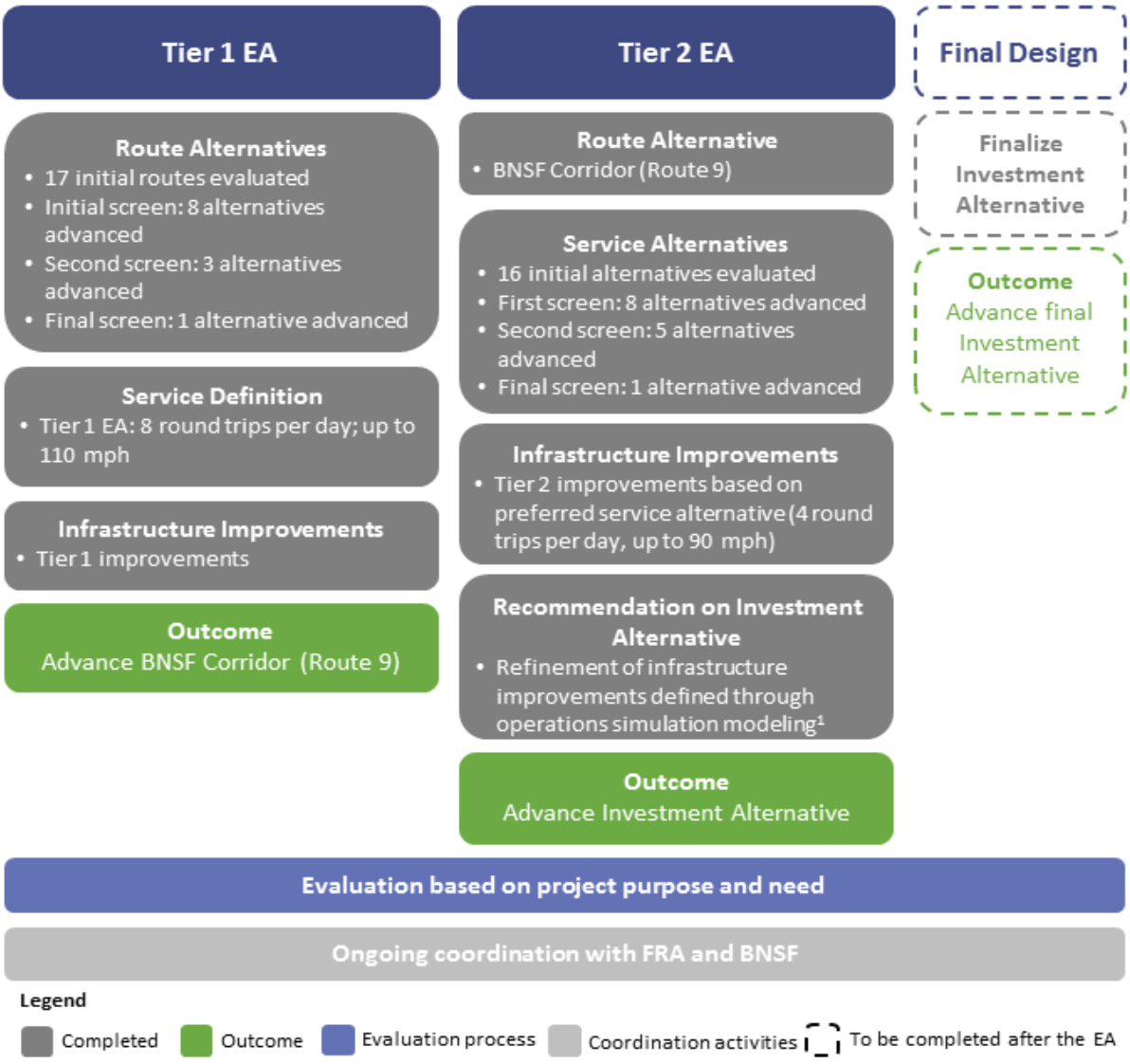
2. Alternatives

This chapter presents the alternatives evaluation process, the resulting decision-making and the Project alternative that meets the NLX Project purpose and need statement as discussed in Chapter 1. This chapter also summarizes the alternatives studied in the Tier 1 EA, and identifies the refinements to the Tier 1 EA alternatives that are studied in this Tier 2 EA.

Figure 2-1 depicts the alternatives analysis process that was used for the NLX Project. For the Tier 1 EA, completed in 2013, potential route alternatives were identified based on the NLX Project purpose and need for the proposed passenger rail service. Route alternatives are the physical corridors that may be capable of supporting intercity passenger rail. Once the route alternatives were identified, potential service alternatives were determined. Service alternatives are the operating plan for the service including number of round trips per day, the station communities and speed of service for a particular route alternative. The route alternatives and potential service alternatives were evaluated in the Tier 1 EA based on resources present, broad infrastructure improvements needed to support passenger rail service, ridership estimates, and high level cost estimates. This analysis is documented in the Tier 1 EA and summarized in Sections 2.1 through 2.3 of this Tier 2 EA.

Figure 2-1: NLX Alternatives Analysis Process



[1] *Operations simulation modeling is an estimate of the performance of anticipated or planned trains on a proposed rail network under conditions different than the present day, or, estimate of the infrastructure necessary to deliver anticipated or planned trains to a desired performance level.*

2.1 Alternatives in the NLX Tier 1 EA

2.1.1 Route Alternatives

The Tier 1 EA focused on identifying and selecting route alternatives. A route alternative is a physical corridor over which passenger rail service may be provided. The route alternatives were evaluated for their ability to support intercity passenger rail service.

Prior to development of the Tier 1 EA, MnDOT conducted a three-level alternatives evaluation of travel corridors, in accordance with FRA guidance (FRA, 2005). The three-level analysis identified a wide range of corridors that were screened based on operational characteristics, investment requirements and broad environmental constraints. The alternatives analysis process included public outreach and coordination with stakeholder agencies.

MnDOT identified and screened the 17 route alternatives, shown in **Figure 2-2,** during Level 1 alternatives analysis. This process is documented in Chapter 3 of the Tier 1 EA and the technical reports contained in the Tier 1 EA appendices (http://www.dot.state.mn.us/nlx/index.html).

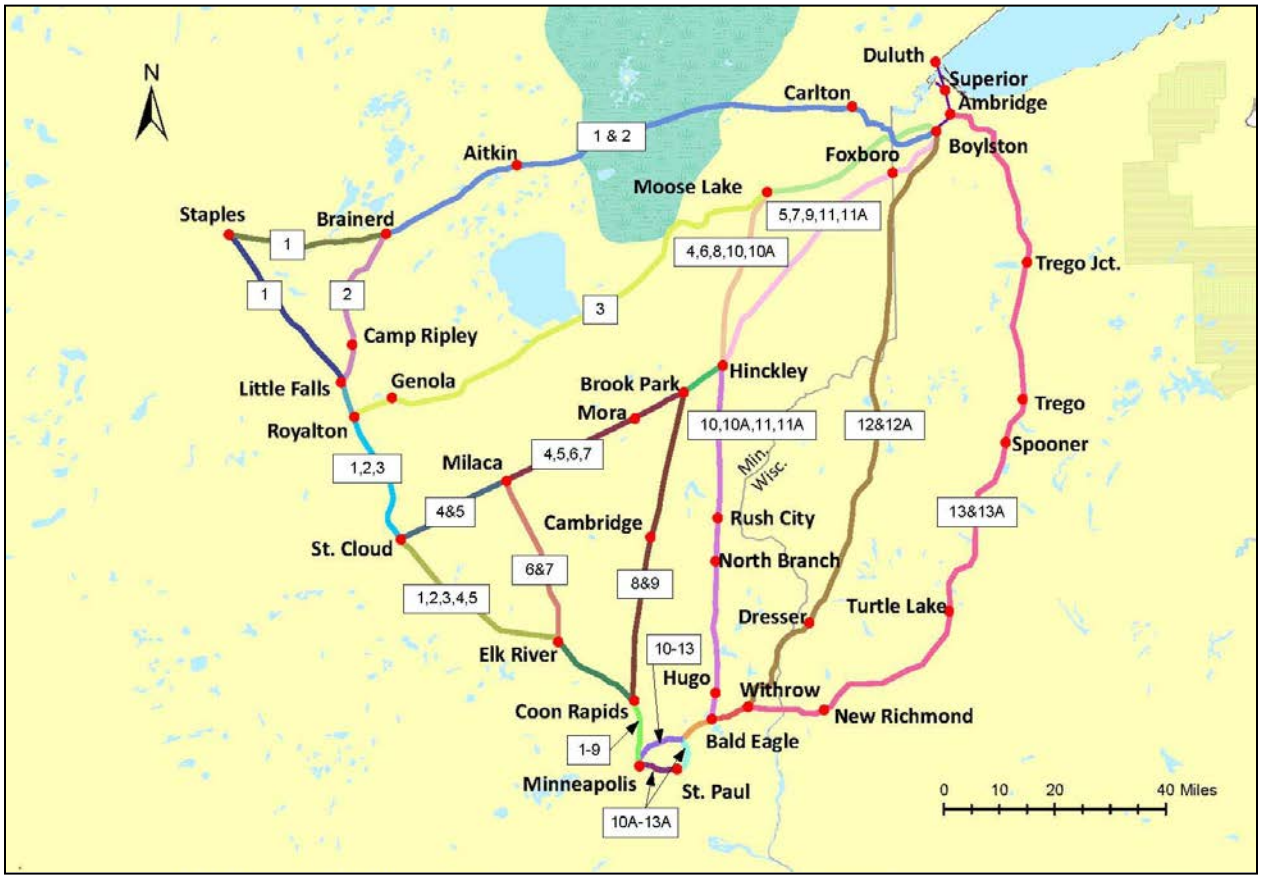
Nine of the 17 routes were eliminated from further consideration due to route distance and/or route conditions that would make construction or operation of passenger rail service particularly costly or difficult. Another five routes were eliminated based on a technical evaluation of environmental, cost and operational concerns. MnDOT carried three (Routes 9, 11 and 11a) forward to the more detailed Level 2 alternatives analysis to compare their functional characteristics: capital investment, travel time, ridership, revenue and benefit-cost ratio (see **Figure 2-3**).

Routes 9, 11 and 11a differed in alignment between Minneapolis and Hinckley, but shared a common alignment from Hinckley to Duluth. Route 9 paralleled MN 65 through Cambridge to Hinckley, while Route 11 and Route 11a followed I-35 through Forest Lake, North Branch and Rush City. The Level 2 analysis identified Route 9 for further study. Route 9 required substantially less capital investment than Routes 11 and 11a and was the only route with an acceptable benefit-cost ratio (greater than one indicates benefits are greater than costs). Route 9 exhibited an acceptable on-going operating ratio in both years 2025 and 2040.

The Level 3 analysis further examined more detailed cost estimates and conceptual engineering of Route 9, the corridor that parallels MN 65 through Cambridge and uses the BNSF right of way from Minneapolis to Duluth.

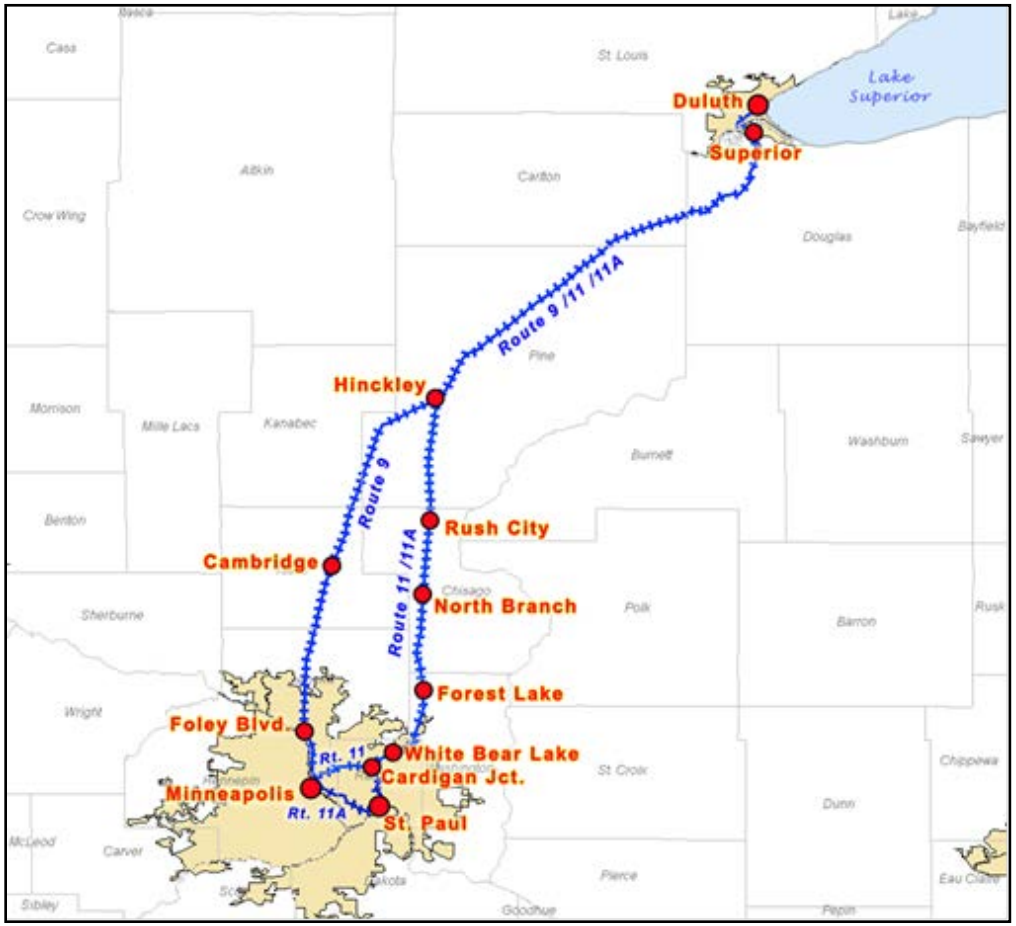
Route 9 was the Build Alternative carried forward for analysis in the Tier 1 EA (see Figure 1-1) and the basis for further analysis and refinement leading to preparation of this Tier 2 EA.

Figure 2-2: NLX Tier 1 EA Level 1 Route Alternatives



Source: NLX Tier 1 EA.

Figure 2-3: NLX Tier 1 EA Level 2 Route Alternatives



Source: NLX Tier 1 EA.

2.1.2 Service Alternatives

The Tier 1 EA evaluated impacts of the NLX Project based on a service alternative of eight round trip trains per day at speeds up to 110 mph. This resulted in a forecasted annual ridership to be 1,302,000 in 2040 with a capital cost of $939 million in 2010 dollars (Transportation Economics & Management Systems, Inc., 2010).

Due to the capital cost of the Tier 1 EA service alternative, an additional service alternatives analysis was completed within the Tier 2 EA to evaluate service alternatives that would reduce infrastructure costs using different speed regimes, frequencies and scheduled stops. MnDOT selected a set of 16 service alternatives that represented a reasonable range of speeds and frequencies to potentially address ridership demand while reducing costs. These service alternatives included two with a maximum speed of 79 mph, seven at 90 mph, and seven at 110 mph. MnDOT then conducted a ridership, revenue and operating cost analysis on these service alternatives. Eight alternatives having low ridership and revenue projections and/or high operating costs were eliminated from further consideration. The eight service alternatives advanced for more detailed analysis included:

- Two round trips per day operating at a maximum speed of 110 mph
- Four round trips per day operating at a maximum speed of 110 mph
- Six round trips per day operating at a maximum speed of 110 mph
- Eight round trips per day operating at a maximum speed of 110 mph
- Two round trips per day operating at a maximum speed of 90 mph
- Four round trips per day operating at a maximum speed of 90 mph
- Six round trips per day operating at a maximum speed of 90 mph
- Eight round trips per day operating at a maximum speed of 90 mph

The eight remaining service alternatives were then evaluated in an initial benefit-cost analysis that considered capital and operating costs and benefits related to travel cost savings, safety improvements and emissions savings for automobile travelers; operating cost savings, emissions savings and inventory savings for freight rail; grade crossing improvements; and economic development. Three of the eight service alternatives were eliminated from further consideration due to comparatively low benefit-cost ratios. The following five service alternatives were advanced for more detailed analysis:

- Four round trips per day at a maximum speed of 110 mph
- Two round trips per day at a maximum speed of 90 mph
- Four round trips per day at a maximum speed of 90 mph

- Six round trips per day at a maximum speed of 90 mph
- Eight round trips per day at a maximum speed of 90 mph

In 2015, MnDOT completed an analysis on the five service alternatives described above using updated train schedules, revised Tier 1 capital and operating cost data and refined ridership and revenue forecasts. Supporting information for the analysis is documented in **Appendix C**. Using the results of the analysis, MnDOT determined that the service alternative consisting of four round trips per day at a maximum speed of 90 mph would be the most cost effective.

MnDOT advanced the Build Alternative with a service alternative of four round trips per day at a maximum speed of 90 mph for further evaluation in the Tier 2 EA.

2.2 Infrastructure Improvement Analysis

The next step in the alternatives analysis process was to identify the infrastructure improvements needed to implement the proposed route and four round trips per day at a maximum speed of 90 mph for the proposed NLX Service. The process for identifying proposed infrastructure is described in Section 2.2.2.

2.2.1 Types of Infrastructure Improvements

Infrastructure improvements needed to establish the proposed NLX Service would include track infrastructure upgrades; bridge and culvert modification and construction; signal system upgrades; roadway grade crossing modifications; station modification and/or construction; and maintenance and layover facility construction.

The types of track infrastructure improvements identified and refined during operations and capacity simulation modeling (see Section 2.2.2) are described in Section 2.2.3 and would include:

- Main track – additional main tracks would be needed where freight traffic is operating at or near track capacity.
  - A main track or mainline track is track that is used for through trains or is the principal artery of the railroad system. It generally refers to a route between cities or towns.
- Sidings – a new siding would be constructed or an existing siding extended where trains travelling in opposite directions or in the same direction at different speeds would meet.
  - A siding is a track adjacent to a main track that is used to allow a train to overtake and pass another train moving in the same direction or to allow trains moving in opposite directions to meet and move past one another. A typical siding track may be more than 2 miles long.

