

# Northstar Commuter Rail Extension Feasibility Assessment

## Appendix D – Technical Memorandum on Operating Assumptions for the Northstar Express Service Alternative

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Photo Credit: Dave Gonzalez

Prepared for



by



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## 1. Introduction

This Technical Memorandum describes the **Northstar Express Service Alternative** and presents the preliminary proposed Operating Plan for the introduction of **Northstar Express** service between Minneapolis and St. Cloud. The extension of service to St. Cloud would be provided within the existing Northstar commuter service framework now provided by BNSF and Metro Transit.

This proposal has been designed to minimize the amount of additional capital investment that would be needed to operate the proposed **Northstar Express** service. It has also considered the description of existing conditions provided by BNSF that may constrain the extension of Northstar service to St. Cloud. These constraints are documented in the Technical Memorandum on Existing Constraints (Appendix A).

By carefully considering the constraints described by BNSF, which directly affect the feasibility and cost of providing a new service and incorporating them into the proposal as part of the Operating Assumptions presented below, this proposal has endeavored to meet the requirements of the railroad, the public agencies and the public stakeholders involved.

## 2. Description of Proposed Service

The **Northstar Express Alternative** provides two new round-trip non-stop **Northstar Express** trains, one in the morning and one in the afternoon peak period between Minneapolis and St. Cloud. Three existing Northstar commuter trains have minor schedule changes to accommodate the **Northstar Express** service.

On Saturdays and Sundays/holidays, two new round trip **Northstar Express** trains have been scheduled between Minneapolis and St. Cloud, one operating in the morning and the other in the afternoon. These trains are in addition to the existing Northstar commuter service on Saturdays and Sundays/holidays.

The **Northstar Express Service Alternative** has an option for new non-stop midday bus service, designated as the **Northstar Midday Shuttle Bus**. The shuttle bus would depart St. Cloud mid-morning and would return to St. Cloud in mid-afternoon.

### **Northstar Express Service Alternative –**

- a. **Weekday Morning** Peak Period - One new train operating Express from St. Cloud to Minneapolis; one new train operating Express from Minneapolis to St. Cloud
- b. **Weekday Afternoon** Peak Period - One new train operating Express from St. Cloud to Minneapolis; one new train operating Express from Minneapolis to St. Cloud
- c. **Saturday and Sunday/Holiday** – two new northbound and two new southbound trains would operate Express between Minneapolis and St. Cloud

## 3. Operating Assumptions

Operating Assumptions are a critical part of this feasibility assessment. Operating assumptions reflect a variety of factors considered in the operations analysis of the proposed service including:

- Service requests (i.e., frequencies, departure/arrival times) from the public stakeholders

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(prospective passengers, the communities, etc.);

- Physical limitations of the railroad and its environment;
- Capacity limitations and the operating requirements of the railroad;
- Effects of new service on the existing passenger and freight services operating in the corridor;
- Non-revenue “deadhead” equipment train trips which are needed to position train sets and crews for revenue service and/or enable crews to go on and off duty at appropriate times and locations;
- Effects of new service on the railroad’s ability to expand its freight service to meet increased traffic demands in the future;
- Northstar locomotive and passenger car fleet considerations;
- Existing collective bargaining agreements in effect on BNSF affecting railroad train crew members;
- Existing service contract between Metro Transit and BNSF;
- Capital expenditures that would be needed to initiate the extended service;
- Operating and maintenance expenses that would be needed to run the new service;
- Budget limitations affecting the State and municipal agencies;
- Federal Railroad Administration (FRA) regulations and their effects on service planning; and
- The safety and reliability of the proposed extended Northstar commuter service.

The following sub-sections discuss the Operating Assumptions for the **Northstar Express Service Alternative**.

#### 3.1. Train Crews and Equipment

1. FRA regulations affect most aspects of the safety of operation of the BNSF, Amtrak, and Northstar train operations and maintenance. Compliance with applicable FRA regulations has been built into the proposal as a basic requirement and assumption. The FRA Hours of Service regulations limit the length of the train crew workdays and specify the minimum rest period between workdays.
2. The **Northstar Express** trains would be operated as a part of the existing Northstar commuter rail service, a cooperative effort by Metro Transit and BNSF Railway.
3. The **Northstar Express Service Alternative** proposal anticipates that the extended service would require five operational train sets, one more than is currently needed. It is suggested that the additional train set consist of one locomotive, two bi-level passenger coaches and two bi-level cab control passenger cars. The second cab control passenger car is important to provide a replacement should one of the existing cab control cars be damaged or require a period out of service for maintenance or repairs. Additional spare equipment may also be required to augment the two locomotives and two cab control passenger cars now available as spares. This will permit the substitution of equipment as needed for the required inspections and maintenance on a timely basis and will support the dependability of the Northstar commuter service.
4. The additional locomotive(s), passenger cars, and cab control passenger cars that would be added to the Northstar fleet would increase the workload on the forces at the BLMF. Additional employees have been proposed to augment the current Metro Transit staff at the BLMF.

