

APPENDIX E

TECHNICAL REPORTS



PURPOSE AND NEED TECHNICAL REPORT

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TABLE OF CONTENTS

- 1. Introduction.....1
- 2. Project Purpose1
- 3. Project Needs.....1
 - 3.1. Serving the Needs of People Who Rely on Transit.....3
 - 3.2. Meeting Increasing Demand for Reliable, High-Frequency Transit10
 - 3.3. Planning for Sustainable Growth and Development.....12
 - 3.4. Expanding Multimodal Travel Options18
- 4. Project Goals19

LIST OF TABLES

- Table 1: Population Below Poverty Level.....5
- Table 2: Zero-Vehicle Households.....8
- Table 3: 2010 to 2040 Population Change.....12
- Table 4: 2010 to 2040 Employment Change12

LIST OF FIGURES

- Figure 1: Rush Line BRT Project.....2
- Figure 2: 2000 to 2018 Population Growth by Age Group.....3
- Figure 3: 7-County Twin Cities Region Population by Age Groups (2010 to 2040).....4
- Figure 4: 1999 to 2018 Change in Median Household Income (in 2018 dollars).....5
- Figure 5: Areas of Concentrated Poverty.....7
- Figure 6: Zero-Vehicle Households.....9
- Figure 7: Existing Routes that Operate Within 1 Mile of the Proposed Rush Line BRT Route.....11
- Figure 8: 2010 to 2040 Percent Change in Population and Employment.....13
- Figure 9: Residence of People Employed in the Study Area.....14
- Figure 10: Direction Traveled from Work to Home for People Employed in the Study Area14
- Figure 11: Percent Change in Commute Times from 2000 to 2018.....15

1. INTRODUCTION

Ramsey County is proposing a new bus rapid transit (BRT) service, called the Rush Line BRT Project, that would connect Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. Ramsey County established the purpose and need for the project as part of the Rush Line Corridor Pre-Project Development Study, which began in 2014 and ended in 2017 with the selection of the locally preferred alternative. The supporting data and analysis were documented in the *Rush Line Corridor Pre-Project Development Study Purpose and Need Statement* dated February 19, 2015. The project's purpose is the fundamental reason why the project is being proposed. The project's needs are the issues that the project is intended to address.

Since the statement of purpose and need was developed, Ramsey County, in coordination with the project area municipalities, identified a locally preferred alternative and the project has been further refined as part of the environmental analysis phase (see Figure 1). This document updates the analysis supporting the project needs based on the refined project definition and current data.

2. PROJECT PURPOSE

The purpose of the Rush Line BRT Project is to provide transit service that satisfies the long-term regional mobility and accessibility needs for businesses and the traveling public and supports sustainable development within the study area.

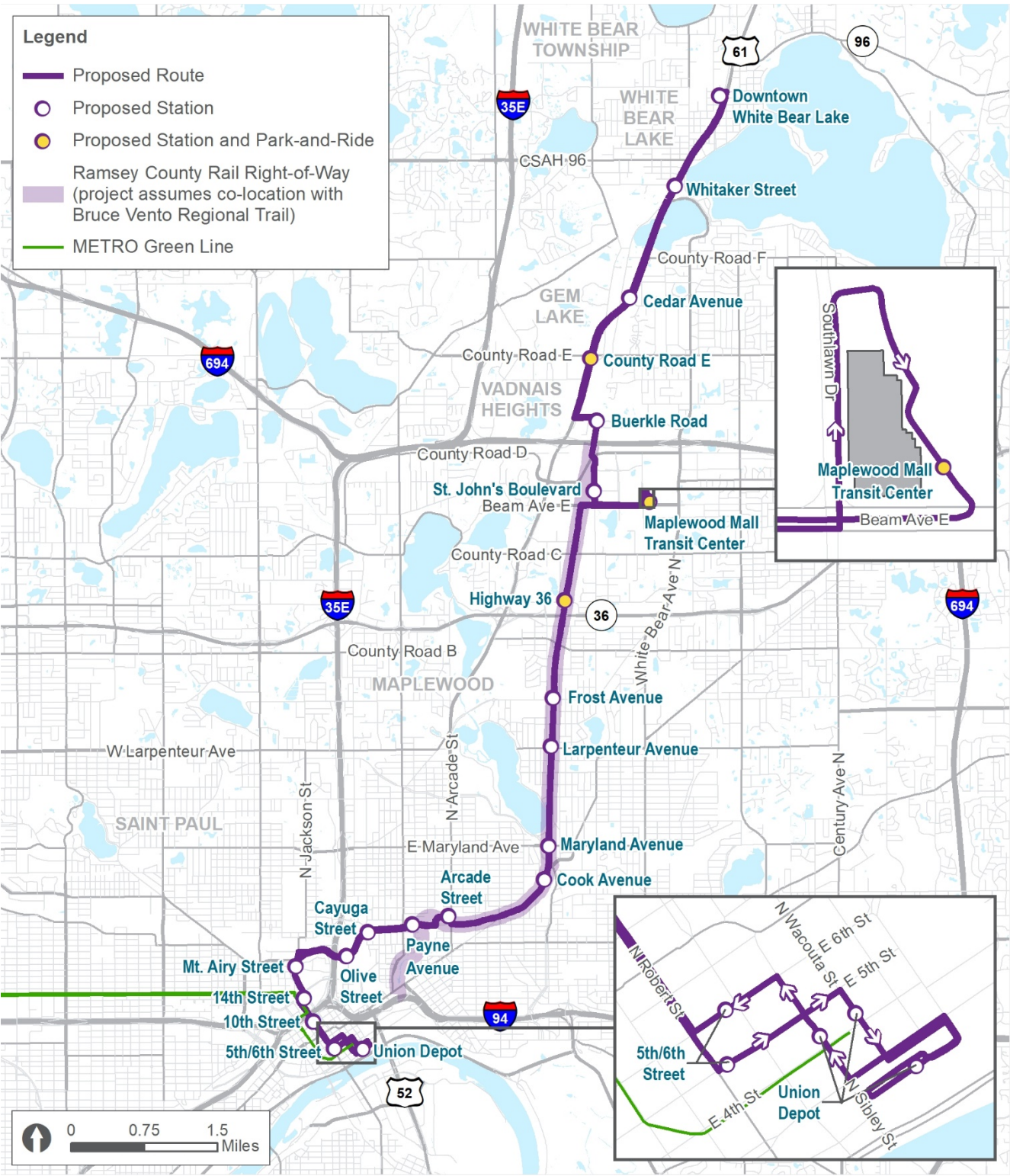
3. PROJECT NEEDS

Four primary factors contribute to the need for the Rush Line BRT Project:

- Serving the needs of people who rely on transit.
- Meeting increasing demand for reliable, high-frequency transit.
- Planning for sustainable growth and development.
- Expanding multimodal travel options.

The data analysis that supports these needs is presented in the following sections. The study area for the analysis was defined as the cities and township adjacent to the Rush Line BRT Project, which include Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake.

Figure 1: Rush Line BRT Project



3.1. SERVING THE NEEDS OF PEOPLE WHO RELY ON TRANSIT

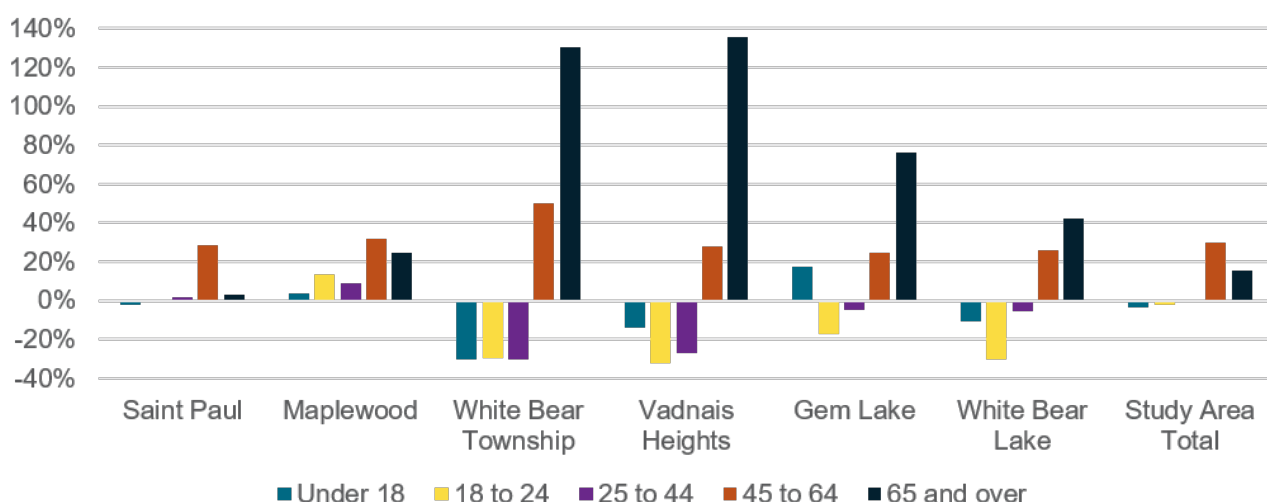
Summary: The number of people in the study area who rely on transit to meet their transportation needs is increasing.

Transit-dependent populations generally include the elderly, those with incomes at or below the poverty line and those who live in households without a car. In the study area, the number of people who rely on transit is increasing, as discussed in the following sections.

3.1.1. Age Distribution

The population in the study area is aging. From 2000 to 2018, the under 18, 18 to 24 and 25 to 44 age groups decreased (by 3, 2 and 0.1 percent, respectively) and the 45 to 64 and 65 and over age groups increased (by 30 and 16 percent, respectively). As shown in Figure 2, this growth in the 45 to 64 age group is consistent in all six study area communities, ranging from 24 to 50 percent. In the 65 and over age group there is more variation, ranging from a 3 percent increase in Saint Paul to a 135 percent increase in Vadnais Heights.

Figure 2: 2000 to 2018 Population Growth by Age Group¹



According to *Thrive MSP 2040*, the Metropolitan Council's long-range plan for the region, this trend toward a larger senior population is expected to continue.² In 2040, more than one in five residents in the Twin Cities region will be 65 or over, compared to one in nine in 2010 (see Figure 3). The 65 and over age group is the fastest growing segment of the region's population. As people age, their physical, visual and cognitive abilities may decline, making it more difficult for them to drive safely. Public transportation can be an option for the elderly, but access and ease of use can be a challenge.³ Housing preferences also tend to change as people age. Some seniors will choose to age in place, while others will choose to move to walkable and transit-served areas with access to

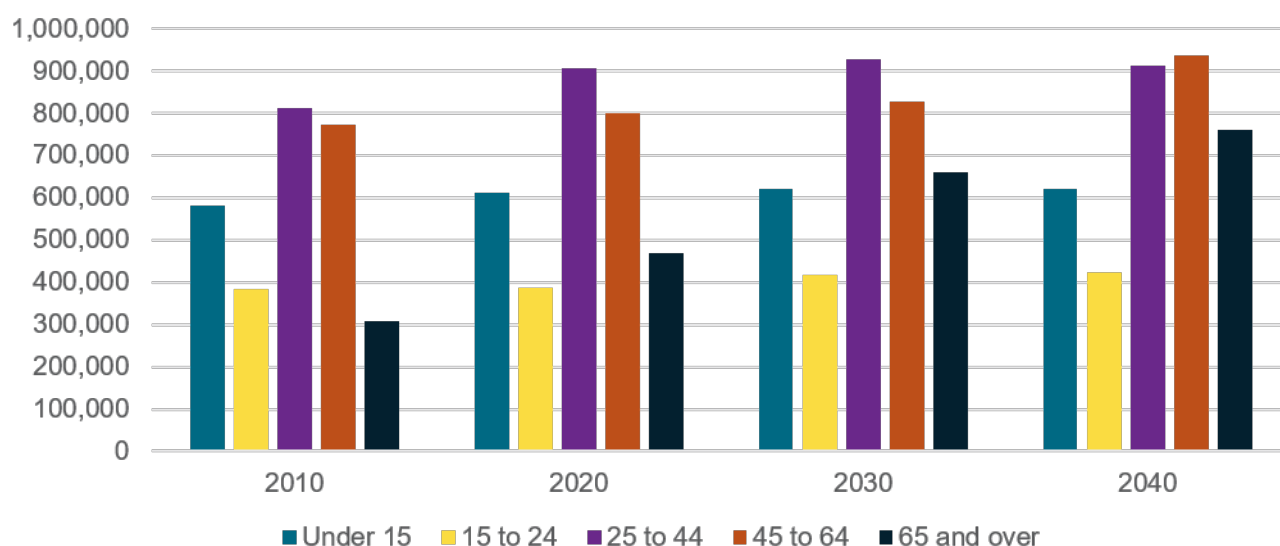
¹ US Census Bureau. 2000 US Census and 2014-2018 American Community Survey 5-Year Estimates.

² Metropolitan Council. *Thrive MSP 2040*. Adopted on May 28, 2014. Available at <https://metro council.org/planning/projects/thrive-2040.aspx>.

³ US Government Accountability Office. *Transportation-Disadvantaged Populations: Coordination Efforts are Underway, but Challenges Continue*. GAO-14-154T. Published November 6, 2013. Available at <https://www.gao.gov/products/GAO-14-154T>.

services and amenities.⁴ Saint Paul – Ramsey County Public Health’s *Healthy Aging: A Public Health Framework*⁵ notes that local governments will need to plan and deliver more services to meet the demands of a larger senior population, including increasing demand for housing and transportation that are affordable and easy to use.

Figure 3: 7-County Twin Cities Region Population by Age Groups (2010 to 2040)^{6,7}



An AARP Public Policy Institute study on trends in the travel patterns of the Baby Boom Generation (born between 1946 and 1964) between 1969 and 2009⁸ found that there has been a steady increase in the number of transit trips per person as Baby Boomers age. In the Twin Cities region, the percent of transit riders aged 65 and over increased from 3 percent in 2010 to 4 percent in 2016.⁹ The AARP study also found that while the average trip to access medical services has remained about the same distance for the past three decades, the number of medical trips has increased substantially. Within the study area communities, there are 317 licensed, registered or certified health care providers, including 228 in Saint Paul, 55 in Maplewood, two in White Bear Township, 16 in Vadnais Heights and 16 in White Bear Lake (there are none in Gem Lake).¹⁰ The report recommended that public transportation providers offer more midday, evening and weekend service to support the Baby Boom Generation’s access to medical services and desire to

⁴ Metropolitan Council. *Thrive MSP 2040*. Adopted on May 28, 2014. Available at <https://metro council.org/planning/projects/thrive-2040.aspx>.

⁵ Ramsey County. *Healthy Aging: A Public Health Framework*. August 22, 2017. Available at https://www.ramseycounty.us/sites/default/files/Departments/Public%20Health/Healthy_Aging_A_Public_Health_Framework_SPRCPH.pdf.

⁶ Metropolitan Council. Regional Forecast Tables. October 2019. Available at <https://metro council.org/Data-and-Maps/Research-and-Data/Thrive-2040-Forecasts.aspx>.

⁷ The 7-county region includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington Counties.

⁸ AARP Public Policy Institute. *Impact of Baby Boomers on US Travel, 1969 to 2009*. Published October 2012. Available at https://www.aarp.org/content/dam/aarp/research/public_policy_institute/liv_com/2012/impact-baby-boomers-travel-1969-2009-AARP-ppi-liv-com.pdf.

⁹ Metropolitan Council. 2010 and 2016 Transit On Board Surveys.

¹⁰ Minnesota Department of Health. Health Care Provider Directory. Available at <https://www.health.state.mn.us/facilities/regulation/directory/providersselect.html>. Accessed August 20, 2018.

maintain an active and mobile lifestyle. It also recommended encouraging mixed-use and transit-oriented development to increase access to transit and other community services that enable older residents to remain in their communities.⁸

3.1.2. Income

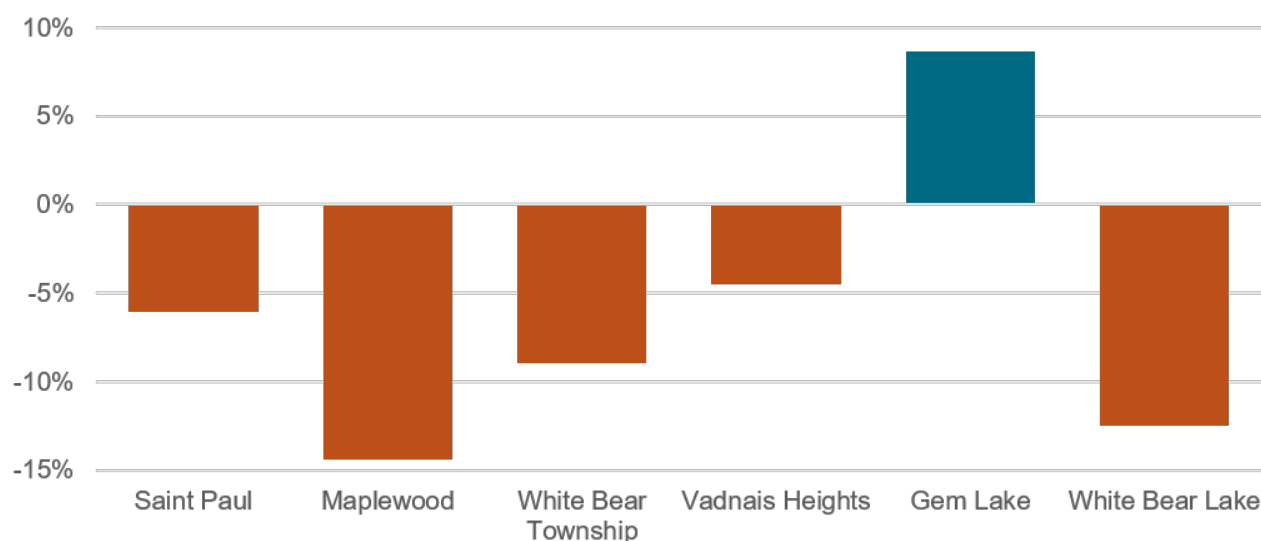
From 2000 to 2018, the population below the poverty level increased across the whole study area and within each community in the study area except Gem Lake. According to the 2014-2018 American Community Survey 5-Year Estimates, the percent of the study area population below the poverty level is 16.9 percent. This is higher than the percent below the poverty level in Ramsey County and in Minnesota, at 14.7 percent and 10.1 percent, respectively.

Table 1: Population Below Poverty Level¹¹

Area	2000		2018	
	Individuals	Percent	Individuals	Percent
Saint Paul	43,266	15.6%	58,763	19.9%
Maplewood	1,667	4.8%	3,864	9.8%
White Bear Township	309	2.8%	362	3.1%
Vadnais Heights	415	3.2%	827	6.2%
Gem Lake	24	5.9%	11	2.3%
White Bear Lake	1,054	4.4%	1,473	5.8%
Study Area	46,735	13.0%	65,300	16.9%

Similarly, median household income has been declining. In 2018 inflation-adjusted dollars, the median household income in the US decreased 5 percent from 1999 to 2018. Minnesota and Ramsey County saw a similar trend, with decreases of 4 and 10 percent, respectively. In the study area, all the communities other than Gem Lake had declining median household incomes (see Figure 4).

Figure 4: 1999 to 2018 Change in Median Household Income (in 2018 dollars)¹¹



¹¹ US Census Bureau. 2000 US Census and 2014-2018 American Community Survey 5-Year Estimates.

According to the American Public Transportation Association's 2017 report *Who Rides Public Transportation*, a total of 13 percent of US households have incomes less than \$15,000, but 21 percent of transit users have household incomes less than \$15,000. At all other income brackets, the percentage of all US households is generally consistent with the percentage of transit-using households (e.g., a total of 24 percent of US households have incomes between \$25,000 and \$49,999, and 22 percent of transit users have household incomes in that range).¹² This infers that across the US the households in the lowest income bracket are particularly reliant on transit. This is also true in the Twin Cities region, where 16 percent of transit riders have household incomes less than \$15,000.¹³ but only 8 percent of households in the region are in that income bracket.¹⁴

To identify concentrations of poverty in the region, the Metropolitan Council identifies Areas of Concentrated Poverty, which are census tracts where 40 percent or more of the residents have family or individual incomes that are less than 185 percent of the federal poverty threshold. In 2017, 185 percent of the federal poverty threshold was \$46,424 for a family of four or \$23,103 for an individual living alone. The Metropolitan Council further differentiates Areas of Concentrated Poverty where 50 percent or more of the residents are people of color.¹⁵ There are 38 census tracts in the study area that are identified as Areas of Concentrated Poverty, and all 38 are located in Saint Paul. Of these 38 census tracts, 33 are census tracts where 50 percent or more of the residents are people of color (see Figure 5). According to the *2040 Transportation Policy Plan*, "residents of Areas of Concentrated Poverty must overcome a legacy of private disinvestment to access the opportunity of the region. In transit, this often means considering higher levels of service, better amenities, or unique service types focused on providing better access to jobs or education."¹⁶

¹² American Public Transportation Association. *Who Rides Public Transportation*. January 2017. Available at <https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/APTA-Who-Rides-Public-Transportation-2017.pdf>.

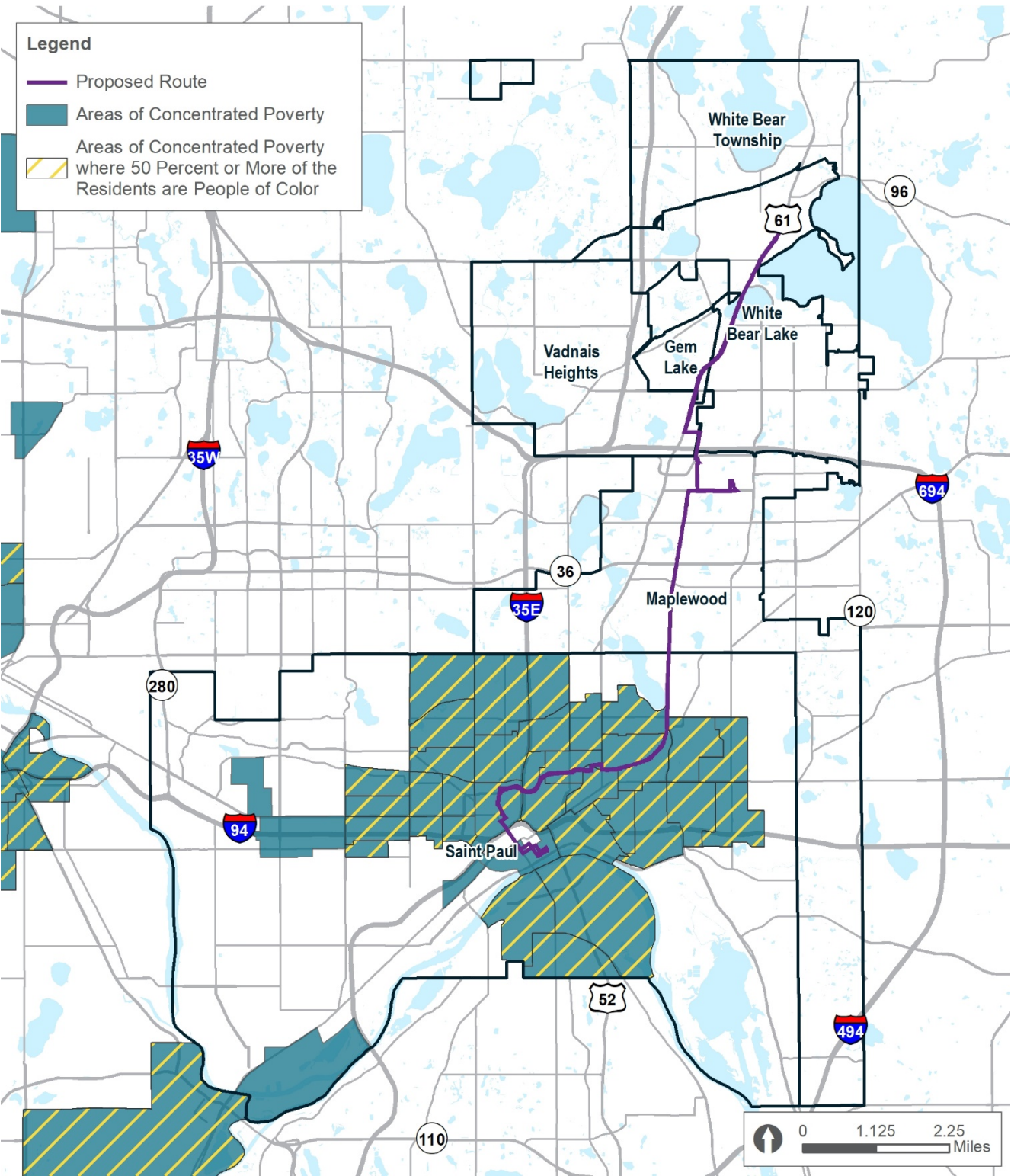
¹³ Metropolitan Council. 2016 Transit On Board Survey. Percentage is based on respondents that provided income data.

¹⁴ US Census Bureau. 2012-2016 American Community Survey 5-Year Estimates. (Note: This data set was used rather than the 2014-2018 American Community Survey 5-Year Estimates so that the data was contemporaneous with the 2016 Transit On Board Survey.)

¹⁵ Metropolitan Council. Areas of Concentrated Poverty. Dataset published December 6, 2018 and based on the 2013-2017 American Community Survey 5-Year Estimates. Available at <https://gisdata.mn.gov/dataset/us-mn-state-metc-society-areas-of-concntrtd-pvrtty>.

¹⁶ Metropolitan Council. *2040 Transportation Policy Plan*. Chapter 6: Transit Investment Direction and Plan. October 2018 Update. Available at <https://metro council.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan.aspx>.

Figure 5: Areas of Concentrated Poverty¹⁷



¹⁷ Metropolitan Council. Areas of Concentrated Poverty. Dataset published December 6, 2018.

3.1.3. Vehicle Availability

About 12 percent of the households in the study area do not have access to a vehicle (referred to as zero-vehicle households). The percentage of zero-vehicle households within the study area is higher than the percentage of zero-vehicle households in Ramsey County (10.5 percent). The number of zero-vehicle households decreased between 2000 and 2018 across the whole study area and within two of the six study area communities (Saint Paul and Vadnais Heights). Maplewood, White Bear Township, Gem Lake and White Bear Lake experienced an increase in zero-vehicle households that ranged from 30 to 50 percent (see Table 2).¹⁸

Table 2: Zero-Vehicle Households¹⁹

Area	2000		2018		Change
	Zero-Vehicle Households	Percent of Occupied Households	Zero-Vehicle Households	Percent of Occupied Households	
Saint Paul	18,866	16.8%	15,809	14.0%	-16%
Maplewood	908	6.6%	1,200	8.0%	+32%
White Bear Township	70	1.8%	95	2.0%	+36%
Vadnais Heights	199	3.9%	78	1.4%	-61%
Gem Lake	2	1.4%	3	1.8%	+50%
White Bear Lake	496	5.1%	644	6.1%	+30%
Study Area	20,541	14.2%	17,829	12.0%	-13%

The Metropolitan Council periodically conducts a Transit On Board Survey to support forecast model development and analysis of the regional transit system. The survey results from 2010 and 2016 were compared, and a larger percentage of transit riders in 2016 lived in zero-vehicle households than in 2010 (33 percent compared to 22 percent). The percentage of transit riders who did not have access to a vehicle also increased from 42 percent in 2010 to 56 percent in 2016.²⁰ This data indicates that those without a vehicle available are becoming more reliant on public transit to meet their transportation needs.

The regional travel demand model was used to estimate future numbers of zero-vehicle households. From 2014 to 2040, the number of households without a vehicle is forecast to grow at a faster rate (26 percent) than the total number of households in the study area (19 percent). The number of households without a vehicle in 2014 and in 2040 is illustrated in Figure 6 by transportation analysis zone.²¹

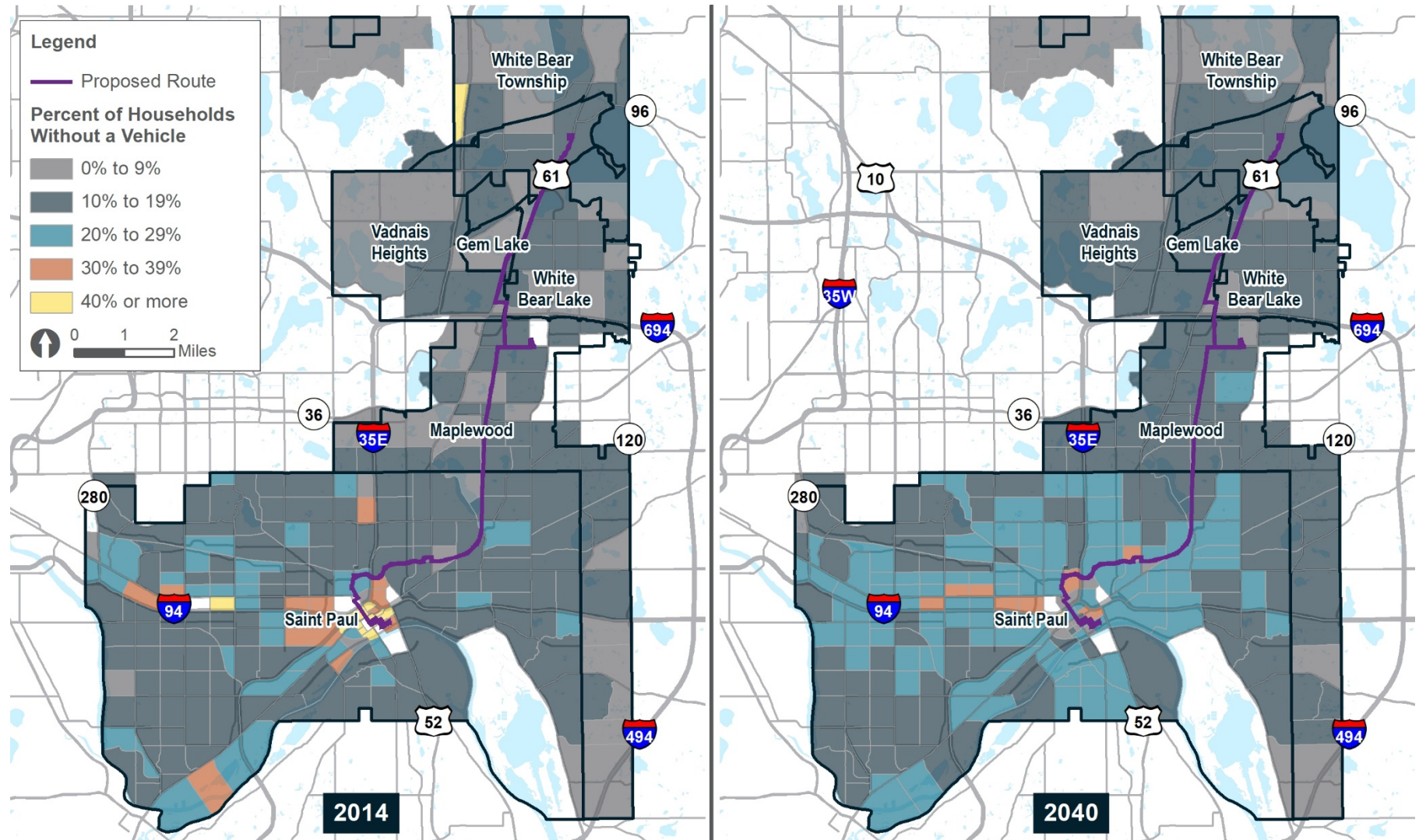
¹⁸ US Census Bureau. 2014-2018 American Community Survey 5-Year Estimates.

¹⁹ US Census Bureau. 2000 US Census and 2014-2018 American Community Survey 5-Year Estimates.

²⁰ This includes respondents who live in a household with a car but it was not available for their use and respondents who live in a household without a car.

²¹ SRF Consulting Group. Modeled estimate from the Metropolitan Council Travel Demand Model (Activity-Based Model, January 2020).

Figure 6: Zero-Vehicle Households²²



²² SRF Consulting Group. Modeled estimate from the Metropolitan Council Travel Demand Model (Activity-Based Model, January 2020).

3.2. MEETING INCREASING DEMAND FOR RELIABLE, HIGH-FREQUENCY TRANSIT

Summary: Demand for reliable, high-frequency transit service is increasing, and the existing high-frequency network does not currently serve the study area outside of Saint Paul.

There are currently 44 bus and light rail transit routes that operate within 1 mile of the proposed route. Only three of these (Route 54, Route 64 and the METRO Green Line) are part of the high-frequency network, and the only study area community they serve is Saint Paul.²³ Routes are considered high-frequency if they have service every 15 minutes or less on weekdays from 6 a.m. to 7 p.m. and Saturdays from 9 a.m. to 6 p.m.

In recent years, Metro Transit has seen an increase in ridership on high-frequency routes even as ridership on other routes has dropped. In 2016, overall ridership was down about 4 percent from 2015; however, ridership increased on high-frequency routes such as the METRO Green Line and A Line.²⁴ Similarly in 2017, systemwide ridership remained essentially flat compared to 2016 while high-frequency routes saw ridership increases. The METRO Green Line and METRO Blue Line had record ridership in 2017, and average weekly ridership on the A Line increased by one-third since its opening in spring 2016.²⁵ This trend of increasing demand for reliable, high-frequency transit has continued in 2018. From January through June 2018, total ridership was down 2.6 percent compared to the first half of 2017, but ridership on the METRO Green Line, METRO Blue Line and A Line were up 2.6 percent, 1 percent and 5 percent, respectively.²⁶

In addition to frequency, reliability is an important consideration for transit riders. Factors that increase travel time reliability include use of exclusive transitways (meaning that the roadway or lane is used exclusively for public transit), level or near-level boarding, off-board fare collection and automated vehicle location technology. When buses operate in exclusive transitways, they can achieve an overall travel time savings as high as 55 percent compared to regular bus service operating in mixed traffic. At stations, off-board fare collection and level or near-level station platforms decrease the amount of time it takes for passengers to get on and off the bus. Automated vehicle location technologies such as transit signal priority, advanced communication systems, automated scheduling and dispatch systems, and real-time traveler information at stations and on vehicles provide for faster and more convenient trips.²⁷

²³ Although Route 54 extends into Maplewood, the portion of the route that is considered high-frequency ends on Maryland Avenue in Saint Paul. A portion of Route 21 in Minneapolis is also part of the high-frequency network, but the portion within 1 mile of the proposed route is not.

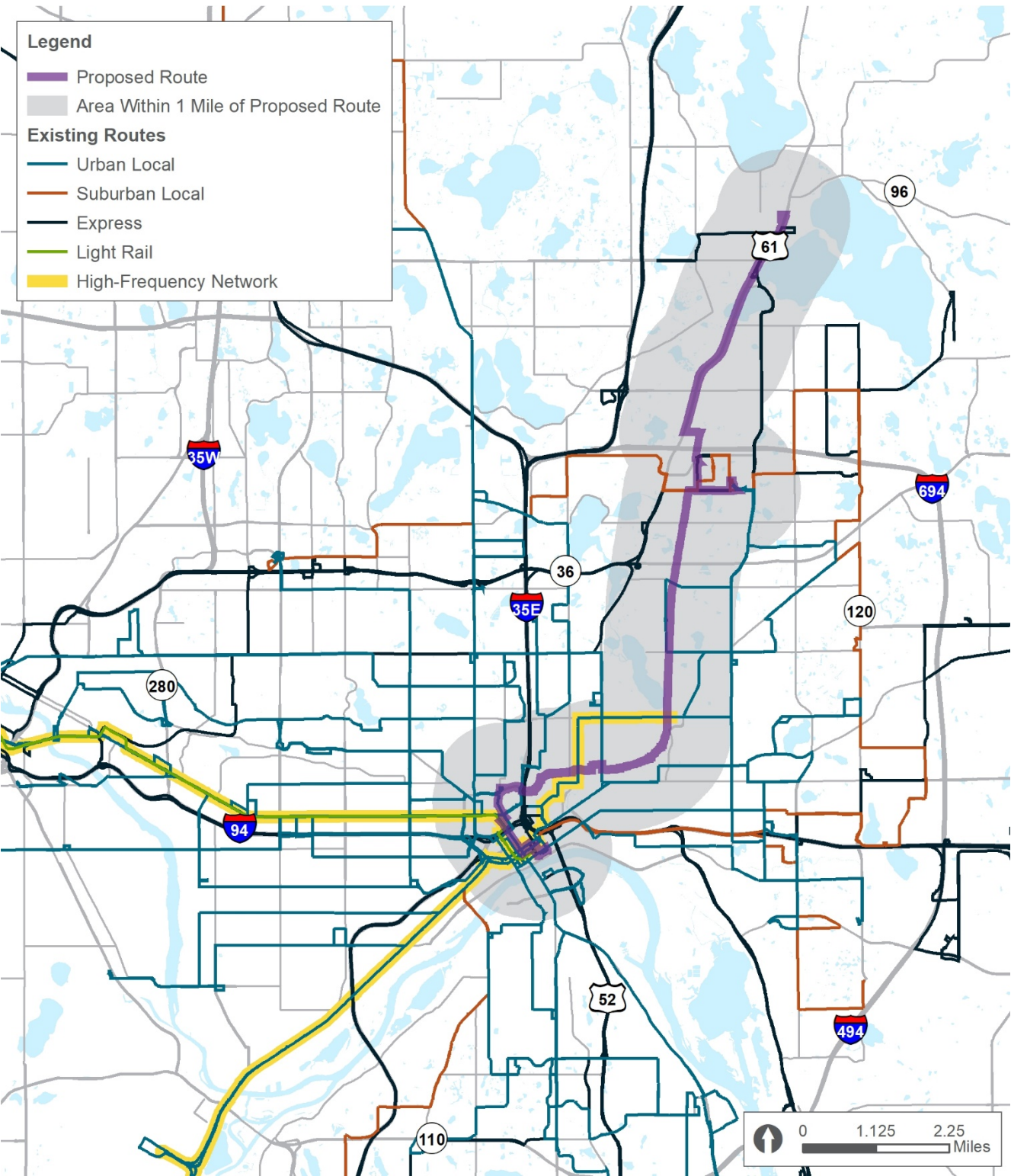
²⁴ Metro Transit. "Metro Transit ridership tops 82.6 million in 2016." January 13, 2017. Available at <https://www.metrotransit.org/metro-transit-ridership-tops-826-million-in-2016>.

²⁵ Metro Transit. "Rail lines set records as Metro Transit ridership tops 81.9 million in 2017." January 25, 2018. Available at <https://www.metrotransit.org/rail-lines-set-records-as-metro-transit-ridership-tops-819-million-in-2017>.

²⁶ Metro Transit. "Rail lines on pace for another year of record ridership." July 19, 2018. Available at <https://www.metrotransit.org/rail-lines-on-pace-for-another-year-of-record-ridership>.

²⁷ Federal Transit Administration. Bus Rapid Transit Brochure. Available at <https://www.transit.dot.gov/sites/fta.dot.gov/files/BRTBrochure.pdf>.

Figure 7: Existing Routes that Operate Within 1 Mile of the Proposed Rush Line BRT Route²⁸



²⁸ Metropolitan Council. Transit Routes dataset. Accessed January 11, 2020.

3.3. PLANNING FOR SUSTAINABLE GROWTH AND DEVELOPMENT

Summary: Population and employment are forecast to grow in the study area. As concentrations of jobs and residents grow in different communities, the need to travel between these communities will increase.

3.3.1. Forecast Population and Employment Growth

The Metropolitan Council's *Thrive MSP 2040* forecasts²⁹ show population and employment in the study area increasing by 20 and 24 percent, respectively, between 2010 and 2040 (see Table 3 and Table 4). The seven-county Twin Cities region has forecast population and employment increases of 28 and 31 percent, respectively. Ramsey County's population and employment is forecast to increase 17 and 24 percent, respectively. The study area's forecast population increase is slightly higher than the county's, and its forecast employment increase is the same as the countywide levels.

Table 3: 2010 to 2040 Population Change²⁹

Area	2010	2040	Change	Percent Change
Saint Paul	285,068	344,100	+59,032	+21%
Maplewood	38,018	48,600	+10,582	+28%
White Bear Township	10,949	11,500	+551	+5%
Vadnais Heights	12,302	14,100	+1,798	+15%
Gem Lake	393	530	+137	+35%
White Bear Lake	23,797	25,800	+2,003	+8%
Study Area Total	370,527	444,630	+74,103	+20%

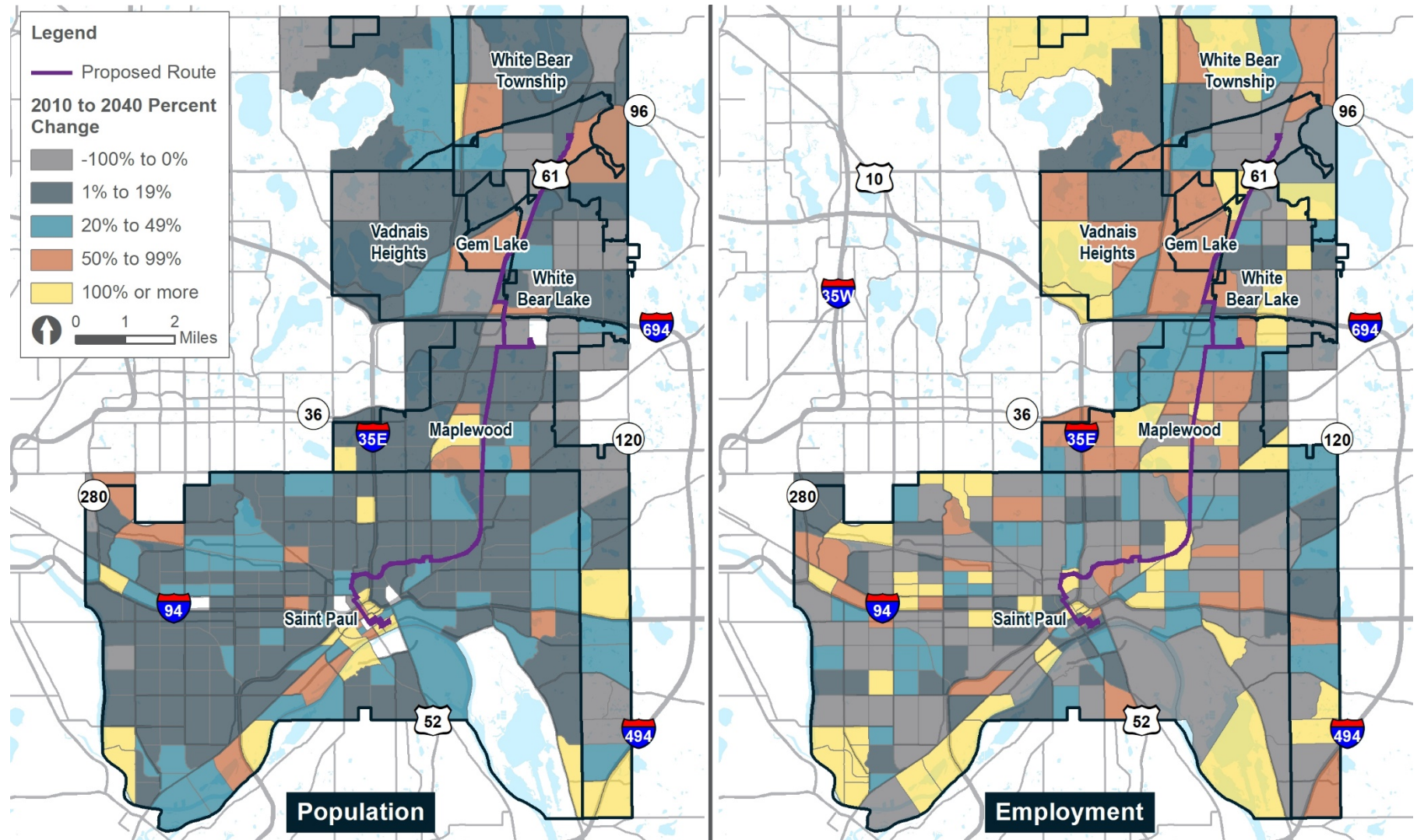
Table 4: 2010 to 2040 Employment Change²⁹

Area	2010	2040	Change	Percent Change
Saint Paul	175,933	213,500	+37,567	+21%
Maplewood	27,635	36,600	+8,965	+32%
White Bear Township	2,309	4,100	+1,701	+78%
Vadnais Heights	6,678	11,200	+4,522	+68%
Gem Lake	526	640	+114	+22%
White Bear Lake	11,269	12,500	+1,231	+11%
Study Area Total	224,350	278,540	+54,190	+24%

Employment in Maplewood, White Bear Township, Vadnais Heights and White Bear Lake is anticipated to grow at a faster rate than their respective populations. As concentrations of jobs and residents grow in different communities, the need to travel between these communities will increase. Population and employment growth in the study area are illustrated in Figure 8.

²⁹ Metropolitan Council. *Thrive MSP 2040* Forecasts as of January 1, 2020. Available at <https://metro council.org/forecasts>.

Figure 8: 2010 to 2040 Percent Change in Population and Employment³⁰



³⁰ Metropolitan Council. Transportation Analysis Zones (Official TAZ System with 3,030 Zones) with Current Forecasts. Dated September 27, 2019.

3.3.2. Commute Patterns

According to 2017 data from the US Census Bureau,³¹ there are approximately 242,000 people employed in the study area. Of these 242,000 people, about 28 percent live and work in the study area. The other 72 percent live outside the study area. A breakdown by place of residence is provided in Figure 9.

As shown in Figure 10, people travel in all directions to reach their workplace, with 10 to 16 percent traveling in each direction. About 53 percent travel less than 10 miles, 33 percent travel 10 to 24 miles and 14 percent travel over 25 miles to get to work.

Figure 9: Residence of People Employed in the Study Area³¹

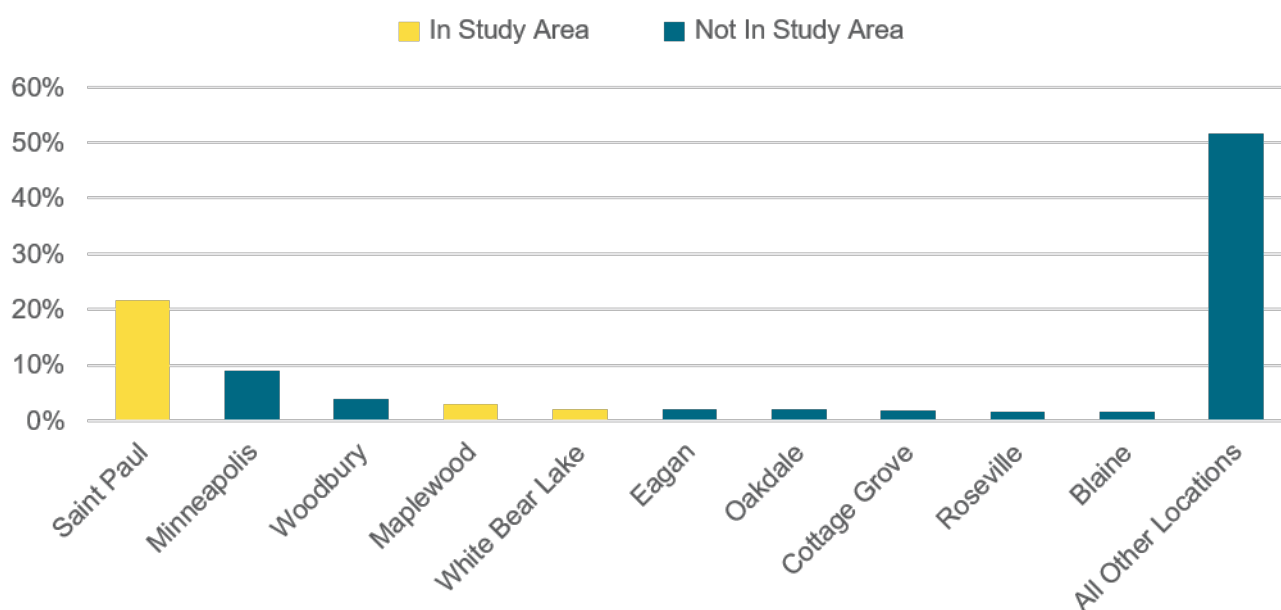
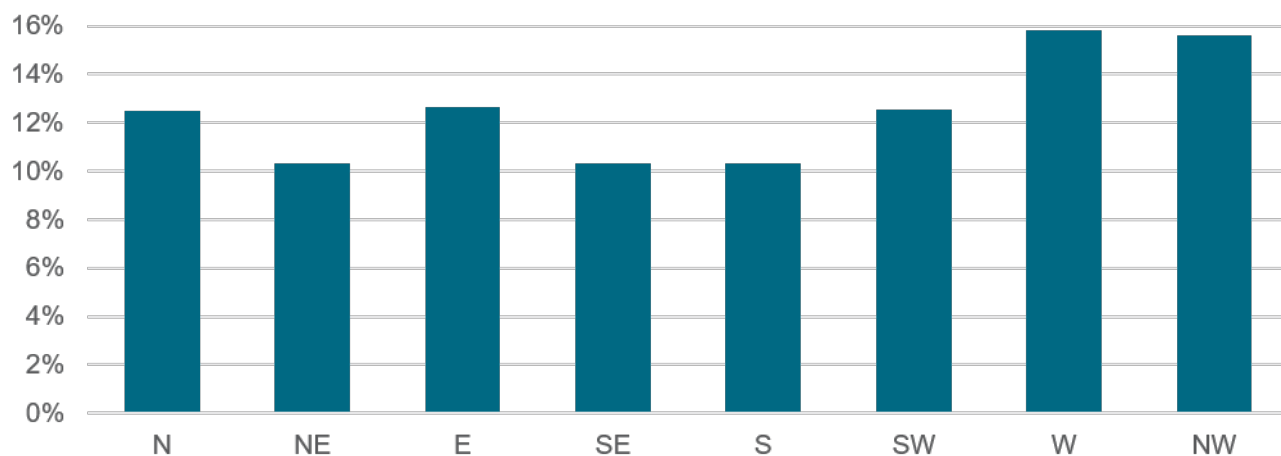


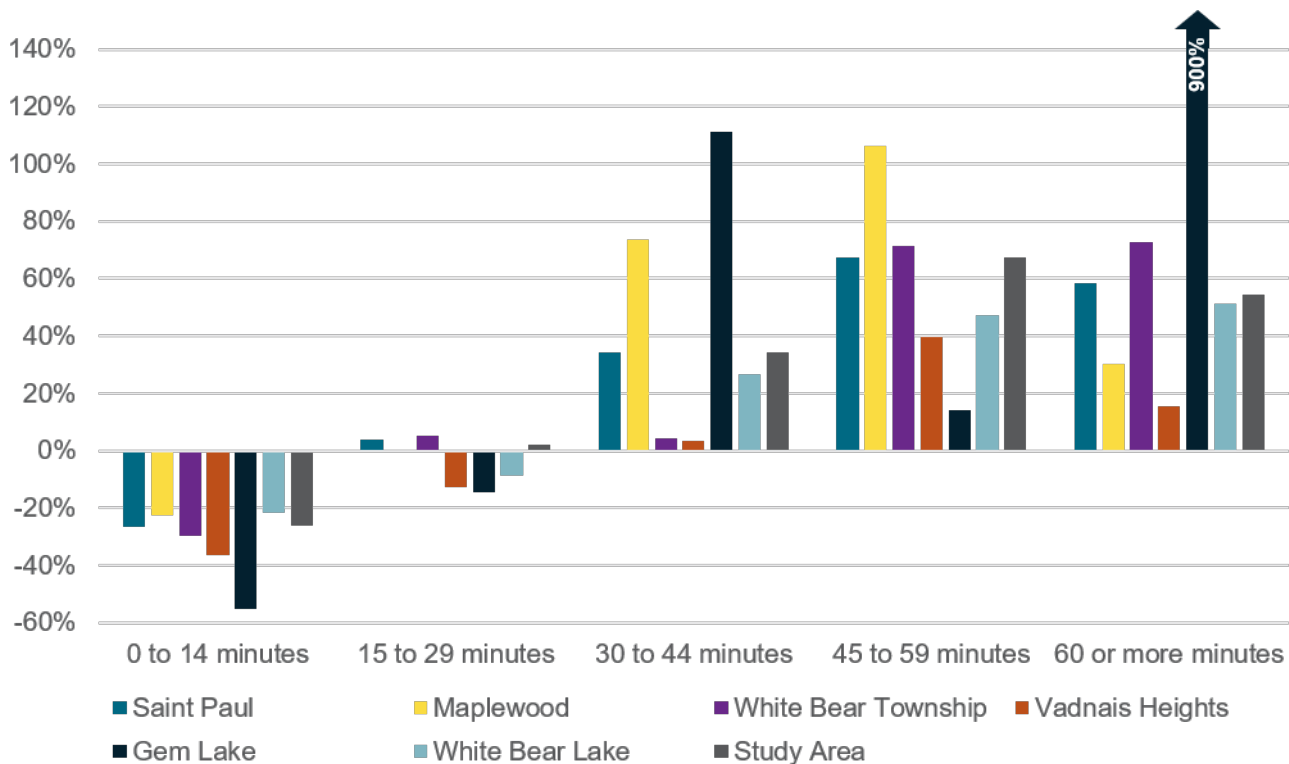
Figure 10: Direction Traveled from Work to Home for People Employed in the Study Area³¹



³¹ US Census Bureau. Longitudinal-Employer Household Dynamics Origin-Destination Employment Statistics (2002-2017). Accessed on January 11, 2020 at <https://onthemap.ces.census.gov>.

In each study area community, the number of people whose commute takes less than 15 minutes has decreased since 2000, with decreases ranging from 21 to 55 percent. The number of people who commute 15 to 29 minutes has increased in two study area communities (Saint Paul and White Bear Township) and decreased in the other four (Maplewood, Vadnais Heights, Gem Lake and White Bear Lake). The number of people whose commute takes longer than 30 minutes has increased in all the study area communities (see Figure 11).

Figure 11: Percent Change in Commute Times from 2000 to 2018³²



3.3.3. Local and Regional Objectives for Growth and Development

Local and regional governments in the study area have established planning frameworks for growth that support diverse land uses, development along transit corridors and preserving and enhancing the natural environment and community quality of life.

In *Thrive MSP 2040*, the Metropolitan Council identified seven policies to guide land use and regional development:

- **Orderly and efficient land use:** Align land use, development patterns and infrastructure to make the best use of public and private investment.
- **Natural resources protection:** Conserve, restore and protect the region's natural resources to ensure availability, support public health and maintain a high quality of life.

³² US Census Bureau. 2000 US Census and 2014-2018 American Community Survey 5-Year Estimates.

- **Water sustainability:** Conserve, restore and protect the quality and quantity of the region's water resources to ensure ongoing availability, support public health and maintain a high quality of life.
- **Housing affordability and choice:** Promote housing options to give people in all life stages and of all economic means viable choices for safe, stable and affordable homes.
- **Access, mobility and transportation choice:** Sustain and improve a multimodal transportation system to support regional growth, maintain regional economic competitiveness and provide choices and reliability for the system's users.
- **Economic competitiveness:** Foster connected land use options to provide businesses and industries with access to materials, markets and talent.
- **Building in resilience:** Promote sensitive land use and development patterns to achieve Minnesota's adopted greenhouse gas emissions goals at the regional scale and to develop local resiliency to the impacts of climate change.

Local comprehensive plans are updated every 10 years to be consistent with the regional plan. Goals relevant to growth and development in the study area communities are summarized below.

- **Saint Paul for All: 2040 Comprehensive Plan:**³³
 - The city-wide land use goals are to increase density and land use diversity at Neighborhood Nodes,³⁴ focus investment along transit corridors and promote high-quality urban design.
- **City of Maplewood 2040 Comprehensive Plan:**³⁵
 - The city's goals for future land use include balanced and efficient growth and the protection of natural resources and key open space and recreational areas.
 - A key influence in future redevelopment is the planned regional investments in the METRO Gold Line and Rush Line. Identified strategies include guiding land use around stations at sufficient net densities, creating a pedestrian-friendly environment, planning for mixed-use development and a mix of housing affordability and incorporating civic, public and semi-public places.
 - The city's goal for economic development is to support ongoing growth of companies and industries while preserving and enhancing quality of life factors that make Maplewood attractive to new companies and new residents.
- **White Bear Township 2040 Comprehensive Plan:**³⁶
 - The township's land use goals are to have a balance of land uses that are appropriately located and developed, allowing the community to thrive, and to have land uses that are interrelated with transportation, trail, utility and natural resource

³³ Approved by the Saint Paul City Council on June 19, 2019. Available at

<https://www.stpaul.gov/departments/planning-economic-development/planning/2040-comprehensive-plan>.

³⁴ Neighborhood Nodes are defined as compact, mixed-use areas that provide shops, services, neighborhood-scale civic and institutional uses, recreational facilities and employment close to residences.

³⁵ Adopted September 9, 2019. Available at <https://maplewoodmn.gov/1718/2040-Comprehensive-Plan>.

³⁶ Draft dated March 2019. Available at <http://www.ci.white-bear-township.mn.us/158/Planning-Community-Development>.

corridors into a system that supports the prosperity of residents, businesses and the natural environment within the township.

- **City of Vadnais Heights 2040 Comprehensive Plan:**³⁷
 - The city's land use goals include planning for growth that accommodates local goals for housing choice, commercial-industrial growth and open space protection; enhancing public spaces across the community; and reducing land use conflicts through redevelopment and improved site design.
 - The city also has transportation policies related to land use, including promoting transit-oriented development to increase the connectivity of people and goods and services and promoting land uses in appropriate areas that can support public transit.
- **City of Gem Lake 2040 Comprehensive Plan:**³⁸
 - The city's land use goals include protecting and enhancing the natural environment; providing a safe, healthy and attractive residential environment that offers a broad choice of housing opportunities including affordable housing; promoting Gateway District development to include regional transit plans and strategies; providing buffers to insulate residential areas from noise, light pollution and traffic; and guiding the development of the area around Hoffman's Corner at Highway 61 and on County Road E for a mix of business, commercial, retail, open space and residential uses.
- **City of White Bear Lake 2040 Comprehensive Plan:**³⁹
 - The city's guiding principles related to land use include maintaining the city's diverse mix of land uses; supporting and strengthening downtown as the "heart" of the community; continuing to focus resources on redevelopment and reinvestment; creating and enhancing opportunities for residents to conveniently meet daily needs without having to make long trips; and applying the framework of resilience and sustainability to all practices and planning.

Although Ramsey County does not play a direct role in municipal land use and zoning decisions, a key goal of the *Ramsey County 2040* plan involves partnering with cities and state agencies to support land use that encourages greater intensity of use, infill and development to promote transit ridership, affordable housing and the stewardship of natural resources.⁴⁰ The county's transportation decisions are guided by its All Abilities Transportation Network Policy and commitment to providing equitable access for all people regardless of race, ethnicity, age, gender, sexual preference, health, education, abilities and economics. Ramsey County's transportation policies prioritize transit, bicycles and pedestrians to implement a safe, integrated and fully interconnected network using a variety of modes. Ramsey County's vision for public transit as defined in *Ramsey County 2040* is one that:

- Provides improved mobility and connectivity for its residents, businesses and visitors for a variety of trip purposes as travel demand increases.

³⁷ Adopted November 6, 2019. Available at <https://www.cityvadnaisheights.com/615/2040-Comprehensive-Plan>.

³⁸ Draft dated December 2018.

³⁹ Draft dated August 2019. Available at <https://www.whitebearlake.org/communitydevelopment/page/comprehensive-plan>.

⁴⁰ Ramsey County. *Ramsey County 2040*. Available at <https://www.ramseycounty.us/your-government/projects-initiatives/comprehensive-plan>.

- Supports re-development and re-investment at a level that is consistent with regional forecasts and local and small area plans.
- Is sustainable, resilient and expandable at incremental costs with minimal environmental impacts.
- Cultivates economic prosperity by providing transit dependent persons with greater access to opportunities.

3.4. EXPANDING MULTIMODAL TRAVEL OPTIONS

Summary: *State and regional transportation policies identify the need to provide multimodal transportation options.*

The state of Minnesota and the Twin Cities region are shifting away from investing in a single mode of transportation (automobile) to investing in multiple modes (transit, bicycling, walking and automobile). Two plans that address this are the Minnesota Department of Transportation's *Statewide Multimodal Transportation Plan* and the Metropolitan Council's *2040 Transportation Policy Plan*.

The *Statewide Multimodal Transportation Plan*⁴¹ is a 20-year plan (2017 to 2036) for a transportation system that maximizes the health of people, the environment and our economy. One of the plan's objectives is to maintain and improve multimodal transportation connections essential for Minnesotans' prosperity and quality of life. The plan identifies multiple strategies to achieve this objective, including the following:

- Identify and prioritize multimodal solutions that have a high return on investment (including social, environmental and economic factors).
- Support and develop multimodal connections that provide equitable access to goods, services, opportunities and destinations.
- Provide greater access to destinations and more efficient, affordable and reliable movement of goods and people throughout the Twin Cities metropolitan area.
- Provide transportation options that improve multimodal connections between workers and jobs.

Similarly, the *2040 Transportation Policy Plan*⁴² sets policies based on the goals and objectives for the regional transportation system from *Thrive MSP 2040*. One of the goals is access to destinations. A reliable, affordable and efficient transportation system supports the prosperity of people and businesses by connecting them to destinations throughout the region and beyond. Four of the associated objectives are:

- Increase the availability of multimodal travel options, especially in congested highway corridors.
- Increase reliability and predictability for travel on highway and transit systems.
- Increase the number and share of trips taken using transit, carpools, bicycling and walking.

⁴¹ Minnesota Department of Transportation. *Statewide Multimodal Transportation Plan*. January 2017. Available at <http://www.minnesotago.org/final-plans/smtf-final-plan>.

⁴² Metropolitan Council. *2040 Transportation Policy Plan*. October 2018 Update. Available at <https://metrocouncil.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan.aspx>.

- Improve the availability and quality of multimodal travel options for people of all ages and abilities to connect to jobs and other opportunities, particularly for historically under-represented populations.

The *2040 Transportation Policy Plan* includes the Rush Line BRT Project as one of six new or extended METRO lines to be built in the next decade under the current revenue scenario.

4. PROJECT GOALS

Based on the needs described in Section 3, six project goals were established during the pre-project development study to evaluate the transit investment alternatives under consideration. The Rush Line BRT Project goals include:

- Increase the use of transit and its efficiency and attractiveness for all users.
- Develop and select an implementable and community-supported project.
- Contribute to improving regional equity, sustainability and quality of life.
- Improve sustainable travel options between and within the study area communities.
- Enhance connectivity of the corridor to the regional transportation network.
- Support sustainable growth and development patterns that reflect the vision of local and regional plans and policies.

These goals, along with the identified project needs, provided the basis for the analysis of alternatives during the pre-project development study and for the analysis of refinements to the Rush Line BRT Project during the environmental analysis phase.



ALTERNATIVES REFINEMENT SUMMARY REPORT

APRIL 2021

Prepared by:

Kimley»Horn

TABLE OF CONTENTS

1. Introduction.....1

2. Decision-Making Process.....1

3. Routing and Station Location Refinements3

4. Park-and-Rides.....12

LIST OF FIGURES

Figure 1: Environmental Analysis Phase Advisory Committees and Working Groups.....1

Figure 2: Routing and Station Locations – Union Depot to Mt. Airy Street.....5

Figure 3: Routing and Station Locations – Mt. Airy Street to Maryland Avenue7

Figure 4: Routing and Station Locations – Maryland Avenue to County Road D9

Figure 5: Routing and Station Locations – County Road D to Downtown White Bear Lake.....11

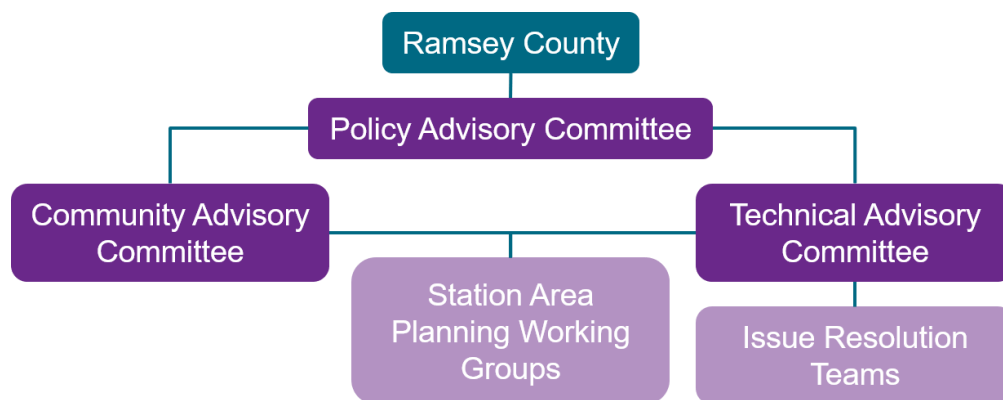
1. INTRODUCTION

Following a three-year pre-project development study of various routes and modes of transit, Ramsey County, in coordination with the project area cities, selected the locally preferred alternative for the Rush Line Bus Rapid Transit (BRT) Project in September 2017. Both technical analysis and public engagement were part of this three-year pre-project development study, which is summarized in the *Rush Line Corridor Pre-Project Development Study Locally Preferred Alternative Selection Report* (September 2017).¹ Since then, based on further stakeholder coordination and technical analysis, various route and station location refinements have been made, which are summarized in Section 3 of this report. Refinement of park-and-ride locations has also occurred as part of the environmental analysis phase, as described in Section 4.

2. DECISION-MAKING PROCESS

The decision-making process for the Rush Line BRT Project is led by the groups shown in Figure 1, which are informed by input gathered from public engagement efforts. The refined project elements were confirmed by the Policy Advisory Committee in September 2018, February 2019 and July 2019.

Figure 1: Environmental Analysis Phase Advisory Committees and Working Groups



2.1. POLICY ADVISORY COMMITTEE

The Policy Advisory Committee consists of elected and appointed officials from communities in the Rush Line BRT Project area and key partner agencies. The Policy Advisory Committee provides the overall direction and guidance for the project and meets approximately every other month during the environmental analysis phase. All Policy Advisory Committee meetings are open to the public and allow for public comment. The Policy Advisory Committee provides recommendations to the Ramsey County Board on project decisions using input and findings from other committees and working groups.

¹ Available at <https://www.ramseycounty.us/residents/roads-transit/transit-corridors-studies/rush-line-brt-project/project-library>.

2.2. TECHNICAL ADVISORY COMMITTEE

The Technical Advisory Committee, comprised of planning and public works staff from Rush Line BRT Project area communities and partner agencies, meets monthly and provides technical input on issues including design, environmental, engineering, construction and operation of the Rush Line BRT Project. Technical Advisory Committee members review technical documents and make recommendations to the Policy Advisory Committee.

2.3. COMMUNITY ADVISORY COMMITTEE

The Community Advisory Committee provides business and community perspectives to Rush Line BRT Project staff, the Technical Advisory Committee and the Policy Advisory Committee on project design, station area planning, environmental analysis and operational plan decisions. The Community Advisory Committee consists of community members and business representatives who advise on public engagement techniques and assist with ensuring that information regarding engagement opportunities is effectively communicated. Community Advisory Committee members may participate in working groups established for specific geographic sub-areas of the route that they represent for items like station area planning or guideway design. The Community Advisory Committee meets quarterly.

Input from the Community Advisory Committee is shared with the Technical Advisory Committee and Policy Advisory Committee.

2.4. STATION AREA PLANNING WORKING GROUPS

Based on geographic location and proximity to stations, four regional station area planning working groups were formed to discuss station area issues, including placement of station platforms, access to stations, circulation within the station areas and land use and development patterns. These working groups included residents, elected officials, interested Community Advisory Committee members, hospital and business representatives and planning commission members. The working groups had meetings where they explored topics in depth with Rush Line BRT Project staff.

Station area planning working groups were informed by input collected through other engagement efforts. Findings from the station area planning working groups were shared with the Technical and Policy Advisory Committees. The station area planning working groups met to address specific station area issues.

2.5. ISSUE RESOLUTION TEAMS

Issue resolution teams were formed during the environmental analysis phase to address specific technical and engineering issues related to the Rush Line BRT Project. Participants in the issue resolution teams include public agency staff (including members of the Technical Advisory Committee) and Rush Line BRT Project staff. Recommendations and findings from the issue resolution teams are given to the Technical Advisory Committee.

2.6. PUBLIC ENGAGEMENT

Public engagement efforts in the environmental analysis phase of the project have built on the public engagement work conducted throughout the pre-project development study, which involved extensive public engagement that led to the adoption of the locally preferred alternative. To this end, Rush Line BRT Project staff created a Communication and Public Engagement Plan to guide and prioritize public

engagement efforts throughout the environmental analysis phase.² This plan described the diverse communities throughout the corridor, identified methods for engaging with these communities and established goals for public engagement during the environmental analysis phase. The three goals are to inform a diverse public, collect input from the diverse public and use this public input to shape the project.

Targeted engagement efforts sought out diverse input on transit needs and project details by focusing outreach with the following relevant populations within the project area:

- Hmong people living in Saint Paul and in Maplewood.
- Latino people living in Saint Paul.
- Karen people.
- People of color.
- Public housing residents.
- Transit users.
- People with disabilities.
- Seniors.
- Residents of each community along the route.
- Employees in each community along the route.

Project staff engaged stakeholders using methods designed to reach the general public, as well as culturally specific methods tailored to each unique group listed above. Project staff sought to attend in-person activities and events that presented opportunities to connect with underrepresented communities living and working along the route, such as cultural festivals, community meetings and information tables at culturally-specific retail venues.

Public input has been used to inform key aspects of the environmental analysis phase such as station area planning, corridor design, environmental analysis and the health impact evaluation. Examples include the addition of stations at Cook Avenue and Buerkle Road, the location of the Arcade Street and Downtown White Bear Lake stations and the design of the Bruce Vento Regional Trail and dedicated guideway in the Ramsey County rail right-of-way.³

3. ROUTING AND STATION LOCATION REFINEMENTS

3.1. UNION DEPOT TO MT. AIRY STREET

3.1.1. Pre-Project Development Study Locally Preferred Alternative

In downtown Saint Paul, the locally preferred alternative route as defined in September 2017 would serve the Union Depot, turn west on Kellogg Boulevard, then north on Robert Street with stations

² Available at <https://www.ramseycounty.us/residents/roads-transit/transit-corridors-studies/rush-line-brt-project/public-engagement>.

³ For more information on the public engagement activities conducted and how input has shaped the project, see the public engagement summary on the project website at <https://www.ramseycounty.us/residents/roads-transit/transit-corridors-studies/rush-line-brt-project/public-engagement>.

located at Kellogg Boulevard, 5th/6th Street, 9th/10th Street and 14th Street (referred to as the Regions/Green Line station). The route would then turn east on 14th Street and continue north on Jackson Street to a station at Mt. Airy Street (see Figure 2).

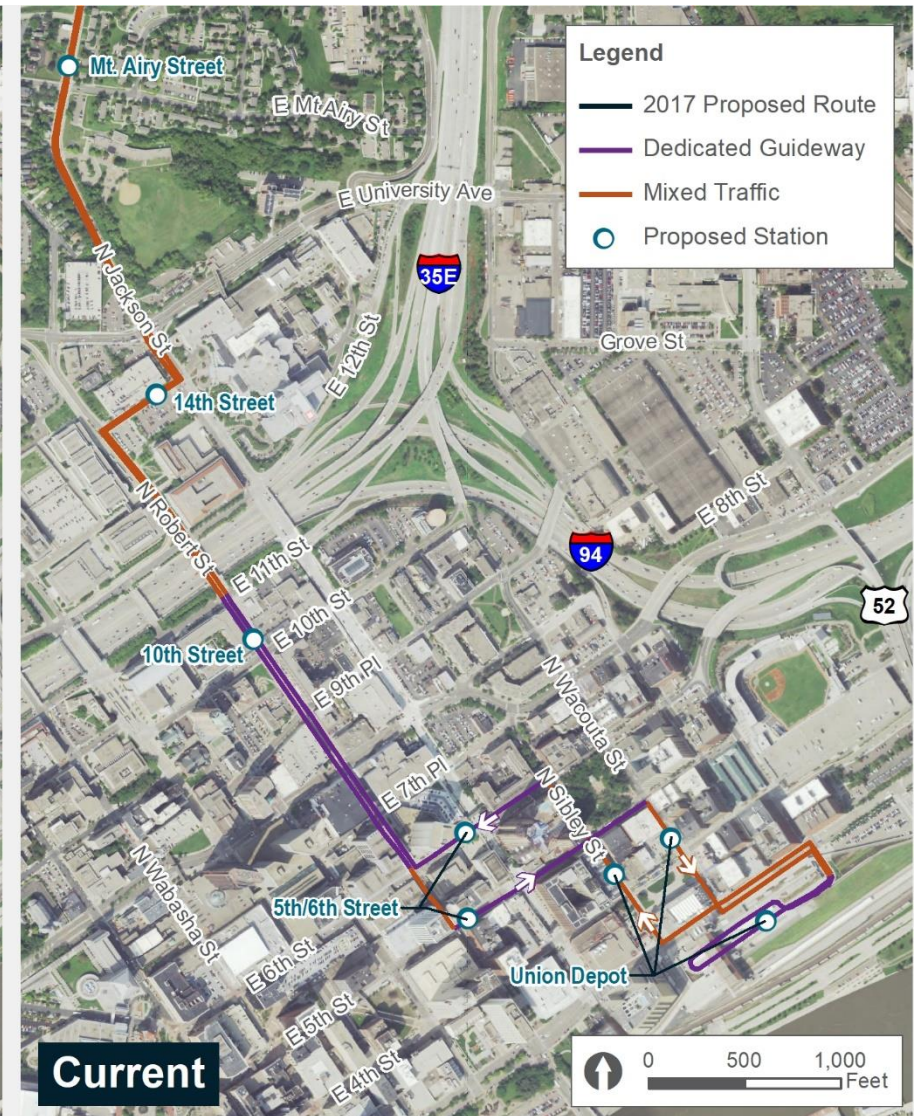
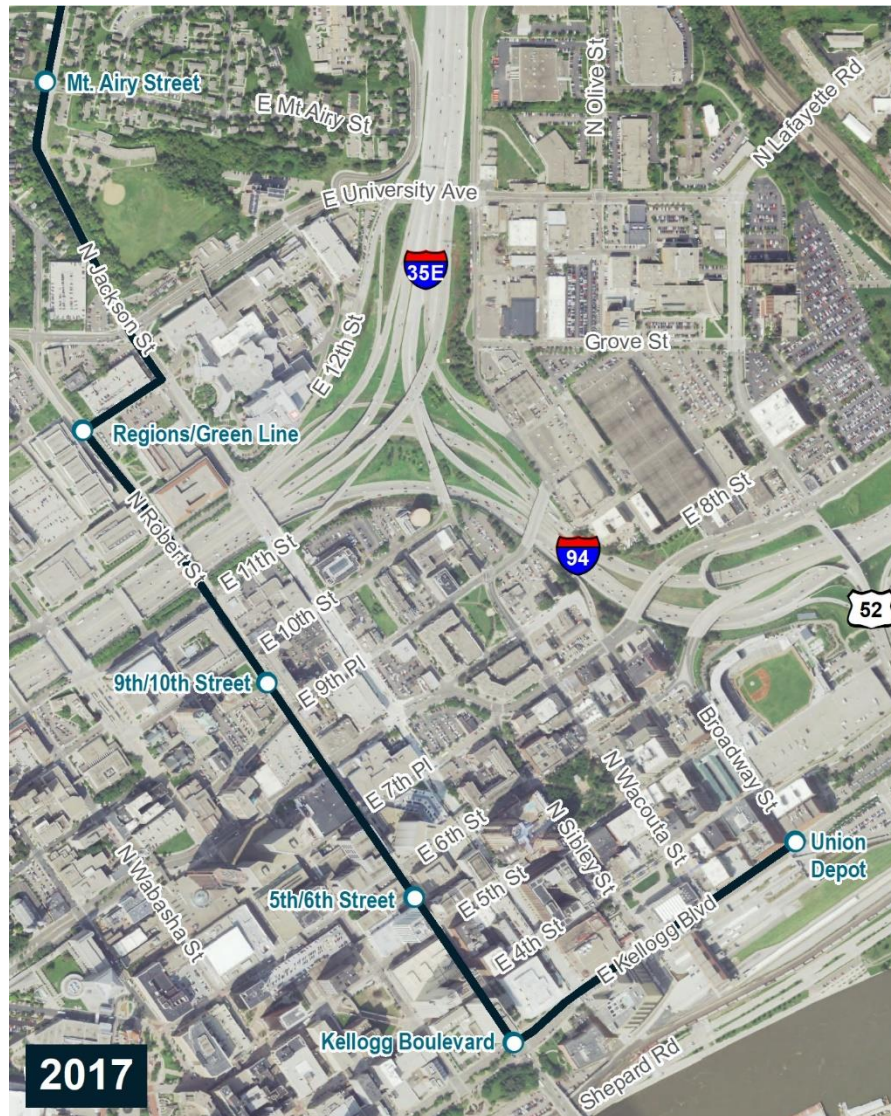
3.1.2. Environmental Analysis Phase Refinements

In 2018, the routing and station locations in downtown Saint Paul between Union Depot and Jackson Street were evaluated to maximize ridership, transfer opportunities and cost-efficiency and to minimize travel time and potential impacts. As a result of this evaluation, the following refinements were made (see Figure 2):

- Route:
 - The northbound route was refined so that it would start at the Union Depot bus deck, travel west on Kellogg Boulevard, north on Sibley Street and west on 6th Street before continuing north on Robert Street.
 - In the southbound direction, the refined route would travel south on Robert Street, east on 5th Street, south on Wacouta Street then east on Kellogg Boulevard to serve the Union Depot bus deck.
- Stations:
 - The Union Depot station was refined to have three platforms located on Sibley Street, Wacouta Street and the Union Depot bus deck.
 - The 5th/6th Street station was refined to be a one-way pair, with the northbound platform on 6th Street and the southbound platform on 5th Street.
 - The 9th/10th Street station was centered on the intersection of 10th and Robert Streets and renamed the 10th Street station.
 - The Regions/Green Line station was centered on 14th Street between Robert Street and Jackson Street and was renamed as the 14th Street station.

The one-way pair on 5th and 6th Streets advanced because it would provide effective transit access to downtown Saint Paul and the Union Depot, take advantage of transit only lanes on 5th and 6th Streets, provide for competitive travel times and minimize traffic, right-of-way and roadway geometric impacts. In addition, this routing and the 5th/6th Street platforms would be shared with the METRO Gold Line, which also provides the potential for cost savings and would improve ease of use for customers.

Figure 2: Routing and Station Locations – Union Depot to Mt. Airy Street



3.2. MT. AIRY STREET TO MARYLAND AVENUE

3.2.1. Pre-Project Development Study Locally Preferred Alternative

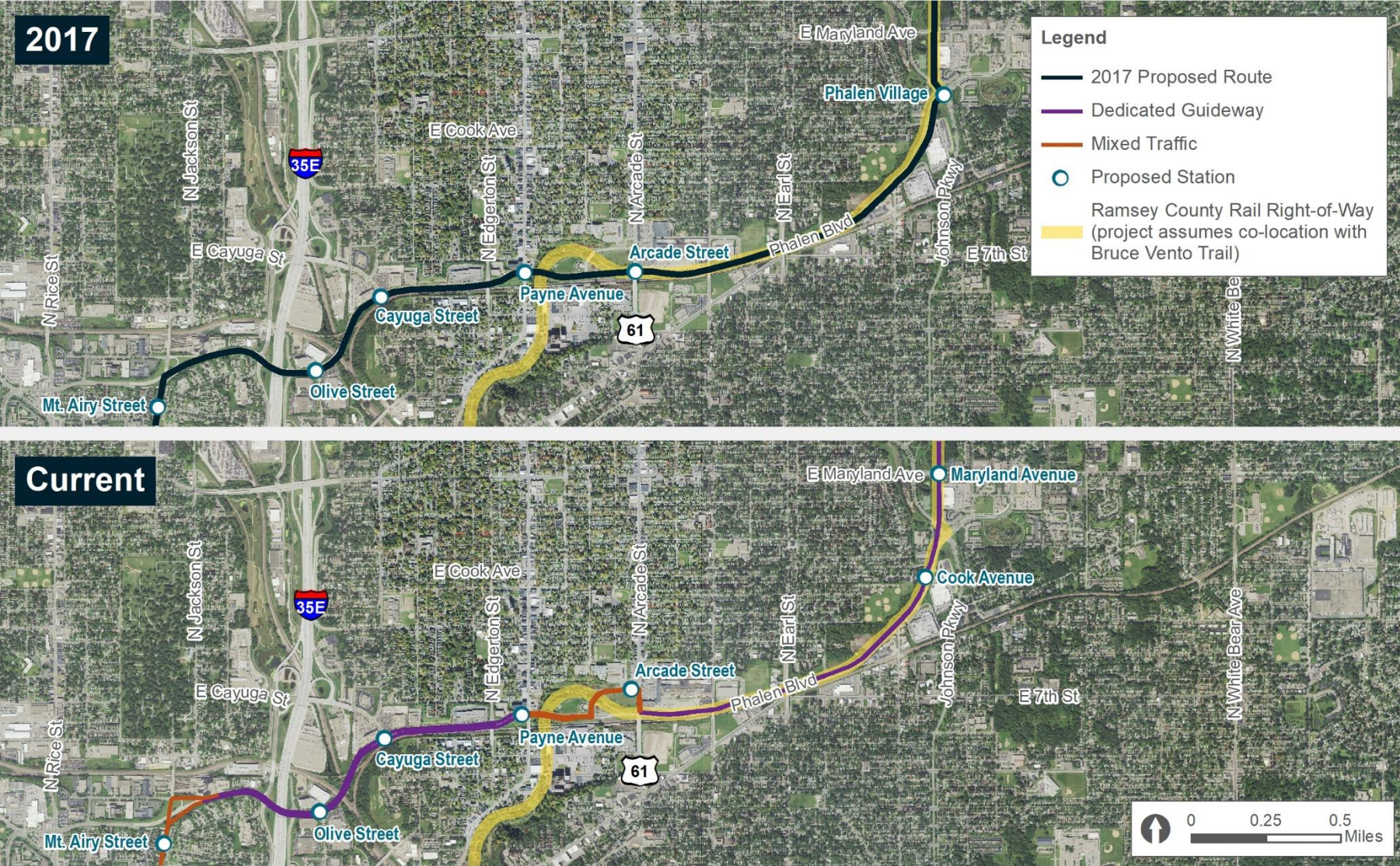
As defined in September 2017, after serving the Mt. Airy Street station, the route would continue north on Jackson Street and turn east on Pennsylvania Avenue, which turns into Phalen Boulevard. The locally preferred alternative included five stations along Phalen Boulevard: at Olive Street, Cayuga Street, Payne Avenue, Arcade Street and Phalen Village (see Figure 3).

3.2.2. Environmental Analysis Phase Refinements

Through the issue resolution team, station area planning and public engagement processes that occurred in 2018, the following refinements were made (see Figure 3):

- Stations:
 - The Arcade Street station was shifted from Phalen Boulevard with vertical circulation connecting the station to the Arcade Street bridge to the intersection of Arcade Street and Neid Lane. The refined station location would eliminate the need for vertical circulation, better serve neighborhoods to the north and the Seeger Square shopping center and encourage development at Arcade Street and Neid Lane.
 - The Phalen Village station was placed at Maryland Avenue (and the name changed to the Maryland Avenue station) to provide better access to connecting bus service.
 - A station was added at Cook Avenue to fill the gap between the Arcade Street and Maryland Avenue stations and serve the neighborhood to the west of Phalen Boulevard as well as Hmong Village and other nearby activity centers.
- Route:
 - To serve the refined Arcade Street station location, the route would exit Phalen Boulevard at Neid Lane then travel south on Arcade Street. A new bus-only bridge would connect Arcade Street back to the dedicated guideway parallel to Phalen Boulevard and the Bruce Vento Regional Trail within Ramsey County rail right-of-way.
 - The dedicated guideway would continue in Ramsey County rail right-of-way across Johnson Parkway on a new bridge that would accommodate both the dedicated guideway and Bruce Vento Regional Trail.

Figure 3: Routing and Station Locations – Mt. Airy Street to Maryland Avenue



3.3. MARYLAND AVENUE TO COUNTY ROAD D

3.3.1. Pre-Project Development Study Locally Preferred Alternative

North of Maryland Avenue, the locally preferred alternative route as defined in September 2017 would continue north in Ramsey County rail right-of-way, co-located with the Bruce Vento Regional Trail, to Beam Avenue. Stations would be located at Larpenteur Avenue, Frost Avenue and Highway 36/English Street. At Beam Avenue, the route would exit the Ramsey County rail right-of-way and turn east with stations located at St. John's Hospital and Maplewood Mall. The route would continue north on Southlawn Drive and west on County Road D before re-entering Ramsey County rail right-of-way (see Figure 4).

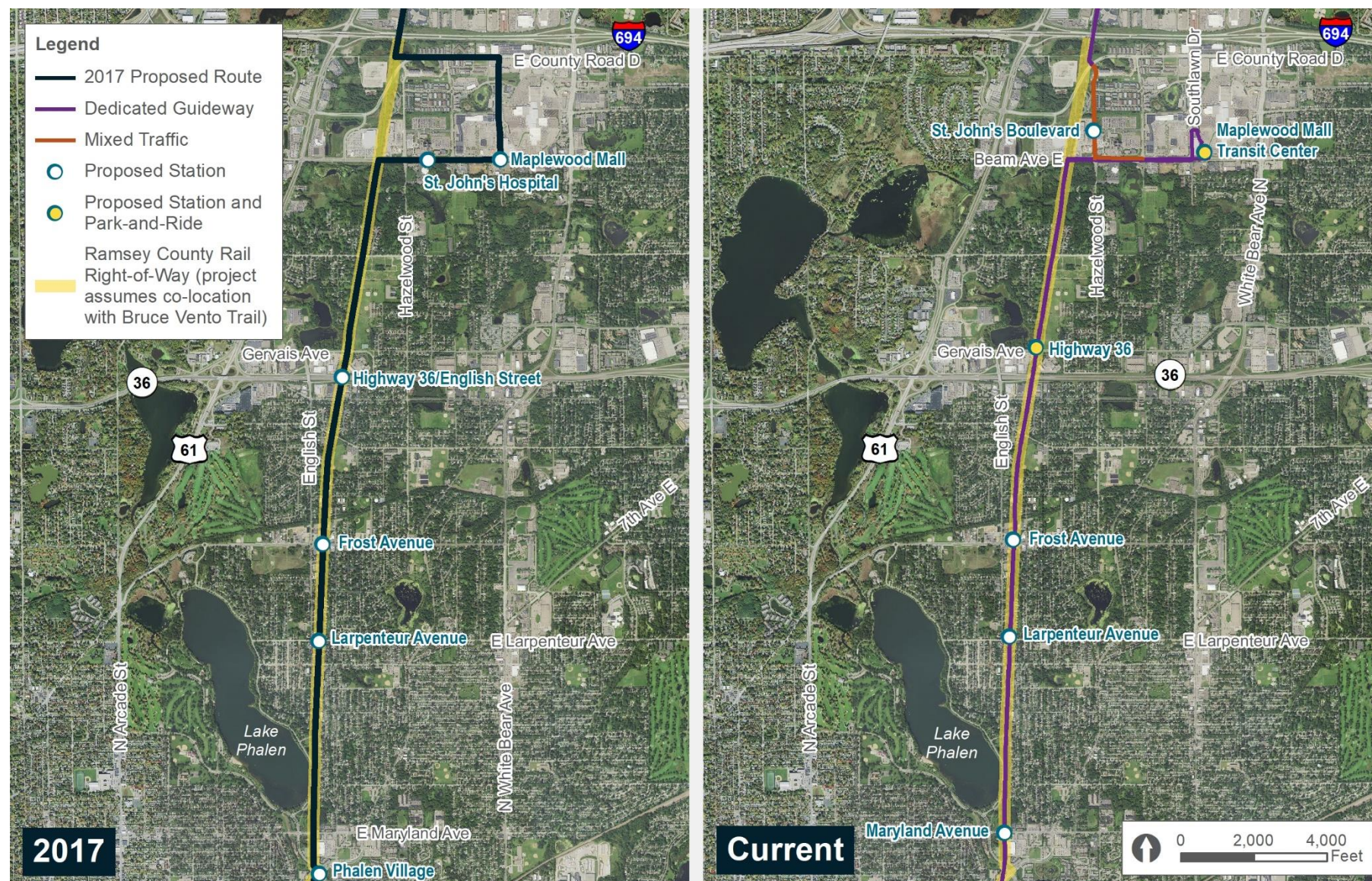
3.3.2. Environmental Analysis Phase Refinements

In 2018 and 2019, route and station options were evaluated to best serve the St. John's Hospital and Maplewood Mall area, including providing a more direct connection to the hospital and maximizing transfer opportunities at the existing Maplewood Mall Transit Center. These modifications were made in coordination with the North End Vision Plan, the city of Maplewood's small area planning process for the St. John's Hospital and Maplewood Mall area, and in coordination with Metro Transit to optimize future transit center operations. As a result, the following refinements were made (see Figure 4):

- Stations:
 - The Maplewood Mall station was placed within the Maplewood Mall Transit Center to facilitate transfers to other bus routes.
 - The St. John's Hospital station was shifted from Beam Avenue to the intersection of Hazelwood Street and St. John's Boulevard, which is located closer to the hospital entrance.
- Route:
 - The route would travel east on Beam Avenue, north on Southlawn Drive and through the Maplewood Mall Transit Center before looping back to the west via Beam Avenue. In the northbound direction, the route would continue north on Hazelwood Street to County Road D. In the southbound direction, the route would continue west on Beam Avenue then turn south onto dedicated guideway in the Ramsey County rail right-of-way.

Routing and stations in the Ramsey County rail right-of-way remained as originally defined in 2017.

Figure 4: Routing and Station Locations – Maryland Avenue to County Road D



3.4. COUNTY ROAD D TO DOWNTOWN WHITE BEAR LAKE

3.4.1. Pre-Project Development Study Locally Preferred Alternative

As defined in September 2017, north of County Road D the locally preferred alternative route would continue in Ramsey County rail right-of-way and cross I-694 on a new dedicated guideway bridge. North of I-694, the route would be in right-of-way owned by BNSF Railway before it would turn west on Buerkle Road then north on Highway 61, with stations at County Road E, Cedar Avenue, White Bear Avenue (referred to as the Marina Triangle station) and 4th Street (referred to as the Downtown White Bear Lake station).

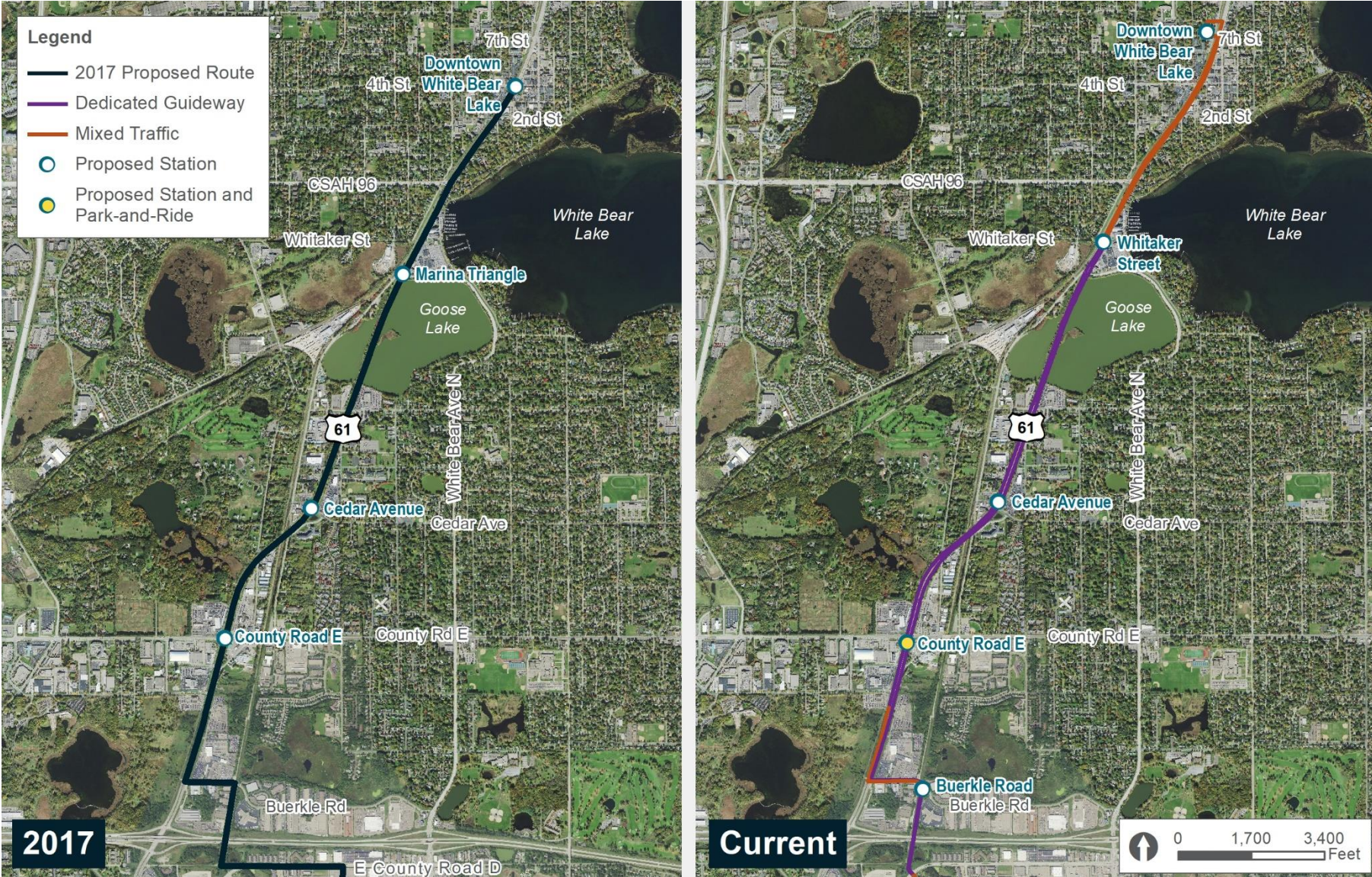
3.4.2. Environmental Analysis Phase Refinements

In 2018 and 2019, ways to avoid and/or minimize impacts to BNSF's right-of-way north of I-694 were evaluated. In addition, station locations were evaluated through the station area planning process. The following refinements were made (see Figure 5):

- Route:
 - The I-694 crossing was shifted to the east to cross on a new bridge east of the existing pedestrian bridge and continue north to Buerkle Road east of BNSF's right-of-way.
 - The route was extended north on Highway 61 and would travel west on 7th Street, north on Washington Avenue and east on 8th Street to serve the refined Downtown White Bear Lake station location (see below).
- Stations:
 - A station was added at Buerkle Road to provide better access to jobs in the area.
 - The Marina Triangle station was shifted north to Whitaker Street to better serve the existing commercial and residential uses and align with the existing pedestrian crossing. This station was renamed the Whitaker Street station.
 - After an extensive public engagement process and technical evaluation, the Downtown White Bear Lake station was located at 7th Street and Washington Avenue based on the recommendations from the Technical Advisory Committee and White Bear Lake City Council.⁴

⁴ A summary of input received on the Downtown White Bear Lake station location options is available at <https://www.ramseycounty.us/sites/default/files/Projects%20and%20Initiatives/2019%2002%2021%20White%20Bear%20Lake%20Station%20Input%20Summary.pdf>.

Figure 5: Routing and Station Locations – County Road D to Downtown White Bear Lake



4. PARK-AND-RIDES

4.1. PRE-PROJECT DEVELOPMENT STUDY LOCALLY PREFERRED ALTERNATIVE

As part of the pre-project development study, a potential new park-and-ride facility was proposed at the Highway 36/English Street station. Additionally, it was assumed that additional park-and-ride capacity at the existing Maplewood Mall Transit Center would be used for the Rush Line BRT Project.

4.2. ENVIRONMENTAL ANALYSIS PHASE REFINEMENTS

4.2.1. Highway 36 Park-and-Ride

The proposed park-and-ride at the Highway 36/English Street station (now referred to as the Highway 36 station) was further defined as part of the environmental analysis phase. An approximately 300-space park-and-ride structure would be located in the southwest corner of Harvest Park (north of Gervais Avenue and east of the Ramsey County rail right-of-way). The Metropolitan Council is not the planned owner or manager of the proposed parking structure, and an alternative ownership commitment has not been made at this time. As the project advances, there is the potential that the full build out of the park-and-ride would be phased over time, starting with an approximately 170-space surface lot that would be constructed within the same footprint. The EA evaluates the 300-space parking structure to reflect the proposed full build out at the station and, therefore, the most impactful environmental analysis.

The EA also evaluates an option for the Highway 36 station that includes the station platforms and a passenger drop-off area with no park-and-ride. Evaluating this option provides Ramsey County, as the local lead agency, and the Metropolitan Council, as the future local project sponsor, flexibility to define required project facilities at this station location.

4.2.2. Maplewood Mall Transit Center

As identified in the pre-project development study, the Rush Line BRT Project would serve the existing 1,000-space Maplewood Mall Transit Center, which has about 50 percent available capacity.⁵ Improvements would be made to the platforms that serve the park-and-ride, but no new parking would be constructed.

4.2.3. County Road E Park-and-Ride

Based on ridership forecasts and stakeholder input, a second new park-and-ride is proposed as part of the project. A surface park-and-ride with up to 70 parking spaces designated for transit use would be located on Ramsey County property by the County Road E station in the existing TCO Sports Garden parking lot. A portion of the existing parking lot would be reconfigured to accommodate the park-and-ride, and it would not impact the number of parking spaces available for the sports center during peak times.⁶

⁵ Metro Transit. *2019 Annual Regional Park & Ride System Report*. January 2020. Available at <https://metro council.org/Transportation/Publications-And-Resources/Transit/2019-Park-and-Ride-Report.aspx>.

⁶ A parking study was conducted at the TCO Sports Garden in the spring of 2019, which found that parking demand for the sports center is highest during evenings and weekends. This usage would be complementary to park-and-ride demand, which would primarily occur between about 7 a.m. and 5 p.m.



RIDERSHIP AND OPERATIONS TECHNICAL REPORT

APRIL 2021

Prepared by:

Kimley»Horn



TABLE OF CONTENTS

- 1. Introduction.....1
- 2. Travel Time.....1
- 3. BRT Service Plan Assumptions.....2
- 4. Connecting Bus Networks3
 - 4.1. Budget Neutral Bus Network.....3
 - 4.2. 2040 Base Bus Network.....5
 - 4.3. 2040 Potential Other Improvements.....5
- 5. Ridership Forecasts6
 - 5.1. Transit Ridership6
 - 5.2. Vehicle Miles Traveled.....8

LIST OF TABLES

- Table 1: Station-to-Station Travel Time Estimates (Southbound).....2
- Table 2: Rush Line Ridership by Trip Purpose and Direction for the Build Alternative in 20407
- Table 3: Regional Linked/New Transit Trips.....8
- Table 4: Average Weekday Reduction in Vehicle Miles Traveled (2040).....8

LIST OF FIGURES

- Figure 1: Budget Neutral Connecting Bus Network4

1. INTRODUCTION

The Rush Line Bus Rapid Transit (BRT) Project (the Build Alternative) is a proposed 15-mile long BRT route connecting Saint Paul, Maplewood, Vadnais Heights, Gem Lake, White Bear Township and White Bear Lake. It would include 21 stations, and the route would generally run along Robert Street, Jackson Street, Phalen Boulevard, Ramsey County rail right-of-way and Highway 61. The Build Alternative would serve the existing Maplewood Mall Transit Center and two proposed park-and-rides at Highway 36 and at County Road E. An option to the Build Alternative, the Build Alternative option without the Highway 36 park-and-ride, is also being evaluated. Differences between the Build Alternative and the Build Alternative option without the Highway 36 park-and-ride are noted where applicable. Ramsey County, on behalf of the Ramsey County Regional Railroad Authority, is preparing an Environmental Assessment (EA) for the project, and this technical report has been prepared in support of the EA.

This report summarizes the travel time for the Rush Line BRT Project, the connecting bus networks developed for the project and the project ridership forecasts.

2. TRAVEL TIME

Travel time was analyzed for the length of the route based on the proposed alignment geometry and characteristics. The travel time calculation reflects the use of dedicated guideway, business access and transit (BAT) lanes and transit signal prioritization, where applicable. With the exception of downtown Saint Paul, posted speeds were assumed with delay at controlled intersections and decelerations for crossing in the dedicated guideway. Travel speeds for downtown Saint Paul were assumed to be 25 miles per hour. A dwell time of 7 seconds was assumed at low ridership stations, 14 seconds at moderate ridership stations and 21 seconds at high ridership stations. Maximum bus acceleration and deceleration rates of 1.5 miles per hour per second and 2.0 miles per hour per second, respectively, were assumed. In addition to acceleration and deceleration for station stops, it was assumed that the Rush Line BRT Project would decelerate to 35 miles per hour at intersections along the dedicated guideway. Control delays were estimated based on whether the intersection was a stop-controlled intersection, a minor signal or a major signal, with a 10 second, 12 second and 32 second delay, respectively. The estimated control delays reflect a 20 percent reduction in delay from transit signal prioritization.

Table 1 presents station-to-station travel time estimates between the Downtown White Bear Lake station and Union Depot. These estimates reflect anticipated travel times in the southbound direction. Based on the proposed station platform location and the low speeds through the Union Depot as well as longer control delay, the anticipated travel time in the northbound direction is approximately three minutes longer.

Table 1: Station-to-Station Travel Time Estimates (Southbound)

Station Name	Distance (miles)	Station-to-Station Time (minutes:seconds)	Cumulative Travel Time (minutes:seconds)
Downtown White Bear Lake	0.00	00:00	00:00
Whitaker Street	1.27	03:37	03:37
Cedar Avenue	1.23	02:29	06:06
Country Road E	0.78	01:56	08:02
Buerkle Road	0.89	02:43	10:44
St. John's Boulevard	0.76	01:57	12:41
Maplewood Mall Transit Center	0.95	02:56	15:38
Highway 36	1.75	04:11	19:49
Frost Avenue	0.96	02:23	22:11
Larpenteur Avenue	0.50	01:21	23:32
Maryland Avenue	1.03	02:17	25:50
Cook Avenue	0.35	01:01	26:51
Arcade Street	1.22	02:58	29:49
Payne Avenue	0.43	01:37	31:26
Cayuga Street	0.50	01:31	32:56
Olive Street	0.34	01:14	34:11
Mt. Airy Street	0.66	02:06	36:17
14 th Street	0.36	01:49	38:05
10 th Street	0.36	02:17	40:22
5 th /6 th Street	0.33	02:24	42:46
Union Depot Wacouta Street	0.25	01:53	44:40
Union Depot	0.31	02:26	46:42
Total	15.20	46:42	

3. BRT SERVICE PLAN ASSUMPTIONS

The service plan assumed for the Rush Line BRT Project is as follows:

- Weekdays:
 - Early morning (5-6 a.m.): 15-minute headways.
 - AM peak (6-9 a.m.): 10-minute headways.
 - Midday (9 a.m. – 3 p.m.): 15-minute headways.
 - PM peak (3-6:30 p.m.): 10-minute headways.
 - Evening (6:30 p.m. – 12 a.m.): 15-minute headways.

- Saturdays:
 - All day (5-12 a.m.): 15-minute headways.
- Sundays:
 - All day (6 a.m. – 10 p.m.): 15-minute headways.

4. CONNECTING BUS NETWORKS

The purpose of designing connecting bus networks is to complement the transitway investment and improve the accessibility and mobility of transit riders. The connecting bus network provides additional access to/from destinations beyond the distance people would typically walk from the Rush Line BRT stations (about one-half mile), including residences, jobs, medical offices, food and other retail needs. Designing connecting bus networks supports the region's transit investment goals from *Thrive MSP 2040*,¹ the Metropolitan Council's long-range plan for the region, and the *2040 Transportation Policy Plan*,² including:

- Access to destinations.
- Competitive economy.
- Healthy and equitable communities.

Three connecting bus networks have been developed for the Rush Line BRT Project. These bus networks are defined as the following:

- **Budget neutral bus network:** the bus network connecting to the Rush Line BRT on opening day if no additional service hours are added.
- **2040 base bus network:** the bus network connecting to the Rush Line BRT if modest improvements to existing bus routes, as identified in the Metro Transit 2017 Service Improvement Plan, are implemented.
- **2040 potential other improvements:** a longer-term vision for the bus network connecting to the Rush Line BRT.

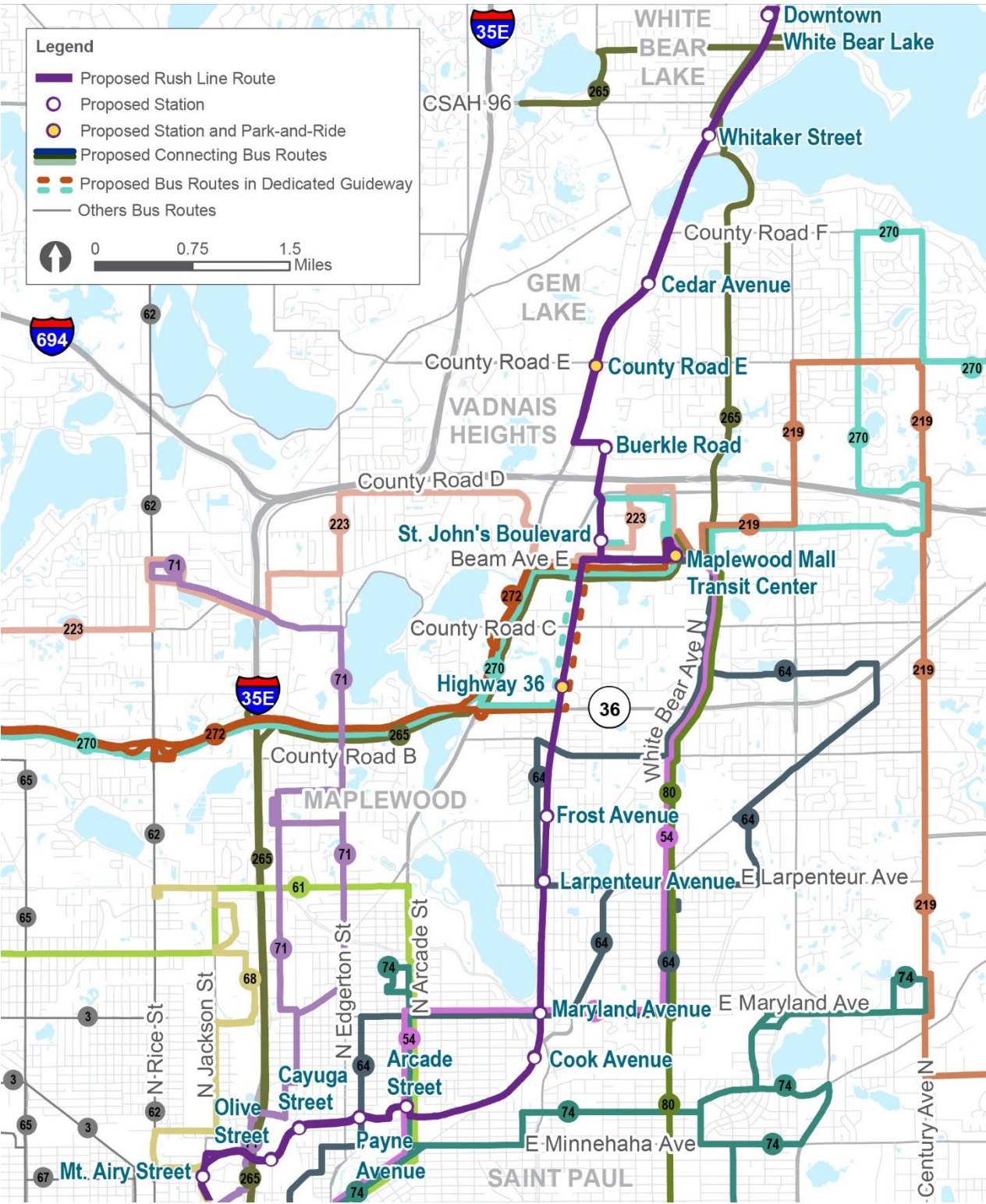
4.1. BUDGET NEUTRAL BUS NETWORK

No bus routes are proposed to be discontinued with the introduction of the Rush Line BRT Project. Therefore, no changes are proposed for the budget neutral bus network. The budget neutral connecting bus network would reflect the existing (fall 2019) connecting bus network for the Rush Line BRT. The proposed budget neutral bus network is shown in Figure 1. In order to focus on the routes most relevant to the Rush Line BRT Project, this map focuses on the area north of downtown Saint Paul.

¹ Metropolitan Council. *Thrive MSP 2040*. Adopted on May 28, 2014. Available at <https://metrocouncil.org/planning/projects/thrive-2040.aspx>.

² Metropolitan Council. *2040 Transportation Policy Plan*. October 2018 Update. Available at <https://metrocouncil.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan.aspx>.

Figure 1: Budget Neutral Connecting Bus Network



4.2. 2040 BASE BUS NETWORK

The 2040 base connecting bus network for the Rush Line BRT would include modest improvements to existing bus routes, as identified in Metro Transit's 2017 Service Improvement Plan.³

- Increase the weekday peak and non-peak frequency on Route 61 from 30 minutes to 20 minutes.
 - Route 61 connects to the Arcade Street station and provides an east-west connection on Larpenteur Avenue/Hennepin Avenue, including a connection to downtown Minneapolis.
- Increase the peak and midday weekday frequency on Route 68 from 20 to 30 minutes to 15 minutes.
 - Route 68 connects to the Mt. Airy Street station and provides a north-south connection on Jackson Street to the north and Robert Street to the south.
- Increase the span of Route 80 from 7 a.m. to 7:30 p.m. to 6 a.m. to 8 p.m. and increase the non-peak frequency from 60 minutes to 30 minutes.
 - Route 80 connects to the Maplewood Mall Transit Center and provides a north-south connection on White Bear Avenue to the Sun Ray Transit Center.
- Increase the peak frequency on Route 223 from 90 minutes to 30 minutes and the non-peak frequency from 90 minutes to 60 minutes.
 - Route 223 connects to the Maplewood Mall Transit Center and provides an east-west connection on Beam Avenue, County Road D, Little Canada Road, County Road C and County Road B2, including a connection to Rosedale Center in Roseville.

Since additional transit funding has not been identified for the region and the productivity of these improvements is unclear, communication to the public and stakeholders about these improvements is important for setting clear expectations. These improvements would only be implemented if additional transit funding is available, and service would be adjusted if it does not meet regional productivity standards.

4.3. 2040 POTENTIAL OTHER IMPROVEMENTS

Other bus network improvements could be considered at a later date. As noted, additional transit funding has not been identified for the region, so consideration of these improvements relies on additional transit funding as well as the improvements meeting regional productivity standards. Improvements that might be explored include:

- High frequency service on Route 54 between Union Depot and the Maplewood Mall Transit Center.
- Sunday service on Route 54 between Union Depot and the Maplewood Mall Transit Center.
- An extension of Route 61 east to the Frost Avenue station.
- Service later into the evenings on Route 61.
- Sunday service on Route 61.

³ Available at <https://www.metrotransit.org/sip>.

- Restructuring Route 64.
- A new route that would provide an east-west connection on Maryland Avenue.
- A new route that would provide a north-south connection on McKnight Avenue.
- An extension of Route 223 further to the east on Lydia Avenue.
- A new route that would provide an east-west connection on County Road E.
- A new route that would provide a north-south connection on White Bear Avenue, north of Maplewood Mall, and an east-west connection on 4th Street in White Bear Lake.

5. RIDERSHIP FORECASTS

5.1. TRANSIT RIDERSHIP

Transit ridership was analyzed and evaluated based on three performance criteria: number of corridor transit boardings (rides), ridership characteristics and new transit trips.

5.1.1. Ridership Modeling Inputs and Assumptions

Ridership forecasts were developed using the Federal Transit Administration's Simplified Trips-on-Project Software (STOPS). This software uses national travel data such as the 2006-2010 American Community Survey Journey to Work data to show travel patterns in the area. This was supplemented by the most recent transit schedule, transit on-board survey and socioeconomic data from the Metropolitan Council to enhance the data for the local area. Based on these inputs and the 2040 base bus network described in Section 4.2, the STOPS model outputs detailed information about the transit system and the Rush Line BRT Project.

STOPS can be run in two ways: incremental and synthetic. The incremental version of STOPS replicates the input transit on-board survey to develop the existing scenario. The synthetic version takes a more traditional approach and relies on input data to develop the existing travel market. A hybrid approach of averaging results of these two methods was used to develop these forecasts. This approach allows for each version's strengths to be captured.

5.1.2. Corridor Transit Boardings

Ridership is an important criterion and a standard in the transit industry – more riders means more customers served and a better return on investment. Compared to 2016 levels, transit ridership in the Rush Line corridor is forecast to increase 19 percent by the year 2040 under the No Build Alternative.⁴ Under the Build Alternative, Rush Line is forecast to carry 7,400 rides per day by 2040.

5.1.3. Ridership Characteristics

Table 2 provides a summary of select Rush Line BRT ridership characteristics, including trip purpose and auto availability. These characteristics help to tell the story of why and how people might ride the Rush Line.

Overall, just over half of the BRT ridership (54 percent) would be for work trip purposes, demonstrating the utility of the service for non-work travel as well. Reverse commuting, or travel that occurs in the direction opposite the traditional downtown orientation (both work and non-work trips), is

⁴ The No Build Alternative is defined as the 2040 transportation network including only the improvements already planned or programmed.

forecast to be 26 percent of daily ridership. Roughly half of these reverse commute trips are work trips to employment opportunities outside of downtown Saint Paul. Under the Build Alternative option without the Highway 36 park-and-ride, the forecasted ridership drops to 6,700 in 2040. This drop impacts the home-based-work market the most.

Table 2: Rush Line Ridership by Trip Purpose and Direction for the Build Alternative in 2040

	Build Alternative		Build Alternative Option without the Highway 36 Park-and-Ride	
	Number of Rides	Percent of Total Daily Project Rides	Number of Rides	Percent of Total Daily Project Rides
Total Daily Rush Line BRT Ridership	7,400	100%	6,700	100%
Home-Based-Work: Transit Dependent	600	8%	600	9%
Home-Based-Work: Non-Transit Dependent	3,400	46%	2,700	40%
Non-Home-Based: Transit Dependent	300	4%	300	4%
Non-Home-Based: Non-Transit Dependent	700	9%	700	10%
Reverse Commute (Non-Peak Direction) Total Rides	1,900	26%	1,900	28%
Reverse Commute (Non-Peak Direction) Work Trips	900	12%	900	13%

5.1.4. New Transit Trips

Table 3 provides a summary of regional transit system use under the No Build and Build Alternatives. New transit trips are an important criterion to consider when choosing a route as each added transit trip correlates to a reduction of vehicular trips on the roadway network. Table 3 provides a regional summary of linked transit trips for existing service (2016) and projected “new transit trips” that would result from the No Build and Build Alternatives by 2040. A linked trip represents a transit user who makes a trip between point A and point B (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.”

Even under the No Build Alternative, significant growth in regional transit ridership is forecast to occur between 2016 and 2040 as a result of planned investment in the regional transit system, including additional light rail transit, BRT and arterial BRT service. For the Build Alternative, new transit trips are attributable only to those improvements associated with the Rush Line BRT Project. Compared to the No Build Alternative, the Build Alternative would attract 3,300 additional new transit trips each weekday in the year 2040 scenario. This number decreases to 2,600 under the Build Alternative option without the Highway 36 park-and-ride.

Table 3: Regional Linked/New Transit Trips

	2016	2040 No Build Alternative	2040 Build Alternative	2040 Build Alternative Option Without the Highway 36 Park-and-Ride
Average Weekday Linked Trips	273,100	323,200	326,500	325,800
Difference Compared to 2040 No Build Alternative	-	-	3,300	2,600
Percent Change Compared to 2040 No Build Alternative	-	-	1.0%	0.8%

5.2. VEHICLE MILES TRAVELED

With an increase in regional transit trips, the Build Alternative is anticipated to reduce the number of auto trips made in the region each weekday. The reduction in automobile trips would result in a decrease in regional automobile vehicle miles traveled, as shown in Table 4. The daily regional vehicle miles traveled on the transportation network in 2016 was roughly 77 million for major roadways in the Twin Cities region. Daily vehicle miles traveled is expected to increase to about 88 million by 2040 with the No Build Alternative. The proposed Rush Line BRT Project would offer some benefit by decreasing this daily vehicle miles traveled by roughly 66,000 miles per day. Each new Rush Line transit trip would result in a 20-mile decrease in daily vehicle miles traveled. Under the Build Alternative option without the Highway 36 park-and-ride, these benefits would be decreased to a reduction of 41,300 miles per day and a 16-mile decrease in daily vehicle miles traveled per new transit trip.

Table 4: Average Weekday Reduction in Vehicle Miles Traveled (2040)

	Build Alternative	Build Alternative Option Without the Highway 36 Park-and-Ride
Regional Daily Vehicle Miles Traveled	87,700,000	87,700,000
Change in Daily Vehicle Miles Traveled Compared to the No Build Alternative	-65,700	-41,300
Regional Daily Vehicle Miles Traveled with the Rush Line BRT Project	87,634,300	87,741,300
New Transit Trips	3,300	2,600
Change in Daily Vehicle Miles Traveled per Transit Trip	-20	-16



TRAFFIC TECHNICAL REPORT

APRIL 2021

Prepared by:

Kimley»»Horn

TABLE OF CONTENTS

1. Introduction.....	1
2. Regulatory Context and Methodology.....	1
2.1. Methodology.....	1
2.2. Study Area	4
2.3. Forecast Traffic Volumes.....	9
3. Existing Conditions.....	9
3.1. Segment 1: Robert Street from 5 th Street to 11 th Street.....	10
3.2. Segment 2: Jackson Street from 14 th Street to Pennsylvania Avenue.....	10
3.3. Segment 3: Phalen Boulevard from L'Orient Street to Maryland Avenue	11
3.4. Segment 4: Ramsey County Rail Right-of-Way from Maryland Avenue to Beam Avenue.....	12
3.5. Segment 5: Beam Avenue to County Road D.....	12
3.6. Segment 6: Highway 61 from Buerkle Road to 8 th Street.....	13
4. Environmental Consequences.....	14
4.1. No Build Alternative	14
4.2. Build Alternative.....	19
5. Mitigation Measures.....	31

LIST OF TABLES

Table 1: Intersection Level of Service Definitions.....	3
Table 2: Existing Peak Hour Operations for Intersections Evaluated on Segment 1	10
Table 3: Existing Peak Hour Operations for Intersections Evaluated on Segment 2	10
Table 4: Existing Peak Hour Operations for Intersections Evaluated on Segment 3	11
Table 5: Existing Peak Hour Operations for Intersections Evaluated on Segment 5.....	12
Table 6: Existing Peak Hour Operations for Intersections Evaluated on Segment 6	13
Table 7: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 1 ...	15
Table 8: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 2 ...	16
Table 9: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 3 ...	17
Table 10: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 5..	18
Table 11: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 6..	19
Table 12: Park-and-Ride Facilities.....	20
Table 13: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 1.....	24
Table 14: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 2.....	25

Table 15: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 3..... 26

Table 16: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 4..... 27

Table 17: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 5..... 27

Table 18: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 6..... 28

Table 19: 2040 Build Alternative Queueing Impact Locations..... 30

Table 20: 2040 Build Alternative Queueing Improvement Locations 31

Table 21: Recommended Queueing Mitigation Measures 33

LIST OF FIGURES

Figure 1: Rush Line BRT Project..... 2

Figure 2: Intersections Evaluated Between Union Depot and Arcade Street 5

Figure 3: Intersections Evaluated Between Arcade Street and County Road B..... 6

Figure 4: Intersections Evaluated Between County Road B and County Road E..... 7

Figure 5: Intersections Evaluated Between County Road E and 8th Street 8

LIST OF APPENDICES

Appendix A: Traffic Volumes

Appendix B: Intersection Geometry and Control

Appendix C: Delay and Level of Service Tables

1. INTRODUCTION

The Rush Line Bus Rapid Transit (BRT) Project (the Build Alternative) is a proposed 15-mile long BRT route connecting Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. It would include 21 stations, and the route would generally run along Robert Street, Jackson Street, Phalen Boulevard, Ramsey County rail right-of-way and Highway 61 (see Figure 1). The Build Alternative would serve the existing Maplewood Mall Transit Center and two proposed park-and-rides at Highway 36 and at County Road E. An option to the Build Alternative, the Build Alternative option without the Highway 36 park-and-ride, is also being evaluated. Differences between the Build Alternative and the Build Alternative option without the Highway 36 park-and-ride are noted where applicable. Ramsey County, on behalf of the Ramsey County Regional Railroad Authority, is preparing an Environmental Assessment (EA) for the project, and this technical report has been prepared in support of the EA.

2. REGULATORY CONTEXT AND METHODOLOGY

2.1. METHODOLOGY

The traffic operations analysis used methodologies from the *Highway Capacity Manual*¹ and created traffic models using Synchro/SimTraffic and Vissim, which are software packages that implement *Highway Capacity Manual* methodologies. The analysis modeled lane geometrics, traffic, transit and pedestrian volumes, intersection-control and signal-timing characteristics. The a.m. and p.m. peak hours of traffic were modeled for each analysis segment. Segment-wide peak hour factors were selected and modeled for each peak hour. Heavy vehicle percentages by intersection were derived from the turning movement counts for use in the analysis. The existing conditions traffic simulations and model output were reviewed to ensure that traffic volumes and operations were representative of observed in-field conditions.

An intersection's level of service describes a driver's quality of experience relative to the intersection's operations. The *Highway Capacity Manual* uses six letter grades (from A to F) to describe an intersection's level of service, with A being the best operating conditions and F being the worst. The *Highway Capacity Manual* uses equations to calculate the delay motorists experience due to traffic signals or stop signs and conflicting traffic as the basis for determining an intersection's level of service. Table 1 shows the *Highway Capacity Manual* control delay² thresholds in seconds per vehicle for each level of service rating.

¹ Transportation Research Board. *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis*. 2016. Washington, D.C.

² Control delay is the component of delay that a vehicle experiences due to the type of control (e.g., stop sign or traffic signal) at the intersection.

Figure 1: Rush Line BRT Project

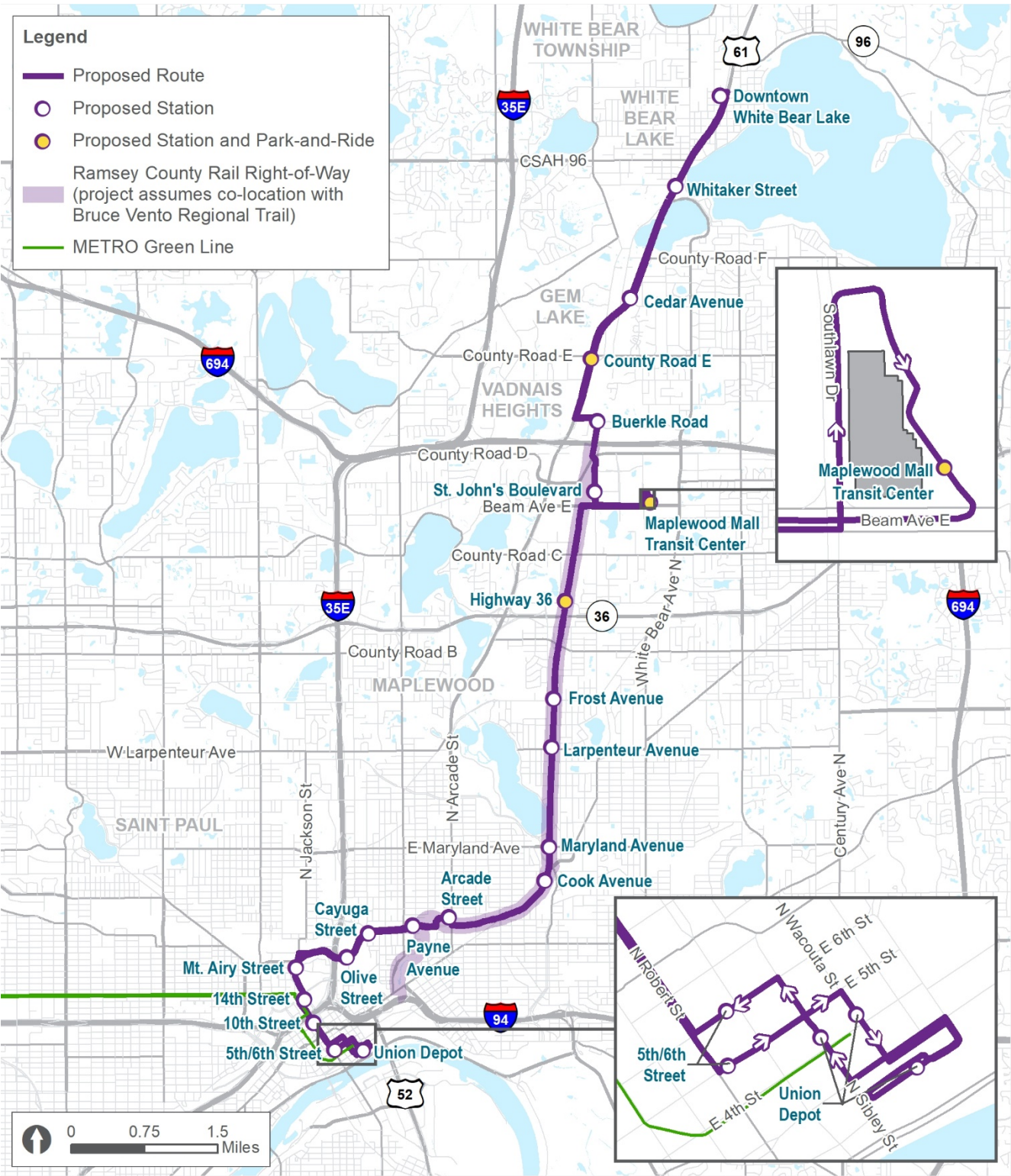


Table 1: Intersection Level of Service Definitions

Level of Service	Average Delay (seconds per vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	Less than 10	Less than 10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	Greater than 80	Greater than 50

Level of service D or better is considered acceptable for intersections during the peak traffic hour in urban and suburban areas according to standard practice in the traffic engineering industry, guidance from the American Association of State Highway and Transportation Officials and the Minnesota Department of Transportation. Operational issues based on delay/level of service are identified throughout this report at locations where an overall intersection operates or is expected to operate at level of service E or F.

Anticipated queue lengths were evaluated to determine if intersections would have queueing issues. An intersection was considered to have a queueing issue if one of the following criteria were met:

- A movement at the intersection has a 95th percentile queue length³ that exceeds lane storage length⁴ and has one of the following:
 - An average back-of-queue length that exceeds storage length.
 - Traffic movement that operates at level of service E or F.
 - A 95th percentile queue length that blocks upstream full-access intersection(s).
- A movement at the intersection has a 95th percentile queue length that exceeds 500 feet on a stop-controlled approach.

For locations where the analysis identified a queueing or operational issue in the Build Alternative conditions that was not present in the No Build Alternative based on the criteria above, mitigation measures were developed where feasible. The severity of the issue, the potential safety and operations implications at intersections, and whether the issue would impact the larger roadway network were considered in developing mitigation measures.

Peak hours reflect the times of day when a facility is typically busiest; therefore, the peak hours indicate the “worst-case scenario” in terms of impacts. This analysis evaluated the hours of highest traffic volume during the weekday morning (a.m.) peak period (6-9 a.m.) and the weekday afternoon (p.m.) peak period (3-7 p.m.). The peak hours varied by intersection, but the analysis generally identified the a.m. peak hours as occurring between 7:15-8:30 a.m. and the p.m. peak hours as occurring between 4-6 p.m.

³ The queue length that has only a 5 percent probability of being exceeded during the analysis period.

⁴ For turning movements with exclusive turning lanes, this is the length of the turn lane measured from the stopping point at the intersection to the beginning of the turn lane taper. For through movements and turning movements without exclusive turn lanes, this is the length of the roadway measured from the stopping point at the intersection and the next upstream intersection.

The operations analysis also incorporated the requirements and standards in the *Minnesota Manual on Uniform Traffic Control Devices*⁵ related to signal operations, including transit signals and transit signal priority.

2.2. STUDY AREA

The description of the Rush Line BRT Project includes the following terms:

- **Dedicated guideway:** a separate, dedicated lane for BRT operations (no general traffic allowed).
- **Business access and transit lanes:** a separate lane primarily dedicated for transit use but allows use by general traffic for turning into driveways or onto intersecting streets.⁶
- **Mixed traffic:** BRT operates in lanes with general traffic and is not in its own separate lane.
- **Grade separated:** a bridge or tunnel separates transportation facilities (e.g., roads, trails) so that they will not disrupt each other's traffic flow when they cross.

Traffic analysis was performed for sections of the project that would be impacted by changes in roadway geometry or traffic control. The locations of the intersections studied are shown in Figure 2 through Figure 5. The traffic analysis was divided into six segments as described below:

- **Segment 1:** Robert Street from 5th Street to 11th Street, operating in business access and transit lanes.
- **Segment 2:** Jackson Street from 14th Street to Pennsylvania Avenue, operating in mixed traffic.
- **Segment 3:** Phalen Boulevard from L'Orient Street to Maryland Avenue, operating primarily in business access and transit lanes with portions in mixed traffic and in dedicated guideway.
- **Segment 4:** Ramsey County rail right-of-way from Maryland Avenue to Beam Avenue, operating in dedicated guideway.
- **Segment 5:** Beam Avenue to County Road D, operating in center-running dedicated guideway and in mixed traffic.
- **Segment 6:** Highway 61 from Buerkle Road to 8th Street, operating primarily in business access and transit lanes with some areas of mixed traffic operations.

Traffic modeling of BRT operations in downtown Saint Paul was limited to intersections along Robert Street where project-related changes to geometrics or intersection control would affect the traffic capacity and operations. Along the rest of the route in downtown Saint Paul, buses would operate in mixed traffic or in existing bus lanes. In these areas, the project does not include changes to the number or assignment of traffic lanes, nor does it alter the location or phasing of existing traffic signals. Further, addition of BRT buses on these streets would represent only a 1 to 2 percent change in traffic volumes, and the existing bus lanes would have adequate capacity to accommodate total bus volumes. Project-related traffic impacts are not expected where BRT operates in mixed traffic through downtown Saint Paul; therefore, these intersections were not included in the analysis.

⁵ Minnesota Department of Transportation. *Minnesota Manual on Uniform Traffic Control Devices*. Revision 6. Last modified February 21, 2018. Available at <http://www.dot.state.mn.us/trafficeng/publ/mutcd/>. Accessed May 2018.

⁶ In the EA and other supporting technical reports, dedicated guideway is defined to include business access and transit lanes. The distinction between business access and transit lanes and dedicated guideway is made in this report, however, because it affects the results of the traffic analysis.

Figure 2: Intersections Evaluated Between Union Depot and Arcade Street



Figure 3: Intersections Evaluated Between Arcade Street and County Road B

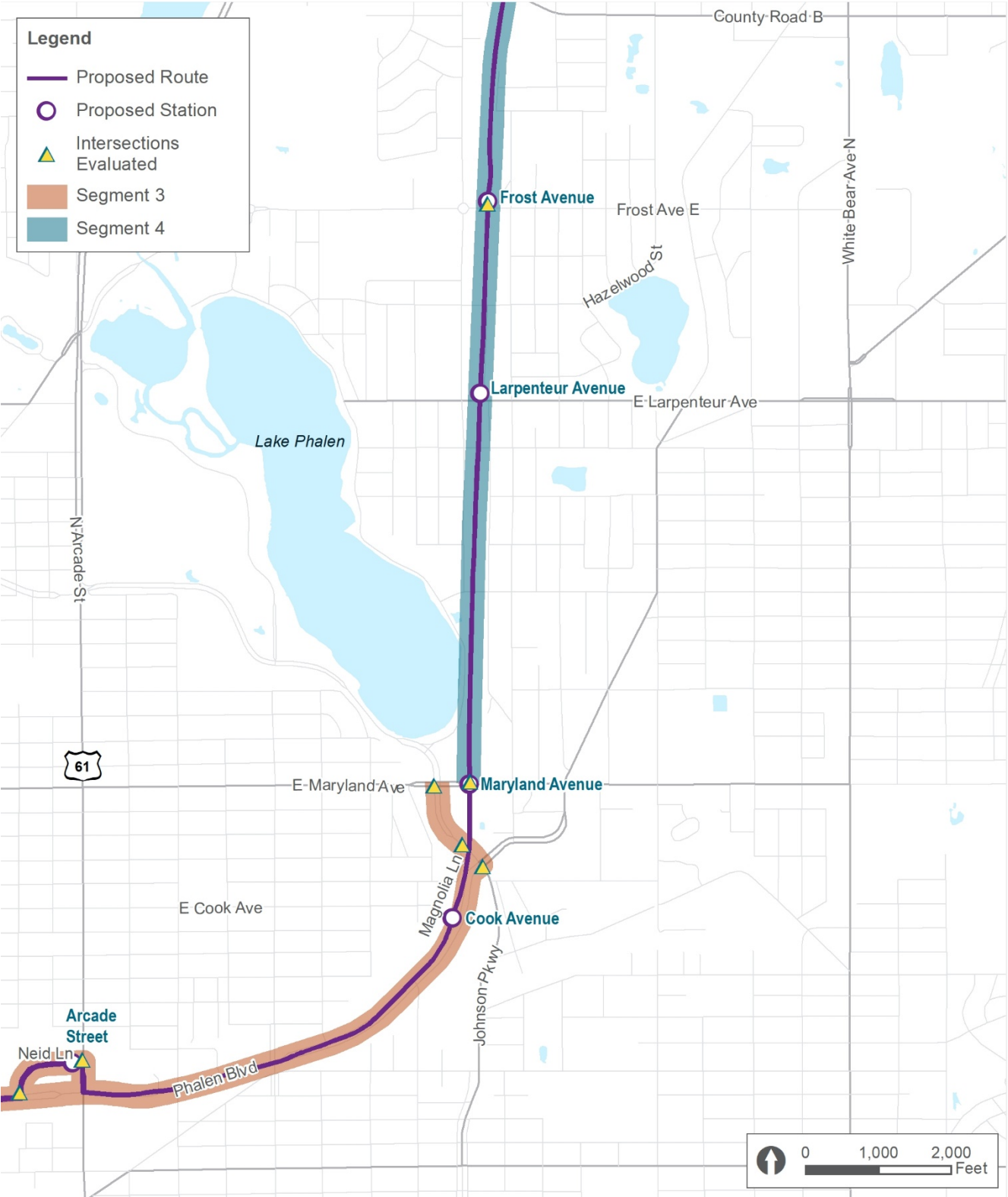


Figure 4: Intersections Evaluated Between County Road B and County Road E

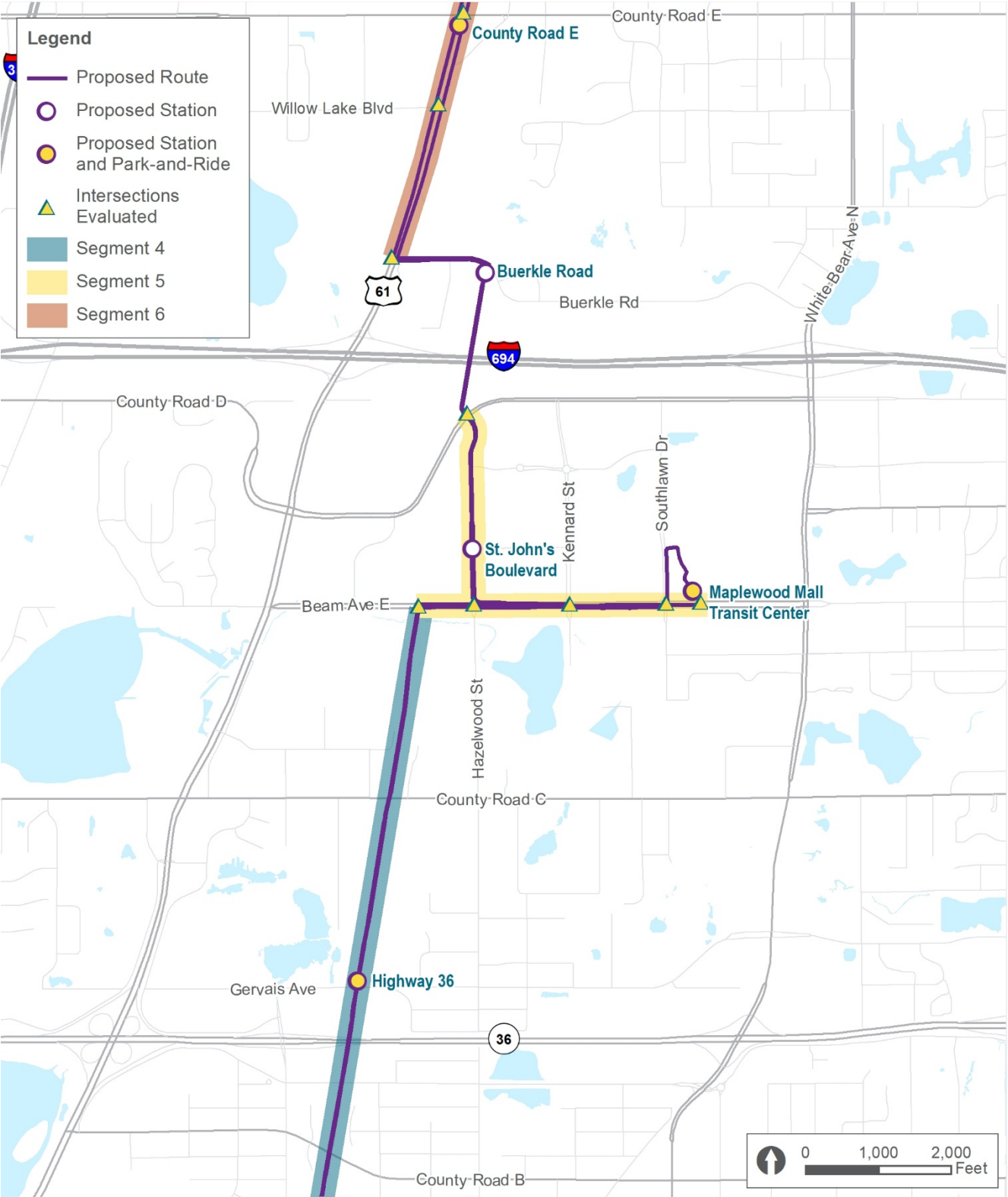
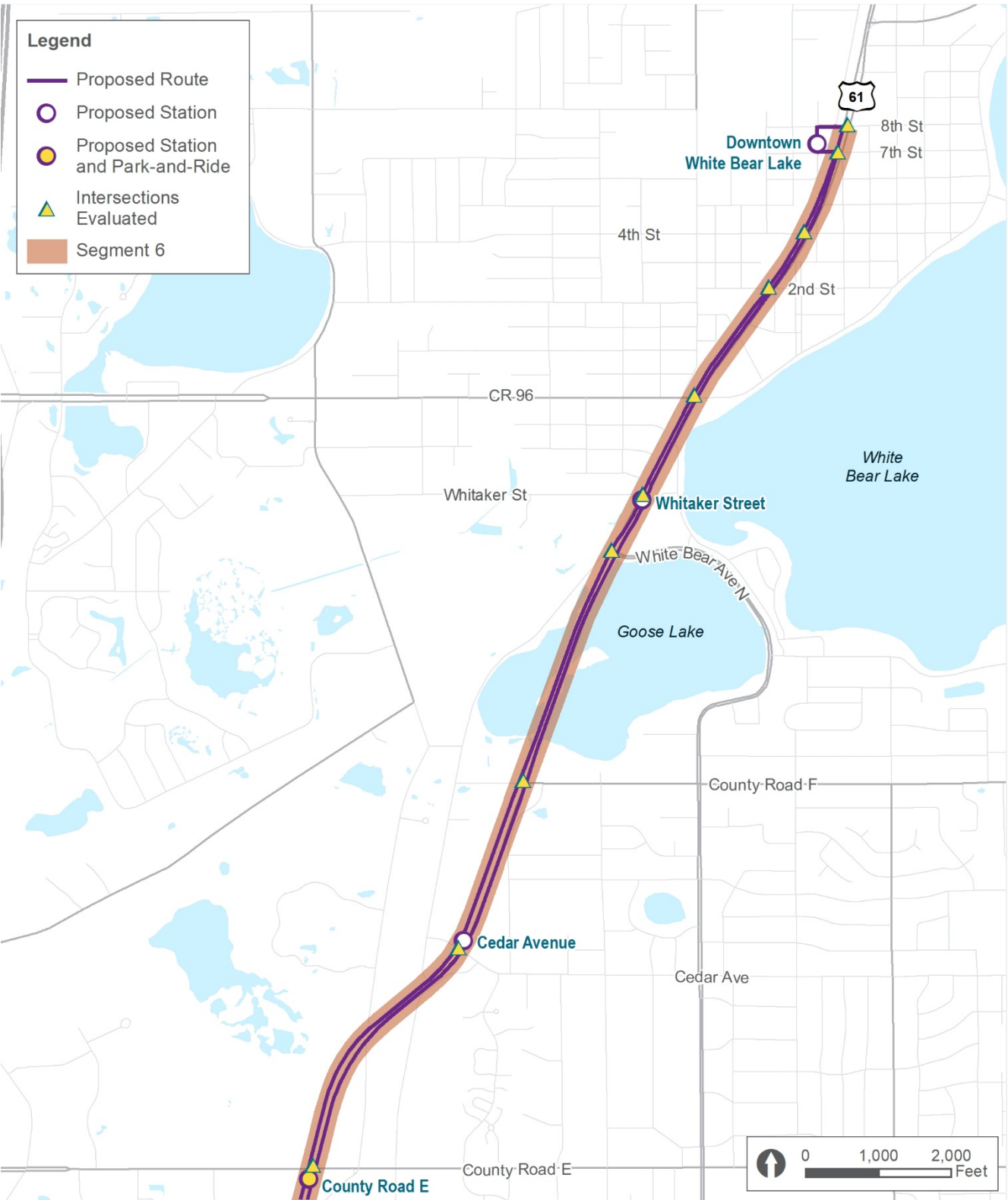


Figure 5: Intersections Evaluated Between County Road E and 8th Street



2.3. FORECAST TRAFFIC VOLUMES

The development of future year traffic forecasts was based on preliminary 2040 socioeconomic data prepared by local communities and is consistent with the Metropolitan Council's long-range plan for the region, *Thrive MSP 2040*.⁷ This data was used as an input to the Metropolitan Council's Regional Travel Demand Model. The outputs from the 2040 Regional Travel Demand Model were then compared to existing and historic traffic counts. This information, combined with the expected changes in land use and density, was used at a localized level to develop future year forecasts for each roadway segment within the study area.