- Turnouts – turnouts would be installed where needed to maintain train traffic flow.
  - A turnout is the location where two tracks are joined together to allow the transfer of trains or equipment from one track to the other. For example, a siding would have a turnout at each end to provide connections to the main track.
- Crossovers – crossovers would be installed where multiple turnouts are needed to maintain train traffic flow.
  - A crossover is a pair of turnouts connecting two parallel tracks.
- Industry tracks – in some areas, modifications to the main tracks would require the relocation of industry tracks.
  - Industry tracks serve nearby factories or other business.
- Lead tracks – modifications would be made to some lead tracks.
  - Lead tracks provide access to yards and industry tracks.
  - A yard is a system of tracks that are arranged in a manner that allows railroads to sort rail cars for assembling into trains, as well as to store rail cars until they are needed.
- Station tracks – separate tracks would be needed at some stations to provide a location for trains to stop at station platforms without blocking main tracks.
- Track improvements – general improvements to the existing track infrastructure, such as rail and tie replacement, replacement or cleaning of ballast or adjustments to the geometry of the track.
- Curves – the sharpness of some curves would need to be flattened, or made more gradual, to accommodate higher train speeds.

The types of bridge and culvert improvements would include:

- New construction – new bridges and culverts would be constructed as needed to accommodate new track infrastructure.
- Bridge deck modification – the project includes modification of selected bridges to transform the bridge from an open deck to a closed deck bridge. This means that the substructure would not be impacted in any way by the bridge modification.
  - On open deck bridges, the rails would be anchored directly to timber ties that are supported by and attached directly to the bridge superstructure. This arrangement would allow a person standing on the bridge to see below the bridge by looking down between the ties.
  - On ballast bridge decks, the rails would be anchored directly to timber ties supported by rock ballast. A ballast bridge deck would require a floor to support the rock ballast, and there would be no view to below between the ties. As a result, there would be no difference in appearance between the track over the bridge and the adjacent track approaching from each direction.
- Culvert extension – culverts would be extended as needed to accommodate new track infrastructure.

The types of signal system improvements would include:

- Control points – control points would be installed where needed to maintain train traffic flow.
  - A control point is a location where train movements are controlled by a train dispatcher who is located at a central location where train movements over the entire railroad are managed. A control point typically includes turnouts and/or crossovers that are operated remotely by the dispatcher and wayside signals that communicate critical information to the train crew.
- Signal system upgrades – hand-operated turnouts to Centralized Traffic Control (CTC) with a new Positive Train Control (PTC) system as an overlay along the length of the NLX Project.
  - CTC is a train control system whereby a train dispatcher provides operational authority to trains remotely via a wayside signal system and radio communication.
  - PTC is an automated communication-based train control system designed to prevent train accidents. PTC technology is capable of automatically controlling train speeds and movements should a train operator fail to take appropriate action for rail system conditions.

Roadway and grade crossing improvements would include:

- Grade modifications – the grade of the crossing roadways would be modified to improve sight-distance for at-grade crossings where sight distance is not sufficient to keep the crossing clear from approaching trains.
- Warning devices – crossing warning devices at public crossings would be upgraded to flashing lights with gates, as needed.
- Fencing – fencing would be installed at certain locations to facilitate pedestrian safety; these locations are anticipated to include:
  - Approximately 100 feet in each direction from at-grade crossings.
  - Areas where residential development is proximate to both sides of the NLX Project.

Station and maintenance and layover facilities would include:

- Station – station amenities would include an enclosed station building, platform with warming shelters, on-site parking and multimodal transportation access.
- Maintenance facility – would be used for inspection, servicing, maintenance and repair activities required to keep NLX trains in service and incorporate train layover and storage needs.
- Layover facility – would provide a location away from BNSF main tracks to store up to two complete train consists.
  - A train consist is a complete train with a defined number and type of cars, including locomotives.

2.2.2 Operations Simulation Modeling

To determine the potential infrastructure improvements needed for the NLX Project, operations simulation modeling was conducted at the Tier 1 EA and Tier 2 EA levels of analysis. Operations simulation modeling provides an estimate of the performance of anticipated or planned trains on a proposed rail network under conditions different than the present day. Analyzing the trains' performance enables planners to estimate the infrastructure necessary to deliver anticipated or planned trains to a desired performance level. During the Tier 1 EA analysis, operations simulation modeling was conducted for eight round trips per day at speeds up to 110 mph. For the Tier 2 EA analysis, operations simulation modeling was conducted for four round trips per day at speeds up to 90 mph. Potential infrastructure improvements presented in this Tier 2 EA are conservative estimates and represent the largest potential construction limits for environmental analysis. The identified infrastructure improvements would continue to be refined as the NLX Project moves into final design and construction.

BNSF established "BNSF's Passenger Principles" that define BNSF's requirements for the continuation of existing or the initiation of new intercity or commuter passenger services over its railroad. These principles are intended to protect BNSF's operations from impacts on freight operations, such as schedule changes or delays, that could result from the addition of passenger train service. In consideration of these principles, MnDOT is identifying capacity improvements that are necessary to accommodate passenger service without unreasonably degrading the quality of current or future freight service. Operations simulation modeling for the NLX Project takes into account known schedule and characteristics of freight and passenger train traffic on the network. These elements all contribute to the operations simulation modeling analysis to identify needed infrastructure. In addition to BNSF freight traffic, portions of the NLX Project are used for Northstar Commuter Rail operated by Metro Transit and long-distance Amtrak Empire Builder passenger rail service.

For the Tier 1 EA analysis, BNSF conducted operations simulation modeling for eight round trips per day at speeds up to 110 mph to identify needed infrastructure improvements along the NLX Project. Following the initial modeling effort, BNSF, MnDOT, FRA and the Minneapolis-Duluth/Superior Passenger Rail Alliance held discussions on conceptual infrastructure improvements required to accommodate proposed NLX Service at eight round trips per day at speeds up to 110 mph, existing and future freight movements, the Northstar Commuter Rail service and the Amtrak Empire Builder passenger rail service.

During the Tier 2 EA analysis, MnDOT conducted additional operations simulation modeling for four round trips per day at speeds up to 90 mph. MnDOT developed a model of the existing 2016 operations, known as the Base Case model. Next, the NLX schedules were added to the Base Case model to identify the impacts of adding the NLX Service. The addition of NLX trains resulted in delays for freight train operations. To minimize the impact of the NLX Service on freight operations, capacity improvements throughout the entire NLX Project were developed and tested with the goal of operating the NLX Service while maintaining current average

freight train speeds. Capacity improvements were focused on the Minneapolis and Superior, Wisconsin, areas as well as the 125-mile-long section between Coon Rapids, Minnesota, and Boylston, Wisconsin. The identified improvements were presented to BNSF in February 2016.

In July 2016, BNSF conducted an independent capacity analysis and concluded that the improvements recommended by MnDOT were needed. In addition, the BNSF analysis identified the need for signal system upgrades for the entire NLX Project and approximately 29 miles of new second main track. Due to the high capital cost and the substantial environmental impacts of the additional capacity improvements proposed by BNSF, MnDOT and FRA determined that an additional capacity analysis was required. MnDOT conducted a third round of operations simulation modeling in October 2016 to identify a cost-effective solution that would provide operating performance results acceptable to BNSF, while also substantially reducing environmental impacts.

The operations simulation modeling conducted by MnDOT in October 2016 showed that satisfactory train performance could be achieved with fewer capacity improvements than those initially recommended by BNSF. The network limitations were studied and improvements were proposed that would remedy existing deficiencies. Negotiations between BNSF, MnDOT and FRA on the necessary infrastructure improvements are still ongoing and the proposed infrastructure may be modified or reduced as the negotiations progress.

2.2.3 Proposed Infrastructure Improvements

The scope of the proposed improvements between the Tier 1 EA and Tier 2 EA analyses is a result of the change in the operating plan from eight round trips per day at speeds up to 110 mph to four round trips per day at speeds up to 90 mph. To recognize the ongoing discussions on infrastructure improvements, the Tier 2 EA used conservative estimates of the improvements and incorporated the largest potential construction limits for environmental analysis. The identified infrastructure improvements would continue to be refined as the NLX Project moves into final design and construction.

For ease of analysis and route descriptions during the Tier 1 EA route evaluations, the NLX Project was divided into route segments, shown in **Figure 2-4**. Route segment numbers were assigned during the Tier 1 EA analysis when 17 route alternatives were still under consideration. As a result, the segments along the selected route have gaps in the numbering shown in **Figure 2-4** and listed in **Table 2-1**.

The proposed NLX Project infrastructure improvements consist of six stations, a maintenance facility, a layover facility, about 41.9 miles of improvements to existing track and about 41.7 miles of new track (including new mainline and new sidings), as well as road crossing improvements, bridge improvements and other rail system improvements to maintain acceptable levels of freight service while providing for new passenger service. Details regarding the proposed improvements are presented in **Table 2-1** by segment, location and milepost

(MP) of the infrastructure improvements described above and analyzed in the Tier 1 EA and in the Tier 2 EA. The table lists the improvements from south to north by segment and within each segment. **Figure 2-5** and **Figure 2-6** geographically depict the information in **Table 2-1**.

The proposed Tier 2 EA improvements are described in **Table 2-1** by NLX Segment. These improvements are shown in the detailed figures in **Appendix D**:

- NLX Segment 1: Wayzata Subdivision[1] – **Appendix D**, Pages 1 to 3
- NLX Segment 2: Midway Subdivision – **Appendix D**, Page 4
- NLX Segment 3: Midway, St. Paul and Staples Subdivisions – **Appendix D**, Pages 5 to 18
- NLX Segment 4: Hinckley Subdivision – **Appendix D**, Pages 19 to 50
- NLX Segment 5: Hinckley Subdivision – **Appendix D**, Pages 51 to 56
- NLX Segment 6: Hinckley Subdivision – **Appendix D**, Pages 57 to 106
- NLX Segment 17: Hinckley Subdivision – **Appendix D**, Pages 107 to 190
- NLX Segment 18: Lakes Subdivision – **Appendix D**, Pages 191 to 201
- NLX Segment 19: Lakes Subdivision – **Appendix D**, Pages 202 to 211

Table 2-1 and Figure 2-6 present the improvements carried forward in the Tier 2 EA.

[1] *A railroad subdivision is railroad segment between two defined points as designated by the railroad timetable.*

Figure 2-4: NLX Segments

Source: NLX Tier 1 EA.

Table 2-1: Infrastructure Improvements Analyzed in NLX Tier 1 EA and NLX Tier 2 EA

NLX Segment	Location		BNSF Railway Milepost[a] (MP)		Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
	Start	End	Start	End			
1[c] Wayzata Subdivision	Target Field Station, Minneapolis	Minneapolis Junction, Minneapolis	11.6	9.7	2.1	• Construct new connecting track through the wye[d] at Minneapolis Junction for approximately 3,000 feet.	• Construct platform extension at Target Field Station and add station track. • Expand control points at Stadium and Harrison Street. • Upgrade existing track from approximately 480 feet north of the Northstar platform at Target Field Station to approximately Harrison Street to second main track. • Construct 0.69 mile of new second main track on west leg of the wye approximately between Harrison Street and Van Buren Street. Reconfigure industry tracks at Harrison Street and on both sides at Van Buren Street.
2[c] Midway Subdivision	Minneapolis Junction, Minneapolis	University Avenue, Minneapolis	9.7	11.4	1.4		
3 Midway, St. Paul and Staples Subdivisions	University Avenue, Minneapolis	Coon Creek Junction, Coon Rapids	11.4	21.1	9.7	• Construct 6.2 miles of new track between Interstate 694 (I-694) and Coon Rapids Boulevard/Coon Creek Junction in Fridley (referred to as the third main). • Track improvements through Coon Creek Junction. • Construct new railroad bridges over Mississippi Street and Rice Creek. • Modification of Minnesota State Highway 610 (MN 610) overpass.	• Construct 6.2 miles of new third main track between I-694 and Coon Rapids Boulevard/Coon Creek Junction in Fridley. • Construct track shifts south of MN 610 bridge to accommodate all three tracks under the existing bridge. • Construct new railroad bridges for third main over Mississippi Street and Rice Creek. • No change to MN 610 overpass because NLX Coon Rapids Station location would not require modifications.

NLX Segment	Location		BNSF Railway Milepost[a] (MP)		Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
	Start	End	Start	End			
4 Hinckley Subdivision	Coon Creek Junction, Coon Rapids	Isanti	136.9	113.0	23.9	• Construct 3.0 miles of siding west of existing track and 1-mile siding extension east of existing track in Andover. • Replace existing railroad bridge and build new parallel bridge over Coon Creek. • Replace railroad bridge over Cedar Creek.	• Convert open deck to ballast deck for railroad bridge on main track over Coon Creek. • Upgrade Andover siding track and extend north to new control point at MP 124.8 with intermediate control point at MP 128.0 including new turnouts and signals. • No new railroad bridge over Cedar Creek for Andover siding extension. • Modify seven curves to increase train speeds.
5 Hinckley Subdivision	Isanti	Cambridge	113.0	107.4	5.6	• Construct 6.0 miles of new track between Isanti and Cambridge. • Connect existing sidings between Isanti and Cambridge.	• Upgrade Cambridge siding track and extend south to meet existing Isanti siding at MP 112.76. • Construct new bridges parallel to existing main track bridges at MP 112.4 over a drainage ditch and MP 111.2 over Isanti Brook for the upgraded Cambridge siding track. • Extend North Cambridge siding south and connect to main track at MP 107.9. • Modify one curve to increase train speeds.
6 Hinckley Subdivision	Cambridge	Hinckley	107.4	72.3	34.1	• Construct 35 miles of new track between Cambridge and Hinckley. • New railroad bridges over Snake River at Grasston, ditch near	• Construct new Stanchfield siding on east side of main track between new control points at MP 99.3 and MP 101.1 including new turnouts and signals. • Upgrade existing Grasston siding between MP 89.8 and MP 91.6 and extend north to MP 87.4.

NLX Segment	Location		BNSF Railway Milepost[a] (MP)		Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
	Start	End	Start	End			
6 Hinckley Subdivision						Henriette (box culvert), and Pokegama Creek at Brook Park. Replacement of 379th Street overpass over railroad near Grandy. • Rehabilitation of existing bridges over Pokegama Creek and Snake River.	• Convert open deck to ballast deck bridge on main track over Pokegama River at Brook Park. • Upgrade Brook Park siding track between MP 78.7 and MP 80.45 and extend north to connect to South Hinckley siding at MP 73.8. Upgrade South Hinckley siding between MP 73.7 and MP 72.3. • Modify seven curves to increase train speeds. • No new second main track between Cambridge and Hinckley. • No new bridge for second main track at Grasston or over ditch near Henriette. • No replacement of overhead bridge for 379th Street near Grandy. • No rehabilitation of main track bridge over Snake River.
17 Hinckley Subdivision	Hinckley	Boylston	72.3	11.8	60.5	• New or extended sidings to a total length of 3.0 to 4.0 miles each near Sandstone, Askov, Bruno, Holyoke and Foxboro. • Rehabilitation of existing bridges over Grindstone, Kettle, Big Willow, Net (2), Black and Nemadji Rivers, and State Line, Balsam, Little Balsam, Hubert	• Upgrade Askov siding track between new control points at MP 56.5 and MP 57.8 including new turnouts and signals and extend south to MP 58.8. • Extend Askov siding to the north to MP 54.8. • Upgrade Nickerson siding track and extend north to MP 35.5 and south to MP 38.7. • Construct new second siding between new control points at MP 35.9 and MP 38.7 including new turnouts and signals.

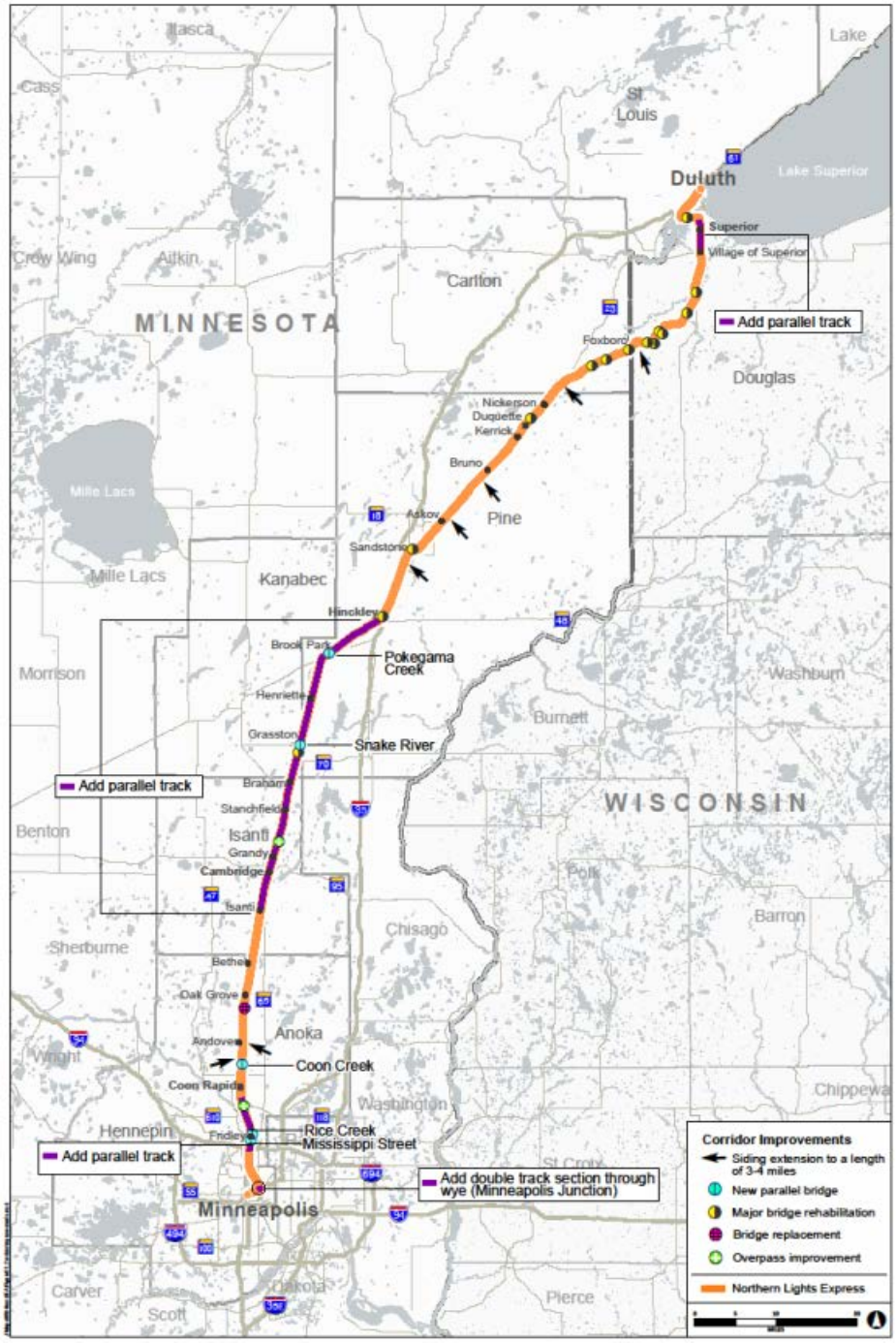
NLX Segment	Location Start	Location End	BNSF Railway Milepost[a] (MP) Start	BNSF Railway Milepost[a] (MP) End	Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
17 Hinckley Subdivision						and Norvell Creeks.	• Upgrade Foxboro siding track between MP 23.3 and MP 24.7 and extend south to MP 25.5 and north to MP 22.4. • At MP 12.43, potential single track construction and new connection to BNSF Lakes Subdivision. • At Boylston, new turnout to BNSF Lakes Subdivision wye track. • Convert open deck to ballast deck for railroad bridges at Grindstone River, West Balsam Creek, Black River and Nemadji River. • Modify 36 curves to increase train speeds. • Rehabilitation of other bridges identified in Tier 1 EA no longer required.
18 Lakes Subdivision	Boylston	Superior, Wisconsin (North of 28th Street)	12.6	5.4	8.7	• Construct 3.0 miles of new passenger track between Central Avenue and 11th Street North in Superior, Wisconsin.	• Construct new crossover, connection and signal modifications at Central Avenue. • Construct new control point, signals and connection to new main track at 28th Street. • Install on Coal Main and NLX Main between 28th Street and LST&T Junction (4.0 miles each track). • Construct 2.6 miles of new track between 58th Street and 28th Street. • New track construction continues into Segment 19. • Modify six curves to increase train speeds.

