Northstar Rail Corridor Post-Pandemic Study

Final Report

Prepared by:

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Appendices

Introduction

The Northstar Rail Corridor Post-Pandemic Study (hereafter "Northstar study") has been developed by the Metropolitan Council (hereafter "Met Council") to inform decision-making regarding the future of the Northstar Rail Corridor. Recognizing the decline in ridership and operational challenges precipitated by the COVID-19 pandemic, this study outlines and evaluates potential scenarios for providing transit service in the Northstar Corridor, including the continuation of commuter rail service, extension to St. Cloud, and replacement with bus service.

Study Purpose

This study will serve as a tool to assist state and local decision makers in determining a future course of action. It is not intended to make recommendations regarding any future transit scenario, but rather, will examine the trade-offs of possible future transit scenarios. The scenario evaluation will document the potential benefits and opportunities for future transit service in the corridor and compare them against the likely impacts and challenges of implementation. Through this study process, the following questions about the future of Northstar are addressed:

- What are the recent trends in this corridor?
- How well did Northstar Corridor perform prior to Covid-19?
- What are peer agencies thinking about similar commuter rail corridors in their regions?
- Given past performance and model of the future and its constraints, what are reasonable scenarios that could make the Northstar Corridor successful?
- What are the impacts of the scenarios on ridership, finances, land use, vehicle miles traveled, and access to opportunity via transit?
- Who will be impacted by these scenarios geographically and by socio-economic demographics?

Previous Planning Efforts

This Northstar study builds on the work of previous planning efforts related to the Northstar Corridor, including but not limited to the following:

- *Northstar Corridor Draft Environmental Impact Statement (DEIS),* 2000
- *Northstar Corridor Final Environmental Impact Statement (FEIS),* 2002
- *Northstar Corridor Phase II Extension Memo,* 2010
- *Northstar Commuter Rail Corridor Before-and-After Study,* 2009
- *Northstar Commuter Rail Extension Feasibility Assessment,* 2020

Project Management Structure

Decision-making for this Northstar study was guided by three advisory groups as follows:

- **Project Management Team (PMT):** Responsible for reviewing consultant progress and providing direction on a biweekly basis. Composed of staff from the Northstar Corridor funding partners: Met Council, Metro Transit, Minnesota Department of Transportation (MnDOT), and Anoka, Hennepin, and Sherburne Counties.
- **Corridor Technical Advisory Group (CTAG):** Responsible for reviewing study progress and providing feedback on the scenarios evaluated, analysis methods used, and preliminary results. Consists of PMT members plus technical planning staff from cities with Northstar stations: Big Lake, Elk River, Ramsey, Anoka, Coon Rapids, Fridley, and Minneapolis as well as the St. Cloud Area Planning Organization.
- **Policymaker Group:** Responsible for reviewing final materials developed based on input from the PMT and CTAG. Consists of elected and appointed policymakers from the funding partner agencies:
    - Met Council (Chair and councilmembers from Northstar Corridor districts)
    - Metro Transit (General manager and senior staff)
    - MnDOT (Commissioner and senior staff)
    - County commissioners from Anoka, Hennepin, and Sherburne Counties

The policymaker group represents the agencies that will ultimately be responsible for making decisions regarding future transit service in the Northstar Corridor, including the type and amount of transit service offered, as well as the funding arrangements for capital and operating costs.

Contents of this Report

This report includes the following items:

- **Corridor History and Existing Conditions:** A summary of Northstar's historical development and recent performance.
- **Peer Corridor Review:** A summary of findings based on analysis of peer commuter rail corridor data, as well as agency interviews.
- **Service Scenarios:** A description of each of the six scenarios evaluated in this study.
- **Scenario Evaluation Framework and Results:** Evaluation criteria and results for all scenarios.
- **Evaluation Summary:** A review of key evaluation criteria that highlight differences in performance between scenarios and across transit modes, with a focus on decision-making.
- **Next Steps:** A brief description of next steps to determine the preferred mode and level of service in the Northstar Corridor.

Appendices to this report include additional content produced to inform the project team's understanding of historic and existing service performance, as well as further detail on select topics.

- **Appendix A:** Corridor History and Existing Conditions Technical Report
- **Appendix B:** Peer Corridor Review Technical Report
- **Appendix C:** Rail Extension Technical Report
- **Appendix D:** Evaluation Methods Technical Report

Corridor History and Existing Conditions

Planning Context and Expectations

Project Origins

Examination of commuter rail in the Twin Cities began in 1997, with the initiation of the Twin Cities Commuter Rail Feasibility Study. The study was conducted in two phases, with reports published in January 1998 and January 1999, respectively. The Northstar Corridor was included in this study.

Planning Efforts

This Northstar study builds on the work of subsequent planning efforts related to the Northstar Corridor, including but not limited to the following[1]:

- *Northstar Corridor Draft Environmental Impact Statement (DEIS),* 2000
- *Northstar Corridor Final Environmental Impact Statement (FEIS),* 2002
- *Northstar Corridor Phase II Extension Memo,* 2010
- *Northstar Commuter Rail Corridor Before-and-After Study,* 2009
- *Northstar Commuter Rail Extension Feasibility Assessment,* 2020

The Northstar Corridor DEIS and FEIS identified the Locally Preferred Alternative (LPA) as a commuter rail line extending from downtown Minneapolis to Rice, Minnesota (a distance of 81.8 miles), with a minimum operating segment from downtown Minneapolis to Big Lake (the current 40.1-mile corridor).

In addition, they established four principal goals for the project:

- Improve mobility and safety within the corridor
- Minimize adverse environmental impacts and foster positive environmental excellence
- Encourage transportation-supportive land use development patterns
- Provide a cost-effective and efficient transportation system

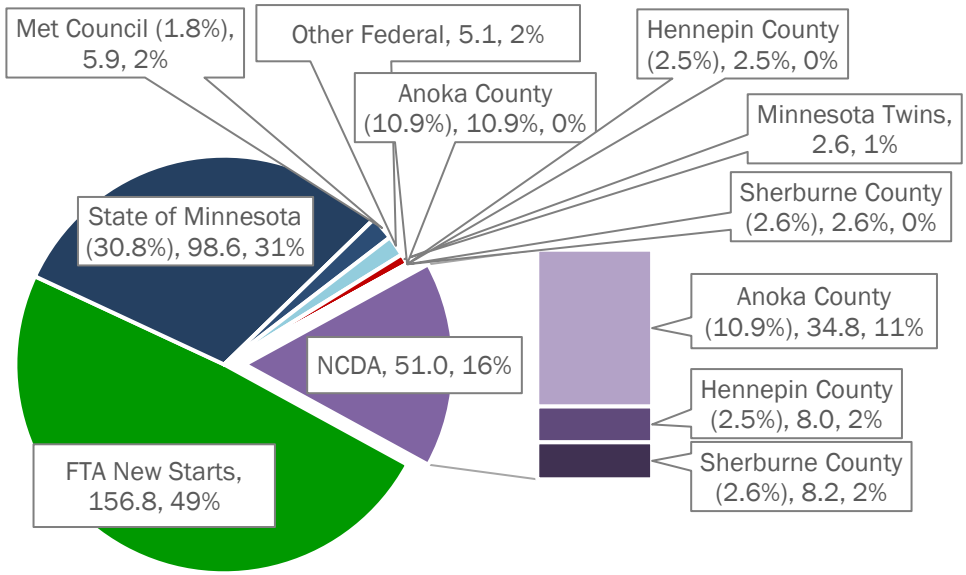
Funding Agreements

In 2007, the Northstar Corridor received an FTA Full Funding Grant Agreement (FFGA) to construct the project's minimum operating segment (MOS) at a total cost of $320.0 million. These costs were allocated among the following project partners, as shown in Figure 1:

[1] For a full list and description of previous planning projects examined, please see Appendix A: Corridor History and Existing Conditions Technical Report.

- FTA New Starts grant: $156.8 million
- State of Minnesota (through MnDOT): $98.6 million
- Met Council: $5.9 million
- Other federal grants: $5.1 million
- Minnesota Twins: $2.6 million (for construction of Target Field vertical circulation building)
- Northstar Corridor Development Authority (NCDA): $51.0 million
  NCDA funding is divided according to the proportion of track miles in each constituent county as follows:
    - Anoka County: $34.8 million (68.3 percent of NCDA total)
    - Hennepin County: $8.0 million (15.6 percent of NCDA total)
    - Sherburne County: $8.2 million (16.1 percent of NCDA total)

Figure 1: Northstar Capital Funding Amounts (in millions and percent of total)



Operations and maintenance costs are similarly allocated among state and local partners. The current funding formula is as follows:

- State of Minnesota (through MnDOT): 50 percent
- NCDA: 50 percent
  As with capital costs, NCDA funding for operations and maintenance is divided according to the proportion of track miles in each constituent county as follows:
    - Anoka County: 68.3 percent of NCDA total
    - Hennepin County: 15.6 percent of NCDA total
    - Sherburne County: 16.1 percent of NCDA total

Northstar Historic Performance

The Northstar Corridor opened for service in 2009. Since then, ridership has underperformed relative to original forecasts but grew steadily during the decade prior to the pandemic.

Forecasted and Observed Ridership

The Northstar FEIS projected about 4,000 average weekday boardings for its opening year of 2009, higher than the 1,800 average observed for that period. Figure 2 shows forecasted and observed weekday ridership figures for 2009 and 2025 (compared to 2019 to represent pre-pandemic peak). The service plan assumed in the original forecasts was changed substantially before the line opened, including a reduction from 18 to 12 trains per day. No forecasts were conducted using this revised service plan, making it difficult to accurately assess system performance against expectations. A normalized version of this chart assessing riders-per-train can be found in Appendix A.

Figure 2: Northstar Forecasted and Observed Average Weekday Ridership

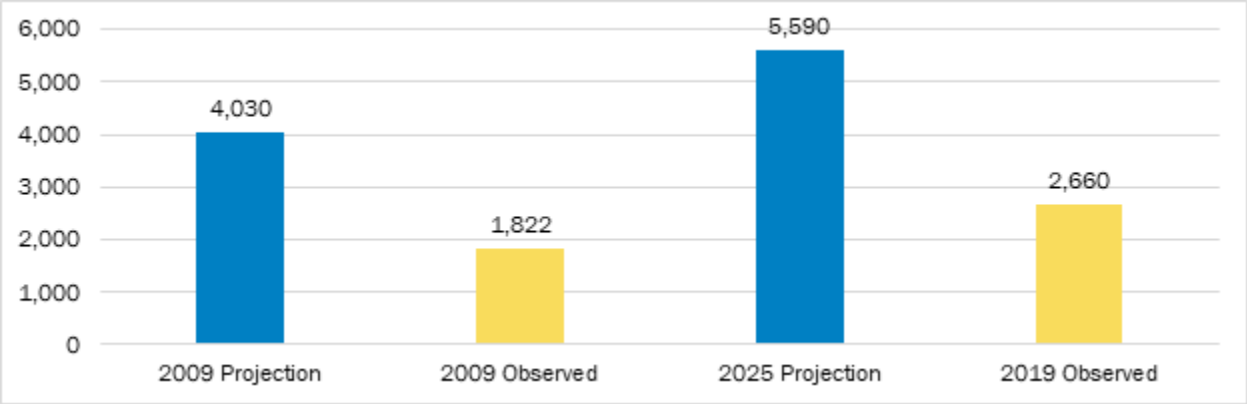
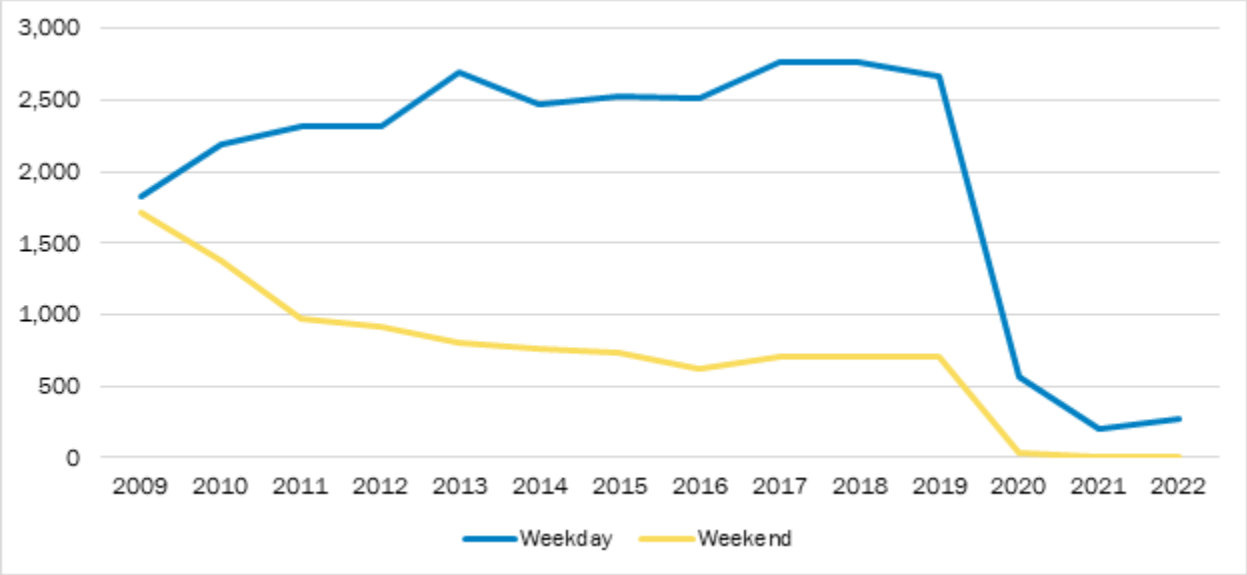


