



GATEWAY CORRIDOR
Alternatives Analysis

Technical Memorandum:
**Optimization of Alternatives,
Methodology & Results**

Prepared for:
Washington County
Regional Railroad Authority
on behalf of the
Gateway Corridor Commission



October 2012

Submitted by

CH2MHILL

Contents

Executive Summary	ES-1
1. Introduction	1
2. Optimization: Ridership	1
2.1 Phase 1: Sketch Planning	1
2.2 Phase 2: Full Ridership Forecasting Model Run Results	4
2.2.1 BRT Constant	4
2.2.2 Alternative Optimization Results.....	8
3. Optimization: Cost	10
3.1 Estimated Capital Costs	10
3.1.1 Operating and Maintenance Costs	11
4. Optimization: Tiered Goals and Weighting	11
4.1 Criteria Used for Optimized Alternative Evaluation	12
4.1.1 Goal 1: Improve Mobility; Objectives:	12
4.1.2 Goal 2: Provide a Cost-Effective, Economically Viable Transit Option....	13
4.1.3 Goal 3: Supports Economic Development.....	14
4.1.4 Goal 4: Protect the Natural Environmental Features of the Corridor	15
4.1.5 Goal 5: Preserve and Protect Individual Community Quality of Life	15
4.1.6 Goal 6: Safety	16
5. Evaluation Results	16
5.1 Gateway Corridor Commission Recommendation	17
6. Consideration of New Federal Transportation Law	20

Executive Summary

This technical methodology report describes the process used to optimize the performance of alternatives which took place during the final phase of the Gateway Corridor Alternatives Analysis (AA). Every effort was made to maintain equivalency in the extent of infrastructure and service modifications to the optimized alternatives, while keeping alternatives basically as described and evaluated throughout the AA process. In spring 2012, the Technical and Policy Advisory Committees ranked the Gateway alternatives in terms of their ability to meet the six project goals:

- Goal 1: Improve Mobility
- Goal 2: Provide a Cost-Effective, Economically Viable Transit Option
- Goal 3: Support Economic Development
- Goal 4: Protect the Natural Environmental Features of the Corridor
- Goal 5: Preserve and Protect Individual Community Quality of Life
- Goal 6: Improve Safety

Following that evaluation, Alternative 7, Commuter Rail, was dismissed as least able to meet the project goals. Remaining alternatives were then optimized to improve performance. Optimization included service changes and modifications to facilities, all consistent with project goals. At the conclusion of the optimization process, the Policy Advisory Committee ranked the alternatives as indicated in Table 1.

TABLE 1
Policy Advisory Committee Rankings

Alternative	Ranking
3—BRT along Hudson Rd/I-94; OPTIMIZED	High
5—LRT along Hudson Rd/ I-94; OPTIMIZED	Medium
8—BRT Managed Lane; OPTIMIZED	Medium
2—TSM; OPTIMIZED	Low
4—BRT along E 7th/ White Bear Ave/ Hudson Rd	Low
6—LRT along E 7th/ White Bear Ave/ Hudson Rd	Low

The results of the optimization process are also described in the AA Final Report. Optimization results led to the Gateway Corridor Commission action to seek public comment on the draft recommendation to advance optimized Alternatives 3 bus rapid transit (BRT) and 5 light rail transit (LRT) into the next phase of project development under the National Environmental Policy Act (NEPA).

1. Introduction

After the initial detailed evaluation of Gateway transit alternatives was complete in April 2012, the Gateway TAC, PAC, and Corridor Commission elected to “optimize” alternatives with the aim of increasing ridership and other benefits and reduce project costs and impacts on the remaining build alternatives.

Several aspects of alternatives were investigated for consideration to improve their performance. These include:

- Refining the factors which affect projected ridership in the regional travel demand model, to increase transit ridership.
- Reducing the length of infrastructure to more closely align with locations of projected ridership demand, to reduce capital cost.
- Reducing the extent and frequency of transit service to more closely align with projected ridership demand, to reduce operating and maintenance cost.
- Reducing the amount of right-of-way (space) required by the transitway alternatives operating within local streets, to reduce impacts.
- Refining station elements such as needed platform length and number of park and ride spaces needed to accommodate projected ridership, to reduce capital costs.
- Evaluating qualifications for transit funding under the new transportation law, Moving Ahead for Progress in the 21st Century (MAP-21), to maintain qualifications for Federal Transit Administration (FTA) capital investment funding.

This exercise is referred to throughout this document as optimization. This technical report describes the technical methodology undertaken to identify factors relevant to the effort, the results from applying those factors, and the final evaluation of optimized alternatives against project goals.

2. Optimization: Ridership

2.1 Phase 1: Sketch Planning

The optimization process was conducted in two phases. In the initial sketch planning phase, factors which had potential to improve benefits while reducing cost were identified and put through a sketch-planning process.

The factors considered included:

- Adding a BRT Constant to the regional travel demand model—This factor represents credit given in the ridership model to account for the benefits of fixed guideway service comparable to LRT, such as a superior rider experience in terms of reliability, speed, and amenities. BRT constants are addressed in more detail in section 2.1.1 of this technical memorandum.
- Reducing Off-Peak Service—decreasing the frequency of off-peak service when ridership is lower to reduce operating costs.
- Adjusting Dwell Time—reducing dwell time at stations to that needed to accommodate lighter ridership loads results in lower overall trip travel times and increased ridership.

- Refining Travel Time to the 1/10th Minute—Presenting refined travel times better represents actual travel time results.
- Adding BRT Bypass Lanes—Bypass lanes were added at BRT stations to allow express bus service to use the guideway along with the station-to-station BRT service.
- Realigning Alternatives 3 and 5 east of I-694—this factor allowed for analysis of the benefits of shifting Alternatives 3 and 5 out of the freeway median east of I-694. The new alignment replicates Alternatives 4 and 6 though Oakdale and Woodbury.
- Identifying a Minimum Operating Segment—this factor addressed the effects of shortening the BRT and LRT fixed guideways from Manning Avenue to Radio Drive.
- Adding Landfall Station—this was applied to Alternatives 3 and 5 to increase transit accessibility.
- Relocating stations—For alternative 8, the White Bear and McKnight Stations were relocated to serve Sun Ray Shopping Center and 3M. This was tested in the full model runs as the sketch-plan model was not able to adequately address this change.

The goal of the sketch-planning process was to eliminate the factors that would have a negative impact on cost or ridership before full travel demand model runs were conducted. The results of the sketch-planning phase are summarized in Table 2.

