

# Exhibit 1

## MEMORANDUM

To: Project Team

From: Paul Moore

Date: July 16, 2015

Subject: Nelson\Nygaard CBA Report Review

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Following is Nelson\Nygaard's initial review of the "Analysis of Costs and Benefits for the State Route 710 North Study Alternatives" (CBA) developed by Metro, released on June 19, 2015.

### Method of Presentation of Benefits

The CBA states that benefits "are typically examined independently of their relationship to costs." This is false. No one responsible for a budget would contend that magnitude of cost is irrelevant. By choosing to present the "results" in terms of net present value rather than a ratio of benefit to cost, the report favors bigness. This is an incomplete picture of the effectiveness of spending limited fiscal resources – in the case of the freeway tunnels, resources that are not available. As presented in the report, the order of preference (ranked by net present value in millions) is:

<b>Single Bore Freeway</b>	<b>\$1,590</b>
<b>Dual Bore Freeway</b>	<b>\$506</b>
<b>BRT</b>	<b>\$369</b>
<b>TSM/TDM</b>	<b>\$344</b>
<b>LRT</b>	<b>-\$870</b>

If, however, the alternatives were presented in terms of the ratio of benefit to cost, the results would be quite different:

<b>TSM/TDM</b>	<b>2.3</b>
<b>Single Bore Freeway</b>	<b>1.8</b>
<b>BRT</b>	<b>1.7</b>
<b>Dual Bore Freeway</b>	<b>1.1</b>
<b>LRT</b>	<b>0.6</b>

The TSM/TDM alternative (even as poorly designed as it is in the DEIR) clearly provides more public benefit per dollar spent. It stands to reason that the best way to create more net present value would be to ramp up the TSM/TDM spending to the same level as the single bore tunnel spending. If as much money were spent on TSM/TDM as is projected for the single bore freeway and the same 2.3 ratio held, the TSM/TDM alternative would provide \$2,693,000,000 of benefit – over \$1 billion more than the single bore tunnel. This seems like a sound strategy to explore.

### BRT Alternative Costs

The bulk of cost for the BRT alternative appears to be operating and maintenance (O&M) cost and TSM/TDM supplemental enhancements. However, the information provided raises some questions:

#### *TSM/TDM*

Each of the build alternatives includes some elements of TSM/TDM. Both freeway alternatives and the LRT include about \$50 million. The BRT alternative, however, includes \$102 million – nearly equal to the construction cost of the BRT itself. There may be two possible explanations:

1. Enhanced support for the core bus service - For more detail, the document refers the reader to the *SR 710 North Study – BRT Operating Plan* (CH2M Hill, March 31, 2014). That document has a section entitled TSM Alternative (Bus Components), which presumably documents what these TSM/TDM components are intended to be. That section says “These enhancements relate primarily to frequency of service. By providing higher frequency service throughout the study area, local bus transit becomes an increasingly viable alternative to private automobile travel while reducing travel times and enhancing mobility significantly for existing transit users.” If the cost of substantially increasing bus service throughout the study area is being assigned to the BRT as a cost, then Metro should confirm that the resulting ridership increases that would be expected have been calculated in the alternative’s benefits. If not, these costs should be removed from the analysis.
2. Simplistic application of a rule of thumb – The CBA, on page 2-7 has a short paragraph that suggests “TSM/TDM Alternative costs were determined for each intersection, local street, and hook ramp location based on a value of \$20,000 per intersection and per ITS location, and \$33,000 per lane mile.” If the methodology used for this analysis was simply apply these linear costs to the BRT alternative (which is twice as long as the LRT alternative) without any modeling of the attendant benefits, this cost should be subtracted.

#### *O&M Cost*

The CBA covers the cost of operating BRT as the most substantial element of the overall cost of this alternative. The report indicates that these costs amount to a fully allocated cost rate of \$134.70 per revenue service hour. This is a reasonable number consistent with Metro’s reporting and is inclusive of all O&M costs. The CBA indicates that these hourly costs add up to \$28 million annually (Table 2-3), however the *SR 710 North Study – BRT Operating Plan* indicates these costs are only \$5 million for the more expensive of the two BRT alternatives based on the service plan outlined (Table 1). It is not clear why the number shown in the CBA is so much higher.

If these costs were, in fact, adjusted downward, it is likely that the BRT alternative would approach a ratio of benefit to cost very similar to the 2.3 achieved by the TSM/TDM alternative. In any event, it would only take a minor downward cost adjustment to cause the BRT to perform better than the single bore tunnel.

### Value of Time

Pages 2-1 and 2-2 go into some detail about why and how the Cal – B/C model was chosen as the tool for this analysis. However, the sensitivity analysis includes a note that a “different value of time(VOT) featuring different VOTs for auto and transit users was applied - \$22.57 for auto and \$6.35 for transit (2014 prices) – instead of the Cal-B/C assumptions (\$13.25 for both auto and transit).” The document does not explain the logic for this analysis, nor why it has any relevance. This is concerning as it seems to suggest a value judgment that the time of one group of modal users is more valuable than another. Even if a narrow analysis of the current incomes of regional drivers versus transit riders illustrated this type of disparity, factoring decision-making processes to favor those who are currently more affluent is a path to hard-wiring poverty. The region and its transportation agencies are all committed to equitable transportation options, so it is important that project selection processes be structured to support these goals. Including an analysis that suggests otherwise, could inappropriately influence readers of the report. The basis for and relevance of this element of the sensitivity analysis should be explained more fully and Metro should consider removing this analysis altogether.