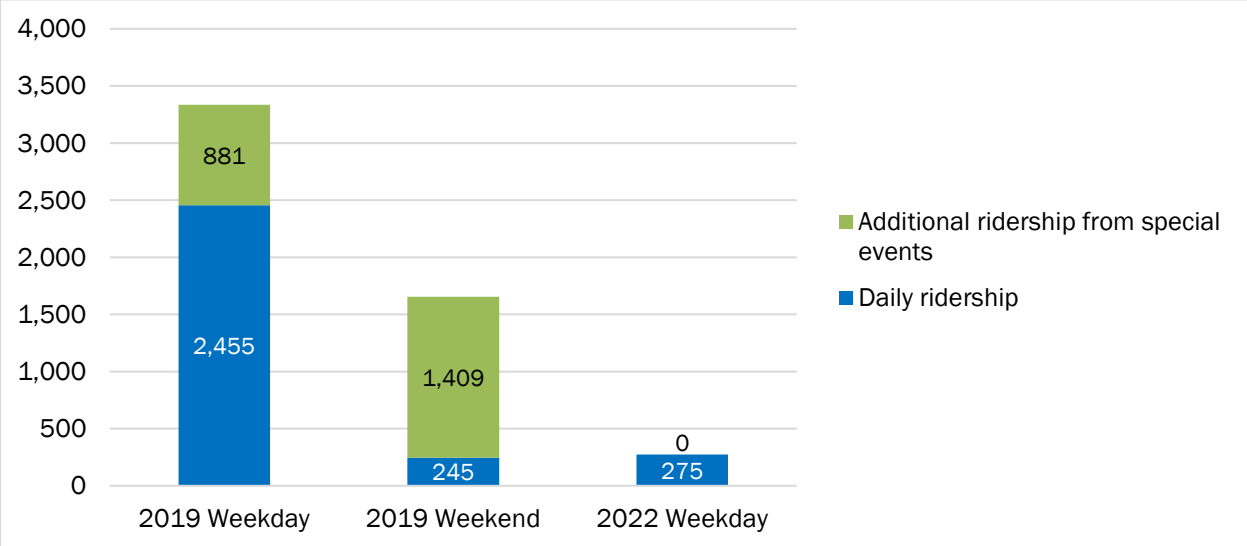
Figure 3 shows average weekday and weekend ridership from 2009 to 2022.
occurred in weekday ridership, with an average of 2,660 in 2019. Weekend ridership declined in the early years of the corridor but leveled out in 2016 until weekend service was eliminated in 2020. Due to the severe impacts of the pandemic, the Northstar Corridor averaged only 275 riders per weekday by 2022, or nearly 90 percent less than its 2019 average.

Figure 3: Average Weekday and Weekend Ridership, 2009-2022



Prior to the pandemic, special events at Target Field and U.S. Bank Stadium provided a significant proportion of daily and annual ridership: between 31 and 37 percent of annual ridership on average. In 2019, weekday special events days had nearly 900 more riders than the average non-event weekday, while weekend event days added over 1,400 riders on average. No weekend or event service has been operated since 2020, when a reduced schedule of two roundtrips per day was implemented due to low ridership.

Figure 4: Average Daily Rides by Day Type, 2019 vs. 2022



Operating Costs and Subsidies

With the decline in ridership on the Northstar Corridor since the pandemic began, project partners are concerned given the level of public funding allocated for construction and operations. Existing operations and maintenance costs ranged from $15.3 to $17.5 million during pre-pandemic years, with decreases in 2020 and 2021 due to the reduction in service. Figure 5 shows the trend of Northstar operating expenses from 2017 through 2021. While operating costs have been reduced, the subsidy per passenger has increased substantially, from $19 per trip in 2019 to $173 in 2022.

Figure 5: Northstar Operations and Maintenance Expenses, 2017-2021

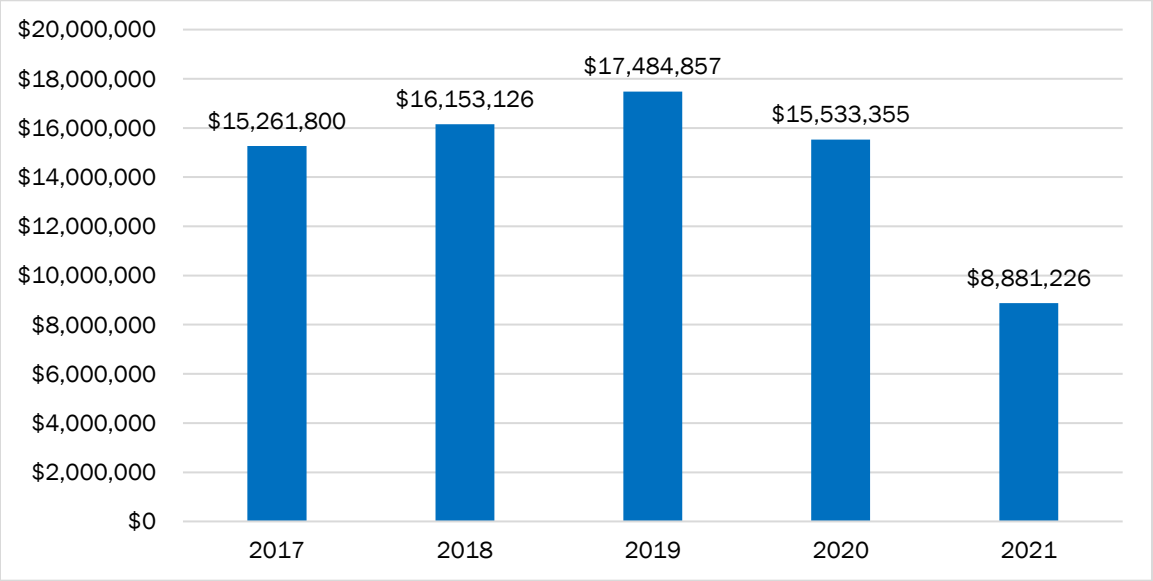
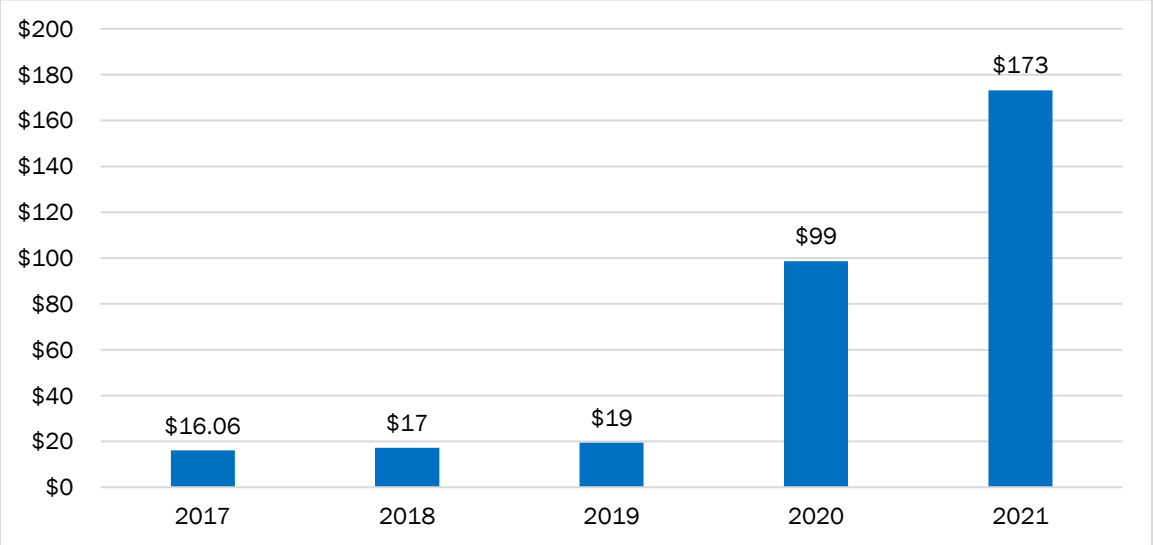


Figure 6: Northstar Per-Passenger Subsidy, 2017-2021



Peer Corridor Review

As part of this study, the consultant team analyzed system performance for Northstar commuter rail and five similar rail corridors before and after the start of the COVID-19 pandemic. Northstar's peer rail corridors evaluated in this report are:

- **Downeaster** intercity rail in New England, which is operated by Amtrak and managed by Northern New England Passenger Rail Authority (NNEPRA). This represents a 'hybrid' system in which serves both commuter and intercity trip purposes.
- **COASTER** commuter rail in San Diego, which is operated by Bombardier Transportation on behalf of North County Transit District (NCTD)
- **FrontRunner** commuter rail in Salt Lake City, which is operated by Utah Transit Authority (UTA)
- **Sounder** commuter rail in Seattle, which is operated by BNSF on behalf of Sound Transit
- **Trinity Railway Express** commuter rail in Dallas/Fort Worth, which is operated by Herzog Transit Services on behalf of Trinity Metro (Fort Worth/Tarrant County) and Dallas Area Rapid Transit (DART)

This review of peer corridors included interviews of peer transit agency staff and a comparison of pre-COVID and pandemic-era system performance measures using data from the National Transit Database (NTD). Detailed results of this review are available in Appendix B.

Peer Agency Interview Summary

The consultant team interviewed peer transit agency staff between August and October 2022. These interviews focused on questions related to agencies' responses to the COVID-19 pandemic highlighting service changes, pandemic ridership recovery strategies, and what the future of the peer rail corridor will look like.

Through these interviews the consultant team learned that most of Northstar's peer agencies have reinstated commuter rail service to pre-pandemic levels, but ridership has been slow to rebound, especially among traditional commuters. All of Northstar's peer agencies have reinstated some level of special event service and many are seeing ridership that mirrors pre-COVID levels on those trips.

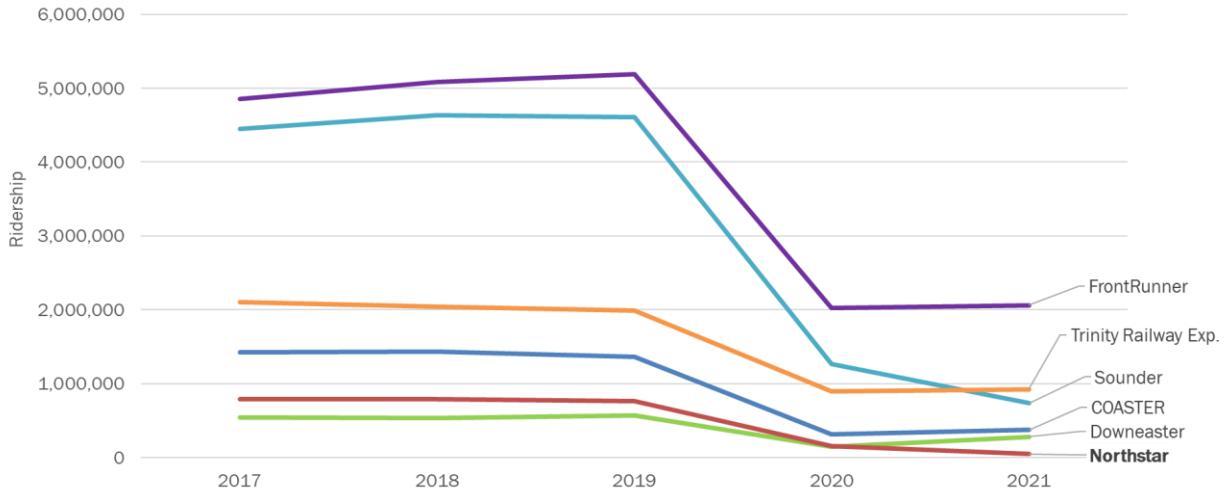
In general, the peer agency contacts seemed optimistic about the future of their commuter rail service. Most of Northstar's peer agencies have major capital projects underway to expand and improve their service. Additionally, multiple agencies cited geographical constraints to the region's growth and growing congestion as reasons why they believe commuter rail will be successful in their region over the long term. For Sounder and FrontRunner, 2019 was either the highest ridership or second highest ridership year on record. Agencies' staff seemed optimistic that pre-COVID demand for their service would return.

