Midtown Corridor Alternatives Analysis

Evaluation Report

January 2014

Prepared by the
SRF Consulting Group Team
for
Metro Transit

Purpose of Report

The purpose of this Evaluation Report is to document the process used for evaluating the alternatives in the Midtown Corridor Alternatives Analysis (AA) Study. The report uses a set of evaluation measures to quantify how each alternative performs related to the defined project goals. The results of this evaluation process will be used as the basis for the recommendation on a locally preferred alternative (LPA) for the Midtown Corridor.

Purpose and Need Statement and Project Goals

The Midtown Corridor AA's purpose and need statement is as follows:

- The purpose of the Midtown Corridor Transitway Project is to provide transit service that meets current and future travel needs, attracts new riders, connects users with job centers and key destinations, and supports sustainable growth and development.

A project's purpose and need statement identifies transportation problems in the study area as a basis for identifying and evaluating alternatives. It also serves as the basis for developing project goals and objectives. The establishment of project goals and objectives articulates the desired benefits of whatever preferred transportation investment results from the AA. It also drives the definition of the evaluation measures and quantitative and qualitative criteria to be used in comparing the performance of the alternatives with respect to these measures/criteria.

The following set of five specific goals and objectives has been developed to serve as a framework for the study and to help compare and evaluate alternate transit technologies (modes), alignments, and other transportation alternatives.

Midtown Corridor Goals and Objectives

1. Increase transit use among the growing number of corridor residents, employees, and visitors
    - Provide transit service that is fast, frequent, reliable and equitable for all users
    - Provide transitway stations that have a high level of passenger amenities and are easily accessible to riders with limited-mobility
    - Provide service that is identifiable and easy for visitors and new users to understand
    - Provide a transit investment that meets today's needs and has ability to expand for future growth
    - Increase the percentage of people using transit as their transportation choice in the corridor
2. Improve corridor equity with better mobility and access to jobs and activities
    - Enhance physical and visual connections with the three transitways - the Blue, Green and Orange lines – and two transit centers in the study area
    - Provide fast and convenient transfers with transitways and the local bus network
    - Locate transit stations to effectively serve transit customers while maintaining the desired speed of service

- Improve access to local and regional destinations, activity centers and business nodes
- Provide a transitway investment that considers the needs of residents who rely on transit and contributes to reduced reliance on auto travel

3. Catalyze and support housing and economic development along the corridor
    - Support a mix of housing choices, including affordable housing
    - Provide transit improvements to help realize city and regional development plans
    - Attract investment along the length of the corridor, concentrated at key nodes
    - Support both small businesses and regional employers by providing better transit options for their customers and employees
    - Minimize construction impacts to businesses, residents and other corridor users
4. Develop a cost-effective transitway that is well-positioned for implementation
    - Develop a transitway operating plan that is well-coordinated with existing service in the corridor
    - Advance transitway alternatives that are financially feasible and minimize new operating resource requirements
    - Provide a transitway with broad support from the community, businesses and policymakers
5. Build upon the vibrancy and diversity of the corridor by supporting healthy, active communities and the environment
    - Ensure safe and direct connections between transit and other multimodal transportation choices such as walking and biking
    - Maintain parkland, trails and green space in the corridor
    - Promote air quality benefits and minimize noise and vibration impacts
    - Recognize impacts to cultural and historic resources
    - Balance impacts to existing traffic operations and curbside uses
    - Enhance safety through increased visibility and activity in the corridor

Evaluation Measures

Based on the project's goals and objectives, specific evaluation measures have been identified to quantitatively/qualitatively evaluate alternatives. At this time in the analysis, it is assumed that the defined project goals will not be weighted.

A list of the evaluation measures and a detailed description of the qualitative and quantitative information associated with each measure is shown in Table 1.