NLX Segment	Location		BNSF Railway Milepost[a] (MP)		Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
	Start	End	Start	End			
19 Lakes Subdivision	Superior, Wisconsin (North of 28th Street)	Duluth Union Depot	5.4	0	5.4	• Construct 1.5 miles of new track between Segment 18/19 boundary and 11th Street in Superior, Wisconsin. • Construct 1.1 miles of new freight siding along existing track from the wye west of Grassy Point Bridge to 46th Avenue in Duluth. • Construct bridge over water inlet. • Construct segment of main track approaching the Duluth Station and track for layover at Duluth Station. • Rehabilitation of Grassy Point Bridge.	• Construct 1.5 miles of new track and two track shifts at 21st Street and Belknap Street to accommodate new NLX main track between bridge piers. • Upgrade signal on Coal Main and NLX Main from 28th Street to LST&T Junction. • Construct new connections, control point and signals at north end of new NLX main track at LST&T Junction (MP 4.0). • Construct new control point at west end LST&T Junction and extending signal upgrades to Duluth. • Rehabilitate Grassy Point swing bridge operating and control systems. • No other work at Grassy Point swing bridge. • Upgrade single main track from LST&T Junction (MP 4.0) to new universal crossovers in new control point at MP 1.0. Install electric locks and derails at industry and junction tracks. • Construct new control point and turnout at Berwind Junction and 0.6 mile of new second track to new control point at MP 1.5. • Upgrade main track between new control points at MP X1.0 and MP X.19. Install electric locks and derails at industry and junction tracks. • Construct new NLX track between MP X1.0 and MP X.19.

NLX Segment	Location		BNSF Railway Milepost[a] (MP)		Segment Mileage[a]	Tier 1 EA Concept-Level Infrastructure Improvements[b]	Tier 2 EA Concept-Level Infrastructure Improvements
	Start	End	Start	End			
19 Lakes Subdivision							• At the Depot in Duluth, rehabilitate existing lead and station tracks, construct new turnout at the north end and construct the new NLX platform. • Extend Depot Track 3 to accommodate NLX train length.
Total					152.4		

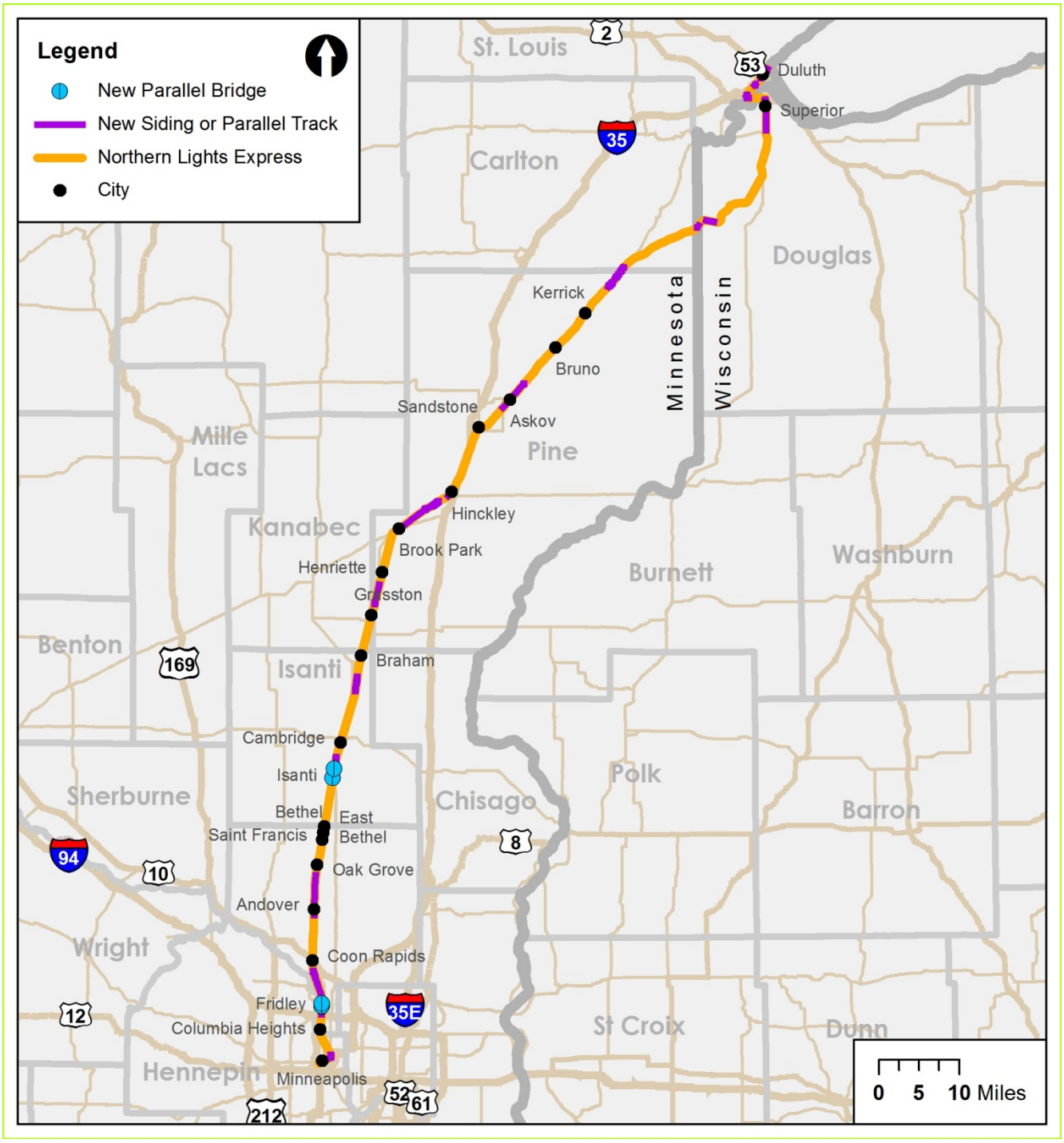
[a] *Mileposts are based on current BNSF Railway mileposts. Mileposts are often not exact miles; therefore, differences between MP references may not equate to actual distances.*
[b] *In addition the items listed here, other elements were generally discussed in Section 3.2 of the Tier 1 EA that are addressed more specifically in the Tier 2 EA.*
[c] *Improvements for Segment 1 Wayzata Subdivision and Segment 2 Midway Subdivision are listed together because the improvements are located where the subdivisions meet.*
[d] *A wye, named for its resemblance to the letter Y, is the location where tracks deviate from each other forming a triangle (Schulte, 1990). Wye tracks enable a train or piece of rail equipment to reverse direction.*

Figure 2-5: NLX Tier 1 EA Assumed Track Infrastructure Improvements



Source: NLX Tier 1 EA.

Figure 2-6: NLX Tier 2 EA Proposed Track Infrastructure Improvements



2.2.4 Facilities Site Evaluation and Design

The Tier 1 EA proposed stations in six communities: Minneapolis, Coon Rapids, Cambridge, Hinckley and Duluth in Minnesota and Superior in Wisconsin. For potential station locations, the Tier 1 EA identified a single site in Minneapolis; Coon Rapids; Superior, Wisconsin; and Duluth; and two potential sites in Cambridge and Hinckley. Initial Tier 1 EA service development planning assumed the NLX Project would need two layover sites and one maintenance facility with one of the layover sites located at the maintenance facility site.

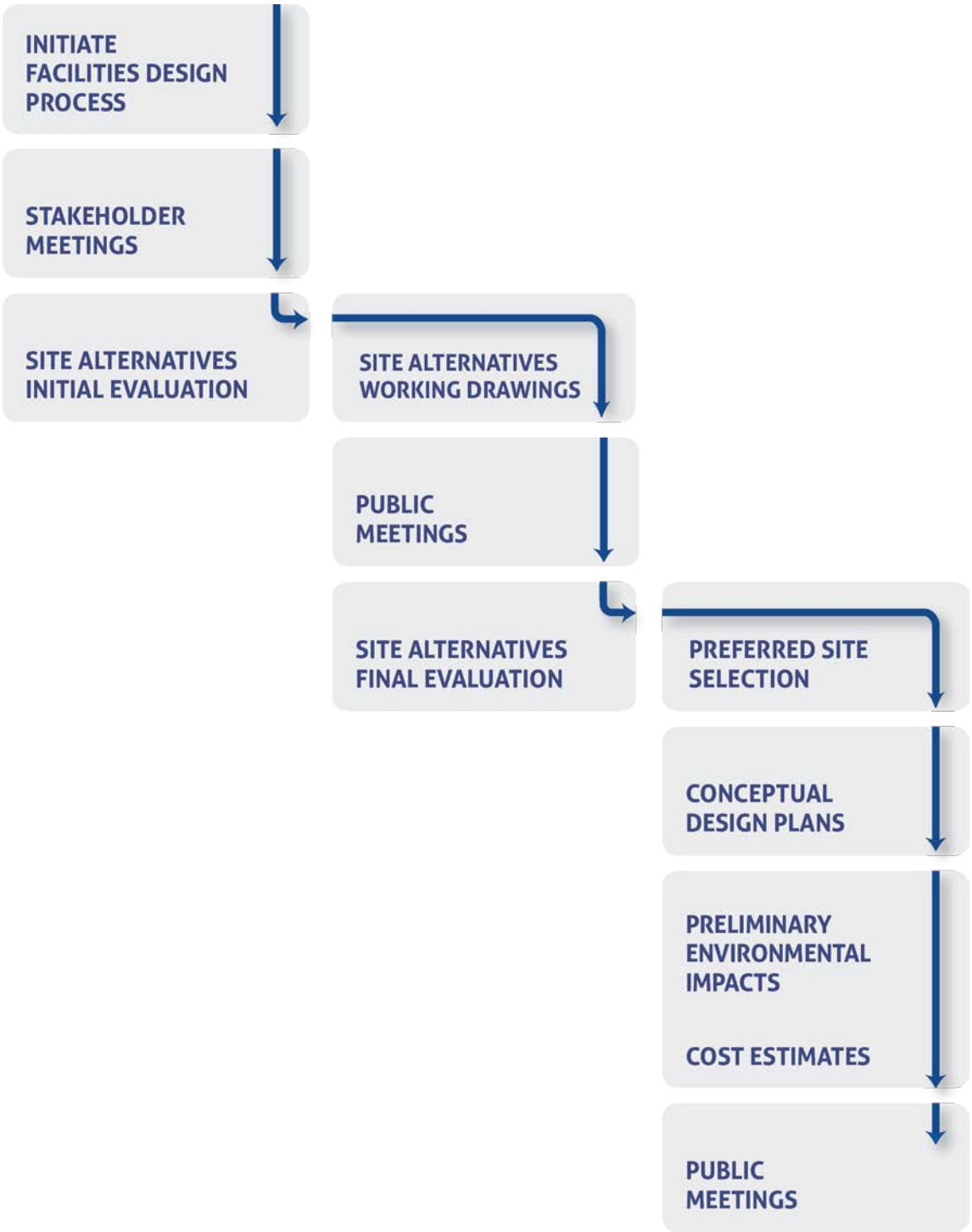
In 2014 and 2015, MnDOT undertook a detailed analysis of the potential stations and maintenance and/or layover facilities needed for the NLX Project. The August 2015 *Facilities Site Evaluation and Design Technical Memorandum* (see **Appendix B**) documents the alternatives analysis conducted to identify the preferred locations for stations, the maintenance facility and layover sites. The evaluation considered and, in some locations, expanded the locations of stations and maintenance and layover facilities identified in the Tier 1 EA. For example, an additional Superior, Wisconsin, site option was evaluated. In addition, the Pit Site in Hinckley was removed from consideration and replaced with the Downtown Site prior to the 2015 analysis because the Pit Site is a publicly funded recreational facility subject to Section 4(f) of the Department of Transportation Act (Section 4(f)). The evaluation process developed and considered site selection criteria, design criteria and public and stakeholder input, as shown in **Figure 2-7**.

2.2.4.1 Analysis and Design Process

MnDOT's *Facilities Site Evaluation and Design Technical Memorandum* (see **Appendix B**) identified a list of station requirements, followed by conceptual engineering. The analysis process for stations, as well as maintenance and layover facilities, included the following steps:

- Confirming site alternative locations
- Preparing working drawings for alternative locations
- Evaluating site alternatives based on physical, operational and environmental criteria
- Selecting preferred sites with community feedback and public input
- Developing conceptual designs for selected sites
- Determining preliminary environmental impacts
- Preparing cost estimates for selected sites

Figure 2-7: Facilities Design Process



2.2.4.2 Stakeholder and Public Involvement

An important part of the station and facilities evaluation process included consultation with each of the communities to help ensure that the proposed locations fit with community plans. In October 2014, MnDOT held stakeholder meetings in all communities that have planned station, maintenance or layover facilities. The purpose of these stakeholder meetings was to confirm site locations and obtain information about site opportunities and constraints. In December 2014, MnDOT presented working drawings to the public at open house meetings in the communities with site location alternatives: Hinckley, Cambridge and Sandstone, Minnesota, and Superior, Wisconsin. The purpose of the meetings was to present the planning and design process for the NLX station, maintenance and layover facility sites and to gather feedback from the public on the proposed site alternatives and working drawings.

MnDOT held two stakeholder workshops in Duluth in December 2014 and May 2015. The purpose of the December 2014 meeting was to obtain stakeholder input on and reaction to working drawings for the Duluth Station. Using input from the December 2014 workshop, MnDOT held a May 2015 workshop to present conceptual site plans and architectural concepts for the Duluth Station, as well as the conceptual plan for the potential maintenance and/or layover facility in Duluth. In addition to these formal meetings, MnDOT continued coordination with local communities and stakeholders throughout the facilities design process. Communities and stakeholders were provided concept plans to obtain feedback and concept plans were modified based on the feedback. As part of the ongoing outreach, eight meetings with community and stakeholders were held between December 2014 and May 2015.

MnDOT's 2015 analysis evaluated sites in Sandstone and Duluth for maintenance and/or layover facilities and Minneapolis for a layover only site. Sites considered in the 2015 analysis that were dismissed from further evaluation are described below. Additional detail on the analysis and reasons for elimination are in **Appendix C**. The sites carried forward for detailed analysis in this Tier 2 EA are described in Section 2.4.2.

2.2.4.3 Station and Facility Sites Dismissed from Further Consideration

The following sections describe the potential station sites and layover facility site that were analyzed in the 2015 analysis and dismissed from further consideration.

Cambridge Station – Ritchart Property Site

The 2015 analysis determined that construction is feasible at the Ritchart Property site for the proposed Cambridge Station (see **Figure 2-8**) and it would accommodate the requirements for an NLX station, but the City of Cambridge did not support this site for the proposed NLX station. This site is not conveniently located near the downtown area and would not support local economic development goals to revitalize downtown Cambridge. For these reasons, MnDOT dismissed the Ritchart Property site from further consideration.

Hinckley Station – Southwest Site

As part of the 2015 analysis, MnDOT eliminated the Southwest site for the proposed Hinckley Station (see **Figure 2-8**) due to conflicts with railroad operations that would require a costly reconfiguration of the local St. Croix Valley Railroad that connects to BNSF at Hinckley, and potential impacts on natural resources. In addition, the City of Hinckley did not express support for this site because it is not conveniently located near downtown Hinckley and would be less likely to facilitate local economic development goals for downtown. For these reasons, MnDOT dismissed the Southwest site from further consideration.

Superior, Wisconsin Station – South Site

The South site for the proposed Superior, Wisconsin Station (see **Figure 2-9**) is located to the south of downtown Superior and the city's primary activity centers and is approximately 2.0 miles from the nearest regional bus service. The 2015 analysis determined that this site could accommodate the required features, but has potential impacts on natural resources and the site is located to the south away from downtown Superior, Wisconsin, and the city's primary activity centers. For these reasons, MnDOT dismissed the South site from further consideration.