National Transit Database Data Analysis Summary

This analysis evaluated performance measures for Northstar and its five peer rail corridors before and after the COVID-19 pandemic began, using data from the National Transit Database (NTD). This analysis used 2019 data as a pre-COVID baseline and 2021 data to reflect performance after the COVID-19 pandemic began. The system performance measures included in this analysis relate to ridership, operating costs, and subsidies.

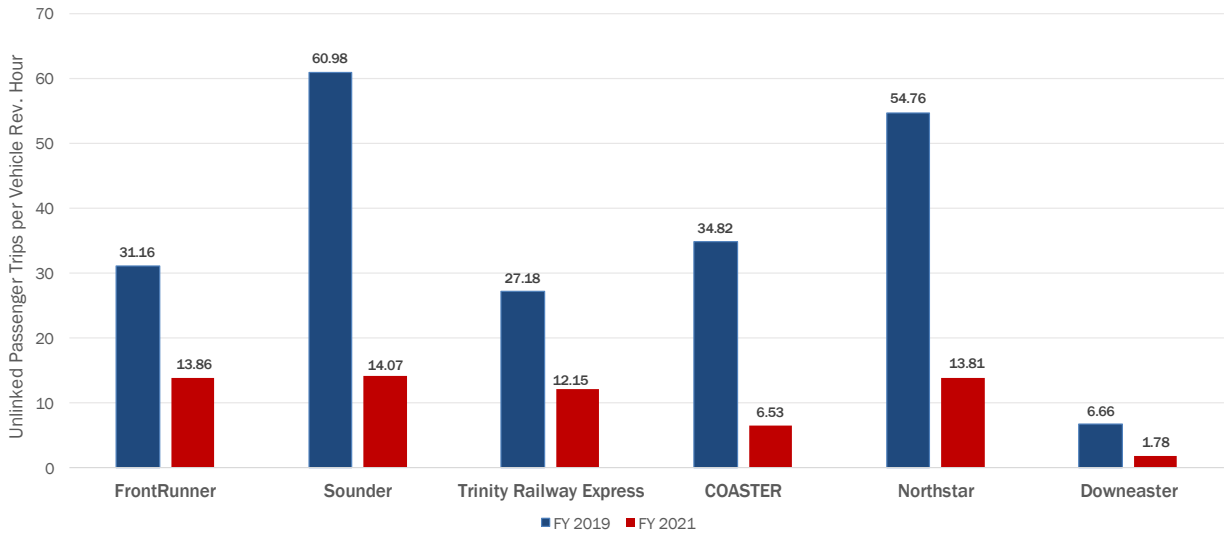
Ridership. In 2019, Northstar had the second lowest annual ridership among these peer agencies and by 2021 it had the lowest annual ridership (Figure 7). However, Northstar's productivity, as measured by passengers per vehicle (train car) revenue hour, is comparable to that of many of its peers (Figure 8).

Figure 7: Northstar and Peer Corridor Ridership, 2017-2021



Source: National Transit Database.

Figure 8: Northstar and Peer Corridor Productivity, 2017-2021



Source: National Transit Database.

Operating Costs. Northstar had the lowest overall operating cost among its peer agencies in both FY 2019 and FY 2021. However, when summarized as cost efficiency, or operating cost per vehicle revenue hour, Northstar had the highest operating cost because Northstar's annual vehicle revenue hours were much lower than its peers for both years (Table 1). Northstar's operating costs per vehicle revenue hour increased 95 percent during this period. Northstar's operating costs per service trip is also found to be high among its peers.

Table 1: Northstar and Peer Corridor Operating Costs, 2019-2021

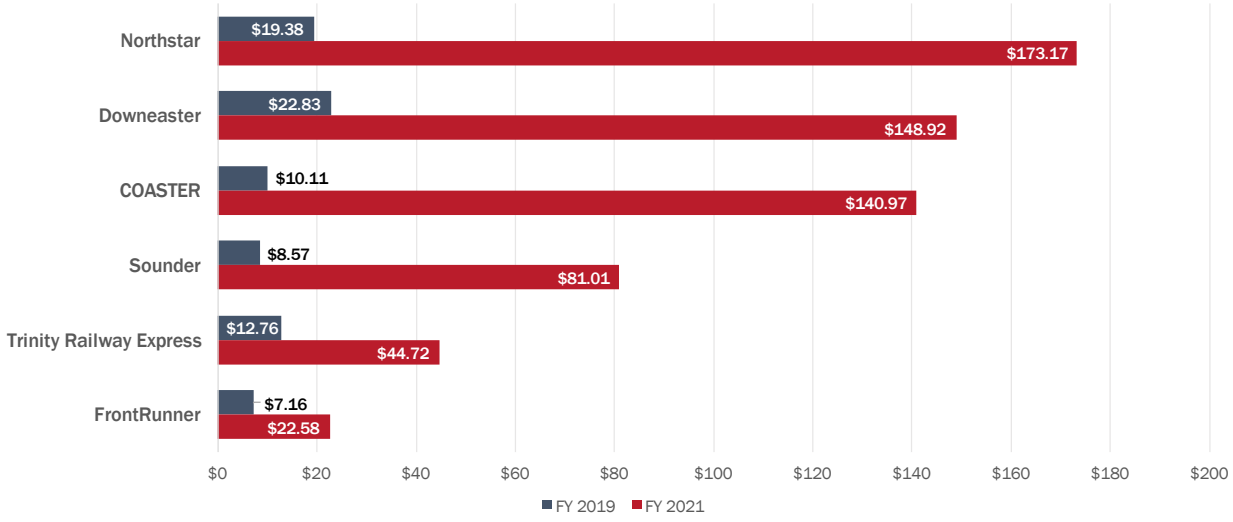
COMMUTER RAIL SERVICE	TOTAL OPERATING COST, FY 2019	TOTAL OPERATING COST, FY2021	OPERATING COST PER VRH, FY2019	OPERATING COST PER VRH, FY2021
Sounder	$56,879,437	$62,324,946	$751.97	$1,194
FrontRunner	$44,291,302	$49,428,282	$265.75	$332
Trinity Railway Express	$33,798,689	$37,823,959	$457.79	$578
COASTER	$19,643,067	$23,843,716	$485.57	$956
Downeaster	$23,056,079	$20,049,595	$280.54	$303
Northstar	$17,484,857	$8,881,226	$1,247.14	$2,433

Source: National Transit Database. VRH = Vehicle Revenue Hour.

Subsidy and Fare Recovery. Northstar had a low total subsidy compared to its peers in FY 2019 and had the lowest total subsidy among its peers in FY 2021. However, the per passenger subsidy allows for a better comparison between the agencies. In FY 2019, Northstar had the second-to-highest per passenger subsidy among its peers and in FY 2021, Northstar had the highest per passenger subsidy (Figure 9). In both FY 2019 and FY 2021, Northstar had the lowest farebox

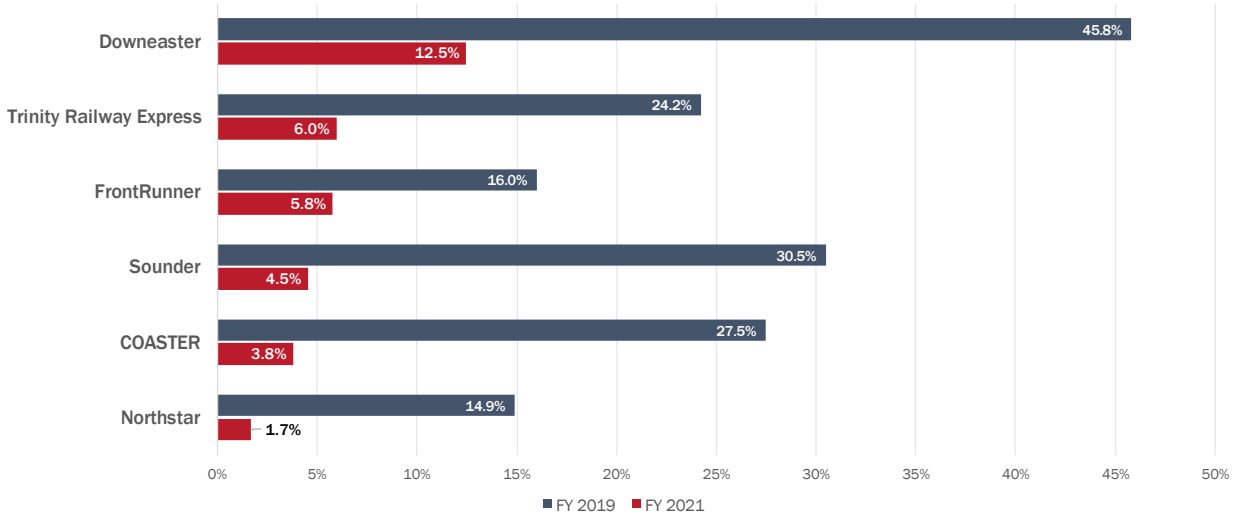
recovery ratio, that is, the percentage of operating expenses covered by fare revenue, of its peers (Figure 10).

Figure 9: Northstar and Peer Corridor Subsidy per Passenger, 2019-2021



Source: National Transit Database.

Figure 10: Northstar and Peer Corridor Fare Recovery, 2019-2021



Source: National Transit Database.

Overall Findings

The results from the peer agency interviews and the NTD data analysis for pre- and post-COVID performance suggests that many of Northstar's peer agencies seem to have stronger prospects for recovering from the pandemic than Northstar. While the NTD data show that Northstar's peers also experienced dramatic decreases in ridership during the early period of the pandemic, most peer

agency staff expressed optimism about the long-term future of their respective corridors when interviewed and most of Northstar's peers are actively planning to expand and improve their commuter rail service coming out of the pandemic. Northstar still operates on a limited pandemic service schedule, which may contribute to slower ridership recovery.

Transit Service Scenarios

The following section describes the six scenarios evaluated in the Northstar Rail Corridor Post-Pandemic Study. These scenarios were developed with input from the Met Council, Metro Transit, MnDOT, and corridor funding partners. The six scenarios represent illustrative service options for three possible transit service types: commuter rail, extend rail, and express bus. Scenarios for each transit mode represent two levels of service: "Base," or minimum service, and "High," a more robust schedule. Considerations related to each transit mode are outlined as follows:

- **Commuter Rail**: Scenarios 1 and 2 reflect the continuation of Northstar commuter rail service using current (Base) or pre-pandemic (High) service levels, with the addition of special event service.
- **Extend Rail to St. Cloud**: Scenarios 3 and 4 outline potential options for rail extension, drawing on information developed in MnDOT's Northstar Commuter Rail Extension Feasibility Assessment (2020). For the purposes of this study, several assumptions have been made as follows:
    - "Extend rail" is used here to refer to scenarios that involve extension of existing rail service to serve St. Cloud. These scenarios differ from the options evaluated in the MnDOT study because they assume that underlying commuter rail trips (peak-oriented trips terminating in Big Lake) no longer operate. Extend Rail scenarios are specific to this study and may differ from Federal Railroad Administration (FRA) or other definitions of intercity rail.
    - In both Scenario 3 and Scenario 4, trips would serve all existing Northstar stations. The resulting schedules would provide access for commute trips to and from downtown Minneapolis at peak hours, but would also operate service in the reverse direction, providing bi-directional service to and from St. Cloud. This operation would allow the Scenarios 3 and 4 to serve a hybrid market of daily commute trips and occasional travel, similar to Amtrak's Downeaster corridor.
    - As in the MnDOT study, potential costs for Extend Rail scenarios are based on the assumption that BNSF would continue to operate the rail service using existing fleet and facilities. Consideration of conversion to Amtrak as the operator is described further in Appendix C: Rail Extension Technical Report.
- **Express Bus:** Scenarios 5 and 6 evaluate the potential discontinuation of Northstar rail service and conversion to Metro Transit express bus operations. Express buses in each scenario would serve all existing Northstar rail stations, providing access to and from downtown Minneapolis via 2nd and Marquette avenues. These scenarios also include

assessment of any potential repayment costs that may be necessary if Northstar rail service is discontinued.