Table 1: Evaluation Measures

Goal 1: Increase transit use among the growing number of corridor residents, employees, and visitors	
Evaluation Measure	Description
1. Daily project linked trips	The total number of daily linked trips made on the project in Year 2030
Goal 2: Improve mobility and access to jobs and activities	
Evaluation Measure	Description
2. Number of transit reliant riders	The total number of daily linked trips made on the transitway by zero car households in Year 2030
3. Travel time savings	The estimated time saved by a transit rider traveling from one end of an alternative to the other when compared to the end-to-end No-Build alternative travel time estimate
Goal 3: Catalyze and support housing and economic development along the corridor	
Evaluation Measure	Description
4. Development Potential	The estimated development potential of developable acres identified
5. Existing TOD policies	The existence of documented TOD policies from local or regional plans that affect areas within ½ mile of station locations
6. Station area population densities (2010)	The population density (year 2010) within ½ mile alternative station locations
7. Corridor employment (2010)	The number of jobs (year 2010) within ½ mile of station locations
8. Level of affordable housing	The proportion of affordable housing units compared to the proportion of affordable housing units in Hennepin County
9. Affordable housing policies	The existence of documented affordable housing policies that affect areas within ½ mile of station locations

Goal 4: Catalyze and support housing and economic development along the corridor	
Evaluation Measure	Description
10. Capital costs ($2013)	The total one-time cost (year 2013) to construct an alternative (guideway, stations, structures, right of way, engineering/design, administration and contingencies)
11. Operating and maintenance costs ($2012)	The ongoing annual cost to operate and maintain an alternative compared to the No-Build Alternative
12. Annualized capital plus operating costs per trip	The alternative's total annualized capital costs plus the alternative's annualized operating and maintenance costs divided by the total annual forecasted trips
13. Passengers per revenue hour	The number of annual linked trips on the project (Year 2030) divided by the annual hours of service
14. Subsidy per passenger	The estimated amount of per-trip operating and maintenance costs not covered by the estimated per trip transit fare

Goal 5: Support healthy, active communities and the environment	
Evaluation Measure	Description
15. Potential impacts to historic and cultural resources	Each alternative's relative potential to impact Section 4(f) and Section 106 historic and cultural resources
16. Potential impacts to parklands	Each alternative's relative potential to impact parklands within 100 feet of the center line of the proposed alternative
17. Potential impacts of noise and vibration	The number of potentially sensitive land uses (as defined by the FTA) within 100 feet of the center of the proposed alternative which could potentially be affected by noise and vibration
18. Potential right of way impacts	The estimated additional acres of right-of-way (beyond land already dedicated to a transportation purpose) required for each alternative
19. Potential traffic impacts	The alternative's anticipated impact to the local street network (e.g. intersections adversely impacted by alternative)
20. Potential pedestrian and bicycle impacts	The alternative's anticipated impact to the surrounding pedestrian and bicycle networks
21. Daily reduction in automobile vehicle miles traveled (VMT)	The reduction in VMT due to people choosing to ride a proposed alternative instead of driving

Enhanced Bus Extension

The enhanced bus extension extends the enhanced bus alignment past the Lake Street LRT station and connects with the METRO Green Line in St. Paul. The longer alignment was included in the study in response to stakeholder feedback. As shown in Table 2, only some of the evaluation measures were analyzed for the extension; therefore, the extension is not included in this evaluation process. Instead the benefits and impacts of the extension are discussed in the final report (under separate cover).

Table 2: Enhanced Bus Potential Extension Evaluation Measures

	Evaluation Measures	Measure Analyzed for Enhanced Bus Potential Extension
GOAL 1	1. Daily project linked trips	✓
GOAL 2	2. Number of transit reliant riders	
	3. Travel time savings	✓
GOAL 3	4. Development potential	
	5. Existing TOD policies	
	6. Station area population densities (2010)	✓
	7. Corridor employment (2010)	✓
	8. Level of affordable housing	✓
	9. Affordable housing policies	
GOAL 4	10. Capital costs ($2013)	✓
	11. Operating and maintenance costs ($2012)	✓
	12. Annualized capital plus operating costs per trip	✓
	13. Passengers per revenue hour	✓
	14. Subsidy per passenger	✓
GOAL 5	15. Potential impacts to historic and cultural resources	
	16. Potential impacts to parklands	
	17. Potential impacts of noise and vibration	
	18. Potential right of way impacts	✓
	19. Potential traffic impacts	
	20. Potential pedestrian and bicycle impacts	
	21. Daily reduction in automobile vehicle miles traveled (VMT)	✓

Scoring the Results

The results of each evaluation measure were comparatively scored on a three point scale by alternative (i.e. a total maximum score of three points per evaluation measure). The five project goals were weighted equally in the overall score for each alternative, as depicted in Table 4. The scores for each alternative by goal, and the total score, are shown in Table 3. The scores by evaluation measure are shown in Table 4. Please see Appendix A for a more detailed discussion of the scoring methodology as well as the quantitative and qualitative data associated with each evaluation measure.

