Technical Report
Transportation

1.0 Introduction

1.1 Purpose of Report

This *Transportation Technical Report* has been prepared in support of the Bottineau Transitway Project Draft Environmental Impact Statement (Draft EIS). The objective of this report is to evaluate the Project's potential transportation impacts within the study area. This includes the following:

- Evaluate the Project's effects on transit service and demand
- Evaluate the Project's impact on freight rail service under Alignments A, B, C, and D1
- Evaluate the Project's impact on non-motorized modes of transportation (bikes/pedestrians) within the corridor
- Evaluate the Project's impact to existing on-street parking
- Evaluate the Project's impact on existing aviation facilities/services.

This report does not include an evaluation of traffic impacts. Due to the magnitude of the analysis conducted, traffic impacts are addressed in a separate technical report dedicated solely to traffic impacts.

2.0 Pedestrian and Bicycle Facilities Technical Analysis

2.1 Regulatory Context/Methodology

This section describes bicycle and pedestrian facilities and connections in the project corridor and potential impacts of the No-Build, Transportation System Management (TSM), and Build alternatives on these facilities.

Non-motorized transportation facilities are found throughout the project area, including sidewalks, single- and multi-use trails, on-street bike facilities, and pedestrian bridges. These facilities vary in terms of design, context, and condition.

Pedestrian and bicycle facilities that may be affected by the project were identified using the following sources:

- City of Brooklyn Park Trails Map (2007)
- City of Maple Grove Parks & Trails Map (2012)
- City of Crystal Non-Motorized Transportation map (in 2030 Comprehensive Plan)
- City of Robbinsdale Bikeway/Walkway System map (in 2030 Comprehensive Plan)
- City of Golden Valley Existing and Proposed Trails and Sidewalks map (in 2030 Comprehensive Plan)
- Hennepin County Road & Bike Map (2011)
- City of Minneapolis Existing and Funded Bike Routes map (2012)
- Three Rivers Park District Trail Map (2012)

In addition, aerial photography and on-the-ground site reviews were used to verify the location of facilities identified on the above maps. All known legal pedestrian/bicycle crossings were analyzed. Build alternative engineering drawings and preliminary construction limits available at this phase in project development were used to determine the number of impacts to non-motorized transportation facilities and the severity of those impacts.

Potential physical encroachments onto existing facilities were identified and measures to avoid or minimize these impacts were explored. If trail impacts cannot be avoided, potential reconstruction options and design guidelines would be discussed with the agency(ies) that have jurisdiction over the facility. If trail facilities also have restrictive covenants due to funds used for construction, these requirements also would be addressed. Potential indirect impacts to trail facilities, including safety concerns and visual impacts, would also be identified.

Impacts to pedestrian and/or bicycle routes due to transitway crossing restrictions were identified and alternate routes examined. Existing pedestrian and bicycle safety characteristics at transitway crossings and measures to improve safety are also addressed. These characteristics and measures would be used to inform station area planning or other corridor activities for non-motorized facility improvements.

Impacts to publicly owned recreational facilities, including parks and regional trails, would be further analyzed in the Section 4(f) evaluation.

2.2 Study Area

The study area for impacts to non-motorized transportation consists of the preliminary construction limits, facilities near the alignment and alternate routes in the surrounding area. The study area of alternate routes examined varies based on the conditions of the surrounding bicycle/pedestrian network, but generally includes alternate routes within a half mile of the transitway and/or affected crossing.

2.3 Affected Environment

Alignment A

An aerial overview of Alignment A and the affected environment is depicted in Figure 1.

West of US 169, Alignment A is located in the gravel mining area of Maple Grove. Because this area is currently undeveloped, no pedestrian or bicycle infrastructure is present.

Between Northland Drive and the BNSF railroad the intersection of Brooklyn Boulevard and Bottineau Boulevard, where the transitway turns south into the BNSF railroad corridor, some pedestrian and bicycle facilities are present:

- Asphalt trail on south side of roadway between Northland Drive and Boone Avenue
- Concrete sidewalk on north side of roadway between Boone Avenue and Bottineau Boulevard

No dedicated bicycle infrastructure is provided for the length of the alignment. At the Hemlock Lane transit station, a connection to an existing north-south off-street trail along Hemlock Lane would be provided.

Marked pedestrian crossings are present at the following locations:

- Northland Drive/Hennepin Technical College

- Boone Avenue

An unmarked crossing is located at Xylon Avenue.

Alignment B

An aerial overview of Alignment B and the affected environment is depicted in Figure 2.

Rush Creek Regional Trail is located north of, and generally parallel to, 101st Avenue between Elm Creek Park Reserve and Coon Rapids Dam Regional Park. The facility provides connections to Shingle Creek Regional Trail and Medicine Lake Regional Trail.

North of the Highway TH 610 access ramps, there are no bicycle or pedestrian facilities present on West Broadway Avenue. Beginning at the TH 610 on-/off-ramps on the north side of the highway, off-street trails run parallel to West Broadway Avenue on both sides of the roadway for approximately 0.5 miles. These trails end on the north side of 93rd Avenue. Approximately 0.5 miles south of 93rd Avenue, a sidewalk begins north of Maplebrook Parkway, and continues south on the west side of the roadway to 85th Avenue.

An off-street trail runs along the east side of the roadway from south of the North Hennepin Community College parking lot to north of Candlewood Drive, through Tessman Park. Beginning at Candlewood Drive, concrete sidewalks are present on both sides of West Broadway for the remainder of the alignment.

Pedestrian crossings of the transitway alignment are present at the following locations along West Broadway Avenue within the City of Brooklyn Park:

- TH 610 ramps (north)
- TH 610 ramps (south)
- 93rd Avenue
- 92nd Avenue
- Setzler Parkway
- Maplebrook Parkway
- 85th Avenue
- 84th Avenue
- North College Park Drive
- Candlewood Drive
- 78th Avenue
- Commercial access north of Brooklyn Boulevard
- Brooklyn Boulevard
- 76th Avenue
- 75th Avenue
- 73rd Avenue (sidewalk on north and south side of roadway)

Bicycles share travel lanes with traffic for the length of the alignment or use the off-street trails; no dedicated bicycle infrastructure is provided on West Broadway Avenue.

At the north end of the alignment, an off-street trail extends to the east of West Broadway Avenue along Oak Grove Parkway. The trail continues east to connect to the Three Rivers Regional Trail network via the Shingle Creek Regional Trail.

Alignment C

An aerial overview of Alignment C and the affected environment is depicted in Figure 3.

Throughout the length of Alignment C, the BNSF railroad corridor does not include any pedestrian/bicycle facilities for the length of the alignment. Therefore, the focus of this analysis on Alignment C is on crossings of the railroad and nearby trail facilities.

Pedestrians and bicyclists can legally cross the BNSF railroad corridor at the following intersections:

City of Brooklyn Park:
- West Broadway Avenue/71st Avenue (sidewalk on north and south side of roadway)
- 63rd Avenue (sidewalk on south side of roadway)

City of Crystal:
- Bass Lake Road (sidewalk on north and south side of roadway)
- Corvallis Avenue (sidewalk on south side of roadway)
- West Broadway Avenue (no sidewalks)

City of Robbinsdale:
- 45th 1/2 Avenue (sidewalk on south side of roadway)
- 42nd Avenue (sidewalk on north and south side of roadway)
- 41st Avenue/Noble Avenue (sidewalk on both sides of roadway)
- 39th 1/2 Avenue/40th Avenue (informal sidewalk on north side of roadway only)

Beyond these intersections, the majority of the railroad corridor is marked with "NO TRESPASSING" signs or pedestrian access across the tracks is restricted by the use of fences or plant barriers.

Several bicycle facilities are located near the alignment or within the preliminary construction limits at the following locations:

- Bass Lake Road, east of Bottineau Boulevard (on-street facility)
- A local trail that leads to Twin Lakes Regional Trail and Crystal Lake Regional Trail
- West side of the railroad corridor in Lee Park (off-street paved facility)

East of Bottineau Boulevard, an on-street bicycle facility is present on Bass Lake Road. A local trail currently crosses the BNSF railroad corridor just southeast of Trunk Highway (TH) 100; the railroad crosses over the trail on the same structure used to cross the highway. A paved, off-street bikeway/walkway runs along the west side of the railroad corridor in Lee Park.

Alignment D1

An aerial overview of Alignment D1 and the affected environment is depicted in Figure 4.

The surrounding terrain varies along alignment D1 with the freight rail running in a trench from 36th Avenue to south of Golden Valley Road. The freight rail runs through wider flood plain valley through open water pond areas north of Golden Valley Road. Further south, the freight runs along the east side of the Basset Creek Valley with steep slopes on the east side of the railroad corridor and existing residential use above it.

Between 36th Avenue and Golden Valley Road, there are no existing formal pedestrian or bicycle facilities. There are also no opportunities for crossing in proximity to the BNSF railroad corridor. Several informal crossings are located along this segment; however, pedestrians who cross at these unmarked locations are illegally trespassing on (private) BNSF property. In the vicinity of 33rd Avenue, an unnamed trail in Sochacki Park runs parallel to the BNSF railroad corridor. During the Scoping phase of this project, it was learned that residents of the area east of the park cross the BNSF railroad corridor at these illegal crossings to access the trail and Sochacki Park.

At Golden Valley Road, the alignment passes under the roadway bridge, with a station platform located below street level. At this location, Golden Valley Road is equipped with sidewalks on both sides of the street, but has no designated bicycle facilities.

Approximately 550 feet south of the alignment's Golden Valley Road crossing, the alignment passes under the bridge for Theodore Wirth Parkway. This parkway is part of the Grand Rounds network of trails and includes a shared bicycle/pedestrian trail on the west side of the roadway.

At Plymouth Avenue, the alignment passes under the roadway bridge, with a station platform located below street level on the north side of the road. Plymouth Avenue has sidewalks on both sides of the street and on-street marked bicycle lanes at this location. The Bassett Creek Trail also parallels the BNSF railroad to the north and south of Plymouth Avenue and runs adjacent to the freight track within the existing BNSF right-of-way under the Plymouth Avenue bridge.

Pedestrian crossings of the TH 55 median and Alignment D1 are present at the following locations within the City of Minneapolis:

- Thomas Avenue (signalized intersection)
- Sheridan Avenue (paved path through median for informal crossing)
- Russell Avenue (paved path through median for informal crossing)
- Queen Avenue (paved path through median for informal crossing)
- Penn Avenue (signalized intersection)

Alignment D2

An aerial overview of Alignment D2 and the affected environment is depicted in Figure 5.

Along the 34th Avenue segment between the BNSF railroad corridor and France Avenue, sidewalks are present on the south side of the roadway, and extend from between Halifax Avenue to the alleyway between Grimes and France Avenues. A sidewalk is also present along the west side of West Broadway Avenue as it parallels Bottineau Boulevard between the Terrace Mall property and North Memorial Medical Center.

At the intersection of Victory Memorial Parkway/West Broadway Avenue/Lowry Avenue, the proposed alignment passes over the separated pedestrian/bikeway trail that is part of the Grand Rounds Trail, as well as the bike lanes running east-west on Lowry Avenue.

On West Broadway Avenue and Penn Avenue, sidewalks are present on both sides of the roadway.

Within Alignment D2, marked pedestrian crossings are provided at the following intersections:

Crossing 34th Avenue (City of Robbinsdale)
- France Avenue/Oakdale Avenue

Crossing West Broadway Avenue (City of Minneapolis)
- 29th Avenue
- 26th Avenue
- Penn Avenue/McNair Avenue

Crossing Penn Avenue (City of Minneapolis)
- Golden Valley Road
- 16th Avenue
- 14th Avenue (West)

- 14th Avenue (East)
- Plymouth Avenue
- 12th Avenue
- Oak Park Avenue
- Olson Memorial TH 55

Unmarked crossings are also present at the following locations:

Crossing 34th Avenue (City of Robbinsdale)
- Halifax Avenue
- Grimes Avenue

Crossing West Broadway Avenue (City of Minneapolis)
- Thomas Avenue/27th Avenue
- Sheridan Avenue
- Queen Avenue
- 24th Avenue

Crossing Penn Avenue (City of Minneapolis)
- 23rd Avenue
- 21st Avenue
- 17th Avenue
- 15th Avenue
- 8th Avenue

Bicycles share travel lanes with traffic for the length of the alignment; no dedicated bicycle infrastructure is provided. Connecting/perpendicular bikeways cross or about the alignment at the following locations within the City of Minneapolis:

- Lowry Avenue (striped bike lanes terminate at West Broadway Avenue)
- Victory Memorial Parkway (separated shared-use trail, part of Grand Rounds)
- 26th Avenue (striped bike lanes)
- Plymouth Avenue (striped bike lanes)

Alignment D Common Section (Along TH 55 east of Penn Avenue)
Within the Alignment D common section, pedestrian crossings are provided at the following signalized intersections:

- Morgan Avenue
- Humboldt Avenue
- Van White Memorial Boulevard
- Bryant Avenue
- West Lyndale Avenue/I-94 ramps
- East Lyndale Avenue/I-94 ramps
- Oak Lake Avenue
- 7th Street
- HERC entrance/Heywood Garage driveway

In addition, paved paths in the TH 55 Memorial Highway median are present to facilitate crossings at the following locations:

- Oliver Avenue
- Newton Avenue
- Logan Avenue
- James Avenue
- Elwood Avenue

No bicycle facilities are present on this portion of Olson Memorial TH 55; east-west bicycle movements are accommodated on parallel paths on Plymouth Avenue (1/2 mile north) and Glenwood Avenue (1/4 mile south). An off-street bicycle path crosses the alignment at Van White Memorial Boulevard. On 7th Street, bicyclists are accommodated by on-street striped bicycle lanes.

2.4 Environmental Consequences

2.4.1 Operating Phase Impacts

No-Build Alternative

The No-Build alternative is not expected to have any operating phase impacts on the non-motorized transportation environment in the project area.

Transportation System Management Alternative

The Transportation System Management alternative is not expected to have any operating phase impacts on the non-motorized transportation environment in the project area.

Build Alternatives

Alignment A

Non-motorized transportation impacts within Alignment A are depicted in Figure 1.

One unmarked pedestrian crossing would be closed at Xylon Avenue and Brooklyn Boulevard. This would be a minor impact, as Xylon Avenue is a dead-end street at this location both north and south of Brooklyn Boulevard with little connectivity beyond the destinations directly served by the street. Pedestrians wishing to cross the guideway at this location would need to divert approximately 1/5 mile east to the Brooklyn Boulevard/Bottineau Boulevard intersection.

Alignment B

Non-motorized transportation impacts within Alignment B are depicted in Figure 2.

The proposed project and other planned improvements by other agencies would result in considerable enhancement of the non-motorized transportation environment within Alignment B.

The OMF at 101st Avenue could potentially impact Three Rivers Park District property. The paved portion of Rush Creek Regional Trail, which is located on this property, would not be affected by the OMF. However, a small portion of the turf trail may be affected if an OMF is constructed at this location and would likely require minor realignment.

Within Alignment B, the existing off-street trail alongside West Broadway north of 93rd Avenue would be rebuilt by Hennepin County as part of the County Road 103 reconstruction project (a programmed project independent of the Bottineau Transitway), and would not be impacted by the proposed LRT project. The trail south of 85th Avenue that connects to Candlewood Drive is located outside the LRT project's construction limits and as such, would not be impacted.

A continuous bicycle/pedestrian facility is included in the design plans for County Road 103 from north of 93rd Avenue to Candlewood Lane; the LRT project would reconstruct the sidewalks south of

Candlewood Lane, providing for continuous facilities along both sides of West Broadway for the entire alignment.

Alignment B would result in closing four crossings of West Broadway Avenue in the City of Brooklyn Park:

- 92nd Avenue (requires diversion of 1/8 mile to cross at 93rd Avenue)
- 84th Avenue (requires diversion of 1/8 mile to cross at College Park Avenue)
- 78th Avenue (requires diversion of 1/8 mile to cross at Candlewood Drive)
- Commercial access to Starlite Center/76th Avenue (requires diversion of 1/8 mile to cross at Brooklyn Boulevard)

New or improved sidewalk crossings of the BNSF/LRT corridor would be included in final design of the transitway at 73rd Avenue.

Alignment C

The project would not result in permanent closure of any existing bicycle or pedestrian crossings of the BNSF railroad corridor. The transitway would pass over a local trail on a continuous structure also used for TH 100. The project's construction limits would come within 10 feet of the existing trail in Lee Park, but would not alter the trail itself.

As a result, no impacts to pedestrian or bicycle access or facilities are expected, as identified in Figure 3.

In addition, the project would improve existing pedestrian crossings and facilitate connections to station platforms. New or improved sidewalk crossings of the BNSF/LRT corridor would be included in final design of the transitway at the following locations:

- 71st Avenue
- 63rd Avenue
- Bass Lake Road
- Corvallis Avenue (replacing existing sidewalk on south side of roadway; no sidewalk present on north side)
- West Broadway Avenue
- 45th 1/2 Avenue (sidewalk on south side of roadway)
- 42nd Avenue (with connection to LRT station parallel to BNSF track)
- 41st Avenue/Noble Avenue(with connection to LRT station parallel to BNSF track)
- 39th 1/2 Avenue (new sidewalk on north side of roadway)

Alignment D1

Non-motorized transportation impacts within Alignment D1 are depicted in Figure 4.

Alignment D1 would result in closure of the existing informal (illegal) BNSF railroad crossings at Mary Hills Nature Area and Sochacki Park. Barriers in these areas that discourage non-motorized crossings would be necessary to preserve pedestrian safety near the LRT tracks.

No impact to the off-road trail that shares the grade-separated crossing with Theodore Wirth Parkway is anticipated.

At Plymouth Avenue, it is anticipated that the BNSF alignment would remain in its current location under Span 5 of the Plymouth Avenue bridge, eliminating a conflict with the Bassett Creek Trail. North of Plymouth Avenue the proposed BNSF access road would transition from between the BNSF and

LRT tracks to be adjacent to the existing trail. A barrier, likely a fence, would be constructed to separate the trail and access road. Therefore, this alignment would result in no operating phase impacts to this trail segment.

East of the BNSF/TH 55 transition, LRT would operate in the median of TH 55. Non-signalized pedestrian crossings of TH 55 Highway at the following intersections would be closed:

- Sheridan Avenue (requires diversion of less than 1/8 mile to cross at Thomas Avenue)
- Russell Avenue (requires diversion of 1/8 mile to cross at Thomas Avenue)
- Queen Avenue (requires diversion of less than 1/8 mile to cross at Penn Avenue)

These crossing closures are characterized as minor impacts, because alternative crossing opportunities are available less than 1/8 mile away at Thomas Avenue and Penn Avenue.

Alignment D2

Non-motorized transportation impacts within Alignment D2 are depicted in Figure 5.

Within the City of Robbinsdale, the alignment would result in few changes to existing pedestrian and bicycle facilities or streetscape. Pedestrian access on 34th Avenue would continue to be provided on both sides of the street where sidewalk exists today. A new sidewalk would also be constructed on the south side to replace the current sidewalk, which would be removed to construct the guideway. New vertical circulation would be provided for pedestrian access between the Terrace Mall and North Memorial Medical Center (NMMC) outpatient clinic and the new station platform. This new station platform would be located at the top of the bluff to the southeast of the mall area.

Bicycle and pedestrian facilities would be provided on the Halifax Avenue bridge over 34th Avenue. Pedestrian and bicycle access across 34th Avenue at Grimes Avenue will be eliminated to accommodate for the guideway as it transitions from the BNSF railroad trench to the elevation of the new station platform. Users would need to divert one block (1/16 mile) east or west to cross 34th Avenue. On 34th Avenue, bicycles would continue share lanes with vehicular traffic, as they do today.