The following ranges of annual growth rates were used to develop traffic forecasts for each of the analysis segments:

- **Segment 1: Robert Street from 5th Street to 11th Street:** 0.5 percent.
- **Segment 2: Jackson Street from 14th Street to Pennsylvania Avenue:** 0.5 percent.
- **Segment 3: Phalen Boulevard from L'Orient Street to Maryland Avenue:** 0.3 to 1.5 percent.
- **Segment 4: Ramsey County rail right-of-way from Maryland Avenue to Beam Avenue:** 0.5 percent.
- **Segment 5: Beam Avenue to County Road D:** 0.6 percent.
- **Segment 6: Highway 61 from Buerkle Road to 8th Street:** 0.5 to 1.5 percent.

The existing traffic turning movement volumes were grown from the count year to 2040 using these growth rates to project future traffic volumes along the corridor. In addition to background traffic growth, projected park-and-ride traffic was estimated for the peak hours and added to the traffic volumes on analysis segments where there are park-and-rides proposed as part of the Build Alternative.

3. EXISTING CONDITIONS

The existing conditions analysis was based on traffic volumes, roadway geometrics and signal operations as they existed in 2017-2019 when the data was collected.

This analysis found that all evaluated intersections operate at level of service D or better during the existing a.m. and p.m. peak hours except for the Phalen Boulevard/Payne Avenue intersection in the p.m. peak. A heavy eastbound through movement on Phalen Boulevard during the p.m. peak hour results in a level of service F for the Phalen Boulevard/Payne Avenue intersection.

Appendix A includes exhibits that show the existing peak hour traffic volumes. Appendix B includes exhibits showing the existing geometry and intersection control. Appendix C includes the results of the existing conditions analysis of delay and level of service.

⁷ Metropolitan Council. *Thrive MSP 2040*. Adopted on May 28, 2014. Available at <https://metro council.org/Planning/Projects/Thrive-2040.aspx>.

3.1. SEGMENT 1: ROBERT STREET FROM 5TH STREET TO 11TH STREET

Table 2 lists the results of the existing conditions analysis for the intersections evaluated on Segment 1. All intersections were modeled in Synchro/SimTraffic. The existing conditions analysis showed that all intersections operate at level of service D or better. The northbound through and right-turn movements at the Robert Street/11th Street intersection have queues that exceed the available storage during the p.m. peak hour due to high traffic demands and the short block spacing at this approach.

Table 2: Existing Peak Hour Operations for Intersections Evaluated on Segment 1

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ⁸	Intersection Level of Service	Average Vehicle Delay ⁸	Intersection Level of Service
Robert Street/5 th Street	13.0	B	12.3	B
Robert Street/6 th Street	9.2	A	10.0	A
Robert Street/7 th Place	5.7	A	19.8	B
Robert Street/7 th Street	10.4	B	17.5	B
Robert Street/9 th Street	7.2	A	19.5	B
Robert Street/10 th Street	13.5	B	23.8	C
Robert Street/11 th Street	12.0	B	18.0	B

3.2. SEGMENT 2: JACKSON STREET FROM 14TH STREET TO PENNSYLVANIA AVENUE

Table 3 lists the results of the existing conditions analysis for the intersections evaluated on Segment 2. All intersections were modeled in Synchro/SimTraffic. The existing conditions analysis showed that all intersections operate at level of service D or better. One queueing issue was identified at Jackson Street/University Avenue, where the westbound left-turn movement queue in the p.m. peak hour exceeds the storage length and operates at level of service E due to heavy conflicting eastbound volumes.

Table 3: Existing Peak Hour Operations for Intersections Evaluated on Segment 2

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ⁸	Intersection Level of Service	Average Vehicle Delay ⁸	Intersection Level of Service
Jackson Street/14 th Street	10.0	A	12.4	B
Jackson Street/University Avenue	14.6	B	19.7	B
Jackson Street/Mt. Airy Street	7.0	A	12.9	B

⁸ Measured in seconds per vehicle.

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ⁸	Intersection Level of Service	Average Vehicle Delay ⁸	Intersection Level of Service
Jackson Street/Pennsylvania Avenue eastbound ramps	1.4	A	2.1	A
Jackson Street/Pennsylvania Avenue westbound ramps/Empire Drive	7.1	A	10.3	B

3.3. SEGMENT 3: PHALEN BOULEVARD FROM L'ORIENT STREET TO MARYLAND AVENUE

Table 4 lists the results of the existing conditions analysis for the intersections evaluated on Segment 3. All intersections were modeled in Synchro/SimTraffic. The existing conditions analysis showed that all intersections operate at level of service D or better except the Phalen Boulevard/Payne Avenue intersection, which operates at level of service F in the p.m. peak due to heavy eastbound traffic. For the purposes of this analysis, at the Phalen Boulevard/Johnson Parkway intersection, Phalen Boulevard was considered to be an east-west oriented roadway and Johnson Parkway was considered to be a north-south oriented roadway.

Table 4: Existing Peak Hour Operations for Intersections Evaluated on Segment 3

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ⁹	Intersection Level of Service	Average Vehicle Delay ⁹	Intersection Level of Service
Pennsylvania Avenue/L'Orient Street	7.9	A	10.8	B
Phalen Boulevard/Olive Street	9.6	A	10.5	B
Phalen Boulevard/Cayuga Street	19.0	B	15.8	B
Phalen Boulevard/Payne Avenue	21.0	C	100+	F
Phalen Boulevard/Neid Lane	2.6	A	7.3	A
Neid Lane/Arcade Street	5.3	A	11.9	B
Phalen Boulevard/Johnson Parkway	19.1	B	25.1	C
Johnson Parkway/Magnolia Lane	1.8	A	2.5	A
Johnson Parkway/Maryland Avenue	13.7	B	16.2	B
Maryland Avenue/dedicated guideway	-	N/A	-	N/A

Queueing issues were identified at the following intersections:

- Phalen Boulevard/Payne Avenue: The southbound shared through/right-turn movement queue exceeds the available storage and blocks the closely spaced.¹⁰ (160 feet) upstream

⁹ Measured in seconds per vehicle.

¹⁰ Closely spaced in this document refers to anything 300 feet or less.

intersection of Payne Avenue/Whitall Street in the a.m. and p.m. peaks. The eastbound and southbound left-turn movements have queues that exceed the available storage and operate at level of service E/F in the p.m. peak hour. Queueing problems at this intersection are related to significant delay from high volumes and intersection geometry capacity deficiencies.

- Neid Lane/Arcade Street: The southbound approach queue in the p.m. peak hour blocks the closely spaced (130 feet) upstream intersection of Arcade Street/Wells Street.
- Phalen Boulevard/Johnson Parkway: The northbound left-turn and through movement queues exceed the available storage, and the northbound through movement queue blocks the closely spaced (200 feet) upstream intersection of Johnson Parkway/Magnolia Avenue in the a.m. and p.m. peaks. The southbound through movement queue exceeds the available storage and blocks the closely spaced (260 feet) upstream intersection of Johnson Parkway/Magnolia Lane in the p.m. peak hour.

3.4. SEGMENT 4: RAMSEY COUNTY RAIL RIGHT-OF-WAY FROM MARYLAND AVENUE TO BEAM AVENUE

The dedicated guideway is only present under the Build Alternative; therefore, no existing conditions traffic analysis was completed for this segment.

3.5. SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D

Table 5 lists the results of the existing conditions analysis for the intersections evaluated on Segment 5. All intersections were modeled in Synchro/SimTraffic. The existing conditions analysis showed that all intersections operate at level of service D or better, and no queueing issues were identified.

Table 5: Existing Peak Hour Operations for Intersections Evaluated on Segment 5

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹¹	Intersection Level of Service	Average Vehicle Delay ¹¹	Intersection Level of Service
Beam Avenue/dedicated guideway	-	N/A	-	N/A
Beam Avenue/Hazelwood Street	10.0	A	14.0	B
Beam Avenue/Kennard Street	7.0	A	8.9	A
Beam Avenue/Southlawn Drive	7.7	A	12.4	B
Beam Avenue/Maplewood Mall Transit Center driveway	-	N/A	-	N/A
Hazelwood Street/County Road D	4.9	A	7.7	A

¹¹ Measured in seconds per vehicle.

3.6. SEGMENT 6: HIGHWAY 61 FROM BUERKLE ROAD TO 8TH STREET

Table 6 lists the results of the existing conditions analysis for the intersections evaluated on Segment 6. Along Highway 61, the Minnesota Department of Transportation required that the traffic analysis be completed using Vissim software due to concerns regarding the shoulder-running business access and transit lane and adjacent through lanes on a high-speed trunk highway. Vissim has the ability to model the following conditions, which are relevant to the Minnesota Department of Transportation's concerns:

- The influence area of signalized intersections to understand the interaction between right-turning vehicles and through bus traffic.
- Areas near transit stations to understand the interaction between transit vehicles and general-purpose traffic.
- Advanced transit signal priority.

The existing conditions analysis showed that all intersections operate at level of service D or better. A queueing issue was identified at the Highway 61/4th Street intersection, where the eastbound left-turn movement queue in the p.m. peak hour exceeds the storage length and operates at level of service F due to long cycle lengths and prioritization of mainline traffic on Highway 61.

Table 6: Existing Peak Hour Operations for Intersections Evaluated on Segment 6

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹²	Intersection Level of Service	Average Vehicle Delay ¹²	Intersection Level of Service
Highway 61/Buerkle Road	23.7	C	27.5	C
Highway 61/Willow Lake Boulevard	6.7	A	7.5	A
Highway 61/County Road E	28.3	C	33.5	C
Highway 61/Cedar Avenue	15.1	B	15.3	B
Highway 61/County Road F	24.3	C	18.0	B
Highway 61/White Bear Avenue	14.3	B	13.6	B
Highway 61/Whitaker Street	1.6	A	5.6	A
Highway 61/County Road 96/Lake Avenue	22.9	C	34.2	C
Highway 61/2 nd Street	5.5	A	11.4	B
Highway 61/4 th Street	11.4	B	18.7	B
Highway 61/7 th Street	10.9	B	8.4	A
Highway 61/8 th Street	23.1	C	7.4	A

¹² Measured in seconds per vehicle.

4. ENVIRONMENTAL CONSEQUENCES

4.1. NO BUILD ALTERNATIVE

The region's highway system is comprised of interstates, state highways, county highways and some city streets. The Metropolitan Council's *2040 Transportation Policy Plan*.¹³ anticipates that the roadway network will experience a substantial increase in automobile demand by the year 2040. However, the state and municipalities have limited roadway expansion projects planned for the study area that would address this increase in vehicle miles traveled.

The 2040 No Build Alternative assumes the following planned capacity-related roadway improvement projects have occurred by 2040. The first two are Minnesota Department of Transportation projects and the third is a city of Saint Paul project:

- Adding a managed lane (i.e., a MnPASS lane) on Interstate 94 (I-94) between 5th/6th Streets South in downtown Minneapolis and Mounds Boulevard in Saint Paul.
- Adding a managed lane (i.e., a MnPASS lane) on Interstate 35E (I-35E) between Little Canada Road and County Road J.
- Converting 10th Street in downtown Saint Paul to a westbound one-way street and adding a bikeway on 10th Street between Jackson Street and Cedar Street.

The 2040 No Build Alternative traffic analysis provides a baseline to measure project-related impacts against. The 2040 No Build Alternative analysis was based on the forecasted traffic volumes and existing roadway geometrics and intersection control. The analysis assumed timing for existing traffic signals would be optimized between the existing conditions and 2040 No Build Alternative conditions.

The analysis found that all evaluated intersections would operate at level of service D or better during the a.m. and p.m. peak hours under the 2040 No Build Alternative except the following intersections:

- Phalen Boulevard/Payne Avenue in the p.m. peak hour due to a heavy eastbound through movement on Phalen Boulevard and multiple over-capacity movements.
- Highway 61/Buerkle Road in the p.m. peak hour due to long cycle lengths and high peak hour traffic demands along the corridor.
- Highway 61/County Road E in the p.m. peak hour due to long cycle lengths and high peak hour traffic demands along the corridor.

Appendix A includes exhibits that show the 2040 No Build Alternative peak hour traffic volumes. Appendix B includes exhibits showing the 2040 No Build Alternative geometrics and intersection control. Appendix C includes the complete results of the 2040 No Build Alternative analysis of delay and level of service.

¹³ Metropolitan Council. *2040 Transportation Policy Plan*. October 2018 Update. Available at <https://metro council.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan.aspx>.

4.1.1. Segment 1: Robert Street from 5th Street to 11th Street

Table 7 lists the results of the 2040 No Build Alternative analysis for the intersections evaluated on Segment 1. All intersections were modeled in Synchro/SimTraffic. All intersections are anticipated to operate at level of service D or better.

Table 7: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 1

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹⁴	Intersection Level of Service	Average Vehicle Delay ¹⁴	Intersection Level of Service
Robert Street/5 th Street	13.2	B	16.4	B
Robert Street/6 th Street	9.7	A	16.1	B
Robert Street/7 th Place	6.2	A	28.8	C
Robert Street/7 th Street	12.2	B	23.6	C
Robert Street/9 th Street	8.0	A	29.5	C
Robert Street/10 th Street	15.9	B	34.6	C
Robert Street/11 th Street	14.0	B	21.2	C

Queueing issues were identified at the following intersections:

- Robert Street/7th Place: The southbound through movement queue would exceed the available storage and block the upstream intersection of Robert Street/7th Street in the p.m. peak hour.
- Robert Street/7th Street: The northbound through and right-turn movement queues would exceed the available storage and block the upstream intersection of Robert Street/7th Place in the p.m. peak hour.
- Robert Street/9th Street: The northbound through and right-turn movement queues would exceed the available storage and block the upstream intersection of Robert Street/7th Street in the p.m. peak hour.
- Robert Street/10th Street: The northbound through movement queue would exceed the available storage and block the upstream intersection of Robert Street/9th Street in the p.m. peak hour.
- Robert Street/11th Street: The northbound through movement queue would exceed the available storage and block the upstream intersection of Robert Street/10th Street in the a.m. and p.m. peak hours. The northbound right-turn movement queue would also exceed the available storage and block the upstream intersection of Robert Street/10th Street in the p.m. peak hour. The southbound left-turn movement queue would exceed the available storage and operate at level of service E in the p.m. peak hour.

¹⁴ Measured in seconds per vehicle.

4.1.2. Segment 2: Jackson Street from 14th Street to Pennsylvania Avenue

Table 8 lists the results of the 2040 No Build Alternative analysis for the intersections evaluated on Segment 2. All intersections were modeled in Synchro/SimTraffic. All intersections are anticipated to operate at level of service D or better.

Table 8: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 2

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹⁵	Intersection Level of Service	Average Vehicle Delay ¹⁵	Intersection Level of Service
Jackson Street/14 th Street	11.3	B	15.0	B
Jackson Street/University Avenue	16.3	B	22.1	C
Jackson Street/Mt. Airy Street	8.0	A	15.0	B
Jackson Street/Pennsylvania Avenue eastbound ramps	1.4	A	4.0	A
Jackson Street/Pennsylvania Avenue westbound ramps/Empire Drive	7.8	A	15.4	C

Queueing issues were identified at the Jackson Street/University Avenue intersection. The westbound left-turn movement queue in the p.m. peak hour would exceed the storage length and operate at level of service F. The northbound through movement queue in the p.m. peak hour would block the closely spaced (200 feet) upstream intersection of Jackson Street/14th Street.

4.1.3. Segment 3: Phalen Boulevard from L'Orient Street to Maryland Avenue

Table 9 lists the results of the 2040 No Build Alternative analysis for the intersections evaluated on Segment 3. All intersections were modeled in Synchro/SimTraffic. All intersections are anticipated to operate at level of service D or better except for the Phalen Boulevard/Payne Avenue intersection, which would operate at level of service F in the p.m. peak hour due to heavy eastbound traffic and multiple over-capacity movements. For the purposes of this analysis, at the Phalen Boulevard/Johnson Parkway intersection, Phalen Boulevard was considered to be an east-west oriented roadway and Johnson Parkway was considered to be a north-south oriented roadway.

¹⁵ Measured in seconds per vehicle.

Table 9: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 3

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹⁶	Intersection Level of Service	Average Vehicle Delay ¹⁶	Intersection Level of Service
Pennsylvania Avenue/L'Orient Street	9.2	A	11.3	B
Phalen Boulevard/Olive Street	10.6	B	13.6	B
Phalen Boulevard/Cayuga Street	37.2	D	48.3	D
Phalen Boulevard/Payne Avenue	23.5	C	100+	F
Phalen Boulevard/Neid Lane	3.3	A	9.7	A
Neid Lane/Arcade Street	6.1	A	12.8	B
Phalen Boulevard/Johnson Parkway	23.3	C	26.8	C
Johnson Parkway/Magnolia Lane	2.0	A	6.0	A
Johnson Parkway/Maryland Avenue	14.4	B	18.3	B
Maryland Avenue/dedicated guideway	-	N/A	-	N/A

Queueing issues were identified at the following intersections under the 2040 No Build Alternative:

- Phalen Boulevard/Cayuga Street: The southbound approach queues in the p.m. peak hour would block the closely spaced (280 feet) upstream intersection of Cayuga Street/Arkwright Street. The southbound left-turn movement would operate at level of service F in the p.m. peak due to congestion and queue spillback from the Phalen Boulevard/Payne Avenue intersection.
- Phalen Boulevard/Payne Avenue: All movements other than the westbound through and right-turn movements would have queues that exceed the available storage and operate at level of service F in the p.m. peak hour. The eastbound, northbound and southbound approach queues would block the nearest upstream intersections in the p.m. peak hour. The southbound approach queue would also block the closely spaced (160 feet) upstream intersection in the a.m. peak hour.
- Neid Lane/Arcade Street: The southbound approach queue in the p.m. peak hour would block the closely spaced (130 feet) upstream intersection of Arcade Street/Wells Street.
- Phalen Boulevard/Johnson Parkway: The northbound left-turn and through movement queues would exceed the available storage, and the northbound through movement queue would block the closely spaced (200 feet) upstream intersection of Johnson Parkway/Magnolia Avenue in the a.m. and p.m. peak hours. The northbound right-turn movement queue would exceed the available storage and would block the closely spaced (200 feet) upstream intersection of Johnson Parkway/Magnolia Avenue in the p.m. peak hour. The southbound through movement queue would also exceed the available storage and block the

¹⁶ Measured in seconds per vehicle.

closely spaced (260 feet) upstream intersection of Johnson Parkway/Magnolia Lane in the p.m. peak hour.

4.1.4. Segment 4: Ramsey County Rail Right-of-Way from Maryland Avenue to Beam Avenue

The dedicated guideway is only present under the Build Alternative; therefore, no traffic analysis was completed for the 2040 No Build Alternative.

4.1.5. Segment 5: Beam Avenue to County Road D

Table 10 lists the results of the 2040 No Build Alternative analysis for the intersections evaluated on Segment 5. All intersections were modeled in Synchro/SimTraffic. All intersections are anticipated to operate at level of service D or better, and no queueing issues were identified.

Table 10: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 5

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹⁷	Intersection Level of Service	Average Vehicle Delay ¹⁷	Intersection Level of Service
Beam Avenue/dedicated guideway	-	N/A	-	N/A
Beam Avenue/Hazelwood Street	11.3	B	15.9	B
Beam Avenue/Kennard Street	8.3	A	10.2	B
Beam Avenue/Southlawn Drive	8.5	A	12.8	B
Beam Avenue/Maplewood Mall Transit Center driveway	-	N/A	-	N/A
Hazelwood Street/County Road D	5.2	A	8.3	A

4.1.6. Segment 6: Highway 61 from Buerkle Road to 8th Street

Table 11 lists the results of the 2040 No Build Alternative analysis for the intersections evaluated on Segment 6. Vissim software was used for the Highway 61 traffic analysis. All intersections are anticipated to operate at level of service D or better during the a.m. and p.m. peak hours except for the Highway 61/Buerkle Road intersection in the p.m. peak and the Highway 61/County Road E intersection in the p.m. peak. Poor operations at these Highway 61 intersections are due to long cycle lengths and high peak hour traffic demands along the corridor.

¹⁷ Measured in seconds per vehicle.

Table 11: 2040 No Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 6

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ¹⁸	Intersection Level of Service	Average Vehicle Delay ¹⁸	Intersection Level of Service
Highway 61/Buerkle Road	25.4	C	60.2	E
Highway 61/Willow Lake Boulevard	11.6	B	44.0	D
Highway 61/County Road E	48.3	D	58.3	E
Highway 61/Cedar Avenue	25.5	C	18.0	B
Highway 61/County Road F	31.6	C	20.5	C
Highway 61/White Bear Avenue	16.0	B	18.9	B
Highway 61/Whitaker Street	1.4	A	12.6	B
Highway 61/County Road 96/Lake Avenue	36.4	D	44.9	D
Highway 61/2 nd Street	7.9	A	26.3	C
Highway 61/4 th Street	13.4	B	26.0	C
Highway 61/7 th Street	11.9	B	10.2	B
Highway 61/8 th Street	27.0	D	8.3	A

Queueing issues were identified at the following intersections under the 2040 No Build Alternative:

- Highway 61/Buerkle Road: The westbound right-turn movement queue would exceed the available storage and would operate at level of service E in the p.m. peak hour.
- Highway 61/Willow Lake Boulevard: The eastbound right-turn movement queue would exceed the available storage and would operate at level of service F in the p.m. peak hour.
- Highway 61/Cedar Avenue: The westbound approach queues would exceed the available storage and would block the closely spaced (225 feet) upstream intersection at Cedar Avenue/Hoffman Road in the a.m. peak hour.
- Highway 61/Whitaker Street: The southbound left-turn movement queue would exceed the available storage and would operate at level of service F in the p.m. peak hour.
- Highway 61/4th Street: The eastbound left-turn movement queue would exceed the storage length and would operate at level of service E in the p.m. peak hour. The westbound approach queues would exceed the available storage length and would block the closely spaced (65 feet) upstream intersection of 4th Street/Washington Avenue in the p.m. peak hour.

4.2. BUILD ALTERNATIVE

Under the 2040 Build Alternative, the project would include several improvements that would provide adequate infrastructure to accommodate buses, pedestrians and park-and-ride traffic near stations.

¹⁸ Measured in seconds per vehicle.

The project would provide improvements that would safely and efficiently control movements at intersections and would not degrade the overall intersection level of service at any intersection from an acceptable level of service under the 2040 No Build Alternative to an unacceptable level of service under the 2040 Build Alternative.

At full-access intersections where the dedicated guideway would be located in the center or on one side of the road, the project would construct new or modify existing traffic signals to safely control the movements of vehicles, pedestrians and bicycles through the intersection. At full-access intersections where BRT would operate in mixed traffic or where the guideway would be split on each side of the road to the right of the vehicle lanes, traffic signals generally are not needed to safely accommodate BRT traffic. The 2040 Build Alternative traffic models incorporated these improvements.

There are three park-and-ride facilities associated with the project as summarized in Table 12. Two of these park-and-rides would use existing surface lots and/or parking structures, and the other would require the construction of a new parking structure. Estimated Rush Line park-and-ride traffic was added to the traffic modeling at intersections near a proposed park-and-ride facility.¹⁹

Table 12: Park-and-Ride Facilities

Location	Number of Parking Spaces	Type of Facility
Highway 36	300	New parking structure
Maplewood Mall Transit Center	1,000	Existing surface lots and parking structure
County Road E	Up to 70	Existing surface lot reconfigured to accommodate the park-and-ride

The 2040 Build Alternative modeling included the following roadway infrastructure improvements. The concept plans (included in Appendix A of the EA) show all traffic signal modifications/reconstructions, grade crossings and other infrastructure changes that are part of the project.

- Segment 1: Robert Street from 5th Street to 11th Street:
 - Remove left-turn lanes and convert the outside northbound lane on Robert Street to a business access and transit lane starting north of 6th Street and terminating at 11th Street.
 - Remove left-turn lanes and convert the outside southbound lane on Robert Street to a business access and transit lane starting at 11th Street and terminating at 6th Street.
- Segment 2: Jackson Street from 14th Street to Pennsylvania Avenue:
 - Replace the existing traffic signal at the intersection of Jackson Street/Mt. Airy Street with one that is up to current standards and provides pedestrian crossings to the platforms.
 - Add transit signal priority at all signalized intersections along the proposed route within this segment of the study area.

¹⁹ The intersections evaluated are not anticipated to have different traffic impacts under the Build Alternative and the Build Alternative option without the Highway 36 park-and-ride given their distance from the Highway 36 park-and-ride.

- Segment 3: Phalen Boulevard from L'Orient Street to Maryland Avenue:
 - Convert the outer eastbound lane/shoulder on Phalen Boulevard to a business access and transit lane from the Jackson Street on-ramp to approximately 115 feet west of Cayuga Street. Add an additional lane outside of the existing lanes for the business access and transit lane between Cayuga Street and Payne Avenue.
 - Expand westbound Phalen Boulevard from two lanes to three lanes approximately 75 feet downstream of the intersection with Payne Avenue, with the outer lane serving as a business access and transit lane. Westbound Phalen Boulevard would narrow to two lanes approximately 300 feet downstream of the intersection with Payne Avenue, with one lane serving as a business access and transit lane and the other lane for general purpose traffic. The business access and transit lane would terminate at the Pennsylvania Avenue westbound off-ramp at Jackson Street.
 - Add northbound and southbound right-turn lanes at the intersection of Phalen Boulevard/Payne Avenue to provide additional traffic capacity.
 - Extend the eastbound, northbound and westbound left-turn lanes at the intersection of Phalen Boulevard/Payne Avenue to increase capacity.
 - Reconstruct the traffic signal at the intersection of Phalen Boulevard/Payne Avenue to accommodate the changes in roadway geometry.
 - Add a new traffic signal at the intersection of Phalen Boulevard/Neid Lane to control pedestrian/bicycle crossings and movements at the intersection.
 - Add a new traffic signal at the intersection of Arcade Street and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements at the intersection.
 - Add a new traffic signal at the intersection of Mendota Circle and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements at the intersection.
 - Add a new traffic signal at the intersection of Wells Street and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements at the intersection.
 - Add a new traffic signal at the intersection of Frank Street and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements at the intersection.
 - Add a new traffic signal at the intersection of Maryland Avenue and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.
 - Add transit signal priority at all signalized intersections along the proposed route within this segment of the study area.
- Segment 4: Ramsey County rail right-of-way from Maryland Avenue to Beam Avenue:
 - Add a new traffic signal at the intersection of Larpenteur Avenue and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.
 - Add a new traffic signal at the intersection of Frost Avenue and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.
 - Add a new traffic signal at the intersection of County Road B and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.

- Add a new traffic signal at the intersection of Cope Avenue and the dedicated guideway to control pedestrian/bicycle crossings and movements.
 - Add new traffic signals at the English Street interchange ramps on Highway 36 to control additional traffic going to and from the Highway 36 park-and-ride.
 - Add a new traffic signal at the intersection of Gervais Avenue and the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.
 - Add transit signal priority at all signalized intersections along the proposed route within this segment of the study area.
- Segment 5: Beam Avenue to County Road D:
 - Add a new traffic signal at Beam Avenue to control movements at the intersection with the dedicated guideway. The traffic signal would not stop westbound through traffic on Beam Avenue.
 - Convert one lane in each direction to center-running dedicated guideway on Beam Avenue between the Ramsey County rail right-of-way and Southlawn Drive.
 - Convert the outside northbound lane on Southlawn Drive between Beam Avenue and the Maplewood Mall entrance to a business access and transit lane.
 - Convert the inside westbound through lane on Beam Avenue to dedicated guideway from approximately 100 feet west of the Maplewood Mall Transit Center driveway to Southlawn Drive.
 - Install a new traffic signal at the Beam Avenue/Maplewood Mall Transit Center driveway intersection. The traffic signal would not stop eastbound through traffic on Beam Avenue.
 - Add a new traffic signal at the Hazelwood Street/County Road D intersection to control pedestrian/bicycle crossings and movements at the intersection with the dedicated guideway.
 - Add transit signal priority at all signalized intersections along the proposed route within this segment of the study area.
- Segment 6: Highway 61 from Buerkle Road to 8th Street:
 - Add a new traffic signal at the Buerkle Road intersection with the dedicated guideway to safely control bus, vehicle and pedestrian/bicycle movements.
 - Add a westbound left-turn lane and remove one receiving lane on the east leg of the Highway 61/Buerkle Road intersection.
 - Convert the existing shoulder to a business access and transit lane on northbound Highway 61 beginning at Buerkle Road and terminating approximately 100 feet north of Whitaker Street.
 - Convert the existing shoulder to a business access and transit lane on southbound Highway 61 beginning approximately 600 feet south of Whitaker Street and terminating approximately 290 feet south of Willow Lake Boulevard.
 - Add a new traffic signal at Whitaker Street to control pedestrian/bicycle crossings and the merging of the northbound movements.
 - Add a permitted phase to the northbound left-turn movement at the Highway 61/Lake Street intersection to improve operations for the movement and intersection.

- Remove the southbound left-turn lane at 7th Street and extend the northbound left-turn lane at 8th Street to increase storage capacity for the northbound left-turn movement at 8th Street.
- Add a new traffic signal at 8th Street to control bus movements onto Highway 61.
- Add transit signal priority at all signalized intersections along the proposed route within this segment of the study area.

The 2040 Build Alternative analysis included the following factors and assumptions:

- Signal-timing optimization: The signal timings for all intersections were optimized for the 2040 Build Alternative conditions.
- Operations and maintenance facility: The project would use the existing Metro Transit East Metro Garage building at 820 L'Orient Street in Saint Paul. Project-related traffic impacts from use of the garage are not anticipated. A traffic analysis was not conducted for buses traveling between the East Metro Garage and the Rush Line route for the following reasons:
 - Approximately 400 drivers and 90 mechanics staff the East Metro Garage, which services more than 30 routes and houses more than 200 buses. The addition of 13 buses for the Rush Line BRT Project would represent less than a 7 percent change in fleet service and storage at the garage.
 - Operator changes would occur on the Rush Line route and not at the garage as they do for the METRO Green Line, METRO Blue Line and A Line because the proposed frequency does not allow buses to travel back to the garage between the a.m. and p.m. peak travel periods.
 - The BRT traffic to and from the East Metro Garage and the BRT operators' travel to and from work would both occur outside of peak hours (before 6 a.m. and after 7 p.m.) when traffic volumes are lower and the surrounding streets and intersections have sufficient traffic capacity.

Appendix A includes exhibits that show the 2040 Build Alternative peak hour traffic volumes, Appendix B includes exhibits that show the geometrics and intersection control for the 2040 Build Alternative and Appendix C includes the complete results of the 2040 Build Alternative analysis of delay and level of service.

4.2.1. Operating Phase Impacts

SEGMENT 1: ROBERT STREET FROM 5TH STREET TO 11TH STREET

Table 13 lists the results of the 2040 Build Alternative analysis for the intersections evaluated on Segment 1. All intersections were modeled in Synchro/SimTraffic. All intersections would operate at level of service D or better.

Table 13: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 1

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²⁰	Intersection Level of Service	Average Vehicle Delay ²⁰	Intersection Level of Service
Robert Street/5 th Street	31.1	C	28.1	C
Robert Street/6 th Street	25.4	C	33.8	C
Robert Street/7 th Place	16.0	B	27.0	C
Robert Street/7 th Street	25.2	C	21.1	C
Robert Street/9 th Street	17.5	B	22.6	C
Robert Street/10 th Street	19.8	B	19.1	B
Robert Street/11 th Street	12.6	B	13.6	B

Queueing issues were identified at the following intersections:

- Robert Street/5th Street: The northbound through and right-turn movement queues on Robert Street would block the Robert Street/4th Street intersection in both the a.m. and p.m. peak hours due to queue spillback from the 6th Street intersection. Additionally, both movements would operate at level of service E in the p.m. peak hour.
- Robert Street/6th Street: The northbound through movement queue on Robert Street would block the Robert Street/5th Street intersection and operate at level of service E in both the a.m. and p.m. peak hours due to queue spillback from the 7th Place intersection.
- Robert Street/7th Place: The northbound through movement queue on Robert Street would block the Robert Street/6th Street intersection in both the a.m. and p.m. peak hours. The southbound shared through/left-turn movement queue on Robert Street would block the Robert Street/7th Street intersection in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.
- Robert Street/7th Street: The northbound shared through/left-turn movement queue on Robert Street would block the nearest upstream intersection during both the a.m. and p.m. peak hours. This queueing issue is anticipated for the northbound shared through/right-turn movement queue during the p.m. peak hour under the 2040 No Build Alternative. The southbound shared through/left-turn movement queue on Robert Street would block the nearest upstream intersection during the a.m. peak hour. Additionally, the southbound left-turn movement would operate at level of service E in the a.m. peak hour.
- Robert Street/9th Street: The northbound shared through/left-turn movement queue on Robert Street would block the Robert Street/7th Street intersection in the p.m. peak hour, as anticipated for the northbound shared through/right-turn movement queue under the 2040 No Build Alternative.

²⁰ Measured in seconds per vehicle.

- Robert Street/10th Street: The northbound shared through/left-turn movement queue on Robert Street would block the Robert Street/9th Street intersection in the p.m. peak hour, as anticipated for the northbound shared through/right-turn movement queues under the 2040 No Build Alternative.

SEGMENT 2: JACKSON STREET FROM 14TH STREET TO PENNSYLVANIA AVENUE

Table 14 lists the results of the 2040 Build Alternative analysis for the intersections evaluated on Segment 2. All intersections were modeled in Synchro/SimTraffic. All intersections would operate at level of service D or better.

Table 14: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 2

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²¹	Intersection Level of Service	Average Vehicle Delay ²¹	Intersection Level of Service
Jackson Street/14 th Street	11.1	B	15.3	B
Jackson Street/University Avenue	16.2	B	24.9	C
Jackson Street/Mt. Airy Street	8.0	A	14.7	B
Jackson Street/Pennsylvania Avenue eastbound ramps	1.4	A	3.8	A
Jackson Street/Pennsylvania Avenue westbound ramps/Empire Drive	7.4	A	13.3	B

Queueing issues identified at the Jackson Street/University Avenue intersection are similar to those found under the 2040 No Build Alternative. The westbound left-turn movement queue on University Avenue would exceed the available storage and operate at level of service F in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative. Additionally, the northbound through movement queue on Jackson Street would block the closely spaced (200 feet) Jackson Street/14th Street intersection in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.

SEGMENT 3: PHALEN BOULEVARD FROM 14TH STREET TO PENNSYLVANIA AVENUE

Table 15 lists the results of the 2040 Build Alternative analysis for the intersections evaluated on Segment 3. All intersections were modeled in Synchro/SimTraffic. All intersections would operate at level of service D or better. For the purposes of this analysis, at the Phalen Boulevard/Johnson Parkway intersection, Phalen Boulevard was considered to be an east-west oriented roadway and Johnson Parkway was considered to be a north-south oriented roadway.

²¹ Measured in seconds per vehicle.

Table 15: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 3

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²²	Intersection Level of Service	Average Vehicle Delay ²²	Intersection Level of Service
Pennsylvania Avenue/L'Orient Street	13.1	B	21.0	C
Phalen Boulevard/Olive Street	18.2	B	38.3	D
Phalen Boulevard/Cayuga Street	29.1	C	20.4	C
Phalen Boulevard/Payne Avenue	24.8	C	52.8	D
Phalen Boulevard/Neid Lane	7.8	A	16.4	B
Neid Lane/Arcade Street	8.2	A	13.4	B
Phalen Boulevard/Johnson Parkway	23.4	C	26.8	C
Johnson Parkway/Magnolia Lane	2.1	A	4.5	A
Johnson Parkway/Maryland Avenue	14.3	B	18.0	B
Maryland Avenue/dedicated guideway	8.0	A	6.8	A

Queueing issues were identified at the following intersections:

- Phalen Boulevard/Olive Street: The eastbound through movement queue on Phalen Boulevard would block the Phalen Boulevard/Mississippi Street intersection due to the lane reduction for the proposed eastbound business access and transit lane in the p.m. peak hour. Additionally, the westbound left-turn movement queue on Phalen Boulevard would exceed the available storage and operate at level of service E in the p.m. peak hour due to the reduction in acceptable gaps in the eastbound traffic stream associated with the conversion of the outside through/right lane to a business access and transit lane.
- Phalen Boulevard/Cayuga Street: The southbound left-turn movement queue on Cayuga Street would exceed the available storage length and block the Cayuga Street/Arkwright Street intersection in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.
- Phalen Boulevard/Payne Avenue: The southbound through movement queue on Payne Avenue would block the closely spaced (175 feet) upstream intersection during the a.m. peak hour, as is anticipated under the 2040 No Build Alternative. The northbound and southbound left-turn and through movement queues on Payne Avenue would exceed the available storage length and would operate at level of service E/F in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.
- Neid Lane/Arcade Street: The southbound through movement queue on Arcade Street would block the closely spaced (130 feet) Arcade Street/Wells Street intersection in both the a.m. and p.m. peak hours. This queueing issue is also present in the 2040 No Build Alternative during the p.m. peak hour.

²² Measured in seconds per vehicle.

- Phalen Boulevard/Johnson Parkway: The northbound left-turn and through movement queues would exceed the available storage, and the northbound through movement queue would block the closely spaced (200 feet) Johnson Parkway/Magnolia Avenue intersection in the a.m. and p.m. peak hours. The northbound right-turn movement queue would exceed the available storage and would block the closely spaced (200 feet) upstream intersection of Johnson Parkway and Magnolia Avenue in the p.m. peak hour. The southbound through movement queue would also exceed the available storage and block the closely spaced (260 feet) Johnson Parkway/Magnolia Lane intersection in the p.m. peak hour. All of the queueing issues at this intersection are also present in the 2040 No Build Alternative.

SEGMENT 4: RAMSEY COUNTY RAIL RIGHT-OF-WAY FROM MARYLAND AVENUE TO BEAM AVENUE

Table 16 lists the results of the 2040 Build Alternative analysis for the intersection evaluated on Segment 4. The intersection was modeled in Synchro/SimTraffic. The intersection would operate at level of service D or better, and no queueing issues were identified. The evaluation of the intersection showed that there would be no queueing interaction between the dedicated guideway/Frost Avenue intersection and the Frost Avenue/English Street roundabout just west of the guideway crossing.

Table 16: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 4

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²³	Intersection Level of Service	Average Vehicle Delay ²³	Intersection Level of Service
Dedicated guideway/Frost Avenue	7.5	A	8.0	A

SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D

Table 17 lists the results of the 2040 Build Alternative analysis for the intersections evaluated on Segment 5. All intersections were modeled in Synchro/SimTraffic. All intersections would operate at level of service D or better, and no queueing issues were identified.

Table 17: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 5

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²³	Intersection Level of Service	Average Vehicle Delay ²³	Intersection Level of Service
Beam Avenue/dedicated guideway	5.4	A	7.2	A
Beam Avenue/Hazelwood Street	13.0	B	23.4	C
Beam Avenue/Kennard Street	10.5	B	18.1	B
Beam Avenue/Southlawn Drive	12.6	B	20.1	C

²³ Measured in seconds per vehicle.

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²³	Intersection Level of Service	Average Vehicle Delay ²³	Intersection Level of Service
Beam Avenue/Maplewood Mall Transit Center driveway	3.9	A	4.4	A
Hazelwood Street/County Road D	4.0	A	6.1	A

SEGMENT 6: HIGHWAY 61 FROM BUERKLE ROAD TO 8TH STREET

Table 18 lists the results of the 2040 Build Alternative analysis for the intersections evaluated on Segment 6. All intersections were modeled in Vissim. All intersections would operate at level of service D during both the a.m. and p.m. peak hours except for the Highway 61/County Road E intersection during the p.m. peak hour, which would also operate at level of service E in the p.m. peak hour under the 2040 No Build Alternative.

Table 18: 2040 Build Alternative Peak Hour Operations for Intersections Evaluated on Segment 6

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Average Vehicle Delay ²⁴	Intersection Level of Service	Average Vehicle Delay ²⁴	Intersection Level of Service
Highway 61/Buerkle Road	27.9	C	54.9	D
Highway 61/Willow Lake Boulevard	14.8	B	29.6	C
Highway 61/County Road E	47.5	D	56.4	E
Highway 61/Cedar Avenue	27.7	C	20.2	C
Highway 61/County Road F	39.6	D	24.0	C
Highway 61/White Bear Avenue	17.1	B	42.5	D
Highway 61/Whitaker Street	8.9	A	14.7	B
Highway 61/County Road 96/Lake Avenue	33.9	C	42.3	D
Highway 61/2 nd Street	9.1	A	30.6	C
Highway 61/4 th Street	27.3	C	34.2	C
Highway 61/7 th Street	10.7	B	14.0	B
Highway 61/8 th Street	48.2	D	14.7	B

The following queueing issues were identified:

- Highway 61/Willow Lake Boulevard: The eastbound right-turn movement queue would exceed the available storage and would operate at level of service F in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.

²⁴ Measured in seconds per vehicle.

- Highway 61/County Road E: The westbound left-turn movement queue would exceed the available storage and would operate at level of service F in the a.m. peak hour.
- Highway 61/Cedar Avenue: The westbound approach queues would exceed the available storage and would block the closely spaced (225 feet) upstream intersection at Cedar Avenue/Hoffman Road in the a.m. peak hour. Additionally, the westbound left-turn and through movements would operate at level of service F in the a.m. peak hour. This queueing issue is also present in the 2040 No Build Alternative.
- Highway 61/County Road 96/Lake Avenue: The eastbound left-turn movement queue would exceed the available storage and would operate at level of service F in the p.m. peak hour.
- Highway 61/4th Street: The eastbound left-turn movement queue would exceed the available storage and operate at level of service F in the a.m. and p.m. peak hours. This queueing issue is also present in the 2040 No Build Alternative during the p.m. peak hour, with the eastbound left-turn movement operating at level of service E. Additionally, the eastbound through movement queue would block the closely-spaced (160 feet) upstream intersection of 4th Street/Bloom Avenue and operate at level of service F during the p.m. peak hour. The westbound left-turn movement queue would exceed the available storage length, block the closely spaced (65 feet) upstream intersection of 4th Street/Washington Avenue, and operate at level of service E in the p.m. peak hour, as is anticipated under the 2040 No Build Alternative.

2040 BUILD ALTERNATIVE SUMMARY

The concept plans (included in Appendix A of the EA) show all traffic signal modifications and reconstructions, grade crossings and other infrastructure changes that are part of the project. With these improvements as part of the 2040 Build Alternative, all intersections evaluated are anticipated to operate at overall level of service D or better in the 2040 a.m. and p.m. peak hours except for the Highway 61/County Road E intersection in the p.m. peak hour, which would operate at level of service E as it would under the 2040 No Build Alternative.

The project would improve operations at the Phalen Boulevard/Payne Avenue intersection (see Table 15), which would operate at level of service F under the 2040 No Build Alternative, in addition to improving overall person throughput with the addition of treatments that prioritize high-capacity transit vehicles. The improvement in operations at the Phalen Boulevard/Payne Avenue intersection is due to the following project-related geometric improvements: extending the eastbound, northbound and westbound turn lanes and adding exclusive right-turn lanes on all approaches (business access and transit lanes on Phalen Boulevard). These capacity additions allow retiming of the signal and reductions in delays and queues at the intersection.

The project would also improve operations at the Highway 61/Buerkle Road intersection (see Table 18) in the p.m. peak hour from level of service E under the 2040 No Build Alternative to level of service D under the 2040 Build Alternative. The improvement in operations at this intersection is due to the project-related improvement of converting one of the two receiving lanes on the east leg of Buerkle Road to an additional westbound left-turn lane and converting the existing right-turn lane into a business access and transit lane.

The 2040 Build Alternative would generate queueing impacts that were not present under the 2040 No Build Alternative at the locations listed in Table 19.

Table 19: 2040 Build Alternative Queueing Impact Locations

Intersection	Movement(s)	Queueing Issue
Robert Street/5 th Street	Northbound through and right	Spillback into closely spaced upstream intersection and operates at level of service E
Robert Street/6 th Street	Northbound through	Spillback into closely spaced upstream intersection and operates at level of service E
Robert Street/7 th Place	Northbound through	Spillback into closely spaced upstream intersection
	Southbound left	Spillback into closely spaced upstream intersection
Robert Street/7 th Street	Northbound left and through	Spillback into closely spaced upstream intersection
	Southbound left	Spillback into closely spaced upstream intersection and operates at level of service E
	Southbound through	Spillback into closely spaced upstream intersection
Robert Street/9 th Street	Northbound left	Spillback into closely spaced upstream intersection
Robert Street/10 th Street	Northbound left	Spillback into closely spaced upstream intersection
Phalen Boulevard/Olive Street	Eastbound through	Spillback into upstream intersection
	Westbound left	Operates at level of service E
Neid Lane/Arcade Street	Southbound through	Spillback into closely spaced upstream intersection
Highway 61/County Road E	Westbound left	Operates at level of service F
Highway 61/County Road 96	Eastbound left	Operates at level of service F
Highway 61/4 th Street	Eastbound left	Operates at level of service F
	Eastbound through	Spillback into closely spaced upstream intersection and operates at level of service F

Mitigation measures for these queueing impacts are discussed in Section 5.

Improvements and modifications that would be made as part of the project would result in a change in the traffic operations at several intersections and lead to a decrease in the queue length for some movements. Table 20 lists the movements that have a queueing issue under the 2040 No Build Alternative but do not exhibit the queueing issue under the 2040 Build Alternative.

Table 20: 2040 Build Alternative Queueing Improvement Locations

Intersection	Movement(s)
Robert Street/9 th Street	Northbound right
Robert Street/11 th Street	Northbound through and right
	Southbound left
Phalen Boulevard/Cayuga Street	Southbound right
Phalen Boulevard/Payne Avenue	Eastbound left, through and right
	Westbound left
	Northbound right
	Southbound right
Highway 61/Buerkle Road	Westbound right
Highway 61/Whitaker Street	Southbound left
Highway 61/4 th Street	Westbound through and right

4.2.2. Construction Phase Impacts

Project construction would produce short-term impacts to traffic operations including lane, intersection and roadway closures and detours that would cause localized increases in congestion.

As engineering advances, a detailed construction staging plan will be developed. Maintenance of traffic plans will be developed during the final engineering or construction phase to address construction phasing, traffic signal operations, access through the work zone, road closures and motorized and non-motorized traffic detours.

5. MITIGATION MEASURES

The project would incorporate improvements to roadways and intersections to provide level of service D or better operations at all intersections that operated at level of service D or better when evaluated under the 2040 No Build Alternative. These improvements are listed in Section 4.2 and are shown on the concept plans included in Appendix A of the EA. The additional recommended mitigation measures in this section will be incorporated into the final design of the project assuming approval by the appropriate roadway authority.

Queueing issues are identified under the 2040 Build Alternative at multiple locations on Robert Street, Phalen Boulevard, Neid Lane and Highway 61. Mitigation measures that are recommended to alleviate queueing impacts generated under the 2040 Build Alternative are discussed below and summarized in Table 21.

While multiple northbound and southbound queues on Robert Street in downtown Saint Paul are expected to extend into upstream intersections under the 2040 Build Alternative, several of these queueing issues are anticipated under the 2040 No Build Alternative. The conversion of one lane in each direction to a business access and transit lane would contribute to increased queue lengths for general purpose traffic, and the closely spaced intersections along Robert Street limit available vehicle storage and lead to the new queueing issues under the 2040 Build Alternative. Traffic diversions would be anticipated from Robert Street to adjacent streets if significant queueing and backups occur on Robert Street. This traffic diversion would be expected to alleviate some of the

queueing issues identified in the 2040 Build Alternative. Although additional capacity in the downtown environment is not feasible, the business access and transit lanes on Robert Street are the recommended design due to the benefit to the multimodal transportation network that they provide. The business access and transit lanes along Robert Street would provide decreased travel times for the bus and would lead to more reliable service. This results in more dependable transportation for the transit-dependent population and may encourage transit-oriented development.

The eastbound through movement at the Phalen Boulevard/Olive Street intersection would be expected to develop a queueing issue under the 2040 Build Alternative due to the conversion of the outside eastbound lane to a business access and transit lane. Due to the limitations that the I-35E bridge presents to the expandability of the roadway in this area, additional capacity would not be reasonable to mitigate this queueing issue. The westbound left-turn movement at the Phalen Boulevard/Olive Street intersection would be expected to queue out of the provided storage lane. This could be mitigated by moving the termination point of the center median 50 feet to the east to provide more storage length for the westbound left-turn lane.

The southbound queue at the Neid Lane/Arcade Street intersection is projected to extend into the intersection of Wells Street, which is located approximately 130 feet upstream of Neid Lane, under the 2040 Build Alternative. This queue could be mitigated with minor signal timing adjustments to provide additional time for the southbound through movement.

The westbound left-turn movement at the Highway 61/County Road E intersection is projected to extend beyond the provided storage length under the 2040 Build Alternative. To mitigate this potential queueing issue, it is recommended that the center lane upstream from the intersection near Hoffman Road be restriped to shorten the existing two-way left-turn lane by 60 feet, which would lengthen the westbound left-turn storage bay.

The eastbound left-turn movement at the Highway 61/County Road 96 intersection is projected to queue beyond the provided storage length under the 2040 Build Alternative. This could be mitigated by adjusting the transit signal priority parameters during the peak hours to reduce queueing impacts on the eastbound approach of the intersection.

Queueing issues are anticipated for the eastbound approach at the Highway 61/4th Street intersection under the 2040 Build Alternative due to the change in time allocation at the traffic signal from the implementation of transit signal priority. This could be mitigated by adjusting the transit signal priority parameters during the peak hours to accommodate eastbound traffic at the intersection.

Beyond the location-specific improvements developed for the project that promote safe and efficient traffic and BRT operations, there are several more fundamental improvements to the transportation system that would result from the project. Dedicated BRT operations directly result in an increase in speed and reliability for transit. This increase in speed and reliability can lead to higher transit ridership and overall person throughput.

Table 21 outlines the mitigation measures that are recommended to alleviate the queueing impacts generated under the 2040 Build Alternative.

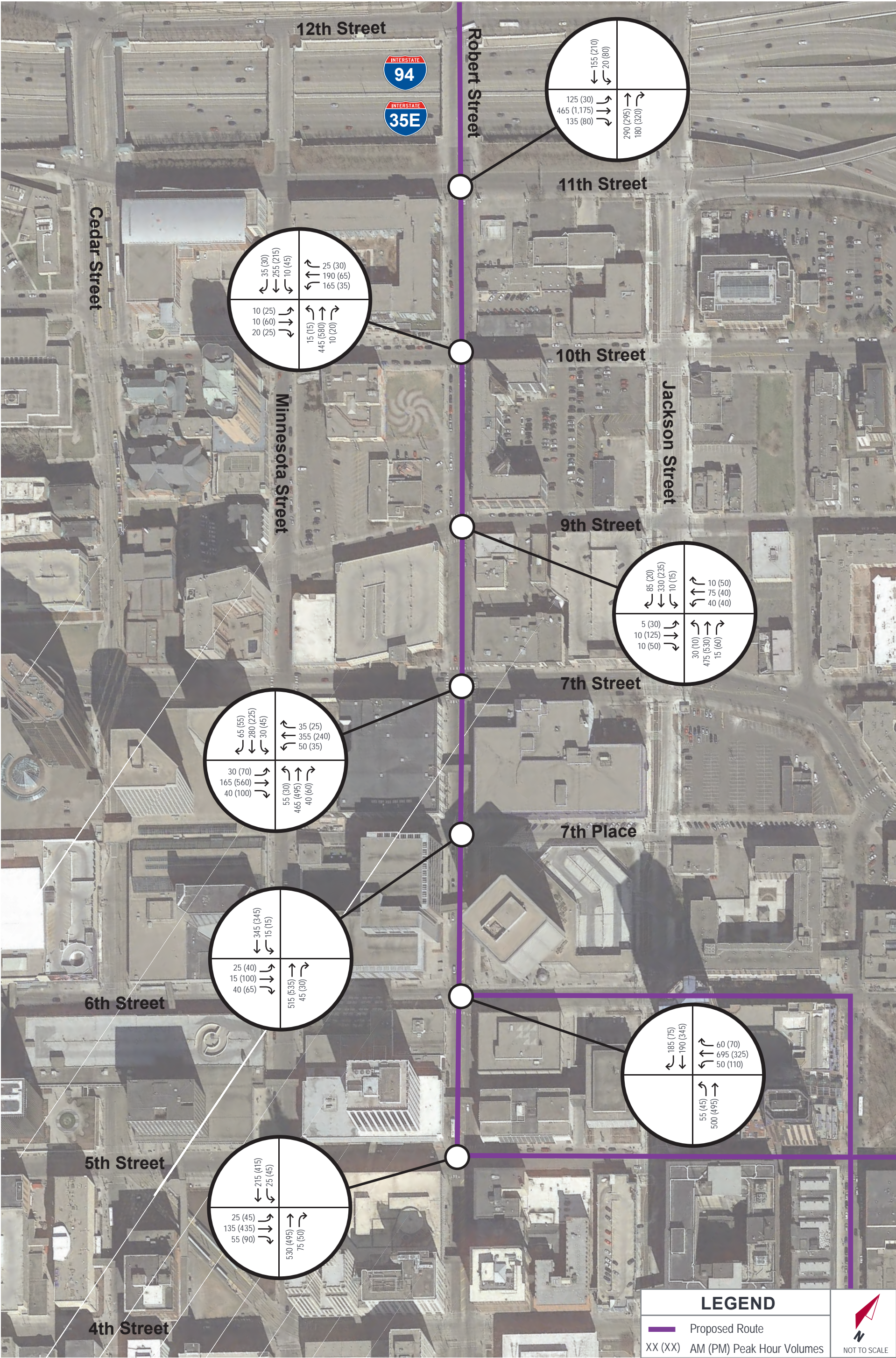
Table 21: Recommended Queueing Mitigation Measures

Intersection	Movement(s)	Recommended Mitigation Measure
Robert Street/5 th Street	Northbound through and right	Diversion to alternative routes expected to reduce impact
Robert Street/6 th Street	Northbound through	Diversion to alternative routes expected to reduce impact
Robert Street/7 th Place	Northbound through	Diversion to alternative routes expected to reduce impact
	Southbound left	Diversion to alternative routes expected to reduce impact
Robert Street/7 th Street	Northbound left and through	Diversion to alternative routes expected to reduce impact
	Southbound left and through	Diversion to alternative routes expected to reduce impact
Robert Street/9 th Street	Northbound left	Diversion to alternative routes expected to reduce impact
Robert Street/10 th Street	Northbound left	Diversion to alternative routes expected to reduce impact
Phalen Boulevard/Olive Street	Eastbound through	None
	Westbound left	Extend the westbound left-turn storage lane by 50 feet
Neid Lane/Arcade Street	Southbound through	Adjust signal timings
Highway 61/County Road E	Westbound left	Restripe upstream two-way left-turn lane to extend the westbound left-turn storage lane by 60 feet
Highway 61/County Road 96	Eastbound left	Adjust transit signal priority parameters
Highway 61/4 th Street	Eastbound left and through	Adjust transit signal priority parameters

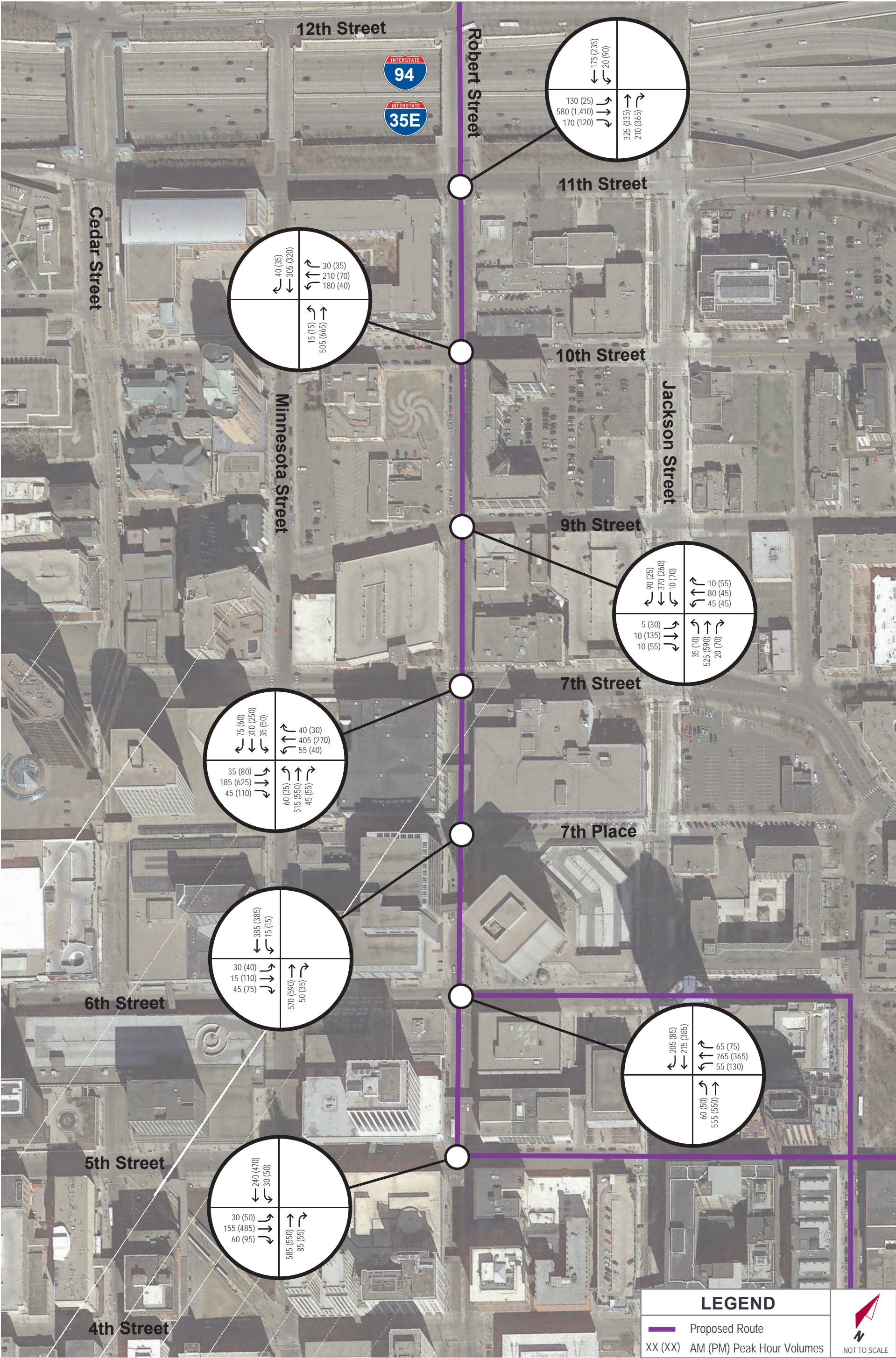
No additional avoidance, minimization or mitigation measures are proposed.

APPENDIX A

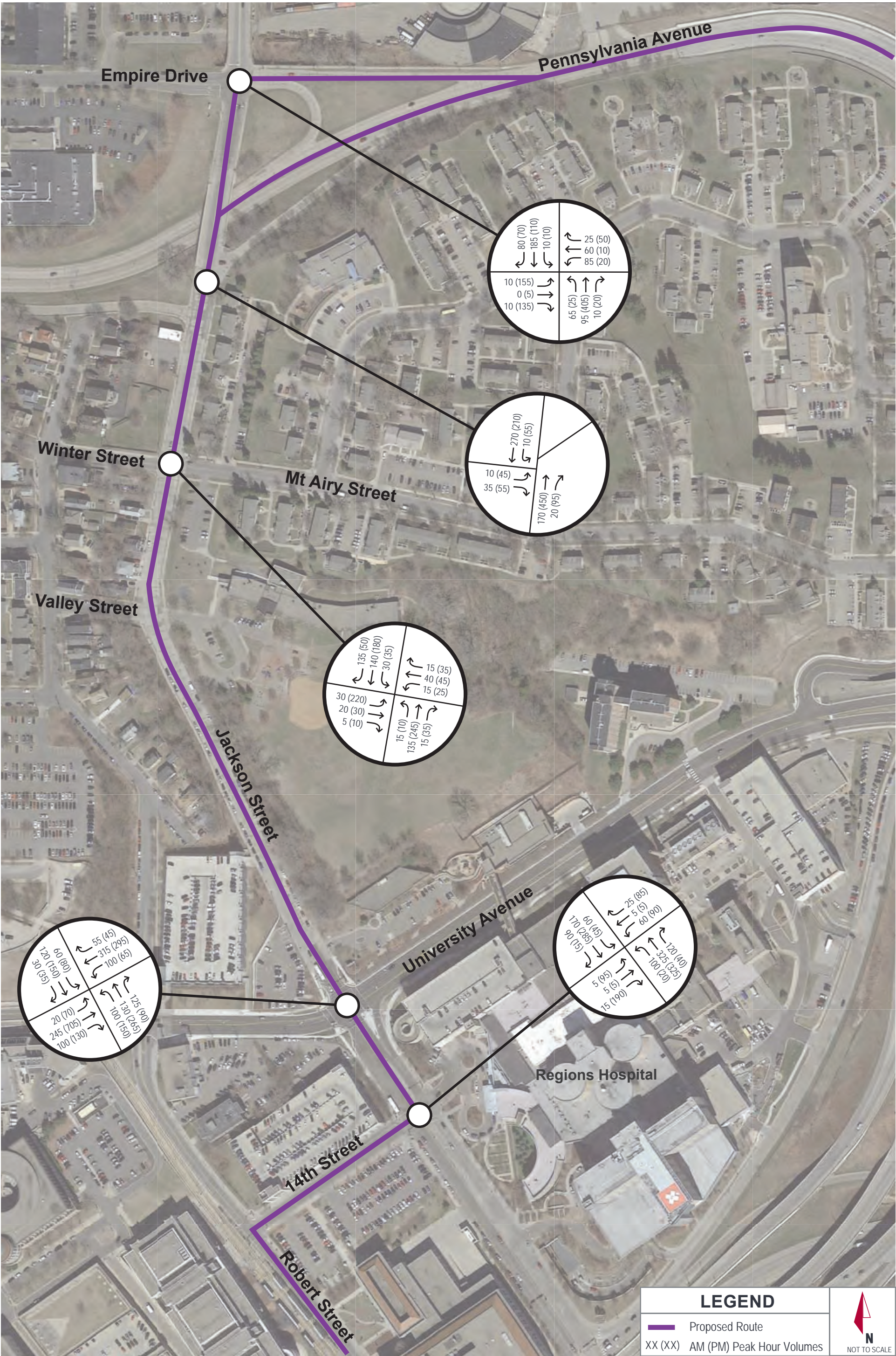
TRAFFIC VOLUMES

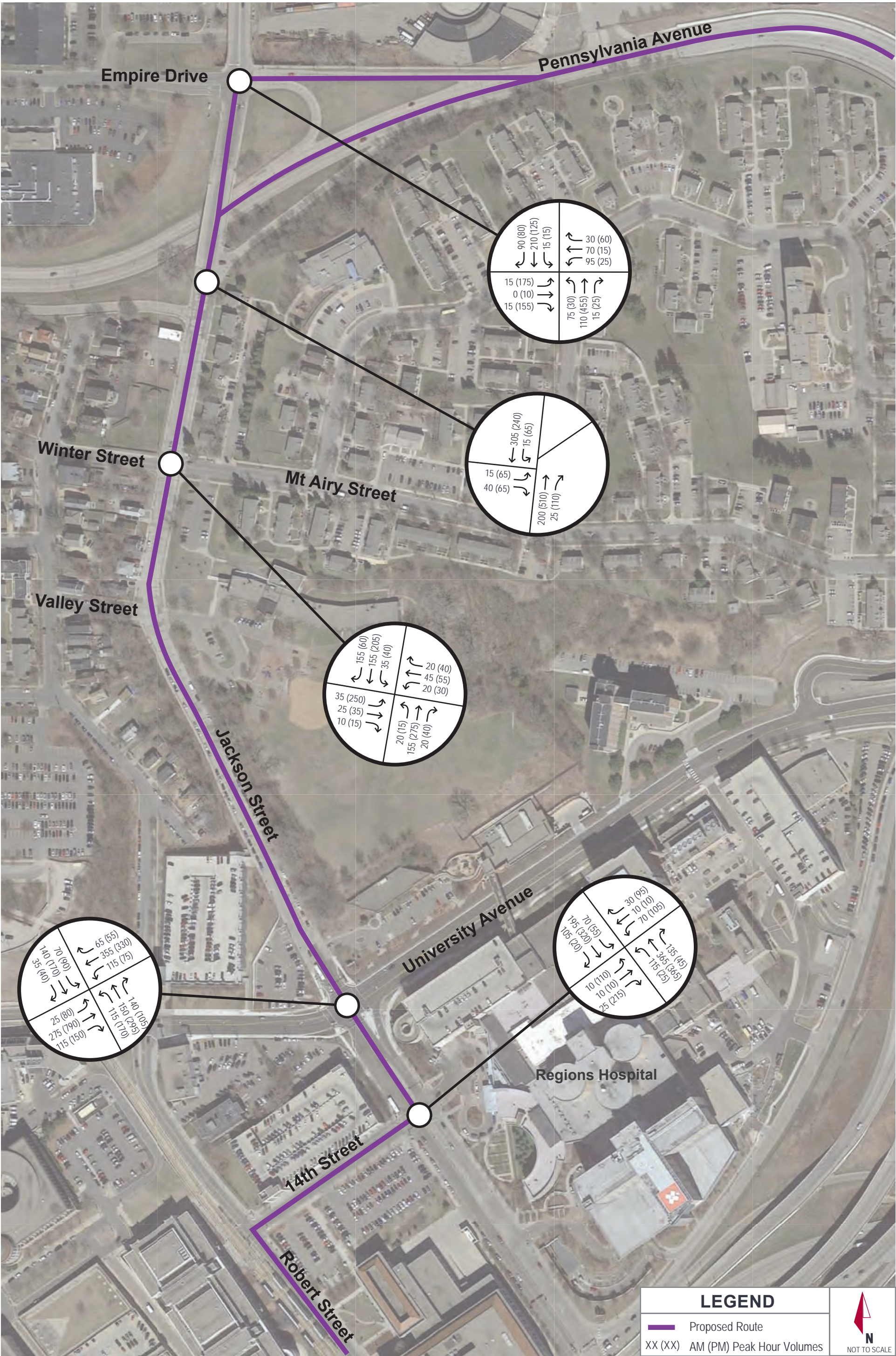


**SEGMENT 1: ROBERT STREET
EXISTING (2018)
PEAK HOUR TRAFFIC VOLUMES**



**SEGMENT 1: ROBERT STREET
FUTURE (2040)
PEAK HOUR TRAFFIC VOLUMES**





LEGEND

Proposed Route

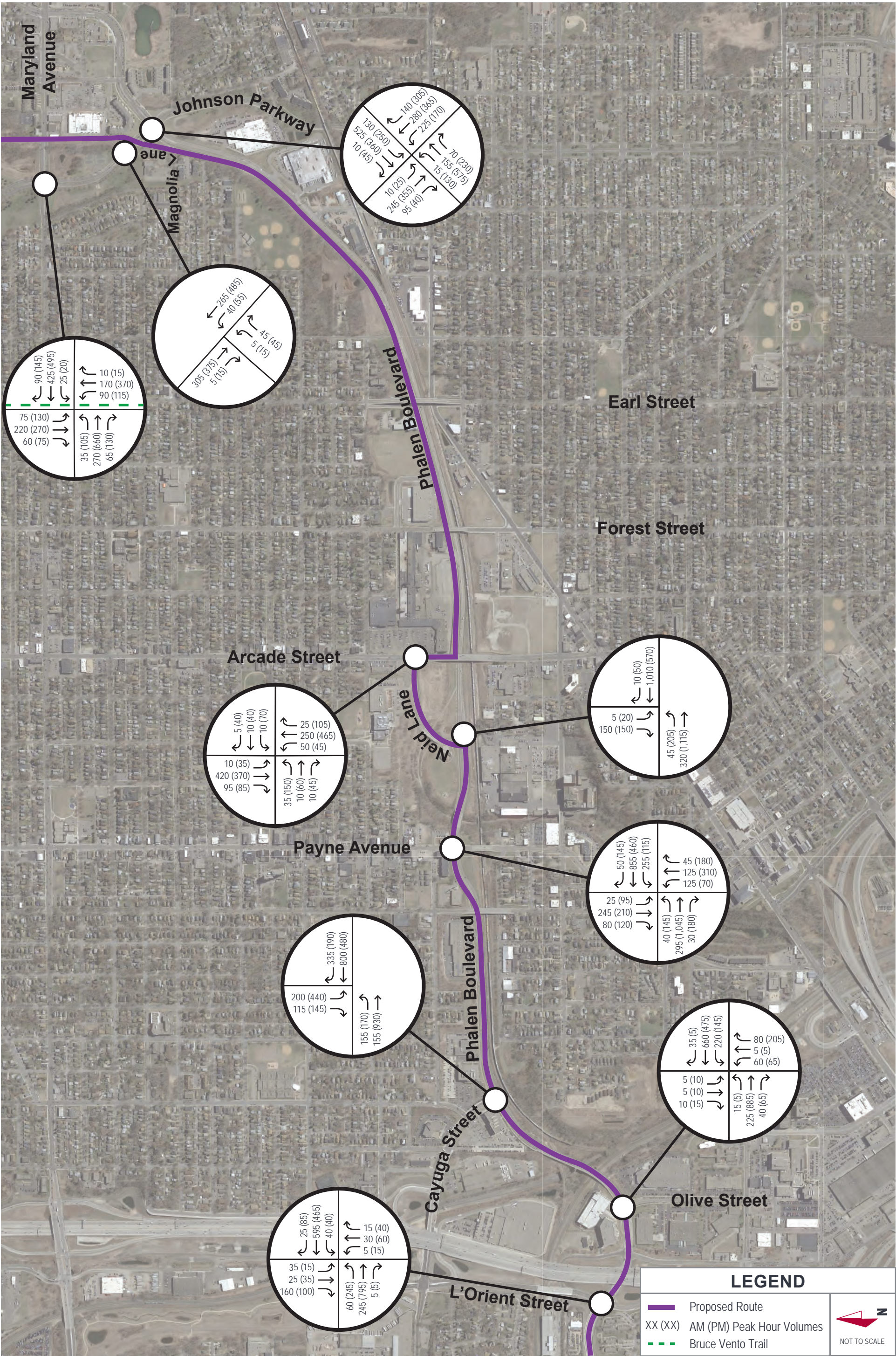
XX (XX) AM (PM) Peak Hour Volumes

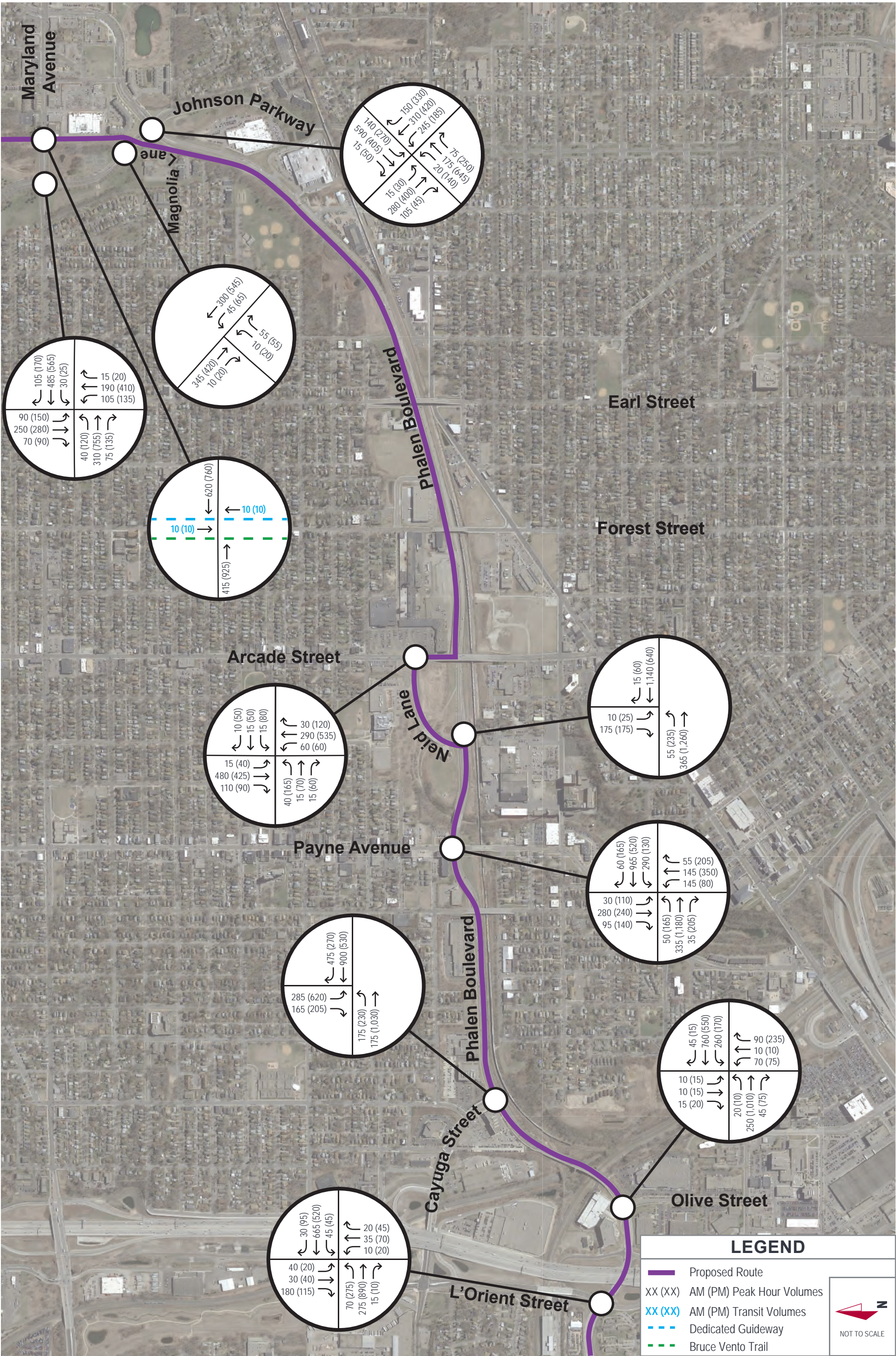
N

NOT TO SCALE

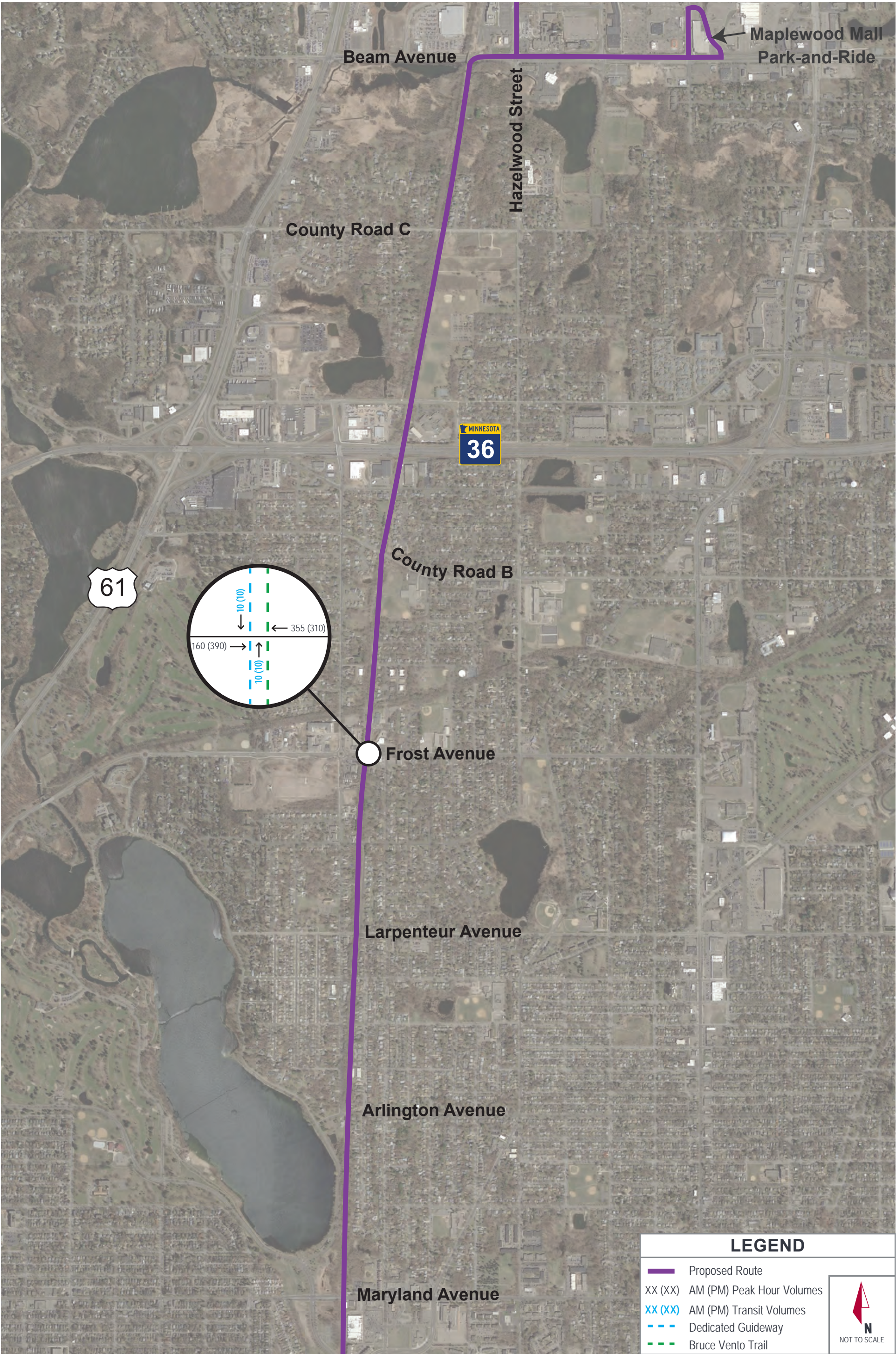


**SEGMENT 2: JACKSON STREET
FUTURE (2040)
PEAK HOUR TRAFFIC VOLUMES**





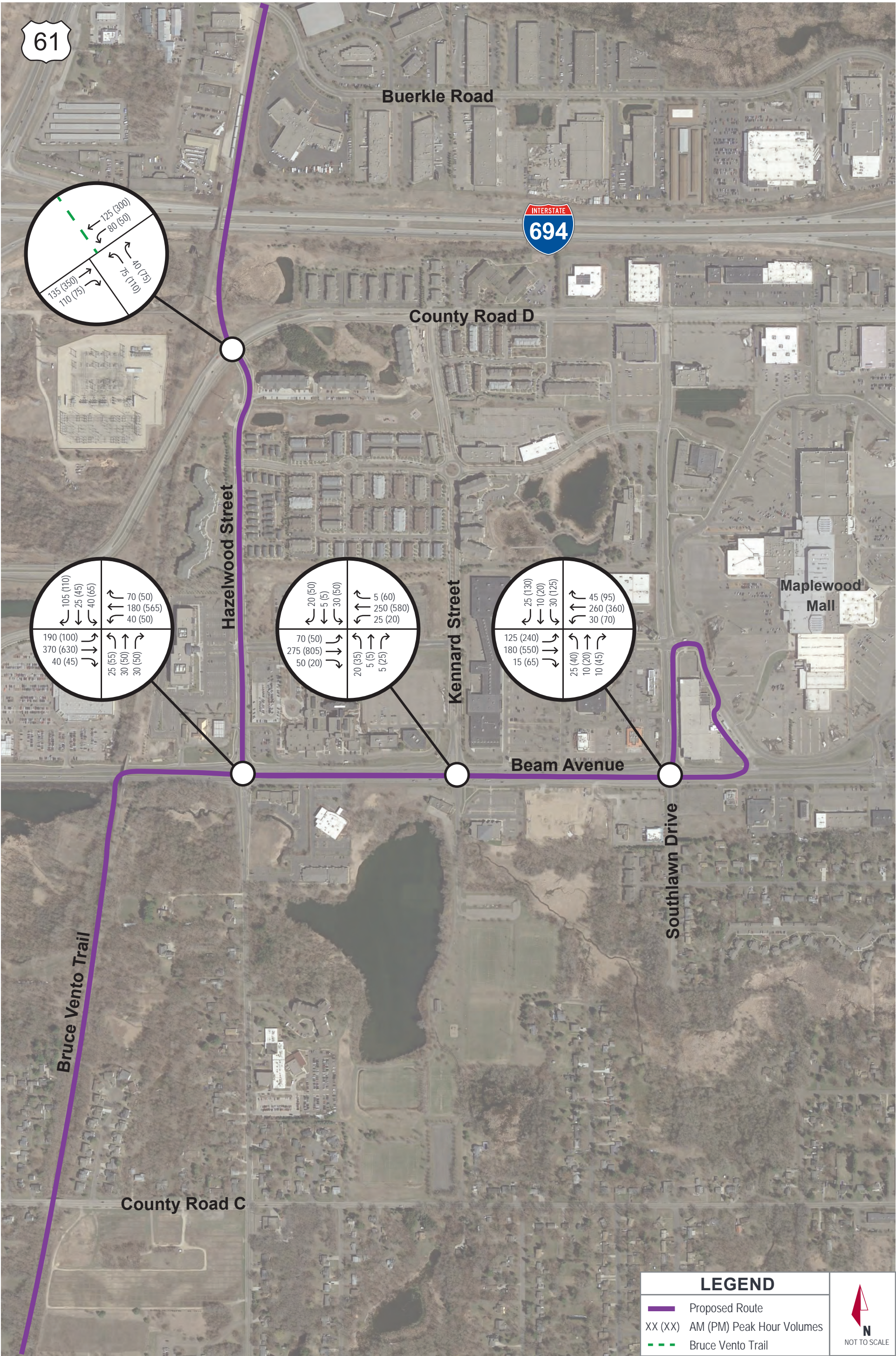
**SEGMENT 3: PHALEN BOULEVARD
FUTURE (2040)
PEAK HOUR TRAFFIC VOLUMES**

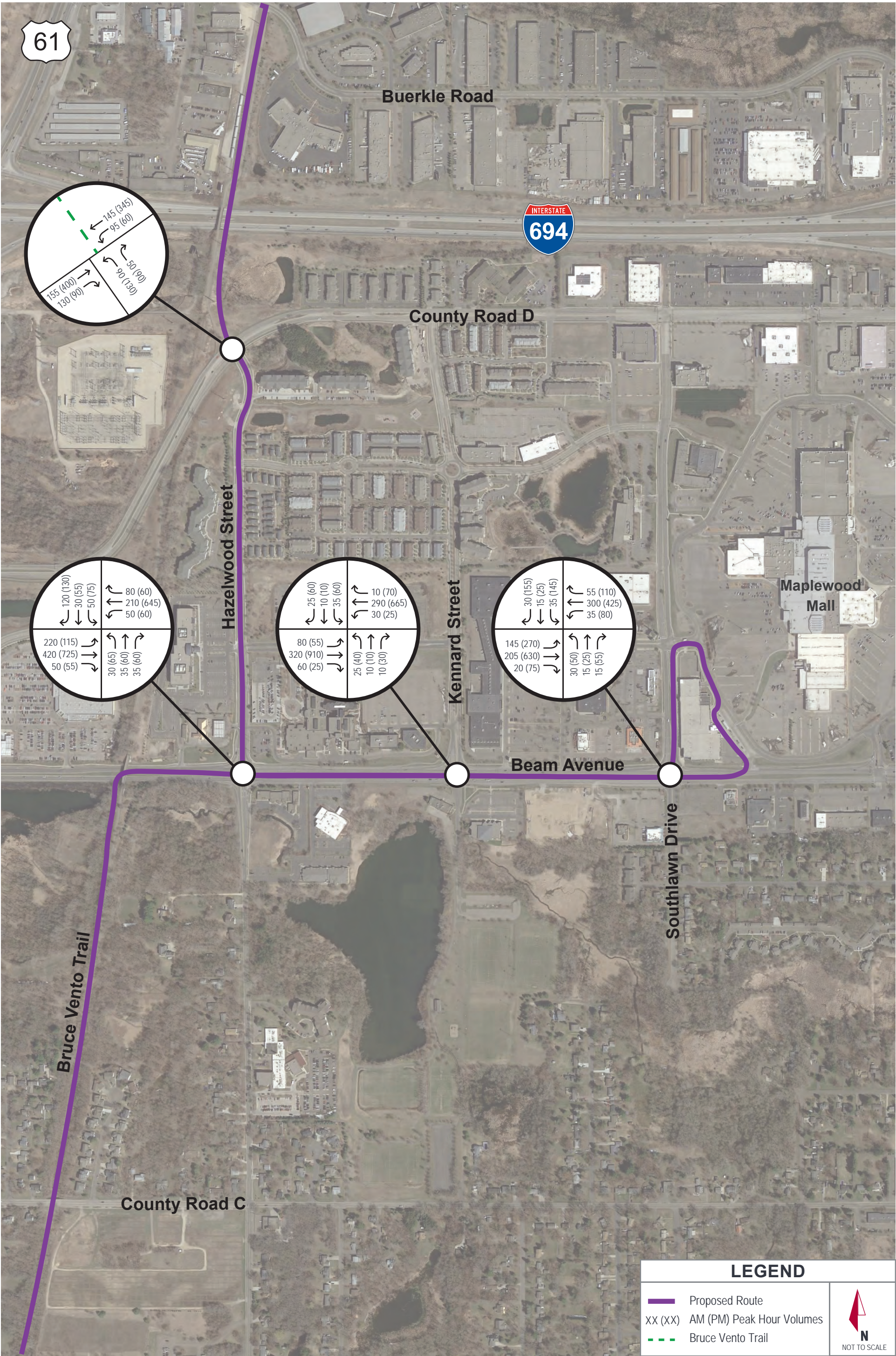


Note: The Rush Line BRT Project assumes co-location with the Bruce Vento Trail

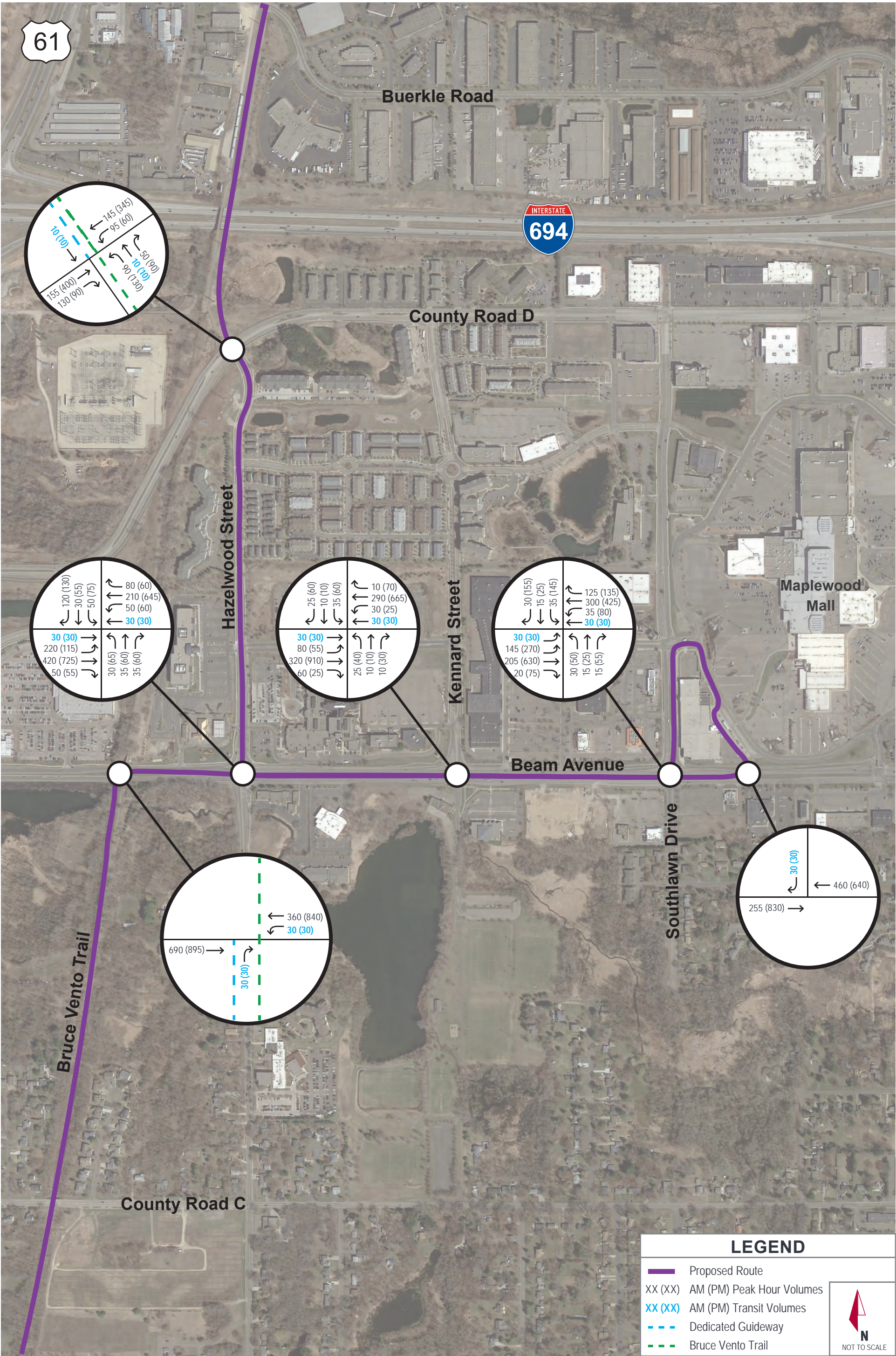


**SEGMENT 4: RAMSEY COUNTY RAIL RIGHT-OF-WAY
FUTURE (2040)
PEAK HOUR TRAFFIC VOLUMES**

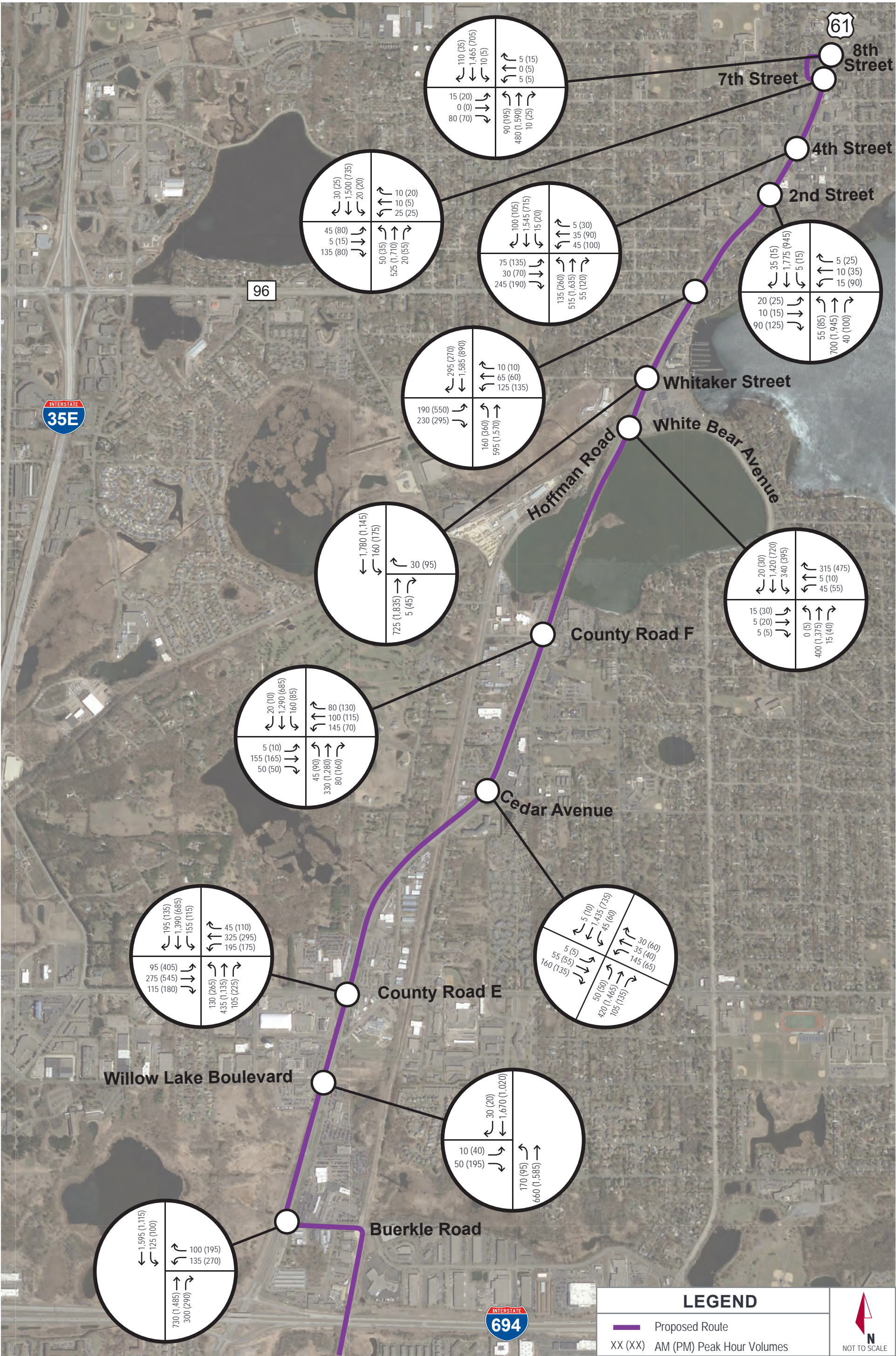




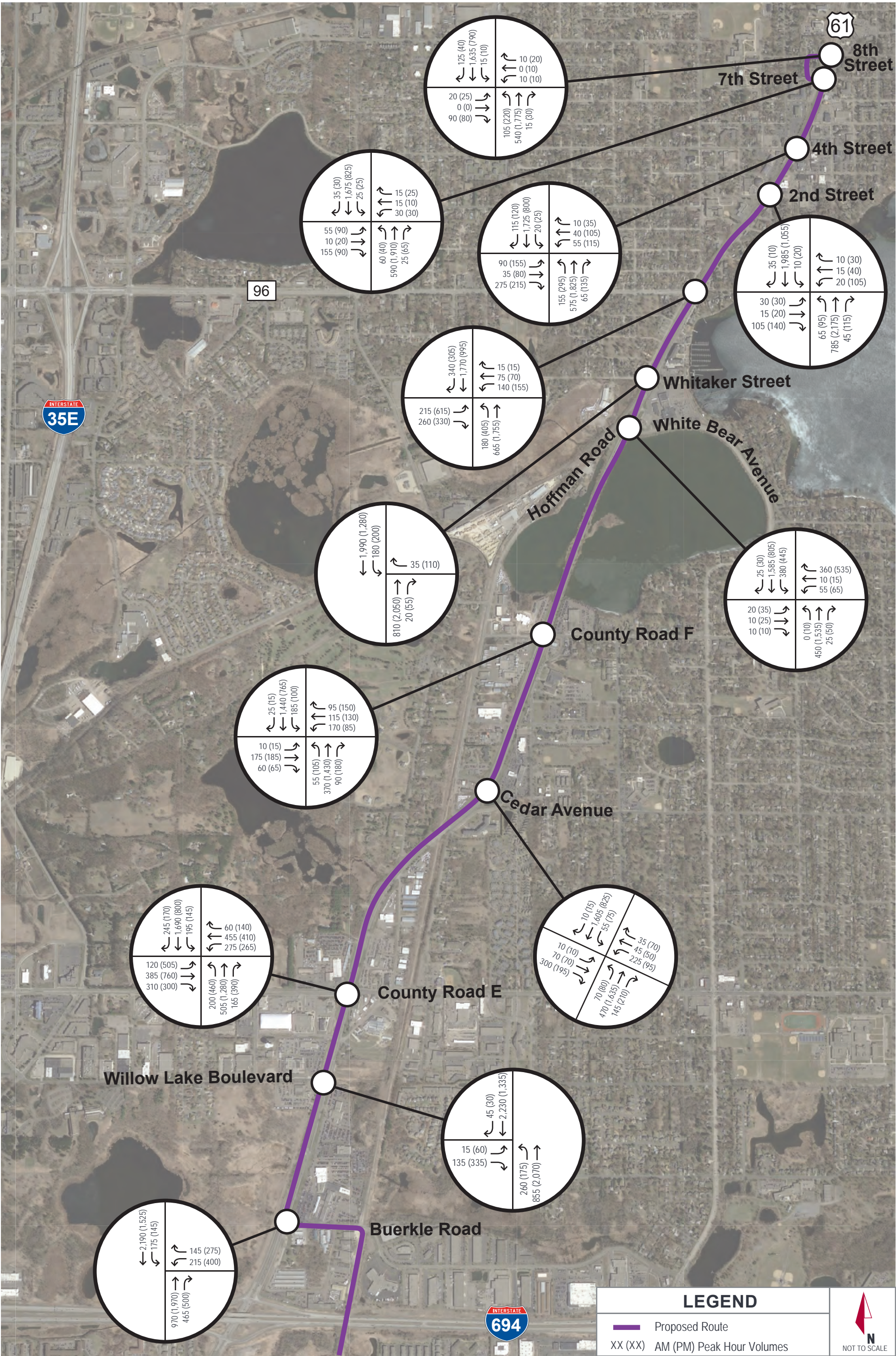
SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D
FUTURE (2040) NO-BUILD
PEAK HOUR TRAFFIC VOLUMES

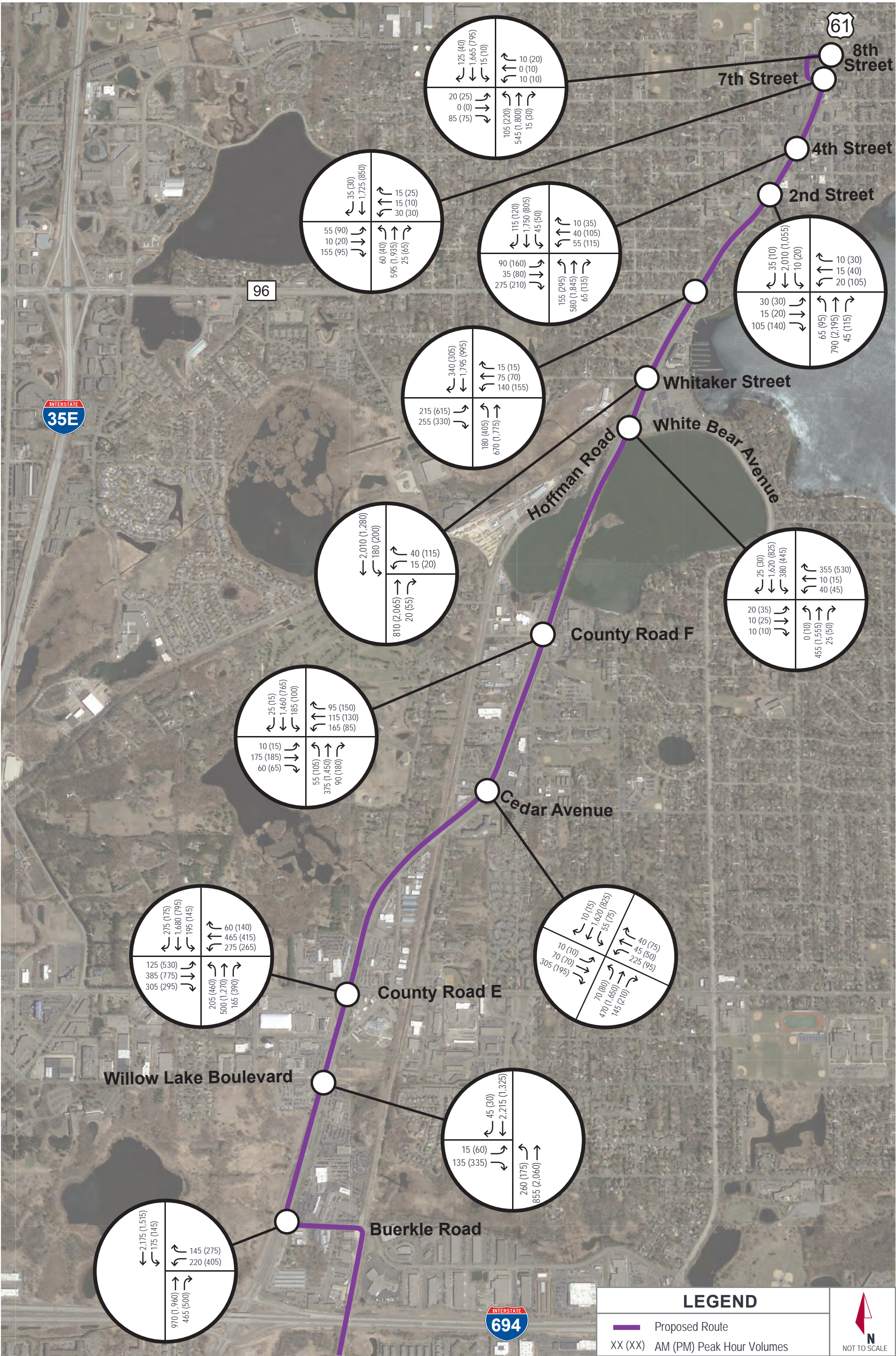


SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D
FUTURE (2040) BUILD
PEAK HOUR TRAFFIC VOLUMES



**SEGMENT 6: HIGHWAY 61
EXISTING (2018)
PEAK HOUR TRAFFIC VOLUMES**

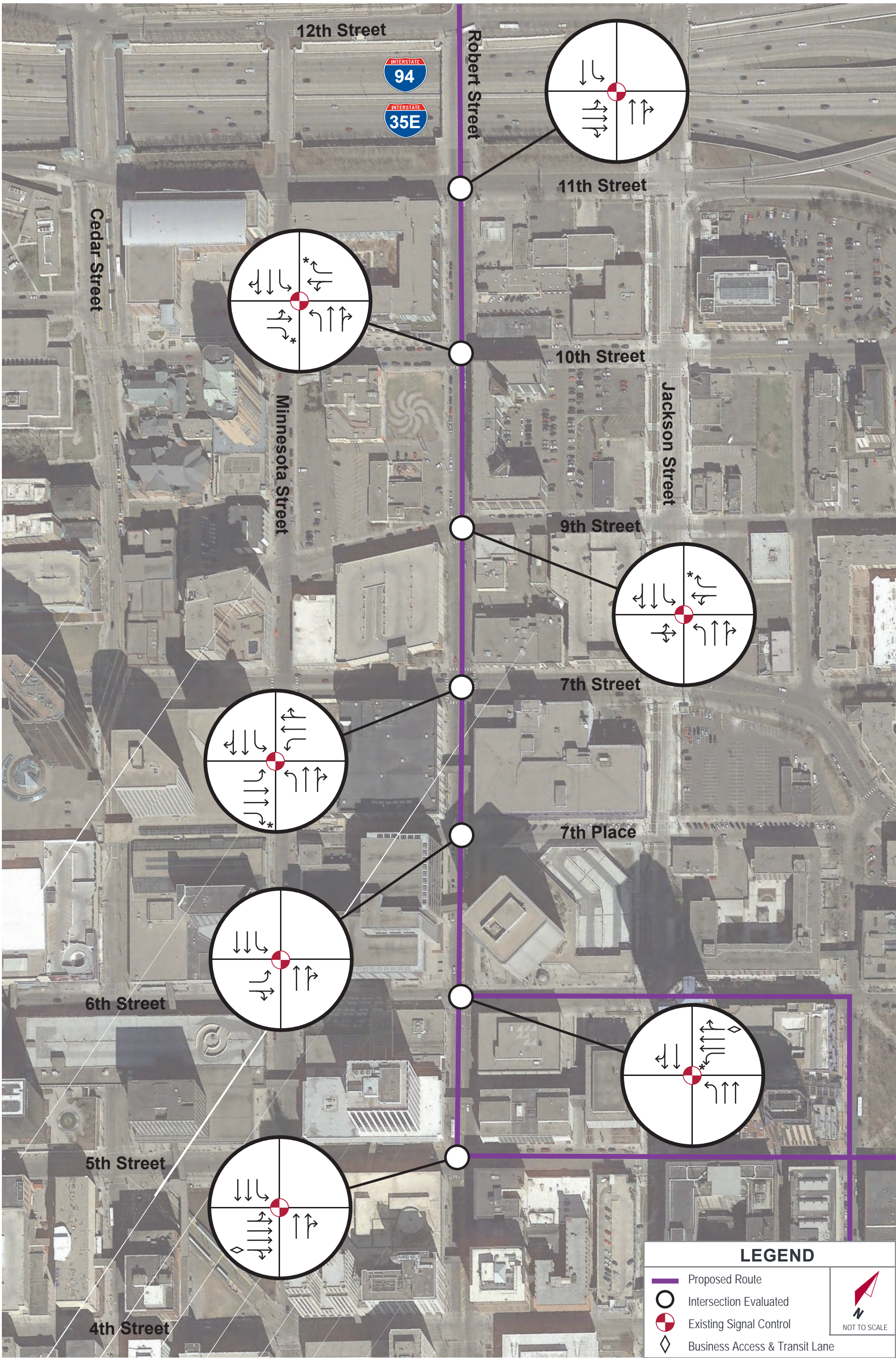




SEGMENT 6: HIGHWAY 61 FUTURE (2040) BUILD PEAK HOUR TRAFFIC VOLUMES

APPENDIX B

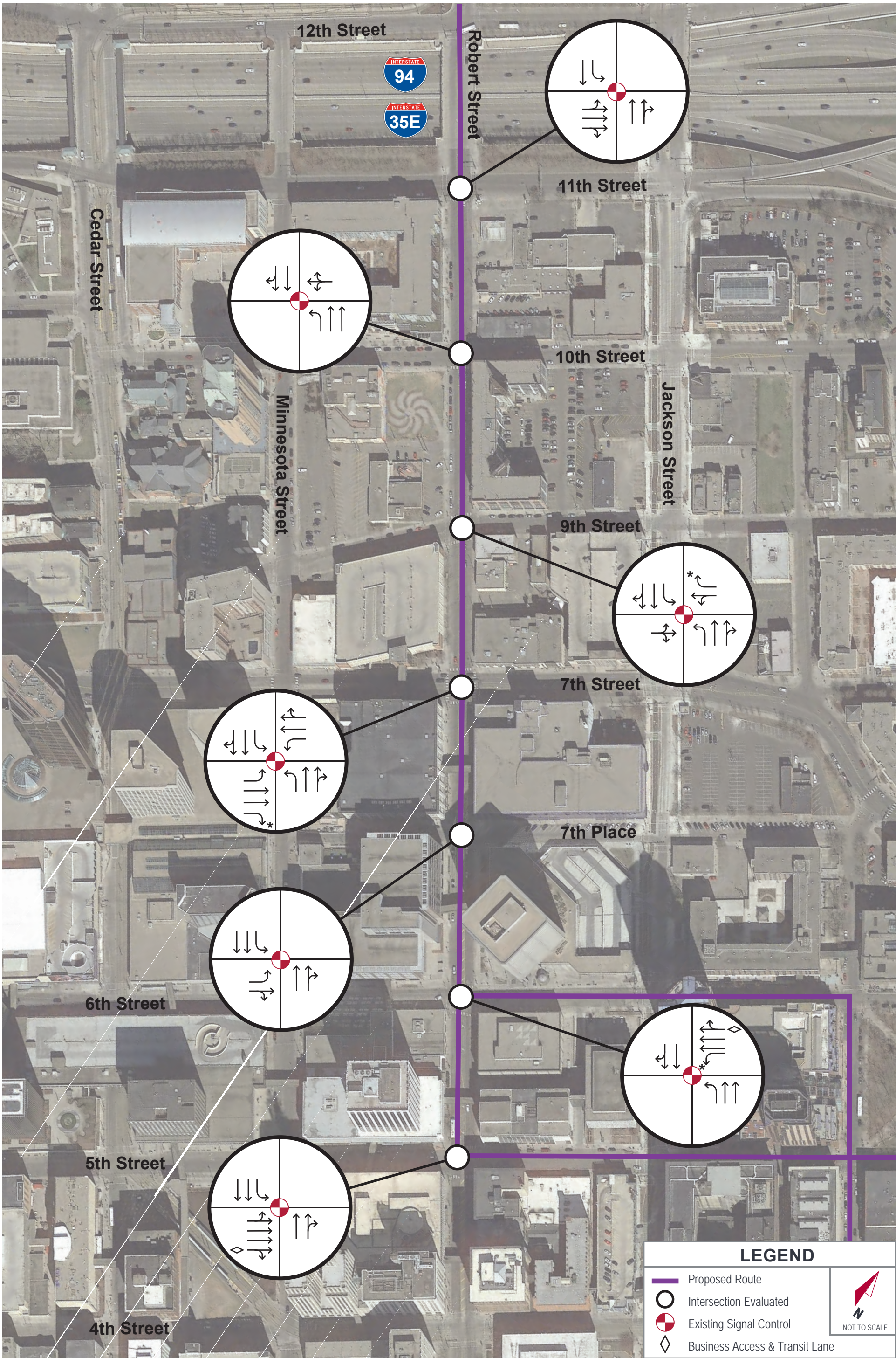
INTERSECTION GEOMETRY AND CONTROL



* Operates as a turn lane due to lane width and parking restrictions



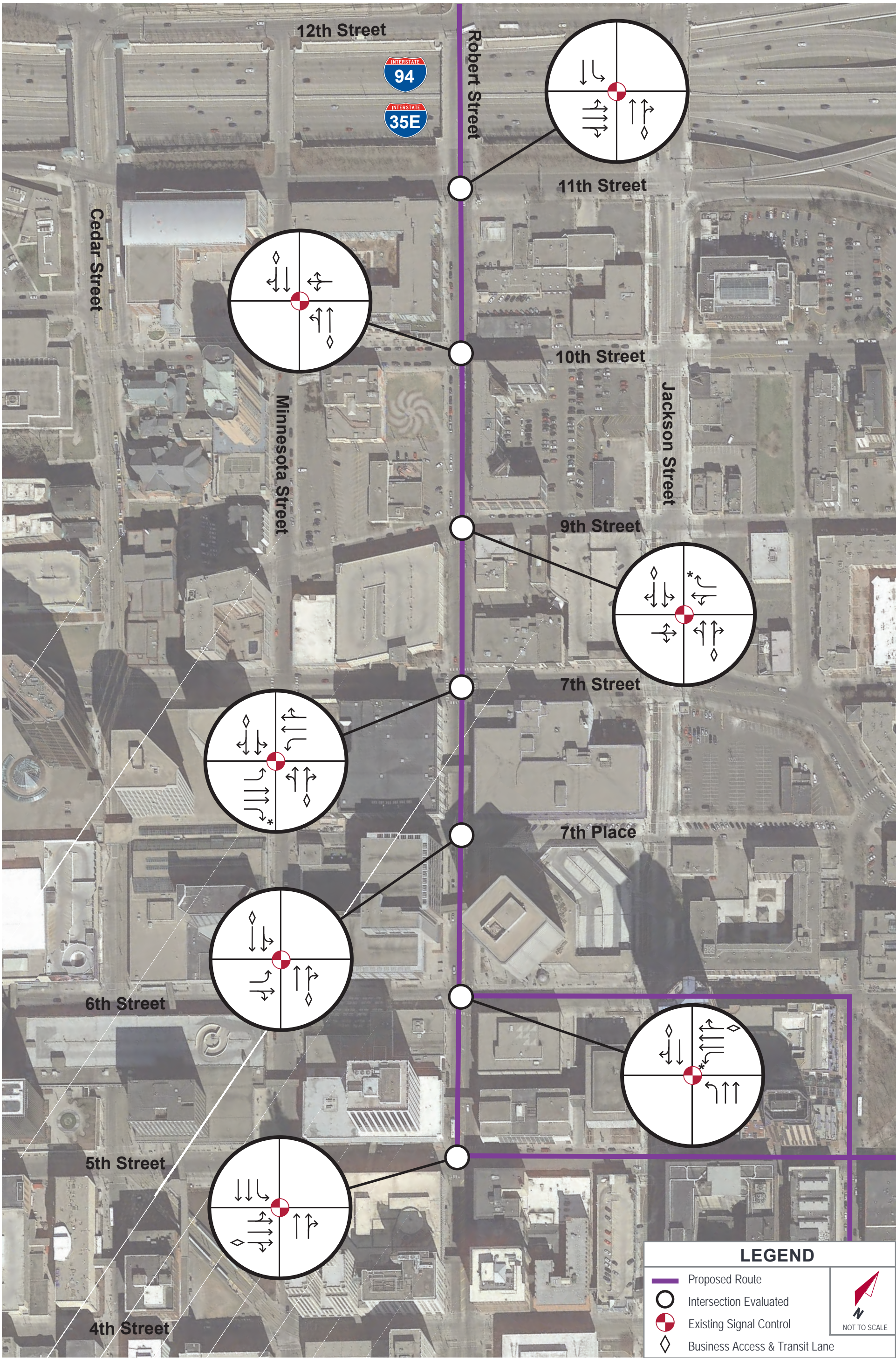
**SEGMENT 1: ROBERT STREET
EXISTING CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



* Operates as a turn lane due to lane width and parking restrictions



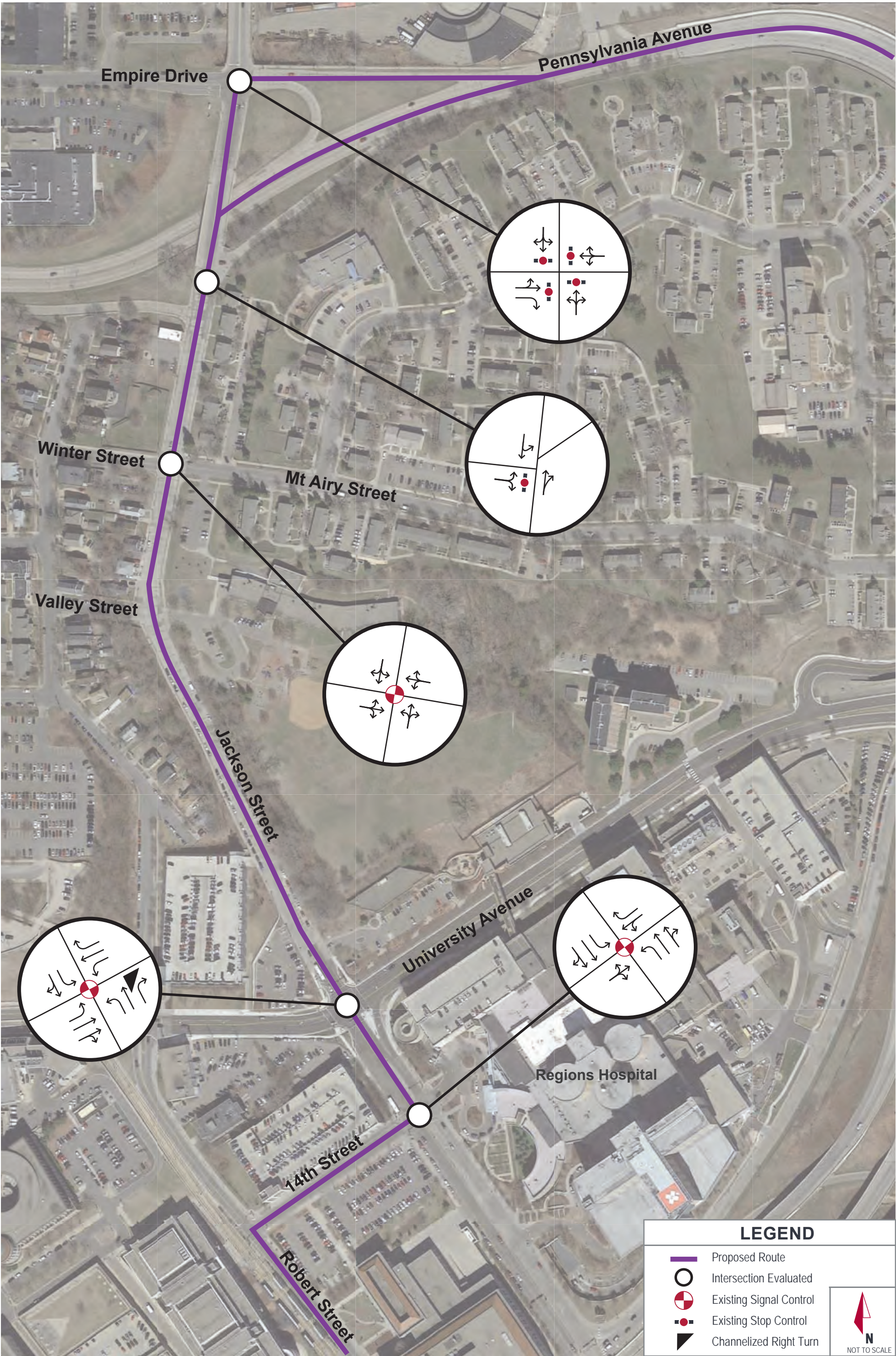
**SEGMENT 1: ROBERT STREET
NO-BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



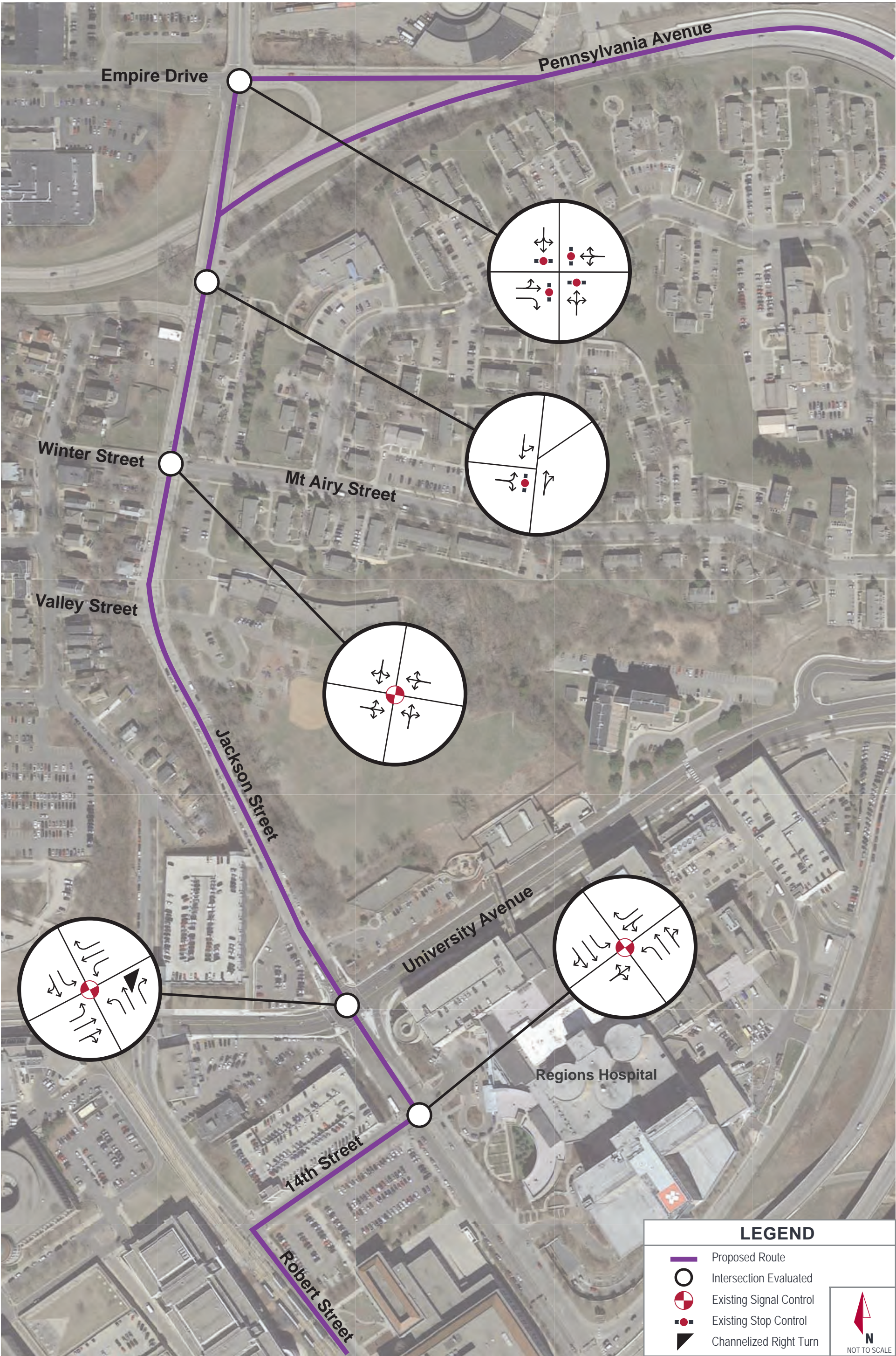
* Operates as a turn lane due to lane width and parking restrictions



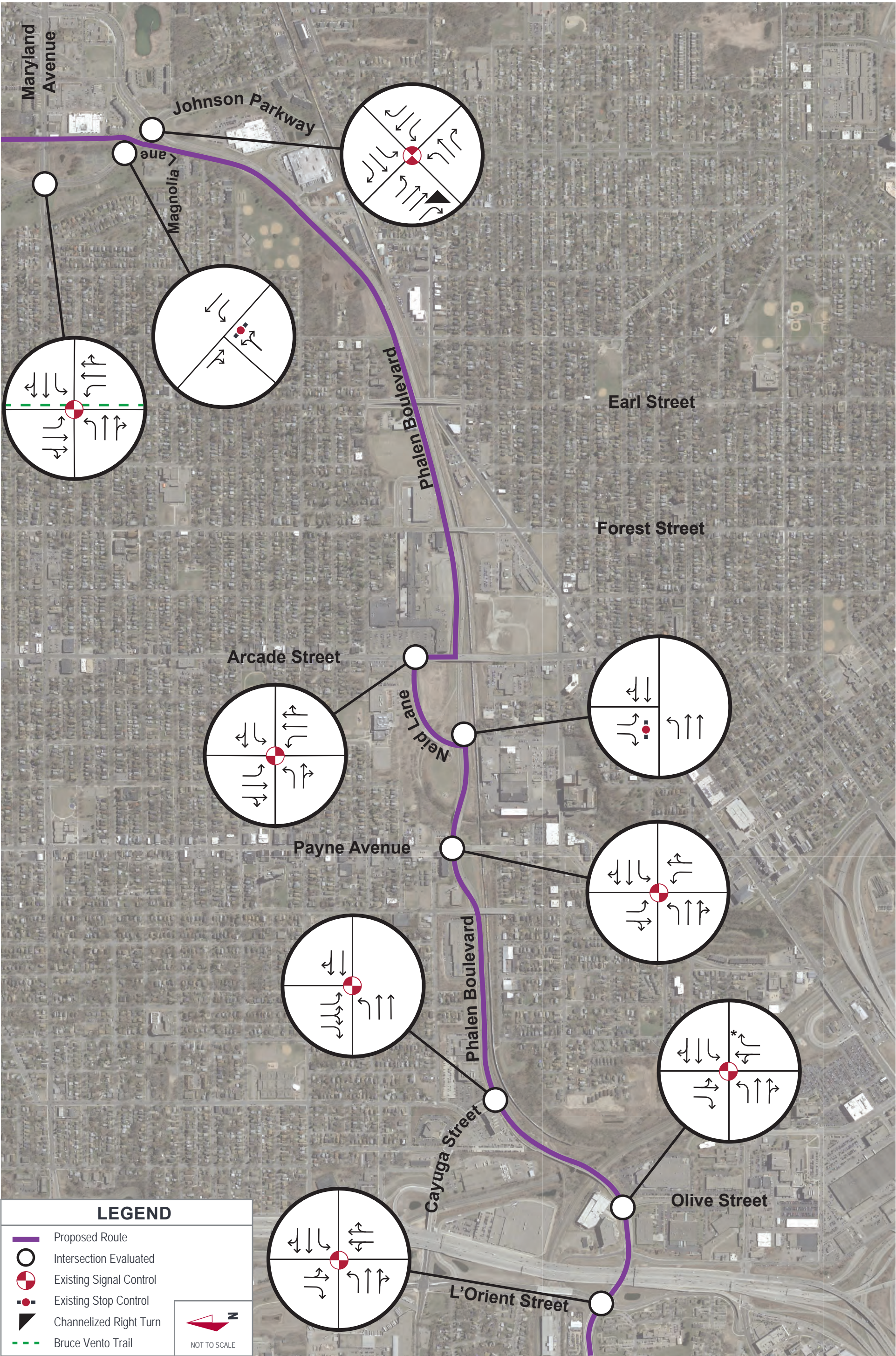
SEGMENT 1: ROBERT STREET BUILD CONDITIONS INTERSECTION GEOMETRY AND CONTROL



**SEGMENT 2: JACKSON STREET
EXISTING AND NO-BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



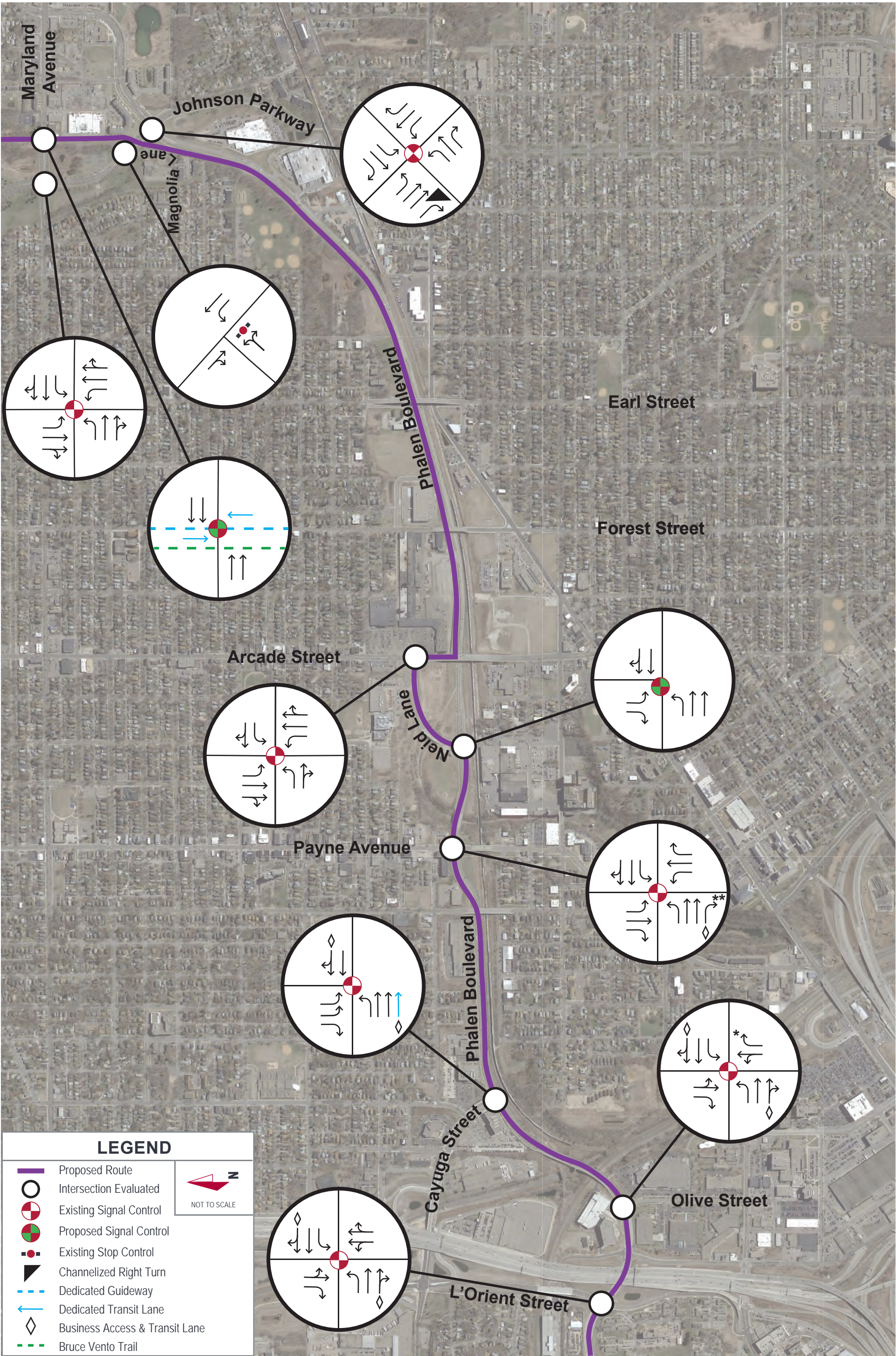
**SEGMENT 2: JACKSON STREET
BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



* Operates as a right-turn lane due to lane width and parking restrictions

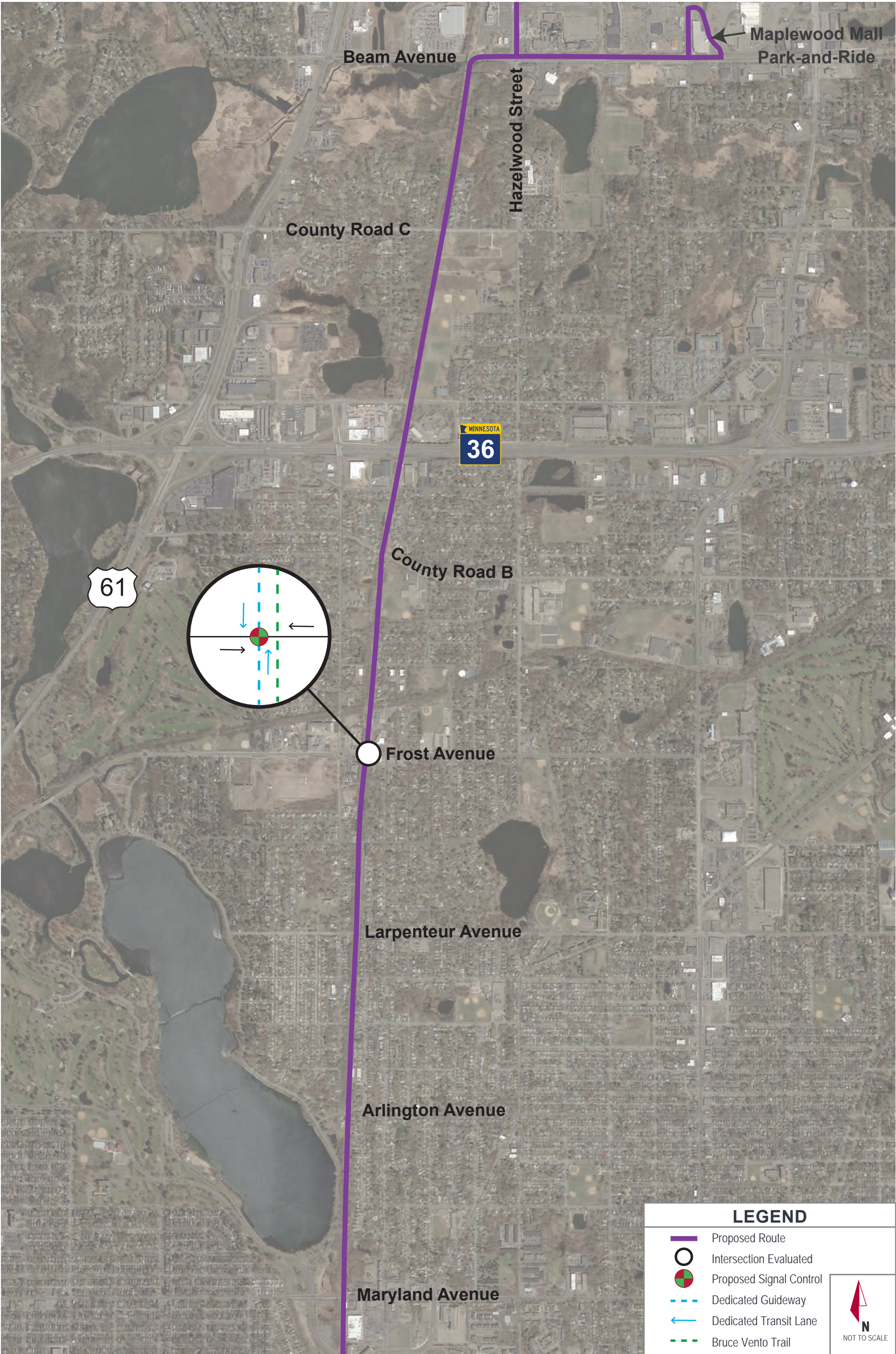


SEGMENT 3: PHALEN BOULEVARD
EXISTING AND NO-BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL



* Operates as a right-turn lane due to lane width and parking restrictions; **BRT queue jump

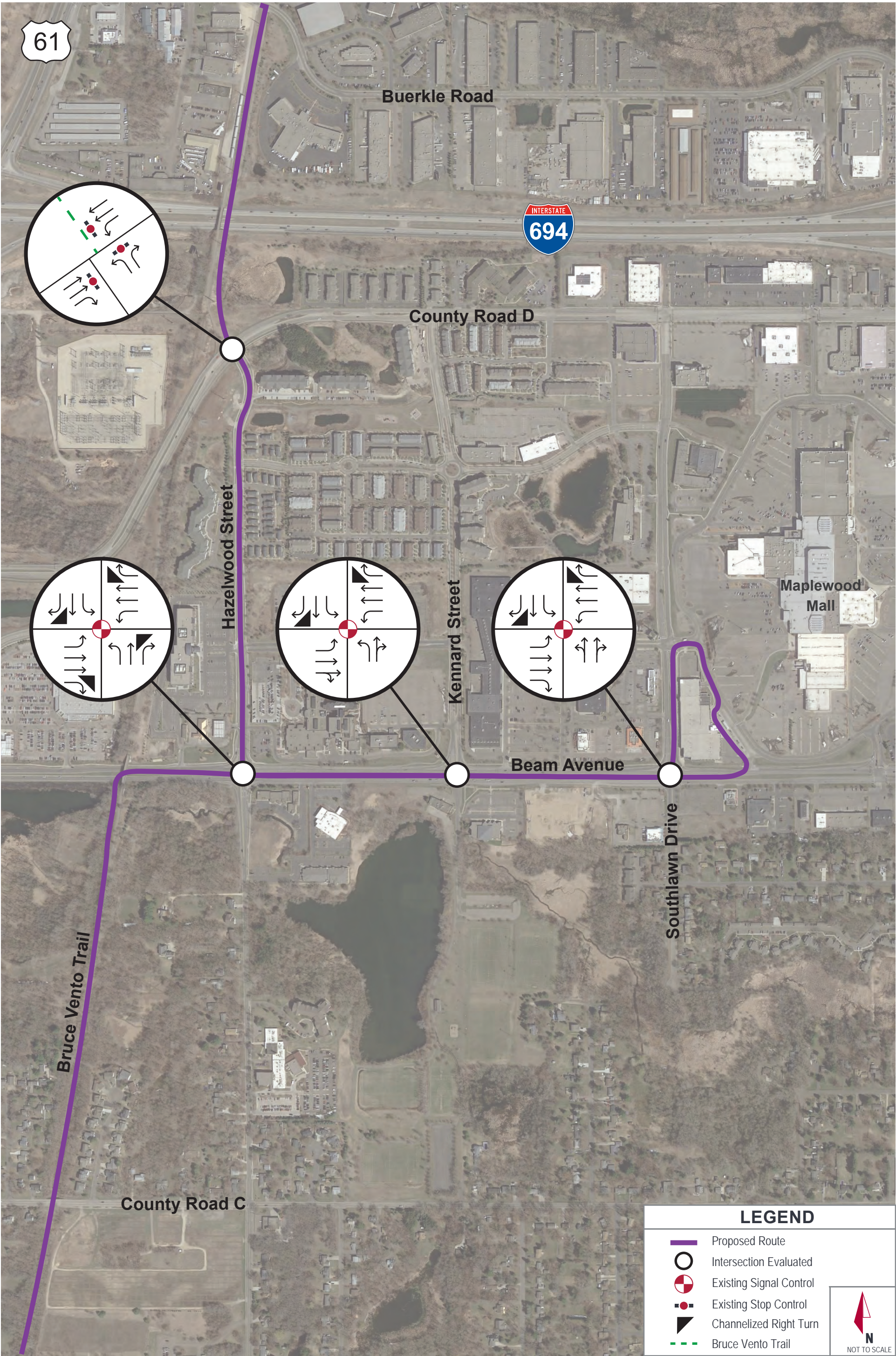




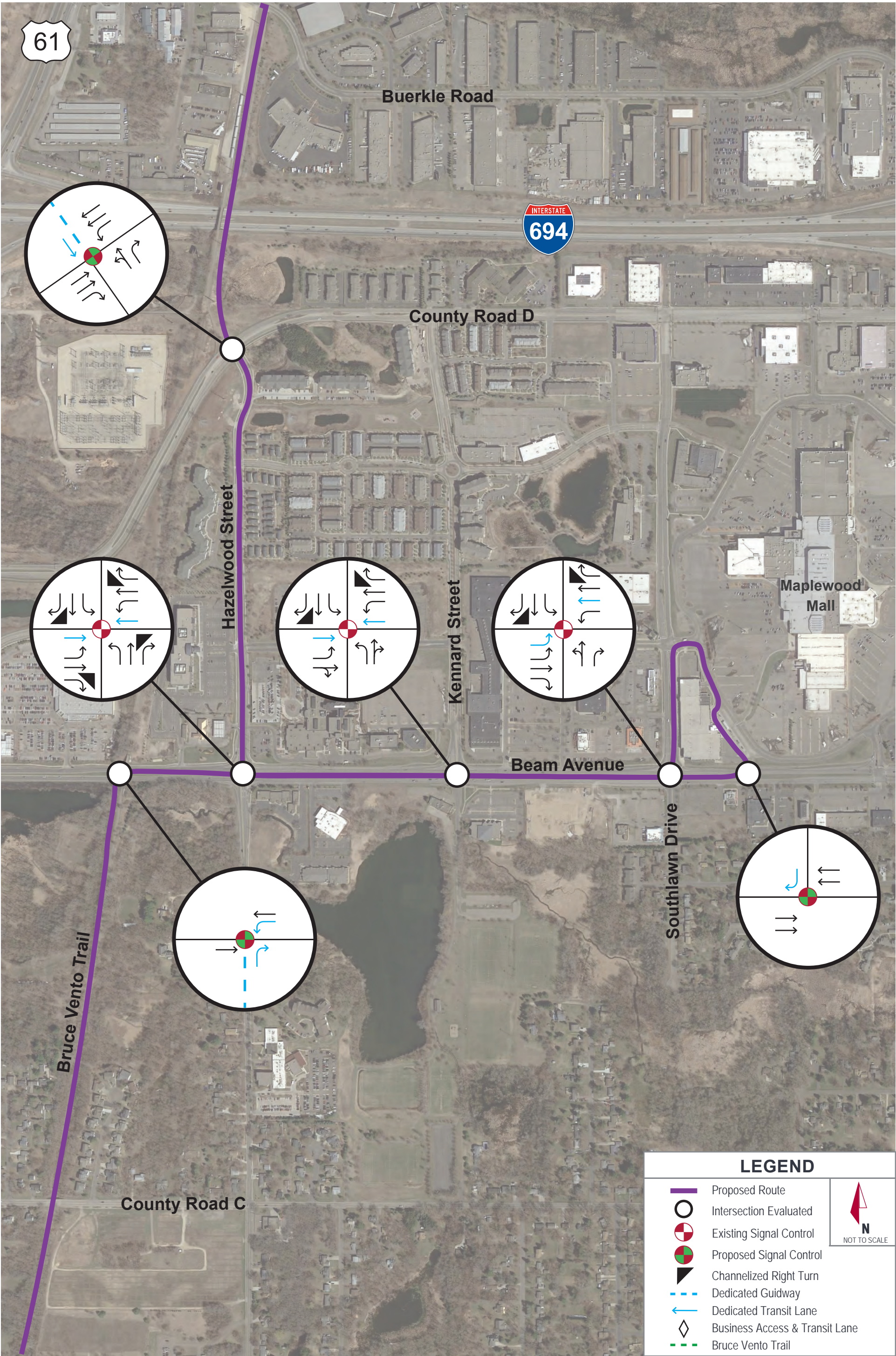
Note: The Rush Line BRT Project assumes co-location with the Bruce Vento Trail