Figure 1: Evaluation Measuring Scoring Breakdown

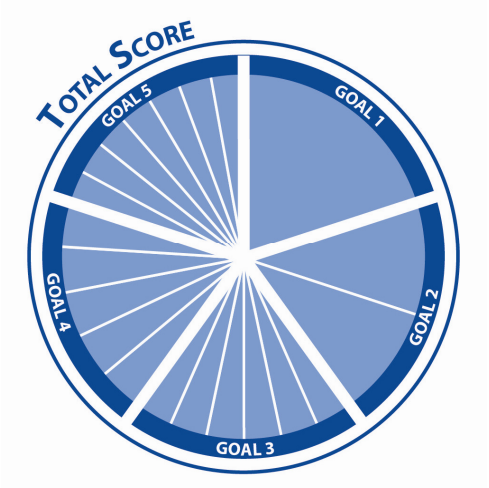

Table 3: Alternative Evaluation Scores by Goal

Goals		Enhanced Bus	Rail in the Greenway	Dual Alternative
Goal 1	Increase transit use among the growing number of corridor residents, employees, and visitors	◐	◐	●
Goal 2	Improve mobility and access to jobs and activities	●	●	●
Goal 3	Catalyze and support housing and economic development along the corridor	◐	●	●
Goal 4	Develop a cost-effective transitway that is well-positioned for implementation	◐	●	◐
Goal 5	Build upon the vibrancy and diversity of the corridor by supporting healthy, active communities and the environment	●	◐	◐
TOTAL		◐	◐	●

KEY TO SYMBOLS

● Strongly supports goal (3 points) ◐ Supports goal (2 points) ○ Does not support goal (1 point)

Table 4: Alternative Scores by Evaluation Measure

	Enhanced Bus	Rail in the Greenway	Dual Alternative
Goal 1: Increase transit use among the growing number of corridor residents, employees, and visitors			
1. Project Daily Linked Trips	◑	◑	●
Goal 1 sub total	◑	◑	●
Goal 2: Improve corridor equity with better mobility and access to jobs and activities			
2. Number of transit reliant riders	◑	◑	●
3. Travel time savings	○	●	●
Goal 2 sub total	◑	●	●
Goal 3: Catalyze and support housing and economic development along the corridor			
4. Development Potential	◑	●	●
5. Existing TOD policies	●	●	●
6. Station area population densities (2010)	●	●	●
7. Corridor employment (2010)	◑	◑	●
8. Proportion of Affordable housing rating	●	●	●
9. Affordable housing policies	●	●	●
Goal 3 sub total	◑	●	●
Goal 4: Develop a cost-effective transitway that is well-positioned for implementation			
10. Capital costs (2013)	●	○	○
11. Net Operating and maintenance costs (2013)	●	◑	○
12. Annualized capital plus operating costs per trip	●	○	◑
13. Passengers per revenue hour	○	●	◑
14. Subsidy per passenger	◑	○	◑
Goal 4 sub total	●	◑	◑
Goal 5: Build upon the vibrancy and diversity of the corridor by supporting healthy, active communities and the environment			
15. Potential impacts to historic and cultural resources	●	○	○
16. Potential impacts to parklands	●	●	●
17. Potential impacts of noise and vibration	◑	◑	○
18. Potential right of way impacts	●	○	○
19. Potential traffic impacts	●	●	●
20. Pedestrian and bicycle impacts	●	◑	◑
21. Reduction in vehicle miles traveled (VMT)	○	●	●
Goal 5 sub total	●	◑	◑
TOTAL	◑	◑	●

Appendix

Scoring Methodology

The results of each evaluation measure were comparatively scored on a three point scale by alternative. Quantitative results were scored using the following process:

- The alternative with the highest quantitative result was given a score of three.
    - Example: For the daily corridor linked trips measure, the dual alternative is estimated to provide 18,000 trips, the largest amount for all three alternatives. This alternative scored a three.
- The best score was then divided into thirds to determine the thresholds for scoring the remaining alternatives.
    - Example: 18,000 =3 points
        - 12,000 = 2 points
        - 6,000 = 1 point
- The results of the remaining alternatives were compared to the thresholds. Scores were assigned based on the comparison that yielded the lowest absolute value.
    - Example: The enhanced bus alternative is estimated to provide 11,000 trips.
        - |18,000 – 11,000| = 7,000
        - |12,000 – 11,000| = 1,000 (lowest absolute value)
        - |6,000 – 11,000| = 5,000
        - 1,000 is the lowest absolute value, therefore the enhanced bus alternative scored two points for this evaluation measure.