Along West Broadway Avenue in the City of Minneapolis, the existing sidewalks are between 6.5 feet and 7.5 feet wide on both sides of the street. These sidewalks would be maintained in the final design of the roadway. Pedestrians would be allowed to cross the LRT guideway only at signalized intersections, which would continue to be located at 29th Avenue, 26th Avenue, and Penn Avenue. These three crossings would be designed to permit safe crossing of both the road and LRT guideway (sidewalk to sidewalk), and are located at the following intersections of West Broadway Avenue:

- 29th Avenue
- 26th Avenue
- Penn Avenue

The unmarked pedestrian crossings at the following two locations would be closed:

- 27th Avenue/Thomas Avenue (requires diversion of 1/8 mile to cross West Broadway Avenue)
- Sheridan Avenue (requires diversion of 1/8 mile to cross West Broadway Avenue)

Bicycles would share 16-foot roadway lanes with vehicular traffic, as they do today.

Along Penn Avenue, six-foot wide sidewalks and a six-foot boulevard would be provided along both sides of the roadway. Pedestrians would be allowed to cross the LRT guideway only at signalized

intersections. These six crossings would be designed to permit safe crossing of both the road and LRT guideway (sidewalk to sidewalk), and are located at the following intersections of Penn Avenue:

- Golden Valley Road
- 16th Avenue
- Oak Park Avenue
- Plymouth Avenue
- West Broadway Avenue
- TH 55

The remaining nine crossings at the following intersections of Penn Avenue would be closed:

- 23rd Avenue (requires diversion of 1/10 mile to cross at West Broadway Avenue)
- 21st Avenue (requires diversion of 1/8 mile to cross at Golden Valley Road)
- 17th Avenue (West) (requires diversion of 1/8 mile to cross at Golden Valley Road)
- 17th Avenue (East) (requires diversion of less than 1/10 mile to cross at 16th Avenue)
- 15th Avenue (requires diversion of 1/8 mile to cross at 16th Avenue)
- 14th Avenue (West) (requires diversion of 1/8 mile to cross at Plymouth Avenue)
- 14th Avenue (East) (requires diversion of 1/8 mile to cross at Plymouth Avenue)
- 12th Avenue (requires diversion of 1/8 mile to cross at Plymouth Avenue or Oak Park Avenue)
- 8th Avenue (requires diversion of 1/8 mile to cross at Olson TH 55)

The closure of the previously listed intersections, as well as the interruption to the street grid system in north Minneapolis, collectively contribute to decreased walkability and accessibility to and within the neighborhoods surrounding this area of the Alignment.

On Penn Avenue, bicyclists would share roadway lanes with vehicular traffic as they do today. The City of Minneapolis Bikeways Master Plan includes a continuous north-south bikeway on Penn Avenue with marked bike lanes from I-394 to 44th Avenue North. Construction of Alignment D2 on Penn Avenue would not preclude future implementation of this lane by the City.

Alignment D Common Section (Along Olson TH 55Highway east of Penn Avenue)
Five existing unmarked pedestrian crossings of the Olson Memorial TH 55 median would be closed at the following locations:

- Oliver Avenue (requires diversion of less than 1/10 mile to cross at Penn Avenue)
- Newton Avenue (requires diversion of less than 1/10 mile to cross at Morgan Avenue)
- Logan Avenue (requires diversion of less than 1/10 mile to cross at Morgan Avenue)
- James Avenue (requires diversion of 1/10 mile to cross at Humboldt Avenue)
- Elwood Avenue (requires diversion of 1/10 mile to cross at Van White Boulevard)

The marked pedestrian crossing at the existing Bryant Avenue signalized intersection would be closed, requiring pedestrians to divert 1/10 mile east to cross at Lyndale Avenue (West)/I-94 ramps or 1/8 mile west to cross at Van White Boulevard.

Traction Power Substations (TPSS)
There are 27 potential Traction Power Substation (TPSS) locations along the proposed alignments, which would convert electrical power into the appropriate voltage, current, and frequency for the railway. A description of a TPSS station footprint can be found in the Project Description Technical Report. TPSS sites should have a minimal impact on existing bicycle and pedestrian facilities.

The minimum clearance distance for TPSS and the LRT tracks is approximately eight feet; therefore, the TPSS would be located at least eight feet from the tracks. However, they could be located on property adjacent to the tracks in order to avoid or minimize impacts to existing transportation infrastructure. Because of this location alternative, impacts to bicycle and pedestrian facilities along the proposed alignments are expected to be minimal.

Summary of Impacts by Alternative
None of the alternatives would result in operating phase impacts to bicycle facilities.

Table 1. Impacts by Alternative – Bicycle and Pedestrian Facilities

Alternative	Alignment/Station Impact	Park-and-Ride Impact	OMF Impact[3]	Total Impact
Alternative A-C-D1	10 crossings closed[1] 1 (A) 3 (D1) 6 (D common section)	No impact	No impact	10 crossings closed
Alternative A-C-D2	18 crossings closed 1 (A) 11 (D2) 6 (D common section)	No impact	No impact	18 crossings closed
Alternative B-C-D1	13 crossings closed[1] 4 (B) 3 (D1) 6 (D common section)	No impact[2]	No impact [93rd] Potential impact [101st]	13 crossings closed
Alternative B-C-D2	21 crossings closed 4 (B) 11 (D2) 6 (D common section)	No impact[2]	No impact [93rd] Potential impact [101st]	21 crossings closed

1 There was no discernible difference in impact between the Golden Valley Road and Plymouth Avenue/Wirth Park station options.
2 Park-and-ride impacts are the same as the 93rd OMF impacts; therefore, they were only counted once in the total impact
3 No impacts from park-and-ride and/or OMF facilities are anticipated.

2.4.2 Construction Phase Impacts

No-Build Alternative
The No-Build alternative is not expected to have any construction phase impacts on the non-motorized transportation environment in the project area.

Transportation System Management Alternative
The Transportation System Management alternative is not expected to have any construction phase impacts on the non-motorized transportation environment in the project area.

Build Alternatives
For all alignments, temporary closures or detours are anticipated to affect bike and pedestrian facilities. Safe access for non-motorized users, as a result of detours, closures, and other inconveniences during the construction phases, would be included in phasing plans.

Depending on how construction activities would impact sidewalk areas, special facilities (such as handrails, fences, barriers, ramps, walkways, and bridges) may be required to maintain bicyclist and pedestrian safety.

If crosswalks are temporarily closed, pedestrians would be directed to use alternate crossings nearby. Every effort would be made not to close adjacent crosswalks at the same time to allow for continued pedestrian movement across streets. All sidewalks and crosswalks would be required to meet minimum standards for accessibility and be free of slipping and tripping hazards. Sidewalk closures would be discouraged but, if required, would be done in such a way as to minimize impacts.

Summary of Impacts by Alternative
Construction phase impacts are expected to be similar for each alternative, with greater impacts where there are more existing pedestrian and bicycle facilities in or near the construction zone.

During final design, it is expected that a plan would be developed to manage the closure of pedestrian crossings and other restrictions on non-motorized transportation facilities and crossings throughout the construction process.

2.4.3 Indirect/Secondary Impacts

No-Build Alternative
The No-Build alternative is not expected to have any indirect/secondary impacts on the bicycle and pedestrian environment in the project area.

Transportation System Management Alternative
The Transportation System Management alternative is not expected to have any indirect/secondary impacts on the bicycle and pedestrian environment in the project area.

Build Alternatives
No indirect or secondary impacts to the non-motorized transportation environment are expected within Alignments A, B, or C. No operating phase safety impacts in the project area due to transit signal priority throughout Alignments A, D1, D2 and the D Common Section are expected. Additionally, no operating phase safety impacts due to transit signal preemption throughout Alignments B and C are expected.

Along all alignments, further detailed analysis on the operating phase impacts locations of one and two-stage pedestrian crossings and related safety impacts will be completed in final project design. Alignment B and the Alignment D Common Section have been identified at this stage of design as potential locations where changes to pedestrian crossings and signal phasing may be recommended to accommodate the guideway and traffic volumes.

All alignments are expected to incur minimal indirect/secondary effects related to visual quality during the construction phase. These anticipated visual effects would be similar to the appearance of most typical roadway and infrastructure projects including the temporary presence of heavy equipment, traffic control measures, and construction activities. Where the transitway passes along residential neighborhoods, the construction activity will likely be perceived as more visually disruptive to these typically peaceful yard settings.

Alignment D1 is expected to incur indirect/secondary effects during operating phase due to modifications on the Plymouth Avenue bridge that are required to make space for the transitway. These modifications, which would be visible from the bicycle and pedestrian trail running parallel to the BNSF corridor, and further analysis of indirect/secondary effects related to visual quality in the construction phase are addressed in the Visual Quality Technical Report.

Minimal indirect/secondary impacts to the non-motorized transportation environment related to temporary noise and vibration during construction are expected. These impacts would be resulting from activities associated with the construction of new tracks and stations, utility relocation, grading,

excavation, track work, demolition, and installation of systems components, and are further addressed in the Noise and Vibration Technical Report.

2.5 Avoidance, Minimization, and/or Mitigation Measures

Current planning for the Bottineau Transitway supports the enhancement of pedestrian facilities and sidewalk landscaping. These enhancements are intended to act both as an improvement effort and as a natural separation to protect pedestrians, bicyclists, and transit vehicles. Furthermore, all pedestrian crossings would be designed in accordance with current American Disabilities Act (ADA) design requirements and standards to ensure access and mobility for all users.

Measures would be taken to discourage pedestrians from illegally crossing the tracks and to enhance safety at permitted crossing locations, such as by providing pedestrian signals and well-marked crosswalks.

3.0 Transit Technical Analysis

3.1 Methodology

Transit demand forecasts for a horizon year 2030 were developed for the six alternatives evaluated in the Draft EIS (No-Build, TSM, and four Build alternatives). The Twin Cities Metropolitan Area Regional Travel Demand Forecast Model developed by the Metropolitan Council was used for this project. This model was used as the basis for the 2010 Bottineau Transitway Alternatives Analysis (AA) Study and in recent project development efforts on the Green Line (Central Corridor and Southwest Corridor). The model was updated in 2012 for this project in order to incorporate the most current employment, population, land development, and Transit On-Board survey data, as well as adjusted parameters for gasoline prices, automotive fuel efficiency, the Consumer Product Index (CPI), and transit fares.

The model is designed to forecast travel on the entire Twin Cities metropolitan area transit and highway system. As such, it contains a network of all existing and planned transitways. The model network contains service frequency (i.e. how often trains and buses arrive at any given transit stop), routing, travel time, and fares for all these lines. In the highway system, all express highways, all principal arterial roadways, and many minor arterial and local roadways are included. Other primary inputs used in the model include population, employment, household information, parking costs, automobile operating costs, and highway travel time factors. Model outputs can provide information relating to transit ridership demand, which includes estimates of passenger boardings on all existing and proposed transitways. The model also generates a number of statistics that can be used to evaluate the performance of a transportation system at several levels of geographic detail.

Comparisons between the performance of the No-Build, TSM, and Build alternatives considered the following evaluation criteria:

- Percentage of daily trips by transit mode
- Bus and rail ridership within the study area
- Daily passenger miles and passenger hours of travel
- LRT boardings by station
- Transportation system user benefits

Following the Scoping process and further technical analysis, the BRT Alternative was eliminated from further study in the Draft EIS. This decision was determined by the Hennepin County Regional Railroad Authority (HCRRA), and was consistent with the Policy Advisory Committee's (PAC)

recommendation to the HCRRA and input to the PAC from the advisory committees.

The model outputs supporting this decision to eliminate the BRT Alternative are summarized below:

- Forecast total ridership for BRT is 19,900 compared to 27,000 for LRT.
- BRT would not have the capacity to handle event crowds like LRT.
- BRT is expected to generate approximately 1,500 fewer net new daily transit riders than LRT (Estimated Year 2030 new daily transit riders; 5,650 for BRT, 7150 for LRT).
- Based on travel time and average speed, LRT provides higher level of daily hours of user benefits compared to BRT (Estimated Year 2030 daily hours of user benefits, 8,250 for LRT, 5,880 for BRT).
- 2030 ridership forecasts show that transitway demand at the maximum load point entering downtown Minneapolis during the morning peak hour exceeds the capacity of the BRT alternative.

3.2 Study Area

The travel demand model described above is designed to analyze the effects of a transit improvement on travel patterns in the entire Twin Cities metropolitan area and provides detailed information available at different levels of geographic detail.

3.3 Affected Environment

The Bottineau Transitway's transit service area is generally defined by the Mississippi River to the north and east, Highway 55 (Olson Memorial TH 55) to the south, and I-494 to the west. The area is served by a network of urban and suburban local routes that make timed connections at three transit centers throughout the corridor (Robbinsdale Transit Center, Brooklyn Center Transit Center, and the Starlite Transit Center). The area is also served by express routes, most of which are oriented toward downtown Minneapolis and serve the peak-period ("rush hour") commuter travel market. Existing transit service in the area is described in detail in the *April 2012 Transit Operations Plans Report (Draft)*, and is also depicted in Figure 6.

Each of the alternatives analyzed in the travel demand forecast model use the existing service as a base and include specific network modifications to form the basis for the transit ridership forecasts. Modifications to existing transit service for the modeled alternatives include changes in routing, frequency, and travel time. Network modifications are focused on providing an integrated "feeder" bus network to connect people to LRT stations. These changes are detailed for each alternative in the *May 2012 Transit Operations Plans Report (Final)*. Bus networks and transit plans would continue to be refined as the project progresses.

Travel time is an important factor in forecasting ridership for the various alternatives. Table 2 shows the end-to-end travel times for the TSM and Build alternatives. Travel times for the LRT alternatives containing Alignment A are approximately 3.5 minutes less than travel times for the alternatives containing Alignment B, and the Alignment D1 alternatives are approximately 4 minutes less than the Alignment D2 alternatives.

Table 2. End-to-End Travel Times for TSM and Build Alternatives

Alternative	From	To	Travel Time
TSM Route 731	**97th Avenue**	**5th St / Marquette Ave**	**0:48:44**
TSM Route 732	Maple Grove Transit Station	5th St / Marquette Ave	0:50:50
LRT A-C-D1	Hemlock Lane	5th St / Nicollet Mall Station	0:29:20

Alternative	From	To	Travel Time
LRT A-C-D2	Hemlock Lane	5th St / Nicollet Mall Station	0:33:19
LRT B-C-D1	97th Avenue	5th St / Nicollet Mall Station	0:32:47
LRT B-C-D2	97th Avenue	5th St / Nicollet Mall Station	0:36:46

Table 3 shows the planned operating frequencies for the alternatives.

Table 3. Summary of Operating Frequencies (Minutes Between Buses/Trains)[1]

		TSM			LRT
Day of Week	Time Period	Route 731	Route 732	Routes 731 + 732 Combined[2]	All alternatives
Weekday	Peak	15	15	7.5	7.5
Weekday	Off-Peak	20	20	10	10
Saturday	Day/evening				
Sunday	Day/evening				

[1] The frequencies presented in this table are general and used in travel demand modeling inputs. Frequencies are defined at a more detailed level for times of day for service planning and cost estimation efforts conducted as part of the Draft EIS.
[2] Routes follow same path south of Brooklyn Boulevard (Starlite Transit Center).

3.4 Environmental Consequences

3.4.1 Operating Phase Effects

Comparisons between the performance of the No-Build, TSM, and Build alternatives considered the following evaluation criteria:

- Percentage of daily trips by transit mode
- Bus and rail ridership within the study area
- Daily passenger miles and passenger hours of travel
- LRT boardings by station

Transit Ridership Results

Unlinked Trips/Corridor Transit Boardings

Table 4 provides the Bottineau Transitway ridership totals by alternative. These are "unlinked" trips, representing individual transit boardings. Corridor service restructuring in the TSM and Build alternatives represents is intended to enhanced intra-corridor connectivity by creating the potential for more trips involving transfers. Therefore, the number of unlinked trips is greater than that of linked trips.

All LRT alternatives are presumed to be through-routed with the Blue Line (Hiawatha LRT). Ridership reported for LRT alternatives includes only those trips attributable to the new service, not existing Blue Line passengers. This includes those patrons boarding and/or alighting at Van White Boulevard and stations to the north and west (including those continuing on the Hiawatha portion of the line).

- Compared to 2010 levels, Bottineau corridor transit ridership is expected to increase 35 percent by the year 2030, including 4,300 daily trips on the assumed West Broadway enhanced transit service.

- Service improvements and restructuring in the TSM are forecast to increase transit trips in the corridor by an additional 29 percent over the No-Build alternative, including 18,300 daily trips on the TSM routes (731 and 732) by the year 2030.
- The Build alternatives are forecast to carry 26,000 to 27,600 trips per day on the LRT transitway, depending on the alternative. Overall corridor ridership for Build alternatives is 21 to 27 percent higher than the TSM alternative.

Table 4. Bottineau Corridor Transit Ridership Summary (Average Weekday Unlinked Trips)

	2010	2030 No-Build	2030 TSM	2030 LRT A-C-D1	2030 LRT A-C-D2	2030 LRT B-C-D1	2030 LRT B-C-D2
Local Bus	25,300	30,600	27,200	31,100	30,100	29,900	29,300
Express Bus	6,800	8,000	7,900	7,500	7,700	6,700	6,800
Broadway Rapid Bus	--	4,700	2,300	2,500	2,000	2,500	2,000
TSM Routes 731/732	--	--	18,300	2,200	2,100	3,500	3,400
LRT	--	--	--	27,600	27,200	27,000	26,000
Total Corridor Boardings	32,100	43,300	55,700	70,900	69,100	69,600	67,500
Change over TSM	--	--	--	15,200	13,400	13,900	11,800
Percent change over TSM	--	--	--	27%	24%	25%	21%

Reverse Commute/Off-peak Period Ridership

Table 5 provides a summary of selected Bottineau transitway ridership characteristics. For each of the LRT alternatives, 55-56 percent of total daily ridership occurs in the peak period. These results are consistent with those currently observed on Hiawatha LRT (Blue Line). Work trips make up 65-66 percent of the peak period demand, which is approximately equal to the work trip share of peak period demand higher than the 61 percent found on Hiawatha LRT. Reverse commute trips (work trips in the non-peak direction) constitute 37-42 percent of the peak work trips. Travel in the off-peak time periods is 44-45 percent of the daily transit ridership.

Table 5. Ridership by Peak/Off-Peak and Direction (2030)

	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Total Daily Transitway Riders	27,600	27,200	27,000	26,000
Peak Period Trips	15,500	15,100	15,000	14,200
Percent of Daily Total	56%	56%	56%	55%
Peak Period Work Trips	10,250	9,950	9,700	9,200
Percent of Peak Period Trips	66%	66%	65%	65%
Peak Direction Work Trips	6,100	5,800	6,100	5,650

	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Percent of Peak Work Trips	60%	58%	63%	61%
Nonpeak Direction (Reverse Commute) Work Trips	4,150	4,150	3,600	3,550
Percent of Peak Work Trips	40%	42%	37%	39%
Off-Peak Period Trips	12,100	12,100	12,000	11,800
Percent of Daily Total	44%	44%	44%	45%

Linked Trips/New Transit Trips

A linked trip represents a transit user who makes a trip between an origin and destination, regardless of the number of transfers the user makes. The net regional increase of all of these linked trips is commonly referred to as "new transit trips." Table 6 provides a regional summary of linked transit trips for existing service alongside the projected "new transit trips" that would result from the No-Build, TSM, and Build alternatives,.

Even without improvements to the Bottineau Corridor, significant growth in regional transit ridership is forecast to occur between 2010 and 2030 as a result of planned investment in the regional transit system, including additional LRT, BRT, and rapid bus corridors. These improvements are included in the No-Build alternative. For the TSM and Build alternatives, new transit trips are only attributable to those improvements associated with the Bottineau Transitway.

Compared to the TSM alternative, the LRT alternatives attract 6,450-8,400 new transit trips each weekday.