TABLE 2
Summary of Factors Evaluated in Sketch-Planning Phase of Optimization Process

Factor	Alts.	Ridership Impact	Associated Cost	Other Considerations	Incorporate into Full Model Runs
BRT Constant	3, 4 & 8	Moderate to high increase	None	Constant not proven	Incorporate
Reduce Off-Peak Service	All	Small decrease	High decrease in O&M costs	May reduce service attractiveness	Incorporate
Adjust Dwell Time	All	Small increase	None	None	Incorporate
Revise Travel Time to 1/10th minute	All	Small increase	None	None	Incorporate
BRT Bypass Lanes	3	Moderate to high increase	Small increase to cap. costs; min. O&M cost reduction	Additional ROW needed	Incorporate
BRT Bypass Lanes	4	Small increase		Additional ROW needed	Do not Incorporate— increase in cost with small increase in ridership
Re-align Alts. 3 & 5 east of I-694	3 & 5	Moderate decrease	Small cap. cost decrease; min. O&M cost increase	Increased service attractiveness, economic development potential	TBD – consultation with affected community recommended

TABLE 2
Summary of Factors Evaluated in Sketch-Planning Phase of Optimization Process

Factor	Alts.	Ridership Impact	Associated Cost	Other Considerations	Incorporate into Full Model Runs
Shorten Minimal Operating Segment (MOS) to Radio Dr.	3-6	Large decrease	Moderate cap. cost decrease; min. O&M cost decrease	Ridership loss partially offset by shift to other corridor express service, attractiveness of service decreased	Do not incorporate—large decrease in signature route ridership
Add Landfall Station	3 & 5	Moderate to high increase	Moderate increase in Capital Cost	Adding a station results in a 1-2 min additional delay to run times	Incorporate

Given the results of the sketch planning process, as presented in Table 2, the Technical and Policy Advisory Committees approved the optimization factors identified in Table 3 to be carried forward for more detailed assessment in Phase 2 – full travel demand model runs. Alternatives 3, 5, and 8 were identified as most promising and underwent full model runs.

TABLE 3
Optimization Factors to Incorporate into Phase 2 (Full Model Runs) – Alternatives 3, 5, & 8

Optimization Factor	Alt 3 (BRT along Hudson Rd / I-94)	Alt 5 (LRT along Hudson Rd / I-94)	Alt 8 (BRT Managed Lane)
Reduce Off-Peak Service	X	X	X
Adjust Dwell Time	X	X	X
Travel Time Refinement	X	X	X
Remove W-100	X	X	X
BRT Constant	X		X
BRT Bypass Lanes	X		
Realign East of 494 / 694	X	X	
Add Landfall Station	X	X	
Shorten MOS to Manning			X
Shift WBA & McKnight Stations			X

The advisory committees had also discussed the possibility of adding a station at Radio Drive to Alternatives 3 and 5, similar to Alternatives 4 and 6. This option was reviewed in the sketch planning effort. However, it was determined that because Alternatives 3 and 5 also included stations at the Crossroads/Oaks Business Park and at Woodbury Drive/Keats Avenue, the addition of another nearby station at Radio drive would have minimal benefit to ridership, while

increasing capital costs. As a result, the TAC and PAC recommended, and the Gateway Corridor Commission directed, that adding a station at Radio Drive in Alternatives 3 and 5 be evaluated in the next study phase, the Draft Environmental Impact Statement.

Early consideration was given to further optimizing Alternative 8, BRT Managed Lane by shortening it to Century Avenue in St. Paul, and by shifting stations to locations outside the I-94 freeway median. The terminus of Alternative 8 infrastructure was shortened during optimization, from its original terminus at Highway 95 in Lakeland to Manning Avenue in Woodbury, to capture the east suburban ridership and to maintain consistency with the other build alternatives. The location of stations in the freeway median was maintained, however, to maximize the travel time advantages of this alternative – one of its most significant benefits. Under less constricted comparisons than those followed in the Gateway AA, in future studies a managed lane alternative could be additionally optimized by further reduction in infrastructure length and by relocating stations to non-freeway-median locations.

2.2 Phase 2: Full Ridership Forecasting Model Run Results

The second phase of the optimization process incorporated the factors estimated to be effective in Phase 1 into full model runs for Alternatives 3, 5, and 8. All build alternatives were updated based on the model results. Because of the extensive changes to Alternative 2 which resulted from removing Route W-100 and reducing the frequency of off-peak service – major elements of the alternative - Alternative 2 was also fully re-modeled. Demand for Alternatives 4 and 6 were estimated at an aggregate level based on the results of the other full model tests.

2.2.1 BRT Constant

One of the optimization factors carried forward into the Phase 2 model runs is implementing a BRT constant, which is a factor within the travel demand model that credits a transit mode (e.g., LRT or BRT) for providing a superior rider experience (in terms of reliability, and other amenities that are otherwise not quantifiable within the model). The Twin Cities has an operating LRT line, and the regional model includes a mode-specific constant (factor) for LRT. The Twin Cities does not yet have an operating BRT line, and thus the default regional model does not include a mode-specific constant for BRT.

2.2.1.1 Background: FTA Guidance

The FTA's proposed new guidelines for calculating and reporting user benefits associated with characteristics of a transit line not included in a travel demand model.¹ Modeled attributes include travel time, frequency and wait time, and fares and parking costs. Service attributes not part of travel demand models include “*its visibility, reliability, span of service hours, comfort, protection from the weather, the chances of finding a seat, and passenger amenities.*” These are called “non-included attributes”. They are theoretically part of the mode-specific constant for existing transit modes being modeled. New modes are required by the FTA to use a mode-specific constant of 0, but are now allowed to take credit for any non-included attributes by using a post-processing procedure that applies user benefits (time savings) to certain riders of the proposed transit line – as has been done in the Gateway BRT alternative optimization. Those user benefits are determined by the type and nature of the attributes of the new mode. The FTA proposes to credit projects that introduce a transit mode to an urban area with additional transportation benefits, the magnitude of which will depend on the characteristics of the proposed project and the number of transit trips predicted to use the project. The additional benefits will occur in three forms: (1) a relatively large positive constant for trips using the project via park & ride access and no dependence on local buses; (2) a smaller positive

¹ Source: FTA *Proposed Guidance on New Start / Small Starts Policies and Procedures*, 2007

constant for all other trips on the project; and (3) a less onerous weight applied to the time spent riding on the new facility compared to the weight applied to time on all other modes.

The FTA will determine the values of the constants and travel-time weight based on three types of project characteristics that are not recognized in current methods for ridership forecasting:

Guideway-like Characteristics

- Reliability of vehicle arrival – the extent that the transit right-of-way is exclusive; if not grade-separated, the extent of traffic signal priority or pre-emption
- Branding/visibility/learnability – the extent that stations, vehicles, and right-of-way are distinctive, and the system is easy to use
- Schedule-free service – the extent to which service headways are less than 10 minutes in the peak period and less than 15 minutes during the off-peak

Span of Good Service

- Hours of frequent service – the extent to which weekday service extends beyond the peak period with headways that are less than 30 minutes

Passenger Amenities

- Stations/stops – the extent to which stations have passenger amenities that relate to safety and security features, protection from weather, retail activities, comfort, and other features valued by users
- Dynamic schedule information – the provision of real time information on vehicle arrivals at stations
- Vehicle amenities – factors such as comfort and the probability of getting a seat.