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5. The **Northstar Express Service Alternative** anticipates the leasing of surplus equipment of the same types now in use by Northstar from other commuter agencies at favorable pricing. The cost would include rehabilitating, painting (or wrapping) the locomotive(s) and passenger cars to match the appearance and operation of the existing Northstar fleet inside and out as much as possible. Using this alternative is important to maintain the simplified maintenance and parts inventory programs (and employee training and qualification) which are now important operating, maintenance, and budget advantages for Northstar. Leasing surplus equipment from other carriers also avoids the delay and cost involved with a capital procurement until such time as the demand for the new service has been proven by ridership levels. It has been assumed that the installation of the appropriate Positive Train Control apparatus in the additional locomotives and cab control passenger cars would be part of the expense of acquiring the additional rolling stock.
6. BNSF train crews from the existing BNSF crew district base at Northtown Yard would continue to be used to operate the service and would support the train crew requirements of the **Northstar Express Service Alternative**:
  - a. Crews would continue to go on and off duty at the same locations they presently use.
  - b. No BNSF crews would go on and off duty at St. Cloud.
  - c. Train crew work schedules included in the **Northstar Express Service** Alternative are preliminary and primarily for cost estimation purposes. They are subject to revision. When BNSF addresses the actual train crew scheduling for the extended service, the work schedules and the number of additional train crews may be revised, and the estimated costs of the proposed service could change.
  - d. BNSF train crews each consist of one engineer and one conductor. These employees are members of a trained and qualified passenger train crew pool based at BNSF's Northtown Yard. The crew members in the passenger pool may also operate freight trains when not being used in passenger service.
  - e. Train crew compensation would be in accordance with the BNSF agreements currently in effect for locomotive engineers and conductors.
  - f. The Northstar and **Northstar Express** train schedules are conceptual and are subject to revision.
  - g. The standard Northstar weekday train consist includes one locomotive, three passenger coaches and one cab control passenger car. The weekend and special event Northstar commuter trains include a second locomotive to ensure service reliability. **Northstar Express** trains would use the same train consists as Northstar commuter trains.
5. The train crew facility at Target Field Station is currently the only location where crews can be relieved from duty during the day for a midday rest break of at least four (compensated) hours before resuming service in the afternoon peak period. Train crews cannot be relieved from duty for a midday break at the BLMF because there are currently no facilities that meet FRA requirements for rest at that location.
6. The proposed train schedules and train crew work assignments may require BNSF to train and qualify additional locomotive engineers and conductors for passenger service at the Northtown Yard crew base.

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7. The crew sheets must be reviewed to identify the deadhead commuter train movements and the total crew hours of service that are a part of the **Northstar Express Service Alternative**.

### 3.2. Stations and Maintenance Facility

1. All Northstar locomotives and passenger cars would continue to be maintained at the Big Lake Maintenance Facility (BLMF). Additional storage and servicing track capacity would be required at the BLMF to accommodate the additional train set. The BLMF is located at 19699 County Road 43, southeast of the existing Big Lake Northstar station.
2. No additional train layover or storage capacity is expected to be needed at Target Field Station or at a nearby location in Minneapolis.
3. The St. Cloud Northstar station is assumed to be located at the existing Amtrak station at 555 East Saint Germain Street in St. Cloud.
4. No overnight train storage capacity is needed at St. Cloud since no Northstar trains lay over at night at St. Cloud. However, a station siding off Main Track 2 at St. Cloud station is assumed as part of **Northstar Express Service Alternative** to enable **Northstar Express** trains to clear the main track during their daytime layovers. On weekends/holidays, one **Northstar Express** train lays over during the midday clear of the main track on the proposed station siding.
5. Additional passenger station facilities are anticipated to be needed at St. Cloud and Big Lake as follows:
  - a. At St. Cloud station, a station siding off Main Track 2, signage, platform changes, additional parking facilities and other amenities associated with the extended Northstar commuter service may be needed, and some station upgrading may be required. The station siding will allow **Northstar Express** trains to clear the main track during their layovers. Their layover position would not interfere with the loading/unloading of Amtrak Trains 7 and 8, both of which use a “double spot” procedure to accommodate coach and sleeper passengers while using the St. Cloud platform, which is much shorter than the Amtrak trains. There is an alternative to place a Northstar platform on the east/south leg of the wye at St. Cloud and have Northstar trains use that location for arrivals, changing ends and departures. Doing so would clear Main Track 2 and provide BNSF more operational flexibility. Northstar trains approaching St. Cloud would get an Approach Restricting signal indication which would minimize delays to arriving trains that would clear the main track. The proposed St. Cloud station improvements include the station siding off Main Track 2; the alternative to use the west wye track is not currently being considered as part of the **Northstar Express** alternative.
  - b. All Northstar stations would require changes in displayed train schedules and maps.
6. The **Northstar Express Service Alternative** assumes that a satisfactory agreement can be arranged with Amtrak for the shared use of the Amtrak St. Cloud passenger station, waiting room, rest rooms