Scenario 1: Commuter Rail - Base

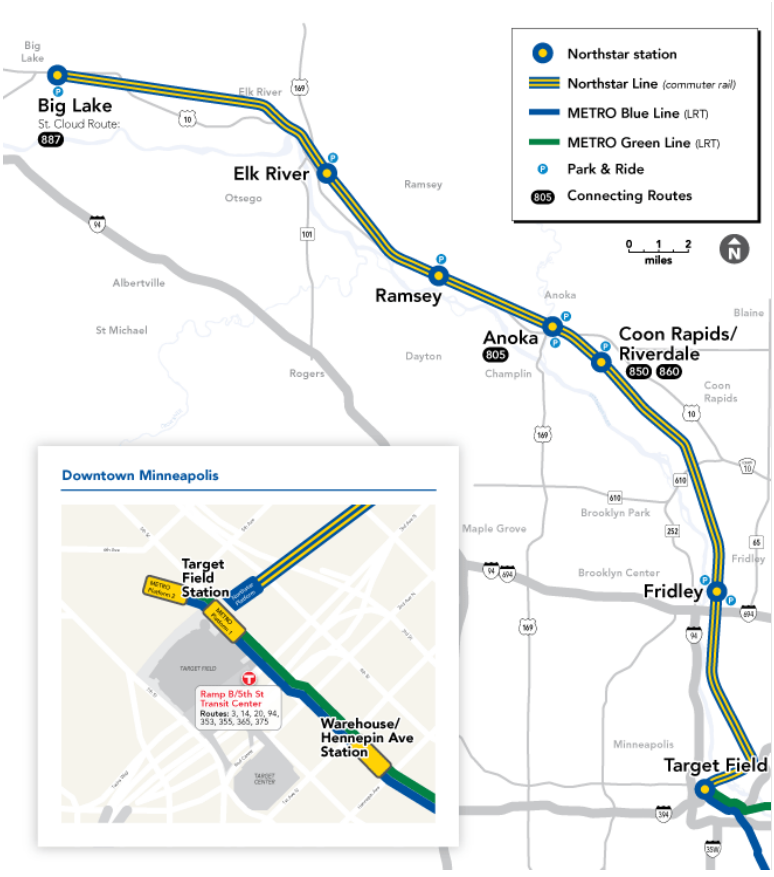
Description

Scenario 1: Commuter Rail – Base would continue Northstar commuter rail operations at the current (reduced) service level, which has been in place since the advent of Covid 19 in early 2020. This scenario also includes two additional round-trip trains on event days.

Route Alignment and Stations

Scenario 1 would maintain service at all current Northstar stations, with all trips serving Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, Fridley, and Target Field stations. All trips would use the existing BNSF-owned rail corridor tracks, as shown in Figure 11.

Figure 11: Scenario 1 Alignment and Stations



Source: Metro Transit.

Frequency and Span of Service

Scenario 1 would maintain the current commuter--oriented service schedule, with two southbound trips from Big Lake Station to Target Field Station in the morning and two northbound trips from Target Field Station to Big Lake Station in the afternoon with times similar to those shown in Table 2. Service would operate on weekdays only. Special event trains (two additional round trips per event day) would operate on an estimated 96 days per year.

Table 2: Weekday Schedule – Scenario 1 (Commuter Rail – Base)

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Big Lake	5:48 AM	Target Field	6:40 AM
2	Southbound	Big Lake	7:18 AM	Target Field	8:10 AM
3	Northbound	Target Field	4:27 PM	Big Lake	5:19 PM
4	Northbound	Target Field	5:30 PM	Big Lake	6:22 PM

Source: Metro Transit.

Estimated Travel Times

Estimated travel times for **Scenario 1** would be consistent with current schedules, with both northbound and southbound trips running at about **52 minutes** between Big Lake Station and Target Field Station. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Scenario 2: Commuter Rail - High

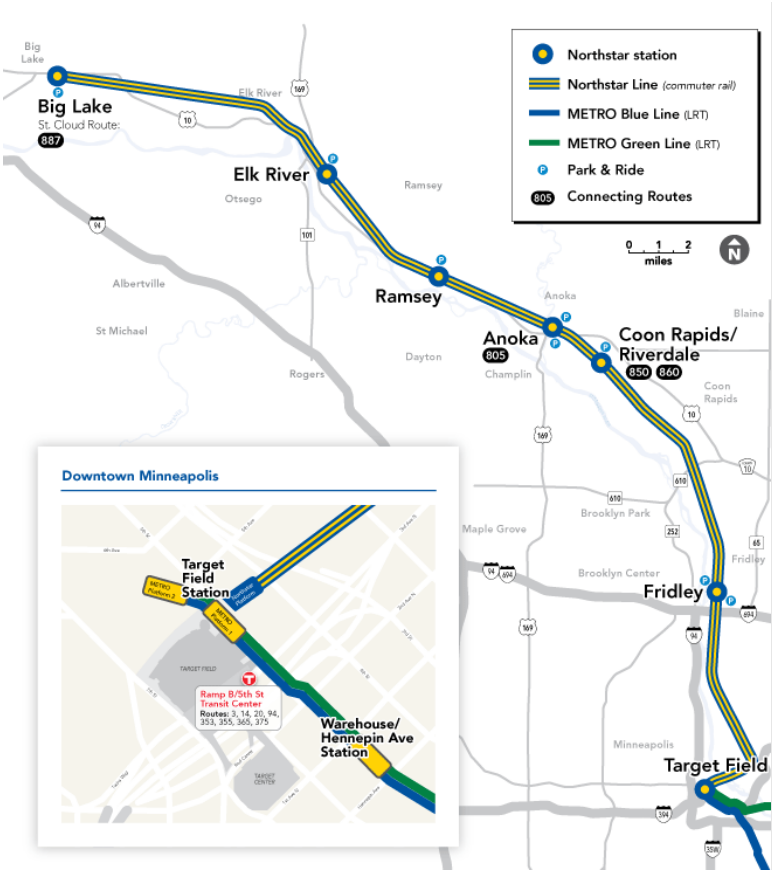
Description

Scenario 2: Commuter Rail – High would restore Northstar commuter rail operations to the pre-pandemic service levels, which were in place prior to 2020. These service levels comprise 12 one-way trips with an addition 2 one-way trips on event days.

Route Alignment and Stations

Scenario 2 would maintain service at all current Northstar stations, with all trips serving Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, Fridley, and Target Field stations. All trips would use the existing BNSF-owned corridor tracks, as shown in Figure 12.

Figure 12: Scenario 2 Alignment and Stations



Source: Metro Transit.

Frequency and Span of Service

Scenario 2 would return to the pre-2020 Northstar service schedule, with 12 total one-way trips per weekday. Peak-direction trips would include five weekday southbound trips in the morning and five northbound trips in the afternoon. In addition to these peak-direction trips, one northbound reverse-commute trip would operate in the morning, and one southbound reverse-commute trip would operate in the evening, as shown in Table 3. Weekend service would consist of 6 one-way trips per day; special event service would add one additional round trip on about 96 event days per year.

Table 3: Weekday Schedule – Scenario 2 (Commuter Rail – High)

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Big Lake	5:00 AM	Target Field	5:52 AM
2	Southbound	Big Lake	5:48 AM	Target Field	6:40 AM
3	Northbound*	Target Field	6:15 AM	Big Lake	7:07 AM
4	Southbound	Big Lake	6:18 AM	Target Field	7:10 AM

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
5	Southbound	Big Lake	6:48 AM	Target Field	7:40 AM
6	Southbound	Big Lake	7:18 AM	Target Field	8:10 AM
7	Northbound	Target Field	3:57 PM	Big Lake	4:49 PM
8	Northbound	Target Field	4:27 PM	Big Lake	5:19 PM
9	Northbound	Target Field	4:57 PM	Big Lake	5:49 PM
10	Southbound*	Big Lake	5:03 PM	Target Field	5:55 PM
11	Northbound	Target Field	5:30 PM	Big Lake	6:22 PM
12	Northbound	Target Field	6:15 PM	Big Lake	7:07 PM

Source: Metro Transit. * Denotes reverse-commute trip.

Estimated Travel Times

Estimated travel times for **Scenario 2** would be consistent with current schedules, with both northbound and southbound trips running at about **52 minutes** between Big Lake Station and Target Field Station. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Scenario 3: Extend Rail to St. Cloud - Base

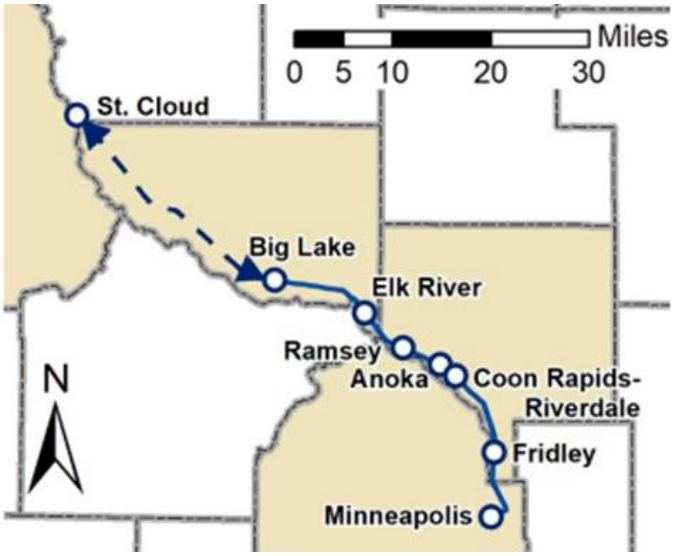
Description

Scenario 3: Extend Rail to St. Cloud – Base would extend daily rail operations to St. Cloud, with four one-way train trips per day and two additional bus round-trips on event days.

Route Alignment and Stations

Scenario 3 would maintain service at all current Northstar stations, while adding service to the existing St. Cloud Amtrak station. All trips would serve St. Cloud, Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, Fridley, and Minneapolis/Target Field stations, using existing BNSF-owned corridor tracks, as shown in Figure 13.

Figure 13: Scenario 3 Alignment and Stations



Source: Northstar Commuter Rail Extension Feasibility Assessment (MnDOT, 2020).

Frequency and Span of Service

Scenario 3 would operate service consistent with the **minimum bi-directional service plan** from MnDOT's Northstar Commuter Rail Extension Feasibility Assessment (2020). Service would include four one-way trips daily, with one AM northbound and one AM southbound trip, and one PM northbound and one PM southbound trip. One midday bus roundtrip would be added, as shown in Table 4. Weekend service would consist of the same four one-way train trips per day, while special event service would be provided on an assumed 96 days per year (assuming continued BNSF/Metro Transit operation) with two bus round trips serving the Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, and Minneapolis/Target Field stations.

Table 4: Weekday Schedule – Scenario 3 (Extend Rail – Base)

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Northbound	Target Field	6:10 AM	St. Cloud	7:28 AM
2	Southbound	St. Cloud	6:47 AM	Target Field	8:10 AM
BUS	Southbound	St. Cloud	10:15 AM	Target Field	12:45 PM
BUS	Northbound	Target Field	1:00 PM	St. Cloud	3:10 PM
3	Southbound	St. Cloud	4:32 PM	Target Field	5:55 PM
4	Northbound	Target Field	5:30 PM	St. Cloud	6:48 PM

Source: Northstar Commuter Rail Extension Feasibility Assessment (2020).

