

Northstar Corridor Rail Project Before-and-After Study (2013)

Minneapolis, Minnesota



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Northstar Corridor Rail Project; Minneapolis, Minnesota

The Northstar project established commuter rail service on a 40-mile segment of an existing freight rail line between downtown Minneapolis and Big Lake, Minnesota. It also extended the light rail line in downtown Minneapolis by 0.3 miles to provide a direct transfer between the commuter rail and light rail lines. The accompanying figure provides a map of both components of the project.



The Northstar Project -- Commuter Rail and Light Rail Components

The project was planned and developed by the Minnesota Department of Transportation, the Northstar Corridor Development Authority, and the Metropolitan Council, the Metropolitan Planning Organization (MPO). The Burlington Northern and Santa Fe (BNSF) Railway Company operates the commuter rail service under contract to the Metropolitan Council. Metro

Transit, a division of the Metropolitan Council, operates the light rail line and bus services in the Minneapolis/St. Paul metropolitan area.

A 1988 major investment study (MIS) identified commuter rail as the preferred alternative for the corridor. The line was to extend from downtown Minneapolis to the metropolitan area of St. Cloud, Minnesota, a distance of approximately 80 miles. Preliminary engineering (PE) of that project began in June 2000, and the environmental process concluded in December 2002, with issuance of a National Environmental Policy Act (NEPA) Record of Decision by the Federal Transit Administration (FTA).

Project development stalled shortly thereafter as state financial support for the project was in question and difficulties became apparent in the ability of the project to meet FTA's revised cost-effectiveness criterion.

In 2005, project sponsors initiated a "PE validation" study to resolve questions on cost-effectiveness. That study concluded in September 2005, with an initial segment of 40 miles that would meet the cost-effectiveness criterion. After resolution of state financial support, the shorter project entered final design (FD) in September 2006, received a Full Funding Grant Agreement (FFGA) in December 2007, and opened to service ahead of the FFGA schedule in November 2009.

Physical scope of the project

The Northstar Corridor rail line extends along 40 miles of the active BNSF double-tracked mainline freight railroad between Minneapolis and Big Lake. Because commuter service is mixed with freight operations, passenger cars are compliant with safety regulations of the Federal Railroad Administration for mixed operations.

Northstar Corridor rail relies on operating easements purchased from BNSF. Consequently, the project included very little track construction for the commuter rail line – only 0.7 miles for track primarily at the terminal stations. The operating easement agreement provided that modifications to signal and communication systems necessary to accommodate commuter rail would be made by BNSF.

Current features of the commuter rail line include seven stations (two funded outside the FFGA: Fridley and Ramsey), six locomotives, 18 passenger cars, and a new vehicle maintenance facility at the Big Lake terminus. One of the six locomotives was added to the fleet shortly after the start of revenue service. The station at Ramsey was added three years after revenue service began.

The six commuter rail stations outside of downtown Minneapolis each have a park-and-ride lot and provisions for kiss-and-ride and bus access. The six park-and-ride lots have a total of 2,800 spaces. Each station platform is 425 feet long and has a mini-high platform that provides level boarding using a bridge plate for one car on each train.

The Northstar terminal station in Minneapolis is located at the new Target Field home of the Minnesota Twins baseball club. The ballpark incorporates the vertical circulation elements of the pedestrian connection between the Northstar station and the new light rail station. These elements were designed, funded, and built as part of the ballpark's construction outside of the FFGA.

The 18 passenger cars include six cab and 12 standard coaches. All are double-decked with two low-platform doors and an average seating capacity for 140 passengers. All cars are equipped

with wheelchair lifts, although ADA access is typically provided using the mini-high platforms located at each station.

The new maintenance facility at the Big Lake terminus includes a 50,000 square-foot maintenance building equipped to support daily maintenance operations and administrative offices. A train-wash facility is adjacent to the maintenance building and a train yard provides overnight storage for the entire Northstar fleet of rolling stock.

The light rail component of the project is a one-station extension of the Hiawatha light rail line on 5th Street North in downtown Minneapolis. Elements include a new light rail station built on a bridge structure at Target Field, 0.6 miles (including a tail-track beyond the terminal station) of new 2-track line with overhead electrification, and two additional light rail vehicles needed to maintain headways on the now-longer Hiawatha line.