Figure 2-8: Cambridge – Ritchart Property and Hinckley Station – Southwest Site Locations (Dismissed from Further Consideration)

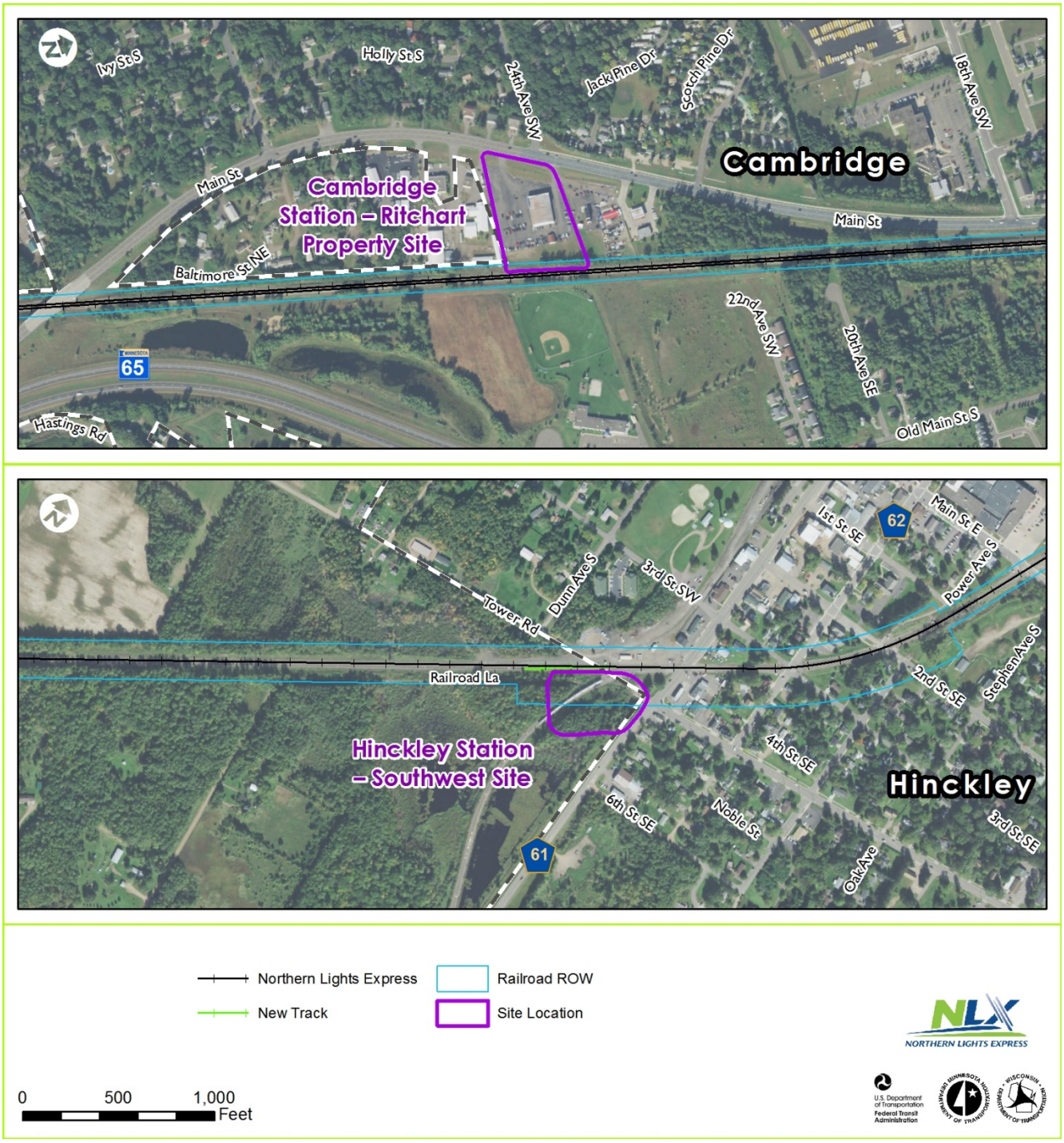
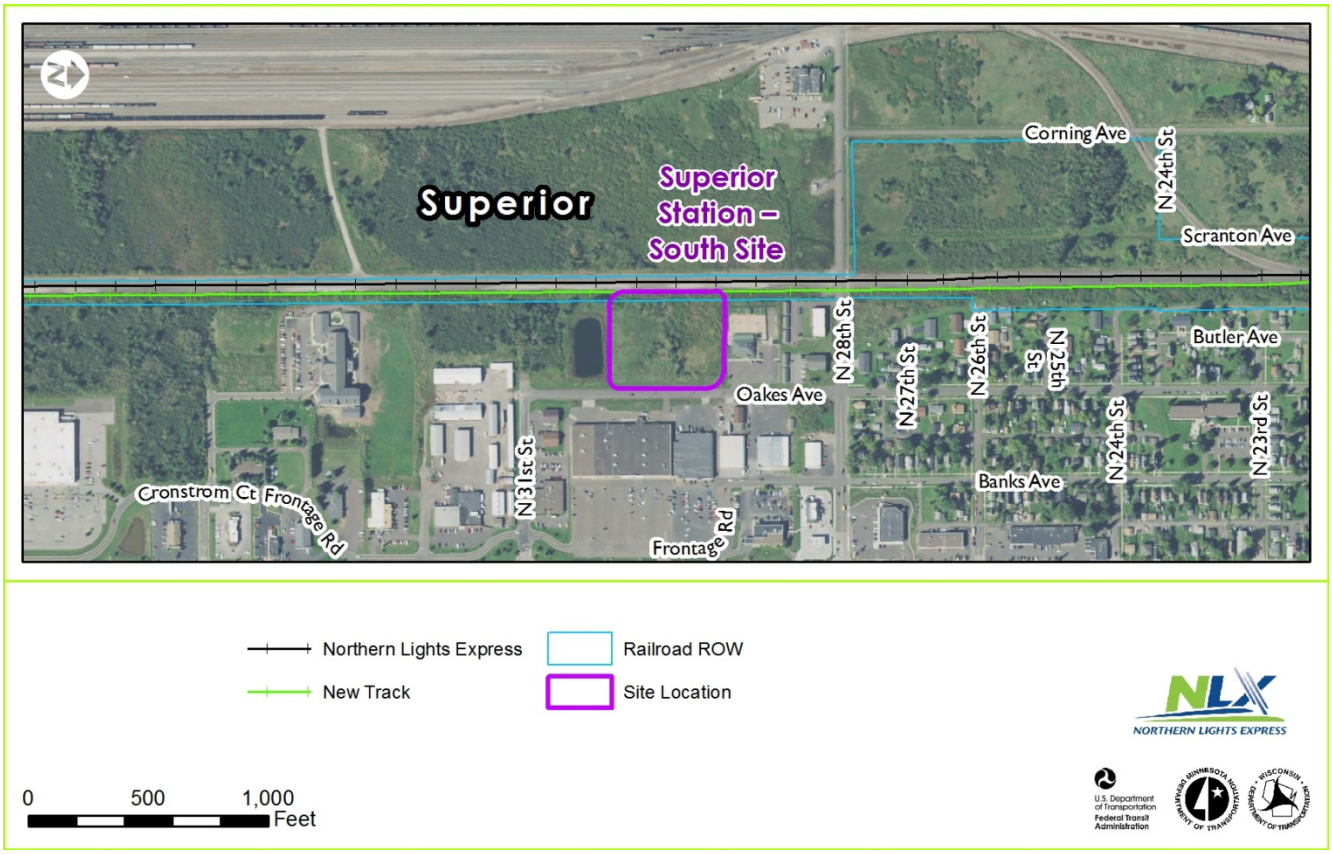


Figure 2-9: Superior, Wisconsin Station – South Site Location (Dismissed from Further Consideration)

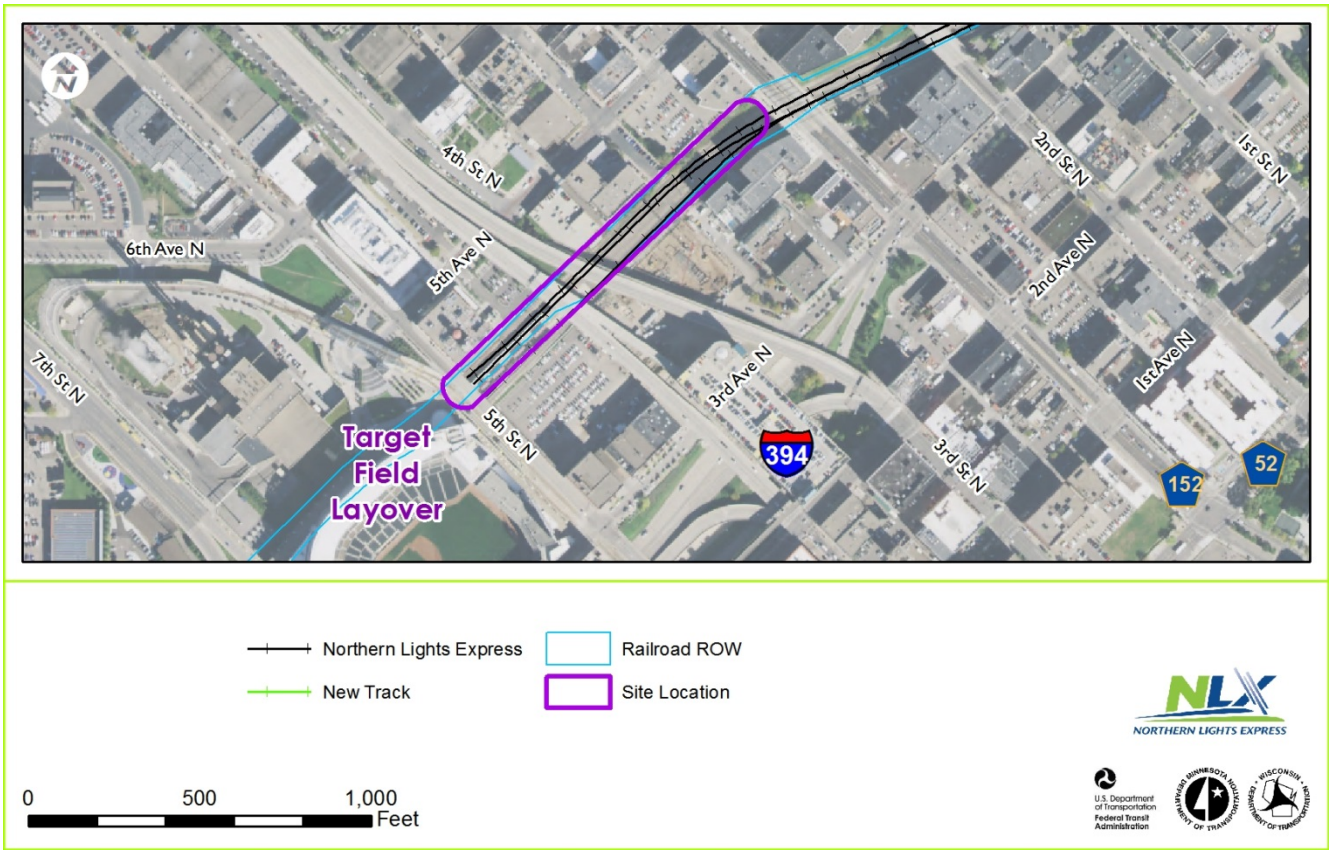


Minneapolis Layover Facility

A potential layover facility in Minneapolis at Target Field Station (see **Figure 2-10**) was identified in the Tier 1 EA. However, Target Field Station is no longer being considered a layover facility because no trains would lay overnight at Target Field Station. Under the proposed schedules, all NLX trains would have their overnight layovers in either Duluth or Sandstone.

MnDOT's analysis identified station locations for Cambridge and Hinckley, Minnesota, and for Superior, Wisconsin, and the decision to include both the proposed Sandstone and Duluth maintenance and/or layover facilities sites for evaluation in this Tier 2 EA. These facilities are described in Sections 2.4.2.8 and 2.4.2.9.

Figure 2-10: Minneapolis Layover Facility Site Location (Dismissed from Further Consideration)



Hinckley Loop Study

A separate Hinckley Loop Study was initiated by MnDOT to explore the feasibility of an alternative new alignment for a short section of the proposed NLX Project that would provide a direct connection to the Grand Casino Hinckley instead of having a station on the BSNF mainline in downtown Hinckley. Several potential route alternatives were evaluated in a two-part screening process. Although the screening process was halted prior to the completion of the study, MnDOT found that serving the Casino directly would result in an overall ridership increase for the NLX Project, but the modest ridership benefit would not warrant the increased project cost. MnDOT suspended consideration of the direct connection to the Casino and proceeded with evaluating the NLX Project in the existing BNSF right of way, with an NLX station in downtown Hinckley.

Sandstone Layover Facility

MnDOT conducted additional analysis of the Sandstone Layover Facility during the Tier 2 EA process and determined that a layover facility at this location would be less efficient than a layover facility in Duluth. Therefore, the Sandstone Layover Facility was eliminated from further consideration. The potential for a maintenance facility at Sandstone is still under consideration and is discussed in Section 2.4.2.9.

2.3 Alternatives in the NLX Tier 2 EA

The federal environmental review process (NEPA) requires consideration of a no build alternative to serve as a baseline of comparison with the proposed build alternatives. In this document, two alternatives have been carried forward for analysis in the Tier 2 EA: the No Build Alternative and the Build Alternative. The No Build Alternative includes the current transportation network, as well as reasonably foreseeable projects. The Build Alternative includes the route alternative, service alternative, and infrastructure improvements identified through the analysis documented in Sections 2.1 through 2.3.

2.3.1 No Build Alternative

The No Build Alternative reflects existing and committed improvements to the transportation network for the horizon year of 2040. The No Build Alternative does not include implementing the NLX Project. The existing track configuration would remain. BNSF would carry out any rehabilitation or replacement of rail infrastructure to meet its needs for regular freight rail operations. No stations, maintenance or layover facilities specific to NLX Service would be constructed.

The No Build Alternative includes the existing transportation system and all other funded transportation infrastructure improvements as of the year 2020 (estimated NLX Project opening year) identified in the MnDOT *Statewide Multimodal Transportation Plan* (http://www.dot.state.mn.us/minnesotago/SMTP.html; MnDOT, 2012). The No Build Alternative includes local projects identified in the *State of Minnesota 2017-2020 State Transportation Improvement Program (STIP)* (http://www.dot.state.mn.us/planning/program/stip.html; MnDOT, 2016d), including those in the Twin Cities and Twin Ports. **Table 1-1** describes the existing and planned transportation connections in the vicinity of the proposed NLX Project.

In addition to the *Statewide Multimodal Transportation Plan* (MnDOT, 2012), MnDOT's *20-Year Minnesota State Highway Investment Plan* (MnSHIP) identifies planned investments in highway infrastructure during the 20-year period from 2013 to 2033 (http://www.dot.state.mn.us/planning/mnship/; MnDOT, 2013). The numerous projects identified for 2013 to 2023 in the vicinity of the proposed NLX Project are focused on asset management (pavement, bridges and roadside infrastructure). While there are several bridge replacements

and numerous road resurfacing projects, there are no planned new critical connection projects or capacity expansions in the 20-year planning period. By 2023, the outcomes of the MnSHIP program are projected to result in:

- Stable interstate pavement and bridge conditions
- Slight decline in non-interstate pavement and bridge conditions
- Increasing congestion and reliability issues in the Twin Cities
- Interregional Corridors[2] meeting performance targets but decreasing average speeds

By 2033, with the implementation of planned asset management projects identified in MnSHIP the outcomes would be:

- Stable interstate pavement conditions and a slight decline in bridge conditions
- Decline in non-interstate pavement and bridge conditions resulting in impacts on freight movement, vehicles and bicycles
- Further increase in congestion and reliability issues in the Twin Cities
- Interregional Corridors performance targets no longer met due to decreasing average speeds

Wisconsin's *Connections 2030 Long-Range Transportation Plan* identifies 37 priority corridors throughout the state through 2030 (http://wisconsindot.gov/Pages/projects/multimodal/conn2030.aspx; WisDOT, 2009). Three of the priority corridors include Douglas County, Wisconsin:

- Lake Superior – A 100-mile corridor from Duluth-Superior to Michigan
- Peace Memorial – A 140-mile corridor centered on U.S. 53, also known as Peace Memorial Highway from Eau Claire to Duluth-Superior
- Superior/Duluth Metropolitan Planning Area – Rehabilitation and reconstruction of existing infrastructure, and a potential capacity expansion of U.S. 2 between 53rd Street and I-535 in Superior, Wisconsin

All three corridors emphasize preservation and maintenance of roadways and improved traffic movement through potential additions of passing lanes. All three corridors support increasing regional coordination of public transportation, enhancing bicycle and pedestrian facilities and developing intercity passenger rail between the Twin Cities; Madison, Wisconsin; Milwaukee, Wisconsin; and Chicago, Illinois.

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[2] *Interregional Corridors and the Interregional Corridor System serve "as the backbone of the state highway system and consists of Greater Minnesota's most heavily traveled roads. Although the [Interregional Corridor] system accounts for only 2 percent of all roadway miles in the state, it carries about 30 percent of all statewide travel. These routes are the most important highways for mobility and accessibility in Greater Minnesota and are used by inter-city buses as well as commercial traffic." (MnDOT 2013).*

The No Build Alternative was retained for detailed analysis, and its consequences were fully developed to serve as a baseline and allow comparison to the Build Alternative and to help decision-makers and the public understand the ramifications of taking no action.

2.3.2 Build Alternative

The NLX Project would introduce new higher speed intercity passenger rail service between Minneapolis and Duluth and would operate on 152 miles of existing BNSF track in Minnesota and Wisconsin (see **Figure 1-1**). The NLX Project would cross Hennepin, Anoka, Isanti, Kanabec, Pine, Carlton and St. Louis Counties in Minnesota, and Douglas County in Wisconsin. The physical elements of the Build Alternative are described below.

Appendix D includes aerial maps showing the existing track alignment and right of way, the proposed track alignment and other infrastructure changes, such as added sidings, culvert extensions, roadway crossing construction limits and station, maintenance and layover facility construction limits described below. The aerial maps also show environmental constraints and potential impacts discussed in Chapter 4 Affected Environment and Environmental Consequences.

Through the NLX Project, MnDOT would provide intercity passenger rail service, working with BNSF as the owner of the railroad right of way and railroad infrastructure, and the yet-to-be identified service operator. MnDOT would enter into agreements with the service operator and BNSF to carry out construction, day to day operations and maintenance (see discussion in Section 2.3.2.1). Work on these agreements would be conducted in conjunction with final design of the NLX Project. For the purposes of analyzing the potential impacts of the NLX Project, the following assumptions were made:

- BNSF would own and maintain all existing and new track infrastructure and signal systems.
- BNSF would own and maintain all existing and new culverts and bridges.
- BNSF would own and maintain all grade crossing warning devices.
- BNSF would continue to own existing railroad right of way.
- MnDOT would be responsible for operation and maintenance of station facilities; right of way arrangements would vary depending on the underlying fee owner of each station property.
- MnDOT would be responsible for passenger rail maintenance and layover facilities, and would lease the property needed for those facilities from BNSF.
- MnDOT would be responsible for operation and maintenance of passenger rail vehicles.

These assumptions are consistent with existing agreements for other passenger rail services operating in active freight rail corridors.

2.3.2.1 Operations

Operations include daily operations of the NLX Service as well as routine maintenance activities to maintain safe and reliable daily operations. Construction of the NLX Project infrastructure is discussed in Section 2.3.2.11.

Passenger Service Operations

The NLX Service includes four daily round trips at a maximum speed of 90 mph, with new passenger rail equipment traveling on BNSF tracks between Target Field Station in Minneapolis and the Duluth Station. Operating rules for NLX passenger trains would be consistent with operating rules for existing freight trains in the corridor.

Station stops would include Target Field Station in Minneapolis; Coon Rapids; Cambridge; Hinckley; Superior, Wisconsin; and Duluth. As part of this operating plan, MnDOT developed proposed schedules for four round trips with one-way travel times between Minneapolis and Duluth of approximately 2 hours and 33 minutes to 2 hours and 38 minutes (see **Figure 2-11**), with fares between Minneapolis and Duluth anticipated to be approximately $30.00 one way and $60.00 round trip (2014 dollars). The proposed schedules were developed using operations simulation modeling and considered freight and passenger operations for the NLX Project. This operating plan optimizes the relationship between service levels, estimated ridership and generated revenue.