Table 6. Regional Linked Transit Trips

	2010	2030 No-Build	2030 TSM	2030 LRT A-C-D1	2030 LRT A-C-D2	2030 LRT B-C-D1	2030 LRT B-C-D2
Average Weekday Linked Trips	203,600	324,100	331,450	339,850	339,250	338,600	337,900
Change over TSM New Transit Trips	--	--[1]	--[2]	8,400	7,800	7,150	6,450
Percent Change over TSM	--	--	--	2.5%	2.4%	2.2%	2.0%

Ridership by Alignment and Station

The LRT alternatives result in different levels of ridership at the stations along stations in their respective alignments. Table 7 summarizes the distribution of ridership along the corridor for these various alternatives.

Table 7: Daily Boardings by Alignment (2030)

	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Total	27,600	27,200	27,000	26,000
Alignment A	11,100	10,400	--	--

[1] Increase of 120,550 linked trips over 2010 (59% increase)
[2] Increase of 7,350 trips over No-Build (2.2% increase)

	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Alignment B	--	--	10,800	9,400
Alignment C	10,400	9,500	10,000	9,100
Alignment D1	6,100	--	6,200	--
Alignment D2	--	7,300	--	7,500

Figure 7 graphically compares station-level ridership across the LRT alternatives.

User Benefits

The results of the travel demand model can be used to illustrate the extent to which different geographic areas in the region would potentially benefit from the Bottineau Transitway Build alternatives, as compared to the TSM alternative. These benefits are usually projected as the overall travel time savings (called user benefits). Using the travel model results, the performance of the TSM and Build alternatives are compared and the overall time and cost savings of each alternative are estimated. To make the comparison easier, all cost savings are converted to equivalent time savings.

These savings are generally expressed as daily hours of user benefits for regional transit riders. They are used in the estimation of the project's cost effectiveness index (CEI), which is one of the factors that the FTA uses to evaluate a project's potential for federal funding. Table 8 summarizes the daily hours of user benefits that would accrue to new and existing (TSM alternative) transit riders as a result of each alternative.

Table 8. Daily (Weekday) Hours of User Benefits (2030)

	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Daily User Benefit Hours	9,460	9,000	8,520	7,940

Figures A-1 through A-8 in Appendix A illustrate the magnitude of benefits received by different geographic areas under the various Build alternatives. The figures show the user benefits in two ways—where people are coming from (productions) and where people are going (attractions). Areas that receive high levels of positive benefits are shown in dark green on the maps; medium levels are shown in lighter green, etc. Sometimes, a transportation project can result in negative benefits to some areas (longer travel times) while providing positive benefits to other areas (shorter travel times). Areas receiving negative benefits are shown in shades of red color.

Vehicle Miles of Travel

The Build alternatives would reduce the number of auto trips made in the region each weekday by 6,450 to 8,400 trips as auto users shift to transit. The reduction in automobile trips would result in a decrease in regional vehicle miles traveled (VMT), as shown in Table 9.

Table 9. Daily (Weekday) Reduction in Vehicle Miles Traveled (2030)

	TSM	LRT A-C-D1	LRT A-C-D2	LRT B-C-D1	LRT B-C-D2
Daily Reduction in VMT over No-Build	-51,700	--	--	--	--
Daily Reduction in VMT over TSM	--	-73,800	-72,600	-64,300	-62,800
New Transit Riders	--	8,400	7,800	7,150	6,450
Daily Reduction in VMT per New Rider	---	-9.0	-9.7	-8.8	-9.3

3.4.2 Construction Phase Impacts

No-Build Alternative
No construction phase impacts would be associated with the No-Build alternative.

Transportation System Management Alternative
No construction phase impacts would be associated with the Transportation System Management alternative.

Build Alternatives
Construction of any of the Build alternatives would result in intermittent impacts to bus operations on routes within the construction area. These may include temporary stop relocations or closures, route detours, or suspensions of service on segments of routes operating on streets where LRT is being constructed.

3.5 Avoidance, Minimization, and/or Mitigation Measures

For short-term changes to bus operations during construction, Metro Transit would post information at bus stops indicating temporary stop closures and/or detour details. Information would also be published in advance of detours on Metro Transit's website and in its on-board information brochure, *Connect*.

In addition to the aforementioned measures, Metro Transit would also develop and refine a service plan to enhance the transitway service, including service changes to improve transfers from feeder bus service to LRT. Metro Transit would follow standard procedures for route changes, additions, and deletions, which may include a community outreach process in designing route changes, a public hearing for the proposed service changes, and ongoing outreach efforts to communicate service changes prior to implementation.

4.0 Parking Technical Analysis

4.1 Regulatory Context/Methodology

This section describes parking in the Bottineau corridor and potential impacts of the No-Build, TSM and Build alternatives on the number and the locations of parking spaces. The construction of LRT and associated modifications to roadway geometry would alter the supply of on-street and off-street parking along the project alignment, particularly within Alignment D2. These changes may, in turn, affect convenient access to businesses and residences.

The corridor is characterized by highway facilities with no-parking, arterial and local streets with some on-street parking and off-street parking that service commercial and institutional facilities. The arterial and local streets that provide on-street parking include 34th Avenue, West Broadway and Penn Avenue in Alignment D2. Off-street parking affected as part of the Build Alternative is both publicly and privately owned and is discussed in more detail within the property impacts portion of the Draft EIS. The analysis presented in this section concentrates on-street parking.

A review of the existing on-street parking supply, which included reviewing aerial photography and field reviews, was performed to assess the impacts of changes in parking supply. The results of this review are summarized in this section.

4.2 Study Area

The study area for parking consists of the preliminary project construction limits.

4.3 Affected Environment

Vehicle parking in the project corridor is a combination of on-street and surface lots. On-street parking is almost entirely available to the public, either as metered or unmetered spaces. The only potentially affected on-street parking within the analysis area is located within Alignment D2 along 34th Avenue, West Broadway Avenue, and Penn Avenue.

- 34th Avenue between the BNSF Railway Company (BNSF) right-of-way and France Avenue contains approximately 40 on-street parking spaces. Due to the residential nature of this area and field reviews, the existing on-street parking is used relatively infrequently.

- West Broadway Avenue between Victory Memorial Parkway and Penn Avenue contains approximately 123 time-restricted on-street parking spaces.
    - Parking restrictions include peak hour parking restrictions: NO PARKING 7 AM-9 AM MON-FRI on the west side of the roadway and NO PARKING 4 PM-6 PM MON-FRI on the east side of the roadway.
- Penn Avenue, between West Broadway Avenue and TH 55, contains approximately 392 on-street parking spaces, 32 of which are time-restricted.
    - Parking restrictions include peak hour parking restrictions between West Broadway and 23rd Avenue: NO PARKING 4 PM-6 PM MON-FRI on the east side of the roadway.
    - Parking is also currently restricted (NO PARKING) on Penn Avenue at bus stops, which are generally located at the near side of intersections.
    - All other on-street parking is unrestricted.

Off-street parking is a mix of public and private. Private off-street parking is located within Alignments A, B, C and D2 and is restricted to authorized individuals. Alignments B, C and D2 include off-street public parking spaces for commercial and retail facilities, which are only accessible to the public when they are using these facilities. These facilities include retail centers, restaurants, churches, North Hennepin Community College in Alignment B and retail centers, medical centers and a funeral home at the intersection of Penn Avenue and Plymouth Avenue.

4.4 Environmental Consequences

4.4.1 Operating Phase Impacts

No-Build Alternative

No operating phase parking impacts would be associated with the No-Build alternative.

Transportation System Management Alternative

No operating phase parking impacts would be associated with the Transportation System Management alternative.

Build Alternatives

Alignment A

No impact to existing parking.

Alignment B
No impact to existing parking.

Alignment C
No impact to existing parking.

Alignment D1
No impact to existing parking.

Alignment D2
Parking impacts under Alignment D2 include the removal of on-street parking along 34th Avenue (Figure 8), West Broadway (Figure 9), and Penn Avenue (Figures 10 and 11) in order to accommodate the proposed guideway while minimizing property impacts.

Along 34th Avenue, all on-street parking spaces between Indiana Avenue and France Avenue would be eliminated. This would result in a loss of approximately 40 on-street parking spaces.

Along West Broadway, all on-street parking spaces between Victory Memorial Parkway and Penn Avenue would be eliminated. This would result in a loss of approximately 120 on-street parking spaces.

Along Penn Avenue, approximately 390 existing on-street parking spaces would be removed from both sides of Penn Avenue and approximately 280 new on-street parking spaces could be provided with the proposed Penn Avenue cross section. The net on-street parking loss on Penn Avenue would be approximately 110 spaces.

Alignment D Common Section
No impact to existing parking.

TPSS
There are 27 potential TPSS locations along the proposed alignments. A description of a TPSS footprint can be found in the Project Description Technical Report. The majority of the TPSS stations would be located on the east side of the proposed LRT track with some being associated with the LRT platforms and stations.

The minimum clearance distance for TPSS stations and the LRT tracks is approximately eight feet; therefore, the TPSS station would be located at least eight feet from the tracks. However, they could be located on adjacent (to the tracks) property to avoid or minimize impacts to existing parking. TPSS sites should have a minimal impact on existing parking.

Summary of Operation Phase Impacts by Alternative

Table 10. Operation Phase Impacts By Alignment – Parking

Alignment	Alignment/Station Impact *[parking spaces]*	Park-and-Ride Impact	OMF Impact	Total Impact
A	0	0	0	**0**
B	0	0	0	**0**

Alignment	Alignment/Station Impact *[parking spaces]*	Park-and-Ride Impact	OMF Impact	Total Impact
C	0	0	0	0
D1	0[1]	0	0	0
D2	270 parking spaces eliminated	0	0	270 parking spaces eliminated
D1/D2 Common	0	0	0	0

1 There is no discernible difference in impact between the Golden Valley Road and Plymouth Avenue/Wirth Park station options.

Table 11. Impacts by Alternative

Alternative	Alignment/Station Impact *[parking spaces]*	Park-and-Ride Impact	OMF Impact	Total Impact
No-Build Alternative	0	0	0	0
TSM Alternative	0	0	0	0
Alternative A-C-D1	0[1]	0	0	0
Alternative A-C-D2	270 parking spaces eliminated	0	0	270 parking spaces eliminated
Alternative B-C-D1	0[1]	0	0[2]	0
Alternative B-C-D2	270 parking spaces eliminated	0	0[2]	270 parking spaces eliminated

1 There is no discernible difference in impact between the Golden Valley Road and Plymouth Avenue/Wirth Park station options.
2 Park-and-Ride Impacts are the same as the 93rd OMF impacts; therefore, they were only counted once in the total impact

4.4.2 Construction Phase Impacts

No-Build Alternative

No construction phase parking impacts would be associated with the No-Build alternative.

Transportation System Management Alternative

No construction phase parking impacts would be associated with the Transportation System Management alternative.

Build Alternatives

Alignment A
No impact to existing parking.

Alignment B
No impact to existing parking.

Alignment C
No impact to existing parking.

Alignment D1
No impact to existing parking.

Alignment D2
Depending on the construction phasing that is implemented, all existing on-street parking provided on 34th Avenue, West Broadway Avenue and Penn Avenue would be restricted or closed during the construction of the D2 alignment. Reduction of parking loss during construction will be considered during final design.

Alignment D Common Section
No impact to existing parking.

Summary of Impacts by Alternative

Table 12. Construction Impacts By Alternative – Parking

Alternative	Alignment/Station Impact *[parking spaces]*	Park-and-Ride Impact	OMF Impact	Total Impact
No-Build Alternative	0	0	0	**0**
TSM Alternative	0	0	0	**0**
Alternative A-C-D1	0[1]	0	0	**0**
Alternative A-C-D2	All on-street parking restricted or closed on Alignment D2.	0	0	**All on-street parking restricted or closed on Alignment D2.**
Alternative B-C-D1	0[1]	0	0[2]	**0**
Alternative B-C-D2	All on-street parking restricted or closed on Alignment D2.	0	0[2]	**All on-street parking restricted or closed on Alignment D2.**

1 There is no discernible difference in impact between the Golden Valley Road and Plymouth Avenue/Wirth Park station options.
2 Park-and-Ride Impacts are the same as the 93rd OMF impacts; therefore, they were only counted once in the total impact

4.4.3 Indirect/Secondary Impacts

No-Build Alternative
No indirect or secondary parking impacts would be associated with the No-Build alternative.

Transportation System Management Alternative
No indirect or secondary parking impacts would be associated with the Transportation System Management alternative.

Build Alternatives
Reduced parking on West Broadway and Penn Avenue could have an indirect/secondary impact to commercial and residential properties adjacent to the 34th Avenue, West Broadway, and Penn Avenue roadways, and is discussed in more detail in the Economic Development Technical Report.

4.5 Avoidance, Minimization, and/or Mitigation Measures

No mitigation required for Alignments A, B, C, D1 or the Alignment D common section.

Mitigation for the loss of parking for the Alignment D2 Build alternatives, specifically on West Broadway, could include creation of small off-street parking facilities proximate to retail businesses. The identification and implementation of parking mitigation measures would involve the City of Minneapolis to facilitate making long-term parking policy decisions. These policy decisions would be intended to make the best of available parking or develop other arrangements to provide additional parking in heavy impact areas. Such measures could result in additional property impacts.

In order to reduce short-term parking impacts, construction phasing would be implemented throughout construction.

The Penn Avenue and 34th Avenue roadway design would be further developed to maximize the use of the proposed right-of-way and provide on-street parking to mitigate the loss of parking on Penn Avenue and 34th Avenue to the extent feasible.

5.0 Freight Rail Technical Analysis

5.1 Regulatory Context/Methodology

Preliminary Bottineau Transitway design drawings and existing BNSF track charts were used to identify potential physical impacts to freight rail infrastructure. Minnesota State Statute 219.46, BNSF Railway, American Railway Engineering and Maintenance-of-Way Association (AREMA) and MnDOT requirements were reviewed to determine vertical and horizontal clearance requirements for the freight rail track. Per Minnesota State Statue 219.46, subd. 2, a minimum of 14-feet horizontal separation is required between mainline tracks. The Bottineau project provides a horizontal separation greater than 14 feet. This additional separation would allow a service road to be constructed between the LRT and freight rail track and would also allow Met Council and BNSF to perform maintenance on their respective track without impacting service on the other track.

5.2 Study Area

The study area for freight impacts is approximately 8.4 miles of the BNSF right-of-way within the Monticello Subdivision that is located between Brooklyn Boulevard in Brooklyn Park, MN (Mile Post (MP) 9.99) and TH 55 in Minneapolis, MN (MP 1.56) . The existing width of the BNSF-owned ROW is generally 100 feet (approximately 50 feet on either side of the existing freight rail track).

5.3 Affected Environment

Within the study area, the BNSF operates on one freight track generally located in the center of a 100-foot right-of-way that BNSF owns and maintains. Within this area, there are several locations where the BNSF right-of-way is less than 100 feet (See Table 13). Currently BNSF operates one freight rail train (one direction only) per day on this track. During peak operations in previous years, up to five trains per day operated in the corridor. Freight operations could increase or decrease based on the anticipated needs of BNSF. This portion of the BNSF system is located in “dark territory,” which means that train movements are controlled by track warrants or train order operations, with train dispatchers issuing orders by radio communication with train engineers, not by train signals. This type of system only allows one train to be one a particular segment of the track at any given time. Safety devices are activated at grade crossings signalizing train movement to vehicular traffic. This

portion of the corridor is Class II track and operates at a maximum speed of 25 miles per hour (MPH) based on existing track conditions.

Table 13. Locations Where BNSF ROW Is Less Than 100 feet

Alignment	Location	Reduced ROW Impact Side	Reduced ROW Width	Approximate Length of Reduced ROW	Property Owner[1]
A/B	South of 71st Avenue	West	84' – 91'	455'	Public
C	North of West Broadway Avenue	West	75'	412'	Robeck Industries Inc.
C	North of TH 100	East	65'	360'	Public
C	South of 42nd Avenue	East	75'	1200'	HCRRA
C	North of 42nd Avenue	East	87'	180'	JDJ Land and Building LLC
D1	Between 36th Avenue and 34th Avenue	East	75' – 85'	720'	Public
D1	Oak Park Avenue	East/West	75'	1200'	Public / SOO Line Railroad

[1]BNSF is the owner for most areas along the proposed transitway, but there are certain areas where BNSF has sold a portion of its right-of-way to other entities.

Between Brooklyn Boulevard and I-94 in the southern portion of Alignments A and B and the very northern portion of Alignment C, four existing siding tracks allow service to be provided to the Anchor Block site, Atlas Cold Storage building, former Knox Lumber site and the current Feed My Starving Children building (See Figures 12 and 13). Although BNSF does not currently provide service to these sites, service agreements between BNSF and the private properties have not been terminated.

The Canadian Pacific (CP) Rail Company has two tracks that come into contact with the existing BNSF Rail line. One is located between Bass Lake Road and TH 100 and generally runs east-west. At this location, the BNSF track crosses the CP track perpendicularly with a diamond crossing. The second one is located at the south end of Alignment D1, where the CP Rail track connects to the BNSF track with a crossover.

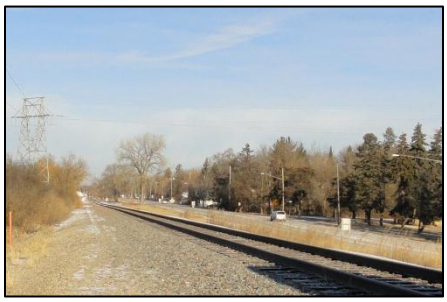
Within Alignments A, B, and C, the existing freight track is generally at the same elevation as the adjacent roadways and crosses several roadways at-grade. Several grade crossings, listed in Table 14, are located within Alignments A, B and C. Both passive and active warning devices, which are identified in Table 14, are provided at these grade crossings.

Table 14. Existing At-Grade Crossing Summary

Alignment	Location	At-Grade Crossing Warning Devices		
		Active	Passive	Devices
A	73rd Avenue	X		Cantilever Flashing-Light Signal, Crossbuck Sign
A/B	71st Avenue	X		Cantilever Flashing-Light Signal, Gate Arm, Crossbuck Sign

Alignment	Location	At-Grade Crossing Warning Devices		
		Active	Passive	Devices
C	63rd Avenue	X		Cantilever Flashing-Light Signal, Crossbuck Sign
C	Bass Lake Road	X		Cantilever Flashing-Light Signal, Gate Arm, Crossbuck Sign
C	Corvallis Avenue	X		Flashing-Light Signal, Crossbuck Sign
C	Broadway Avenue	X		Flashing-Light Signal, Crossbuck Sign
C	45-1/2 Avenue	X		Flashing-Light Signal, Crossbuck Sign
C	42nd Avenue	X		Cantilever Flashing-Light Signal, Crossbuck Sign
C	Noble / 41st Avenue	X		Cantilever Flashing-Light Signal, Gate Arm, Crossbuck Sign
C	40th Avenue		X	Stop Sign, Crossbuck Sign

Within the south portion of Alignment C and a large portion of Alignment D1, the freight track is located within a "trench," at an elevation that is lower than the adjacent infrastructure and includes vegetated side slopes on either side of the track. The track located in the remaining portion of Alignment D1 is generally at the same elevation, or higher than the adjacent roadways. The track area that is located within a trench, no at-grade crossings are located within Alignment D1. However, the track crosses under five bridge structures, namely at 36th Avenue, Golden Valley Road, Theodore Wirth Parkway, Plymouth Avenue and TH 55. Both the Golden Valley Road and Theodore Wirth Parkway bridges were designed to accommodate a future LRT track.


Existing BNSF Track Cross-Section


Existing BNSF Track "Trench" Cross-Section

5.4 Environmental Consequences

5.4.1 Operating Phase Impacts

No-Build Alternative

No operating phase impacts to the freight rail corridor would be associated with the No-Build alternative.

Transportation System Management Alternative

No operating impacts to the freight rail corridor would be associated with the Transportation system Management Alternative.

