA reports only the net present value (NPV), and omits the two other financial indicators.**

Instead of including these figures, the CBA provides a cursory comment about investment returns on page 2: “In general, a positive NPV indicates a better return on an investment. The Freeway Tunnel Alternative (single-bore variation) has the highest NPV as shown below in Table 1.” From this, the reader might assume that the single-bore tunnel also has the highest ROI and benefit/cost ratio. In fact, the TSM/TDM has the highest ROI at 4.35% per year (see below). The single-bore tunnel has a ROI of 2.81 to 2.90%, and the BRT has an ROI of 2.76%. Omitting the ROI and benefit/cost ratio data makes the single-bore tunnel option appear comparatively more financially attractive. All three financial indicators should be presented in the *Table 1: Cost-Benefit Analysis Summary for the SR-710 North Study* to put

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<sup>1</sup> Net Present Value is the present value of future benefits of a transaction (discounted according to interest rate and opportunity costs), minus the costs of the transaction.

the NPV figures in context and to address Metro’s stated goal of “maximizing the cost efficiency of public investments” (CBA ES-1).

**Table 1: Full Results, as per Cal-B/C**

	<b>Present Value of Costs (\$ million)</b>	<b>Present Value of Benefits (\$ million)</b>	<b>Net Present Value (\$ million)</b>	<b>Benefit/Cost Ratio (Omitted from CBA)</b>	<b>Annual Return On Investment (Omitted from CBA)</b>
<b>TSM/TDM</b>	255	599	344	1.35	4.35 %
<b>Freeway Tunnel Single Bore</b>	1951 to 1997	3429 to 3587	1487 to 1590	0.74 to 0.80	2.81 to 2.90 %
<b>Freeway tunnel Dual Bore</b>	3227 to 3374	3377 to 3733	-37 to 506	-0.01 to 0.16	-0.06 to 0.73 %
<b>BRT</b>	510	879	369	0.72	2.76 %
<b>LRT</b>	2163	1293	-870	-0.40	-2.54 %

**2) The CBA fails to address the costs of mitigation activities, despite the fact that mitigation is listed as a cost input in the Cal-B/C template.**

A cost figure should be attached to each proposed mitigation listed in the DEIR/S Table ES-1, *Summary of Potential Environmental Impacts of the Build Alternatives and Measures Addressing Those Topics*. It is possible that these figures were included in the construction costs, but they should be laid out explicitly as suggested by the Cal-B/C template. Similarly, if building plans do not call for any mitigation activities, this should be noted in the CBA. The failure of the CBA to address mitigation costs makes the environmental analysis section unsatisfactory.

**Discounted Sensitivity Analysis:**

**1) The CBA concludes that the sensitivity analysis results are inconsequential; however many of the results have significant impacts on both ROI and NPV.**

The CBA claims that “[e]ven under the most pessimistic scenarios, the range of values does not change the general comparisons. The sensitivity ranges are often relatively small and/or in the same direction” (CBA 4-1). This statement glosses over the fact that the magnitude of the NPV changes significantly under some sensitivity analyses, implying significant changes in ROI.

Table 5 of Appendix A identifies 17 cases where results in the sensitivity analysis lead to significant changes in both ROI and NPV – that is, annual ROI changed by more than 0.75%, and NPV changed by more than \$250 million. To put these figures into context, the average NPV for the 5 projects is \$322 million, and the average annual ROI for the projects is 1.56%.

Table 2 shows one such scenario, where a 7% discount rate is used instead of the 4% rate used elsewhere in the CBA. Adopting a 7% discount rate causes the single-bore tunnel NPV to drop from \$1487 million to \$397 million, and the ROI for the single-bore tunnel to drop from 2.81% to 0.93%. It is irresponsible to dismiss a three-fold reduction in the ROI and an NPV decrease of over \$1 billion as “relatively small.”

**Table 2: Discount Rate Sensitivity Analysis Results**

	<b>Present Value of Costs (\$ million)</b>	<b>Net Present Value (\$ million)</b>	<b>Benefit/Cost Ratio (\$ million)</b>	<b>Annual Return on Investment (\$ million)</b>
<b>TSM/TDM</b>	255	223	0.87	3.19 %
<b>Freeway Tunnel Single Bore (Toll, No Trucks)</b>	1951	397	0.20	0.93 %
<b>Freeway tunnel Dual Bore (No Toll)</b>	3227	-783	-0.24	-1.36 %
<b>BRT</b>	510	244	0.48	1.48 %
<b>LRT</b>	2163	-853	-0.39	-2.48 %

Table 2: The NPV column uses the CBA estimates for a 7% discount rate (CBA Table 4-1). This leads to significant changes in ROI. The CBA, however, does not calculate ROI, so the effects of the sensitivity analysis are understated.