Figure 2-11: Proposed NLX Schedule

Read Down

7003	7007	7009	7013	Train	7002	7006	7010	7014
5:25	9:31	**1:42**	**6:16**	Duluth	11:10	**3:21**	**7:55**	12:01
5:39	9:45	**1:56**	**6:30**	Superior, Wisconsin	10:58	**3:09**	**7:43**	**11:49**
6:41	10:52	**3:03**	**7:37**	Hinckley	9:51	**2:02**	**6:36**	**10:47**
7:11	11:22	**3:33**	**8:07**	Cambridge	9:21	**1:32**	**6:06**	**10:17**
7:37	11:48	**3:59**	**8:33**	Coon Rapids	8:55	**1:06**	**5:40**	**9:51**
7:55	**12:06**	**4:17**	**8:51**	Minneapolis	8:35	**12:46**	**5:20**	**9:31**
2h 30m	2h 35m	2h 35m	2h 35m	Trip Time	2h 35m	2h 35m	2h 35m	2h 30m

Read Up

PM times in **bold**

Maintenance

BNSF would continue to own the railway right of way and infrastructure. The NLX Project would be maintained in accordance with a maintenance agreement among MnDOT, the yet-to-be-identified service operator and BNSF. Maintenance on the BNSF right of way is anticipated to include usual and customary activities such as inspection and repair of rail, turnouts and ties; ballast unloading and lining and surfacing of track; vegetation and weed control; ditch and right of way maintenance and cleaning; inspection, upkeep and repair of bridges, culverts and other structures; and upkeep of wayside signals for train operation and crossing warning devices. Work on this agreement would be conducted in conjunction with final design of the NLX Project.

2.3.2.2 Ridership

Opening year (2020) ridership forecasts for four daily round trips at a maximum speed of 90 mph are estimated to be between 700,000 and 750,000 rides per year. By the 2040 horizon year, ridership is anticipated to average between 900,000 and 1,000,000 rides per year (see **Appendix C**).

2.3.2.3 Capital and Operating Costs

The Build Alternative, as summarized in **Table 2-1**, is the basis for the majority of the impact analyses, especially the physical impact analyses, in this Tier 2 EA. However, the Build Alternative also includes the recommended investment alternative that has been developed based on ongoing coordination with the FRA, MnDOT, WisDOT and the BNSF. This investment alternative reflects further refinement of the Build Alternative infrastructure improvements (see **Figure 2-1**) and is the basis for the development of the NLX Project capital costs, operating and maintenance costs and benefit cost analysis (see **Appendix C**).

The capital cost is the cost to bring a project to operation. The estimated capital cost of the NLX Project is approximately $547 million in 2014 dollars. Capital costs were identified based on FRA's standard cost categories that include: track improvements; stations, maintenance and layover facilities; land acquisition and easements; signal system improvements; train equipment; design and environmental permitting, and anticipated finance charges. See **Appendix C** for the Capital Cost Report for additional detail on the development of the estimated NLX Project capital cost.

Operating and maintenance costs are the costs incurred to operate a rail service and maintain the track, bridges, buildings, communication and signal systems, and equipment associated with the rail service. Operating costs include fuel costs, maintenance and operating crew salaries and benefits, car and locomotive maintenance, and insurance costs. Maintenance costs include costs for track inspections, spot repairs, and routine maintenance as well as cyclic costs such as costs for rail replacement, tie renewal, surfacing, ballast replacement, and similar capital improvements. The total operating and maintenance cost for the NLX Project

for year 2020 is $17.0 million in 2017 dollars and includes operating costs, expensed maintenance costs, and cyclic capital cost of track, signals, buildings, and bridges. A full description of the methodologies used to calculate the operating and maintenance costs can be found in the Operating and Maintenance Costs and Capital Replacement Forecast Technical Document, included in **Appendix C**.

A benefit cost analysis was undertaken to provide quantifiable benefits and costs that result from the construction and operation of the NLX Project. Costs included in the benefit-cost analysis are capital costs, operating and maintenance costs, and cyclic costs. The total of these costs are offset by fare revenues to estimate the benefit cost. The Preliminary Benefit Cost Analysis (see **Appendix C**) concluded that the benefits of the proposed NLX Project are greater than the anticipated cost.

Certain issue areas in this Tier 2 EA (primarily economic impacts) use these capital and operating cost estimates and benefit cost analyses. Following the environmental determination for the Tier 2 EA, the above noted agencies and BNSF will continue to refine and advance the design of the investment alternative.

The investment alternative infrastructure is described in **Appendix C**.

2.3.2.4 Equipment

MnDOT would purchase or lease the equipment for the NLX Project. The equipment necessary for daily operations would include two train consists. A third consist would be available for use when one of the two active consists requires maintenance. Each 650-foot-long train consist would include six 85-foot-long coaches and two 70-foot-long push-pull locomotives.

2.3.2.5 Track Infrastructure

Proposed track infrastructure improvements are listed in **Table 2-1**. **Appendix D** contains figures showing the locations of proposed track infrastructure improvements described in **Table 2-1**. Typical track cross sections are in **Appendix E**. Track infrastructure improvements are needed to accommodate the higher speeds of the passenger trains, as well as to allow the new passenger trains and existing freight trains to operate within the same corridor.

The NLX Tier 1 EA did not include rehabilitation of existing track in the construction limit calculation. At the time of the Tier 1 EA analysis, it was assumed that existing track rehabilitation would be accomplished by replacing rail ties and track without disturbing the ballast or subgrade. The Tier 2 EA analysis does include ballast replacement as part of the track rehabilitation; therefore, track rehabilitation has been included as part of the construction limits. This accounts for the majority of the construction limit increase from the Tier 1 EA to this Tier 2 EA. In addition, approximately 120 of the 420 acres in the Tier 1 EA construction limits were outside

of the existing BNSF right of way; this was necessary for the new sidings, track curve modifications, and other rail infrastructure required for a service level of eight round trips at up to 110 mph. The Tier 2 EA service level of four round trips at up to 90 mph requires less new infrastructure; therefore, only about 19 acres (rather than 120 acres) of the 878 acre construction limits are outside of BNSF right of way in the Tier 2 EA analysis. While overall acreage has increased due to the addition of the existing track in the construction limit calculation, the portion outside of the BNSF right of way has been reduced.

2.3.2.6 Bridges and Culverts

Bridge and culvert improvements are needed to accommodate the additional track and other infrastructure necessary for freight and passenger trains to operate on the same corridor. New bridges would be constructed to accommodate additional track at Mississippi Street and Rice Creek in Fridley and over a drainage ditch and Isanti Brook in Isanti County. Open deck bridges would be converted to ballast deck bridges over the following waterways: Coon Creek, Grindstone River, West Balsam Creek, Black River, Nemadji River and Pokegama River. The operating and control systems would be rehabilitated on the Grassy Point swing bridge between Superior, Wisconsin, and Duluth. **Appendix E** lists the various culvert improvements that would be completed under the Build Alternative.

2.3.2.7 Signal Systems

The NLX Project includes upgrades to train signal and communication systems. Upgrades would include the installation of CTC with a PTC overlay. Additional control points would be located at powered turnouts and crossovers to increase flexibility and capacity in operations.

2.3.2.8 Roadways/Grade Crossings

A total of 126 public rail grade crossings exist in the NLX Project. The NLX Project proposes improvements to public rail grade crossings, including installation of active warning devices, reconstruction of approach roadways, installation of medians and rail infrastructure improvements, such as construction of an additional track across the roadway. The NLX Project is not proposing to close any public rail grade crossings. Private rail crossings are not under the jurisdiction of MnDOT; any changes to private rail crossings would be addressed by BNSF and the adjacent property owners.

Improvements are needed at certain rail grade crossings to improve site visibility for approaching trains and vehicles. Crossings were evaluated for existing geometric conditions and to determine the level of improvements that were needed. A total of 42 crossings were considered critical, meaning that the slopes of roadway approaches to the railroad did not meet minimum state and federal standards. Improvements to the

critical crossing locations include reconstruction of the roadway approaches to flatten the slopes and installation of recommended grade crossing warning devices, signage and striping.

Currently, 62 of the crossings are equipped with automatic gates and flashing lights, and the remainder are stop sign controlled. As part of the NLX Project, each rail grade crossing would be equipped with automatic gate systems and flashing-light signals. The options for automatic gates systems are as follows:

- Two quadrant gates
  - Flashing-light signals
  - Automatic gate arm before the tracks for each direction of travel
  - Railroad crossing sign
- Two quadrant gates with median
  - Flashing-light signals
  - Automatic gate arm before the tracks for each direction of travel
  - Railroad crossing sign
  - Four-foot-wide raised concrete median
- Four quadrant gates
  - Flashing-light signals
  - Four automatic gate arms – two for each direction; one gate before the tracks, and one after the tracks
  - Railroad crossing sign

A total of 37 public rail grade crossings would be upgraded to quad gates and flashing lights, 50 public rail grade crossings would be upgraded to dual gates and flashing lights with a median, 21 public rail grade crossings would be upgraded from stop controlled to dual gates and flashing lights with no median, 1 public rail grade crossing would be upgraded from a single gate to dual gates and flashing lights with no median, and 17 public rail grade crossings would have no upgrade to their warning devices or upgrades would be done by others separately from the NLX Project.

Appendix E contains a list of work that would be completed at each crossing.

2.3.2.9 Stations

This Tier 2 EA evaluates the environmental effects of the preferred station locations in detail. All of the NLX station locations in the Build Alternative were determined through consultation and public meetings in the communities in which they would be located. The NLX stations would meet the needs of modern intercity

passenger rail service and would include an enclosed station building, platform and warming shelters, on-site parking and multimodal transportation access. In addition, all stations would be accessible and comply with the Americans with Disabilities Act (ADA). The enclosed station buildings would be climate controlled and include a passenger waiting area, seating, public restrooms, ticket purchasing machines and space for vending machines and drinking fountains. Space would be provided for storage of maintenance items, mechanical and electrical rooms, passenger information displays and public address systems. Stations would not be staffed, which is consistent with Amtrak's guidelines for corridor service. The stations analyzed in the Tier 2 EA are listed in **Table 2-2** and are shown in **Figure 2-12, Figure 2-13** and **Figure 2-14**.

Table 2-2: Proposed Station Locations

City	General Location	Figure Number
Minneapolis	Target Field Station	2-12
Coon Rapids	Foley Boulevard	2-12
Cambridge	City Center Mall	2-13
Hinckley	Downtown	2-13
Superior, Wisconsin	Downtown	2-14
Duluth	New station at Union Depot	2-14

Figure 2-12: Minneapolis (Target Field) and Coon Rapids Station Site Locations

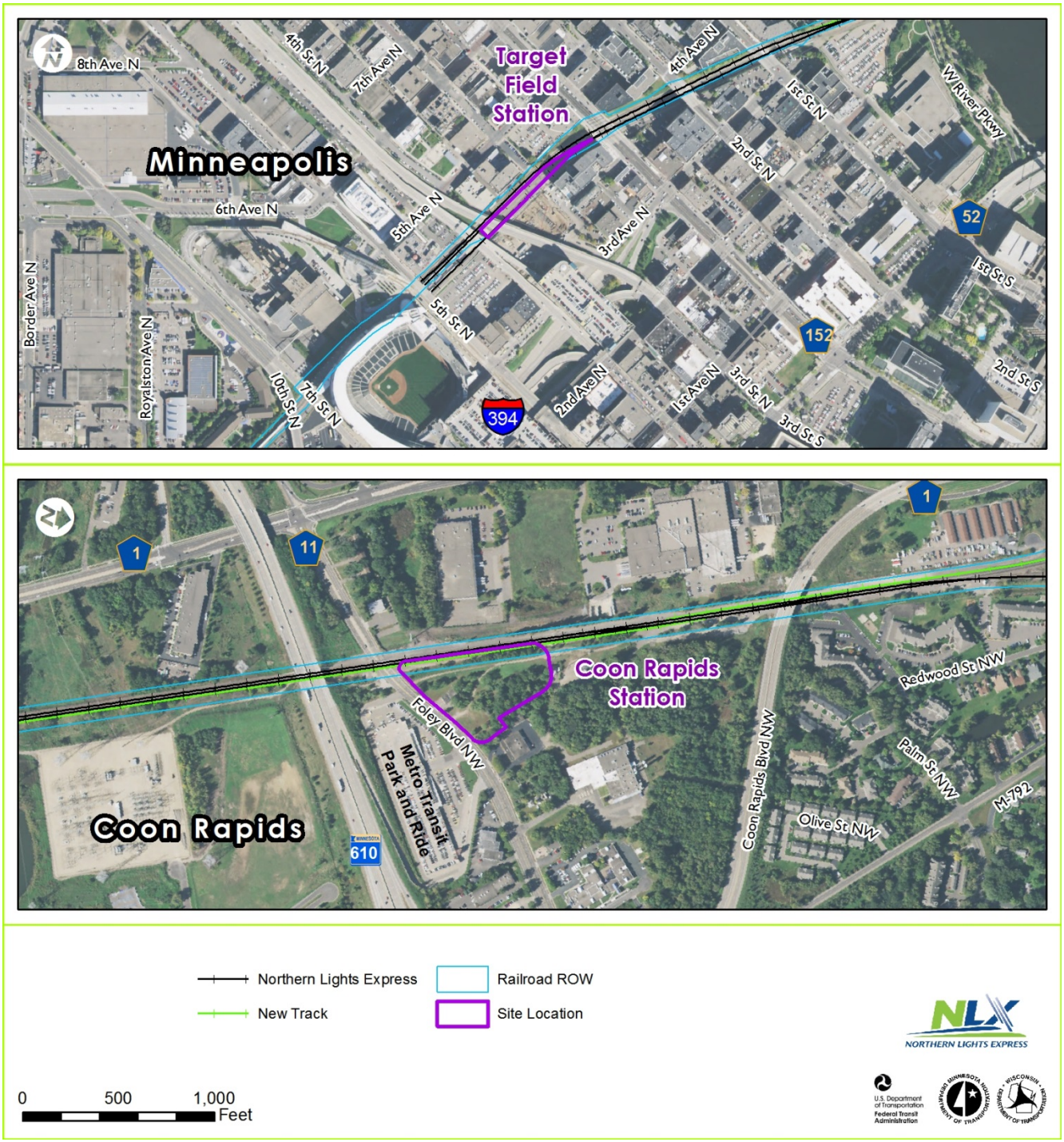


Figure 2-13: Cambridge and Hinckley Station Site Locations

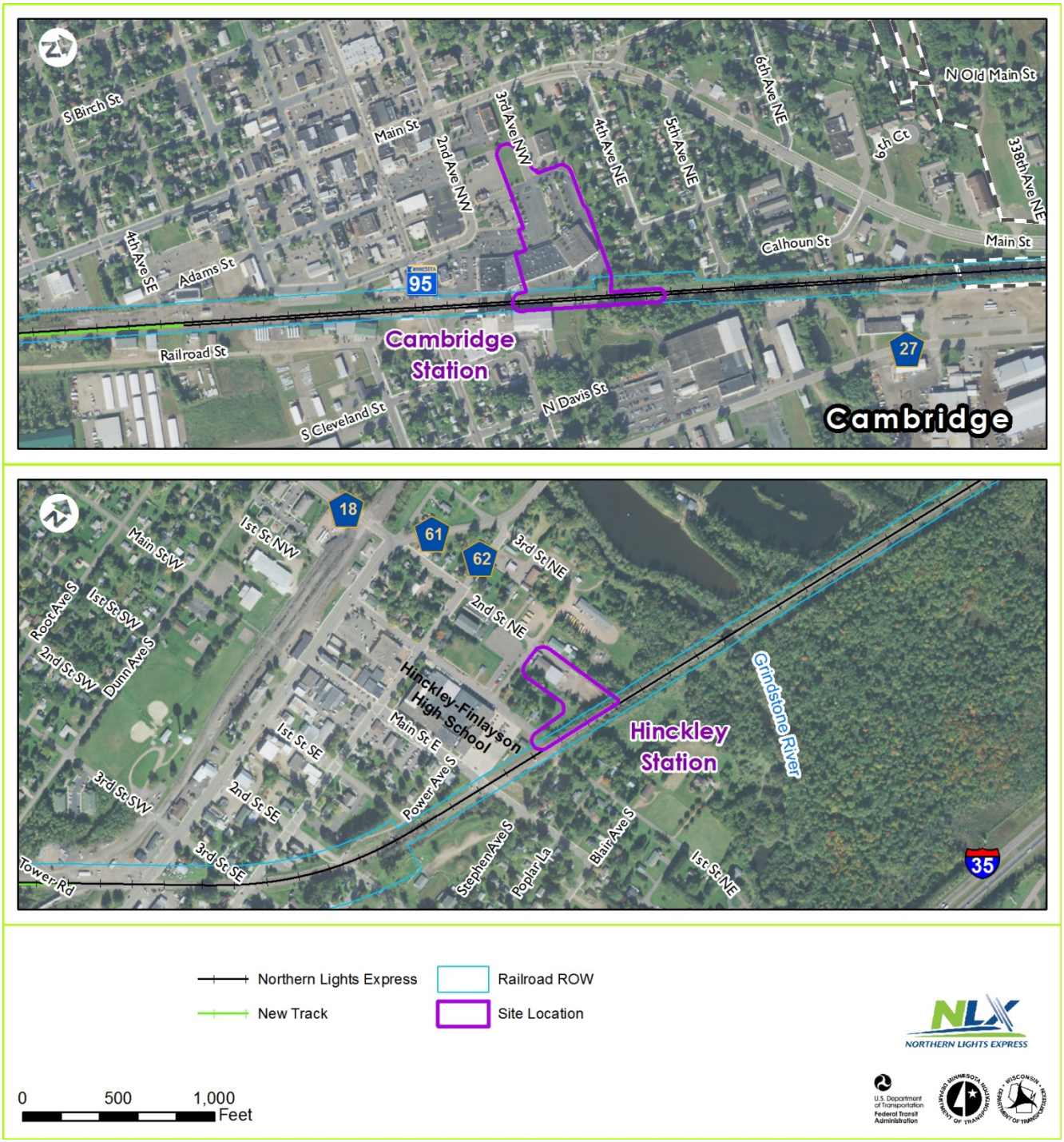


Figure 2-14: Superior, Wisconsin Station and Duluth Station Site Locations

Minneapolis

The NLX Station facilities would be added to the existing Target Field Station in Minneapolis (see **Figure 2-12**). The NLX platform would be integrated with the existing Northstar Commuter Rail boarding area at track level and connected to the other facilities at Target Field Station on the upper level. The existing commuter rail platform would be extended approximately 490 feet to the northeast and a stub end track would be constructed on the southeast side of the platform. Existing public parking structures in the area would accommodate NLX Service parking demand. Use of this location is cost effective because it uses existing station and parking facilities, thus minimizing construction costs. Adding the NLX platform to the existing multimodal Target Field Station is consistent with local land use plans and helps to provide ready connections to bicycle, pedestrian, transit and vehicle travel options. **Figure 2-12** and **Figure 2-15** show the site location and proposed layout, including the space needed for platform extension and stub end track.