Build Alternatives

The Build alternative includes constructing the proposed LRT guideway in the eastern half of the BNSF right-of-way. The Project would divide the existing 100-foot right-of-way to accommodate both

the BNSF and LRT tracks. This would allow BNSF to operate within the western 50 feet of the existing right-of-way and would require that the existing BNSF track be relocated approximately 25 feet to the west, providing 25 feet of horizontal clearance on either side of the track at most locations. The LRT tracks would operate in the eastern 50 feet of the existing right-of-way. Proposed construction would include a 12 foot–wide access road generally located between the relocated BNSF track and the LRT guideway. The following design parameters indicate the minimum clearance requirements per Minnesota State Statutes and the minimum clearances that BNSF requires.

- MN State Statute Horizontal clearance to a vertical obstruction = 8'-6"
- BNSF Horizontal clearance to a vertical obstruction = 15'-0"
    - Per AREMA and MnDOT standards, existing and proposed bridge piers will require crash wall protection if they are located closer than 25'-0" from the track centerline.
- MN State Statute Vertical clearance = 22'-0"
- BNSF Vertical Clearance = 23'-4"

The Build Alternative also includes modifications to active warning devices and signals for at-grade crossings in order to accommodate the relocated BNSF and new LRT tracks.

The project would include fencing at station locations to provide additional separation between pedestrians using the LRT station platform and the freight rail operations. Replacement of existing fence located on the BNSF right-of-way line affected by construction would also be provided..

While BNSF would be required to operate within the western 50 feet of their existing right-of-way, the incorporation of an access road throughout the shared portion of the corridor would improve BNSF's overall accessibility to their track and the construction of a LRT guideway in the east 50 feet of the existing right-of-way would not affect BNSF's existing operations.

The following describes the improvements necessary to accommodate the relocated freight rail alignment. Unless otherwise noted, these impacts do not have a permanent impact to overall freight rail operations. Temporary impacts during construction are discussed in Section 5.4.2.

Table 15. Potential Bridge Modifications

Alignment	Bridge Location	Proposed Improvements
Alignment C	TH 100	Provide two separate bridge structures for LRT and BNSF tracks. The existing BNSF bridge structure will be widened to accommodate two LRT tracks and a new BNSF bridge structure will be constructed south of the existing alignment.
Alignment C	36th Avenue	The existing slope paving and portions of the embankment would be removed and new retaining walls would be constructed to accommodate the relocated freight rail track. A horizontal clearance of approximately 15 feet would be provided between the existing bridge pier and new retaining wall within the west portal of the bridge structure. Existing piers would require modifications in order to provide adequate crash wall protection based on current MnDOT and AREMA standards.

Alignment	Bridge Location	Proposed Improvements
Alignment D1	Golden Valley Road	Existing slope paving and portions of the embankment would be removed and new retaining walls would be constructed within the west portal in order to accommodate the relocated freight rail track. The west abutment was designed to accommodate a future track within the west portal of the bridge. Existing piers would require modifications in order to provide adequate crash wall protection based on current MnDOT and AREMA standards.
Alignment D1	Theodore Wirth Parkway	Existing slope paving and portions of the embankment would be removed and new retaining walls would be constructed within the west portal in order to accommodate the relocated freight rail track. Within the east portal, removal of the existing slope paving and portions of the embankment along with construction of a new retaining wall would occur in order to accommodate the LRT guideway. The west abutment was designed to accommodate a future track within the west portal of the bridge. Existing piers would require modifications in order to provide adequate crash wall protection based on current MnDOT and AREMA standards.
Alignment D1	Plymouth Avenue	Existing slope paving and portions of the embankment would be removed and new retaining walls would be constructed within the portal east of the existing track in order to accommodate the LRT guideway. Existing piers would require modifications in order to provide adequate crash wall protection based on current MnDOT and AREMA standards.
Alignment D1	TH 55	The north half of the TH 55 Bridge would be reconstructed in order to accommodate the transition of the LRT guideway out of the BNSF right-of-way into the median of TH 55. These bridge reconstruction impacts are not associated with the relocation of the freight rail track.

Alignment A
The BNSF freight rail track would be relocated approximately 25 feet west of its current alignment. South of 71st Avenue, a portion of the BNSF right-of-way is less than 100 feet wide due to the 71st Avenue roadway configuration. This may require installation of a barrier between the existing roadway (back of sidewalk) and freight rail track. The relocated track may need to reconnect the existing sidings located south of Brooklyn Blvd, unless BNSF were to terminate existing service agreements.

Alignment B
The BNSF freight rail track would be relocated approximately 25 feet west of its current alignment. South of 71st Avenue, a portion of the BNSF right-of-way is less than 100 feet wide due to the 71st Avenue roadway configuration. This may require installation of a barrier between the existing roadway (back of sidewalk) and freight rail track. The relocated track may need to reconnect the existing sidings that are located south of 73rd Avenue, unless BNSF were to terminate existing service agreements.

Alignment C

The BNSF freight rail track would be relocated 25-feet west of its current alignment. The existing diamond crossing that is located at the BNSF/CP Railway at-grade intersection would require relocation as part of shifting the freight rail tracks. The southern portion of Alignment C is located within the "trench" described in Section 5.3, Affected Environment. Retaining walls would replace the existing vegetated side slopes on either side of the BNSF Railway Corridor to accommodate the relocated freight rail track and minimize adjacent property impacts.

The existing BNSF bridge that crosses over TH 100, would require modifications to accommodate the LRT guideway and a new BNSF bridge would be constructed south of the existing bridge. See Table 15 for proposed modifications. Two bridges structures are proposed in order to minimize construction impacts to the BNSF operations. This will allow BNSF to utilize the existing bridge structure until the new bridge structure is constructed. Once constructed, BNSF will transition to the new bridge structure allowing the existing bridge structure to be widened for the LRT guideway.

The 36th Avenue Bridge, which is located at the south end of Alignment C, would require modifications in order to accommodate the relocated freight rail track and LRT guideway. Unlike some of the bridges located within Alignment D1, this bridge was not designed to accommodate a future track within the west portal. See Table 15 for proposed modifications.

Alignment D1

Alignment D1 is located within the "trench" described in Section 5.3, Affected Environment. Retaining walls would replace the existing vegetated side slopes on either side of the BNSF to accommodate the relocated freight rail track and elevation difference and to minimize adjacent property impacts. At Plymouth Avenue and TH 55 the proposed freight rail alignment transitions to the existing alignment in order to minimize impacts to existing bridge structures.

The Golden Valley Road Bridge, Theodore Wirth Bridge, Plymouth Avenue Bridge and TH 55 Bridge would all require modifications in order to accommodate the relocated freight rail track and LRT guideway. See Table 15 for proposed modifications.

There is an existing crossover that is located north of TH 55 at the south end of Alignment D1, which provides a connection between the CP Rail and BNSF Rail. This crossover would require reconstruction in order to accommodate the relocated freight rail track.

Alignment D2

Freight rail impacts associated with Alignment D2 would be minimal and would be located at the northerly end of Alignment D2 where the alignment exits the BNSF right-of-way at 34th Avenue. North of 34th Avenue the freight rail track would be relocated generally 25 feet west of its existing alignment in order to accommodate the LRT guideway. South of 34th Avenue, the freight rail track would transition back to its existing alignment, which is generally located in the center of the BNSF right-of-way.

Alignment D Common Section

There are no impacts are associated with freight rail in the Alignment D Common Section.

TPSS

There are 27 potential TPSS locations along the proposed alignments. A description of a TPSS station footprint can be found in the Project Description Technical Report. The majority of the TPSS stations would be located on the east side of the proposed LRT track with some being associated with the LRT platforms and stations.

The minimum clearance distance for TPSS stations and the LRT tracks is approximately eight feet; therefore, the TPSS station would be located at least eight feet from the tracks. Larger horizontal clearances, a minimum of 15 feet, would be required if located adjacent to the BNSF freight rail track. However, they could be located on adjacent (to the tracks) property to avoid or minimize impacts to the freight rail. Depending on the location of the TPSS site, utilities may need to cross under or over the freight rail tracks. Vertical and horizontal clearances, as required by the BNSF Utility Accommodation Policy, would need to be maintained for these utility crossings.

Summary of Operating Phase Impacts by Alternative

Table 16. Operating Phase Impacts By Alternative – Freight Rail

Alternative	Total Freight Rail Impact
No-Build Alternative	No impact
TSM Alternative	No impact
Alternative A-C-D1	No direct impact to freight rail operations in Alignments A, C and D1. Potential impact to CP Rail in Alignments C and D1.
Alternative A-C-D2	No direct impact to freight rail operations in Alignment A and C. Potential impact to CP Rail in Alignment C.
Alternative B-C-D1	No direct impact to freight rail operations in Alignments B, C, and D1. Potential impact to CP Rail in Alignments C and D1.
Alternative B-C-D2	No direct impact to freight rail operations in Alignments B and C. Potential impact to CP Rail in Alignment C.

There are no anticipated freight rail impacts associated with the proposed park-and-ride or OMF facilities.

5.4.2 Construction Phase Impacts

No-Build Alternative

No construction phase impacts to freight rail are associated with the No-Build alternative.

Transportation System Management Alternative

No construction phase impacts to freight rail are associated with the Transportation System Management alternative.

Build Alternatives

Construction activities required to relocate the freight rail track, required as part of constructing the LRT guideway, would affect freight service. Construction activities may also result in temporary impacts to sidings used by freight customers. Temporary crossovers between the existing and relocated freight rail track would be required in order to facilitate construction phasing and maintain freight operations.

Alignment C and D1, as well as the southerly portions of Alignment A and B, would result in temporary impacts and interruptions in freight rail services that would be required as part of relocating and reconstructing the existing freight rail infrastructure.

Coordination with BNSF would be required with BNSF to minimize alignment impacts during construction.

Summary of Construction Impacts by Alternative

Table 17. Construction Impacts By Alternative – Freight Rail

Alternative	Total Freight Rail Impact
No-Build Alternative	No impact.
TSM Alternative	No impact.
Alternative A-C-D1	Operational impact associated with track relocation in Alignments A, C and D1
Alternative A-C-D2	Operational impact associated with track relocation in Alignments A and C. Minor impact at the north end of Alignment D2
Alternative B-C-D1	Operational impact associated with track relocation in Alignments B, C and D1
Alternative B-C-D2	Operational impact associated with track relocation in Alignments B and C. Minor impact at the north end of Alignment D2

There are no anticipated freight rail construction impacts associated with the proposed park-and-ride or OMF facilities.

5.4.3 Indirect/Secondary Impacts

No-Build Alternative

No freight rail indirect/secondary impacts are associated with the No-Build alternative.

Transportation System Management Alternative

No freight rail indirect/secondary impacts are associated with the Transportation System Management alternative.

Build Alternatives

Indirect/secondary impacts associated with Build alternatives would include potential service impacts to adjacent businesses that are currently served via a siding track.

Noise, vibration and visual impacts associated with the shifting of the tracks is discussed in detail in the Visual Impact and Noise and Vibration Technical Reports.

5.5 Avoidance, Minimization, and/or Mitigation Measures

Where existing freight rail track is relocated, conditions would be improved compared to the existing rail infrastructure through providing of continuously welded rail (CWR) and a new service road adjacent to the relocated freight rail track.

Mitigation measures, such as construction phasing to minimize track outages, would be taken to minimize impacts to existing freight rail operations during construction. Coordination with BNSF Railway and CP Rail would continue through the EIS process and beyond to affirm appropriate mitigation measures.

6.0 Aviation Technical Analysis

6.1 Regulatory Context/Methodology

This section describes the aviation environment in the Bottineau Transitway Corridor and the

potential impacts of the No-Build, TSM, and Build alternatives on the aviation facilities. No airports will be impacted by the Bottineau Corridor in the construction of Alignments A, B, D1 and D2 in the Build alternatives. The only aviation facility potentially impacted in the proposed Bottineau Transitway Corridor is the Crystal Airport (MIC) in Alignment C. Crystal Airport is one of seven airports owned and operated by the Metropolitan Airports Commission (MAC). The construction of Alignment C has the potential to impact the runway protection zone (RPZ) and the State Safety Zone A of the Crystal Airport (MIC).

According to Federal Aviation Administration (FAA) Advisory Circular (AC 150/5300-13 CHG 17), the runway protection zone "is an area off the runway end to enhance the protection of people and property on the ground." RPZs are located at the end of each runway and land use is typically controlled by the airport owner.

The state safety zone areas overlay and extend beyond the RPZs. The most restrictive areas created by MnDOT regulations are called State Safety Zones A and B. The length of Safety Zone A is typically 2/3 of the total runway length; Safety Zone B is typically 1/3 of the total runway length and extends from Safety Zone A.

When the airport does not own the land within the entire RPZ, the FAA studies the existing and proposed activities and land uses to determine the effect the proposed activities and land uses would have on the safety of the airport and people. The FAA may issue an advisory recommendation in opposition to the presence of any off-airport object or activity in the vicinity of a public-use airport that conflicts with airport planning or design standard.

The Minnesota Department of Transportation (MnDOT) has established regulations that control the land use allowed off runway ends in order to prevent incompatible development. Safety Zone A typically does not allow any buildings, temporary structures, places of public assembly or transmission lines. Permitted uses include agriculture, livestock, cemeteries, and auto parking areas. Safety Zone B typically does not allow places of public or semipublic assembly (i.e. churches, hospitals, schools) and is subject to site-to-building area ratios and site population limits. Permitted uses are generally the same as Safety Zone A, with the addition of some low-density developments.

6.2 Study Area

For the Crystal Airport several of the RPZs and Safety Zones extend beyond the property of the airport. The study area for the impacts to the Crystal Airport includes preliminary construction limits that are outside the Crystal Airport property boundaries, but within the RPZ and Safety Zone A for Runway 6L (See Figure 14).

The RPZ for Runway 6L contains 13.8 acres; 4.9 of which are not on airport property. The construction limits for the project affect approximately 1.6 acres of the RPZ. Safety Zone A contains 10.3 acres; 2.2 of which are not on airport property. The construction limits for the project affect approximately 1.0 acres of Safety Zone A which are all contained within the RPZ. Safety Zone B contains 8.3 acres, none of which are on airport property or within the construction limits of the project.

6.3 Affected Environment

Alignment C runs through the RPZ and Safety Zone A of Runway 6L (See Figure 14). Bottineau Boulevard (County Road 81) currently traverses these areas. The current land use in the portion of Safety Zone A that is off Crystal Airport's property boundary is residential.

6.4 Environmental Consequences

6.4.1 Operating Phase Impacts

No-Build Alternative

No operating phase aviation impacts would be associated with the No-Build alternative.

Transportation System Management (TSM) Alternative

The TSM alternative would include running additional bus service on the existing Bottineau Boulevard, located adjacent to the Crystal Airport. Bottineau Boulevard currently impacts approximately 0.75 acres of the RPZ and 0.5 acres of Safety Zone A of Runway 6L. The TSM alternative will not increase the limits of these existing impacts.

Build Alternatives

The only aviation facility in the proposed Bottineau Transitway corridor is Crystal Airport, located in Alignment C. Proposed LRT facilities and operations would impact approximately 1.6 acres of the RPZ and 1.0 acre of Safety Zone A of Runway 6L. The approach surface is an imaginary surface that exists primarily to prevent objects from extending upward into navigable airspace. Light rail vehicles and associated equipment would not penetrate approach surface associated with Runway 6L or any other runway.

TPSS

There are no proposed TPSS stations located inside the RPZ or Safety Zone A.

Summary of Operating Phase Impacts by Alternative

Operating phase impacts would be similar for each build alternative.

Table 17. Operating Phase Impacts By Alternative – Aviation

Alternative	Total Aviation Impact[1]
No-Build Alternative	No impact.
TSM Alternative	No impact.
Alternative A-C-D1	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative A-C-D2	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative B-C-D1	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative B-C-D2	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.

[1]Only accounts for additional impacts. Does not include areas already impacted by the existing Bottineau Boulevard.

6.4.2 Construction Phase Impacts

No-Build Alternative

The No-Build alternative is not expected to have any construction phase impacts on the aviation environment in the project area.

Transportation System Management Alternative

The Transportation System Management alternative is not expected to have any construction phase impacts on the aviation environment in the project area.

Build Alternatives

Construction on Alignment C will impact the RPZ and Safety Zone A of Runway 6L. Construction operations and phasing in the RPZ and Safety Zone A will be coordinated with the Metropolitan Airports Commission (MAC) and FAA.

Summary of Construction Impacts by Alternative

Construction phase impacts are expected to be similar for each alternative, as reflected in Table 18.

Table 18. Construction Impacts By Alternative – Aviation

Alternative	Total Freight Rail Impact
No-Build Alternative	No impact.
TSM Alternative	No impact.
Alternative A-C-D1	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative A-C-D2	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative B-C-D1	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.
Alternative B-C-D2	1.6 acres of the RPZ and 1.0 acre of Safety Zone A in Alignment C.

6.4.3 Indirect/Secondary Impacts

No-Build Alternative

The No-Build alternative is not expected to have any indirect/secondary impacts on the aviation environment in the project area.

Transportation System Management Alternative

The Transportation System Management alternative is not expected to have any indirect/secondary impacts on the aviation environment in the project area.

Build Alternatives

The Build Alternatives are not expected to have any indirect/secondary impacts on the aviation environment in the project area.

6.5 Avoidance, Minimization, and/or Mitigation Measures

No mitigation is required for Alignments A, B, D1, D2 or the Alignment D common section.

Mitigation measures would be taken to minimize impacts on the aviation environment in Alignment C. Construction phasing in the RPZ and Safety Area A will be coordinated with the FAA and the MAC during the final design. The FAA's *Form 7460 – Notice of Proposed Construction or Alteration* will be completed during final design.

Equipment height will be restricted so it does not penetrate the runway approach surface. No open water will be allowed in the RPZ during construction to discourage bird nesting. The MAC is in the process of updating the Airport Layout Plan (ALP). Proposed encroachments on RPZ and Safety Zone A will be provided for inclusion in the ALP document, as well as overhead contact system (OCS) pole and rail elevations.

7.0 Summary

Table ES-1. Summary of Impacts and Mitigation Measures

Impact Category	Impacts of Build Alternatives	Avoidance, Minimization, and/or Mitigation Measures
Non-Motorized Transportation (Pedestrian/bicycle facilities)	The project would improve existing pedestrian crossings and facilitate connections to station platforms. However, the project would require closure of existing bicycle/pedestrian crossings at several perpendicular crossing locations along the guideway and only allow pedestrian crossings at signalized intersections: Alternative A-C-D1would close 10 existing pedestrian/bicycle crossings. Alternative A-C-D2 would close 18 existing pedestrian/bicycle crossings. Alternative B-C-D1would close 13 existing pedestrian/bicycle crossings. Alternative B-C-D2 would close 21 existing pedestrian/bicycle crossings.	Current planning for the Bottineau Transitway supports the enhancement of pedestrian facilities and sidewalk landscaping. These enhancements are intended to act both as an improvement effort and as a natural separation to protect pedestrians, bicyclists, and transit vehicles. Measures would be taken to discourage pedestrians from illegally crossing the tracks and to enhance safety at permitted crossing locations, by providing pedestrian signals and well-marked crosswalks at crossing locations.

Impact Category	Impacts of Build Alternatives	Avoidance, Minimization, and/or Mitigation Measures
Transit	The Bottineau Transitway project would have a positive effect on existing transit operations and would improve transit connectivity in the project area by providing frequent, fast, and highly reliable transitway service throughout the day, as well as an enhanced connecting bus network to connect the greater corridor to transitway station locations, along with better connecting the corridor to the regional transit system.	No mitigation measures required.
Parking[1]	Approximately 270 on-street parking spaces would be eliminated on 34th Avenue, West Broadway Avenue, and Penn Avenue under Alignment D2, No impact to on-street parking would result from the other alignments.	Mitigation could take the form of identifying and implementing new small off-street parking facilities, requiring involvement from local cities to identify the best and most appropriate available parking solutions to meet local needs. Detailed study of parking utilization would be needed in future project development phases to identify more definitive mitigation measures.