Rather, the opposite relationship could be argued. Time spent on transit is less “lost” time than that spent driving, since transit riders can work or communicate in ways that car drivers cannot. This is, in fact, why many riders choose transit over driving. The CBA fails to account for this reality.

### Accounting for Tolls

The CBA report indicates that tolls were not included as a CBA benefit (or disbenefit) because they are considered “transfer benefits.” Presumably this means that since the tolls paid by users will help to defray the cost of the tunnel they would be present on both sides of a cost/benefit equation (or ratio) and therefore need not be accounted. This is a fallacious conclusion for multiple reasons but specifically because there is no guarantee that the tolls collected over the 20 year period of CBA analysis will cover the full private contribution to tunnel construction. It is inaccurate to ignore the disbenefit of all of the tolls collected past the 20 year analysis period while assigning a residual value of the constructed tunnel as a benefit. In simple terms (with no adjustments made to present dollars) here is how the math would change:

#### *Assumption Set 1 (Similar to CBA Analysis)*

- a. Tunnel Cost: \$3 Billion
- b. Time Benefit: 400 Million Person Hours @ \$13/hr = \$5Billion
- c. Residual Value: \$750 Billion

**Ratio of Benefits to Costs:  $((b+c)/a) = 1.9$**

#### *Assumption Set 2 (More accurate Methodology)*

- a. Tunnel Cost: (\$3 Billion minus \$1.6 B Toll Revenue after Debt Service) = \$1.4 Billion
- b. Time Benefit: 400 Million Person Hours @ \$13/hr = \$5Billion
- c. Residual Value: \$750 Billion
- d. Tolls Collected = (610 Million Trips x \$4) = \$2.4 Billion

**Ratio of Benefits to Costs:  $((b+c)/(a+d)) = 1.5$**

As stated, the above is a simplistic demonstration meant to illustrate that omitting the tolls from the analysis results in four primary problems:

1. **Basic Math** – Looking at ratios built of numerous factors means that presence of tolls (or toll-related borrowing) in the numerator and denominator does not necessarily cancel.
2. **Cost of Money** – Any toll money that is intended to fund construction does not exist at the time of tunnel construction and so must be borrowed, with interest.
3. **Incompatible time cycles** – The CBA only analyzed a 20 year period for costs and benefits, then gave the residual value of the tunnel life cycle back as a benefit. This would only be valid if all tolls were collected and done in the 20 year window, which they likely won't be. The above analysis quantifies this 20 years of tolling and only gives that level of relief to the tunnel cost.
4. **Tolls affect behavior** – Tolls are not simply a “transfer benefit.” The tolls are responsible for much of the travel time benefit. As stated on page ES-3 of the DEIR “the travel time savings do not factor in the cost of tolls, which in the single-bore variations function to keep the tunnel operating at a higher speed.” To account for the benefit of time savings while ignoring the cost is counter to the point of a benefit/cost analysis.

The CBA should be re-run accounting for toll revenues (and the cost of servicing the debt) and associated travel behavior changes to better understand their effects on costs and benefits.

### Flawed Modeling Results

The analysis substantially overestimates travel time savings. This is problematic since page 2-10 states that travel time “often produces the majority of the benefits” of a CBA. An error on this element is significant. The analysis of travel time savings are flawed in several ways:

1. As has been documented elsewhere, the travel analysis performed for the DEIR (and used for the CBA) did not account for the proven dynamic of induced travel.
2. The description of methodology on page 2-10 refers to calculation of traffic growth over 20-years at 1% compounded annually. Not only does this seem odd, given the availability of a travel demand model that reports vehicle delays, but the assumption flies in the face of available data which suggest traffic volumes have been fairly steady over the past 30 years.
3. The methodology suggests that travel time was only calculated for highway users. In particular, it makes no sense to evaluate a transit alternative and not account for the travel time of actual transit riders. It is not appropriate to ignore, for example, all of the current local bus riders, pedestrians and cyclists whose travel time may be improved by the BRT, LRT or TSM/TDM alternatives. The fact that these travelers do not currently drive in a car should not negate the benefits that they will accrue from improved transit service.
4. The DEIR ignores significant delays that would result from construction of the dual bore tunnel. The DEIR model does not include spillback (traffic backups, common in Los Angeles, that spill over into upstream segments and accumulate), but instead assumes that all cars will get through the bottleneck. The EIR model numbers for I-710 northbound at I-10 (the primary upstream source of northbound tunnel traffic) indicates

that traffic would begin spilling back at 7 a.m. and the queue would get longer and longer during the day. If this were accounted for, that segment would move from the 280th most congested freeway segment in the greater Los Angeles region (as reported by the DEIR) to become the 24<sup>th</sup>. To fail to account for this massive degradation is unacceptable.

#### Other Fiscal Questions

Assumptions about long term employment (which the CBA estimated based upon European research) and residual value (which like much of the CBA assessment appears to favor mega-infrastructure) are not addressed in this memo and will be left to an economic analyst.