The specific values assigned to a project will depend on the specific characteristics of the project. For example, a project running at grade through intersections without traffic signal priority or pre-emption would have a significantly lower value for reliability compared to a project in a tunnel, on an aerial structure, or on other dedicated right-of-way for which travel is uninterrupted by cross traffic².

2.2.1.2 Gateway BRT Non-included Attributes

The Gateway BRT alternatives are designed to have virtually the same characteristics and amenities as the LRT alternatives, with the only difference being the vehicle and guideway employed. Two BRT constant values were considered as an optimization factor: 6 minutes, and 9 minutes. Though justified, no discount of in-vehicle time was included in the forecasts for BRT. These values are consistent with BRT constants which have been applied to other BRT projects that have been developed around the country. By comparison, LRT systems typically receive at most a 12 minute constant credit, and this value has been used for LRT in the regional model, as calibrated to existing conditions.

The following paragraphs address the proposed values of non-included BRT attributes for use in the mode choice model. Each attribute is compared to FTA guidance with respect to the kinds of features considered, and the associated maximum allowable values. Separate ranges of values are allowed for direct and single BRT use versus local bus access or egress to BRT lines. Non-

² FTA 2007 Proposed Guidance on New Start / Small Starts Policies and Procedures

included attributes for the I-94 Gateway BRT are shown in **Error! Reference source not found.** and described below.

TABLE 4
Gateway Bus Rapid Transit Attributes not Included in Full Model Runs?

Non-included attribute	BRT Only	BRT + local
Guideway-like characteristics	5.0	3.0
- reliability of vehicle arrival	3.0	2.0
- branding/visibility/learnability	1.5	1.0
- schedule-free service	0.5	0.0
Span of good service	1.0	0.0
Passenger amenities	3.0	3.0
- stations/stops	2.0	2.0
- dynamic schedule information	1.0	1.0
TOTAL	9.0	6.0
IVT coefficient	0.95*Civt	0.95*Civt
- ride quality		
- vehicle amenities		
- reliability of travel time		
- availability of seat		

Guideway-like Characteristics

- Reliability of vehicle arrival (3.0 of 4.0 minutes for trips using park & ride or walk access with no dependence on local bus, and 2.0 of 2.0 minutes for all other trips using the proposed project): Schedule adherence will be better than local bus due to use of a guideway and consequently the avoidance of in-street congestion delays. The Gateway BRT alternative includes exclusive guideway for most of the corridor, allowing higher speeds and little delay from at-grade crossings, which will utilize signal prioritization and gate-arms in suburban areas. Lower reliability is apparent for trips using local bus access, since local buses use local streets, and transfers will introduce some additional variable delay.
- Branding/visibility/learnability (1.5 of 2.0 minutes, 1.0 of 1.0 minutes for local bus access): Gateway BRT will be very visible with much of the guideway at-grade, adjacent to arterials and freeways. The vehicles will be new, low-floor, attractive 40 or 60-ft articulated buses. While stations will be generally easy to find and to use, some stations will require passengers to cross streets, requiring separate access paths.
- Schedule-free service (0.5 of 2.0 minutes, 0.0 of 0.0 minutes for local bus access): Gateway BRT will operate at 10 minutes in the peak period and 30 minutes during the off-peak, providing service equal to the peak threshold of 10 minutes but longer than the current off-peak threshold of 15 minutes.

Span of Good Service

- Hours of frequent service (*1.0 of 3.0 minutes, 0.0 of 0.0 minutes for local bus access*): Gateway BRT is expected to match the span of service of Metro Transit's regular mainline bus service, with 18 hours of service Sunday through Saturday. During off-peak hours, however, buses will operate at a frequency of 30 minutes, below the current off-peak threshold of 15 minutes. Feeder service will operate during peak periods only, at 30 minute headways.

Passenger Amenities

- Stations/stops (*2.0 of 3.0 minutes, 2.0 of 2.0 minutes for local bus access*): All stations will have canopies for shelter and platforms for level boarding. Stations will also have adequate lighting and security monitoring, similar to Hiawatha LRT stations.
- Dynamic schedule information (*1.0 of 1.0 minute, 1.0 of 1.0 minute for local bus access*): All stations will have real-time bus arrival information displayed at the stations, similar to Hiawatha LRT stations and the downtown Minneapolis bus transit corridors.
- Vehicle amenities (a 0.95 discount over a minimum of 0.85 on the weight applied to time spent on the transit vehicle): Gateway vehicles will have attractive interiors, and rider amenities common to BRT buses. Vehicles matched to anticipated demand will assure passengers of a seat.

The Gateway project team believes that together, the non-included attributes for the Gateway BRT total 9.0 minutes of savings out of a possible 12 minutes for Premium Only service, and 6.0 minutes of a possible 6.0 minutes for Premium plus Local Bus service. The resulting range of ridership projections provides a reasonable approach, until a decision on applying a BRT constant can be determined based on future discussions with FTA staff.

For comparison, Table 5 below presents an assessment of the non-included attributes of other fixed-guideway transit corridors around the country, an exercise undertaken previously by national experts in consultation with FTA staff. Gateway BRT characteristics are most comparable to many of the characteristics of the Kansas City and Houston BRT systems.

TABLE 5
BRT Constant Review—Other US Systems

Un-included attribute	Premium only - Maximum	Premium + local - Maximum	Portland	Kansas City BRT	VA Railway Express	NY/CTA	BART	DC Metro	Street car	OmniRide Manassas	Houston Busway
Guideway-like characteristics	8.0	3.0	7.0	2.0	4.0	7.0	7.5	7.5	2.0	0.0	6.5
-reliability of vehicle arrival	4.0	2.0	3.5	0.0	2.0	4.0	4.0	4.0	0.0	0.0	3.0
-branding/visibility/learnability	2.0	1.0	2.0	1.0	2.0	1.0	2.0	2.0	2.0	0.0	1.5
-schedule-free service	2.0	0.0	1.5	1.0	0.0	2.0	1.5	1.5	0.0	0.0	2.0
Span of good service	3.0	0.0	3.0	1.0	0.0	3.0	3.0	3.0	2.0	0.0	1.5
Passenger amenities	4.0	3.0	2.5	2.0	3.0	1.5	4.0	4.0	1.0	0.0	1.0
- stations/stops	3.0	2.0	1.5	1.0	2.0	1.5	3.0	3.0	0.0	0.0	1.0
-dynamic schedule information	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	0.0	0.0
TOTAL	15.0	6.0	12.5	5.0	7.0	11.5	14.5	14.5	5.0	0.0	9.0
TARGET	15.0	6.0									
IVT coefficient -ride quality -vehicle amenities -reliability of travel time -availability of seat	0.85*Civt		0.85	0.95	0.75	0.90	0.85	0.85	0.95	0.95	0.95