Estimated Travel Times

Estimated travel times for **Scenario 3** would be consistent with the Northstar Commuter Rail Extension Feasibility Study, with northbound train trips scheduled to run **78 minutes** between

Target Field and St. Cloud, and southbound train trips running at **83 minutes** in the opposite direction. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Scenario 4: Extend Rail to St. Cloud - High

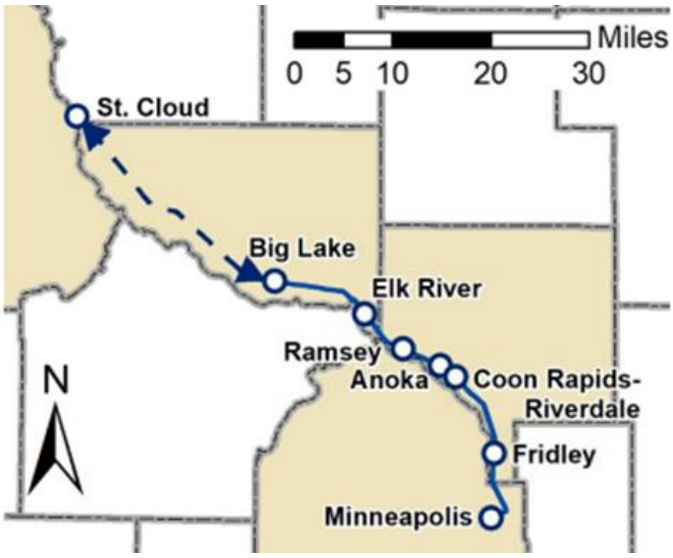
Description

Scenario 4: Extend Rail to St. Cloud – High would extend daily rail operations to St. Cloud, with nine one- way train trips and two additional one-way bus trips on event days.

Route Alignment and Stations

Scenario 4 would maintain service at all current Northstar stations, while adding service to the existing St. Cloud Amtrak station. As in Scenario 3, all trips would serve St. Cloud, Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, Fridley, and Minneapolis/Target Field stations, using existing BNSF-owned corridor tracks, as shown in Figure 14.

Figure 14: Scenario 4 Alignment and Stations



Source: Northstar Commuter Rail Extension Feasibility Assessment (MnDOT, 2020).

Frequency and Span of Service

Scenario 4 would operate service consistent with the **bi-directional service plan** from the Minnesota Department of Transportation (MnDOT) Northstar Commuter Rail Extension Feasibility Assessment (2020). Service would include nine trips per weekday, with five northbound and four southbound trips. An additional midday bus round trip would also be operated, as shown in Table 5. Weekend service would consist of the same four train trips per day as in Scenario 3, while special event service would be provided on 96 days per year with two bus round trips serving the Big Lake, Elk River, Ramsey, Anoka, Coon Rapids-Riverdale, and Minneapolis/Target Field stations.

Table 5: Weekday Schedule – Scenario 4 (Extend Rail – High)

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	St. Cloud	5:48 AM	Target Field	7:11 AM
2	Northbound	Target Field	6:10 AM	St. Cloud	7:28 AM
3	Southbound	St. Cloud	6:47 AM	Target Field	8:10 AM
BUS	Southbound	St. Cloud	10:15 AM	Target Field	12:45 PM
BUS	Northbound	Target Field	1:00 PM	St. Cloud	3:10 PM
4	Northbound	Target Field	4:27 PM	St. Cloud	5:45 PM
5	Southbound	St. Cloud	4:32 PM	Target Field	5:55 PM
6	Northbound	Target Field	4:57 PM	St. Cloud	6:15 PM
7	Northbound	Target Field	5:30 PM	St. Cloud	6:48 PM
8	Southbound	St. Cloud	5:30 PM	Target Field	6:53 PM
9	Northbound	Target Field	6:15 PM	St. Cloud	7:33 PM

Source: Northstar Commuter Rail Extension Feasibility Assessment (2020).

Estimated Travel Times

Estimated travel times for **Scenario 4** would be consistent with the Northstar Commuter Rail Extension Feasibility Study and identical to Scenario 3, with northbound train trips scheduled to run **78 minutes** between Target Field and St. Cloud, and southbound train trips running at about **83 minutes** in the opposite direction. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Scenario 5: Express Bus - Base

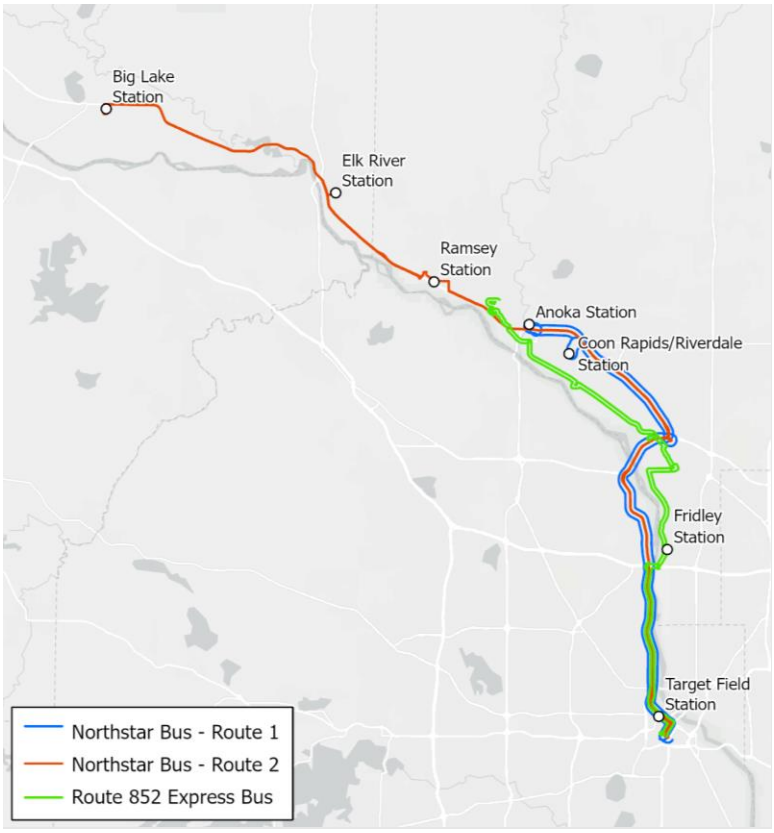
Description

Scenario 5: Express Bus – Base would replace Northstar commuter rail operations with two new bus routes serving most existing rail stations and operating peak-only service every 30 minutes.

Route Alignment and Stations

Scenario 5 would implement two new express bus routes: Route 1 would serve the Big Lake, Elk River, and Ramsey stations, while Route 2 would serve the Anoka and Coon Rapids-Riverdale stations. Both routes would operate primarily via Hwy 10, Hwy 252, and Interstate 94 before serving the Marq2 transit corridor in downtown Minneapolis. The Fridley station would be served via a short deviation on the existing Route 852 which provides service between downtown Minneapolis and Anoka Community & Technical College via US-10, East River Road, and I-94, as shown in Figure 15.

Figure 15: Scenario 5 Alignment and Stations



Frequency and Span of Service

Scenario 5 would operate service every 30 minutes on both Northstar bus routes for the duration of Metro Transit's peak hours, defined as 6:00 to 9:00 AM and 3:00 to 6:30 PM. Trips would operate in the southbound direction only in the morning and northbound direction only in the afternoon, as shown in Table 6 and Table 7. Route 852 would keep its existing service schedules, with Fridley Station added as a stop on all trips that serve East River Road.

Table 6: Weekday Schedule – Scenario 5 (Express Bus – Base) – Northstar Route 1

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Big Lake	6:00 AM	Minneapolis	7:40 AM
2	Southbound	Big Lake	6:30 AM	Minneapolis	8:10 AM
3	Southbound	Big Lake	7:00 AM	Minneapolis	8:40 AM
4	Southbound	Big Lake	7:30 AM	Minneapolis	9:10 AM
5	Southbound	Big Lake	8:00 AM	Minneapolis	9:40 AM
6	Southbound	Big Lake	8:30 AM	Minneapolis	10:10 AM
7	Northbound	Target Field	3:00 PM	Big Lake	4:44 PM
8	Northbound	Target Field	3:30 PM	Big Lake	5:14 PM

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
9	Northbound	Target Field	4:00 PM	Big Lake	5:44 PM
10	Northbound	Target Field	4:30 PM	Big Lake	6:14 PM
11	Northbound	Target Field	5:00 PM	Big Lake	6:44 PM
12	Northbound	Target Field	5:30 PM	Big Lake	7:14 PM
13	Northbound	Target Field	6:00 PM	Big Lake	7:44 PM

Table 7: Weekday Schedule – Scenario 5 (Express Bus – Base) – Northstar Route 2

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Anoka	6:00 AM	Minneapolis	6:46 AM
2	Southbound	Anoka	6:30 AM	Minneapolis	7:16 AM
3	Southbound	Anoka	7:00 AM	Minneapolis	7:46 AM
4	Southbound	Anoka	7:30 AM	Minneapolis	8:16 AM
5	Southbound	Anoka	8:00 AM	Minneapolis	8:46 AM
6	Southbound	Anoka	8:30 AM	Minneapolis	9:16 AM
7	Northbound	Target Field	3:00 PM	Anoka	3:44 PM
8	Northbound	Target Field	3:30 PM	Anoka	4:14 PM
9	Northbound	Target Field	4:00 PM	Anoka	4:44 PM
10	Northbound	Target Field	4:30 PM	Anoka	5:14 PM
11	Northbound	Target Field	5:00 PM	Anoka	5:44 PM
12	Northbound	Target Field	5:30 PM	Anoka	6:14 PM
13	Northbound	Target Field	6:00 PM	Anoka	6:44 PM

Estimated Travel Times

Estimated travel times for **Scenario 5** are based on existing travel speeds of nearby Metro Transit express routes. Northstar Route 1 (Minneapolis-Big Lake) is estimated to run at **one hour and 40 minutes** northbound between downtown Minneapolis and Big Lake and **one hour and 44 minutes** in the southbound direction. The running times for Northstar Route 2 (Minneapolis-Anoka) are estimated at **46 minutes** northbound between downtown Minneapolis and Anoka and **44 minutes** in the southbound direction. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Scenario 6: Express Bus - High

Description

Scenario 6: Express Bus – High would replace Northstar commuter rail operations with two bus routes serving most existing rail stations and operating peak-only service every 15 minutes, thereby doubling the service frequency of Scenario 5.

Route Alignment and Stations

Scenario 6 would implement two new express bus routes identical to those in Scenario 5. Route 1 would serve the Big Lake, Elk River, and Ramsey stations, while Route 2 would serve the Anoka and Coon Rapids-Riverdale stations. Both routes would operate primarily via Hwy 10, Hwy 252, and Interstate 94 before serving the Marq2 transit corridor in downtown Minneapolis. The Fridley station would be served via a short deviation on the existing Route 852, as shown in Figure 16.

Figure 16: Scenario 6 Alignment and Stations

Frequency and Span of Service

Scenario 6 would operate service every 15 minutes on both Northstar bus routes for the duration of Metro Transit's peak hours, defined as 6:00 to 9:00 am and 3:00 to 6:30 pm. Trips would operate only in the southbound direction in the morning and only northbound in the afternoon, as shown in

Table 8 and Table 9. Route 852 would keep its existing service schedules, with Fridley Station added as a stop on all trips that serve East River Road.

Table 8: Weekday Schedule – Scenario 6 (Express Bus – High) – Northstar Route 1

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Big Lake	6:00 AM	Minneapolis	7:40 AM
2	Southbound	Big Lake	6:15 AM	Minneapolis	7:55 AM
3-11			Every 15 minutes until…		Every 15 minutes until…
12	Southbound	Big Lake	8:45 AM	Minneapolis	10:25 AM
13	Northbound	Target Field	3:00 PM	Big Lake	4:44 PM
14	Northbound	Target Field	3:15 PM	Big Lake	4:59 PM
15-25			Every 15 minutes until…		Every 15 minutes until…
26	Northbound	Target Field	6:15 PM	Big Lake	7:59 PM

Table 9: Weekday Schedule – Scenario 6 (Express Bus – High) – Northstar Route 2

TRIP #	DIRECTION	ORIGIN STATION	START TIME	DESTINATION STATION	END TIME
1	Southbound	Anoka	6:00 AM	Minneapolis	6:46 AM
2	Southbound	Anoka	6:15 AM	Minneapolis	7:01 AM
3-11			Every 15 minutes until…		Every 15 minutes until…
12	Southbound	Anoka	8:45 AM	Minneapolis	9:31 AM
13	Northbound	Target Field	3:00 PM	Anoka	3:44 PM
14	Northbound	Target Field	3:15 PM	Anoka	3:59 PM
15-25			Every 15 minutes until…		Every 15 minutes until…
26	Northbound	Target Field	6:15 PM	Anoka	6:59 PM

Estimated Travel Times

Estimated travel times for **Scenario 6** are based on existing travel speeds of nearby Metro Transit express routes and are identical to Scenario 5. Northstar Route 1 (Minneapolis-Big Lake) is estimated at **one hour and 40 minutes** northbound between downtown Minneapolis and Big Lake and **one hour and 44 minutes** in the southbound direction. The running times on Northstar Route 2 (Minneapolis-Anoka) are estimated at **46 minutes** northbound between downtown Minneapolis and Anoka and at **44 minutes** in the southbound direction. A comparison of travel times with congested auto travel times is given in the Transit Scenario Analysis section on ridership.