and parking facilities by the Northstar trains and their passengers, at the hours they will need them.

### **3.3. General Operations**

1. Amtrak’s Empire Builder Train Number 8 from the Pacific Northwest is currently scheduled to leave St. Cloud at 5:19 A.M. each day. It operates eastbound (in the peak direction) through the Northstar commuter territory during the morning peak period and, if Amtrak Train 8 is off schedule, it can cause delays to other trains in the corridor including Northstar trains. Amtrak Train 8 is shown for information purposes in the train schedules presented in Sections 0 and 0. The westbound Amtrak Empire Builder Train Number 7 currently departs from St. Paul Union Depot at 10:20 P.M., does not affect Northstar scheduling, and has not been shown in the train schedules.
2. No Northstar commuter trains currently operate during the midday period from about 9:00 A.M. to about 3:00 P.M. The **Northstar Express** Service Alternative between Minneapolis and St. Cloud would not include any trains during the midday period. Observations of the midday maintenance window are:
  - a. The midday maintenance window is a critical and short (especially short in the winter) period of daylight when BNSF maintenance forces must conduct most of their maintenance activities.
  - b. The replacement of ties, dumping of track ballast, track surfacing, changeout of switches and switch components, and repairs to signal and communications equipment occurs primarily during this midday window.
  - c. When one track is out of service for maintenance, all trains in both directions must use the single remaining main track between available control points and past the work areas. This causes extreme congestion and train delays.
  - d. Adding new passenger trains during this midday maintenance window would only increase the congestion and train delays. It would also result in passenger dissatisfaction with the Northstar service.
  - e. Additional trains would also shorten the maintenance time available, degrade maintenance productivity, and extend the time needed to perform maintenance activities. This would increase the cost of the maintenance work, a portion of which is allocated to the agencies operating the passenger trains. The inability to complete needed maintenance can also contribute to track and signal failures which can delay all trains in the corridor.
3. The **Northstar Express Service Alternative** includes non-revenue (“deadhead”) train miles between BLMF and St. Cloud at either the start or end of some of the new **Northstar Express** train trips. The deadhead miles are needed to avoid the capital cost and long lead time required to plan and construct additional maintenance and/or train layover facilities. It is also important to ensure that all Northstar trains are operated by BNSF train crews from the same centrally located Northtown Yard crew base, thereby preserving the reliability of the service and minimizing the train crew costs.

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4. To avoid the need for a reverse movement of revenue trains moving between BLMF and St. Cloud, and to enable extended Northstar trains operating between St. Cloud and Minneapolis to stop at the existing Big Lake station, the Big Lake Station track is proposed to be extended to a power-operated turnout, a power-operated universal main track crossover, and the necessary signaling at the north end of the Big Lake station track to enable straight-through movements to access the main tracks.

### 3.4. Schedule Assumptions

1. The existing Saturday and Sunday/Holiday Northstar commuter train schedules have each been augmented with one new morning round trip and one new afternoon round trip **Northstar Express** train between St. Cloud and Minneapolis. No changes to the existing Northstar weekend commuter train schedules or crew assignments are proposed.
2. The Northstar Midday Shuttle Bus service option would depart St. Cloud at 10:30 A.M. and arrive at Minneapolis at 12:15 P.M. It would return as a non-stop bus in the early afternoon leaving Minneapolis at 2:00 P.M. arriving at St. Cloud at 3:45 P.M. The bus schedules are preliminary and may need to be adjusted depending on the route selected for the service.
3. BNSF and Metro Transit currently operate extra train service for special events throughout the year. The **Northstar Express Service Alternative** operating assumptions do not include requirements for accommodating special events, but special event service can be evaluated separately. The requirements for operating extra train service for special events would be in addition to the requirements shown above.
4. **Northstar Express** trains have been scheduled to operate between existing Northstar commuter trains in the same direction. No “overtakes” are included in this proposal.