For evaluation measures where a high quantitative result resulted in a negative outcome, the same scoring process was used; however the highest quantitative result was given a score of one. For example, in measure seventeen (potential impacts of noise and vibration), the dual alternative has the potential to negatively impact 1,440 parcels, the highest number of potential impacts for all three alternatives. This resulted in the following scoring thresholds:

- 1,440 parcels = 1 point
- 960 parcels = 2 points
- 480 parcels = 3 points

Evaluation measures with qualitative results were scored by assessing the relative difference between the qualitative ratings. For example, potential impacts to cultural and historic resources for the three alternatives ranged from ‘high potential’ to ‘medium potential’. Alternative with high potential impacts received one point and alternatives with ‘medium’ impacts received two points.

Lastly, for evaluation measures where all three alternatives produced exactly the same quantitative or qualitative results all alternatives received a score of three.

Corridor Population and Employment

This report documents the sources and methodologies used to estimate population and employment levels in the Midtown Corridor.

Station Area Population Density (Evaluation Measure #6)

The station area population density (evaluation measure #6) for each alternative was defined as the population within ½ mile of alternative station locations. A half-mile buffer was placed around each alternative's station locations to define the 'station area.' Overlapping buffers were collapsed into one overall 'station area' per alternative.

To find the amount of land in each station area, the combined areas of any lakes, ponds, parks and major roadways within the station area were subtracted and the remaining land area (in square miles) was calculated for each alternative. Population levels were estimated using US 2010 Census data at the block level. The population densities for each alternative are shown in Table 5.

Corridor Employment (Evaluation Measure #7)

Corridor employment was defined as the number of jobs within ½ mile of alternative station locations. The same methodology described in the previous section was used to define the station area. The number of jobs within each area was estimated using 2010 Quarterly Census of Employment and Wages (QCEW) data. The results by alternative are shown in Table 5.

Table 5: Station Area Population Density

	Enhanced Bus on Lake Street	Single/Double-Track Rail in the Greenway	Dual Alternative	Dual Alternative + Extension
Station area population densities (2010)	14,100 persons per sq. mile	14,600 persons per sq. mile	14,400 persons per sq. mile	12,200 persons per sq. mile
Corridor employment (2010)	27,000	29,000	34,000	45,000

Evaluation Measures	Enhanced Bus on Lake Street	Single/Double-Track Rail in the Greenway	Dual Alternative	Dual Alternative + Extension
Goal 1: Increase transit use among the growing number of corridor residents, employees, and visitors				
1. Daily project linked trips 2030 Forecast	11,000	11,000	18,000	26,000
Goal 2: Improve corridor equity with better mobility and access to jobs and activities				
2. Number of transit reliant riders 2030 Forecast	8,100	6,200	12,400	-
3. Travel time savings	12 minutes	29 minutes	11 min (E. Bus)/ 29 min (rail)	19 min (E. Bus)/ 29 min (rail)
Goal 3: Catalyze and support housing and economic development along the corridor				
4. Development Potential	$201-390	$239-464	$352-464	-
5. Existing TOD policies	Same	Same	Same	-
6. Station area population densities (2010)	14,100 persons per sq. mile	14,600 persons per sq. mile	14,400 persons per sq. mile	12,200 persons per sq. mile
7. Corridor employment (2010)	27,000	29,000	34,000	45,000
8. Proportion of affordable housing units compared to proportion of affordable units in Hennepin County (and FTA MAP-21 rating)	1.6 (Medium)	1.7 (Medium)	1.6 (Medium)	n/a
9. Affordable housing policies	Same	Same	Same	n/a
Goal 4: Develop a cost-effective transitway that is well positioned for implementation				
10. Capital costs ($2013)	$47 million	$185 million – $220 million	$213 million – $249 million	$232 million - $268 million
11. Net operating and maintenance costs ($2012)	$6,834,000	$8,333,000	$14,779,000	$15,037,000
12. Annualized capital plus operating costs per trip (Assuming double ballasted track)	$2.74	$4.39	$3.51	$2.94
13. Passengers per revenue hour	55	142	104	104
14. Subsidy per passenger	$1.05	$1.27	$1.10	$0.87
Goal 5: Build upon the vibrancy and diversity of the corridor by supporting healthy, active communities and the environment				
15. Potential impacts to historic and cultural resources (Section 4(f) and Section 106 historic and cultural resources)	Medium potential for impacts	High potential for impacts	High potential for impacts	-
16. Potential impacts to parklands (Section 4(f) parklands)	Low potential for impacts	Low potential for impacts	Low potential for impacts	-
17. Potential impacts of noise and vibration Category 1: Hospitals, recording studios, etc. Category 2: Places where people sleep	8 Category 1 892 Category 2	6 Category 1 848 Category 2	10 Category 1 1,430 Category 2	-
18. Potential right of way impacts	None	3.5 acres	3.5 acres	3.5 acres
19. Potential traffic impacts Traffic flow impacts Loss of parking spaces	Minor impacts 26 parking spaces	Minor impacts None	Minor impacts 26 parking spaces	-
20. Potential Pedestrian and bicycle impacts Pedestrian impacts Bicycle impacts	None None	None Minor impacts	None Minor impacts	- -
21. Daily reduction in vehicle miles traveled (VMT)	1,400	11,200	11,800	18,500

