Arterial BRT Corridor Evaluation and Prioritization: Ridership Forecasts

NetworkNEXT

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Metro Transit

SRF

Table of Contents

Introduction 3
Corridor Comparison 5
    Corridor Ridership 5
Technical Results 8

Introduction

This memorandum describes one criterion, corridor ridership, used in comparing candidate corridors for Network Next. Descriptions and results of evaluation criteria can be found in the *Arterial BRT Corridor Evaluation and Prioritization* memo along with additional background information on Network Next.

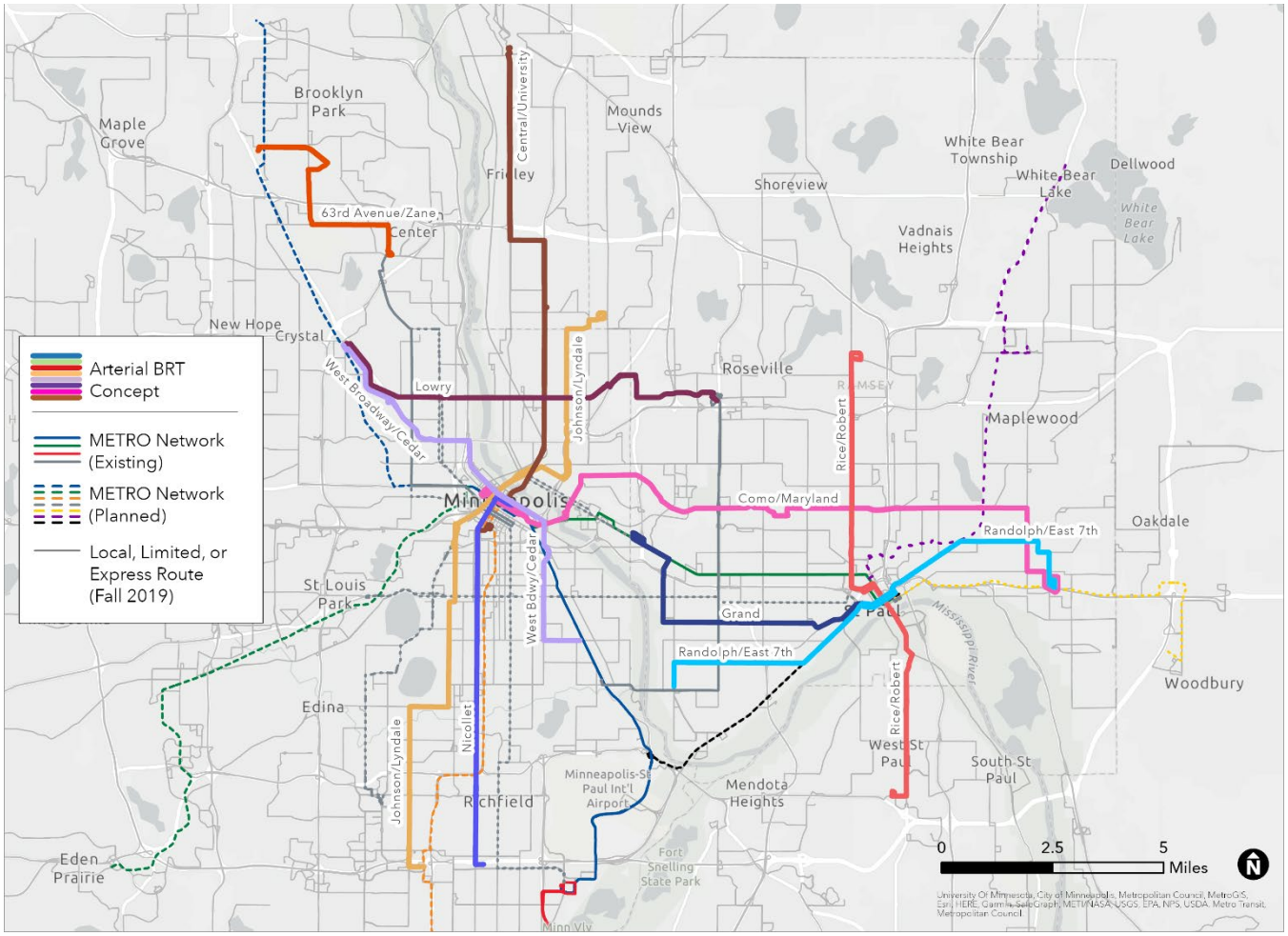
The project team developed corridor concepts for each of the 10 corridors, shown in Table 1 and Figure 1, that were advanced through the initial arterial BRT candidate corridor screening. Corridor concepts are meant to represent the application of arterial BRT in each corridor and provide adequate definition to facilitate corridor evaluation. Concepts include alignments, termini, and station locations. For details on each corridor concept, please refer to the *Arterial BRT Corridor Concepts* memo.