### 3.5. Other Assumptions

1. The electronic train information system requires updating to reflect the new service territory, train schedules, and days of operation. On-train electronic display systems and public information would also require updating to reflect the extended service.
2. The proposal does not include a discussion of any of the opportunities for coordination (or additional coordination) of local transit services at Target Field Station, St. Cloud, or the other Northstar stations.
3. In the schedules shown in Sections 0 and 5, new train numbers are identified by higher numbers so they may be easily recognized. When final schedules are issued, it is likely that the train numbers will be revised to follow in the correct numerical sequences (even numbers for trains to Minneapolis and odd numbered trains from Minneapolis).











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### 6. BNSF Train Crew Assignments for Weekday Train Schedules

**\*\*For Train Crew Assignments, Target Field Station in Minneapolis, MN is shortened to 'TFS' for ease of description**

#### **Crew 1:**

On Duty BLMF	4:15 A.M.	Operates 5:00 A.M. Train A-1900 Big Lake to TFS. Operates 6:15 A.M. Train A-1901 TFS to Big Lake. Operates 7:18 A.M. Train A-1908 Big Lake to TFS.
Arrive TFS	8:10 A.M.	Secure equipment at TFS.
Off Duty TFS	8:25 A.M.	Rest period at TFS Crew Facility: 8:25 A.M.-4:27 P.M. (8'02").
On Duty TFS	4:27 P.M.	Operates 4:52 P.M. Train A-1907 TFS to Big Lake.
Arrive Big Lake	5:44 P.M.	Secure equipment at BLMF.
Off Duty BLMF	6:14 P.M.	Total Compensated Hours: <u>13'59"</u> . Rest Period: <u>10'01"</u> .

#### **Crew 2:**

On Duty BLMF	4:48 A.M.	Operates 5:43 A.M. Train A-1902 Big Lake to TFS. Operates 6:50 A.M. <b>Northstar Express</b> Train A-1961 TFS to St. Cloud. Operates 8:10 A.M. deadhead Train A-1961 St. Cloud to BLMF.
Arrive BLMF	8:40 A.M.	Secure equipment at BLMF.
Off Duty BLMF	9:10 A.M.	Total On-Duty Hours: <u>4'22"</u> . Basic day rule applies. Rest Period: <u>19'38"</u> .

#### **Crew 3:**

On Duty BLMF	4:45 A.M.	Operates 5:30 A.M. deadhead Train A-1960 BLMF to St. Cloud. Operates 6:15 A.M. <b>Northstar Express</b> Train A-1960 St. Cloud to TFS.
Arrive TFS	7:20 A.M.	Secure equipment at TFS.
Off Duty TFS	7:35 A.M.	Rest period at TFS crew facility: 7:35 A.M.-3:57 P.M. (8'22").
On Duty TFS	3:57 P.M.	Operates 4:27 P.M. Train A-1905 TFS to Big Lake.
Arrive Big Lake	5:19 P.M.	Secure equipment at BLMF.
Off Duty BLMF	5:49 P.M.	Total Compensated Hours: <u>13'04"</u> . Rest Period: <u>10'56"</u> .

#### **Crew 4:**

On Duty BLMF	5:33 A.M.	Operates 6:18 A.M. Train A-1904 Big Lake to TFS.
Arrive TFS	7:10 A.M.	Secure equipment at TFS.
Off Duty TFS	7:25 A.M.	Rest period at TFS Crew Facility: 7:25 A.M.-3:27 P.M. (8'02").
On Duty TFS	3:27 P.M.	Operates 3:57 P.M. Train A-1903 TFS to Big Lake. Operates 5:03 P.M. Train A-1910 Big Lake to TFS. Operates 6:10 P.M. Train A-1911 TFS to Big Lake.
Arrive Big Lake	7:02 P.M.	Secure equipment at BLMF.
Off Duty BLMF	7:32 P.M.	Total Compensated Hours: <u>13'59"</u> . Rest Period: <u>10'01"</u> .