2.2.2 Alternative Optimization Results

The results from incorporating the recommended optimization factors (Table 2) are summarized in Table 6. For comparison, the table also includes previous results which are presented in parentheses. Table 4 indicates the generally beneficial effect of the optimization factors on ridership for key routes (LRT or BRT and express buses using the guideway) in the corridor for the alternatives modeled. For example, in comparison to the original ridership results, average daily ridership for Alternative 3 increased from 5,400 to 8,800 with a 6-minute BRT constant, and to 9,300 with a 9-minute BRT constant. As the test of a 9-minute BRT constant in Alternative 3 provides an assessment of the impact of a 9 versus 6 constant, repeating this test for Alternative 8 was not needed. Alternative 8 values assume a 6-minute equivalent BRT constant; the equivalent percentage increase under a 9 minute constant could be assumed.

The results from incorporating the recommended factors (Table 3) are summarized in Table 6. Table 6 indicates the generally beneficial effect of the optimization factors on ridership for key routes (LRT or BRT and express on guideway) in the corridor for the alternatives modeled. For example in comparison to the original ridership results, Alternative 3 average daily ridership increased from 5,400 to 8,800-9,300.

The values in parentheses identify the corresponding values prior to optimization, and include ridership from the W-100 routes for Alts 2,3,5 and 8 which are listed in the third row and were dropped for the optimization runs. The background bus totals include boardings on all routes that use the corridor, but exclude those routes included in the TSM emulator, the BRT or LRT, Feeder Routes and express ridership in the corridor. Route 395 emulates the BRT or LRT service for the TSM. The BRT/LRT ridership is the boardings for the LRT or BRT station-to-station service. Feeder routes are the set of routes that serve particular corridor stations, and are new over TSM to all LRT and BRT alternatives. The express loadings in the corridor are person-trips that are on express buses while they are using the corridor segments, whether or not they are on a guideway. If the value has an asterisk, it means that these express routes use the guideway itself. Finally, the last row contains the total guideway ridership by combining the station-to-station route ridership with the Express routes' ridership while using the corridor, where applicable.

TABLE 6
Route Boardings, Full Model Runs Including pre- and post-optimization results. (pre-optimization run results)

Alternative	Alt1	Alt2	Alt3-6min	Alt3-9min**	Alt5	Alt8
Background Bus	34,200 (34,000)	33,300 (33,600)	31,700 (33,000)	31,500 (33,000)	30,800 (31,200)	33,800 (33,700)
Route 395 (TSM Emulator)		3,000 (3,400)				
W-100 (Express from Eau Claire)	0 (0)	0 (1,000)	0 (1,000)	0 (1,000)	0 (1,100)	0 (1,200)
BRT/LRT			6,100 (5,400)	6,600 (5,400)	9,300 (9,200)	5,900 (4,700)
Feeder			1,700 (1,700)	1,700 (1,700)	2,300 (2,600)	1,900 (2,100)
Express Loads In Corridor	2,400 (2,400)	1,700 (1,800)	2,700* (1,400)	2,700* (1,400)	1,400 (1,400)	2,200* (2,200*)
Total Corridor	36,600 (36,300)	38,000 (39,800)	42,100 (42,500)	42,500 (42,500)	43,800 (45,500)	43,900 (43,800)
Diff From NB		1,400 (2,500)	5,500 (5,200)	5,900 (5,200)	7,200 (9,200)	7,300 (6,300)
Diff From TSM			4,100 (2,700)	4,500 (2,700)	5,800 (6,700)	5,900 (3,800)
LRT or BRT + Express On Guideway			8,800 (5,400)	9,300 (5,400)	9,300 (9,200)	8,100 (6,900)

*Express Trips on Guideway – These are persons actually using express buses while on the guideway.
(x,xxx) – values for pre-optimization full model runs.

** A 9-minute BRT constant was modeled to test the sensitivity of the results to a higher constant.

3. Optimization: Cost

3.1 Estimated Capital Costs

Overall, estimated capital costs decreased for all optimized alternatives. The facility modifications listed below influenced the revised cost estimates:

- **Shortening the length of infrastructure for Alternative 8.** The fixed guideway elements of all build alternatives now terminate at Manning Avenue in Woodbury.
- **Shifting the alignment of Alternatives 3 and 5.** These alternatives would no longer travel within the median of I-94 east of I-694, but would cross to the south side and travel at street-level in Woodbury.
- **Adding bypass lanes at BRT stations to Alternative 3.** Bypass lanes at stations permit express buses to use the BRT guideway, rather than travelling on I-94.
- **Adding a Landfall station to Alternatives 3 and 5.** This station provides significant walk-up access to the local community.
- **Shifting the Alternative 8 McKnight station to Ruth Street/Sun Ray and 3M locations.** By re-aligning the current White Bear Avenue station closer to Ruth Street and Sun Ray shopping center, and placing the former McKnight Road station directly in front of 3M instead, ridership increases for Alternative 8.
- **Reducing the number of vehicles required as a result of eliminating Route W-100 and reducing the frequency of off-peak service.** Under all alternatives, fewer light rail vehicles and fewer BRT vehicles, including spares, are required.
- **Reducing the number of stations required as a result of eliminating service to Eau Claire.** Park and ride stations originally proposed at Baldwin, Menomonee and Eau Claire would no longer be needed.
- **Revising park and ride facility sizing as a result of refined ridership projections at stations.** The original place-holder assumption of 300 vehicles per park and ride station was refined to reflect actual optimized ridership estimates at stations.
- **Shortening BRT station platform length to accommodate the BRT vehicle sizes assumed in regional BRT corridor planning.** Following discussions with Metro Transit service planning staff, platforms were shortened to 100-foot length from the original 120-foot length. LRT platform lengths did not change. Capital cost assumptions assume platform lengths constructed to accommodate two-car trains, with right-of-way preserved for eventual expansion to three-car trains.

The updated capital costs are presented in Table 7 below along with a comparison to the cost estimates developed for the originally defined alternatives. Revised capital costs for Alternatives 4 and 6 - which did not undergo full model runs during the optimization process - were estimated based on the percentage change for the optimized alternatives.