Impact Category	Impacts of Build Alternatives	Avoidance, Minimization, and/or Mitigation Measures
Freight Rail	The Bottineau Transitway project would shift the existing freight rail track approximately 25' to the west of its current alignment. This shift would not have a negative effect on existing freight operations and in fact would improve the existing rail infrastructure by providing continuously welded rail (CWR) and a new service road, currently not provided within the existing right-of-way, adjacent to the relocated freight rail track.	No mitigation measures required.
Aviation	The build alternative would be located within a portion of the RPZ limits identified for the Crystal Airport within Alignment C.	Mitigation measures would be taken to minimize impacts on the aviation environment. The FAA's *Form 7460 – Notice of Proposed Construction or Alteration* will be completed during final design. Light rail vehilces and associated equipment height will be restricted so it does not penetrate the runway approach surface. No open water will be allowed in the RPZ to limit bird nesting. The Metropolitan Airports Commission (MAC) is in the process of updating the Airport Layout Plan (AIP). Proposed RPZ and safety zone encroachments will be provided for inclusion in the ALP document. The overhead contact system (OCS) pole and rail elevations will also be provided to the MAC.

[1]Assessment of parking that is included within this tech report includes existing on-street parking. Proposed park and ride facilities that are part of the build alternatives are assessed separately from impacts on existing parking.

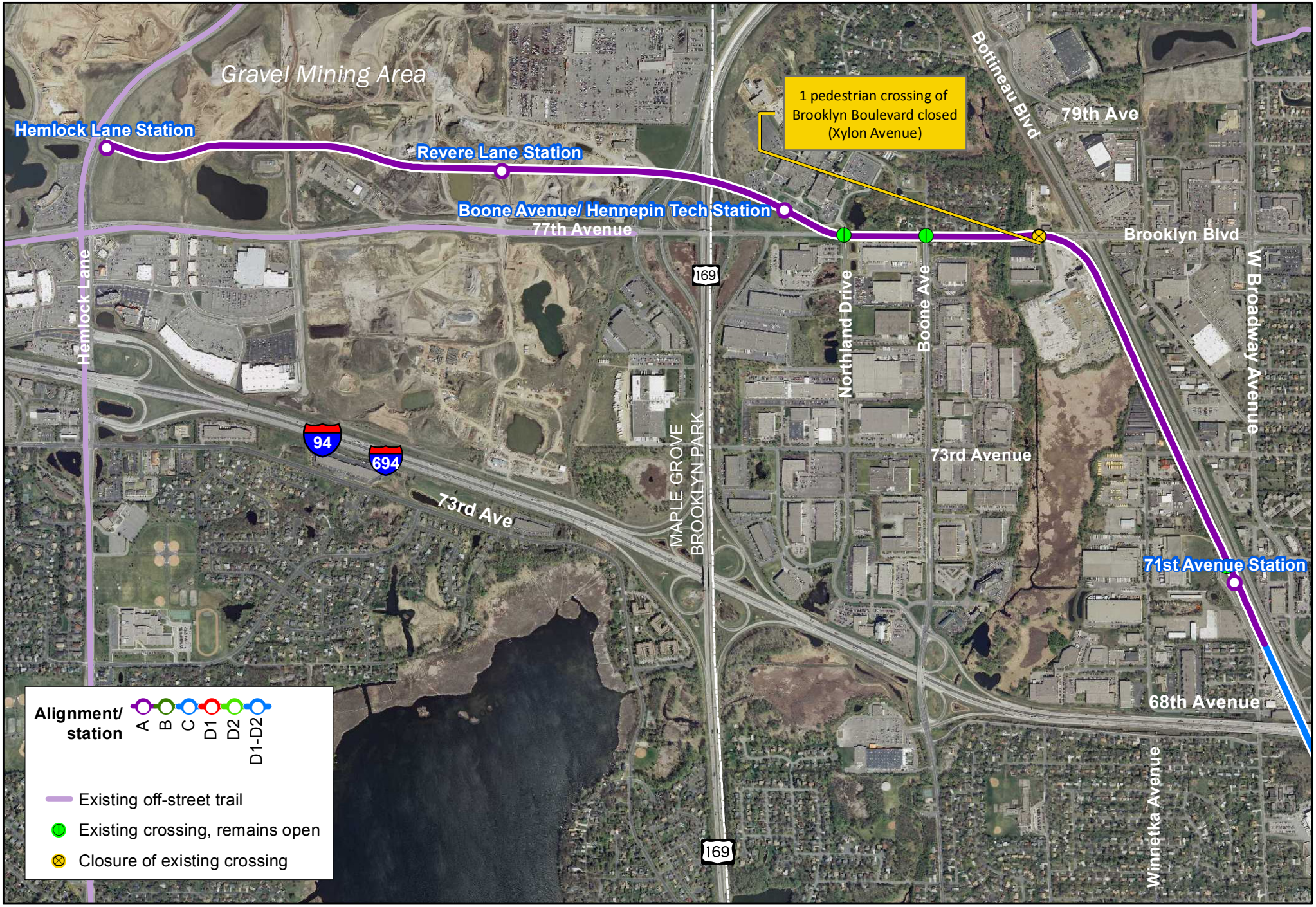
Table ES-2. Summary of Construction Impacts and Mitigation Measures

Impact Category	Construction Impacts of Build Alternatives	Avoidance, Minimization, and/or Mitigation Measures
Non-Motorized Transportation (Pedestrian/bicycle facilities)	Construction of any of the Build alternatives would result in temporary impacts to pedestrian/bicycle routes within the construction area. These may include closures and detours around the construction area.	To the extent feasible, construction would be phased in order to reduce non-motorized transportation impacts. The implementation of phasing to minimize impacts would occur during the construction phasing to reduce non-motorized transportation impacts to the extent feasible throughout the duration of construction.
Transit	Construction of any of the Build alternatives would result in temporary impacts to bus operations on routes within the construction area. These may include temporary stop relocation or closure, route detours, or suspension of service on segments of routes operating on streets where LRT would be being constructed.	Metro Transit would post information at bus stops indicating temporary bus stop closures and/or detour details. Information would also be published in advance of any bus detours on Metro Transit's website and in its on-board information brochure, *Connect*.
Parking	All on-street parking would be eliminated on 34th Avenue, West Broadway, and Penn Avenue in Alignment D2.	Mitigation would include phasing construction to reduce parking impacts. Existing on-street parking on 34th Avenue would likely not be able to be mitigated during construction.
Freight Rail	Construction activities would likely result in temporary impacts to sidings used by freight customers. Temporary crossovers between the existing and the relocated freight rail track would be required in order to facilitate construction phasing and maintain freight operations. Construction activities would have a temporary impact to two CP Rail lines located within the corridor. The CP rail line that is located between Bass Lake Road and TH 100 would be impacted in order to relocate the existing diamond crossing. The CP rail line that is located north of TH 55 would be impacted in order to reconstruct the existing crossover that connects the BNSF and CP rail lines.	Coordination with BNSF Railway and CP Rail would be required to determine appropriate mitigation measures to minimize construction impacts.

Impact Category	Construction Impacts of Build Alternatives	Avoidance, Minimization, and/or Mitigation Measures
Aviation	Construction of the build alternative would be located within a portion of the RPZ that is located for the Crystal Airport within Alignment C.	Construction phasing in the RPZ will be coordinated with the FAA during the final design. The FAA's *Form 7460 – Notice of Proposed Construction or Alteration* will be completed during final design. Equipment height will be restricted so it does not penetrate the runway approach surface. No open water will be allowed in the RPZ during construction to discourage bird nesting.

Analysis of Traffic Impacts is included in the Traffic Technical Report.

FIGURES



Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Aerial: Minnesota Geospatial Information Office, 2010
Bikeways: Metropolitan Council, Hennepin County, Three Rivers Park District

FIGURE 1. ALIGNMENT A: Impacts to Pedestrian and Bicycle Facilities

Hennepin County
Regional Railroad Authority
Metropolitan Council

Sources:
Aerial: Minnesota Geospatial Information Office, 2010
Bikeways: Metropolitan Council, Hennepin County, Three Rivers Park District, City of Brooklyn Park

FIGURE 2. ALIGNMENT B: Impacts to Pedestrian and Bicycle Facilities

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

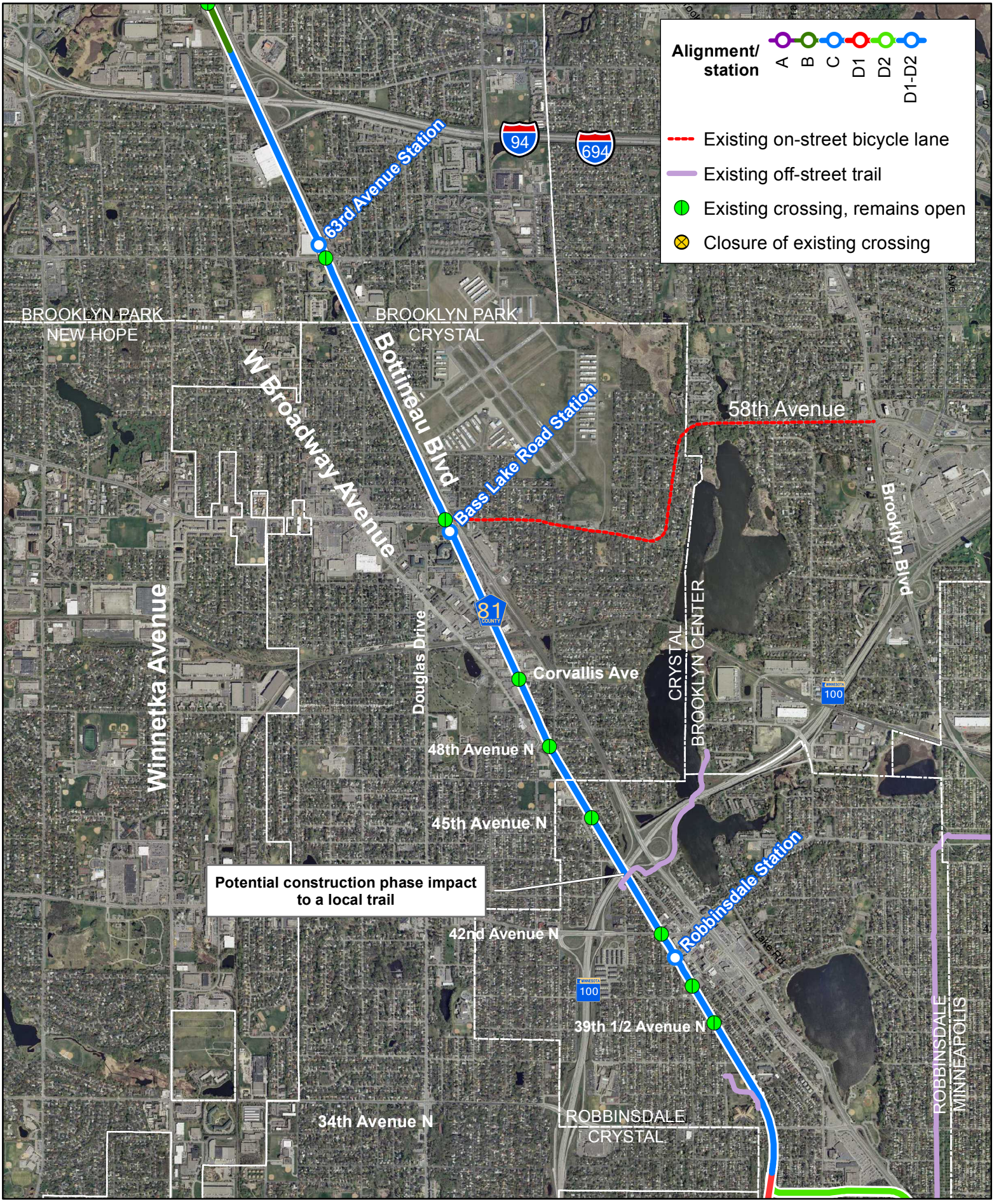
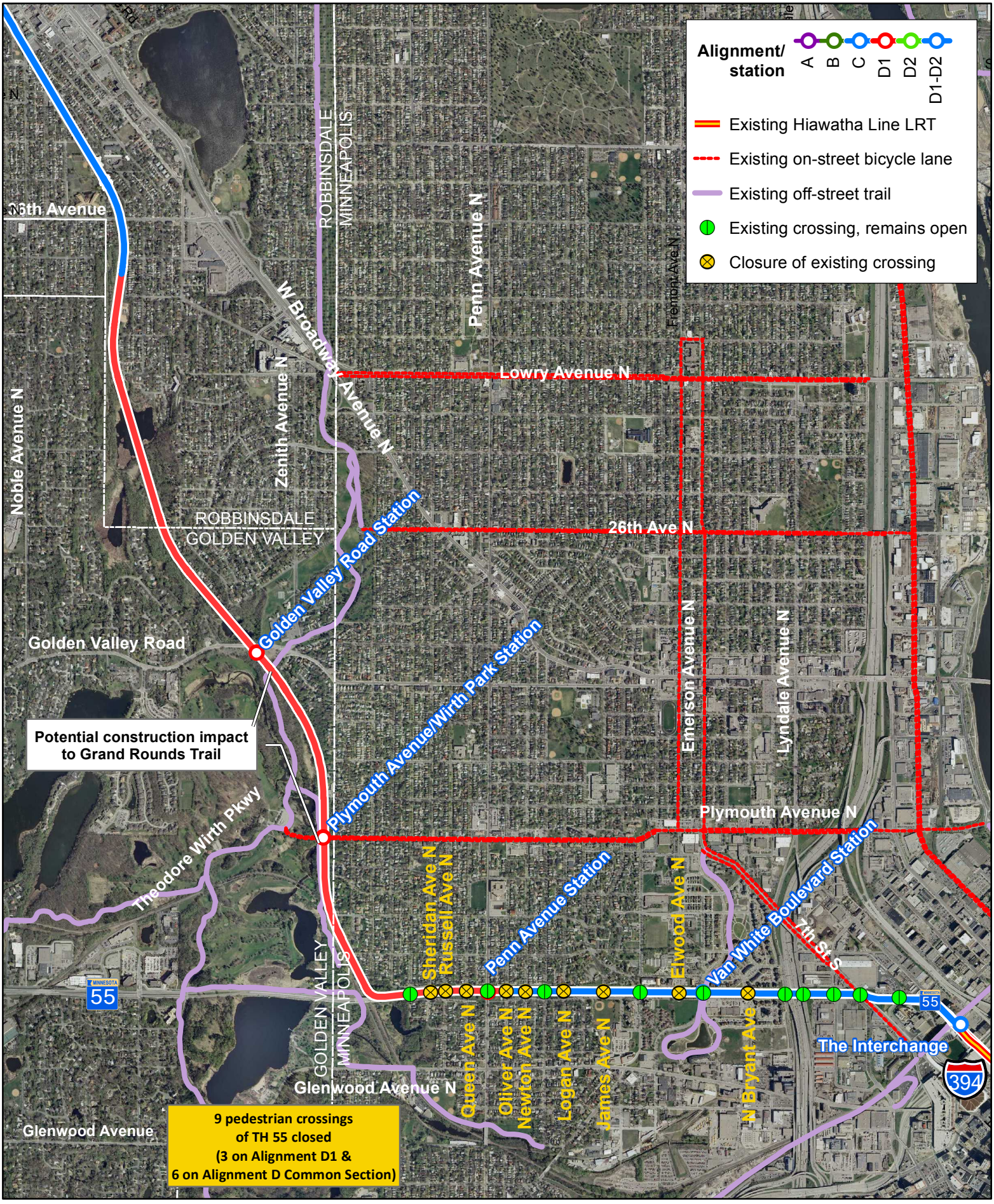


FIGURE 3. ALIGNMENT C: Impacts to Pedestrian and Bicycle Facilities



0 0.25 0.5 Miles

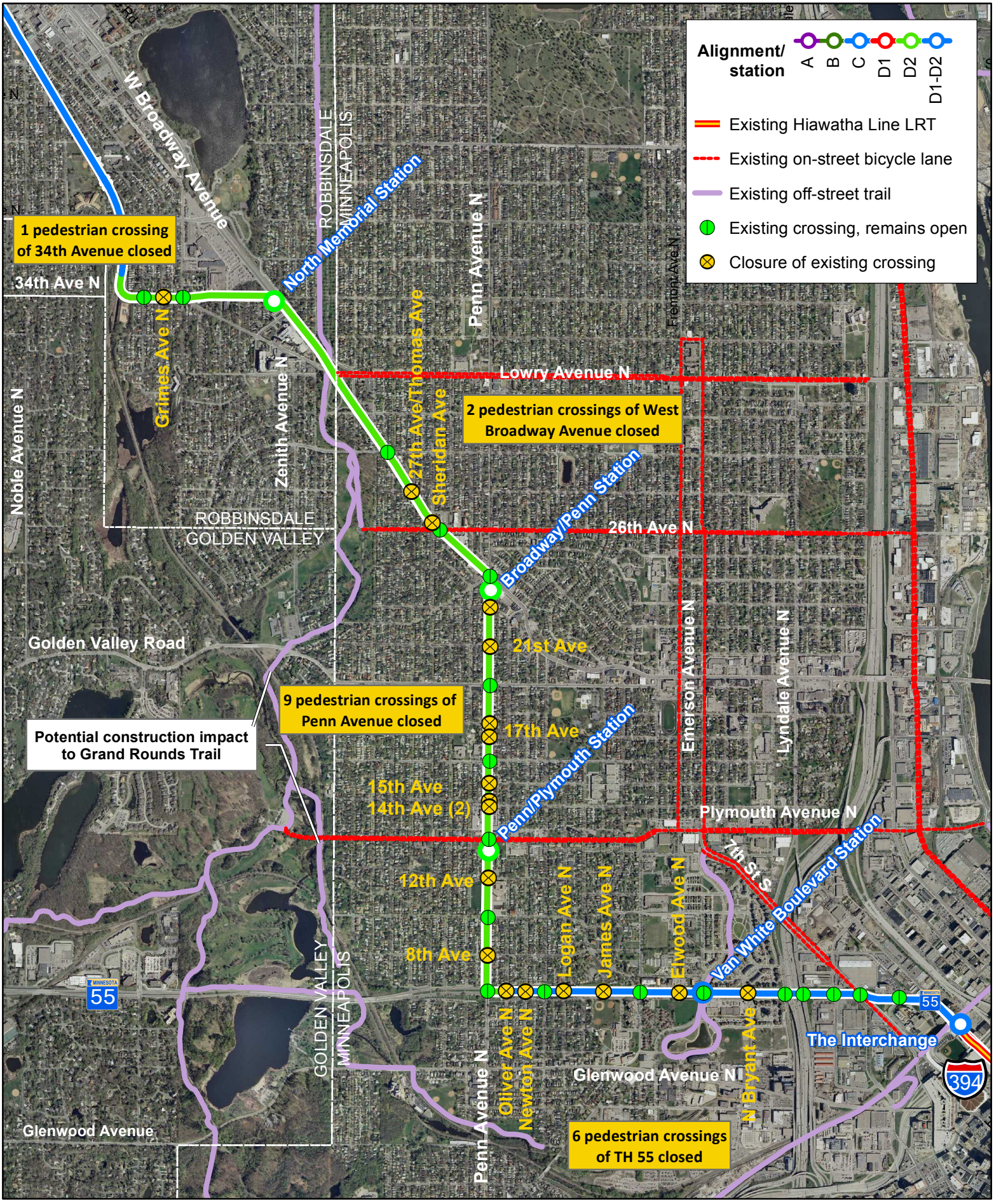
Sources:
Aerial: Minnesota Geospatial Information Office, 2010
Bikeways: Metropolitan Council and City of Minneapolis

FIGURE 4. ALIGNMENT D1: Impacts to Pedestrian and Bicycle Facilities

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County Regional Railroad Authority

Metropolitan Council



0 0.25 0.5 Miles

Sources:
Aerial: Minnesota Geospatial Information Office, 2010
Bikeways: Metropolitan Council and City of Minneapolis