**2) The Sensitivity Analysis does not take into account cumulative effects.**

The results of each sensitivity analysis should not be considered in a vacuum. What happens in the likely scenario that several parameter values are not exactly equal to those used to estimate costs? The CBA should model, or at very least discuss, this possibility.

**3) The Sensitivity Analysis should include per-mile tunneling costs.**

As construction represents the majority of costs for the projects that involve tunneling – \$5.5, \$3, and \$2.2 billion for the dual-bore, single-bore and LRT alternatives, respectively – tunneling costs per mile should be included in the sensitivity analysis. The Sepulveda Pass project uses a figure of \$1 billion per mile tunneled to inform construction costs – twice the number used for the SR 710. If the CBA were to adopt this figure, the single-bore tunnel’s purported \$1.5 billion NPV would be reduced to nearly zero. If there are technological or geological reasons why one METRO tunneling project would cost twice that of another project per mile, these reasons should be noted in the CBA.

## **Limitations of the Cal-B/C:**

### **1) Cal-B/C does not discuss sources of funding.**

While the Cal-B/C model does not require this, funding has been a central issue in the SR 710 debate. According to metro.net, “[t]he SR 710 Gap Closure project was identified as a high-potential candidate for delivery as a P3 project.” Currently, the CBA counts tolls as transfer payments – which are a redistribution of income in the study area, and therefore do not influence costs or benefits. Because a private partner would be entitled to toll revenues, these payments could no longer be considered as transfer payments if the private partner is not in L.A. County. This could have significant impacts on the NPV of the projects, depending on the private partner’s investment and profit margins. The CBA should at the very least provide an outline of a P3 contract to show that Metro has addressed these issues. It is also important to discuss how using Measure R (and potentially R 2.0) funds on the SR 710 project would affect funding for transportation projects elsewhere in L.A. County.

### **2) This CBA should do more to model low probability, high-cost events.**

Examples of these events include earthquakes, leakage between the Raymond and San Gabriel Aquifers, and harder-than-expected sediment along the tunnel course. This is not a case of Metro not following the guidelines of Cal-B/C, but rather incompatibility between Cal-B/C and the proposed projects. It is imperative to include these possibilities to reflect the inherent risk of large construction projects like the freeway tunnel and LRT alternatives. Metro is using a document designed for road construction and should tailor it to address the nuances of the proposed projects.

### **3) Cal-B/C does not take into account health care costs.**

Exhibit 3-10 of the CBA clearly shows that all tunnel options will cause increases in emissions. The CBA should be extended to examine health care–related costs that may arise from reduction in air quality both in communities adjacent to construction areas and the region as a whole.

### **4) Cal-B/C does not take into account business interruption litigations.**

The Cal-B/C model does not consider business interruption litigation when calculating costs. An effort should be made to determine the extent to which this type of litigation may increase project costs.

**Appendix A:** Tables 1-5 investigate the significance of figures listed in Table 4-1 of the CBA, *NPV Sensitivity Analysis*. We use a threshold of 0.75% net change in annual ROI and \$250 million change in NPV as significance standards. To put these figures into context, the average NPV for the 5 projects is \$322 Million, and the Average annual ROI for the projects is 1.56%. If Metro takes issue with these standards, we urge them to adopt their own significance standards.

**Table 1: NPV Sensitivity Analysis (Table 4-1 CBA)**

All figures are in millions of dollars, save annual ROI, which is a percent.