TABLE 7
Optimized Capital Costs (in millions)

Alternative	Alt1	Alt2	Alt3	Alt 4	Alt5	Alt 6	Alt 8
2019 (optimized)	\$0	\$27	\$404	\$468	\$922	\$1,1B	\$523
2019 (original)	\$0	\$62	\$417	\$490	\$979	\$1,3B	\$587

3.1.1 Operating and Maintenance Costs

Estimated operating and maintenance (O&M) costs decreased for optimized alternatives, primarily from the reduction in off-peak service from 15 minute to 30 minute frequency, and the elimination of Route W-100 to Eau Claire. Revised estimated operating and maintenance costs are presented in Table 8 along with a comparison to the cost estimates developed for the originally defined alternatives. Revised O&M costs for Alternatives 4 and 6 were estimated based on the percentage change for the optimized alternatives.

TABLE 8
Optimized Operating and Maintenance Costs above No Build (in millions)

Alternative	Alt1	Alt2	Alt3	Alt 4	Alt5	Alt 6	Alt 8
2030 (optimized)	\$0	\$11	\$20	\$22	\$21	\$26	\$18
2030 (original)	\$0	\$13	\$24	\$27	\$28	\$35	\$22

4. Optimization: Tiered Goals and Weighting

The Technical and Policy Advisory Committees ranked the project goals, identified previously in this document, and ranked them into Tier 1 and Tier 2 goals:

- **Tier 1 Goals**
 - Goal 1 Improve Mobility
 - Goal 2 Provide a Cost-Effective, Economically Viable Transit Option
- **Tier 2 Goals**
 - Goal 3 Support Economic Development
 - Goal 4 Protect the Natural Environmental Features of the Corridor
 - Goal 5 Preserve and Protect Individual Community Quality of Life
 - Goal 6 Improve Safety

Following the initial evaluation process of optimized alternatives and input from the TAC, the two Tier 1 goals – ridership and cost - together were weighted with a total of 50 available points. The four remaining Tier 2 goals received the remaining 50 available points. During project development, it became apparent in discussions with project partners that economic development was emerging as a dominant factor. Economic development was therefore weighted more heavily than the other Tier 2 goals, receiving 20 of the possible 50 points.

New Starts funding eligibility was not a factor originally weighted during the AA. With the passage of the new Federal transportation law, Moving Ahead for Progress in the 21st Century (MAP-21), it became apparent that that aspect of an alternative’s feasibility needed to be considered. While it was always understood that only the transit elements of Alternative 8, BRT

Managed Lane would qualify for FTA funding under SAFETEA-LU, qualifications for FTA funding under MAP-21 became more restrictive. Qualification as a New Starts-eligible capital investment was added as a factor during the final evaluation of optimized alternatives.

4.1 Criteria Used for Optimized Alternative Evaluation

Because the optimization process resulted in some changes to Gateway alternatives, re-evaluation became necessary to accurately compare remaining alternatives against each other. Goals, objectives, and measures documented in the memorandum, “*Measurements for Evaluating Alternative Performance against Corridor Goals and Objectives*” were used as a starting point for this evaluation. The objective was to determine how optimized alternatives compared using criteria that had already been determined to be key differentiators.

In most cases, the original measures were retained for the re-evaluation process. However, in other cases, the alternative refinements resulted in significant changes that meant original measurement categories no longer provided a sound basis for comparing alternatives. This section details the criteria that were used in the evaluation of select criteria for each project goal. In cases where the criteria differ from that used in the initial detailed evaluation process completed in the spring of 2012 and documented previously in this report, the initial criteria used as well as the criteria used for the optimized evaluation are provided below.

Alternatives rated as “strongly supporting goal” received 10 points; those rated as “supporting goal” received 5 points; those rated as “not supporting goal” received zero points. The maximum point count equaled 100 points.

4.1.1 Goal 1: Improve Mobility; Objectives:

Each of these criteria under Goal 1 was weighted at a potential 10 points, for a total potential rating of 30 points for alternatives under Goal 1.

- A. Responds to Corridor Travel Demand Pattern: Year 2030 Transit Ridership Forecast. Defined as the estimated daily transitway ridership in the Gateway Corridor in forecast year 2030.

	Original Criteria	Revised Criteria
Ratings: Strongly supports goal =	More than 10,000 transitway trips per day	More than 8,000 transitway trips (boardings) per day
Supports goal =	5,000 to 10,000 transitway trips per day	4,000 to 8,000 transitway trips (boardings) per day
Does not support goal =	Less than 5,000 transitway trips per day	Less than 4,000 transitway trips (boardings) per day

The ranges for this criterion were changed to draw a finer line between alternatives following optimization.

- B. Transit Travel Times: Offers competitive commute time compared to trip made via automobile—Comparison of alternative travel times between two fixed points in 2030, during the AM peak period.

		Original Criteria	Revised Criteria
		Performance against Regional Guidelines compared to Auto	Comparison to 2030 AM Peak Auto Travel Time between Crossroads/Oaks Business Park or Radio Drive, and St. Paul Union Depot (2030 AM Peak Auto travel time = 18 minutes)
Ratings:	Strongly supports goal =	Exceeds regional guidelines in all 4 corridor segments (less than 35% slower than average auto or express bus time)	Faster than auto travel time
	Supports goal =	Meets regional guidelines in all but 1 of 4 corridor segments	Equal to auto travel time
	Does not support goal =	Meets regional guidelines in 2 or less of 4 corridor segments	Slower than auto travel time

The PAC requested an actual travel time comparison with and without a Gateway transitway. To compare actual current and 2030 express bus service to proposed transitway service, either the Crossroads/Oaks Business Park or Guardian Angels Park and Ride at Radio Drive was used as the eastern limit of the travel time comparison area.

Traffic Impacts—For local streets (East 7th Street, White Bear Avenue, Hudson Road), several potential impacts which affected the general accessibility of the area resulting from implementing a transitway were identified. These included reducing the number of traffic lanes, restricting movements at intersections by removing left turns, and the impact on nearby streets from diverted traffic. In addition, volume to capacity ratios were measured on I-94, and were reported in terms of level of service to reflect potential congestion mitigation resulting from the implementation of alternatives.

Ratings:	Strongly supports goal =	Restrictions at no intersections; no lane reduction; no expected traffic diversion into residential neighborhoods at station locations
	Supports goal =	Restrictions at no intersections; no lane reduction; some expected traffic diversion into residential neighborhoods at station locations
	Does not support goal =	Reduces local street accessibility; reduces lane capacity; and high levels of traffic diversion into residential neighborhoods

No changes were made to this criterion for the evaluation of optimized alternatives.

4.1.2 Goal 2: Provide a Cost-Effective, Economically Viable Transit Option

Each of the criteria under Goal 2 was weighted as a potential 10 points, for a total potential rating of 20 points for alternatives under Goal 2.

- A. Has acceptable Capital Costs (mid-year of Construction, 2019)—defined as the one-time capital cost to construct the transitway (guideway, stations, structures, right-of-way, engineering/design, administration, and contingencies) escalated from 2012 to 2019 using the 3.5% annual escalation rate, consistent with Central Corridor LRT.