Transit Scenario Analysis

The primary outcome of the Northstar Corridor Post-Pandemic Study is an evaluation of the identified service scenarios. An initial set of evaluation categories consistent with other transit feasibility studies was shared with the PMT to obtain buy-in prior to developing specific criteria. The PMT identified environmental sustainability as a key topic initially missing from the evaluation. The consultant team determined specific criteria and associated measures for each category. Table 10 lists the individual evaluation criteria approved by the PMT, Corridor Technical Advisory Group (CTAG), and policymakers to evaluation categories. Methodologies for the analyses herein are described in detail in Appendix D.

Table 10: Evaluation categories and criteria

CATEGORY	EVALUATION CRITERIA
RIDERSHIP ESTIMATES	Weekday ridership, annual ridership, productivity, travel time
COMMUNITY DEVELOPMENT	Land use, zoning, development activity
ENVIRONMENTAL SUSTAINABILITY	Auto emissions reductions, direct emissions
FINANCIAL PERFORMANCE	Cost effectiveness, fare recovery, operating costs, capital costs, local share
ACCESSIBILITY AND EQUITY	Service to transit-reliant populations, access to downtown Minneapolis, access for BIPOC and low-income populations

In reporting the results of the evaluation framework, all measures are treated equally. That is, no scores or weights are assigned to any measures. Some metrics are rounded to better reflect their uncertainty and others include likely ranges. The goal of this presentation style is to accurately reflect the high-level precision of this study and appropriately inform decisionmakers.

The following sections detail evaluation criteria and associated metrics grouped by category that make up the evaluation framework. Categories (also noted in Table 10) include ridership estimates, community development, environmental sustainability, financial performance, and accessibility and equity.

Ridership Estimates

Ridership metrics (detailed in Table 11) were estimated for each transit service scenario for comparison. Care has been taken to evaluate the three separate modes in a way that enables fair comparisons. Future studies of a project-specific mode would likely augment this study's methodology to better accommodate individual project characteristics. Results included below

should primarily be considered for relative comparisons between scenarios rather than as official forecasts.

Table 11: Ridership evaluation criteria, metrics, and data sources

EVALUATION CRITERIA	METRICS	DATA SOURCE(S)
Weekday Ridership	Estimated average weekday ridership (excluding special event service); 2019 and 2022 base years; 2040 reported as a range	STOPS model
Annual Ridership	Estimated total annual ridership (including special event service); 2019 and 2022 base years	STOPS model; historical special event ridership data
Productivity	Passengers per in-service hour (weekday); 2019 and 2022 base years	STOPS model; service scenarios
Travel Time	Ratio of transit to auto travel time (average across all stations)	Service scenario schedules; StreetLight auto travel time data

Transit forecasting practice around the country has not fully recalibrated to a pandemic era reality. Current guidance from the Federal Transit Administration (FTA) for Capital Investment Grant applicants is to continue to use a pre-pandemic baseline. In the spirit of this study as a pandemic era investigation, methods applied here deviate from earlier regional study methodologies and include ridership estimates using both 2019 and 2022 baselines. Results presented in subsequent sections will be denoted as "2019 Baseline" and "2022 Baseline."

Results

Travel Time

Table 13 shows the ratio of transit to auto travel times by transit mode across all project stations. The metric is the average of individual stations' travel times to Marquette Avenue and 5th Street (shown in Table 12) compared to auto travel times derived from StreetLight (observed) travel time data. A travel time index of 1.0 indicates that transit and auto travel times are identical, while an index of 0.5 indicates that transit travel times are half as long as auto travel. Both rail modes are highly competitive with auto travel times with index values less than 1.0. The Express Bus mode is about equivalent to auto travel time. The methodology of travel time calculations can be found in Appendix D.

Table 12: Travel Time (in minutes) from Station to 5th St & Marquette by Mode

MODE	FRIDLEY STATION	COON RAPIDS RIVERDALE	ANOKA	RAMSEY	ELK RIVER	BIG LAKE	ST. CLOUD
Commuter Rail	**29**	**37**	**41**	**46**	**52**	**62**	**-**
Extend Rail	**29**	**37**	**41**	**46**	**52**	**62**	**93**
Express Bus	**19**	**36**	**45**	**57**	**72**	**98**	**-**
Auto	**33**	**44.8**	**51.1**	**51.6**	**53.4**	**65.9**	**94.2**

Table 13: Ratio of Transit to Auto Travel Time

MODE	TRAVEL TIME INDEX
Commuter Rail	0.89
Extend Rail	0.90
Express Bus	1.03

Weekday Ridership

Table 14 shows weekday ridership estimates by service scenario for 2019 and 2022 base years as modeled by STOPS. 2040 ridership estimates are presented as a range from ridership modeled on 2022 to ridership modeled on 2019. Ridership forecasting methodology is described in Appendix D.

Table 14: Weekday Ridership Forecast Results by Service Scenario

SERVICE SCENARIO	2019 WEEKDAY RIDERSHIP	2022 WEEKDAY RIDERSHIP	2040 WEEKDAY RIDERSHIP
Commuter Rail Base	1,800	600	700 – 2,000
Commuter Rail High	2,500	1,000	1,100 – 2,900
Extend Rail Base	3,500	1,200	1,600 – 4,600
Extend Rail High	3,800	1,500	1,900 – 5,000
Express Bus Base	900	700	800 – 1,000
Express Bus High	900	700	800 – 1,100

Both Commuter Rail and Express Bus scenarios show minimal growth from the current year to 2040. Much of this can be attributed to competition with other, new service in 2040, particularly Blue Line Extension. The terminal station of Blue Line Extension is located well within park-and-ride catchment areas of the Anoka and Coon Rapids-Riverdale stations and travel times to the core of downtown are similar between the Commuter Rail scenarios and Blue Line Extension.

There is notably minimal difference between ridership on Express Bus scenarios. This is in part due to rounding, but it is also indicative of demand being met with the Base scenario (peak service every 30 minutes).

Annual Ridership

Table 15 shows annualized ridership estimates by service scenario for 2019 and 2022 base years. 2040 ridership estimates are presented as a range of values. Annualization methods for ridership estimates are described in Appendix D.

Table 15: Annual Ridership Forecast Results by Service Scenario

SERVICE SCENARIO	2019 ANNUAL RIDERSHIP	2022 ANNUAL RIDERSHIP	2040 ANNUAL RIDERSHIP
Commuter Rail Base	560,000	200,000	220,000 – 620,000
Commuter Rail High	780,000	320,000	350,000 – 880,000
Extend Rail Base	1,100,000	390,000	490,000 – 1,400,000
Extend Rail High	1,200,000	470,000	560,000 – 1,500,000
Express Bus Base	350,000	220,000	230,000 – 360,000
Express Bus High	350,000	220,000	230,000 – 400,000

Productivity

Productivity by service scenario, measured as passengers per revenue hour, is shown in Table 16. Note that weekday ridership for the Express Bus scenarios includes two routes in addition to ridership at Fridley Station on a modified Route 852. Because multiple services are included, tabulation of revenue hours is more complicated for Express Bus scenarios. As such, boardings per revenue hour are tabulated separately for each route, and Fridley Station ridership is excluded. Productivity results for Extend Rail scenarios are based on the assumption of continued BNSF/Metro Transit operation, and may vary from a service operated by Amtrak.

Table 16: Passengers per Revenue Hour by Service Scenario

SERVICE SCENARIO	2019 WEEKDAY PRODUCTIVITY	2022 WEEKDAY PRODUCTIVITY
Commuter Rail Base	500	170
Commuter Rail High	240	100
Extend Rail Base	383	130
Extend Rail High	236	95
Express Bus Base: Route 1	20	15
Express Bus Base: Route 2	14	8
Express Bus High: Route 1	13	6
Express Bus High: Route 2	5	2

The productivity results in Table 16 highlight that ridership in "high" scenarios does not increase commensurate with level of service. This is true across all modes in 2019 and 2022 base years.

Community Development

The community development category includes criteria for land use, zoning, development activity, and density. The land use and zoning criteria evaluate what Northstar corridor cities envisioned and planned for in their station areas. The development activity and density criteria evaluate actual development in these station areas since 2009. The metrics for these evaluation criteria are summarized in Table 17.

Table 17: Community Development Evaluation Criteria

EVALUATION CATEGORY	METRICS
Land Use	Transit-supportive land uses – 2010 (%)
Land Use	Transit-supportive land uses – 2020 (%)
Land Use	Percent change of station area transit-supportive land uses, 2010 to 2020
Zoning	Presence of transit-supportive zoning/overlay districts
Zoning	Presence of transit-supportive station area plans
Development Activity	Transit-supportive development (non- residential sq ft)
Development Activity	Transit supportive development (units)
Density	Density (units per acre)
Density	Are minimum density expectations for regional transitway stations met for the community type?
Density	Are the target density expectations for regional transitway stations met for the community type?

Since the scenarios evaluated in this study largely use the same station areas, the results for the community development category metrics are presented by station area and city rather than by scenario.

Results

Land Use

Table 18 summarizes the change in transit-supportive land uses in Northstar station areas between 2010 and 2020. During this period the City of Ramsey had the greatest increase in transit-supportive

land uses, followed by the City of Anoka. Minneapolis consistently had the highest amount of transit-supportive land uses. Big Lake also had a high percentage of transit-supportive land uses, due mostly to a large area that is planned for transit-oriented development. The City of Coon Rapids had the lowest percentage of transit-supportive land uses in its station area and had the largest decrease in transit-supportive uses between 2010 and 2020. Note that additional and in some cases substantial developments have occurred in station areas since 2020 that are not encompassed in this analysis.

Table 18: Transit Supportive Land Uses

CITY - STATION	TRANSIT-SUPPORTIVE LAND USES – 2010 (%)	TRANSIT-SUPPORTIVE LAND USES – 2020 (%)	PERCENT CHANGE OF TRANSIT-SUPPORTIVE LAND USES
Minneapolis - Target Field	62.8%	69.8%	11.1%
Fridley	21.6%	21.4%	-0.8%
Coon Rapids	6.1%*	6.1%	0%*
Anoka	24.0%	28.2%	17.5%
Ramsey	17.0%	24.4%	43.5%
Elk River	N/A	33.1%	N/A
Big Lake	N/A	60.0%	N/A
St. Cloud - Amtrak Station	N/A	21.5%	N/A

* Prior versions of this analysis showed a higher proportion of Coon Rapids' station area land use as transit-supportive in 2010, resulting in a decline between 2010 and 2020. This is due to an error in classification of a single parcel, which was classified in the 2010 dataset as single-family attached (townhomes). The percentage has been corrected to show the appropriate classification of single-family detached, a non-transit-supportive land use.

Station area land use maps are included in the Corridor History and Existing Conditions memorandum in Appendix A.

Zoning

All cities with existing Northstar stations have adopted some type of transit-oriented development (TOD) supportive zoning, overlay districts, or station area plans, as shown in Table 19. These cities also have regulations that either specifically reference TOD (e.g., a "TOD Overlay" in Fridley and a "TOD Employment-Emphasis" district in the City of Anoka) or are zoned for high-density use. Additionally, all of the current Northstar corridor cities except for Minneapolis have a Northstar-specific station area plan. Most of the stations are also tax-increment financing (TIF) districts. Saint Cloud does not have any existing TOD regulations for the Amtrak station area; however, the current comprehensive plan notes that the area could be redeveloped for TOD if Northstar were extended to the city, and the city's East End Vision plan positions the Amtrak station as a catalyst for future development.

Table 19: Transit-Supportive Zoning and Plans

CITY - STATION	PRESENCE OF TRANSIT-SUPPORTIVE ZONING/OVERLAY DISTRICTS	PRESENCE OF TRANSIT-SUPPORTIVE STATION AREA PLANS
Minneapolis - Target Field	Yes	Yes*
Fridley	Yes	Yes
Coon Rapids	Yes	Yes
Anoka	Yes	Yes
Ramsey	Yes	Yes
Elk River	Yes	Yes
Big Lake	Yes	Yes
St. Cloud - Amtrak Station	No	Yes*

*While there is no Northstar-specific station area plan, the Minneapolis 2040 comprehensive plan provides for transit-supportive density in the Target Field station area. St. Cloud's East End Vision plan shows the existing Amtrak station as a catalyst for future development.