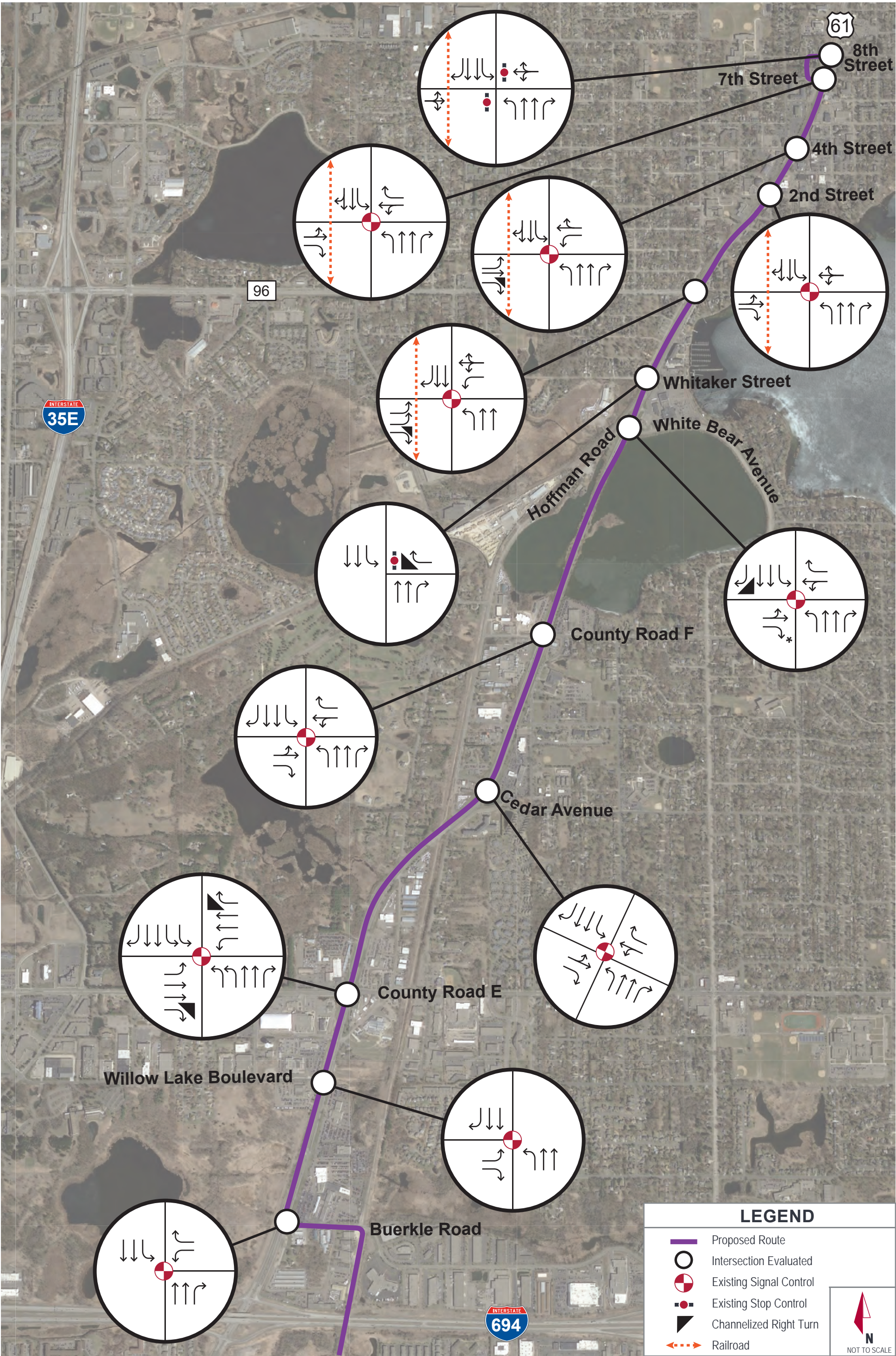
**SEGMENT 4: RAMSEY COUNTY RAIL RIGHT-OF-WAY
BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



**SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D
EXISTING AND NO-BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**



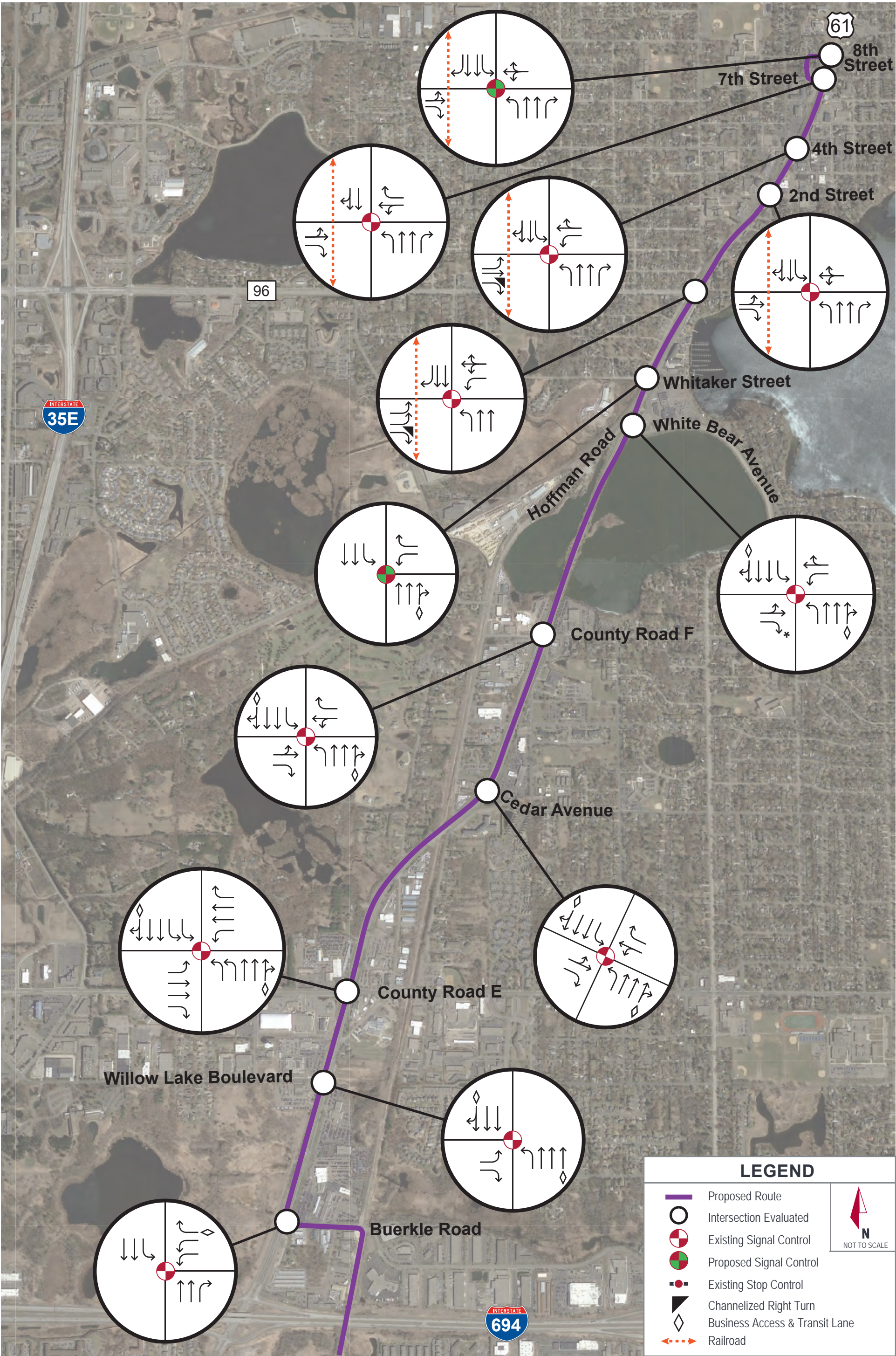
SEGMENT 5: BEAM AVENUE TO COUNTY ROAD D
BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL



* Operates as a right-turn lane due to lane width



SEGMENT 6: HIGHWAY 61
EXISTING AND NO-BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL



* Operates as a right-turn lane due to lane width



**SEGMENT 6: HIGHWAY 61
BUILD CONDITIONS
INTERSECTION GEOMETRY AND CONTROL**

APPENDIX C

DELAY AND LEVEL OF SERVICE TABLES

A.M. Level of Service and Intersection Delay

Scenario				2018			2040					
				Existing Conditions			No Build			Build		
#	Intersection	Approach	Appr	Level of Service	Delay	by Intersection	Level of Service	Delay	by Intersection	Level of Service	Delay	by Intersection
				by Approach	by Intersection		by Approach	by Intersection		by Approach	by Intersection	
Robert Street from 5th Street to 11th Street												
1	Robert Street & 5th Street	Eastbound	EB	A	B	13.0	A	B	13.2	A	C	31.1
		Westbound	WB	-			-			-		
		Northbound	NB	B			B			D		
		Southbound	SB	B			B			B		
2	Robert Street & 6th Street	Eastbound	EB	-	A	9.2	-	A	9.7	-	C	25.4
		Westbound	WB	A			A			A		
		Northbound	NB	A			A			E		
		Southbound	SB	B			B			B		
3	Robert Street & 7th Place	Eastbound	EB	B	A	5.7	B	A	6.2	C	B	16.0
		Westbound	WB	-			-			-		
		Northbound	NB	A			A			C		
		Southbound	SB	A			A			A		
4	Robert Street & 7th Street	Eastbound	EB	A	B	10.4	A	B	12.2	A	C	25.2
		Westbound	WB	A			B			B		
		Northbound	NB	A			A			D		
		Southbound	SB	B			C			D		
5	Robert Street & 9th Street	Eastbound	EB	A	A	7.2	A	A	8.0	A	B	17.5
		Westbound	WB	B			B			C		
		Northbound	NB	A			A			B		
		Southbound	SB	A			A			C		
6	Robert Street & 10th Street	Eastbound	EB	A	B	13.5	-	B	15.9	-	B	19.8
		Westbound	WB	B			B			B		
		Northbound	NB	B			B			C		
		Southbound	SB	B			B			C		
7	Robert Street & 11th Street	Eastbound	EB	A	B	12.0	A	B	14.0	B	B	12.6
		Westbound	WB	-			-			-		
		Northbound	NB	B			C			B		
		Southbound	SB	B			B			B		
Jackson Street from 14th Street to Pennsylvania Avenue												
8	Jackson Street & 14th Street	Eastbound	EB	B	A	10.0	B	B	11.3	B	B	11.1
		Westbound	WB	C			C			C		
		Northbound	NB	A			B			B		
		Southbound	SB	A			A			A		
9	Jackson Street & University Avenue	Eastbound	EB	B	B	14.6	B	B	16.3	B	B	16.2
		Westbound	WB	B			B			B		
		Northbound	NB	B			B			B		
		Southbound	SB	C			C			C		
10	Jackson Street & Mt Airy Street	Eastbound	EB	B	A	7.0	B	A	8.0	B	A	8.0
		Westbound	WB	B			B			A		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
11	Jackson Street & Pennsylvania Avenue EB Ramps	Eastbound	EB	A	A	1.4	A	A	1.4	A	A	1.4
		Westbound	WB	-			-			-		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
12	Jackson Street & Pennsylvania Avenue WB Ramps / Empire Drive	Eastbound	EB	A	A	7.1	A	A	7.8	A	A	7.4
		Westbound	WB	A			A			A		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		

P.M. Level of Service and Intersection Delay

Scenario			0	2018			2040					
				Existing Conditions			No Build			Build		
#	Intersection	Approach	Appr	Level of Service	Delay	Level of Service	Delay	Level of Service	Delay	Level of Service	Delay	
				by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection
Robert Street from 5th Street to 11th Street												
1	Robert Street & 5th Street	Eastbound	EB	A	B	12.3	B	B	16.4	A	C	28.1
		Westbound	WB	-			-			-		
		Northbound	NB	B			C			E		
		Southbound	SB	B			B			B		
2	Robert Street & 6th Street	Eastbound	EB	-	A	10.0	-	B	16.1	-	C	33.8
		Westbound	WB	A			A			A		
		Northbound	NB	A			C			E		
		Southbound	SB	B			B			B		
3	Robert Street & 7th Place	Eastbound	EB	C	B	19.8	C	C	28.8	C	C	27.0
		Westbound	WB	-			-			-		
		Northbound	NB	B			D			C		
		Southbound	SB	B			B			B		
4	Robert Street & 7th Street	Eastbound	EB	B	B	17.5	B	C	23.6	B	C	21.1
		Westbound	WB	A			B			B		
		Northbound	NB	C			D			C		
		Southbound	SB	C			C			C		
5	Robert Street & 9th Street	Eastbound	EB	C	B	19.5	C	C	29.5	C	C	22.6
		Westbound	WB	B			C			C		
		Northbound	NB	C			D			B		
		Southbound	SB	B			C			C		
6	Robert Street & 10th Street	Eastbound	EB	B	C	23.8	-	C	34.6	-	B	19.1
		Westbound	WB	B			B			B		
		Northbound	NB	C			D			C		
		Southbound	SB	B			B			B		
7	Robert Street & 11th Street	Eastbound	EB	B	B	18.0	B	C	21.2	B	B	13.6
		Westbound	WB	-			-			-		
		Northbound	NB	C			D			B		
		Southbound	SB	C			C			B		
Jackson Street from 14th Street to Pennsylvania Avenue												
8	Jackson Street & 14th Street	Eastbound	EB	B	B	12.4	C	B	15.0	C	B	15.3
		Westbound	WB	B			B			B		
		Northbound	NB	A			B			B		
		Southbound	SB	A			A			A		
9	Jackson Street & University Avenue	Eastbound	EB	B	B	19.7	B	C	22.1	C	C	24.9
		Westbound	WB	C			C			D		
		Northbound	NB	B			B			B		
		Southbound	SB	C			C			C		
10	Jackson Street & Mt Airy Street	Eastbound	EB	C	B	12.9	B	B	15.0	C	B	14.7
		Westbound	WB	B			B			B		
		Northbound	NB	A			B			B		
		Southbound	SB	A			B			B		
11	Jackson Street & Pennsylvania Avenue EB Ramps	Eastbound	EB	A	A	2.1	C	A	4.0	C	A	3.8
		Westbound	WB	-			-			-		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
12	Jackson Street & Pennsylvania Avenue WB Ramps / Empire Drive	Eastbound	EB	A	B	10.3	A	C	15.4	A	B	13.3
		Westbound	WB	A			A			A		
		Northbound	NB	B			C			C		
		Southbound	SB	A			A			A		

A.M. Level of Service and Intersection Delay

Scenario				2018			2040					
#	Intersection	Approach	Appr	Existing Conditions			No Build			Build		
				Level of Service	Delay		Level of Service	Delay		Level of Service	Delay	
				by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection
Phalen Boulevard from L'Orient Street to Maryland Avenue												
13	Pennsylvania Avenue & L'Orient Street	Eastbound	EB	A	A	7.9	A	A	9.2	A	B	13.1
		Westbound	WB	A			A			B		
		Northbound	NB	C			C			C		
		Southbound	SB	B			B			C		
14	Phalen Boulevard & Olive Street	Eastbound	EB	A	A	9.6	A	B	10.6	A	B	18.2
		Westbound	WB	A			B			C		
		Northbound	NB	C			B			C		
		Southbound	SB	B			C			B		
15	Phalen Boulevard & Cayuga Street	Eastbound	EB	B	B	19.0	B	D	37.2	C	C	29.1
		Westbound	WB	C			D			C		
		Northbound	NB	-			-			-		
		Southbound	SB	C			C			E		
16	Phalen Boulevard & Payne Avenue	Eastbound	EB	C	C	21.0	C	C	23.5	C	C	24.8
		Westbound	WB	C			C			C		
		Northbound	NB	C			C			C		
		Southbound	SB	B			C			C		
17	Phalen Boulevard & Neid Lane	Eastbound	EB	A	A	2.6	A	A	3.3	A	A	7.8
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			-		
		Southbound	SB	A			B			A		
18	Neid Lane & Arcade Street	Eastbound	EB	C	A	5.3	C	A	6.1	C	A	8.2
		Westbound	WB	C			C			C		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
19	Phalen Boulevard & Johnson Parkway	Eastbound	EB	B	B	19.1	B	C	23.3	B	C	23.4
		Westbound	WB	C			C			C		
		Northbound	NB	B			C			C		
		Southbound	SB	C			C			C		
20	Johnson Parkway & Magnolia Lane	Eastbound	EB	A	A	1.8	A	A	2.0	A	A	2.1
		Westbound	WB	-			-			-		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
21	Johnson Parkway & Maryland Avenue	Eastbound	EB	A	B	13.7	B	B	14.4	A	B	14.3
		Westbound	WB	B			B			B		
		Northbound	NB	B			B			B		
		Southbound	SB	C			B			B		
22	Maryland Avenue & Dedicated Guideway	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	8.0
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			B		
		Southbound	SB	-			-			B		
Ramsey County Rail Right-of-Way from Maryland Avenue to Beam Avenue												
23	Dedicated Guideway & Frost Avenue	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	7.5
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			A		
		Southbound	SB	-			-			A		
Beam Avenue to County Road D												
24	Beam Avenue & Dedicated Guideway	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	5.4
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			A		
		Southbound	SB	-			-			-		
25	Beam Avenue & Hazelwood Street	Eastbound	EB	A	A	10.0	B	B	11.3	B	B	13.0
		Westbound	WB	B			B			B		
		Northbound	NB	B			B			B		
		Southbound	SB	A			A			A		
26	Beam Avenue & Kennard Street	Eastbound	EB	A	A	7.0	A	A	8.3	A	B	10.5
		Westbound	WB	A			A			B		
		Northbound	NB	B			B			B		
		Southbound	SB	B			B			B		
27	Beam Avenue & Southlawn Drive	Eastbound	EB	A	A	7.7	A	A	8.5	B	B	12.6
		Westbound	WB	A			A			B		
		Northbound	NB	B			B			B		
		Southbound	SB	B			B			B		
28	Beam Avenue & Transit Mall Crossing	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	3.9
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			-		
		Southbound	SB	-			-			A		
29	Hazelwood Street & County Road D	Eastbound	EB	A	A	4.9	A	A	5.2	A	A	4.0
		Westbound	WB	A			A			A		
		Northbound	NB	A			A			A		
		Southbound	SB	-			-			A		
Highway 61 from Buerkle Road to 8th Street												
30	TH 61 & Buerkle Road ^a	Eastbound	EB	-	C	23.7	-	C	25.4	-	C	27.9
		Westbound	WB	D			D			D		
		Northbound	NB	D			D			D		
		Southbound	SB	A			A			B		
31	TH 61 & Willow Lake Boulevard ^a	Eastbound	EB	C	A	6.7	C	B	11.6	C	B	14.8
		Westbound	WB	-			-			-		
		Northbound	NB	A			B			C		
		Southbound	SB	A			A			A		
32	TH 61 & County Road E ^a	Eastbound	EB	D	C	28.3	D	D	48.3	E	D	47.5
		Westbound	WB	E			E			E		
		Northbound	NB	C			C			D		
		Southbound	SB	B			D			D		
33	TH 61 & Cedar Avenue ^a	Eastbound	EB	C	B	15.1	C	C	25.5	C	C	27.7
		Westbound	WB	E			F			F		
		Northbound	NB	B			C			C		
		Southbound	SB	A			B			B		
34	TH 61 & County Road F ^a	Eastbound	EB	D	C	24.3	E	C	31.6	E	D	39.6
		Westbound	WB	D			D			E		
		Northbound	NB	C			D			D		
		Southbound	SB	B			B			C		
35	TH 61 & White Bear Avenue ^a	Eastbound	EB	E	B	14.3	E	B	16.0	D	B	17.1
		Westbound	WB	B			C			B		
		Northbound	NB	B			B			B		
		Southbound	SB	B			B			B		
36	TH 61 & Whitaker Street ^a	Eastbound	EB	-	A	1.6	-	A	1.4	-	A	8.9
		Westbound	WB	A			A			C		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			B		
37	TH 61 & County Road 96 / Lake Avenue ^a	Eastbound	EB	D	C	22.9	D	D	36.4	D	C	33.9
		Westbound	WB	F			E			F		
		Northbound	NB	C			C			C		
		Southbound	SB	B			D			C		
38	TH 61 & 2nd Street ^a	Eastbound	EB	C	A	5.5	D	A	7.9	C	A	9.1
		Westbound	WB	E			E			E		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
39	TH 61 & 4th Street ^a	Eastbound	EB	D	B	11.4	D	B	13.4	F	C	27.3
		Westbound	WB	E			E			E		
		Northbound	NB	A			A			B		
		Southbound	SB	A			A			C		
40	TH 61 & 7th Street ^a	Eastbound	EB	C	B	10.9	D	B	11.9	C	B	10.7
		Westbound	WB	E			E			D		
		Northbound	NB	A			A			B		
		Southbound	SB	A			A			A		
41	TH 61 & 8th Street ^a	Eastbound	EB	C	C	23.1	D	D	27.0	C	D	48.2
		Westbound	WB	B			B			D		
		Northbound	NB	A			A			B		
		Southbound	SB	D			E			E		

P.M. Level of Service and Intersection Delay

Scenario				2018			2040					
#	Intersection	Approach	Appr	Existing Conditions			No Build		Delay	Build		
				Level of Service	Delay		Level of Service			Level of Service	Delay	
				by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection	by Approach	by Intersection	by Intersection
Phalen Boulevard from L'Orient Street to Maryland Avenue												
13	Pennsylvania Avenue & L'Orient Street	Eastbound	EB	A	B	10.8	A	B	11.3	C	C	21.0
		Westbound	WB	B			A			B		
		Northbound	NB	C			C			D		
		Southbound	SB	B			B			C		
14	Phalen Boulevard & Olive Street	Eastbound	EB	A	B	10.5	B	B	13.6	D	D	38.3
		Westbound	WB	A			B			C		
		Northbound	NB	B			C			D		
		Southbound	SB	B			C			E		
15	Phalen Boulevard & Cayuga Street	Eastbound	EB	B	B	15.8	D	D	48.3	B	C	20.4
		Westbound	WB	B			C			B		
		Northbound	NB	-			-			-		
		Southbound	SB	C			-			D		
16	Phalen Boulevard & Payne Avenue	Eastbound	EB	F	F	100+	F	F	100+	D	D	52.8
		Westbound	WB	C			D			C		
		Northbound	NB	C			F			F		
		Southbound	SB	D			F			E		
17	Phalen Boulevard & Neid Lane	Eastbound	EB	A	A	7.3	B	A	9.7	A	B	16.4
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			-		
		Southbound	SB	B			C			B		
18	Neid Lane & Arcade Street	Eastbound	EB	C	B	11.9	C	B	12.8	C	B	13.4
		Westbound	WB	C			C			C		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
19	Phalen Boulevard & Johnson Parkway	Eastbound	EB	C	C	25.1	C	C	26.8	C	C	26.8
		Westbound	WB	C			C			C		
		Northbound	NB	C			C			C		
		Southbound	SB	C			C			D		
20	Johnson Parkway & Magnolia Lane	Eastbound	EB	A	A	2.5	E	A	6.0	C	A	4.5
		Westbound	WB	-			-			-		
		Northbound	NB	A			A			A		
		Southbound	SB	A			A			A		
21	Johnson Parkway & Maryland Avenue	Eastbound	EB	B	B	16.2	B	B	18.3	B	B	18.0
		Westbound	WB	B			B			B		
		Northbound	NB	C			C			C		
		Southbound	SB	C			C			C		
22	Maryland Avenue & Dedicated Guideway	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	6.8
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			C		
		Southbound	SB	-			-			C		
Ramsey County Rail Right-of-Way from Maryland Avenue to Beam Avenue												
23	Dedicated Guideway & Frost Avenue	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	8.0
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			A		
		Southbound	SB	-			-			A		
Beam Avenue to County Road D												
24	Beam Avenue & Dedicated Guideway	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	7.2
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			-		
		Southbound	SB	-			-			-		
25	Beam Avenue & Hazelwood Street	Eastbound	EB	B	B	14.0	B	B	15.9	C	C	23.4
		Westbound	WB	B			B			C		
		Northbound	NB	B			B			C		
		Southbound	SB	B			B			B		
26	Beam Avenue & Kennard Street	Eastbound	EB	A	A	8.9	A	B	10.2	B	B	18.1
		Westbound	WB	A			A			B		
		Northbound	NB	B			B			C		
		Southbound	SB	B			B			B		
27	Beam Avenue & Southlawn Drive	Eastbound	EB	B	B	12.4	B	B	12.8	C	C	20.1
		Westbound	WB	B			B			B		
		Northbound	NB	B			B			C		
		Southbound	SB	B			B			B		
28	Beam Avenue & Transit Mall Crossing	Eastbound	EB	A	N/A	-	A	N/A	-	A	A	4.4
		Westbound	WB	A			A			A		
		Northbound	NB	-			-			-		
		Southbound	SB	-			-			A		
29	Hazelwood Street & County Road D	Eastbound	EB	A	A	7.7	A	A	8.3	A	A	6.1
		Westbound	WB	A			A			A		
		Northbound	NB	A			A			A		
		Southbound	SB	-			-			A		
Highway 61 from Buerkle Road to 8th Street												
30	TH 61 & Buerkle Road ^a	Eastbound	EB	-	C	27.5	-	E	60.2	-	D	54.9
		Westbound	WB	D			F			D		
		Northbound	NB	C			E			F		
		Southbound	SB	B			D			B		
31	TH 61 & Willow Lake Boulevard ^a	Eastbound	EB	C	A	7.5	F	D	44.0	F	C	29.6
		Westbound	WB	-			-			-		
		Northbound	NB	A			D			B		
		Southbound	SB	A			B			B		
32	TH 61 & County Road E ^a	Eastbound	EB	D	C	33.5	D	E	58.3	D	E	56.4
		Westbound	WB	D			E			D		
		Northbound	NB	C			E			E		
		Southbound	SB	C			D			D		
33	TH 61 & Cedar Avenue ^a	Eastbound	EB	C	B	15.3	C	B	18.0	C	C	20.2
		Westbound	WB	E			D			D		
		Northbound	NB	B			B			C		
		Southbound	SB	A			B			B		
34	TH 61 & County Road F ^a	Eastbound	EB	D	B	18.0	D	C	20.5	E	C	24.0
		Westbound	WB	C			C			D		
		Northbound	NB	A			B			B		
		Southbound	SB	C			C			C		
35	TH 61 & White Bear Avenue ^a	Eastbound	EB	E	B	13.6	D	B	18.9	D	D	42.5
		Westbound	WB	C			C			D		
		Northbound	NB	A			B			D		
		Southbound	SB	B			B			C		
36	TH 61 & Whitaker Street ^a	Eastbound	EB	-	A	5.6	-	B	12.6	-	B	14.7
		Westbound	WB	B			C			C		
		Northbound	NB	A			A			A		
		Southbound	SB	B			D			C		
37	TH 61 & County Road 96 / Lake Avenue ^a	Eastbound	EB	D	C	34.2	D	D	44.9	E	D	42.3
		Westbound	WB	E			E			F		
		Northbound	NB	B			C			C		
		Southbound	SB	D			E			D		
38	TH 61 & 2nd Street ^a	Eastbound	EB	B	B	11.4	C	C	26.3	C	C	30.6
		Westbound	WB	E			E			F		
		Northbound	NB	A			C			C		
		Southbound	SB	A			B			B		
39	TH 61 & 4th Street ^a	Eastbound	EB	E	B	18.7	D	C	26.0	F	C	34.2
		Westbound	WB	E			E			E		
		Northbound	NB	A			C			C		
		Southbound	SB	A			B			B		
40	TH 61 & 7th Street ^a	Eastbound	EB	D	A	8.4	D	B	10.2	C	B	14.0
		Westbound	WB	D			D			D		
		Northbound	NB	A			A			B		
		Southbound	SB	A			A			A		
41	TH 61 & 8th Street ^a	Eastbound	EB	B	A	7.4	B	A	8.3	C	B	14.7
		Westbound	WB	D			D			D		
		Northbound	NB	A			A			A		
		Southbound	SB	C			C			D		



LAND USE AND ECONOMIC ANALYSIS TECHNICAL REPORT

APRIL 2021

Prepared by:



TABLE OF CONTENTS

1. Introduction.....	1
2. Land Use Plan Compatibility.....	1
2.1. Regulatory Context.....	2
2.2. Methodology.....	2
2.3. Existing Conditions.....	3
2.4. Environmental Consequences.....	23
2.5. Mitigation Measures.....	23
3. Land Acquisitions and Relocations	24
3.1. Regulatory Context.....	24
3.2. Methodology.....	24
3.3. Environmental Consequences.....	24
3.4. Mitigation Measures.....	26
4. Neighborhoods and Community Resources	27
4.1. Regulatory Context.....	27
4.2. Methodology.....	27
4.3. Existing Conditions.....	27
4.4. Environmental Consequences.....	48
4.5. Mitigation Measures.....	56
5. Economics.....	58
5.1. Regulatory Context.....	58
5.2. Methodology.....	58
5.3. Existing Conditions.....	58
5.4. Environmental Consequences.....	59
5.5. Mitigation Measures.....	65

LIST OF TABLES

Table 1: Type and Acreage of Property That May Be Impacted During the Operating Phase	25
Table 2: Parcels Temporarily Impacted During the Construction Phase by Municipality and Type	26
Table 3: Community Facilities near Rush Line BRT in Saint Paul	31
Table 4: Community Facilities near Rush Line BRT in Maplewood	41
Table 5: Community Facilities near Rush Line BRT in White Bear Township	42
Table 6: Community Facilities near Rush Line BRT in Vadnais Heights.....	43

Table 7: Community Facilities near Rush Line BRT in Gem Lake	43
Table 8: Community Facilities near Rush Line BRT in White Bear Lake	45
Table 9: Direct Impacts to Commercial Uses in Saint Paul	60
Table 10: Direct Impacts to Commercial Uses in Maplewood	61
Table 11: Direct Impacts to Commercial Uses in White Bear Township	61
Table 12: Direct Impacts to Commercial Uses in Vadnais Heights.....	62
Table 13: Direct Impacts to Commercial Uses in Gem Lake	62
Table 14: Direct Impacts to Commercial Uses in White Bear Lake	63
Table 15: Construction Phase Parking Impacts.....	64
Table 16: Commercial Properties Impacted by Temporary Easements.....	64

LIST OF FIGURES

Figure 1: Existing Land Use in Saint Paul from Union Depot to Arcade Street	6
Figure 2: Existing Land Use in Saint Paul from Arcade Street to Larpenteur Avenue	7
Figure 3: Planned Land Use in Saint Paul from Union Depot to Arcade Street.....	8
Figure 4: Planned Land Use in Saint Paul from Arcade Street to Larpenteur Avenue.....	9
Figure 5: Existing Land Use in Maplewood	12
Figure 6: Planned Land Use in Maplewood.....	13
Figure 7: Existing Land Use in White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake	16
Figure 8: Planned Land Use in White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake	17
Figure 9: Existing Land Use in White Bear Township, Gem Lake and White Bear Lake	21
Figure 10: Planned Land Use in White Bear Township, Gem Lake and White Bear Lake	22
Figure 11: Saint Paul District Councils.....	30
Figure 12: Community Facilities in Saint Paul	37
Figure 13: Community Facilities in Downtown Saint Paul	38
Figure 14: Community Facilities in Saint Paul and in Maplewood	39
Figure 15: Community Facilities in Maplewood, White Bear Township, Vadnais Heights and White Bear Lake	44
Figure 16: Community Facilities in White Bear Township, Gem Lake and White Bear Lake	47

1. INTRODUCTION

The Rush Line Bus Rapid Transit (BRT) Project (the Build Alternative) is a proposed 15-mile long BRT route connecting Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. It would include 21 stations, and the route would generally run along Robert Street, Jackson Street, Phalen Boulevard, Ramsey County rail right-of-way and Highway 61. The Build Alternative would serve the existing Maplewood Mall Transit Center and two proposed park-and-rides at Highway 36 and at County Road E. An option to the Build Alternative, the Build Alternative option without the Highway 36 park-and-ride, is also being evaluated. Differences between the Build Alternative and the Build Alternative option without the Highway 36 park-and-ride are noted where applicable. Ramsey County, on behalf of the Ramsey County Regional Railroad Authority, is preparing an Environmental Assessment (EA) for the project, and this technical report has been prepared in support of the EA.

This report summarizes the potential impacts of the Rush Line BRT Project on land use, neighborhoods and community resources, land acquisitions and relocations, and economics. For each of these characteristics and resources, this report describes the regulatory context for the analysis, methods used and existing conditions within the study area. Potential operating (long-term) impacts and construction phase (short-term) impacts were evaluated and potential mitigation measures to address these impacts are described.

Throughout this report, the Rush Line BRT Project is also referred to as “the project” and “Rush Line BRT.” Rush Line BRT Project staff, also referred to as “project staff,” include employees of Ramsey County as well as members of the consultant team preparing the EA.

2. LAND USE PLAN COMPATIBILITY

The objective of this section is to evaluate the project’s potential land use impacts within the study area. This includes the following:

- Description of existing land use conditions.
- Description of planned land uses and land use planning efforts.
- Evaluation of the Rush Line BRT Project’s compatibility with local land use and transportation planning policies including municipal comprehensive plans and zoning ordinances as well as the Metropolitan Council’s *2040 Transportation Policy Plan*.
- Evaluation of existing zoning and planned land use.

In 2018 project staff conducted a preliminary station area planning process with input from city staff and community and business representatives. During preliminary station area planning work sessions, participants identified potential opportunities for transit-supportive development and examined multimodal accessibility around proposed stations to inform the identification of platform locations. Transit-supportive development is dense and includes a mix of uses that contribute to walkability and provide the activity level needed to support high-quality transit service. These sessions did not assess or recommend changes in land use designations or zoning.

Project staff shared the information gathered in these station area planning exercises with staff from each project area community. Project staff will also share a market assessment and analysis of pedestrian and bicycle accessibility for each station area with city staff. Intensification of use, including new development of previously unused land and redevelopment of built-out sites at increased

densities, may occur around stations, which would be compatible with existing local zoning codes and comprehensive plans.

2.1. REGULATORY CONTEXT

No specific laws or executive orders regulate the consideration of land use impacts as a component of National Environmental Policy Act review documents. The National Environmental Policy Act and Minnesota Environmental Policy Act form the general basis for consideration of land use issues, which focus on promoting productive and harmonious relationships with nature and precluding or mitigating damage to the environment.

In accordance with Sections 3 and 5 of the Urban Mass Transportation Assistance Act of 1970,¹ federally funded transit projects must be consistent with official plans for the comprehensive development of an area, as well as with the goals and objectives of affected communities. The Metropolitan Land Use Planning Act of 1976² requires municipalities in Minnesota to complete comprehensive, coordinated land use plans.

Municipal comprehensive plans determine community goals for future development and identify public policy and land use controls needed to reach these goals. Every 10 years, each city completes a comprehensive plan that guides land use through a 20-year planning horizon. The Metropolitan Council reviews local plans for consistency with existing regional plans and policies, including *Thrive MSP 2040*,³ which forecasts future needs for the region and sets policy foundations, including support for transit investments, in the Metropolitan Council's *2040 Transportation Policy Plan*.⁴ The *2040 Transportation Policy Plan* identifies Rush Line BRT as a transit project that will be funded in the Current Revenue Scenario, which is also considered the Fiscally Constrained Scenario. A project's inclusion in a fiscally constrained plan is required for federal funding eligibility; inclusion of the Rush Line BRT Project in the *2040 Transportation Policy Plan* meets this requirement.

2.2. METHODOLOGY

The study area is located in Ramsey County in the east and northeast part of the Twin Cities metropolitan area. For the land use analysis, the study area is defined as the area within one-half mile of the proposed route. The one-half mile radius is commonly used by transit planners to represent the distance transit users are willing to walk to access a transit station and the station's area of real estate development influence.

Land use data was obtained from adopted and draft⁵ versions of comprehensive plans for the cities of Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. Information from the comprehensive plans was supplemented by historic and recent aerial photography, field inspections and local knowledge of the study area. Assessment of compatibility with existing and planned land uses was based on the land use inventories in the adopted comprehensive plans. These source documents include:

¹ Public Law 91-453, 84 Stat. 962

² Minnesota Statutes, section 473.851

³ Metropolitan Council. *Thrive MSP 2040*. Adopted on May 28, 2014. Available at <https://metrocouncil.org/planning/projects/thrive-2040.aspx>.

⁴ Metropolitan Council. *2040 Transportation Policy Plan*. October 2018 Update. Available at <https://metrocouncil.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan.aspx>.

⁵ Draft comprehensive plans are currently under review by city councils or the Metropolitan Council.

- City of Saint Paul 2040 Comprehensive Plan (Draft, June 2019).⁶
- City of Maplewood 2040 Comprehensive Plan (August 2019).⁷
- White Bear Township 2040 Comprehensive Plan (Draft, March 2018).⁸
- City of Vadnais Heights 2040 Comprehensive Plan (November 2019).⁹
- City of Gem Lake Comprehensive Plan 2040 (Draft, September 2019).¹⁰
- City of White Bear Lake 2040 Comprehensive Plan (Draft, August 2019).¹¹

2.3. EXISTING CONDITIONS

2.3.1. Saint Paul

The Rush Line BRT Project is compatible with the city of Saint Paul’s local land use planning policies. The draft land use chapter of the *City of Saint Paul 2040 Comprehensive Plan* outlines a number of strategies that support transit-oriented development, including permitting medium- to high-density residential development in Neighborhood Nodes, along arterial and collector streets, and in downtown Saint Paul. Neighborhood Nodes are defined in the plan as “compact, mixed-use areas that provide shops, services, neighborhood-scale civic and institutional uses, recreational facilities and employment” in predominantly residential areas. Each station in Saint Paul would be located in an area designated as a Neighborhood Node. The *City of Saint Paul 2040 Comprehensive Plan* calls for targeting growth in Neighborhood Nodes while balancing the scale of development with other objectives, including consistency with the prevailing character and overall density of the area. The comprehensive plan explicitly recognizes that growth in Neighborhood Nodes would be achieved through the development of housing types at densities that support transit, walking and biking.

Multiple strategies within the *City of Saint Paul 2040 Comprehensive Plan*’s draft transportation chapter also address transit development. Goal 2 of the chapter, which prioritizes “safety and accessibility for all users,” seeks to create a safe and inviting environment for transit users, pedestrians and cyclists. Goal 4, “True transportation choice throughout the city,” similarly aims to reduce vehicle miles traveled, increase transit mode share and support quality public transit service through transit-supportive land use and design. The plan also explicitly calls for “working with transit providers to improve their service offerings and supporting transit facilities.” The Rush Line BRT Project is compatible with existing land use and zoning in the city of Saint Paul and meets the transportation goals of the 2040 comprehensive plan.

Though it comprises relatively little of the study area, the primary planned land use found in the draft *Saint Paul 2040 Comprehensive Plan* is Urban Neighborhood, which is defined as “primarily residential areas with a range of housing types,” allowing for single- and multi-family housing as well as neighborhood-scale uses including schools, parks and religious institutions. Within Urban Neighborhoods and across the city, the plan also identifies 73 Neighborhood Nodes at the intersections of local, collector and arterial streets. The goal for residential density throughout Urban

⁶ Available at <https://www.stpaul.gov/departments/planning-economic-development/planning/2040-comprehensive-plan>.

⁷ Available at <https://www.maplewoodmn.gov/1718/2040-Comprehensive-Plan>.

⁸ Available at <http://www.ci.white-bear-township.mn.us/DocumentCenter/View/1330/Current-Comp-Plan-PDF>.

⁹ Available at https://www.cityvadnaisheights.com/DocumentCenter/View/1245/Vadnais-Heights-Comp-Plan_Draft-PDF?bidId=.

¹⁰ Draft plan not yet available online.

¹¹ Available at <https://www.whitebearlake.org/communitydevelopment/page/comprehensive-plan>.

Neighborhoods is seven to 30 units per acre as a base range, with a goal of 15 to 55 units per acre at Neighborhood Nodes. These target ranges are largely compatible with those established in the Metropolitan Council's *2040 Transportation Policy Plan* for urban areas including Saint Paul. The density expectation for urban areas is at least 25 units per acre within one-half mile of dedicated guideway transit projects, with target ranges of 50 to 100 or more units per acre.

DOWNTOWN STATIONS

Downtown Saint Paul is the second-largest job center in the Twin Cities metropolitan area and includes the Union Depot, 5th/6th Street, 10th Street, 14th Street and Mt. Airy Street stations. Land use in these station areas includes industrial, high-density mixed-use commercial and retail, institutional and multi-family uses, as shown in Figure 1. Downtown Saint Paul also encompasses the historic Lowertown neighborhood and Union Depot, which are both listed in the National Register of Historic Places. Union Depot is a historic train depot that currently serves passenger trains, the METRO Green Line and several local and express bus routes. Union Depot would act as the southern terminus of the Rush Line BRT Project. Northwest of the Interstate 94 (I-94) and I-35E interchange, in the area surrounding Regions Hospital and Gillette Children's Specialty Healthcare, land use is predominantly institutional. The area also includes single-family and multi-family residential, industrial and commercial land uses, as well as some undeveloped land. Undeveloped land is vacant land where construction could occur in the future. From Union Depot to the Mt. Airy Street station, zoning in the study area is a mix of central business district, industrial, medium- to high-density residential and traditional neighborhood. In Saint Paul, traditional neighborhood zoning allows for a "compatible mix of commercial and residential uses within buildings, sites and blocks," additional housing choices and new development proximate to major transit corridors.¹²

Throughout the study area in downtown Saint Paul, planned land use in the draft plan remains mostly unchanged from existing land use, as shown in Figure 3. Downtown Saint Paul and the Capitol complex are guided to maintain their uses as a commercial hub and a key institutional center, respectively. The Mt. Airy Street station area is identified as a Neighborhood Node in a planned Urban Neighborhood, a distinction that is consistent with its current character but allows for more intensive development in the future.

EAST SIDE STATIONS

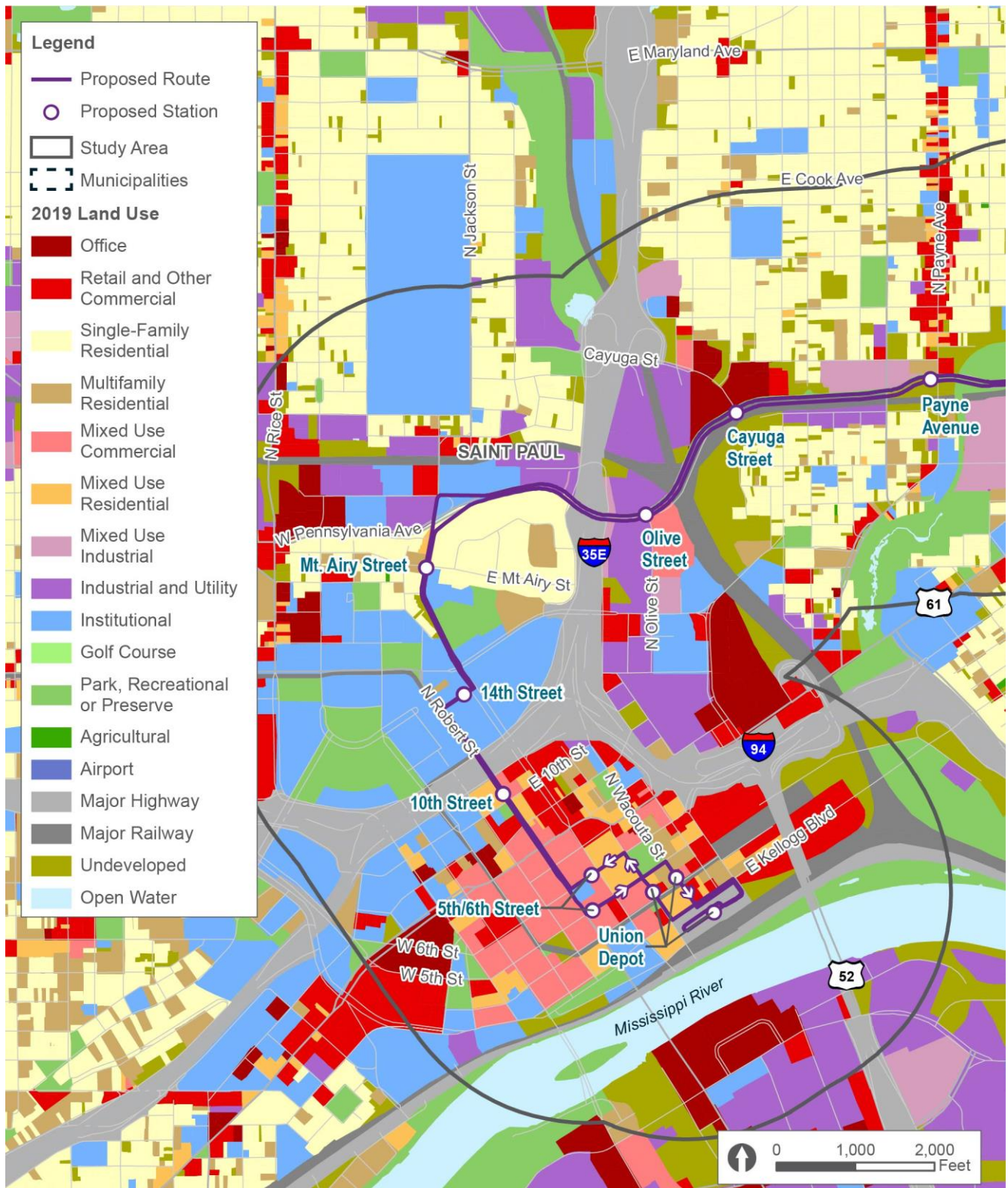
Six stations are proposed for the area of Saint Paul east of I-35E: the Cayuga Street, Olive Street, Payne Avenue, Arcade Street, Cook Avenue and Maryland Avenue stations. There are institutional land uses associated with state office buildings and medical facilities around the Cayuga Street and Olive Street stations, and industrial, mixed-use and single-family land uses near Phalen Boulevard. Payne Avenue and Arcade Street are key commercial corridors serving the area and also include mixed use, institutional, multi-family residential and some industrial land uses. South of the Union Pacific railroad, there is undeveloped land that has been prepared for future industrial uses as well as institutional uses associated with Metropolitan State University (see Figure 2). South and east of Lake Phalen, there is a commercial node near the proposed Cook Avenue station that includes Hmong Village, and there are multi-family housing and institutional uses. Hmong Village is a large indoor shopping market with more than 250 vendors, and it is a major regional destination. Aside from these uses, single-family housing is the predominant land use in this part of the study area. Around the Olive Street and Cayuga Street stations, zoning permits industrial, institutional and commercial uses.

¹² Available at https://library.municode.com/mn/st._paul/codes/code_of_ordinances?nodeId=PTIILECO_TITVIII_ZOCO_CH66ZOCOONDIUSDEDIST_ARTIII66.300.TRNEDI_DIV166.310.IN_S66.311GEINTTRNEDI.

From the Payne Avenue station to the Larpenteur Avenue station, single-family zoning is the primary classification, along with some industrial, traditional neighborhood and medium- to high-density zoning, particularly in areas near the proposed Rush Line BRT route.

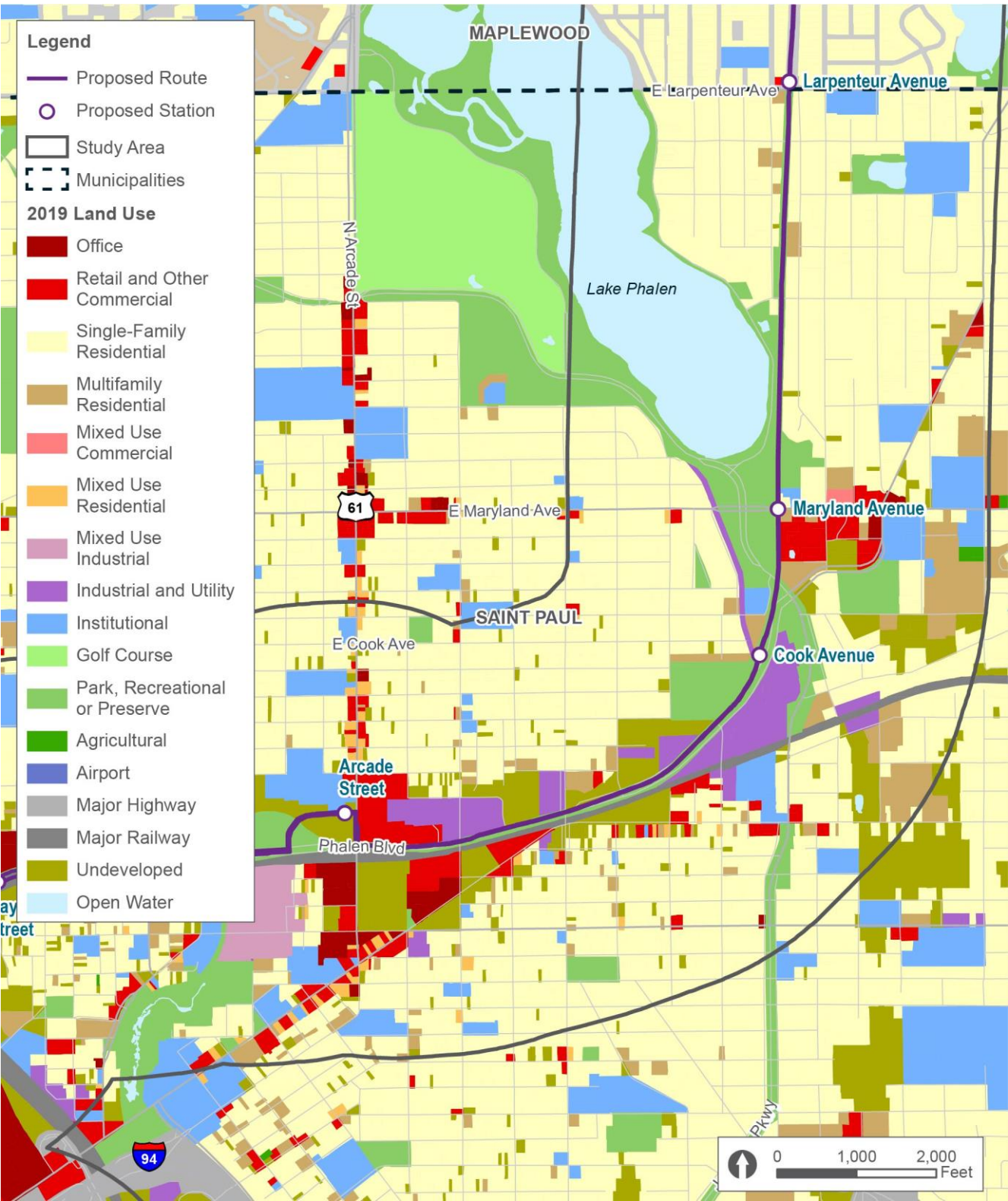
In the draft plan, land use proximate to Phalen Boulevard is planned to remain predominantly industrial. Beyond the industrial land uses immediately adjacent to Phalen Boulevard, much of the study area is designated as Urban Neighborhood; along certain intersecting and nearby streets, the planned land use is mixed use. The commercial hub at the intersection of Johnson Parkway and Maryland Avenue would be maintained. From Maryland Avenue to Larpenteur Avenue, land use is planned to change from single-family residential to Urban Neighborhood.

Figure 1: Existing Land Use in Saint Paul from Union Depot to Arcade Street



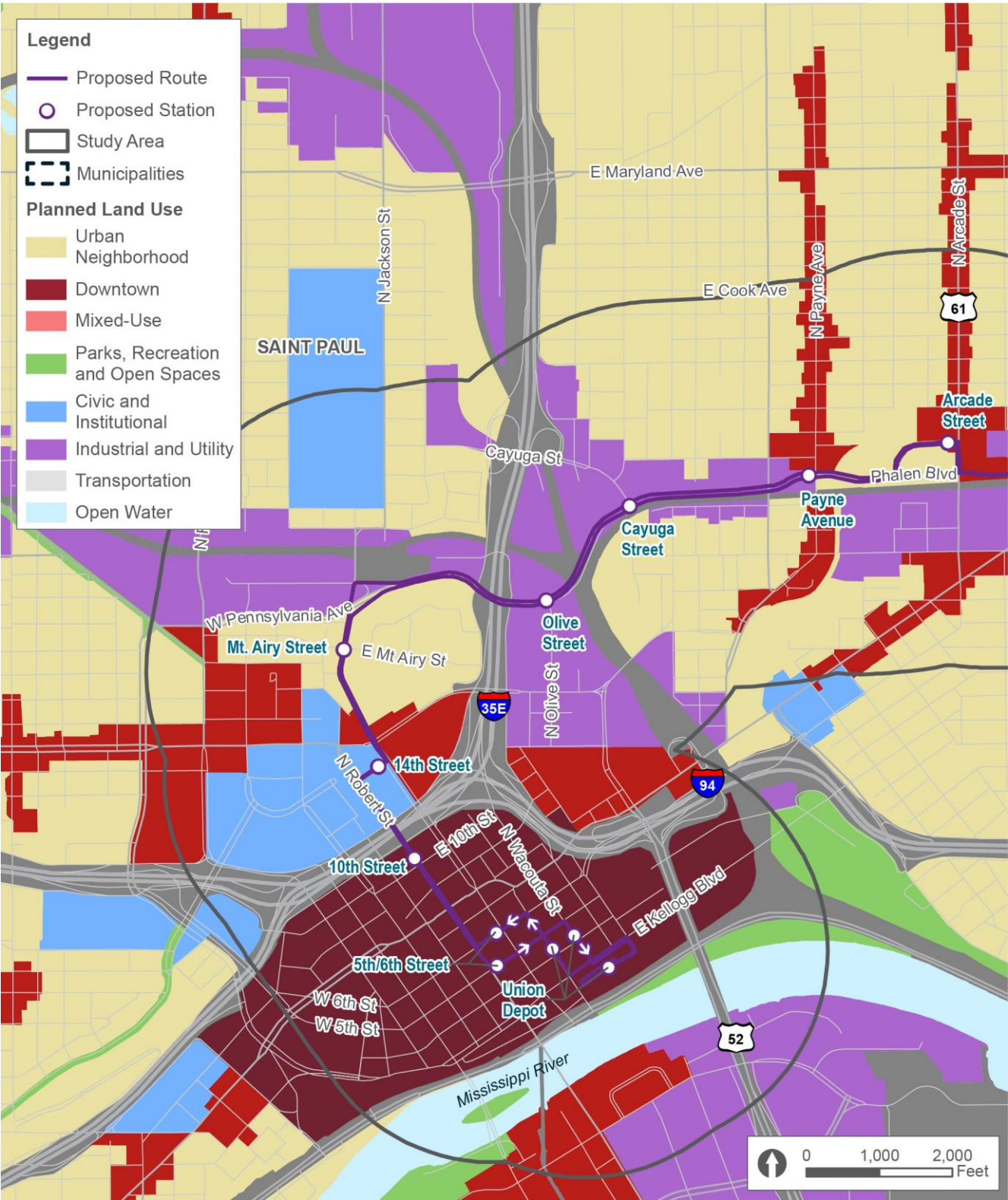
Source: City of Saint Paul

Figure 2: Existing Land Use in Saint Paul from Arcade Street to Larpenteur Avenue



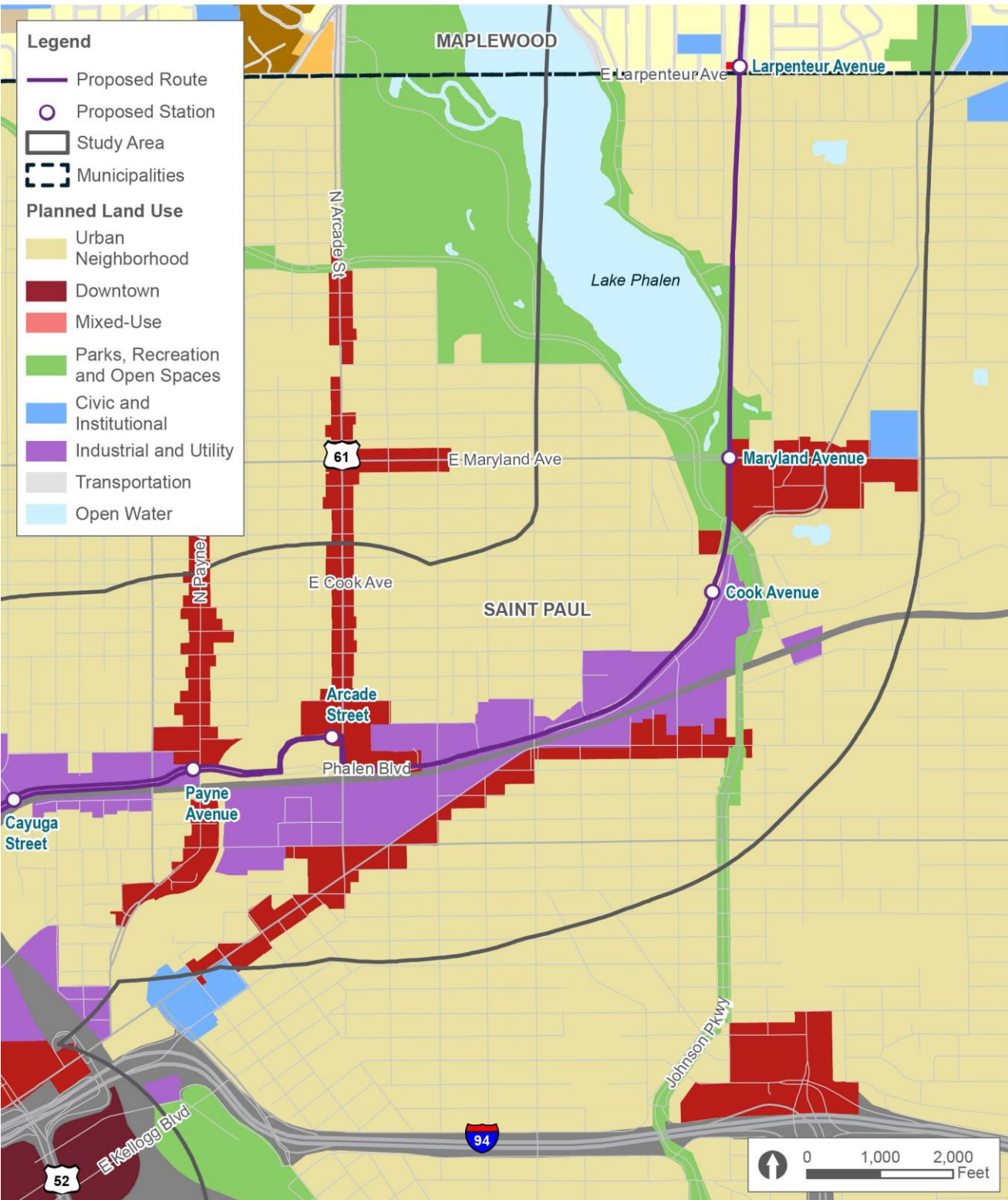
Source: City of Saint Paul

Figure 3: Planned Land Use in Saint Paul from Union Depot to Arcade Street



Source: City of Saint Paul Department of Planning and Economic Development, April 2019 Draft Future Land Use Layer

Figure 4: Planned Land Use in Saint Paul from Arcade Street to Larpenteur Avenue



Source: City of Saint Paul Department of Planning and Economic Development, April 2019 Draft Future Land Use Layer; City of Maplewood

2.3.2. Maplewood

Rush Line BRT would include five stations in Maplewood: Larpenteur Avenue, Frost Avenue, Highway 36, Maplewood Mall Transit Center and St. John's Boulevard. The Rush Line BRT Project is compatible with Maplewood land use planning policies. The *City of Maplewood 2040 Comprehensive Plan* states that the city supports improved transit service and the addition of dedicated guideways on arterial roadways. The land use chapter of the comprehensive plan includes a stated goal to increase development density and intensity to support regional transit investments including the Rush Line BRT Project.

Maplewood is classified as an urban community in the Metropolitan Council's *2040 Transportation Policy Plan*, meaning the density expectation is a minimum of 25 units per acre within one-half mile of dedicated guideway transit projects with a goal of 50 to 100 or more units per acre. The low-density (2.6 to 6.0 units per acre) and medium-density (6.1 to 10.0 units per acre) residential targets are below this minimum, while the high-density (10.1 to 25.0 units per acre) residential targets and mixed-use neighborhood goal (8 to 31 units per net acre) partially meet the minimum density expectation. The mixed use – neighborhood high density and mixed use – community land uses have target densities of 25 to 50 units per net acre and exceed the minimum density expectation established in the *2040 Transportation Policy Plan*.

Furthermore, the land use chapter of the comprehensive plan calls for strengthening the HealthEast St. John's Hospital area as a key employment center. The transportation chapter of the plan outlines several steps to support transit initiatives, including municipal support for Metro Transit's construction of new or improved bus stops, shelters and guideways, as well as coordination of the sidewalk and trails plan to encourage walking, biking and bus usage. All parks within the study area are guided to continue to be used for park, recreation and open space uses.

In addition to comprehensive planning efforts, the city of Maplewood recently adopted a vision plan for the North End, a commercial area anchored by Maplewood Mall and St. John's Hospital, to foster continued economic revitalization in this activity hub. The North End is a planned future neighborhood roughly bounded by I-694 to the north, White Bear Avenue to the east, Beam Avenue to the south and the Bruce Vento Regional Trail to the west. This plan includes goals for future land use intensification, as well as enhanced accessibility for transit users, pedestrians and bicyclists.

The Larpenteur Avenue station area is predominated by single-family land uses and includes limited institutional, utility and multi-family residential uses (see Figure 5). Existing zoning in this area is consistent with these uses. Land use in the station area is not planned to change significantly, with low-density residential (2.6 to 6.0 units per acre) remaining the primary use in the area, though parcels adjacent to the station location are intended to be converted from utility to commercial use (see Figure 6).

The Frost Avenue station area includes a commercial hub surrounding the station location as well as institutional, parks and open space, single-family residential uses and undeveloped land. Zoning in this station area is consistent with these land uses. Land use in the area adjacent to the station location is planned to be converted to neighborhood mixed use, a designation that will allow for commercial activity in the area to continue and for new investments in medium- to high-density housing (8 to 31 units per acre).

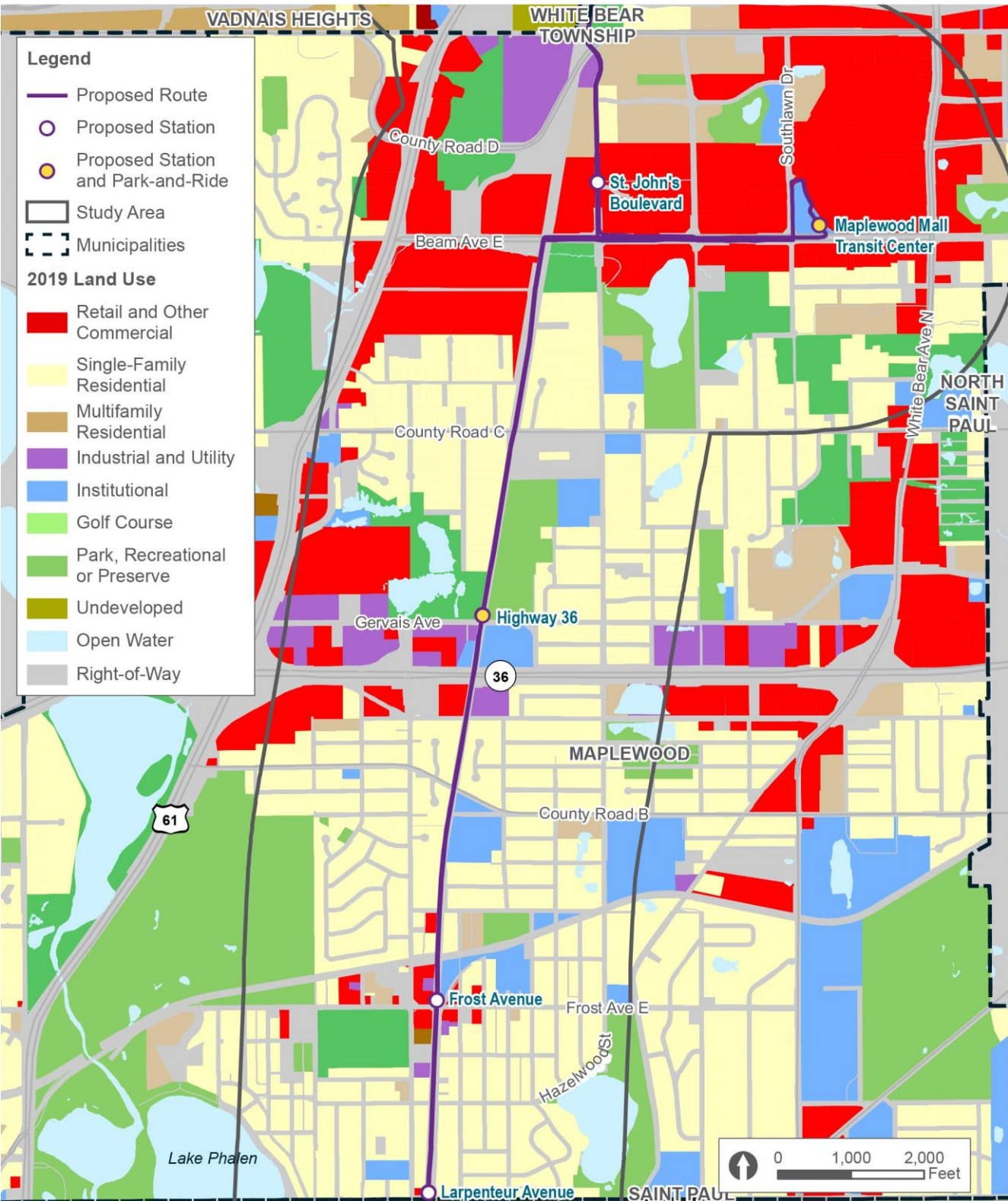
The Highway 36 station area includes single-family residential, parks and open space, institutional, industrial and agricultural uses, as well as several parcels of undeveloped land. Zoning in the area is consistent with these uses and permits single-family residential and mixed-use community uses in the currently undeveloped parcels. Much of the land south of the station is planned to be converted to

mixed-use community, a classification intended to create districts that are primarily commercial, with at least 50 percent of development being commercial in nature, while also permitting office and high-density residential development. Office development is also considered commercial, though different guidelines apply for siting this type of development than other types of commercial development.

The Maplewood Mall Transit Center station area mostly includes commercial uses as well as park, recreational and preserve; institutional; and single- and multi-family residential uses. Zoning in this area is consistent with these uses. Land use north of the station is intended to be converted to mixed-use community, consistent with the North End Vision Plan, while land use to its south is intended for low- to medium-density residential, commercial and parks and open spaces uses.

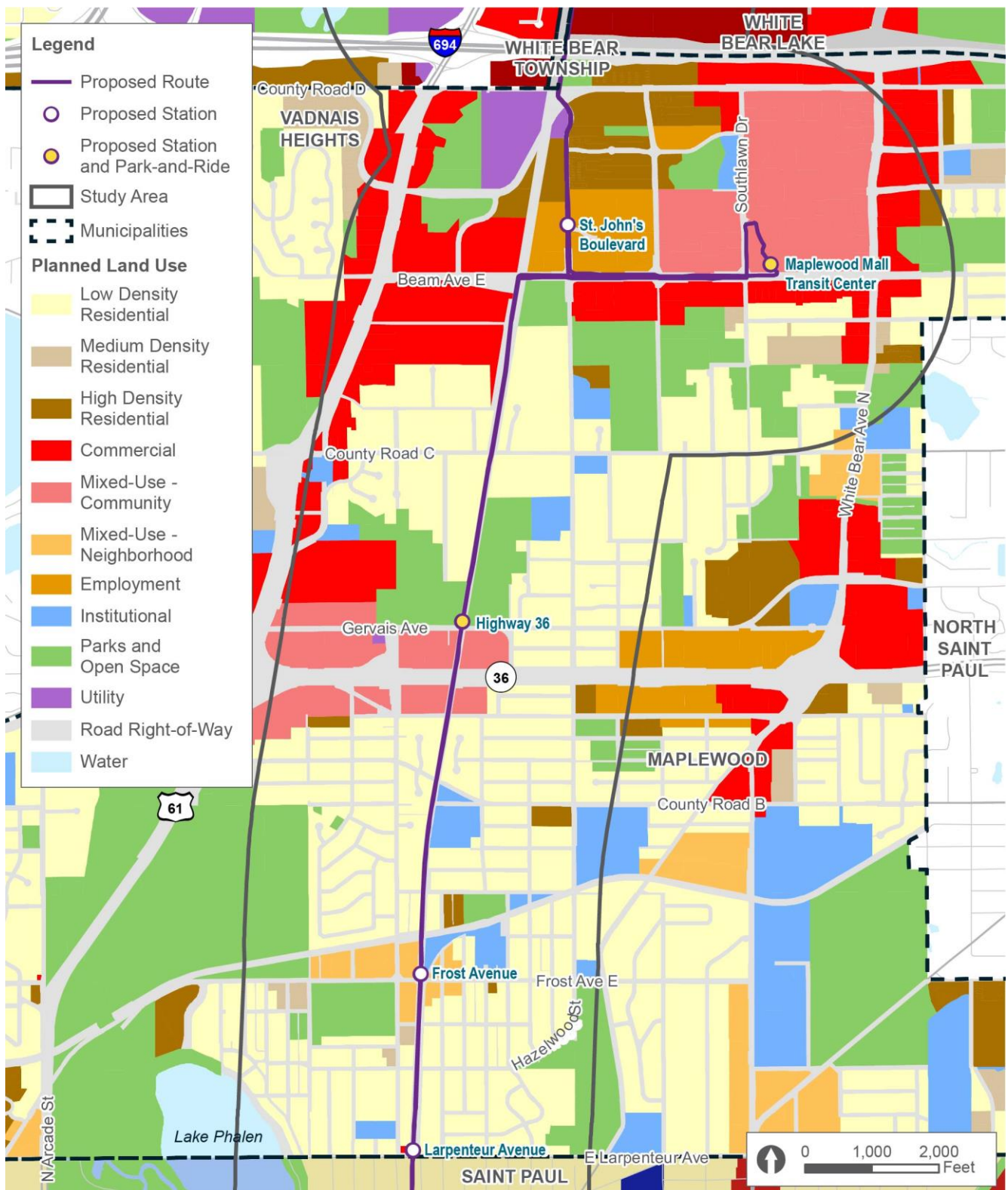
The St. John's Boulevard station area includes institutional, commercial and single-family residential uses, as well as many undeveloped parcels. Zoning is consistent with these established uses, and areas zoned for planned unit development and commercial uses permit more intensive development in the area. Land use in this area is guided for employment, commercial, high-density residential, industrial and parks and open spaces uses. The employment designation places a special emphasis on land uses that promote job creation and retention, such as industrial and manufacturing centers and corporate campuses.

Figure 5: Existing Land Use in Maplewood



Source: City of Maplewood

Figure 6: Planned Land Use in Maplewood



Source: City of Maplewood

2.3.3. White Bear Township

The southern platform of the Buerkle Road station lies in a portion of White Bear Township that consists of a narrow strip of land that stretches from County Road D to County Road E. The study area encompasses this part of White Bear Township as well as an area just west of Goose Lake and Highway 61. The land use chapter of the draft *White Bear Township 2040 Comprehensive Plan* identifies potential sites for residential, commercial and industrial development and redevelopment. The plan also establishes guidelines for locating medium- and high-density residential developments and a stipulation for a minimum development density of five units per acre. In the limited residential areas of White Bear Township within the study area, the target density range of one to 10 units per acre for residential development falls below the Metropolitan Council's *2040 Transportation Policy Plan* suburban density expectation of 20 units per acre near dedicated guideway transit projects. However, the project is consistent with the comprehensive plan, which includes guidelines for locating medium- and high-density residential developments proximate to major amenities, existing or planned commercial areas, and existing or planned job centers, as well as major roads and compatible nearby land uses.

Existing land use in the White Bear Township portion of the study area is predominantly industrial with some undeveloped land near the railroad. There is also undeveloped land that extends south from Whitaker Street to approximately White Bear Parkway. Single- and multi-family residential uses and a park are adjacent to Otter Lake Road and Highway 96, as shown in Figure 7 and Figure 9. A small strip of land extending across I-694 to Buerkle Road is a primarily undeveloped exclave of White Bear Township owned by a railroad company.

Existing zoning in this area is primarily light industrial. As established in the draft plan, most land in the study area is planned to continue its current use, with industrial uses permitted just west of Goose Lake and wetlands near Whitaker Street remaining undeveloped, as shown in Figure 8 and Figure 10. Undeveloped land north of White Bear Parkway is planned to be developed for industrial uses. Existing single-family residential, multi-family residential and park uses are not designated for change.

2.3.4. Vadnais Heights

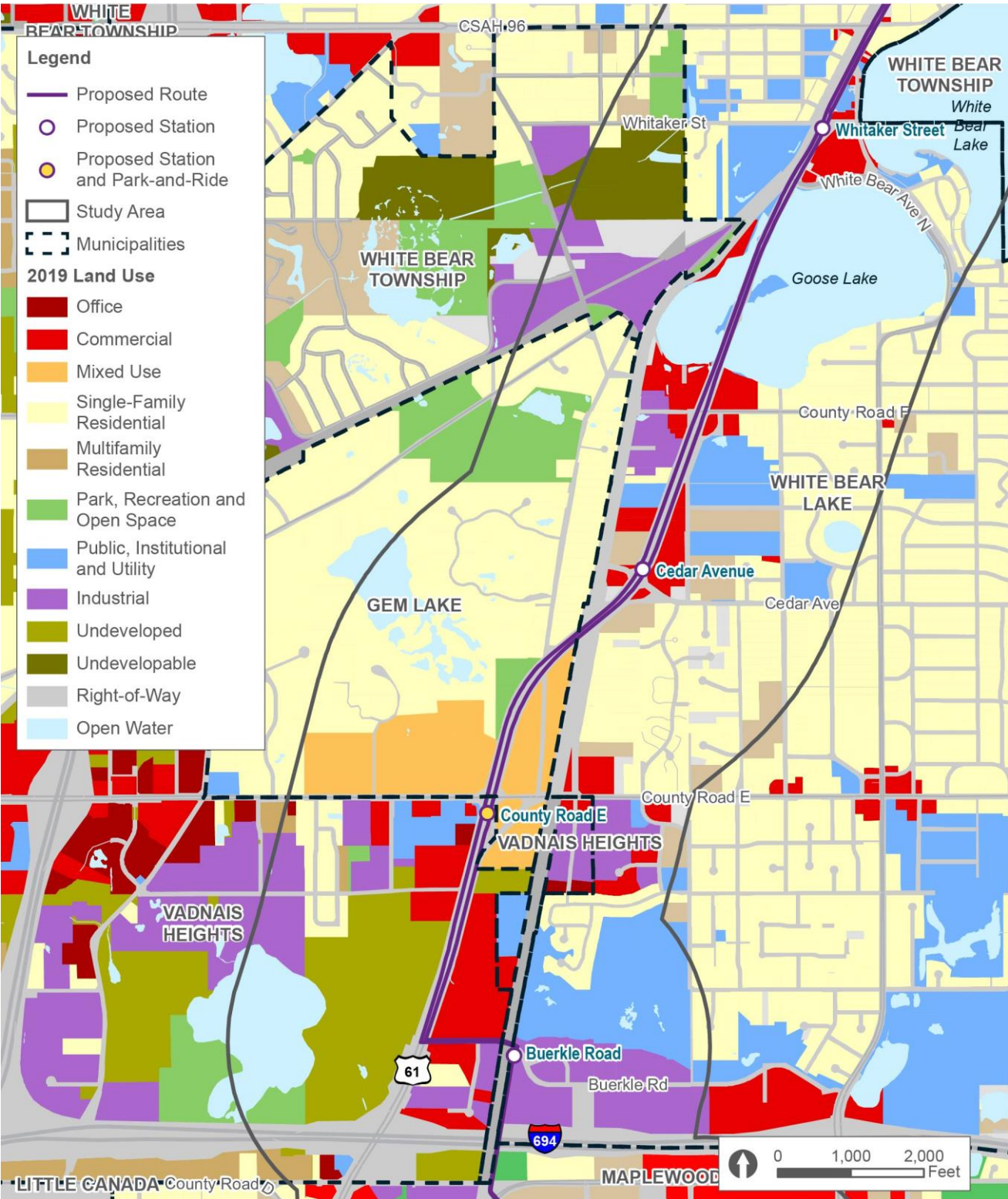
The County Road E station would be located in Vadnais Heights, and though the Buerkle Road station would be located in White Bear Lake and White Bear Township, the western half of its station area would lie within the city of Vadnais Heights. The Rush Line BRT Project is consistent with the *Vadnais Heights 2040 Comprehensive Plan*. This plan establishes land use goals in accordance with the Metropolitan Council's guidelines for communities with a suburban designation. A stated goal of the comprehensive plan is to "target opportunities for more intensive development near regional transit investments" in a manner consistent with the Metropolitan Council's *2040 Transportation Policy Plan*. The *2040 Transportation Policy Plan* classifies Vadnais Heights as a suburban community with a minimum density expectation of 20 units per acre within one-half mile of dedicated guideway transit projects and a target of 40 to 75 or more units per acre. In the limited residential areas of Vadnais Heights within the study area, density goals of 5 to 22 units per acre are partially below the minimum density expectation. The mixed-use designation, which calls for residential densities of 8 to 30 units per acre, is partially compatible with the minimum density expectation. The city will identify opportunities for redevelopment, particularly in areas that are well-served by a variety of transportation options, and lead land use planning efforts around regional transit stations and other regional investments.

Land use adjacent to the Buerkle Road station is predominantly industrial and commercial, and west of Highway 61 there is a privately-owned nature preserve around Willow Lake (Figure 7). Zoning in the area between the Buerkle Road station and Highway 61 permits industrial and commercial uses

while a shoreland overlay district west of Highway 61 restricts development near Willow Lake. Land use east of Highway 61 is planned to remain commercial and industrial. Where possible in the area around Willow Lake, land is intended to be developed for industrial uses (see Figure 8).

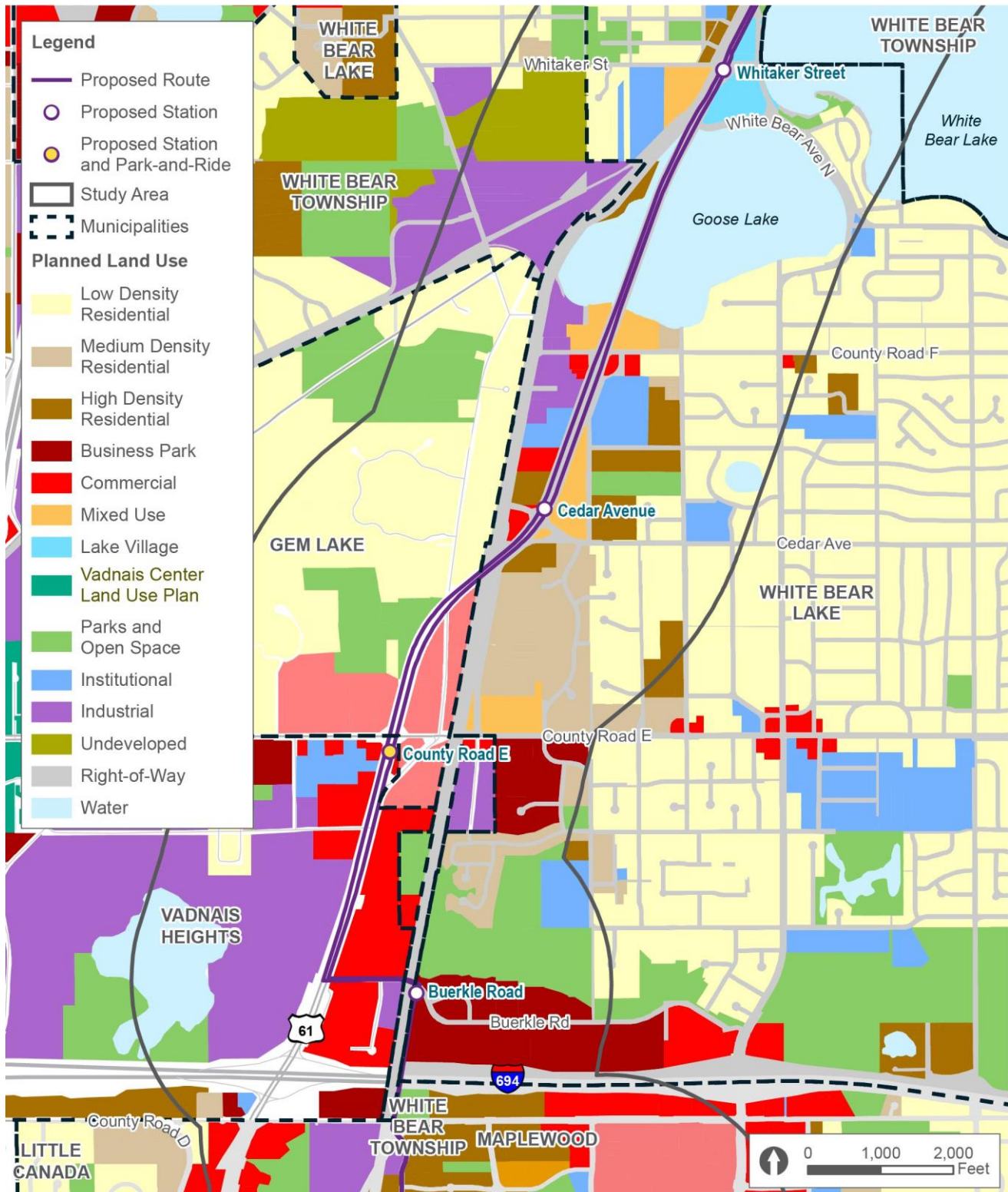
The County Road E station area includes primarily commercial and institutional uses such as car dealerships and the TCO Sports Garden. South and west of the station, there is a mix of single-family residential, park, commercial and industrial land uses. Zoning in this area includes a planned unit development as well as an office-business district that allows for large-scale office buildings and related businesses. Land use is guided to remain a mix of commercial, institutional, park and residential uses.

Figure 7: Existing Land Use in White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake



Source: White Bear Township; Cities of Vadnais Heights, Gem Lake and White Bear Lake

Figure 8: Planned Land Use in White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake



Source: City of Vadnais Heights; White Bear Township; City of Gem Lake; City of White Bear Lake

2.3.5. Gem Lake

Though the County Road E station platforms would be located in Vadnais Heights, Gem Lake borders the station to the east, north and northwest. The Rush Line BRT Project is consistent with the draft *Gem Lake 2040 Comprehensive Plan*. This plan establishes land use goals in accordance with the Metropolitan Council's guidelines for communities with a suburban designation. The draft plan prioritizes the continuation of single-family homes on large lots as the primary land use throughout most of the city and promotes more intensive, transit-supportive development near the proposed County Road E station.

Gem Lake is classified as a suburban community in the Metropolitan Council's *2040 Transportation Policy Plan* with a minimum density expectation of 20 units per acre within one-half mile of dedicated guideway transit projects. The maximum residential density called for in the comprehensive plan is five units per acre in mixed-use areas; in exclusively residential areas, the maximum planned density is two units per acre. In the limited residential areas of Gem Lake within the study area, these densities are below the 20 unit per acre expectation of the *Transportation Policy Plan*.

Land use east and north of the County Road E station is predominantly commercial and includes car dealerships, restaurants and a greenhouse (see Figure 9). Northwest of the station, land use includes single-family residential; undeveloped; park, recreational or preserve; and agricultural uses. Zoning in this area includes a mixture of Neighborhood Center, Neighborhood Mixed-Use, Neighborhood General and low- to medium-density residential uses. As established in the draft comprehensive plan, Neighborhood Center zoning emphasizes ground-floor retail with offices and residential uses occupying the upper stories. In Neighborhood Centers, medium and large developments are permitted, and multi-family housing is encouraged. Neighborhood Mixed-Use zoning allows civic buildings; small-scale commercial, business, office and mixed-use buildings; and higher-density residential buildings. Neighborhood General zoning is intended to begin the transition from low-density residential use to more intensive mixed-use development. Land use in this area is predominantly intended to be Neighborhood Center and Neighborhood Mixed-Use, as shown in Figure 10.

The Cedar Avenue station would be located in White Bear Lake, but the western half of its station area lies in Gem Lake. Existing land use in this area is primarily large single-family lots, a golf course and undeveloped land, as seen in Figure 9. Zoning supports these uses. These existing land uses are planned to be maintained.

2.3.6. White Bear Lake

Four Rush Line BRT stations would be located within the city of White Bear Lake: the northbound Buerkle Road platform, Cedar Avenue, Whitaker Street and Downtown White Bear Lake. The Whitaker Street station would serve the Marina Triangle commercial center. The proposed County Road E station is also proximate to White Bear Lake, as shown in Figure 7 and Figure 9. Rush Line BRT would traverse much of White Bear Lake, including its downtown.

The Rush Line BRT Project is consistent with the draft *White Bear Lake 2040 Comprehensive Plan*. The draft plan prioritizes the continuation of single-family residential uses in most of the community but encourages transit-supportive uses such as multi-family housing and mixed-use development along major corridors and at major nodes of infrastructure investment. White Bear Lake is classified as a suburban community in the Metropolitan Council's *2040 Transportation Policy Plan*, meaning the minimum density expectation is 20 units per acre within one-half mile of dedicated guideway transit projects. The very low-density residential, low-density residential and medium-density residential planned land uses do not meet this expectation with a maximum density of 14 units per acre. The

high-density residential and “Arts and Culture Mixed Use” designations partially meet the *Transportation Policy Plan* expectation with a target density range of 12 to 34 units per acre. The Downtown classification, with a target density of 12 to 50 units per acre, and the Neighborhood Mixed Use classification, with a target density of 16 to 34 units per acre, generally exceed the minimum density expectation. The Lake Village and Transit-Oriented Development Mixed Use classifications exceed the *Transportation Policy Plan* expectation with target densities of 25 to 60 residential units per acre and 25 to 50 residential units per acre, respectively.

East of the proposed Buerkle Road station, existing land use is predominantly industrial. Immediately to the north of this industrial area is a nature preserve, single-family homes and institutional use associated with Willow Lane Elementary School. Zoning is predominantly industrial along with some parks and single-family residential areas. As established in the draft plan, planned land use around the proposed Buerkle Road station within White Bear Lake is primarily business park to the south and northwest, allowing for a mixture of light industrial, warehouse, office and limited retail uses (see Figure 8). Planned land use in this area also includes commercial, low-density residential, and park, recreation and open space to the northeast.

East of the proposed County Road E station is a commercial and industrial hub as well as some multi-family housing and a small undeveloped area. In this area, zoning includes a Diversified Business Development district as well as a small industrial area and some low-density residential zoning.

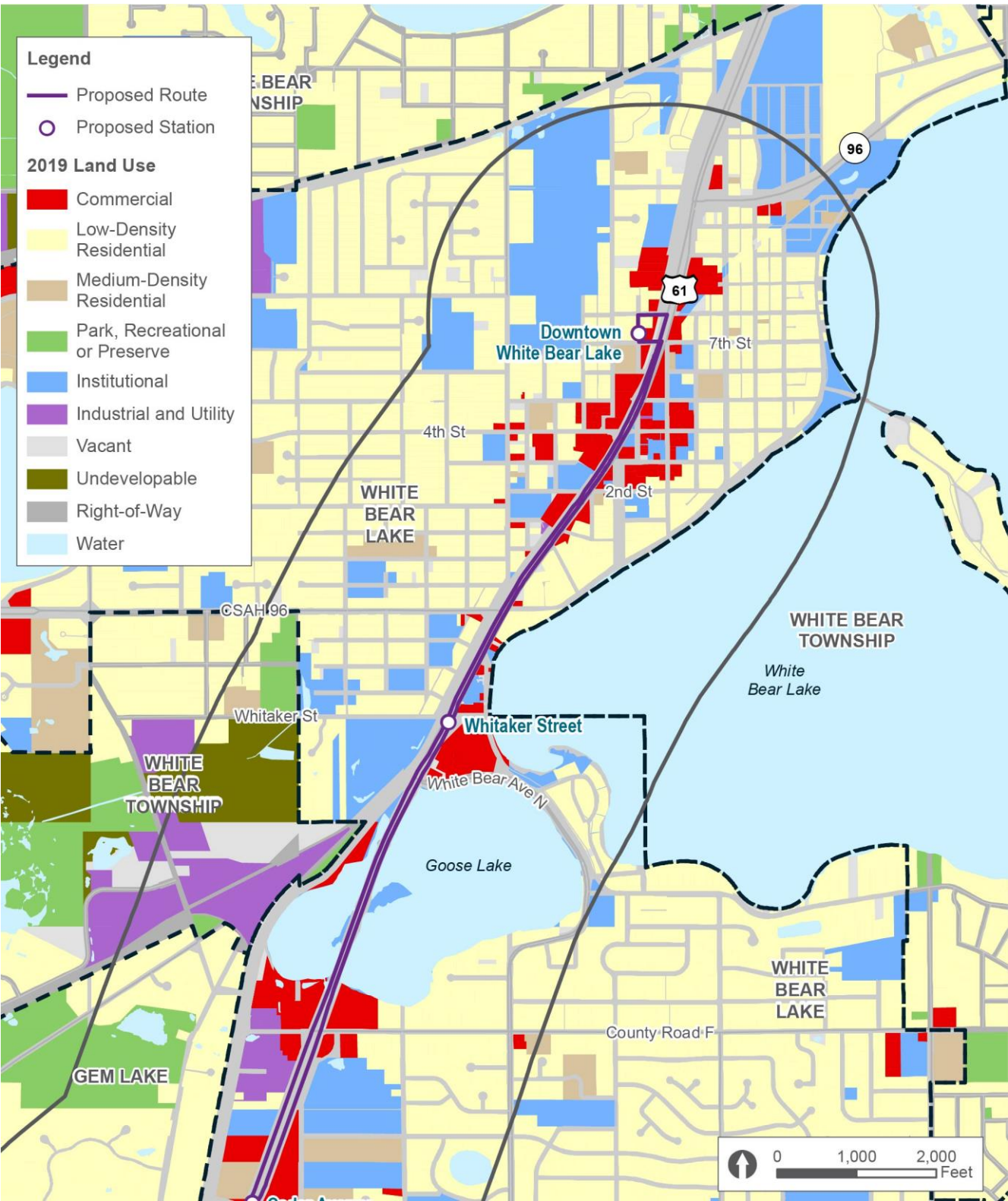
Near the proposed Cedar Avenue station, south of Goose Lake, land use is a mix of multi-family residential, commercial, industrial and institutional uses. Farther east, land use is predominantly single-family residential, along with some institutional use associated with local churches. Zoning in this area includes low- to medium-density residential, commercial and public space, and there are high-density residential and industrial districts nearby. Adjacent to the station, planned land uses designated in the draft plan include mixed-use, commercial and medium- to high-density residential. The transit-oriented mixed-use designation is intended to allow for commercial retail and service businesses, offices and high-density housing. Planned land use in the station area also includes some public and semi-public uses north of the station; parks, recreation and open space to the east; industrial to the north; and low-density residential uses to the east of the proposed station. The “public and semi-public” designation applies to properties owned by a public or nonprofit entity and used for public and semi-public uses such as city hall, recreation centers, churches and cemeteries.

The proposed Whitaker Street station would be located near the White Bear Shopping Center and Boatworks Commons in the Marina Triangle area, which includes commercial and mixed-use residential land uses. The station area also includes single-family and multi-family residential uses and some undeveloped land on the west side of Highway 61. Zoning includes mixed-used, commercial and single- and multi-family residential areas. Planned land use in the area immediately around the station includes a mix of high-density residential, transit-oriented mixed-use, parks, recreation and open space, and public and semi-public use (see Figure 9). Lake Village, directly east of the proposed station, is intended to be a district with a mix of commercial, office, institutional and residential uses with development guided by the Lake Village Master Plan. Land use north and northwest of the station area is guided to continue as low-density residential use, and to the west a wetland area is intended to remain undeveloped while a former public works facility is guided for mixed-use development.

The proposed Downtown White Bear Lake station would be located among various commercial, residential and institutional uses. The remainder of land use within the study area in White Bear Lake is primarily single-family residential. Zoning includes a mix of multi-family residential, Central Business, Diversified Central Business and General Business areas. Central Business District zoning is intended to preserve the historic character of the downtown area while allowing for mixed-use,

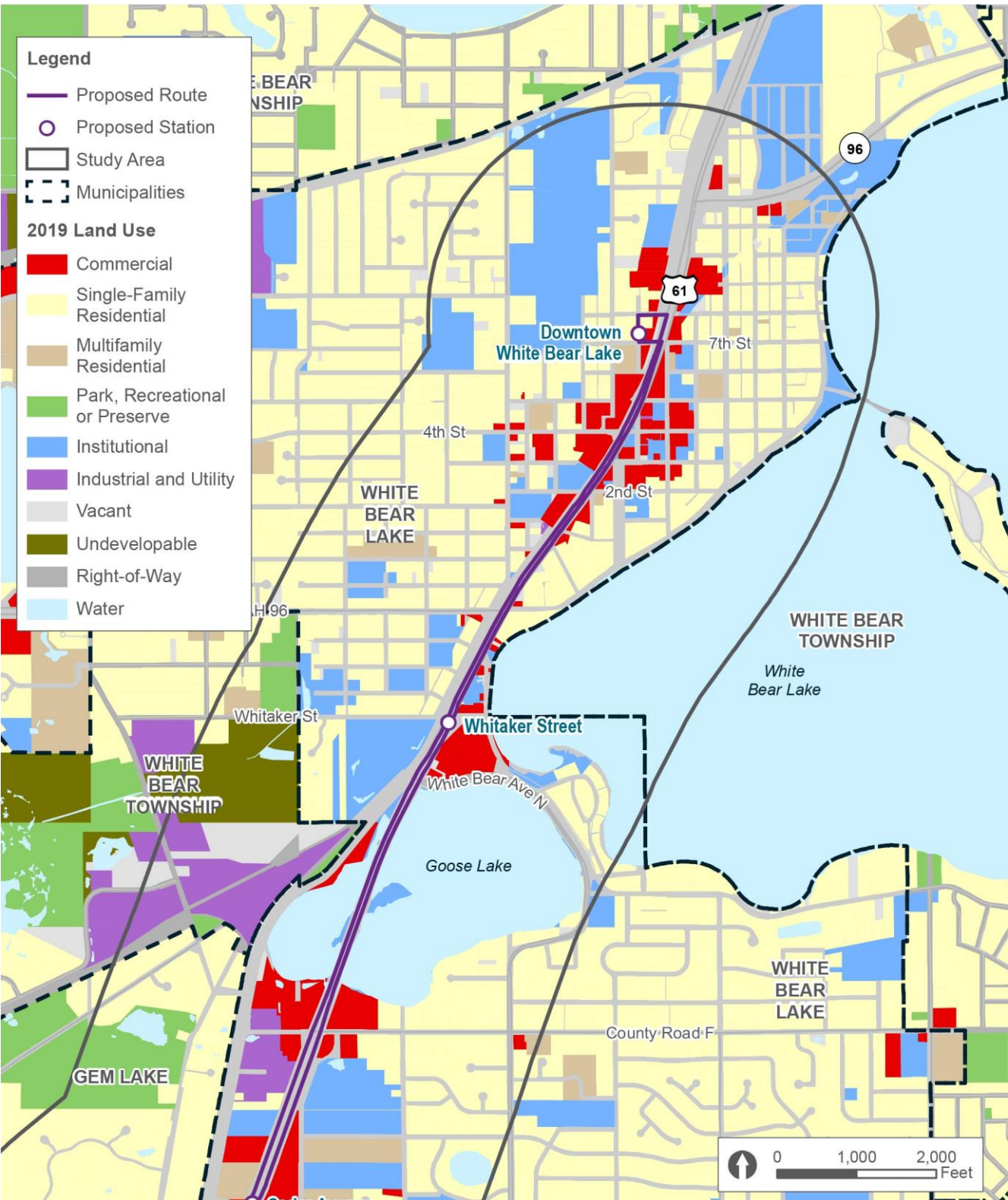
small-scale and pedestrian-oriented development including retail, service, office and residential uses. The Diversified Central Business District is intended to provide for a limited mixture of land uses such as office, hotels and commercial development in areas proximate to the Central Business District. The purpose of General Business District zoning is to provide for commercial and service activities. The remainder of the station area is zoned for single-family residential uses. The primary planned land use around the proposed Downtown White Bear Lake station is "Downtown," which is intended to allow a broad range of uses and intensities including residential, commercial and institutional. An emerging arts district north of the station is intended to accommodate performance theaters, art centers, studios, galleries and other creative businesses in proximity to an existing performing arts theatre and arts center. Other planned land uses for the station area include low- to high-density residential; institutional; public and semi-public; parks, recreation and open space; and transit-oriented mixed-use.

Figure 9: Existing Land Use in White Bear Township, Gem Lake and White Bear Lake



Source: White Bear Township, Cities of Gem Lake and White Bear Lake

Figure 10: Planned Land Use in White Bear Township, Gem Lake and White Bear Lake



Source: City of Gem Lake, White Bear Township, City of White Bear Lake

2.4. ENVIRONMENTAL CONSEQUENCES

2.4.1. No Build Alternative

Under the No Build Alternative, the Rush Line BRT Project would not be constructed and no land use or economic development benefits or impacts of the project would occur. The No Build Alternative would not be compatible with local comprehensive plans and regional policy, which call for supporting the development and implementation of transit improvements.

No construction phase impacts would occur under the No Build Alternative.

2.4.2. Build Alternative

OPERATING PHASE IMPACTS

Implementation of transit service, and specifically the Rush Line BRT Project, would be compatible with the local land use planning policies of Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. The Build Alternative and the Build Alternative option without the Highway 36 park-and-ride are both compatible with the land use planning policies in Maplewood.

CONSTRUCTION PHASE IMPACTS

Construction phase impacts would generally include:

- Road closures and detours resulting in traffic delays through residential neighborhoods.
- Trail closures and detours.
- Noise, dust and visual impacts due to construction.
- Temporary effects to land use caused by staging areas.

These impacts do not pose compatibility issues with planning policy documents but are addressed under other topic areas (community cohesion, economic impacts, etc.) in this technical report.

2.5. MITIGATION MEASURES

The Build Alternative would be compatible with adopted local land use planning documents. No related land use avoidance, minimization or mitigation measures are recommended.

3. LAND ACQUISITIONS AND RELOCATIONS

The construction and operation of the Rush Line BRT Project will occur primarily in right-of-way currently designated for transportation purposes, but additional land acquisition will be required on a limited basis. This section summarizes land acquisition and residential and commercial displacements associated with the proposed alignments and alternatives.

3.1. REGULATORY CONTEXT

Specific regulations govern the displacement and relocation of residents and businesses resulting from publicly funded transportation projects. Public agencies are required by law to compensate landowners for property acquired for public uses. Any acquisition of property required for the Rush Line BRT Project would be in accordance with Minnesota Statutes, chapter 117, and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) (Public Law 91-646; 49 CFR Part 24). The objective of the Uniform Act is to provide fair and equitable treatment of people whose real property is acquired or who are displaced in connection with federally funded projects, to ensure relocation assistance is provided, and to ensure that decent, safe and sanitary housing is available within the displaced person's financial means.

3.2. METHODOLOGY

Right-of-way acquisitions can be divided into two categories: partial acquisitions and full acquisitions. A partial acquisition occurs when a public agency acquires part of a property, but the original use of the property remains intact. For example, a partial acquisition may occur when a strip of land is acquired from the front of a residential lot for construction of a dedicated guideway, but the residence remains intact and undisturbed. In contrast, a full acquisition occurs when a key structure(s) is acquired or physically impacted, and/or a larger amount of land is required that negatively affects the functionality of the property.

Displacement results from full acquisitions and the conversion of the existing land use to a transportation use. Displacements are measured by housing unit or business, not tax parcel (property). For example, the acquisition of an apartment building with six units on a single tax parcel would result in six residential displacements. Similarly, the acquisition of two businesses operating on a single tax parcel would result in two commercial displacements.

This analysis identifies the location, size and number of parcels, and type of property that may be acquired to construct the Rush Line BRT Project and any resulting displacement. Property type was determined using municipal land use data. Potential acquisitions (partial and full) were identified and estimated using the potential area of disturbance and approximate right-of-way requirements for the proposed project.

3.3. ENVIRONMENTAL CONSEQUENCES

3.3.1. No Build Alternative

The No Build Alternative would not require acquisitions of any properties within the Rush Line BRT Project study area.

3.3.2. Build Alternative

OPERATING PHASE IMPACTS

Property Impacts

The operating phase of the Rush Line BRT Project may require the permanent acquisition of approximately 18 to 20 acres of publicly- and privately-held residential, commercial, industrial and transportation properties (not including existing right-of-way). All acquisitions would be partial acquisitions; no full acquisitions resulting in the displacement of businesses or residents would be needed. Impacted institutional properties include vacant land owned by government entities, existing parkland and elementary schools. Acquisitions that would be required for the Build Alternative and for the Build Alternative option without the Highway 36 park-and-ride have both been evaluated. The Build Alternative option without the Highway 36 park-and-ride would require 1.81 acres less acquisition at Harvest Park (from two parcels) than the Build Alternative. The estimated magnitude and number of acquisitions in each municipality are shown in Table 1.

Table 1: Type and Acreage of Property That May Be Impacted During the Operating Phase

Municipality	Residential Properties	Commercial Properties	Institutional Properties	Park Properties	Total Properties	Acres
Saint Paul	3	8	9	2	22	6.53
Maplewood	1	1	4	2	8	11.24
<i>Option without the Highway 36 park-and-ride</i>	1	1	4	0	6	9.43
White Bear Township	0	2	0	0	2	0.03
Vadnais Heights	0	1	0	0	1	0.01
Gem Lake	0	2	0	0	2	0.02
White Bear Lake	1	10	1	0	12	2.33
Total	5	24	14	4	47	20.16
<i>Option without the Highway 36 park-and-ride</i>	5	24	14	2	45	18.35

Displacements and Relocations

The Rush Line BRT Project is not expected to require the displacement of residents or commercial properties.

CONSTRUCTION PHASE IMPACTS

Some construction activities would require temporary construction easements, resulting in short-term impacts. The estimated number and magnitude of temporary easements that would be required in each municipality during the construction phase are shown in Table 2. The Build Alternative option without the Highway 36 park-and-ride would reduce the size of the temporary impacts to Harvest Park. In addition, project construction would likely require temporary modification or closure of access

to businesses throughout the study area. Refer to Section 4.4.2. for further discussion of construction impacts related to access closures and impacts to on-street parking.

Table 2: Parcels Temporarily Impacted During the Construction Phase by Municipality and Type

Municipality	Residential Properties	Commercial Properties	Institutional Properties	Park Properties	Total Properties	Acres
Saint Paul	9	10	10	2	31	1.31
Maplewood	10	4	4	3	21	3.19
<i>Option without the Highway 36 park-and-ride</i>	10	4	4	3	21	2.72
White Bear Township	0	2	0	0	2	0.02
Vadnais Heights	0	3	0	0	3	0.40
Gem Lake	0	0	0	0	0	0
White Bear Lake	3	20	0	0	23	1.50
Total	22	39	14	5	80	6.41
<i>Option without the Highway 36 park-and-ride</i>	22	39	14	5	80	5.93

3.4. MITIGATION MEASURES

Rush Line BRT Project staff will continue to explore options for avoiding property acquisition through refinements to project design and engineering. Owners would be paid just compensation for property acquired for the project consistent with Minnesota Statutes, chapter 117, and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Public Law 91-646; 49 CFR Part 24). All property owners directly affected by potential project-related right-of-way acquisitions would be invited to project public meetings and engagement events.

4. NEIGHBORHOODS AND COMMUNITY RESOURCES

4.1. REGULATORY CONTEXT

No specific laws or executive orders regulate how impacts to neighborhoods and community resources resulting from transit projects are evaluated. This section evaluates potential changes to neighborhood cohesion as a result of the project as well as potential impacts to accessing community resources including medical facilities, schools and libraries. Parks are included in this section for evaluation as a community resource and are evaluated in greater detail in the context of state and federal regulations in Chapters 3 and 4 of the EA.

4.2. METHODOLOGY

This impact analysis consists of two parts: an analysis of potential impacts to neighborhood cohesion and an analysis of impacts to community resources. The community resources impact analysis is based on the geographic location of community facilities such as schools, colleges, libraries, community centers, parks, medical facilities, places of worship, police and fire departments, and community service organizations in relation to the proposed route. The neighborhood cohesion impact analysis assesses whether the project would create barriers within or between neighborhoods.

The study area is defined as the area within one-half mile of the proposed route. Neighborhood features within 200 feet of the proposed route were evaluated for potential direct impacts from construction and operation of the Rush Line BRT Project, including property acquisitions and conversions, loss of parking, access changes, visual changes and noise impacts. Neighborhood features beyond 200 feet but within one-half mile of the proposed route were evaluated only for potential indirect impacts to access and visual changes.

Established neighborhood boundaries and local knowledge of other cohesive areas such as subdivisions or college or corporate campuses were used to conduct the neighborhood impact analysis. Cohesive areas were evaluated for any physical or visual division of communities and negative alteration of community connections.

Data characterizing each neighborhood or community were obtained from comprehensive plans for the cities of Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. This data was supplemented by recent aerial photography, input from public involvement activities and internet search results for community organizations. This data was accessed between December 2018 and October 2019.

4.3. EXISTING CONDITIONS

This section describes the study area neighborhoods in each of the communities along the proposed Build Alternative: Saint Paul, Maplewood, White Bear Township, Vadnais Heights, Gem Lake and White Bear Lake. Where applicable, descriptions of formally recognized neighborhoods within these communities are also provided. For the purpose of this discussion, neighborhoods are defined as areas within the study area that are geographically and socially cohesive.

These community descriptions provide context for subsequent discussion about displacements and relocations, community facilities, healthcare facilities, cohesion within communities, and safety and security concerns associated with the Rush Line BRT Project. Existing physical features such as

roadways or major topographical changes, which may represent barriers between communities and neighborhoods, are identified. Roadways that provide connectivity within communities are also noted.

4.3.1. Saint Paul

Saint Paul is organized into 17 geographic districts, each of which has a name and a number. The Rush Line BRT Project would serve five of the districts in Saint Paul: District 17 – Capitol River, District 4 – Dayton’s Bluff, District 7 – Thomas-Dale/Frogstown, District 5 – Payne-Phalen and District 2 – Greater East Side. These five districts are shown in Figure 11.

DISTRICT 17 – CAPITOL RIVER

District 17 encompasses all of downtown Saint Paul and includes the central business district, the entire Lowertown Historic District and Lowertown neighborhood, Union Depot and the State Capitol building and environs. The downtown portion of the district is cohesive, with a regular street grid connecting the central business district and Lowertown. As shown in Figure 12 and Figure 13, there are dozens of community facilities in downtown Saint Paul and Lowertown. Rush Line BRT would pass through the Capitol River District and into District 7 on Robert and Jackson Streets.

DISTRICT 7 – THOMAS-DALE/FROGTOWN

District 7 is bounded by railroad tracks to the north, Lexington Parkway to the west, University Avenue to the south and I-35E to the east. District 7 includes the northern portion of the Capitol complex and the Mt. Airy neighborhood. Rush Line BRT would pass through these neighborhoods on Jackson Street and Phalen Boulevard before crossing I-35E into Payne-Phalen. Figure 12 includes the community facilities located near the Rush Line BRT Project in District 7.

DISTRICT 4 – DAYTON’S BLUFF

District 4 encompasses the Dayton’s Bluff neighborhood just south of Payne-Phalen and is bounded by Phalen Boulevard to the north, Swede Hollow Park to the west, Johnson Parkway and Birmingham Street on the east, and the Mississippi River to the south. I-94 bisects the neighborhood and separates the Dayton’s Bluff Heritage Preservation District, which is a locally established historic district, and the business district on East 7th Street from the mostly residential part of the neighborhood to the south of the interstate. Rush Line BRT would operate on Phalen Boulevard beyond the Dayton’s Bluff locally designated Historic Preservation District, traveling along the northern border of the neighborhood. Community facilities located near Rush Line BRT in District 4 are shown in Figure 14.

DISTRICT 5 – PAYNE-PHALEN

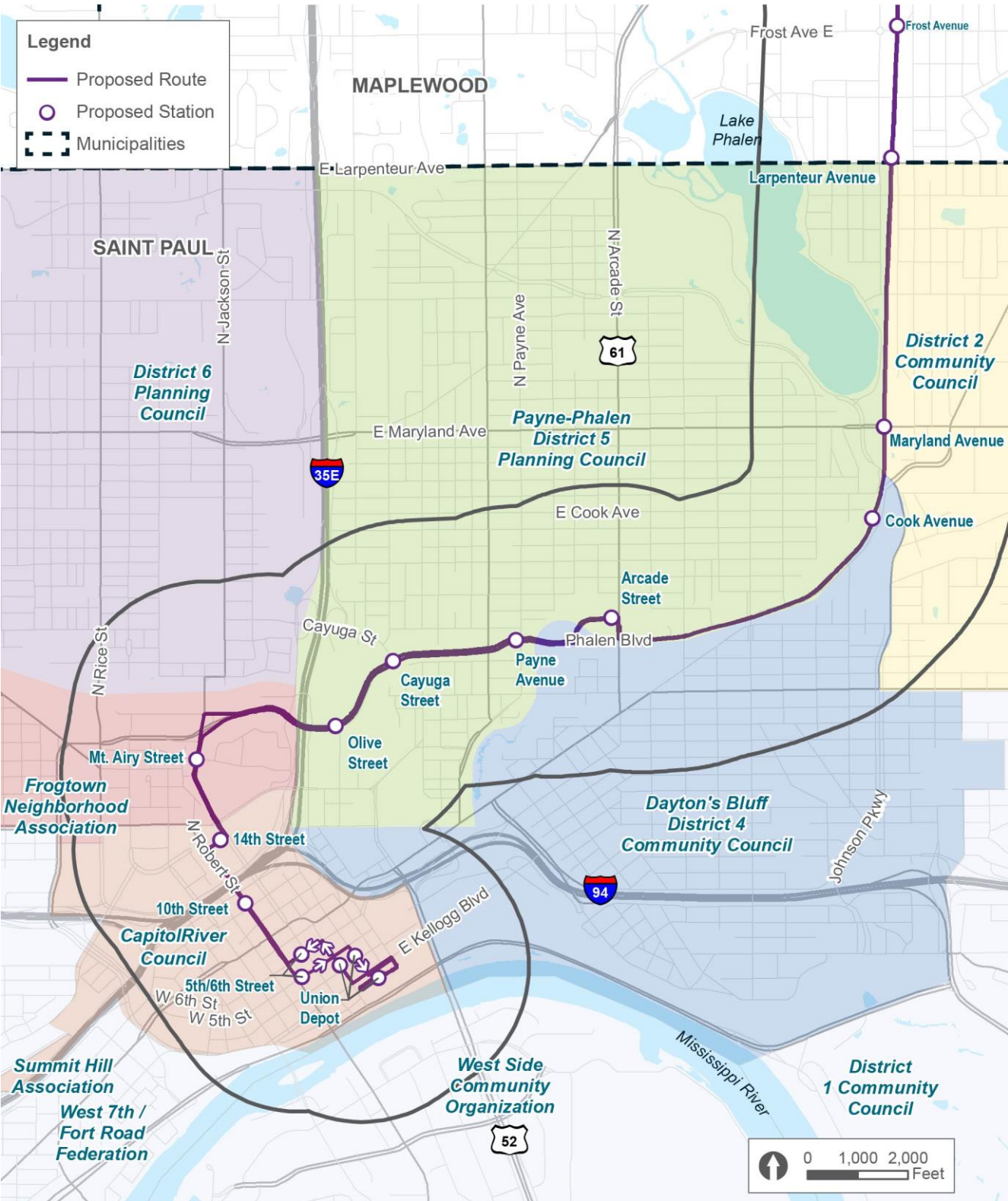
The Payne-Phalen neighborhood constitutes District 5 and is bounded by I-35E to the west, Larpenteur Avenue to the north, Ramsey County rail right-of-way to the east and Phalen Boulevard to the south. Highway 61, called Arcade Street within the city of Saint Paul, traverses the neighborhood. Rush Line BRT would travel parallel to the Bruce Vento Regional Trail on Phalen Boulevard and in the Ramsey County rail right-of-way (which accommodates the Bruce Vento Regional Trail) on the borders of the neighborhood. Community facilities located near the Rush Line BRT Project in District 5 are shown in Figure 14.

DISTRICT 2 – GREATER EAST SIDE

Saint Paul’s Greater East Side neighborhood constitutes District 2 and is bounded by Johnson Parkway and Ramsey County rail right-of-way to the west, Larpenteur Avenue to the north, McKnight Road to the east and Minnehaha Avenue to the south. Rush Line BRT would operate on Ramsey

County rail right-of-way in this area, traveling on the western boundary of the neighborhood. Community facilities located near Rush Line BRT in District 2 are shown in Figure 14.

Figure 11: Saint Paul District Councils



COMMUNITY FACILITIES

As shown in Table 3 and Figures Figure 12, Figure 13 and Figure 14, there are 37 known community facilities within 200 feet of the proposed route in Saint Paul and 151 more within one-half mile of the proposed route. Because community facilities are so densely clustered in downtown Saint Paul, they are excluded from Figure 12 and are shown separately in Figure 13.

Table 3: Community Facilities near Rush Line BRT in Saint Paul

ID	Community Facility	Location	Distance
1	Boys and Girls Club Twin Cities	690 Jackson Street	<200 feet
2	Darul Uloom Islamic Center	977 5th Street East	<200 feet
3	David Tuck Dental	101 5th Street East	<200 feet
4	District 17 Council Offices	101 5th Street East	<200 feet
5	Downtown Patrol Unit	401 Robert Street North	<200 feet
6	Dr. Vang's	401 Phalen Boulevard	<200 feet
7	Duluth and Case Recreation Center	1020 Duluth Street	<200 feet
8	Eastside Heritage Park	735 Phalen Boulevard	<200 feet
9	Fourth and Sibley Park	4th Street East & Sibley Street North	<200 feet
10	Gillette Lifetime Specialty Healthcare	435 Phalen Boulevard	<200 feet
11	Gillette Phalen Clinic	435 Phalen Boulevard	<200 feet
12	HealthPartners Home Medical	537 Phalen Boulevard	<200 feet
13	HealthPartners Neuroscience and Memory	295 Phalen Boulevard	<200 feet
14	HealthPartners Specialty Center	401 Phalen Boulevard	<200 feet
15	Mears Park	221 5th Street East	<200 feet
16	Metro Optics	101 5th Street East	<200 feet
17	Minnesota Department of Health	625 Robert Street North	<200 feet
18	Minnesota Museum of American Art	350 Robert Street North	<200 feet
19	Minnesota Transportation Museum	193 Pennsylvania Avenue East	<200 feet
20	Minnesota Virtual High School	180 5th Street East	<200 feet
21	Proactive Healthcare	101 5th Street East	<200 feet
22	Regions Digestive Care	435 Phalen Boulevard	<200 feet
23	Regions Hospital	640 Jackson Street	<200 feet
24	Safe Zone	130 7th Place East	<200 feet
25	Saint Paul Dentistry	400 Robert Street North	<200 feet
26	Saint Paul District Tech Library	190 5th Street East	<200 feet
27	Saint Paul Downtown YMCA	194 6th Street East	<200 feet
28	Saint Paul Eastside YMCA	875 Arcade Street	<200 feet
29	Skyway Dental	405 Sibley Street North	<200 feet

ID	Community Facility	Location	Distance
30	St. Michael's Church	168 6th Street East	<200 feet
31	Trinity Catholic School	835 5th Street East	<200 feet
32	Union Depot	214 4th Street East	<200 feet
33	Union Gospel Mission Twin Cities	109 9th Street East	<200 feet
34	US Post Office	101 5th Street East	<200 feet
35	US Post Office	886 Arcade Street	<200 feet
36	USDA Inspector General	375 Jackson Street	<200 feet
37	Valley Park	690 Jackson Street	<200 feet
38	180 Degrees	1301 7th Street East	>200 feet
39	Alltyr	332 Minnesota Street	>200 feet
40	Ames Lake Park	1380 Magnolia Avenue East	>200 feet
41	Apostolic Bible Church	1545 Dieter Street North	>200 feet
42	Archdiocese of Saint Paul and Minneapolis Chancery	777 Forest Street North	>200 feet
43	Beacon of Hope Church	850 Terrace Court	>200 feet
44	Berean Cogic Church	441 Rice Street	>200 feet
45	Bethesda Clinic	580 Rice Street	>200 feet
46	Bethesda Hospital	559 Capitol Boulevard	>200 feet
47	Bethlehem Lutheran Church	655 Forest Street North	>200 feet
48	Biogenesis Surgical	1387 Cope Avenue	>200 feet
49	Bruce Vento Elementary School	409 Case Avenue East	>200 feet
50	Bruce Vento Nature Park	265 Commercial Street	>200 feet
51	Building Code and Standards Division	50 Sherburne Avenue	>200 feet
52	Capital Family Eye Clinic	941 Payne Avenue	>200 feet
53	Capitol Dental Center	30 7th Street East	>200 feet
54	Capitol Grounds	75 Rev Dr Martin Luther King Junior Boulevard	>200 feet
55	Casa de Esperanza	925 Payne Avenue	>200 feet
56	Cass Gilbert Memorial Park	30 Sherburne Avenue	>200 feet
57	Catholic Charities Dorothy Day Center	435 Dorothy Day Place	>200 feet
58	Cayuga Park	198 Cayuga Street East	>200 feet
59	Central Presbyterian Church	500 Cedar Street	>200 feet
60	Chiro Rehab Clinic	606 Rice Street	>200 feet
61	Christ Lutheran Church	105 University Avenue West	>200 feet
62	Church of Scientology	505 Wabasha Street North	>200 feet

ID	Community Facility	Location	Distance
63	Church of the Assumption	51 7th Street West	>200 feet
64	Clear Lakes Dental	555 Wabasha Street North	>200 feet
65	Clinic 555	555 Cedar Street	>200 feet
66	City Academy	958 Jessie Street	>200 feet
67	Consulado de Mexico and Comunidades Latinas Unidas En Servicio	797 7th Street East	>200 feet
68	Contender for the Faith Church	580 Case Avenue East	>200 feet
69	Creative Arts Secondary School	65 East Kellogg Boulevard	>200 feet
70	Cross Lutheran Church	1945 Prosperity Avenue	>200 feet
71	Culture Park	122 East Kellogg Boulevard	>200 feet
72	Dayton's Bluff Library	645 7th Street East	>200 feet
73	District 4 Council Offices/East Side Enterprise Center	804 Margaret Street	>200 feet
74	Driver and Vehicle Services	445 Minnesota Street North	>200 feet
75	East Side Family Clinic	895 7th Street East	>200 feet
76	Ecolab Plaza	376 Wabasha Street North	>200 feet
77	Ethiopian Evangelical Church	770 7th Street East	>200 feet
78	Ezy Urgent Care Clinic	1001 Johnson Parkway	>200 feet
79	Farnsworth Aerospace 5-8 Upper Campus	1000 Walsh Street North	>200 feet
80	First Baptist Church	499 Wacouta Street	>200 feet
81	First Lutheran Church, East Side Elders, Urban Roots	463 Maria Avenue	>200 feet
82	Fitzgerald Theater	10 Exchange Street East	>200 feet
83	Frost Lake Elementary School	1505 Hoyt Avenue East	>200 feet
84	Frost Lake Park	1421 Hoyt Avenue East	>200 feet
85	George Latimer Central Library & James J. Hill Center	80 4th Street West	>200 feet
86	Gordon V. Doering, D.D.S.	413 Wacouta Street	>200 feet
87	Great River Dental	375 Jackson Street	>200 feet
88	Hamm Clinic	408 St. Peter Street	>200 feet
89	Hamm Park	743 7th Street East	>200 feet
90	Hamm Plaza	99 6th Street West	>200 feet
91	Harriet Island Regional Park	200 Dr Justus Ohage Boulevard	>200 feet
92	Head Start Mt. Airy and Mount Airy Community Center	91 Arch Street	>200 feet
93	HealthEast Care Center	753 7th Street East	>200 feet

ID	Community Facility	Location	Distance
94	HealthEast Downtown Saint Paul	17 Exchange Street West	>200 feet
95	Helping Hand Dental Clinic	895 7th Street East	>200 feet
96	History Theatre	30 10th Street East	>200 feet
97	Hmong Evangelical Church	784 Jackson Street	>200 feet
98	Hmong Village	1001 Johnson Parkway	>200 feet
99	Holy Trinity Orthodox Church	956 Forest Street North	>200 feet
100	Hope Community Academy	720 Payne Avenue	>200 feet
101	Hunger Solutions Minnesota	555 Park Street	>200 feet
102	Iglesia de Dios Pentecostal	670 Payne Avenue	>200 feet
103	Immanuel Hmong Lutheran Church & Saint John Lutheran Church	765 Margaret Street	>200 feet
104	John A Johnson Elementary School & East Side Learning Center	740 York Avenue	>200 feet
105	Joy Lutheran Elementary School	655 Forest Street North	>200 feet
106	Juvenile and Family Justice Center	25 7th Street East	>200 feet
107	Kellogg Mall	62 West Kellogg Boulevard	>200 feet
108	Lake Phalen Community Church	1717 English Street North	>200 feet
109	Landmark Center	75 W 5th Street	>200 feet
110	Landmark Plaza	379 Saint Peter Street	>200 feet
111	Lane Park	Lane Place	>200 feet
112	Law Enforcement Center, Ramsey Court	425 Grove Street	>200 feet
113	L'Etoile du Nord French Immersion, Lower Campus	1305 Prosperity Avenue	>200 feet
114	Listening House of Saint Paul	464 Maria Avenue	>200 feet
115	Lockwood Park	901 Cook Avenue	>200 feet
116	Lower Landing Park	200 Warner Road	>200 feet
117	Lowertown Ballpark/CHS Field	360 Broadway Street North	>200 feet
118	Lutheran Social Services	965 Payne Avenue	>200 feet
119	Lyton Park	92 Lyton Place West	>200 feet
120	Margaret Recreation Center	1109 Margaret Street	>200 feet
121	Meals on Wheels	715 Edgerton Street	>200 feet
122	Metropolitan State University	700 7th Street East	>200 feet
123	Midwest Special Services	900 Ocean Street	>200 feet
124	Minnesota Children's Mental Health	23 Empire Drive	>200 feet
125	Minnesota Children's Museum	10 7th Street West	>200 feet
126	Minnesota Coalition for the Homeless	555 Wabasha Street North	>200 feet

ID	Community Facility	Location	Distance
127	Minnesota Counties Intergovernmental Trust	100 Empire Drive	>200 feet
128	Minnesota Department of Human Services	444 Lafayette Road	>200 feet
129	Minnesota Department of Labor and Industry	443 Lafayette Road	>200 feet
130	Minnesota History Center	345 West Kellogg Boulevard	>200 feet
131	Minnesota Public Criminal History	1430 Maryland Avenue East	>200 feet
132	Minnesota Secretary of State	60 Empire Drive	>200 feet
133	Minnesota State Capitol	75 Rev Dr Martin Luther King Jr Boulevard	>200 feet
134	Minnesota State Office	100 Rev Dr Martin Luther King Jr Boulevard	>200 feet
135	Minnesota Supreme Court	25 Rev Dr Martin Luther King Jr Boulevard	>200 feet
136	Nautilus Music Theater	308 E Prince Street	>200 feet
137	New Hope Baptist Church	711 Bradley Street	>200 feet
138	New Horizon Academy	327 York Avenue	>200 feet
139	Ordway Center for the Performing Arts	345 Washington Street	>200 feet
140	Our Redeemer Lutheran Church	1390 Larpenteur Avenue E	>200 feet
141	Palace Theatre	17 7th Place West	>200 feet
142	Park Square Theatre	20 7th Place West	>200 feet
143	Parkway Montessori and Community Middle School	1363 Bush Avenue	>200 feet
144	People Inc. Home Health Agency	317 York Avenue	>200 feet
145	Phalen Hmong Studies and Core Knowledge	1089 Cypress Street North	>200 feet
146	Phalen Village Family Medicine	1414 Maryland Avenue East	>200 feet
147	Public Safety Department	700 7th Street East	>200 feet
148	RADIAS Health	166 4th Street East	>200 feet
149	Ramsey County Adult Probation	800 Minnehaha Avenue East	>200 feet
150	Ramsey County Department of Community Human Services	160 East Kellogg Boulevard	>200 feet
151	Ramsey County Detox Center and Urgent Care for Adult Mental Health	402 University Avenue East	>200 feet
152	Ramsey County Emergency Communications	388 13th Street East	>200 feet
153	Ramsey County Records Office	555 Cedar Street	>200 feet
154	Raspberry Island	1 Wabasha Street South	>200 feet
155	Rice Park	109 4th Street West	>200 feet
156	River Valley Church	30 10th Street East	>200 feet

ID	Community Facility	Location	Distance
157	Robert L Ostlund, D.D.S.	1043 Payne Avenue	>200 feet
158	Roy Wilkins Auditorium	175 West Kellogg Boulevard	>200 feet
159	Sacred Heart Church	840 6th Street East	>200 feet
160	Saint Paul City Hall, Ramsey County Courthouse and Ramsey County Law Library	15 West Kellogg Boulevard	>200 feet
161	Saint Paul Conservatory for Performing Artists	16 5th Street East	>200 feet
162	Saint Paul Eye Clinic	30 7th Street East	>200 feet
163	Saint Paul Farmers Market	290 5th Street East	>200 feet
164	Saint Paul Fire Department Station 4	505 Payne Avenue	>200 feet
165	Saint Paul Fire Department Station 7	1038 Ross Avenue	>200 feet
166	Saint Paul Fire Department Station 8	71 10th Street East	>200 feet
167	Saint Paul Police Department	367 Grove Street	>200 feet
168	Saint Paul Police Department Eastern District Station	722 Payne Avenue	>200 feet
169	Saint Paul RiverCentre	175 West Kellogg Boulevard	>200 feet
170	Salvation Army Eastside Corps	1019 Payne Avenue	>200 feet
171	Schara Dentistry	408 St. Peter Street	>200 feet
172	Science Museum of Minnesota	120 West Kellogg Boulevard	>200 feet
173	St. Mary's Catholic Church	261 8th Street East	>200 feet
174	St. Joseph's Hospital	45 10th Street West	>200 feet
175	Swede Hollow Park	603 North Street East	>200 feet
176	The Church of Saint Louis, King of France	506 Cedar Street	>200 feet
177	The College of St. Scholastica	340 Cedar Street	>200 feet
178	Treasure Island Center	400 Wabasha Street North	>200 feet
179	TRIA Orthopedic Center	400 Wabasha Street North	>200 feet
180	Trillium Park	1200 Jackson Street	>200 feet
181	Twin Cities Bible Church	2555 Hazelwood Street	>200 feet
182	United Family Medicine	166 4th Street East	>200 feet
183	Upper Landing Park	226 Spring Street	>200 feet
184	US District Court	316 Robert Street North	>200 feet
185	Veterans Service Building	20 12th Street West	>200 feet
186	Wacouta Commons	465 Wacouta Street	>200 feet
187	Weida Park	637 Burr Street North	>200 feet
188	Wilder Recreation Center	958 Jessie Street	>200 feet

Figure 12: Community Facilities in Saint Paul

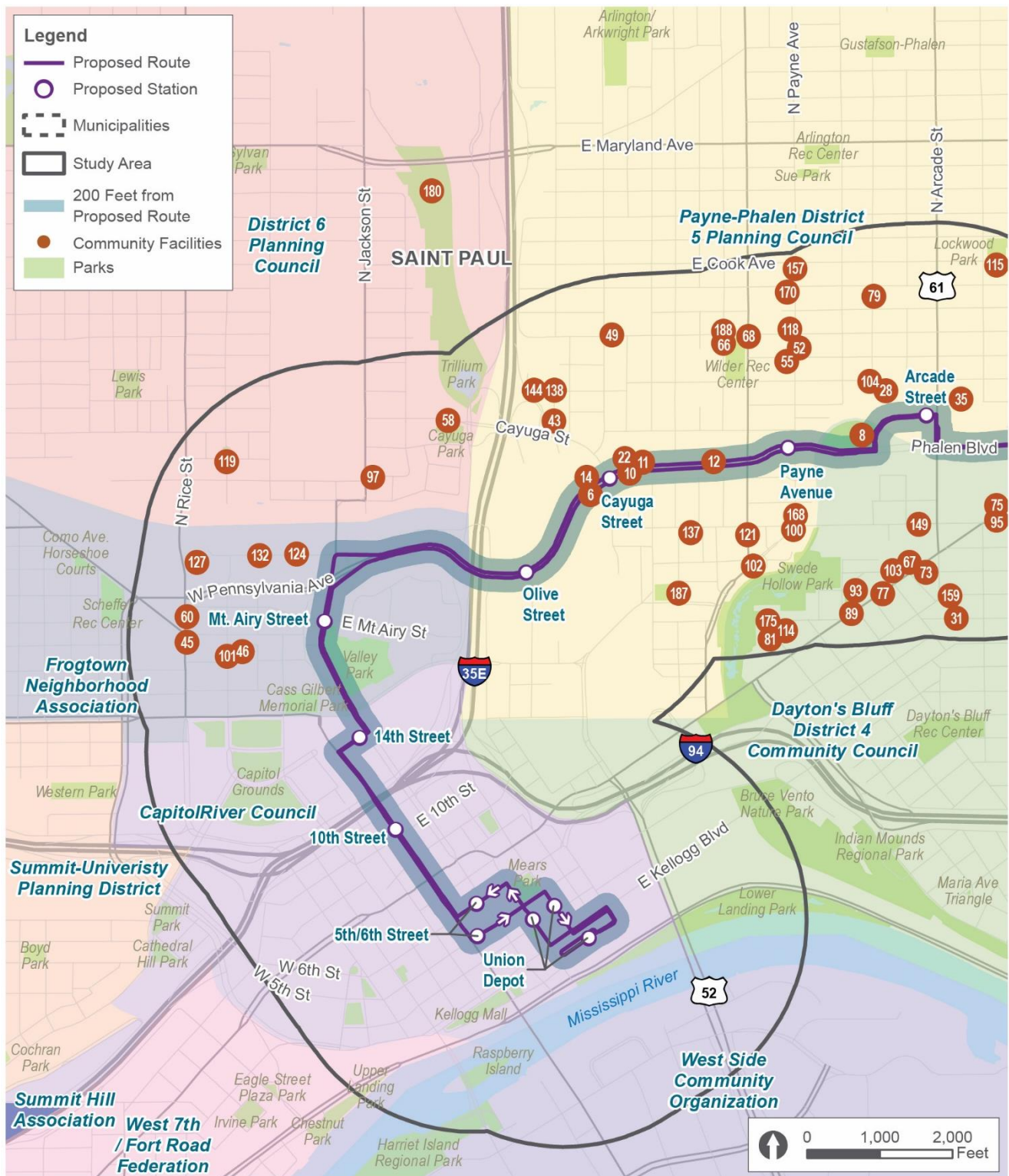


Figure 13: Community Facilities in Downtown Saint Paul

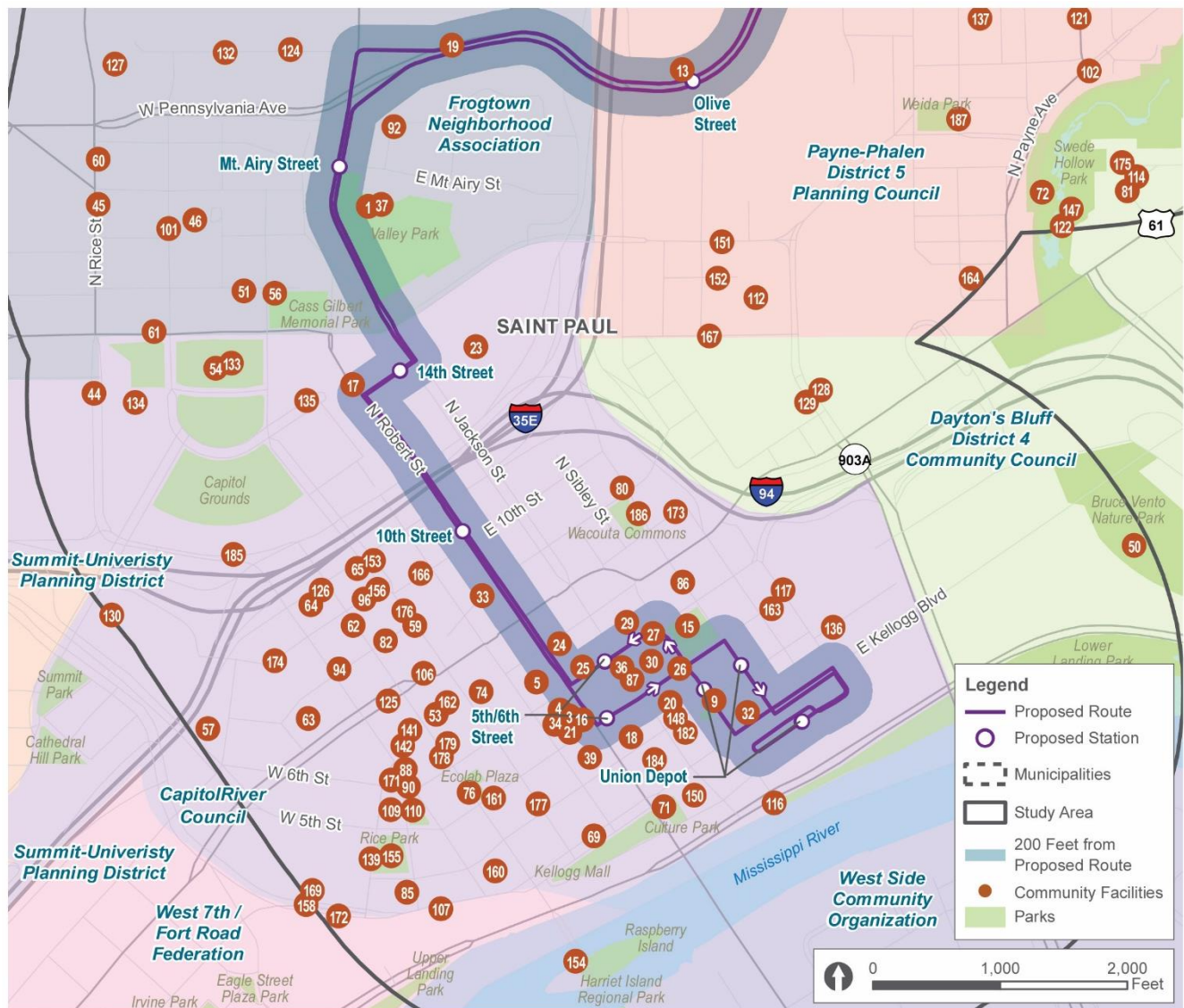
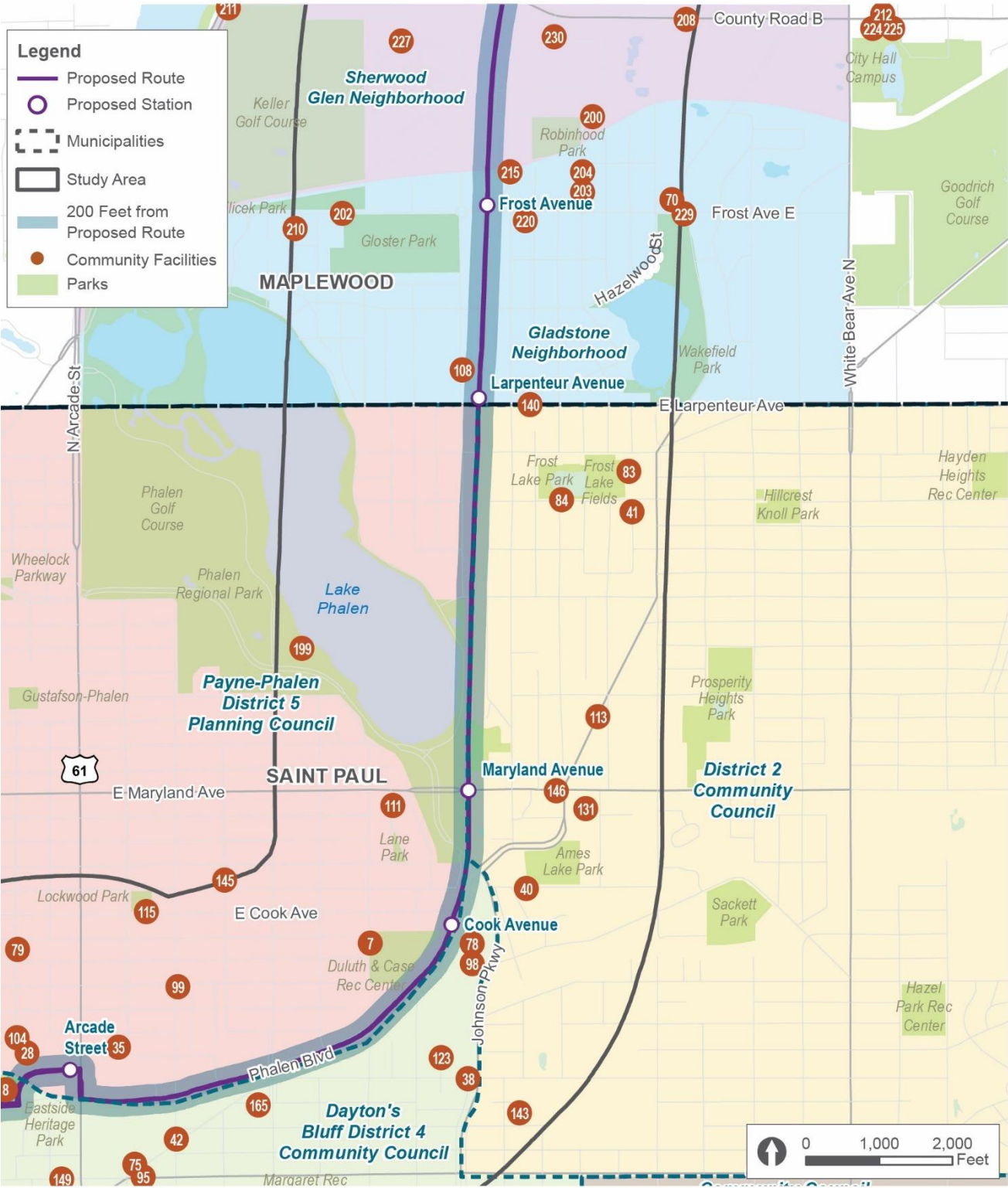


Figure 14: Community Facilities in Saint Paul and in Maplewood



4.3.2. Maplewood

Maplewood has 13 officially recognized neighborhoods within its boundaries. The proposed Larpenteur Avenue and Frost Avenue stations would serve the Gladstone neighborhood and the proposed Highway 36 station would serve the Sherwood Glen neighborhood. The proposed Maplewood Mall Transit Center and St. John's Boulevard stations would serve the Hazelwood neighborhood. Figure 15 shows the community facilities located near the Rush Line BRT Project in Maplewood.

GLADSTONE

The Gladstone neighborhood is bounded by the Gateway State Trail to the north, White Bear Avenue to the east, Larpenteur Avenue to the south and Highway 61 to the west. This area of Maplewood is predominated by single-family homes though there is an emerging higher-density, mixed-use node near the proposed Frost Avenue station. This area also includes the Gladstone Savanna, Phalen Lake and Wakefield Lake. Phalen Lake and surrounding recreational and open space, along with Highway 61, are barriers to neighborhoods to the west. Rush Line BRT would pass through this neighborhood and run parallel to the Bruce Vento Regional Trail in the Ramsey County rail right-of-way.

SHERWOOD GLEN

The Sherwood Glen neighborhood is bounded by Highway 36 to the north, Highway 61 to the west, the Gateway State Trail to the south and Ariel Street to the east. Keller Golf Course and Highways 61 and 36 act as barriers to surrounding areas. Rush Line BRT would operate parallel to the Bruce Vento Regional Trail in the Ramsey County rail right-of-way through this neighborhood.

HAZELWOOD

The Hazelwood neighborhood is bounded by I-694 to the north, Highway 61 to the west, Highway 36 to the south and White Bear Avenue and Ariel Street to the east. Maplewood Mall and St. John's Hospital are major landmarks in the area. The highways act as barriers to surrounding neighborhoods and other destinations. Rush Line BRT would operate alongside the Bruce Vento Regional Trail in the Ramsey County rail right-of-way in the southern portion of this neighborhood, and on existing roads in northern Hazelwood before passing into White Bear Lake on a new bridge over I-694. I-694 creates a barrier between communities to the north and destinations south of the interstate including Maplewood Mall and St. John's Hospital.

COMMUNITY FACILITIES

As shown in Table 4, there are 11 community facilities located within 200 feet of the proposed Rush Line BRT route in Maplewood and 31 more within one-half mile of the proposed route. This list was generated using the distance from the proposed route to the parcel for parks and the distance from the proposed route to the nearest building for all other facilities.

Table 4: Community Facilities near Rush Line BRT in Maplewood

ID	Community Facility	Location	Distance
189	Allina Health Clinic	1850 Beam Avenue	<200 feet
190	America's Best Contacts and Eyeglasses	1727 Beam Avenue	<200 feet
191	Community Dental Care	1670 Beam Avenue	<200 feet
192	Harvest Park	2561 Barclay Street North	<200 feet
193	HealthEast Spine Center	1747 Beam Avenue	<200 feet
194	Henrickson Dental and My Medical Clinic	1560 Beam Avenue	<200 feet
195	Kohlman Creek Preserve	Kohlman Creek Preserve	<200 feet
196	Maplewood Clinic Eye Care	1570 Beam Avenue	<200 feet
197	Maplewood Imaging Center	1723 Beam Avenue	<200 feet
198	Neurological Associates of Saint Paul and Ryan Dental	1650 Beam Avenue	<200 feet
199	Phalen Regional Park	1600 Phalen Drive	<200 feet
200	Assalam Mosque	1460 Skillman Avenue E	>200 feet
201	Dental Health of Maplewood	1270 Cope Avenue	>200 feet
202	Flicek Park	1050-1150 Frost Avenue	>200 feet
203	Gladstone Education Center	1945 Manton Street	>200 feet
204	Gladstone Savanna	1945 Manton Street	>200 feet
205	Gloster Park	Edward Street North	>200 feet
206	Hazelwood Park	1663 County Road C East	>200 feet
207	HealthEast Clinic	2945 Hazelwood Street	>200 feet
208	John Glenn Middle School	1560 County Road B East	>200 feet
209	Josiah Center	1600 Gervais Avenue	>200 feet
210	Judith Driscoll	1896 Walter Street	>200 feet
211	Keller Golf Course	2166 Maplewood Drive	>200 feet
212	Kohlman Creek	No address	>200 feet
213	Legacy Park	Legacy Parkway East	>200 feet
214	Maplewood Alliance Church	1233 Lark Avenue	>200 feet
215	Maplewood Fire Station	1955 Clarence Street	>200 feet
216	Maplewood Heights Park	2078 Beam Avenue	>200 feet
217	Maplewood VA Clinic	1725 Legacy Parkway	>200 feet
218	Metro Dentalcare	1866 Beam Avenue	>200 feet
219	Minnesota Mental Health Clinics and Saint Paul-Ramsey County Environmental Health Office	2785 White Bear Avenue	>200 feet
220	Philippine Center of Minnesota	1380 Frost Avenue	>200 feet

ID	Community Facility	Location	Distance
221	Physicians' Diagnostics and Rehabilitation	1856 Beam Avenue	>200 feet
222	PrairieCare	2001 Beam Avenue	>200 feet
223	Ramsey County Library - Maplewood	3025 Southlawn Drive	>200 feet
224	Robinhood Park	No address	>200 feet
225	Sherwood Park	No address	>200 feet
226	St. John's Hospital	1575 Beam Avenue	>200 feet
227	Timber Park	2135 Atlantic Street	>200 feet
228	Twin Cities Bible Church	2555 Hazelwood Street	>200 feet
229	Wakefield Park	1590 Frost Avenue	>200 feet
230	Weaver Elementary School	2135 Birmingham Street	>200 feet

4.3.3. White Bear Township

White Bear Township has 11 officially recognized planning districts within its boundaries. The southbound platform of the Buerkle Road station would serve the portion of White Bear Township between County Road D and County Road E. Rush Line BRT would serve the Birch Lake planning district with the proposed Cedar Avenue and Whitaker Street stations. The township is comprised by four non-contiguous areas bordering Vadnais Heights, Gem Lake and White Bear Lake, creating an intrinsic barrier to cohesion among residents of White Bear Township. Highway 61, I-35E, two railways act as barriers within the township and between White Bear Township and surrounding communities. Community facilities near Rush Line BRT in White Bear Township are shown in Figure 15.