	Original Criteria	Revised Criteria
	2019 (\$)	
Ratings:	Strongly supports goal = \$0-\$750 million	\$0-\$500 million
	Supports goal = \$750 million-\$1.5 billion	\$500 million-\$1.0 billion
	Does not support goal = >\$1.5 billion	>\$1.0 billion

The ranges for this criterion were changed in response to the revised (lower) capital costs for the optimized alternatives. The optimized alternatives incorporated a number of factors that were specifically aimed at reducing project costs, including shortening the length of fixed guideway. The revised ranges provided a more effective means to differentiate between alternatives.

- B. Has acceptable operating costs—defined as the ongoing annual operating and maintenance costs.

	Original Criteria	Revised Criteria
	2020 (Year of Opening) O&M Costs	
Ratings:	Strongly supports goal = < \$10 million annually	<\$5 million annually
	Supports goal = \$10 million to \$20 million annually	\$5 to \$10 million annually
	Does not support goal = > \$20 million annually	> \$10 million annually

The ranges for this criterion were changed in response to reduced operating and maintenance costs associated with the optimized alternatives. The optimized alternatives incorporated a number of factors that were specifically aimed at reducing project costs, including removing express bus service between the Twin Cities and western Wisconsin (the W-100 route) and extending off-peak transit service headways from 15 to 30 minutes. These and other factors resulted in reduced operating and maintenance costs which made the original operating and maintenance cost ranges ineffective in highlighting differences between alternatives.

4.1.3 Goal 3: Supports Economic Development

Each of the criteria under Goal 3 was weighted as a potential 10 points, for a total potential rating of 20 points for alternatives under Goal 2.

- A. Enhances the potential for increased transit ridership—Defined as existing population and employment already within ½ mile of stations based on available 2010 US Census data. [Note: The figures shown below do not include population and employment forecasts within ½ mile of either the Union Depot or the Interchange.]

	2010 Population	2010 Employment
Ratings:	Strongly supports goal = > 25,000 people	15,000 jobs
	Supports goal = 10,000 to 25,000 people	5,000 to 15,000 jobs
	Does not support goal = < 10,000 people	<5,000 jobs

B. Station-area development potential—defined by meeting the majority of the measures shown in the table below.

		Original and Optimized Ranges		Original Ranges	Revised Ranges	Original and Optimized Ranges
Within ½ Mile of Stations						
		2030 Population	2030 Employment	# of Stations	# of Stations	Station Locations
Ratings:	Strongly supports goal =	> 25,000 people	15,000 jobs	≥ 15 stations	≥ 10 stations	All stations located outside of freeway median
	Supports goal =	10,000 to 25,000 people	5,000 to 15,000 jobs	10-15 stations	8-9 stations	Stations located both outside freeway median and within freeway median
	Does not support goal =	< 10,000 people	<5,000 jobs	< 10 stations	< 8 stations	All stations located within freeway median

Except for the number of stations, the ranges for criteria used to determine alternative support of economic development did not change. The ranges used in the number of stations criterion were revised in response to changes in the number of stations for each alternative. The number of stations per alternative was reduced as part of the optimization process, largely due to removing transit service between Hudson, WI and Eau Claire, WI.

4.1.4 Goal 4: Protect the Natural Environmental Features of the Corridor

The optimized alternatives did not increase the environmental impacts of alternatives. Given that the initial detailed evaluation completed in the spring of 2012 did not show any of the environmental criteria to be useful differentiators, the project team opted not to re-evaluate specific criteria associated with this goal. This is not to suggest that the alternatives would not result in environmental impacts. A thorough environmental evaluation of alternatives will be completed during the next phase of study.

Goal 4 criteria were weighted at a potential 10 points. All alternatives received the maximum 10 points.

4.1.5 Goal 5: Preserve and Protect Individual Community Quality of Life

Objectives: Designed sensitively, with respect to neighborhoods and property values—defined as the potential number of both full and partial parcel acquisitions now estimated to be needed to implement alternative.

		Full Acquisitions	Partial Acquisitions
Ratings:	Strongly supports goal =	< 25	< 50
	Supports goal =	25-50	50-100
	Does not support goal =	> 50	> 100

The original evaluation process identified a substantial number of potential full and partial property acquisitions, in particular for Alternatives 4 and 6. In an attempt to reduce the estimated impacts, options for reducing the space required to implement BRT and LRT along East 7th Street and White Bear Avenue were developed and reviewed with St. Paul and Ramsey County staff. The exercise concluded it is not feasible to reduce the BRT and LRT right-of-way requirements enough to generate a substantial reduction in property impacts without compromising both traffic and transit operations. As a result, no changes were made to the design of Alternatives 4 and 6 along East 7th Street and White Bear Avenue.

The ranges for this criterion were not changed for the evaluation of optimized alternatives. Goal 5 criteria were weighted at a potential 10 points.

4.1.6 Goal 6: Safety

Objectives: Defined as the number of new ungated, at-grade street crossings.

Ratings:	Strongly supports goal =	< 15 ungated, at-grade crossings
	Supports goal =	15 to 50 ungated, at-grade crossings
	Does not support goal =	>50 ungated, at-grade crossings

The ranges for this criterion were not changed for the evaluation of optimized alternatives. Goal 6 criteria were weighted at a potential 10 points.

5. Evaluation Results

With a 100 point maximum point total, the alternatives were then sorted by total points into “High”, “Medium” and “Low” categories. With “High” or “Medium” rankings for all goals, optimized Alternative 3 – BRT adjacent to Hudson Road, again received the highest number of points and was ranked highest of the alternatives. As the highest ranked option overall, with high or medium ranking for all goals, Alternative 3 has:

- Average daily ridership of 8,800-9,300, comparable to LRT ridership of 9,300
- Capital cost of approximately \$400M
- Annual operating & maintenance cost approximately \$9.6M
- High economic development potential, with 10 stations, all outside freeway median
- Competitive travel time to auto and express bus in 2030
- Eligible project for FTA New Starts funding

Alternative 3 had also received a “High” ranking during the previous evaluation of alternatives, before the optimization process.

Optimized Alternative 5, LRT along the same alignment, received equivalent rankings to Alternative 3 in all but one category – cost. Alternative 5 retained its previous ranking of “Medium”. With a Medium ranking because of cost, but high or medium ranking for other goals, Alternative 5 has:

- Average daily ridership of 9,300
- Capital cost of approximately \$920M
- Annual operating & maintenance cost approximately \$11.5M
- High economic development potential, with 10 stations, all outside freeway median
- Competitive travel time to auto and express bus in 2030
- Eligible project for FTA New Starts funding



- Opportunity for detailed comparison to BRT in an EIS

Although Alternative 8, BRT Managed Lane, maintained its “Medium” ranking and compared very favorably in terms of average daily ridership (8100), capital cost (approximately \$520M), and competitive travel time, it did not compare as favorably to Alternatives 3 and 5 for the following reasons:

- Fewer stations (7), and their location within the freeway median, offer less opportunity for economic development around stations for communities in the corridor.
- In accordance with the new Federal transportation law (MAP-21), a managed lane does not qualify for Federal transit funding, and the Twin Cities Transportation Policy Plan does not include future funding for a managed lane in the Gateway Corridor.