FIGURE 5. ALIGNMENT D2: Impacts to Pedestrian and Bicycle Facilities

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

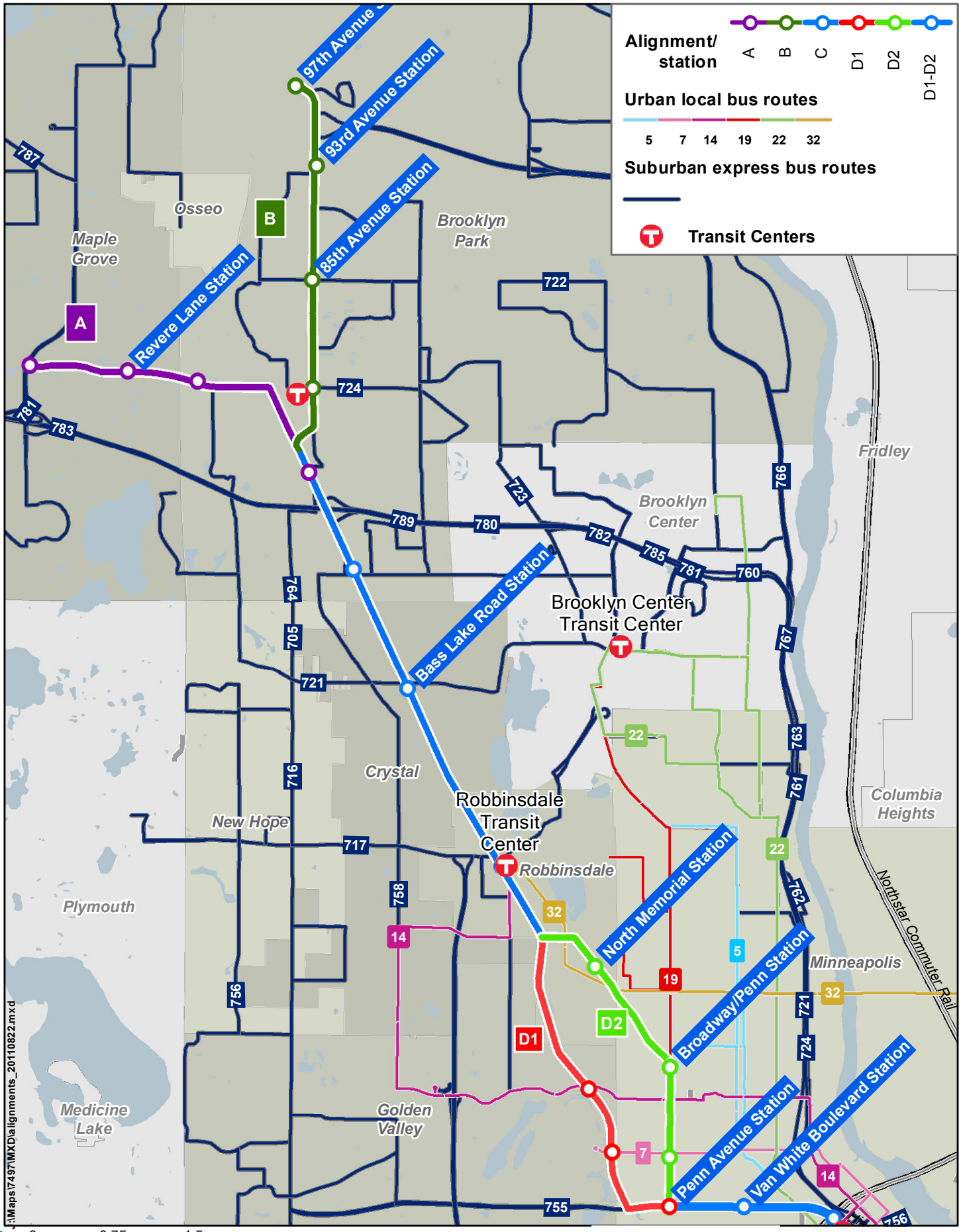


FIGURE 6.
Transit Service Area and Existing Service

Sources:
Aerial: Minnesota Geospatial Information Office, 2010
Bikeways: Metropolitan Council and City of Minneapolis

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

Bottineau Transitway

2030 Forecast Daily Station Use for Build Alternatives

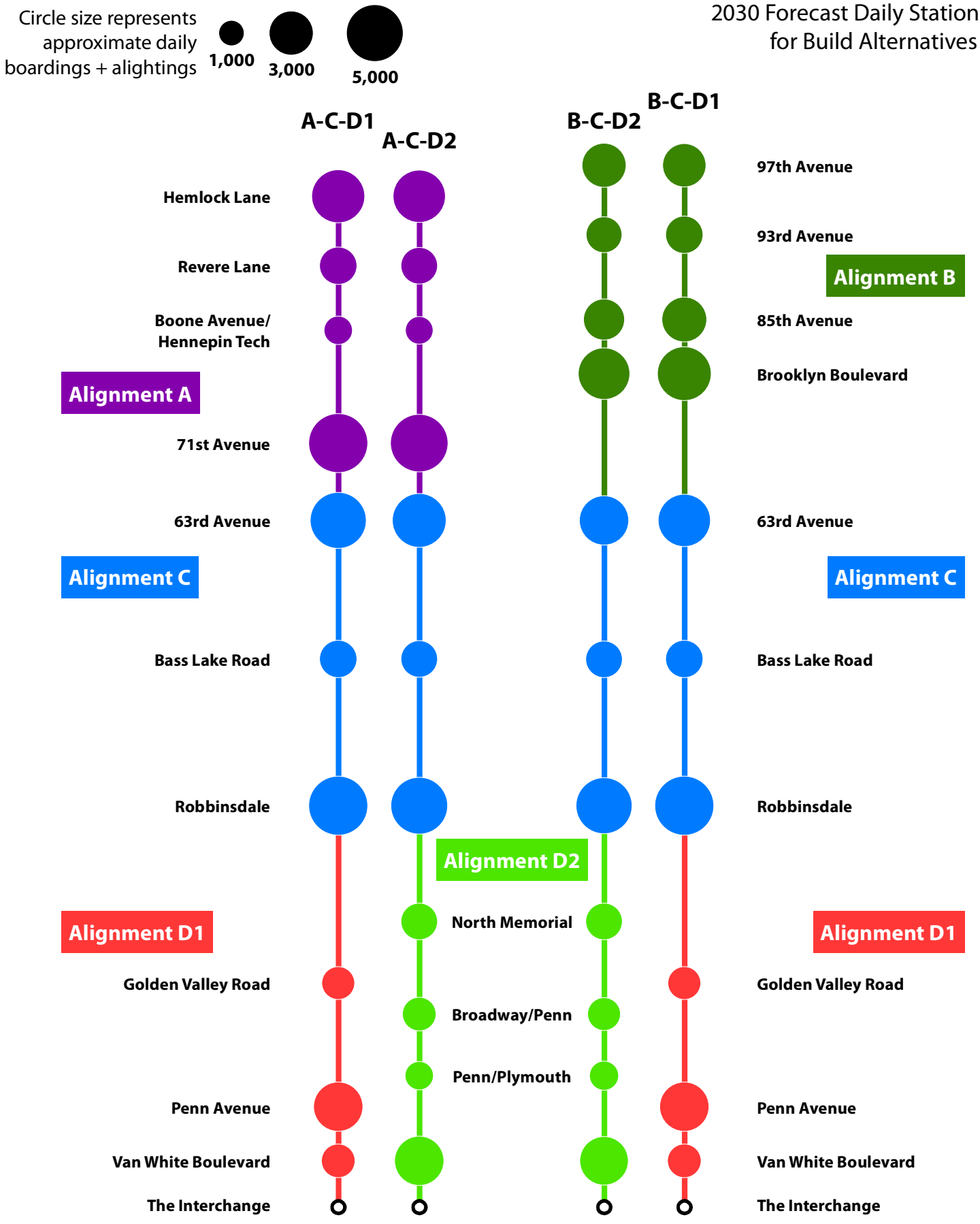
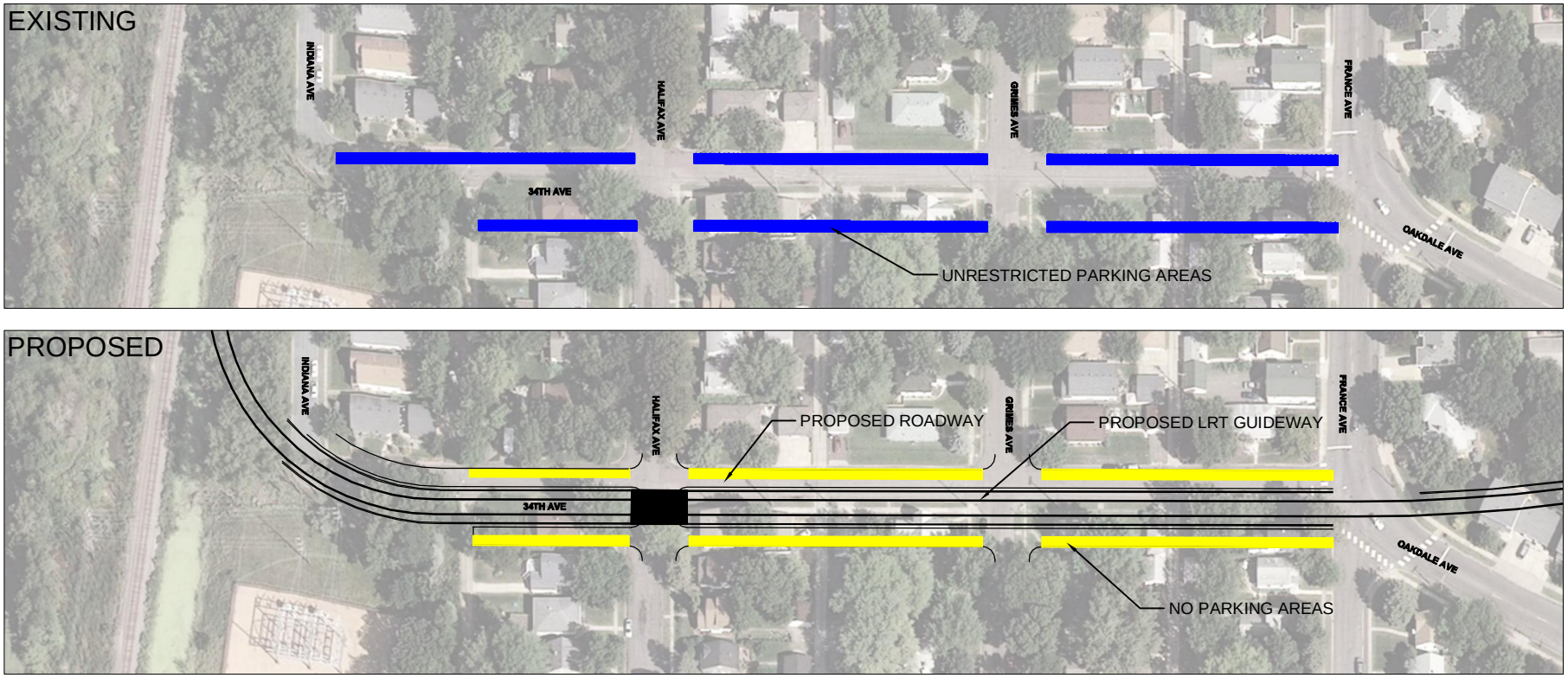


FIGURE 7. 2030 Forecast Daily Station Use for Build Alternatives



LEGEND

UNRESTRICTED PARKING

NO PARKING AREAS

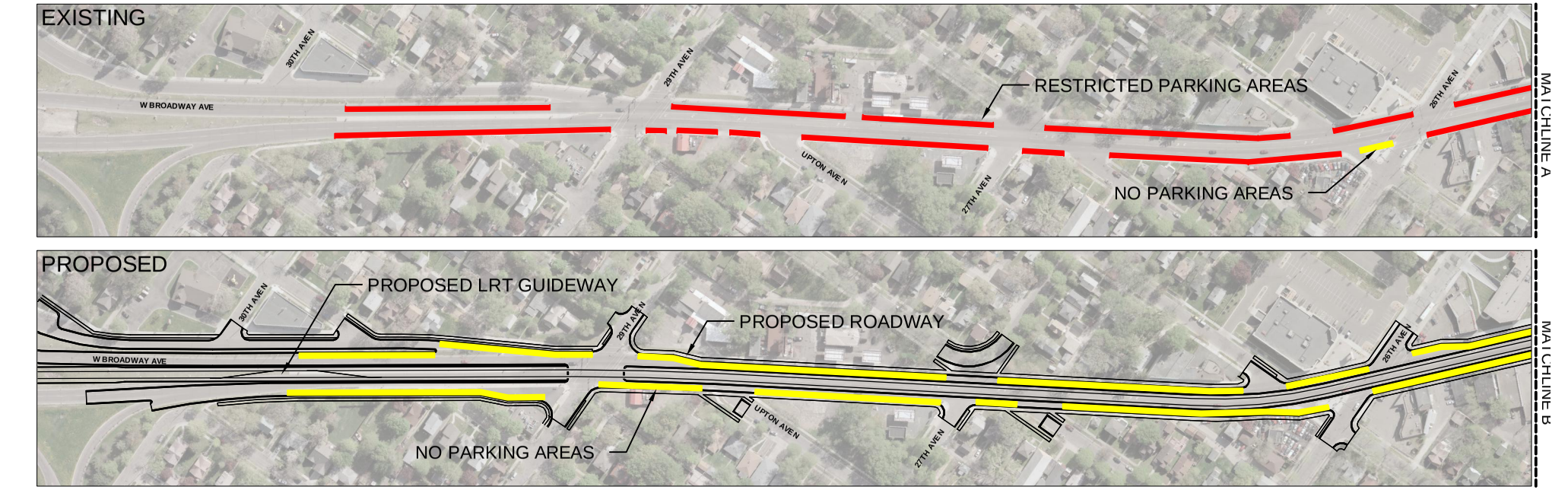
BottineauTransitway

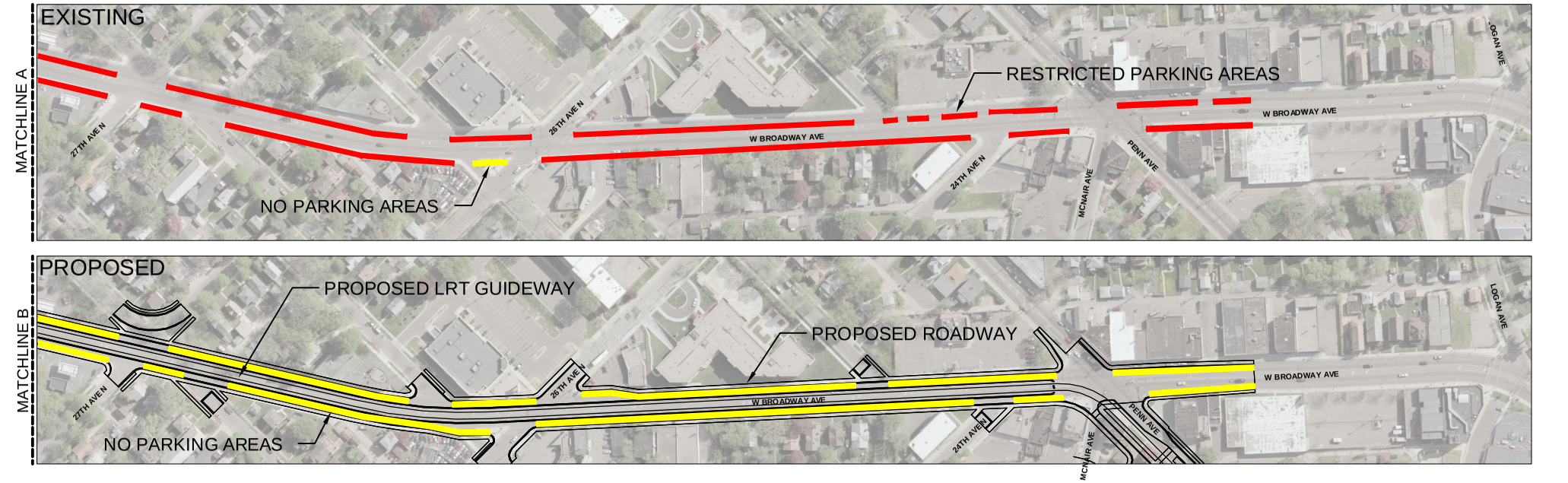
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE 8. ALIGNMENT D2: 34th AVENUE PARKING IMPACTS