BIRCH LAKE

The Birch Lake planning district is bounded by White Bear Parkway to the south and west, Highway 96 and Park Street to the north, and Grace Street to the east. Rush Line BRT would operate to the east of this district on Highway 61.

COMMUNITY FACILITIES

As shown in Figure 15 and Table 5, there are no community facilities located within 200 feet of the proposed Rush Line BRT Route within White Bear Township and two within one-half mile of the proposed route.

Table 5: Community Facilities near Rush Line BRT in White Bear Township

ID	Community Facility	Location	Distance
231	Columbia Park	1756 Highway 96 East	>200 feet
232	Korean American Association of Minnesota	1331 County Road D Circle E	>200 feet

4.3.4. Vadnais Heights

Vadnais Heights does not have officially recognized neighborhoods within its boundaries. I-35E and I-694 function as a barrier between the southeast corner of Vadnais Heights and the remainder of the city, as well as between Vadnais Heights and surrounding communities. Many streets end in cul-de-sacs, limiting street connectivity between neighborhoods or subdivisions. By vehicle, subdivisions are

connected by collector streets. However, collector streets are often wide with fast-moving traffic and few marked pedestrian crossings, so they reduce connectivity for people traveling on foot, by bicycle or in a mobility device, and signal a boundary between one neighborhood and another. Additionally, most residential areas in Vadnais Heights are separated from the proposed Rush Line BRT stations by I-35E. Community facilities near Rush Line BRT in Vadnais Heights are shown in Figure 15 and 16.

As shown in Figure 16 and Table 6, there are three community facilities located within one-half mile of the proposed Rush Line BRT route within Vadnais Heights, two of which are within 200 feet of the proposed route.

Table 6: Community Facilities near Rush Line BRT in Vadnais Heights

ID	Community Facility	Location	Distance
233	Twin Cities Orthopedics	3545 Highway 61 North	<200 feet
234	TCO Sports Garden	1490 County Road E East	<200 feet
235	Wolters Park	1351 Willow Lake Boulevard	>200 feet

4.3.5. Gem Lake

Gem Lake occupies just 1.14 square miles and does not have officially recognized neighborhoods within its boundaries. Goose Lake Road is the only road that traverses the city, running from its southwest corner toward the northeast. Parcels for each home are typically one acre or more in size, and these lot sizes, along with Gem Lake (the body of water) and the Gem Lake Golf Course, function as a barrier to connectivity and community cohesion. There are two community facilities located within one-half mile of the proposed Rush Line BRT route within Gem Lake and none within 200 feet of the proposed route, as shown in Table 7 and Figure 16.

Table 7: Community Facilities near Rush Line BRT in Gem Lake

ID	Community Facility	Location	Distance
236	Gem Lake City Hall	4200 Otter Lake Road	>200 feet
237	Gem Lake Hills Golf Club	4039 Sheuneman Road	>200 feet

[illegible]

4.3.6. White Bear Lake

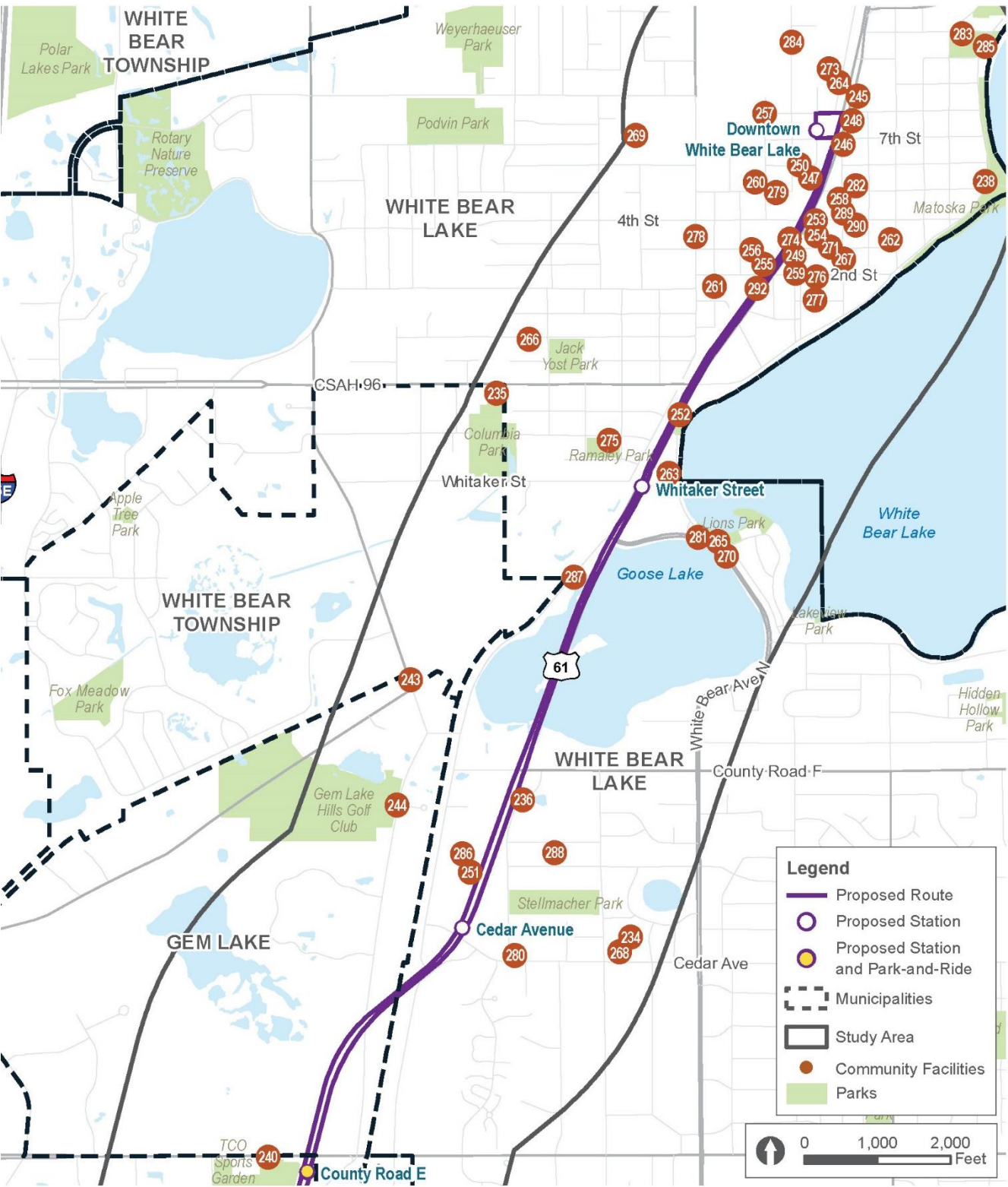
White Bear Lake does not have officially recognized neighborhoods within its boundaries. Near the proposed Rush Line BRT route, there is a gridded street system, providing connectivity and accessibility throughout the area. Highway 61 traverses the city, and bodies of water including Goose Lake and White Bear Lake act as a barrier between the northern and southern parts of the city. Additionally, there is an active railroad with minimal train traffic that runs parallel to Highway 61. There are 11 community facilities located within 200 feet of the Rush Line BRT route within White Bear Lake and another 36 within one-half mile of the route, as shown in Figure 15 and Figure 16 and Table 8.

Table 8: Community Facilities near Rush Line BRT in White Bear Lake

ID	Community Facility	Location	Distance
238	Dr. Sarah Boo	4916 Highway 61 North	<200 feet
239	Intuitive Therapy and Counseling	4858 Banning Avenue	<200 feet
240	Lake Area Dental	4801 Highway 61 North	<200 feet
241	Orthodontic Care Specialists White Bear Lake	4886 Highway 61 North	<200 feet
242	Railroad Park	4752 Highway 61 North	<200 feet
243	Roger G. Ettel and Associates	4801 Highway 61 North	<200 feet
244	The FootLab	3959 Highway 61 North	<200 feet
245	Veterans Park	4520 Highway 61 North	<200 feet
246	Washington Square Dental	4754 Washington Square	<200 feet
247	White Bear Eye Clinic and Optical	4750 Washington Avenue	<200 feet
248	White Bear Lake City Hall and Fire Department Station 1	4701 Highway 61 North	<200 feet
249	Central Middle School	4857 Bloom Avenue	>200 feet
250	Cerenity Care Center	1891 Webber Street	>200 feet
251	Church of Saint Pius X and Liberty Classical Academy	3878 Highland Avenue	>200 feet
252	Community of Grace Lutheran Church	4000 Linden Street	>200 feet
253	Entira Family Clinics	4786 Banning Avenue	>200 feet
254	First Church of Christ-Scientist	4705 Clark Avenue	>200 feet
255	First Presbyterian Church of White Bear Lake	4821 Bloom Avenue	>200 feet
256	Frassati Catholic Academy	4690 Bald Eagle Avenue	>200 feet
257	Great Hope Community Church	2263 3rd Street	>200 feet
258	Gulden Kent Orthodontics	4437 Lake Avenue South	>200 feet
259	Hanifl Performing Arts Center and Lakeshore Players Theatre	4941 Long Avenue	>200 feet
260	Healthwise Behavioral Health and Synergy Family Physicians	4422 Old White Bear Avenue	>200 feet
261	Jack Yost Park	1856 Florence Street	>200 feet

ID	Community Facility	Location	Distance
262	Lakeshore Family Dentistry	4706 Banning Avenue	>200 feet
263	Lincoln Elementary School	1961 6th Street	>200 feet
264	Lions Park	4410 Lake Avenue South	>200 feet
265	Manitou Dental Care	2189 3rd Street	>200 feet
266	Matoska Park	No address	>200 feet
267	McCarty Park	1799 Elm Street	>200 feet
268	Ramaley Park	1883 Hinckley Street	>200 feet
269	Ramsey County Library - White Bear Lake	2150 2nd Street	>200 feet
270	Saint John in the Wilderness	2175 1st Street	>200 feet
271	Saint Mary of the Lake Church	4741 Bald Eagle Avenue	>200 feet
272	Signature Orthodontics	2126 5th Street	>200 feet
273	Stellmacher Park	3850 Linden Street	>200 feet
274	US Post Office	2223 5th Street East	>200 feet
275	West Park	2350 11th Street	>200 feet
276	White Bear Center for the Arts	4971 Long Avenue	>200 feet
277	White Bear Lake Area High School	5575 Division Avenue	>200 feet
278	White Bear Lake County Park	5050 Lake Avenue	>200 feet
279	White Bear Lake Public Works	3950 Hoffman Road	>200 feet
280	White Bear Lake Public Works	4200 Hoffman Road	>200 feet
281	White Bear Lake United Methodist Church	1851 Birch Street	>200 feet
282	White Bear Smiles	4778 Banning Avenue	>200 feet
283	Wild Tree Psychotherapy	4756 Banning Avenue	>200 feet
284	Willow Lane Elementary School	3375 Willow Avenue	>200 feet

Figure 16: Community Facilities in White Bear Township, Gem Lake and White Bear Lake



4.4. ENVIRONMENTAL CONSEQUENCES

4.4.1. No Build Alternative

No changes to neighborhoods or community facilities within communities are anticipated under the No Build Alternative.

No construction phase impacts would occur under the No Build Alternative.

4.4.2. Build Alternative

The following discussion evaluates the potential access changes, parking loss, noise impacts, visual changes, property acquisition and conversion impacts to community facilities within 200 feet of the proposed Rush Line BRT route, as well as related impacts to community cohesion and character. The analysis also includes an evaluation of potential indirect impacts to community facilities beyond 200 feet but within one-half mile of the proposed route. The Build Alternative would have greater impacts to Harvest Park than the Build Alternative option without the Highway 36 park-and-ride. These differences are discussed further under the Maplewood heading of the Operating Phase Impacts section.

OPERATING PHASE IMPACTS

Saint Paul

Access Changes

The project would improve access to many facilities near station locations. For example, implementation of the 10th Street station would improve transit access to the Metropolitan Center for Independent Living, and construction of the Mt. Airy Street station would improve access to the Twin Cities Boys and Girls Club for patrons who do not drive or prefer not to drive. Similarly, the proposed Payne Avenue station would improve access to Phalen Senior Apartments. The proposed Maryland Avenue and Larpenteur Avenue stations would enhance access to Phalen Regional Park. Access to community destinations near the proposed Cook Avenue station, such as Hmong Village, would also be improved as a result of the Rush Line BRT Project. Additionally, the project would enhance access to other community facilities and destinations, including Regions Hospital and other healthcare providers.

No other access impacts to community facilities in Saint Paul are anticipated during Rush Line BRT Project operations.

Loss of Parking

Along the Saint Paul portion of the proposed route, implementation of the project would result in a net loss of 32 on-street and 37 off-street parking spaces.

All on-street parking impacts would occur on Robert Street; 35 parking spaces would be removed and three would be added. The three new parking spaces would be located between 6th and 7th Streets. Eleven time-restricted parking spaces would be removed between 7th Place and 7th Street. Time-restricted spaces are on-street parking spaces that are only available for use as parking during off-peak hours. These spaces are not available during peak times, which are typically defined as approximately 7-9 a.m. and 4-6 p.m. Some time-restricted spaces may only have restrictions during morning hours or only during afternoon hours, depending upon traffic patterns in the area. Between 7th and 9th Streets, two on-street time-restricted parking spaces would be removed. Between 9th and 10th Streets, adjacent to Pedro Park, 13 time-restricted parking spaces would be removed. Between

10th and 11th Streets, near the Metropolitan Center for Independent Living, nine on-street time-restricted parking spaces would be lost. Visitors to the Metropolitan Center for Independent Living would continue to be served by free parking onsite. Though these spaces are immediately adjacent to the community facilities identified in this analysis, they are located near many other parking options including on-street parking on adjacent streets and many off-street parking lots and ramps within three blocks of the facility. On-street parking in this area of Saint Paul is time-restricted, and meters are enforced on select high-demand days. These standards apply to the on-street parking spaces that would be removed as well as the on-street parking options that would remain following implementation of the project. Typically, there is a charge for off-street parking ramps and lots regardless of the day or time. Therefore, loss of these spaces is not expected to adversely impact community facilities within 200 feet of the proposed route in downtown Saint Paul or the community character and cohesion along this segment of the proposed route.

Two off-street parking spaces serving a single-family home on Arlington Avenue would be removed. Four off-street parking spaces serving an apartment building adjacent to the Cook Avenue station would be removed. Another eight off-street parking spaces serving an apartment building adjacent to the Larpenteur Avenue station would be removed. These 14 spaces are not immediately adjacent to any community facilities identified in this analysis and are located in an area with many other parking options. The remaining 23 off-street parking spaces that would be removed serve commercial areas on Forest Street and are described in Section 5.4.2. Therefore, loss of these spaces is not expected to adversely impact community facilities within 200 feet of this portion of the proposed route or affect community character and cohesion in the area.

Noise Impacts

As noted in Chapter 3 of the EA, operation of the Rush Line BRT Project is not anticipated to result in noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in Saint Paul.

Visual Changes

As noted in the Chapter 3 of the EA, Rush Line BRT Project elements are consistent with the current visual context throughout much of Saint Paul. In downtown Saint Paul, changes to the bus deck at Union Depot and the construction of new platforms at the 5th/6th Street, 10th Street, 14th Street and Mt. Airy Street stations would not adversely impact any community facilities, as the surrounding urban context already includes transit-related features and infrastructure. Union Depot is also a historic property and is subject to additional adverse effects assessment, which includes an assessment of visual effects, under the Section 106 process. Any visual effects to Union Depot would be resolved through consultation. Because Rush Line BRT would share several downtown stations with the METRO Gold Line, which is a proposed BRT project that is expected to begin service in 2024 (before Rush Line BRT), most of the consultation process for these visual changes is anticipated to occur during METRO Gold Line project development.

Along Phalen Boulevard, the addition of Rush Line BRT Project elements would be largely consistent with the current visual context (a multi-lane roadway corridor). However, moderate to high visual contrast is anticipated at the following locations:

- Arcade Street: The construction of a dedicated guideway structure connecting Arcade Street to the Ramsey County rail right-of-way would result in a moderate change from the existing visual context. This guideway structure would be visible from one nearby community facility, the Saint Paul Eastside YMCA.

- Maryland Avenue: The construction and operation of the Maryland Avenue station would result in a moderate change from the existing visual context (undeveloped right-of-way). However, no adverse impacts to community facilities are anticipated.
- Ramsey County rail right-of-way: The construction and operation of Rush Line BRT within the Ramsey County rail right-of-way would result in a high visual contrast with the existing visual context. This visual change, resulting from construction of the dedicated guideway and stations, would impact the following community facilities: the Duluth and Case Recreation Center, the Bruce Vento Regional Trail and Phalen Regional Park. Phalen Regional Park is also a historic property and is subject to additional visual effects assessment under the Section 106 process. The Bruce Vento Regional Trail also occupies the Ramsey County rail right-of-way, which in this area is considered a historic district. Any visual effects to these resources would be resolved through implementation of the *Ramsey County Rail Right-of-Way Design Guide* and consultation within the Section 106 process.

Property Acquisitions and Conversions

There would be no full property acquisitions required along the Saint Paul segment of the proposed route; 23 partial acquisitions would be required, of which 22 would total fewer than 1 acre. Most of these acquisitions would occur adjacent to existing transportation right-of-way and would primarily impact underutilized or unused land. Partial property acquisitions would affect Gillette Children's Specialty Healthcare, HealthPartners 401 Phalen Clinic and John A. Johnson Elementary School. These acquisitions would occur along the edge of each property and would not impede their respective primary uses. Property acquisitions and conversions are described in more detail in Section 5.4.2; no relocations would be required.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would have minimal indirect impacts to community facilities within one-half mile of the Saint Paul portion of the proposed route based on their distance from the project. Visual changes would impact the Bruce Vento Regional Trail. All other effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

Maplewood

Access Changes

The Rush Line BRT Project would enhance access to several community facilities. The proposed St. John's Boulevard station would provide access to St. John's Hospital and several other healthcare facilities nearby. The project would also improve access to organizations and nonprofits such as the Philippine Center of Minnesota, which would be served by the proposed Frost Avenue station. The proposed Highway 36 station would serve Harvest Park directly.

No access closures or impacts to community facilities along the Maplewood segment of the proposed route are anticipated during Rush Line BRT Project operations. Therefore, there are no expected effects to community facilities or neighborhood cohesion along this segment of the proposed route.

Loss of Parking

As discussed in Section 5.4.2, 24 off-street parking spaces at the Maplewood Mall Transit Center would be removed as part of the project to facilitate other transit improvements. These spaces are not

immediately adjacent to any community facilities identified in this analysis. Under the Build Alternative, an approximately 300-space parking facility would be constructed to serve the proposed Highway 36 station. Eighteen on-street parking spaces would be removed from Gervais Avenue. Under the Build Alternative option without the Highway 36 park-and-ride, 13 on-street parking spaces would be removed from Gervais Avenue. Loss of these spaces is not expected to adversely affect any community facilities within 200 feet of the proposed Rush Line BRT route or the community character and cohesion along this segment of the proposed route.

Noise Impacts

As noted in Chapter 3 of the EA, noise modeling shows that operation of the Rush Line BRT Project is not anticipated to produce noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in Maplewood.

Visual Changes

As noted in the Chapter 3 of the EA, construction and operation of the Rush Line BRT Project would contribute to moderate to high visual impact to some community facilities in Maplewood. A high visual impact is anticipated to the current Bruce Vento Regional Trail, which would be mitigated by landscaping and design features of the project, as outlined in the *Ramsey County Rail Right-of-Way Design Guide*. In addition, moderate visual impacts are anticipated at the following locations:

- Larpenteur Avenue and Frost Avenue stations: A moderate contrast with the existing visual context is expected at the Larpenteur Avenue and Frost Avenue stations, to be mitigated by station-area landscaping as specified in the *Ramsey County Rail Right-of-Way Design Guide*. No adverse visual impacts to community facilities are anticipated.
- Gateway State Trail: A grade-separated trail crossing would be constructed at the Gateway State Trail; construction of this crossing and the dedicated guideway would result in moderate visual impacts to the Gateway State Trail itself, to be mitigated by landscaping as specified in the *Ramsey County Rail Right-of-Way Design Guide*.
- Weaver Elementary School: A grade-separated trail crossing would be constructed to facilitate continued nonmotorized access to and from Weaver Elementary School. Construction of this crossing and the dedicated guideway would result in moderate visual impacts, to be mitigated by landscaping as specified in the *Ramsey County Rail Right-of-Way Design Guide*. Weaver Elementary School is also a historic property and is subject to additional visual effects assessment under the Section 106 process. Any visual effects would be resolved through consultation.
- Highway 36 station: Some change from the existing visual context is anticipated at Harvest Park resulting from the construction of the Highway 36 station and associated parking improvements. Under the Build Alternative, a parking facility would be constructed. Visual impacts to Harvest Park would be mitigated by the design and landscaping of the parking facility. Under the Build Alternative option without the Highway 36 park-and-ride, no additional parking would be constructed.

Property Acquisitions and Conversions

There are zero full property acquisitions and eight partial acquisitions required in Maplewood. One of the largest acquisitions would impact approximately 1.56 acres of a 12.4-acre parcel where Weaver Elementary School is located. The acquisition would impact a wooded area behind the school, which

is a property recommended as eligible for listing in the National Register of Historic Places. Risk of conflict between buses and pedestrians in this area would be mitigated by the proposed construction of a trail underpass, providing safe pedestrian access from English Street to the school.

Other large acquisitions (those totaling one acre or more) would affect unused city-owned land and existing publicly-owned transportation right-of-way, leading to minimal anticipated impacts in these areas. One large acquisition would impact approximately one acre of a 2.5-acre, privately-owned residential parcel but would not affect any buildings on the parcel. Underutilized and unused commercial land would also be affected by strip takings. Strip takings are acquisitions along the border of a property that do not preclude continuation of the parcel's primary use. There are no impacts to community facilities within 200 feet of the proposed Rush Line BRT route or to the cohesion of the area as a result of property acquisitions or conversions, and minimal impacts are anticipated to Weaver Elementary School. Property acquisitions and conversions are described in more detail in Section 5.4.2.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would have minimal indirect impacts to community facilities within one-half mile of the Maplewood segment of the proposed route based on their distance from the project. The visual character of the Bruce Vento Regional Trail and Harvest Park would change, altering the experience for trail and park users as well as adjacent residents; any potential impacts would be mitigated through design and landscaping. All other effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

White Bear Township

Access Changes

No access closures or impacts to community facilities along the White Bear Township segment of the proposed route are anticipated during Rush Line BRT Project operations. Therefore, there are no anticipated impacts to community facilities or neighborhood cohesion along this segment of the proposed route.

Loss of Parking

No off-street or on-street parking spaces would be lost in White Bear Township as a result of the Rush Line BRT Project. Therefore, adverse effects to any community facilities within one-half mile of the proposed Rush Line BRT route or community character and cohesion along this segment of the proposed route are not anticipated.

Noise Impacts

As noted in Chapter 3 of the EA, operation of the Rush Line BRT Project is not anticipated to have noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in White Bear Township.

Visual Changes

As noted in Chapter 3 of the EA, construction and operation of the Rush Line BRT Project is consistent with the existing visual context in White Bear Township. The construction of the Buerkle Road station southbound platform would be mitigated by landscaping as specified in the *Ramsey County Rail Right-of-Way Design Guide*, leading to no adverse impact to nearby community facilities.

Property Acquisitions and Conversions

There would be one partial property acquisition required for Rush Line BRT Project operations in White Bear Township affecting existing transportation right-of-way owned by BNSF Railway Company. The property has been recommended as eligible for listing in the National Register of Historic Places. This acquisition would comprise approximately 0.02 acres of a property that lies within the boundaries of both White Bear Township and White Bear Lake. The acquisition would be necessary for construction of a sidewalk on the north side of Buerkle Road near the proposed station. Therefore, there are no expected impacts to community cohesion or facilities the area as a result of property acquisitions or conversions. Property acquisitions and conversions are described in more detail in Section 5.4.2.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would have minimal indirect impacts to community facilities within one-half mile of the White Bear Township segment of the proposed route based on their distance from the project. All other effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

Vadnais Heights

Access Changes

The proposed County Road E station would substantially improve access to Twin Cities Orthopedics and the TCO Sports Garden, which are not currently served by transit. No access closures or impacts to community facilities along the Vadnais Heights segment of the proposed route are anticipated during Rush Line BRT Project operations. Therefore, impacts to community facilities or neighborhood cohesion along this segment of the proposed route are not anticipated.

Loss of Parking

Though reconfiguration of a portion of the TCO Sports Garden parking lot would be required to accommodate the County Road E park-and-ride, no parking spaces under private ownership would be lost as a result of the Rush Line BRT Project. The reconfiguration would increase parking capacity by 26 spaces. Seventy spaces would be designated for park-and-ride users during peak times and would be available for use by business patrons during off-peak hours. Peak times are typically defined as approximately 7 a.m. to 6 p.m. Because parking capacity would increase, no adverse impacts to community facilities within 200 feet of the proposed Rush Line BRT route or community character and cohesion along this segment of the proposed route are anticipated.

Noise Impacts

As noted in Chapter 3 of the EA, operation of the Rush Line BRT Project is not anticipated to have noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in Vadnais Heights.

Visual Changes

As noted in Chapter 3 of the EA, construction and operation of the Rush Line BRT Project is consistent with the existing visual context in Vadnais Heights. The construction of the dedicated guideway bridge over I-694, the Buerkle Road station northbound platform and the County Road E station would have low visual contrast with existing visual features. Some visual changes would occur

at the TCO Sports Garden due to the reconfiguration of existing parking, but this is not anticipated to create any adverse visual impact to this community facility.

Property Acquisitions and Conversions

Rush Line BRT Project operations would not require any permanent property acquisitions in Vadnais Heights. No impacts to community facilities or cohesion are anticipated along this segment of the route. Property acquisitions and conversions are described in more detail in Section 5.4.2.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would not have any indirect impacts to community facilities within one-half mile of the Vadnais Heights segment of the proposed route based on their distance from the proposed route. All other effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

Gem Lake

Access Changes

No access closures or impacts to community facilities along the Gem Lake segment of the proposed route are anticipated during Rush Line BRT Project operations. Therefore, there are no expected effects to community facilities or neighborhood cohesion along this segment of the route.

Loss of Parking

There would be no loss of parking in Gem Lake as a result of the Rush Line BRT Project. Therefore, there is expected to be no adverse effect to any community facilities within one-half mile of the proposed Rush Line BRT route or to community character and cohesion along this segment of the route.

Noise Impacts

As noted in Chapter 3 of the EA, operation of the Rush Line BRT Project is not anticipated to have noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in Gem Lake.

Visual Changes

As noted in Chapter 3 of the EA, Rush Line BRT Project elements in Gem Lake would consist only of dedicated guideway along Highway 61. This use is consistent with the existing visual context (a multi-lane divided roadway), and no impacts to community facilities are anticipated.

Property Acquisitions and Conversions

Two partial acquisitions of privately-owned parcels, totaling fewer than 0.02 acres, would be required for the Rush Line BRT Project in Gem Lake. Because these acquisitions are minimal in size and would only impact parking lots serving private commercial uses, no impacts to community facilities or cohesion are anticipated along this segment of the route. Property acquisitions and conversions are described in more detail in Section 5.4.2.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would not have any indirect impacts to community facilities within one-half mile of

the Gem Lake segment of the route based on their distance from the route. Effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

White Bear Lake

Access Changes

Rush Line BRT would improve access to community facilities located proximate to the proposed Downtown White Bear Lake station such as White Bear Lake Area Schools. Rush Line BRT would also enhance access to White Bear Lake City Hall and the White Bear Lake branch of the Ramsey County Library, which are located approximately halfway between the proposed Whitaker Street and Downtown White Bear Lake stations.

The Rush Line BRT Project would eliminate one driveway connecting the Lakeside Shops to Highway 61. However, access to the shopping center would be maintained via Whitaker Street to the south and Lake Avenue. Therefore, loss of this driveway is not anticipated to have any long-term negative impacts. Near the proposed Downtown White Bear Lake station, the southbound travel lane on Washington Avenue would be converted to a northbound lane between 7th and 8th Streets, and the northbound lane would be converted to a bus lane. Washington Avenue only extends one block south of 7th Street and one block north of 8th Street, providing limited connectivity to the surrounding street grid. Access for northbound motorists would be maintained along Division Avenue and Highway 61, which run parallel to Washington Avenue to the west and east, respectively. Because Washington Avenue serves relatively little traffic, access along this road would only be partially reduced, and there are alternative streets in close proximity, this change in access is not anticipated to have long-term adverse effects.

Loss of Parking

Rush Line BRT operations would require removal of 40 off-street parking spaces in White Bear Lake. Of these spaces, 24 are located in or partially in the public right-of-way adjacent to the White Bear Shopping Center. There is abundant parking provided throughout the shopping center. At Lakeside Shops, eight parking spaces on private property would be removed; there are many other parking options nearby. Near Beartown Bar and Grill, eight parking spaces that encroach on public right-of-way would be removed; there are many other parking options nearby. An additional eight on-street parking spaces would be removed on Washington Avenue; surrounding streets have abundant on-street parking available. The removal of these parking spaces is not expected to adversely impact any community facilities within 200 feet of the proposed route or affect community character and cohesion along this segment of the proposed route because of the abundance of alternative parking options.

Noise Impacts

As noted in Chapter 3 of the EA, operation of the Rush Line BRT Project is not anticipated to have noise impacts along any portion of the proposed route. Therefore, there are no anticipated noise impacts to neighborhoods or community resources in White Bear Lake.

Visual Changes

As noted in Chapter 3 of the EA, construction and operation of Rush Line BRT is consistent with the existing visual context and would create only a low visual contrast with surrounding features. Along Highway 61, the introduction of dedicated guideway and the Cedar Avenue and Whitaker Street stations would not create any adverse impacts to community facilities. Similarly, the Downtown White Bear Lake station is consistent with the current visual context (surface parking), and no community facilities would be impacted.

Property Acquisitions and Conversions

The Rush Line BRT Project would require several partial property acquisitions in White Bear Lake. North of I-694, acquisitions would primarily occur on unused land and parking lots. One acquisition would affect existing transportation right-of-way owned by BNSF Railway Company. This acquisition would comprise approximately 0.02 acres of a property that lies within the boundaries of both White Bear Township and White Bear Lake. The acquisition would be necessary for construction of a sidewalk on the north side of Buerkle Road near the proposed station. Additional acquisitions would be required around Cummins Sales and Service, the White Bear Shopping Center and Lakeside Shops. Three residential properties would be impacted by partial acquisitions; the remaining acquisitions would affect areas primarily used for parking.

Because the required acquisitions would encompass vacant land and parking lots, the project is expected to have minimal adverse effects on community facilities within one-half mile of the proposed Rush Line BRT route or community character and cohesion along this segment of the proposed route. Property acquisitions and conversions are described in more detail in Section 5.4.2.

Indirect Impacts

As noted in Chapter 3 of the EA, consideration of access and visual impacts determined that the Rush Line BRT Project would have minimal indirect impacts to community facilities within one-half mile of the White Bear Lake segment of the proposed route based on their distance from the project. All other effects would be confined to limited areas and would not indirectly result in substantial physical or social barriers.

CONSTRUCTION PHASE IMPACTS

Although temporary in nature, construction phase impacts may affect community facilities and neighborhood cohesion. Detours may increase traffic through residential neighborhoods or change access to community facilities, and parking closures may change access to these facilities as well. Similarly, sidewalk closures and detours may affect pedestrian traffic patterns. Construction impacts such as increased levels of noise and dust may temporarily affect neighborhood character, primarily in areas that are relatively quiet. The presence of large construction equipment may be perceived as visually disruptive, resulting in temporary effects to community character, particularly in residential settings.

4.5. MITIGATION MEASURES

No adverse impacts to community facilities are expected along most of the proposed Rush Line BRT route. However, as discussed in Chapter 3 of the EA, visual impacts to the Bruce Vento Regional Trail are anticipated. The *Ramsey County Rail Right-of-Way Design Guide*, developed using community input, includes guiding principles and design recommendations intended to address these visual impacts. Potential impacts to accessing Weaver Elementary School would be mitigated by the construction of a trail underpass for pedestrians. Impacts to Harvest Park and associated mitigation measures are described in the Chapter 4 of the EA. Harvest Park is undergoing a master planning and coordinated review process to make sure the park continues to meet the needs of the community. Specific mitigation for property acquisitions and displacements is discussed in Section 3.4. Mitigation for loss of parking is discussed in Section 0.

Short-term construction impacts may be mitigated by the use of construction staging or phasing as well as signage and signal control requirements that facilitate continued access to neighborhoods and community facilities throughout the construction period. To minimize impacts to pedestrian traffic

patterns during the construction phase, temporary sidewalks may be implemented in the roadway using concrete barriers and appropriate signage. To minimize impacts to bicycle traffic during the construction phase, trail detours may also be implemented in the roadway using concrete barriers, appropriate signage and, if necessary, road closures. To minimize construction noise and vibration, a noise and vibration control plan would be prepared to mitigate short-term noise and vibration resulting from construction activities. Although specific mitigation plans have not yet been developed, best management practices would include working with residents and community facility managers to provide alternative access, providing residents and community facilities adequate notice about construction plans and phasing, maintaining access to existing bus stops and alerting the public about detours. A communications plan for the project's construction phase would be developed as the project advances.

5. ECONOMICS

This section focuses specifically on commercial uses in the Rush Line BRT project area and potential impacts to businesses resulting from the project.

While this section's focus is on potential impacts the project may have on commercial establishments, the Rush Line BRT Project is also positioned to have positive economic impacts on the project area and region as a whole. As discussed in Chapter 1 of the EA, Rush Line BRT Project goals include supporting sustainable development, improving sustainable transportation options and enhancing regional connectivity.

5.1. REGULATORY CONTEXT

No specific laws or executive orders regulate the topic of economic impacts. The National Environmental Policy Act and Minnesota Environmental Policy Act form the general basis of consideration for economic issues. Operating phase impacts include direct and permanent impacts of operating Rush Line BRT, including acquisition of right-of-way, loss of on-street parking and changes in traffic patterns. Construction phase impacts are defined as impacts that are associated with constructing the project and are generally temporary in nature.

5.2. METHODOLOGY

The study area for operating phase direct impacts (e.g., right-of-way acquisition, loss of on-street parking, restrictions to business access) is defined as the potential area of disturbance for the project. Project staff conducted intensive engagement efforts with local business owners to identify potential impacts and mitigation strategies. Additionally, economic impacts at the regional and statewide level were estimated using the Metropolitan Council's REMI-PI model, which is an economic forecasting and policy analysis tool employed to project future economic impacts.

5.3. EXISTING CONDITIONS

This section focuses specifically on commercial uses in the study area and potential impacts to businesses as a result of the project. A full evaluation of both residential and commercial right-of-way and parking impacts is available in Section 5.4.2.

The southern terminus of the Rush Line BRT Project would be at Union Depot in the Lowertown neighborhood of Saint Paul. Lowertown is located in downtown Saint Paul, which is the region's second largest job center with more than 48,000¹³ private and public sector jobs in office, retail, civic and hospitality settings. Lowertown hosts offices, galleries and studios, as well as retail space in renovated warehouse buildings. North of Lowertown, there are large office buildings and various businesses including restaurants, a gas station and a grocery store. Rush Line BRT would pass several of these before crossing over I-94. North of I-94 and west of I-35E, Rush Line BRT would serve the capitol area, including several state office buildings, and Regions Hospital.

Rush Line BRT would serve state office buildings located east of I-35E and south of the proposed Olive Street station. A number of healthcare facilities located near the proposed Cayuga Street and Payne Avenue stations would also be well-served by Rush Line BRT. On Phalen Boulevard from

¹³ Downtown Saint Paul employment determined using 2017 Longitudinal Employer-Household Dynamics from the United States Census Bureau OnTheMap tool.

Payne Avenue to Forest Street, Rush Line BRT would serve a cluster of retail businesses including a hardware store, locally owned restaurants, a laundromat and an indoor climbing facility. After Rush Line BRT turns north onto the Ramsey County rail right-of-way, it provides access to a small commercial hub near Maryland Avenue that includes a supermarket, an automobile part shop, a recreational climbing facility and small chain retail shops.

Near the proposed Frost Avenue station, there are small-scale retail uses including a piercing shop, a liquor store and a towing service, as well as a 157-unit apartment building and a 107-unit senior housing development. There are several large-scale commercial facilities in the proposed Highway 36 station area, including two car dealerships, a truck accessories store and a moving and self-storage facility. The Maplewood Mall Transit Center provides easy access to Maplewood Mall, and the proposed St. John's Boulevard station is surrounded by medical retailers. St. John's Hospital and the area surrounding the St. John's Boulevard station constitute another major job center in the project area.

Around the proposed Buerkle Road station, there are many commercial uses and a variety of industrial companies. Near the proposed County Road E station, there are numerous small foodservice and retail establishments, an indoor sports facility, a bank, a sporting goods store and a medical office, as well as several car dealerships. In the Cedar Avenue station area, there are commercial uses including several specialty retail shops and a car dealership. The proposed Whitaker Street station would be located near the White Bear Shopping Center, which includes a grocery store, a bank and fast food restaurants. The proposed Downtown White Bear Lake station would be located near a variety of commercial, institutional and residential uses, such as a restaurant, local schools and a senior living facility.

5.4. ENVIRONMENTAL CONSEQUENCES

5.4.1. No Build Alternative

The No Build Alternative would not have any direct economic impacts. Impacts due to introduction of the Rush Line BRT Project, such as loss of parking and change in access, would not occur. However, the No Build Alternative would not provide the transportation or economic development benefits of implementing the Rush Line BRT Project, which are project goals described in Chapter 1 of the EA.

No construction phase impacts would occur under the No Build Alternative.

5.4.2. Build Alternative

OPERATING PHASE IMPACTS

The Rush Line BRT Project would result in several types of direct impacts to existing businesses in the study area. This section evaluates these direct economic impacts based on the concept plans for the Rush Line BRT Project. Impacts to commercial properties are anticipated to be the same under the Build Alternative and the Build Alternative option without the Highway 36 park-and-ride. This section addresses the following:

- Displacement of commercial uses as a result of right-of-way acquisition.
- Loss of on-street parking serving businesses and changes to business access resulting from location of BRT within the street right-of-way.
- Loss of off-street parking serving businesses.
- Other property acquisition (both commercial and non-commercial) due to right-of-way acquisition resulting in reduced property tax collection.

Saint Paul

Construction of the Rush Line BRT Project would largely occur within existing roadway right-of-way from Union Depot to the Arcade Street station. Eight partial acquisitions affecting commercial property would be required. These acquisitions are each less than 0.15 acres and would not impede continued use of the affected properties. Of the 69 parking spaces that would be removed in Saint Paul, 55 serve commercial uses, as shown in Table 9. Implementation of the project on Robert Street in downtown Saint Paul would lead to the loss of 32 on-street parking spaces that are available only during off-peak times. Near the Arcade Street station, 20 off-street parking spaces at 827 Forest Street would be removed along with three off-street parking spaces at 833 Forest Street. The remaining 14 spaces that would be removed serve residential properties; these are not counted in Table 9 because loss of these spaces would not affect any commercial uses. Potential parking losses affecting commercial uses are described in Table 9.

The majority of these spaces are unavailable for several hours on weekdays and there are many other parking options in the area. Therefore, the loss of these spaces is not anticipated to have a significant impact on daytime commercial uses along this portion of the proposed Rush Line BRT route. However, there are some retailers, restaurants and bars on Robert Street that conduct a significant portion of their business in the evening and may be impacted by the loss of parking.

Table 9: Direct Impacts to Commercial Uses in Saint Paul

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	8 acquisitions
Number of on-street parking spaces serving commercial uses lost	32 spaces lost ¹⁴
Number of off-street parking spaces serving commercial uses lost	23 spaces lost
Net commercial parking impact	55 spaces lost
Number of commercial properties with reduction in access points	0 properties

Maplewood

Rush Line BRT would operate in Ramsey County rail right-of-way throughout most of Maplewood, leading to minimal impacts to parking, loading zones and business access. One partial acquisition impacting commercial property would be required, affecting vacant land owned by the radio station KSTP. At the Maplewood Mall Transit Center, 24 off-street parking spaces would be removed to implement the Rush Line BRT station and other transit improvements. Two options are being considered for the proposed Highway 36 station: one with a park-and-ride with approximately 300 spaces and one with no additional parking. Under the Build Alternative, the park-and-ride would be constructed and 18 on-street parking spaces on Gervais Avenue would be removed. Under the Build Alternative option without the Highway 36 park-and-ride, the park-and-ride would not be constructed and 13 on-street spaces on Gervais Avenue would be removed. These impacts are summarized in Table 10.

¹⁴ The 32 spaces that would be removed on Robert Street are time-limited and unavailable for several hours on weekdays.

Table 10: Direct Impacts to Commercial Uses in Maplewood

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	1 acquisition
Number of on-street parking spaces serving commercial uses lost	18 spaces lost
<i>Option without the Highway 36 park-and-ride</i>	<i>13 spaces lost</i>
Number of off-street parking serving commercial uses spaces lost	24 spaces lost
<i>Option without the Highway 36 park-and-ride</i>	<i>24 spaces lost</i>
Net commercial parking impact	258 spaces gained
<i>Option without the Highway 36 park-and-ride</i>	<i>37 spaces lost</i>
Number of commercial properties with reduction in access points	0 properties

White Bear Township

Rush Line BRT operations would require a permanent partial land acquisition of a parcel that lies within the boundaries of both White Bear Township and White Bear Lake and belongs to BNSF Railway Company, comprising approximately 0.02 acres of the 16.72-acre active right-of-way spanning from I-694 to County Road E East. No other acquisitions would be required for the operating phase, as shown in Table 11.

Table 11: Direct Impacts to Commercial Uses in White Bear Township

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	2 acquisitions
Number of on-street parking spaces serving commercial uses lost	0 spaces lost
Number of off-street parking spaces serving commercial uses lost	0 spaces lost
Net commercial parking impact	0 spaces lost
Number of commercial properties with reduction in access points	0 properties

Vadnais Heights

In Vadnais Heights, Rush Line BRT would operate in Ramsey County rail right-of-way and existing road right-of-way on Buerkle Road and Highway 61. One permanent acquisition, totaling less than 0.01 acres, would be required along the edge of the property at 1520 Buerkle Road and would not interfere with the primary use of the property. No permanent access changes affecting commercial uses would result from Rush Line BRT operations in Vadnais Heights, as shown in Table 12.

Reconfiguring a portion of the existing TCO Sports Garden parking lot to accommodate the County Road E park-and-ride would increase the parking capacity at the commercial complex by 26 spaces.

A parking study completed as part of the environmental analysis found that no significant business impacts are anticipated as a result of operation of the proposed County Road E station park-and-ride.

Table 12: Direct Impacts to Commercial Uses in Vadnais Heights

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	1 acquisition
Number of on-street parking spaces serving commercial uses lost	0 spaces lost
Number of off-street parking spaces serving commercial uses lost	0 spaces lost
Net commercial parking impact	0 spaces lost
Number of commercial properties with reduction in access points	0 properties

Gem Lake

Two partial acquisitions of commercial property, both owned by Hy-Vee and totaling less than 0.02 acres, would be required in Gem Lake, as shown in Table 13. These would both impact unused land acting as a buffer between businesses and Highway 61 and County Road E and would not impact parking or access for these businesses. Therefore, no direct impacts to commercial uses in Gem Lake are anticipated as a result of the Rush Line BRT Project.

Table 13: Direct Impacts to Commercial Uses in Gem Lake

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	2 acquisitions
Number of on-street parking spaces serving commercial uses lost	0 spaces lost
Number of off-street parking spaces serving commercial uses lost	0 spaces lost
Net commercial parking impact	0 spaces lost
Number of commercial properties with reduction in access points	0 properties

White Bear Lake

Ten partial acquisitions of commercial property, totaling approximately 1.8 acres, would be required to facilitate operation of Rush Line BRT. The largest of these would occur at Cummins Sales and Service, located at 1600 Buerkle Road, and consist of a strip taking of approximately 1.63 acres along the edge of the property; the other nine acquisitions would consist of strip takings approximately 0.07 acres in size or smaller. The dedicated guideway would be located primarily in existing road right-of-way on Highway 61 in White Bear Lake.

Construction of the dedicated guideway would result in the loss of 40 off-street parking spaces in White Bear Lake. At the White Bear Shopping Center (4422 Highway 61), approximately 24 off-street parking spaces would be removed, all of which are located in or partially in the public right-of-way. There is abundant parking at the shopping center; thus, this loss of spaces is not anticipated to have an impact on the businesses in this commercial center. The Lakeside Shops, located at 1971 Whitaker Street, would lose eight off-street parking spaces located on private property as well as driveway access to Highway 61. This loss of parking and access is not anticipated to have an impact on the businesses located here, as there is abundant parking at the shopping center and a second

driveway that provides access to the shops immediately to the south. Direct impacts to commercial uses are summarized in Table 14. Beartown Bar and Grill, located at 4875 Highway 61, would lose eight off-street parking spaces located in or partially in the public right-of-way. Zoning regulations require one parking space for every 2.5 seats in a restaurant. With 130 seats in the dining room and an outdoor patio with an additional 44 seats, the restaurant is required to maintain 70 parking spaces and currently has approximately 85. Implementation of the project would decrease the total number of spaces to 77, a total that is compliant with White Bear Lake parking minimums. An additional eight on-street parking spaces would be removed on Washington Avenue.

Table 14: Direct Impacts to Commercial Uses in White Bear Lake

Type of Impact	Magnitude of Impact
Number of businesses displaced	0 businesses
Number of commercially-zoned businesses fully acquired	0 businesses
Number of partial land acquisitions impacting commercial properties	10 acquisitions
Number of on-street parking spaces serving commercial uses lost	8 spaces lost
Number of off-street parking spaces serving commercial uses lost	40 spaces lost
Net commercial parking impact	48 spaces lost
Number of commercial properties with reduction in access points	1 property

Metro Region and Statewide

The Metropolitan Council's economic forecasting model estimates the impact of the Rush Line BRT Project on the gross state product, which represents the size of Minnesota's economy, and on employment compared to the No Build Alternative. The project would add \$96 million¹⁵ to the gross state product during its operating phase through 2040. In 2040, employment in Minnesota would be 124 jobs higher than under the No Build Alternative. Of these, 50 jobs would be directly created by the transit industry and 74 would be jobs in other industries. A public sector project is said to "pay for itself" in economic terms at the point that the cumulative economic activity impact surpasses the public project cost (from all local, state and federal sources). The Rush Line BRT Project would "pay for itself" by 2033.

CONSTRUCTION PHASE IMPACTS

Under the Build Alternative, changes to access included as part of the operating phase would also occur within the construction phase. No additional construction phase impacts are anticipated in White Bear Township or Gem Lake; one temporary easement resulting in a partial acquisition would be required in Maplewood and one would be required in Vadnais Heights.

Parking impacts expected during construction may negatively affect area businesses, though potential impacts would be mitigated by the abundance of on- and off-street parking in the area. Many of the spaces would be restored after construction is concluded and Rush Line BRT operations begin. Long-term parking impacts are summarized in Section 5.4.2. During construction, parking spaces would be temporarily unavailable in two additional locations to accommodate staging and laydown areas: on 10th Street in downtown Saint Paul (25 on-street spaces temporarily unavailable) and at Cummins Sales and Service located at 1600 Buerkle Road in White Bear Lake (28 off-street spaces temporarily

¹⁵ Expressed in 2018 dollars per the REMI-PI model outputs.

unavailable) (see Table 15). Temporary parking removal on 10th Street would be mitigated by on- and off-street parking near the affected area. The Cummins Sales and Service parking lot currently operates near capacity and loss of parking may affect customer access to the business.

Table 15: Construction Phase Parking Impacts

Municipality	On-Street Parking Spaces Eliminated During Construction	Off-Street Parking Spaces Eliminated During Construction
Saint Paul	25	0
Maplewood	0	0
White Bear Township	0	0
Vadnais Heights	0	0
Gem Lake	0	0
White Bear Lake	0	28
Total	25	28

A summary of construction phase business and economic impacts is provided in Table 16. Under the Build Alternative, businesses could expect activities to be temporarily affected by changes in customer access, on-street parking availability, service access, traffic flow and congestion during construction activities. Depending on the intensity and duration of construction activities, businesses relying on ease of customer access may experience a loss of revenue during this time. Businesses with outdoor activities, such as outdoor dining or outdoor storage of products or materials, could also experience negative impacts due to noise, dust or other nuisance conditions caused by nearby construction activities. Businesses that rely on providing customers with a quiet atmosphere (such as dining or spa services) may also be impacted during nearby construction activities. Businesses may experience short-term disruptions of utility services during construction activities if utilities need to be moved or replaced.

Other temporary impacts would occur around the Metropolitan Center for Independent Living, Beartown Bar and Grill, Seeger Square, Buerkle Hyundai, White Bear Shopping Center and Lakeside Shops. Several businesses located along Phalen Boulevard and Buerkle Road may also be affected by temporary impacts. Temporary impacts to commercial properties in Maplewood would be the same whether a park-and-ride facility is constructed at the Highway 36 station or not.

Table 16: Commercial Properties Impacted by Temporary Easements

Municipality	Number of Commercial Properties Impacted by Temporary Easements
Saint Paul	10
Maplewood	4
White Bear Township	2
Vadnais Heights	3
Gem Lake	0
White Bear Lake	20
Total	39

Metro Region and Statewide

According to the Metropolitan Council's economic forecasting model, the Rush Line BRT Project would result in an overall employment expansion of 4,140 job-years during the project's construction phase (3,768 job-years in the metro region and 372 job-years in Greater Minnesota).¹⁶ Over half of these jobs would be from indirect or induced activity, not direct employment with the project itself. During the construction phase, personal income in Minnesota would be \$260 million¹⁷ higher than under the No Build Alternative. The gross state project would be \$418 million¹⁷ higher (\$384 million in the metro region and \$34 million in Greater Minnesota).

5.5. MITIGATION MEASURES

Throughout the environmental analysis phase, project staff have coordinated with property owners regarding parking and access changes and ways to minimize any potential impacts. Coordination will continue throughout project development, final engineering and construction.

Permanent acquisition of commercial, residential and institutional property would be mitigated by payment of fair market compensation and provision of relocation assistance in accordance with applicable laws and statutes, as noted in Section 3.4.

During construction, measures to avoid and/or minimize adverse impacts would include maintenance of traffic, maintenance of access, and business signage and advance communication of construction activities.

The route alternatives were developed with consideration for minimizing impacts to the greatest degree possible while preserving project benefits. The implementation of the proposed park-and-ride facility at the County Road E station would minimize adverse impacts to nearby businesses and would result in a net increase in parking in the station area. The implementation of the proposed park-and-ride facility at the Highway 36 station would not affect any businesses but could contribute to a net increase in parking in the project area. In future project design and engineering phases, efforts would continue to avoid and minimize impacts to businesses.

¹⁶ A job-year is one job for one year. For example, 100 construction jobs for two years equals 200 job-years.

¹⁷ In 2018 dollars.

**PHASE IA LITERATURE REVIEW, PHASE I ARCHAEOLOGICAL
INVESTIGATIONS AND PHASE II ARCHAEOLOGICAL
INVESTIGATIONS OF 21RA82 FOR THE RUSH LINE BRT
PROJECT, RAMSEY COUNTY, MINNESOTA**

SHPO Project No. 2019-0985
MnDOT No. TCP-Rush-18

2018 OSA Phase I License #18-013, 2018 Phase II OSA Phase II License #18-093, 2019 OSA Phase I License #19-033, and DNR Special Permit No. 201897

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MVAC ROI 1156

REDACTED VERSION

MANAGEMENT SUMMARY

The Ramsey County Regional Railroad Authority (RCRRA) is proposing to construct the Rush Line Bus Rapid Transit Project (Rush Line BRT Project), a 14 mile transit corridor connecting downtown Saint Paul to downtown White Bear Lake. The Local Preferred Alternative (LPA) runs along a dedicated guideway and in mixed traffic generally along Robert Street, Phalen Boulevard, Ramsey County Regional Railroad Authority right-of-way (RCRRA ROW) (co-located with the Bruce Vento Trail), and Trunk Highway (TH) 61. This will connect Union Depot in downtown Saint Paul to neighborhoods on the east side of Saint Paul and the communities of Maplewood, Vadnais Heights, Gem Lake, White Bear Lake, and White Bear Township. The project is located in SHPO Region 4e.

The proposed project is seeking funding through a Federal Transit Administration Capital Improvement Grant Program, so it must comply with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act of 1966, as amended, the Minnesota Environmental Policy Act (MEPA), and the Federal Transit Administration (FTA) environmental requirements. The Minnesota Department of Transportation (MnDOT) Cultural Resources Unit (CRU) is the delegated agency for FTA for the Section 106 review.

Identification efforts for the Project began prior to the development of preliminary engineering plans. As a result, the Phase IA archaeological study was initiated on the basis of a preliminary project centerline and potential station locations and addressed a broad initial archaeological study area. As the Phase IA study and engineering progressed, the archaeological study area was refined and reduced in consultation with the Minnesota Department of Transportation Cultural Resources Unit (MnDOT CRU). The archaeological study area considered all potential areas of ground disturbance, with the understanding that ancillary features such as ponds, park-and-rides, and stations might change as project design proceeds and the study area may require further refinement.

The Phase IA literature search and archaeological assessment summarized previously recorded sites and surveys as well as other pertinent information such as historical map research, lidar imagery, and MnModel 3 predictions for precontact resources. Six areas within the study area were identified as having medium to high archaeological potential. One of these areas, in White Bear Lake, was not subjected to field survey because project design does not currently involve ground disturbance in these locations. A total of 48 acres were surveyed. Field investigation in the remaining areas resulted in the identification of remnants of two late-nineteenth/early-twentieth century railroad depot privies (Site 21RA82), and remnants of the original Lake Superior & Mississippi (LS&M) railroad roadbed (Minnesota Architecture/History Inventory No. XX-RRD-NPR002, XX-RRD-NPR003, and XX-RRD-NPR004), which was completed within the study area by 1868. Due to loss of integrity, the depot privies are recommended not eligible for the National Register of Historic Places (NRHP), either individually or as contributing to the Lake Superior & Mississippi (LS&M) Railroad Corridor

MANAGEMENT SUMMARY

Historic District: Saint Paul to White Bear Lake Segment. Evaluation of the early 1868 LS&M railroad roadway is reported in detail in a separate document evaluating the Lake Superior & Mississippi Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment (Pettis et al. 2020). The remnants of the LS&M railroad roadbed (XX-RRD-NPR002, XX-RRD-NPR003, and XX-RRD-NPR004) are contributing elements to the historic district.

No additional archaeological work is recommended for the rest of the project as designed to date. However, any future changes to the project should be reviewed against survey recommendations to determine if additional survey may be warranted.

TABLE OF CONTENTS

TABLE OF CONTENTS

Management Summary	2
Table of Contents	4
List of Figures	5
List of Tables	8
Introduction.....	9
Project Description.....	9
Research Design	17
<u>Phase IA</u>	
Introduction.....	18
Environmental Setting	19
Cultural Contexts	21
Precontact	21
Postcontact.....	22
Previously Recorded Sites and Surveys.....	25
Previous Recorded Sites	25
Sites within or immediately adjacent to the archaeological study area	25
Sites within one mile of the archaeological study area	33
Previous Surveys.....	38
Discussion of previous surveys.....	48
MnModel 3 Predictions for Precontact Resources.....	50
Historical Research	55
Lidar Imagery.....	65
Discussion	70
Phase IA Results and Recommendations	72
<u>Phase I Survey</u>	
Introduction.....	80
Research Design/Methods	83
Field Methods	84
Geomorphological Desktop Assessment.....	90
Field Survey.....	90
A) Phalen Boulevard.....	91
B) RCRRA ROW.....	94

TABLE OF CONTENTS

C) Frost Avenue/Gateway State Trail Bridge	94
D) Larpenteur Avenue Station, Weaver Elementary Bridge and Trail Extension, Highway 36 Bridge, Fitch Road/N. Barclay Street Bridge, Beam Avenue Bridge, and I-694 Bridge	94
E) TH 61 from Buerkle Road to Willow Lake Boulevard	95
F) White Bear Lake (Marina Triangle Station to end of BRT corridor)	95
Other Areas	95
Phase I Conclusions and Recommendations	95

Phase II Investigations

Introduction.....	98
Research Design/Methods	100
Historical Background and Research	101
Results.....	112
Excavation Area 1 and Site 21RA82 (Gladstone/Gloster privy).....	112
21RA82 Artifacts.....	115
21RA82 NRHP Evaluation.....	121
Excavation Area 2.....	123
Excavation Area 3.....	126
Phase II Summary and Recommendations	132
Rush Line BRT Archaeological Summary and Recommendations.....	133

References Cited.....	137
Appendix 1: Archaeological Study Area Maps.....	146
Appendix 2: Archaeological Survey Area Maps.....	147
Appendix 3: Geomorphological Desktop Assessment	148
Appendix 4: Mn OSA and DNR permits.....	149

List of Figures

Figure 1. Project location in Minnesota.....	10
Figure 2. Overview (2019) of Rush Line BRT project route and Stations.	11
Figure 3. Southern portion of archaeological study area shown on St. Paul East, MN, USGS quadrangle.	12
Figure 4. Central portion of archaeological study area shown on White Bear Lake West, MN, USGS quadrangle	13
Figure 5. Northern portion of archaeological study area shown on White Bear Lake West, MN, USGS quadrangle.....	14
Figure 6. Previously recorded sites and surveys near the southern portion of the archaeological study area.....	26
Figure 7. Map of OSA portal location of 21RA38 and 21RA39, versus larger site area	

TABLE OF CONTENTS

as found on the site form	27
Figure 8. [Figure 8 redacted]	29
Figure 9. Map of OSA portal location of RAp, versus larger site area as found on the site form.....	31
Figure 10. [Figure 10 redacted]	32
Figure 11. Map from Dolence, Ketz, and Anderson (1996:15, Figure 7) showing location of soil cores and borings for the Phalen Boulevard project.....	42
Figure 12. Location of Phase II work for Phalen Boulevard project showing location of sites where fieldwork was undertaken, and those where landowner access was not obtained.....	44
Figure 13. MnModel 3 predictions for precontact resources for the Lowertown or downtown Saint Paul area	51
Figure 14. MnModel 3 predictions for precontact resources west and north of Lake Phalen	52
Figure 15. MnModel 3 predictions for precontact resources between Highway 36 and County Road E	53
Figure 16. MnModel 3 predictions for precontact resources near White Bear Lake	54
Figure 17. Potential historic resources shown on 1891-1901 map in downtown White Bear Lake	57
Figure 18. Hopkins (1886) map of Gladstone area showing “Station” and old school house near the railroad tracks (current RCRRA ROW)	58
Figure 19. Gladstone Depot and Saint Paul Plow Works on 1891-1901 map.....	59
Figure 20. Depots near Gladstone, Gladstone shops, and Saint Paul Plow Works on undated historic map of Maplewood	60
Figure 21. Lidar imagery of the archaeological study area in Lowertown or downtown Saint Paul area	66
Figure 22. Lidar imagery of south central portion of the archaeological study area.....	67
Figure 23. Lidar imagery of north central portion of the archaeological study area	68
Figure 24. Lidar imagery of northern portion of archaeological study area near White Bear Lake	69
Figure 25. [Figure 25 redacted]	71
Figure 26. Areas of RCRRA ROW overlapping 1868 LS&M railroad roadway where geomorphological soil coring was undertaken.	81
Figure 27. Areas of RCRRA ROW overlapping 1868 LS&M railroad roadway where geomorphological soil coring was undertaken.	82
Figure 28. Southern area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexploration	85

TABLE OF CONTENTS

Figure 29. Southcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations.....	86
Figure 30. Northcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations.....	87
Figure 31. Northcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations.....	88
Figure 32. Area showing County Road D to Buerkle survey area.....	89
Figure 33. Edge of RCRRA ROW, north of Atlantic Street, near Duluth and Case Recreation Center Park shovel tested.....	92
Figure 34. Example of edge of RCRRA ROW near Duluth and Case Recreation Center Park shovel tested.	93
Figure 35. Circular depression noted at eastern edge of RCRRA ROW north of Maryland Avenue.....	96
Figure 36. Displaced bricks from the St. Paul Plow Works, north of the Gateway State Trail and east of the Bruce Vento Trail in the RCRRA ROW.....	97
Figure 37. Locations of depots and outbuildings at the 1890 St. P&P Gladstone/Gloster Station (Area A), joint NP and West Central/Soo Line depot (Area B), and West Central (Soo Line) depot (Area C).....	99
Figure 38. Discrepancies of 1886 Gladstone Station shown on Hopkins (1886) overview index map, and close up detail map of area.	102
Figure 39. Error in original depot location at Gladstone/Gloster shown in <i>Northwest Magazine</i> in 1888.	103
Figure 40. Gladstone Depot circa 1916, north of Frost Avenue, east of the tracks.....	104
Figure 41. Map of Gladstone Depot area circa 1913, provided by Bob Jensen, President Maplewood Historical Society.....	105
Figure 41. Map of proposed joint depot at intersection of two rail lines showing proposed privy location.....	108
Figure 43. Joint Gladstone/Gloster joint depot circa 1926.	109
Figure 44. Joint Gladstone/Gloster joint depot circa 1963.	110
Figure 45. Joint Gladstone/Gloster joint depot circa 1963.	110
Figure 46. Sanitary force main map provided by Metropolitan Council showing force main (highlighted in orange) going around joint depot, circa 1966	111
Figure 47. Location of areas excavated in the Gladstone/Gloster area for Phase II work.....	113
Figure 48. Sketch map of 21RA82 site location.....	116
Figure 49. Plan view of privy shafts within trench.....	117
Figure 50. View of southern privy shaft showing wood lining in profile.....	117
Figure 51. View of northern privy shaft showing faint wood lining near profile edge in foreground.	118
Figure 52. MVAC personnel on left in photos is standing on sterile subsoil between	

TABLE OF CONTENTS

privy shafts.	118
Figure 53. View of remaining portion of northern privy shaft in profile.	119
Figure 54. View of remaining portion of southern privy shaft in profile.	119
Figure 55. Bottles recovered from 21RA82.....	120
Figure 56. Location of trench excavated in Area 2.	124
Figure 57. View of location of possible privy in Area 2, where MVAC personnel is standing next to orange flags in treeline.	125
Figure 58. View of trench in Area 2 showing disturbed soil.	125
Figure 59. Location of trench in Area 3.....	127
Figure 60. View of possible privy (orange flag next to backhoe operator) in Area 3.	127
Figure 61. Map dated 8-20-1920 of Gloster joint depot showing structure in the general location where “wooden toilet” was labeled in the 1960’s	128
Figure 62. Faint outline of wood in trench in Area 3.	129
Figure 63. Disturbance in western half of trench in Area 3.	129
Figure 64. Profile in western half of trench in Area 3 showing buried topsoil.....	131
Figure 65. Area recommended for archaeological survey along TH 61 north of Buerkle Road if there is added ground disturbance	135
Figure 66. Area in White Bear Lake recommended for archaeological survey if there is added ground disturbance	136

List of Tables

Table 1. New intersections and bridges.....	16
Table 2. Archaeological Study area.....	72
Table 3. Archaeological survey recommendations.	76

INTRODUCTION

In 2018 and the spring of 2019, the Mississippi Valley Archaeology Center undertook a Phase IA literature review, Phase I survey investigations, and Phase II excavations for the Rush Line Bus Rapid Transit Project (Rush Line BRT Project), a 14 mile transit corridor connecting downtown Saint Paul to downtown White Bear Lake in Ramsey County, Minnesota (Figures 1 -5). This project is being sponsored by the Ramsey County Regional Railroad Authority (RCRRA). The proposed project is seeking funding through a Federal Transit Administration Capital Improvement Grant Program, so it must comply with the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act of 1966, as amended, the Minnesota Environmental Policy Act (MEPA), and the Federal Transit Administration (FTA) environmental requirements. The purpose of this Rush Line BRT project is to: increase transit use; develop an implementable project; improve quality of life; improve sustainable transportation options; enhance regional connectivity; and support the local vision for sustainable development. A brief project description provided by Kimley-Horn is presented below.

PROJECT DESCRIPTION

Starting at the southern end of the project, the route begins at the Union Depot bus deck. After serving the bus deck, buses would travel west on Kellogg Boulevard then north on Sibley Street in mixed traffic. At 6th Street, buses would turn west and operate in a dedicated guideway until Robert Street, where buses would turn north and operate in mixed traffic until 7th Place. North of 7th Place, buses would operate in a dedicated guideway until 11th Street then transition to mixed traffic to cross over I-35E/I-94 on the existing bridge. Buses would continue north on Robert Street in mixed traffic, turn east on 14th Street and north on Jackson Street. North of University Avenue, buses would enter a dedicated guideway and continue north on Jackson Street until Pennsylvania Avenue, operating on the ramp to Pennsylvania Avenue in mixed traffic (see Figure 3).

Buses would travel east on Pennsylvania Avenue in dedicated guideway, continuing onto Phalen Boulevard east of I-35E. Buses would operate in dedicated guideway on Phalen Boulevard until Payne Avenue, where they would transition to mixed traffic and turn north on Neid Lane then south on Arcade Street. Buses would travel on a new guideway bridge from Arcade Street to the Ramsey County rail right-of-way on the north side of Phalen Boulevard. The route would be located on the north side of Phalen Boulevard, co-located with the Bruce Vento Trail, with buses operating in dedicated guideway until Johnson Parkway (see Figures 3 -4).

INTRODUCTION



Figure 1. Project location in Minnesota.

INTRODUCTION

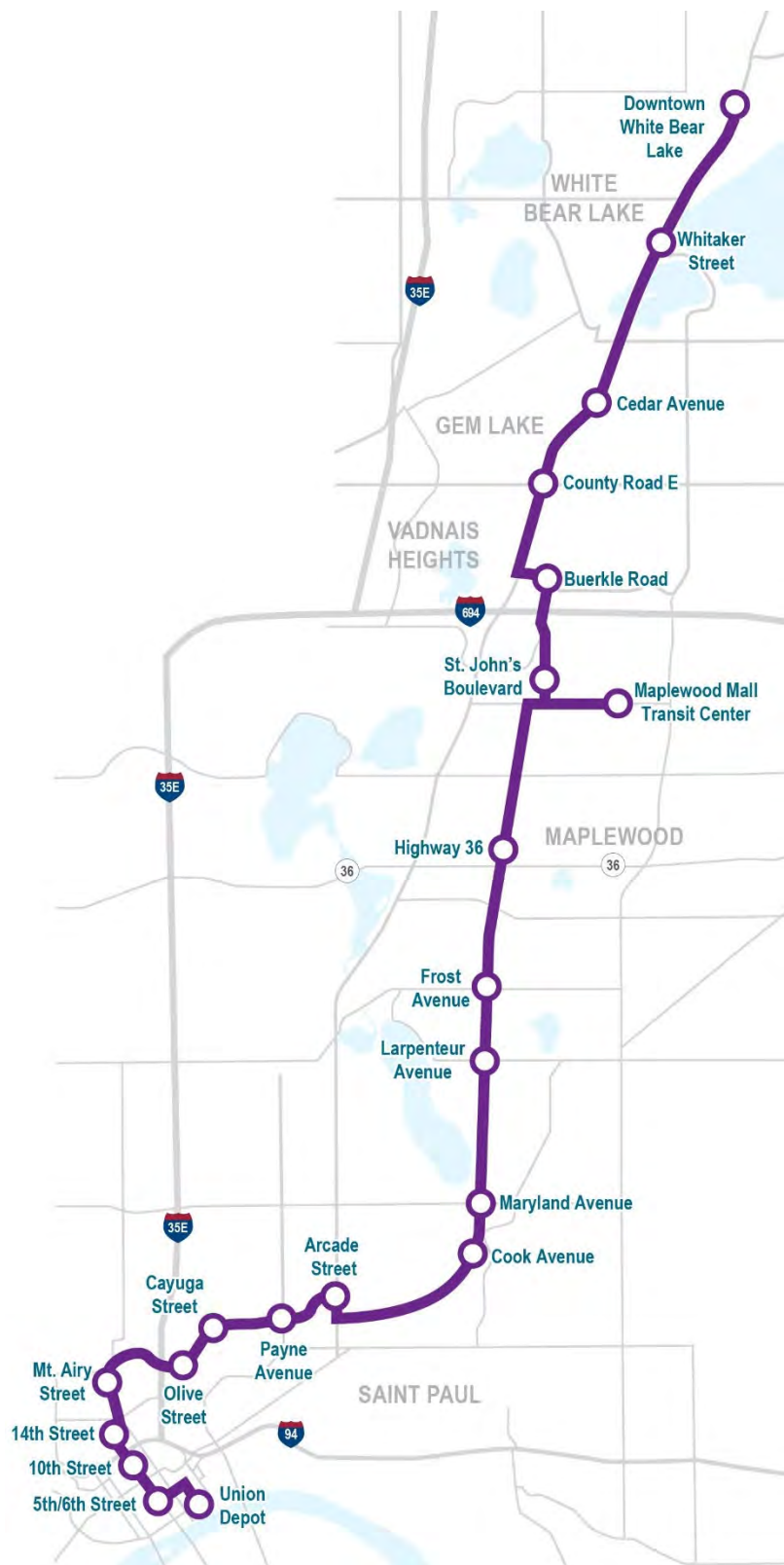


Figure 2. Overview (2019) of proposed Rush Line BRT Project Route and Stations.

INTRODUCTION

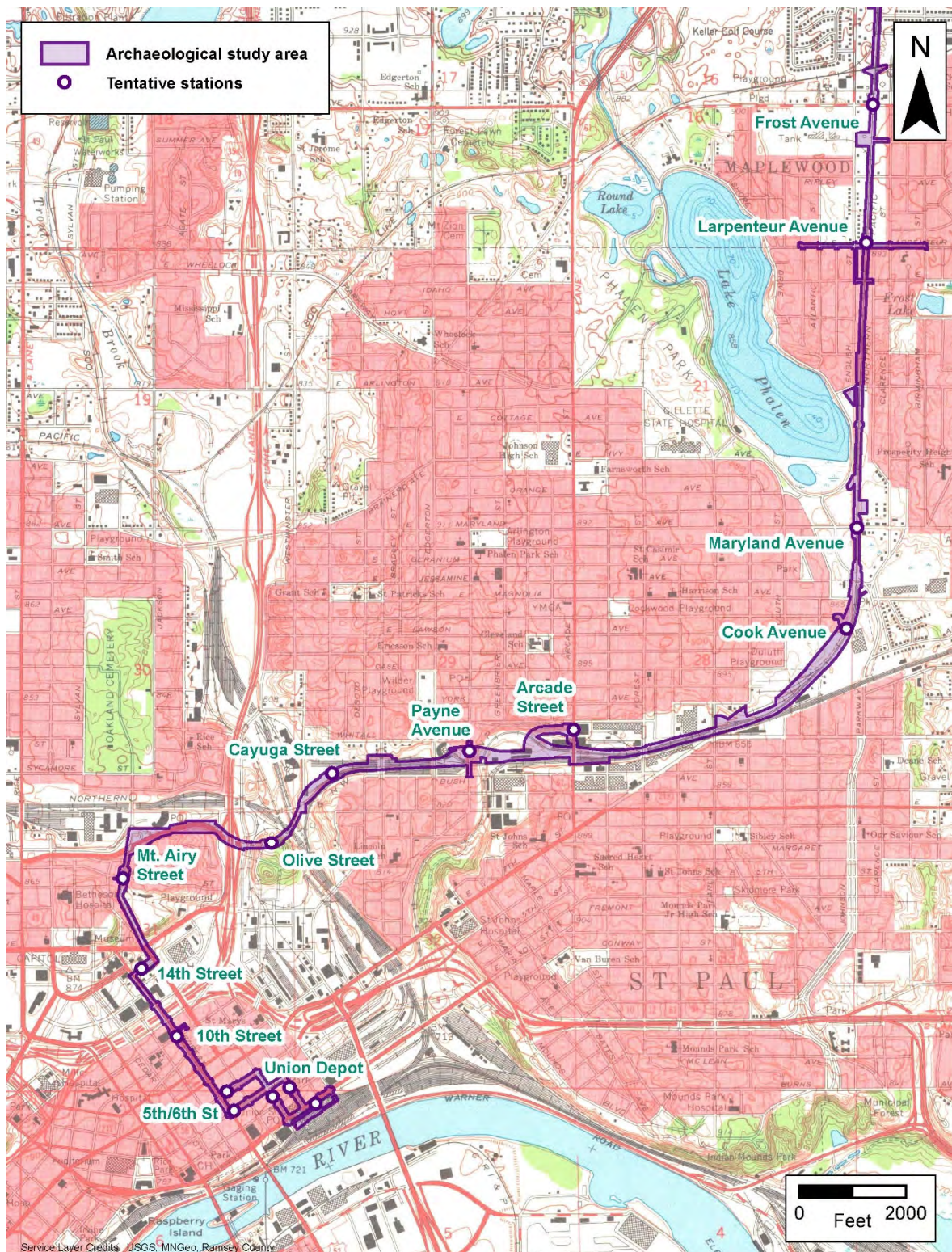


Figure 3. Southern portion of archaeological study area shown on St. Paul East, MN 7.5' USGS quadrangle.

INTRODUCTION

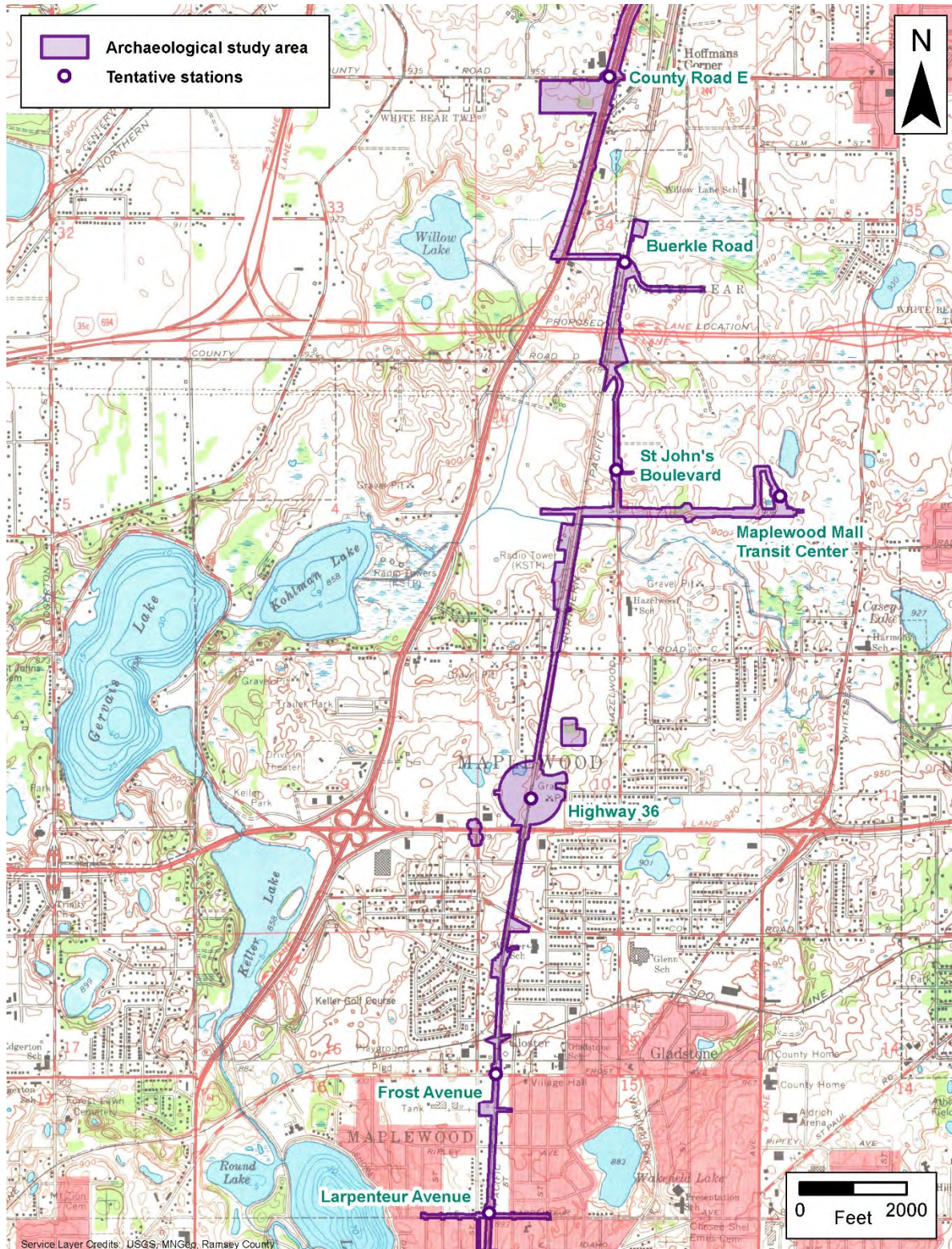


Figure 4. Central portion of archaeological study area shown on White Bear Lake West, MN 7.5' USGS quadrangle.

INTRODUCTION

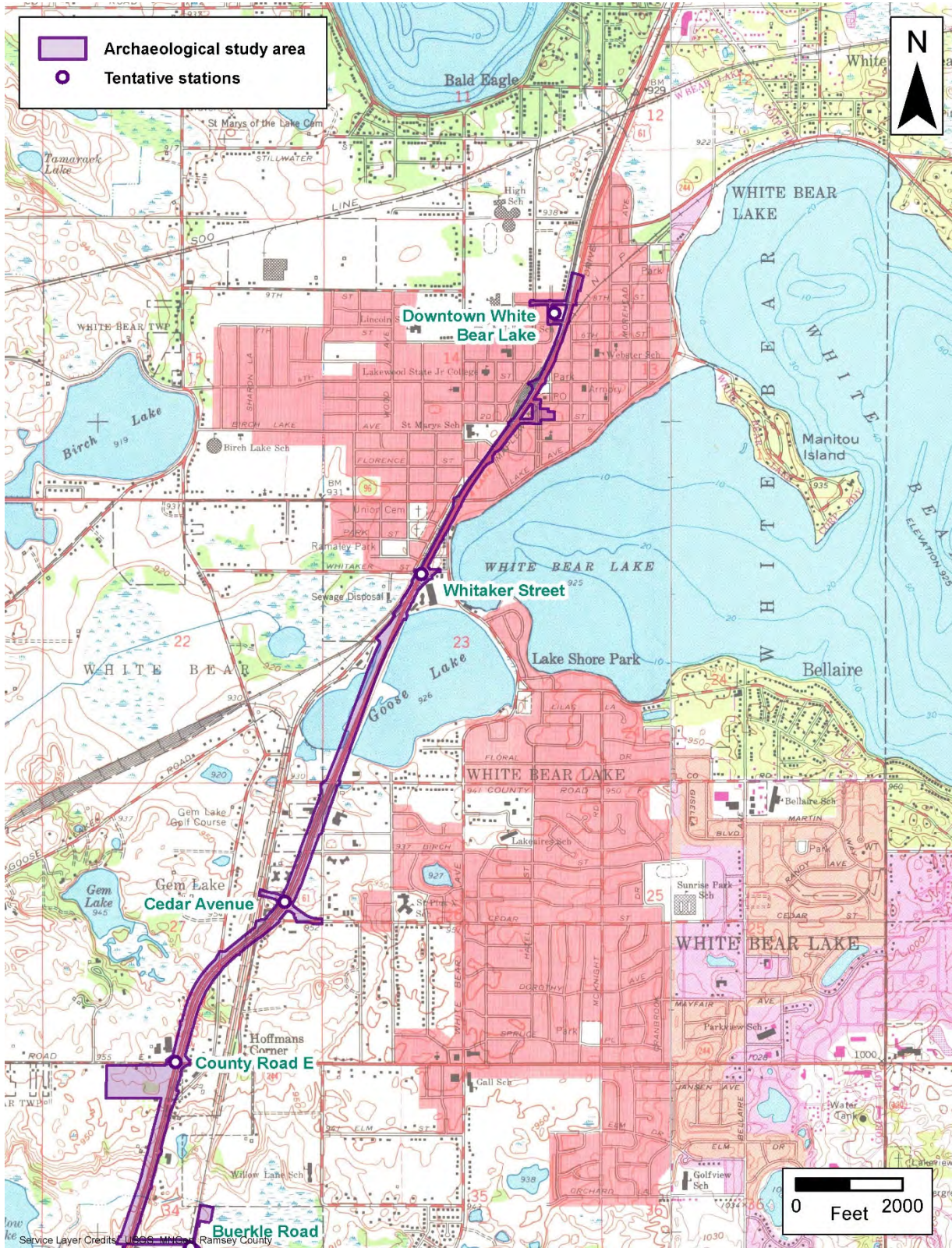


Figure 5. Northern portion archaeological study area shown on White Bear Lake West, MN 7.5' USGS quadrangle.

INTRODUCTION

Buses would cross over Johnson Parkway on a new bridge then cross Maryland Avenue at grade and continue north in a dedicated guideway in the Ramsey County rail right-of-way until Beam Avenue. While in the Ramsey County rail right-of-way, the guideway would cross the Gateway State Trail (both an at-grade crossing and a trail underpass are under consideration), go over an existing trail connection to Weaver Elementary School on a new bridge, cross Highway 36 on a new bridge (the Bruce Vento Trail would remain on the existing pedestrian bridge) and cross an existing trail connection from Fitch Road to Barclay Street north of County Road C (both an at-grade crossing and a trail underpass are under consideration) (see Figure 4).

At Beam Avenue, buses would turn east into a dedicated guideway then turn north on Southlawn Drive and east onto an internal circulation road to the Maplewood Mall Transit Center. After serving the Maplewood Mall Transit Center, buses would turn west on Beam Avenue into a dedicated guideway, transitioning into mixed traffic to turn north on Hazelwood Street. Buses would continue in mixed traffic to County Road D and would then enter a dedicated guideway to cross I-694 on a new bridge and continue in dedicated guideway north of I-694 to Buerkle Road. On Buerkle Road, buses would travel in dedicated guideway west to Highway 61 (see Figure 4).

On Highway 61, buses would travel north in dedicated guideway to Whitaker Street. North of Whitaker Street, buses would operate in mixed traffic, turn west on 7th Street and north on Washington Avenue to serve the northern terminus station (see Figures 4-5). Buses would turn on east on 8th Street then south on Highway 61 to begin the southbound routing.

In the southbound direction, buses would travel in the reverse direction in dedicated guideway or mixed traffic as described above, except in the following locations:

- On Highway 61 south of Willow Lake Road to Buerkle Road buses would travel in mixed traffic.
- On Buerkle Road between Highway 61 and the Ramsey County rail right-of-way buses would travel in mixed traffic.
- On Phalen Boulevard between Neid Lane and Payne Avenue buses would operate in a dedicated guideway.
- From Robert Street, buses would turn east onto 5th Street and travel in a dedicated guideway until Wacouta Street, where they would turn south and operate in mixed traffic. Buses would continue in mixed traffic on Kellogg Boulevard before turning into the Union Depot bus deck at Broadway Street.

There would be 21 stations along the route:

- Union Depot.
- There would be three platforms associated with this station: at the Union Depot bus deck, Wacouta Street (southbound) and Sibley Street (northbound).
- 5th/6th Street.

INTRODUCTION

- The southbound platform would be on 5th Street and the northbound platform on 6th Street.
- 10th Street.
- 14th Street.
- Mt. Airy Street.
- Olive Street.
- Cayuga Street.
- Payne Avenue.
- Arcade Street.
- Cook Avenue.
- Maryland Avenue.
- Larpenteur Avenue.
- Frost Avenue.
- Highway 36.
- Maplewood Mall Transit Center.
- St. John's Boulevard.
- Buerkle Road.
- County Road E.
- Cedar Avenue.
- Whitaker Street.
- Downtown White Bear Lake.

Most platforms would be 80 to 100 feet long, with 60-foot platforms in some locations due to site constraints. Standard station features would include NexTrip real-time departure signs, raised platforms, maps, benches, heat, lighting, bike racks, trash and recycling bins, and ticket machines. Park-and-rides would be located at the Highway 36 station, Maplewood Mall Transit Center and County Road E station.

New intersections and bridges that would be constructed as part of the project are summarized in Table 1.

Table 1. New Intersections and Bridges

Location	Description
Arcade Street to Ramsey County rail right-of-way north of Phalen Boulevard	New bridge – guideway only
Ramsey County rail right-of-way and Johnson Parkway	New bridge – guideway and trail
Ramsey County rail right-of-way and Maryland Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Arlington Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Idaho Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Larpenteur Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Ripley Avenue	New at-grade, signalized intersection

INTRODUCTION

Ramsey County rail right-of-way and Frost Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Gateway State Trail	New bridge – guideway only ¹
Ramsey County rail right-of-way and trail connection to Weaver Elementary School	New bridge – guideway only
Ramsey County rail right-of-way and County Road B	New at-grade, signalized intersection
Ramsey County rail right-of-way and Cope Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and Highway 36	New bridge – guideway only
Ramsey County rail right-of-way and Gervais Avenue	New at-grade, signalized intersection
Ramsey County rail right-of-way and trail connection between Fitch Road and Barclay Street	New bridge – guideway only ²
Ramsey County rail right-of-way and I-694	New bridge – guideway only
Ramsey County rail right-of-way and Buerkle Road	New at-grade, signalized intersection

RESEARCH DESIGN

The specific research design and methods for each phase of the project are described in those pertinent sections of the report.

¹ An at-grade crossing is also under consideration at this location.

² An at-grade crossing is also under consideration at this location.

PHASE IA

INTRODUCTION

In February and March 2018, the Mississippi Valley Archaeology Center (MVAC) conducted a Phase IA literature review and archaeological assessment for the Rush Line Bus Rapid Transit Project. The Local Preferred Alternative has a dedicated guideway generally along Robert Street, Phalen Boulevard, Ramsey County Regional Railroad Authority (RCRRA) right-of-way (ROW) (co-located with the Bruce Vento Trail), and Trunk Highway (TH) 61 (see Figures 2 through 4).

Identification efforts for the project began prior to the development of preliminary engineering plans. As a result, the Phase IA archaeological study was initiated on the basis of a preliminary project centerline and potential station locations and addressed a broad initial archaeological study area. As the Phase IA study and engineering progressed, the archaeological study area was refined and reduced in consultation with the Minnesota Department of Transportation Cultural Resources Unit (MnDOT CRU). The archaeological study area considered all potential areas of ground disturbance, with the understanding that ancillary features such as ponds, park-and-rides, and stations might change as project design proceeds and the study area may require further refinement. The purpose of the archaeological assessment was to present information on previously recorded sites and surveys in relation to the archaeological study area, assess archaeological potential of the study area, and formulate survey recommendations based on locations of previously recorded sites and surveys and other information that may be pertinent such as research of historical maps, lidar imagery, and MnModel 3 predictions for precontact resources.

Historical research on the former Lake Superior & Mississippi (LS&M) railroad roadway was performed by MVAC and Mead and Hunt in the summer of 2018 prior to any fieldwork to help determine the extent of survey work needed. This historic research was used to establish a context for the history of the railroad roadway, including the selection of the original LS&M rail route; the original construction by the LS&M in 1868; the post-1886 improvements of the railroad roadway by the St. Paul & Duluth (St.P&D) including straightening of the line and building up the roadbed on a high embankment in many areas; the selection of locations of depots and stations; the post-1900 use of the railroad roadway by the Northern Pacific (NP); the abandonment of the railroad line; and the conversion of the rail line to the Bruce Vento trail. This context, presented in Pettis et al. (2020), helped determine what should be considered within the former railroad roadway using the *Multiple Property Documentation for Railroads in Minnesota* (Schmidt et al. 2013) and the draft *Supplement to Multiple Property Documentation for Railroads in Minnesota, 1862-1956* (Arnott and Pizza 2017).

ENVIRONMENTAL SETTING

The project passes through: Section 6 of Township 28 North, Range 22 West; Sections 2, 3, 10, 15, 21, 22, 27, 28, 29, 31, and 32 of Township 29 North, Range 22 West; and, Sections 14, 23, 26, 27, 34, and 35 of Township 30 North, Range 22 West, in Ramsey County. Ramsey County is in southeastern Minnesota, and is bordered by Anoka County to the north, Washington County to the east, Dakota County to the south, and Hennepin County to the west.

The project lies in the Central Lake Deciduous Region. The topography of this region includes moraines, till plains, and outwash plains. Numerous lakes are found throughout the region, and the Mississippi River flows through the region's eastern and central portions. The soils generally have medium to coarse textures, with prairie soils to the south and west and forest soils in the north and east. In early historic times, the vegetation in the southern and western parts of the region would have been dominated by Big Woods species with numerous large inclusions of prairie and wood oak (Anfinson 1990:147-148). The original vegetation cover of the project would have consisted of brushland (oak openings and barrens with scattered trees and groves of oaks of scrubby form, with some brush and thickets and occasional pines), wet prairies, marshes, and sloughs (marsh grasses, flags, reeds, rushes, wild rice, with willow and alder brush in places), and hardwood forests (big woods) including oaks (bur, white, red and black), elm, basswood, maple, hornbeam, aspen, birch, wild cherry, hickory, butternut, and black walnut, with some white pines (Marschner 1930). The project is within what is considered to be the Eastern Broadleaf Forest Province. This province covers nearly 12 million acres of the central and southeastern portion of Minnesota and serves as a transition between semiarid portions of the state that were historically prairie and semi-humid, mixed conifer-deciduous forests to the northeast (Minnesota DNR 1999).

The bedrock geology of the archaeological study area includes outwash, the end moraine of the Saint Croix Moraine Association, glacial outwash sediment including silt and fine sand, and the end moraine of the Saint Croix moraine (Hobbs and Goebel 1982). The project passes through various types of soils (Natural Resource Conservation Service 2018) including:

Along E. Kellogg Boulevard, Robert Street, and E. 14th Street:

- Urban land.

Along Jackson Street:

- Urban land – Waukegan complex, 0 to 3 percent slopes.
- Urban land – Chetek complex, 3 to 15 percent slopes.

Along Pennsylvania Avenue

- Urban land.

PHASE IA

- Urban land – Chetek complex, 3 to 15 percent slopes.
- Chetek sand loam, 12 to 15 percent slopes.

Along Phalen Boulevard

- Mahtmodi loamy sand, 12 to 25 percent slopes.
- Urban land.
- Urban land, Kingsley complex, 3 to 15 percent slopes.
- Udorthents, wet substratum.

RCRRA ROW (south of Beam Avenue)

- Udorthents, wet substratum.
- Urban land.
- Urban land – Chetek complex, 3 to 15 percent slopes.
- Pits, gravel.
- Chetek sandy loam, 0 to 6 percent slopes.
- Chetek sandy loam, 12 to 25 percent slopes.

RCRRA ROW (north of Beam Avenue)

- Seeleyville muck.
- Kingsley sandy loam, 2 to 6 percent.

Along Beam Avenue, Southlawn Drive, and County Road D

- Urban land - Kingsley complex, 3 to 15 percent slopes.
- Urban land – Chetek complex, 3 to 15 percent slopes.
- Chetek sandy loam, 6 to 12 percent slopes.

Along Buerkle Road

- Urban land.
- Urban land - Chetek complex, 3 to 15 percent slopes.

Along TH 61

- Urban land.
- Urban land - Kingsley complex, 3 to 15 percent slopes.
- Urban land – Zimmerman complex, 1 to 8 percent slopes.
- Urban land – Lino complex, 0 to 3 percent slopes.
- Kingsley sandy loam, 2 to 6 percent.
- Kingsley sandy loam, 6 to 12 percent.
- Aquolls and histosols, ponded.

CULTURAL CONTEXTS

Precontact

The project lies in what has been classified as the Central Lake Deciduous Region. The history of this area prior to European contact has been divided into three periods: Early, Middle, and Late Prehistoric. Technology and cultural changes interpreted in the archaeological record are used to define these periods. Within these periods, Johnson (1988) has identified Paleoindian, Eastern Archaic, Woodland, and Mississippian cultural traditions.

Early Prehistoric (before 6000 B.C.–1000 B.C.): Paleoindians during this time maintained a hunting-gathering subsistence strategy, traveling in small bands. Large Pleistocene mammals such as woolly mammoths and mastodons were supported by a vast Boreal conifer forest (Wright 1974). Clovis and Folsom fluted projectile points representative of this period have been recovered in southern and southwestern Minnesota (Anfinson 1997). During the latter phases of the Paleoindian tradition, human populations apparently began spreading throughout the state, based on projectile point finds (Johnson 1988:6-9).

Eastern Archaic (6000–800 B.C.): During this time, occupants of the region continued hunting and gathering, and the appearance of groundstone technology suggests a shift to greater use of plant resources (Anfinson 1990; Wright 1974). Early Archaic peoples focused on bison hunting, and later on deer and elk. In the latter half of the period, copper became an important material in the production of utilitarian items. Stemmed points became popular during this time period, and chipped stone scrapers, knives, punches, and drills were utilized. Techniques for making ground and pecked stone tools also became established (Johnson 1988:10-14).

Middle Prehistoric (800 B.C.–A.D. 900): The beginning of this period is marked by the appearance of pottery and burial mound construction, mainly identified as the Woodland tradition. Woodland pottery contained grit, a crushed rock or sand used to temper the clay during firing. The thin-walled pottery often displayed decorated impressions. Conical and linear mounds were mainly utilized for burial mounds (very few effigy mounds are found along the Wisconsin border from the Twin Cities southward). Woodland peoples still relied on seasonal hunting and gathering but developed a more sedentary lifestyle. Projectile points varied in form, with side- and corner-notched points becoming popular. The use of copper lessened during this time, but copper continued to be used for awls or piercing tools and ornaments. Ground stone tools, including the popular grooved maul, were utilized (Johnson 1988:15-19). Increasing population growth, intensification of regional identity and local groups, increasingly efficient use of local raw materials and food sources, and intrusion of ideas, materials, and technology from other regions are major trends identified in Minnesota during this time period (Benchley et al. 1997a:124).

PHASE IA

Late Prehistoric (A.D. 900–1650): In southern Minnesota this period is identified with the appearance of the Mississippian culture and the introduction of corn horticulture. Mississippian culture was based upon intensive agriculture, including the cultivation of maize or corn, beans, squash, sunflowers, and tobacco. Although intensive agriculture was important, hunting and fishing remained essential, with bison an important food staple, and large, semi-permanent villages were maintained. Chipped stone technology continued, including side-notched and unnotched triangular points, double-pointed knives, and trapezoidal forms of hide scrapers, along with drills and punches. Ground stone tools continued to be used, as well as bone tools. Eastern Minnesota pottery was tempered with crushed shell and included wide or narrow incised geometric decoration. The use of burial mounds continued in some areas, and in southern Minnesota, some of the mounds were more distinctive than their Woodland counterparts in that the exterior was covered in limestone slabs (Johnson 1988:24-27).

Postcontact

With the coming of Europeans to the area, European items and diseases came into Minnesota from the east and south. Eastern tribes began to push to the west, displacing the original inhabitants. At the beginning of the contact period, the largest and possibly most widespread group in the region were the Eastern Dakota, who occupied most of the lake-forest biome of central and northern Minnesota. The Dakota were displaced from the lake-forest biome into the prairies, mainly by the Ojibway during the Chippewa (Ojibway)-Dakota wars, which lasted from the 1730s until 1854. Other Native groups present in Minnesota during the early historic time period included the Iowa, Oto, and possibly the Assiniboiné (Benchley et al. 1997b: 203-207).

Between 1805 and 1867, Native American Nations in Minnesota signed more than 25 treaties with the United States government, with various Nations involved in specific treaties. Several of the treaties included land cessions, such as (e.g., treaties in 1805, 1825, 1830, 1837, 1847, 1851, 1854, 1855, 1858, 1863, 1864, 1866, and 1867; Minnesota Indian Affairs Council and Minnesota Humanities Center 2018). Some of these affected lands were located to the north and south of what is now Ramsey County, but a few treaties affected the land within the present-day county. The Pike Treaty of 1805 was the first agreement in which the United States government acquired land in Minnesota. At that time, a council was held with the Sioux of Mendota, and a nine-mile-square grant of land was negotiated for military purposes; this has been known as the Fort Snelling Reservation (Williams 1983 [1876]:38). A treaty in 1851 was the culmination of various bands of the Sioux and Chippewa selling all their lands in the Minnesota Territory, and affected primarily the southern half of the state (Williams 1876:187).

The construction of Fort Snelling on the west side of the Mississippi River strengthened the Euro-American presence in Minnesota (Anfinson 1989:20). Ramsey County was established on October 27, 1849, and was named in honor of the first governor of the

Minnesota Territory, Alexander Ramsey. Originally, this county was larger, reaching north to Mille Lacs and the upper Mississippi River in present-day Aitkin County. However, in 1857, with the establishment of other surrounding counties, Ramsey County retained only a small portion of its former area and became the smallest county in Minnesota, with Saint Paul as its county seat and capital of the state (Upham 2001:469). Saint Paul was first settled in 1838 and received its name from a Catholic chapel built in 1841. Saint Paul was organized as a village/town on November 1, 1849, and was incorporated as a city on March 4, 1854. Various annexations in the late 1800s contributed to Saint Paul's existing size of 55.44 square miles (Upham 2001:172, 472-473).

During its early years, Saint Paul was a divided town, including Uppertown, which developed around the Upper Landing for steamboats and other river traffic, and Lowertown, which developed around the Lower Landing, a steamboat docking area. Both settlements had their own steamboat levees, commercial centers, and residential neighborhoods, but eventually the two districts became united with the expansion of small business concerns in industrial complexes.

The early pioneer settlement of Saint Paul ended in 1865, and during and after the Civil War, steady population growth and increase in land values resulted in great commercial and industrial development of the city. Saint Paul experienced its most rapid growth in population, industry, and business and civic development between 1880 and 1890, and the street numbering system had to be changed three times as a result. The city emerged as a major rail hub in the Midwest as rail became a more popular mode of transportation versus the river. During the last decade of the nineteenth century, Saint Paul evolved from being a river port to become the leading job and distribution center in the Midwest (Nelson and Zeik 1976).

The Dayton's Bluff neighborhood of Saint Paul is located south of the Payne-Phalen neighborhood and east of the downtown area. The development of this area as a suburban residential location began in the 1840s. Feed, flour, and lumber mills were established in the 1850s to take advantage of Phalen Creek as a power source. Additional industries were established when the railroad was built north of East 7th Street in the late 1860s. The neighborhood saw additional prosperity as new industries and factories were established (Wikipedia 2018). The Payne-Phalen neighborhood of Saint Paul is located north and east of the downtown Saint Paul area. This neighborhood was populated by various immigrant groups including Irish, Germans, Swedes, and Italians. This neighborhood was home to several large industrial sites that employed thousands of local residents (Payne-Phalen District 5 Council 2018). The Greater East Side, in Saint Paul's northeast corner, is the fourth largest among the city's planning districts. In the mid 1800's, it was used largely for farming, but as rail service was established, early industries developed in the area including the St. Paul Harvester Works (Murphy and Granger 1983). The neighborhood saw prosperity in the post-World War II era, which included major employers including the Hamm's Brewing Company, 3M, and Whirlpool (Woltman 2016).

Maplewood is a city and suburb of Saint Paul that was formerly considered part of New Canada Township. It was incorporated as a village in 1957. New Canada Township was first called Little Canada and was organized in 1858. It was named for the several French Canadian settlers in the area. Gem Lake, located adjacent to the city of White Bear Lake, was incorporated as a village in 1959. Vadnais Heights is a city formerly in White Bear Township, and was incorporated as a village in 1957 (Upham 2001:470-474).

White Bear Lake Township was established in 1858. Due to its scenic landscape, the town grew into a popular resort area, with resorts and hotels lining the shores of the lake while restaurants, theaters, and stores set up shop in the downtown area to accommodate visitors. With the extension of the LS&M Railroad to White Bear Lake in 1868, travel time from Saint Paul was reduced from a former three hour horse and buggy ride to a twenty-minute train trip. The rail services afforded new opportunities for business and industry in the area. Shortly after the turn of the century, the resort era faded; however, other industries such as boat building, farming and lumbering continued to prosper. The city of White Bear Lake first incorporated as a village in 1881 and was incorporated as a city in 1921 (City of White Bear Lake 2018).

In 1857, the Nebraska and Lake Superior Railroad was chartered to operate a railroad between the Mississippi River and Lake Superior. Due to an economic slowdown and lack of credit to purchase materials and pay for labor, in March 1861 the railroad was reorganized as the LS&M Railroad with financing from Jay Cooke and Company of Philadelphia. By 1868, tracks were laid to White Bear Lake, and by 1870, tracks were laid to Duluth. Jay Cooke and Company went bankrupt during the economic panic of 1873. The railroad declared bankruptcy in 1877, and the Saint Paul & Duluth Railroad (SP&D) bought the railroad with financing with new investors. A depot was built in Gladstone in 1886, and by 1887, there were as many as 25 daily passenger trains going through Gladstone. The SP&D began a large investment by reducing the grades, straightening curves, and installing a double set of tracks to reduce operating costs between White Bear Lake and Saint Paul. The SP&D was bought out by the NP Railroad in 1900. With the use of automobiles and highways, railroad passenger service began to decline, and in January 1967, the last passenger train passed through Gladstone and the depot was demolished. NP merged with other railroads in 1970 to form Burlington Northern (BN). In 1986, the tracks were removed in Gladstone, and freight was routed to Duluth over the former Great Northern Railroad. In the 1990s, the railroad right of way (ROW) was acquired by the Ramsey County Regional Rail Authority to be held for transportation purposes. A paved trail was constructed and named in honor of Representative Bruce Vento (Jensen 2018). This trail was built along the RCRRA ROW. Vento, a DFL East Side native, served 12 terms in Congress and championed environmental protection issues until his untimely death from mesothelioma in 2000.

PREVIOUSLY RECORDED SITES AND SURVEYS

A literature review request was submitted to the Minnesota State Historic Preservation Office (MnSHPO) for the township, range, and section designations that the archaeological study area passes through, and the sections within one mile of the study area. Based on the information provided by the MnSHPO and MnDOT, and research in the Minnesota Historic Preservation Office (HPO) files and Office of the State Archaeologist (OSA) files, including the new OSA online portal, information regarding previous sites within one mile and previous surveys within a quartermile were compiled and are presented below. Figures 6 through 10 illustrate locations of previous sites and surveys near the archaeological study area.

Previously Recorded Sites

Sites within or immediately adjacent to the archaeological study area

- **21RA38, Lot 5** (see Figure 6), is in Township 29 North, Range 22 West, in the northwest quarter of the northwest quarter of the southeast quarter of Section 31. It is between 13th and 12th Streets to the north and south, and Jackson and Robert Streets to the east and west. The site consists of a late 19th century stone-lined well and segments of three limestone foundations discovered below an asphalt parking lot. The OSA portal and MnDOT shapefiles have this located north of East 12th Street, east of Robert Street North, south of East 13th Street, and west of Jackson Street, in the location of the Minnesota Department of Revenue office. This appears to match the description of the actual location of the cultural material and features outlined in the report (Abel et al. 1998). However, the map associated with the site forms shows 21RA38 as larger, encompassing Robert Street and two blocks to the west, two blocks to the south, a block to the east, and a half-block to the north. The smaller version of the site is immediately adjacent to the archaeological study area, while the larger version of the site overlaps the archaeological study area which is the Robert Street ROW plus a 25 foot buffer (see Figure 7). Although this site was given its own site number, it was considered part of the larger 21RA39, Lowertown Neighborhood site. 21RA38 was considered eligible for the NRHP, and salvage excavations were undertaken in the late 1990's prior to the construction of the Department of Revenue building. Five features were identified including three limestone foundation walls, one limestone-line water well, and one historic trash pit (Higginbottom 1997 and Abel et al. 1998). Records indicate that this site has been destroyed by construction of the Department of Revenue building.

PHASE IA

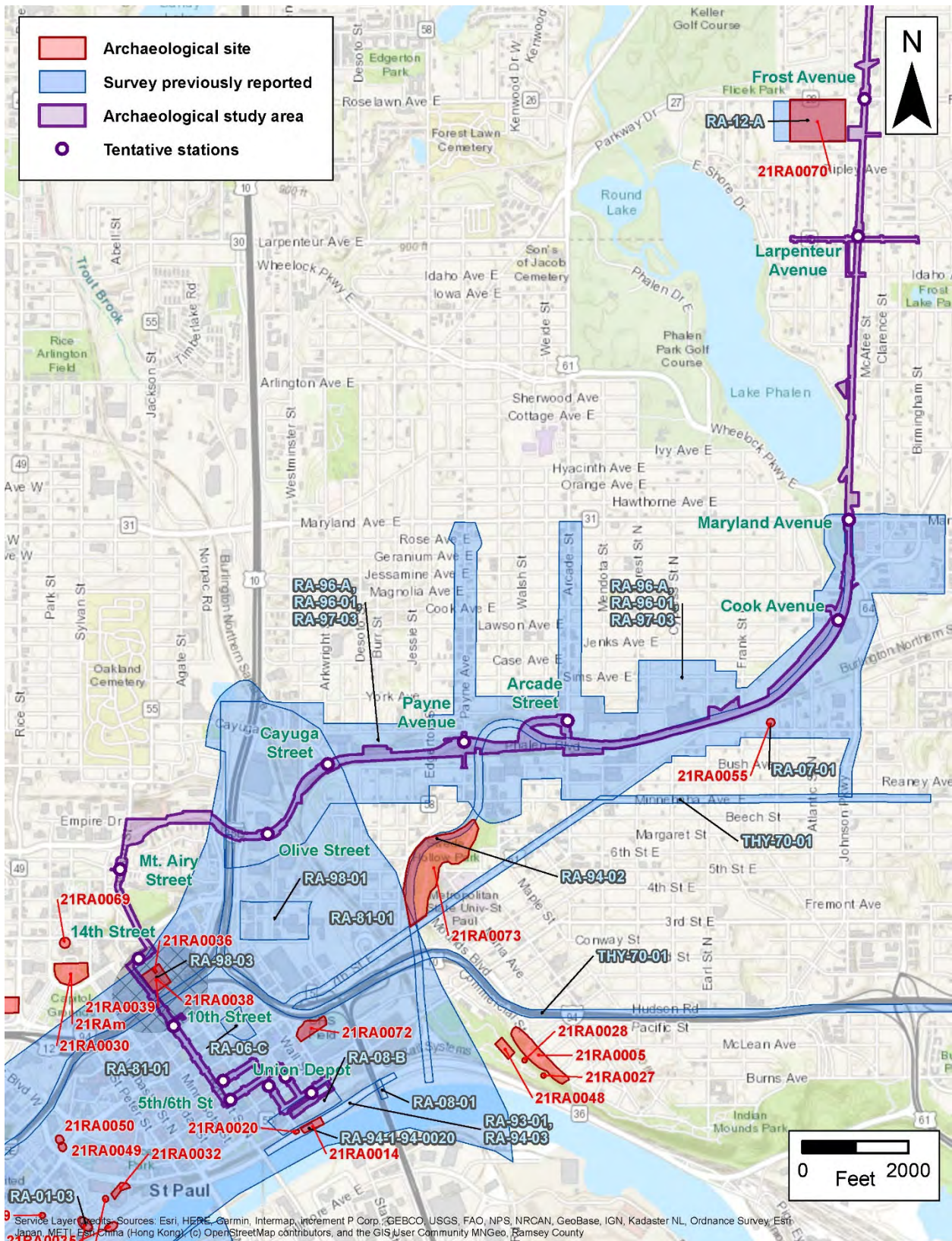


Figure 6. Previously recorded sites and surveys near the southern portion of the archaeological study area.

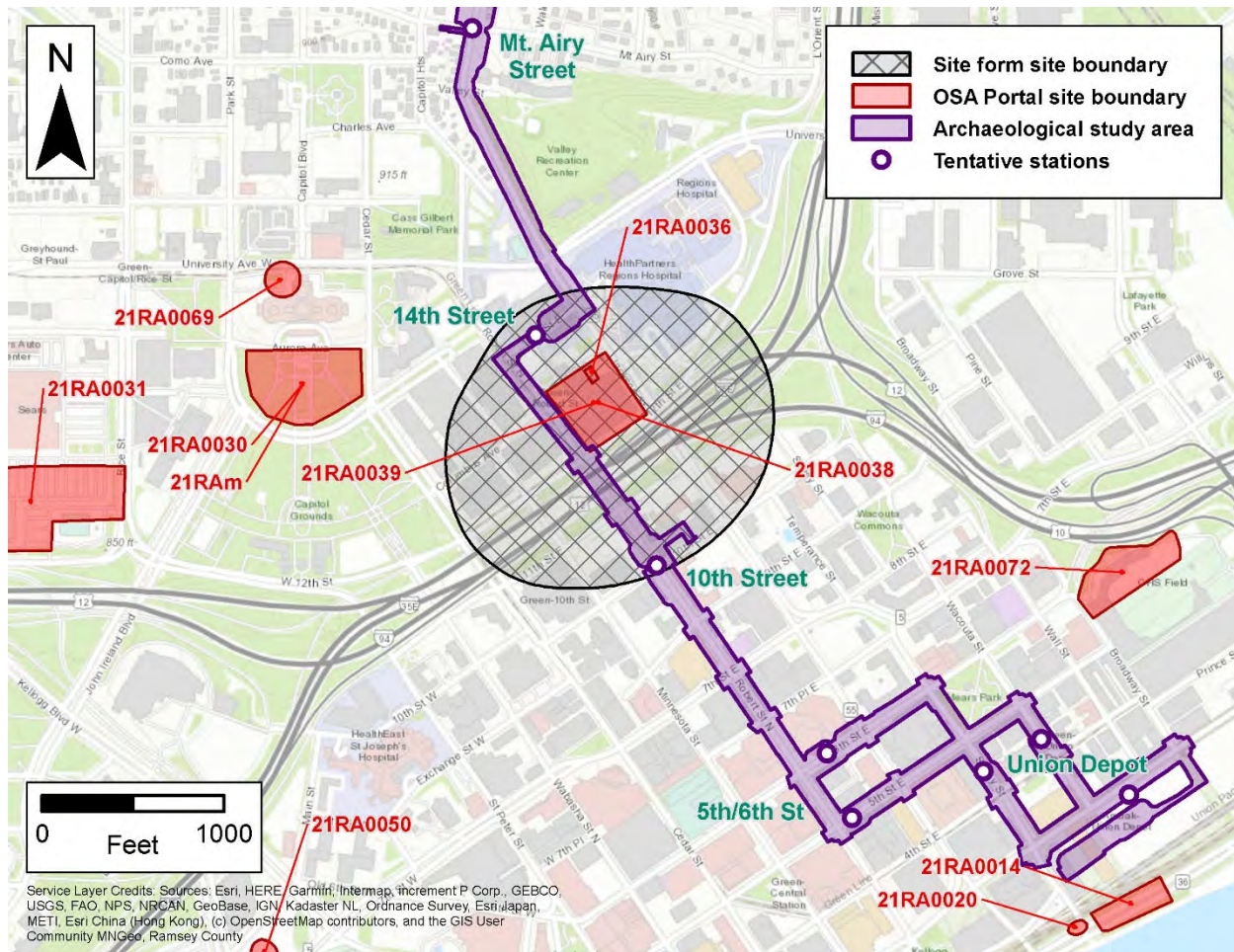


Figure 7. OSA portal location of 21RA36 and 21RA38 (red square) versus larger site area as found on the site forms (hatched area).

- 21RA39, Lowertown Neighborhood** (see Figure 6), is in Township 29 North, Range 22 West, in the southwest quarter of the northwest quarter of the southeast quarter, the northeast quarter of the northeast quarter of the southwest quarter, the northwest quarter of the northwest quarter of the southeast quarter, and the southeast quarter of the northeast quarter of the southwest quarter of Section 31. This archaeological site is not related to the Lowertown NRHP district, and appears to have been named “Lowertown Neighborhood” since at the time of its discovery, it had surviving deposits dating to the largely undocumented period of Lowertown’s initial urbanization of the 1850’s to 1870’s (Higginbottom 1997: 2). The site is between 13th and 12th Streets to the north and south and Jackson and Robert Streets to the east and west. It consists of historic features including trash middens, foundation, privies, wells, and cisterns found during archaeological monitoring at the Department of Revenue building in the Randall Addition. This site excludes those areas previously recorded as 21RA36 and 21RA38. The OSA portal and MnDOT shapefiles have this located north of East 12th Street, east of Robert Street North,

south of East 13th Street, and west of Jackson Street, in the location of the Minnesota Department of Revenue office. This appears to match the description of the location of the cultural material located in the report (Abel et al. 1998). However, the map associated with the site forms shows 21RA39 as larger, encompassing Robert Street and two blocks to the west, two blocks to the south, a block to the east, and a half-block to the north (see Figure 7). The smaller version of the site is immediately adjacent to the archaeological study area, while the larger version overlaps the study area. 21RA39 was considered eligible for the NRHP, and salvage excavations were undertaken in the late 1990's prior to the construction of the Department of Revenue building. Forty features dating to the late 19th and early 20th century including foundation remnants, wells, cisterns, privy pits, and trash middens were identified, although some were outside the area of potential effect and were just mapped and photographed (Higginbottom 1997 and Abel et al. 1998). Records indicate that this site has been destroyed by construction of the Department of Revenue building.

- **21RA70, Gladstone Shops**, (see Figure 8), is in Township 29 North, Range 22 West, in the northeast quarter of the southeast quarter of Section 16. It is south of Frost Avenue and west of English Street in the city of Maplewood. This site consists of 37 historic features that were associated with structures relating to the Saint Paul and Duluth Railroad (former LS&M) beginning in 1887. The features on this block were related to various types of shops (machine, blacksmith, wheel, boiler room, etc.) and a roundhouse. The shops remained in operation until the early 20th century, when they were leased by various other companies. During the 1940s, most of the track along with the boiler room, engine room, smokestack, and roundhouse were removed, and by 1980, the remaining structures on the site had been demolished. In 2012, the 37 features associated with the site included limestone foundation material (including several features associated with the former roundhouse), depressions, and cultural debris. Many of these foundations are still intact at the site, below the current ground surface. The archaeological site and the Gladstone Savanna Neighborhood Preserve have been designated as a local historic site in the city of Maplewood in 2017 (Maplewood Historic Preservation Commission, n.d). It has not been formally evaluated for the NRHP.
- **21RAp** (see Figure 8), is in Township 30, Range 22 West, Sections 33 and 34. This vaguely recorded site consists of two chert flakes and possibly two rice hulling pits found near Willow Lake. The OSA portal and MnDOT shapefiles have the site as a small area just to the northeast of Willow Lake. This is likely based on the description of the site in the report (Waschuseth and Woolworth 1979). However, the map associated with the site form has the site as a much larger area, following along the northern end of Willow Lake and angling down over TH 61. This would overlap the archaeological study area (TH 61 ROW plus 10 foot buffer) since this is where the project follows TH 61. MVAC personnel discussed this situation with Bruce Koenen at Minnesota Office of the State Archaeologist (Mn OSA), and Mr. Koenen indicated that the site forms are the official record for the site, not the maps on the portal. So although the MnDOT shapefile appears to be the more likely

[Figure 8 redacted]

Figure 8. Previously recorded sites and surveys near the central portion of the archaeological study area.

location of the site based on the report, the site record map has this site overlapping the archaeological study area (see Figure 9). This site has not been evaluated for the NRHP.

- **21RAp** (see Figure 8), is in Township 30, Range 22 West, Sections 33 and 34. This vaguely recorded site consists of two chert flakes and possibly two rice hulling pits found near Willow Lake. The OSA portal and MnDOT shapefiles have the site as a small area just to the northeast of Willow Lake. This is likely based on the description of the site in the report (Waschuseth and Woolworth 1979). However, the map associated with the site form has the site as a much larger area, following along the northern end of Willow Lake and angling down over TH 61. This would overlap the archaeological study area (TH 61 ROW plus 10 foot buffer) since this is where the project follows TH 61. MVAC personnel discussed this situation with Bruce Koenen at Minnesota Office of the State Archaeologist (Mn OSA), and Mr. Koenen indicated that the site forms are the official record for the site, not the maps on the portal. So although the MnDOT shapefile appears to be the more likely location of the site based on the report, the site record map has this site overlapping the archaeological study area (see Figure 9). This site has not been evaluated for the NRHP.
- **21RAI, White Bear** (see Figure 10), is in Township 30 North, Range 22 West, Sections 13 and 14. This site appears to be a ghost town that overlaps a portion of what is today the city of White Bear Lake. This overlaps portions of the archaeological study area, which includes TH 61 ROW plus a 10-foot buffer at the project's very northern end. The site location surrounds TH 61 and overlaps the archaeological study area between 4th and 5th Streets in White Bear Lake. This ghost town has not been evaluated for the National Register of Historic Places (NRHP).

PHASE IA

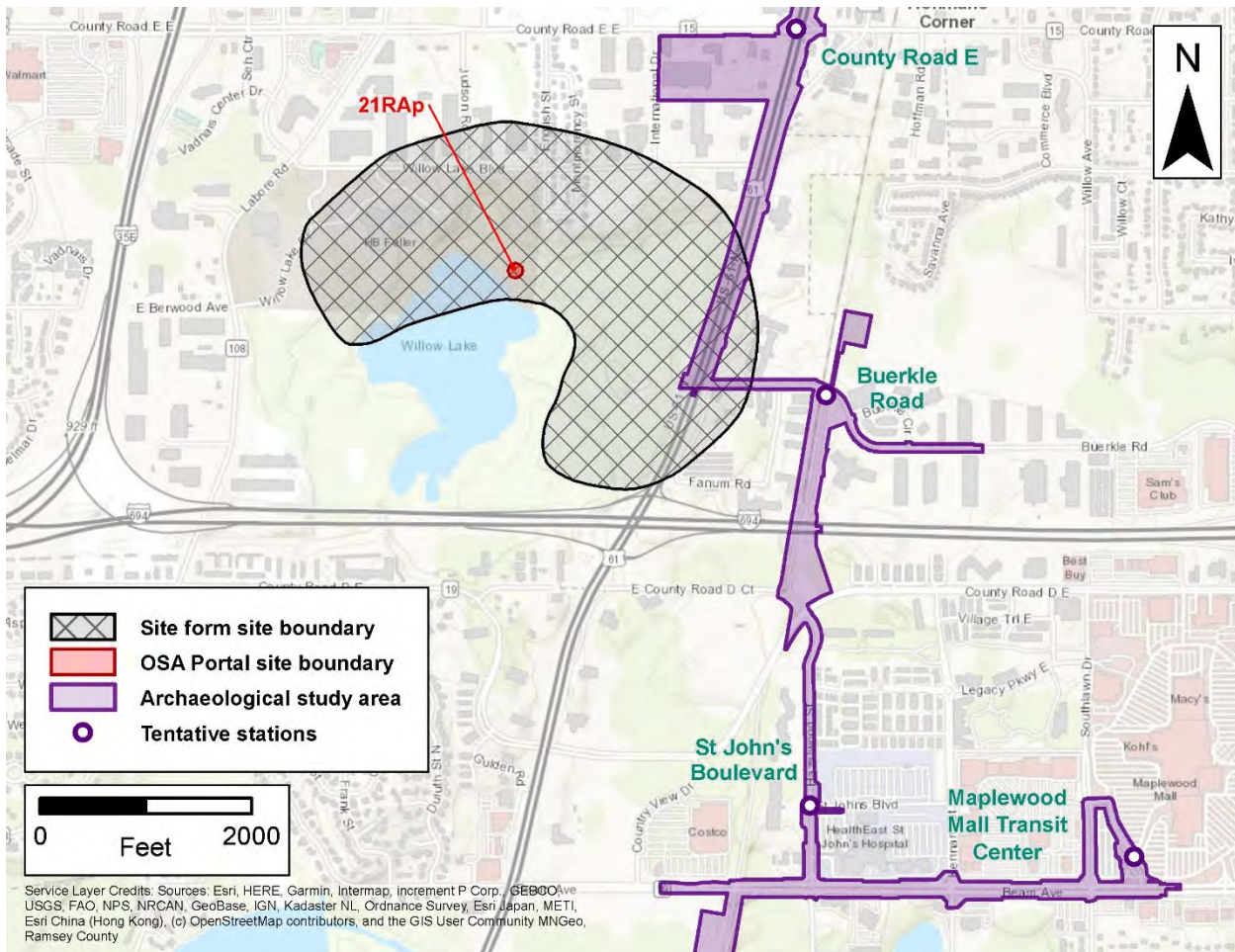


Figure 9. Map of OSA portal location of RAp (red dot), versus larger site area as found on the site form (hatched area).

[Figure 10 redacted]

Figure 10. Previously recorded sites and surveys near the northern portion of archaeological study area.

Sites within one mile of the archaeological study area

- **21RA4, West Saint Paul** (see Figure 6), is in Township 28 North, Range 22 West, in the northeast quarter of the northeast quarter of the northwest quarter of Section 8. This site consists of a group of 16 mounds located east of the intersection of Greenwood and Isabel Streets in West Saint Paul. By 1880, some of the mounds had been removed for housing. A 1975 survey of the site confirmed that the site was destroyed by homes and streets.
- **21RA5, Dayton's Bluff** (see Figure 6), Township 29 North, Range 22 West, in the center of the southeast quarter of the southeast quarter of Section 32. This site consists of 19 mounds near the intersection of McLean Avenue and Mounds Boulevard. The mounds are along the bluff between Mounds Boulevard and the edge of the bluff. A note in the site file indicates that a 1975 inspection of the site area indicates the site was destroyed by the construction of I-94 and the scenic overlook. This is separate from 21RA10, which includes the existing mounds in Indians Mound Park to the east of 21RA5, but is more than a mile from the project
- **21RA14, C. M. Saint P & P** (see Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the northwest quarter of the northwest quarter of Section 5. It is near the intersection of Sibley Street and Warner Road. The site consisted of late 19th/early 20th century domestic wares associated with the 1881 C. M. Saint P & P Freight House.
- **21RA19, Ramsey House** (see west of 21RA50 in Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the southwest quarter of the northwest quarter of Section 6. It is northwest of the corner of Exchange Street and North Walnut Street, and includes the extant Alexander Ramsey house. The MHS file for this site does not have a great deal of specific information about what was found, but it appears that a limestone fill feature near the Ramsey House foundation was identified and excavated.
- **21RA20, Diamond Joe Freighthouse** (see Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the northwest quarter of the northwest quarter of Section 5. This site designation is related to some test trenches placed between Jackson and Sibley Streets near the Lower Landing or Lambert's Landing, after some vertical piers related to the Diamond Joe steamboat packet freight house and depot were discovered. A small scattering of 1800s to 1900s artifacts were also found.
- **21RA21, James J. Hill House** (see Figure 6), is in Township 28 North, Range 23 West, in the southwest quarter of the northeast quarter of the northeast quarter of Section 1. This site is north of the study area, north of I-35E, and south of Summit Avenue. It is a historic Euro-American structural ruin and artifact scatter consisting of retaining walls, greenhouse foundations, cisterns, a mushroom cave, and a stone drain, all in the backyard garden area along Summit Avenue in Saint Paul. The site dates to the early 1900s. The existing James J. Hill estate is a National Historic Landmark.

PHASE IA

- **21RA27, Carvers Cave** (see Figure 6), is in Township 29 North, Range 22 West, in the southeast quarter of the southeast quarter of the southeast quarter of Section 32. This cave is within the base of Dayton's Bluff near the end of Short Street. A portion of the front of the cave was destroyed by the railroad. Precontact petroglyphs were known to exist in the cave.
- **21RA28 Dayton's Bluff Cave** (see Figure 6), is in Township 29 North, Range 22 West, in the southwest quarter of the southeast quarter of the southeast quarter of Section 32. This site is a cave at the base of Dayton's Bluff located midway between Plum and Cherry Streets. This site is recorded to have precontact petroglyphs. A 2002 site visit could not relocate the exact location of the site, but if estimates of its location are correct, at that time the entrance was covered with debris.
- **21RA30, Central State Capital Mall** (see Figure 6), is in Township 29 North, Range 22 West, in the south half of the northeast quarter of the southeast quarter and the north half of the southeast quarter of the southeast quarter of Section 31. This is in the Central State Capital Mall Area between Constitution and Aurora Avenues, and Cedar and Park Streets. The site includes a house, apartment, store, stone yard, school foundation, and related features (privy pits, garbage pits, wells) that were expected to be intact below an area that has been filled and landscaped as part of the construction of the state capitol. This site also has the designation of 21RAm.
- **21RAm – Same as 21AR30.**
- **21RA31, Rondo Ave. at Sears** (see west of 21RA30 in Figure 6), is in Township 29 North, Range 23 West, in the south half of the southeast quarter of the northeast quarter, and the north half of the southeast quarter of the southeast quarter of Section 26. This site is north of the archaeological study area, and north of I-94. Soil borings indicated that some of the area may retain historic Euro-American deposits from a 1880s-era farm that was turned into a residential development for German-Americans and Canadians settling in the area during the late 1800s. It is believed that historic fill placed in this area during the 1950s to build a Sears building likely sealed and preserved most of the historic deposits below, as suggested by geomorphological testing of the area.
- **21RA32, Washington Street Residential District** (see Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the southeast quarter of the northwest quarter of Section 6. It is northeast of Eagle Street, between Hill Street and the Civic Center parking lot. The site consists of foundations and artifacts associated with mid- to late 19th-century residential commercial buildings in Saint Paul's red-light district. The site was completely destroyed when the Science Museum was built.
- **21RA35, Saint Paul Glass Company Paint Warehouse** (see southwest of 21RA32 in Figure 6), is in Township 28 North, Range 22 West, in the northwest quarter of the northeast quarter of the northwest quarter of Section 6. It is on the northwest side of the Mississippi River, within the Upper Landing area of Saint Paul, northeast of the corner of the Chestnut Street and Shepard Road intersection, and south of the railroad tracks. It

PHASE IA

consists of concrete aggregate foundation footings and a brick paved yard associated with the Saint Paul Glass Co. Paint Warehouse beneath the surface of an existing parking lot.

- **21RA36, Dahl House** (see Figure 6), is in Township 29 North, Range 22 West, in the northeast quarter of the northeast quarter of the southwest quarter of Section 31. It is south of 13th Street between Robert and Jackson Streets. It is located on the same block as 21RA38 and 21RA39, but in the northeast corner of the block, and would not be considered immediately adjacent to the study area. This site consists of a mid-late 19th century urban domestic site (Dahl House) with surrounding yard and midden. Several feet of fill were placed over the site and surrounding block starting in 1885, sealing and preserving the pre-1885 deposits. The house was moved in 1997 to 508 Jefferson Avenue to make way for the construction of the new Minnesota Department of Revenue Building.
- **21RA37, Osborn Foundry/Old Brewery Site** (see west of 21RA37 in Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the northwest quarter of the southeast quarter of Section 6. It is south of Eagle Street, west of Washington Street, east of Franklin Street, and north of Chestnut Street. This site consists of remaining foundations of mid- to late-19th century commercial buildings that had either a parking lot or some other structure built on top of them, protecting them.
- **21RA45, Harriet Island** (see south of 21RA14 in Figure 6), is in Township 28 North, Range 22 West, in the southeast quarter of the southwest quarter, the southeast quarter of the northeast quarter of the southwest quarter, and the northwest quarter of the southeast quarter of Section 6. The site on Harriet Island, along the Mississippi River. It consists of a buried concrete foundation associated with an early 20th century (circa 1900–1930) public bath complex.
- **21RA46, Western-Marshall Cemetery** (see west of 21RA69 in Figure 6), is in Township 29 North, Range 23 West, in the southwest quarter of the southwest quarter of the southeast quarter of Section 36. This cemetery is south of I-94. The site was recorded as the result of two grave shafts/burials being visible in a 2000 utility excavation trench. The graves were remnants of an early Catholic cemetery (circa 1853–1856) that reportedly had been moved.
- **21RA47, Armstrong House Relocation Site 7** (see west of 21RA32 in Figure 6), is in Township 28 North, Range 22 West, in the southwest quarter of the southeast quarter of the northwest quarter of Section 6. This site is in Lot 10 of Block 35 of Rice and Irvine's Addition. It includes limestone foundations and artifact deposits associated with a late nineteenth century building formerly located at 227 Chestnut Street and a dwelling/store formerly located at 225 Chestnut Street that was constructed in 1884.
- **21RA48, North Star Brewery** (see Figure 6), is in Township 29 North, Range 22 West, in the west half of the southeast quarter of the southeast quarter of Section 32. This site is at the base of Dayton's Bluff on what was historically the southwest corner of Commercial Street and Hudson Avenue. It consists of limestone foundations and brick floors of the

North Star Brewery, a limestone foundation associated with 215 Commercial Street, and four caves within Dayton's Bluff used by the former brewery.

- **21RA49, Dacotah/Washington House Hotel** (see Figure 6), is in Township 28 North, Range 22 West, in the southeast quarter of the northwest quarter of the northwest quarter of Section 6. It is north of the intersection of E. Kellogg Boulevard and 7th Street. This site consists of the rear foundation wall and historical building footprints of the late 19th century Dacotah/Washington House hotel, the associated sewer and drainage conduit, and associated historic artifacts.
- **21RA50, Schnelle** (see Figure 6), is in Township 28 North, Range 22 West, in the southeast quarter of the northwest quarter of the northwest quarter of Section 6. It is north of the intersection of E. Kellogg Boulevard and 7th Street. The site consists of a large, circular enclosure of limestone surrounding a discrete and dense mid-to late-19th century artifact concentration, as well as an adjacent artifact scatter from the same period.
- **21RA55, East 7th Street Station** (see Figure 6), is in Township 29 North, Range 22 West, in the southeast quarter of the northwest quarter of the southeast quarter of Section 28. It is located at the northwest corner of East 7th Street and Duluth Street North. The site consists of the basement walls of the Twin City Rapid Transit Company East 7th Street Station. This site was adjacent to the Saint Paul Street Railway Company (Twin City Rapid Transit Co. East Seventh Street line), and is approximately 150 feet south of the Chicago, Saint Paul, Minneapolis and Omaha railroad. The site form indicates that the site was demolished after documentation as part of cleanup of the property.
- **21RA69, State Capital Marble Mill**, (see Figure 6), is in Township 29 North, Range 22 West, in the northeast quarter of the northwest quarter of the southwest quarter of Section 31. This site is along University Avenue. It is the site of the former marble mill for cutting stone during construction of the State Capitol. Structural remains discovered included those of three separate foundations, two of cut stone masonry and one of brick masonry.
- **21RA72** (see Figure 6), is in Township 29 North, 22 West, in the southwest quarter of the southwest quarter of Section 32. This site is west of USH 52 and south of I-94. It consists of archaeological features associated with early warehouse and wholesaling operations within the Lowertown neighborhood in Saint Paul during the early twentieth century. This site was considered not eligible for listing on the NRHP.
- **21RA73, Swede Hollow** (see Figure 6), is in Township 29 North, Range 22 West in the northeast and northwest quarter or Section 32. This site is bounded by the Hamms Brewery complex to the north, East 7th Street on the south, the Dayton's Bluff neighborhood to the east, and Payne Avenue to the west. The site consists of historic artifacts associated with a location in a hollow that various immigrant groups settled in from 1850 until 1956, when the city of Saint Paul determined the area was unfit for habitation and moved the remaining people out. Aside from the historic artifacts, two prehistoric artifacts were also discovered at this site.

PHASE IA

- **21RAw, Kohlman Lake Site** (see Figure 8), is in Township 29 North, Range 22 West in the northeast quarter of the northwest quarter of the northwest quarter of Section 9. The site is south of County Road C E, east of Keller Road Parkway, and west of TH 61. This site consists of various projectile points (the Stanke Collection) collected from near both Kohlman and Gervais Lakes that were donated to the Maplewood Area Historical Society in 1998 or 1999.
- [Text redacted]
- **21RAf, Bald Eagle** (see Figure 10), is in Township 30 North, Range 22 West in the south half of the northeast quarter of Section 11. The ghost town called Bald Eagle is located on the southern edge of Bald Eagle Lake. It consisted largely of summer homes with some permanent residents. There is little other information for this site in the records.
- **21RAq, J. Stevens Co. Ice Houses** (see Figure 10), is in Township 30 North, Range 22, in the northwest quarter of the northeast quarter of the northwest quarter of Section 13. This site is near 12th Street and Lake Avenue in White Bear Lake. This site consists of foundation material related to large ice houses associated with the J. Stevens Company that were at this location until the 1930s.
- **21RAt, Manitou Island** (see Figure 10), is in Township 30 North, Range 22 West, in the south half of Section 13 and the north half of the northeast quarter of Section 24. This site is on Manitou Island in White Bear Lake. The site consists of an isolated prehistoric spear head found embedded in a decaying tree on the island. The OSA portal and MnDOT shapefiles have the site taking up only about three-quarters of Manitou Island, while the map associated with the site form indicates the site takes up the whole island (see Figure 10).
- [Text redacted]
- [Text redacted]

[Text redacted]

- **21RA71** (see Figure 10), is in Township 30 North, Range 22 West, in the southern half of the southeast quarter of the southwest quarter of the northeast quarter of Section 22. This site is east of Otter Lake Road in White Bear Township. It consists of an isolated projectile point found at the location of the Water Gremlin Company facility. Archaeologists who visited the location did not find any additional artifacts
- **21RAu, Saint Anthony Avenue Neighborhood** (not mapped), is listed in the HPO database as being located in Township 29 North, Range 23 West, in the southeast quarter of the southeast quarter of Section 36. However, this site is not mapped on the HPO topographic maps, and there is no site file for this site located at the HPO office.

Historic Cemetery

There are a few historic cemeteries within one mile of the archaeological study area. However, one is close to the study area in White Bear Lake. The Union Cemetery is east of 2nd Avenue, west of Lincoln Avenue, north of Park Street, and south of Highway 96 E. It is located approximately 300 feet west of TH 61 and the BRT archaeological study area (see Figure 10). Separating the archaeological study area from the cemetery are existing railroad tracks, a city street, and a row of houses east of Lincoln Avenue.

Previous Surveys

Previous surveys within a quarter-mile of the archaeological study area include literature reviews, geomorphological investigations, Phase I surveys, Phase II investigations, and data recovery of specific sites (see Figures 6, 8, and 10 for locations of the reported surveys.) Some survey areas represented on the maps are literature reviews only, and some surveys would not be considered acceptable by today's standards. Some of the early reports do not have a great deal of information about specific areas tested, but just general information about how many miles were surveyed. For the trunk highway survey (THY) projects, some of the very early reports did not have the projects listed, but only mapped. However, later THY survey reports had cumulative lists of surveys by district and county, and therefore information can be

taken from those to determine previous survey areas. Previous archaeological surveys within a quarter-mile of the archaeological study area are presented below based on numbers that refer to reports on file at the Mn SHPO.

THY-70-01 (see Figures 6, 8, and 10): The 1968 and 1969 survey covered 421 miles of proposed highway construction, including portions of TH 61 (Franke 1970). Not enough detail is provided in the report to determine the exact location of this work. However, a summary in the 1979 field season THY report says that in 1969 and 1972, approximately nine miles of TH 61 was surveyed from TH36 heading north to the Ramsey County line (Peterson and Pfutzenreuter 1980: Table 4). Several other THY reports have this same information in the appendices regarding TH 61. This would overlap the portion of the current project that follows TH 61. Highway 36 from TH 61 to McKnight Road was also surveyed, which the RCRRA ROW portion of the project crosses. I-694 was surveyed between I-35E and Highway 36 in 1968. A portion of Minnehaha Avenue south of the current Phalen Boulevard was also surveyed at this time. Methods outlined in this report indicate that a records review was conducted and visual inspection was made of project areas to make recommendations about locations that might require monitoring during construction.

THY-80-01 (see Figures 6 and 8): This 1979 survey of a portion of TH 244 (CTH E) from TH 61 to TH 120 just south of White Bear Lake included the upgrading of TH 244 (CTH E) to a four-lane design that would include approximately 120 to 150 feet from the existing centerline. Intensive field survey included a records search, surface reconnaissance, and informal testing that was noted to be random in nature. This area was found to be previously disturbed by road construction and residential landscaping (Peterson and Pfutzenreuter 1980).

RA-81-01-24375 (see Figure 6): In this 1981 survey of the I-35E, Pleasant Avenue, and Shepard Road Corridors in Saint Paul, various alternatives were surveyed for both archaeology and architectural history. Historic features were identified in both the Pleasant Avenue and Shepard Road Corridors that are National Register listed or eligible properties. Archaeological sites that had undergone substantial disturbance due to previous right-of-way clearing and construction were also in the project corridors. Mitigation efforts are summarized in the report for various sites and structures (Environmental Research and Technology, Inc. 1981).

RA-93-01, RA-94-01, and RA-94-03 (see Figure 6): For this 1993 evaluation of proposed work along a section of Warner Road (Jackson Street to Childs Road), the fieldwork consisted of reconnaissance level and exploratory trenches to determine if there were remains of the structures in the project areas shown on historic maps. Remnants of pier columns, and foundation material related to the Saint Paul and Pacific (C.M. Saint P.&P.) Railroad Freight House/Station built in 1881, were identified in some of the trenches (Peterson 1993). The 1993

PHASE IA

Phase II work included testing along three areas associated with the Shepard/Warner/East Central Business Bypass Project. Only one of the areas is located within a quarter-mile of the current project area, south of Union Station, near the Saint Paul and Pacific (C.M. Saint P.&P.) Railroad Freight House/Station. The Phase II investigations uncovered the north exposure of the north foundation wall of the 1881 Saint Paul and Pacific Railroad Freight House, which was built on the location of the former 1863-1866 James J. Hill Warehouse. No structural remains or artifacts related to the 1863-1866 James J. Hill Warehouse were identified (The 106 Group Ltd 1994a). Additional archival information for some of the properties tested can be found in a separate report (The 106 Group Ltd 1994b).

RA-94-02 (see Figure 6): This literature review addressed a City of Saint Paul Division of Parks and Recreation and Ramsey County Parks and Recreation plan to develop a bike trail along an abandoned line of the Burlington Northern Regional Trail. The portion of the project covered in the report includes the portion within the Saint Paul city limits, from East 7th Street to Lake Phalen. It was determined that development of the trail by the blacktopping of the existing rail route would have little to no impact on potential archaeological resources. It was recommended that subsurface archaeological investigations be undertaken for all areas of impact in both Swede Hollow and Lower Phalen Creek, including trail access points, parking areas, slope stabilization, shelters, and restroom facilities (The 106 Group Ltd. 1994c). No follow-up survey report was found in the HPO records.

RA-96-A, RA-96-01, and RA-97-03 (see Figure 6): This 1996 and 1997 project was a geomorphological, Phase I, and Phase II survey of Phalen Boulevard. (This project would cover the location of the existing Phalen Boulevard, and addressed the portion of the BRT study area that runs along Phalen Boulevard.) This two mile roadway connecting I-35E to Johnson Parkway would be adjacent to or within the former Burlington Northern Railroad (BN) right-of-way, and included some land formerly occupied by the Chicago and Northwestern Railroad. Since much of this would be grade separated from existing city streets, interchanges and other connections were proposed to be constructed at Westminster Street, Payne Avenue, Arcade Street, Earl Street, and Atlantic Street (Dolence, Ketz, and Anderson 1996).