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#### **Crew 5:**

On Duty BLMF	6:03 A.M.	Operates 6:48 A.M. Train A-1906 Big Lake to TFS.
Arrive TFS	7:40 A.M.	Secure equipment at TFS.
Off Duty TFS	7:55 A.M.	Rest Period at TFS Crew Facility: 7:55 A.M.-5:00 P.M. (9'05").
On Duty TFS	5:00 P.M.	Operates 5:30 P.M. Train A-1909 TFS to Big Lake.
Arrive Big Lake	6:22 P.M.	Secure equipment at BLMF.
Off Duty BLMF	6:52 P.M.	Total Compensated Hours: <u>12'49"</u> . Rest Period: <u>11'11"</u> .

#### **Crew 6:**

On Duty BLMF	2:45 P.M.	Operates 3:20 P.M. deadhead Train A-1962 BLMF to St. Cloud. Operates 4:05 P.M. <b>Northstar Express</b> Train A-1962 St. Cloud to TFS. Operates 5:25 P.M. <b>Northstar Express</b> Train A-1963 TFS to St. Cloud. Operates 6:45 P.M. deadhead Train A-1963 St. Cloud to BLMF.
Arrive BLMF	7:15 P.M.	Secure equipment at BLMF.
Off Duty BLMF	7:45 P.M.	Total On-Duty Hours: <u>5'00"</u> . Basic day rule applies. Rest Period: <u>19'00"</u> .

## 7. BNSF Train Crew Assignments for Saturday, Sunday, and Holiday Train Schedules

**\*\*For Train Crew Assignments, Target Field Station in Minneapolis, MN is shortened to 'TFS' for ease of description**

### *Saturday*

#### **Crew 7:**

On Duty BLMF	6:30 A.M.	Operates 7:15 A.M. deadhead Train A-1936 to St. Cloud. Operates 8:00 A.M. <b>Northstar Express</b> Train A-1936 St. Cloud to TFS. Operates 9:20 A.M. <b>Northstar Express</b> Train A-1937 TFS to St. Cloud.
Arrive St. Cloud	10:25 A.M.	Clears main track 10:25 A.M. to 1:40 P.M. (Stands for Train A-1938.) Operates 1:40 P.M. <b>Northstar Express</b> Train A-1938 St. Cloud to TFS. Operates 3:00 P.M. <b>Northstar Express</b> Train A-1939 TFS to St. Cloud. Operates 4:20 P.M. deadhead Train A-1939 to BLMF.
Arrive BLMF	4:50 P.M.	Secure equipment at BLMF.
Off Duty BLMF	5:20 P.M.	Total On-Duty Hours: <u>10'50"</u> . Rest Period: <u>13'10"</u> .

#### **Crew 8:**

Operates Trains A-1930, A-1931, A-1932, A-1933, A-1934 and A1935.

#### **NOTES:**

Crew 7 operates the **Northstar Express** weekend service on Saturday and Sunday/Holiday. Crew 7 is in addition to Crew 8 which currently operates existing the Northstar Saturday commuter service and provides for extra board capability.

The Rest Period may vary from the time shown depending on the starting time of the assignment for this

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crew on the following day.

#### ***Sunday/Holiday***

##### **Crew 7:**

On Duty BLMF 6:30 A.M.	Operates 7:15 A.M. deadhead Train A-1946 to St. Cloud. Operates 8:00 A.M. <b>Northstar Express</b> Train A-1946 St. Cloud to TFS. Operates 9:20 A.M. <b>Northstar Express</b> Train A-1947 TFS to St. Cloud.
Arrive St. Cloud 10:25 A.M.	Clears main track 10:25 A.M. to 1:40 P.M. (Stands for Train A-1948) Operates 1:40 P.M. <b>Northstar Express</b> Train A-1948 St. Cloud to TFS. Operates 3:00 P.M. <b>Northstar Express</b> Train A-1949 TFS to St. Cloud. Operates 4:20 P.M. deadhead Train A-1949 to BLMF.
Arrive BLMF 4:50 P.M.	Secure equipment at BLMF.
Off Duty BLMF 5:20 P.M.	Total On-Duty Hours: <u>10'50"</u> . Rest Period: <u>13'10"</u> .

##### **Crew 8:**

Operates Trains A-1940, A-1941, A-1942, A-1943, A-1944 and A-1945.

##### **NOTES:**

Crew 7 operates the **Northstar Express** weekend service on Saturday and Sunday/Holiday. Crew 7 is in addition to Crew 8 which currently operates existing the Northstar Sunday/Holiday commuter service and provides for extra board capability.

The Rest Period may vary from the time shown depending on the start time of the assignment for this crew on the following day.