The summary matrix attached (Table 9) illustrates the comparative evaluation of alternatives, including rankings under Tier 1 and Tier 2 goals.

5.1 Gateway Corridor Commission Recommendation

On October 11, 2012, the Gateway Corridor Commission approved the following:

Advance Optimized Alternative 3—BRT adjacent to Hudson Road into the DEIS as the preferred option.

- Received a medium or high ranking under all project goals, resulting in it becoming the highest ranked option overall. Alternative 3 is also eligible for FTA New Starts funding under MAP-21.

Advance Optimized Alternative 5—LRT adjacent to Hudson Road for comparative purposes to BRT.

- Received a low ranking for cost but medium or high ranking for all other project goals, resulting in its continued “Medium” ranking. Alternative 5 is also eligible for FTA New Starts funding under MAP-21. Because LRT Alternative 5 replicates BRT Alternative 3 in alignment, stations, and service plan, carrying it forward into the DEIS provides an opportunity to compare the two technologies in a detailed side-by-side analysis.

The Commission requested public comment on the AA Final Report through early December 2012. At its December meeting, the Commission will approve the Final Report and direct the project to initiate the next phase of study, environmental analysis under the National Environmental Policy Act (NEPA).

It is understood that under current FTA guidance, Alternative 2—Transportation System Management (TSM), will also advance into environmental analysis. Should new guidance be issued under MAP-21 no longer requiring a TSM baseline, this alternative would not advance into the DEIS. A locally preferred alternative will be determined during the NEPA phase.

TABLE 9
Gateway Corridor Alternatives: Updated Evaluation of Alternatives

Point Assignment	TIER 1 GOALS						TIER 2 GOALS					Overall Ranking
	10 pts	Goal 1: Improve Mobility (30 points total) 10 pts	10 pts	Goal 2: Cost Effective, Economically Viable Option (20 Points total) 10 pts	10 pts	10 pts	Goal 3: Supports Economic Development (20 points total) 10 pts	Goal 4: Protect Natural Environment 10 pts total	Goal 5: Preserve Community Quality of Life 10 pts total	Goal 6: Safety 10 pts total		
	Daily Transitway Ridership ¹	Transit Travel Times ²	Traffic Impacts	2019 Capital Cost (CEI) ³	Operating Costs	2010 Population & Employment	Station Area Development Potential (2030 Population & Employment, # of Stations, Station Location)	Impact Avoidance/ Minimization & VMT Reduction	Estimated Property Acquisitions	Ungated, At- Grade Crossings ⁴		
3 – BRT along Hudson Rd/I-94 <i>OPTIMIZED</i> -Length = 11.7 miles -Exclusive Guideway -Stations = 5 walk-up, 5 Park & Rides (P&Rs)	+	+	0	+	0	+	+	+	0	+	High (85 points)	
5 – LRT along Hudson Rd/I-94 <i>OPTIMIZED</i> Length = 11.7 miles -Exclusive Guideway -Stations = 5 walk-up, 5 P&Rs	+	+	0	0	-	+	+	+	0	+	Medium (75 points)	
8 – BRT Managed Lane <i>OPTIMIZED</i> Length = 14.4 miles -Managed Lane shared with auto uses -Stations = 2 walk-up, 5 P&Rs	+	+	+	0	0	0	-	+	+	+	Medium (75 points)	
2-TSM <i>OPTIMIZED</i> -Length = 9 mi. Mixed Traffic and Shoulder running -Stations = 7 P&Rs	-	+	0	+	+	0	-	+	+	+	Low (70 points)	
4 – BRT along E 7 th /White Bear Ave/Hudson Rd -Length = 13.3 miles -Exclusive Guideway -Stations = 7 walk-up, 6 P&Rs	0	-	-	+	-	+	+	+	-	0	Low (50 points)	
6 – LRT along E 7 th /White Bear Ave/Hudson Rd Length = 13.3 miles -Exclusive Guideway -Stations = 7 walk-up, 6 P&Rs	+	-	-	-	-	+	+	+	-	0	Low (45 points)	

TABLE 9
Gateway Corridor Alternatives: Updated Evaluation of Alternatives

Point Assignment	TIER 1 GOALS					TIER 2 GOALS					Overall Ranking	
	10 pts	Goal 1: Improve Mobility (30 points total) 10 pts		Goal 2: Cost Effective, Economically Viable Option (20 Points total) 10 pts		10 pts	Goal 3: Supports Economic Development (20 points total) 10 pts		Goal 4: Protect Natural Environment 10 pts total	Goal 5: Preserve Community Quality of Life 10 pts total		Goal 6: Safety 10 pts total
	Daily Transitway Ridership ¹	Transit Travel Times ²	Traffic Impacts		2019 Capital Cost (CEI) ³	Operating Costs	2010 Population & Employment	Station Area Development Potential (2030 Population & Employment, # of Stations, Station Location)		Impact Avoidance/Minimization & VMT Reduction		Estimated Property Acquisitions
Ranking Criteria	+ >8,000 O 4K – 8000 — <4,000	+ Faster than 18 min O Equal to 18 min — Less than 18 min	+ No changes to street access/cap. & improves I-94 LOS O No changes to street access/cap. & no change I-94 LOS - Changes to street access/cap. & no change I-94 LOS	+ \$0 - \$500M O \$500M - \$1B — > \$1B	Annually + > \$5M O \$5M - \$10M — > \$10M	+ >25k pop, >15k emp. O 10-25k pop, 5-15k emp. — < 10k pop, < 5k emp.	+ >25k pop., >15k emp., >10 stations, all stations outside of freeway O 10-25k pop., 5-15k emp., 10-15 stations, some stations within freeway median — < 10k pop, < 5k emp., <10 stations, all stations within freeway median	Acres of impact (wetlands, water bodies, floodplains & parklands) + < 50 acres O 50 – 100 acres — > 100 acres	+ <25 full, <50 partial O 25-50 full, 50-100 Partial — >50 full, >100 partial	+ < 15 crossings O 15 – 50 crossings — > 50 crossings		

1. Boardings on BRT or LRT at stations and boardings on express buses using the guideway. All alternative ridership reported for 6 minute BRT constant. Alt 3 includes test of 9 minute BRT constant.
2. Transit travel time compared to an 18 minute projected auto travel time during 2030 AM peak period between the Crossroads/Oaks Business Park Station in Oakdale(or comparable location) and Union Depot.
3. The Cost Effectiveness Index (CEI) is a Federal Transit Administration (FTA) metric currently used to measure incremental cost per hour of transportation system user benefits in the forecast year. The CEI will be replaced by a new metric under MAP-21 Surface Transportation Bill.
4. Consistent with Hiawatha implementation, local street intersections are ungated, increasing the potential for interaction with traffic, pedestrians and bicycles

6. Consideration of New Federal Transportation Law

Of special note, during the final phase of the Gateway AA, the federal transportation law changed. Under the new law, Moving Ahead for Progress in the 21st Century, called MAP-21, several criteria for evaluating New Starts projects changed. Because new FTA guidance under MAP-21 is not yet available, the Gateway AA procedures continue to be consistent with existing guidance under the Safe, Accountable, Flexible, Efficient Transportation Equity Act—a Legacy for Users (SAFETEA-LU).