The conclusion of the “PE validation” study identified the shorter segment of the commuter rail line, and the anticipated scope of the project matched the actual outcome quite closely. Most basic elements of the predicted scope were in place at the start of revenue service: a 40-mile commuter rail line operating on BNSF tracks between Big Lake and downtown Minneapolis serving six stations (five with park-and-ride lots), connecting to an extended light rail line in downtown, and using five locomotives and 18 passenger cars. One significant change in scope was the assignment of responsibility to BNSF to improve BNSF track facilities, signals, and systems to accommodate commuter rail. This assignment occurred as part of the operating easement agreement. The “PE validation” study anticipated that these improvements to BNSF infrastructure would be made by the project sponsors, but negotiations prior to entering final design resolved the issue, and subsequent milestones accurately anticipated the actual approach. One noteworthy improvement anticipated at “PE validation” but not ultimately implemented by BNSF, was construction of a third mainline track for six miles in the vicinity of the locally-funded Fridley station.

Capital cost

The cost of the as-built project at the start of revenue service was \$308.5 million in year-of-expenditure (YOE) dollars. This total includes \$303.3 million for project scope identified in the FFGA; \$2.6 million for the eighteenth passenger car, which was purchased with contingency funds before commencement of revenue service; and \$2.6 million for the vertical circulation elements designed, funded, and built by the Minnesota Twins outside the FFGA. It does not include the cost of the locally funded stations at Fridley or Ramsey or the sixth locomotive, which was purchased with contingency funds after commencement of revenue service.

The aggregate unit cost of the as-built project, excluding the contribution of the Minnesota Twins, was \$7.7 million per mile – \$6.1 million per mile without the vehicles. The low per-mile cost is a direct reflection of the use of existing tracks and avoidance of any substantial guideway construction elements.

The predicted capital cost developed during “PE validation” was \$265.1 million in YOE dollars, an underestimate of 14 percent. This cost estimate was based on project scope and schedule assumptions that were quite accurate, with the exception of still-unknown outcome of negotiations with BNSF. This uncertainty was the principal source of the under-prediction. The negotiations changed the premise carried through “PE validation” – that Northstar would provide upgrades to the existing BNSF rail infrastructure needed to accommodate commuter rail service

– to an agreement that Northstar would pay BNSF \$107.5 million for operating easements and BNSF would make the infrastructure improvements. This new agreement shifted costs from track and systems work to right-of-way acquisitions and increased the predicted total cost for these three categories by \$38.5 million between “PE validation” and entry to final design.

At entry to final design, predicted YOE costs were \$307.2 million – within 1 percent of actual costs. However, between entry to final design and execution of the FFGA, FTA required project partners to perform a risk assessment, partly due to a concern that value engineering and other cost saving efforts of the project sponsors may have been too aggressive. The risk assessment led to the addition of \$10 million to the project budget – most of which was assigned to unallocated contingency.

At execution of the FFGA, predicted YOE costs were \$317.4 million (plus \$2.6 million provided by the Twins outside of the FFGA). This prediction was higher than actual costs by less than 4 percent. The accuracy of this forecast reflects the settled negotiations with BNSF, the resulting certainty of the price for operating easements versus the risks in actually doing the work, and the subsequent adherence to the construction schedule.

As the project developed, it became clear that a sixth locomotive and eighteenth cab-car – scope items removed during value engineering – would be needed to ensure reliable operation. The partial draw-down of contingency funds was primarily for these elements. The eighteenth cab car was acquired shortly before revenue service began, and the sixth locomotive was acquired shortly after.

Transit service

Northstar provides five peak-direction trains on approximately 30-minute headways during weekday mornings and afternoons, plus one train in the reverse direction, and no service at other times of day. Northstar operates three trains in each direction on Saturdays and Sundays. Special-events trains serve riders attending baseball games, football games, and other events. End-to-end run time is 49 minutes – with an average speed of 48 miles per hour. Track speeds range between 79 mph on the western segments to 25 mph near the downtown Minneapolis area.

Light rail service headways are unchanged from pre-Northstar levels at 7 to 10 minutes in peak periods and 15 to 30 minutes at other times of day.

Two bus routes provide connecting service to Northstar Corridor rail. One route operates in the peak period on 30-minute headways to connect a park-and-ride lot in St. Cloud to the Big Lake terminal station – a distance of 40 miles. The other operates in downtown Minneapolis to connect the terminal station to southern parts of the central business district not conveniently accessed via the light rail connection.