Development Activity

Table 20 summarizes station area development since 2009 and classifies the development as transit-supportive or non-transit-supportive development. Non-residential development is measured in square feet and residential developments are measured in units. Minneapolis is excluded from this table because they did not provide development data and Saint Cloud is excluded because there is not an existing Northstar station.

All of the residential development that occurred along the existing Northstar corridor was transit-supportive (i.e., not single-family detached development). The majority of transit-supportive non-residential development occurred in the City of Ramsey. Most of the non-residential development along the corridor was non-transit supportive (e.g., industrial parks or auto-centric commercial development). Most of this non-residential, non-transit-supportive development took place in Fridley; however, it is notable that the non-transit supportive industrial development in Fridley added over 3,500 jobs to the station area, according to data provided by the city, which could contribute to an increase in ridership.

Table 20: Station Area Development since 2009

CITY - STATION	NUMBER OF TRANSIT-SUPPORTIVE PROJECTS	NON-RESIDENTIAL (SQ FT)	RESIDENTIAL (UNITS)	NUMBER OF NON-TRANSIT-SUPPORTIVE PROJECTS	NON-RESIDENTIAL (SQ FT)	RESIDENTIAL (UNITS)
Minneapolis - Target Field	N/A	N/A	N/A	N/A	N/A	N/A
Fridley	8	0	809	3	2,275,000	0
Coon Rapids	13	45,094	525	1	130,356	0
Anoka	5	0	598	1	0	0
Ramsey	16	1,035,347	863	3	218,526	0
Elk River	3	0	158	7	288,140	0
Big Lake	4	0	255	0	0	0
St. Cloud - Amtrak Station	N/A	N/A	N/A	N/A	N/A	N/A
Total	49	1,080,441	3,208	15	2,912,022	0

Development Density

Table 21 compares residential density of station area developments since 2009 to the regional transitway station area minimum and target densities defined in the Transportation Policy Plan. Minneapolis is excluded from this table because it did not provide development data and Saint Cloud is excluded because there is not an existing commuter rail station. Of the remaining cities, Fridley, Ramsey, and Big Lake met the minimum residential density guidelines for transitway stations and none of the station areas met the target density guideline for the corresponding community type.

Table 21: Residential Density

CITY - STATION	TPP COMMUNITY TYPE	MINIMUM DENSITY (UNITS PER ACRE)	TARGET DENSITY (UNITS PER ACRE)	ACTUAL DENSITY (UNITS PER ACRE)	ARE MINIMUM DENSITY EXPECTATIONS MET?	ARE THE TARGET DENSITY EXPECTATIONS MET?
Minneapolis - Target Field Station	Urban Center	N/A	N/A	N/A	N/A	N/A
Fridley	Urban	25	50-100+	26.77	Yes	No
Coon Rapids	Suburban	20	40-75+	13.20	No	No
Anoka	Suburban	20	40-75+	15.04	No	No
Ramsey	Emerging Suburban Edge	15	40-75+	20.51	Yes	No
Elk River	Emerging Suburban Edge*	15	40-75+	2.20	No	No
Big Lake	Emerging Suburban Edge*	15	40-75+	15.92	Yes	No
St. Cloud - Amtrak Station	N/A	N/A	N/A	N/A	N/A	N/A

* The Cities of Elk River and Big Lake are outside of the Met Council's jurisdiction and are not assigned a Community Type in the agency's TPP. Emerging Suburban Edge was used for these cities based on guidance from Council staff.

Maps showing parcels and development sites that have been developed or redeveloped since 2009 can be found in Appendix A. These maps also categorize development as transit-supportive or non-transit-supportive.

Environmental Sustainability

Table 22 shows the evaluation criteria selected for environmental sustainability. Environmental sustainability was assessed using the FTA's Capital Investment Grant (CIG) methodology which estimates the change in auto vehicle miles travelled (VMT) and direct transit vehicle emissions within the corridor for each service scenario. All results are given in annual tons of carbon dioxide equivalent (CO2e) for a comprehensive look at environmental impacts. All methodology used in evaluating environmental sustainability is described in Appendix D.

Table 22. Environmental Sustainability Evaluation Criteria, Metrics, and Data Sources

EVALUATION CRITERIA	MEASURES	DATA SOURCE(S)
Auto Emissions Reductions	Change in CO2 emissions due to increase/decrease in regional auto VMT	Regional STOPS model; FTA estimates by mode
Direct Emissions	Estimated CO2 emissions per passenger trip	Regional STOPS model; FTA estimates by mode
Net Emissions	Net emissions change (auto + transit)	Regional STOPS model; FTA estimates by mode

Results

Auto Emissions Reductions

Change in auto VMT relative to the no-build scenario (see Schedules section under Ridership Estimates Methods for definition) was calculated for each service scenario to derive the annual reduction in tons of carbon dioxide equivalent (CO2e) for each scenario as shown in Table 23.

Table 23: Change in Auto Emissions by Service Scenario (Tons CO2e)

SERVICE SCENARIO	CHANGE IN AUTO EMISSIONS (2019 BASE YEAR)	CHANGE IN AUTO EMISSIONS (2022 BASE YEAR)
Commuter Rail Base	-4,600	-1,800
Commuter Rail High	-6,200	-3,000
Extend Rail Base	-11,500	-5,600
Extend Rail High	-12,000	-6,000
Express Bus Base	-2,100	-1,000
Express Bus High	-2,100	-1,000

Direct Emissions

Table 24 shows annual direct emissions from transit vehicles in tons of carbon dioxide equivalent (CO2e) by service scenario as calculated using FTA's CIG methodology.

Table 24: Direct Transit Vehicle Emissions by Service Scenario (Tons CO2e)

SERVICE SCENARIO	TRANSIT DIRECT EMISSIONS
Commuter Rail Base	450
Commuter Rail High	1,500
Extend Rail Base	1,200
Extend Rail High	2,200
Express Bus Base	1,000
Express Bus High	2,000

Net Emissions

Table 25 shows a breakdown of changes in emissions by service scenario including a range of net emissions for 2019 and 2022 model base years. All service scenarios realized a net emissions reduction in the 2019 model, whereas only the Commuter Rail Base and Extend Rail High and Base scenarios showed a net emissions reduction in the 2022 model.

Table 25: Net Emissions (Transit – Auto) by Service Scenario (Tons CO2e)

SERVICE SCENARIO	TRANSIT DIRECT EMISSIONS	CHANGE IN AUTO EMISSIONS (2019 BASE YEAR)	2019 NET EMISSIONS	CHANGE IN AUTO EMISSIONS (2022 BASE YEAR)	2022 NET EMISSIONS
Commuter Rail Base	400	-4,600	-4,200	-1,800	-1,300
Commuter Rail High	1,500	-6,200	--4,700	-3,000	-1.500
Extend Rail Base	1,200	-11,500	-10,300	-5,600	-3,200
Extend Rail High	2,200	-12,000	-10,000	-6,000	-3,400
Express Bus Base	1,000	-2,100	-1,100	-1,000	+0
Express Bus High	2,000	-2,100	-100	-1,000	+1,000

Financial Performance

Financial performance evaluation criteria include operations and maintenance costs, capital costs, and various measures calculated based on cost, ridership, and expected revenue. These criteria and metrics are shown in Table 26. The methodology for all financial performance metrics is described in Appendix D.

Table 26: Financial Performance Evaluation Criteria, Metrics, and Data Sources.

EVALUATION CRITERIA	MEASURES	DATA SOURCE(S)
Cost-Effectiveness	Total operations and maintenance cost per passenger trip	Regional STOPS model; service scenarios; fare data
Fare Recovery	Percent of operations and maintenance costs covered by fares	Regional STOPS model; service scenarios; fare data
Operating Costs	Total annual operations and maintenance costs	Service scenarios
Capital Costs	Estimated total capital costs for project, including any repayment of federal funds	Service scenarios
Local Share	Expected share of operations and maintenance costs to be borne by local communities	Service scenarios

Results

Operations and Maintenance Costs

Estimated total annual operations and maintenance costs for each scenario are shown in Table 27.

Table 27: Operations and Maintenance Costs by Service Scenario (Annual, 2023 $)

SERVICE SCENARIO	ESTIMATED ANNUAL OPERATIONS AND MAINTENANCE COST (MILLIONS)
Commuter Rail Base	$12.0M
Commuter Rail High	$22.6M
Extend Rail Base*	$17.3M
Extend Rail High*	$26.0M
Express Bus Base	$1.9M
Express Bus High	$3.4M

* Note: Extend Rail results are shown using unit costs scaled from commuter rail service and assume continued operation under BNSF/Metro Transit. Analysis of costs under an Amtrak-operated option (see Appendix C) indicated potentially lower costs if developed as a stand-alone (i.e., not connected with national network) corridor.

Cost Effectiveness

The estimated operations and maintenance cost per passenger trip for each scenario (calculated based on annual 2022 base year ridership) is shown in Table 28.

Table 28: Cost Effectiveness by Service Scenario

SERVICE SCENARIO	OPERATIONS AND MAINTENANCE COST PER PASSENGER TRIP*
Commuter Rail Base	$63.31
Commuter Rail High	$70.55
Extend Rail Base	$44.46
Extend Rail High	$55.30
Express Bus Base	$8.89
Express Bus High	$15.53

* Note: Operations and maintenance costs per trip are calculated based on 2022 base year ridership results.

Fare Recovery

The estimated percentage of operations and maintenance costs covered by fare revenue for each scenario (calculated based on 2022 base year ridership) is shown in Table 29.

Table 29: Fare Recovery by Service Scenario

SERVICE SCENARIO	FARE RECOVERY RATIO (REVENUE AS PERCENT OF COSTS)*
Commuter Rail Base	5.4%
Commuter Rail High	4.8%
Extend Rail Base	6.6%
Extend Rail High	5.8%
Express Bus Base	15.0%
Express Bus High	8.6%

* Note: Fare recovery is calculated based on 2022 base year ridership results.

Capital Costs

Estimated total direct capital costs for each scenario (excluding ongoing debt service costs and potential repayment of federal funds) are shown in Table 30.

Table 30: Direct Capital Costs by Service Scenario

SERVICE SCENARIO	DIRECT CAPITAL COSTS (MILLIONS)*
Commuter Rail Base	$0
Commuter Rail High	$0
Extend Rail Base	$35.5M
Extend Rail High	$66.6M
Express Bus Base	$7.2M
Express Bus High	$13.2M

* Note: Direct capital costs assume no additional costs required for continuation of service. Extend Rail scenarios include track upgrades at St. Cloud and Big Lake stations and assume continued use of Northstar rolling stock. Express bus scenarios assume the purchase of new motorcoach vehicles sufficient to operate Northstar replacement service.

Estimated indirect capital costs (ongoing debt repayment, decommissioning costs, grant repayment costs, sale/disposal of assets, and penalties) are shown in Table 31.

Table 31: Indirect Capital Costs by Service Scenario

SERVICE SCENARIO	ONGOING COSTS (DEBT)	DECOMMISSIONING COSTS	REPAYMENT COSTS	SALE/ DISPOSAL	PENALTIES
Commuter Rail Base	$14.4M	$0	$0	$0	$0
Commuter Rail High	$14.4M	$0	$0	$0	$0
Extend Rail Base*	$14.4M	$0	$0	$0	$0
Extend Rail High*	$14.4M	$0	$0	$0	$0
Express Bus Base**	$14.4M	$0.4M	$10.6M-$161.9M	($11.1M)	$0
Express Bus High**	$14.4M	$0.4M	$10.6M-$161.9M	($11.1M)	$0

* Note: Extend Rail scenarios assume planned service complies with FTA New Starts FFGA, with no repayment required. This may require a waiver from FTA due to the schedule differences between rush-hour oriented commuter rail and bidirectional passenger rail. Similarly, Extend Rail scenarios assume operations with existing Northstar equipment, with no conversion to Amtrak fleet.
** Note: Express bus scenarios assume some FTA repayment will be required. Due to uncertainty regarding FTA's potential decisions regarding the appropriate utilization of Northstar assets, a range of repayment values is given. At minimum, FTA's share of rolling stock sold ($10.6M) would need to be repaid. A moderate repayment could be based on the federal share of the net book value of Northstar assets, estimated at $73.4 million as of June 30, 2022. At maximum, FTA could require the repayment of all $161.9M in federal funding for the project. Penalties for rail termination assume adequate notice of six months if terminating with a contract period, or one year if terminating at the end of a five-year contract term. Repayment may not be required after the full lifespan of assets funded by federal grants has passed, estimated to be between 12 and 40 years. More analysis may be required to accurately determine decommissioning costs for assets on BNSF right-of-way.