The geomorphological testing of the Phalen Boulevard project area included a review of historical cartographic resources, a visual inspection of the entire corridor, and the placement of soil borings in areas that had potential for buried soils. Nine test areas were identified, and 14 soil borings at 12 locations were completed to examine subsurface deposits within the project corridor (Figure 11). Both sampling core tubes and a drill rig were used. The depth of the soil borings ranged from 183 centimeters (cm) to 1100 cm, with most of the borings ranging from 300 to 700 cm. One area tested for buried soils was in the northeastern portion of the project, including various soil cores and borings just west of Johnson Parkway. This area exhibited varying amounts of historic fill up to 183 centimeters in thickness. This fill contained coal slag, coal cinders, historic glass, and gravel. The native A horizons below the fill had

either been completely removed or were highly disturbed. This area was considered to have low potential for buried soils containing archaeological materials because Holocene-age stream terraces and/or alluvial fans do not occur along this portion of the project corridor. Dolence, Ketz, and Anderson (1996:16) note that archaeological materials might be found at or near the surface where the native soils developed in Grantsburg drift; however, any of these locations in the project area were previously disturbed by railroad activities, and contained fill and disturbed soils below the fill. Another portion of the project that was tested for buried soils is near the central portion of the project following the Burlington Northern Trail bike path and the former course of Phalen Creek. This area exhibited multiple units of fill (generally consisting of either a mixture of organic rich A-horizon material gravel and coal; concrete, limestone cobbles, and demolition debris, or glass and oil-stained sands and highly oxidized, unconsolidated structureless soils, locally derived) over deeply buried parent materials of outwash and till. The depth of the fill ranged from approximately 245 cm to greater than 500 cm. Dolence, Ketz, and Anderson (1996:17) note that the highly variable nature and depths of the fill were consistent with installation of a large, deeply buried sewer system, which was known to be in the area. It was concluded that the potential for buried soils containing archaeological deposits was low due to the large amount of disturbance from urbanization. The original landscape in this area likely contained Holocene-age stream terraces and/or alluvial fans prior to historic occupation, but urbanization and installation of the main Saint Paul sewer system had totally removed evidence of the original surfaces. Any archaeological materials uncovered in this area would be in disturbed context and associated with historic fill. The third area tested for buried soils was west of the second area (central part of the project) on a poorly drained glacial outwash terrace which had undergone extensive urbanization. This was the

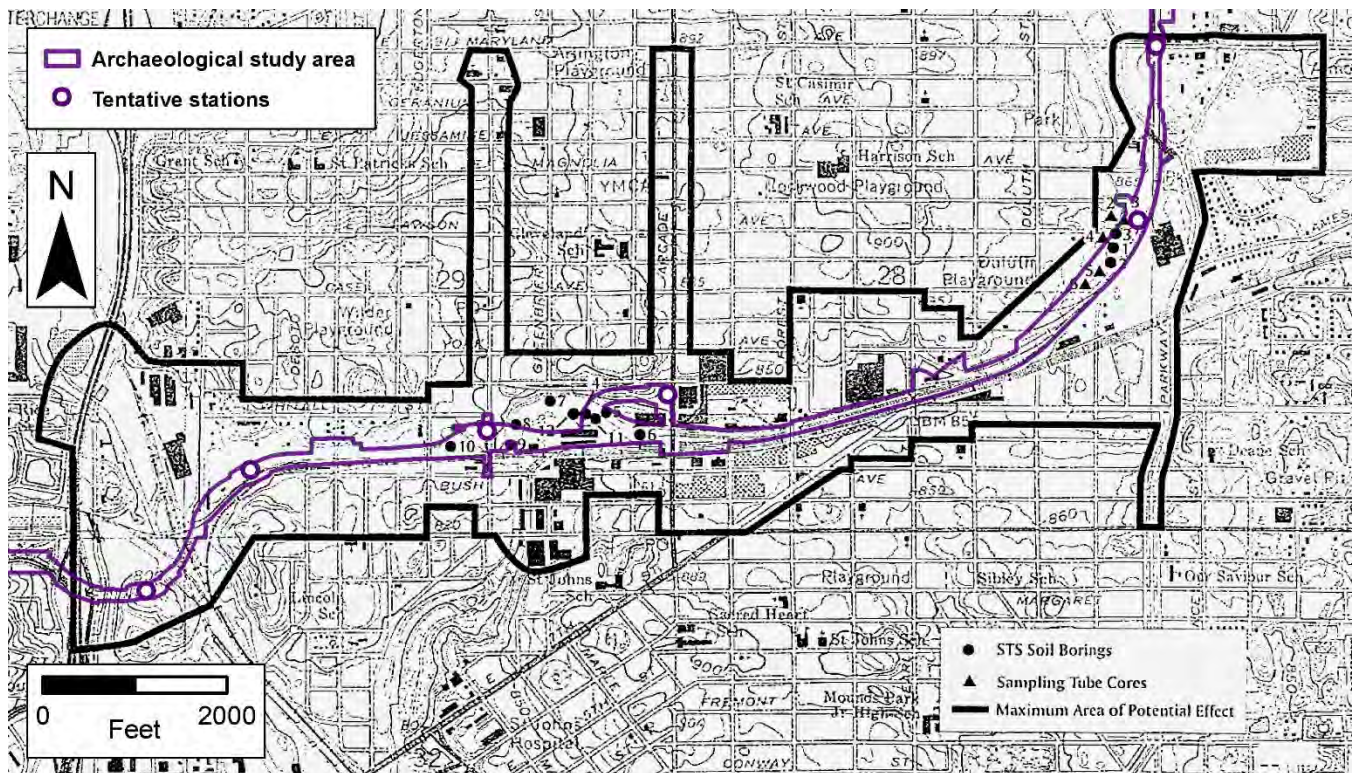


Figure 11. Map from Dolence, Ketz, and Anderson (1996:15, Figure 7) showing location of soil cores and borings for the Phalen Boulevard project.

location of one of the former railroad roundtables. At that time, Dolence, Ketz, and Anderson (1996:17) noted that the roundtable area was capped by concrete with a sand and gravel upgrade, and the roundtable had been abandoned and replaced by a recycling storage area. One soil boring was placed in this area, and the native soil, a “sapric peat”, was identified at approximately 240 cm below the ground surface. Below this peat was a weakly developed mineral horizon, and the profile ended in interbedded sand and peat, and then a coarse calcareous outwash. The soil profile indicated poorly drained peatland conditions, and based on the weak development of a subsurface horizon, and the peat, this surface was poorly drained even during drier Holocene periods. Dolence, Ketz, and Anderson (1996:17-18) concluded that the potential to contain archaeological material is probably low or unknown, assuming that cultural occupants had limited uses for peatlands, and noted that if cultural materials were found, they would be below the historic fill.

The Phase I assessment of the project area consisted mainly of a review of historic maps and sources to better assess which areas might have intact, potentially significant historic archaeological resources, since the Phalen Boulevard study area had been subjected to significant landscape alterations through cutting and filling (Dolence, Ketz, Anderson, and Trent 1996). Potential historic properties in the project Area of Potential Effect (APE) were identified and then considered for research potential. Based on the historic research, seven areas within the project corridor were identified from historic maps that could have potential for

intact, potentially significant historic archaeological resources: 1) Cayuga/Mississippi area; Pullman Porters area; 2) Hauser Malting Company; 3) East Saint Paul Depot; 4) C. Saint PM&O. Roundhouse; 5) East Saint Paul Roundhouse; 6) nine miscellaneous railroad buildings; and, 7) East Saint Paul Station (Figure 12).

The Phase II investigations of the seven areas included excavations at three of the resources, and additional historical research at the other four due to lack of landowner permission at the time. Aside from historical research, Phase II investigations included backhoe trenches to determine site presence, integrity, and horizontal and vertical limits (Ketz and Schmidt 1997).

- 1) At the Hauser Malting Company location, four backhoe trenches were excavated in areas likely to contain building locations based on historic maps. Based on the field work, it was concluded that this area was severely impacted by railroad activities and the construction of the Trout Brook sewer system. Although a few scattered and deteriorated remnants of limestone and brick survived in the area, they did not retain integrity and did not confirm an association with the Hauser Malting Company. No artifacts or features related to the Hauser Malting Company were uncovered; therefore, this area was recommended as not eligible for listing on the NRHP.
- 2) At the Cayuga/Mississippi Pullman Porters area, three backhoe trenches were excavated. No clear evidence of the Cayuga/Mississippi African-American community was uncovered. The trenches consisted of series of recent fill episodes, and no intact foundations of the former boarding house or rental houses remained. The area had been severely disturbed by the construction of the Soo Line railroad and I-35E. This area was considered to be not eligible for listing on the NRHP due to the lack of any site being found.
- 3) At the East Seventh Street Depot area, located just east of Earl Street between the Saint Paul & Duluth (later Northern Pacific) and “CStPM&O” tracks, four backhoe trenches were excavated. Cultural material related to the depot included brick bats, mortar, fragments of plate glass, and some wire nails, all surrounded by black oily cinders. However, no intact foundations were identified. Since little remained of the site, and it had little research potential to contribute to the existing historical knowledge of railroad development or depot construction in Saint Paul or Minnesota, this area was recommended as not eligible for listing on the NRHP.
- 4) The remaining four properties, the CStPM&O Roundhouse, East Saint Paul Roundhouse, East Saint Paul Station, and nine miscellaneous railroad buildings could not be field evaluated due to lack of landowner permission. At the time of the Phase I, these areas were recommended for further investigation because of their possible significance as part of the early railroad history for Saint Paul, and for their potential inclusion in the proposed Westminster Junction Historic District. During the

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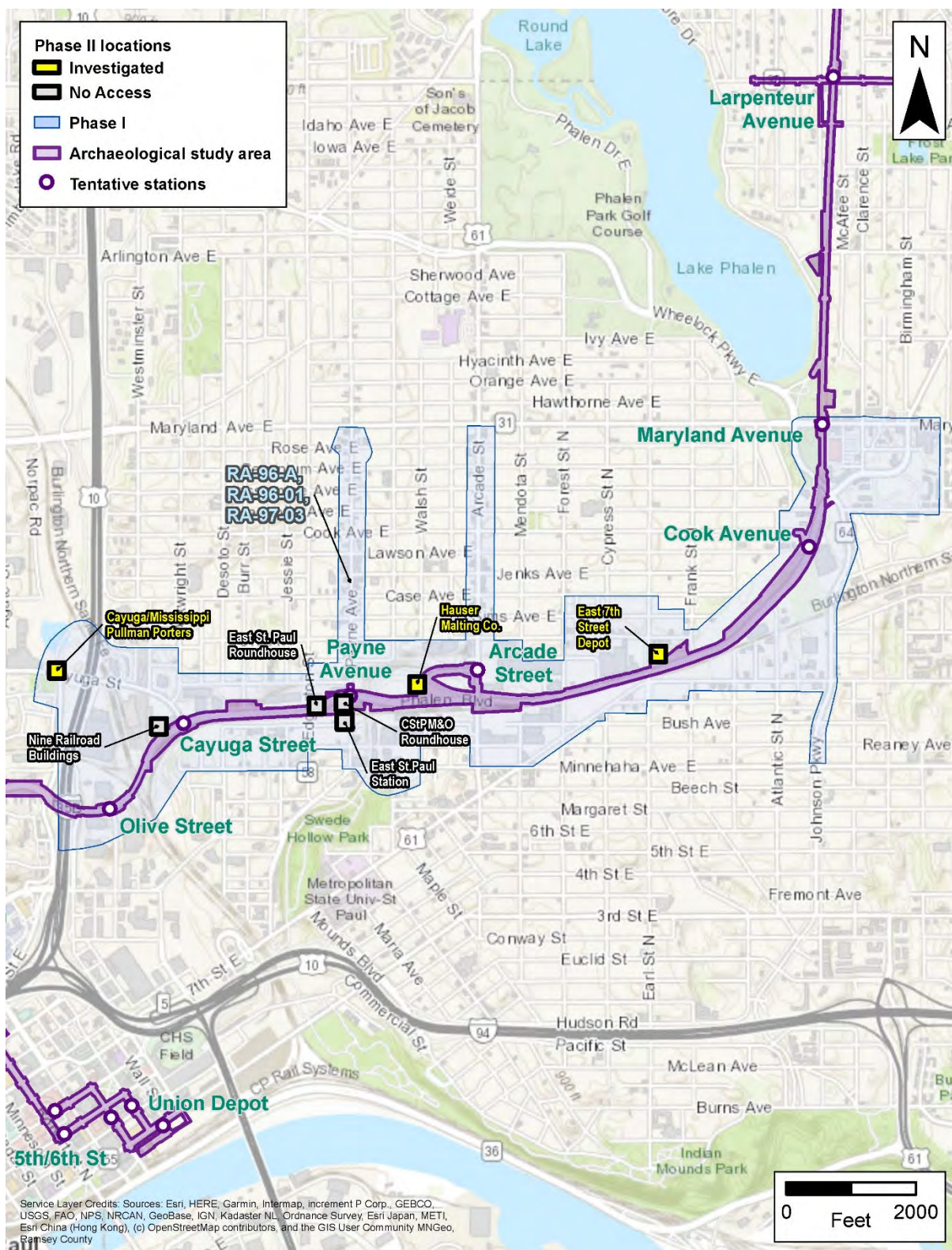


Figure 12. Location of Phase II work for Phalen Boulevard project showing location of sites where fieldwork was undertaken, and those where landowner access was not obtained (information taken from Ketz and Schmidt 1997:2, Figure 1).

PHASE IA

Phase II, these sites were evaluated based on the historical documentation that was available. It was felt that documentary research provided sufficient information to show that these locations were not to be included in the Westminster Junction Historic District, and the properties did not appear to be associated with an important individual or events in the city or region's past, and did not appear to contain research potential. Therefore, these sites were recommended as not eligible for listing on the NRHP.

RA-98-01 (see Figure 6): This project was a 1998 cultural resources assessment of a proposed metro transit bus garage site in Saint Paul. This area was bounded by University Avenue to the north, John Street to the east, Grove Street to the south, and Mississippi Street to the west. This literature review assessed that there could be buried historic deposits below the existing parking lot (Halloran and Frey 1998).

RA-98-03 (see Figure 6): This 1997 project included archaeological monitoring, emergency salvage excavations, and data recovery excavations at the Department of Revenue Construction Site in Saint Paul. The monitoring and work led to the identification of three historic sites within the block, including the William Dahl House site (21RA36), the Lot 5 Site (21RA38), and the Lowertown Neighborhood (21RA39) site. Forty archaeological features, including foundation remnants, wells, cisterns, privies, trash and ash pits, soil stains, and middens dating to the mid-19th to early 20th centuries were encountered. Features dating from the 1850s to the mid-1880s were found sealed below eight to ten feet of fill. The Dahl House (21RA36) was removed from the area to develop the lot (Abel et al. 1998).

RA-06-C (see Figure 6): This cultural resources review focused on the Northeast Quadrant Property in downtown Saint Paul. This property is composed of three city blocks and includes Lots 1-6, Block 6, and Lots 1-6, Block 3, Hoyt's Addition, and Lots 1-10, Block 2, Whitney and Smith's Addition. This area was a parking lot at the time of the work. Fourteen trenches aligned north/south across the parking lot were excavated to an average depth of 9 feet, with most generally measuring 15 to 20 feet in length. Intact structures and foundations were identified below the bituminous parking lot layer in several of the trenches, including brick cisterns, and building walls related to the late 1800s and early 1900s buildings. It was recommended that additional historical research take place, and a cultural resource management plan be developed (Loucks Associates 2006).

RA-07-01 (see Figure 6): During an environmental cleanup of the former Globe Building Materials, Inc., factory site, walls of the basement of the former Twin City Rapid Transit East Seventh Street Station (21RA55) were exposed. The Minnesota HPO requested the walls be documented prior to demolition. Archaeologists from Summit Envirosolutions, Inc. (Summit) completed the documentation, which included photos and mapping (Vermeer 2007).

RA-08-B (see Figure 6): An archaeological boring study (geologic testing) at the Loading Dock and Parking Facility of the United States Postal Service (USPS) Processing and Distribution Center located at 180 Kellogg Boulevard East was undertaken in April 2008 (Earth Tech/Berger Joint Venture 2008). This work was done to more fully understand the depth and expanse of disturbed fill and possible intact stratigraphic deposits under the existing parking facility so that archaeological potential of the property could be evaluated prior to the transfer of the property to Ramsey County. A 1997 archaeological assessment of the property using archival data and topographic contexts indicated that this area had a moderate to high potential for both prehistoric and historic archaeological deposits to exist under the fill in the area of the rail yard platform/loading dock and parking facility between Sibley and Broadway Streets, south of Second Street East, as well as below the city-owned parking areas south of Second Street between Jackson and Sibley Streets. The 2008 work included borings starting at the upper deck area and the lower parking lot. The results of the geologic coring indicated that the potential is very low for undisturbed archaeological deposits that may contribute important new information about the early history or prehistory of Saint Paul. Although natural deposits were found beneath the fill of the upper level parking lot, they did not include developed soils and therefore did not mark a former landscape surface. No soils that would have developed at the site location by the 1830s, when Saint Paul was beginning to be settled, were found in the borings or cores. It was concluded that the ground appeared to be graded to prepare for construction of the original railroad roadbed (circa 1865), which moved any potential A-E-B-BE horizons and any precontact or early historic deposits that had been present. Building rubble (brick and mortar), cinders, coal, creosote-impregnated wood, and likely railroad ballast were present in sandy loam fill 15 to 24 feet below the ground surface. These materials are consistent with the historic use of the site as a railroad freight and passenger depot from circa 1862 to 1932, and by 1900, as a warehouse district. Although some historic structural debris and a few historic artifacts were noted at the location, the evidence from deep testing strongly suggested a very low potential for discovery of undisturbed archaeological deposits that would contribute important new information about the history of Saint Paul (Earth Tech/Berger Joint Venture 2008).

RA-08-01 (see Figure 6): This cultural resources review was conducted for the replacement of the Lafayette Bridge over the Mississippi River in Saint Paul. Since the upper 3 feet of the APE had been heavily disturbed by previous roadway and railway construction, geomorphological testing was completed to assess the potential for deeply buried archaeological deposits. Although some precontact artifacts along with postcontact-period microartifacts were identified, they were found to be detrital and not in situ, and were not designated as an archaeological site. No further work was recommended for the project (Vermeer and Hudak 2008).

PHASE IA

RA-12-A (see Figure 6): Archaeological monitoring and visual assessment was conducted for the Gladstone Savanna Neighborhood Preserve and Gloster Park Project in the city of Maplewood. This project was completed for a concept plan for the development of a 24-acre property at the southwest corner of the intersection of Frost Avenue and English Street, which was occupied by the Gladstone Shops of the Saint Paul and Duluth Railroad from the late 19th to early 20th centuries. Monitoring of removal of contaminated soil and visual inspection of the area identified 37 features, included foundations and depressions (Ollila 2012). These were recorded as 21RA70, Gladstone Shops.

THY-84-01 (see Figure 8): The 1983 survey covered 96 miles of proposed highway construction and re-examination of several sites if further investigations or work would be required. Within this work, a survey was completed for revisions to the interchange of TH 61 and I-694. This revision included going from a partial diamond interchange to a full diamond configuration with two new ramps. This entire area was found to have been altered by previous highway, street, utility, and residential construction (Peterson and Yourd 1984:225-226).

THY-73-01 (see Figure 8): This 1972 survey addressed 324 miles of proposed highway construction and the re-examination of several sites to determine if further investigations or work would be required. Approximately 3.4 miles of TH 61 was surveyed between TH 36 and TH 694 (Nystuen 1973). No information about survey methods was included in the report, but it was likely similar to other early trunk highway surveys, with a records review and, at a minimum, visual inspection of the project area.

THY-76-01 (see Figure 8): The survey covered several miles of proposed highway construction (total number not specified in the report) and re-examination of several sites if further investigation or work would be required. This included survey of a portion of I-694, from I-35E to one-half mile east TH 61. The report indicated that based on the records search and surface reconnaissance, completion of the proposed construction along I-694 should not affect any known historical or archaeological sites. No further work was recommended (Peterson 1976:64).

RA-79-01 (see Figure 8): This cultural resources survey focused on a tract of land adjacent to Willow Lake that was approximately 250 acres, 180 of which were water or marsh. Shovel tests were placed on selected parts of the tract, including the north and east margins of the lake and all high ground surrounding it in these locations (Wochuseth and Woolworth 1979). The report led to the recording of site 21RAp.

THY-85-** (see Figure 10): This 1985 review of 150 miles of roadway work included 12 miles of new alignments. Within this work was a survey of TH 96 that included widening from I-35E to TH 61 in White Bear Lake. The widening along this two mile stretch of road was largely

confined to the in-place ditch limits, with the ROW measuring 50 to 75 feet, and an expansion that might extend 10 to 20 feet outside the ditch limits. Archaeological work along this stretch included a records search, surface reconnaissance, and informal testing in an area thought to possibly contain intact soil. No cultural material other than recent window glass was found, and no further work was recommended for the project (Peterson 1986:223-224).

RA-06-B (see Figure 10): This was a 2006 cultural resource review for a proposed telecommunications tower in White Bear Township. This cell tower location was approximately 60 feet northwest of Hoffman Road and 50 feet southeast of the Northern Pacific Railway Company line. The archaeological survey included the lease area for the tower and the proposed new access road. No cultural material was recovered (Vermeer 2006).

Discussion of Previous Surveys

Documentation included in the trunk highway surveys from 1969 and 1972 indicate that the 9 miles of TH 61 from the TH 36 intersection heading north to the Ramsey County line were surveyed in advance of improvements along the road. This 9-mile section is continually referenced in later reports as having been surveyed. This would overlap the current project alignment along TH 61. The introduction to the 1970 archaeology report indicated that the survey work included mainly surface inspection of projects to identify areas that might contain archaeological sites in which additional work would be completed. Although this survey was done over fifty years ago and would not be sufficient by today's survey standards, at least some level of archaeological survey work was completed along this 9-mile stretch of TH 61 in advance of construction efforts at that time.

The geomorphological testing along the Phalen Boulevard corridor in 1996 concluded that it was unlikely that intact prehistoric deposits existed within the APE. This conclusion was based on previous disturbances from the Saint Paul main sewer system and other historic disturbances that had stripped the area of Holocene deposits, or the presence of peat that probably would not have been used for long-term occupation in precontact times. The Phase I survey consisted mainly of historical map research and a literature review to determine areas that might have a high potential for intact historic deposits that could be potentially eligible for listing on the NRHP. This work considered seven locations potentially eligible. Phase II excavations were undertaken at three of the seven locations; landowner permission was not obtained for the other four. The fieldwork undertaken at the three locations did not identify any archaeological sites, and therefore no further work was recommended. The other four properties where fieldwork was not undertaken were considered ineligible for listing on the NRHP based on historical documentation. It was felt that fieldwork would not contribute any additional information about the properties that was not already available in the historical records. These recommendations were made prior to the NRHP Multiple Property Documentation for Railroads in Minnesota, 1862-1956 (Schmidt et al. 2013), so by today's

standards, the properties may have been evaluated differently. However, based on the locations of these four properties, they appear to have been either disturbed by Phalen Boulevard construction or are now covered with buildings or impervious surfaces, such as parking lots.

Other previous projects overlapping the current archaeological study area include: a few trunk highway surveys that the project passes through, including Highway 36 from TH 61 to McKnight Road, I-694 between I-35E to Highway 36, TH 244 between TH 61 and TH 120, and TH 96 from I-35E to TH 61; the I-35E corridor; and the Phase III investigation of 21RA38, Lot 5, and 21RA39, Lowertown neighborhood in which most of the cultural resources on the block were documented and/or excavated. As previously discussed, not all of the surveys would meet today's survey standards, but at least some level of field investigation was undertaken.

MN/MODEL 3 PREDICTIONS FOR PRECONTACT RESOURCES

In general, areas considered to have relatively low potential for containing precontact archaeological resources include former and existing wetlands, poorly drained areas, areas with a 20 percent or greater slope, and areas where existing roadways and railroad grades or development has disturbed the soil. Areas considered to be high potential for precontact resources are those close to water sources not on former or existing floodplains, close to other previously recorded precontact sites, particularly those areas not affected by development.

For the current project, MVAC reviewed MnModel 3 Survey Implementation Model predictions for precontact deposits available on the OSA portal. MnModel 3 predictions make suggestions for degree of probability of precontact deposits based on landforms, distance from a water source, original land surface, and other variables using statistical models that map the potential for pre-1837 surface archaeological sites in Minnesota. Predictions for the archaeological study area are varied (Figures 13–16). At the southern end, nearest the Mississippi River, potential for resources is high. As the project heads north along Robert Street, 14th Street, and Jackson Street, the potential is considered possibly high. Along Pennsylvania Avenue, predictions of potential are both high and medium. As the project heads east across I-35E, the model predicts high site potential. Along Phalen Boulevard, in the western half of the project, potential for this area is considered possibly to suspected medium. Along Phalen Boulevard near Neid Lane, predictions switch to high probability for a few blocks heading east, and then to medium probability, with a small area considered high near where the project leaves Phalen Boulevard to switch into the RCRRA ROW area. Much of the archaeological study area is considered low probability except at the southern end near Lake Phalen, where it is medium probability, and some areas close to Ripley Avenue and Frost Avenue that are also medium. The RCRRA ROW is then considered to be in a medium probability area (surrounded by low probability) between Hwy 36 and Beam Avenue. The archaeological study area along Beam Avenue is medium probability for a short distance then switches to low probability, and continues to be low probability along Southlawn Drive and County Road D. As the project rejoins the RCRRA ROW and heads north on TH 61, this portion of the archaeological study area is considered medium probability. Along TH 61, the archaeological site potential predictions are considered to be low, medium, or unknown up to Goose Lake. As the project heads north from Goose Lake into White Bear Lake, this area is considered high probability for precontact resources.

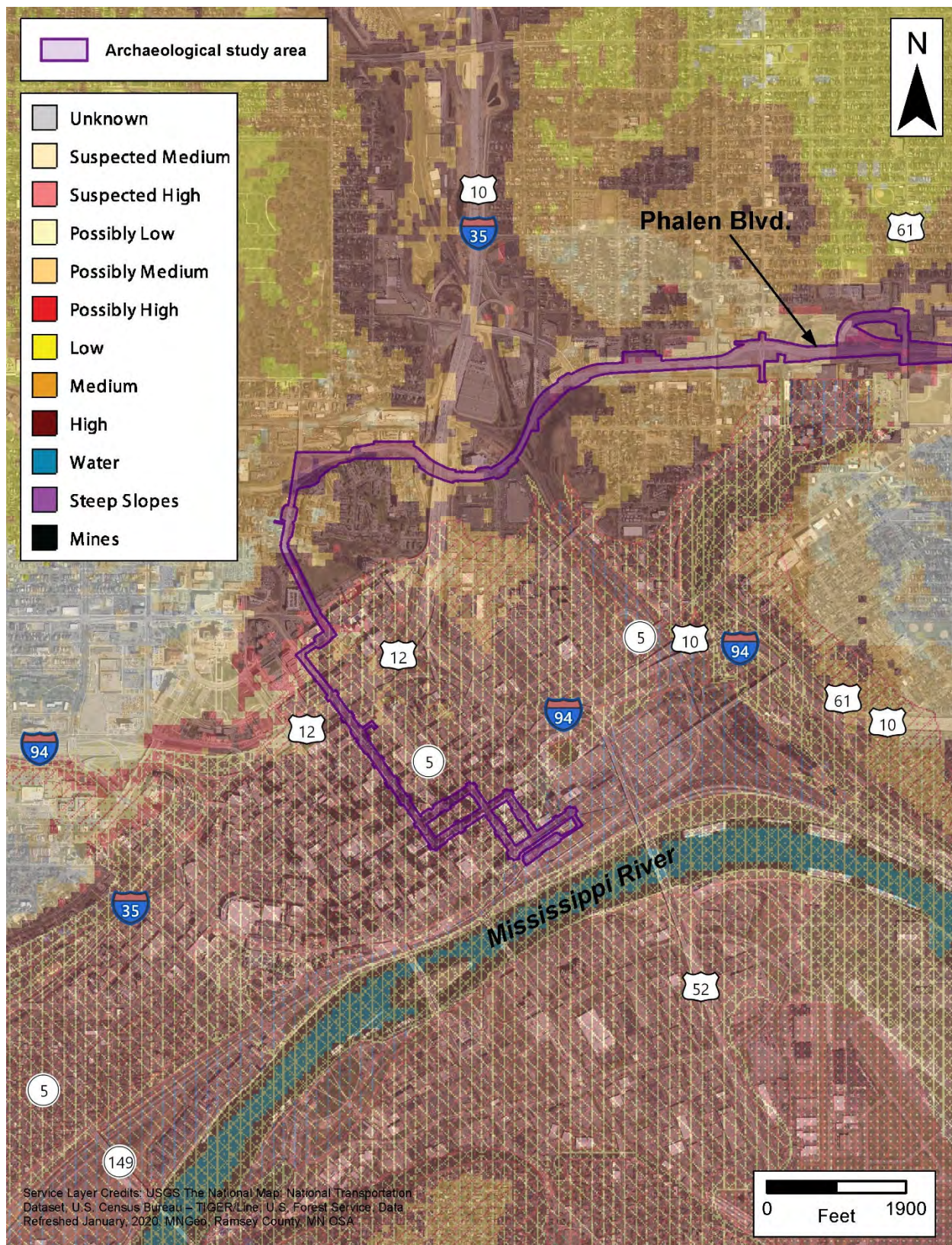


Figure 13. MnModel 3 predictions for precontact resources for the Lowertown or downtown Saint Paul area. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

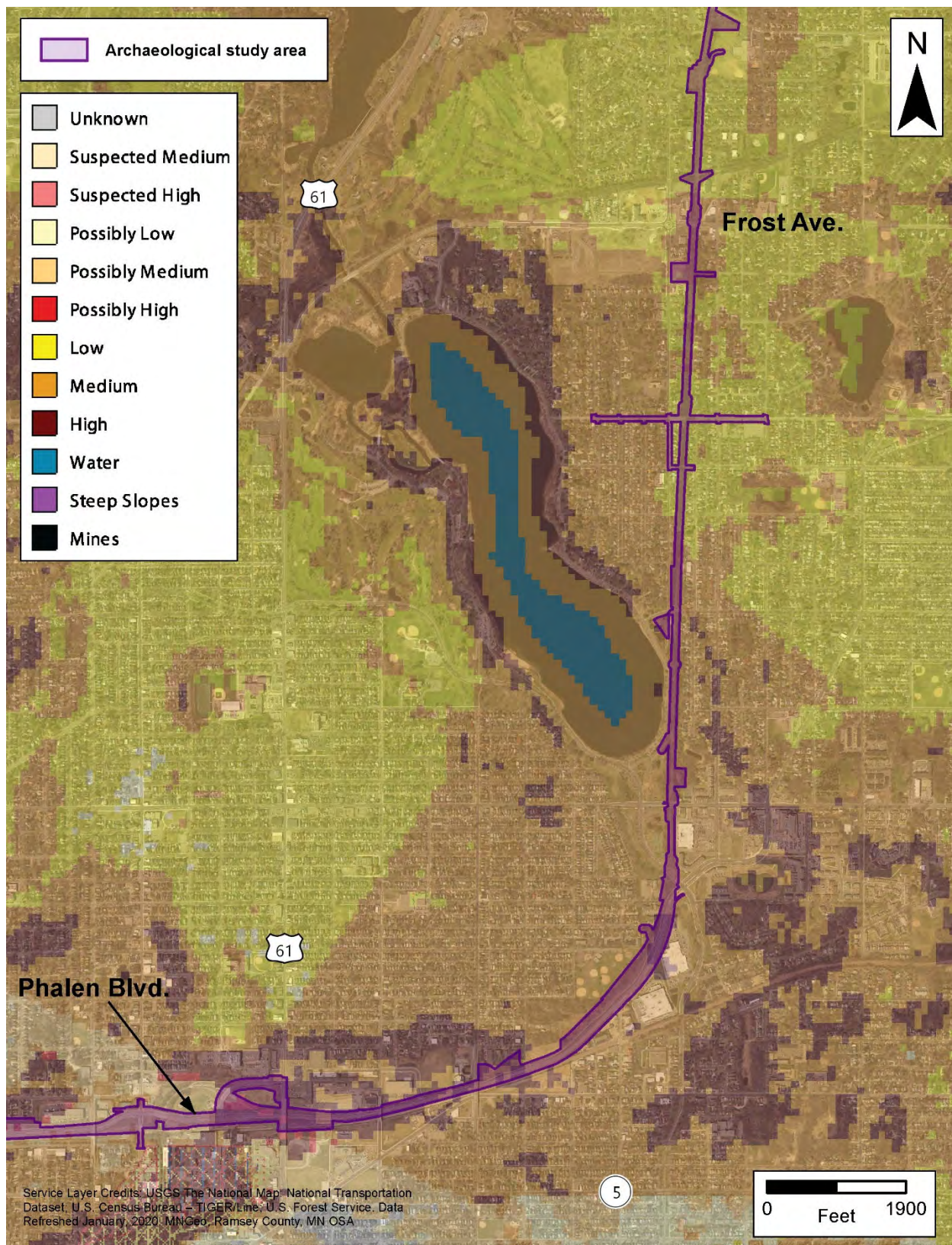


Figure 14. MnModel 3 predictions for precontact resources west and north of Lake Phalen. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

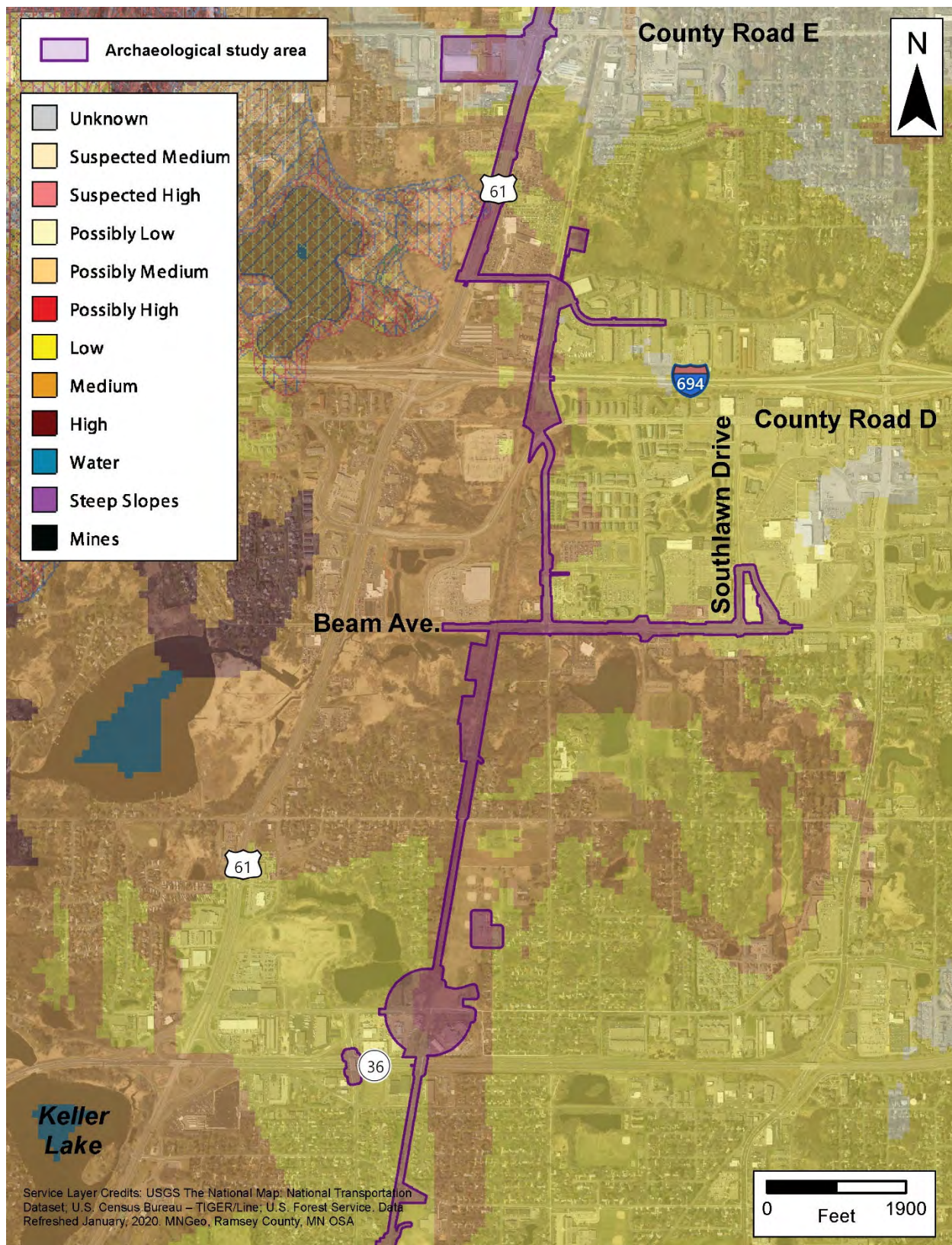


Figure 15. MnModel 3 predictions for precontact resources between Highway 36 and County Road E. Base map from OSA portal, <https://osa.qisdata.mn.gov/OSAPortal/Home>.

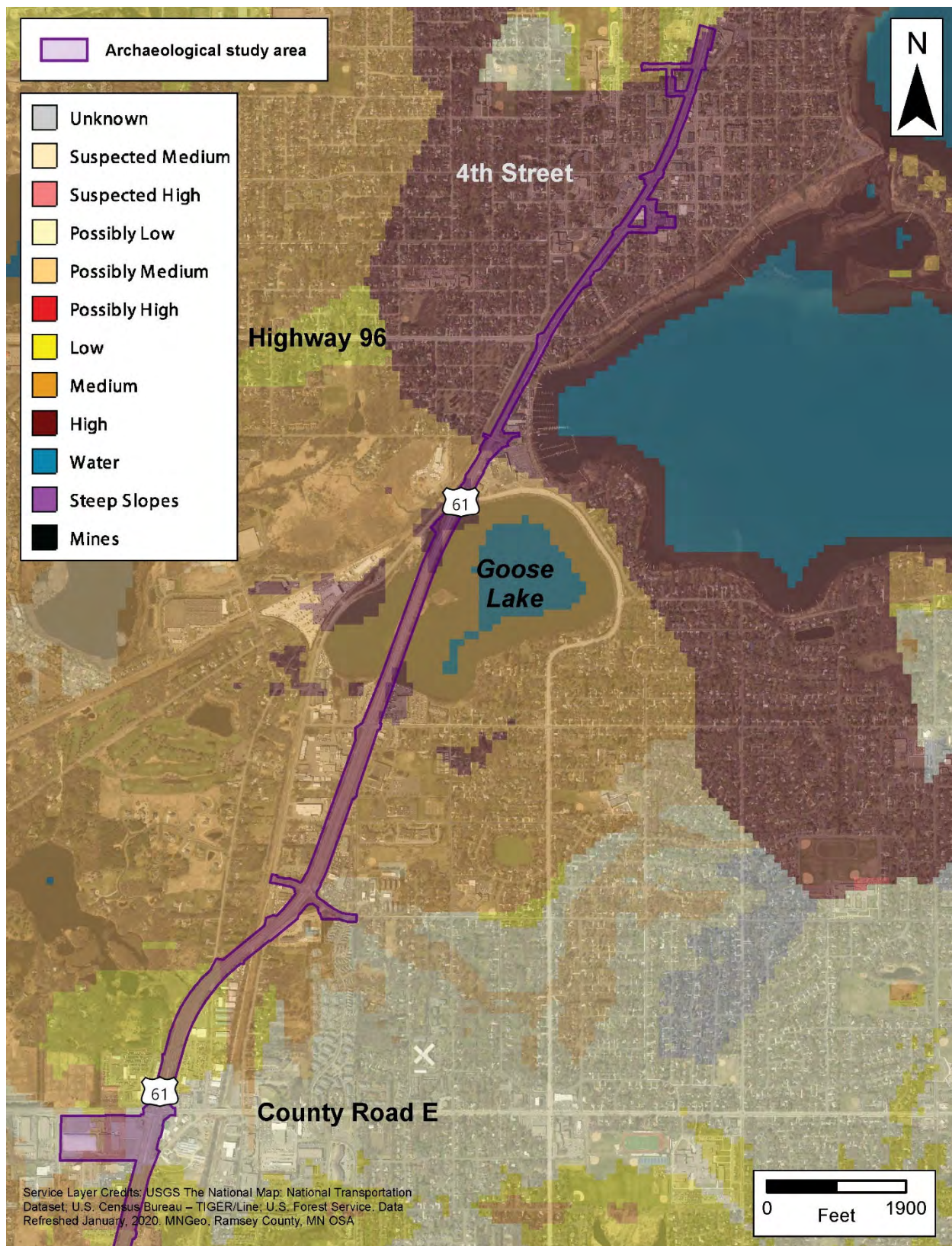


Figure 16. MnModel 3 predictions for precontact resources near White Bear Lake. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

HISTORICAL RESEARCH

Various maps, atlases, and aerial photos were researched to establish a general pattern of development and land use history within the study area and help assess archaeological resource potentials. Minnesota Historic Contexts applicable to this project include: Early Agriculture and River Settlement (1840–1870), Railroads and Agricultural Development (1870–1940), Minnesota Tourism and Recreation in the Lake Regions (1870–1945), and Urban Centers (1870–1940). As final design plans became available with locations of proposed ground-disturbing activities, the plans were compared to the historic maps and aerial photos to assess the potential for historic archaeological sites in the archaeological study area. This assessment includes other considerations, including the amount of previous disturbance by development and utilities.

On the late 1840s to early 1850s General Land Office (GLO) Records maps from the Bureau of Land Management, no significant cultural features are noted on the maps from the Lake Phalen area to the northern terminus of the project. GLO records do show that in the proximity of the former east-west railroad line (currently Phalen Boulevard) was a road labeled “Road from Stillwater to Saint Paul”. Another historic, unnamed road is shown running in a south-northeast direction west of where I-35E is located. A small area with streets and blocks plotted represents the city of Saint Paul at that time (Bureau of Land Management 2018). Aside from the historic roads, no other cultural features are represented on the GLO maps within a mile of the Rush Line BRT alignment.

The 1874 Andreas map (Andreas 1874) of Ramsey County does not have detailed depictions of the structures in the downtown Saint Paul area. At least three structures are noted possibly near the railroad tracks (currently RCRRA ROW area) north of Lake Phalen. These three structures are in Section 15 of Township 29 North, Range 22 West, to the west of the tracks (Andreas 1874). However, the scale on this early map is unknown, and in reality, the structures may have been farther away from the tracks, except for a school that will be discussed below.

The best early detailed maps covering most of the archaeological study area are Hopkins’ 1884 and 1886 maps of both downtown Saint Paul and the townships outside of Saint Paul. On these maps, in White Bear Lake, buildings are noted along the railroad line on the east side of the railroad tracks (likely where TH 61 is now located) near 3rd Street. Also on the east side of the tracks is a park called Railroad Park, which still exists today. Although no station structure is shown on the Hopkins (1886) map, the word “STATION” is marked on the east side of the tracks near Railroad Park. The 1891-1901 Atlas of Saint Paul created by the Rascher Insurance Map Publishing Company (1891-1901) shows that in White Bear Lake, prior to a road being established where TH 61 is now located, there was a railroad depot west of Railroad Park. Additionally there were two water tanks, an artesian well with two small structures near it, a building for oil, and an ice house located north of Railroad Park, between

4th and 5th Streets (Figure 17). Although the water tanks were located within the railroad track layout, the artesian well, depot, and other buildings were located just east of the railroad tracks, which would overlap the current location of TH 61. The remaining structures and the well in this area are not shown on the 1923 Sanborn Fire Insurance map (Sanborn Map Company 1923), but a structure with the notation of “depot” still appears in 1923. Although no surface evidence of these structures still exists, the artesian well was probably filled in during road construction. Railroad Park would likely be an area with minimal previous ground disturbance since the park is still in existence today and if proposed disturbance may take place in this area, it is considered an area high for prehistoric archaeological resource potential. The 1923 Sanborn Fire Insurance maps (Sanborn Map Company 1923) show that at the southern end of the park, adjacent to east 3rd Street, was a post office building. On the west side of the railroad tracks, which should be out of the archaeological area, additional structures are noted near 5th Street and between 1st and 2nd Street. The 1923 Sanborn maps show Stickley Boulevard or TH 61. A 1931 atlas of the area has both the name Stickley Boulevard and TH 61. The depot is not marked on the 1931 atlas, but this atlas mainly shows city lots and few other cultural features, although the post office building is shown in the southeast corner of Railroad Park and is marked as being 135 feet east-west and 150 feet north-south (Saint Paul Abstract Company 1931).

The Hopkins (1886) map of the township areas between Phalen Boulevard and White Bear Lake has the word “station” in Section 15 of Township 29 North, Range 22 West. This would be in the city of Maplewood in the Gloster neighborhood. On this map, there is a structure on the west side of the tracks near the word “station”; however, based on later maps, it appears that the structure shown and the word “station” are unrelated (Figure 18). The Rascher Insurance Map Publishing Company (1891-1901) fire insurance maps show the Gladstone Depot on the east side of the tracks just north of Frost Street. Map details indicate that there were three rooms or areas of the depot including a post office, a baggage area, and a waiting area. To the north of the depot, on the east side of the tracks, there are several brick buildings associated with the Saint Paul Plow Works (Figure 19). An undated “historic neighborhood map” of the Gladstone area as depicted in the Gladstone Savanna local historic site designation form (Maplewood Historic Preservation Commission n.d.) shows the two depots, along with the Plow Works buildings (Figure 20). The depots are not shown on the State of Minnesota 1916 map of Ramsey County; however, this map does not have a lot of detail including structure locations (State of Minnesota 1916). Historical research indicates that there were two depots in Gladstone, one for each rail line in the vicinity. The first Gladstone depot was built in 1886 by the St. Paul and Duluth line, just north of Frost Avenue and east of the tracks. The second depot was built near the Saint Paul Plow Works buildings in the early 1900s by the Wisconsin Central Line. The two rail lines merged their depots in 1916, moving the first depot to a location at the junction of the two railroads, while using the second one for

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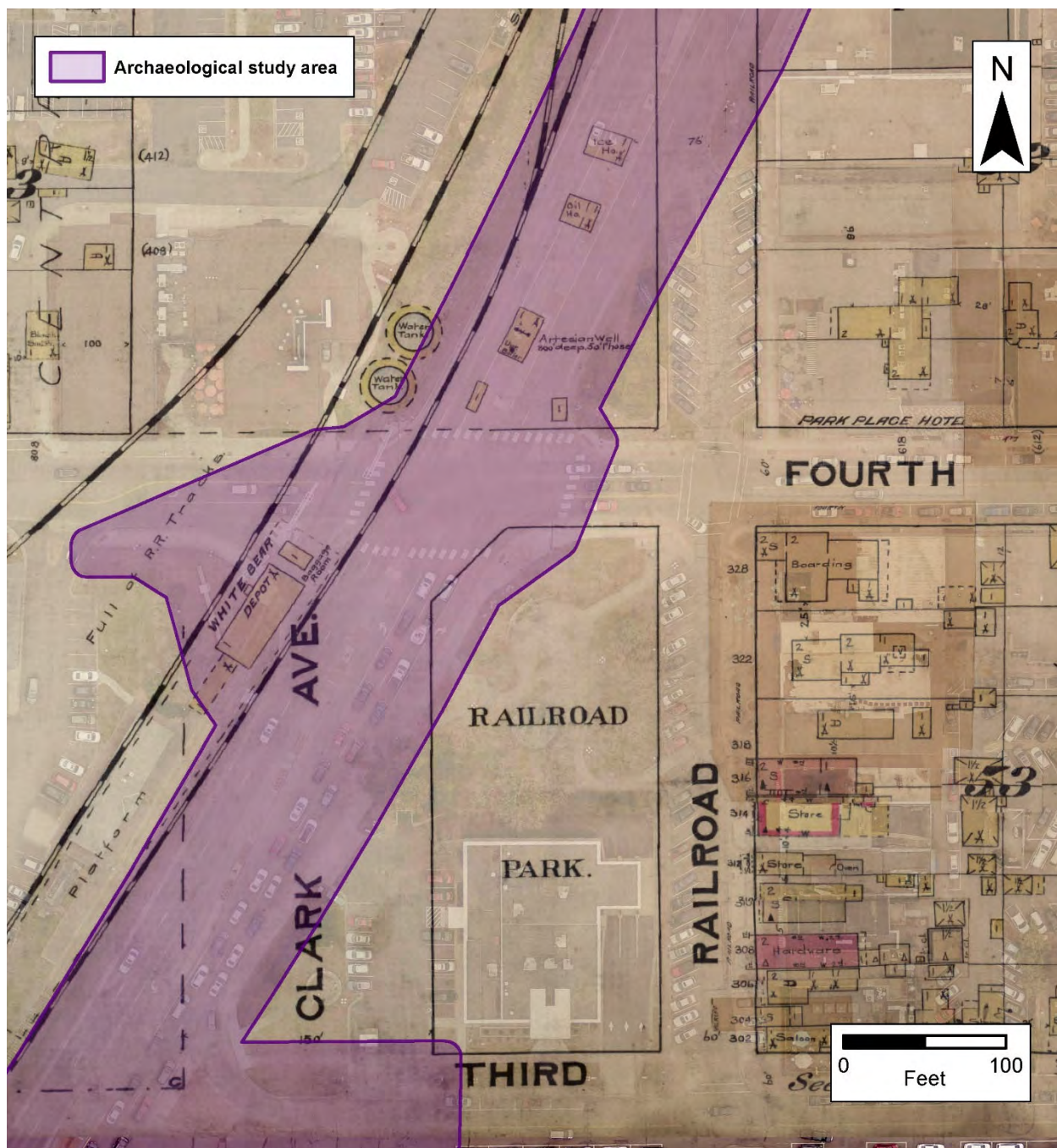


Figure 17. Potential historic resources shown on 1891-1901 map (Rascher Insurance Map Publishing Company 1891-1901, Volume 1: 99) overlaid on modern aerial image in downtown White Bear Lake.

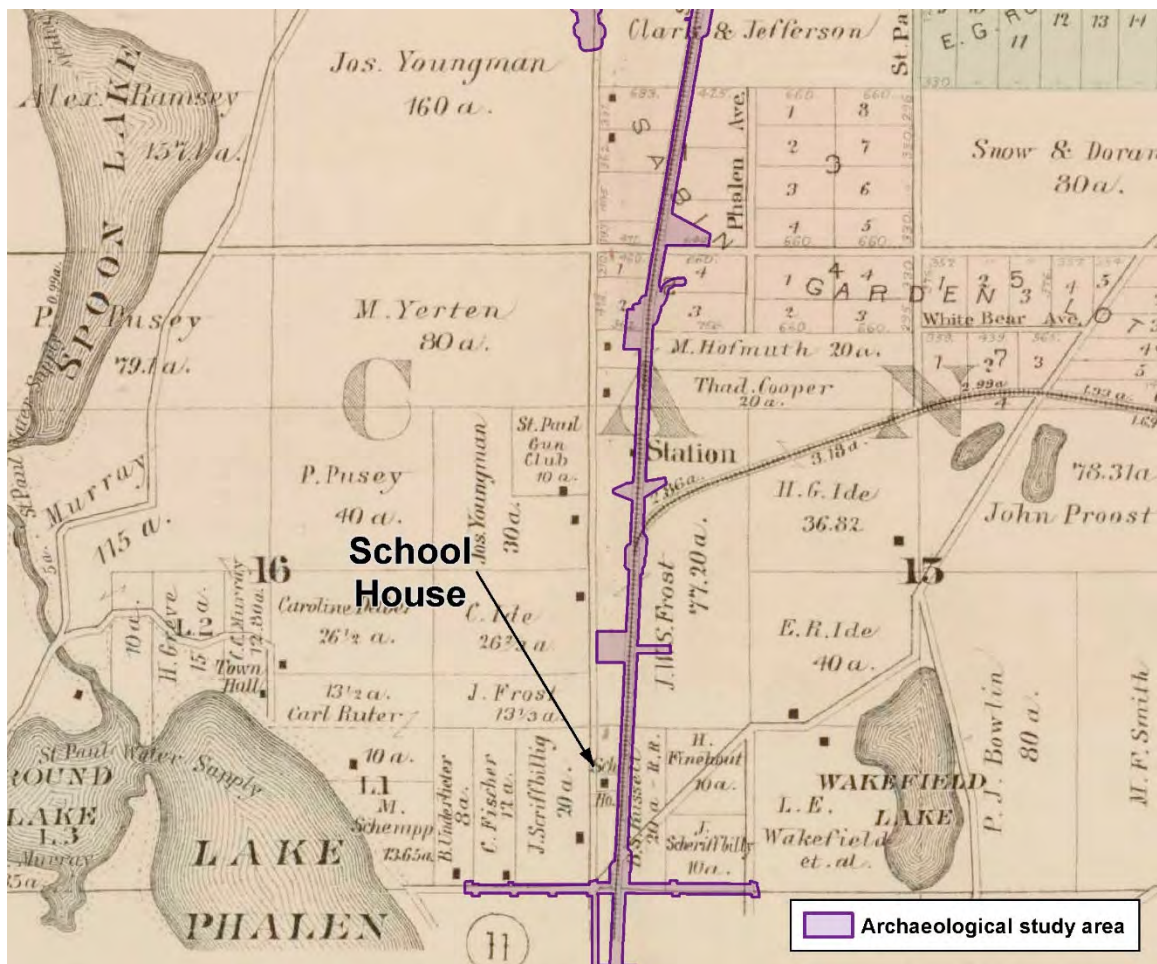


Figure 18. Hopkins (1886) map of Gladstone area showing “Station” and old school house near the railroad tracks (current RCRRA ROW).

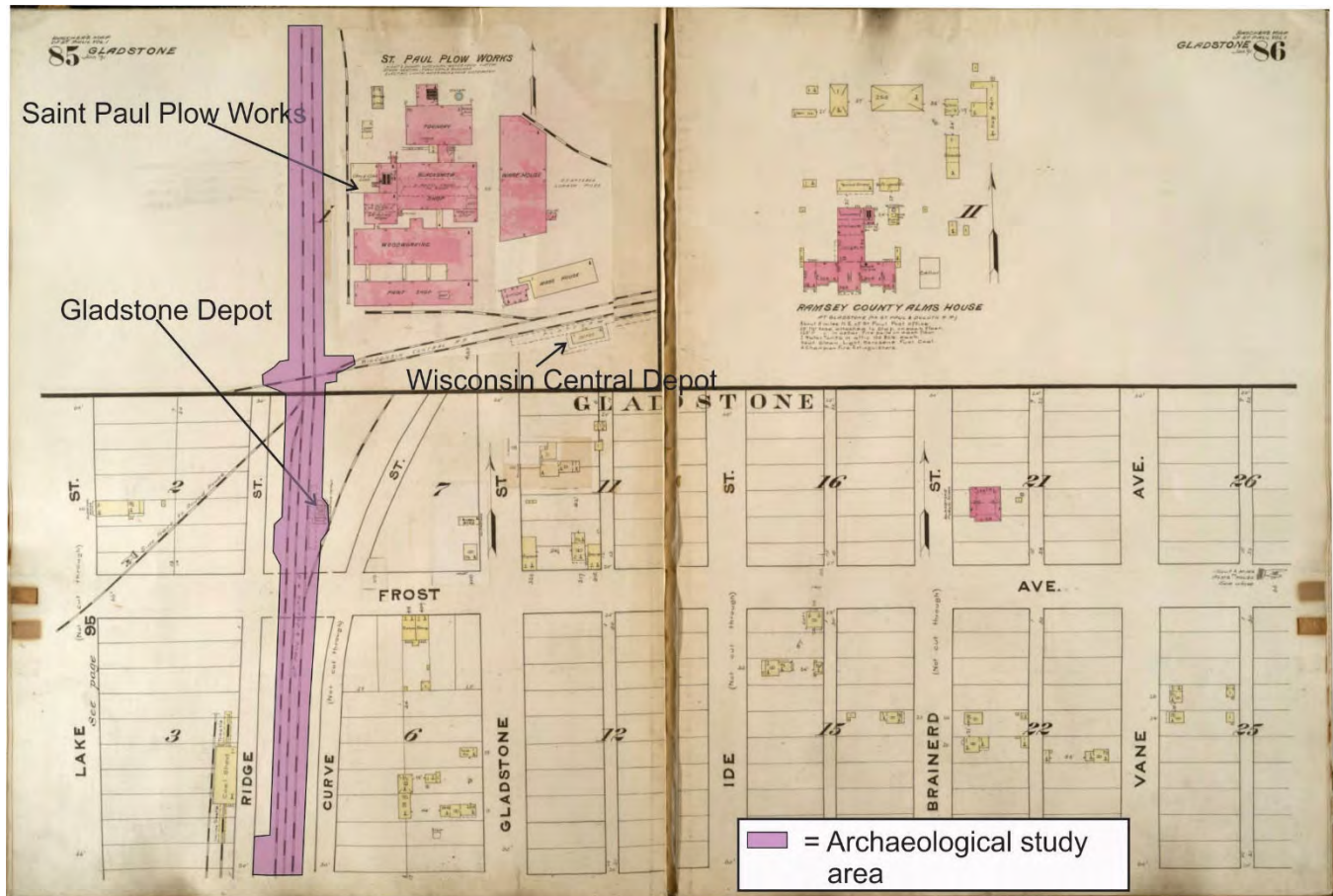


Figure 19. Gladstone Depot and Saint Paul Plow Works on 1891-1901 map (Rascher Insurance Map Publishing Company 1891-1901, Volume 1: 85-86).

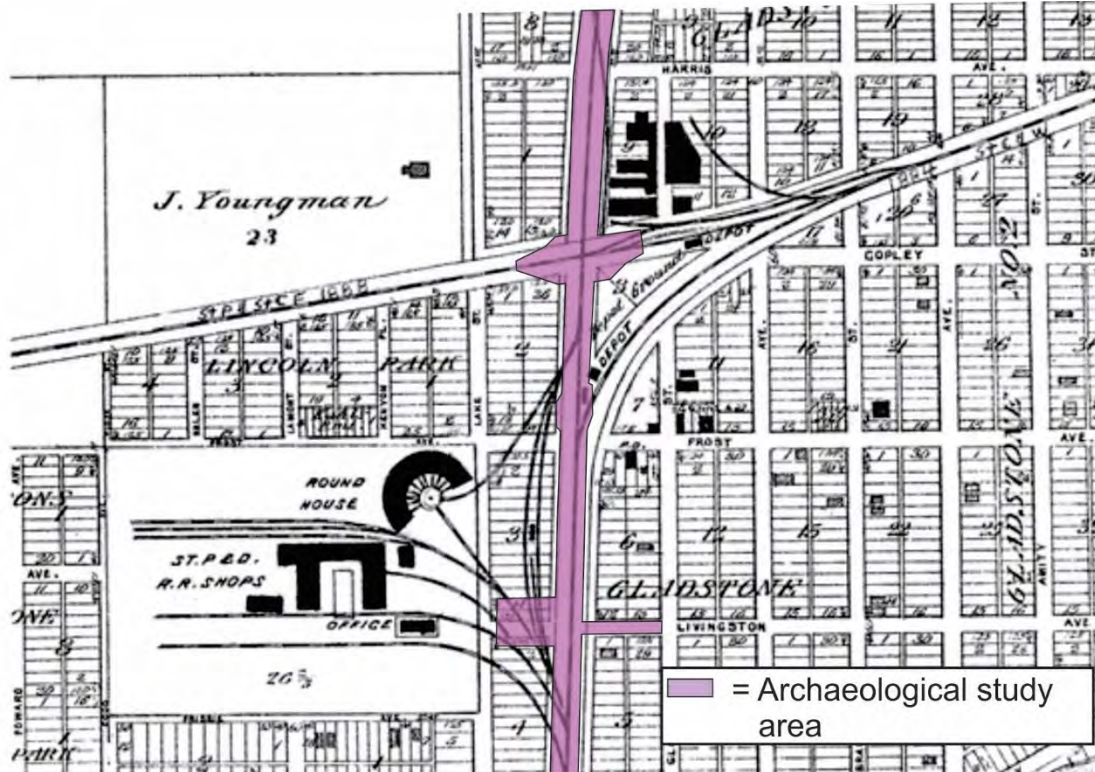


Figure 20. Depots near Gladstone, Gladstone shops (to west of tracks), and Saint Paul Plow Works (north of depots) on undated map of Maplewood (Maplewood Historic Preservation Commission n.d.: 10).

storage. The storage depot burned in 1944, and the combined depot was demolished in 1967 (Zahn and Gladhill 2014). The earliest aerial photo for this area is from 1945 (Regents of the University of Minnesota 2018). A possible structure is noted just to the southeast of the junction of the two rail lines, a few hundred feet north of Frost Avenue. The other “storage” depot does not appear on this aerial photo (Regents of the University of Minnesota 2018) where it should be located based on historic maps, as it was reported to have burned the prior year.

A schoolhouse is noted near the northwest quarter of the southwest quarter of the southwest quarter of Section 15, west of the rail line on the Andreas (1874) and Hopkins (1886) map (see Figure 18). This school is not depicted on the 1916 map (State of Minnesota 1916) due to lack of details in this area. The earliest aerial photo for this area is from 1945, and there is a structure noted near the school location (Regents of the University of Minnesota 2018). The Andreas (1874) and Hopkins (1886) maps show that the structure was outside of, but adjacent to, the rail ROW. This is also apparent on the earliest aerial photo for the area (Regents of the University of Minnesota 2018).

Along the area now known as Phalen Boulevard, on the Hopkins (1884) map, there are several dwellings near the former St. Paul and Duluth (StP&D) and Chicago, Saint Paul, Minneapolis & Omaha (CMO) rail corridors, but also various industrial buildings that would

have contributed to the development and commerce of the Payne-Phalen neighborhood. These include the Harvester Works, Terra Cotta Works, C.N. Nelson Lumber Co. Planing Mill and Office, a half round-about, and several small railroad buildings. Detailed maps from the Rascher Insurance Map Publishing Company (1891-1901) have other structures near the rail corridor such as: a box and fixture factory between the Saint Paul & Duluth and Chicago, Saint Paul & Omaha railroad tracks (buildings are partially brick and partially frame); the Northwestern Fuel Company frame coal sheds north of the tracks just east of Earl Street; the frame East 7th Street Depot between the Saint Paul & Duluth and Chicago, Saint Paul & Omaha railroad tracks, just east of Earl Street; the North Western Sewer Pipe Company and Robert's Manufacturing Co. Art Metal Works north of the tracks near Cyprus Avenue (a mix of brick and frame buildings); a planing mill and box factory just west of Forest Avenue (a mix of brick and frame buildings); a frame lumber warehouse west of the planing mill and box factory; a brick sash, door, and blinds factory north of the tracks, and a brick warehouse south of the tracks just east of Arcade Street; two brick railroad roundhouses north of the tracks just east of Edgerton Street; the East Saint Paul Depot south of the tracks, west of Payne Street (frame building); a carpenter shop and store west of the East Saint Paul Depot; frame coal sheds just north of the tracks west of Edgerton Street; a frame coal shed and a few other frame buildings associated with the Saint Paul and Western Coal Company just east of Westminster Street (near current I-35E); and frame buildings such as sheds and iron storage associated with the Chicago, Saint Paul & Omaha railroad just east of Westminster Street (near current I-35E). Several of these buildings are noted on the 1903-1904 and 1923 Sanborn Fire Insurance maps (Sanborn Map Company 1903-1904 and 1923) with some additions, such as the Greenberg Brothers scrap iron works building north of the tracks just west of Forest Street (which may be the Northern Iron and Machine building now). Many of these structures are also shown on the 1938 aerial photos of this area (Regents of the University of Minnesota 2018).

In the Hopkins (1884) map of downtown Saint Paul, there is a dense settlement on both sides of Robert Street up to 9th Street, where it becomes more sporadic. There are several structures abutting Robert Street on the east side of the road between East 3rd Street (East Kellogg Boulevard) and East 7th Street, while there are structures set back from the road on the west side of Robert Street. Between East 7th Street and East 14th Street, some structures are shown abutting the road on both the east and west sides, while others are set back from the road. One structure abuts the archaeological study area along Jackson Street. On the north side of Pennsylvania Avenue, there are railroad shops, and a roundhouse. (The roundhouse is now part of the Transportation Museum along Pennsylvania Avenue.)

The Rascher Insurance Map Publishing Company (1891-1901) fire insurance maps show several buildings along East Kellogg Boulevard, between East 3rd Street (Kellogg Boulevard) and East 14th Street, along East 14th Street, along Jackson Street and a few along Pennsylvania Avenue. Some of these are dwellings, but several are businesses that would have contributed to the commerce and development of the downtown or Lowertown area. In the downtown area there are several dwellings, but also several businesses along the Rush

Line BRT Project route. These properties are adjacent to the archaeological study area and include:

- Along East 3rd Street (East Kellogg Boulevard), Foot Schultz & Co. Shoe Warehouse; Griggs, Cooper and Co Grocery; a shoe factory; a warehouse; the Tarbox Schliek & Co. Shoe Factory; P.H. Kelly Mercantile Co. (brick building); a boot and shoe company; Northwestern Paint Works; Allen, Moon & Co. Grocery (brick building); P.H. Kelly Mercantile Company (brick building); Commercial Hotel, Seabury & Co. Grocery (brick building); Merchants Hotel (brick and stone buildings); Northwestern Bedding Co. (stone building); St. Paul Fire & Marine Building (stone building); stone building for hides, fur, and wool; and Brown Treacy & Co. – lithographing and printing (stone building).
- Along Robert Street, the Boston Clothing store, a flour and feed store, and a restaurant between East 3rd and East 4th Streets.
- Along Robert Street, the National German American Bank Building, Pioneer Press Building, Café Royal, Arcade Building, a restaurant, a cigar factory, and the Manhattan Office Building between East 4th and East 5th Streets.
- Along Robert Street, railroad ticket offices, Who. Liquor and Lodging House, the Chamber of Commerce, and the “Gent’s Furnisg[sic] Hall” between East 5th and East 6th Streets.
- Along Robert Street, Manneheimer Brothers Store, the Ryan Hotel, a confectionary, and J.L. Hudson Clothier between East 6th and East 7th Streets.
- Along Robert Street, the Plymouth Clothing Company, the Hotel Ryan Livery, a restaurant, and a granite and marble works between East 7th and East 8th Streets.
- Along Robert Street, a horse shoeing shop, Kent and Brady Roasting and Coffee Grinding Shop, the Tremont Hotel and associated saloon, and another saloon between East 8th and East 9th Streets.
- Along Robert Street, a feed store between East 9th and East 10th Streets.
- Along Robert Street, three stores between East 11th and East 12th Streets.
- Along Robert Street, four stores and a saloon between East 12th and East 13th Streets.
- The Johnson Brothers and Loomis Furniture Factory, and the U.S. Express Company Barn along East 14th Street near its intersection with Jackson Street.
- A carpenter shop, three stores, a saloon along Jackson Street between East 14th Street and Pennsylvania Avenue.
- Northwest of Jackson Street where Pennsylvania Avenue is now is a continuous street, with several rail buildings called the Railway Line Car Shops along with the roundhouse that is now part of the Transportation Museum.

PHASE IA

Most of these buildings still exist on the 1903-1904 and later 1923 Sanborn Fire Insurance maps, while some areas have additional buildings (Sanborn Fire Insurance Company 1903-1904 and 1923). By the early 1900s, some of the businesses had changed, while some remained the same.

Along Phalen Boulevard near Olive Street, there were a few dwellings near the intersection. At Cayuga Street, this is likely the approximate location of nine non-extant railroad buildings considered not eligible for listing on the NRHP during the Phalen Boulevard Phase II investigations based on historical research (Ketz and Schmidt 1997). Since this recommendation was made prior to the Supplement to the NRHP Multiple Property Documentation (MPD) for Railroads in Minnesota, 1862-1956 (draft) (Arnott and Pizza 2017), that eligibility assessment might need to be reconsidered if an project impacts this area since archaeological resources related to the former buildings may be impacted by proposed ground disturbance depending on where the station might be located and how much previous disturbance is in the area. Along Phalen Boulevard at the Payne Avenue intersection, the former East St. Paul Depot was located on the south side of the tracks, northwest of the intersection of Bush Avenue (historically known as Faquier Street) and Payne Avenue, along with a saloon and store. On the north side of the tracks, the roundhouses were located southwest of the intersecting roads. The non-extant East St. Paul Depot and the roundhouses were already considered not eligible during Phase II investigations of Phalen Boulevard, based on historical research (Ketz and Schmidt 1997). Again, since these recommendations were made prior to the Supplement to the NRHP Multiple Property Documentation for Railroads in Minnesota, 1862-1956 (draft) (Arnott and Pizza 2017), these areas might need to be reassessed for NRHP eligibility for archaeological resources depending on where the station might be located and how much previous disturbance exists. The proposed Phalen Village station near the intersection of Phalen Boulevard and Johnson Parkway might be near historic buildings associated with the Harvester Works shown on the 1891-1901 maps (Rascher Insurance Map Publishing Company). The foundry was later referred to as the Griffin Wheel Works (Sanborn Map Company 1903-1904), and later as the Northwestern Wheel Foundry Works (Sanborn Map Company 1923). There is a building in this same location today, but it is not known if it is a historic building related to the foundry works.

Along the RCRRA ROW, there do not appear to be any buildings near the Larpenteur Avenue intersection on the Hopkins (1886) map or on the 1923 aerial photo (Regents of the University of Minnesota 2018). As discussed previously, there were two stations near the Frost Avenue intersection. There do not appear to be any buildings near the Hwy 36 intersection in Hopkins (1886) or the earliest aerial photo for this area, which is 1940 (Regents of the University of Minnesota 2018).

Along Beam Avenue, Southlawn Drive, and County Road D, there do not appear to be any structures on the Hopkins (1886) map or the earliest aerial photo for the area, which is 1945 (Regents of the University of Minnesota 2018). This area mainly appears to have been agricultural until its later development after 1945.

Along TH 61, there do not appear to be any structures near the County Road E intersection on the Hopkins (1886) map, but there do appear to be nearby structures northeast and southeast of the intersection on the earliest aerial photo, which is 1953 (Regents of the University of Minnesota 2018). Currently, this intersection is almost entirely covered with impervious surfaces on all sides. As previously discussed, in downtown White Bear Lake, near 4th Street, there were possible historic features north of Railroad Park, but likely under the current TH 61 roadway.

As final design plans became available with locations of proposed ground-disturbing activities, the plans were compared to the historic maps and aerial photos to assess the potential for historic archaeological sites in the archaeological study area. This assessment included other considerations, including the amount of previous disturbance by development and utilities, and is presented in the Phase I portion of this report.

LIDAR IMAGERY

Light Detection and Ranging (lidar) imagery can be a helpful tool for discerning cultural features such as mounds or foundations in areas where aerial photos cannot pick up such features, depending on how far one can zoom in on the lidar image. Lidar imagery can help show areas of cutting and filling which affect archaeological resource potential, and can often detect cultural features such as foundations, depressions, or even prehistoric mounds that may be concealed beneath vegetation. Lidar imagery available on the OSA portal was reviewed for the length of the project (Figures 21-24). Where the archaeological study area follows TH 61, the area appears to be somewhat filled, which is not surprising for a major highway. The portion of the archaeological study area overlapping the RCRRA ROW mainly exhibits filling or cutting from the former railroad tracks, then removal of the tracks and establishment of the Bruce Vento trail. The only area of the archaeological study area along the RCRRA ROW that appears to be somewhat equal in topography to the surrounding terrain is a small area south of Frost Avenue. This may have had to do with the former depots being in this area. Along the archaeological study area that follows Phalen Boulevard, the lidar imagery shows that the most of Phalen Boulevard has been either cut, or cut and filled. A round object is visible north of Phalen Boulevard, but it is a block to the east of where the documented roundhouses should have been according to historical maps. In the portion of the archaeological study area that overlaps the downtown Saint Paul area, the area is too congested to discern any possible features on the lidar images.

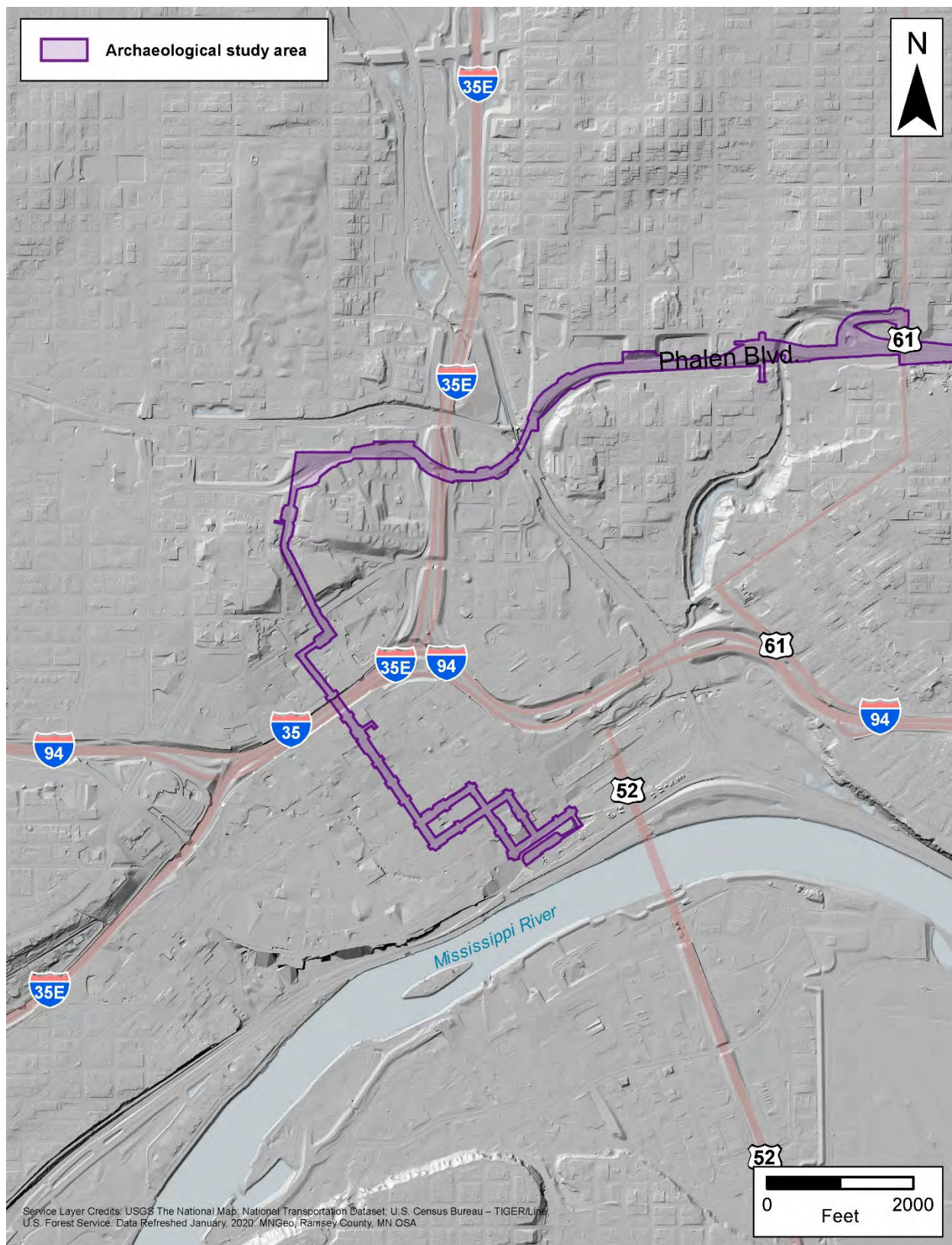


Figure 21. Lidar imagery of the archaeological study area in Lowertown or downtown Saint Paul area. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

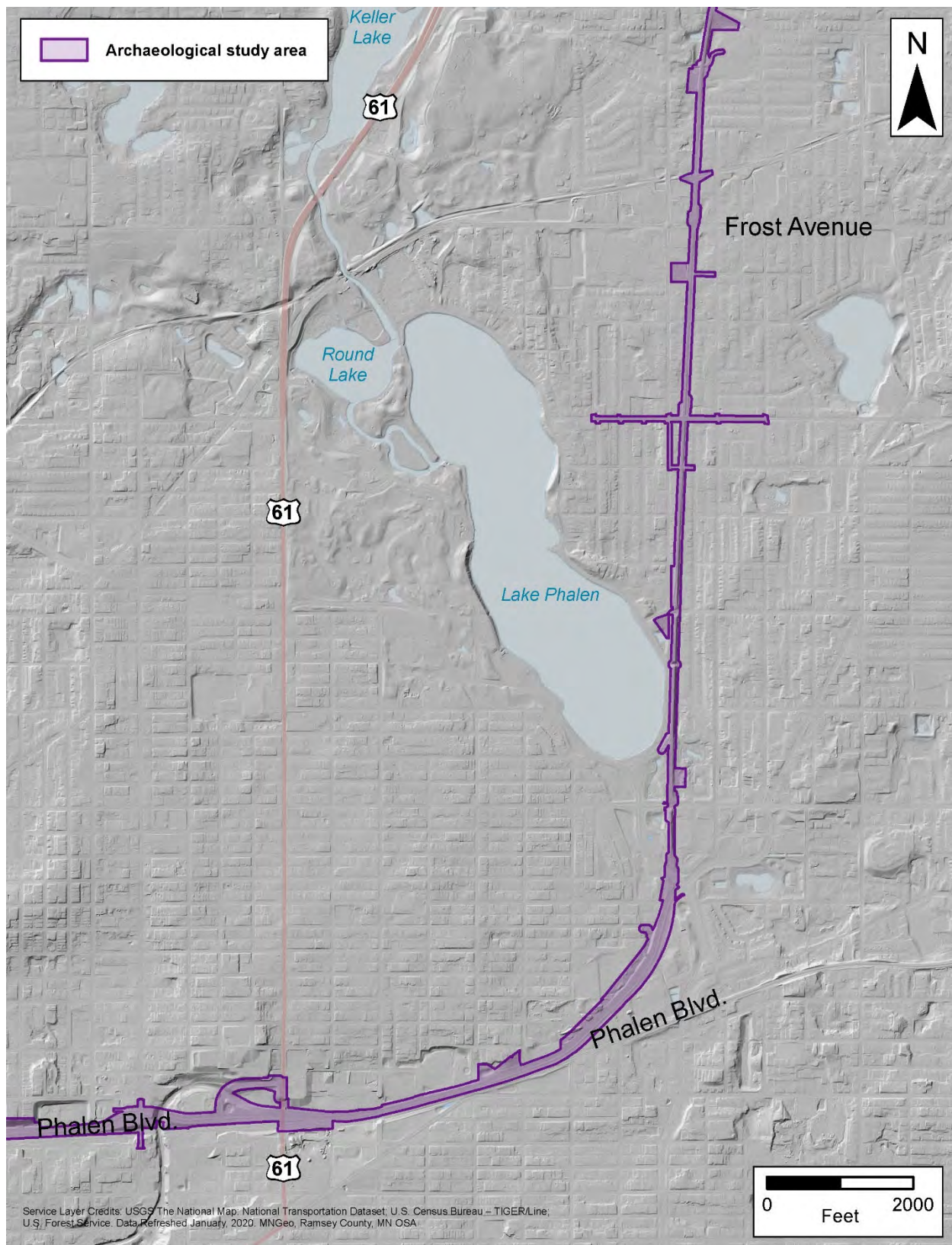


Figure 22. Lidar imagery of south central portion of the archaeological study area. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

PHASE IA

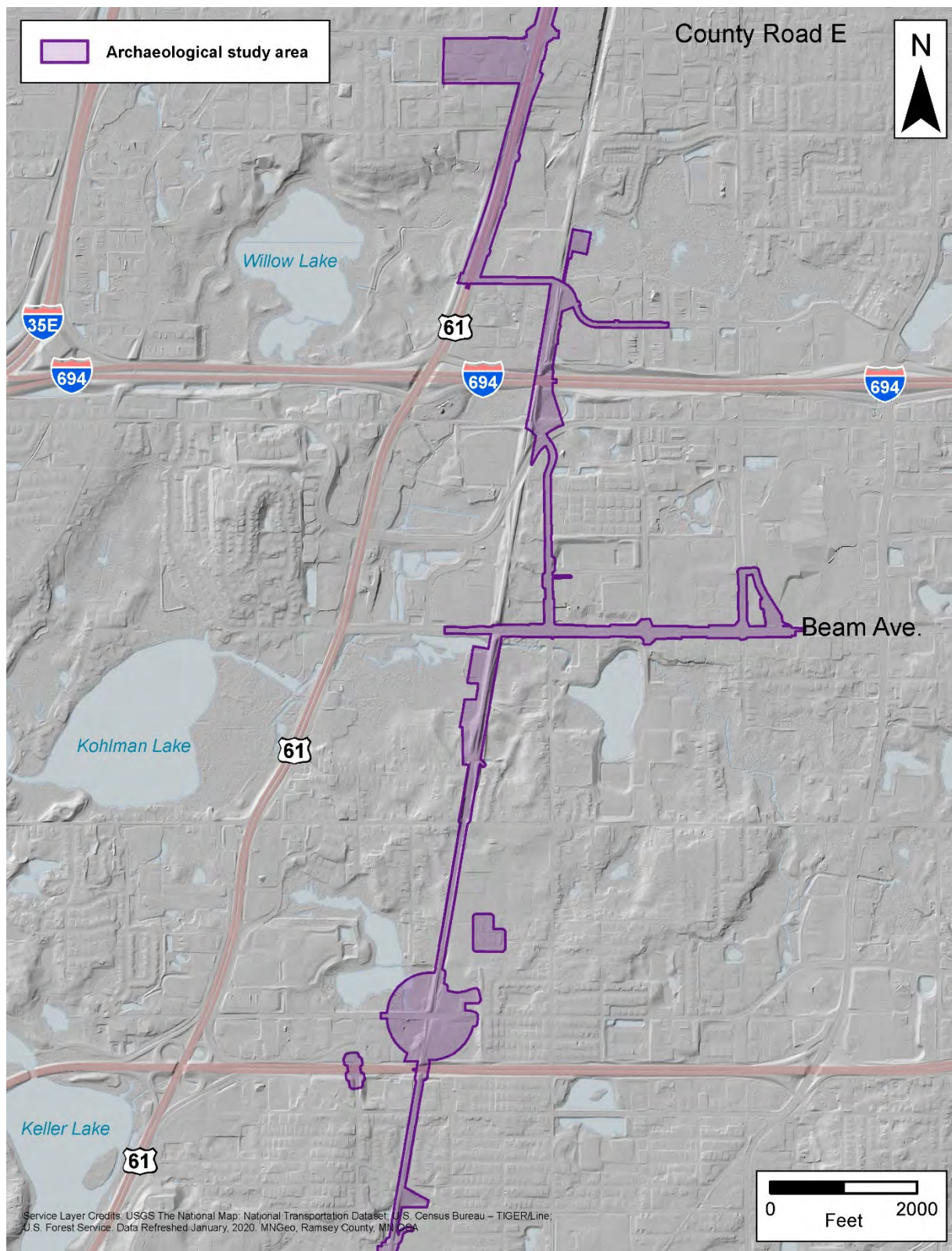


Figure 23. Lidar imagery of north central portion of the archaeological study area. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.



Figure 24. Lidar imagery of northern portion of the archaeological study area near White Bear Lake. Base map from OSA portal, <https://osa.gisdata.mn.gov/OSAPortal/Home>.

DISCUSSION

The results of the Phase IA literature review and archaeological assessment show that there are several previously recorded sites within a mile of the archaeological study area, and that some areas of the study area were previously surveyed. Not all of the previous surveys would meet today's survey standards, but at least some level of investigation was undertaken. There are a few precontact sites within a mile of the archaeological study area, and several historic sites. In the Lowertown area, most of the historic archaeological sites are on blocks, and not along established roadways, and many are under a protective layer of fill. Various portions of the archaeological study area have impervious surfaces and utilities, which would make current survey methods neither feasible nor warranted. As the station, park and rides, and became finalized, they were reviewed for their potential to contain NRHP eligible archaeological deposits by comparing them to MnModel 3 predictions, historic maps, aerial photos, lidar imagery, soil types, previously surveyed areas, and levels of previous disturbance for survey recommendations. Based on criteria presented in the Supplement to the NRHP Multiple Property Documentation for Railroads in Minnesota, 1862-1956 (draft) (Arnott and Pizza 2017), the former LS&M/St.P&D/Northern Pacific rail corridor which overlaps the BRT project was evaluated for NRHP eligibility (Pettis et al. 2020). Also, there are former privies related to the former depots in the Gladstone/Gloster area north of Frost Avenue within the archaeological study area that overlaps the RCRRA ROW.

[Text redacted]

[Figure 25 redacted]

Figure 25. [Text redacted]

[Text redacted]

PHASE IA RESULTS AND RECOMMENDATIONS

In summer/fall of 2018 and fall 2019, the Rush Line Archaeological Study Area was developed in consultation with MnDOT and using proposed project actions from Kimley-Horn (Appendix 1). The study area's definition and mapping boundaries are based on the TAC maps dated September 13, 2018, and subsequent clarification of project activities by Kimley-Horn in the October of 2019 and April of 2020. The text and mapping document all areas considered for archaeological study, and which areas were recommended for field survey or no field survey (Table 2). This information will aid in determining whether additional survey is needed if project changes occur in the future. The archaeological study area boundaries were determined as follows:

- Where the project follows mixed traffic on a dedicated guideway, with no planned disturbance, the existing ROW plus 10 feet will be considered. Along TH 61, where there might be a large ROW, either the ROW or a minimum of 50 feet from the edge of the pavement will be considered to minimize survey efforts if the project is in mixed traffic with no planned ground disturbance.
- Where the project runs along RCRRA/railroad ROW, the entire ROW (typically 100 to 150 feet) will be considered.
- Station locations and bridges will be considered with a 50-foot buffer. For stations and bridges on the RCRRA ROW, a 50-foot buffer will be considered beyond the RCRRA ROW.
- Areas where the project crosses the interstate system are considered exempt from survey due to previous disturbance.

Table 2. Archaeological Study Area

Project Segment	Study Area Boundaries
Downtown Saint Paul: <ul style="list-style-type: none"> • E Kellogg Boulevard to Wacouta • Wacouta and N Sibley Street between E Kellogg Boulevard and E 5th Street • N Sibley Street between E 5th and E 6th Streets • 5th Street between N. Sibley Street and Robert Street • 6th Street between N. Sibley Street and Robert Street 	Right-of-Way with 25 ft. buffer 25 ft. down cross-streets with 25 ft. buffer 50 ft. buffer around stations and structures

PHASE IA

Project Segment	Study Area Boundaries
Downtown Saint Paul: Robert Street to 12th Street East	Right-of-Way with 25 ft. buffer 25 ft. down cross-streets with 25 ft. buffer 50 ft. buffer around stations and structures
12th Street East to L'Orient Street	Right-of-way with 10 ft. buffer 50 ft. buffer around stations and structures
L'Orient Street to Mississippi Street	50 ft. buffer from edge of pavement
Mississippi Street to Westminster Junction	Right-of-way with 10 ft. buffer 50 ft. buffer around stations and structures
Westminster Junction	Bridge deck and railings
Westminster Junction to Payne Avenue	Right-of-way with 10 ft. buffer 50 ft. buffer around stations and structures
Payne Avenue to Arcade Avenue (including Neid Lane)	50 ft. buffer from edge of pavement 50 ft. buffer around stations and structures
Neid Lane and Payne intersection improvements between Phalen Boulevard and Whitall Street	ROW plus 10 ft buffer
Arcade Avenue to Johnson Parkway	Right-of-way with 10 ft. buffer and full RCRRRA Right-of-Way 50 ft. buffer around stations and structures Limits of disturbance for stormwater outside RCRRRA ROW
Johnson Parkway to Beam Avenue	RCRRRA Right-of-way 50 ft. buffer beyond RCRRRA Right-of-Way for stations and structures Limits of disturbance for stormwater outside RCRRRA ROW, and trail connection to Phalen Park on St. Paul Park property
English Street Pedestrian Improvements	Right of way with 10 foot buffer
Larpenteur Avenue Pedestrian Improvements	Right of way with 10 foot buffer
Highway 36 and English Street Signal Improvements	Right of way
Gervais Ave Park and Ride	Design not confirmed – 50 foot buffer for all possible locations

PHASE IA

Project Segment	Study Area Boundaries
Harvest Park Park and Ride	Limits of disturbance and 50 foot buffer
Beam Avenue to Maplewood Transit Center	Right-of-way with 10 ft. buffer
At Maplewood Mall Transit Center	50 ft. buffer from centerline or approximate centerline of Maplewood Mall Drive and McCarty Avenue Right-of-way with 10 ft. buffer on Southlawn Drive 50 ft. buffer around stations and structures
Beam Avenue to County Road D	Right-of-way with 10 ft. buffer 50 ft. buffer around stations and structures
County Road D to Buerkle Road <i>Option off existing trail alignment is located within the RCRRRA Right-of-Way</i>	RCRRRA Right-of-way 50 ft. buffer beyond RCRRRA ROW for stations and structures
Buerkle Road to Highway 61	Right-of-way with 10 ft. buffer on south side Right-of-way with 20 ft. buffer on north side 50 ft. buffer around stations and structures
Highway 61	Right-of-way with 10 ft. buffer 50 ft. buffer around stations and structures
Highway 61 from White Bear Avenue to Downtown White Bear Lake	Right-of-way with 10 ft. buffer
Intersection improvements at 4 th Street and Highway 61	Limits of disturbance outside right of way and 10 ft buffer
Pedestrian improvements Cedar Avenue, Whitaker west and east of Highway 61	Right of way with 10 ft buffer
White Bear Lake Station – original 2 nd Ave Station and 7 th Ave Station	50 ft. buffer around stations and structures, Right of way with 10 ft buffer along streets

There are four previously recorded sites overlapping the archaeological study area. Two of these sites are vaguely recorded, and have not been evaluated for the NRHP. The other two sites were considered potentially eligible for the NRHP and salvage excavations were undertaken during the construction of the Department of Revenue office building.

[Text redacted]

reported surveys within the archaeological study area. Although some of the previous reported surveys were not performed to today's Mn OSA and Mn SHPO standards, at least some level of survey was performed. Historical research shows that there were several residential and commercial buildings along some of the roads along adjacent to the archaeological study area in downtown Saint Paul which could have potential to have archaeological resources. However, many of these areas have been saturated with utilities and urban expansion, which were considered for potential survey recommendations.

Two areas within the former LS&M/St.P&D/NP Northern Pacific rail corridor were surveyed. With reference to the Supplement to the NRHP Multiple Property Documentation for Railroads in Minnesota, 1862-1956 (draft) (Arnott and Pizza 2017), the former railroad roadway itself was evaluated for possible NRHP Criteria C and D considerations. This included a recommended pedestrian survey of the former railroad roadway to see what surface features may be apparent, and soil borings to look for buried remnants of the original LS&M 1868 roadway under the later post 1880s railroad embankment on which the Bruce Vento Trail was constructed. The literature review and subsequent historical research identified potential historic resources near the location of the former railroad depots north of Frost Avenue within the archaeological study area. Although the depots have been removed, there is archival information about the depots at the Minnesota Historical Society Library, and field investigations would not likely provide any new information that is not already available in historical documents. However, historic maps of the depot locations noted privies related to the depots. During removal of the depots, these privies were likely filled in. Besides their original purpose, privies were often used for depositing garbage, such as bottles, ceramics, etc., so there was potential for intact deposits in the privies if they could be located. Historic research and fieldwork, including Phase II investigations using heavy machinery due to the amount of fill in the area, were undertaken at these potential privy locations and are presented in the Phase II portion of this report.

Due to the degree of urban development within and adjacent to the archaeological study area, including the vast number of underground utilities, recommendations for survey areas were developed in consultation with MnDOT CRU (Table 3). Areas recommended for survey and the survey type within the areas can be found in Appendix 2. Assumptions about the presence, absence, or degree of archaeological potential are based on MnModel 3, patterns of Native American and early Euro-American land use, results of the literature and records review, visual reconnaissance, and visual inspection of the former railroad roadway in the summer of 2018. Survey work is recommended in the following areas:

- Phalen Boulevard: visual inspection of wooded areas at western edge of RCRRA ROW north of Atlantic Street to determine if shovel testing is warranted.
- RCRRA ROW: pedestrian reconnaissance of the entire RCRRA ROW corridor; visual inspection by the geomorphologist to determine if shovel testing is warranted; geomorphological coring to determine presence of 1868 LS&M railroad roadbed.

- Frost Avenue/Gateway State Trail Bridge: Phase I/II of railroad depot privies.
- Larpenteur Avenue Station, Weaver Elementary School bridge and trail extension, and Highway 36: visual inspection by geomorphologists to determine if shovel testing is warranted.
- TH 61: survey recommended for 10 foot buffer beyond the existing ROW if work is proposed here in the future.
- White Bear Lake: Review any work beyond the archaeological study area if work is proposed in the future.

Table 3. Archaeology Survey Recommendations for the Rush Line BRT project.

BRT Segment	Appendix 2, Map Page No.	Assessment	Recommendations
Kellogg Avenue	1	Will generally use existing roadway and work is expected to be within the road ROW; platform area disturbed, ROW heavily disturbed	No survey recommended
Wacouta Street	1	Will generally use existing roadway and work is expected to be within the road ROW; platform area disturbed, ROW heavily disturbed	No survey recommended
5 th and 6 th Street	1	Will generally use existing roadway and work is expected to be within the road ROW; ROW heavily disturbed	No survey recommended
Sibley Street	1	Will generally use existing roadway and work is expected to be within the road ROW; platform area disturbed, ROW heavily disturbed	No survey recommended
Robert Street	1	Will generally use existing roadway and work is expected to be within the road ROW; station area heavily disturbed, ROW heavily disturbed	No survey recommended
East 14 th Street	1	Will generally use existing roadway and work is expected to be within the road ROW; station area heavily disturbed, ROW heavily disturbed	No survey recommended
Jackson Street	1-2	Will generally use existing roadway and work is expected to be within the road ROW; station area heavily disturbed, ROW heavily disturbed	No survey recommended
Pennsylvania Avenue	2	Will generally use existing roadway and work is expected to be within the road ROW; station areas disturbed, ROW heavily disturbed	No survey recommended

BRT Segment	Appendix 2, Map Page No.	Assessment	Recommendations
Phalen Boulevard (including alternative centerline near Arcade Street/Neid Lane and Payne intersection improvements between Phalen Boulevard and Whittall Street, and sidewalk connection at Cook Avenue East) and including stormwater improvements	2-5	<p>Will use existing roadways to Arcade, then RCRRA ROW to Johnson Parkway; station areas heavily disturbed; area along Payne Avenue heavily disturbed</p> <p>Visual reconnaissance indicates locations of nine former railroad buildings at Cayuga Street; East St. Paul Station; E. St. Paul Roundhouse; and CStPM&O Roundhouse (see Figure 12) have been heavily disturbed by construction of Payne Avenue, modern buildings and installation of utilities. Low potential for intact deposits. No reconsideration per the Supplement to the NRHP MPDF for Railroads in Minnesota, 1861-1956 (draft) warranted.</p>	<p>No survey recommended for most of area</p> <p>Exception: minimal visual inspection of wooded areas at western edge of RCRRA ROW north of Atlantic Street, to determine if shovel testing is needed (RCRRA ROW is significantly larger in this area). Also, minimal visual inspection of wooded area at eastern end of Cook Avenue East. If area has potential for intact soil, then shovel test.</p>
Trail connection to Phalen Park on St. Paul Park property	5	This area originally part of Lake Phalen; fill deposited to fill in the portion of lake; no potential for prehistoric surficial deposits	No survey recommended
RCRRA ROW (including stormwater areas outside of RCRRA ROW)	5-11	May require modification of the trail embankment in some areas	Pedestrian reconnaissance of entire RCRRA ROW corridor; visual inspection by geomorphologist to determine if shovel testing is warranted in some areas; geomorphological coring to determine whether earliest railroad roadbed is present beneath modern Bruce Vento Trail embankment
Frost Avenue/Gateway State Trail Bridge	7	Location of former depot privies	Ph I/II with mechanical stripping to determine if privy feature(s) present
Larpenteur Avenue Station, Weaver Elementary Bridge and trail extension, Highway 36	6, 7, 8, 10, 11	Low to medium potential for surficial precontact deposits; heavily disturbed in most areas	Visual inspection by geomorphologist to determine if shovel testing is warranted in some areas

PHASE IA

BRT Segment	Appendix 2, Map Page No.	Assessment	Recommendations
Bridge, Fitch Road/N. Barclay Street Bridge, Beam Avenue Bridge, and I-694 Bridge			
Pedestrian improvement along both sides of Larpenteur Avenue, and English Street on west side of RCRRA ROW	6, 7	Low to medium potential for surficial precontact deposits; heavily disturbed in most of area including grading and underground utilities	No survey recommended
Highwy 36 and English Street Signal Improvements	8	Low potential for surficial precontact deposits; covered by impervious surfaces or heavily disturbed in grassy areas including grading and underground utilities	No survey recommended
Gervais Ave Park and Ride	9	Low to medium potential for surficial precontact deposits; heavily disturbed including grading and underground utilities	No survey recommended
Harvest Park Park and Ride	9	Low to medium potential for surficial precontact deposits; heavily disturbed including grading for existing parking lot	No survey recommended
Trail connection to Barclay cul-de-sac	9, 10	Low to medium potential for surficial precontact deposits; steep slope to Barclay cul-de-sac	No survey recommended
Beam Avenue, Hazelwood Street, Buerkle Road (including pedestrian improvements east of corridor)	10,11	Low to medium potential for surficial precontact deposits; heavily disturbed including grading and underground utilities	No survey recommended
Sidewalk along St. Johns Boulevard East	10	Low to medium potential for surficial precontact deposits; heavily disturbed including grading and underground utilities	No survey recommended
Trunk Highway 61 from Buerkle Road to Willow Lake Boulevard	11-12	Previously recorded archaeological site (21RAp) located north of Buerkle Road heading north to near Willow Lake Boulevard. Previously recorded site location is vague. Based on site description, likely chance for any remaining site would be on west side of TH 61, outside the ROW. The	No survey recommended. NOTE: If any change in design extends work beyond the TH 61 ROW, survey for precontact deposits west of TH 61 recommended.

PHASE IA

BRT Segment	Appendix 2, Map Page No.	Assessment	Recommendations
		ROW is heavily disturbed in this area both east and west of TH 61.	
Trunk Highway 61 from Willow Lake Boulevard to Marina Triangle Station	12-15	Will generally use existing roadway and work is expected to be within the road ROW; station area heavily disturbed; ROW heavily disturbed.	No survey recommended
County Road E Park and Ride (Vadnais Heights Sport Center)	12	Will generally use existing roadway and work is expected to be within the road ROW; station areas heavily disturbed; ROW heavily disturbed	No survey recommended
Pedestrian improvements along Cedar Avenue	13	Area highly disturbed by utilities, retention pond, previous road construction, grading	No survey recommended
Trunk Highway 61 (Whitaker Street Station to northern terminus of BRT corridor)	14-16	Will generally use existing roadways and work is expected to be within the road ROW. Road ROW heavily disturbed. Area adjacent to project segment generally has high potential for precontact and historic deposits.	No survey recommended. NOTE: <i>If any change in design extends work beyond the limits of the archaeological study area, survey is recommended.</i>
BNSF pedestrian improvements at Whitaker west of Trunk Highway 61	15	Area highly disturbed by previous railroad grading	No survey recommended
Other improvements at Whitaker east of Trunk Highway 61	15	Area highly disturbed by previous road construction and utilities	No survey recommended
Originally proposed White Bear Lake 2 nd Avenue Station	16	This location no longer being considered	NOTE: <i>If this station location is considered again, geomorphological coring to assess potential for intact precontact deposits recommended.</i>
Intersection improvements along 4 th Street (White Bear Lake)	16	Area highly disturbed by previous road construction and utilities	No survey recommended

PHASE I SURVEY

INTRODUCTION

The Phase IA literature review of the Rush Line BRT project in Ramsey County, Minnesota included various avenues of historical research and consultation with MnDOT CRU to establish the archaeological study area and survey recommendations prior to fieldwork. The archaeological study area as of April 2020 (including primary storm water best management practice locations) is presented in Appendix 1, with the archaeological survey presented in Appendix 2.

A visual reconnaissance of the entire project was performed at least two times, and the Phase IA resulted in recommendations for survey in six areas:

- A) Phalen Boulevard: visual inspection of wooded areas at western edge of RCRRA ROW north of Atlantic Street to determine if shovel testing is warranted (see Appendix 2, page 4).
- B) RCRRA ROW: pedestrian reconnaissance of the entire corridor; visual inspection by the geomorphologist to determine if shovel testing is warranted; geomorphological coring to determine presence of 1868 LS&M railroad roadbed (Figures 26 and 27 and see Appendix 2, page 5-10).
- C) Frost Avenue/Gateway State Trail Bridge: Phase I/II of railroad depot privies (see Appendix 2, page 7).
- D) Larpenteur Avenue Station, Weaver Elementary School Bridge and trail extension, and Highway 36: visual inspection by geomorphologists to determine if shovel testing is warranted (see Appendix 2, pages 7-9).
- E) TH 61: survey recommended for 10 foot buffer beyond the existing ROW if work is proposed here in the future (see Appendix 2, page 11-12).
- F) White Bear Lake: Review any work beyond the archaeological study area if work is proposed in the future (see Appendix 2, pages 15-16).

Due to the project's urban nature and the amount of previous disturbance and utilities, the Phase I included intensive historical research of the former 1868 LS&M railroad roadway; windshield surveys of the BRT project alignment; intensive walkover with soil geomorphologists along the former railroad roadway within the RCRRA ROW on which the Bruce Vento Trail is located; geomorphological coring within the former railroad roadway; and shovel testing in a few specific areas. The project is located in SHPO Region 4e. In total 48 acres were surveyed.

PHASE I SURVEY



Figure 26. Areas of RCRRRA ROW overlapping 1868 LS&M railroad roadway where geomorphological soil coring was undertaken.

PHASE I SURVEY



Figure 27. Areas of RCRRA ROW overlapping 1868 LS&M railroad roadway where geomorphological soil coring was undertaken.

PHASE I SURVEY

In November 2018, MVAC personnel led by the Principal Investigator conducted fieldwork along portions of the Rush Line BRT project, including intense visual reconnaissance and shovel testing a few locations based on the Phase IA recommendations for each area.

Strata Morph Geoexploration performed soil borings along the former railroad roadway to look for evidence of the original 1868 LS&M railroad roadbed beneath the post 1880 railroad embankment on which the Bruce Vento Trail was constructed. The results of the soil coring and intensive reconnaissance of the former railroad roadway are summarized briefly in this report and are presented in more detail in a separate report, written in coordination with Mead and Hunt, that evaluates the NRHP eligibility of the former railroad roadway (Pettis et al. 2020). Archaeological considerations for the former railroad roadway were evaluated under Criteria C and D and focused on the initial 1868 LS&M roadway, while the architectural history component was considered Criterion A. Although the entire former LS&M/St.P&D/NP rail corridor from Saint Paul to Duluth had previously been considered to be NRHP eligible, no formal documentation had been prepared, so the report on the portions of the corridor that overlap the Rush Line BRT study areas considers the various criteria in detail (Pettis et al. 2020).

Based on consultation with MnDOT CRU, survey recommendations considered the extensive previous disturbance along the archaeological study area, including urban expansion and especially utilities. Reconnaissance included walkthroughs of the former railroad roadway (RCRRA ROW) overlapping the archaeological study area from Johnson Parkway to Beam Avenue, and from County Road D to Buerkle Avenue. The late start to the 2018 field season for the survey also led to less than optimal survey conditions due to rain, light snow cover, and somewhat frozen ground, but did not impede the reconnaissance survey. One area on private land was shovel tested in April 2019, after Kimley-Horn obtained permission from the landowner, to look for possible evidence of the original 1868 LS&M railroad roadbed. The results of this are presented in Pettis et al. (2020).

RESEARCH DESIGN/METHODS

The Phase IA literature review prepared prior to fieldwork considered historical resources such as Government Land Office (GLO) maps, fire insurance maps, historic plat maps, historic aerial photos, and topographic maps to consider areas where historic resources might be located. The literature review also considered MnModel 3 predictions for prehistoric surface deposits along the project. Lidar imagery provided information on areas that had been cut or filled, including the former railroad roadway. Research in SHPO records provided information on previously recorded sites near or within the archaeological study area and previous surveys that overlapped the study area. This information, in combination with modern Google Earth imagery of the study area and a drive-through with MnDOT CRU staff in the

PHASE I SURVEY

summer of 2018, helped in assessing the study area and the amount of previous disturbance. A bike ride by MVAC personnel in the summer of 2018 along the Bruce Vento Trail (which is on the post-1880s railroad embankment) also helped provide a good feel for the former railroad roadway and the amount of disturbance along Phalen Boulevard. Utilizing the Phase IA literature review and historical research, the research design for the project sought to identify cultural resources that might be impacted by proposed construction activities.

Field Methods

Along the former 1868 LS&M railroad roadway overlapping the RCRRA ROW and Rush Line BRT archaeological study area from Johnson Parkway to Beam Avenue, and from County Road D to Buerkle Road, the archaeological reconnaissance focused primarily on looking for remnants of the 1868 LS&M railroad roadway, and also on looking for any surface features related to the initial railroad construction (Figures 28 through 32). The area overlapping the archaeological study area (RCRRA ROW in this area) from County Road D to Buerkle Avenue was also visually inspected to look for surface features, even though it did not overlap the initial 1868 LS&M railroad roadway. Visual reconnaissance related to direct effects of the project was selected as the primary field method because of the area's extensive urban development. MnModel 3 shows low to medium potential for intact surficial prehistoric deposits along the entire length of the RCRRA ROW and the immediately surrounding area, so systematic subsurface investigations such as shovel testing were not undertaken. Exceptions were hand probing in some locations to determine the presence or absence of fill, shovel testing in selected areas, and geomorphological coring to look for remnants of the original 1868 LS&M railroad roadbed below the post-1880s railroad roadway on which the Bruce Vento Trail was constructed.

In early November 2018, MVAC personnel and geomorphologists from Strata Morph Geoexploration walked along the Bruce Vento Trail within the RCRRA ROW portion of the project to (1) look over the archaeological study area for upcoming soil coring; (2) assess whether any areas should be considered higher potential for intact prehistoric deposits, and if so, whether they should be shovel tested; and (3) look for surface cultural features that should be recorded. Intensive visual reconnaissance of the former railroad roadway included scanning the ground surface for cultural materials or surface features, observing modern and historic land use activities, confirming locations of low archaeological potential (steep slopes, mechanically disturbed soils, wetlands, cut and filled areas), and looking for evidence of the former original 1868 LS&M roadway. Digital photographs were taken to document representative samples of characteristic elements of the rail corridor. After the visual inspection, inspection of lidar imagery helped in interpreting the results of the reconnaissance survey and obtaining basic measurements of the railroad embankments as needed.

As noted, the visual inspection was supplemented by hand soil coring as needed, and shovel testing was undertaken in a few specific areas. Shovel tests were generally placed 12

PHASE I SURVEY

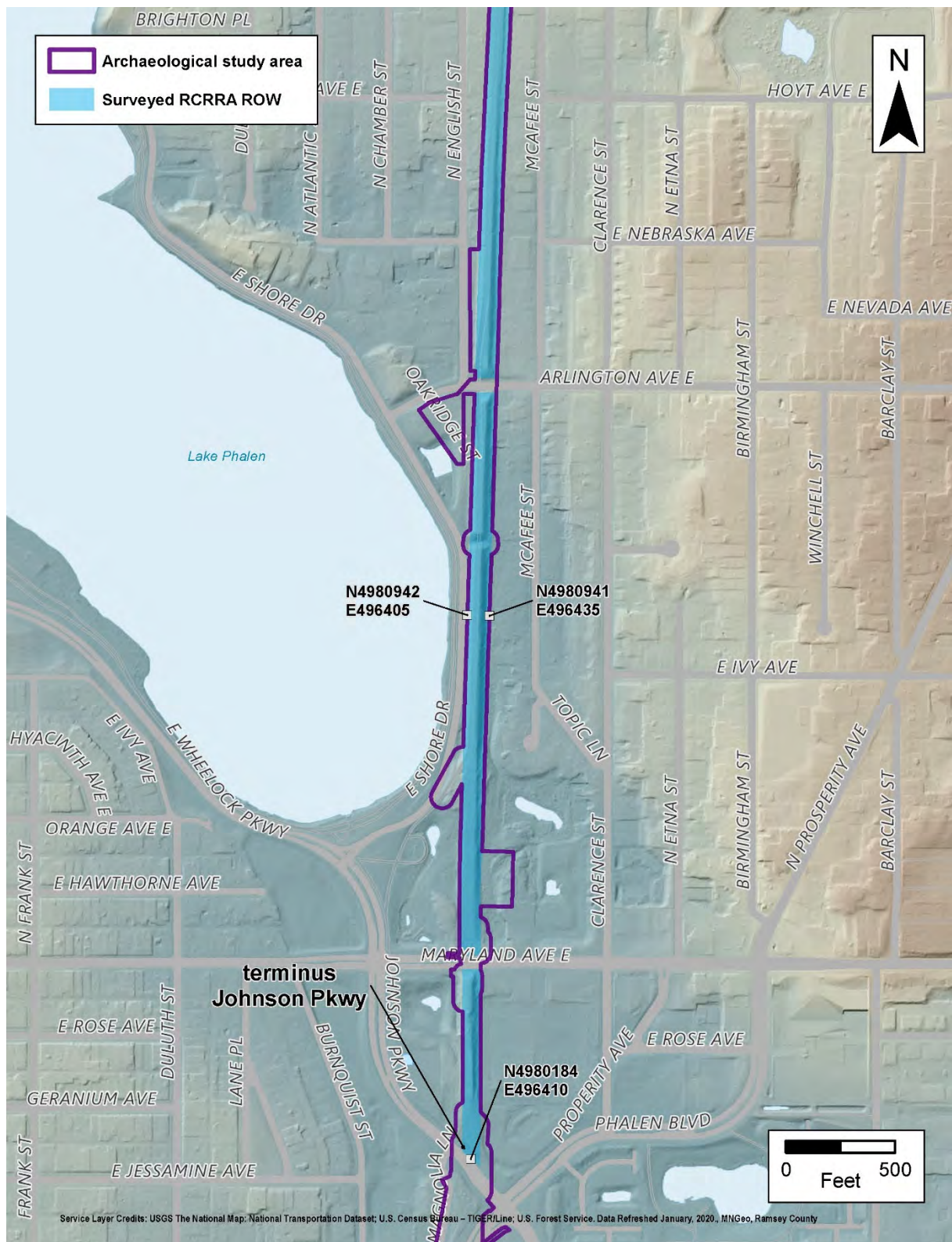


Figure 28. Southern area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations. Representative UTM coordinates are presented.

PHASE I SURVEY

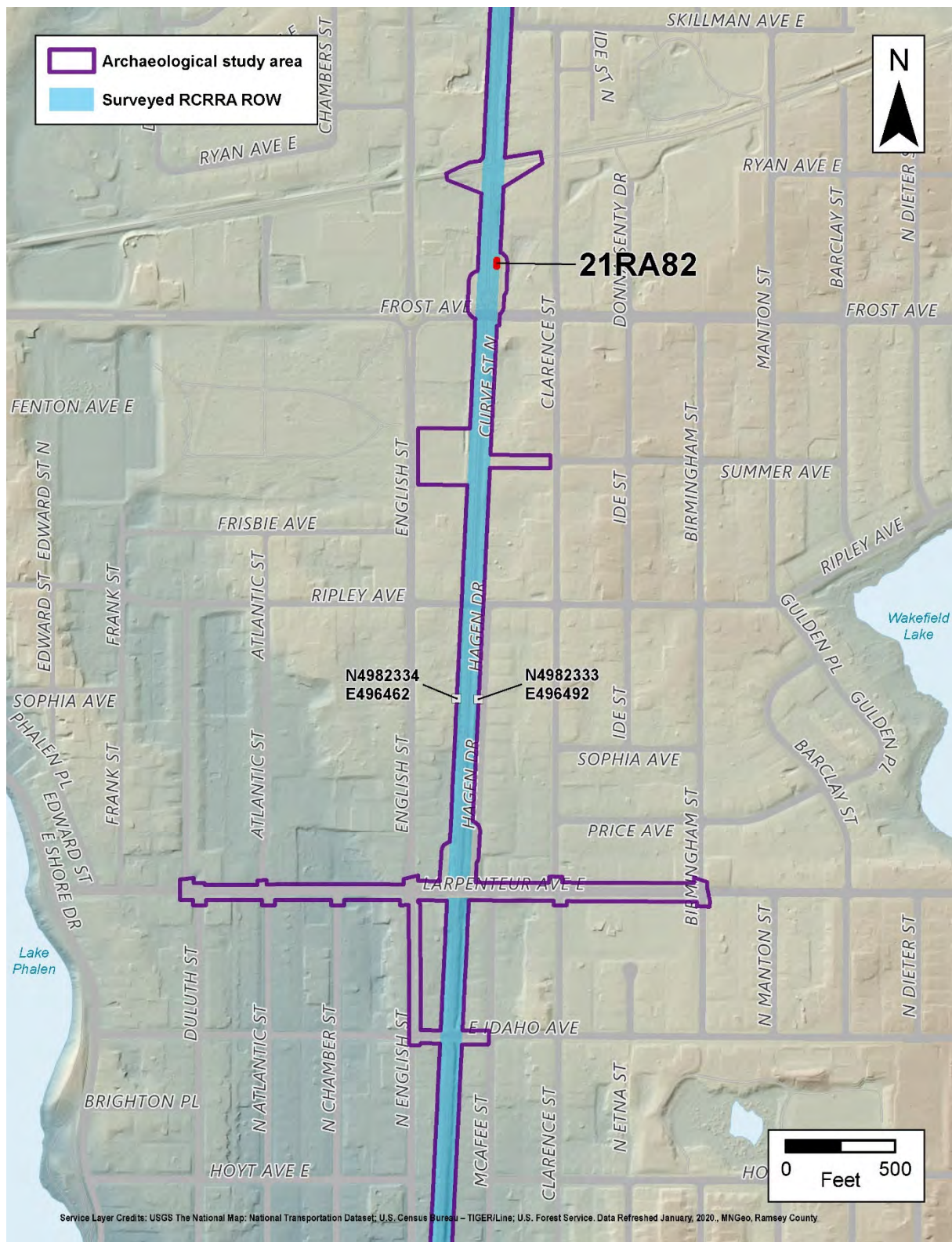


Figure 29. Southcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations. Representative UTM coordinates are presented. New site, 21RA82 shown in archaeological study area.

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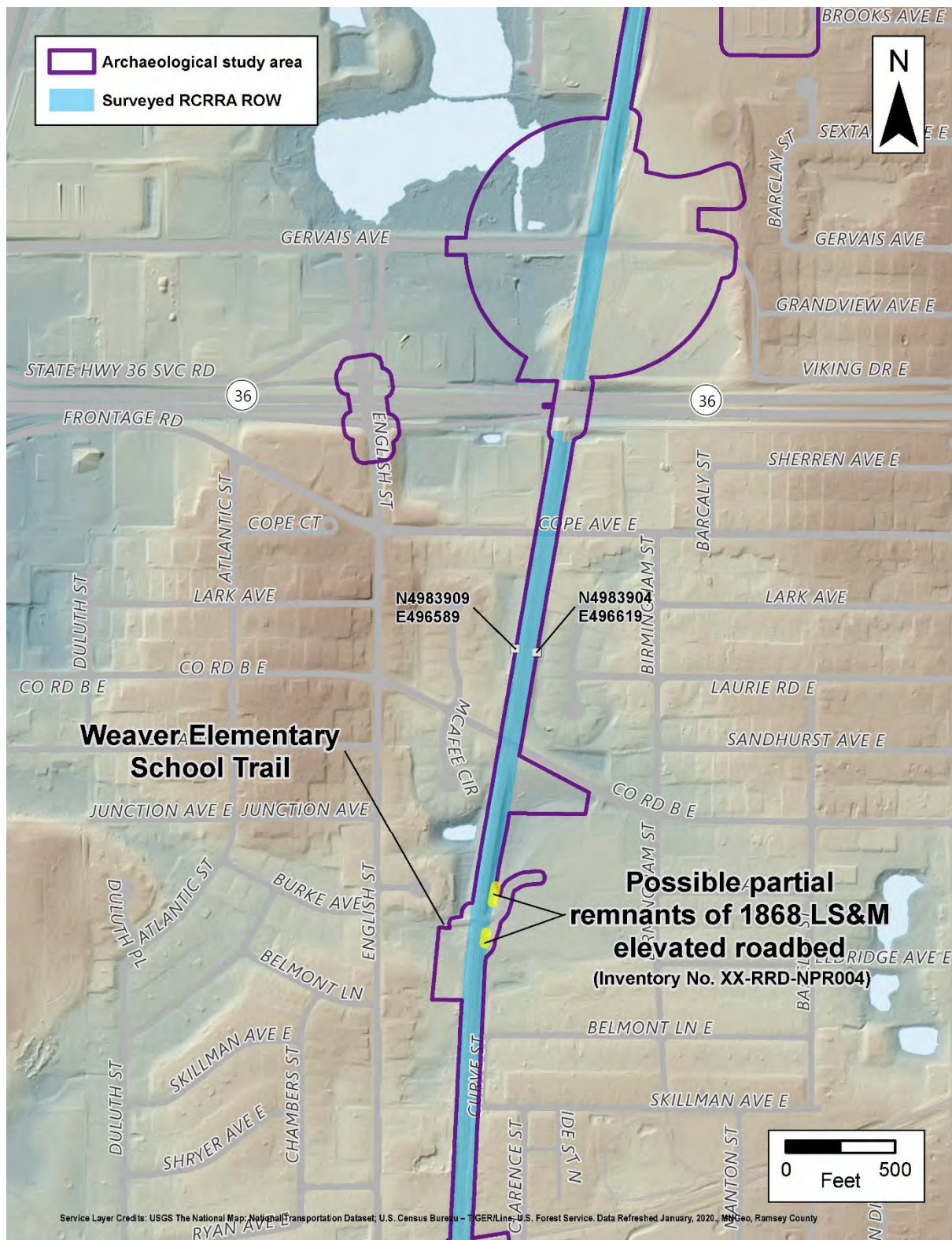


Figure 30. Northcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations. Representative UTM coordinates and architecture/historic inventory numbers for surface remnants of the 1868 LS&M elevated roadbed are presented.

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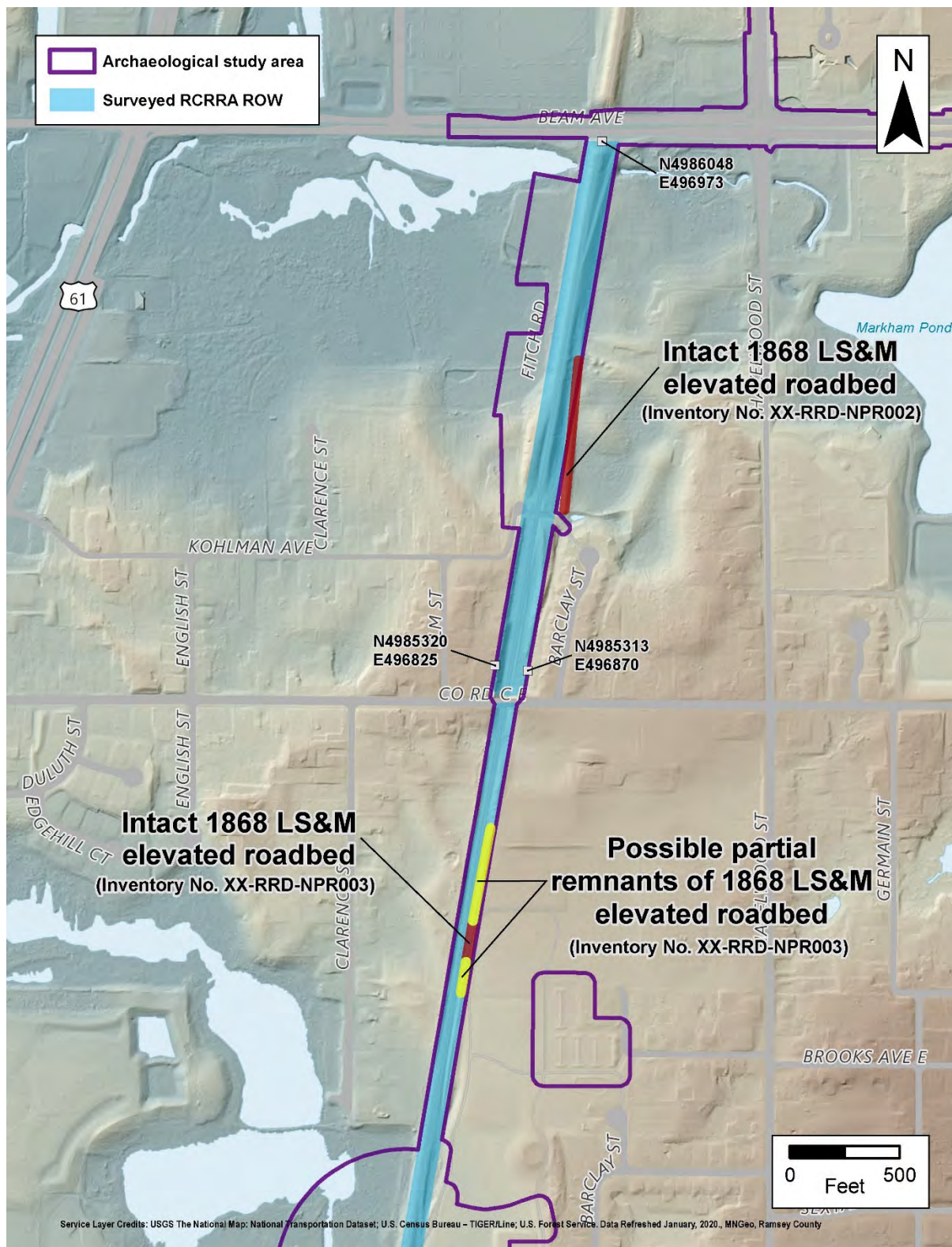


Figure 31. Northcentral area of RCRRA ROW that was intensively visually inspected by MVAC and Strata Morph Geoexplorations. Representative UTM coordinates and architecture/historic inventory numbers for surface remnants of the 1868 LS&M elevated roadbed are presented.

PHASE I SURVEY



Figure 32. Area showing County Road D to Buerkle survey area that was intensively visually inspected (area between County Road D and to just north of I-694 is owned by RCRRA and area north of I-694 to Buerkle owned by Ramsey County).

PHASE I SURVEY

to 15 meters apart and were about 28 to 30 centimeters (cm) in diameter. All shovel tests were excavated into sterile subsoil. Specific methods for various areas are presented in the results section of the report.

Survey methods and report preparation complied with guidelines in the *SHPO Manual for Archaeological Project in Minnesota* (Anfinson 2005), the *State Archaeologist's Manual for Archaeological Projects in Minnesota* (MN OSA 2011), and *MnDOT Cultural Resources Unit (CRU) Project and Report Requirements* (MnDOT 2017).

GEOMORPHOLOGICAL DESKTOP ASSESSMENT

Strata Morph Geoexploration prepared a desktop assessment using a preliminary centerline for the project to help assess whether buried archaeological deposits might exist beneath the existing rail grade fill and beneath other urban fill where the proposed BRT corridor is not on the grade (Appendix 3). Strata Morph used geologic maps to determine the nature of the landscape and deposits in and surrounding the proposed corridor; USGS topographic maps dating from 1902 to 1952 to examine local and regional topography recorded prior to the heaviest urbanization; and hillshade lidar images and maps to determine modern topographic detail, which helped determine the extent of the rail grade cut and fill, as well as the thickness of the fill and depth of cutting. Strata Morph concluded that the cut portions of the corridor have a low potential for surface or buried archaeological deposits, and that the filled portions have moderate potential for buried archaeological deposits in the glacial deposits directly beneath the fill, but low potential for deeply buried archaeological deposits within the glacial deposits covered by fill. In paludal deposit sequences, archaeological deposits could be at the surface, within, or beneath the paludal soil (soil that developed in marshy condition).

FIELD SURVEY

An intensive visual inspection with minimal shovel testing was conducted with Strata Morph Geoexploration on November 4 and 5, 2018 between Johnson Parkway and Beam Avenue, and County Road D to Buerkle Avenue (see Figures 28 through 32). Light rain was encountered the first day, but surface visibility was good since the vegetation and leaves had begun to die off. A second intensive reconnaissance survey was undertaken on November 14 and 15, 2018, to look at some areas more closely and to measure surface evidence of what

PHASE I SURVEY

was presumed to be the 1868 LS&M roadbed. The vegetation had died off even further by this time, although some areas (particularly in the shade) had a light covering of snow. Some additional reconnaissance was undertaken on November 30, 2018, after the completion of the Phase II work for the project. There was a light layer of snow on the ground on that day. On April 26, 2019, shovel testing and visual inspection were undertaken at the Weaver Elementary School trail area after the snow had melted and the ground had thawed; the 1868 LS&M railroad roadbed exposed on the surface between Kohlman and Beam Avenue also was revisited. Field conditions were optimal on this day.

Archaeological survey recommendations had included visual inspection of various areas to either confirm disturbance or to decide where shovel testing was needed. The following locations were inspected, recommendations were updated, and survey actions were taken as appropriate.

A) Phalen Boulevard

Recommended visual inspection of wooded area at western edge of RCRRA ROW north of Atlantic Street and along the eastern edge of the Duluth and Case Recreation Center Park (see Appendix 2, page 4). Also visual inspection of the wooded area at eastern end of Cook Avenue East. The wooded area east of Cook Avenue East was found to be disturbed and no shovel testing is warranted. In early November 2018, shovel testing was conducted in a portion of the RCRRA ROW west of Phalen Boulevard and west of the Bruce Vento Trail near the Duluth and Case Recreation Center Park, south of Johnson Parkway. The RCRRA ROW widens to the west here, and includes a portion of the park's manicured lawn (Figure 33 and 34). The topography in the wooded RCRRA ROW was obviously disturbed, and it was apparent that the construction of Phalen Boulevard had affected this area significantly. However, the northwestern limits of the RCRRA ROW in the edge of the park lawn appeared less disturbed, at least on the surface, and visual inspection with the geomorphologist indicated that there was some potential for intact soil.

Shovel testing was undertaken near the edge of the RCRRA ROW, along the edge of the park and/or at the edge of the adjacent wooded area if it was not obviously disturbed. The wooded area had numerous small trees, but many of the leaves had fallen, which facilitated visual inspection. One line of shovel tests was excavated at 12 to 15 meter intervals, into sterile subsoil. A few of the tests exhibited signs of disturbance, but at least 14 of the 17 had relatively intact topsoil, or intact topsoil under a very thin layer of fill. An Oakley soil core was used to core the base of the shovel tests for at least 30 additional centimeters into sterile subsoil, to look for evidence of buried cultural deposits, and none was found. The topsoil in this area ranged between 30 and 35 centimeters below the ground surface (cmbgs). The following are examples of typical soil profiles within the edge of the RCRRA ROW:

PHASE I SURVEY

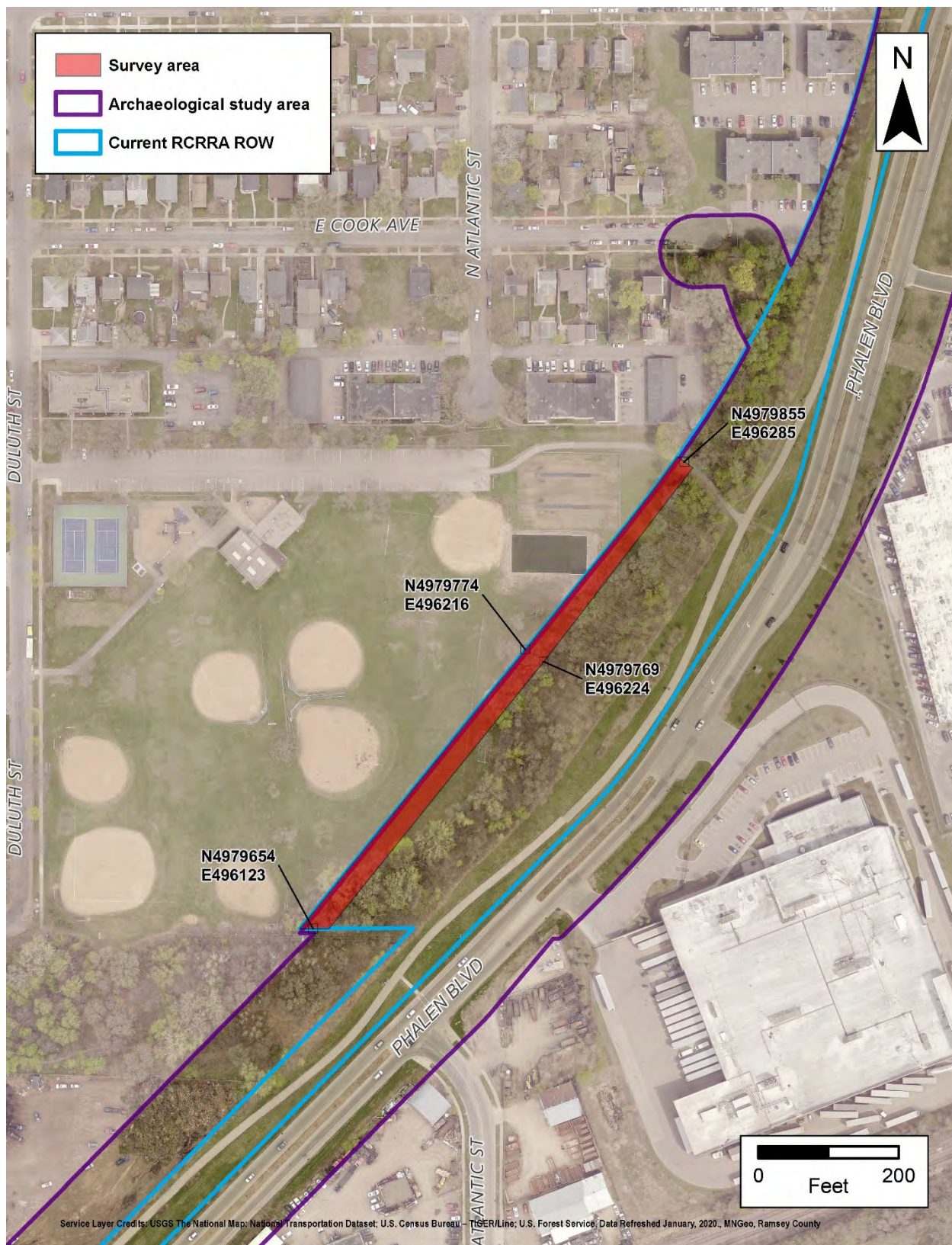


Figure 33. Edge of RCRRA ROW north of Atlantic Street near Duluth and Case Recreation Center Park shovel tested. Representative UTM coordinates are presented.



Figure 34. Example of edge of archaeological survey area near Duluth and Case Recreation Center Park shovel tested. View facing southwest.

Shovel Test Example 1

0-10 cmbgs 10YR 2/2 dark brown silty

10-35 cmbgs 10YR 3/6 dark yellowish brown silt mottled with 10yr 2/2 dark brown silt

35-45 cmbgs 7.5YR 4/4 dark yellowish brown silty sand

Oakley soil core to 72 cmbgs – still 7.5 YR 4/4 dark yellowish brown sand

Shovel Test Example 2

0-35 cmbgs 10YR 3/1 very dark grey silt

35-50 cmbgs 10YR 5/4 yellowish brown silt

Oakley soil core to 70 cmbgs – still 10YR 5/4 yellowish brown silt

No prehistoric cultural materials or materials related to the former adjacent railroad roadway were identified. No further work is recommended for this area.

PHASE I SURVEY

B) RCRRA ROW

Recommended pedestrian reconnaissance of the entire RCRRA corridor between Johnson Parkway and Beam Ave; visual inspection by the geomorphologist to determine if shovel testing is warranted; geomorphological coring to determine the presence of 1868 LS&M railroad roadbed beneath the later, 1880s railroad roadway. Recommended pedestrian survey of RCRRA ROW between County Road D and Buerkle Avenue to determine if there was any areas that needed to be shovel tested for possible historic or prehistoric resources (see Appendix 2, pages 5-10).

Visual inspection identified remnants of the 1868 LS&M roadway (XX-RRD-NP002, XX-RRD-NP003 and XXRRD-NP004) on the surface in three areas and geomorphological cores resulted in the identification of portions of the 1868 LS&M roadway below the post-1880 railroad roadway which now carries the Bruce Vento Trail. The Phase II NRHP evaluation of these features is detailed in a separate report (Pettis et al. 2020). Archaeological study area between County Road D and Buerkle Road inspected and had low probability for cultural resources (original 1868 LS&M roadway did not overlap this area).

C) Larpenteur Avenue Station, Weaver Elementary Bridge and Trail Extension, Highway 36 Bridge, Fitch Road/N. Barclay Street Bridge, Beam Avenue Bridge, and I-694 Bridge

Recommended visual inspection by geomorphologist to determine if shovel testing is warranted in some areas (see Appendix 2, page 7-9). Areas assessed as having low potential for intact cultural resources and no shovel testing was undertaken. Some remnants of the 1868 LS&M railroad roadbed were identified near the Weaver Elementary School Trail and their investigation is reported in detail in a separate report (Pettis et al. 2020).

D) Frost Avenue/Gateway State Trail Bridge

Recommended mechanical stripping to determine if privy features were present (see Appendix 2, page 7). Mechanical stripping of modern fill exposed remnants of two depot privies (Site 21RA82). Details of the investigation are reported in the Phase II Investigation section of this report.

E) TH 61 from Buerkle Road to Willow Lake Boulevard

Recommended survey of the 10-foot buffer beyond the TH 61 ROW (see Appendix 2, pages 11-12). There is currently no planned disturbance in this area and it was not surveyed.

PHASE I SURVEY

F) White Bear Lake (Marina Triangle Station to end of BRT corridor)

Recommended no survey of the archaeological study area, unless work is proposed beyond the study area limits in future (see Appendix 2, pages 15-16).

Other Areas

Additional areas beyond Phase IA recommendations were inspected during the field survey. About 601 feet north of Maryland Avenue and 57 feet east of Bruce Vento Trail, a small depression 11.5 feet east–west by 14 feet north–south was noted in the low area adjacent to the embankment (Figure 35). This depression had modern refuse nearby (part of an outdoor grill and part of a bedframe). Several remnants of homeless encampments also were noted in this area, such as fire pits with modern garbage strewn around them. At the time of the survey, no RCRRA ROW markers were observed in the area, but a GPS point taken and lidar imagery show this depression almost exactly at the eastern edge of the RCRRA ROW. Since this area would have been part of Lake Phalen during the railroad construction, and modern materials were noted around it, the depression appears to be modern rather than related to railroad construction, and it was not recorded as an archaeological site.

North of the intersection of the Bruce Vento Trail and the Gateway State Trail, east of the Bruce Vento Trail, and outside the archaeological study area/RCRRA ROW was the former Saint Paul Plow Works, a late 19th century business near the rail corridor. The president of the Maplewood Historical Society had mentioned to MVAC in the summer of 2018 that bricks from the former plow works building were present in the archaeological study area/RCRRA ROW. MVAC found these bricks on the east side of the trail, northeast of the Gateway State Trail and Bruce Vento Trail intersection in the RCRRA ROW, but the bricks were in poor context (Figure 36). It appeared that at various times local residents had pushed bricks they had found in their yards into the RCRRA ROW.

PHASE I CONCLUSIONS AND RECOMMENDATIONS

In the fall of 2018 and spring of 2019, personnel from MVAC performed a reconnaissance survey of the RCRRA ROW overlapping the Rush Line archaeological study area and shovel testing within a few locations. The reconnaissance survey found surface evidence of what is presumed to be portions of the original 1868 LS&M railroad roadbed. Geomorphological coring also found evidence of the former 1868 LS&M railroad roadbed below the post-1880s railroad embankment on which the Bruce Vento Trail was constructed.

PHASE I SURVEY

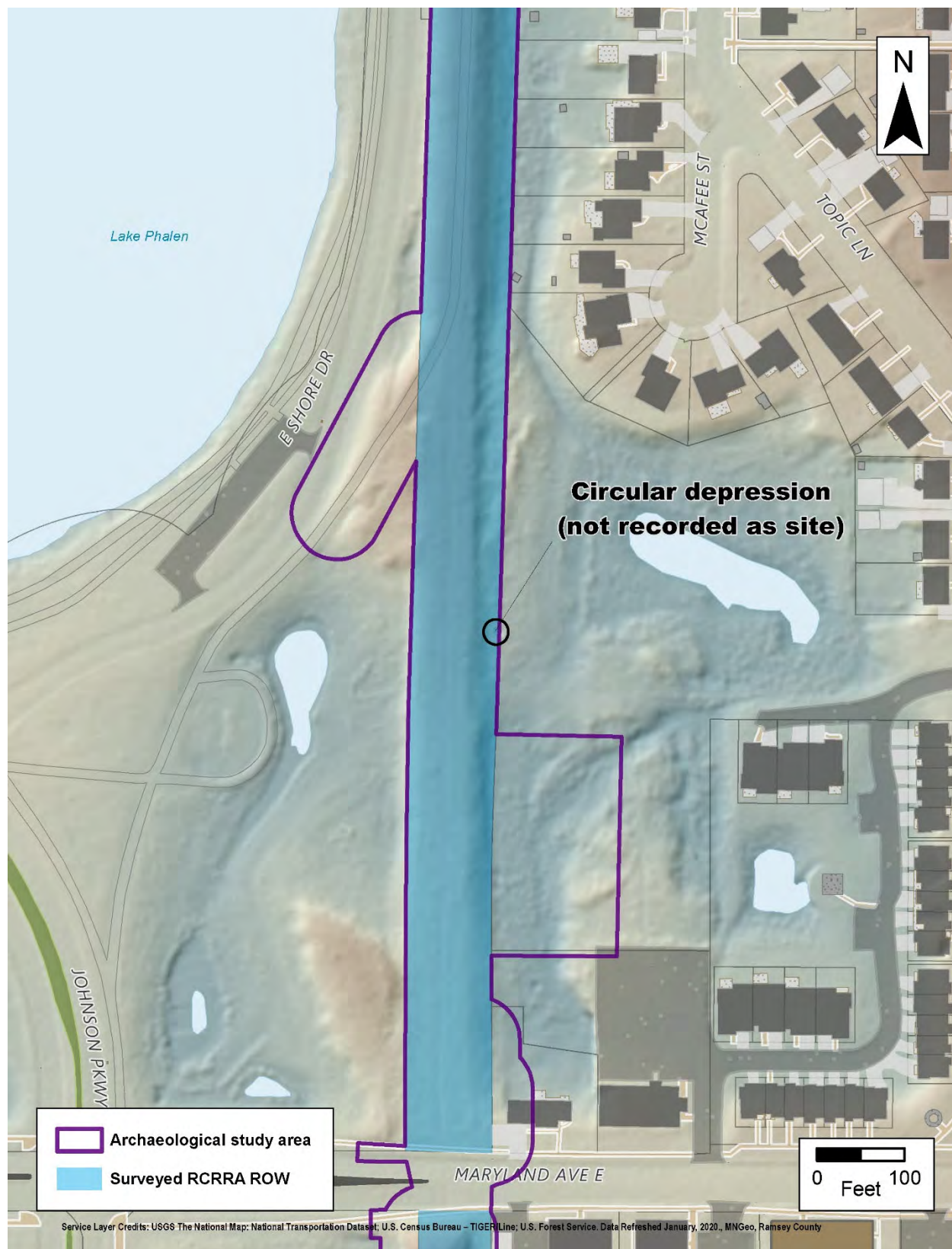


Figure 35. Circular depression noted at eastern edge of RCRR ROW north of Maryland Avenue.



Figure 36. Displaced bricks from the St. Paul Plow Works, north of the Gateway State Trail and east of the Bruce Vento Trail in the RCRRRA ROW.

Based on OSA guidelines, these areas were not recorded as an archaeological site, but they were evaluated for NRHP eligibility in combination with architectural history considerations (Pettis et al. 2020). Shovel testing in several areas did not find any prehistoric cultural material or historic cultural material that could be linked to the railroad. Three depressions were noticed. One appeared to be relatively modern, and the other two could not be related to a particular date or purpose. None of the three was recorded as an archaeological site.

The portion of the archaeological study area from Johnson Parkway to Beam Avenue that overlaps the former 1868 LS&M railroad roadway is being evaluated as an NRHP eligible resource in a separate report (Pettis et al. 2020). Phase II investigations were conducted in the Gladstone (Maplewood) area, and the results are described in the following section of this report. As project plans stand to date, no further work is recommended for the other portions of the archaeological study area. However, additional survey might be necessary if project plans change, depending on the location and amount of proposed disturbance.

PHASE II INVESTIGATIONS

INTRODUCTION

In the fall 2018, privies related to the former railroad depots near the Gladstone/Gloster area north of Frost Avenue within the archaeological study area were evaluated for significance under Criterion D for their potential to provide information on undocumented aspects of the lives of railroad workers and travelers. The Phase IA literature review and subsequent historical research identified potential cultural resources related to former railroad depots, particularly privy shafts that likely would not have been directly affected by the razing of the depot buildings. Due to the amount of fill in the area, field work recommendations included using heavy equipment to strip the fill and try and identify privy shafts using georeferenced locations of the privy shafts from historic maps.

On November 28–30, 2018, MVAC personnel led by the Principal Investigator performed Phase II archaeological investigations in a portion of the Rush Line BRT project in Ramsey County. This work spanned both resource identification and evaluation, due to the amount of fill and historic disturbance in that area. During development of the historic railroad context, privies related to former depots in the Gladstone/Gloster area in the City of Maplewood were noted on historic maps. Maps and historical documents related to the depots/stations themselves are housed at the Minnesota Historical Society library, and looking for stains or foundations related to the depots or other outbuildings would not add significant information about them. However, historic maps also indicated that there were privies associated with these depots, and since privies were often used as trash dumps, they might contain significant information regarding passengers who used the rail line or workers associated with the rail line. In consultation with MnDOT CRU, it was decided that the depot-related privies might have the potential to contain non-redundant information about people using or working at the depots that would not be found in historical records.

