

Appendix K

Cost Effectiveness

TECHNICAL MEMORANDUM

From: URS Consultant Team

To: City of Minneapolis

Topic: Cost Effectiveness

1.0 Cost Effectiveness

The Nicollet-Central Transit Alternatives study looked at three separate measures for cost-effectiveness: passenger boardings per vehicle revenue hour, operating and maintenance cost per passenger boarding, and incremental annual cost per annual project trips. Each of the measures was developed to assist with the local decision-making process.

$$\text{Cost-effectiveness} = \frac{\text{Annual Passenger Boardings}}{\text{Annual Vehicle Revenue Hour}}$$

$$\text{Cost-effectiveness} = \frac{\text{Annual Operating and Maintenance Cost}}{\text{Annual Passenger Boardings}}$$

$$\text{Cost-effectiveness} = \frac{(\text{Project Incremental Annualized Capital Cost} + \text{Project Incremental Annual O\&M Cost})}{\text{Annual Project Trips}}$$

The last of these formulas was intended to serve as proxy for the FTA's New Starts cost-effectiveness measure described in the Proposed New Starts and Small Starts Policy Guidance, January 9, 2013. Cost effectiveness is one of six equally weighted measures used to determine the project justification rating; the others are environmental benefits (air pollutants, greenhouse gases, energy use, and safety), mobility (project trips and project trips by transit-dependent), congestion relief, economic development (plans and policies to foster growth in the corridor and encourage affordable housing) and land use (existing population density, employment service, and legally binding affordable housing).

2.0 Definitions

Following are other general clarifications on the cost effectiveness calculations:

Nicollet – Central Transit Alternatives

- Annual Passenger Boardings

Forecasted boardings in 2030

- Annual Vehicle Revenue Hours

Annual number of hour transit vehicles are in service, open to the public. So if a route requires six bus to operate at a route a route for an hour, that represents six revenue hours

- Annual Operating and Maintenance Cost

Estimated cost to operate the transit service for a year

- Definition of “Project”

The “Project” is defined as only the enhanced bus or modern streetcar service and facilities/infrastructure, such as track, stops, off-board ticket vending machine, etc., per the Detailed Definition of Alternatives Report.

- Project Incremental Annualized Capital Cost (Year 2013 Dollars)

The annualized project capital cost for each Build alternative has been determined using FTA’s definition of the useful life of various items under each Standard Cost Category (SCC) and using the most current version of the SCC workbook (Rev. 14, August 5, 2011). *Technical Memorandum: Capital Cost Methodology and Results* – under separate cover – provides the details of the annualized capital cost of each element by Build alternative, as well as the total annualized project capital cost for input into the cost effectiveness formula.

Subtracted from the annualized project capital cost is the incremental cost Metro Transit would spend to implement the No-Build alternative, rather than a one-for-one replacement of the existing buses in the corridor. This included 10 hybrid articulated buses and the *difference* in cost between 47 40-foot hybrid buses and 47 articulated hybrid buses.

- Project Incremental Annual O&M Cost (Year 2013 Dollars)

The change in the annual O&M cost to provide transit service in the Nicollet-Central corridor, discussed in detail in *Operations and Maintenance Cost Methodology and Results*, under separate cover.

- Annual Project Trips (Year 2030)

- Project Trips = Project Boardings

- Annual Project Trips used are based on the 2030 average weekday boardings.

FTA guidance indicates that the number of project trips be based on current year socio-economic data, or the average of *current* year and horizon year (2030 in the case of this study) estimates of project trips. At the ridership kick-off meeting on January 2, 2013, with the Metropolitan Council, several modeling assumptions were discussed and agreed upon including the decision to develop ridership estimates using 2030 socio-economic data to be consistent with other past and current planning efforts occurring in the Minneapolis-Saint Paul region.

- The annualization factor used is 320 and is based on 2012 data from Metro Transit for Routes 10 and 18.

3.0 Results

3.1 Annual Passenger Boardings per Annual Vehicle Revenue Hour

		No Build	Enhanced Bus	Modern Streetcar	Modern Streetcar Starter Line
Passenger boardings Daily					
	Project	N/A	13,400	20,100	9,200
	Other Buses in Corridor	37,300	10,100	12,300	26,300
	Corridor Total	37,300	23,500	32,400	35,500
Passenger boardings annual					
	Project		4,288,000	6,432,000	2,944,000
	Other Buses in Corridor	11,936,000	3,232,000	3,936,000	8,416,000
	Corridor Total	11,936,000	7,520,000	10,368,000	11,360,000
Vehicle Revenue Hours					
	Project	N/A	103,100	71,700	39,200
	Other Buses in Corridor	187,900	94,200	106,400	163,300
	Corridor Total	187,900	197,300	178,100	202,500
Passenger boardings per vehicle revenue hour					
	Project	N/A	42	90	75
	Other Buses in Corridor	64	34	37	52
	Corridor Total	64	38	58	56

Due to rounding calculations may appear to be off slightly.

3.2 Annual Operating and Maintenance Cost

		No Build	Enhanced Bus	Modern Streetcar	Modern Streetcar Starter Line
Passenger boardings annual					
	Project		4,288,000	6,432,000	2,944,000
	Other Buses in Corridor	11,936,000	3,232,000	3,936,000	8,416,000
	Corridor Total	11,936,000	7,520,000	10,368,000	11,360,000
Annual O&M Cost Estimate					
	Project	N/A	\$13,600,000	\$20,100,000	\$10,600,000
	Other Buses in Corridor	\$18,900,000	\$9,700,000	\$11,200,000	\$16,600,000
	Corridor Total	\$18,900,000	\$23,300,000	\$31,300,000	\$27,200,000
	Systemwide changes vs. No Build	N/A	\$4,400,000	\$12,400,000	\$8,300,000
O&M Cost per passenger boarding					
	Project	N/A	\$3.17	\$3.13	\$3.60
	Other Buses in Corridor	\$1.58	\$3.00	\$2.85	\$1.97
	Corridor Total	\$1.58	\$3.10	\$3.02	\$2.39

Due to rounding calculations may appear to be off slightly.

3.3 (Project Incremental Annualized Capital Cost + Project Incremental Annual O&M Cost) per Annual Project Trip

	No Build	Enhanced Bus	Modern Streetcar	Modern Streetcar Starter Line
Annualized Capital Cost*	\$2,119,000	\$5,386,000	\$17,258,000	\$7,855,000
Incremental Annual O&M Cost	N/A	\$4,400,000	\$12,400,000	\$8,300,000
Annualized Cost		\$7,667,000	\$27,539,000	\$14,036,000
Annual Riders		4,284,160	6,444,480	2,948,160
Annualized Cost per Rider		\$1.79	\$4.27	\$4.76

Due to rounding calculations may appear to be off slightly.

*See Attachment – Annualized Capital Cost