Prior to issuance of MAP-21, the FTA also issued a Notice of Proposed Rulemaking (NPRM). Included in the NPRM is the potential double-counting of transit-dependent populations, which may or may not be incorporated into New Starts guidance under MAP-21. The Gateway AA evaluated this potential factor as well, breaking down the corridor population into percentages of people within one-half mile of stations who are under age 18, over age 65, low-income, minority (non-white) or disabled. Low-income was calculated at 185% of poverty level, consistent with the Twin Cities regional definition of this category. Table 10 below presents Gateway populations within the various transit dependent categories.

TABLE 10
Gateway Corridor Transit Dependent Populations

		% Under 18	% Over 65	% Non White	% Low income	% w/ Disability	2010 Population (used for Age, Race and Income)	2000 Population Age 5 and over (used for % w/ Disability)
Alternative 3	Manning Avenue	29.83%	9.01%	18.45%	8.15%	9.64%	466	197
	Mounds Earl	30.63%	8.49%	50.61%	50.63%	21.69%	8194	7981
	Oak Business Park	23.08%	14.12%	19.76%	17.44%	15.23%	1508	1241
	WB Sunray 3M	25.70%	10.59%	42.51%	30.91%	19.10%	9158	8169
	Woodbury Dr / Keats Ave	29.98%	7.49%	18.55%	7.25%	9.13%	814	493
	Greenway Avenue	22.11%	13.81%	18.63%	18.81%	14.35%	1637	1449
	Carmichael Road	26.09%	12.59%	4.38%	14.78%	8.21%	548	207
	Alternative 3 Total	25.06%	10.20%	39.88%	34.62%	19.10%	22,325	19,737
Alternative 4	Greenway Avenue	22.11%	13.81%	18.63%	18.81%	14.35%	1637	1449
	Manning Avenue	29.83%	9.01%	18.45%	8.15%	9.64%	466	197
	Metro Arcade Johnson	34.70%	6.41%	62.13%	59.65%	24.15%	14765	14344
	Oak Park Radio	24.63%	11.94%	19.33%	13.83%	12.60%	2907	2429
	WB7 WB3 Sunray 3M	28.53%	8.86%	47.88%	38.62%	18.96%	14838	13302
	Woodbury Dr / Keats Ave	29.98%	7.49%	18.55%	7.25%	9.13%	814	493
	Carmichael Road	26.09%	12.59%	4.38%	14.78%	8.21%	548	207
Alternative 4 Total	30.47%	8.35%	48.38%	42.88%	20.30%	35,975	32,421	

TABLE 10
Gateway Corridor Transit Dependent Populations

		% Under 18	% Over 65	% Non White	% Low income	% w/ Disability	2010 Population (used for Age, Race and Income)	2000 Population Age 5 and over (used for % w/ Disability)
Alternative 5	Manning Avenue	29.83%	9.01%	18.45%	8.15%	9.64%	466	197
	Mounds Earl	30.63%	8.49%	50.61%	50.63%	21.69%	8194	7981
	Oak Business Park	23.08%	14.12%	19.76%	17.44%	15.23%	1508	1241
	WB Sunray 3M	25.70%	10.59%	42.51%	30.91%	19.10%	9158	8169
	Woodbury Dr / Keats Ave	29.98%	7.49%	18.55%	7.25%	9.13%	814	493
	Greenway Avenue	22.11%	13.81%	18.63%	18.81%	14.35%	1637	1449
	Carmichael Road	26.09%	12.59%	4.38%	14.78%	8.21%	548	207
	Alternative 5 Total	27.32%	10.20%	39.88%	34.62%	19.10%	22,325	19,737
Alternative 6	Greenway Avenue	22.11%	13.81%	18.63%	18.81%	14.35%	1637	1449
	Manning Avenue	29.83%	9.01%	18.45%	8.15%	9.64%	466	197
	Metro Arcade Johnson	34.70%	6.41%	62.13%	59.65%	24.15%	14765	14344
	Oak Park Radio	24.63%	11.94%	19.33%	13.83%	12.60%	2907	2429
	WB7 WB3 Sunray 3M	28.53%	8.86%	47.88%	38.62%	18.96%	14838	13302
	Woodbury Dr / Keats Ave	29.98%	7.49%	18.55%	7.25%	9.13%	814	493
	Carmichael Road	26.09%	12.59%	4.38%	14.78%	8.21%	548	207
Alternative 6 Total	30.47%	8.35%	48.38%	42.88%	20.30%	35,975	32,421	
Alternative 8	Earl Street	30.52%	9.37%	50.50%	48.51%	20.68%	5551	5213
	Manning Avenue	29.83%	9.01%	18.45%	8.15%	9.64%	466	197
	<i>Ruth St / Sunray (formerly WBA)</i>	<i>19.96%</i>	<i>15.31%</i>	<i>22.69%</i>	<i>17.61%</i>	<i>18.63%</i>	<i>1613</i>	<i>4084</i>
	<i>3M (formerly McKnight)</i>	<i>26.96%</i>	<i>9.59%</i>	<i>46.07%</i>	<i>36.02%</i>	<i>17.77%</i>	<i>4495</i>	<i>1339</i>
	Radio Drive	26.18%	9.66%	18.92%	10.28%	10.14%	1459	1233
	Woodbury Dr / Keats Ave	29.98%	7.49%	18.55%	7.25%	9.13%	814	493
	Carmichael Road	26.09%	12.59%	4.38%	14.78%	8.21%	548	207
Alternative 8 Total	27.67%	10.11%	38.65%	32.95%	17.88%	14,946	12,766	

NOTE: Based on 1/2 Mile buffer around the Station

Source: Disability (2000 Census Tract Data & Table QTP21), Age (2010 Census Tract Data & table QTP1), Race (2010 Census Tract Data & table QTP5), Low Income (2010 Census Tract Data & Table S1701)