Annualized capital plus operating costs per trip
(assuming double ballasted track)

	No Build	Rail Alternative	Enhanced Bus Alternative	Dual Alternative (Minnehaha)	Dual Alignment Alternative (Full)
Total Annualized Capital Costs (2013)	$0	$7,759,300	$3,192,657	$9,449,819	$10,678,956
Total Annual O&M Costs (2012)	$2,861,100	$8,333,400	$6,833,700	$11,582,000	$14,779,300
Total Annual O&M Costs (2013)	$2,910,971	$8,478,658	$6,952,817	$11,783,883	$15,036,915
Capital+O&M	$2,910,971	$16,237,958	$10,145,474	$21,233,702	$25,715,871
Forecasted Daily Ridership	9,600	11,000	11,000	18,000	26,000
Forecasted Annual Ridership (2030)	3,225,600	3,696,000	3,696,000	6,048,000	8,736,000
Annualized Capital+O&M per Trip	$0.90	$4.39	$2.74	$3.51	$2.94

CPI -2013 (1 year) inflation rate 1.74%

Subsidy per passenger

	Metro Transit		
	Bus	**Light Rail**	**Bus + Light Rail**
Total unlinked trips:	63,782,602	10,400,864	74,183,466
Annual passenger fare revenue:	$77,110,143	$10,138,583	$87,248,726
Average Fare:	$0.83	$1.03	$0.85

	No Build	**Single/Double Track Rail Alternative**	**Enhanced Bus Alternative**	**Dual Alternative (Minnehaha)**	**Dual Alignment Alternative (Full)**
Total Annual O&M Costs (2013 $)	$ 2,910,971	$ 8,478,658	$ 6,952,817	$ 11,783,883	$ 15,036,915
Forecasted Daily Ridership (2030)	9,600	11,000	11,000	18,000	26,000
Forecasted Annual Ridership (2030)	3,225,600	3,696,000	3,696,000	6,048,000	8,736,000
Per Trip O&M Costs (2013 $)	$0.08	$1.27	$1.05	$1.10	$0.87

Metro Transit Data Source:

2011 NTD Transit Profiles

http://www.ntdprogram.gov/ntdprogram/pubs/profiles/2011/agency_profiles/5027.pdf

Passengers per revenue hour

	No Build	Rail Alternative	Enhanced Bus Alternative	Dual Alternative (Minnehaha)	Dual Alignment Alternative (Full)
Forecasted Daily Ridership (2030)	9,300	11,000	11,000	18,000	26,000
Forecasted Annual Ridership (2030):	3,124,800	3,696,000	3,696,000	6,048,000	8,736,000
Annual Revenue Hours:	32,955	25,979	66,795	58,058	83,643
Passengers per In-Service Hour:	**94.82**	**142.27**	**55.33**	**104.17**	**104.44**