	Base NPV	Cost	Base ROI		Operating Costs	Tunnel Life	VMT Reduction	Air Quality	Discount Rate	Annualization	Value of Time
TSM/TDM	343	255	4.35	Lower	318	343	309	325	223	294	343
	343	255	4.35	Upper	356	343	343	343	343	343	561
Single Bore (Toll)	1524	1979	2.90	Lower	1250	1140	1159	1524	428	1298	1524
	1524	1979	2.90	Upper	1662	1524	1524	1543	1524	1524	3022
Single Bore (Toll, No Trucks)	1447	1951	2.81	Lower	1205	1093	1165	1477	397	1258	1477
	1447	1951	2.81	Upper	1613	1477	1477	1497	1477	1477	2946
Single Bore (Toll, Express Bus)	1590	1997	2.97	Lower	1313	1205	1267	1590	466	1355	1590
	1590	1997	2.97	Upper	1728	1590	1590	1601	1590	1590	3095
Dual Bore (No Toll)	75	3273	0.11	Lower	-391	-618	-261	75	-783	-111	75
	75	3273	0.11	Upper	308	75	75	92	75	75	1358
Dual Bore (No Toll, No Trucks)	506	3227	0.73	Lower	45	-188	191	506	-533	283	506
	506	3227	0.73	Upper	737	506	506	506	506	506	1947
Dual Bore (Toll)	-37	3374	-0.06	Lower	-513	-730	-328	-37	-851	-222	-37
	-37	3374	-0.06	Upper	201	-37	-37	7	-37	-37	1410
BRT (ELA to Pasadena)	369	510	2.76	Lower	318	369	332	348	224	316	369
	369	510	2.76	Upper	394	369	369	369	369	369	516
LRT (ELA to Pasadena)	-869	2163	-2.54	Lower	-1110	-869	-1219	-880	-853	-902	-869
	-869	2163	-2.54	Upper	-749	-869	-869	-869	-869	-869	-813

**Table 2: Annual ROI Sensitivity Analysis**

Cell values represent the annual ROI, in percent, for a given sensitivity analysis. Values were calculated using NPV data from Appendix Table 1.

		Operating Costs	Tunnel Life	VMT Reduction	Air Quality	Discount Rate	Annualization	Value of Time
TSM/TDM	Lower	4.13	4.35	4.05	4.19	3.19	3.91	4.35
	Upper	4.47	4.35	4.35	4.35	4.35	4.35	5.99
Single Bore (Toll)	Lower	2.48	2.30	2.33	2.90	0.98	2.55	2.90
	Upper	3.10	2.90	2.90	2.92	2.90	2.90	4.74
Single Bore (Toll, No Trucks)	Lower	2.43	2.25	2.37	2.86	0.93	2.52	2.86
	Upper	3.06	2.86	2.86	2.89	2.86	2.86	4.71
Single Bore (Toll, Express Bus)	Lower	2.56	2.39	2.49	2.97	1.05	2.62	2.97
	Upper	3.17	2.97	2.97	2.99	2.97	2.97	4.79
Dual Bore (No Toll)	Lower	-0.63	-1.04	-0.41	0.11	-1.36	-0.17	0.11
	Upper	0.45	0.11	0.11	0.14	0.11	0.11	1.75
Dual Bore (No Toll, No Trucks)	Lower	0.07	-0.30	0.29	0.73	-0.90	0.42	0.73
	Upper	1.03	0.73	0.73	0.73	0.73	0.73	2.39
Dual Bore (Toll)	Lower	-0.82	-1.21	-0.51	-0.06	-1.44	-0.34	-0.06
	Upper	0.29	-0.06	-0.06	0.01	-0.06	-0.06	1.76
BRT (ELA to Pasadena)	Lower	2.45	2.76	2.54	2.64	1.84	2.44	2.76
	Upper	2.90	2.76	2.76	2.76	2.76	2.76	3.56
LRT (ELA to Pasadena)	Lower	-3.54	-2.54	-4.06	-2.58	-2.48	-2.66	-2.54
	Upper	-2.10	-2.54	-2.54	-2.54	-2.54	-2.54	-2.33

**Appendix Table 3: Significant Changes in ROI**

Each cell is the change in annual ROI from the base value. Colored cells indicate changes of over 0.75% in Annual ROI. Green cells (dark gray) indicate a positive change; pink cells (light gray) indicate a negative change.

		Operating Costs	Tunnel Life	VMT Reduction	Air Quality	Discount Rate	Annualization	Value of Time
TSM/TDM	Lower	-0.22	0.00	-0.30	-0.16	-1.16	-0.45	0.00
	Upper	0.11	0.00	0.00	0.00	0.00	0.00	1.63
Single Bore (Toll)	Lower	-0.42	-0.60	-0.56	0.00	-1.91	-0.34	0.00
	Upper	0.20	0.00	0.00	0.03	0.00	0.00	1.85
Single Bore (Toll, No Trucks)	Lower	-0.38	-0.56	-0.44	0.05	-1.88	-0.29	0.05
	Upper	0.25	0.05	0.05	0.08	0.05	0.05	1.90
Single Bore (Toll, Express Bus)	Lower	-0.41	-0.58	-0.48	0.00	-1.92	-0.35	0.00
	Upper	0.19	0.00	0.00	0.02	0.00	0.00	1.82
Dual Bore (No Toll)	Lower	-0.75	-1.15	-0.53	0.00	-1.47	-0.29	0.00
	Upper	0.34	0.00	0.00	0.03	0.00	0.00	1.64
Dual Bore (No Toll, No Trucks)	Lower	-0.66	-1.03	-0.44	0.00	-1.63	-0.31	0.00
	Upper	0.30	0.00	0.00	0.00	0.00	0.00	1.66
Dual Bore (Toll)	Lower	-0.77	-1.16	-0.45	0.00	-1.39	-0.28	0.00
	Upper	0.34	0.00	0.00	0.07	0.00	0.00	1.82
BRT (ELA to Pasadena)	Lower	-0.31	0.00	-0.22	-0.12	-0.92	-0.32	0.00
	Upper	0.14	0.00	0.00	0.00	0.00	0.00	0.80
LRT (ELA to Pasadena)	Lower	-1.00	0.00	-1.52	-0.04	0.06	-0.13	0.00
	Upper	0.43	0.00	0.00	0.00	0.00	0.00	0.21