Subsidy per Passenger

The operations and maintenance costs per trip that are not covered by fares, or subsidy per passenger estimates, are shown for each service scenario in Table 32.

Table 32: Estimated Subsidy per Passenger by Service Scenario

SERVICE SCENARIO	SUBSIDY PER PASSENGER
Commuter Rail Base	$59.92
Commuter Rail High	$67.15
Extend Rail Base	$41.05
Extend Rail High	$51.88
Express Bus Base	$7.56
Express Bus High	$14.20

* Note: Subsidy per passenger is calculated based on 2022 base year ridership results.

Accessibility and Equity

Table 33 describes the specific evaluation criteria and their corresponding measures that were applied for accessibility and equity. Relative levels of equity of the service scenarios are determined by two metrics: rides by people from zero-car households and ability of BIPOC and low-income populations to access downtown Minneapolis using each service mode at different travel time thresholds. All accessibility methodology is described in Appendix D.

Table 33. Accessibility And Equity Evaluation Criteria, Measures, and Data Sources

EVALUATION CRITERIA	MEASURES	DATA SOURCE(S)
Service to Transit-Reliant Populations	Number of trips by zero-car households (weekday)	STOPS ridership forecasting model output
Access to Downtown Minneapolis	Number of people with access to downtown Minneapolis in 15-minute incremental thresholds.	American Community Survey (ACS) 2016-2020, Open Street Map, StreetLight LBS data
Access For BIPOC and Low-Income Populations	Number of BIPOC and low-income individuals with access to downtown Minneapolis in 15-minute incremental thresholds.	American Community Survey (ACS) 2016-2020, Open Street Map, StreetLight LBS data

Results

Service to Transit-Reliant Populations

Table 34 shows the 2019-based weekday forecasted trips from zero-car households by service scenario as modeled by STOPS. For all scenarios, estimates remain at or below 50 trips by zero-car households, similar to the 40 daily trips observed in the 2016 On-Board Survey. These trips comprise only a small portion of overall estimated ridership, indicating that the majority of riders in the Northstar Corridor have access to a vehicle.

Table 34: Trips from Zero-Car Households by Service Scenario

SERVICE SCENARIO	2019 TRIPS FROM ZERO CAR HOUSEHOLDS	PERCENT OF TOTAL TRIPS
Commuter Rail Base	20	1.1%
Commuter Rail High	40	1.6%
Extend Rail Base	25	0.7%
Extend Rail High	50	1.3%
Express Bus Base	10	1.1%
Express Bus High	30	3.3%

Access to Downtown Minneapolis (Total Population, BIPOC Population, and Low-Income Population)

Table 35 through Table 37 compare park-and-ride accessibility between service scenarios cumulatively at 30, 60, 90, and 120-minute thresholds. Extend Rail results resemble those of commuter rail until the 90-minute threshold, as service is identical between scenarios outside of St. Cloud, after which point Extend Rail totals exceed those of commuter rail due to its serving additional populations. Longer travel times associated with express bus service yield lower accessibility than both rail scenarios. Commuter rail estimates are entirely captured within the 90-minute threshold and so are not represented in the 120-minute threshold.

Table 35. Comparison of access to downtown Minneapolis – Total Population

TIME THRESHOLD	COMMUTER RAIL SCENARIOS	EXTEND RAIL SCENARIOS	EXPRESS BUS SCENARIOS
30 min	170,183	170,183	170,183
60 min	843,843	843,843	655,713
90 min	934,721	961,462	838,013
120 min	-	1,080,426	895,314

Table 36. Comparison of access to downtown Minneapolis – BIPOC Population

TIME THRESHOLD	COMMUTER RAIL SCENARIOS	EXTEND RAIL SCENARIOS	EXPRESS BUS SCENARIOS
30 min	81,688	81,688	81,688
60 min	253,153	253,153	223,059
90 min	261,722	269,209	250,582
120 min	-	280,911	255,948

Table 37. Comparison of access to downtown Minneapolis – Low-Income Population

TIME THRESHOLD	COMMUTER RAIL SCENARIOS	EXTEND RAIL SCENARIOS	EXPRESS BUS SCENARIOS
30 min	20,422	20,422	20,422
60 min	65,430	65,430	56,429
90 min	67,507	76,917	63,064
120 min	-	86,434	64,938

Evaluation Summary

The evaluation results presented in this report offer context for future decision-making regarding transit service in the Northstar Corridor. Since this study is not intended to recommend a single course of action, results are organized to facilitate comparisons across the three transit modes under consideration and between each of the six transit service scenarios evaluated.

As shown in Table 38, the scenarios evaluation included five analysis categories to differentiate between the transit modes and base/high levels of service.

Table 38. Evaluation Summary by Category

CATEGORY	EVALUATION CRITERIA	MAJOR DIFFERENCES?
RIDERSHIP	Weekday ridership, annual ridership, productivity, travel time	Yes
COMMUNITY DEVELOPMENT	Land use, zoning, development activity	No
ENVIRONMENTAL SUSTAINABILITY	Auto emissions reductions, direct emissions	No
FINANCIAL PERFORMANCE	Cost effectiveness, fare recovery, operating costs, capital costs, local share	Yes
ACCESSIBILITY AND EQUITY	Service to transit-reliant populations, access to downtown Minneapolis, access for BIPOC and low-income populations	Yes

Three of these categories exhibited major differences and are described here:

- **Ridership:** Weekday and annual ridership varied significantly between transit modes, scenarios, and forecast years, with the highest ridership predicted in the Extend Rail scenarios. Within each transit mode, productivity was highest for the base service scenarios, indicating that higher service levels may yield diminishing returns in terms of ridership. Travel times indicate that rail scenarios are most competitive with car travel, while bus service would offer marginally slower travel times to and from downtown Minneapolis from most stations.
- **Financial Performance:** Financial evaluation measures showed clear differences between transit modes, with variation between base and high scenarios that is consistent with ridership results. Operations and maintenance costs are expected to be highest in the rail scenarios, with Extend Rail exceeding the costs required to provide similar service on commuter rail. Bus scenarios offer much lower potential operating costs but could be subject to full or partial repayment of federal grants, which could require significant outlays by Northstar Corridor funding partners.

- **Accessibility and Equity:** Based on the faster travel times exhibited by rail, Scenarios 1 through 4 offer better access to downtown Minneapolis employment destinations, including for BIPOC and low-income populations. (See Appendix D, pp. 17 – 29 for detailed discussion of methodology and results.)

Financial performance and ridership are essential quantitative factors in the overall evaluation and are summarized in Table 39.

Table 39. Financial and Ridership Results Summary

EVALUATION CATEGORY	NORTHSTAR ACTUALS	COMMUTER RAIL BASE	COMMUTER RAIL HIGH	EXTEND RAIL BASE	EXTEND RAIL HIGH	EXPRESS BUS BASE	EXPRESS BUS HIGH
CAPITAL COSTS (2025$)	N/A	None	None	$36M+*	$67M+*	$7M	$13M
RISK OF FTA REPAYMENT	N/A	Unlikely	Unlikely	Possible	Possible	Likely (Est. ~$75M)	Likely (Est. ~$75M)
ANNUAL OPERATING COSTS (2023$)	$11.9M	$12M	$23M	$17M+*	$26M+*	$2M	$3.5M
RIDERSHIP POTENTIAL (# OF WEEKDAY RIDERS)	275	600	1,000	1,200	1,500	700	700
SUBSIDY PER PASSENGER	Est. $150	$60	$67	$41	$52	$8	$14

* Costs for Extending Rail to St. Cloud are preliminary and could increase depending on future project decisions and operating arrangements.

The remaining evaluation categories did not exhibit major differences between scenarios:

- **Community Development:** Evaluation criteria within the Community Development category are primarily related to land use and development within station areas. Since all scenarios would provide transit service to the six existing Northstar stations outside downtown Minneapolis, differences between scenarios are primarily related to the addition of St. Cloud in the Extend Rail scenarios. (See pp. 29-33 of this report for detailed results; see Appendix D, pp. 10-12 for detailed methodology.)
- **Environmental Sustainability:** Based on the ridership forecasts and expected travel patterns, each scenario and transit mode was found to reduce automobile travel. Direct emissions from transit were fully offset by the reduction in auto emissions in at least one forecast year for all scenarios and transit modes. (See pp. 34-35 of this report for detailed results; see Appendix D, pp. 12-13 for detailed methodology.)

Key Factors Analysis

The evaluation results contained in this report illustrate the tradeoffs between scenarios and transit modes, and they also highlight important considerations for decision-making regarding Northstar. A summary of key decision factors is provided for each mode below.

Commuter Rail

A continuation of Northstar commuter rail service may allow for some ridership recovery, though the amount is uncertain. The evaluation metrics for this mode build on the historic performance of the service.

Pros

- Ridership is likely to increase with return to pre-pandemic service, but it is not expected to return to 2019 levels in the near term due to changes in commute patterns and in the downtown Minneapolis employment market.
- Special event service could still be very productive in the future, as event attendance in Minneapolis has largely rebounded from the pandemic.

Cons

- Northstar's operating costs per passenger are much higher than its peers. Current service levels minimize total costs, but subsidy per passenger remains high as well.
- The current reduced service schedule (Base scenario of this study) offers limited utility for riders and limited potential for ridership recovery.

Risks

- Ridership may not rebound to levels in line with expectations.

Extend Rail

Extending rail service to St. Cloud would be a new type of service that introduces a number of new complexities. Because of the unprecedented nature of this option, its evaluation metrics carry uncertainty.

Pros

- Extension of the Northstar Corridor to St. Cloud would require further analysis but does offer the potential to reach new ridership markets.
- This service is the least commuter-centric option, well-suited to accommodate changes in travel behaviors due to remote work. This service is more akin to a 'hybrid' service serving both commuter and intercity markets.
- Repayment of FTA investment funds may be less likely or lower in total than for the express bus scenarios, depending on various factors including private or public operator, ultimate service schedule, and number/location of stations served.
- Rail service between St. Cloud and Minneapolis is estimated to provide a faster trip than driving during the AM peak period.

Cons

- If operations were converted to Amtrak, it would require a new ridership and revenue forecast completed using Amtrak's state-supported cost model. High-level analysis completed during this study indicates that annual Amtrak operating costs may be lower than operating Northstar today, but capital improvements will be necessary to realize an Amtrak-operated line. Operating costs will differ from the estimates provided in this report.
- Engineering studies are needed to develop the design specifications and refine capital costs for track improvements needed in St. Cloud, and potentially between Target Field and downtown Saint Paul.

Risks

- Expansion of service will require additional negotiations with BNSF.
- Negotiations with FTA may also be required to permanently adjust service levels.
- Though ridership estimates were highest for the Extend Rail sceanrios, there is uncertainty around the adoption of this new style of service by current non-transit users.

Express Bus

Modifying the service mode in the Northstar Corridor to bus would mean a return to service similar to what existed prior to rail investment. Express bus service has seen large declines in use during the pandemic era.

Pros

- Operations and maintenance savings are estimated to be at least $10 million per year based on the scenarios analyzed.
- Bus service can more easily be expanded or contracted based on passenger demand.

Cons

- Ridership is anticipated to be much lower than other options.
- Travel times are less competitive via bus than rail.
- Repayment is subject to FTA discretion and may be impacted by potential legal action. Several scenarios are possible:
  - At minimum, FTA would need to be reimbursed for the federal share of any rail assets sold, estimated at $10.6 million.
  - At maximum, FTA could require the repayment of the entire federal share of the project, totaling $161.9 million.
  - A negotiated repayment could result in a value between the two, potentially on the basis of the federal share of Northstar assets at their current value, estimated at $73.4 million as of June 30, 2022.

Risks

- Conversion of Northstar to express bus operations offers the potential for lower annual operations and maintenance costs but carries a significant risk of FTA repayment for rail capital costs.
- The amount required for repayment is impossible to predict without beginning negotiations with FTA.

Next Steps

Future decisions on transit service in the Northstar Corridor will be based on policy and public input considerations that go beyond the scope of this study. Ultimately, the transit mode and service levels selected will be adopted by policymakers based on local and regional needs, including the potential for future growth, the need to address funding considerations, and the ongoing desire to provide reasonably cost-effective and equitable transit. Public engagement will also be an essential component of any service decisions made. Project partners will consider these and other factors in pursuing a course of action that best meets the needs of Northstar Corridor communities, the Twin Cities metropolitan area, and the state of Minnesota. The diagram shown in Figure 17 illustrates the proposed next steps for selecting a preferred transit mode and level of service for the Northstar Corridor.

Figure 17: Next Steps