Coon Rapids

The Coon Rapids Station site is located north of Foley Boulevard, east of the BNSF rail line and north of the Metro Transit park and ride facility in Coon Rapids (see **Figure 2-12**). The site is large enough to accommodate the requirements of a new station and is almost entirely on land owned by the Anoka County Regional Railroad Authority and BNSF. Development of a station at this location is consistent with the land use and transportation plans identified in the City of Coon Rapids *Foley Boulevard Station Area Plan* (City of Coon Rapids, 2015). The site has local and regional access and is adjacent to existing bus service at the Metro Transit Foley Boulevard park and ride facility. A 60-foot utility easement runs along the BNSF rail line through the site and contains major utilities including a 48-inch sanitary sewer interceptor. The NLX station building would be placed to avoid the interceptor. A total of 192 parking spaces would be provided immediately east of the NLX station. **Figure 2-12** and **Figure 2-16** show the site location and proposed layout, respectively.

Cambridge

The Cambridge Station would be integrated with the publicly owned area in the City Center Mall and the platform would be located on BNSF right of way (see **Figure 2-13**). The site is centrally located to current activity areas, connected to local and regional transportation facilities and accessible for pedestrians. The station would be integrated with existing uses at the City Center Mall. Some interior renovations would be required within the City-owned portion of the mall to accommodate space for an enclosed passenger waiting area. The existing City Center Mall parking spaces would be reconfigured and shared with NLX Service with a total of 346 spaces provided for all users. The City Center Mall would house the station waiting area and access to the track platform. **Figure 2-13** and **Figure 2-17** show the site location and proposed layout, respectively.

Hinckley

The Hinckley Station site is northeast of downtown Hinckley and near the Hinckley-Finlayson High School (see **Figure 2-13**). The Hinckley Station site is largely located on property owned by the City and BNSF. The site design was configured to minimize acquisition of private property from the church immediately west of the site. Due to substantial grade changes at the site, the upper portion of the site would contain the NLX station building and passenger drop-off area and the lower level would contain the 166-stall parking lot. Fencing would be constructed adjacent to the railroad right of way on the southern portion of the site to provide a physical barrier between the NLX station and Hinckley-Finlayson High School. **Figure 2-13** and **Figure 2-18** show the site location and proposed layout, respectively.

Superior, Wisconsin

The Superior, Wisconsin Station site is located at the western edge of downtown (see **Figure 2-14**). The boundaries of the site are generally north of U.S. 2 (Belknap Street), south of 14th Street, east of the BNSF tracks and west of Oakes Avenue. The site is located primarily on BNSF right of way, but would also require private property acquisition to the east of the BNSF right of way. The NLX Project would require an easement to extend North 14th Street from Oakes Avenue to provide an entrance road to the station. The site is connected to the local and regional transportation networks, providing access to pedestrians, public transportation users and vehicles. In addition, the site would support the efforts of the City of Superior, Wisconsin, to attract additional activity generators to encourage downtown redevelopment. Preliminary design plans show the station could be designed to avoid placing permanent structures over an 8-inch high-pressure oil pipeline that runs north to south through the site. The existing AMSOIL railroad spur on the site would be reconfigured as part of station development. A total of 192 parking spaces would be provided immediately east of the station. **Figure 2-14** and **Figure 2-19** show the site location and proposed layout, respectively.

Duluth

The Duluth Station would be located adjacent to the historic Union Depot at the south end of downtown Duluth on the west side of I-35 (see **Figure 2-14**). Reestablishing passenger rail service at this location is consistent with local land use and transportation goals. Additional service at the Duluth Station would support other transportation uses within downtown Duluth, including the new Duluth Multimodal Transportation Center. The location of the two facilities would create a hub of transportation uses in downtown, supporting the comprehensive planning goals for the City of Duluth. The station would feature a new dedicated passenger walkway from Michigan Street to the new entrance on the north side of the Union Depot building and a second passenger drop-off lane at the track level. A new passenger waiting area would be provided at the

track level where the existing ticket office for the North Shore Scenic Railroad (NSSR) is located. A new NLX station platform would be provided at track level. The site would accommodate both the NLX Service and NSSR operations. The Duluth Station would not require property acquisition. The anticipated parking demand generated by NLX Service would be accommodated by existing public parking facilities adjacent to Union Depot. During subsequent design stages, MnDOT would need to coordinate agreements with parking facility owners to secure dedicated NLX Service parking. The working concept for parking assumes all or a portion of the metered public parking spaces at ground level and the existing parking spaces under I-35 at the lower level of the parking ramp north of Union Depot would be dedicated for NLX Service parking. **Figure 2-14** and **Figure 2-20** show the site location and proposed layout, respectively.