Table 1. Arterial BRT Corridors for Evaluation

Corridor	Approximate Terminals	Primary Underlying Route(s)
63rd Avenue/ Zane	Starlite Transit Center to Brooklyn Center Transit Center	724
Central	Downtown Minneapolis to Northtown Transit Center	10
Como/ Maryland	Downtown Minneapolis to Sun Ray Transit Center	3
Grand	Westgate Station to downtown Saint Paul	63
Johnson/ Lyndale	Silver Lake Village to Knox Boulevard and Knox Avenue S	4
Lowry	Robbinsdale Transit Center to Rosedale Transit Center	32
Nicollet	Downtown Minneapolis to American Boulevard	18
Randolph/ East 7th	Cleveland Avenue S and Ford Parkway to Sun Ray Transit Center	74
Rice/ Robert	Little Canada Transit Center to Dakota Co. Northern Service Center	62, 68*
West Broadway/ Cedar	Robbinsdale Transit Center to 38th Street Station	14, 22^

*Routes 62 and 68 are the primary routes on the northern and southern half of the corridor, respectively.
^Routes 14 and 22 are the primary routes on the northern and southern half of the corridor, respectively.

Figure 1. Arterial BRT Corridors for Evaluation



Corridor Comparison

Corridor ridership as a comparison criterion is described in detail in the following section including what is measured, why the measure is important to decision making, the methods and sources used for analysis, and how to interpret the results. Table 3 at the end of this section summarizes corridor ridership for all 10 corridors.

CORRIDOR RIDERSHIP

Description	• Transit ridership on arterial BRT and underlying local routes in each corridor • Estimated using the Federal Transit Administration (FTA)'s Simplified Trips on Project Software (STOPS) and locally available data
Principle	• Build on success to grow ridership
Why it is Important	• Transit ridership is a key indicator of the success of a transit system. The number of trips taken on transit and the number of people using transit is a good measure of how useful the transit network is to people.

Methods and Data Sources	• Ridership estimates were generated using FTA's STOPS model. STOPS produces estimates of average weekday ridership. While care has been taken to build a high-quality model, the nature of one model producing results for 10 corridors limits the ability to specialize the set-up to each corridor as would happen in a single corridor study. STOPS calibrates using large district summaries. District definitions from the Metropolitan Council are used in the model. Future studies of these corridors individually would use a specialized set of districts to ensure accuracy in the corridor as opposed to accuracy at a regional level. • The unit of geography in this model is the Census Block Group. STOPS creates a correspondence between Census Block Groups and local transportation analysis zones to generate 2040 transit demand from local socio-economic data (population and employment) forecasts prepared by the Metropolitan Council. • STOPS uses Generalized Transit Feed Specification (GTFS) data to form the model transit network. GTFS is an industry-standard for representing transit schedules. It includes route and route type information for every timed stop transit vehicles make in a day. GTFS data were provided by Metro Transit for existing and planned scenarios. The network includes all corridors included in the 2040 Long Range Transportation Plan and (if developed) their supporting bus service plans. Walk connections to the transit network were obtained from Open Street Map. • STOPS provides options to incorporate a visibility factor (representing unquantifiable trip attributes) on a route-by-route basis. For this project, light rail and highway BRT are coded with this benefit, but arterial BRT routes are not. This means that arterial BRT within the model is perceived the same way as local buses. Choice of arterial BRT over local bus is based on speed, frequency, and stop accessibility. • The ridership estimates for each corridor were generated independently of each other, in the context of other existing transit service. This means that the ridership for proposed BRT corridors reflects benefits from connections to other existing and proposed transit.

Corridor ridership includes select supporting routes' ridership. Table 2 shows routes whose ridership forecasts are included in the respective corridor ridership forecast. Ridership on these routes is included in its entirety, regardless of stop proximity to the arterial BRT line. Some corridors have supporting service primarily along the core of the route that serves stops that the arterial BRT does not serve (like the existing A Line and route 84). Other corridors have only arterial BRT serving the trunk with supporting routes that currently serve the trunk shortened to feeder service.