Minimal hand coring earlier in the fall of 2018 confirmed the suspected presence of historic fill in the area north of Frost Avenue and east of the Bruce Vento Trail. Due to the amount of fill in the area, the Phase II investigations included the use of heavy equipment to look for the possible privies. At least two former depot locations and three potential privy locations within the archaeological study area between Frost Avenue and the Gateway State Trail (former Wisconsin Central rail line) might be impacted by the proposed project, and therefore were reviewed (Figure 37). The depot and associated privy in this location likely would have dated from 1886 or 1897 (Area A on Figure 37). A joint LS&M/StP&D/NP and Wisconsin Central (Soo) line railroad depot would have been immediately southeast of the

PHASE II INVESTIGATIONS

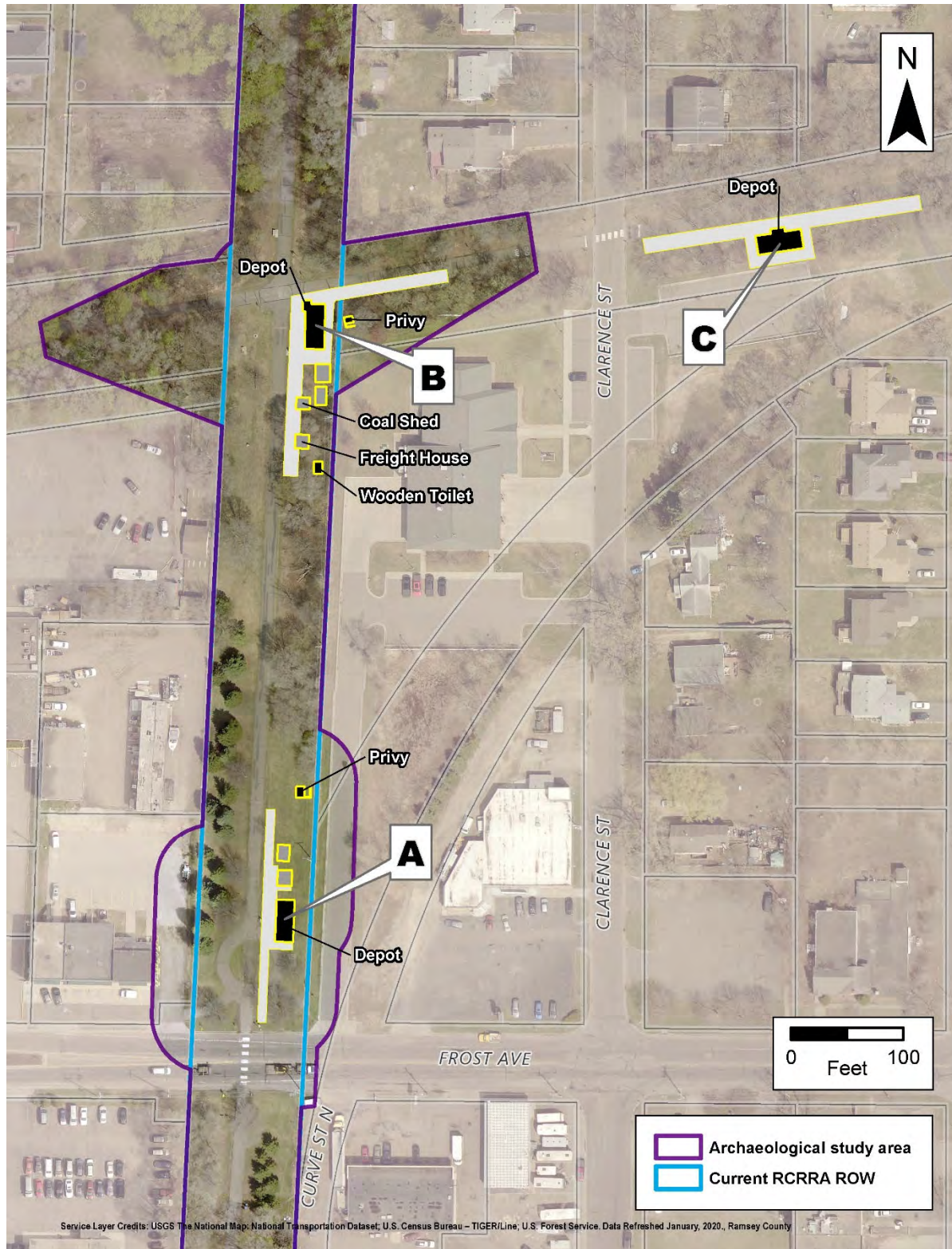


Figure 37. Locations of depots and outbuildings at the 1890 St. P&D Gladstone/Gloster Station (Area A), joint NP and West Central/Soo Line depot (Area B), and West Central (Soo Line) depot (Area C). Sources (Maplewood Historical Society, NP Records 1918, Met Council map circa 1960's, MnDOT 2018).

PHASE II INVESTIGATIONS

LS&M/StP&D/NP and Wisconsin Central (Soo) line intersection (Area B on Figure 37). A 1918 map of this depot shows a privy just outside the RCRRA ROW, but within the archaeological study area, on land owned by the DNR and within the 50-foot buffer study area around proposed bridge locations. Another possible privy associated with this joint depot was noted on utility maps of area. The field investigation was performed after a Phase II license (No. 18-093) was obtained from the OSA and a research license (Special Permit No. 201897) was obtained from the DNR.

The Wisconsin Central (Soo) rail line had a depot east of the intersection of the LS&M/StP&D/NP rail line (the current Bruce Vento Trail) and the Wisconsin Central (Soo) line, on the south side of the Wisconsin Central (Soo) line (the current Gateway State Trail) (Area C on Figure 37). This depot location was outside of the archaeological study area for the Rush Line BRT, since it was beyond the 50-foot buffer surrounding proposed bridges, so it was not investigated.

RESEARCH DESIGN/METHODS

The Railroads in Minnesota National Register Multiple Property Documentation Form (MPDF) (Schmidt et al. 2013) considered mainly historical aspects of railroads; however, the draft supplement to the MPDF (Arnott and Pizza 2017) also considered archaeological features related to railroads. These would include privy vaults. Minnesota Historic Contexts applicable to this work include Early Agriculture and River Settlement (1840–1870), Railroads and Agricultural Development (1870–1940), Minnesota Tourism and Recreation in the Lake Regions (1870–1945), and Urban Centers (1870–1940).

MVAC performed Phase II investigations to look for the first Gladstone (Gloster) Depot privy just north of Frost Avenue, the possible privy for the joint depot near the junction of the former LS&M/St.P&D/NP rail corridor (now the Bruce Vento Trail) and the Wisconsin Central rail corridor (now the Gateway State Trail), and a third area where another possible privy related to the joint depot was indicated. The privy built for the Gladstone (Gloster) depot north of Frost Avenue would lie within the RCRRA ROW (Area A on Figure 37). Judging from the available maps, the first possible privy associated with the joint depot would be on DNR property outside the RCRRA ROW (noted as “privy” in Area B on Figure 37), even though the depot itself would be within the ROW. The third potential privy location (noted as wooden toilet in Area B on Figure 37) would be south of the joint depot, east of the current Bruce Vento Trail and within the RCRRA ROW.

Georeferencing historical maps of the depots at the Gladstone/Gloster location helped to narrow down the locations, but since the maps had to be rubber-sheeted to fit modern maps, the accuracy of the georeferencing and the exact locations of the privies were uncertain. In addition, the area was known to be covered with modern fill. The Phase II investigations used a backhoe to strip the modern topsoil and fill, to look for the tops of the privy shafts and

PHASE II INVESTIGATIONS

try to determine the site's presence, integrity, and horizontal and vertical limits. Excavation of the trenches was monitored closely. A screen with a quarter-inch mesh was utilized when appropriate. Digital photographs were taken to document soil profiles and work efforts. Ramsey County representatives were present during the work to oversee it and to answer any questions from the public. MnDOT CRU representatives were also able to visit the excavation area when two possibly privy locations were opened. Artifacts recovered from intact deposits were returned to the MVAC laboratory where they were cleaned, catalogued, photographed (as appropriate), and analyzed. All artifacts to be curated at the Minnesota Historical Society (MHS) were accessioned according to MHS standards.

HISTORICAL BACKGROUND AND RESEARCH

Detailed information about the former railroad roadway within the Rush Line BRT archaeological study area is presented in Pettis et al. (2020). The following section describes the history of the depots within the archaeological study area.

Historical accounts indicate that the first StP&D depot was built in the Gladstone (Gloster) location around 1886. There is no detailed map of the depot location, although one historic map makes a reference to it (Hopkins 1886). This early depot, called "Gladstone Station" (Boulay 1997:19), was made of wood for a cost of \$524. It was a one-story structure, 16.5 by 40.5 feet in size, divided into a baggage area, a post office, and a waiting room (Boulay 1997:41). Luecke (2005:45) indicates that this depot was moved to Carlton in 1890, but Boulay (1997:41-43) does not mention such a move.

The exact location of this 1886 station is unknown. On the Hopkins (1886) map, the detail map of the Gladstone area has the word "Station" on the east side of the tracks, with a building symbol on the west side of the tracks, but the overview index map shows the word "Station" on the west side of the tracks, with a structure symbol on the east side (Figure 38). Georeferencing of the detail map for the LS&M evaluation placed the building symbol associated with the word "Station" on the west side of the tracks, northwest of the intersection of the current Bruce Vento Trail and the Gateway State Trail. The Hopkins (1886) overview index map shows the structure symbol southeast of the intersection of the current Bruce Vento Trail and the Gateway State Trail, and north of a side track of the former LS&M/StP&D/NP. To further complicate the issue, a map Boulay (1997:34) took from a February 1888 issue of *Northwest Magazine* shows the depot near the intersection of the LS&M/StP&D/NP and Wisconsin Central/Soo line (Figure 39), which does not match the georeferencing. The joint depot was not constructed in that area until 1918. The scales of the maps and the

PHASE II INVESTIGATIONS



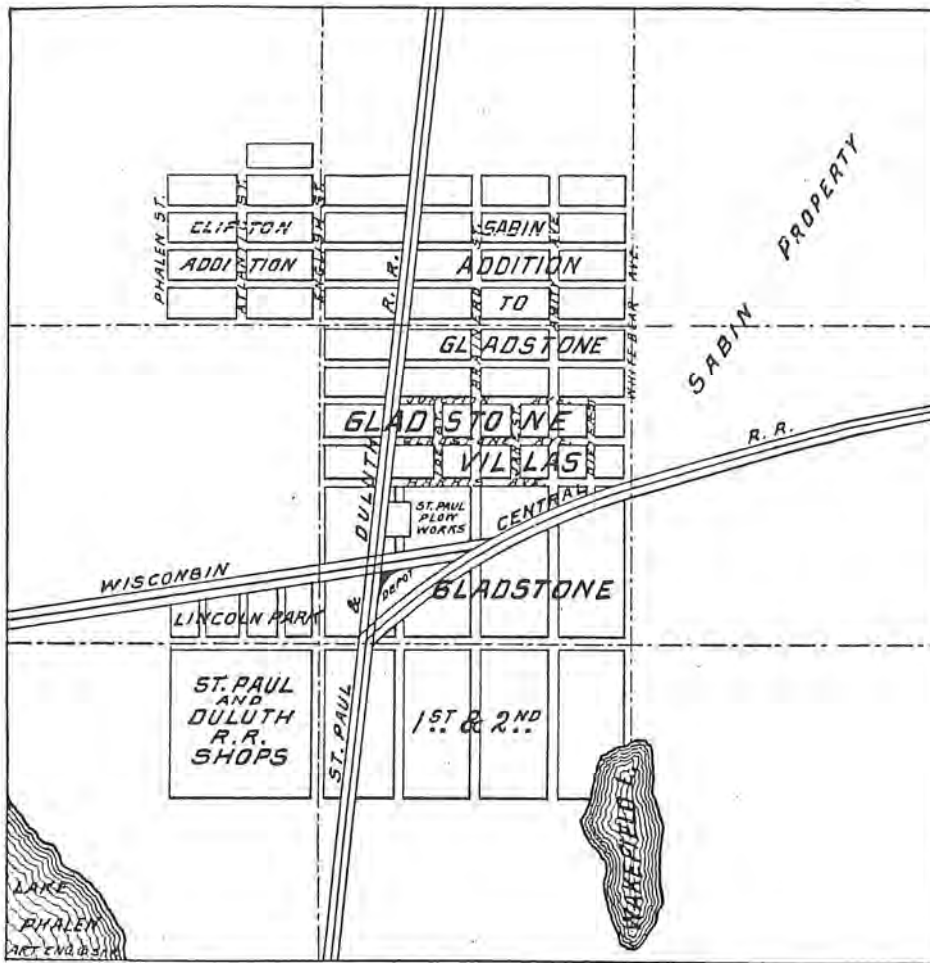
Hopkins (1886) overview index map.



Hopkins (1886) close up detail map of area.

Figure 38. Discrepancies of 1886 Gladstone Station shown on Hopkins (1886) overview index map, and close up detail map of area. Gladstone Stations locations are circled.

PHASE II INVESTIGATIONS



MAP OF GLADSTONE.

From an illustration in the *Northwest Magazine*. February, 1888.

Figure 39. Error in original depot location at Gladstone shown in *Northwest Magazine* in 1888 (taken from Boulay 1997: 34).

PHASE II INVESTIGATIONS

discrepancies in location made it hard to georeference this station with sufficient accuracy to pinpoint an exact location for field investigations.

In 1897, the StP&D built a one-story depot, 16.5 by 40.5 feet in size, at the Gladstone location (Luecke 2005:45). This depot was north of Frost Street on the east side of the tracks, and would have been used until around 1917 or 1918 (Figure 40). Historical railroad track maps of this area show a privy northeast of the depot location, along with some other outbuildings (Figure 41).

During early railroad use, the Gladstone area, including the Wisconsin Central depot, was referred to as “Phalen Junction,” and then in 1886, when the LS&M/StP&D depot was built, it was referred to “Gladstone,” referring to the neighboring community (Gladstone was never incorporated as a town, and it was absorbed when Maplewood became a city in 1957 (Boulay 1997: 3). After 1910, however, it was referred to as “Gloster,” because there were two towns called “Gladstone” on the Wisconsin Central or Soo Line, one in Minnesota and the other in Michigan, and freight was sometimes shipped to the wrong “Gladstone” depot. The Soo line suggested changing the name of the junction to “Stone,” but the Northern Pacific thought that “Gloster” would be better, and the Soo line agreed. Sometime after July 1910, the junction name was changed from “Gladstone” to “Gloster.” Generally, the railroad companies were the only ones who referred to the area as “Gloster” (Boulay 1997:41).



Figure 40. Gladstone Depot circa 1916, north of Frost Avenue, east of the tracks (taken from Boulay 1997: 40). View facing northeast. Depot privy would have been to the northeast of the depot.

PHASE II INVESTIGATIONS

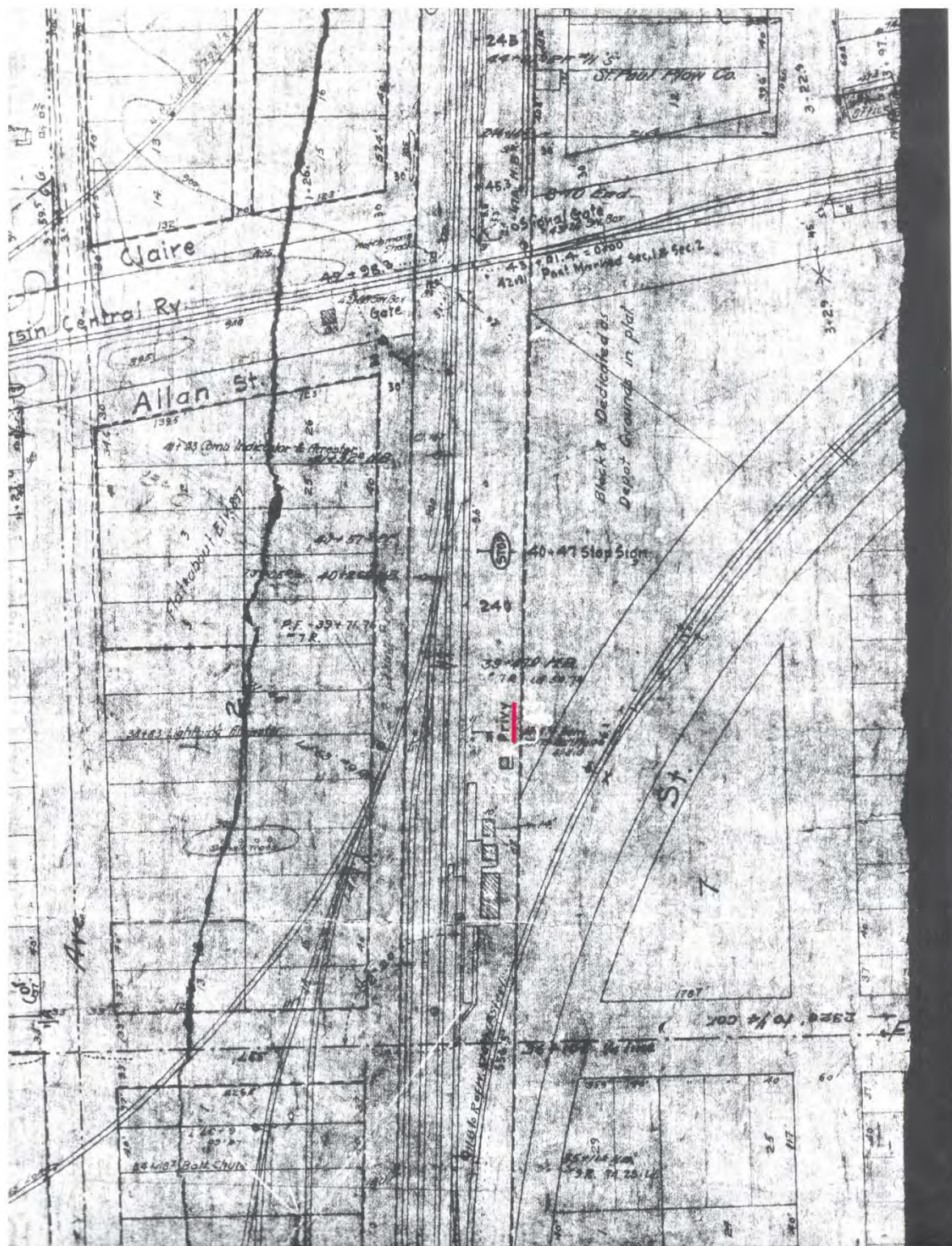


Figure 41. Map of Gladstone Depot area circa 1913, provided by Bob Jensen, President Maplewood Historical Society. The word “privy” has been underlined in red.

PHASE II INVESTIGATIONS

Around 1916, the Northern Pacific (formerly the LS&M/StP&D) and the Soo line (formerly the Wisconsin Central) decided to combine their depots into one. Before this, the Wisconsin Central had a depot a few hundred feet east of the intersection of the two rail lines, built circa 1885 (see Figure 37). The Northern Pacific depot was considered the better of the two existing depots, so around 1918 it was moved to the southeast corner of the junction of the Northern Pacific (now the Bruce Vento Trail) and the Soo Line (now the Gateway State Trail). While the depot was being moved, a temporary depot was set up in a boxcar along a spur of the old Plow Works, and the Soo line depot was used for storage. The joint depot was open 24 hours a day and was reported to be busy. The crossing gates were not automatic, and the operator of the station would go outside and manually move the gates so that train traffic could cross the junction. Fifty-two daily freight and passenger trains passed by the depot on a regular basis (Boulay 1997:42-43).

Historical documents were found at the MHS relating to estimated costs of proposed changes in the depot facilities at Gloster for the joint depot. An excerpt of those proposed expenses, dated October 15, 1918, is below (taken from NP Records 1918). Under Operating Expenses, note the expense for moving a privy.

NEW WORK	LABOR	MATERIAL	TOTAL
Grading 850 cu yards @ .45¢	382.50		382.50
Bay Window for Operator	35.00	60.00	95.00
Cinder Platform Filling for Platform			
75 cu. yds @ .45¢	33.75		33.75
Lumber 10,000 FBM @ L. \$15. M. \$30	150.00	300.00	450.00
Hardware 300# @ 8¢		24.00	24.00
Telegraph Work	<u>25.00</u>	<u>15.00</u>	<u>40.00</u>
	626.25	399.00	1025.25
Suptce. & Use of Tools	<u>62.75</u>		<u>62.75</u>
	689.00	399.00	1088.00
Engineering & Incidentals	<u>69.00</u>		<u>69.00</u>
	758.00	399.00	1157.00
Freight on Material			95.00
Rent & Repair of Equipment			<u>100.00</u>
			1352.00
OPERATING EXPENSES	LABOR	MATERIAL	TOTAL
Moving depot, repairing, etc.	250.00	50.00	300.00
Moving freight house, coal shed	75.00	15.00	90.00
and privy			
Removing timber, curbing, etc.	25.00		25.00

PHASE II INVESTIGATIONS

Remove partition in depot	12.00	3.00	15.00
Remove portion of depot for bay window	15.00		15.00
Removing crossing gates	10.00		10.00
Repairs, etc.	100.00	150.00	250.00
	487.00	218.00	705.00
Suptce. & Use of Tools	48.70		48.70
	535.70	218.00	753.70
Engineering & Incidentals	53.30		53.30
	589.00	218.00	807.00

A letter to the general superintendent of the Northern Pacific line dated October 4, 1918, refers to a sketch (Figure 42) of the proposed location of the Northern Pacific Station at the Soo Line (West Central) crossing. This letter also references a letter from the superintendent of the Soo Line saying that he favored moving the Northern Pacific station and outbuilding, dividing the two expenses equally between the Soo Line and the Northern Pacific. The move was proposed to maintain contiguous telegraph services at this point when the improvement was completed (NP Records 1918). The sketch mentioned in the letter shows a proposed privy southeast of the depot location. The cost breakdown calls out a “privy” among the buildings to be moved. This potential privy location is the one on DNR land.

The Soo line depot used for storage burned in 1944, but the joint depot remained in service until the 1950s (Figures 43 through 45). It was torn down in 1967 (Boulay 1997:43) and removed by the highest bidder for lumber salvage (Soo Line Historical and Technical Society 2015).

Prior to the Phase II investigations, the City of Maplewood had provided Ramsey County with GIS shapefiles of utilities in and near the archaeological study area, which were passed on to MVAC. Two “sewer” lines were shown north of Frost Avenue within the RCRRA ROW, east of the Bruce Vento Trail, possibly overlapping the privy locations. While MVAC was researching this information, a City of Maplewood utility representative indicated that only one utility line was present in that area, not two, and it was governed by the Metropolitan Council. MVAC discussed this utility with representatives from the Metropolitan Council and found out that it was a sanitary force main installed sometime in the 1960s and abandoned since that time. The Metropolitan Council provided MVAC with a map showing the general location of the pipe, which ran east of the existing Bruce Vento Trail and around (to the east) of the former joint depot location near the junction of the Bruce Vento Trail and the Gateway State Trail (Figure 46).

PHASE II INVESTIGATIONS

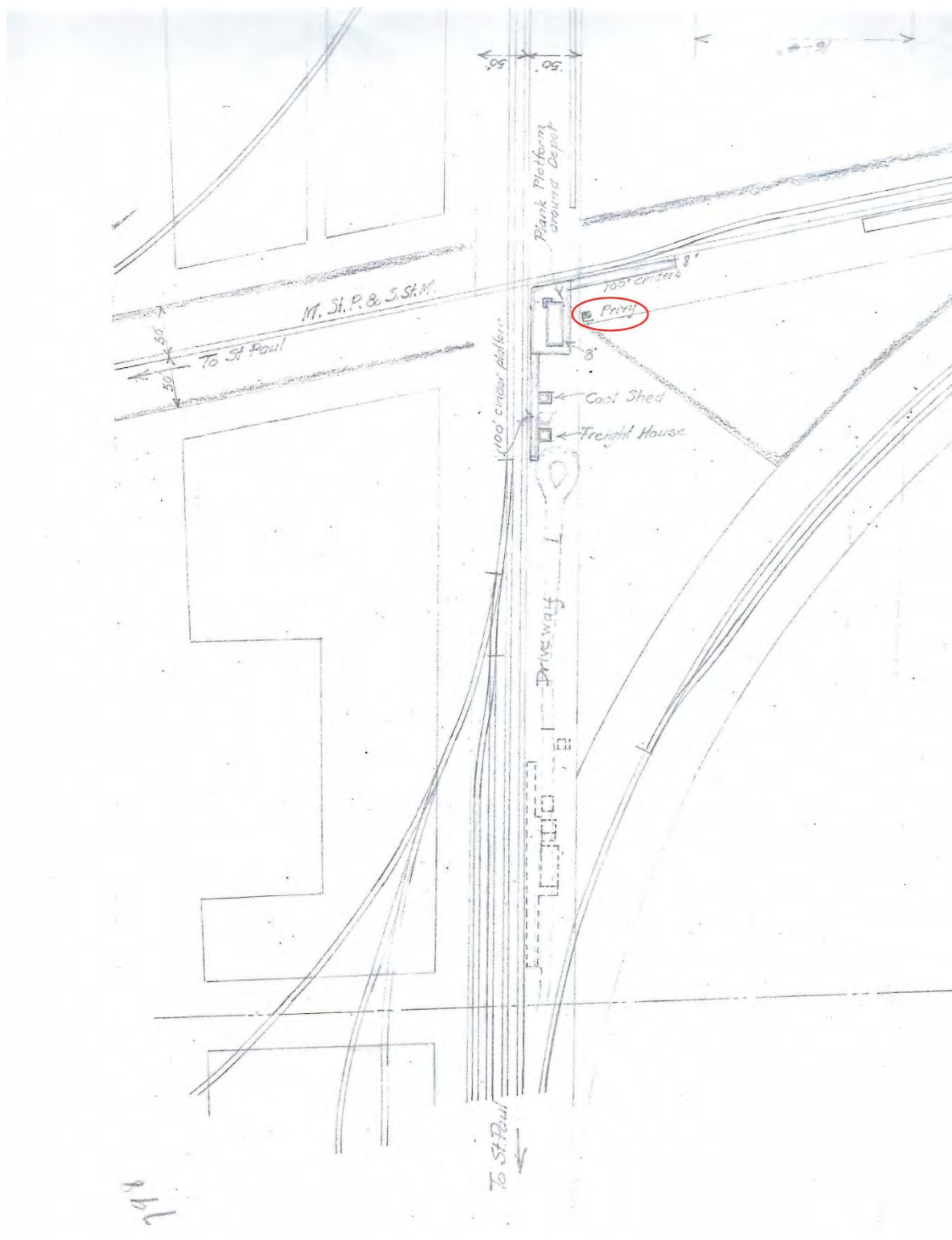


Figure 42. Map of proposed joint depot at intersection of two rail lines showing proposed privy location. Map from NP Records 1918 and Maplewood Historical Society.

PHASE II INVESTIGATIONS



Figure 43. Joint Gladstone/Gloster joint depot circa 1926. View facing north. Depot is under the letter B near Center of photograph. Cross street near center foreground of photograph is Frost Avenue. Photo from Maplewood, Minnesota 2019 and Maplewood Area Historical Society, 2013.

PHASE II INVESTIGATIONS



Figure 44. Joint Gladstone/Gloster joint depot circa 1963. View facing southeast. Photo courtesy Bob Jensen, Maplewood Area Historical Society.



Figure 45. Joint Gladstone/Gloster joint depot circa 1963. View facing east along Northern Pacific tracks (now Gateway State Trail). Photo courtesy Bob Jensen, Maplewood Area Historical Society.

PHASE II INVESTIGATIONS

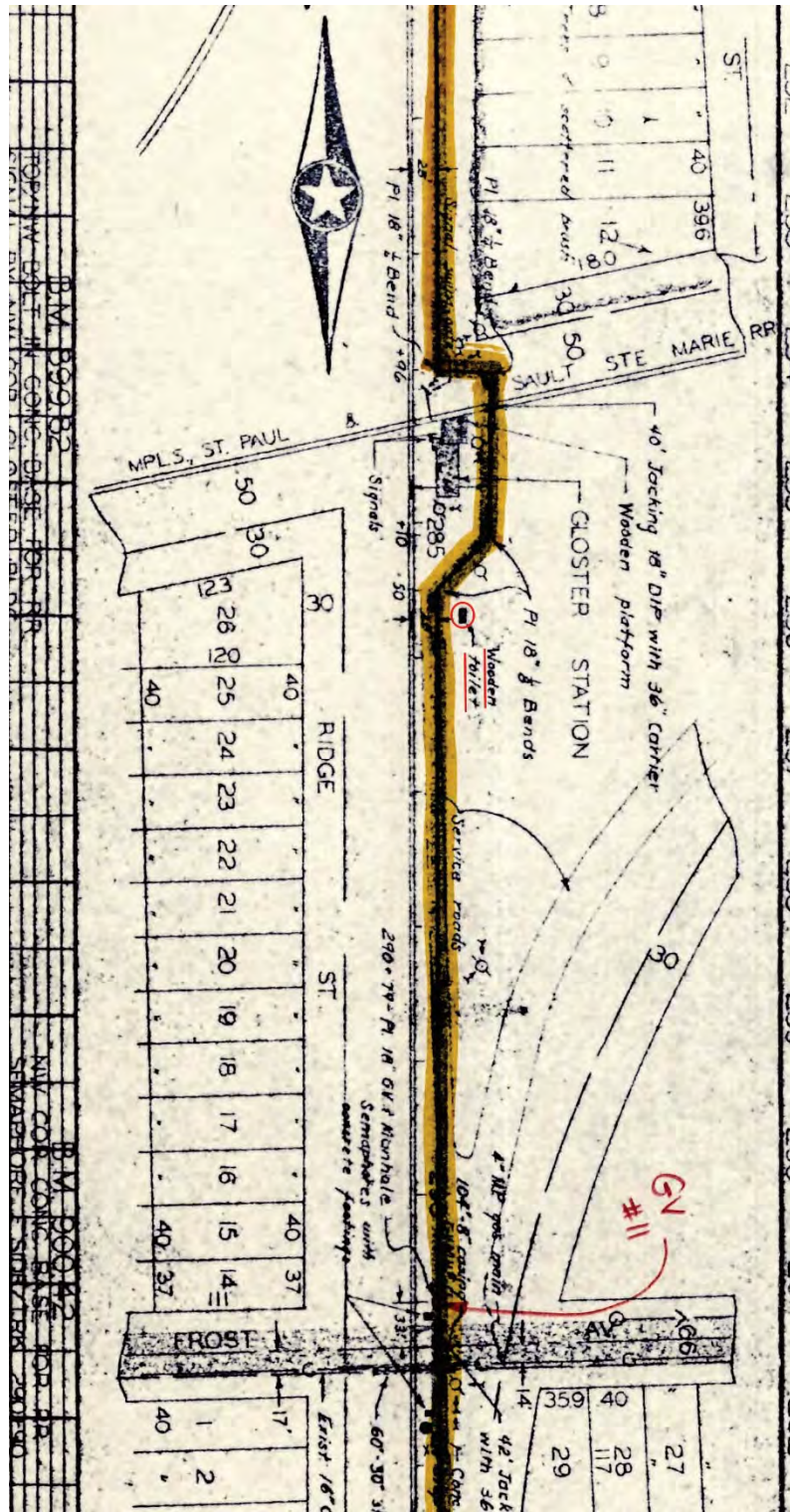


Figure 46. Sanitary force main map provided by Metropolitan Council showing force main (highlighted in orange) going around joint depot, circa 1960's. Note "wooden toilet" near joint depot area outside force main location.

PHASE II INVESTIGATIONS

On the map the Metropolitan Council provided, a third area that might have contained a privy was identified. The words “wooden toilet” were marked southeast of the joint depot (see Figure 46). This was the first time a possible toilet or privy was found on historic maps. It is unclear whether this was a second, later privy associated with the depot, or possibly the “as built” version of the proposed privy shown on the DNR land. This “wooden toilet” location is easily identifiable as a structure on the 1957 aerial photos. Earlier aerial photos from 1945 and 1940 also show a shadow or likely structure in this area. A 1920 plan of the area shows a structure labeled as 10 x 6 feet in this general area, but since this map also shows other outbuildings or ancillary structures, there was no indication of that particular one being a privy or toilet until a more legible version of the Metropolitan Council map, received the week before the fieldwork, showed that this third location was within the RCRRA ROW. Since permit requirements had pushed the Phase II investigations towards the end of the field season, there was too little time to figure out which buildings were which. MVAC adjusted the research design in consultation with the OSA, and the new location was added to the Phase II license so that all three possible privy areas could be explored during the Phase II work.

Prior to their truck-mounted coring work in the Gladstone/Gloster area, Strata Morph Geoexploration personnel met on-site with a Metropolitan Council representative who helped identify the approximate location sanitary force main, which appeared to be between the Bruce Vento Trail and the privy location. Due to the pipe’s type of metal and depth (about 8.5 to 10 feet below the current ground surface), it could not be located by Gopher One.

RESULTS

Phase II investigations north of Frost Avenue were undertaken on November 28–30, 2018, directed by the Principal Investigator. Initially, the weather was clear, but by the end of the first day, it had begun to snow. Over the remaining two days of fieldwork, there was a light layer of snow in the investigation area, particularly in shaded areas.

Excavation Area 1 and Site 21RA82 (Gladstone/Gloster privy)

Excavation Area 1 was north of Frost Avenue and east of the existing Bruce Vento Trail (Figure 47), in an open area of the RCRRA ROW, just south of a grove of trees.

PHASE II INVESTIGATIONS

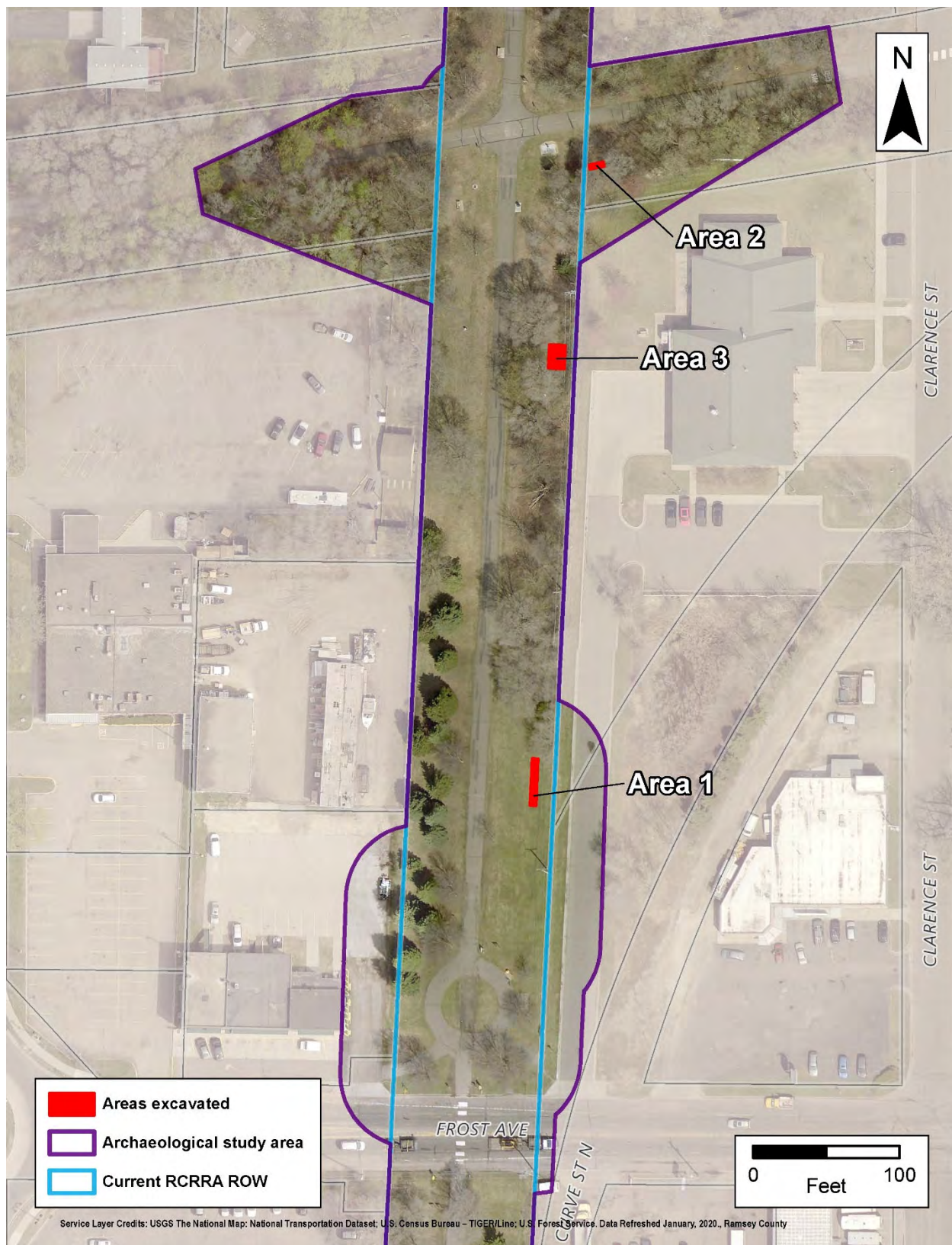


Figure 47. Location of areas excavated in the Gladstone/Gloster area for Phase II work.

PHASE II INVESTIGATIONS

Georeferencing of historic maps indicated that a depot-associated privy lay approximately 213 feet north of the sidewalk on the north side of Frost Avenue, 31 feet east of the eastern edge of the Bruce Vento Trail, and 16 feet west of a north–south fence line that separates this area from the Maplewood Fire Station grounds (Figure 48). Judging from posts delineating the edge of the RCRRA ROW, the fence was at least 6 feet east of the ROW. A previous shovel test and hand coring with the geomorphologists in the general area of the privy had shown that the uppermost foot or more was fill. Several days before MVAC started the Phase II archaeological investigations, the geomorphology team began their truck-mounted soil coring to look for buried remnants of the 1868 LS&M roadway, and they informed MVAC that they had found a likely buried A horizon under fill to the east of the existing trail, north of Frost Street.

MVAC hand measured out the potential location of the privy using the georeferenced measurements discussed above. This was to be used as a starting point for the backhoe, with additional trenches excavated if appropriate. A backhoe with a 36-inch blade was used to strip a trench that was initially about 10 feet long. The sod was removed first, followed by the next few centimeters of soil, which were already frozen. Next, the underlying soil was carefully stripped in approximately 5 cm intervals. Historic fill present for the first 40–45 cm contained a few pieces of cultural material such as fragments of window glass, a railroad spike, unidentifiable metal, and plastic, but it was all in poor context and was not collected. As the excavation proceeded, it was unclear whether the backhoe trench was adjacent to the sanitary force main trench, since the force main was known to be close, and the soil encountered to that point was either disturbed or fill. Beneath the fill, a few small historic “flakes” of dried wood were encountered, but they did not appear to be in any type of pattern. A darker soil (10YR 3/1 very dark gray silt) started to appear, lightly mottled with a lighter soil (10YR 4/4 dark yellowish brown silt). The darker soil did not appear to be the typical “night soil” a privy might contain; instead, it appeared to be potentially intact topsoil with some mottling below the fill, similar to what the geomorphologists had encountered in their soil coring a few feet away. A broken bottle was encountered at 45 cmbgs, but it was near the edge of the fill. The excavation continued, still in 3 to 5 cm increments, until several broken bottles were encountered near the southern end of the trench at about 110 cmbgs. The backhoe was stopped, and the trench wall to the east was carefully cut back with a trowel, revealing remnants of a wood lining. The backhoe trench had come down exactly in the middle of the likely privy and within a wood-lined area. Once the eastern profile wall was cleaned, it became apparent that a centimeter or so of dirt was covering some intact wood lining in the profile. If the trench had been placed a few centimeters to the east or west, the wood lining might have been easier to define, but as it was, the darker soil was not identifiable as a privy until the trench was into the privy vaults. The wood fragments encountered below the fill were likely from the north edge of one of the privy vaults, impacted by previous disturbance. By the time the bottles were found at 110 cmbgs, the northern wood lining was more defined and appeared to be in better shape.

Part of a second privy shaft was also identified to the north, in the same trench and at the same depth as the southern shaft. The southern portion of this northern privy shaft had

PHASE II INVESTIGATIONS

been exposed during the initial trench excavations. The trench length was expanded northward to expose the remainder of the northern privy, and the backhoe excavation was stopped just below the fill, at the top what was now known to be a privy shaft. The trench length was expanded a few feet more to the north and the south to try to determine the depths of the privy shafts, and 20 more centimeters to the west to try to find the western edge of the wood lining, which was located just a few centimeters beyond the western edge of the trench.

This was a privy with two privy shafts, likely housed under one superstructure. The northern shaft measured about 7 feet north–south by a little over 7 feet east–west, and the southern shaft measured 9 feet north–south by a little over 4 feet east–west. Between the two shafts was 5 feet of sterile subsoil. The southern wood-lined shaft had little cultural material, and none was noted in the exposed portion of the northern privy. Measurements taken at the edges of the privy shafts, based on the soil profiles, indicated that at least 12–15 centimeters of privy deposit remain in the southern privy before sterile subsoil is reached. In the northern privy, about 15 centimeters of privy fill remains in the southern half, and at least 50–53 centimeters remains in the northern half, since excavation in that area stopped at the base of the fill (Figures 48 through 54).

The excavated trench came down almost in the center of the privy shafts (within the wooded boundaries of the privy), and the top of the wood lining had been truncated by previous cutting and filling. The scarcity of artifacts and the presence of soil that did not appear to be “night soil” also made this feature difficult to identify as a privy until the trench was already into it, especially since the geomorphologists had found buried topsoil just a few feet away. Both the scarcity of artifacts and the nature of the soil suggest that the privies were cleaned out regularly and probably around the time of abandonment. The soil within the privies might have been mottled topsoil from the surrounding area, based on its color and texture and the lack of artifacts. The artifacts found were likely deposited after the privy was abandoned, and might not be related to railroad passengers or workers.

Since eligibility had not yet been assessed fully, the remaining portions of the two privies were covered with biodegradable plywood in case further work would be needed, and the area was backfilled. The privy was recorded with the OSA as an historic archaeological site and received the site number 21RA82.

21RA82 Artifacts

Artifacts found in the disturbed fill above the privy shafts were not collected. Within the privy shaft on the southern end of the trench, four spirit bottles, one beer bottle, one medicine bottle, and one pickle bottle were found (Figure 55), as well as one small piece of window glass.

The spirit bottles are four clear whiskey flasks. One is broken but has partial engraving of “GRAVES B.../59.6th Ave S/MINNEAPOLIS MN.” Based on the size of the portion

PHASE II INVESTIGATIONS

Gladstone/Gloster Privy Sketch Map

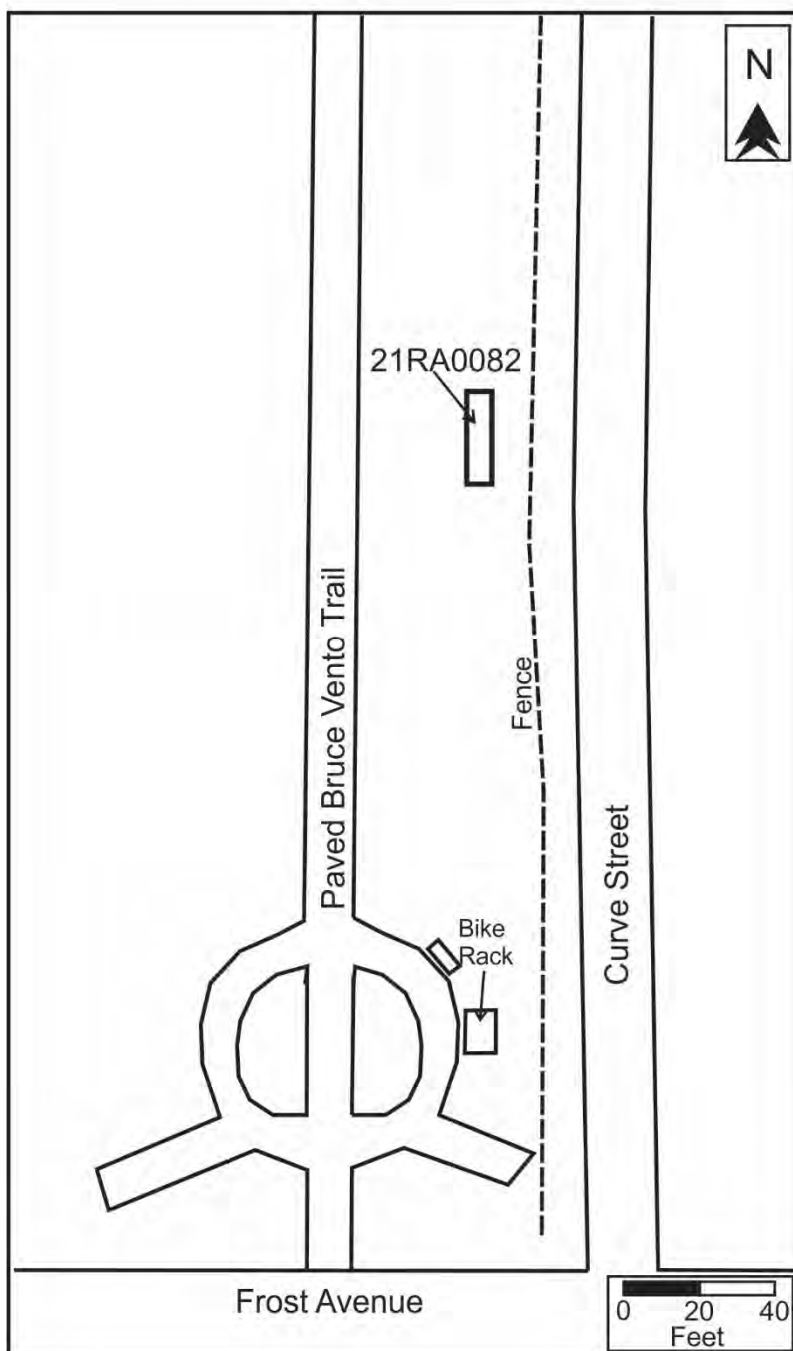


Figure 48. Sketch map of 21RA82 site location.

PHASE II INVESTIGATIONS

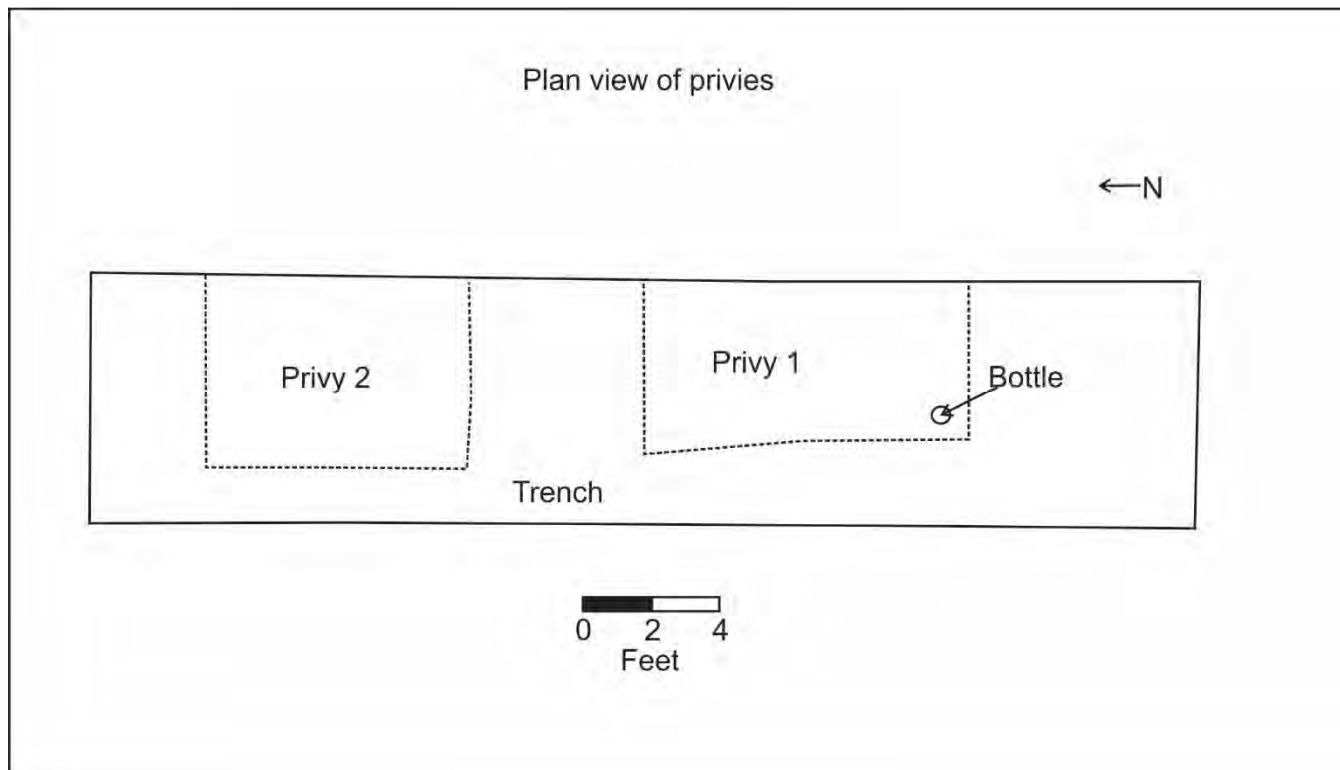


Figure 49. Plan view of privy shafts within trench.



Figure 50. View of southern privy shaft showing wood lining in profile trench. View facing east.

PHASE II INVESTIGATIONS



Figure 51. View of northern privy shaft showing faint wood lining near profile edge in foreground. View facing east.



Figure 52. MVAC personnel on left in photo is standing on sterile subsoil between privy shafts. View facing east.

PHASE II INVESTIGATIONS



Figure 53. View of remaining portion of northern privy shaft in profile. View facing southeast.



Figure 54. View of remaining portion of southern privy shaft in profile. View facing north.

PHASE II INVESTIGATIONS



Figure 55. Bottles recovered from 21RA82.

recovered, this flask appears to be half-pint size. Minneapolis city directories from 1898 to 1918 have no listing for a Graves Company at that address (Hennepin County Library 2019).

This bottle is 7¼ inches tall, 3 inches wide, and 1¼ inches thick. The seam appears just past the shoulder. Based on the cup mold heal seam on the base, and the seam on the sides, this container appears to have been blown in a cup bottom mold. Two clear whiskey bottles that appear to be just under a one-pint size also were recovered. These bottles have a seam up to the just past the shoulder. The neck appears to have been applied separately. One bottle measures 7½ inches tall, 3¼ inches wide, and 1¼ inches thick, while the other is 7¼ inches tall, 3 inches wide, and 1¼ inches thick. Based on the cup mold heal seam on the base and the seams on the sides, these containers appear to have been blown in a cup bottom mold. The taller of the two still has a cork in the top. No markings or embossing are present on these bottles. The fourth bottle is a clear whiskey bottle. It is broken but has “HALF PINT/FULL MEASURE” embossed on the back and the number “4” embossed on the bottom. The container is broken in too many places to get accurate measurements for height, width, and thickness.

One brown beer bottle was found. This bottle is broken, and although there is embossing on the front, most of the embossed part is missing, so a definitive name cannot be ascertained. This bottle is 11½ inches tall and 3 inches wide and has a crown cap and a slightly bulged shoulder. It appears to have been blown in a post bottom plate mold. A large “H” is embossed on the bottom. The “H” logo can be related to several companies from the late

PHASE II INVESTIGATIONS

1800s and early 1900s, including the W.H. Hamilton & Co. (date range circa 1898–1918), the Hart Glass Manufacturing Co. (circa 1918–1938), the Hazel Glass Company (circa 1886–1902), and the Hazel-Atlas Glass Company (1902–1930s) (Lindsay 2019: Makers Mark Logo Table).

One medicine bottle was also recovered. This clear bottle has a flanged lip, with seams that end past the shoulder. It is rectangular with rounded shoulders and measures 5¼ inches tall, 2¼ inches wide, and 1¼ inches thick. The word “BANNER” is embossed on the base. The BANNER logo could not be found in Fike’s (1987) book on medicine bottles; however, the “BANNER” logo has been found on other medicine bottles and could be related to the Obear-Nester Glass Co., which was in operation from 1899 to circa 1920 (Lindsay 2019: Makers Mark Logo Table).

One clear pickle bottle also was recovered. This clear bottle has a square body, a square base with rounded edges, and a wide mouth opening. The seam runs nearly up to the rim of the bottle. The bottle has a square base and appears to have been blown in a post bottom plate mold. It measures 2 inches by 2 inches at the base and is 6½ inches tall. It does not have any embossing or maker’s marks.

Although the artifacts appear to date to the early 1900s, they are very general in nature. The contents of the privy shafts suggest that the privies were cleaned out regularly, including likely at the time of abandonment, and the artifacts were probably deposited after abandonment. The artifacts may or may not have been deposited by passengers at the rail depot, and they cannot be assigned to a particular time in railroad history.

21RA82 NRHP Evaluation

As an historic site related to railroad activity, 21RA82 does meet some basic conditions of NRHP eligibility under Criterion D, with potential to yield important information about the past; however, it does not meet others. The site has been truncated by cutting and filling and contains very limited cultural material that might or might not be related to the railroad passengers or workers. Considerations for eligibility include:

Material Integrity – Although some of the wooden privy lining remains intact, portions of the shafts were truncated during moving of the superstructure to the joint depot, or during other cutting and filling actions. The cultural remains within the privies are sparse, with only a few bottles found in one area. This sparsity of artifacts probably reflects privy cleaning, including prior to abandonment, and the artifacts recovered cannot be definitively assigned to railroad passengers or workers. The site does not hold a significant artifact assemblage that could answer potential research questions about the population using the depot privy.

Integrity of Design – In the draft supplement to the Multiple Property Documentation for Railroads in Minnesota, Arnott and Pizza (2017: 98) indicate that “Archaeological data sets

PHASE II INVESTIGATIONS

with integrity of design, consisting of artifacts and features will: 1) be present in sufficient quantities to be analytically visible and extractable; 2) not be mixed with unrelated materials; and, 3) preserve patterns that allow for interpretation.” Site 21RA82 does have a partially intact arrangement of feature patterning in the wood-lined privy outline. Although the top of the lining appears to have been affected by post-1917/1918 cutting and filling, other portions were found intact in the profile of the excavated trench. The few artifacts found in the fill above the privy shafts were in poor context and were mixed with other materials, and cannot be firmly associated with the privy. The bottles found within the privy did not appear to be mixed with unrelated materials; however, their low number and the small size of the remaining deposit leaves little potential for cultural materials to be present in sufficient quantities to be analytically visible and extractable. Also, since the only artifacts found within the privy were container glass and one piece of window glass, the assemblage is not sufficient for stratigraphic analysis to establish use patterns, etc.

Integrity of Workmanship – Arnott and Pizza (2017: 99) define workmanship as the physical evidence of crafts, labor, and skill during a given period. The privy shafts retain some integrity of workmanship in the form of the wooden shaft outlines, and the basic privy design is still present, except in the area truncated by removal of the superstructure and subsequent filling. The depth of the remaining shafts is still present, along with the privy’s placement near the former depot. However, evidence related to the labor or experience of workers is lacking.

Integrity of Location, Setting, and Feeling – The site still has integrity of location. The privy remnants were found exactly where they were mapped in 1913, prior to the depot being moved north to the joint depot location. Since this privy is associated with the post-1880 railroad upgrades, the overall setting is still somewhat present, although construction of the Bruce Vento Trail system removed all evidence of ballast and rail ties. The feeling of a railroad roadway has been compromised by the addition of fill over the privy, and the privy’s presence cannot be discerned from the modern ground surface.

Integrity of Association – Arnott and Pizza (2017: 98) suggest that “Association is the direct link between the data sets and identified historic research area(s) within a historic context and period of significance.” The privy’s association to the former railroad depot is known; however, the artifacts found were few and general in nature and cannot be associated with a specific time in rail history. The bottles were likely deposited soon after abandonment, before the fill was added over the area, and may not be related to railroad personnel or passengers.

Arnott and Pizza (2017: 98) suggest that a railroad archaeological site considered eligible under Criterion D will have integrity of association when the material remains can answer research questions directly related to the historical significance of the property.

PHASE II INVESTIGATIONS

Although 21RA82 does meet some NRHP eligibility conditions under Criterion D, there is too little information left to answer research questions. Based on the Phase II excavations, the width, length, depth, and layout of the privy is known, as are the basic structural elements—a privy with two wood-lined shafts, and sterile subsoil between them. Considering the few artifacts recovered, and the low potential for significant cultural materials in the remaining deposits, it is difficult to develop research questions that would justify additional work. Therefore, this site is not recommended for the NRHP, and no further work is recommended.

Excavation Area 2

Excavation Area 2 was southeast of the intersection of the Bruce Vento Trail and the Gateway State Trail, on DNR property. This location is in a sparsely wooded area next to the manicured lawn areas adjacent to the two trails. As noted earlier, a 1918 plan of the joint depot in this area included a proposed privy location about 54 feet from the east edge of the paved Bruce Vento Trail, and 29 feet south of the southern edge of the paved Gateway State Trail (see Figures 47, 56, and 57). Under its DNR permit, MVAC was allowed to put in two trenches 20 feet long by 3 feet wide, if necessary. The DNR had concerns about disturbance to trees more than 3 inches in diameter. During the work, disturbance was avoided by bringing the backhoe into the thinly wooded area through a gap in the trees and carefully selecting locations for the trench and back dirt.

MVAC hand measured to the georeferenced location of the privy as a starting point for the backhoe. A 36-inch-wide backhoe blade was used to strip a trench approximately 10.8 feet (3.3 meters) east–west by 3 feet (0.9 meters) north–south. Near the surface, between 12 and 24 centimeters, was a layer of 10YR 2/2 dark brown sandy fill with abundant pebbles. Below this was mixed, disturbed soil consisting of 10YR 4/3 brown sand mottled with 10YR 6/3 brownish yellow sand and 10YR 5/8 yellowish brown sand. The backhoe skimmed off approximately 5 cm at a time. The trench was excavated to a depth of about 150 centimeters (4.9 feet) and still showed the mixed, disturbed soil (Figure 58). Since it was not safe to have the backhoe make the trench deeper, a soil core and a shovel test were placed in the bottom of the trench, and revealed that the disturbed soil continued for at least another foot. The disturbance covered almost the entire length of the trench. Based on the local soils, the distinct length of the disturbance, and depth of the disturbance, it is likely that this trench overlapped the previous trench from the abandoned sanitary force main. Any possible cultural material in this area would have been removed when the force main was installed in the 1960s.

Since the georeferencing proved accurate in Area 1, where the privy was found in the first trench, the georeferencing for Area 2 should have been accurate for finding the second privy, provided that it was installed in the location shown on the 1918 plan. If the “as-built” location differed from the planned location, available records provide no information to clarify the change. After the first trench in Area 2 turned out to be disturbed, no further trenches were excavated. MnDOT representatives who visited the site concurred with this decision. An

PHASE II INVESTIGATIONS

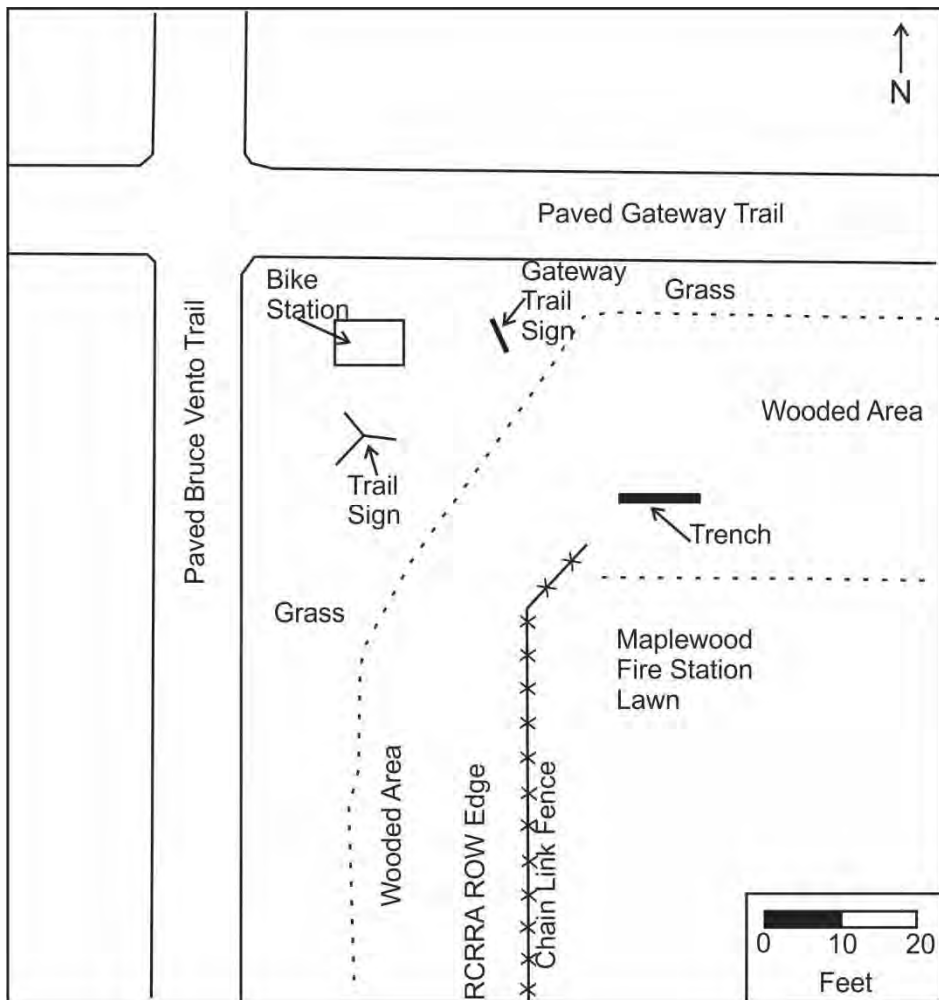


Figure 56. Location of trench excavated in Area 2.

PHASE II INVESTIGATIONS

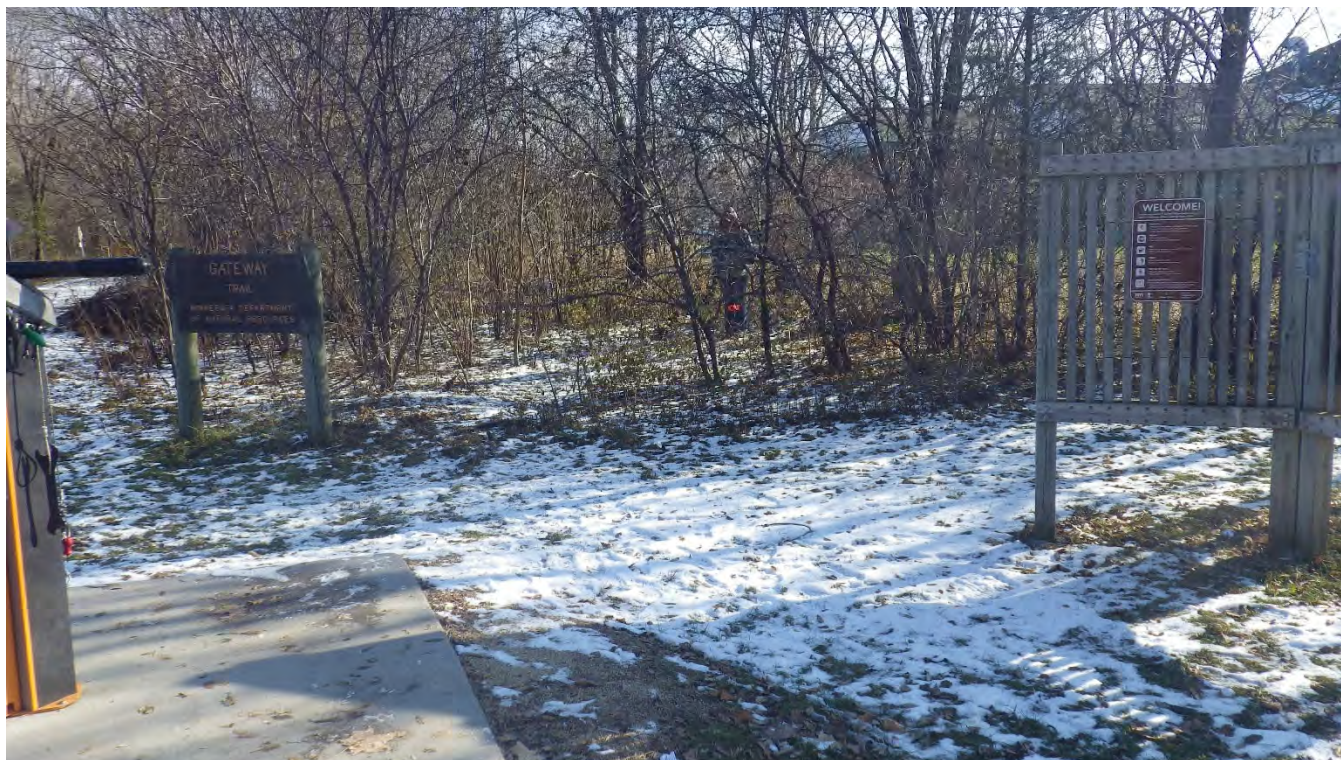


Figure 57. View of location of possible privy in Area 2, where MVAC personnel is standing next to orange flags in treeline. View facing southeast.



Figure 58. View of trench in Area 2 showing disturbed soil. View facing south.

PHASE II INVESTIGATIONS

additional trench to the north or south would also have been in disturbed soils, and another trench to the east or west would have departed from the georeferenced location and also endangered trees the DNR wanted to protect. Based on the results of the fieldwork, the location of the proposed privy shown on the 1918 map was probably disturbed during construction of the sanitary force main, and no further work is recommended for this area.

Excavation Area 3

Excavation Area 3 was east of the Bruce Vento Trail, across from the northern edge of the back (western) parking lot of the Maplewood Fire Station, in the RCRRA ROW. A 1960s map of the sanitary force main showed a “wooden toilet” about 154 feet south of the southern edge of the paved Gateway State Trail, 34 feet east of the paved Bruce Vento Trail, and 16 feet west of a north–south fence line that separates this area from the Maplewood Fire Station grounds (see Figures 47, 59, and 60). Based on georeferencing, this location matched a 6' x 10' structure shown on a 1920 map of the depot area, but that map showed no indication that the structure was privy (Figure 61). It was unclear whether the “wooden toilet” label on the force main map meant a privy or a more modern type of flushable toilet. Also, the construction date of the toilet was unknown. This “wooden toilet” was related to the joint Soo (formerly Wisconsin Central) and Northern Pacific Depot. Since the 1918 depot map showed the privy in Area 2 as proposed rather than as-built (see Figure 42), Phase II excavations were undertaken in Area 3 in case the “wooden toilet” was the as-built location.

MVAC hand measured to the georeferenced location as a starting point for the backhoe. The backhoe was used to strip three side-by-side trenches, each 36 inches wide, based on the georeferencing. In the first trench, a small wooden lining and possible architectural material appeared under about 40 centimeters of fill, so two additional 36-inch-wide trenches were excavated to the west to get a better view. In all, an area of about 11 feet east–west by 16 feet north–south was opened. At first, a faint outline of wood in a 9 foot by 7 foot area was thought to represent remnants of a former building; however, disturbance was visible within it (Figure 62). A few reddish stains had nails and window glass near the faint wooden outline. These stains were skim shoveled to try to determine their origin, with the soil screened through one-quarter inch mesh. Round nails and window glass fragments were found within one of these reddish stains. Underneath the stains were relatively modern items such as plastic bags, a plastic knee guard of the type construction workers wear, and other somewhat recent material. The faint wooden outline was only two centimeters deep and disappeared with minimal skim shoveling.

Since there still appeared to be mottled soil on the west side of the trench, incremental stripping continued in that area. At about 115 cmbgs, clear evidence of disturbance was encountered, including coal, piles of broken and burned window glass, cinder, ash, charcoal, metal, and some burned soil (Figure 63). This disturbed material covered almost the entire

PHASE II INVESTIGATIONS

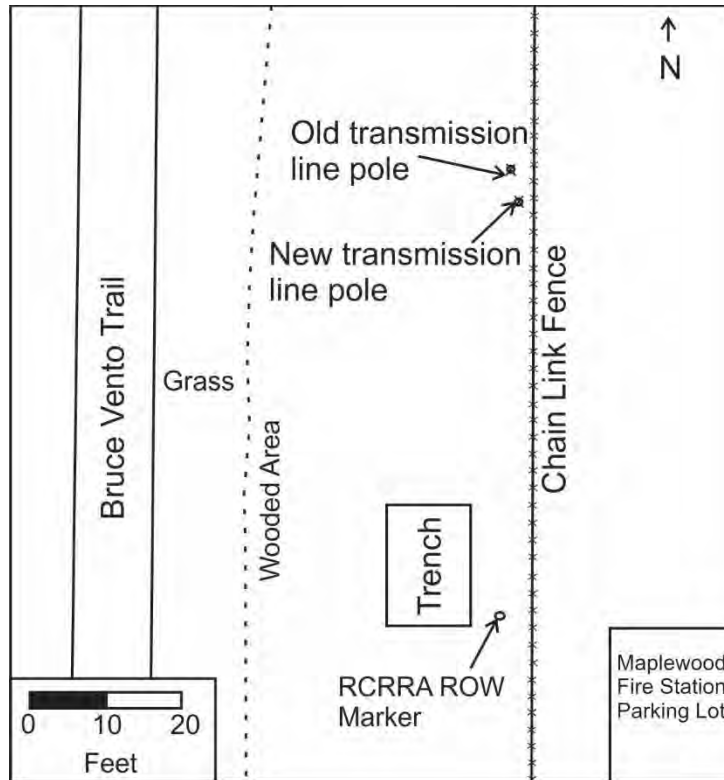


Figure 59. Location of trench in Area 3.



Figure 60. View of possible privy (orange flag next to backhoe operator) in Area 3. View facing east towards back barking lot of Maplewood Fire Station.

PHASE II INVESTIGATIONS

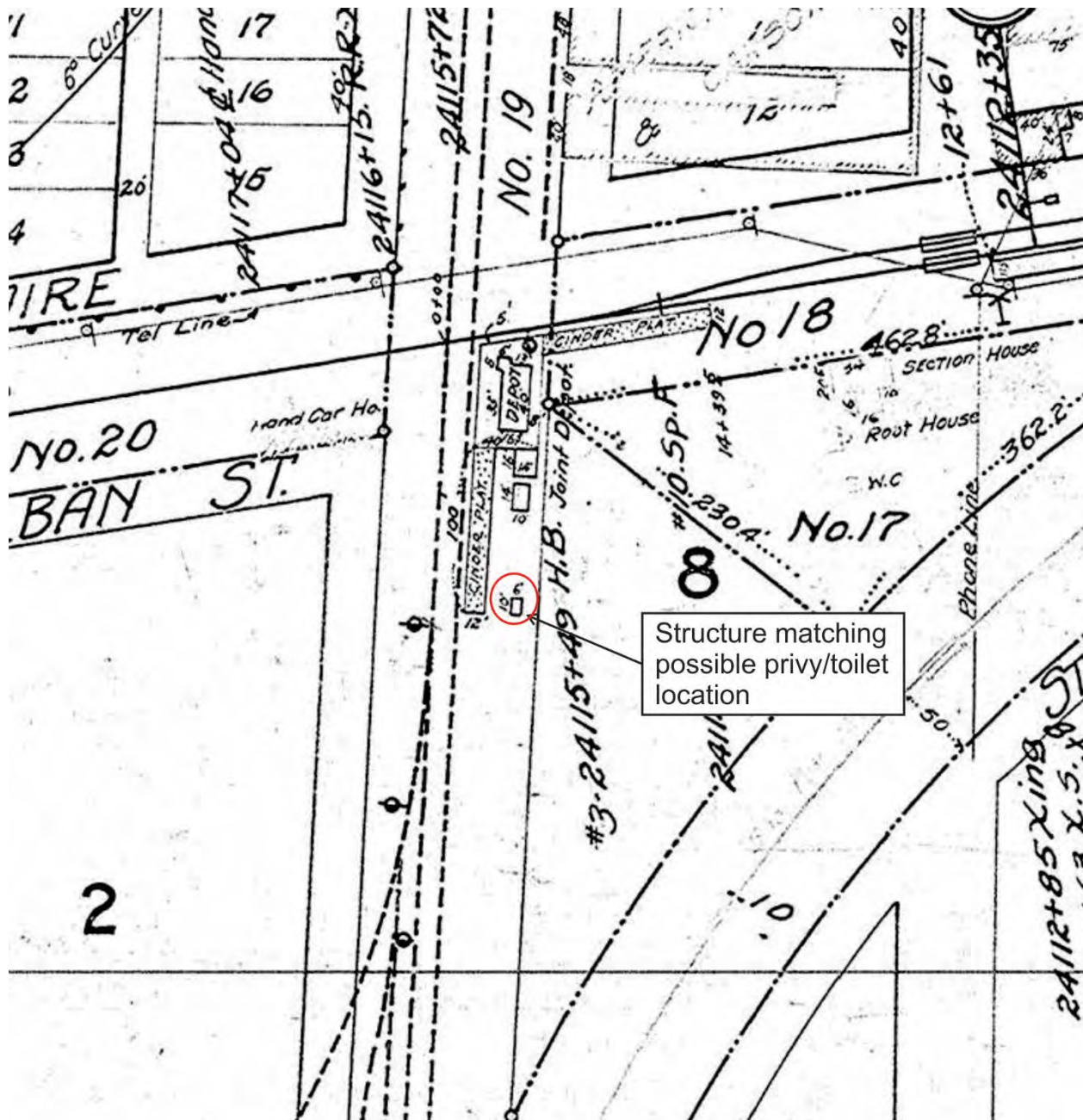


Figure 61. Map dated 8-20-1920 of Gloster joint depot showing structure in the general location where “wooden toilet” was labeled in the 1960’s (MnDoT 2018).

PHASE II INVESTIGATIONS



Figure 62. Faint outline of wood in trench in Area 3.



Figure 63. Disturbance in western half of trench in Area 3.

PHASE II INVESTIGATIONS

trench area (approximately 3 feet by 10 feet) and did not appear to be a privy shaft. Below this disturbance was a thin deposit of what appeared to be 1960s/1970s bottles (beer bottles, root beer bottles, others), metal, and plastic materials strewn throughout the trench. Partially burned remnants of wooden boards, noted on the western and eastern profiles in this portion of the trench, likely indicated the former presence of a building, the rest of which was missing. The bottles were removed by hand to determine whether this 1960s/1970's deposit capped a privy shaft; however, only sterile subsoil was found below. The total excavation depth in this area was about 140 cmbgs. Two hand soil cores placed in the sterile subsoil confirmed that it continued for at least 3 more feet and was not just a layer of fill with a possible buried cultural deposit beneath it. The east side of the trench was not excavated further as it was outside the boards exposed in the western half and did not appear to contain any further artifacts.

Based on historic maps and aerial photos, it was known that this area contained a building, likely since 1920, and the excavation found partial remnants of the building with debris thrown in. Some of the materials found inside the former building had been burned; these were mainly on the west side of the excavated area. In the western area, outside the wooden boards, the original topsoil was found about 115 cm (3.8 feet) below the current ground surface (Figure 64). Original topsoil was also present on the east side of the excavated area, about 100 cm (3.28 feet) below the current ground surface. The former building had apparently been built on or just below the original surface, with fill added around it during use, or added over it after it was no longer used. Some burning was represented; however, the whole building was not necessarily burned, since two wooden planks did not exhibit burning. Only artifacts from the 1960s or more recent years were found in this area, and they were all in poor context.

The location of this former structure had no evidence of pre-1960s cultural deposits, and no trace of privy shafts. The building appeared to have been used as a dumping area in the 1960s, as evidenced by the bottles, and also more recently, as indicated by the plastic bags, knee guard, and other modern materials. In the wooded area less than 50 feet south of this excavation area, there is a trench about 125 feet long near the edge of the RCRRA ROW. The more modern disturbance found in the excavation area might be related to that trench.

MVAC's excavation confirmed the location of a former structure where one was shown on the 1920 rail map and later aerial photos. The possibility that this structure was a privy or other toilet was raised by the "wooden toilet" notation on the 1960s map of the sanitary force main. The excavation found no indications of a privy or other toilet facility at that location, but did find structural remnants and modern debris with clear evidence of disturbance. Due to the degree of disturbance and the modern nature of the materials, this location was not recorded as an archaeological site, and no further work is recommended there.

PHASE II INVESTIGATIONS



Figure 64. Profile in western half of trench in Area 3 showing buried topsoil.

PHASE II SUMMARY AND RECOMMENDATIONS

In November 2018, personnel from MVAC undertook Phase II investigations in a portion of the Rush Line BRT archaeological study area to try to identify potential railroad depot privies at locations noted on historic maps. In three different areas, heavy equipment was used to remove more recent fill and look for evidence of privies. In Area 1, a privy location shown on historic maps of the Gladstone/Gloster depot area was identified in the field and recorded as new site, 21RA82. The site had two privy shafts that had been truncated by cutting and filling. The excavated portion contained very little cultural material, and the portion that still remains has little potential to contain significant cultural deposits. This site does not meet criteria for NRHP eligibility under Criterion D either as an individual property or as a contributing feature to the Lake Superior & Mississippi Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, and no further work is recommended. For Area 2, 1918 plans for a joint depot showed a potential privy location, but no confirmation has been found that a privy was built in that same location. A trench excavated there found only disturbed soils, with the disturbance probably related to construction of a now abandoned sanitary force main. No further work is recommended there. Area 3 was investigated because a “wooden toilet” marked on a map of the sanitary force main location might have represented the as-built location of the proposed privy, or perhaps a later depot privy, or a later type of toilet. Excavation trenches showed evidence of a former building in that location, but no indications of privy shafts or toilet, and the artifacts were all from the 1960s or more recent years. No further work is recommended.

RUSH LINE BRT ARCHAEOLOGICAL SUMMARY AND CONCLUSIONS

In the fall of 2018 and spring of 2019, MVAC personnel undertook archaeological investigations for the Rush Line BRT project. Recommendations for reconnaissance survey or shovel testing were determined for areas considered to be medium to high potential for intact cultural resources based on the results of the Phase IA literature review and historic research into the former 1868 LS&M railroad roadway.

Phase I work consisted of shovel testing in some areas that had potential for intact prehistoric deposits. Shovel testing for precontact resources identified no new archaeological sites. Phase I work also consisted of reconnaissance survey along the former 1868 LS&M railroad roadway overlapping the Rush Line BRT archaeological study area, which mainly consisted of the current RCRRA ROW between Johnson Parkway and Beam Avenue, to look for surface features related to the 1868 LS&M railroad roadway. Phase I work also consisted of geomorphological soil borings by Strata Morph Geoexplorations along the former rail roadway to look for remnants of the former 1868 LS&M railroad roadbed likely buried by the later post 1880s railroad embankment on which portions of the Bruce Vento trail were constructed. MVAC found evidence of portions of the 1868 LS&M railroad roadbed on the surface in three areas (Minnesota Architecture/History Inventory No. XX-RRD-NPR002, XX-RRD-NPR003, and XX-RRD-NPR004) and Strata Morph Geoexplorations found what was presumed to be evidence of the 1868 LS&M railroad roadbed under the post 1880s railroad embankment on which the Bruce Vento Trail was constructed in several areas. The NRHP eligibility of these resources is assessed in a separate report evaluating the Lake Superior & Mississippi Railroad Corridor Historic District between St. Paul and White Bear Lake (Pettis et al. 2020). Both the surface and buried remnants of the former 1868 LS&M railroad roadbed are recommended NRHP eligible as contributing features of this historic district.

Phase II investigations were undertaken in the areas of the RCRRA ROW north of Frost Avenue where historic maps found during the Phase IA literature review and subsequent research showed privies related to former LS&M/St.P&D/Northern Pacific rail depots in that area might still be intact below fill. Due to the amount of fill in the area, heavy equipment was utilized to strip the fill to look possible privies. One new site, 21RA82, called the Gladstone/Gloster privy, was identified. Phase II investigations revealed that the privy had been cleaned out on a regular basis, and portions of the privy had been truncated by cut and fill actions. Therefore, it did not meet individual NRHP eligibility requirements and is recommended as a non-contributing element to the Lake Superior & Mississippi Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, and no further work is recommended for the site.

SUMMARY AND CONCLUSIONS

No other new archaeological sites were identified in the remaining portions of the archaeological study area. Based on the results of the Phase IA and Phase I archaeological studies, the following portions of the project are in proximity to areas where archaeological site potential is high and survey is recommended if any work is proposed beyond the study area in these locations (see Table 3, Figures 65 and 66, and Appendix 2, pages 15-16):

- West of Trunk Highway 61 between Buerkle Road and Willow Lake Boulevard in Gem Lake (pages 11-12 in Appendix 2, and Figure 65).
- Between Whitaker Street Station to the northern terminus of the BRT corridor in White Bear Lake (pages 14-16 in Appendix 2, and Figure 66).
- The originally proposed 2nd Avenue Station in White Bear Lake, if reconsidered in the design (page 16 in Appendix 2).

If advancements in project design extend work beyond the limits of the archaeological study area in any portion of the project, changes should be reviewed by an archaeologist to determine whether further study and/or field survey is warranted.

SUMMARY AND CONCLUSIONS

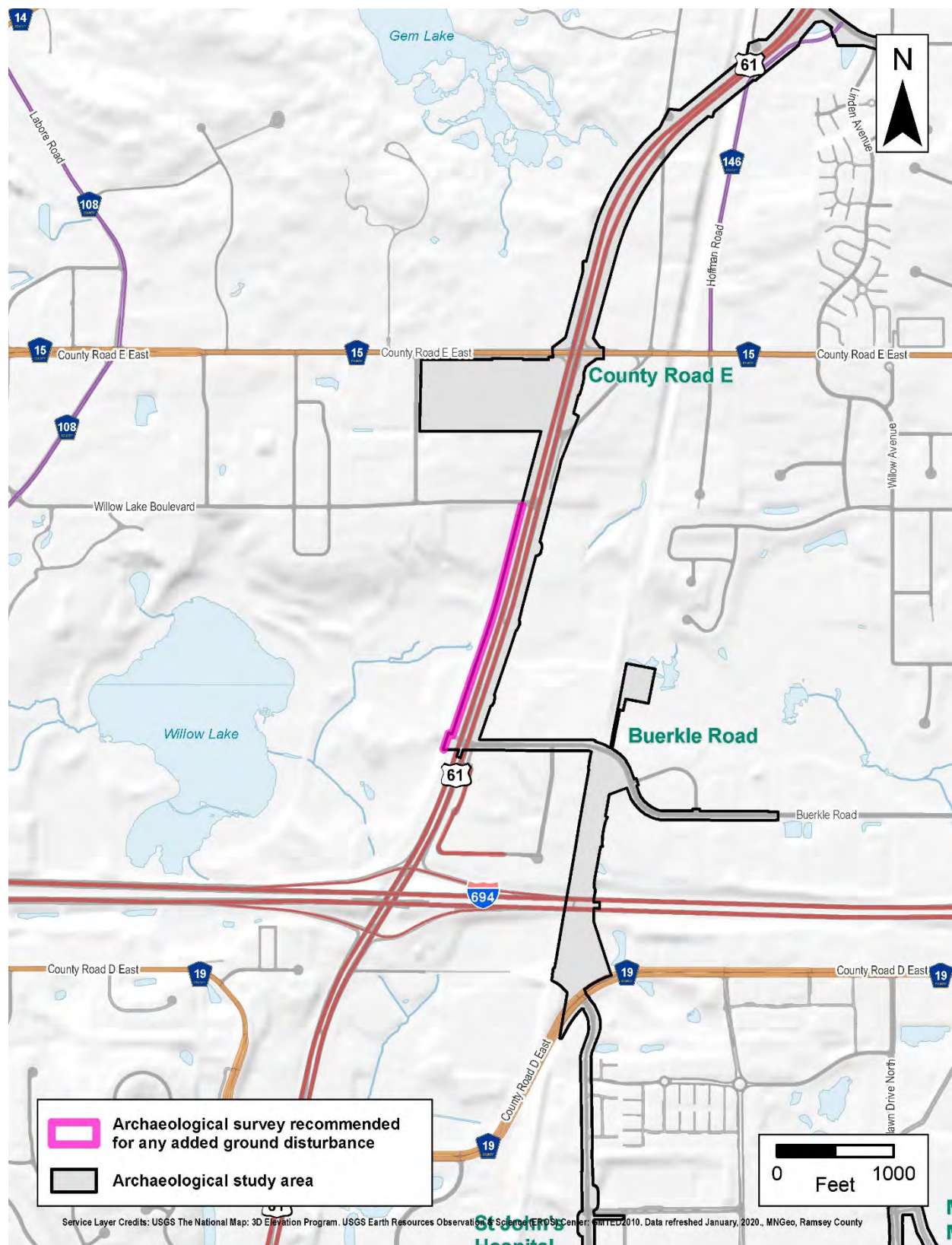


Figure 65. Area recommended for archaeological survey along TH 61 north of Buerkle Road if there is added ground disturbance.

SUMMARY AND CONCLUSIONS



Figure 66. Area in White Bear Lake recommended for archaeological survey if there is added ground disturbance.

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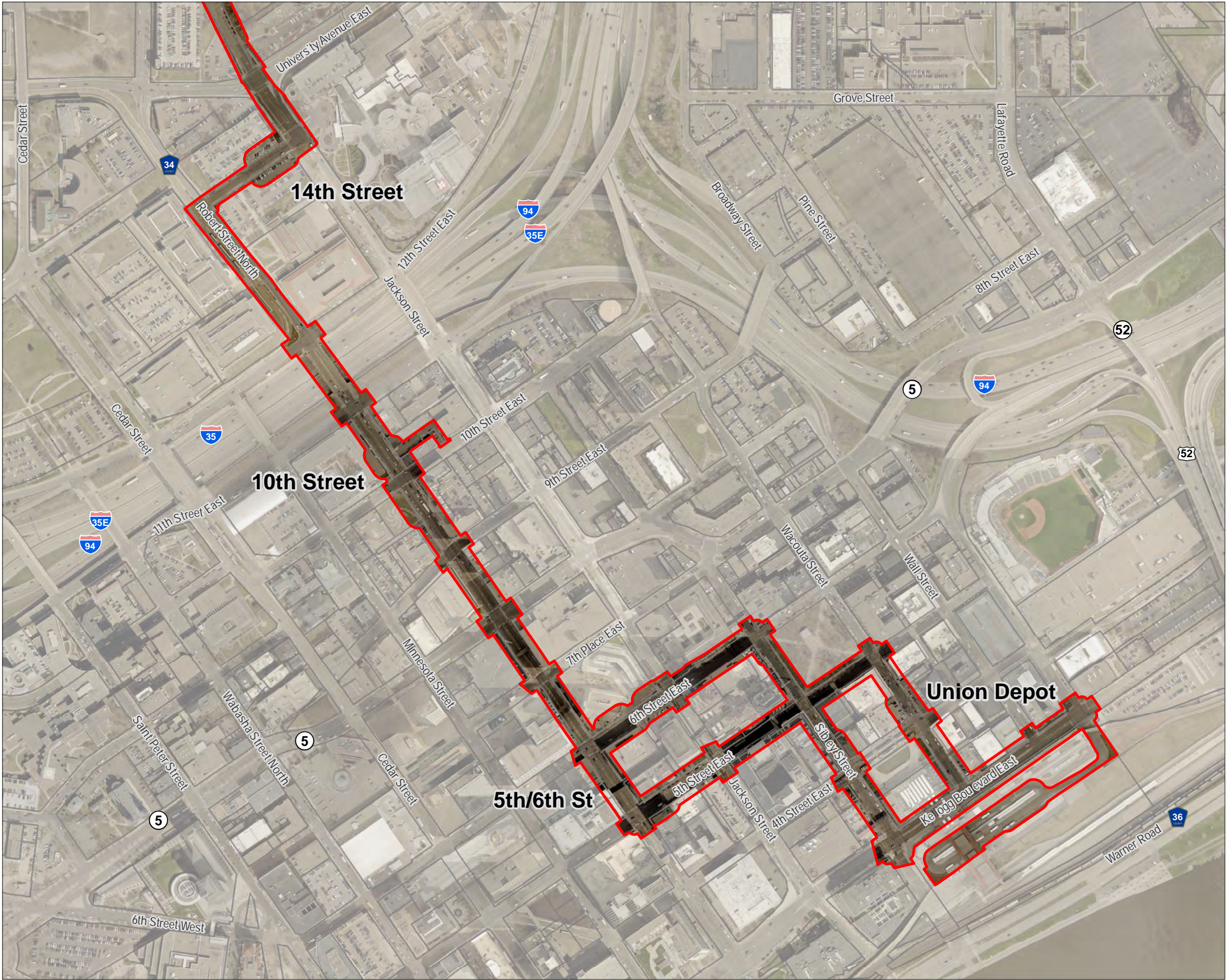
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APPENDIX 1: ARCHAEOLOGICAL STUDY AREA MAPS

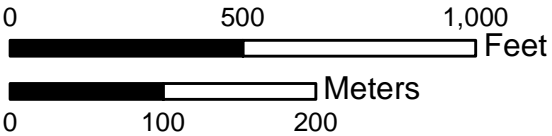
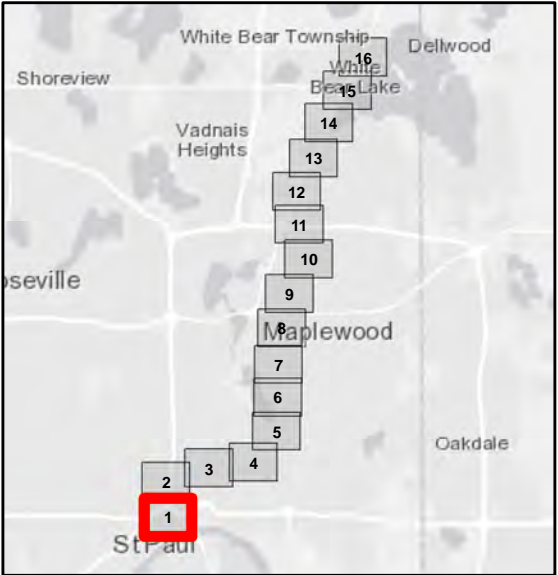


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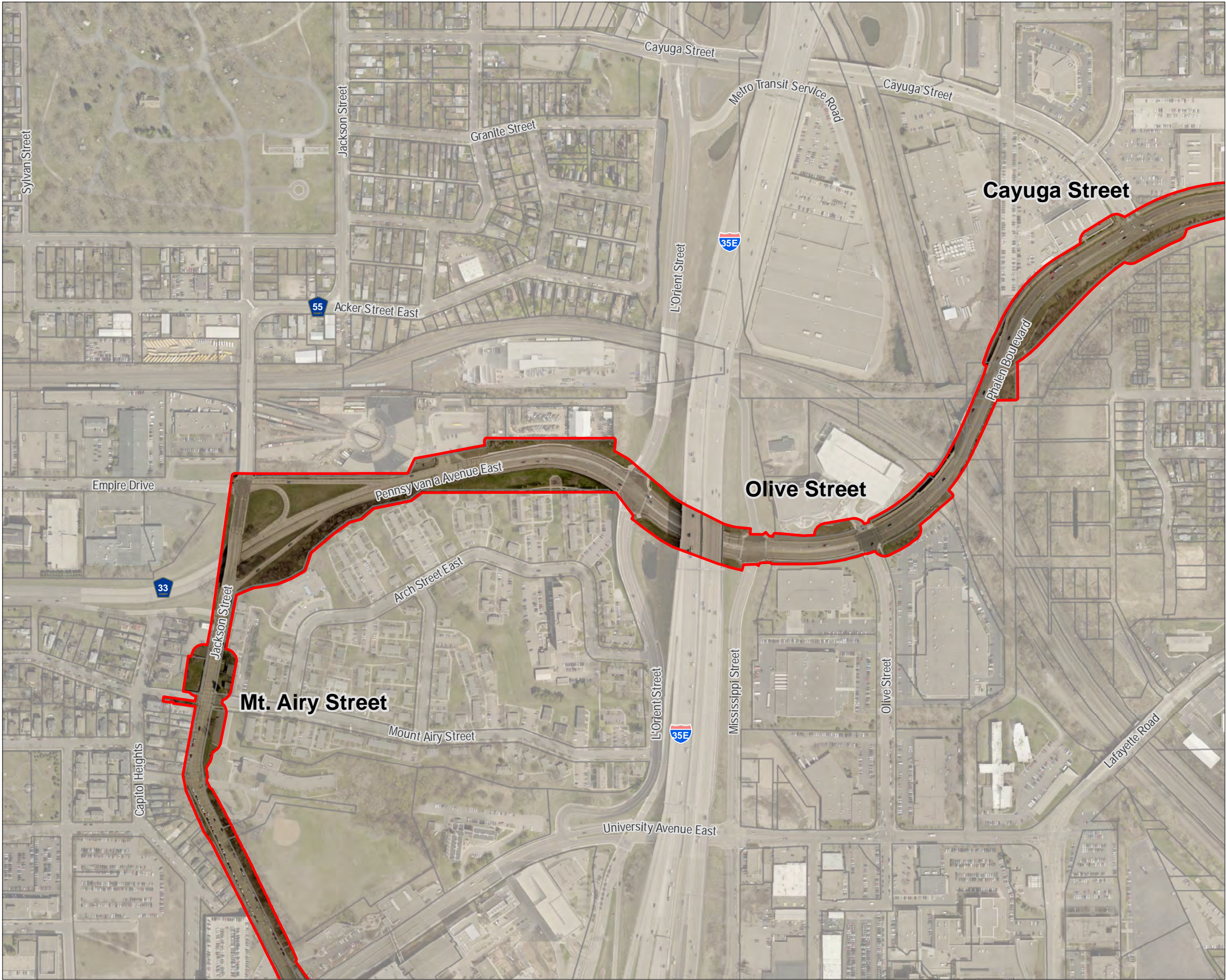
RUSH Line BRT

Ramsey County, Minnesota

Archaeological Study Area
February 2020



**Archaeological
Study Area**

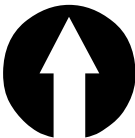
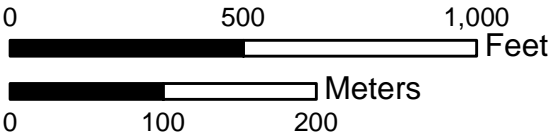
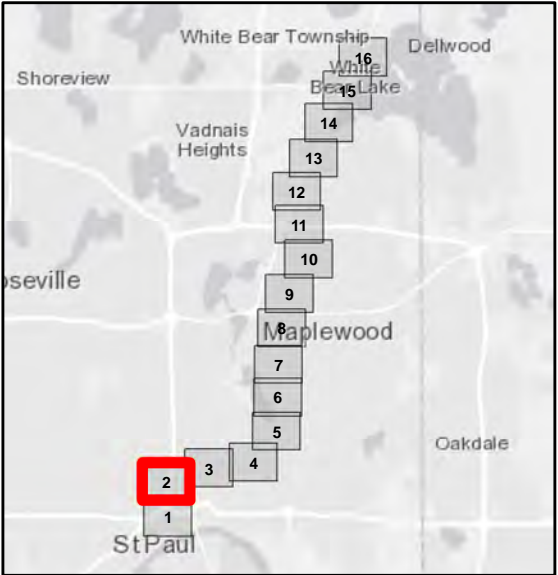


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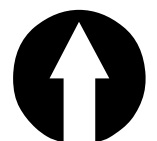
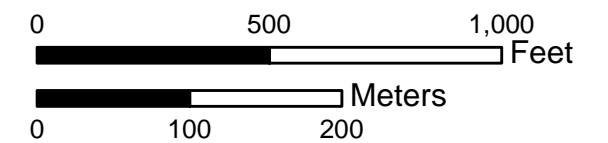
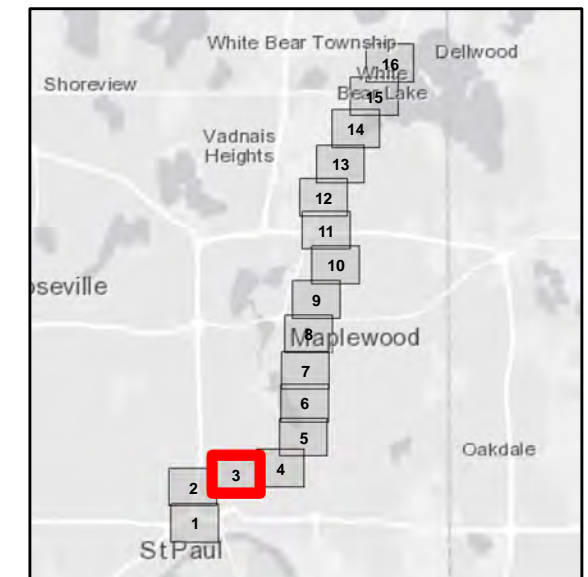
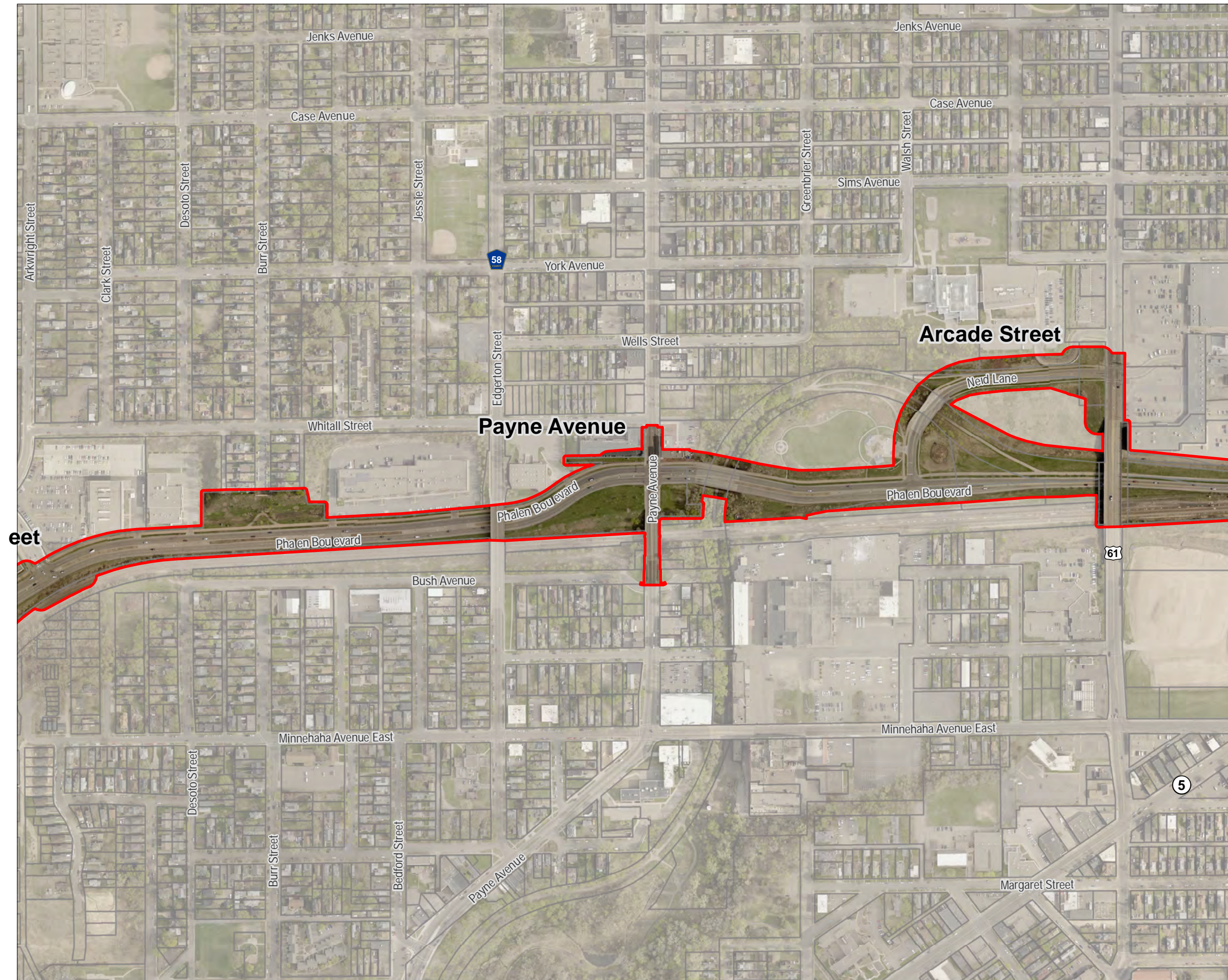
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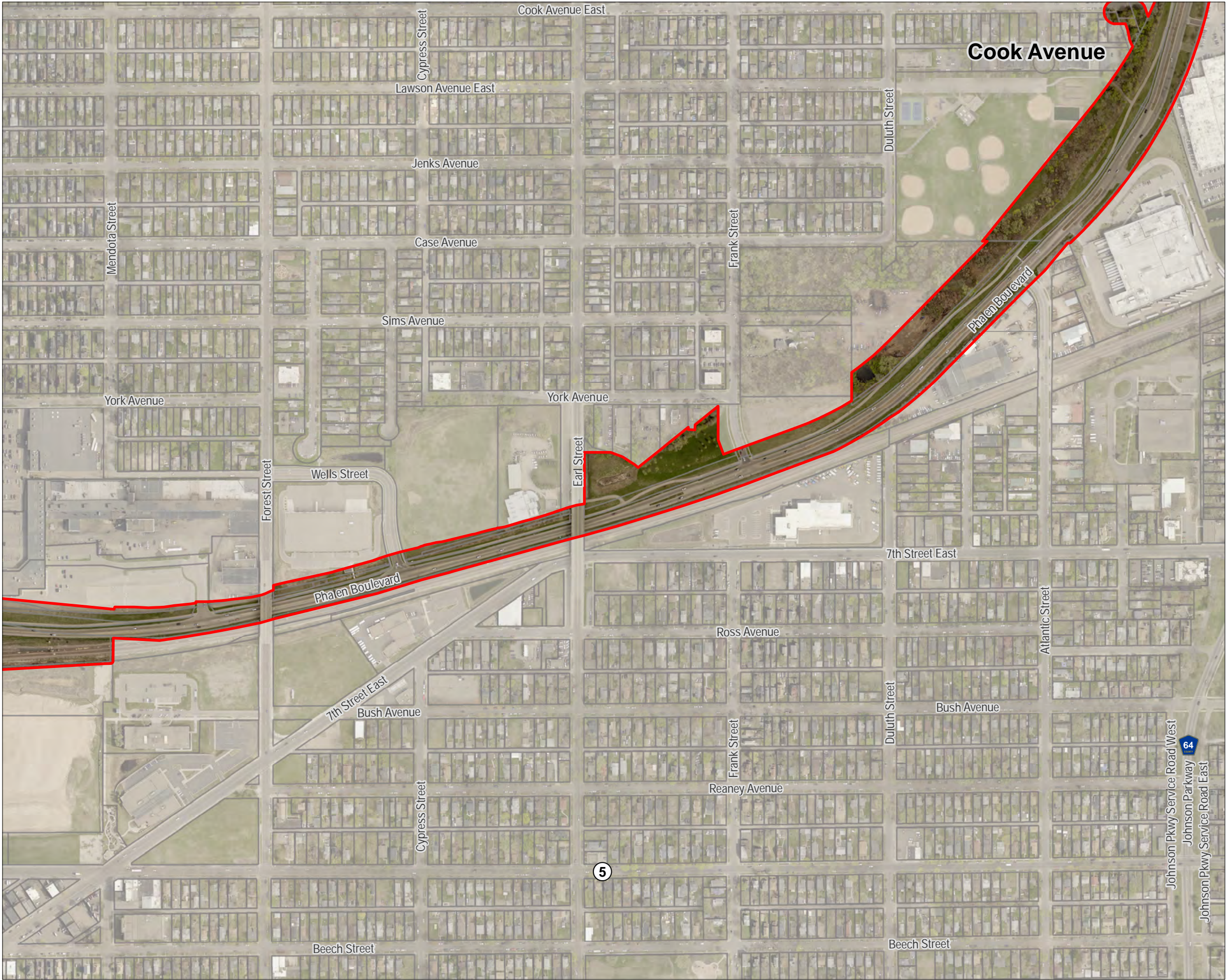


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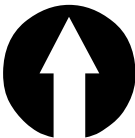
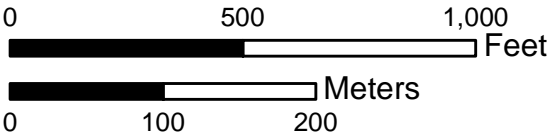
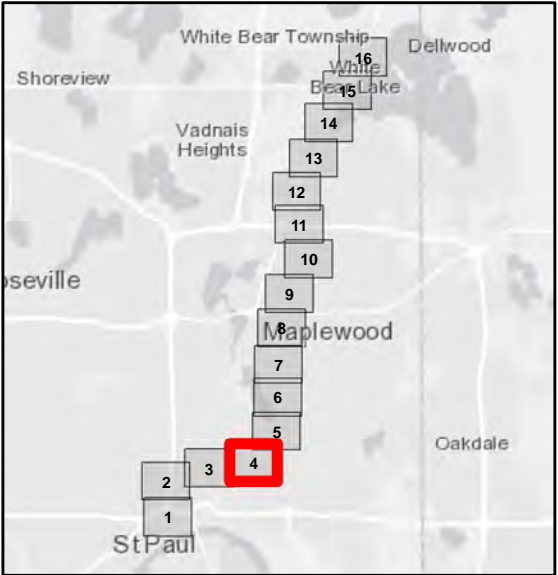


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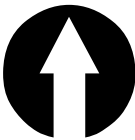
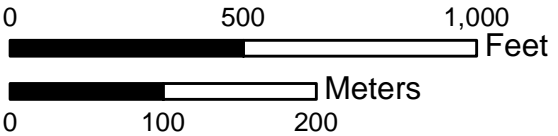
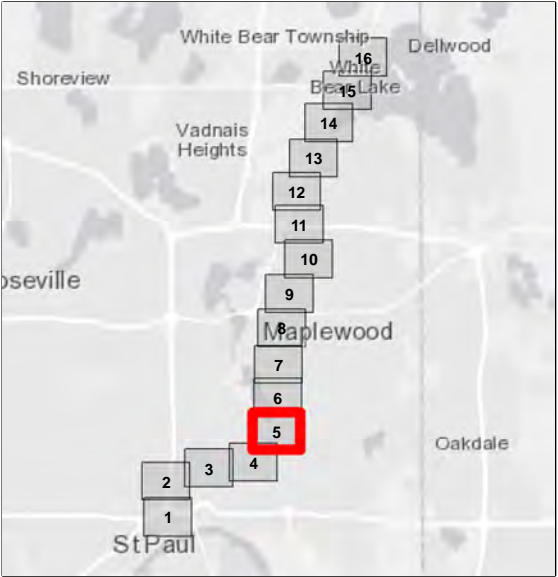
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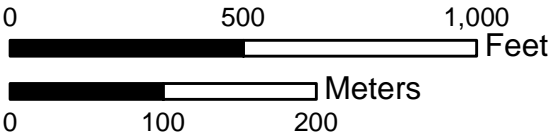
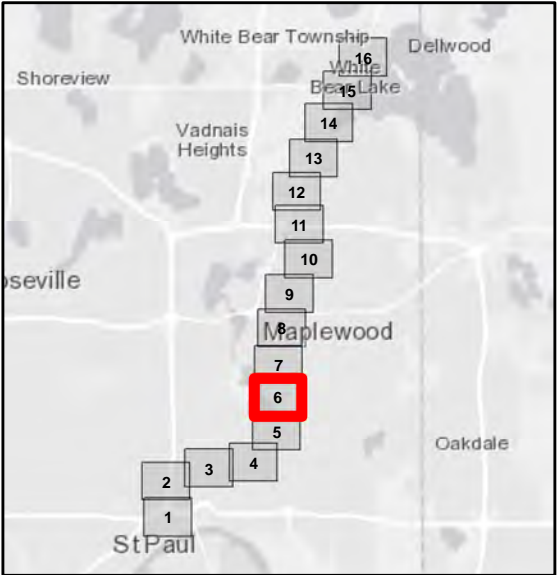


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Ramsey County, Minnesota

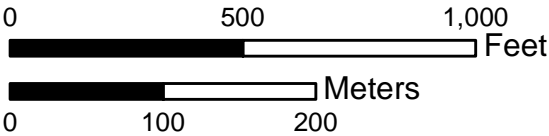
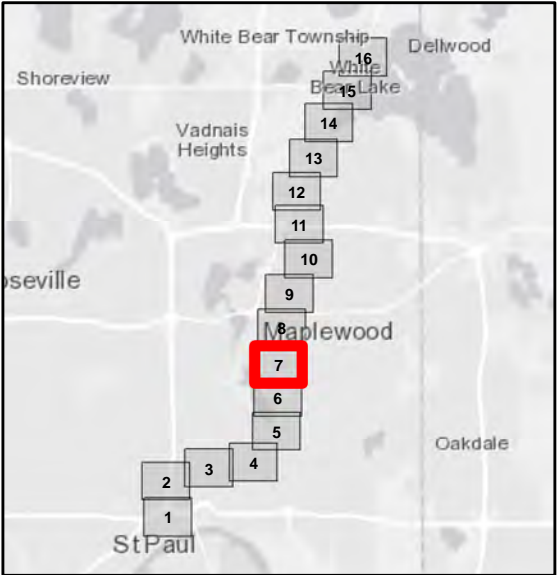
 **Archaeological Study Area**
February 2020



**Archaeological
Study Area**

RUSH Line BRT
Ramsey County, Minnesota

Archaeological Study Area
February 2020



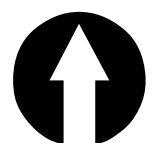
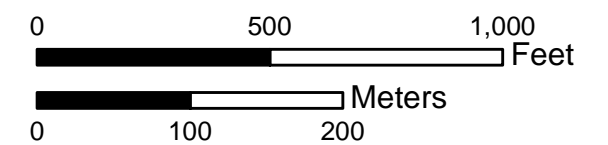
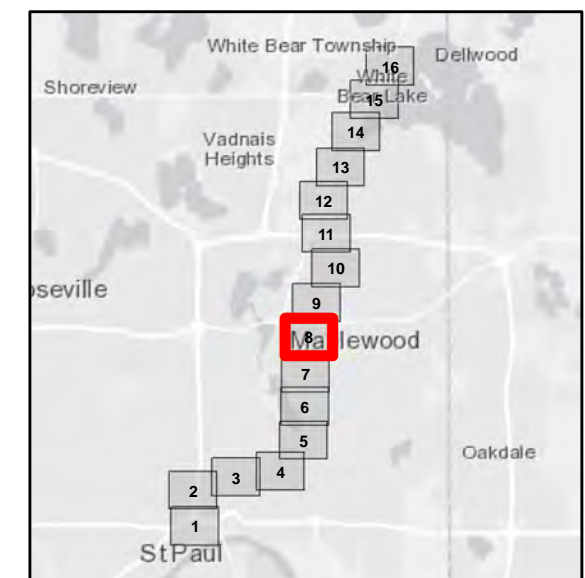
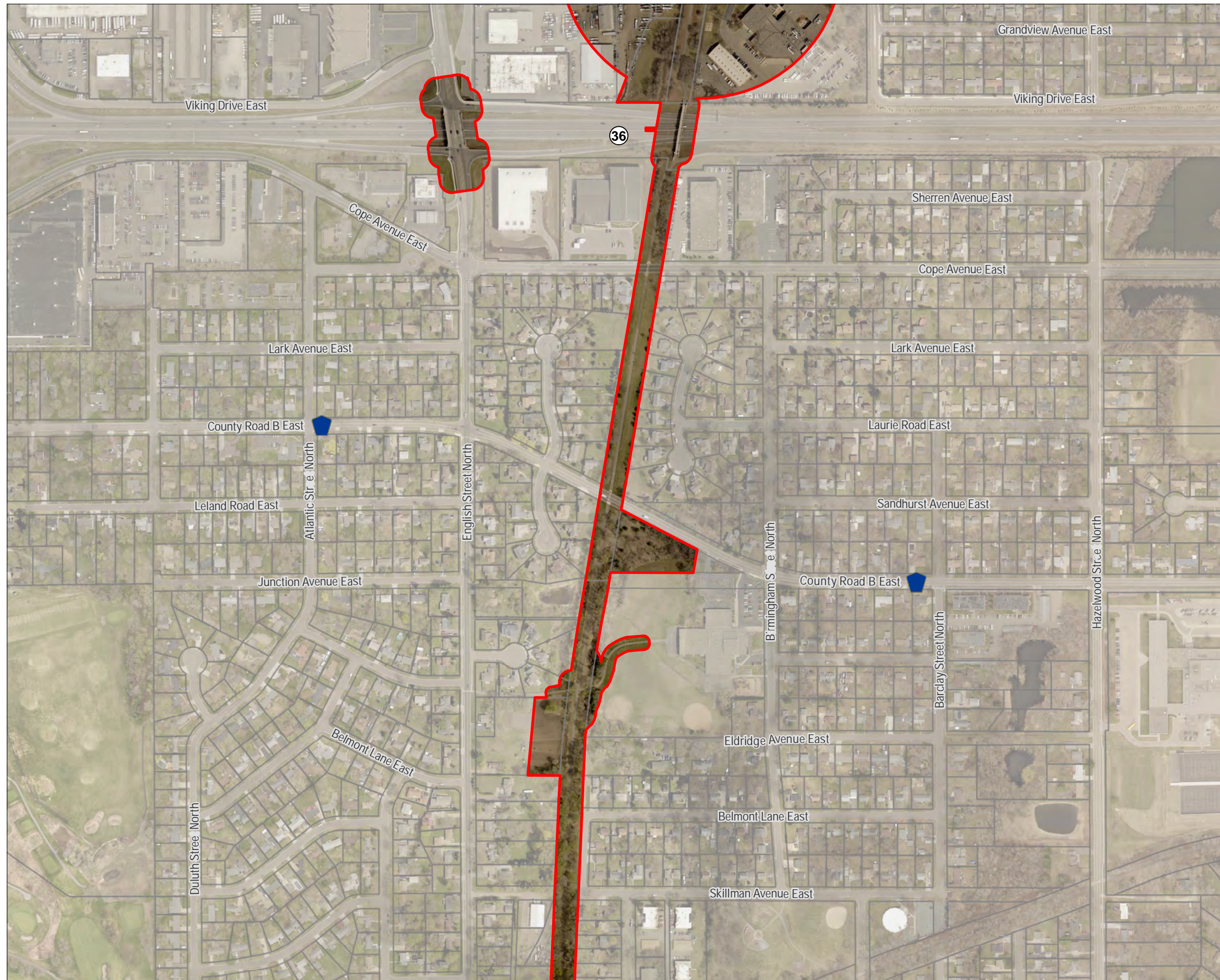
Archaeological
Study Area

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, MNGeo, Ramsey County - Map generated: February 2020

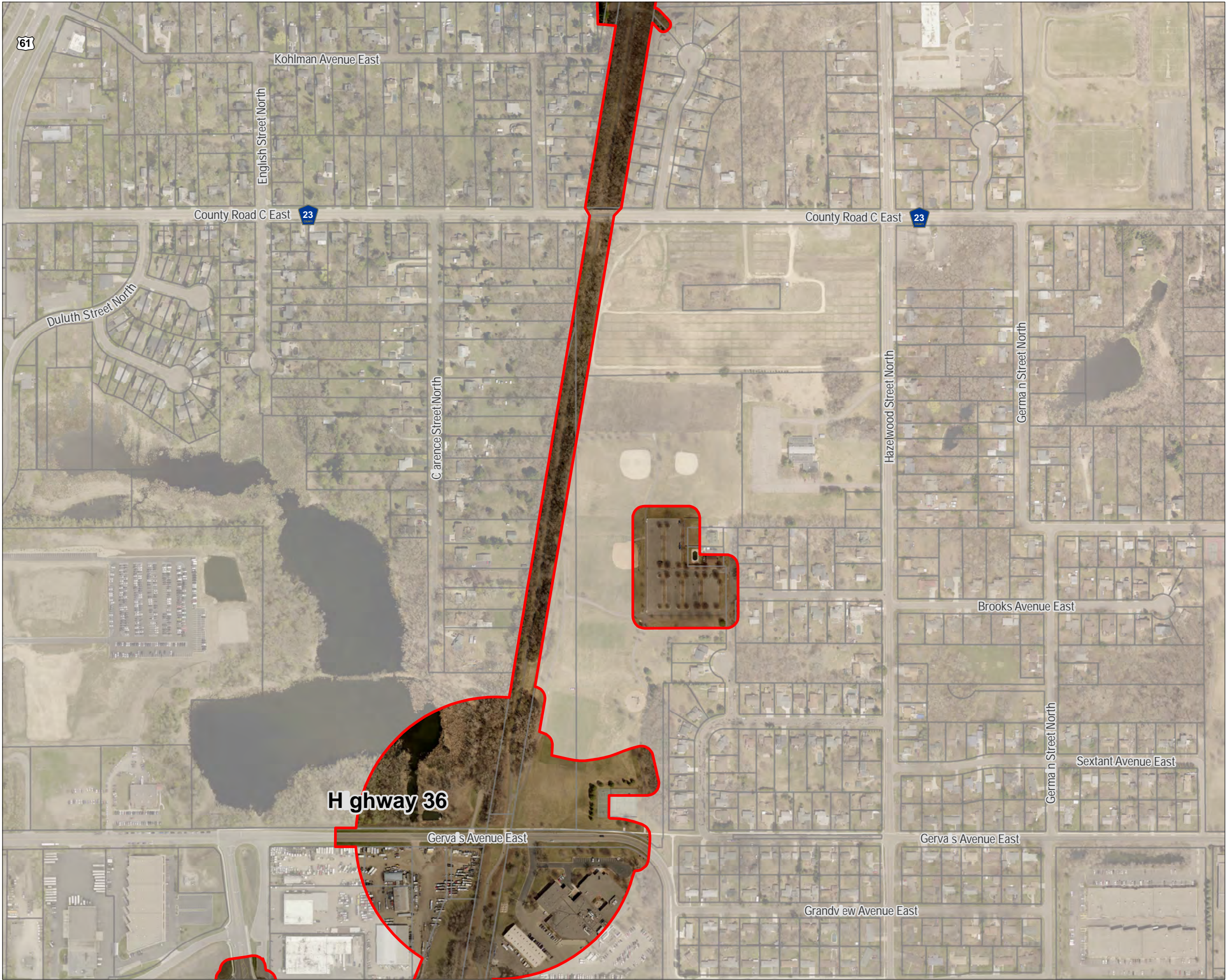
RUSH Line BRT

Ramsey County, Minnesota

 **Archaeological Study Area**
February 2020



Archaeological Study Area

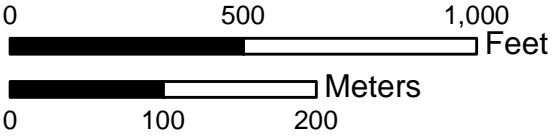
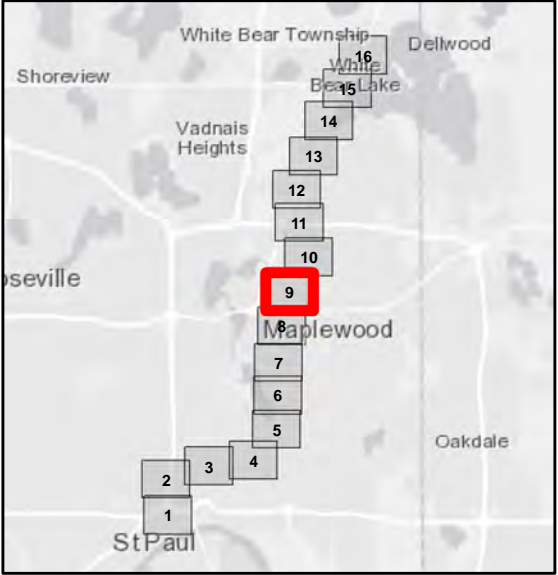


Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, MNGeo, Ramsey County - Map generated: February 2020

RUSH Line BRT

Ramsey County, Minnesota

Archaeological Study Area
February 2020



Archaeological Study Area

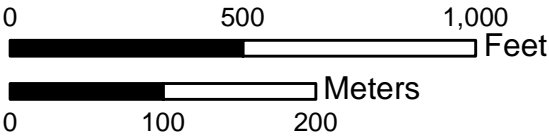
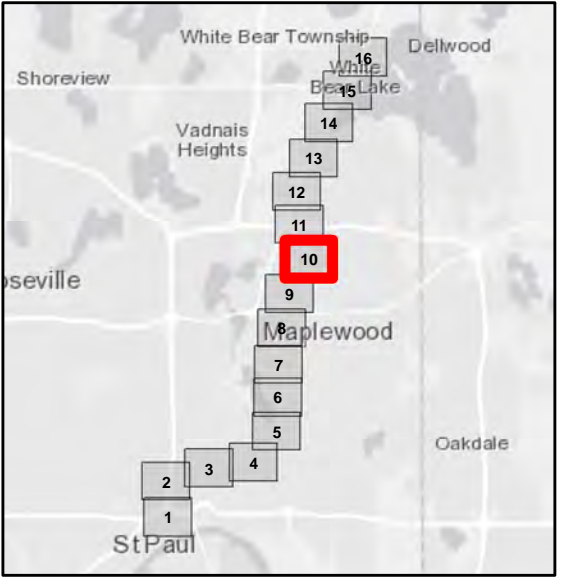


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RUSH Line BRT

Ramsey County, Minnesota

 **Archaeological Study Area**
February 2020



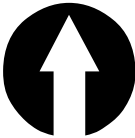
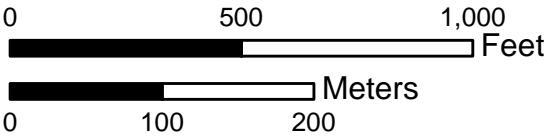
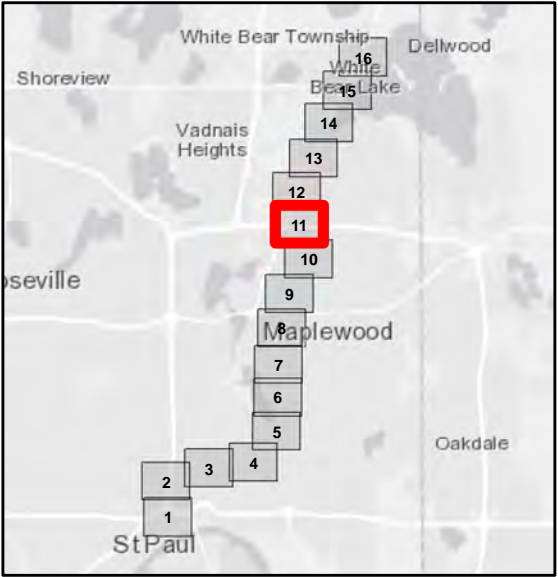
**Archaeological
Study Area**

RUSH Line BRT
Ramsey County, Minnesota

Archaeological Study Area
February 2020



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Archaeological
Study Area

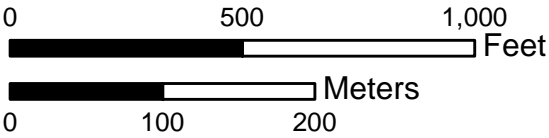
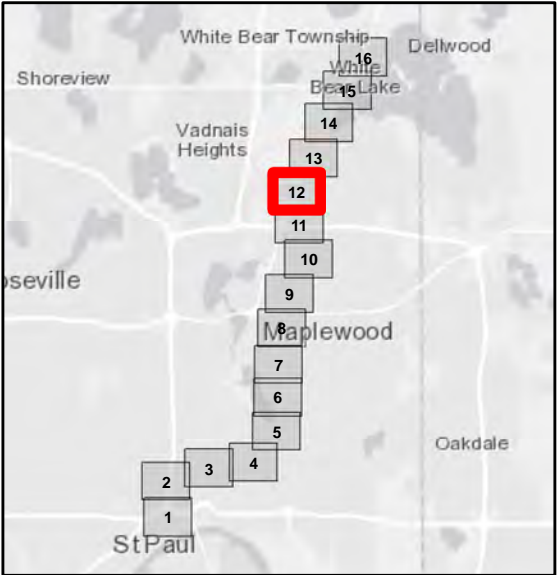


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RUSH Line BRT

Ramsey County, Minnesota

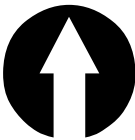
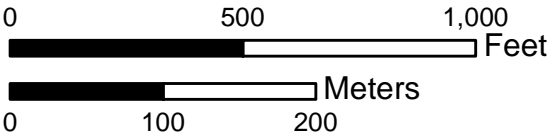
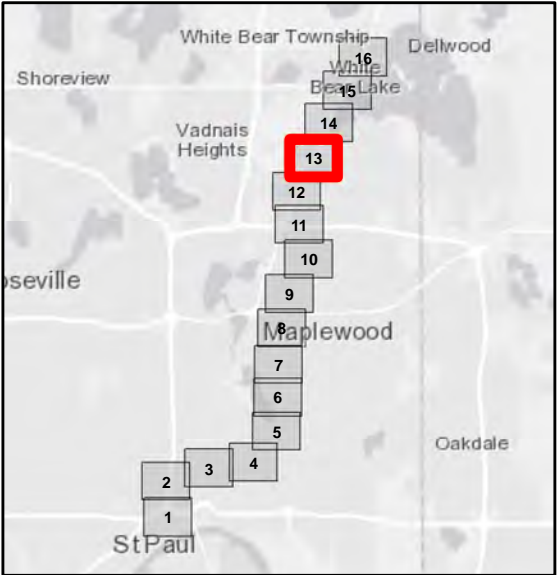
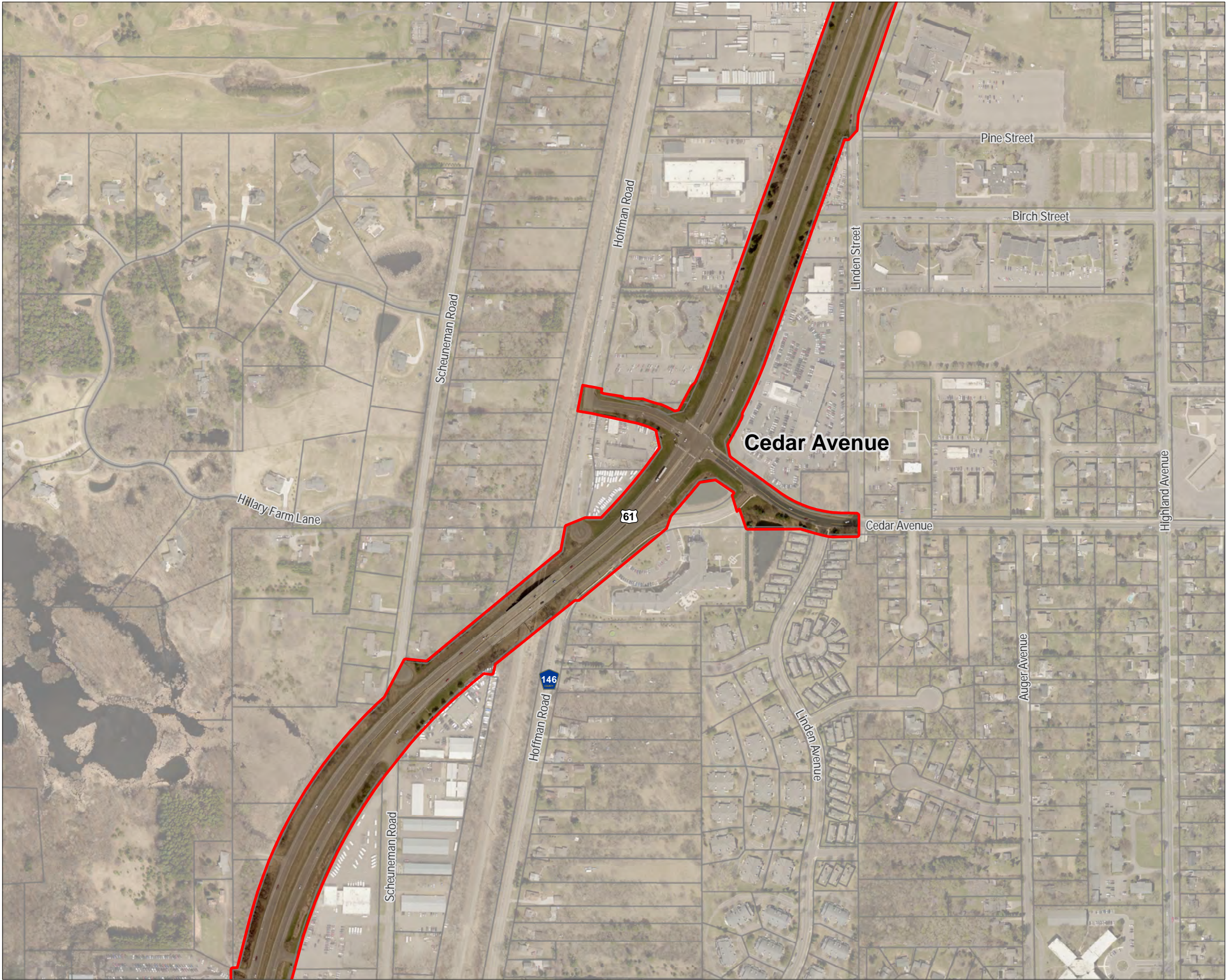
Archaeological Study Area
February 2020



Archaeological Study Area

RUSH Line BRT
Ramsey County, Minnesota

Archaeological Study Area
February 2020



Archaeological
Study Area

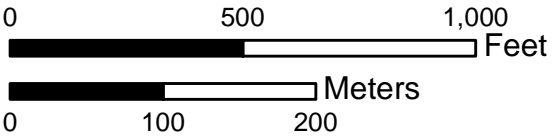
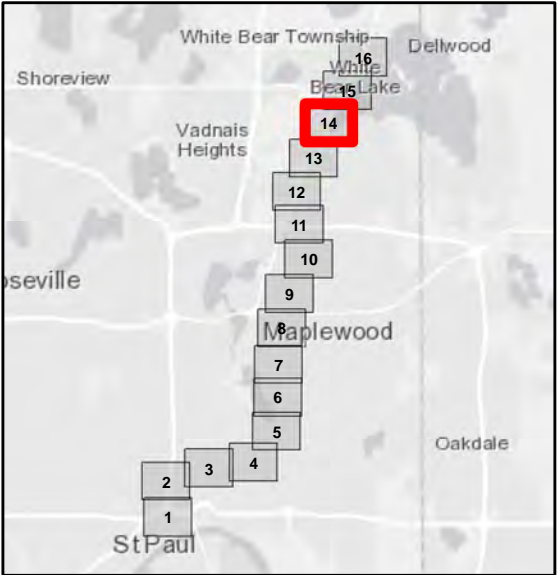


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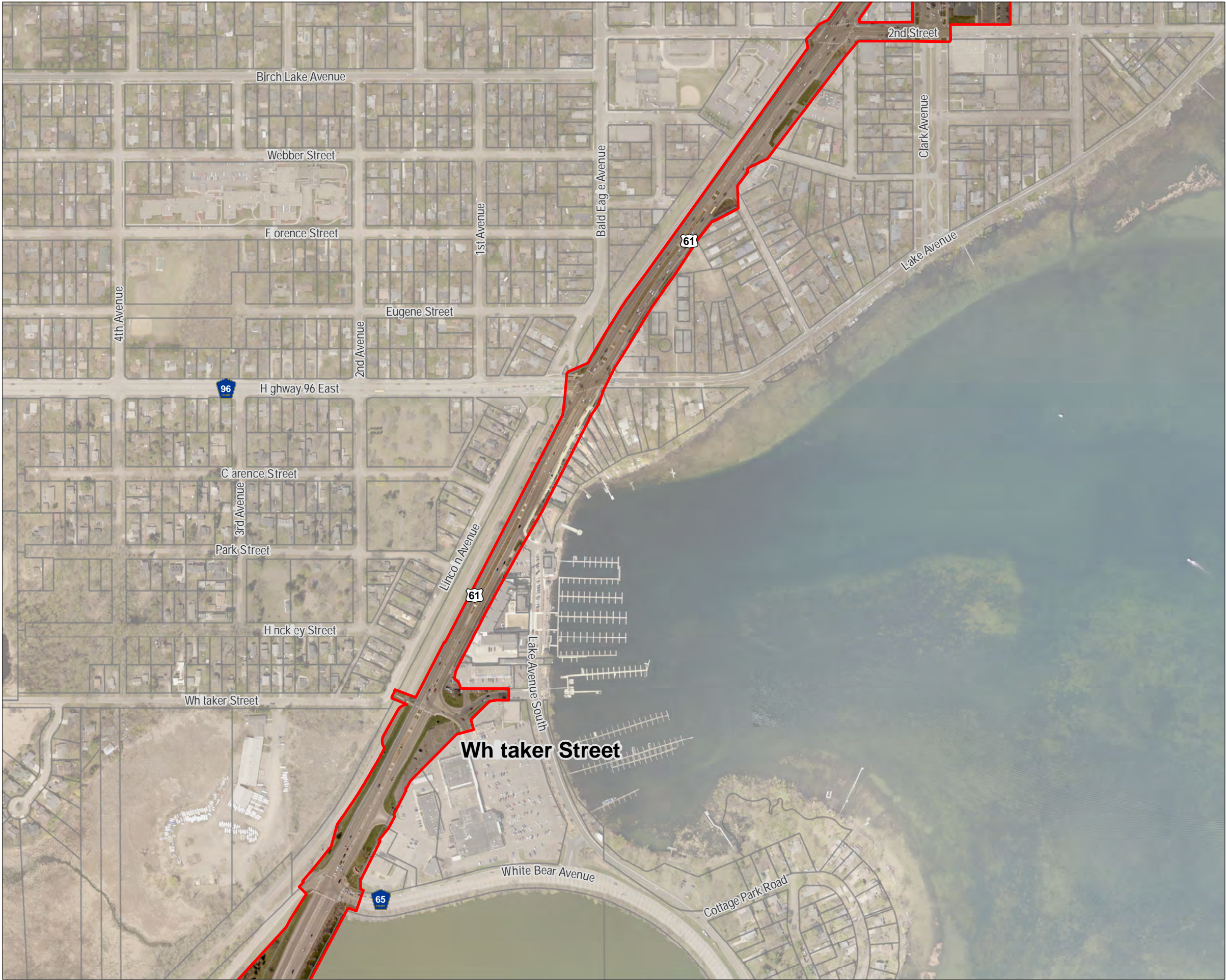
RUSH Line BRT

Ramsey County, Minnesota

 **Archaeological Study Area**
February 2020



**Archaeological
Study Area**

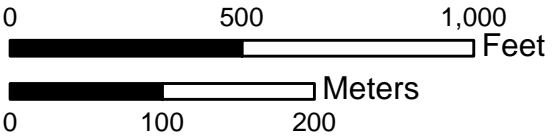
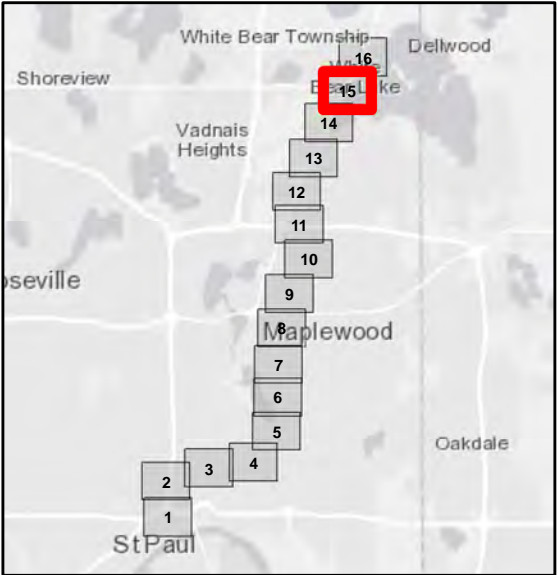


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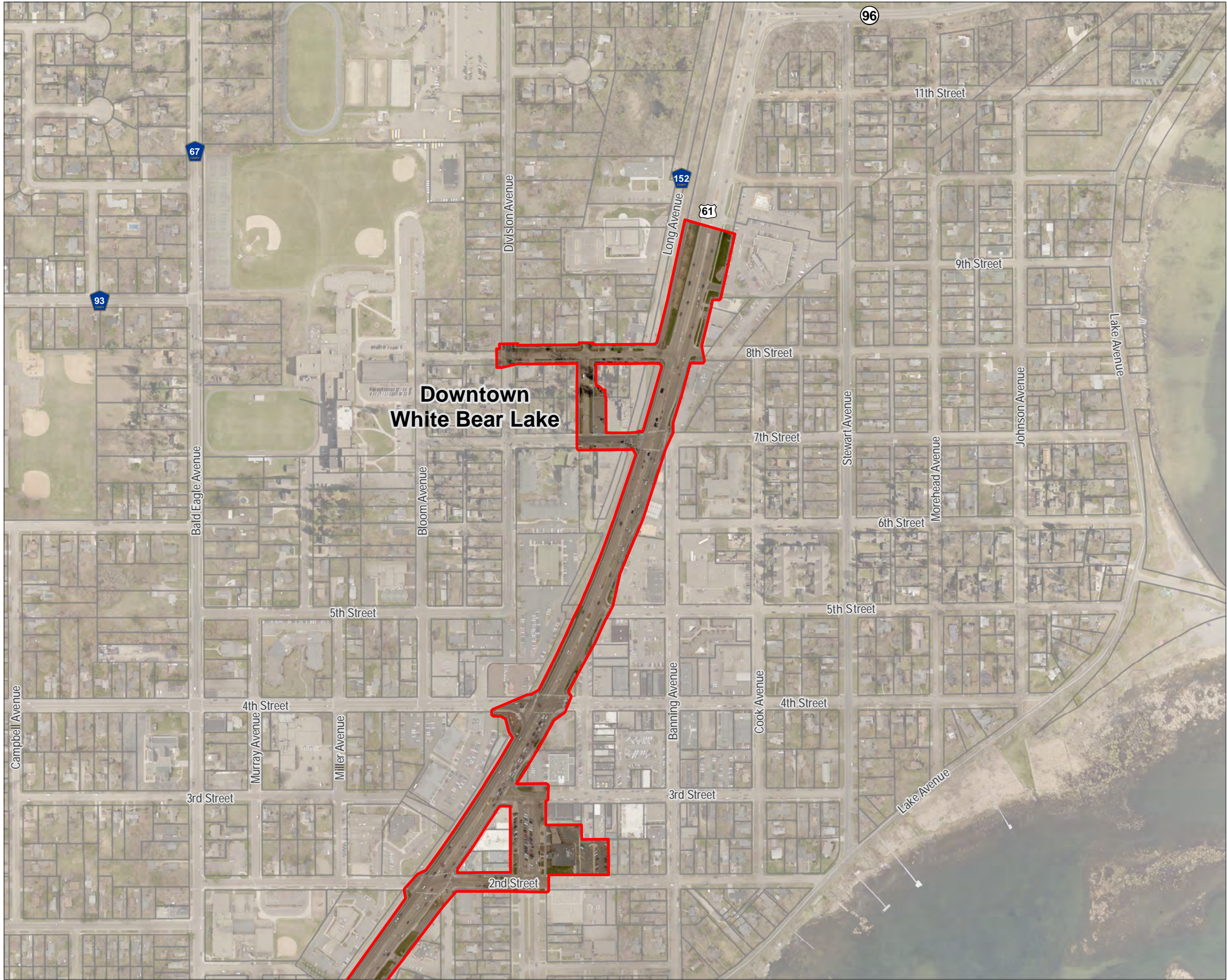
RUSH Line BRT

Ramsey County, Minnesota

Archaeological Study Area
February 2020



**Archaeological
Study Area**

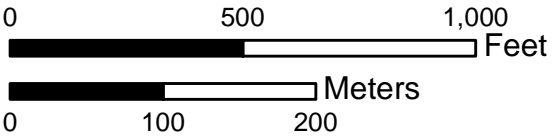
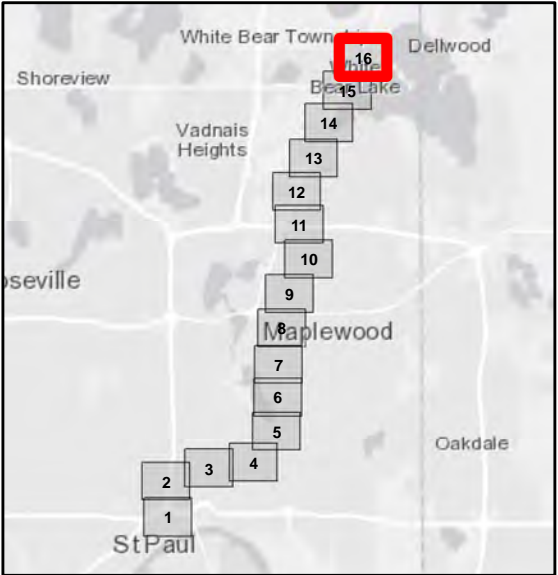