Figure 2-15: Minneapolis (Target Field) Station Layout

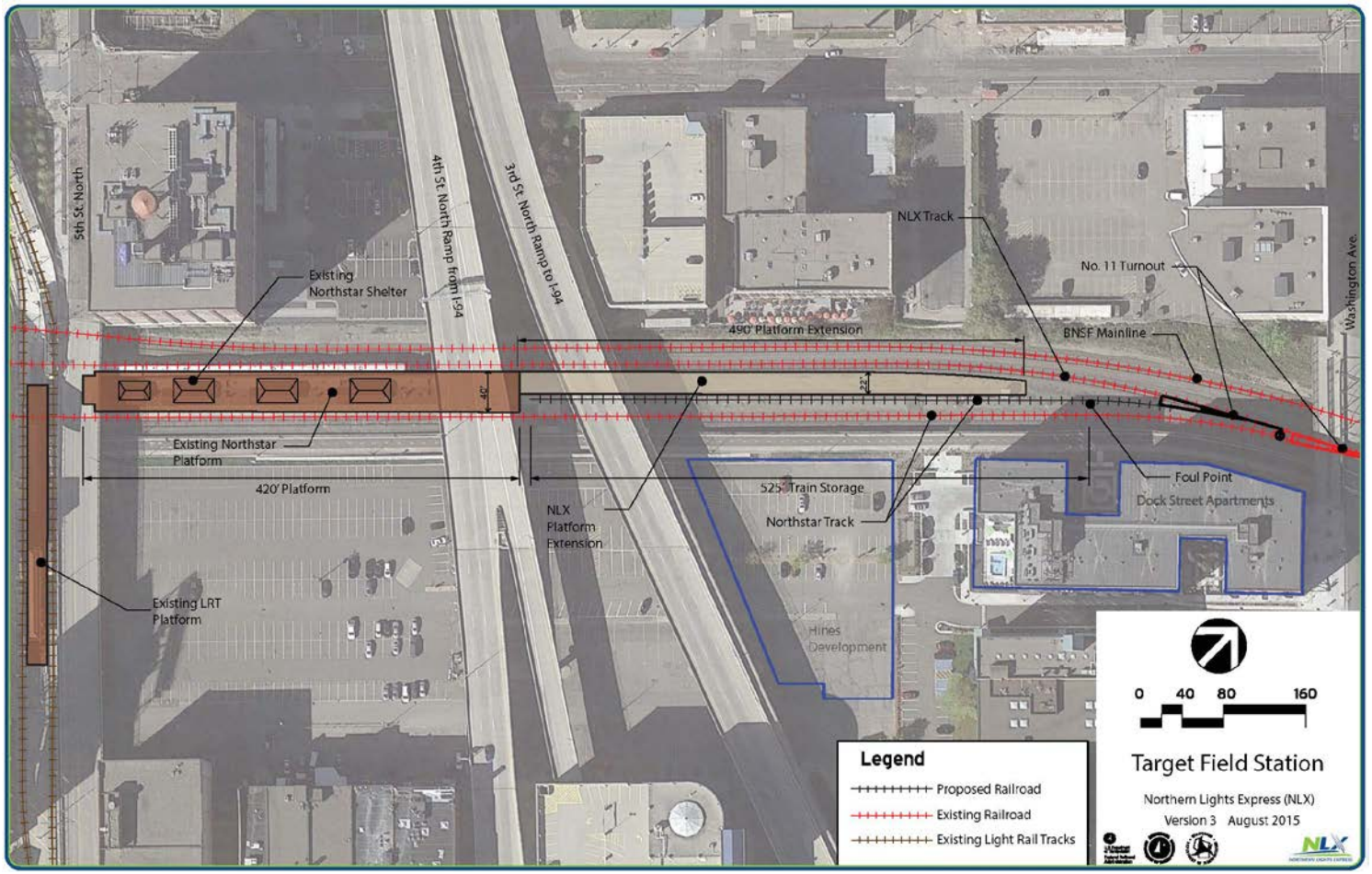


Figure 2-16: Coon Rapids Station Layout

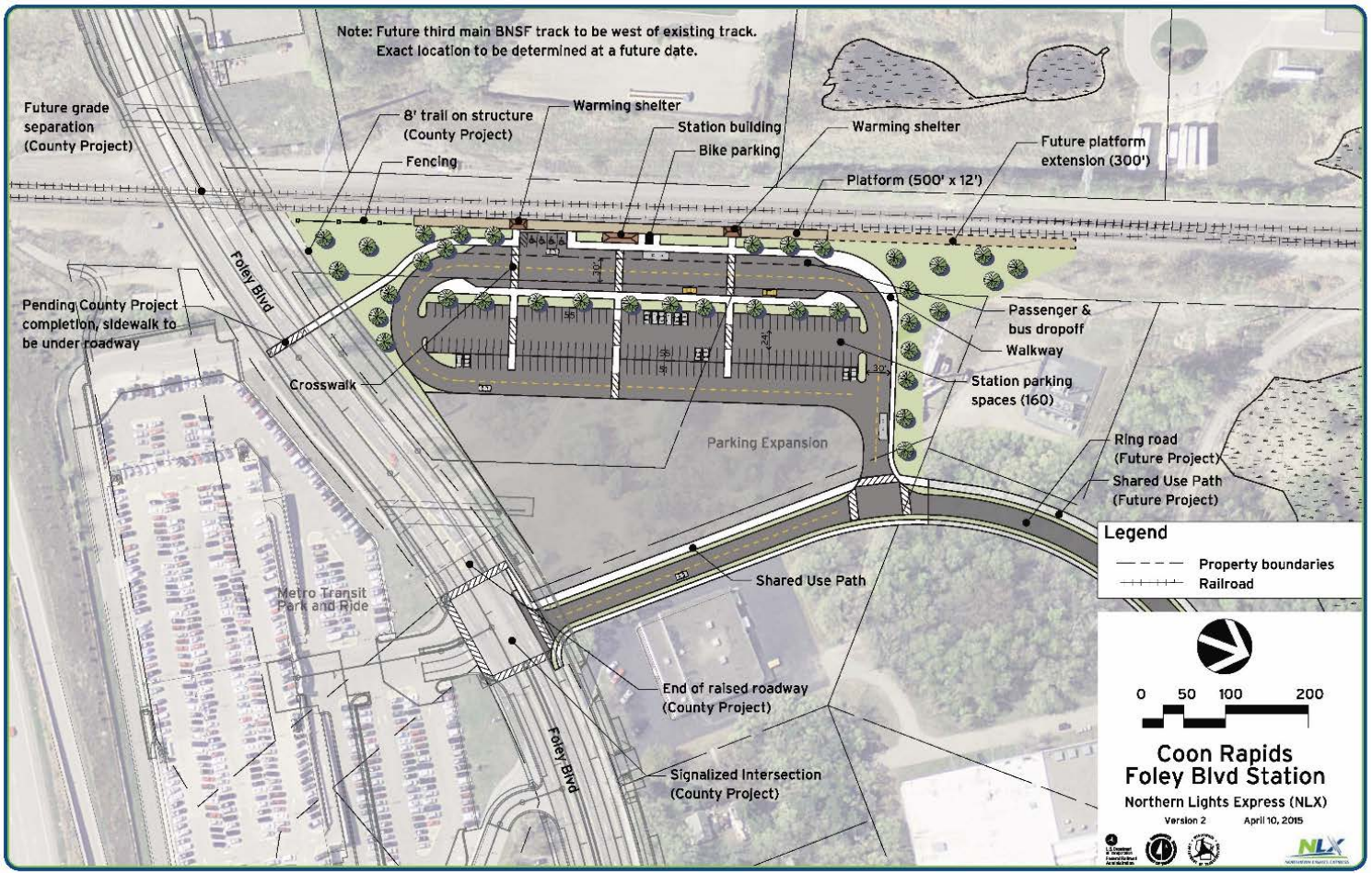


Figure 2-17: Cambridge Station Layout

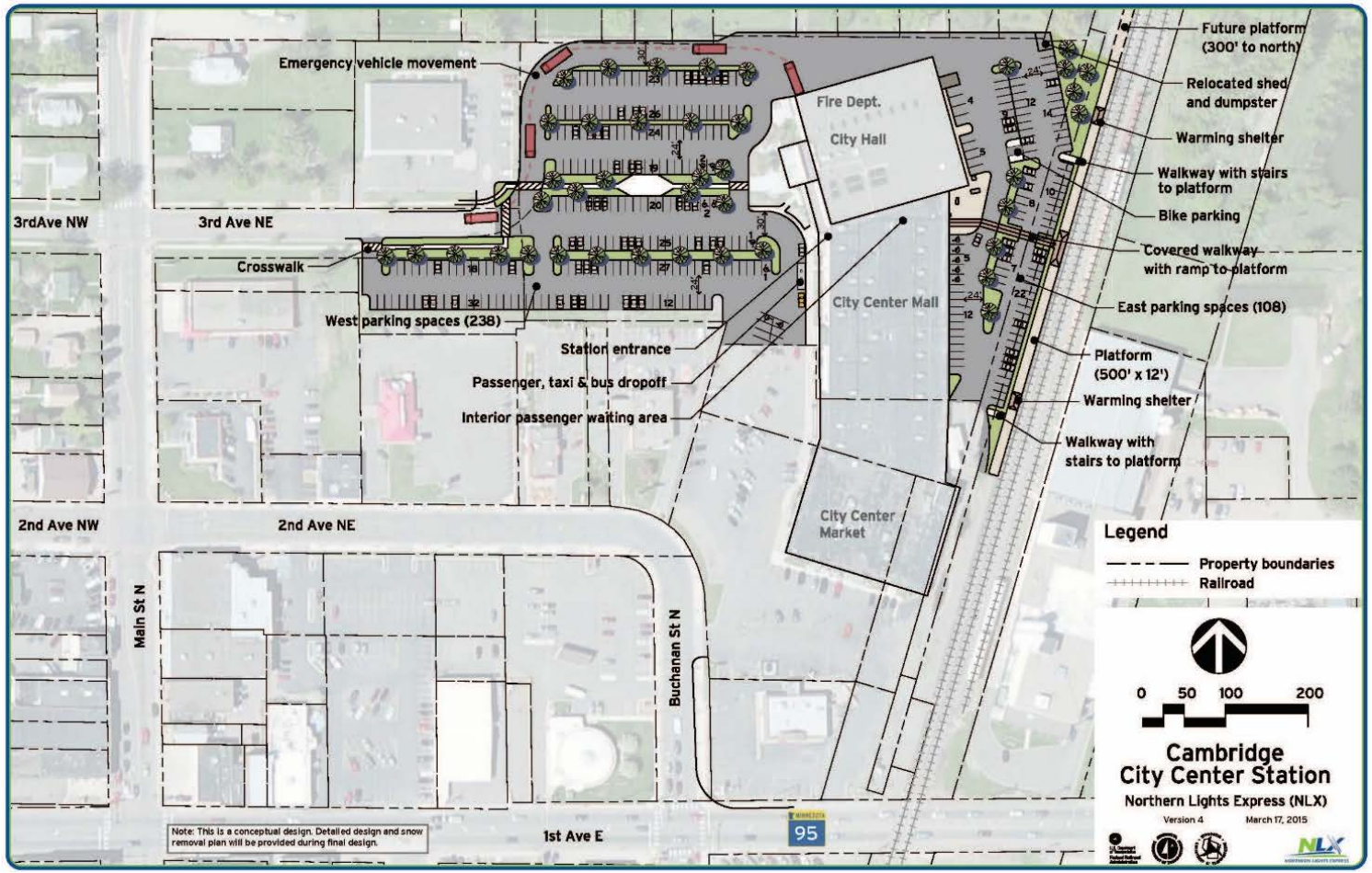


Figure 2-18: Hinckley Station Layout

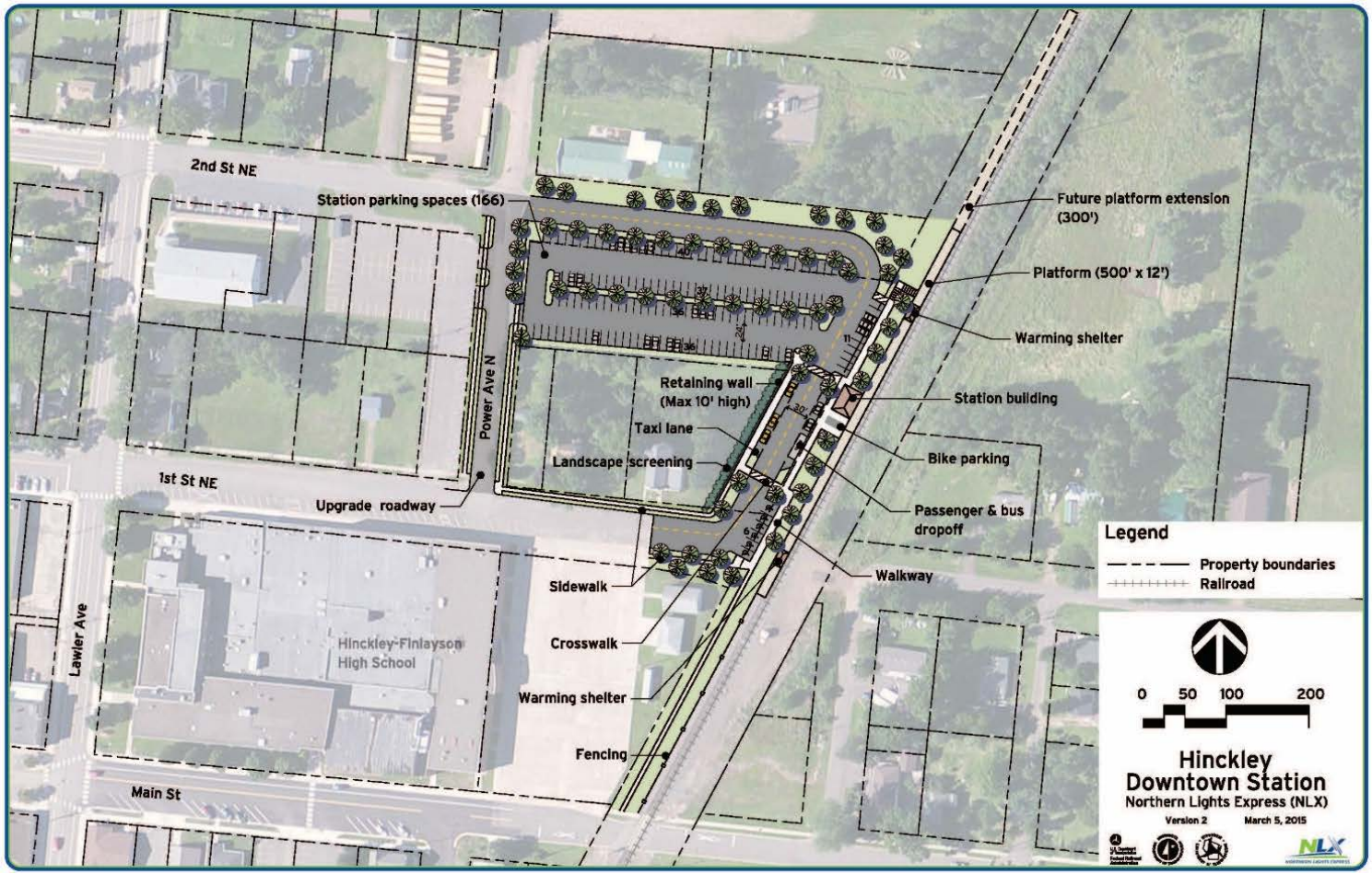


Figure 2-19: Superior, Wisconsin Station Layout

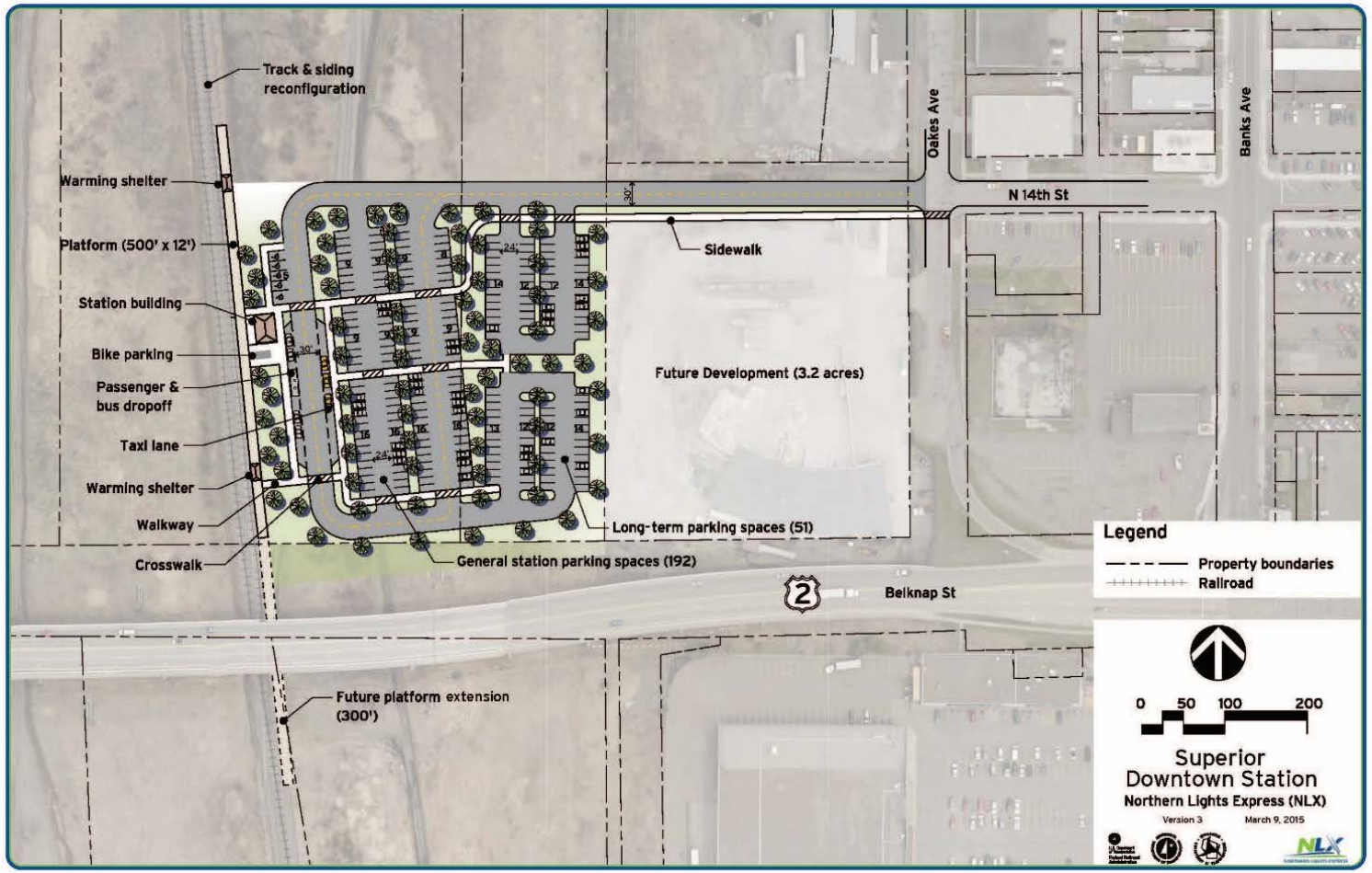
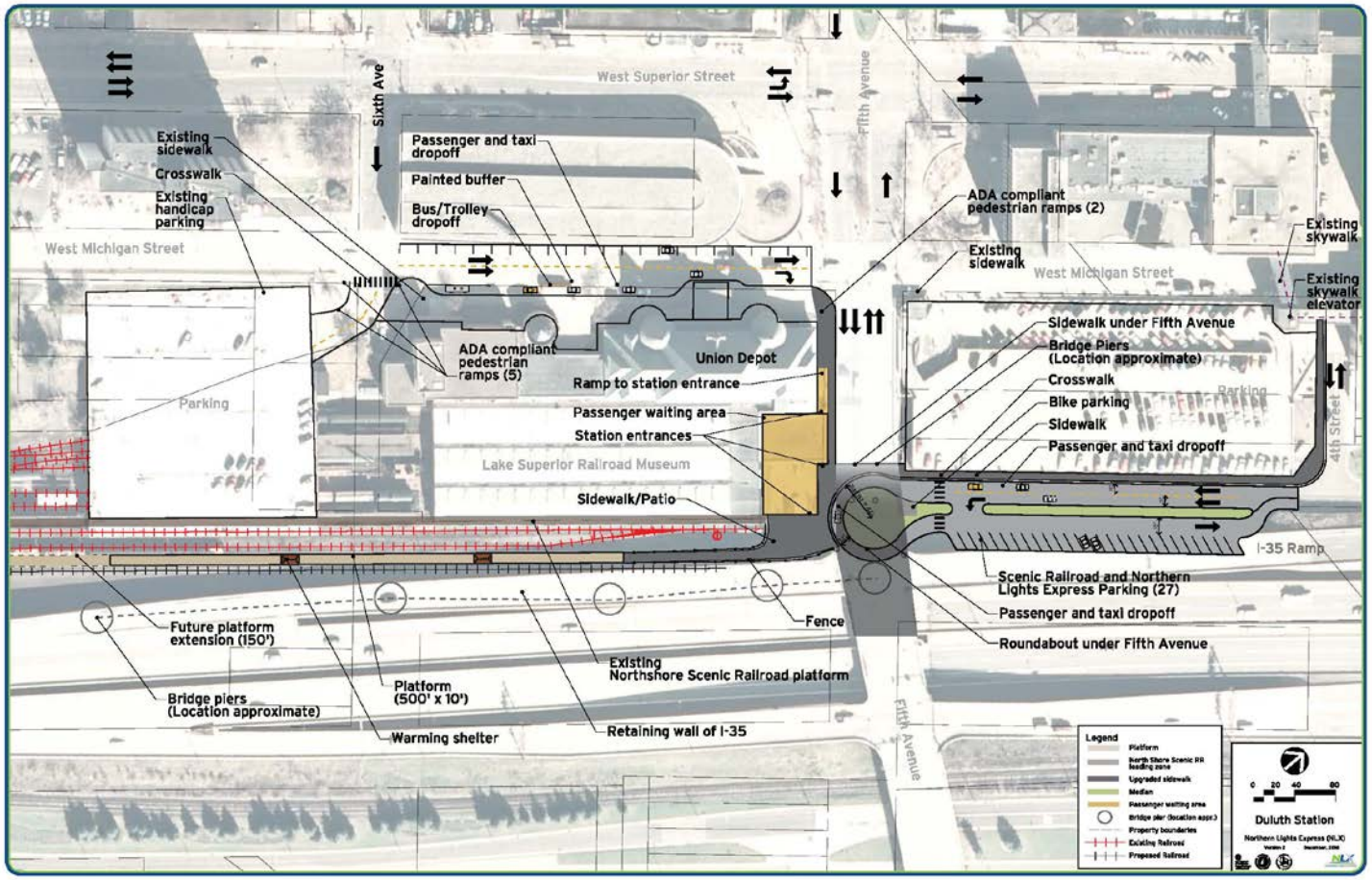


Figure 2-20: Duluth Station Site Layout



2.3.2.10 Maintenance and Layover Facilities

To accommodate NLX Service, one maintenance facility and one layover facility would be needed. Two maintenance facility site location alternatives are under consideration for the NLX Project: one in which all maintenance and layover activities would occur in Duluth, and one in which a maintenance facility would be located in Sandstone and an overnight layover facility would be located in Duluth (see **Table 2-3**).

Table 2-3: Proposed Maintenance and/or Layover Facilities Locations

City	General Location	Figure Number
Sandstone Maintenance Facility	Minnesota State Highway 23	2-21
Duluth Maintenance and/or Layover Facility	Railroad Street	2-21

The NLX maintenance facility would be used for inspection, servicing, maintenance and repair activities required to keep NLX trains in service and incorporate train layover and storage needs. The maintenance building would accommodate one 650-foot-long train consist. Additional features of the maintenance facility would be a train wash, office and shop space, yard and lead tracks, shop equipment, vehicular access, exterior lighting and signage and security systems. The maintenance facility would not be used for major rebuilds, main engine change-outs, wreck repairs or component rebuilds.

The layover facility would provide a location off the BNSF main tracks to store up to two complete train consists. The layover facilities would provide a location to perform limited servicing, inspections and minor repairs. The layover facility would consist of yard and lead tracks, a support building, vehicle access, exterior lighting and signage and security systems.

Sandstone

MnDOT identified the Sandstone site location for consideration after completing the Tier 1 EA (see **Figure 2-21**). The 2015 analysis concluded that the MN 23 site in Sandstone is a feasible and functional site for an NLX maintenance facility (see **Figure 2-22** through **Figure 2-24**). The site would accommodate NLX train lengths and all required elements described above including two maintenance bays and yard tracks. This site can accommodate train car switching without conflicting with BNSF mainline operations. The site would be located within BNSF right of way.

Duluth

MnDOT identified the Duluth site at Railroad Street as a maintenance and/or layover facility in the Tier 1 EA (see **Figure 2-21**). The 2015 analysis concluded that the Railroad Street site, located approximately 0.34 mile southwest of the proposed NLX Station, would accommodate a feasible and functional maintenance and/or layover facility (see **Figure 2-25** through **Figure 2-28**). Like Sandstone, the site accommodates the length of NLX trains and all required program elements including two maintenance bays and yard tracks.

2.3.2.11 Construction

Final design plans would be prepared for NLX infrastructure based on the environmental and preliminary engineering work completed by MnDOT for this Tier 2 EA. Final design plans would consider how the NLX Project would be constructed, meaning that the plans would identify how equipment would access construction sites, whether land acquisition or easements would be needed for construction and the utility and underground work that would be required to minimize impacts on BNSF operations. MnDOT, FRA and BNSF would approve final design plans.

For the NLX Project, it is expected that BNSF would construct the majority of the proposed improvements needed for track infrastructure within the BNSF right of way. As such, it is expected that BNSF would schedule the work to be completed for the NLX Project in a comprehensive construction schedule and in the proper sequence.

When construction activities would affect train operations, BNSF would schedule the various construction projects along the NLX Project corridor to maximize the productivity of each track outage. For example, if an 8-hour track outage (where no trains may operate) is scheduled in order to replace a main track turnout for the siding at Andover, during that same outage, BNSF may have additional crews and equipment scheduled and on hand at other sidings, such as Grasston, Hinckley, Askov and Nickerson, to replace those turnouts at the same time. Likewise, certain rail grade crossings may be replaced during the same outages. The objective would be to minimize the delay to trains by controlling the number of outages scheduled and to maximize the productivity of each outage.

MnDOT would be responsible for constructing station and maintenance and layover facilities, which would include the following activities:

- Constructing platforms at all stations
- Constructing a station building, warming shelters, bike parking and bus and vehicular pick-up and drop-off locations at the stations in Coon Rapids, Cambridge, Hinckley and Duluth, Minnesota, and in Superior, Wisconsin

- Constructing parking for vehicles at the stations in Coon Rapids, Cambridge and Hinckley, Minnesota, and in Superior, Wisconsin
- Constructing support buildings and street access for maintenance and/or layover facilities in Sandstone or Duluth

Figure 2-21: Sandstone and Duluth Maintenance and/or Layover Facility Site Locations

Figure 2-22: Sandstone Maintenance Facility (1 of 3)

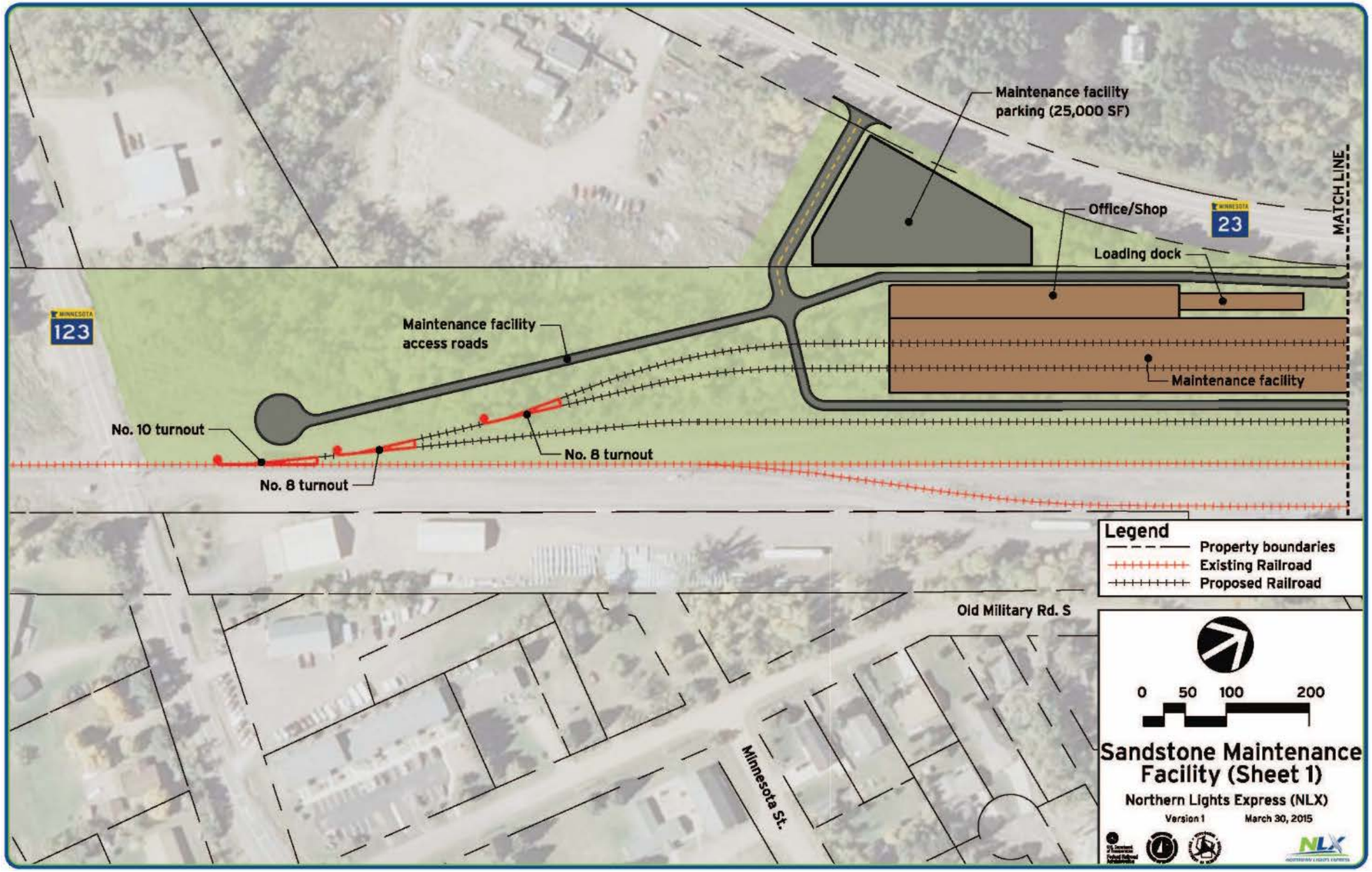


Figure 2-23: Sandstone Maintenance Facility (2 of 3)