LEGEND

RESTRICTED PARKING

NO PARKING AREAS

North

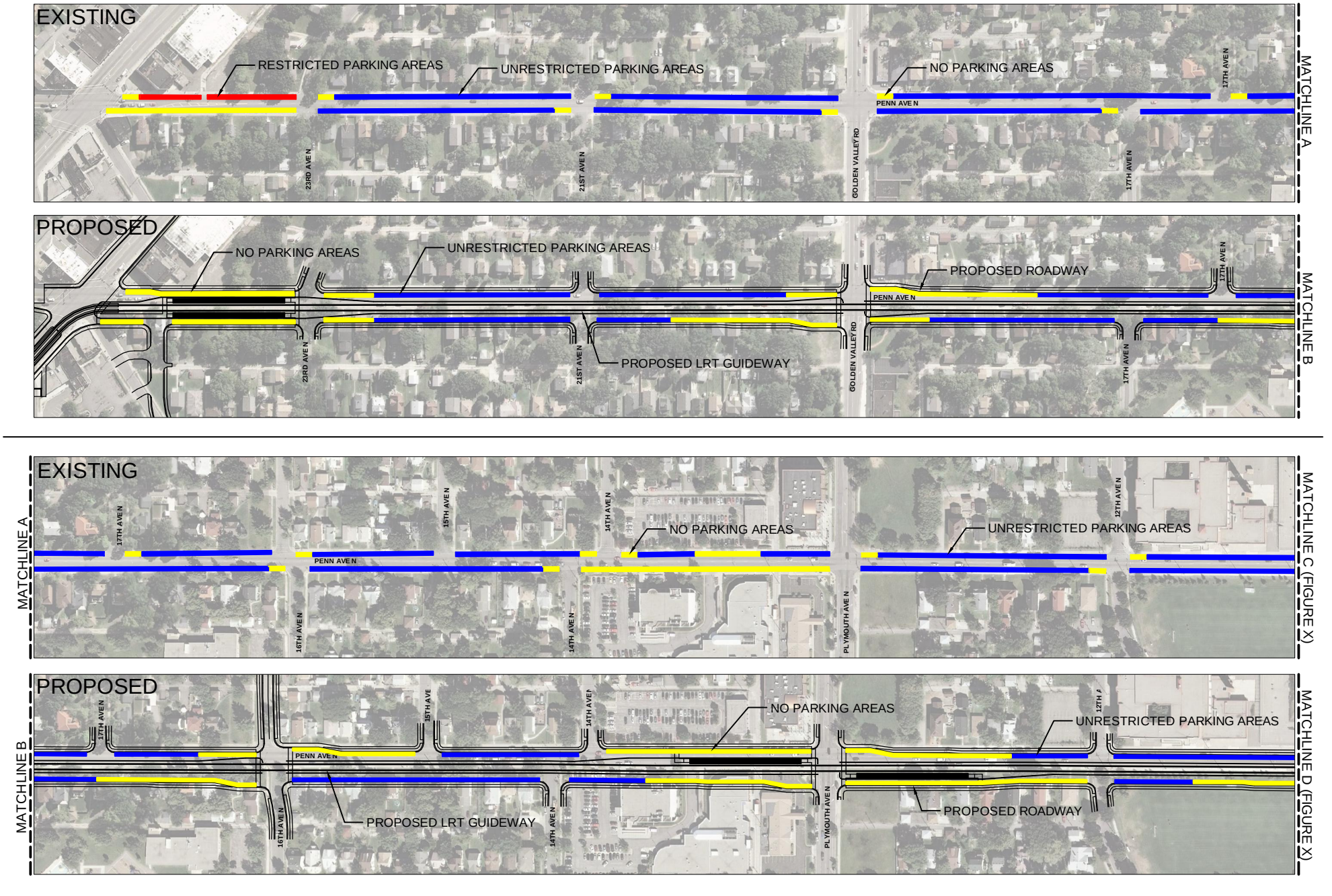
Bottineau Transitway

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE 9. ALIGNMENT D2: WEST BROADWAY PARKING IMPACTS

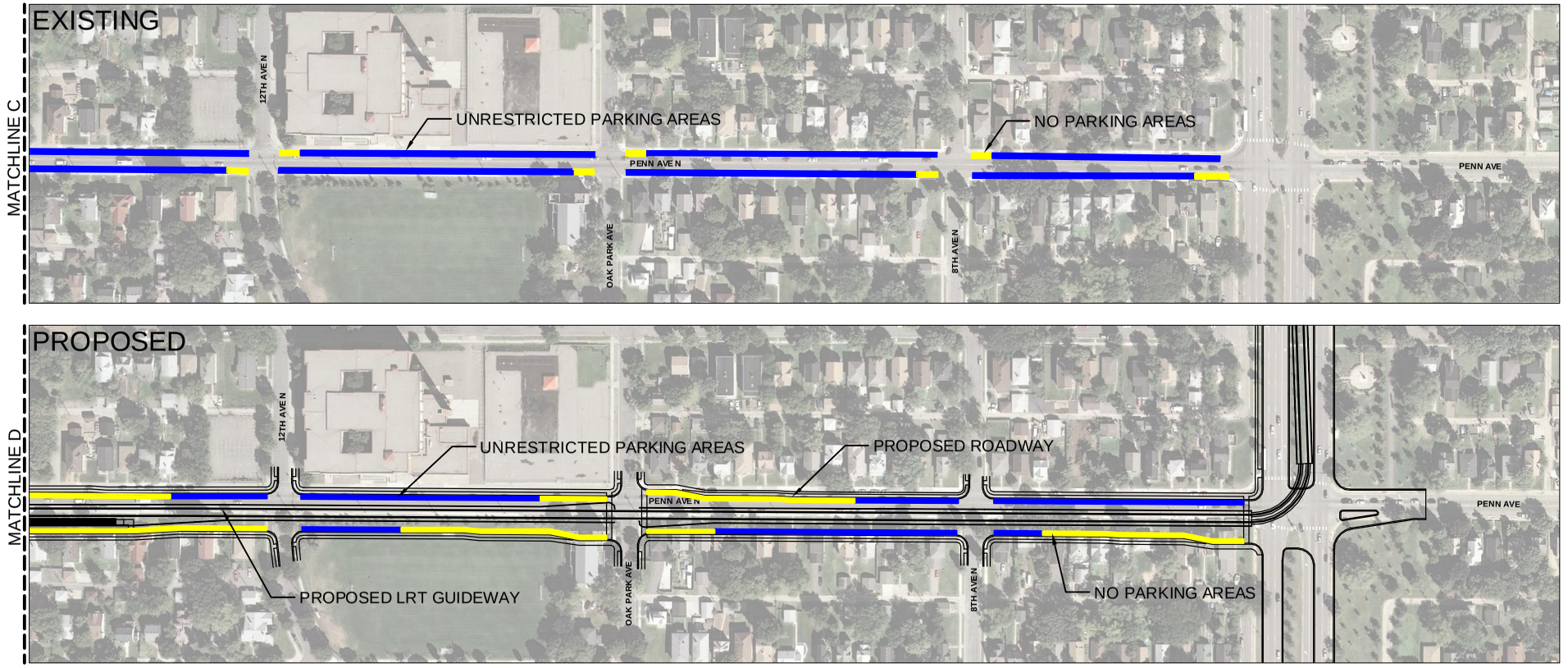


Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE 10. ALIGNMENT D2: PENN AVENUE PARKING IMPACTS (1)



LEGEND

- UNRESTRICTED PARKING
- RESTRICTED PARKING
- NO PARKING AREAS

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE 11. ALIGNMENT D2: PENN AVENUE PARKING IMPACTS (2)

NORTH

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

0 300 600
SCALE IN FEET

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE 12 ALIGNMENTS A, B & C: EXISTING FREIGHT RAIL SIDING LOCATIONS



Anchor Block Site


Atlas Cold Storage Site



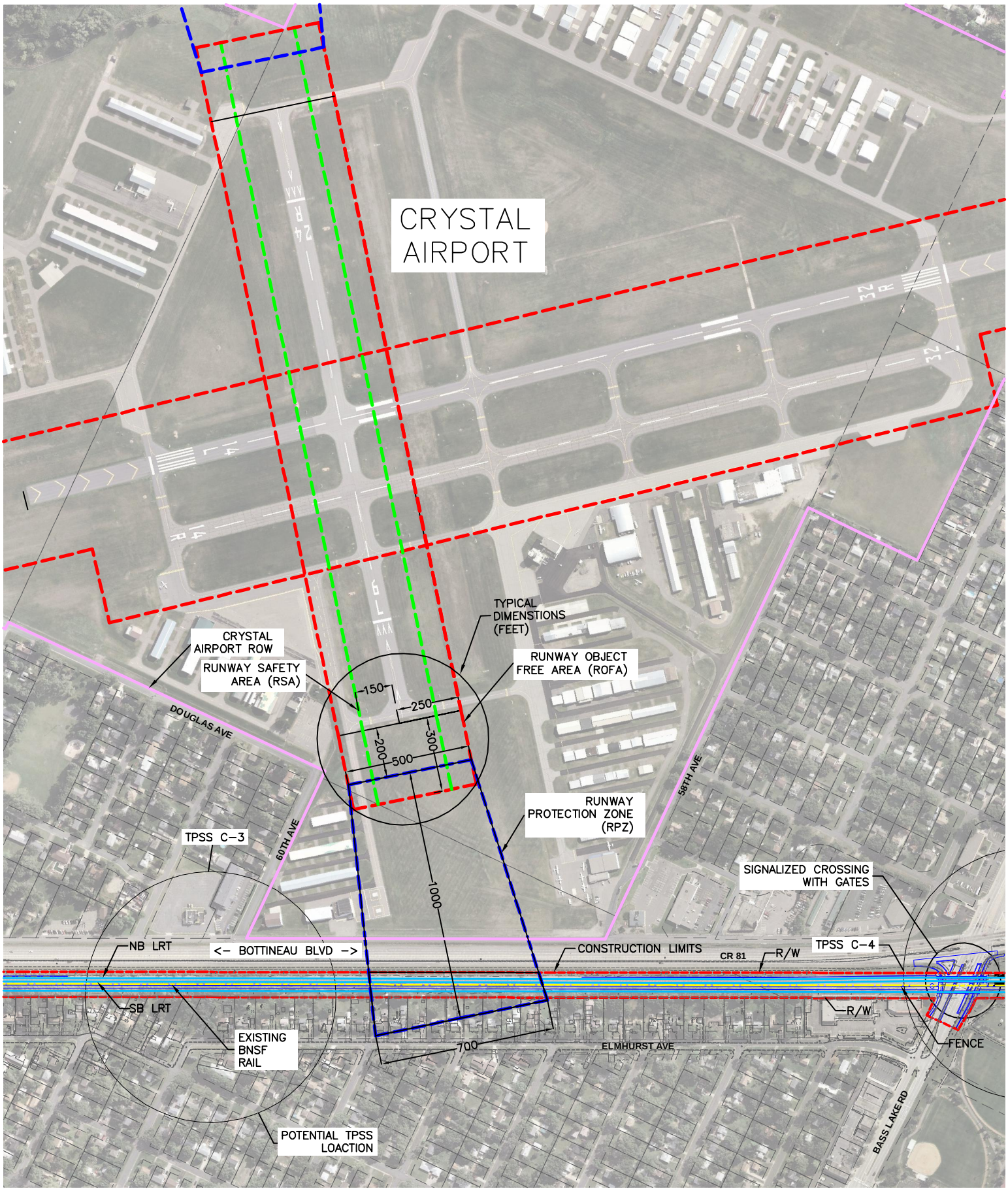
Former Knox Lumber Site



Current Feed My Starving Children Building

Sources:
Photos: Hennepin County Regional Railroad Authority

FIGURE 13. ALIGNMENTS A, B, & C:
EXISTING SIDING TRACK IMAGES



0 250 500

SCALE IN FEET

FIGURE 14. ALIGNMENT C
AVIATION IMPACTS

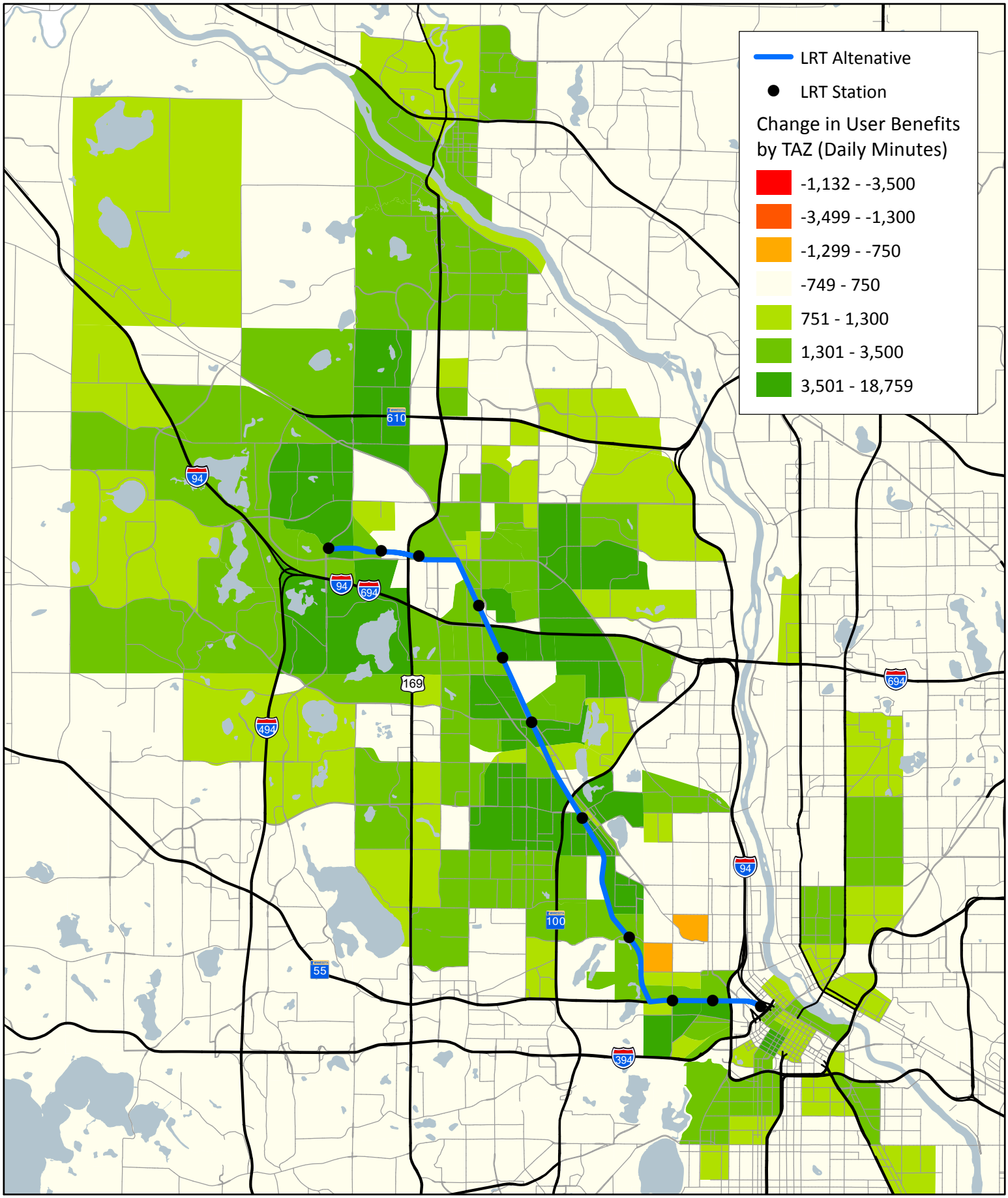
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Hennepin County
Regional Railroad Authority
Metropolitan Council

APPENDIX A:

User Benefit Productions and Attractions Figures

October 2012



0 1.25 2.5 Miles

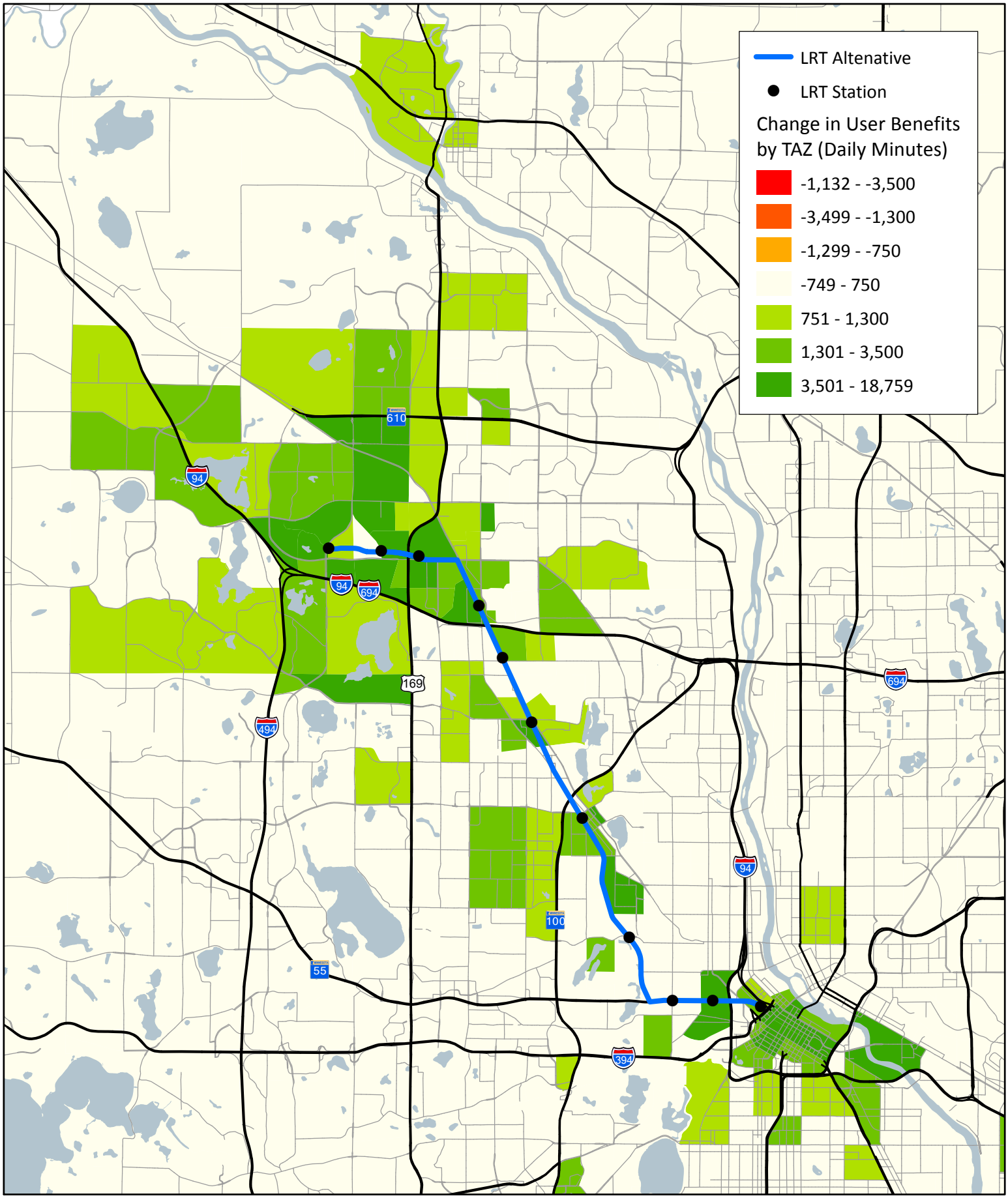
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-1. Alternative 1 (A-C-D1): Change in User Benefits - Productions



0 1.25 2.5 Miles

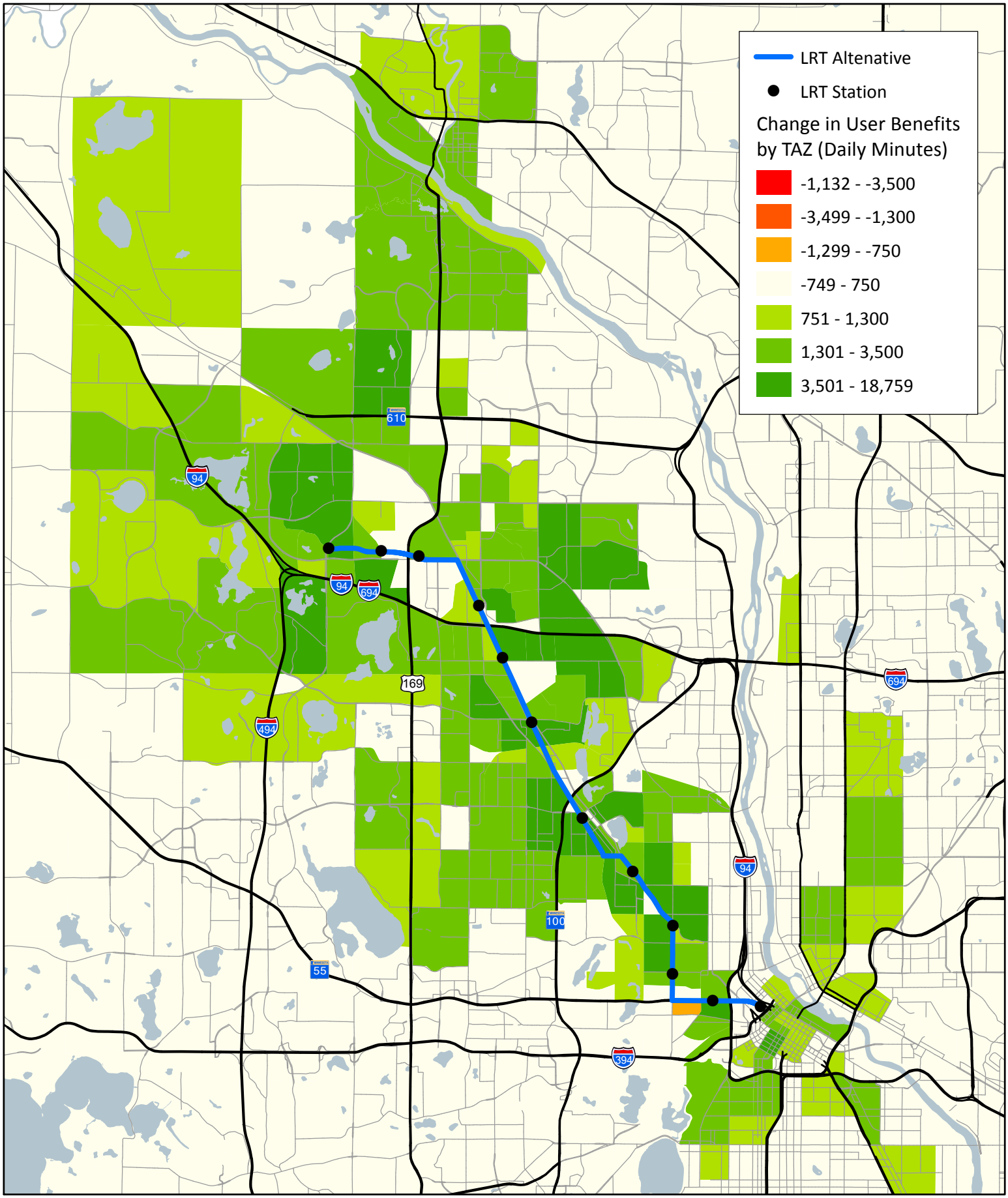
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-2. Alternative 1 (A-C-D1): Change in User Benefits - Attractions