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RUSH Line BRT

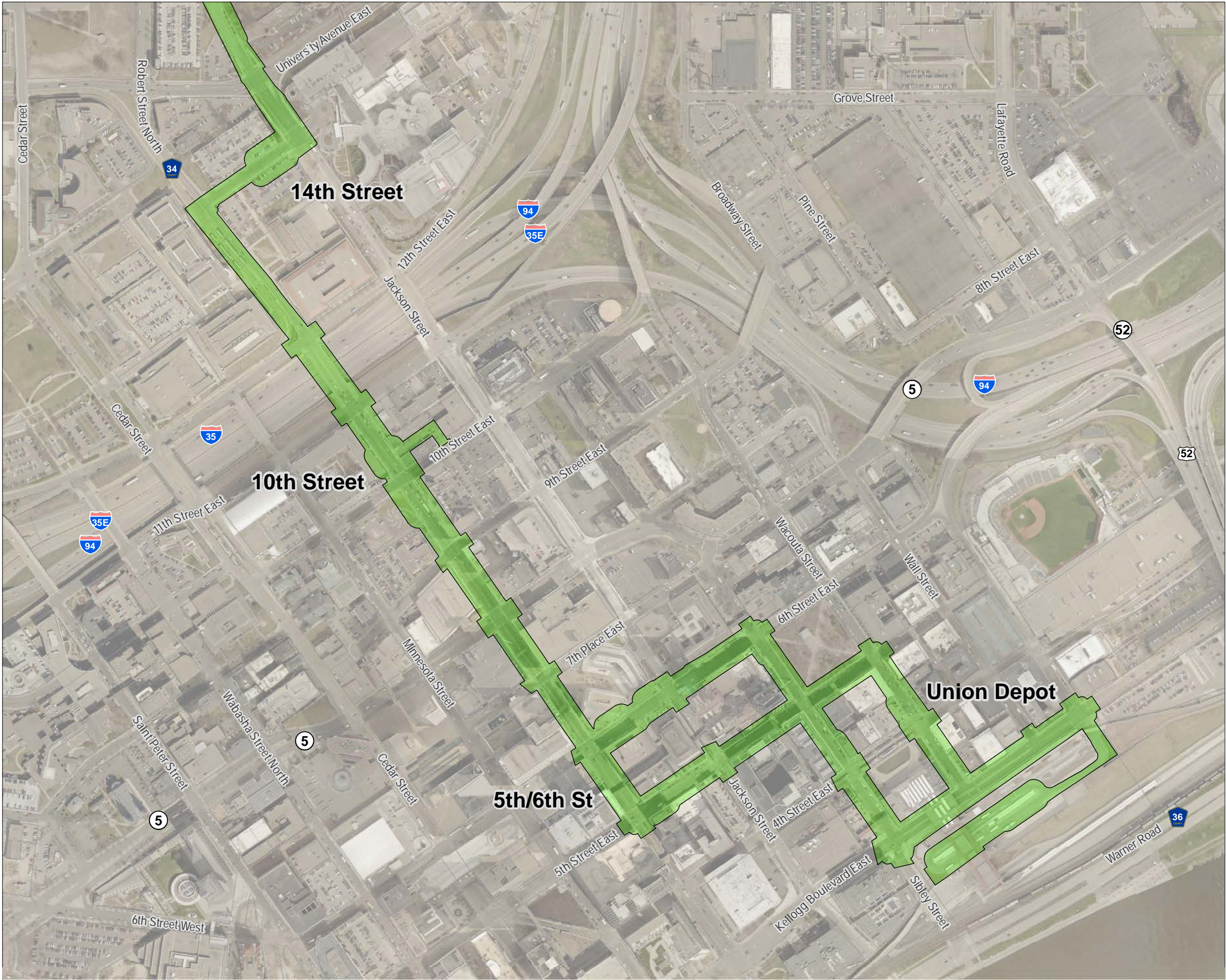
Ramsey County, Minnesota

 **Archaeological Study Area**
February 2020



**Archaeological
Study Area**

APPENDIX 2: ARCHAEOLOGICAL SURVEY AREA MAPS

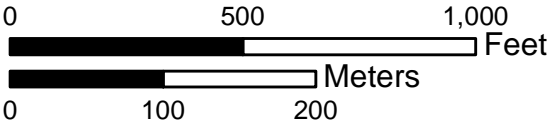
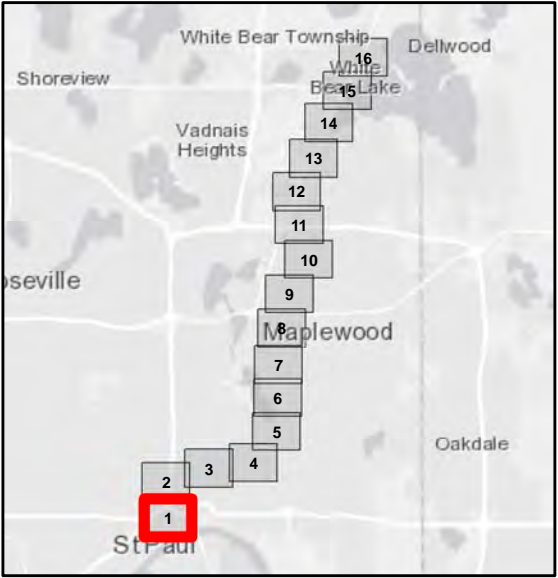


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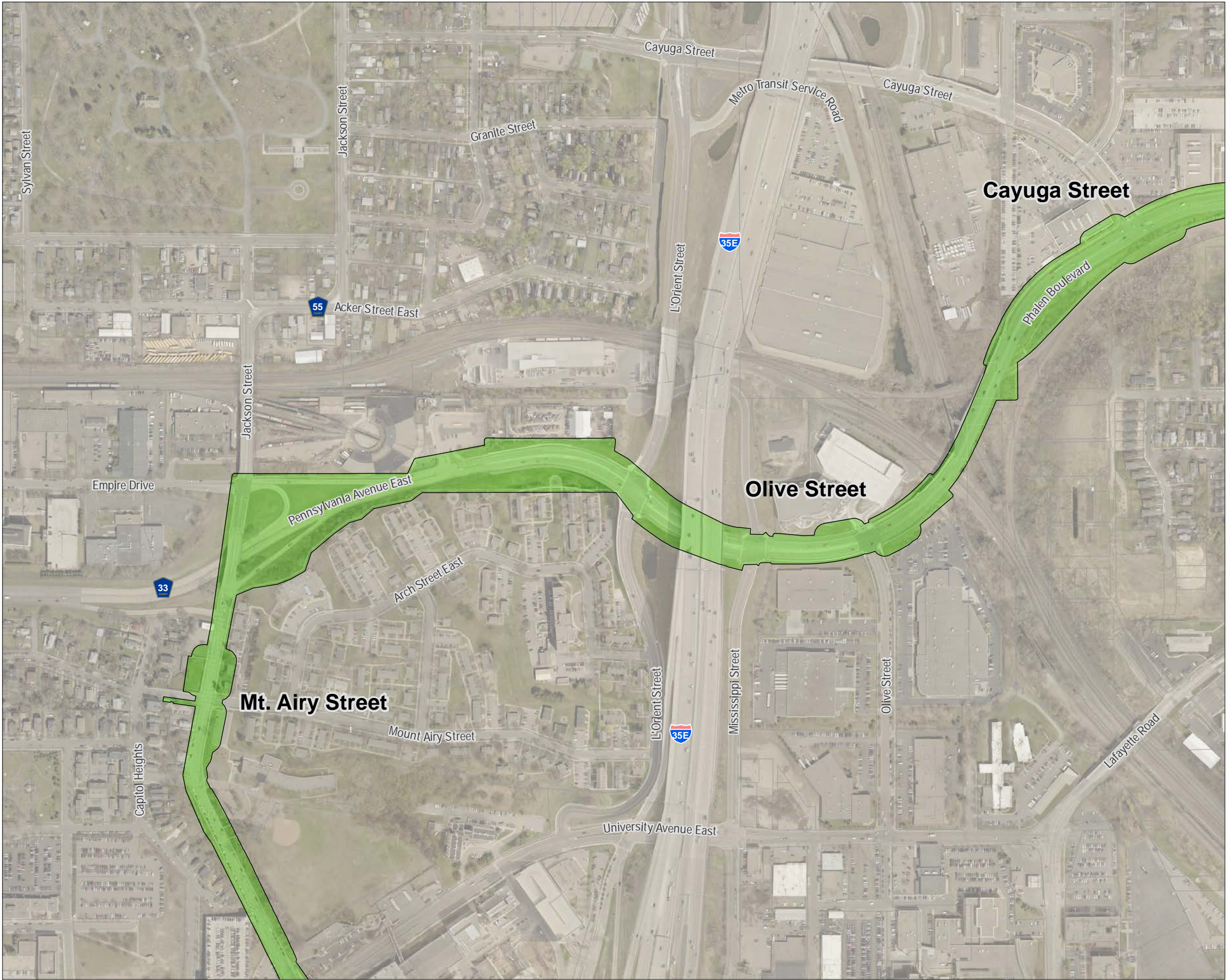
RUSH Line BRT

Ramsey County, Minnesota

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February 2020
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-  Recommended survey area
-  Visual reconnaissance
-  Pedestrian survey
-  Shovel testing
-  Excavation areas
-  Geomorphological core



Archaeological Survey Area

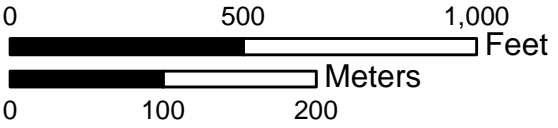
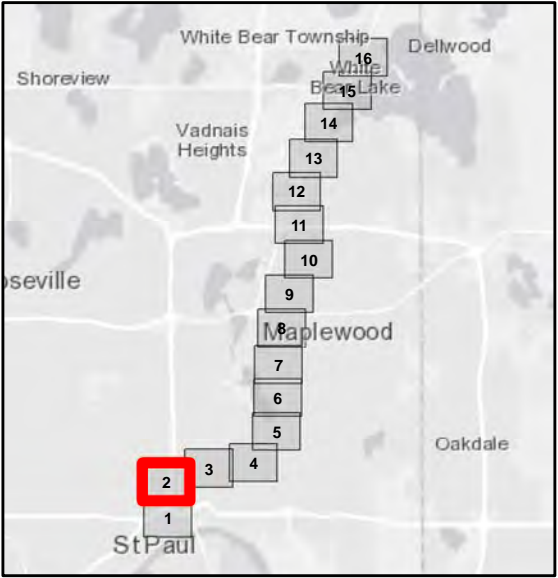


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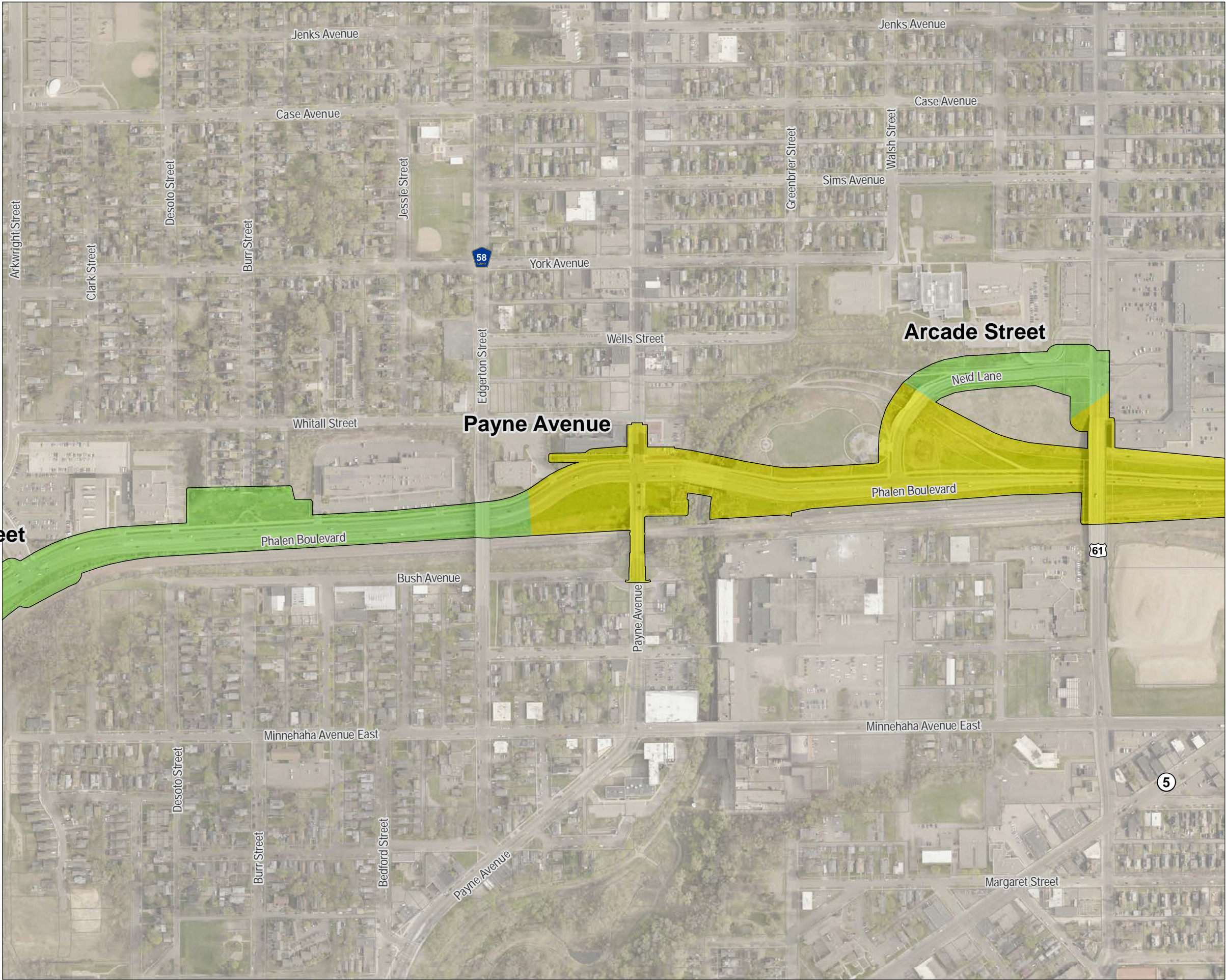
RUSH Line BRT

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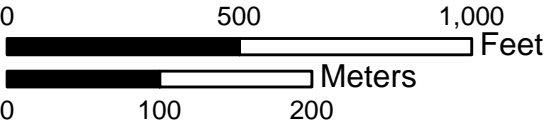
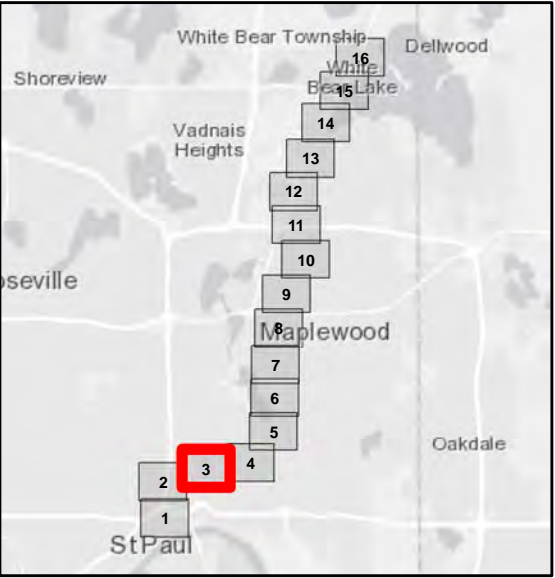
Archaeological Survey Area



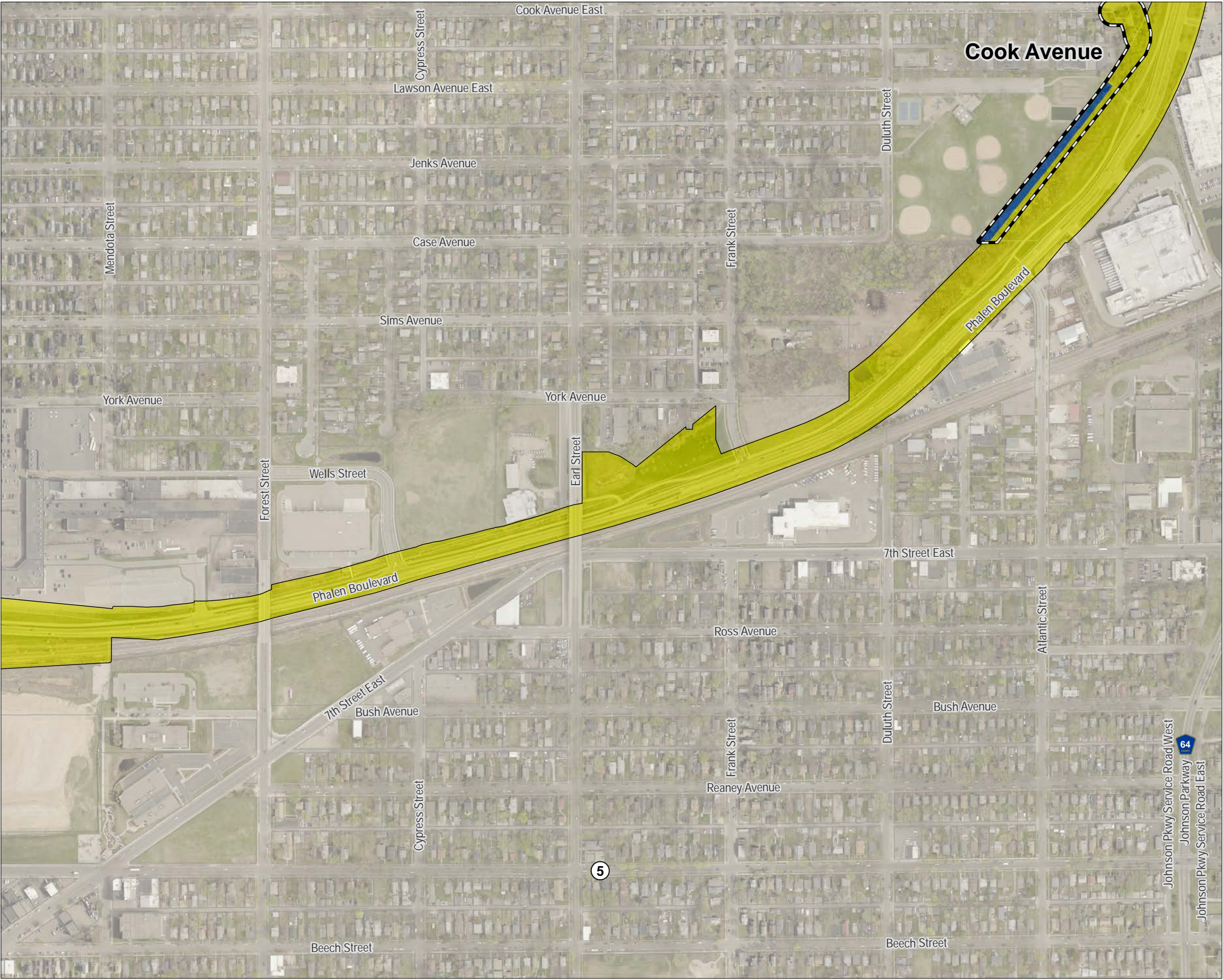
RUSH Line BRT

Ramsey County, Minnesota

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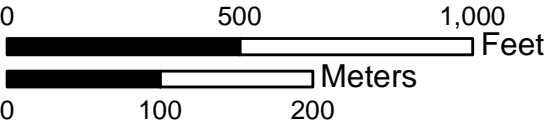
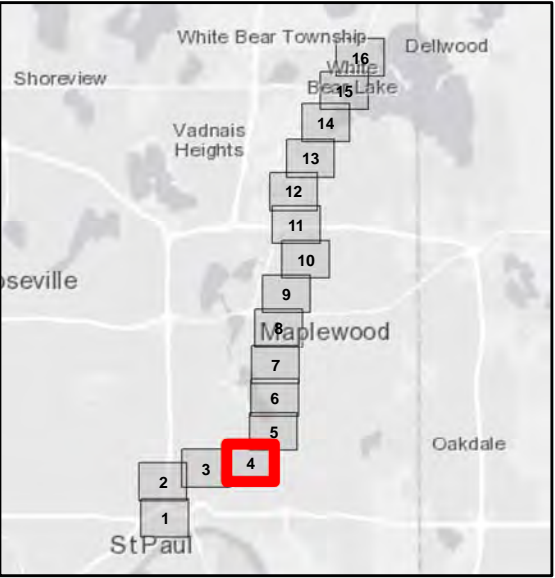
Archaeological Survey Area



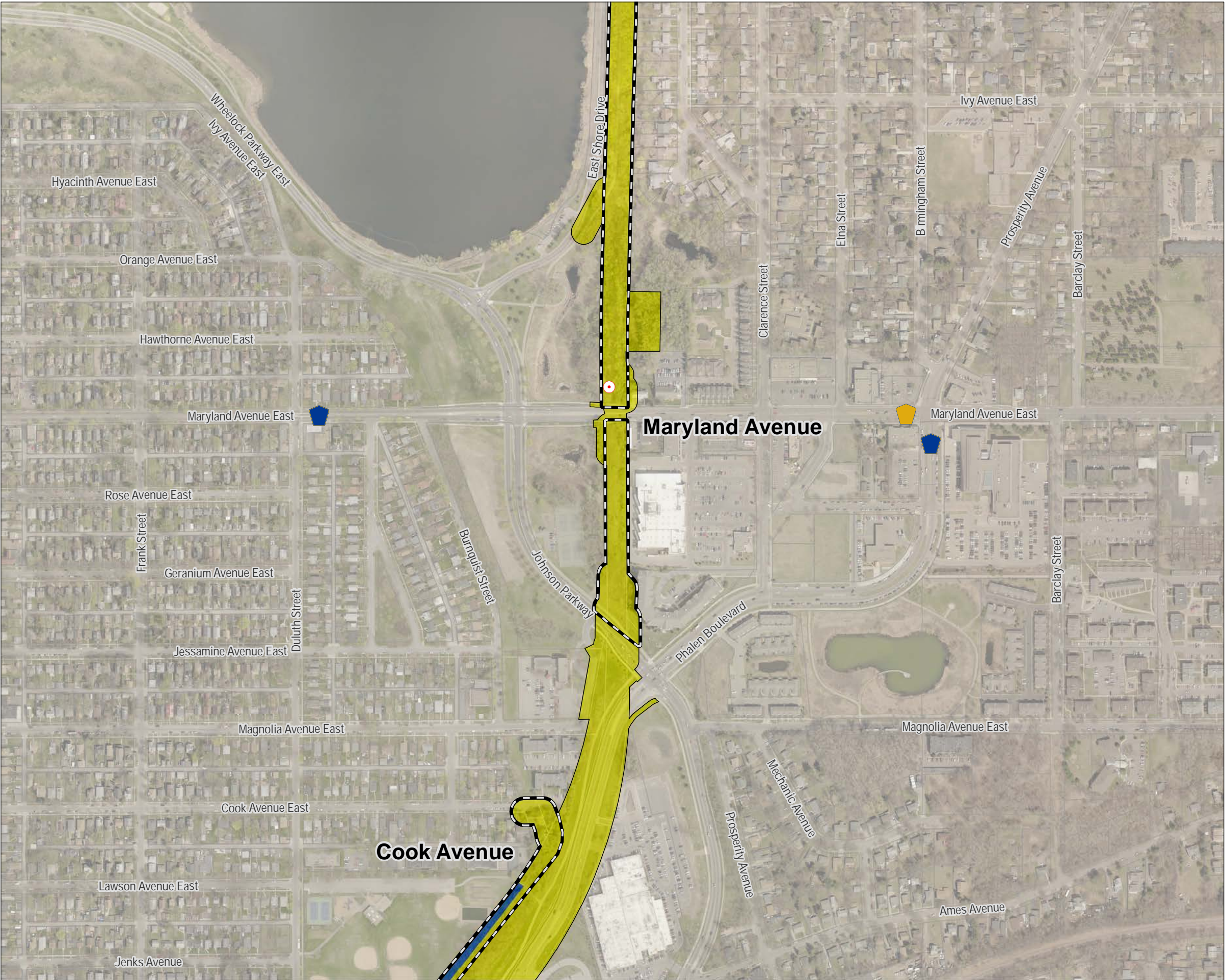
RUSH Line BRT

Ramsey County, Minnesota

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

Archaeological Survey Area

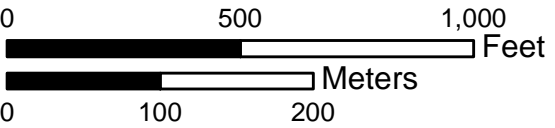
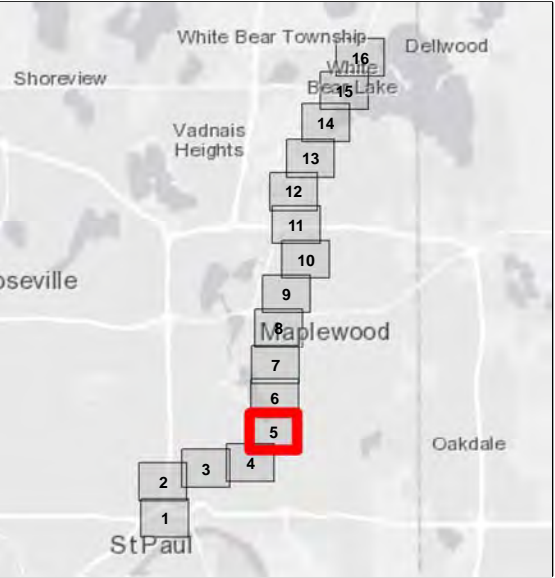


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RUSH Line BRT

Ramsey County, Minnesota

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-  **Visual reconnaissance**
-  **Pedestrian survey**
-  **Shovel testing**
-  **Excavation areas**
-  **Geomorphological core**



Archaeological Survey Area

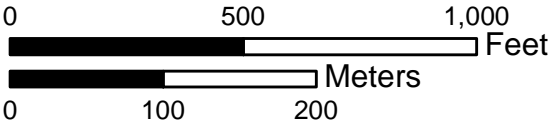
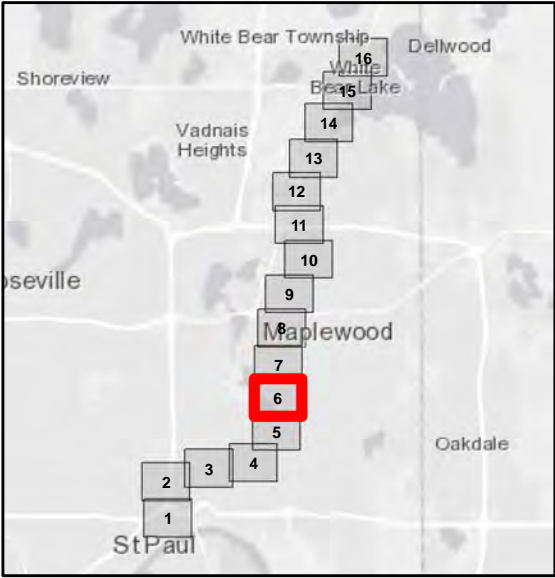


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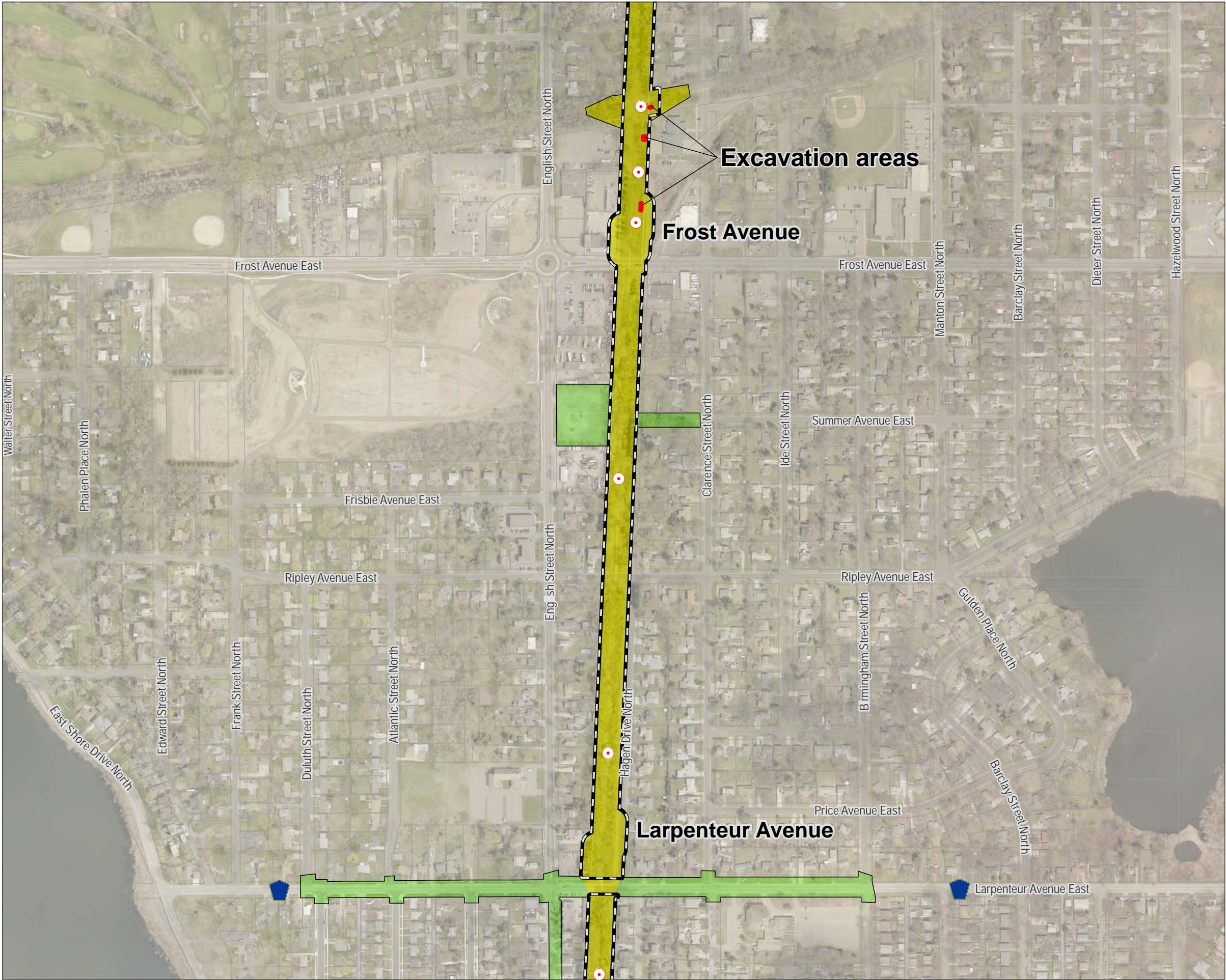
RUSH Line BRT

Ramsey County, Minnesota

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Archaeological Survey Area

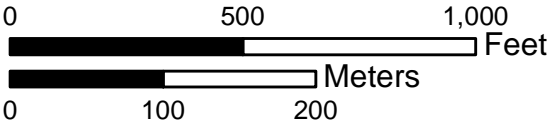
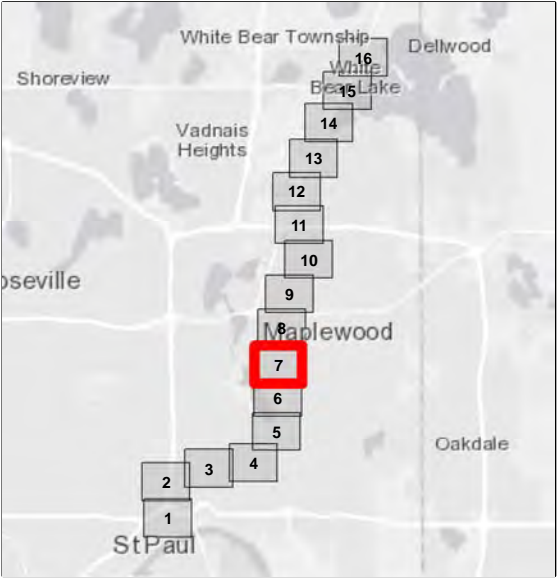


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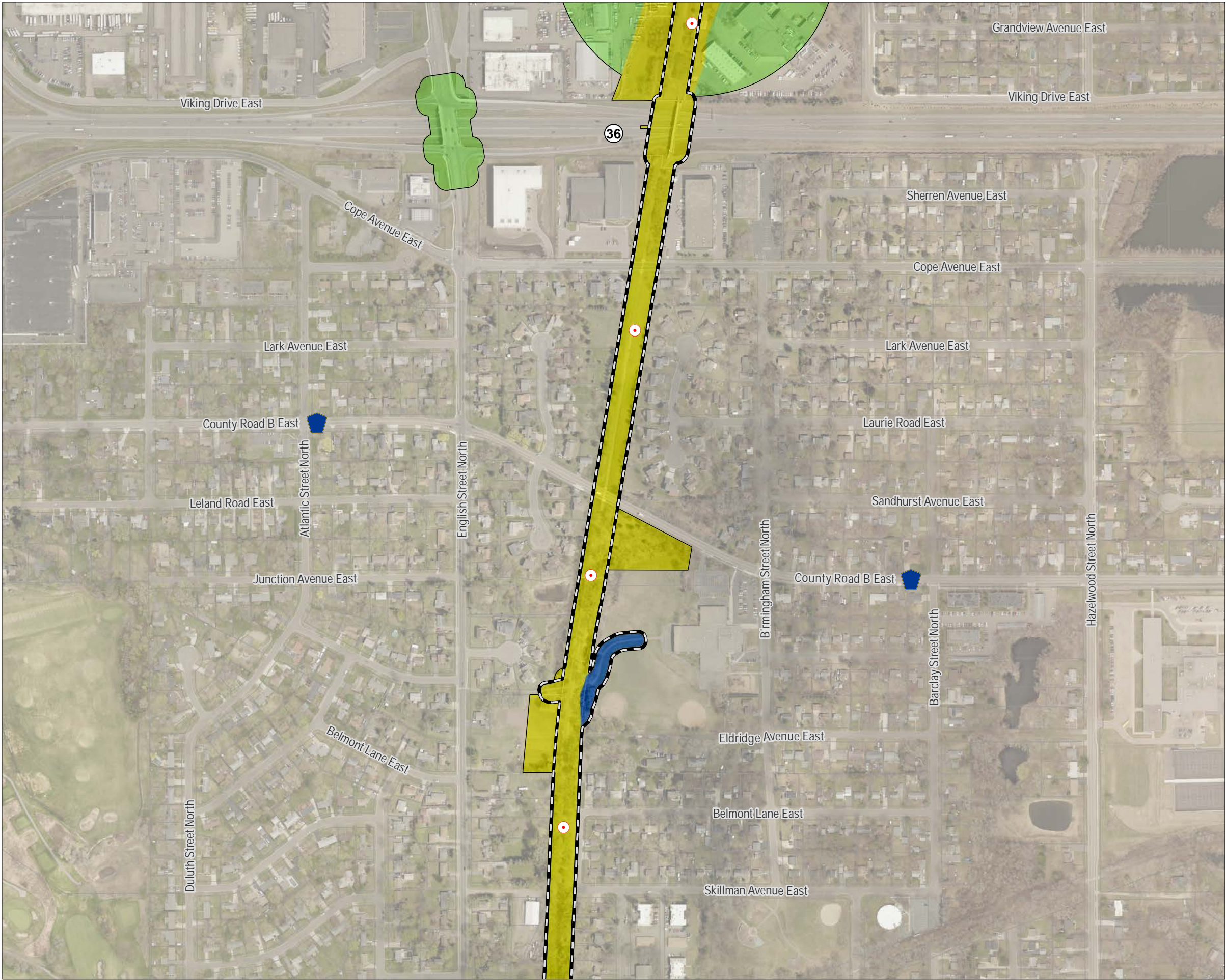
RUSH Line BRT

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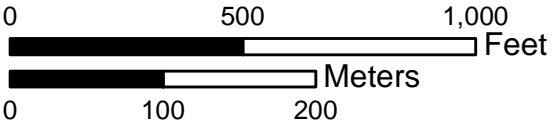
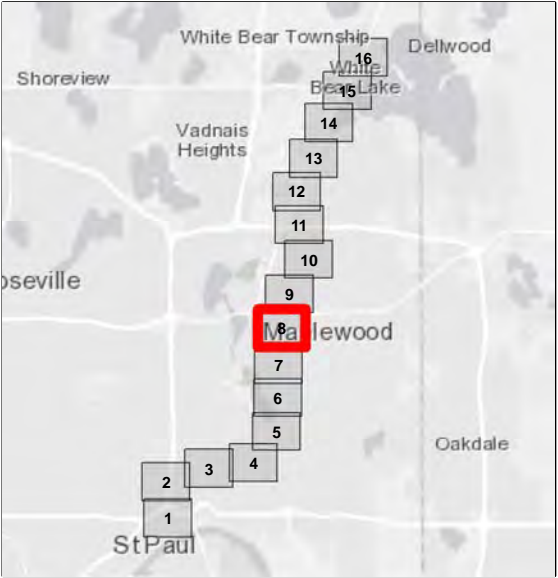
Archaeological Survey Area



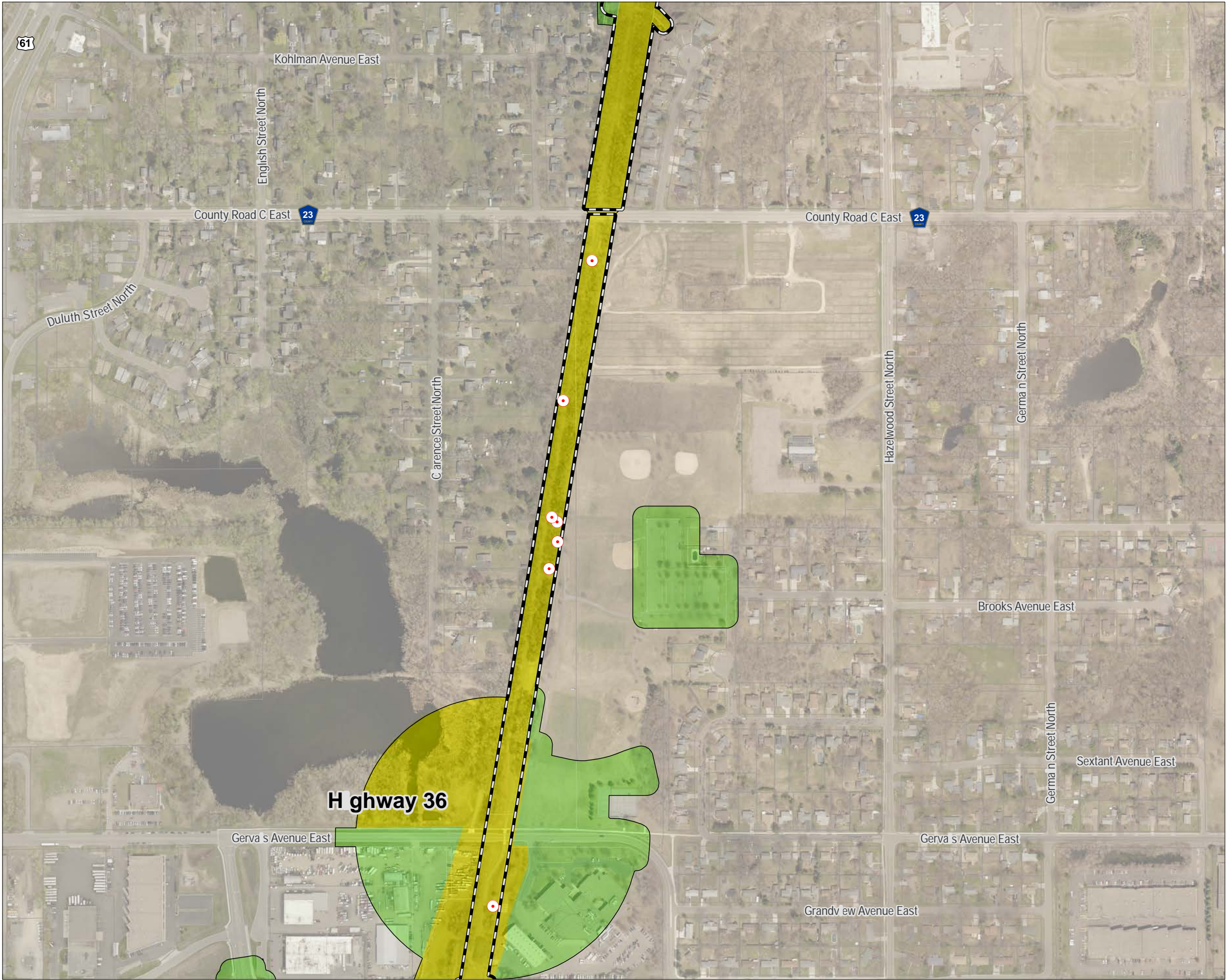
RUSH Line BRT

Ramsey County, Minnesota

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**Archaeological
Survey Area**

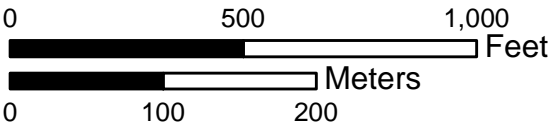
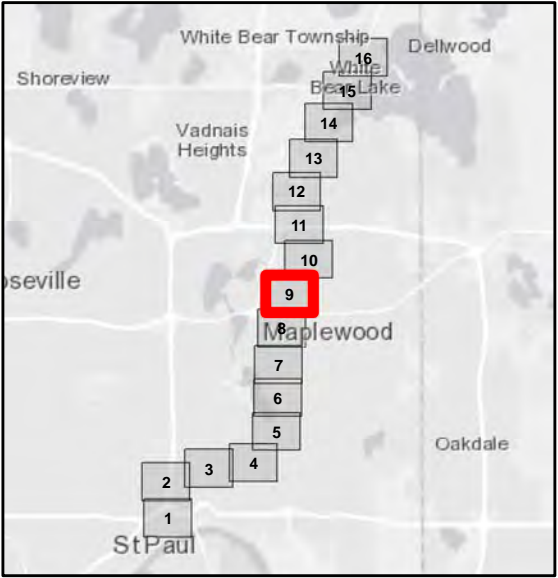


Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, MNGeo, Ramsey County - Map generated: May 2020

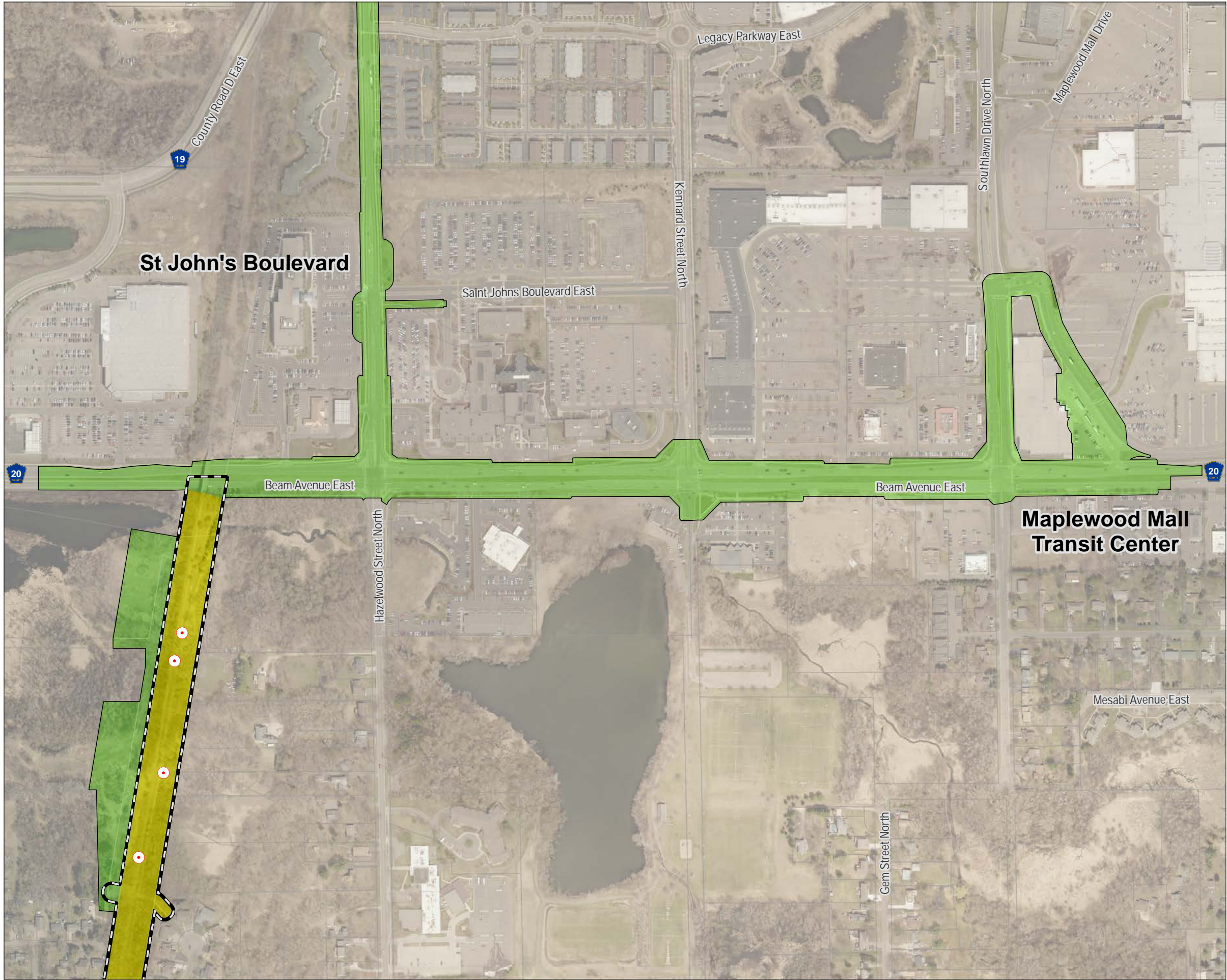
RUSH Line BRT

Ramsey County, Minnesota

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Archaeological Survey Area

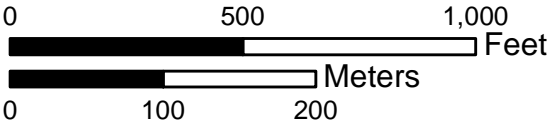
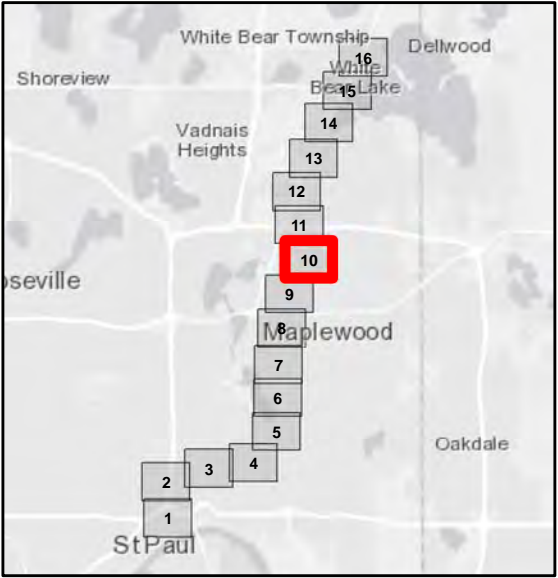


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RUSH Line BRT

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Archaeological Survey Area



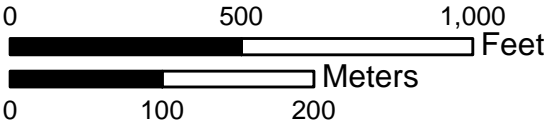
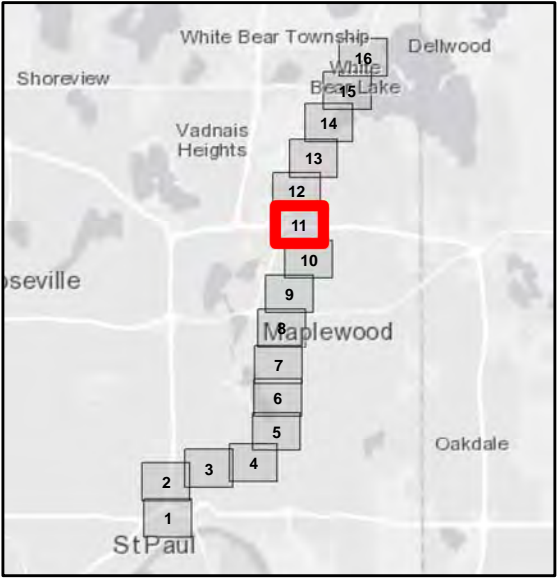
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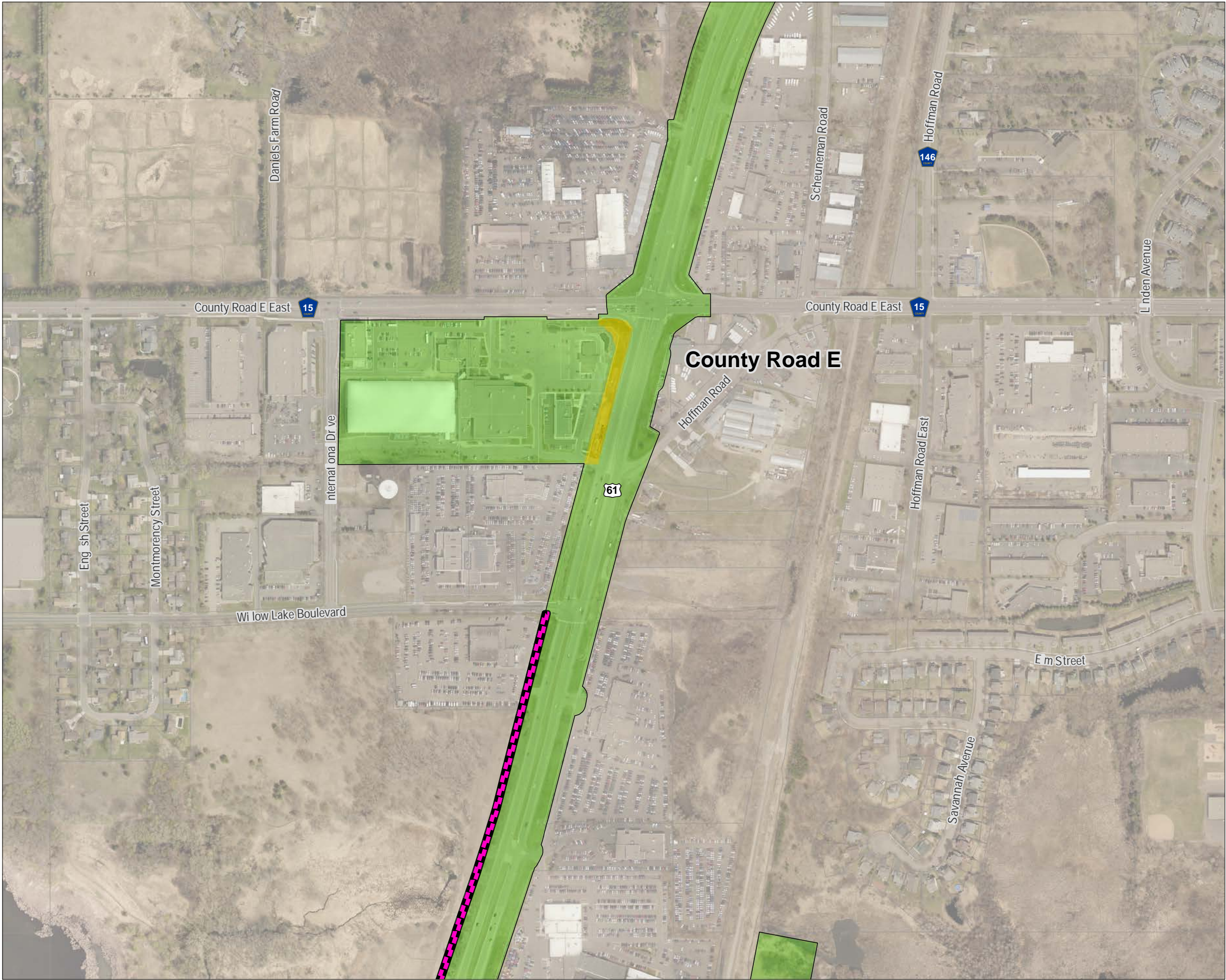
Ramsey County, Minnesota

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- Shovel testing
- Excavation areas
- Geomorphological core

NOTE: If any change in design extends work beyond the road ROW, survey is recommended west of TH 61 for precontact deposits.



Archaeological Survey Area



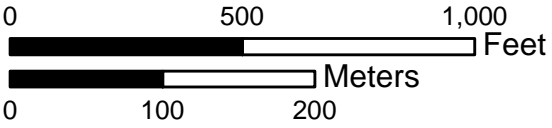
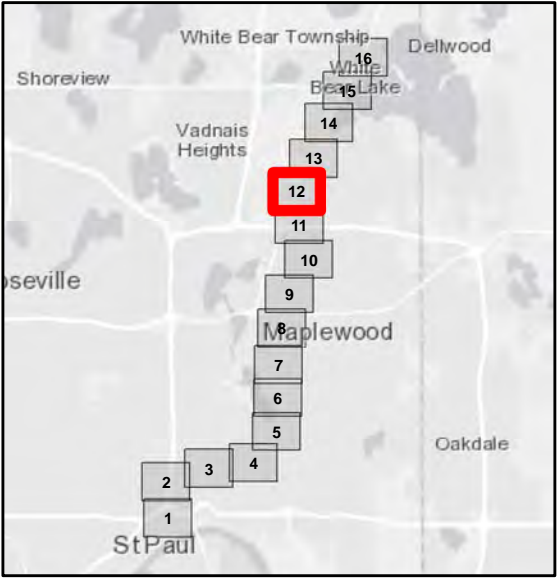
Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, MNGeo, Ramsey County - Map generated: May 2020

RUSH Line BRT

Ramsey County, Minnesota

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NOTE: If any change in design extends work beyond the road ROW, survey is recommended west of TH 61 for precontact deposits.



Archaeological Survey Area

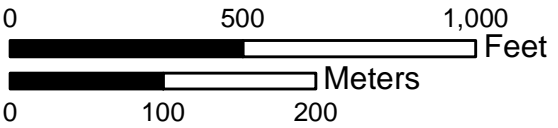
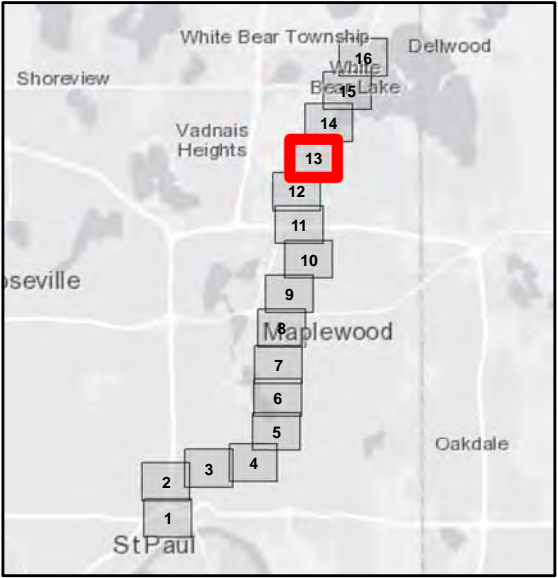


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RUSH Line BRT

Ramsey County, Minnesota

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February 2020
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-  Geomorphological core



**Archaeological
Survey Area**



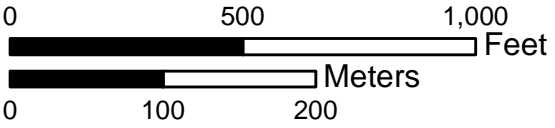
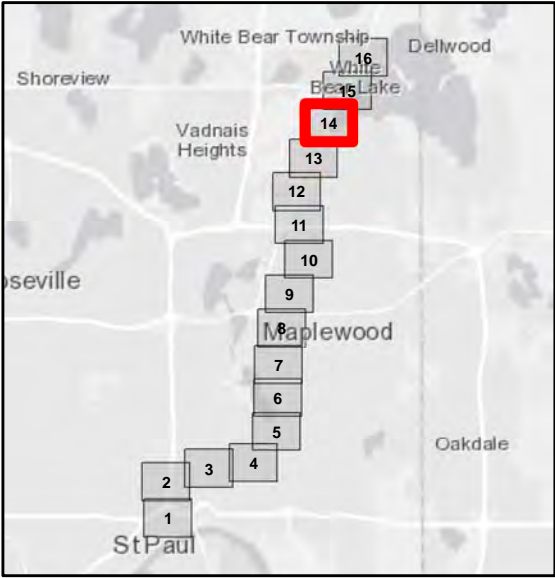
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RUSH Line BRT

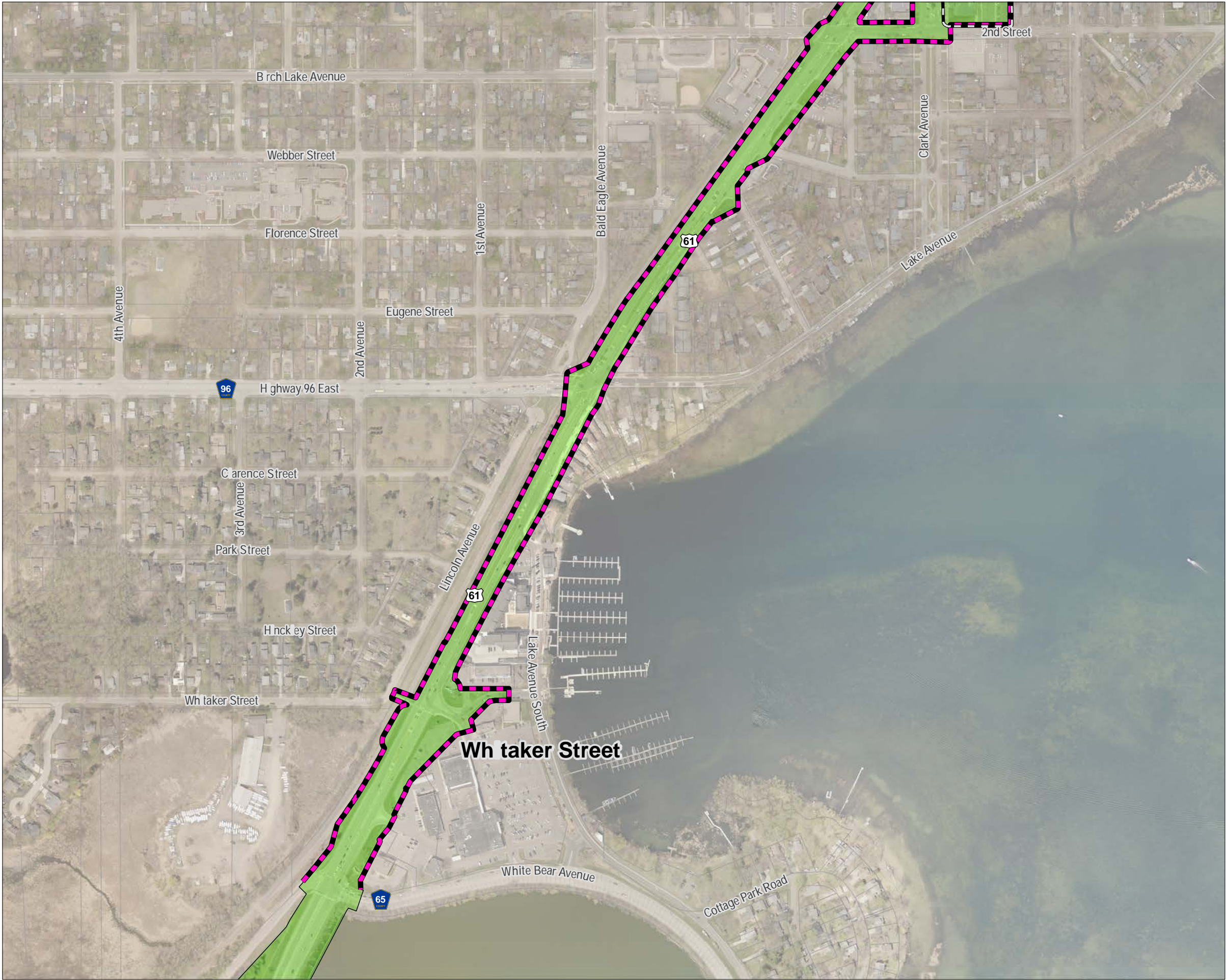
Ramsey County, Minnesota

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-  Pedestrian survey
-  Shovel testing
-  Excavation areas
-  Geomorphological core

NOTE: If any change in design extends work beyond the limits of the archaeological study area, survey for precontact and historic deposits is recommended.



Archaeological
Survey Area



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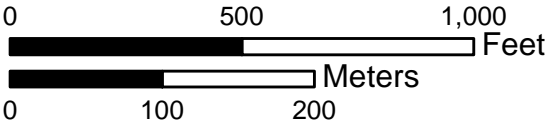
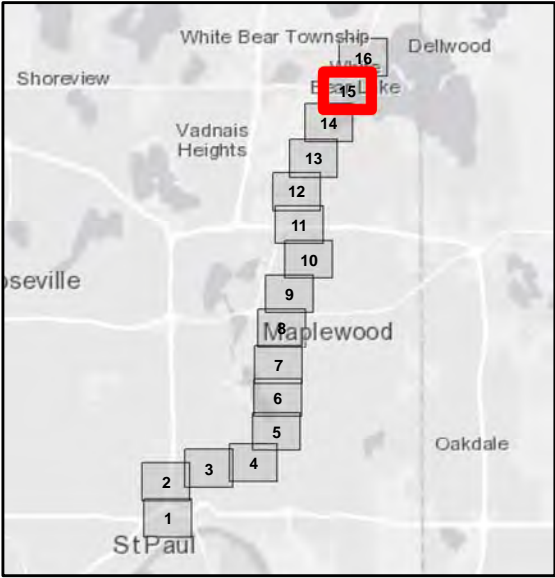
RUSH Line BRT

Ramsey County, Minnesota

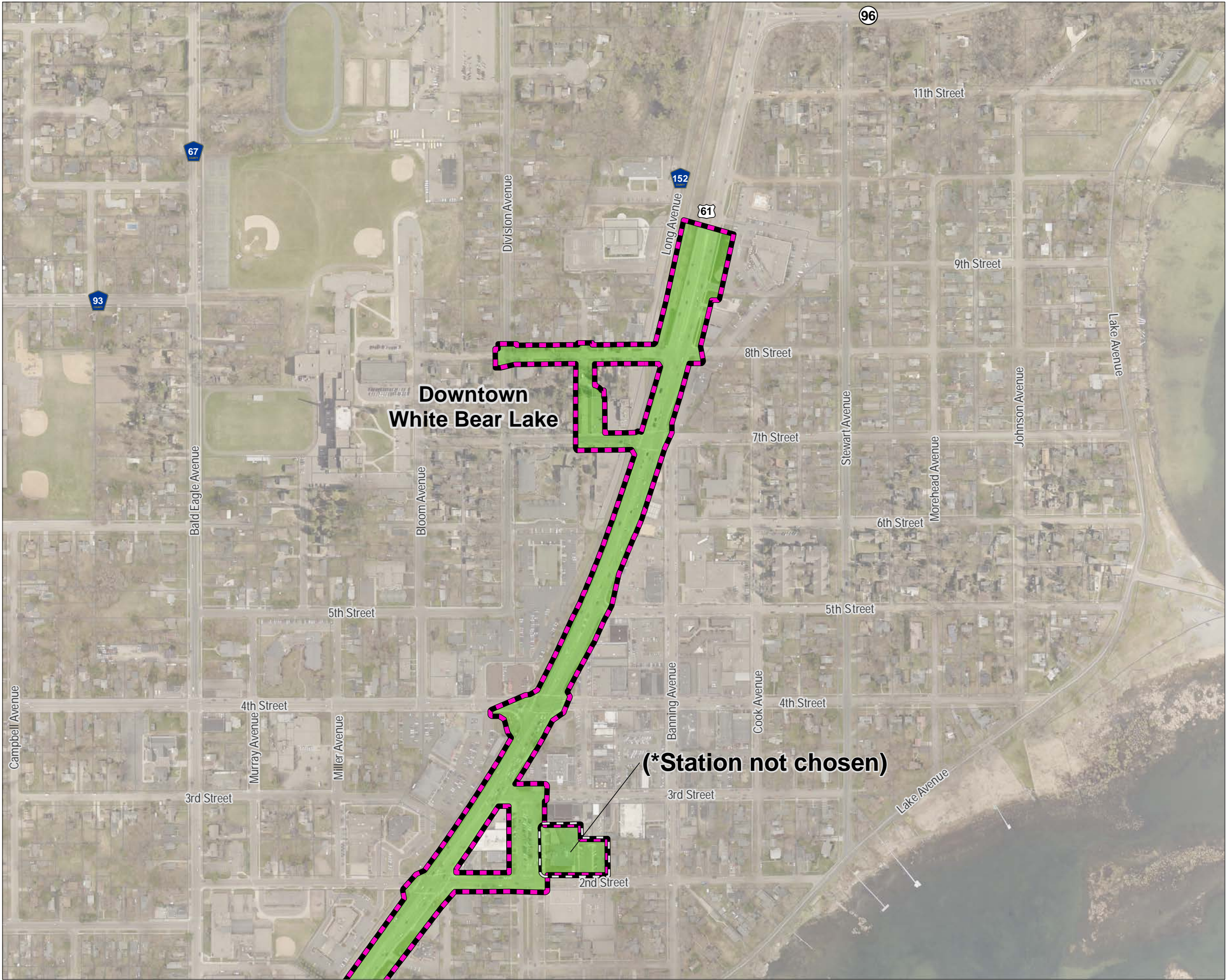
-  Archaeological study area
February 2020
-  Archaeological survey recommended for any added ground disturbance
-  Recommended survey area
-  Visual reconnaissance
-  Pedestrian survey
-  Shovel testing
-  Excavation areas
-  Geomorphological core

NOTE: If any change in design extends work beyond the limits of the archaeological study area, survey for precontact and historic deposits is recommended.

NOTE: If the 2nd Ave. Station is reconsidered for project design, geomorphological coring is recommended to assess the potential for intact precontact deposits.



Archaeological Survey Area



Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, MNGeo, Ramsey County - Map generated: May 2020

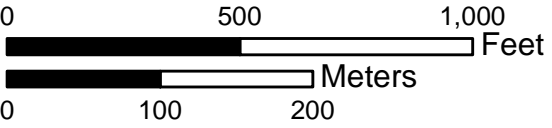
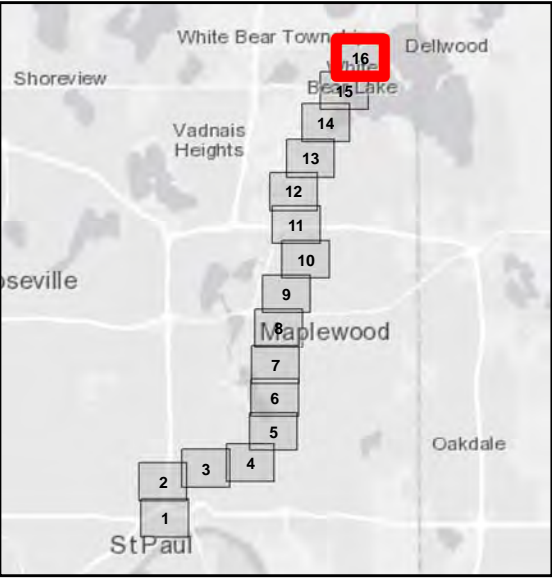
RUSH Line BRT

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Archaeological Survey Area

APPENDIX 3: GEOMORPHOLOGICAL DESKTOP ASSESSMENT

**A Geomorphological Assessment of the Rush Line BRT Preliminary
Corridor in Ramsey County, Minnesota**

By

Michael F. Kolb, Ph.D.

Strata Morph Geoexploration, Inc.

August 2018

Prepared for

Mississippi Valley Archaeology Center

University of Wisconsin-La Crosse

La Crosse, WI

Introduction

The assessment covers the proposed Rush Line corridor from I-35 in St Paul, at the southern end, to the southern shore of Goose Lake in the city of White Bear Lake at the northern end (Appendix A). The purpose of the assessment is to determine the potential for buried archaeological deposits in primary contexts beneath the existing rail grade fill and beneath other urban fill where the proposed corridor is not on the rail grade.

Methods

The following sources were used to make the assessment.

- 1) Geologic maps published by the Minnesota Geological Survey were used to determine the nature of the landscape and deposits in and surrounding the proposed corridor.
- 2) USGS topographic maps (1:24,000 and 1:62,500 scale) dating from 1902 to 1952 were used to examine local and regional topography recorded prior to the heaviest urbanization.
- 3) Hillshade LIDAR images and maps with 0.6 m (2-foot) contour lines, derived from LIDAR, were examined to determine modern topographic detail. Detail is sufficient to determine the extent of rail grade cut and fill as well as the thickness of the fill and the depth of cutting.

Results

Glacial Landscape

The glacial landscape consists of landforms created by stagnating glacial ice and associated meltwater flows associated with the Grantsburg sublobe of the Des Moines lobe, and the Superior Lobe (Hobbs and Goebel 1982). The deposits consist of loamy glacial till and sandy and gravelly outwash of the New Ulm Formation and sandy loam glacial till of the Cromwell Formation (Meyer 2007). The New Ulm Formation was deposited around 13,000 ¹⁴C years BP (16,000 cal years BP) (Lusardi 2016). The Cromwell Formation underlies the New Ulm and was deposited somewhat earlier perhaps 15,000-18,000 ¹⁴C years BP (Johnson and Mooers 1998). The glacial landforms have been the landscape surface up until they were covered during urbanization or Holocene paludal deposits. Archaeological deposits resulting from occupations on the glacial landforms would be located near the landform surface.

Glacial Landscape Along the Rush Line Route

The following is taken from a geologic maps of the Twin Cities area (Meyer 2007). In downtown St Paul the proposed route begins (at Union Depot) on the Mississippi River floodplain then proceeds southwest and then north on to a series of meltwater stream terraces (Grey Cloud and Langdon Terraces) and then onto an outwash plain up to Pennsylvania Avenue. The route then trends east back across a meltwater stream terrace to I-35E. From I-35E the proposed route trends slightly north then east in former meltwater channel routes where outwash was deposited over stagnant ice. The ice melted creating the hummocky topography but the meltwater stream belts remain on the modern landscape as lowlands. The route is bordered on the north by high relief ice-contact deposits of the Cromwell Formation. The route begins to turn north at Earle Street and crosses a lowland mapped as peat and muck north and east Johnson Parkway and south of Lake Phalen. These organic deposits occupy the same basin as Lake Phalen. The route proceeds north on outwash skirting some high relief ice contact terrain (Cromwell Formation) just east of the south end of the lake and on across more low relief hummocky outwash (New Ulm Formation) up to a perennial stream and some peat and muck at Beam Avenue. The route then leaves the rail grade and turns east along Beam Avenue for ½ mile then north along Southlawn Avenue for ½ mile to County D. It then follows D west back to the rail grade then north and west to Highway 61. From the intersection with Beam Avenue up to the intersection with Highway 61 the route crosses low relief outwash terrain with some peat and muck near the intersection of the existing trail and Highway D (Meyer 2007). On Highway 61 the proposed route crosses both high and low relief terrain underlain by till up to Goose Lake where the route transitions to fine sandy lake deposits that accumulated in Glacial Lake Anoka. The surface of the Anoka Sand plain is commonly reworked by wind resulting in eolian sand sheets and low dunes (Meyer and Patterson 1999). Eolian activity may have occurred during deglaciation after the lake drained or, as documented at Lake Ann 64 km (40 mi) to the northwest during the middle Holocene (4900-7400 years BP) (Keen and Shane 1990).

Topo maps (1:24,000) indicate the outwash terrain the route follows has less local relief and lower gradients than the hummocky terrain underlain by till to the east and west. Meltwater flowing off the melting stagnant ice would seek the lowest parts of the

recently deglaciated landscape and through erosion and deposition create its own course and gradient. The melting of buried ice blocks transformed a smooth glaciofluvial landscape surface into a hummocky relatively rough landscape that nonetheless is still a lowland. GLA topography is mostly flat maybe dunes not obvious on LIDAR

Post-Glacial Landscape (Holocene)

The post-glacial landscape is dominated by soil formation and urbanization. The only non-anthropogenic post-glacial deposit that could bury archaeological deposits are peat and muck paludal deposits and alluvial deposits in the Mississippi River valley in St Paul. Paludal deposits are present along the proposed corridor where it crosses wetlands or former lake basins. These deposits have been accumulating in wetland/lake basins and along lake margins. Lake and groundwater levels have fluctuated throughout the Holocene resulting in variable shoreline positions, sedimentation rates and sediment distribution (for example see (Bradbury, et al. 1993; Eyster-Smith, et al. 1991; Keen and Shane 1990). If Native occupations occurred in or around these basins their archaeological remains would be well preserved. Alluvial deposits may be present beneath the urban construction and fill at the south end of the route. The process of urbanization has either buried or truncated portions of both the post-glacial landscape and the glacial landscape.

Table 1. Locations and descriptions of cut and fill for the proposed Rush Line route from large- scale hillshade and contour maps derived from LIDAR (see Appendix B)

Map #	Streets	Description
1	Station between 7 th Street and 8 th Street	Along US 61 parallel to LS&M; slight cut
2	3 rd Street to 7 th Street	Along US 61 parallel to LS&M; slight cut
3	Lake Court to 3 rd Street	Along US 61 parallel to LS&M; slight cut
4	Park Street to just north of Lake Avenue N	Along US 61 parallel to LS&M; slight cut
5	White Bear Avenue N to Park Street	Along US 61 parallel to LS&M; cut
6	Goose Lake crossing	Along US 61; fill in lake; off LS&M
7	Middle of Goose Lake to County Road F	Along US 61; slightly cut; off LS&M
8	County Road F to Birch Street	Along US 61; slightly cut; off LS&M
9	Birch Street to Cedar Avenue	Along US 61; fill; off LS&M
10	Cedar Avenue to Scheuneman Road	Along US 61; fill over old rail grade bridge and wetland to west; off LS&M
11	Just south of Scheuneman Road to County Road E	Along US 61; slight cut; off LS&M
12	County Road E to Willow Lake Boulevard	Along US 61; slightly cut; off LS&M

13	Willow Lake Boulevard to North of Buerkle Road	Along US 61; slightly cut; off LS&M
14	Centered on Buerkle Road	On US 61 to Buerkle Road then east to rail grade then south on grade fill; parallel to LS&M
15	Centered on I-694	Fill ranging from 12 -20 feet thick; on or parallel to LS&M
16	Rail grade to County Road D then south along Hazelwood Street	Rail bed fill north of County Road D; cut and roadway; off LS&M south of Co Rd D
17	Along Hazelwood Street between Legacy Parkway and just north of Beam Avenue.	On roadway; slight cut and fill; off LS&M
18	Beam Avenue to Bruce Vento Trail then south on trail	On roadways; slight cut and fill; parallel to LS&M
19	Bruce Vento Trail south of Beam Avenue	Filled over wetlands in stream valley on rail grade/trail; fill is 20-25 feet thick: parallel to LS&M
20	Bruce Vento Trail north of County Road C.	On trail/rail grade; fill north of Fitch Road then cut south County Road C; parallel to LS&M
21	Along Harvest Park south of County Road C	On rail grade; cut north of the wetland which is at end of Clarence Street; parallel to LS&M
22	Harvest Park south past Gervais Avenue to just south of Highway 36	On rail grade; filled along the edge of a lake marginal wetland to Highway 36 then cut
23	Highway 36 south to County Road B	On rail/trail grade and LS&M; cut up to Highway 36
24	Between County Road B and Skillman Avenue	On rail/trail grade and LS&M; slight cutting then deep cuts to Burke Avenue then slight cutting

25	Between Skillman and Frost Avenues	On rail/trail grade and LS&M; slight cutting
26	Between Frost and Ripley Avenues	On rail/trail grade; slight cutting
27	Between Ripley and Larpenteur Avenues	On rail/trail grade and LS&M; cut or on natural surface
28	Between Larpenteur and Hoyt Avenues	On rail/trail grade; fill 4-8 ft thick south of Idaho Avenue and cut north of Idaho Avenue
29	Centered on Arlington Avenue	On rail/trail grade and LS&M; 16 feet of RR fill; possibly cut on east side.
30	Along East Shore Drive south of Arlington Avenue	On rail/trail grade and LS&M; fill ±18 feet thick
31	Centered on Johnson Parkway and Clarence Street	On rail/trail grade; fill 12 – 16 feet thick; depression to east may be a borrow pit.
32	Centered on Johnson Parkway and Phalen Avenue	On rail grade fill 12-14 ft thick north of Johnson Parkway; south of Johnson Parkway is cut
33	Lawson Avenue to just west of Atlantic Street	Cut and fill
34	Just west of Atlantic Street to Earle Street	Along Phalen Boulevard; sloping down with slight cutting at Earl Street
35	Wells to US 61 (Arcade Street) north on Arcade to Neid Street	Along Phalen Boulevard at grade or slight cut; cut north of Phalen Boulevard and Neid Street.
36	Neid Street west to Phalen Boulevard and then west to Bradley Street	Cut along Neid Street and at grade or slight cut along Phalen Boulevard

37	Bradley Street to just west of Railroad tracks	Along Phalen Boulevard at grade or slight cut west to RR tracks
38	Railroad tracks to I-35E change to Pennsylvania Avenue	Along Phalen Boulevard; cut to go under I-35 from Olive Street west; fill to bridge over railroad; cut on Pennsylvania Avenue
39	Pennsylvania Avenue to Jackson then south to Valley Street	All cut along roadways.
40	South on Jackson Street to 14 th Street then southwest on 14 th Street to Roberts Street	All cut along roadways.
41	Roberts Street southeast to 9 th Street	Ct north of I-94; slight cut from I-94 to 10 th Street then fill.
42	Roberts Street southeast from 9 th to 5 th Streets then northeast on 5 th and 6 th Streets	Slight cut on Roberts and 6 th Streets then slight fill on 5 th Street
43	Cut and fill on 5 th Street to Sibley and Wacousta Streets; south to Kellogg Road then east on Kellogg	Cut on Sibley and Wacousta Streets t hen fill on Kellogg Road

Urbanization and Archaeological Potential

Cutting and filling the landscape are basic processes associated with most urbanization. It involves moving earth from landscape highs to landscape lows and grading and/or filling to prepare surfaces for building of structures and facilities of all kinds. Prior to urbanization the surface deposits in the project area were either glacial till and outwash dating to about 13,000 ¹⁴C years BP or paludal deposits (peat and muck) that accumulated during the post glacial period. The archaeological remains of most Euro-American and all Native occupations that occurred on the glacial landforms would be located near the landform surface, not deeply buried. So, if these landforms are subjected to cutting during urbanization the archaeological deposits, if present, would be removed to secondary contexts. Portions of the proposed corridor that have been cut (see Table 1 and Appendix A and B) have low potential for surface or buried archaeological deposits. Portions of the proposed corridor that have been filled have moderate potential for buried archaeological deposits in the glacial deposits directly beneath the fill but low potential deeply buried within the glacial deposits covered by the fill (Table 1, Appendix A and B).

Archaeological deposits could also be deeply buried at the surface, within, or beneath the paludal deposit sequences (Hawley, et al. 2013; Kolb, et al. 2010; Widga 2014). If archaeological deposits are present and buried they would be well preserved in the anaerobic environment.

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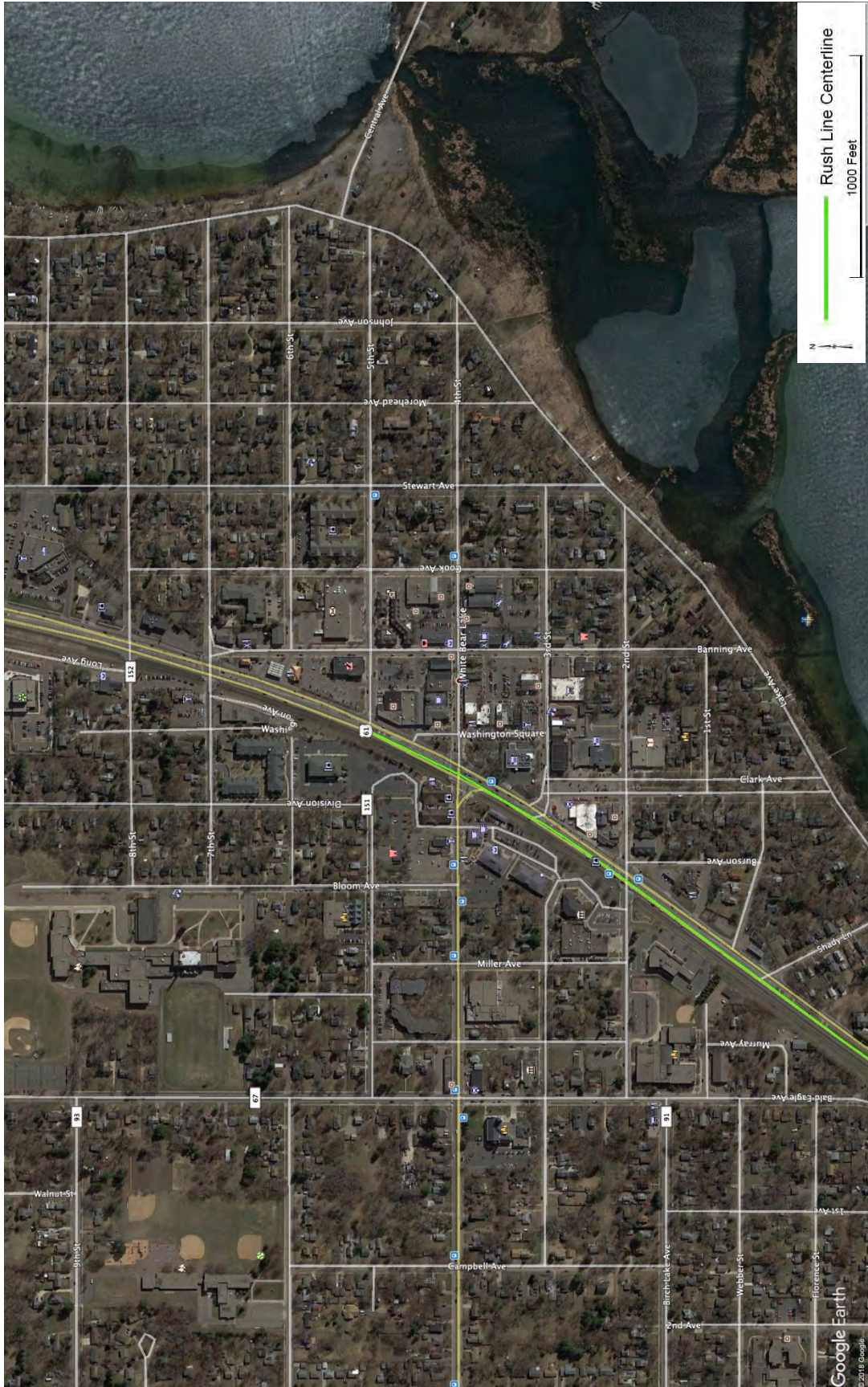
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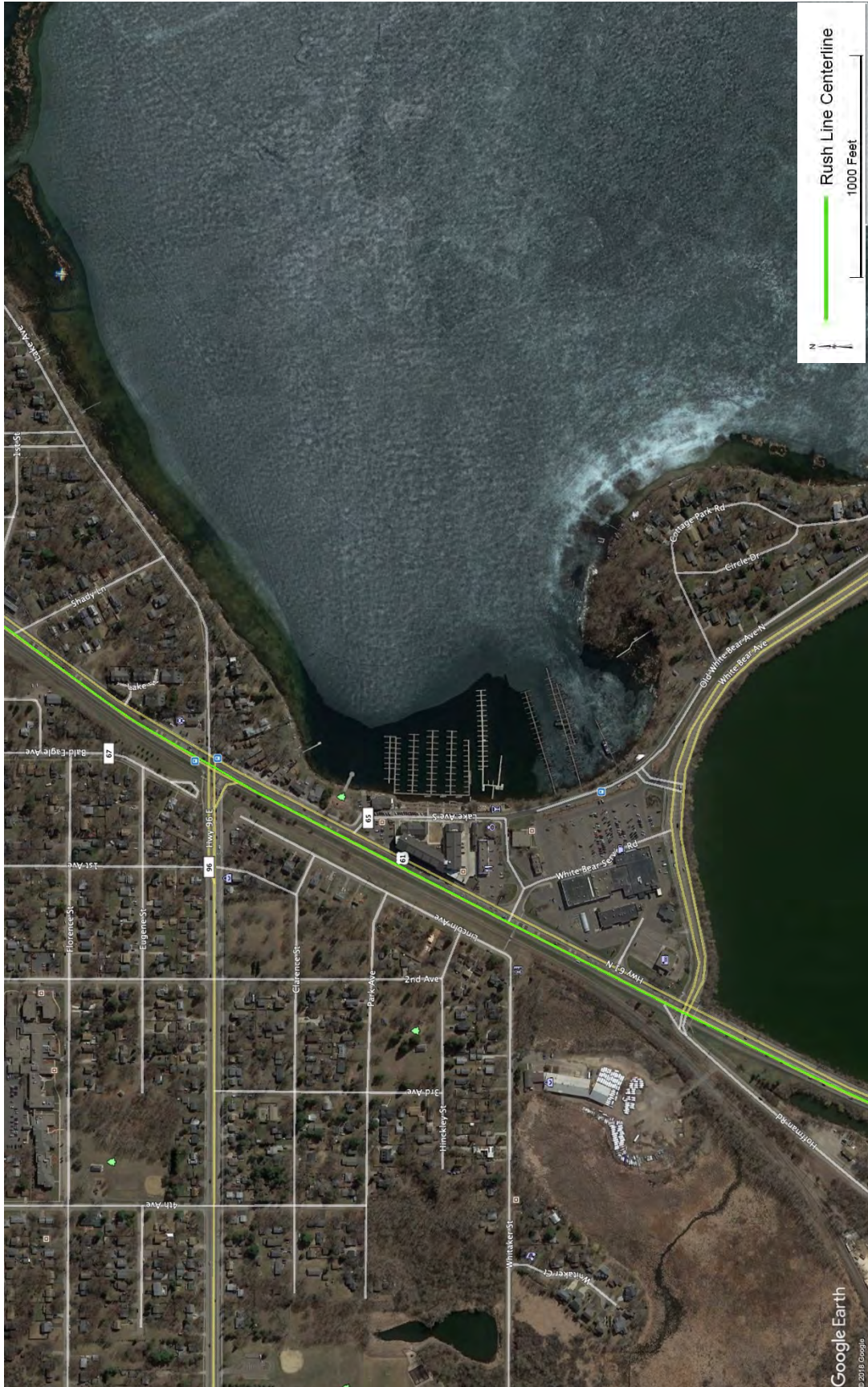
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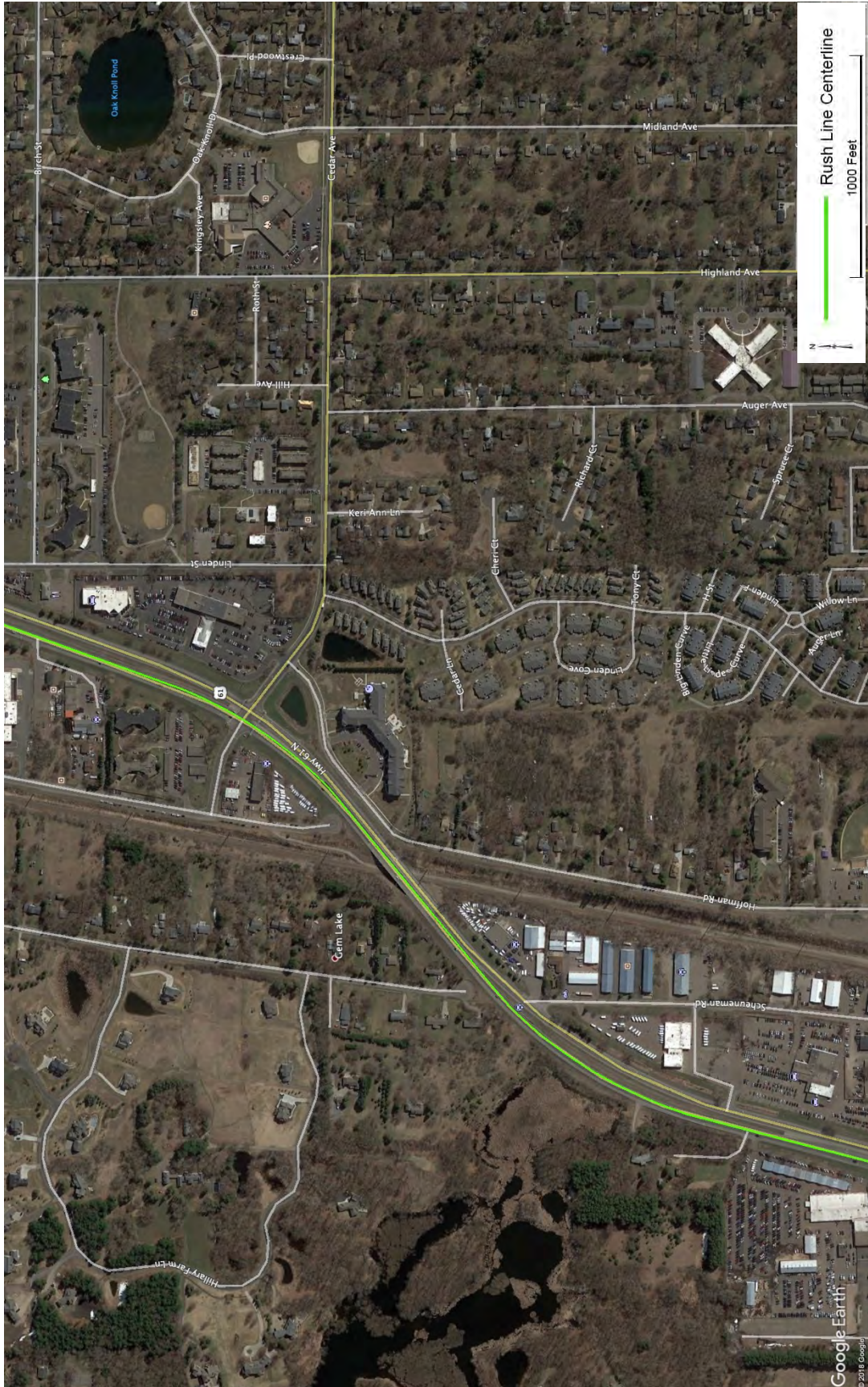
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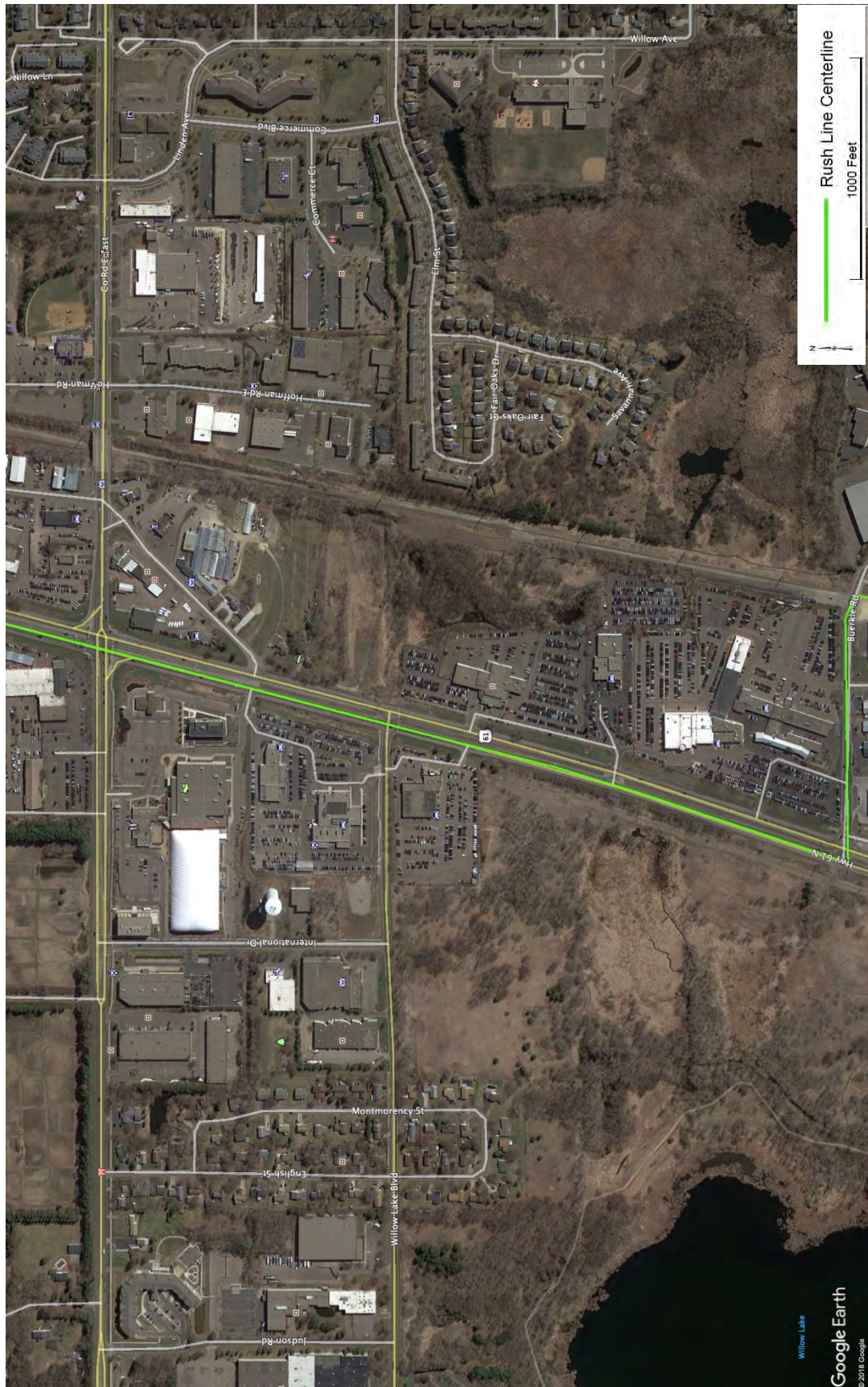
APPENDIX A