**Appendix Table 4: Significant Changes in NPV**

The cell value is the change in NPV, in millions of dollars, from the base value. Colored cells indicate changes of more than \$250 Million. Green cells (dark gray) indicate a positive change; pink cells (light gray) indicate a negative change.

		Operating Costs	Tunnel Life	VMT Reduction	Air Quality	Discount Rate	Annualization	Value of Time
TSM/TDM	Lower	-25	0	-34	-18	-120	-49	0
	Upper	13	0	0	0	0	0	218
Single Bore (Toll)	Lower	-274	-384	-365	0	-1096	-226	0
	Upper	138	0	0	19	0	0	1498
Single Bore (Toll, No Trucks)	Lower	-242	-354	-282	30	-1050	-189	30
	Upper	166	30	30	50	30	30	1499
Single Bore (Toll, Express Bus)	Lower	-277	-385	-323	0	-1124	-235	0
	Upper	138	0	0	11	0	0	1505
Dual Bore (No Toll)	Lower	-466	-693	-336	0	-858	-186	0
	Upper	233	0	0	17	0	0	1283
Dual Bore (No Toll, No Trucks)	Lower	-461	-694	-315	0	-1039	-223	0
	Upper	231	0	0	0	0	0	1441
Dual Bore (Toll)	Lower	-476	-693	-291	0	-814	-185	0
	Upper	238	0	0	44	0	0	1447
BRT (ELA to Pasadena)	Lower	-51	0	-37	-21	-145	-53	0
	Upper	25	0	0	0	0	0	147
LRT (ELA to Pasadena)	Lower	-241	0	-350	-11	16	-33	0
	Upper	120	0	0	0	0	0	56

**Appendix Table 5: Significance of Sensitivity Analysis.**

Colored squares indicate scenarios that lead to a net change in annual ROI of over 0.75% and a change in NPV of over \$250 million. Of the 63 scenarios studies, 17 lead to significant changes in both annual ROI and NPV (colored cells). Green cells (dark gray) indicate a positive change; pink cells (light gray) indicate a negative change. Cells labeled 'ns' were not significant in at least one of the categories.

	Operating Costs	Tunnel Life	VMT Reduction	Air Quality	Discount Rate	Annualization	Value of Time
TSM/TDM	ns	ns	ns	ns	ns	ns	ns
	ns	ns	ns	ns	ns	ns	ns
Single Bore (Toll)	ns	ns	ns	ns	-1096.00	ns	ns
	ns	ns	ns	ns	ns	ns	1498.00
Single Bore (Toll, No Trucks)	ns	ns	ns	ns	-1050.00	ns	ns
	ns	ns	ns	ns	ns	ns	1499.00
Single Bore (Toll, Express Bus)	ns	ns	ns	ns	-1124.00	ns	ns
	ns	ns	ns	ns	ns	ns	1505.00
Dual Bore (No Toll)	ns	-693.00	ns	ns	-858.00	ns	ns
	ns	ns	ns	ns	ns	ns	1283.00
Dual Bore (No Toll, No Trucks)	ns	-694.00	ns	ns	-1039.00	ns	ns
	ns	ns	ns	ns	ns	ns	1441.00
Dual Bore (Toll)	-476.00	-693.00	ns	ns	-814.00	ns	ns
	ns	ns	ns	ns	ns	ns	1447.00
BRT (ELA to Pasadena)	ns	ns	ns	ns	ns	ns	ns
	ns	ns	ns	ns	ns	ns	ns
LRT (ELA to Pasadena)	ns	ns	-350.00	ns	ns	ns	ns
	ns	ns	ns	ns	ns	ns	ns