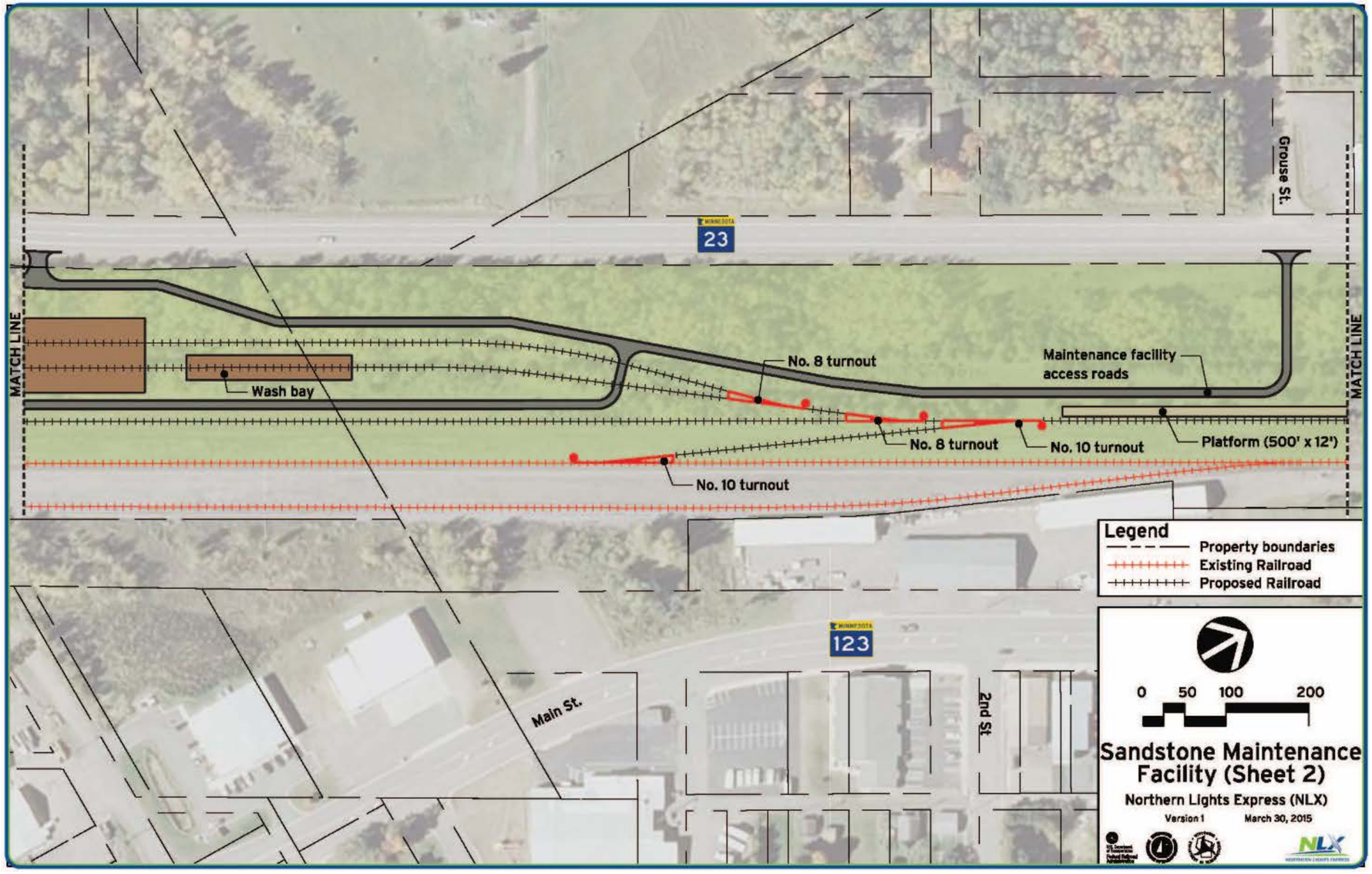


Figure 2-24: Sandstone Maintenance Facility (3 of 3)

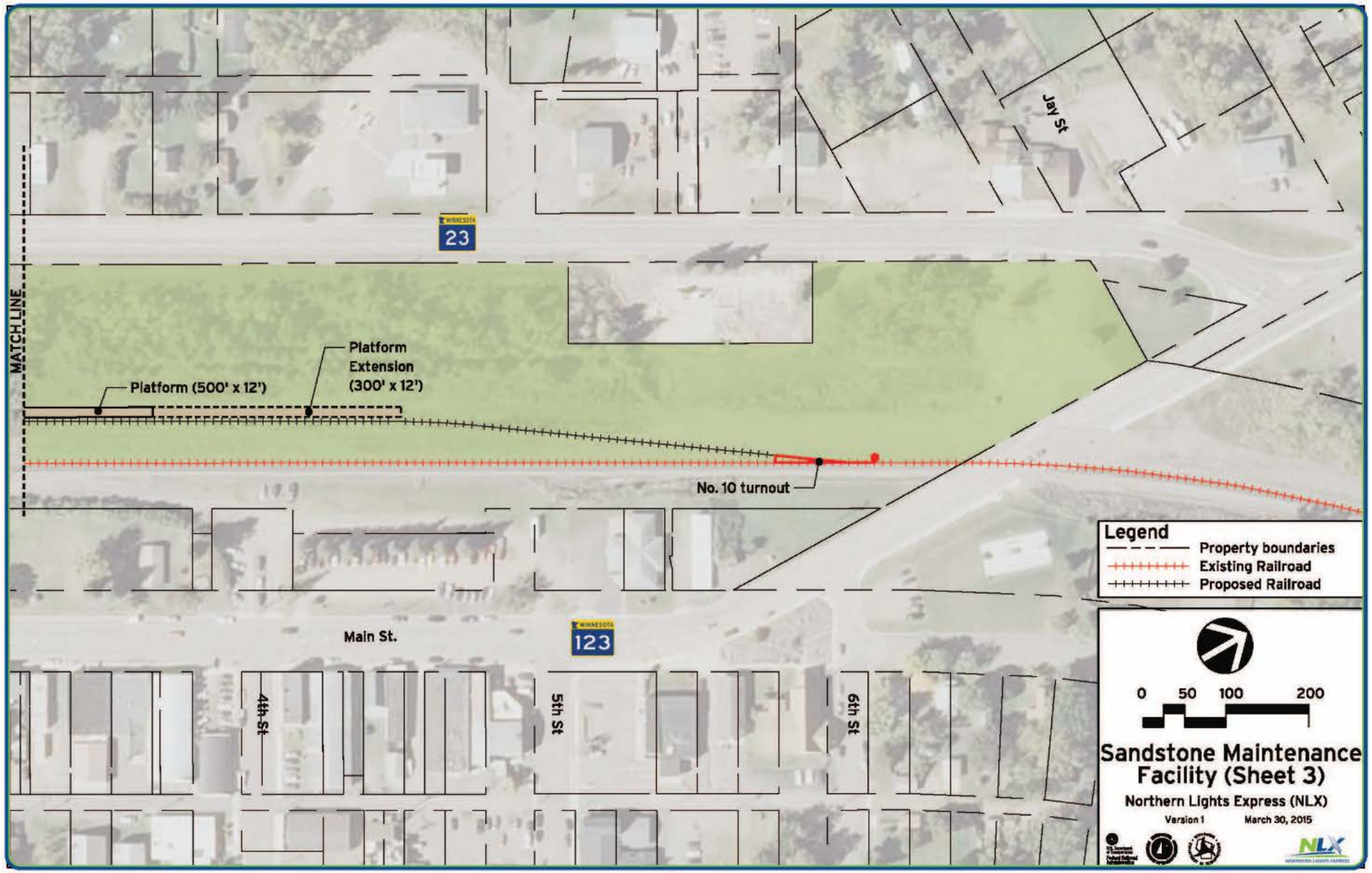


Figure 2-25: Duluth Layover Facility (1 of 2)

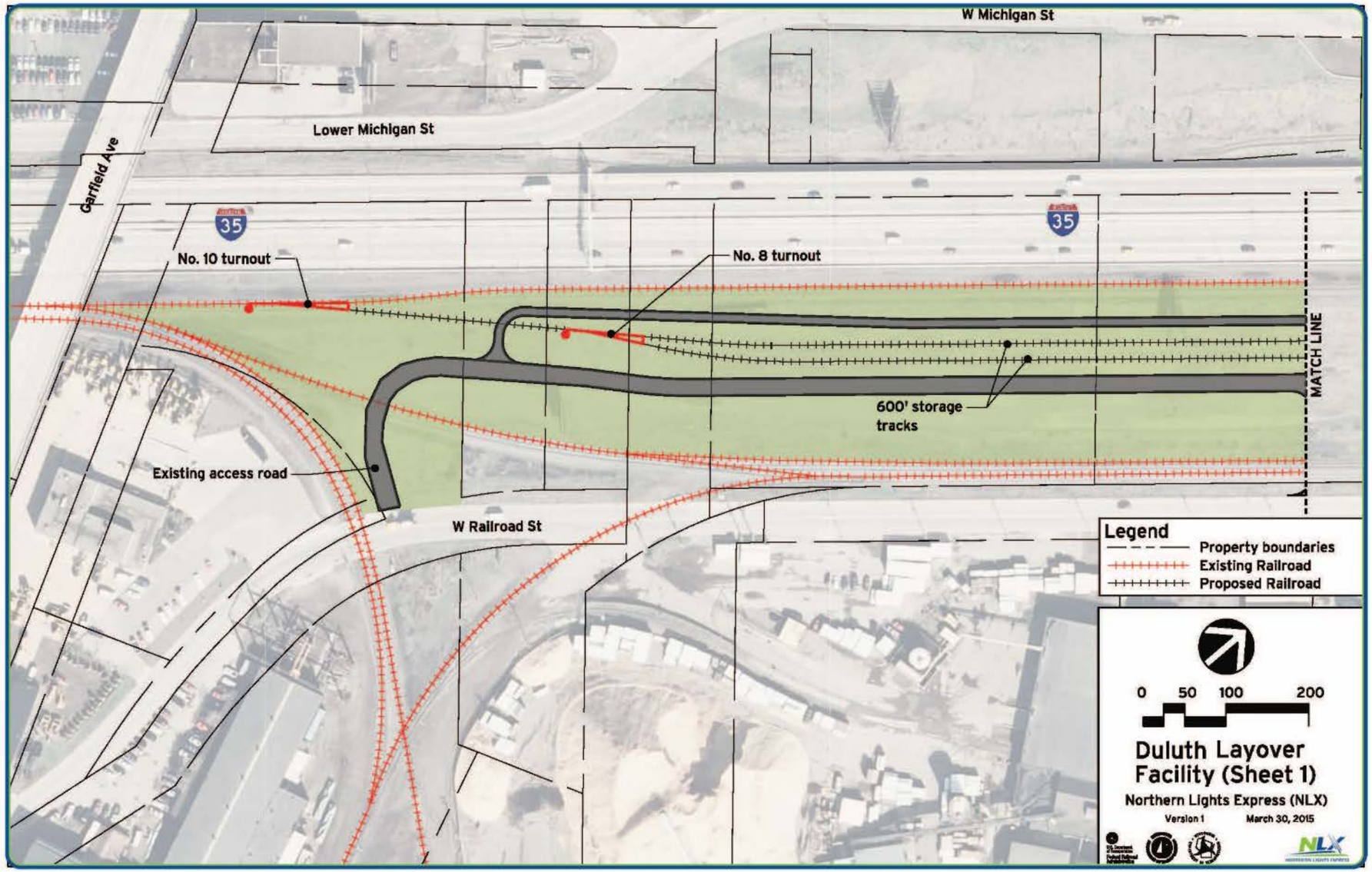


Figure 2-26: Duluth Layover Facility (2 of 2)

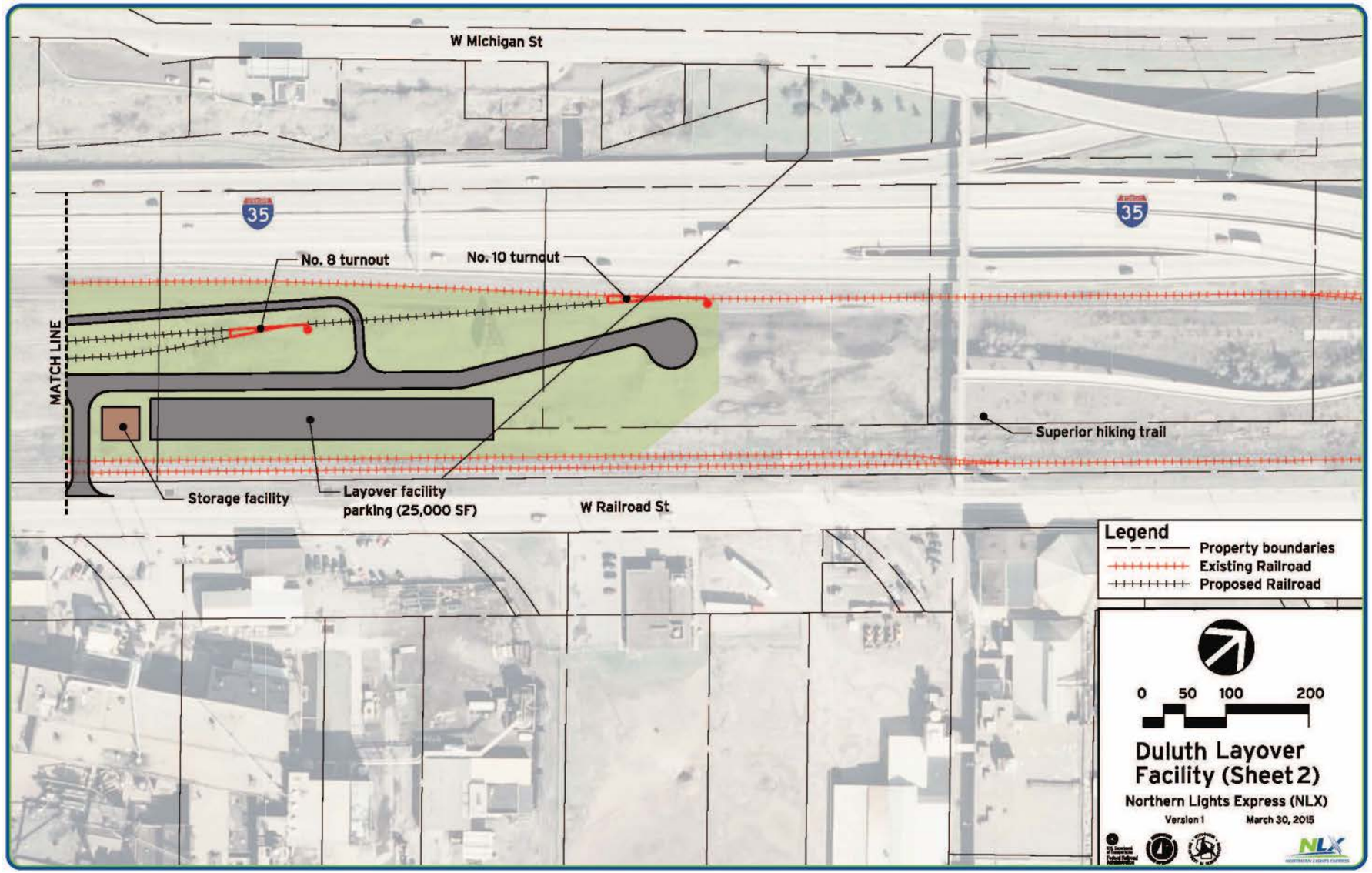


Figure 2-27: Duluth Maintenance Facility (1 of 2)

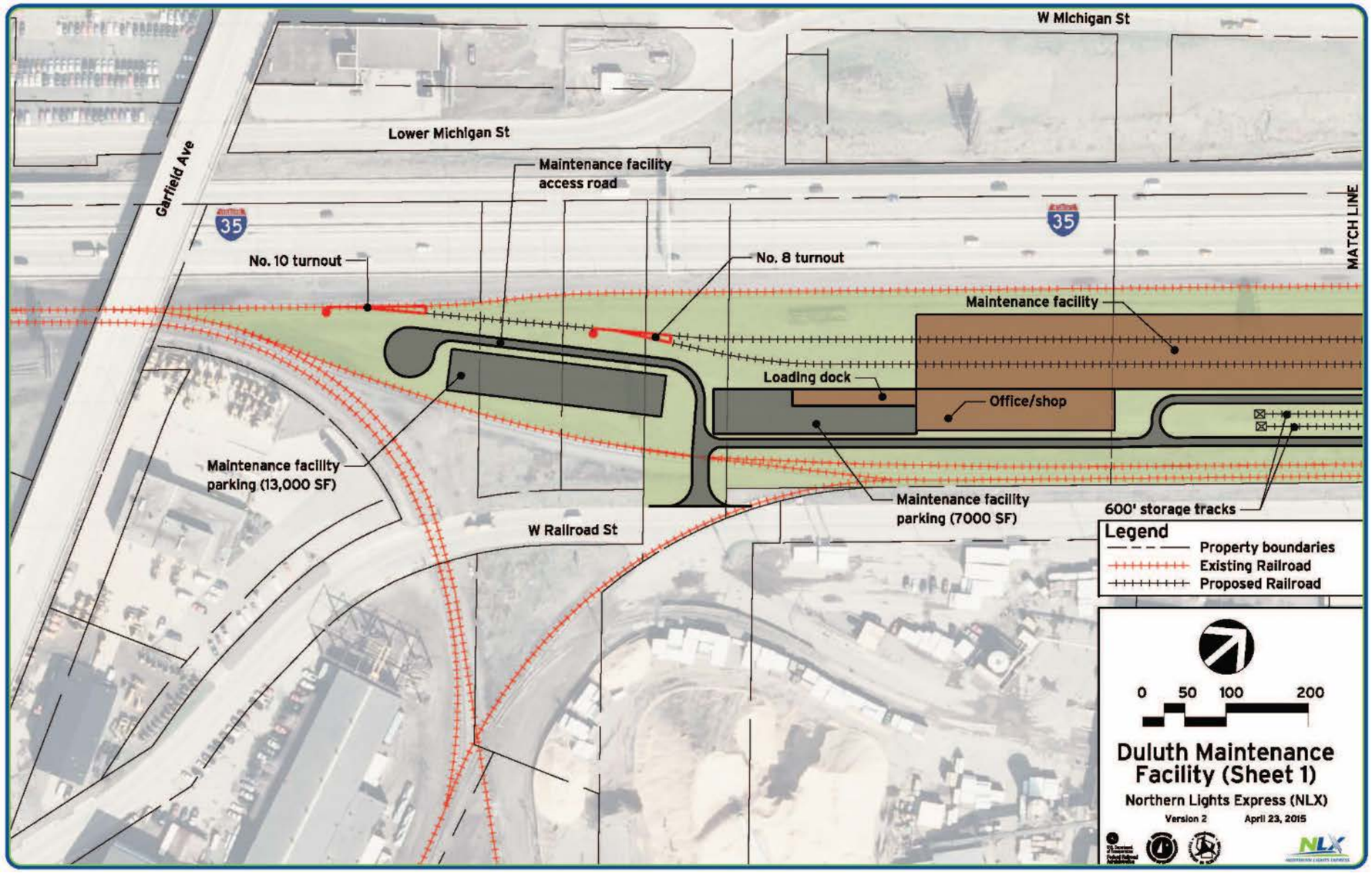


Figure 2-28: Duluth Maintenance Facility (2 of 2)