Other coordinated bus services were launched as part of the Northstar opening but have since been terminated because of low ridership. These services included (1) a mid-day express-bus trip from downtown Minneapolis to the Anoka and Coon Rapids stations for rail riders needing a mid-day return home, (2) a local feeder service between the Anoka and Coon Rapids communities and the Coon Rapids station, and (3) a last chance evening express-bus trip from downtown Minneapolis to the Anoka and Coon Rapids stations.

Two express-bus routes were eliminated with the introduction of Northstar commuter rail service in 2009. Both routes were eliminated because Northstar rail stations were built at the park-and-

ride locations served by the express buses. Runtime on these express buses from Coon Rapids to downtown Minneapolis was 35 minutes compared to 36 minutes on Northstar (including 21 minutes on commuter rail and 15 minutes for the connection via light rail from the Target Field station into downtown).

Overall, Northstar replaced 35 weekday express bus trips with 12 commuter rail trips.

Other bus routes near the Northstar Corridor include six express routes and two local routes. These routes continue to operate serving different markets in which the Northstar train service is no not time competitive.

Operating and maintenance costs

Operation and maintenance costs for the Northstar commuter rail line were \$15.8 million in calendar 2011. Connecting bus services from St. Cloud and within downtown Minneapolis cost an additional \$0.5 million. Light rail O&M increased by approximately \$2 million per year to provide service on the extended line. The largest cost centers for commuter rail are contracted services (BNSF operation crews, ROW maintenance and dispatch), labor, and insurance.

Adjustments to bus services in the corridor decreased bus O&M costs by \$1.6 million. Overall, O&M costs for all services (including bus connections, LRT and Commuter Rail) in the corridor increased by \$16.7 million.

The 2002 Final Environmental Impact Statement (FEIS) anticipated commuter rail O&M costs of \$9.7 million for the project, estimates increased to \$11 million in the 2007 Northstar Corridor Project Financial Plan. The primary sources of differences between predicted costs in 2007 and actual costs in 2011 are higher than anticipated BNSF operating costs (that are passed through to Northstar) and rapid increases in the cost of liability insurance that occurred after a major accident on a commuter rail line elsewhere in the country.

Ridership

In March 2011, Northstar rail carried an average of 2,200 weekday rides. Saturday and Sunday ridership averaged 560 and 343 respectively. In all of 2011, nearly 90 special events were served including all Minnesota Twins baseball and Vikings football games. For these events, Northstar carried an average of more than 1,500 rides in addition to regular commute ridership.

Overall weekday transit ridership in the corridor grew from a base of 3,800 weekday rides in March 2009 to 5,000 in March 2011. The March 2009 total includes 1,200 weekday rides on two express-bus routes that were replaced by Northstar. Consequently, the 2,200 weekday Northstar riders appears to comprise 1,200 trips shifted from former express bus services and 1,000 trips entirely new to transit.

Northstar customers in 2011 were primarily Caucasian (93%), between the ages of 35-54, commuting to work, and earning \$50,000-\$150,000 per year. The majority of Northstar riders drove alone to the station from their homes and 45 percent rode light rail to their destination from Northstar while 37 percent walked, and 11 percent rode the bus.

Weekday ridership on the project has continued to increase since 2011 and in April 2013 averaged 2,800 weekday trips.

At the FFGA milestone, opening year ridership forecasts anticipated 4,100 weekday commuter rail rides. Metro Transit subsequently finalized the planned fare policy, setting fares at higher levels than anticipated at the FFGA. A revised ridership estimate of 3,400 weekday trips was prepared to reflect this change in fares.

Analysis of the differences between actual and predicted ridership suggests several causes of the differences. The FFGA ridership forecast anticipated a travel time of 43 minutes from Big Lake to Target Field, compared to the actual 51 scheduled minutes in 2011. The FFGA forecast assumed a reduction in Route 850 express bus service which serves Foley park-and-ride lot about five miles south of Coon Rapids Station; this reduction did not occur. Anticipated increases in population, employment, and highway congestion did not happen, at least in part because of the significant economic downturn that began in 2008. Finally, actual fares were slightly higher in 2011 than were assumed in the forecast.