0 1.25 2.5 Miles

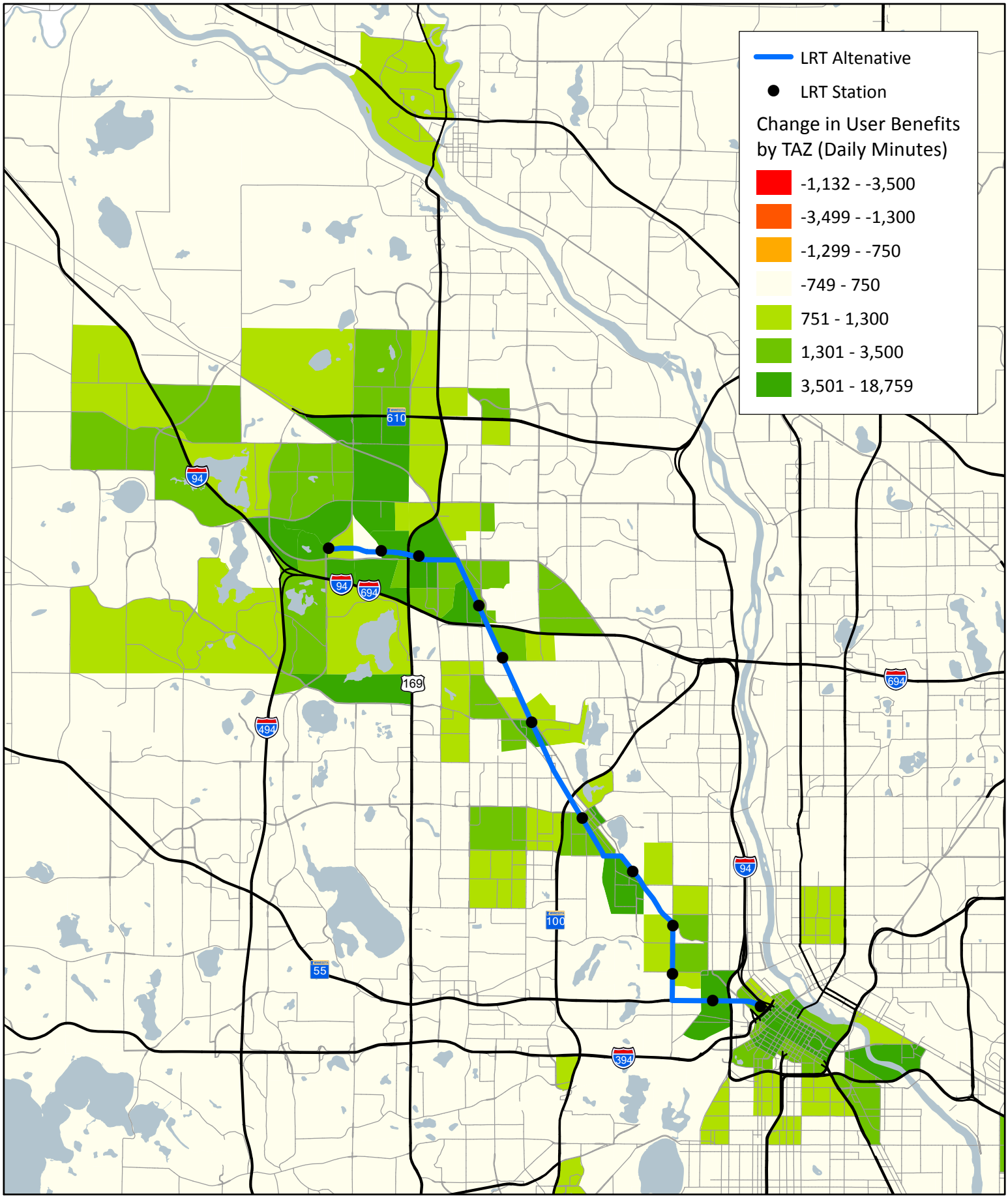
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-3. Alternative 2 (A-C-D2): Change in User Benefits - Productions



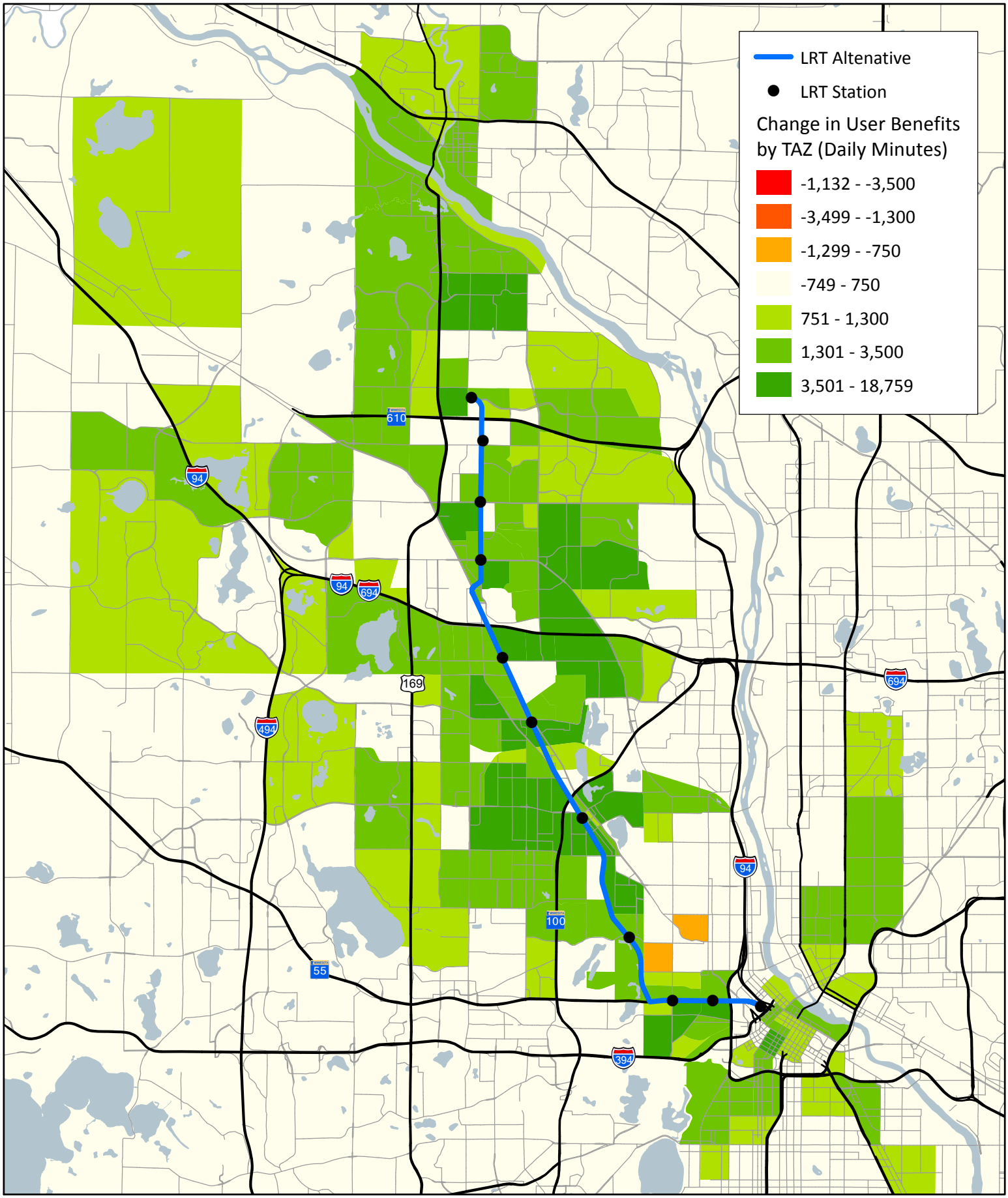
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-4. Alternative 2 (A-C-D2): Change in User Benefits - Attractions



0 1.25 2.5 Miles

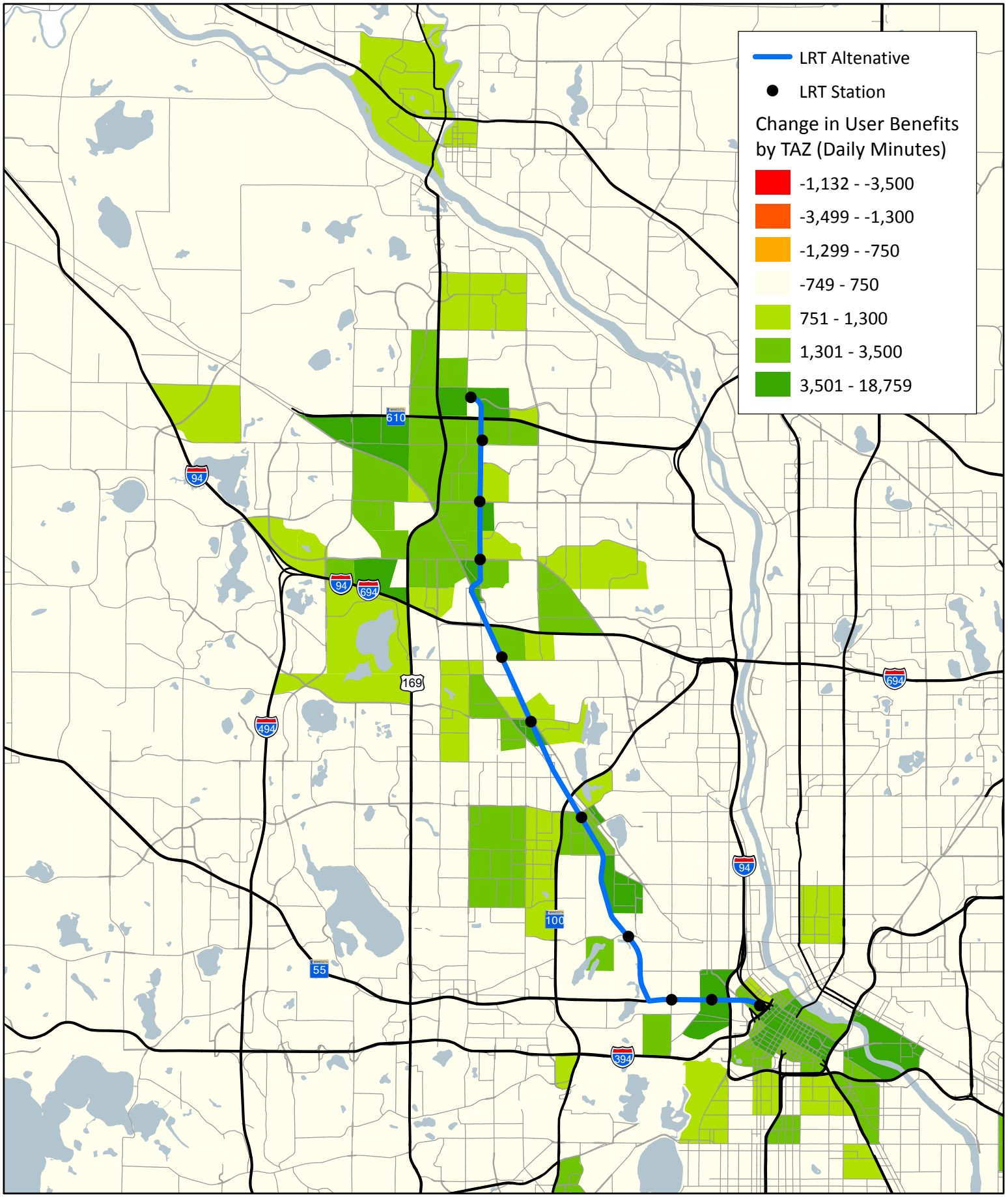
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-5. Alternative 3 (B-C-D1): Change in User Benefits - Productions



0 1.25 2.5 Miles

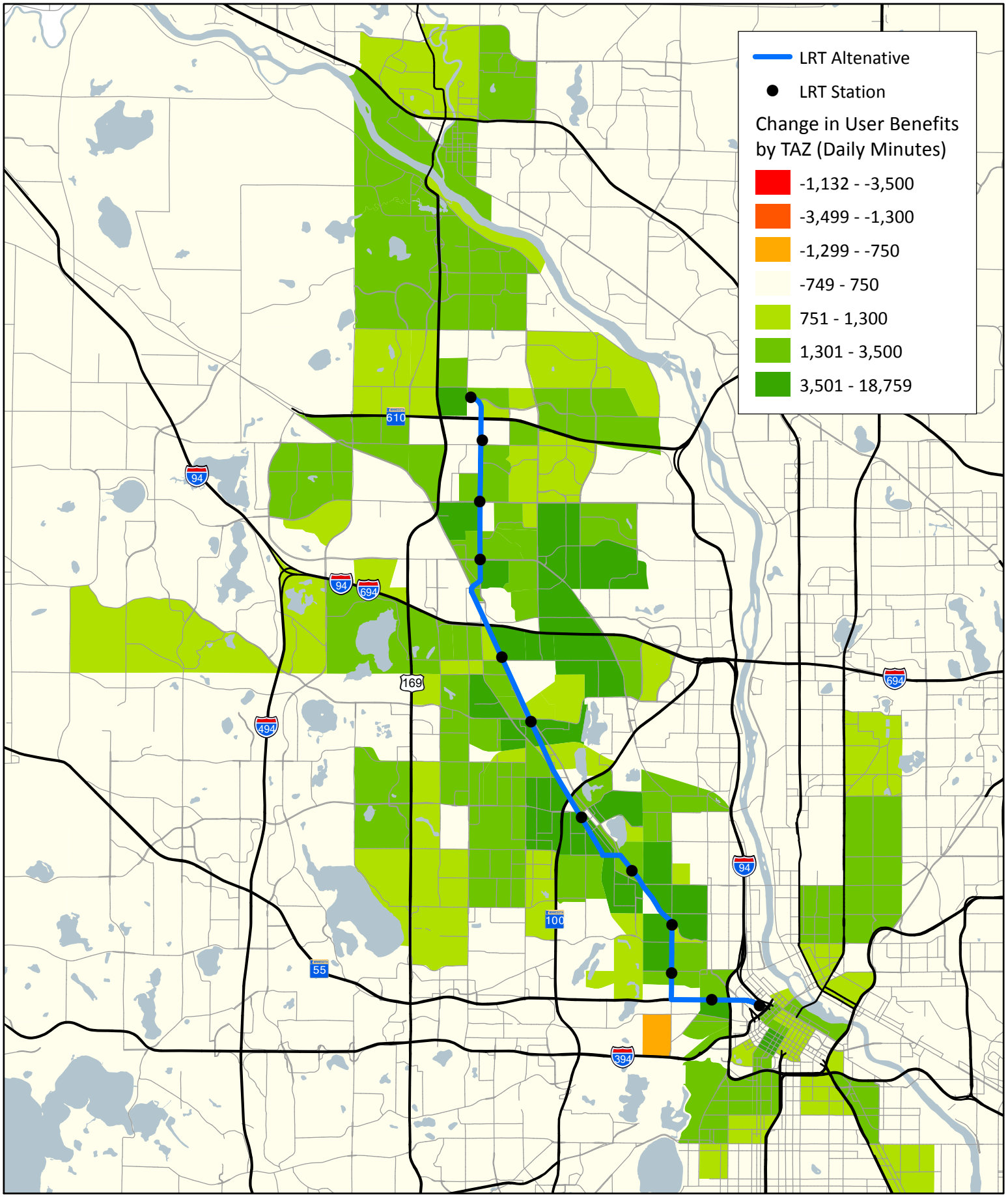
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-6. Alternative 3 (B-C-D1): Change in User Benefits - Attractions



0 1.25 2.5 Miles

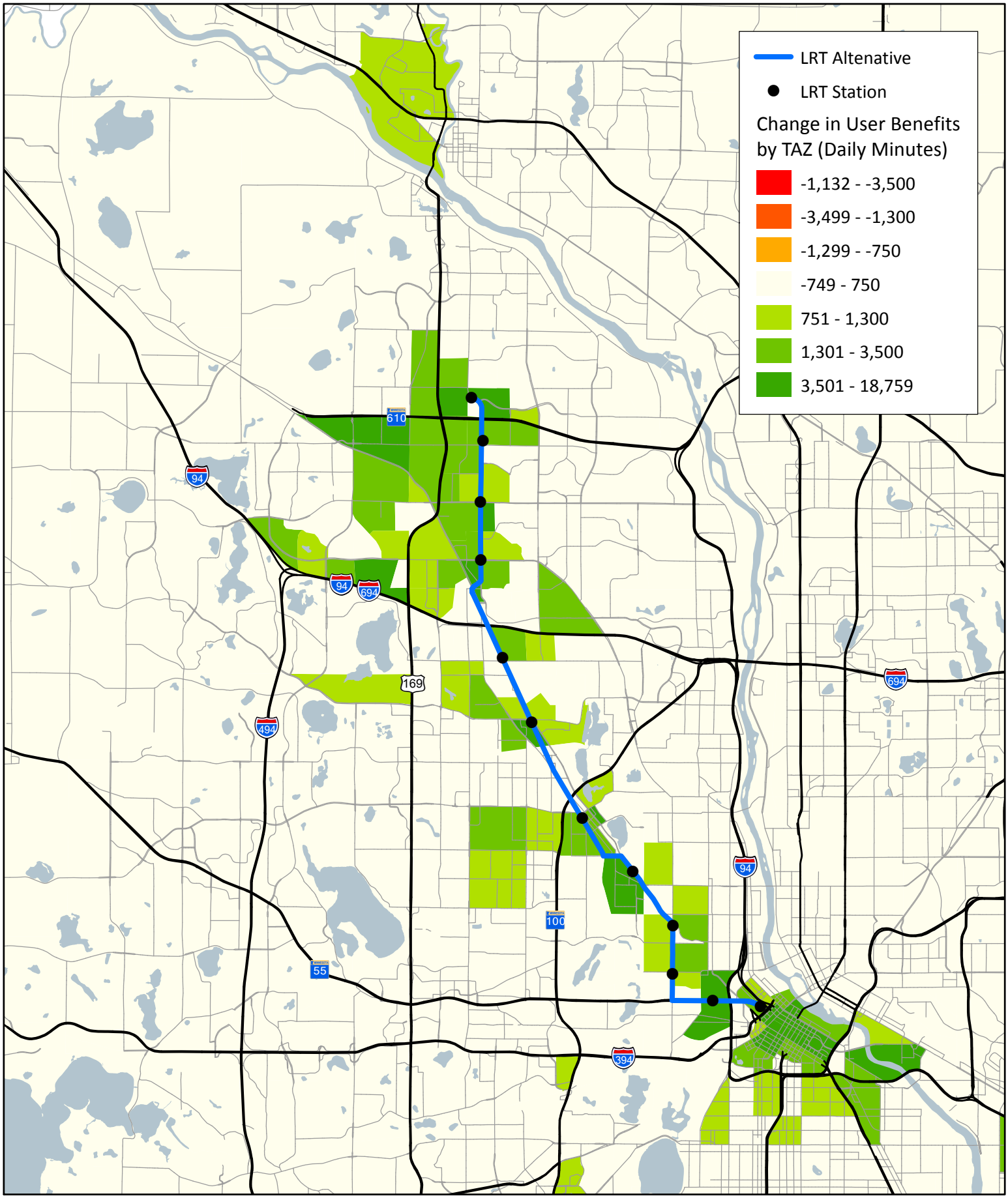
Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-7. Alternative 4 (B-C-D2): Change in User Benefits - Productions



0 1.25 2.5 Miles

Bottineau Transitway
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Sources:
Roadways: Minnesota Department of Transportation, 2011
Water Features: Minnesota Department of Natural Resources

Hennepin County
Regional Railroad Authority

Metropolitan Council

FIGURE A-8. Alternative 4 (B-C-D2): Change in User Benefits - Attractions