Table 2. Routes Included in Corridor Ridership Forecasts

Corridor	No Build Corridor Routes	Build Corridor Routes
Como/ Maryland	Route 3	BRT, Route 66 (new)
Johnson/ Lyndale	Route 4, Route 141	BRT, Route 4 (modified), Route 804 (new)
Central	Route 10, Route 59	BRT, Route 10 (modified)
West Broadway/ Cedar	Route 14, Route 22	BRT, Route 22 (modified), Route 24 (new)
Nicollet	Route 18	BRT, Route 518 (new)
Randolph/ East 7th	Route 74	BRT, Route 324 (new)
Lowry	Route 32	BRT
Rice/ Robert	Route 62, Route 68	BRT, Route 68 (modified), Route 222 (new)
Grand	Route 63	BRT, Route 63
63rd/ Zane	Route 724	BRT, Route 724

Service plans are impactful in STOPS, a schedule-based model. This means that STOPS calculates potential travel times using specific arrival and departure information in the transit schedule and incorporates it into a decision-making structure. Changing the frequency of a route impacts transfers and therefore travel times. Exclusion of stops along the arterial BRT lines reduces stop accessibility which also impacts travel times. STOPS has a set of parameters that weight how each aspect of trip (walking, in-vehicle time, etc.) is perceived. For example, drive time to park-and-rides is weighted 1.5 times transit in-vehicle time meaning that ten minutes of driving feels like fifteen minutes of time on a transit vehicle. These weights are calibrated based on national and local data. While STOPS and travel models in general are helpful for gaining an understanding of potential ridership, they do have limitations in their ability to precisely mimic human decision making.

One STOPS option, to better reflect real world transit choices, is a visibility factor with two levels. The stronger level is generally reserved for rail corridors. It is applied to light rail and commuter rail in the model used for this project. The weaker level is generally applied to BRT or other transit service that has strong branding and enhanced service and station characteristics, but not all characteristics associated with fixed-guideway service on dedicated right of way. The weaker level of the visibility factor is applied to highway BRT in the model used for this project. This means that arterial BRT does not have any implicit benefits applied to it in the model, and modeled riders' choice to use arterial BRT service is purely based on travel time, frequency, and station accessibility.

The decision to not give arterial BRT service any implicit benefit in STOPS was made following a thorough investigation by the Metropolitan Council's Regional STOPS Model Project Team. The team found variation in the effect of applying the second-level visibility factor to arterial BRT based on connections to light rail. Future studies of these corridors individually should evaluate results with and without the visibility factor applied. As previously stated, the model used for this project has not been tailored to each individual corridor given the regional nature of the study.

Technical Results

A corridor ridership forecast was developed for each of the 10 BRT corridors evaluated (Table 3). Forecasts for Network Next represent ridership on an average weekday in 2040 from corridor routes, that is, the arterial BRT line and the planned connecting/ supporting service within the corridor (see Table 2). In Table 3, the 2040 corridor ridership values with BRT service are shown relative to those in the "no build" scenario, that is, the scenario without the BRT service. The "no build" scenario is representative of 2040 transit demand and current service levels (without the additional connecting/ supporting service).

The 2040 corridor ridership results shown in Table 3 reflect the limitations of STOPS, but the results do provide a benchmark of likely ridership levels. For example, the Nicollet corridor does not show a change in ridership from no build to build for a few reasons. The Nicollet corridor already offers high frequency service, so modest speed improvements and a reduction in stop access have limited effect. The Nicollet corridor also serves an area comparable to the planned Orange Line highway BRT which is coded in STOPS with the second-level visibility factor. The forecasted ridership does, however, place the corridor in the top half of corridors from a ridership perspective.

Table 3. Results by Corridor: 2040 Corridor Ridership Build vs. No Build

Corridor	Corridor Ridership without BRT ("No Build")	Corridor Ridership with BRT
Como / Maryland	10,900	11,600
Johnson / Lyndale	7,100	13,200
Central	9,400	12,100
West Broadway / Cedar	10,900	16,100
Nicollet	9,100	9,100
Randolph / East 7th	5,500	5,900
Lowry	1,700	2,300
Rice / Robert	7,100	9,100
Grand	4,300	5,400
63rd / Zane	2,000	2,000

Overall, the ridership forecast results provide a clear stratification of corridors. West Broadway/ Cedar, Johnson/ Lyndale, Central, and Como/ Maryland are the top four corridors in terms of ridership. Following not far behind are Nicollet and Rice/ Robert. Randolph/ East 7th, Grand, Lowry, and 63rd/ Zane are the third tier. These results are consistent within the context of the Network Next evaluation framework.