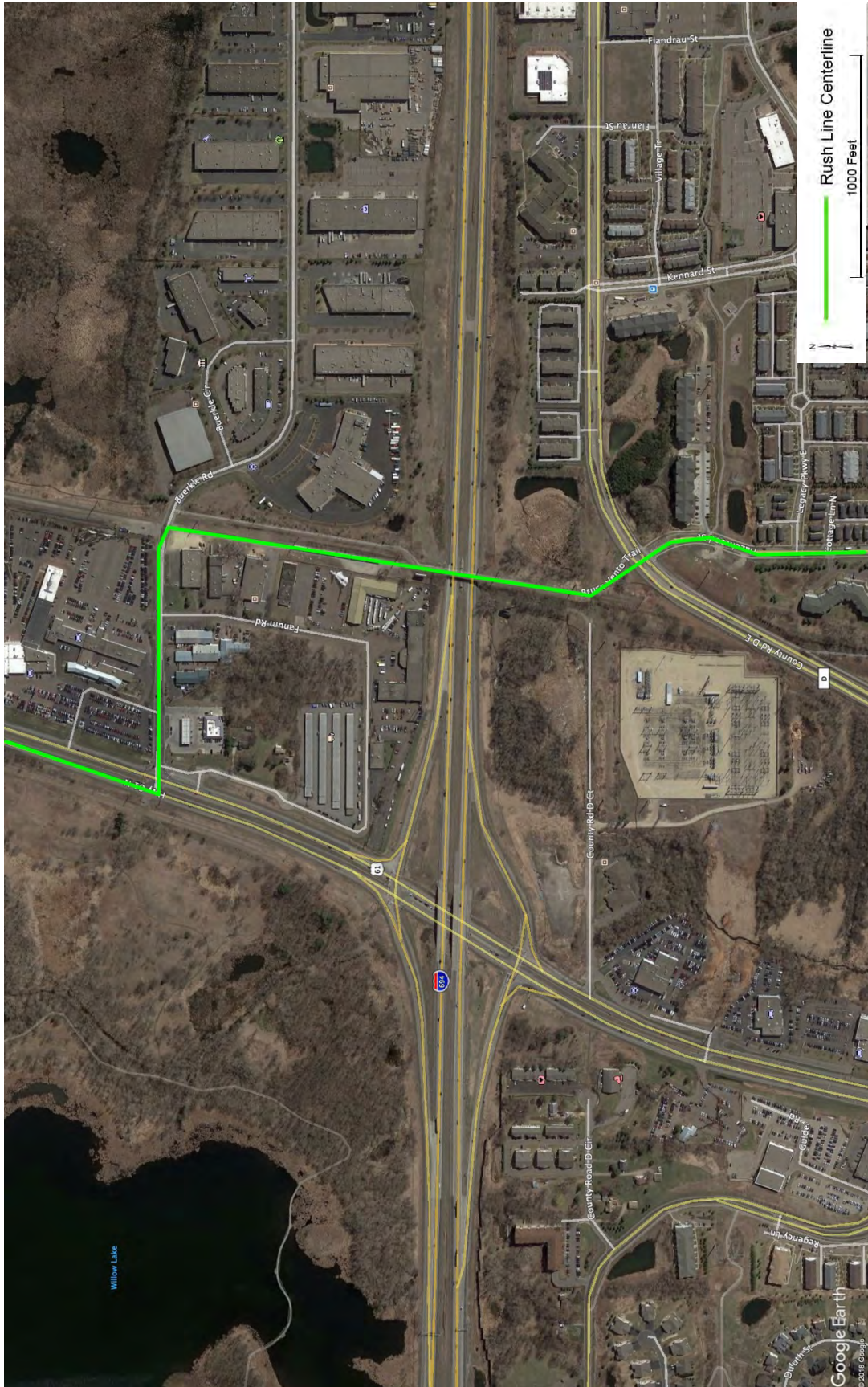




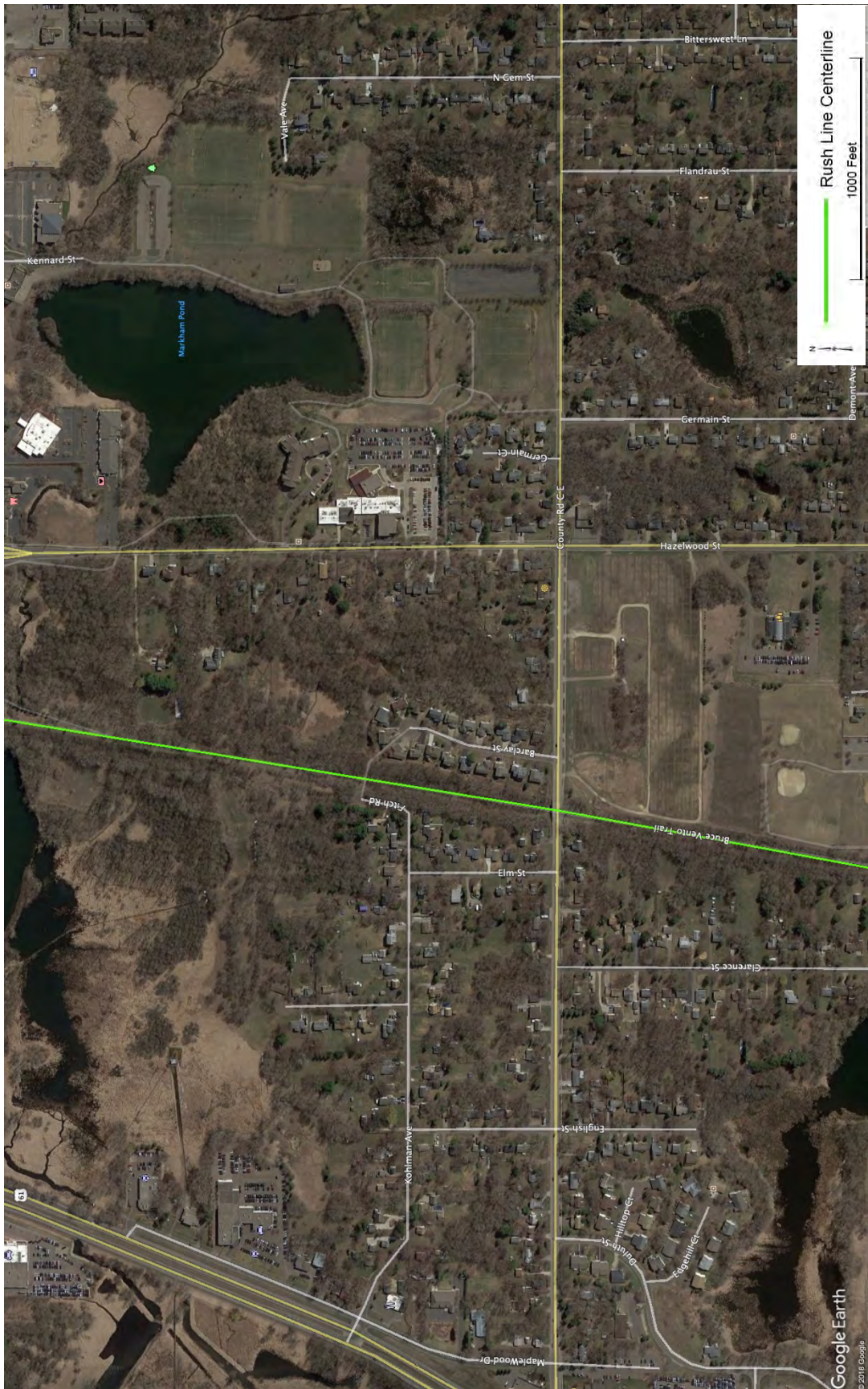




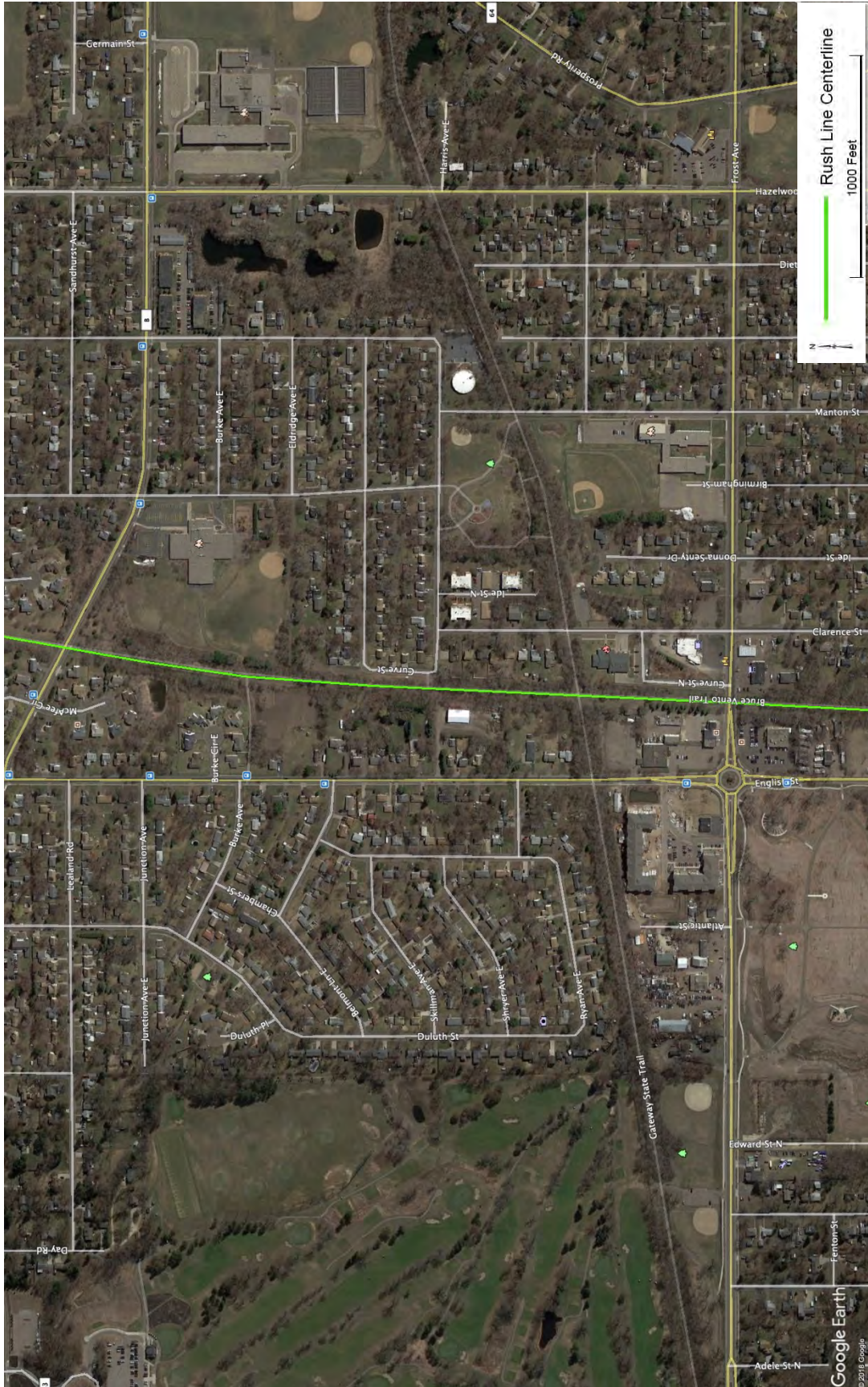


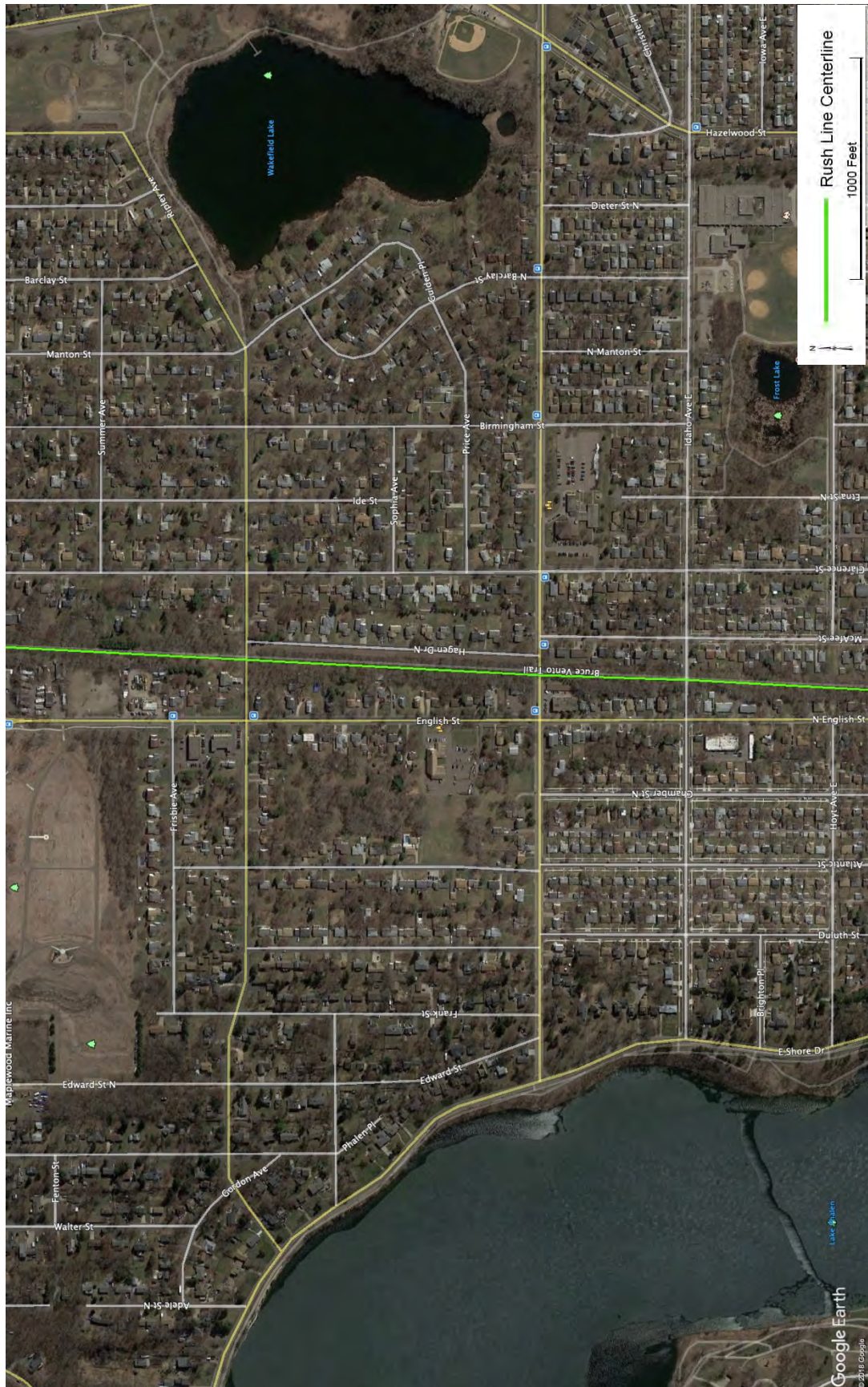


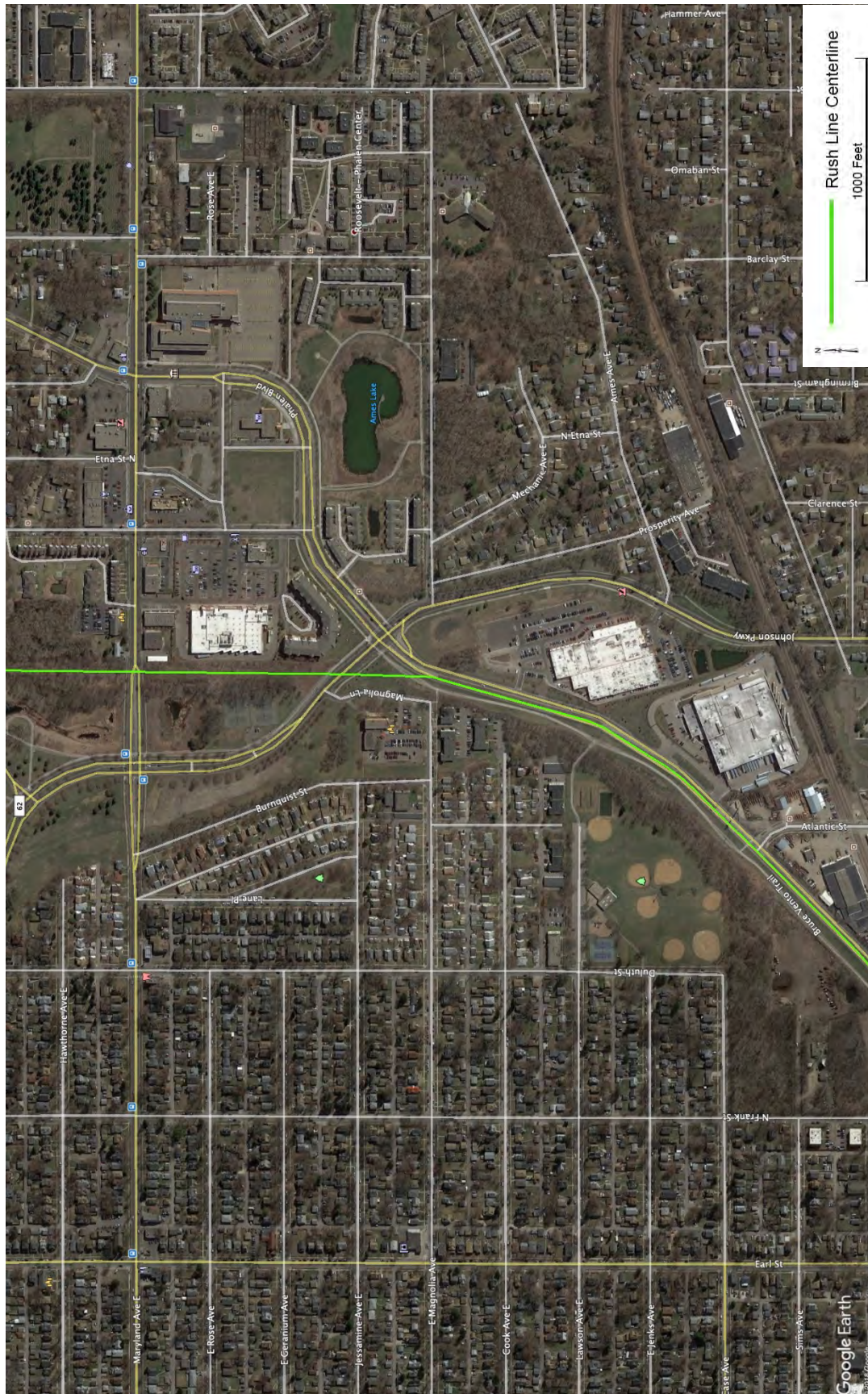












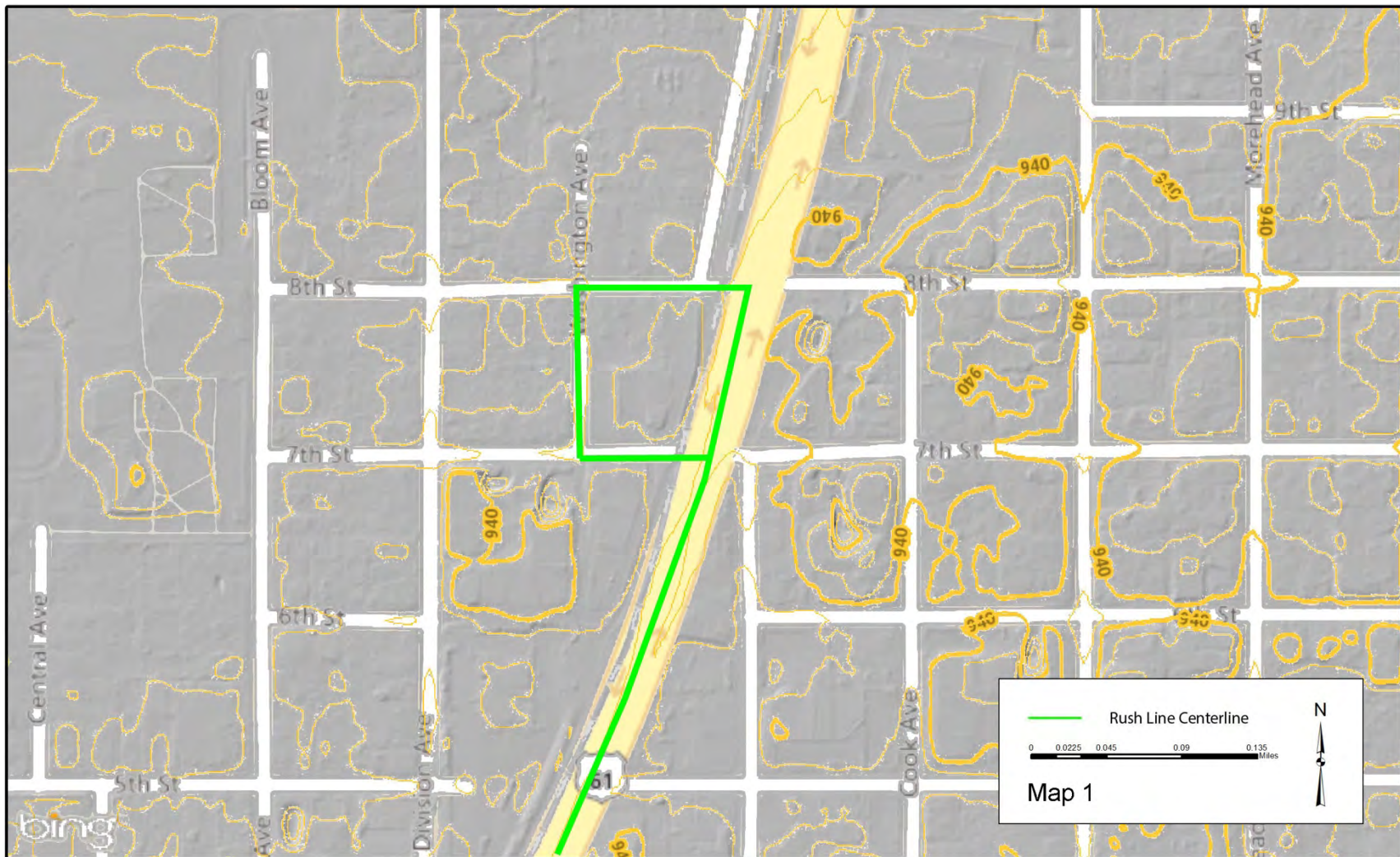






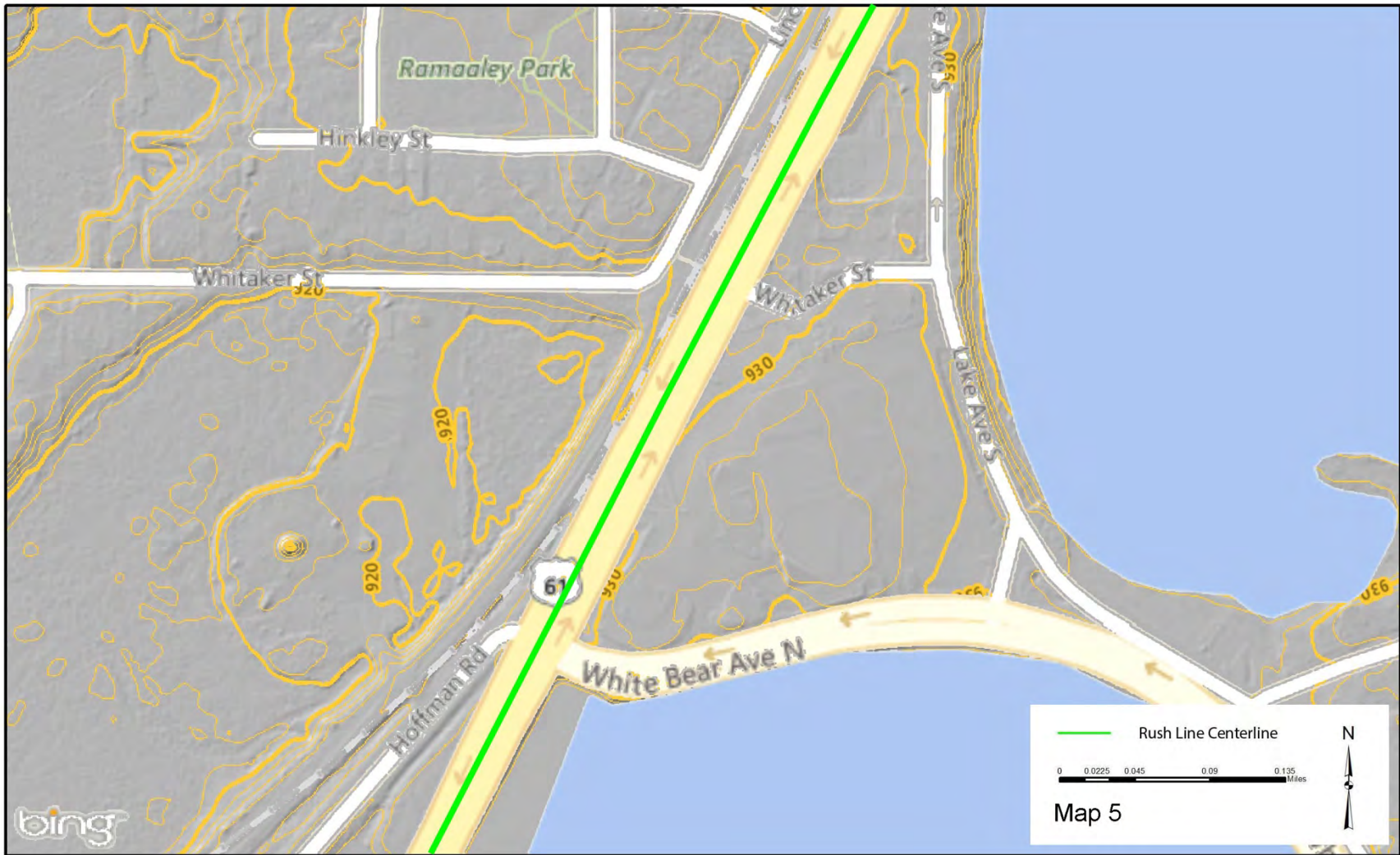
APPENDIX B

LIDAR Hillshade ad Contour Maps

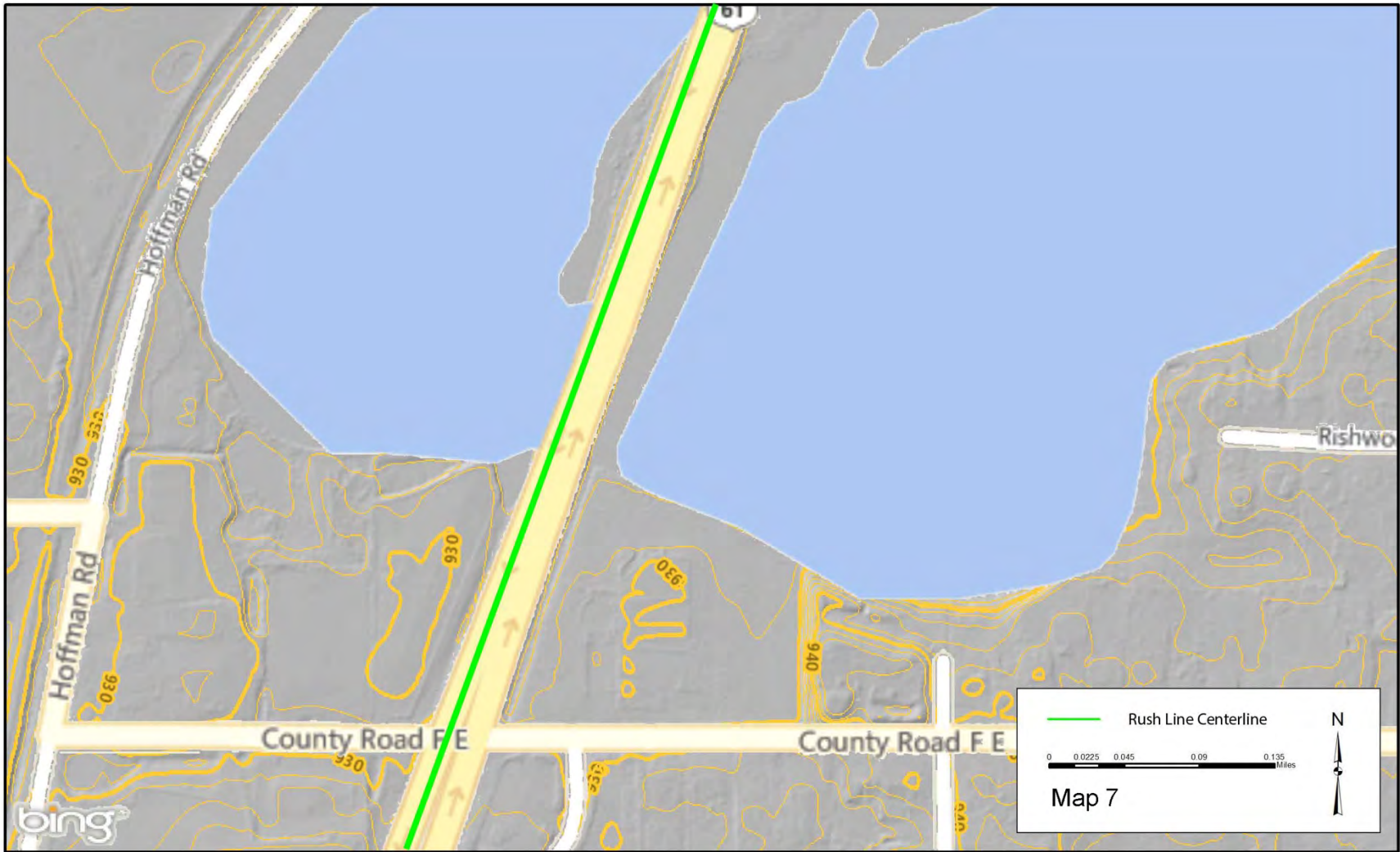






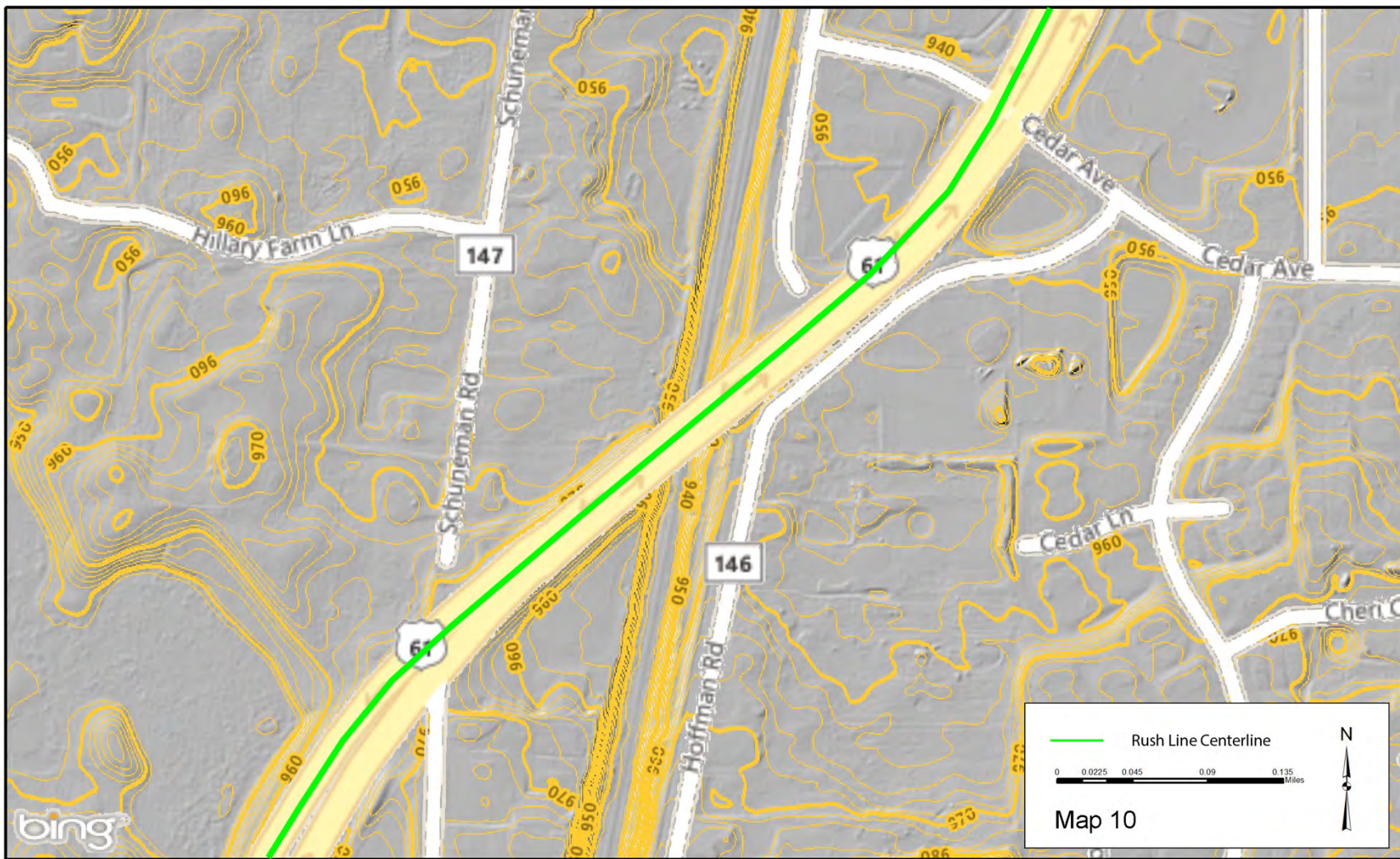


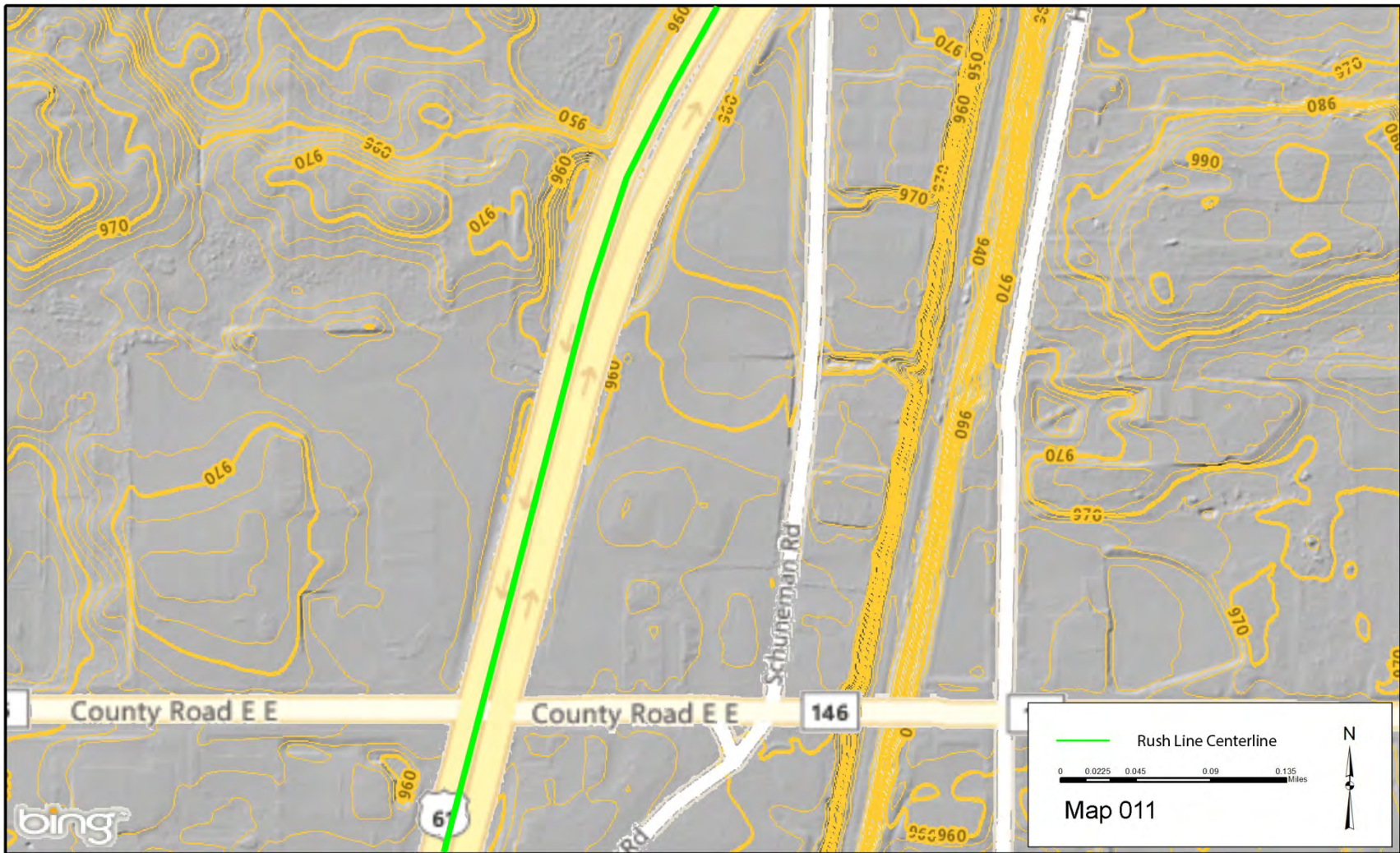


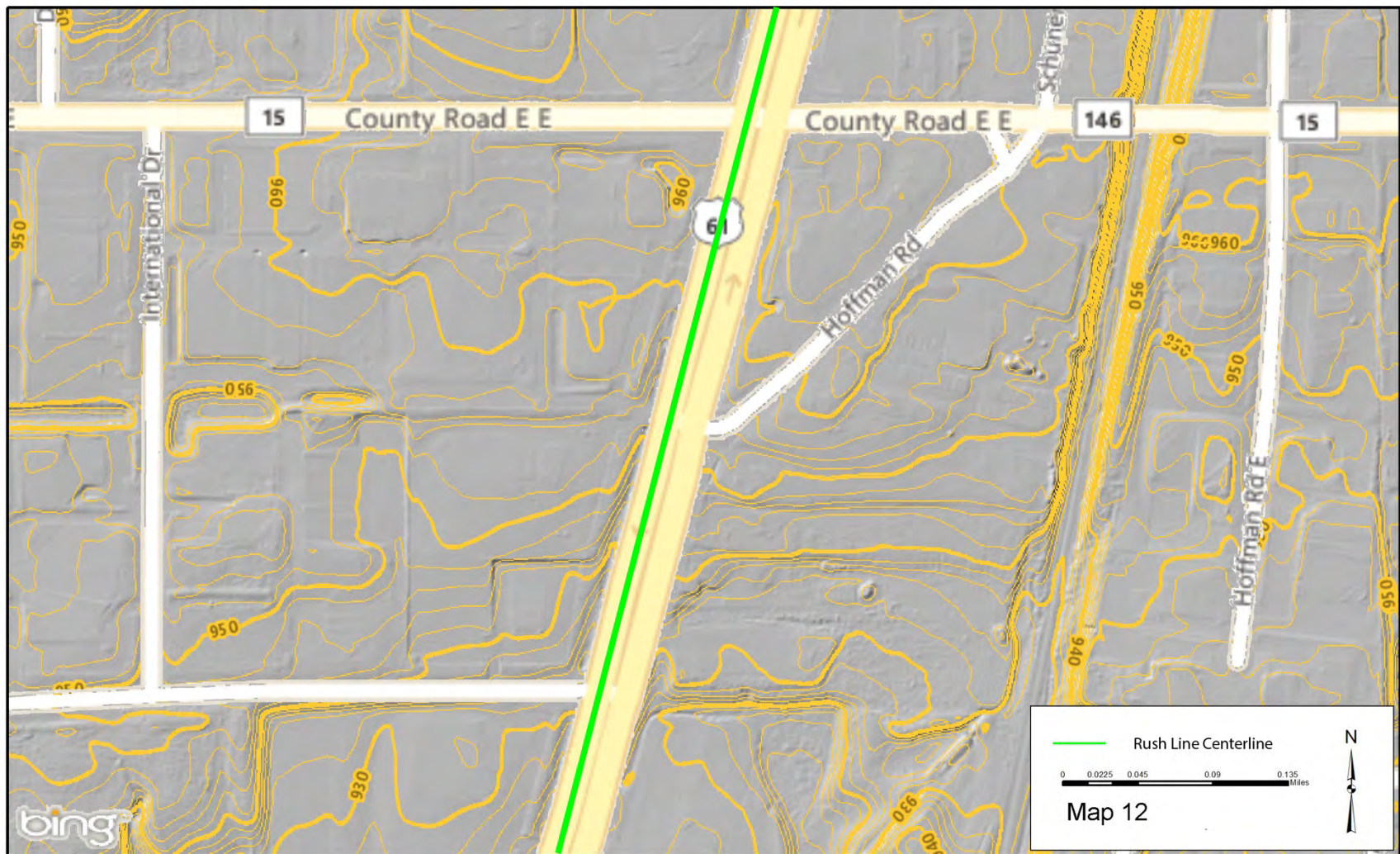


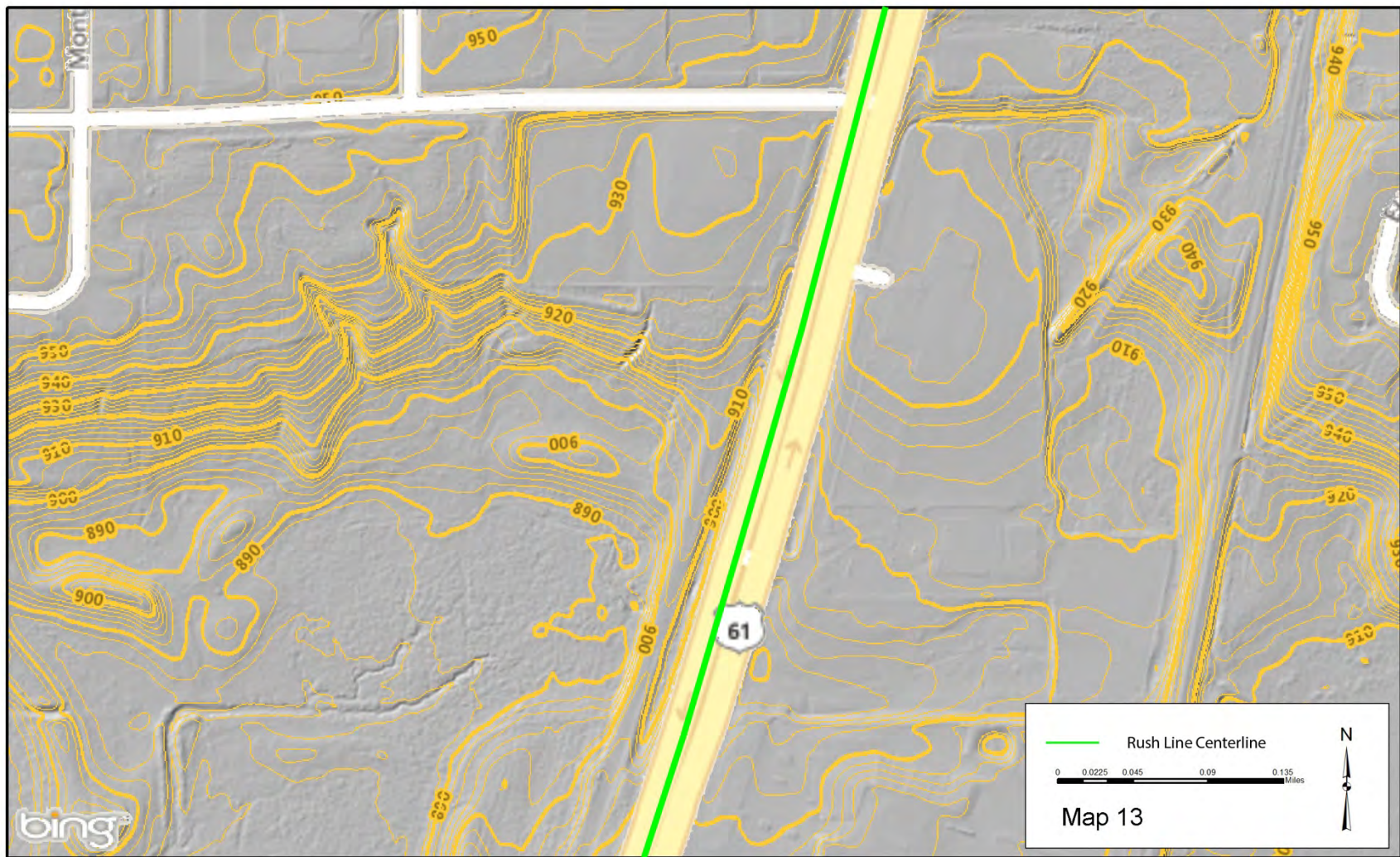


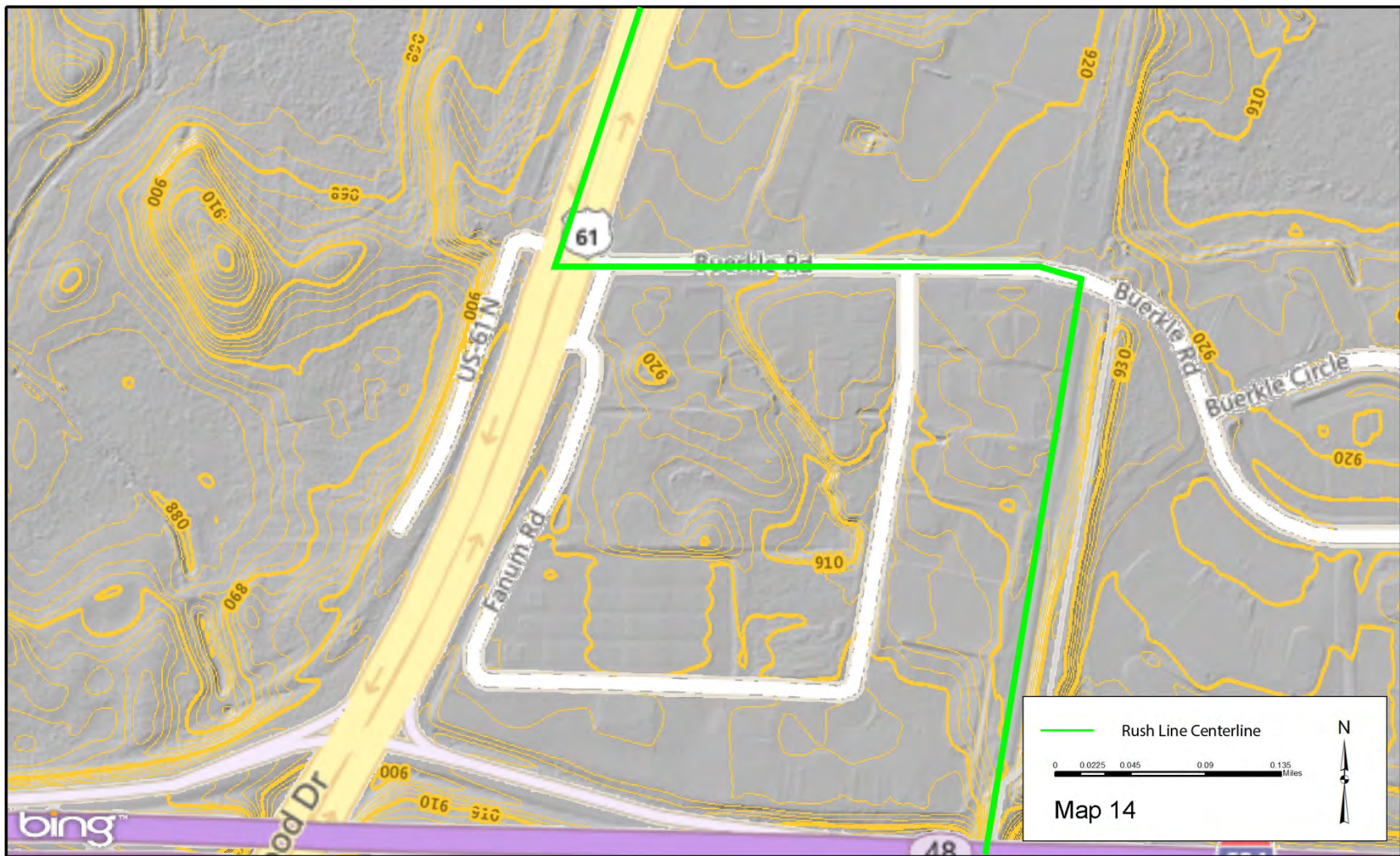


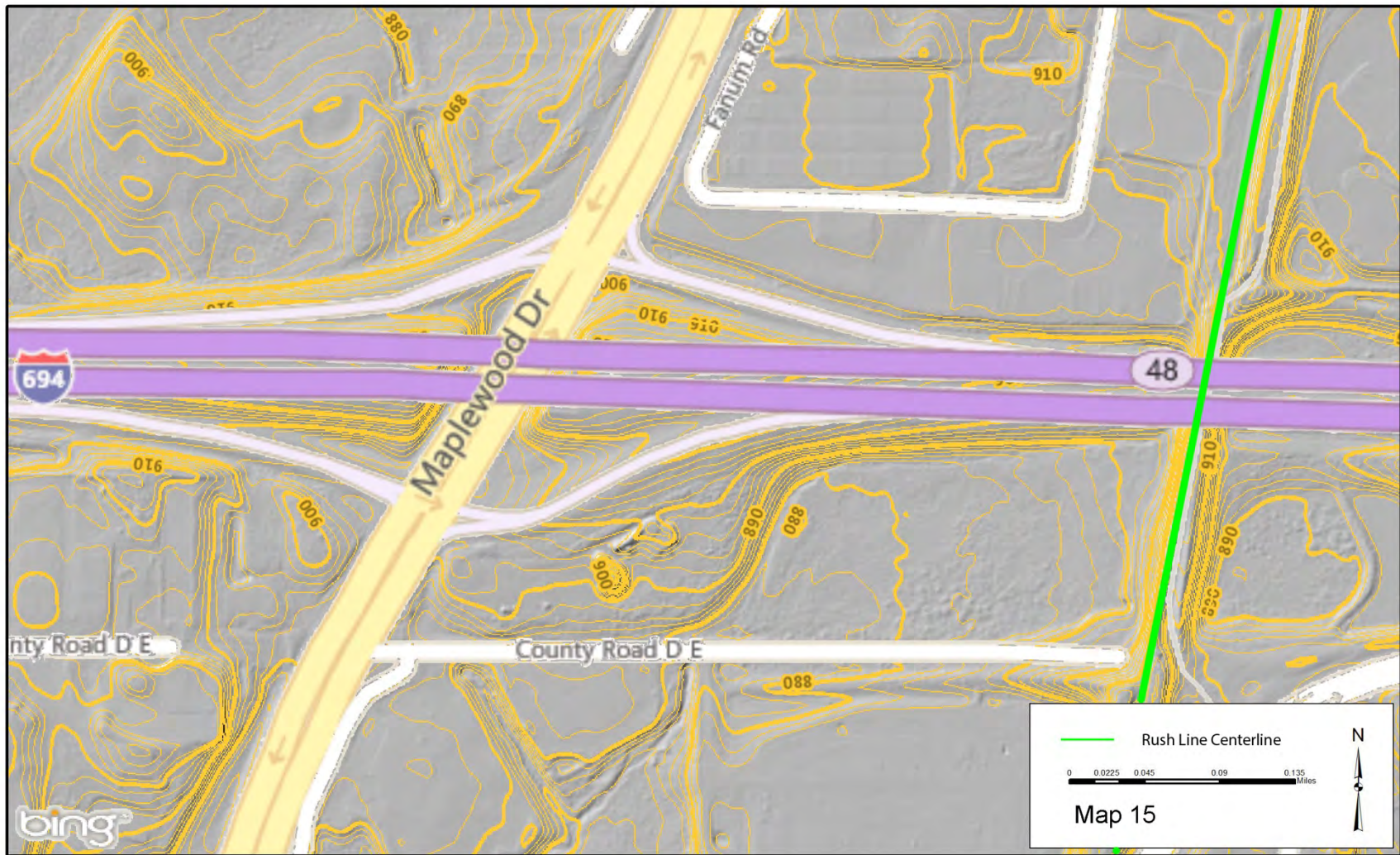


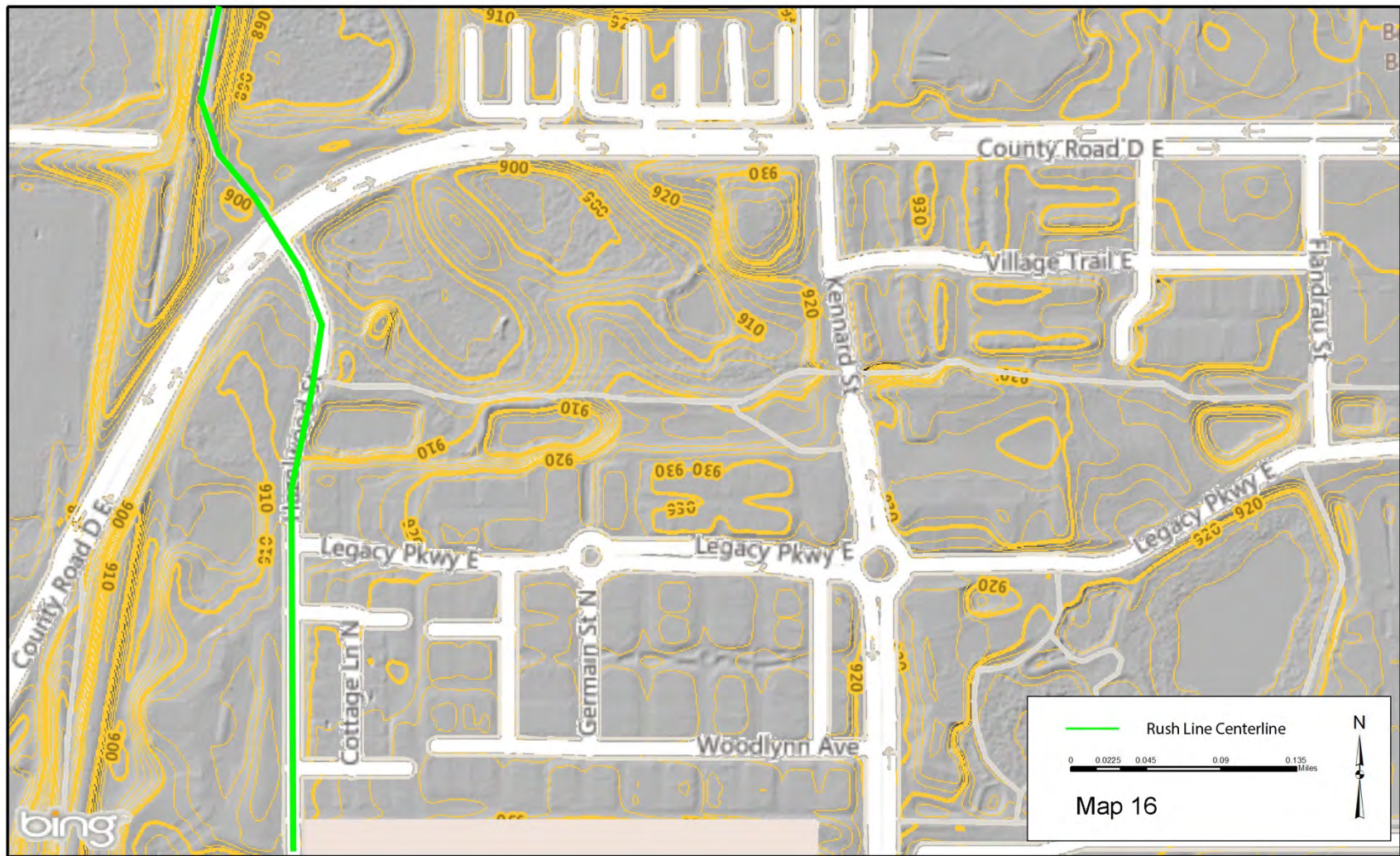






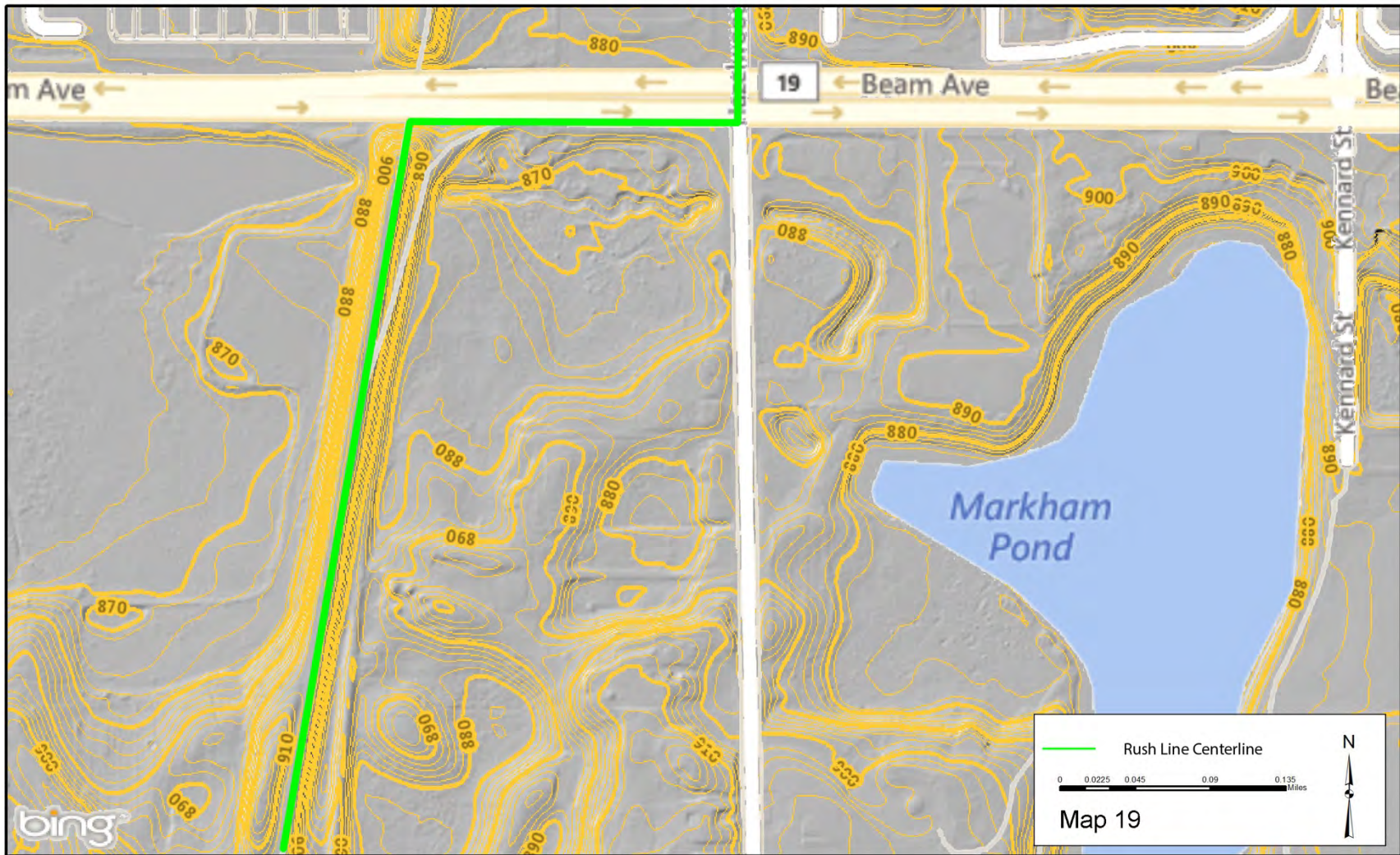


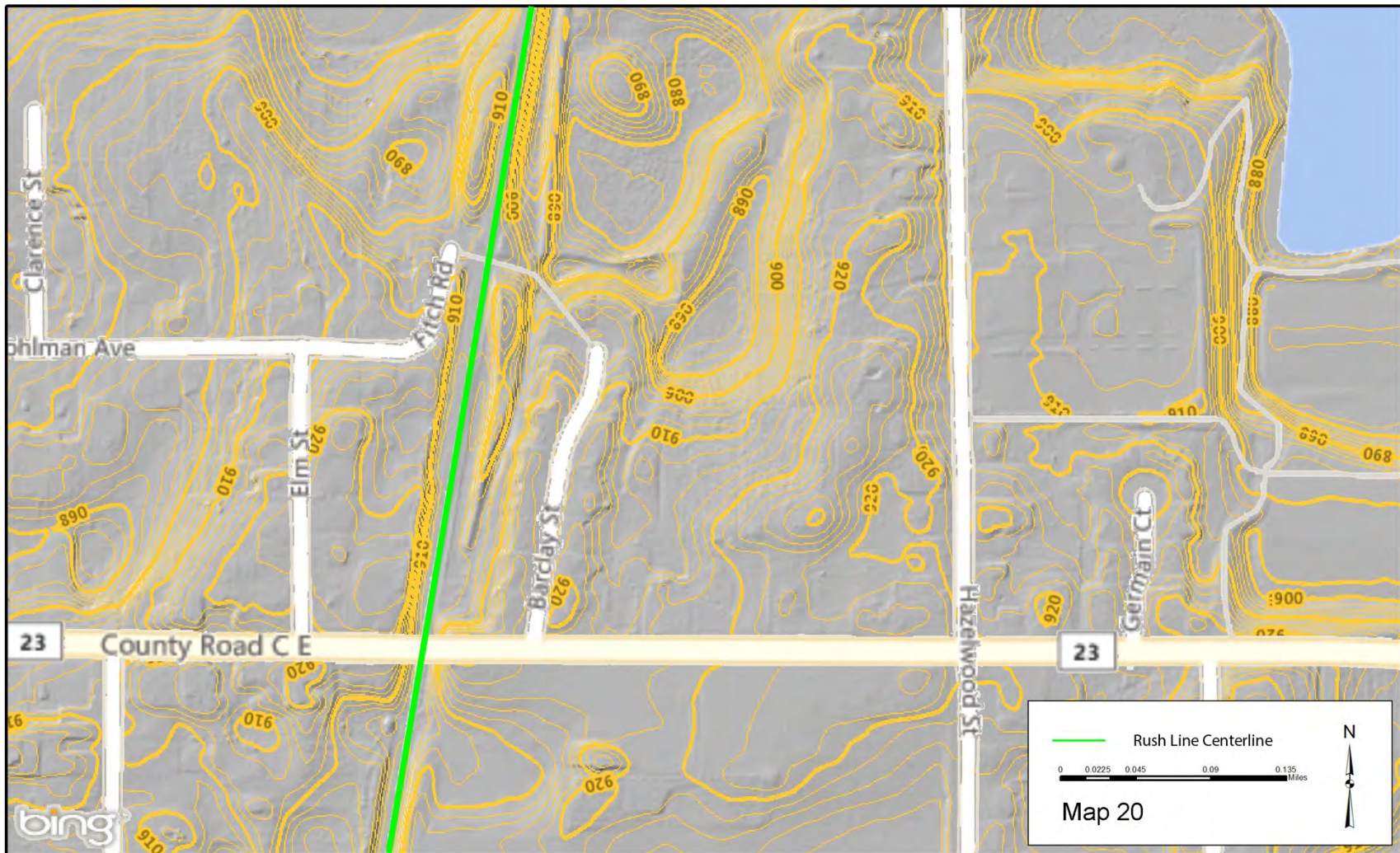


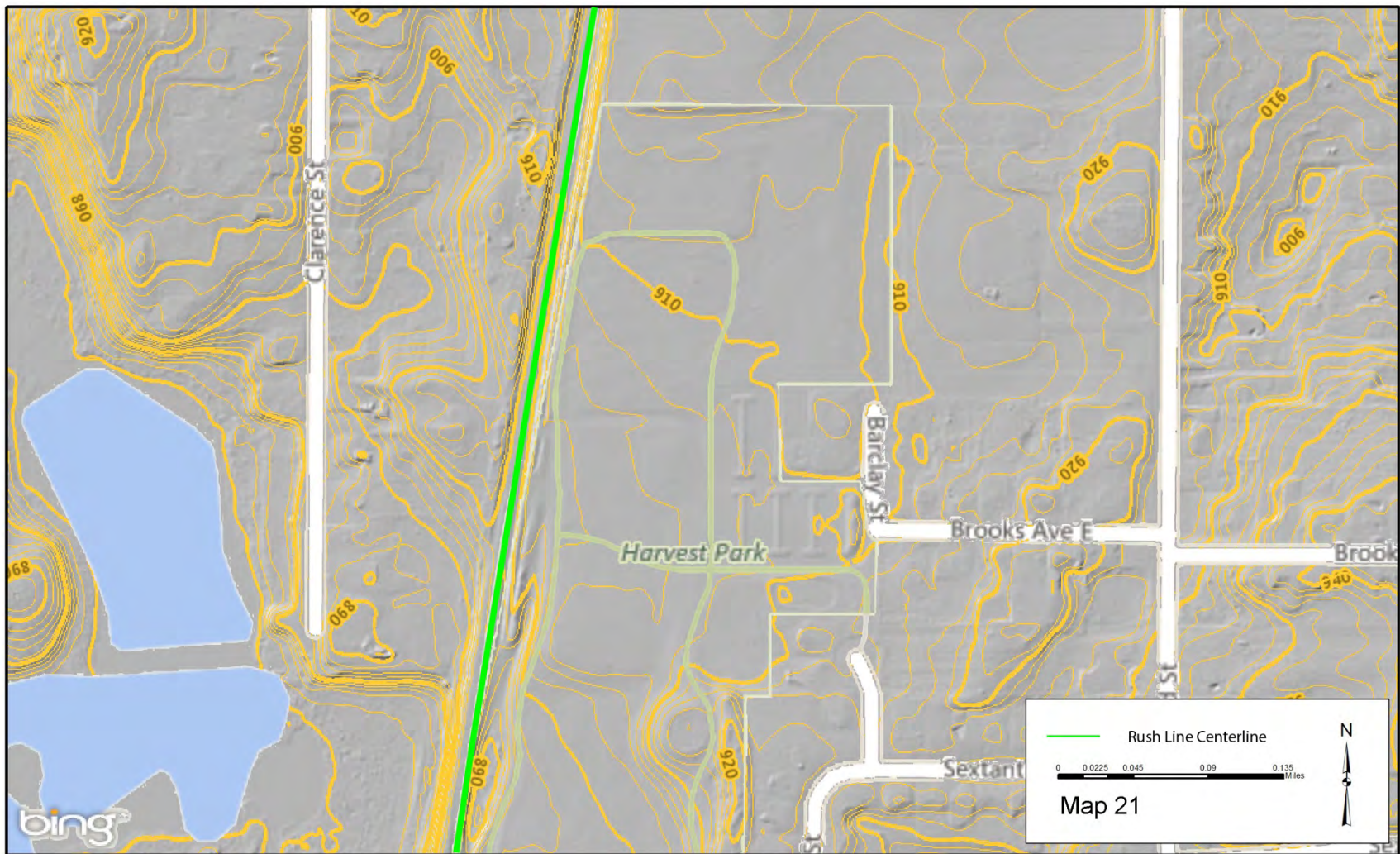


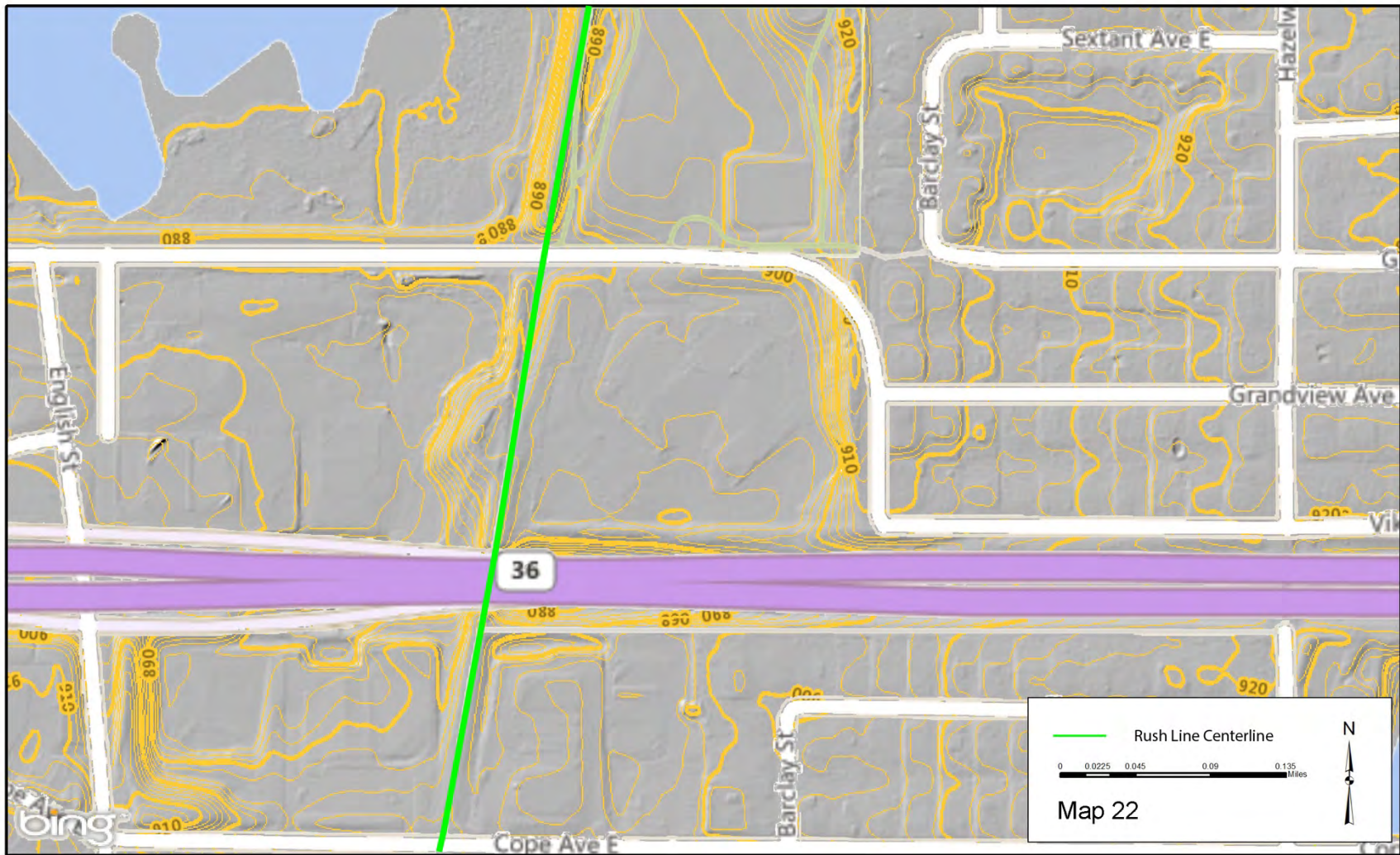


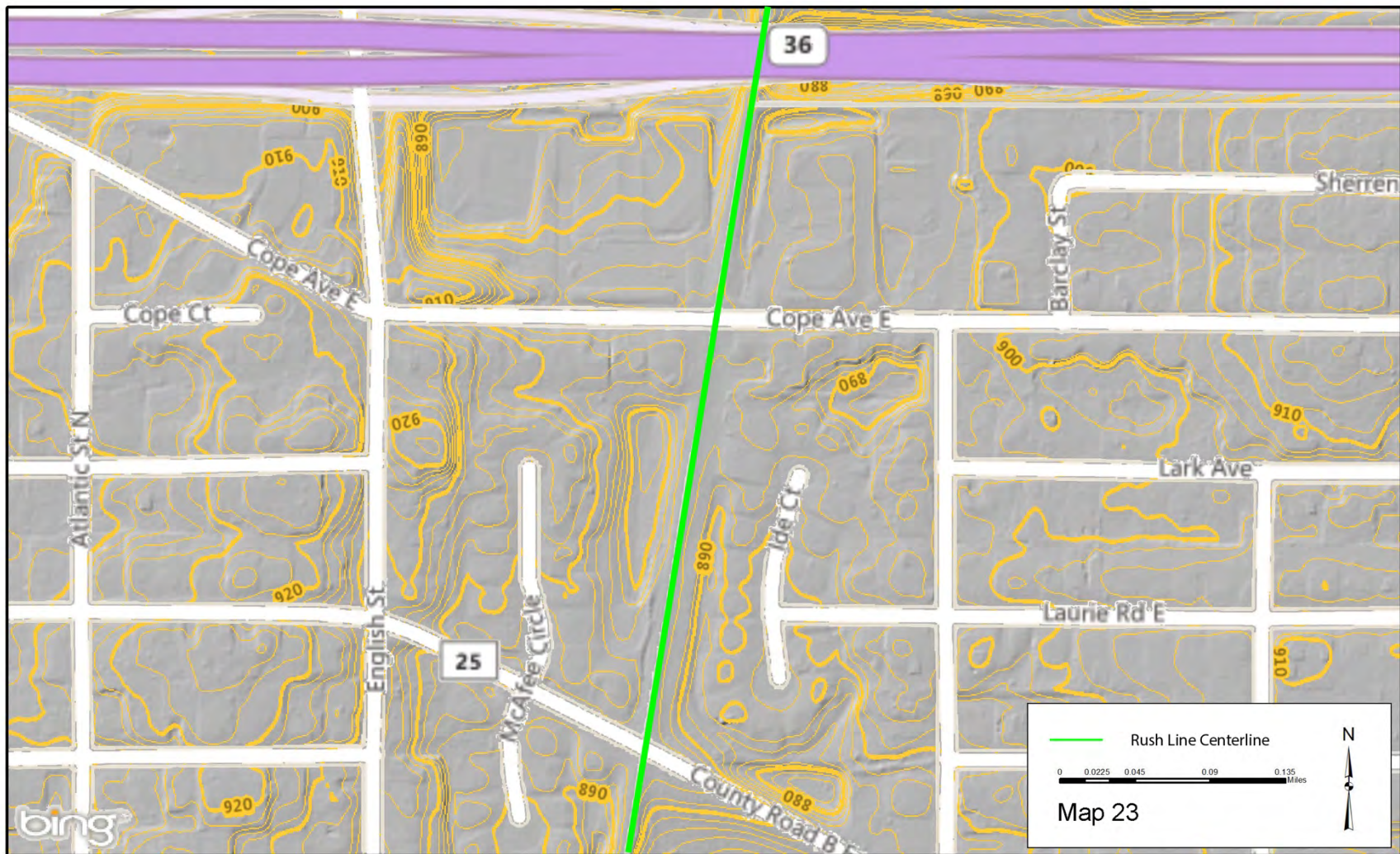


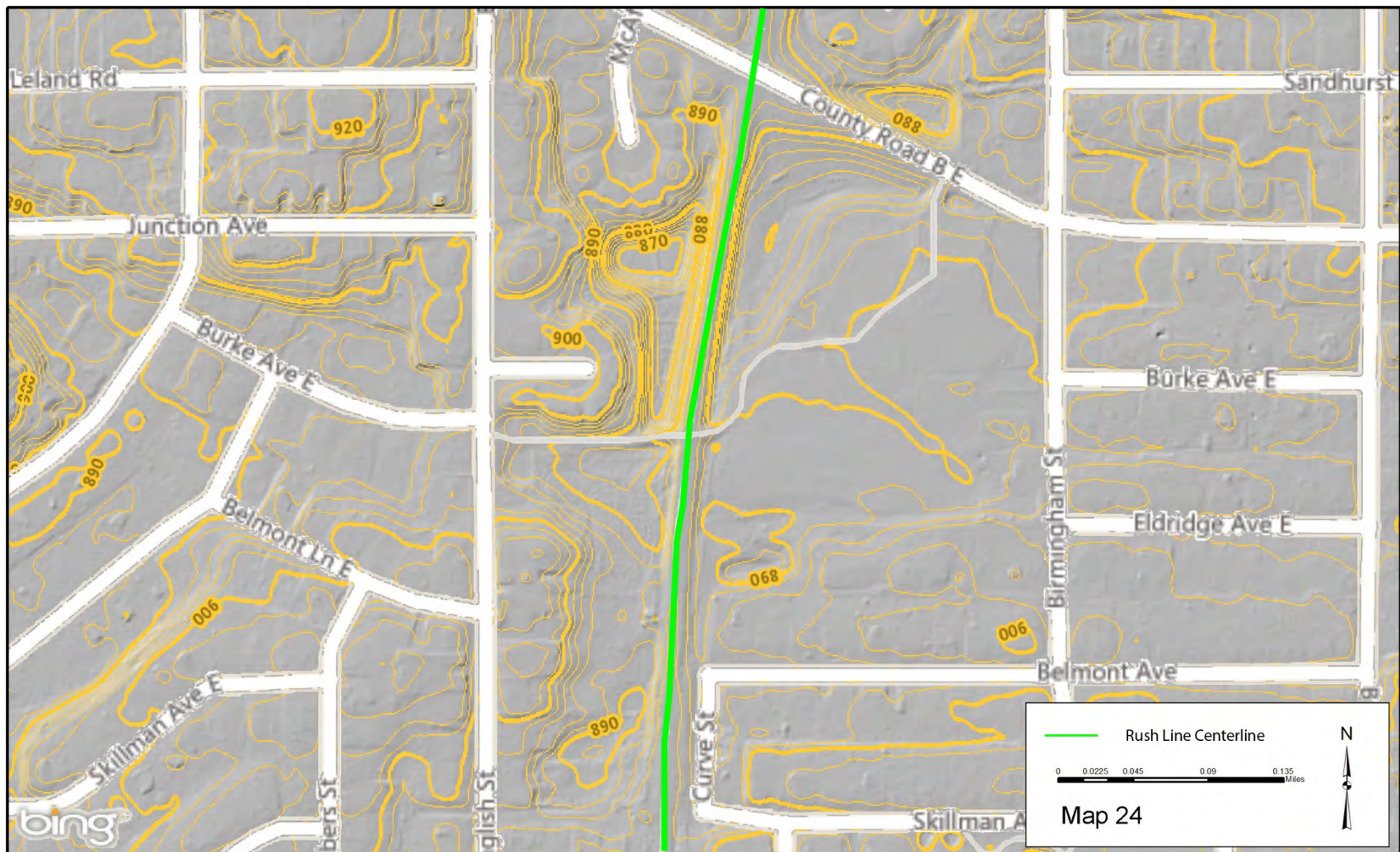


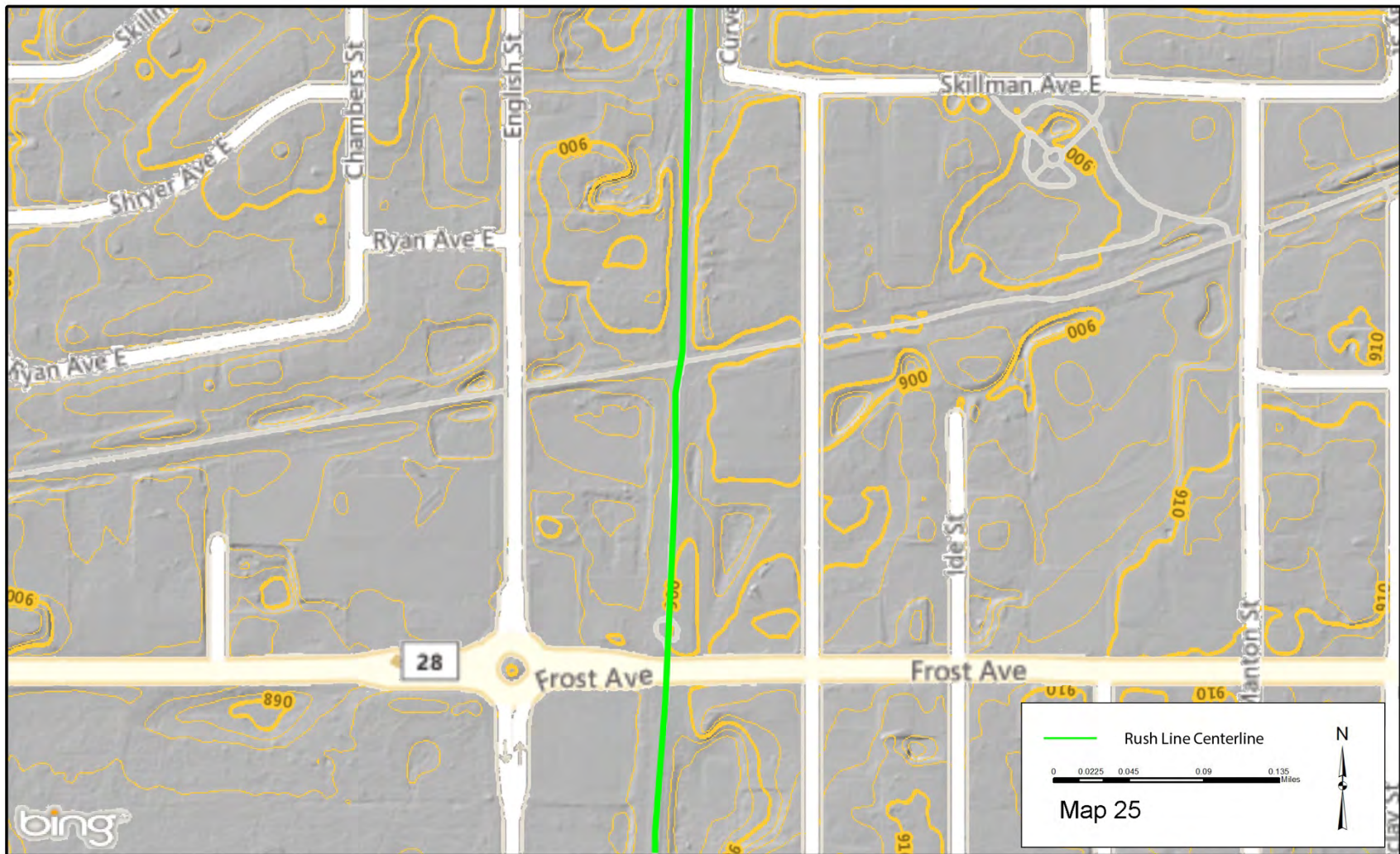






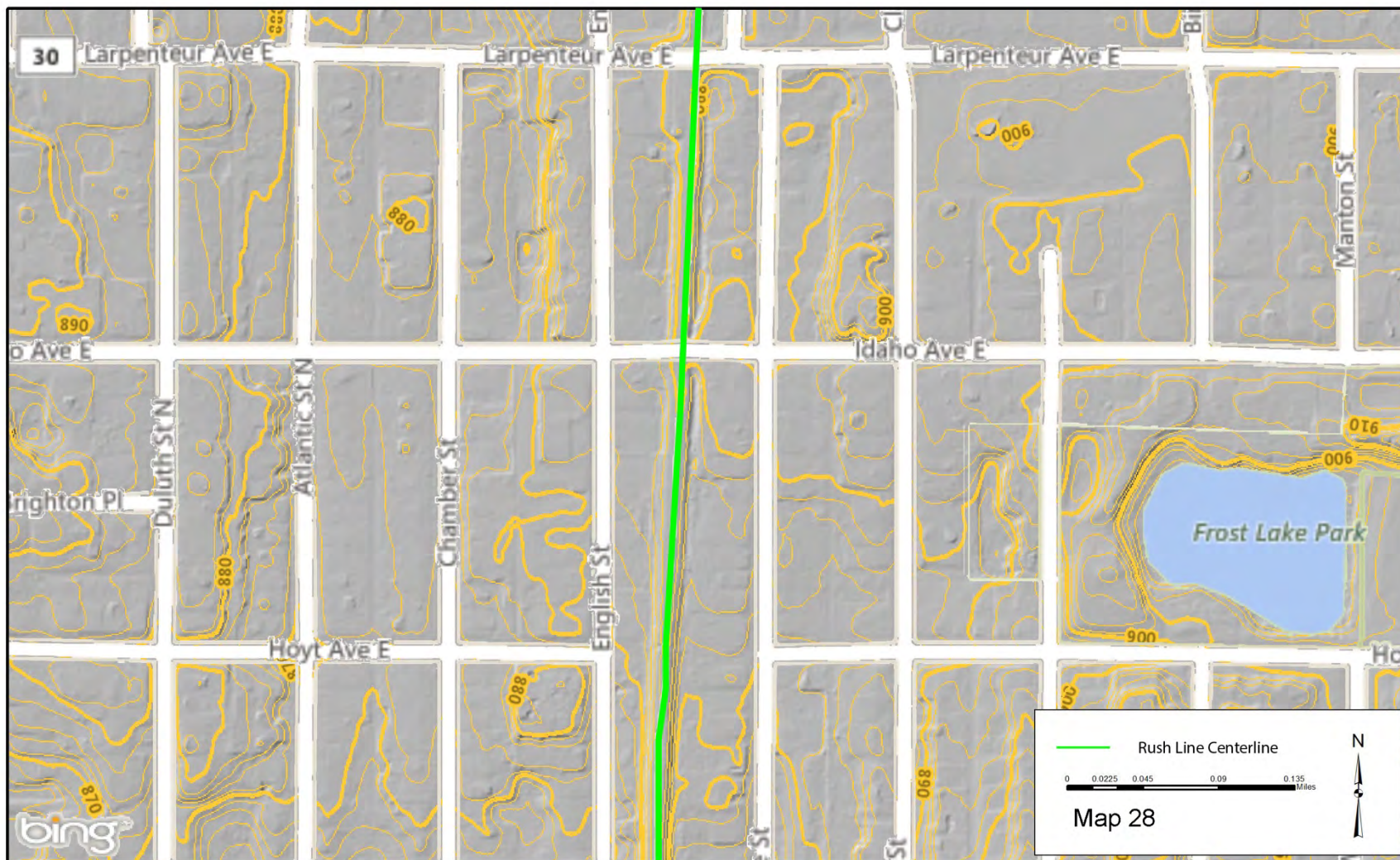




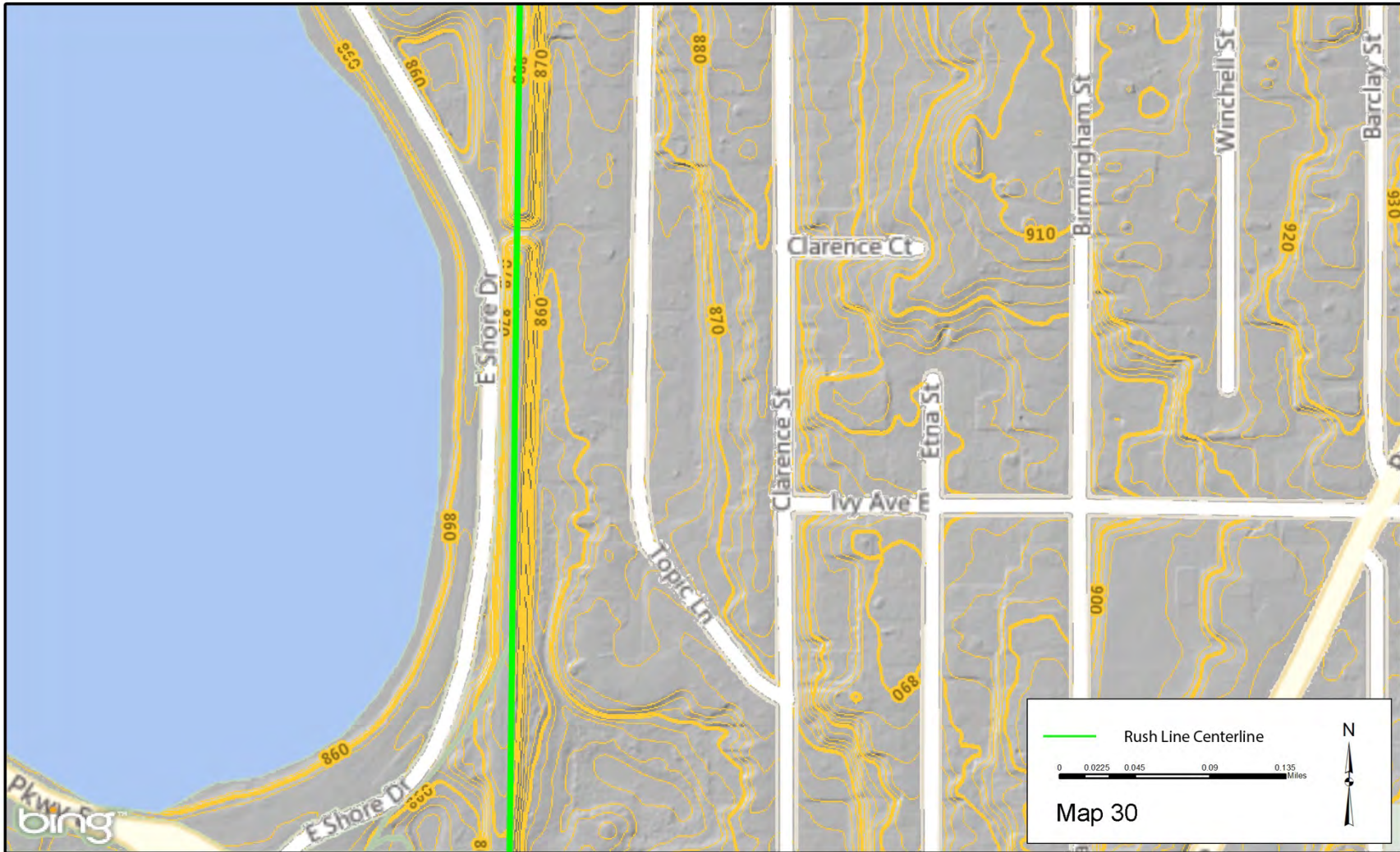




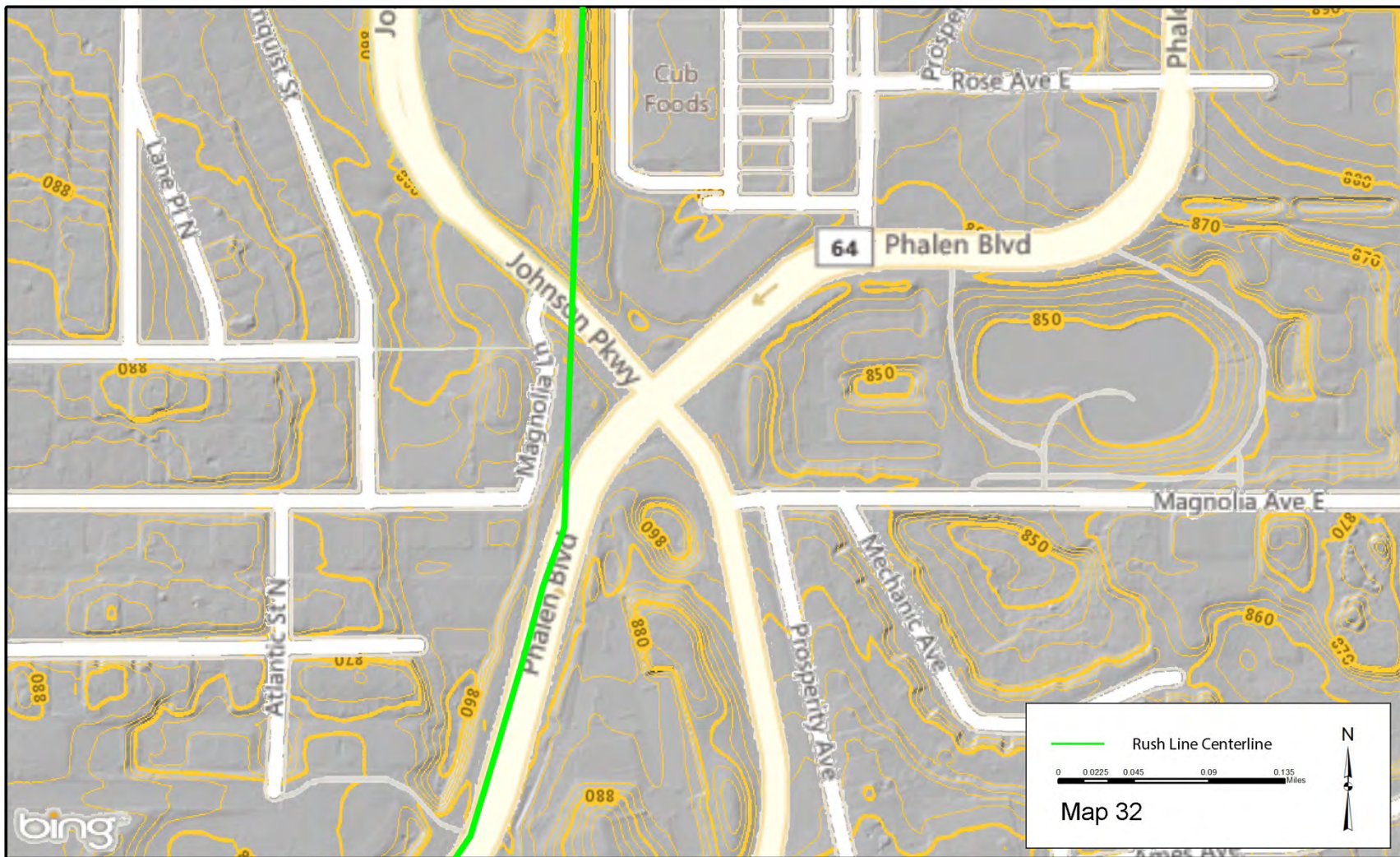


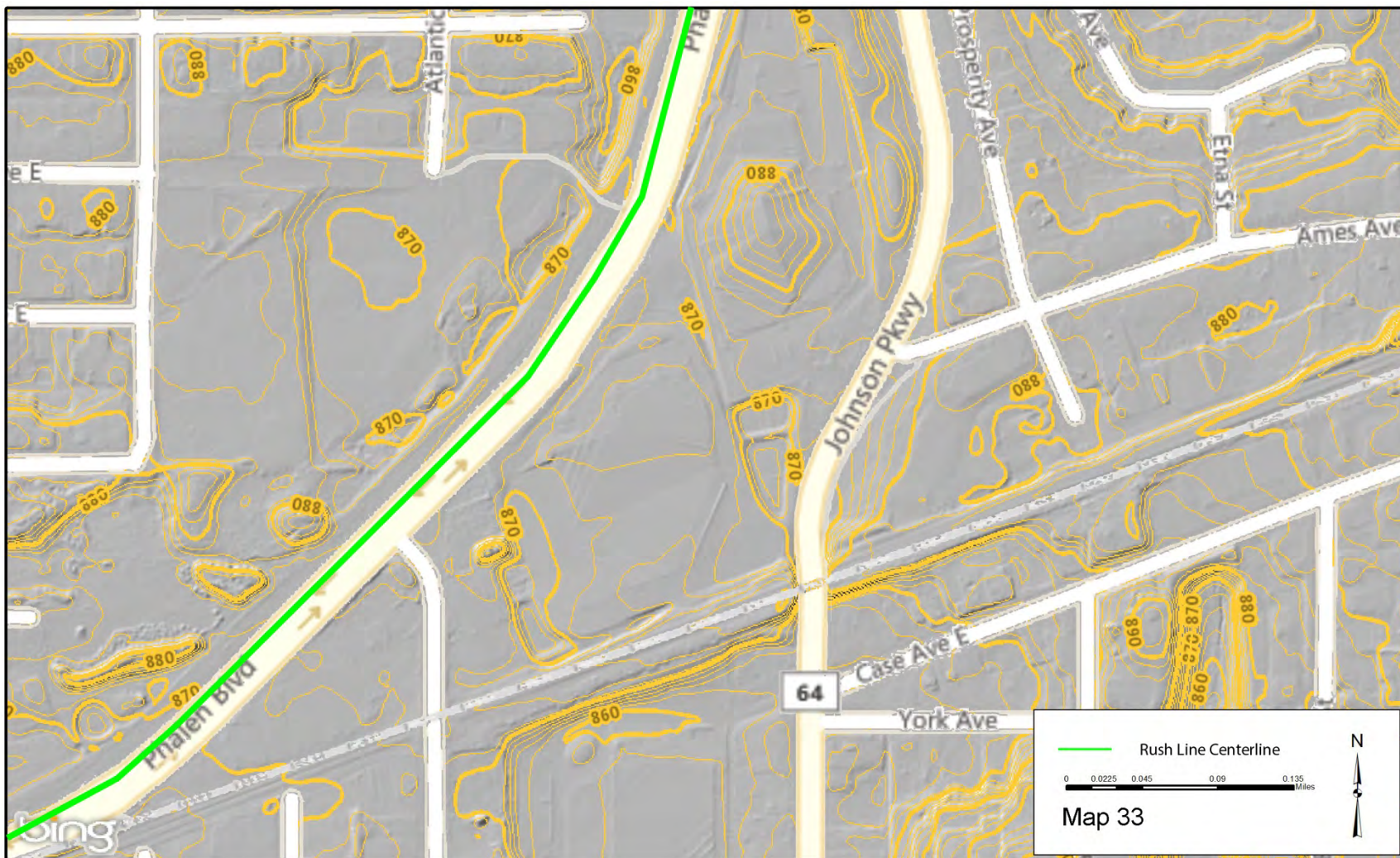


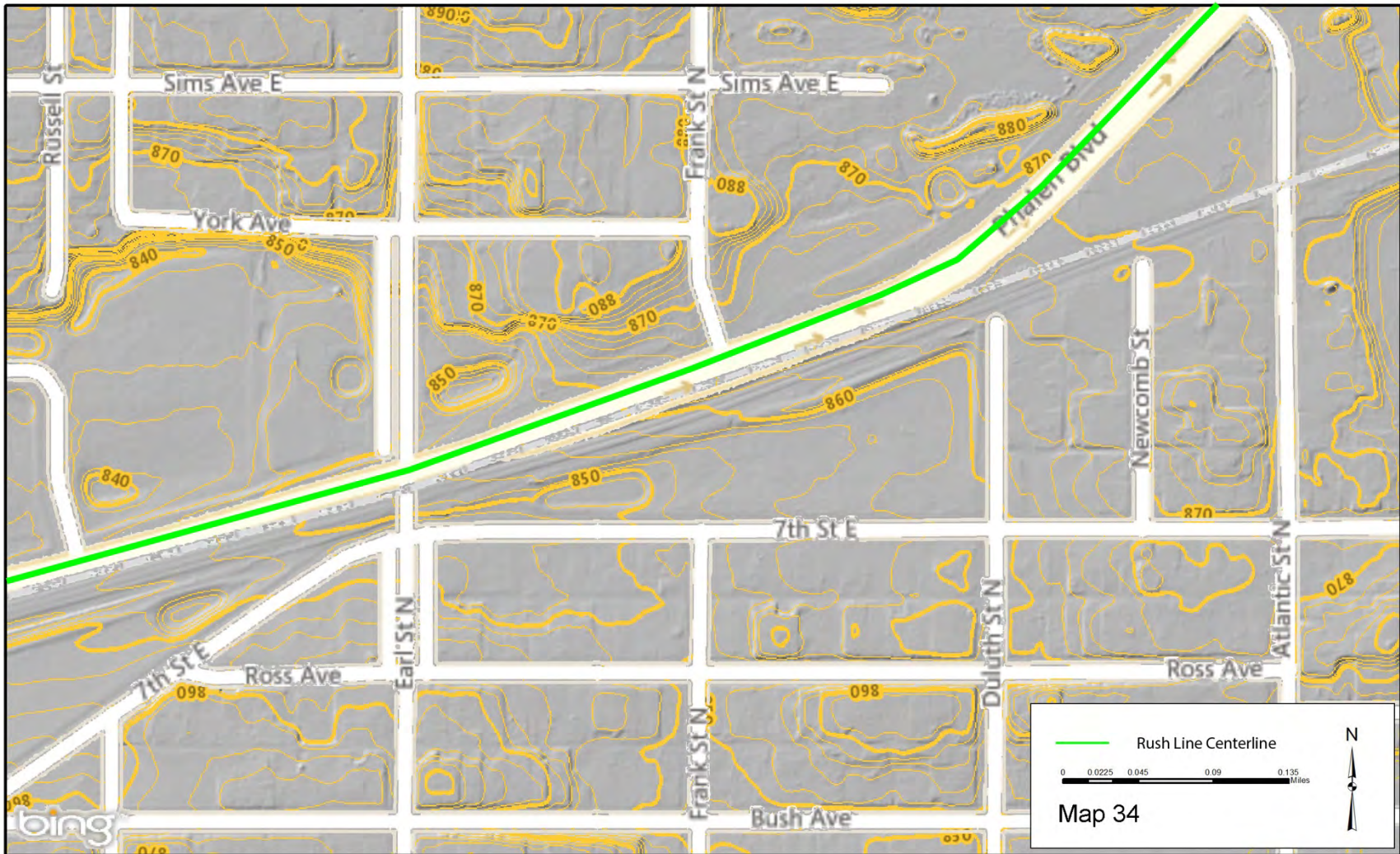


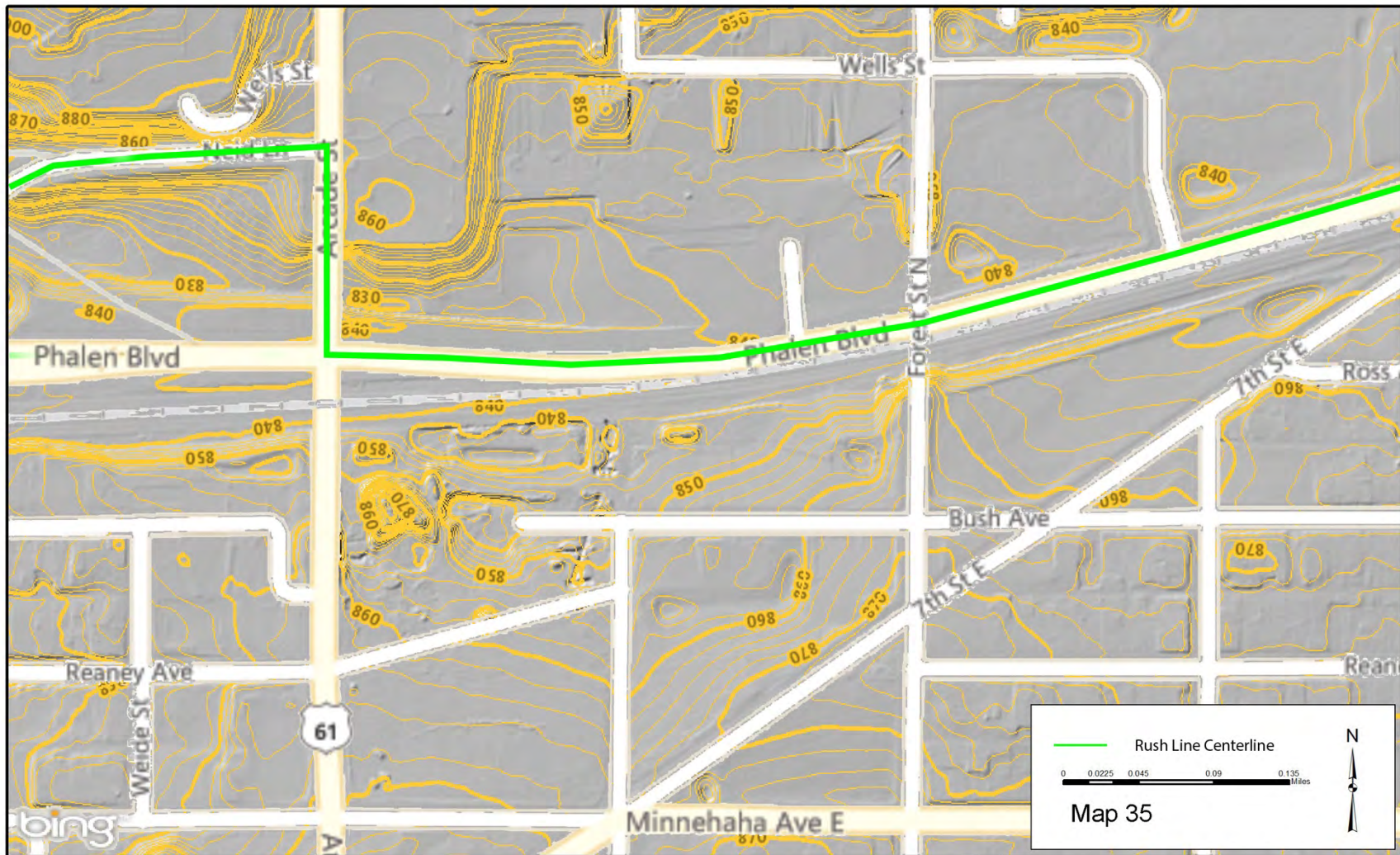


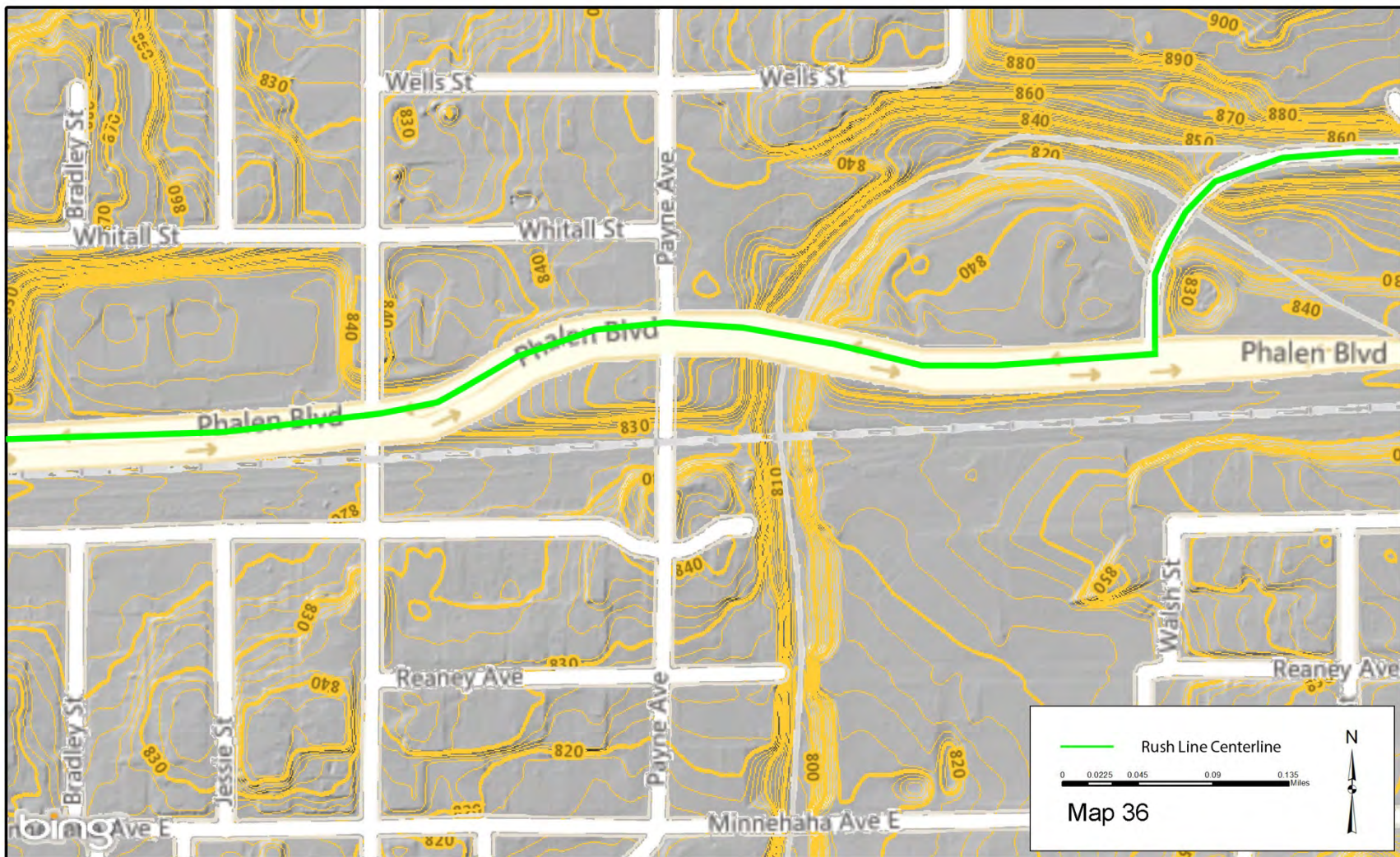


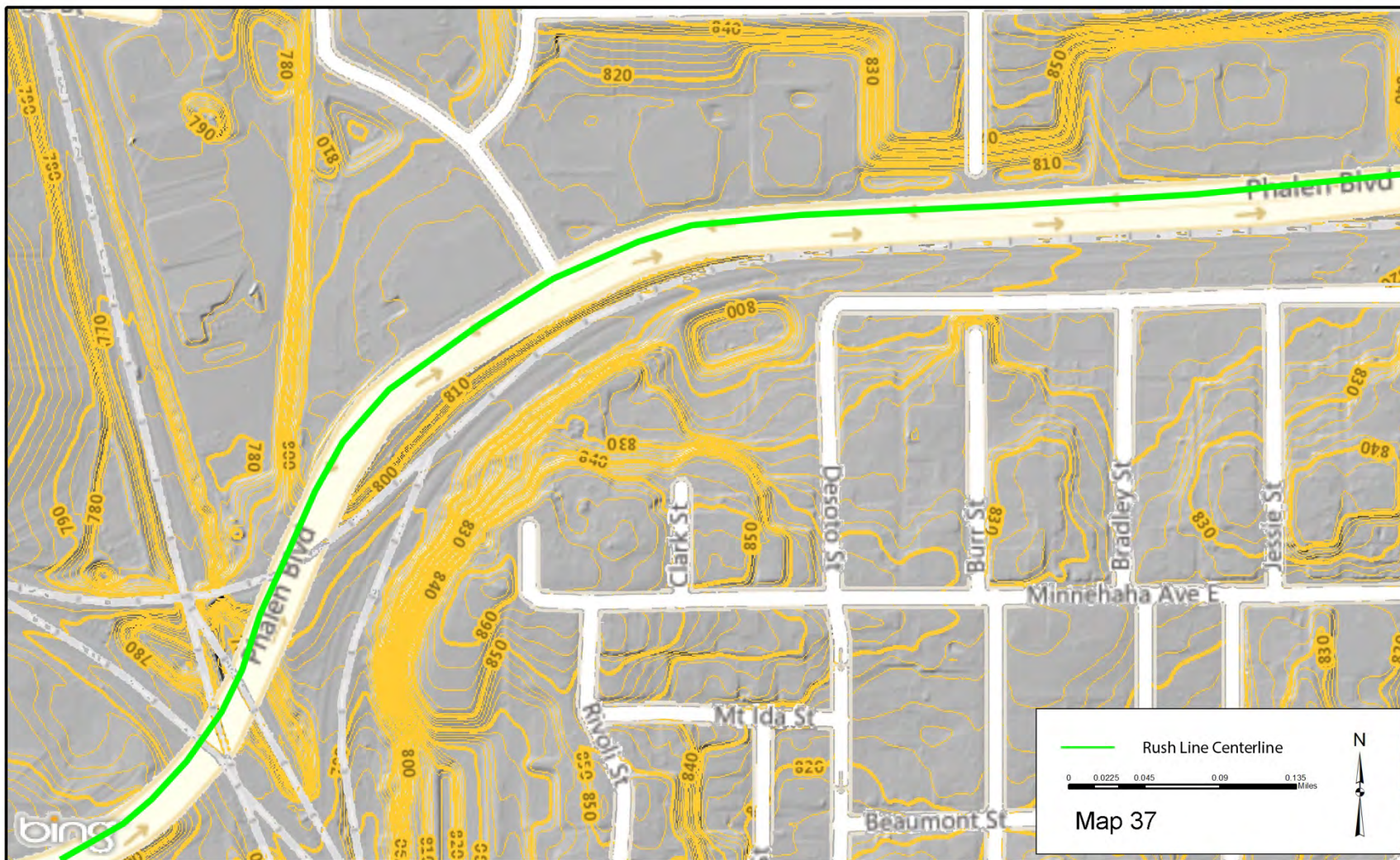


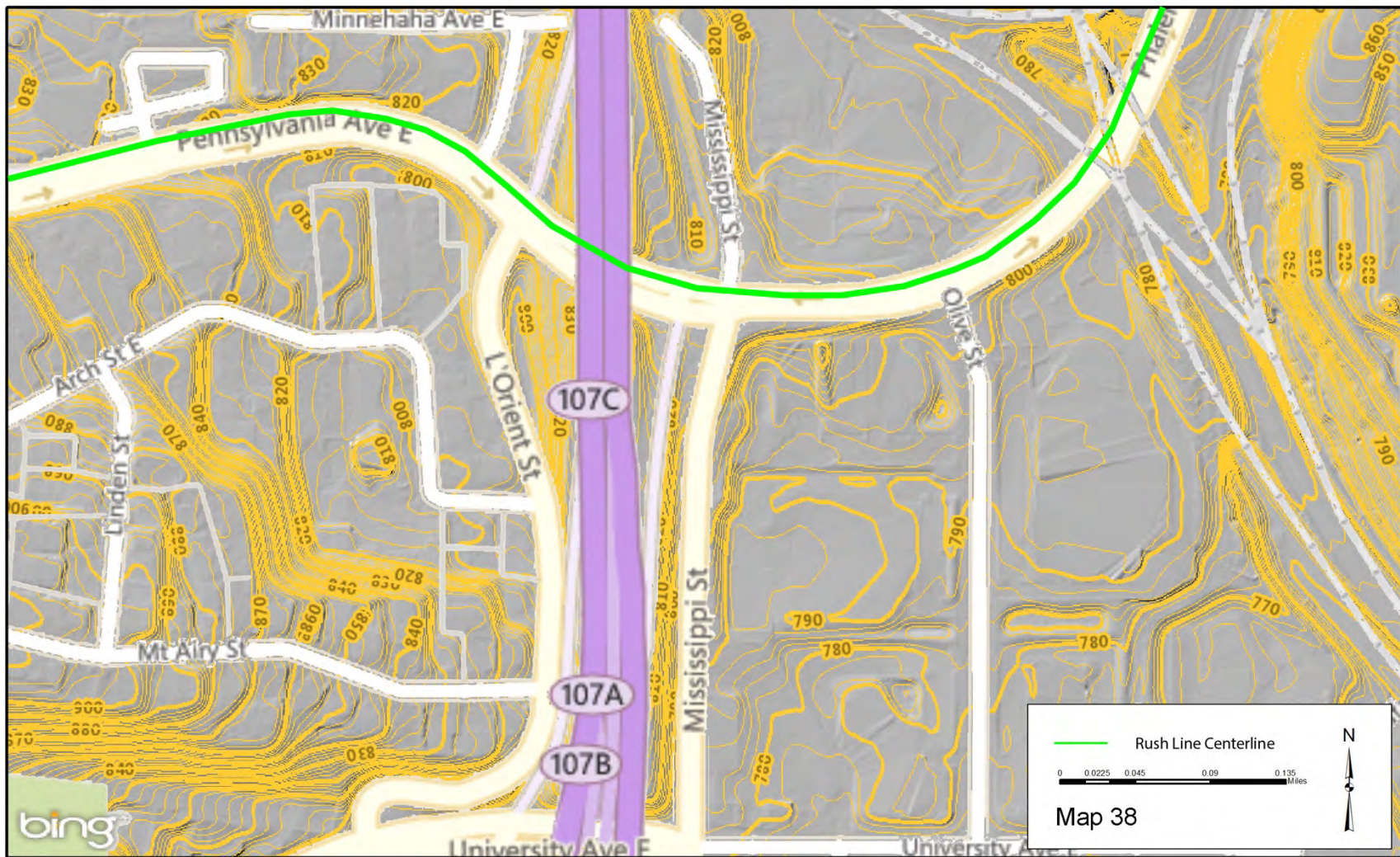


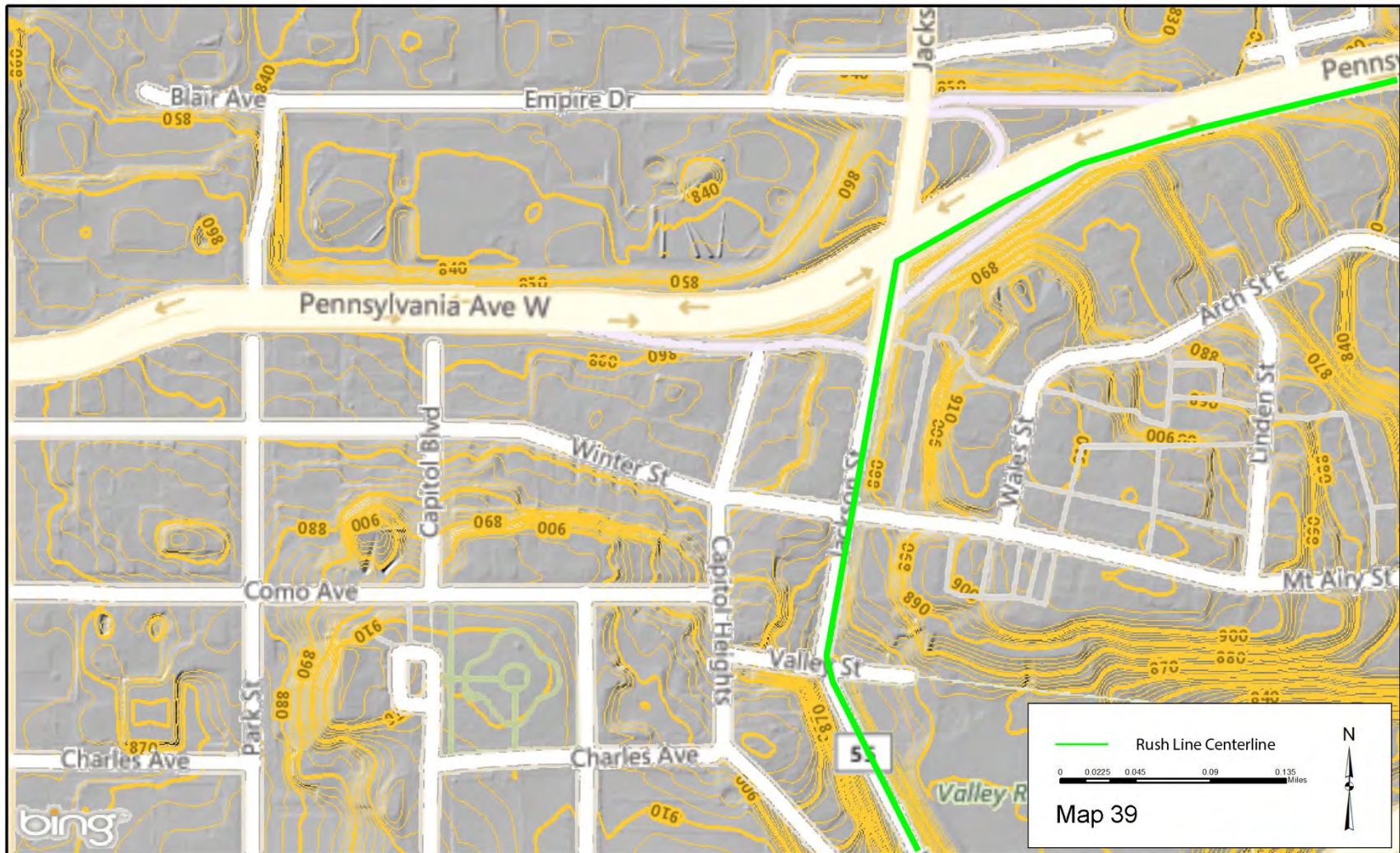


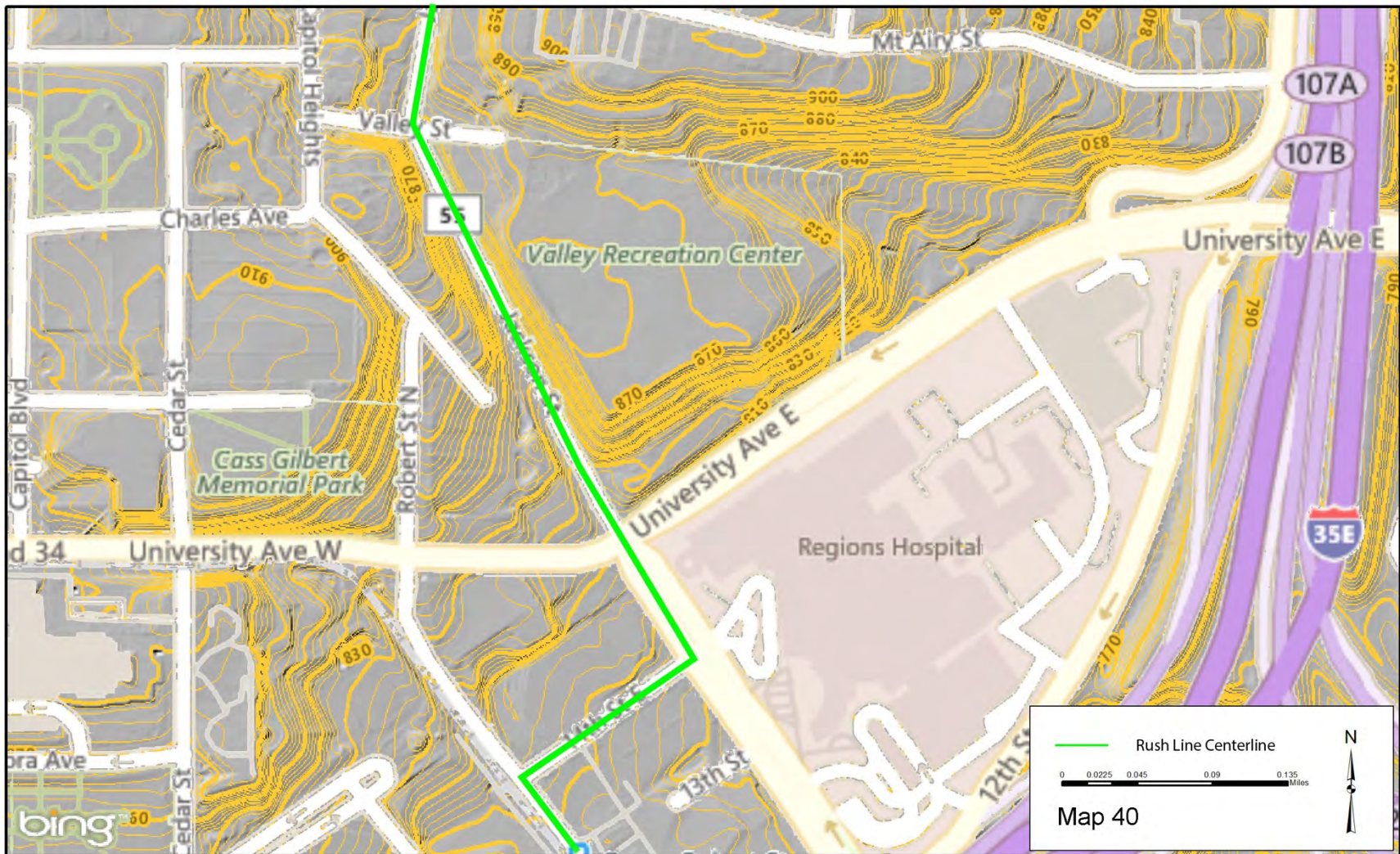


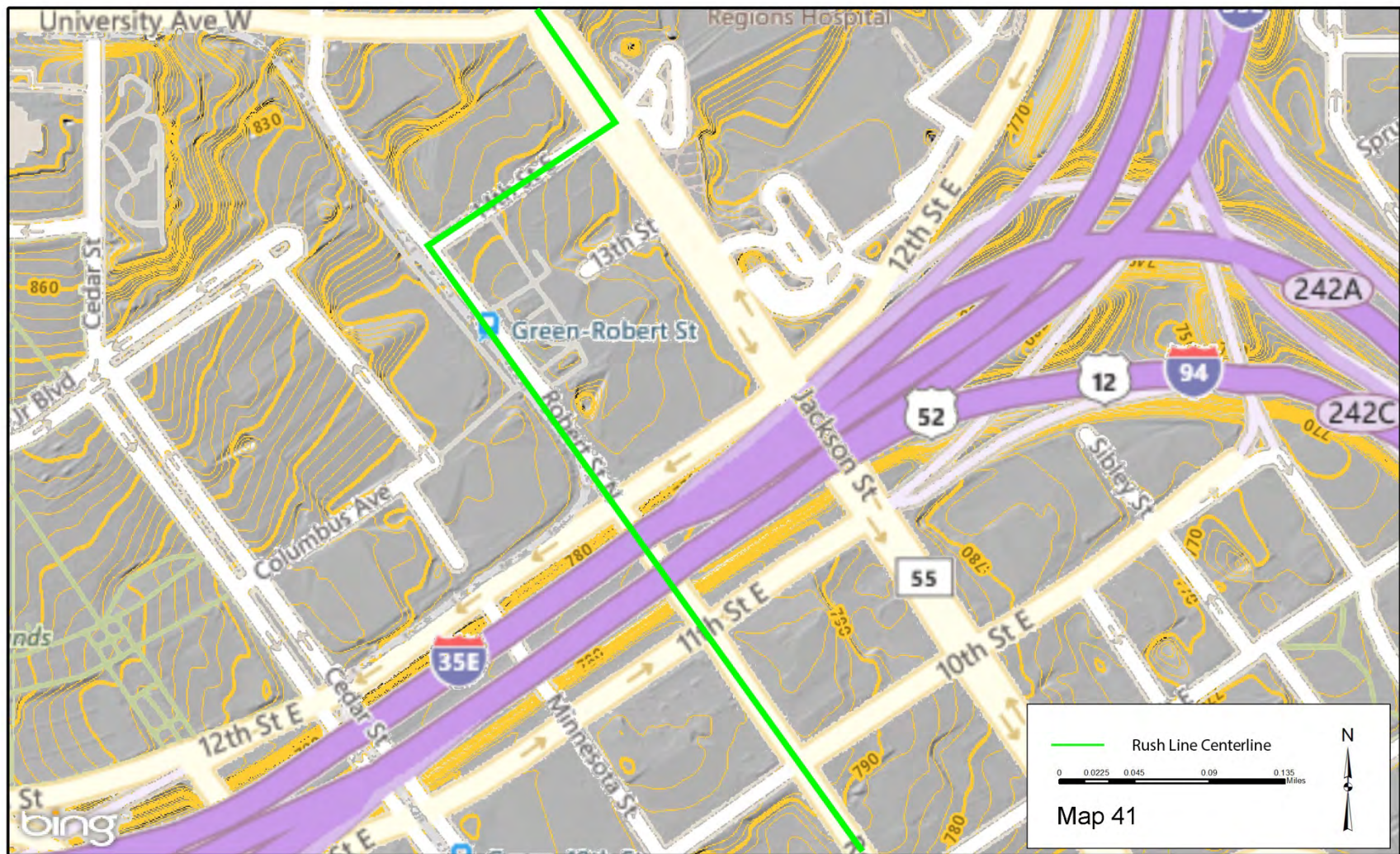




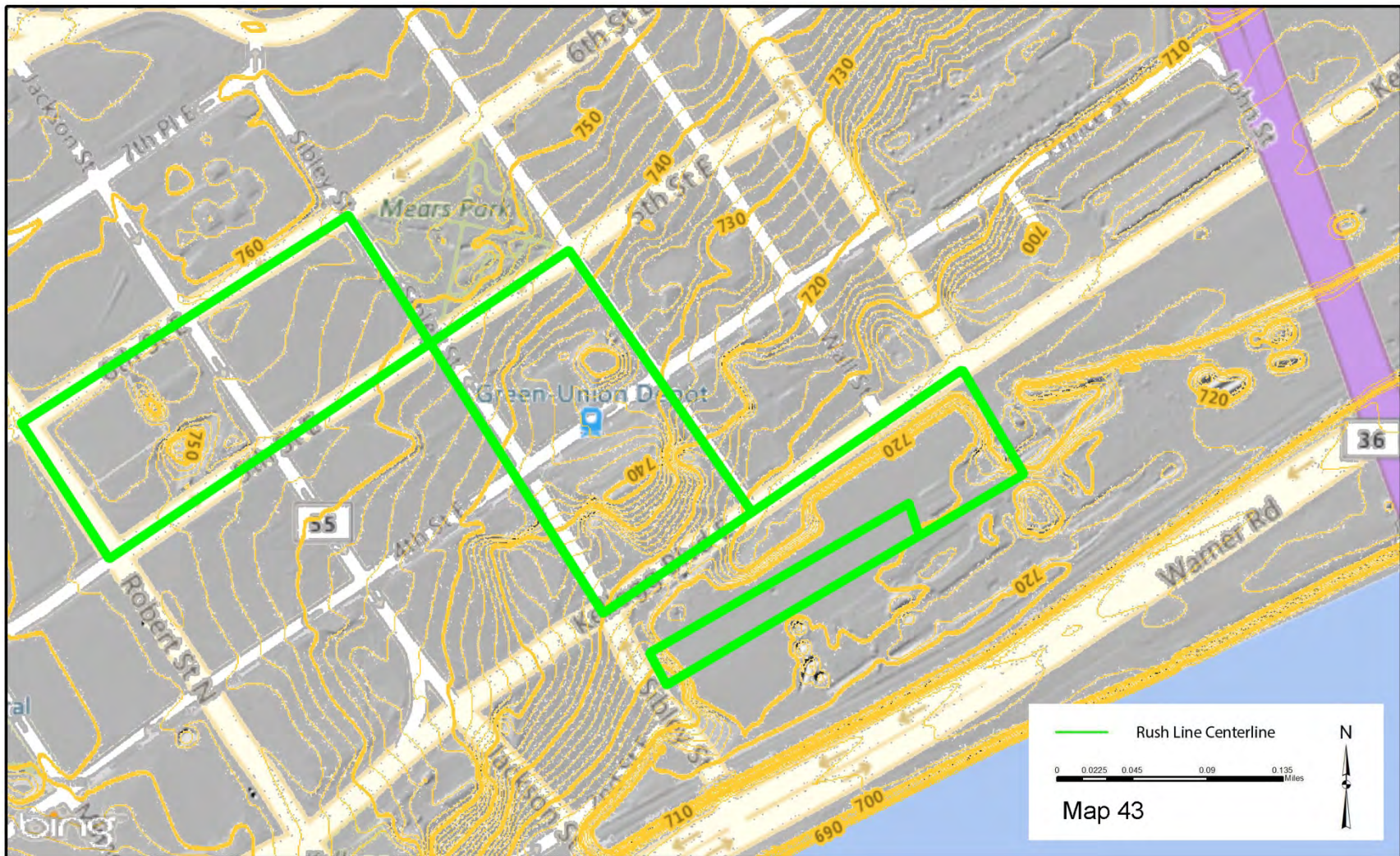












APPENDIX 4: MN OSA AND DNR LICENSES

**APPLICATION FOR MINNESOTA
ANNUAL ARCHAEOLOGICAL RECONNAISSANCE SURVEY LICENSE**

This license only applies to reconnaissance (Phase I) surveys conducted under Minnesota Statutes 138.31-.42 during calendar year 2018. Separate licenses must be obtained for site evaluation (Phase II) surveys, for major site investigations (Phase III), for burial site authentications under Minnesota statutes 307.08, and for survey work that will continue into another calendar year. Only the below listed individual is licensed as a Principal Investigator, not the institution/agency/company or others who work for that entity. The licensed individual is required to comply with all the conditions attached to this license form. Permission to enter land for the purposes of archaeological investigation must be obtained from the landowner or land manager.

Name: Vicki Twinde-Javner

Institution/Agency/Company Affiliation: Mississippi Valley Archaeology Center, UW-L

Title/Position: Senior Research Archaeologist

Address: MVAC, 1725 State St, La Crosse, WI 54601

Work Phone: 608-785-6475 E-Mail: vtwinde-javner@uwlax.edu

Name of Advanced Degree Institution: University of Wisconsin - Milwaukee Year: 1997

Name of Department: Anthropology Degree: MA ☒ MS ☐ PhD

Purpose: (check all that may apply)

CRM ☒ Academic Research ☒ Institutional Field School ☒

Type of Land: (check all that may apply)

State Owned ☒ County Owned ☒ Township/City Owned ☒

Other non-federal public ☐ List: _____

MHS Repository Agreement # 801 Other Approved Curation Facility: _____

Previous License: Year 2017 Type Phase I Number 17-031

Signed (applicant): Vicki Twinde-Javner Date: Jan. 18, 2018

Required Attachments: Curriculum Vita and Documentation of Appropriate Experience _____
for previously unlicensed individuals.

Submit one copy of this form and attachments to:

Office of the State Archaeologist, Ft. Snelling History Center, St. Paul, MN 55111
612-725-2411 612-725-2729 FAX 612-725-2427 email: mn.osa@state.mn.us

Minnesota Historical Society Approval: [Signature] Date: 1-22-18

State Archaeologist Approval: [Signature] Date: 1/19/18

License Number: 18-013

Form Date: 11/6/12

**APPLICATION FOR MINNESOTA
EVALUATION/PHASE II SURVEY ARCHAEOLOGICAL LICENSE**

This license only applies to evaluation investigations/Phase II surveys conducted under the provisions of Minnesota Statutes 138.31 - .42 at the specific site or locality listed on the application during calendar year 2018. Separate licenses must be obtained for reconnaissance (Phase I) surveys, for major investigation (Phase III) work, for burial site work under Minnesota statutes 307.08, for fieldwork that will continue into another calendar year, for fieldwork conducted at locations other than those listed below, and for fieldwork that significantly exceeds the Phase II specifications of the *SHPO Manual for Archaeological Projects in Minnesota*. Only the listed individual is licensed as a Principal Investigator, not the institution/agency/company or others who work for that entity. The licensed individual and the sponsoring entity are required to comply with all the conditions attached to the license.

Name: Vicki Twinde-Javner

Institution/Agency/Company Affiliation: Mississippi Valley Archaeology Center

-Title/Position: Senior Research Archaeologist

Address: 1725 S-tate Street, La Crosse, WI 54601

Work Phone: 608-785-6475 E-Mail: vtwindejavner@uwlax.edu

Name of Advanced Degree Institution: UW- Milwaukee Year: 1997

Name of Department: Anthropology Degree: MA ☒ MS ☐ PhD

Site Number: _____ Project: Rush Line BRT

Type of Land: (check all that may apply)

State Owned ☐ County Owned ☒ Township/City Owned ☐ Manager: Ramsey County
Other non-federal public ☐ List: Department of Natural Resources

Purpose: (check all that may apply)

CRM ☐ Academic Research ☐ Institutional Field School ☐

Expected Period Components/Contexts: Precontact ☐ Contact ☐ Post-Contact ☒

MHS Repository Agreement # 801 Other Approved Curation Facility: _____

Signed (applicant): Vicki Twinde-Javner Date: Oct-10, 2018

Required Attachments: 1) *Curriculum Vita* ☐ 2) Documentation of Appropriate Experience ☐
3) Research Design ☐

Previous License: Year 2018 Type Phase I Number 18-013

Submit one copy of this form and attachments to:

Office of the State Archaeologist, Ft. Snelling History Center, St. Paul, MN 55111
612-725-2411 612-725-2729 FAX 612-725-2427 email: mn.osa@state.mn.us

Minnesota Historical Society Approval: [Signature] Date: 10-17-18

State Archaeologist Approval: [Signature] Date: 10/16/18

License Number: 18-093 Form Date: 2/15/11

APPLICATION FOR MINNESOTA ANNUAL ARCHAEOLOGICAL SURVEY LICENSE

This license only applies to reconnaissance (Phase I) surveys conducted under Minnesota Statutes 138.31-.42 during calendar year 2019. Separate licenses must be obtained for monitoring, evaluations/ Phase II and major investigation/Phase III work, and burial site work under Minnesota Statute. This license must be renewed annually. Only the individual indicated below is licensed as principal investigator. The licensed individual is required to comply with all the conditions attached to this license.

Name: Vicki Twinde-Javner

Institution/Agency/Company Affiliation: MVAC, University of Wisconsin - La Crosse

Title/Position: Senior Research Archaeologist

Address: 1725 State Street, La Crosse, WI 54601

Work Phone: 608-785-6475 E-Mail: vtwinde-javner@uwlax.edu

Name of Advanced Degree Institution: University of Wis - Milwaukee Year: 1997

Department Name: Anthropology Degree: ☒ MA/MS ☐ PhD

Type of Land: (check all that may apply)

☒ State Owned ☒ County Owned ☒ Township/City Owned
☒ Other non-federal public List: _____

Purpose: (check all that may apply)

☒ CRM ☒ Academic Research ☐ Institutional Field School

Required Documentation:

☐ 1) Curriculum Vita
☐ 2) Documentation of Appropriate Experience

Most Recent License Year 2018 Type Annual (e.g. Annual, evaluation, mitigation)

MHS Curation #: 867 Other Approved Facility: _____

Signed (applicant): Vicki Twinde-Javner Date: 3/12/2019

Submit one copy of this form and attachments to:

Office of the State Archaeologist, Ft. Snelling History Center, St. Paul, MN 55111
612-725-2411 612-725-2729 FAX 612-725-2427 email: mn.osa@state.mn.us

Minnesota Historical Society Approval: [Signature] Date: 3-19-19
State Archaeologist Approval: [Signature] Date: 3/18/19
License Number: 19-033



STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
Division of Parks and Trails
SPECIAL PERMIT NO. 201897

DATE: November 19th, 2018

PERMISSION IS HEREBY GRANTED TO:

The individual(s) listed below to do a project entitled **Rush Line Phase II Archaeological Investigations** as described in the research application. This permit applies only to those lands administered by the Division of Parks and Trails which are listed below. The applicant is also subject to any other state or federal permits which may apply.

Permittee	State Park(s)	State Park Contact Information
Vicki Twinde-Javner	Gateway State Trail	Rachel Hintzman rachel.l.hintzman@state.mn.us (6512595875)

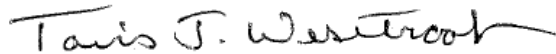
- 1) Applicant must contact park manager to notify them when permitted activities are scheduled to begin.
- 2) The Park Manager may approve or disapprove where such activities may be carried on.
- 3) Permit activities must be carried out so as to minimize the potential to introduce, establish or spread invasive species.
- 4) The site where you will be working may be subject to management actions such as prescribed burning, invasive species, & timber harvest. Unless prior arrangements have been made with PAT, study sites will not be exempt from these actions.
- 5) It is a condition of this permit that interim progress reports be submitted annually by the end of the calendar year. A final report is also required at the conclusion of the project. Reports shall be submitted to: Natural Resource Program Coordinator, DNR Division of Parks and Trails, 500 Lafayette Rd., Box 39, St. Paul, MN 55155-4039. It is requested that interim and final reports be submitted electronically in either .docx or .pdf format.
- 6) You must have a copy of this permit when you are working in the park.
- 7) All markers, equipment, and other items used during the research must be removed at the end of the study. Marking ribbons, stakes or similar items must be marked with the researcher's name and permit number.
- 8) You are using the State Park at your own risk. You agree to take all necessary safety precautions to protect yourself, your assistants, and any other State Park visitors.
- 9) All rules for State Parks and State Trails remain in effect except that portion of 6100.0900 Subp. 1 which is waived to allow the research to be conducted.
- 10) Any specimens collected under this permit, any components of any specimens (including but not limited to natural organisms, enzymes or other bioactive molecules, genetic materials, or seeds), and research results derived from collected specimens are to be used for scientific or educational purposes only, and may not be used for commercial or other revenue-generating purposes, by the permit holder, a University or other third party, unless the permittee has entered into an approved benefit-sharing agreement with the Minnesota Department of Natural Resources (MNDNR). The sale of collected research specimens or other unauthorized transfers to third parties is prohibited. Furthermore, if the permittee sells or otherwise transfers collected specimens, any components thereof, or any products or research results developed from such specimens or their components without an approved benefit-sharing agreement, permittee will pay the MNDNR a royalty rate of twenty percent (20%) of gross revenue from such sales or other revenues. In addition to such royalty, the MNDNR may seek other damages to which the DNR may be entitled, including but not limited to injunctive relief against the permittee.
- 11) Public ownership of all materials and their derivatives will be retained by the State of Minnesota. The permittee agrees to notify the MNDNR, within 60 days, of every subject discovery or invention that relates in any respect to research results derived from this research or use of any research specimens or other materials collected as part of this research, or that may be patentable or otherwise protected under the intellectual property (IP) laws of the United States or other jurisdiction. The permittee may not patent or otherwise protect under the intellectual property laws of the United States, or any other jurisdiction, any materials or derivatives of said materials collected under this agreement without prior written consent of the State.

This permit is valid from the date of issuance through December 31st, 2018, but it may be revoked at any time.

Special Conditions

- Conditional approval is granted. However, the permittee must provide further definition of the scope and extent of the archaeological excavation to the State's representative (Rachel Hintzman) before work can begin. Research may begin immediately after approval by the State.
- Permittee is responsible for revegetating/reseeding the site with materials and methods satisfactory to the State's representative (Rachel Hintzman).
- In addition to the report(s) required by standard condition #5, the permittee shall also submit all Office of the State Archaeologist site forms produced during research to MN State Park Cultural Resource Program Manager David Radford (dave.radford@state.mn.us).
- All historical artifacts and materials discovered as a result of this research shall be submitted and accessioned in the MN Historical Society archaeological collection.
- State Park research permits must be renewed annually.

TOM LANDWEHR, COMMISSIONER
DEPARTMENT OF NATURAL RESOURCES



By _____
Tavis J. Westbrook
State Parks and Trails Resource Management Program Coordinator

Cc: Regional Resource Specialist, Area/Park Resource Specialist, Park Managers, Archaeologist



Phase II Evaluation
Lake Superior & Mississippi Railroad Corridor Historic District:
Saint Paul to White Bear Lake Segment
(SHPO Inventory Number: XX-RRD-NPR001)

Rush Line Bus Rapid Transit Project
Ramsey County, Minnesota

SHPO Project Number 2019-0985
MnDOT Project Number TCP-Rush-18
OSA License No. 18-013 and No. 19-033

Prepared for:
Ramsey County Regional Rail Authority

Prepared by:
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and

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1725 State Street
La Crosse, WI 54601

June 2020

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

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MANAGEMENT SUMMARY

In 2018, Mead & Hunt, Inc. (Mead & Hunt) was retained by the Ramsey County Regional Rail Authority (RCRRA) to complete a Phase I Architecture/History Survey (Phase I Survey) for the Rush Line Bus Rapid Transit (BRT) Project and a Phase II Evaluation of properties that are potentially eligible for inclusion in the National Register of Historic Places (National Register). Mead & Hunt retained the Mississippi Valley Archaeology Center (MVAC) to provide archaeological services and Strata Morph was retained to provide geomorphological services.

The Rush Line Bus Rapid Transit (BRT) Project is a proposed 14-mile transit route with stops between Union Depot in Lowertown Saint Paul and downtown White Bear Lake. The proposed route will travel on a combination of existing city streets, dedicated guideways, and the Bruce Vento Regional Trail (Bruce Vento Trail), which generally follows the former Lake Superior & Mississippi (LS&M) mainline railroad and is now RCRRA right-of-way (ROW). Bridges and intersection improvements are proposed, including a number along the RCRRA ROW. Twenty-one stations are proposed along the route.

The study area for architecture/history was delineated in consultation with Minnesota Department of Transportation Cultural Resources Unit (MnDOT CRU) to include properties adjacent to proposed project activities that were constructed prior to 1979. The archaeological study area was delineated in consultation with MnDOT CRU to include all areas of proposed ground disturbance and, in some areas, an appropriate buffer to account for minor changes as the project develops. Based on the literature review, it was identified that a portion of the former LS&M mainline railroad from Reaney Avenue in Saint Paul north to White Bear Lake is within the Rush Line BRT architecture/history and archaeological study areas. The LS&M was previously determined eligible for listing in the National Register under *Criterion A*. However, it was determined that the LS&M required further evaluation for eligibility under *Criteria C and D* and supplemental information was needed to assess integrity to determine if the segment contributes to the overall LS&M Railroad Corridor Historic District under *Criterion A*. This level of detail is necessary because the subject corridor is proposed to be directly and physically affected by the project. The Phase II Evaluation of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is being presented in this report. The *Phase I Architecture/History Survey and Phase II Evaluation for the Rush Line Bus Rapid Transit Project* report will include the complete architecture/history findings and a summary of this LS&M Railroad Corridor Historic District evaluation. The results of the archaeology survey are in the *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project*, which also summarizes this evaluation.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

This Phase II Evaluation was prepared jointly by Mead & Hunt and MVAC. It includes the evaluation of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment per the National Register Multiple Property Documents *Railroads in Minnesota, 1862-1956* (Schmidt, 2013) and *Supplement to Railroads in Minnesota, 1862-1956* (draft) (Arnott and Pizza, 2017).

As a result of the Phase II Evaluation, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment was found to be eligible for the National Register under *Criteria A, C and D*. Under *Criterion A: Transportation*, the approximately 11-mile-long LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is significant under National Register *Criterion A: Transportation* as an early segment of what would become the primary rail connection between the navigable waterways of the Mississippi River and Lake Superior and as an important railroad connection between downtown Saint Paul and the summer tourism industry of White Bear Lake. The period of significance under *Criterion A* begins with the completion of the railroad roadway in 1868 and extends until 1970. Under *Criterion C: Design/Engineering*, the three exposed roadbed portions between Johnson Parkway and Beam Avenue provide an example of early railroad engineering in Minnesota from the mid-1860s to 1870 and are significant under the research domain Railroad Spaces: Industrialized Transportation and the Transformation of the Minnesota Landscape. The period of significance under *Criterion C* is 1864 to 1868 to coincide with the initial grading and construction. The portion between Johnson Parkway and Beam Avenue is also considered significant under *Criterion D* except where the 1868 LS&M railroad roadway veered away from the 1880s railroad roadway and modern Bruce Vento Trail embankment (near Lake Phalen and from County Road C to Kohlman Avenue), which is outside the current RCRRA ROW, but appears to have been destroyed by modern development. The presumed portions of the original LS&M railroad roadbed buried under the post-1880 fill have similar potential and contribute to the following research areas: Pre-Industrial Transportation Landscapes and Railroad Spaces: 1858-1910; Initial, Pioneering, and Expansion Railroads: Engineering, Construction, and Ruination: 1858-1910; and Machines in the Garden: Railroads and Evidence of Environmental Change in Minnesota: 1858-1945. The period of significance under *Criterion D* begins in 1864 with the initial grading and construction and ends in 1868 with the completion of the LS&M between Saint Paul and White Bear Lake.

Character-defining features of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment include the railroad roadway, grade separation structures, retaining walls, and depot, exposed and buried portions of the 1868 railroad roadbed, and the overall sense of linearity emphasized by the setting, comprised of the adjacent land uses and lack of vegetation between the railroad roadway and the edge of ROW.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Mead & Hunt's project team consisted of Principal Investigators Christina Slattery and Emily Pettis and historians Chris Hommerding and Sebastian Renfield. MVAC's project team consisted of Principal Investigator Vicki Twinde-Javner. Research and fieldwork were completed from May 2018 through April 2019.

Certification of Results

I certify that this investigation was conducted and documented according to the Secretary of the Interior's Standards and Guidelines and that the report is complete to the best of my knowledge.



Christina Slattery, Principal Investigator



Emily Pettis, Principal Investigator



Vicki Twinde-Javner, Principal Investigator

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TABLE OF CONTENTS

	Page
1. Introduction	1
A. Location and Purpose of Survey	1
B. Project description	3
2. Methods and Research Design	7
A. Objectives.....	7
B. Evaluation methodology	7
C. Architecture/history survey methods	9
D. Archaeology survey methods.....	9
E. Geomorphological survey methods.....	15
3. Literature Search.....	23
A. Previously surveyed or previously evaluated properties.....	23
B. Historic context research	25
C. Archaeological research	26
4. Description	27
A. Overall setting and topography	27
B. Union Depot to Arcade Street	29
C. Arcade Street to Johnson Parkway	41
D. Johnson Parkway to Beam Avenue	45
E. Beam Avenue to the White Bear Lake Depot.....	62
F. Summary of LS&M Railroad Corridor Historic District alterations post-1970 (listed south-to-north)	73
5. Archaeological Reconnaissance and Geomorphological Coring for Johnson Parkway to Beam Avenue	77
A. Summary	104
6. Historic Context	109
A. Introduction.....	109
B. Railroad history.....	111
(1) Lake Superior & Mississippi Railroad	112

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

(2)	St. Paul & Duluth Railroad.....	119
(3)	Northern Pacific acquisition and subsequent history	138
7.	Statement of Significance.....	145
A.	<i>Criterion A</i>	145
B.	<i>Criterion C</i>	146
C.	<i>Criterion D</i>	147
D.	Period of Significance	148
E.	Integrity.....	149
(1)	<i>Criterion A</i>	149
(2)	<i>Criterion C</i>	153
(3)	<i>Criterion D</i>	158
F.	Historic Boundary	162
8.	Recommendation	167
	Bibliography.....	169

Appendices

A	Rush Line Bus Rapid Transit Project Corridor Maps
B	Original LS&M 1870 Right-of-Way Alignment Georeferenced with 1884-1886 Maps, 1945 Aerial Photographs, and Modern Aerial Photographs
C	Glossary of Terms
D	<i>A Geomorphological Investigation of Portions of the Rush Line BRT Preliminary Corridor Between Beam Avenue and Maryland Avenue in Ramsey County, Minnesota</i>
E	Historic Photographs (Courtesy of Maplewood Area Historical Society)
F	LS&M Railroad Corridor Historic District Boundary Maps

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

List of Tables

Table 1. New Intersections and Bridges within RCRRA ROW.....	5
Table 2. Previously surveyed properties along the corridor	24
Table 3. Results of reconnaissance and geomorphological investigations	105
Table 4. Bridges on the LS&M between Saint Paul and White Bear Lake in 1879	116
Table 5. Bridges on the StP&D between Saint Paul and White Bear Lake as of 1917.....	132
Table 6. Notable cut/fill areas based on 1917 track profile maps	135
Table 7. Extant bridges on the Bruce Vento Trail	144
Table 8. List of Extant Elements in the Corridor and Contributing Status	163

List of Figures

Figure 1. Entire extent of the LS&M mainline railroad, with the subject Saint Paul to White Bear Lake Segment under evaluation highlighted in yellow.	2
Figure 2. Overview (2019) of Rush Line BRT Project corridor and proposed stations.	4
Figure 3. Southern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing termini for archaeological reconnaissance survey.	11
Figure 4. Northern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing area where archaeological reconnaissance survey was performed.....	12
Figure 5. Portion of RCRRA ROW between County Road D and Buerkle Road where archaeological reconnaissance survey was performed (between Beam Avenue and County Road D, the Rush Line BRT Project runs on existing streets and will not physically affect the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment).	13
Figure 6. Sanitary sewer force main present within the RCRRA ROW.....	14

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 7. Southern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing area where it overlapped the 1868 LS&M ROW (based on 1870 LS&M maps) and where soil coring was recommended.	16
Figure 8. Northern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing area where it overlapped the 1868 LS&M ROW (based on 1870 LS&M maps) and where soil coring was recommended.	17
Figure 9. Southern end of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed and location of geomorphological soil cores outlined in Appendix D.....	18
Figure 10. Southcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and new archaeological site discovered.....	19
Figure 11. Northcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and location of possible portions of 1868 LS&M railroad roadbed found on the surface.	20
Figure 12. Northcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadbed. Figures shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and location of possible portions of 1868 LS&M roadbed found on the surface.	21
Figure 13. Rush Line BRT archaeological study area between County Road D and Buerkle Avenue overlapping the RCRRA ROW. No geomorphological soil cores were undertaken in this area as the original 1868 LS&M railroad roadway did not overlap this area.	22
Figure 14. Aerial image of downtown Saint Paul from 1940 showing area east of Union Depot with LS&M mainline railroad roadway shown in green. Trackage between Union Depot and the LS&M mainline would have been historically built, owned, and operated by the Saint Paul Union Depot Company.....	31
Figure 15. Aerial imagery from 1966 (left) and 1991 (right) showing initial construction of I-94 over the LS&M railroad roadway and late 1980s reconstruction atop fill that resulted in removal of the railroad track.	33

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 16. Portion of LS&M railroad roadway between Bruce Vento Nature Sanctuary and the southern end of Swede Hollow Park. Note how the roadway was largely obliterated by the reconstruction of I-94.	34
Figure 17. Image of Seventh Street East carried over the LS&M Railroad Corridor Historic District by an 1884 double-arched tunnel (MnDOT Bridge 90386). Note the paved Bruce Vento Trail, which currently utilizes the westernmost tunnel. View facing north.....	35
Figure 18. Image of the 1978 bridge (MnDOT Bridge 62533) that carries Minnehaha Avenue across the LS&M Railroad Corridor Historic District. Note the presence of the Bruce Vento Trail (partially under water). The buildings at right are part of the former Hamm’s Brewery complex (discussed below). View facing north.	36
Figure 19. Image of the Bruce Vento Trail, which generally coincides with the LS&M railroad roadbed in Swede Hollow Park, showing the topography sloping from west (left) to east (right), view facing north.	37
Figure 20. Concrete retaining wall constructed in 1915, located at the rear of 622 Beaumont Street East, view facing north.	37
Figure 21. Closeup of the stamp at top of the concrete retaining wall, noting that the wall was built by the NP in 1915, view facing west.....	38
Figure 22. Image of the Bruce Vento Trail in Swede Hollow Park showing the sloping topography from west (left) to east (right). The embankment at center separates the Bruce Vento Trail (which generally follows the railroad roadbed) from the former Phalen Creek bed, portions of which have been daylighted. A second trail, not associated with the LS&M mainline, is located east of the creek bed. Note the vegetation on either side of the Bruce Vento Trail. View facing north.	38
Figure 23. LS&M railroad roadway through Swede Hollow Park to Phalen Boulevard and current Bruce Vento Trail. Note the proximity of Hamm’s Brewery to the LS&M.....	39
Figure 24. Comparison of 1966 aerial (top) with 2016 aerial (bottom) showing changes to the setting including construction of Phalen Boulevard, Neid Lane, and associated bridges, as well as multiple recreational paths that branch off the Bruce Vento Trail, which generally follows the LS&M railroad roadbed through the Eastside Heritage Park.	40
Figure 25. Portion of LS&M railroad roadway obliterated by construction of Phalen Boulevard, showing relationship of Bruce Vento Trail to historic railroad roadway.	42

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 26. Portion of LS&M railroad roadway obliterated by construction of Phalen Boulevard, showing relationship of Bruce Vento Trail to historic roadway.	43
Figure 27. Image of Phalen Boulevard (at left) and Bruce Vento Trail (at center), view facing west toward Forest Street. The LS&M railroad roadway was obliterated by the construction of Phalen Boulevard. The Bruce Vento Trail was built north of the LS&M railroad roadway. Note the gas pipeline and manhole for access to water/sewer and/or other utilities that also would have disturbed the former railroad roadbed.	43
Figure 28. Image of Phalen Boulevard (at right) and Bruce Vento Trail (at center) just east of Earl Street, view facing east. The LS&M railroad roadway was obliterated by the construction of Phalen Boulevard (at right). The Bruce Vento Trail (center) is located north of the LS&M railroad roadway.	44
Figure 29. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations to railroad roadway at Johnson Parkway.	45
Figure 30. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between Johnson Parkway and Larpenteur Avenue.	48
Figure 31. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between Larpenteur Avenue and County Road B.	48
Figure 32. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between County Road B and County Road C.	49
Figure 33. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between County Road C and I-694.	49
Figure 34. Image of the 1880s embankment south of Maryland Avenue, view facing southeast. This photo illustrates the height of the embankment in relationship to the surrounding topography, as demonstrated by the at-grade parking lot in the background.	50
Figure 35. Image of the LS&M Railroad Corridor Historic District from the top of the embankment north of Maryland Avenue, view facing south. Note the presence of a walking path.	51
Figure 36. Comparison of 1940 (left) and 2016 (right) aerial imagery showing eastern shore of Lake Phalen.	53
Figure 37. Example of a ditch area adjacent to the Bruce Vento Trail south of Idaho Street, view facing south.	54

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 38. Parking lot encroaching the RCRRA ROW south of Idaho Street. The ROW is marked by a green post near the chain link fence at right. View facing southwest.	54
Figure 39. Bruce Vento Trail south of Ripley Street, view facing south.	55
Figure 40. View of modern Bruce Vento Trail facing south at Frost Avenue. Note the minimal embankment and lack of ditched areas.	56
Figure 41. Comparison of 1940 (left) and 2016 (right) aerial imagery showing former Gladstone Shops/Gloster Junction area.	57
Figure 42. View of the LS&M railroad roadway near the intersection of the Bruce Vento Trail and the Gateway State Trail showing a small embankment, view facing north.	58
Figure 43. View of the LS&M railroad roadway showing a cut area north of the intersection with the Gateway State Trail, view facing north.	58
Figure 44. View of the LS&M railroad roadway facing north from County Road B. Note the presence of a slight embankment.	59
Figure 45. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations due to the construction of TH 36 and Gervais Avenue. Note how the bridge over TH 36 is offset to the east of the LS&M railroad roadway.	60
Figure 46. Image from the top of the embankment just south of Gervais Avenue, facing north. Note the Bruce Vento Trail to the left, which veers off the railroad roadbed south of this location to cross Gervais Avenue at grade.	61
Figure 47. Bridge 62529, view facing east along Beam Avenue, showing the 25-foot vertical clearance that is consistent with the height of the original LS&M railroad roadbed at this location.	62
Figure 48. Ramsey County Property Assessor's map showing the shared ROW within the LS&M Railroad Corridor Historic District from just north of I-694 to Buerkle Road.	64
Figure 49. Comparison of 1966 (left) and 2016 (right) aerial imagery showing alterations due to construction of I-694 and realignment of County Road D.	65
Figure 50. Remnants of the ca. 1905 StP&D Bridge No. 7 over the former County Road D vehicular roadway, view facing west. Note that the area beneath the bridge was likely enclosed with fill during the construction of the current County Road D vehicular roadway.	66

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 51. Image of the LS&M railroad roadway north of County Road D, looking south. Note the presence of rails, ties, ballast, and encroaching vegetation. Also note the County Road D vehicular roadway in the background.	66
Figure 52. View of the LS&M railroad roadway at Buerkle Road, view facing south. The extant tracks (at right) coincide with the LS&M railroad roadbed. The Bruce Vento Trail travels parallel to the tracks, east (left) of the alignment, just on the other side of the chain-link fence. The berm the trail travels on here appears in a 1966 aerial photograph and may have been associated with the construction of a railroad shoo-fly, built to route the railroad roadway around the bridge over I-694, which was under construction at the time. The trail is within the RCRRA ROW while the active railroad roadway is in BN ROW.....	67
Figure 53. View of the railroad roadway from Buerkle Road, view facing north.	68
Figure 54. View of the LS&M Railroad Corridor Historic District at County Road E, view facing northwest. Note the deep cut through which the active railroad roadway is routed.	68
Figure 55. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations due to realignment of US/TH 61.....	69
Figure 56. View of the LS&M Railroad Corridor Historic District, facing north from Scheuneman Road. Note the wye junction just to the north of the at-grade crossing. The historic district follows the eastern leg of the wye.	70
Figure 57. View of the White Bear Lake Depot and the LS&M Railroad Corridor Historic District, view looking south.....	71
Figure 58. 1952 Sanborn map showing the White Bear Lake Depot (extant, shown in orange).	72
Figure 59. Map showing the portion of the LS&M Railroad Corridor Historic District that does not include the Bruce Vento Trail. The topography just north and west of the location where the trail enters the LS&M Railroad Corridor Historic District has been filled in. This was observed during field survey and confirms historical accounts.	78
Figure 60. Map of the LS&M Railroad Corridor Historic District showing the location of the Gladstone privy site, 21RA0082.	80
Figure 61. Portions of 1868 LS&M railroad roadbed on the surface near the Weaver School trail, along with area shovel tested, and circular depressions noted in the RCRRA ROW.	83
Figure 62. Shovel testing on school grounds near Weaver School trail. View facing west towards Bruce Vento Trail.	84

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 63. Slight raised area, possibly representing 1868 LS&M railroad roadbed, south of Weaver School trail, and east of the Bruce Vento Trail. View facing south.	84
Figure 64. Raised area (where MVAC personnel to left in photo is standing), possibly representing 1868 LS&M railroad roadbed north of the Weaver School trail and east of the Bruce Vento Trail. View facing south. Note the difference in elevation between the two MVAC personnel. A green RCRRA ROW marker is near MVAC personnel to left in photo.	85
Figure 65. Map of the RCRRA ROW showing the location of possible partial remnants of the original 1868 LS&M railroad roadbed.	87
Figure 66. Likely remnant of the 1868 LS&M railroad roadbed west of Harvest Park and east of the Bruce Vento Trail, view facing south. The orange flags (center right and center left) denote approximate outer edge of the top of berm, where the top begins to slope downward.....	89
Figure 67. Image of likely 1868 berm remnant near Harvest Park, view facing east. Archaeologists pictured are measuring the berm height while the photographer is standing on the Bruce Vento Trail.....	89
Figure 68. LiDAR imagery of likely 1868 LS&M railroad roadbed and berm adjacent to and east of the cut area that currently carries the Bruce Vento Trail near Harvest Park, between Gervais Avenue and County Road C.	90
Figure 69. 1945 aerial image showing likely original 1868 LS&M railroad roadbed, east of railroad tracks.	91
Figure 70. Georeferenced map showing the 1870 LS&M ROW (in yellow) relative to the 1945 aerial image (see Figure 69).	92
Figure 71. Map of the LS&M Railroad Corridor Historic District showing the location of possible partial remnants of the original 1868 LS&M railroad roadbed between County Road C and Beam Avenue.	93
Figure 72. View of two embankments south of Kohlman Avenue. The likely 1868 LS&M railroad roadbed is at right while the 1880s railroad roadway, currently used by the Bruce Vento Trail, is at left.	94
Figure 73. View of the likely 1868 LS&M railroad roadbed north of Kohlman Avenue, view facing east. Flags in the foreground show the relative ground surface between the 1868 and 1880s rail embankments.	95

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 74. Northern end of the likely 1868 LS&M railroad roadbed north of Kohlman Avenue as it starts to slope down toward Beam Avenue, view facing south (towards Kohlman Avenue).	95
Figure 75. LiDAR imagery between Beam Avenue and County Road C, showing likely 1868 railroad roadbed east of the 1880s railroad roadbed/Bruce Vento Trail.	97
Figure 76. 1945 aerial imagery showing the likely 1868 original LS&M railroad roadbed east of the railroad tracks between the current locations of County Road C and Beam Avenue. Beam Avenue did not exist in 1945, so the modern vehicular roadway is shown here as an overlay. Note that Kohlman Avenue currently terminates just north of where it turns to the north in this photograph.	98
Figure 77. Georeferenced map showing the 1870 LS&M ROW map (in yellow) relative to the 1945 aerial image (see Figure 76). Beam Avenue did not exist in 1945, so the modern vehicular roadway is shown here as an overlay.	99
Figure 78. Location map (1 of 2) of soil cores found along the corridor.	102
Figure 79. Location map (2 of 2) of soil cores found along the corridor.	103
Figure 80. 1853 image of Saint Paul. Note the topography of the city and surrounding area including what became downtown on the high bluff at center and the breaks in the bluff on either side, creating Upper and Lower Landings.	111
Figure 81. 1874 map showing the LS&M mainline railroad from Saint Paul (bottom center) to White Bear Lake (top right). This map represents the 1868 LS&M mainline railroad and calls out future locations of yards, shops, and significant realignment with construction dates in parentheses. Please note that the railroad roadway alignment at Lake Phalen shown here is incorrect and would have swung to the east around the lake in 1874.	114
Figure 82. Closeup of 1874 map showing how the rail lines in Saint Paul followed creek beds between the bluffs in order to lessen the grade as lines transitioned from the Mississippi River bed to the tops of the bluffs.	115
Figure 83. 1867 etching plate showing the (then under construction) route of the LS&M Railroad from downtown Saint Paul to White Bear Lake. Note how the route follows Phalen Creek between the Mississippi River and Lake Phalen. Since this etching was done before construction was completed, there are some differences between the projected and the as-built alignment. For example, the area near present-day County Road E appears straight in this image, while the 1874 map above (see Figure 81 and Figure 82) shows several curves in that area.	117

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

- Figure 84. 1891 map of the StP&D line (dark black) and its connections. Note the StP&D branch lines as well as its connections with the NP at the NP Junction..... 119
- Figure 85. Closeup of 1904 Sanborn map showing the location of the Claymont roundhouse. Note the numerous sidings along the mainline (lower right corner). The map indicates that by 1904, the roundhouse (nonextant) is “not used.” 121
- Figure 86. 1926 image looking north from Gloster Junction, showing the northern wye connection with the Wisconsin Central/Soo Line (coming from left). Note the relatively flat landscape, which made the area conducive for constructing the Gladstone Shops. 122
- Figure 87. Inset of an 1891 atlas of Saint Paul showing the small platted community of Gladstone. Note the rail lines and the two major industries: the Gladstone Shops and the St. Paul Plow Works. 124
- Figure 88. 1889 plat map of Ramsey County showing the railroad roadway realignment across the southeastern corner of Lake Phalen..... 128
- Figure 89. Georeferenced image showing the 1887-1889 railroad roadway realignment (red) of the StP&D line. This realignment shifted the roadbed west and required the construction of a trestle or series of trestles across Lake Phalen. Base map is a 1945 aerial photograph, georeferenced with an 1870 LS&M ROW map and 1884-1886 plat map. Note that streets are labeled using modern names and that on the plat map Ivy Avenue was labeled Autumn Street and Arlington Avenue was labeled Phalen. 129
- Figure 90. 1945 aerial photograph showing that the 1868 LS&M railroad roadway was used as a local road following the 1887-1889 realignment. This road is nonextant and the area is a postwar suburban development within the city limits of Saint Paul. Note also that the trestle across the lake has been filled in and is an earthen berm that includes three bridge structures allowing local traffic to pass beneath the railroad. 130
- Figure 91. 14-foot-wide concrete arch bridge near Clarence Court (MnDOT Bridge R0438, RA-SPC-11140, contributing). This structure carried the StP&D railroad roadway (currently the Bruce Vento Trail) and allowed local traffic to pass under it. It may have been installed when the 1887-1889 trestle was filled in 1908. 131
- Figure 92. 1926 image of StP&D Railroad bridge over Arlington Avenue (nonextant). 132

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Figure 93. Georeferenced map showing the 1868 LS&M railroad roadway (yellow) and the 1887-1889 roadway realignment (red). Note that the realignment eliminated the previous curves, which traveled around higher ground. This realignment required a sizable cut near County Road E..... 134

Figure 94. 1926 image of the concrete bridge (nonextant) carrying County Road C over the railroad roadway. A cut in the landscape allowed the roadway to travel under the bridge rather than meet County Road C at grade. The current bridge at this location (MnDOT Bridge 62563) was constructed in 1993..... 136

Figure 95. 1952 topographic map showing the swampy swampland and creeks the LS&M railroad roadway had to traverse near County Road D..... 137

Figure 96. 1919 railroad map showing the NP network in the northern Twin Cities in orange, with locations of the Como Avenue Shops, Claymont, and Gladstone labeled. Note how the Como Avenue Shops sat between the downtowns of Minneapolis and Saint Paul, providing the NP with more centrally located facilities. 139

Figure 97. 1974 Saint Paul Dispatch clipping showing construction of the Beam Avenue bridge atop the railroad embankment. The caption notes that “Beam Avenue will cut beneath the track.” 142

1. INTRODUCTION

A. LOCATION AND PURPOSE OF SURVEY

A portion of the former Lake Superior & Mississippi (LS&M) mainline railroad is located within the Rush Line Bus Rapid Transit (BRT) architecture/history and archaeological study areas. The LS&M mainline railroad extended from Union Depot in downtown Saint Paul to downtown Duluth (see Figure 1). This report presents the survey and evaluation of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment (hereafter referred to as the LS&M Railroad Corridor Historic District) as it relates to the Rush Line BRT architecture/history and archaeological study areas. The LS&M segment for evaluation has been defined to be the segment from Union Depot in Saint Paul to the White Bear Lake Depot in downtown White Bear Lake (identified on Figure 1). This encompasses the portion of the LS&M Railroad Corridor Historic District that will be physically and directly affected by the Rush Line BRT Project and provides an appropriate segment for full evaluation. The complete Rush Line BRT Project findings for architecture/history and archaeology are provided in the overall project reports: *Phase I Architecture/History Survey and Phase II Evaluation for the Rush Line Bus Rapid Transit Project* and *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project*.¹

¹ Mead & Hunt, Inc., *Phase I Architecture/History Survey and Phase II Evaluation for the Rush Line Bus Rapid Transit Project (DRAFT)* (Prepared for the Ramsey County Regional Rail Authority, March 2020); Mississippi Valley Archaeology Center, *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project (DRAFT)* (Prepared for the Ramsey County Regional Rail Authority, February 2020).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

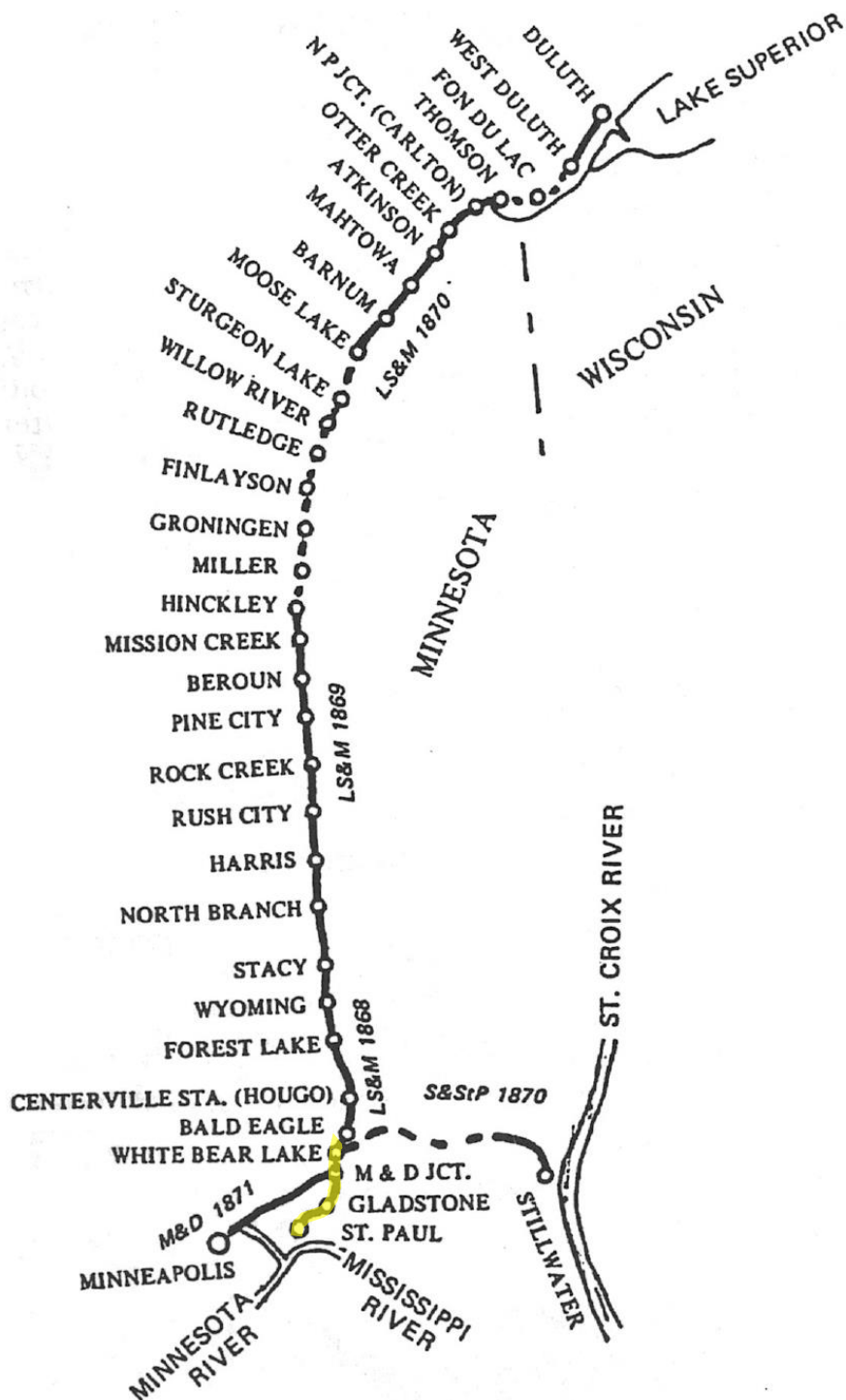


Figure 1. Entire extent of the LS&M mainline railroad, with the subject Saint Paul to White Bear Lake Segment under evaluation highlighted in yellow.²

² William T. Schwietz, *Minnesota Railroads* (Saint Paul, Minn.: National Railway Historical Society, 1985), 37.

B. PROJECT DESCRIPTION

The Ramsey County Regional Rail Authority (RCRRA) proposes to construct the Rush Line Bus Rapid Transit (BRT) Project, a 14-mile transit route with stops between Union Depot in Lowertown Saint Paul and downtown White Bear Lake. See Figure 2 for an overview map of the project corridor; Appendix A provides more detailed maps of the Rush Line BRT corridor and proposed station locations. The route will travel on a combination of existing city streets, dedicated guideways, and the Bruce Vento Regional Trail (Bruce Vento Trail), which generally follows the former LS&M mainline railroad roadway and is now RCRRA right-of-way (ROW). A number of bridge and intersection improvements are proposed including 13 along the RCRRA ROW (see Table 1). Twenty-one stations are proposed along the project corridor; of these, five are located adjacent to the LS&M Railroad Corridor Historic District (a list of which is provided below):

- Maryland Avenue.
- Larpenteur Avenue.
- Frost Avenue.
- Trunk Highway 36.
- Buerkle Road.

Most platforms would be 80 to 100 feet long; however, platforms in some locations will be 60 feet due to site constraints. Standard station features would include NexTrip real-time departure signs, raised platforms, maps, benches, heat, lighting, bike racks, trash and recycling bins, and ticket machines. Four park-and-ride facilities are proposed along the project corridor.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

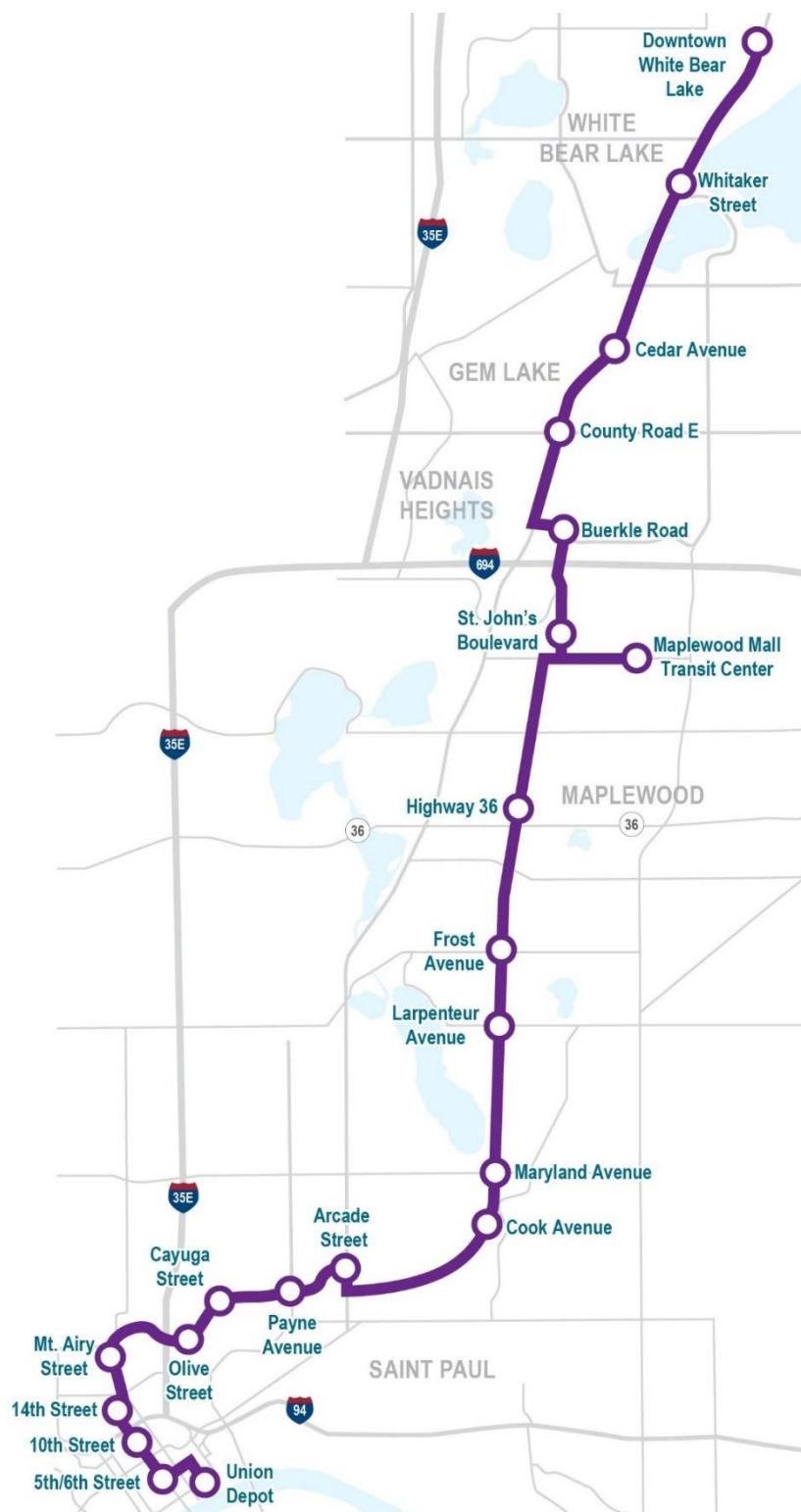


Figure 2. Overview (2019) of Rush Line BRT Project corridor and proposed stations.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 1. New Intersections and Bridges within RCRRA ROW

Location	Description
RCRRA ROW and Johnson Parkway	New bridge – guideway and trail
RCRRA ROW and Maryland Avenue	New at-grade, signalized intersection
RCRRA ROW and Arlington Avenue	New at-grade intersection
RCRRA ROW and Idaho Avenue	New at-grade intersection
RCRRA ROW and Larpenteur Avenue	New at-grade, signalized intersection
RCRRA ROW and Ripley Avenue	New at-grade intersection
RCRRA ROW and Frost Avenue	New at-grade, signalized intersection
RCRRA ROW and Gateway State Trail	New bridge – guideway only ³
RCRRA ROW and trail connection to Weaver Elementary School	New bridge – guideway only
RCRRA ROW and County Road B	New at-grade, signalized intersection
RCRRA ROW and Cope Avenue	New at-grade, signalized intersection
RCRRA ROW and Highway 36	New bridge – guideway only
RCRRA ROW and Gervais Avenue	New at-grade, signalized intersection
RCRRA ROW and trail connection between Fitch Road and Barclay Street	New bridge – guideway only ⁴
RCRRA ROW/Hazelwood and County Road D	New at-grade, signalized intersection (existing stop sign T-intersection to proposed four leg signalized)
RCRRA ROW and I-694	New bridge – guideway only
RCRRA ROW and Buerkle Road	New at-grade, signalized intersection

The Rush Line BRT architecture/history and archaeological study areas were delineated in consultation with Minnesota Department of Transportation Cultural Resources Unit (MnDOT CRU). For a full description of the Rush Line BRT Project and architecture/history and archaeological study areas and maps, please see *Phase I Architecture/History Survey and Phase II Evaluation for the Rush Line Bus Rapid Transit Project* and *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project*. The Rush Line BRT follows a portion of the LS&M mainline railroad roadway that is located within the architectural history and archaeology study areas.

³ An at-grade crossing is also under consideration at this location.

⁴ An at-grade crossing is also under consideration at this location.

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2. METHODS AND RESEARCH DESIGN

A. OBJECTIVES

The objective of the Phase II Evaluation is to determine if the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is eligible for listing in the National Register under the two MPDs: *Railroads in Minnesota, 1862-1956* (Schmidt, 2013) and *Supplement to Railroads in Minnesota, 1862-1956* (draft) (Arnott and Pizza, 2017). This Phase II Evaluation will also identify the historic boundary and contributing and noncontributing elements in order to facilitate the assessment of effects and consultation under Section 106.

B. EVALUATION METHODOLOGY

Project fieldwork and documentation were completed according to the MnDOT CRU's *Project and Report Requirements* (January 2017), the Minnesota SHPO's *Historic Architectural Survey Manual* (June 2017), the Minnesota SHPO's *Manual for Archaeological Projects in Minnesota* (July 2005) and the *State Archaeologist's Manual for Archaeological Projects in Minnesota* (2011).

Two National Register MPDs—*Railroads in Minnesota, 1862-1956* (Schmidt, 2013) and *Supplement to Railroads in Minnesota, 1862-1956* (draft) (Arnott and Pizza, 2017)—were used to guide this evaluation. The *Railroads in Minnesota, 1862-1956* document will prevail if there are any discrepancies between the two MPDs since the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD has not yet been reviewed or accepted by the National Park Service.

This Phase II Evaluation covers the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. It is based on the aforementioned MPDs and the National Register Criteria for Evaluation: *Criterion A: History, Criterion B: Significant Person, Criterion C: Architecture/Engineering* and *Criterion D: Information Potential*. A glossary of terms is included in Appendix C.

The LS&M is being evaluated as a railroad corridor historic district property type per guidance in the MPDs *Railroads in Minnesota, 1862-1956* and *Supplement to Railroads in Minnesota, 1862-1956* (draft). The *Railroads in Minnesota, 1862-1956* MPD defines a railroad corridor historic district as a property type that:

...encompasses the right of way within which the railroad operated and all of the buildings, structures, and objects that worked together for the dedicated purpose of running trains to transport freight and passengers. The elements of railroad corridor historic districts are organized within linear rights of way that range from approximately 30 feet to several hundred feet in width but may extend for hundreds of miles in length.⁵

⁵ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," Statewide, Minnesota, National Register #64501188, F-183.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD expands the definition of a railroad corridor historic district to “include railroad archeological sites (primarily the abandoned remains and associated artifact scatters of the properties defined in the 2013 document) and the features and data sets therein directly related to the survey, design, construction, operation and maintenance of the railroad.”⁶

Per the *Railroads in Minnesota, 1862-1956* MPD, railroad corridor historic districts will consist of contributing and noncontributing segments. District boundaries are defined as the historic ROW and terminal destinations.

Only a portion of the full extent of the LS&M mainline railroad corridor (which extends from Saint Paul to Duluth, see Figure 1) is located within the Rush Line BRT architecture/history and archaeological study areas. As a result, the overall railroad corridor was reviewed to identify a segment that provides for logical termini to assess integrity under *Criterion A*. The segment defined for evaluation extends from the origin of the mainline railroad corridor at the Union Depot (RA-SPC-5255, listed in the National Register, #74001040) in downtown Saint Paul to the White Bear Lake Depot (RA-WBC-0121) in downtown White Bear Lake. After evaluation of this segment was begun, the Rush Line BRT Project area was expanded to intersect with the LS&M Railroad Corridor Historic District: White Bear Lake to Hugo Segment (XX-RRD-NPR005). Because the project does not anticipate physically impacting the White Bear Lake to Hugo Segment to the same extent as the Saint Paul to White Bear Lake Segment, and because the White Bear Lake to Hugo Segment is active railroad corridor, a traditional Phase II Evaluation was performed for the White Bear Lake to Hugo Segment and included in the architecture/history report.

The archaeological survey focused only on the portion of the LS&M mainline corridor within the archaeological study area where there is a potential for direct physical effect. This portion begins at Johnson Parkway and extends north to Beam Avenue, and from County Road D to Buerkle Avenue, encompassing the present RCRRA ROW. LS&M ROW maps dated 1870 (see Appendix B) and research indicated the portion of the Rush Line BRT archaeological study area overlapping the RCRRA ROW between County Road D and Buerkle Avenue did not overlap the original 1868 LS&M railroad roadway, as in this area the 1868 roadway was outside and east of the archaeological study area, likely built around some type of topographical feature at that time (see Maps B-1, B-3 and B-4 in Appendix B). Therefore, although a reconnaissance-level survey was undertaken from County Road D to Buerkle

⁶ National Register of Historic Places, Multiple Property Documentation Form, *Supplement to Railroads in Minnesota, 1862-1956* (Draft) (Draft Submitted to the Minnesota Department of Transportation Cultural Resource Unit by Sigrid Arnott and Andrea Pizza, 2017), F-101.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Avenue within the archaeological study area, this area was not an element of the archaeological considerations for *Criteria C* and *D* for this assessment.

For the archaeological assessment of the railroad corridor historic district, the primary feature of the property is the railroad roadbed and the portion of the LS&M ROW now owned by RCRRA. The amount of urbanization, placement of a later 1880s realigned railroad roadway over much of the original 1868 railroad roadway, and grading for the Bruce Vento Trail have altered the natural landscape and few additional archaeological features associated with the railroad, such as early depots, shanties and related individual artifact scatters arranged around the original transportation corridor that may be outside of the RCRRA ROW.

C. ARCHITECTURE/HISTORY SURVEY METHODS

Mead & Hunt historians that meet the Secretary of the Interior's Standards for History and Architectural History conducted a site visit to evaluate the LS&M mainline corridor within the Rush Line BRT architecture/history study area. Associated resources, such as retaining walls and bridges, were mapped and photographed for inclusion in the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. Historians also completed field review of portions of the LS&M mainline corridor south of the architecture/history study area to confirm the current conditions to assist in assessing integrity of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. Aerial images and Google Street View were also used to assist in identifying the current conditions.

D. ARCHAEOLOGY SURVEY METHODS

The focus of the archaeological reconnaissance survey along the archaeological study area (RCRRA ROW) between Johnson Parkway and Beam Avenue was to look for remnants of the 1868 LS&M roadway since that is the primary concern for the archaeological evaluation. This work focused on looking at the surrounding topography for surficial features related to railroad construction, if surface features related to railroad construction were present, and if remnants of the 1868 LS&M roadway were present on the surface.

Due to the amount of urban development in the archaeological study area, the archaeological methodology consisted primarily of visual reconnaissance of the areas where direct physical effects to the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment are anticipated as part of this project. Archaeological methodology also included basic interpretation of lidar imagery after the LS&M mainline railroad roadway had been visually inspected, to help facilitate interpretation of the reconnaissance survey and obtain basic measurements of the fill embankment supporting the 1868

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

LS&M railroad roadway as needed. Digital photographs were used to document representative samples of characteristic elements of the railroad corridor.

MVAC personnel that meet the Secretary of the Interior's Standards for Archaeology completed the site investigations. Archaeologists completed three project area visual inspections at different times of the year.

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD suggests that the area of the railroad ROW that exhibits railroad-authorized activities during the period of significance will define the side-to-side, versus end-to-end, boundaries. The boundary can consider areas where there is physical evidence of railroad activities related to construction. The boundaries of the site or area of significance may widen to include artifact scatters, archaeological sites or more features when there are no related resources next to the ROW.⁷

Reconnaissance survey included walk-throughs of the RCRRA ROW that could have the potential for the 1868 LS&M railroad roadway to be present, which is defined in Figure 3 through Figure 5.

Research on modern utilities within the project area shows that a sanitary sewer force main is present within the RCRRA ROW (see Figure 6). Maps provided by the Metropolitan Council show an abandoned force main from Larpenteur Avenue north to at least Trunk Highway (TH) 36. This force main was installed in the 1960s and apparently abandoned sometime in the 1970s. Maps provided by the Metropolitan Council show that the force main is on the east side of the former rail tracks. According to other information from the Metropolitan Council, the base of the pipe would be around 10 feet below the ground surface and the top of the pipe approximately 8.5 feet below the surface, making the pipe 1.5 feet in diameter. Due to the type of metal used and the pipe's depth, utility locators cannot find the pipe successfully. South of Larpenteur Avenue, the sanitary force main is still active and extends at least several blocks to the south. Therefore, the archaeological survey considered this when visually inspecting areas to help interpret anomalies on the ground surface, and their possible relationship to the forcemain.

⁷ National Register of Historic Places, Multiple Property Documentation Form, *Supplement to Railroads in Minnesota, 1862-1956* (draft) (Draft Submitted to the Minnesota Department of Transportation Cultural Resource Unit by Sigrid Arnott and Andrea Pizza, 2017), 102.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

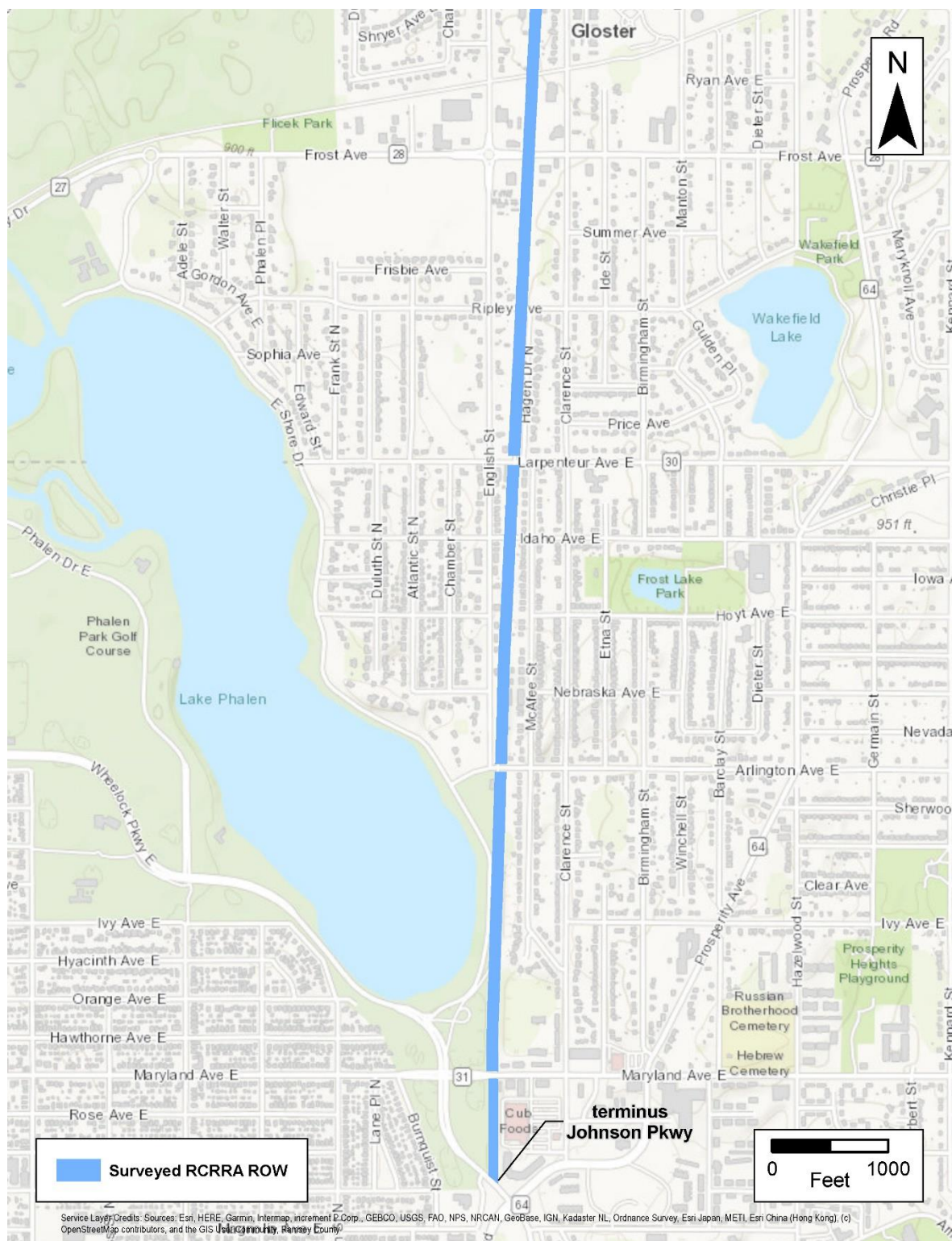


Figure 3. Southern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing termini for archaeological reconnaissance survey.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

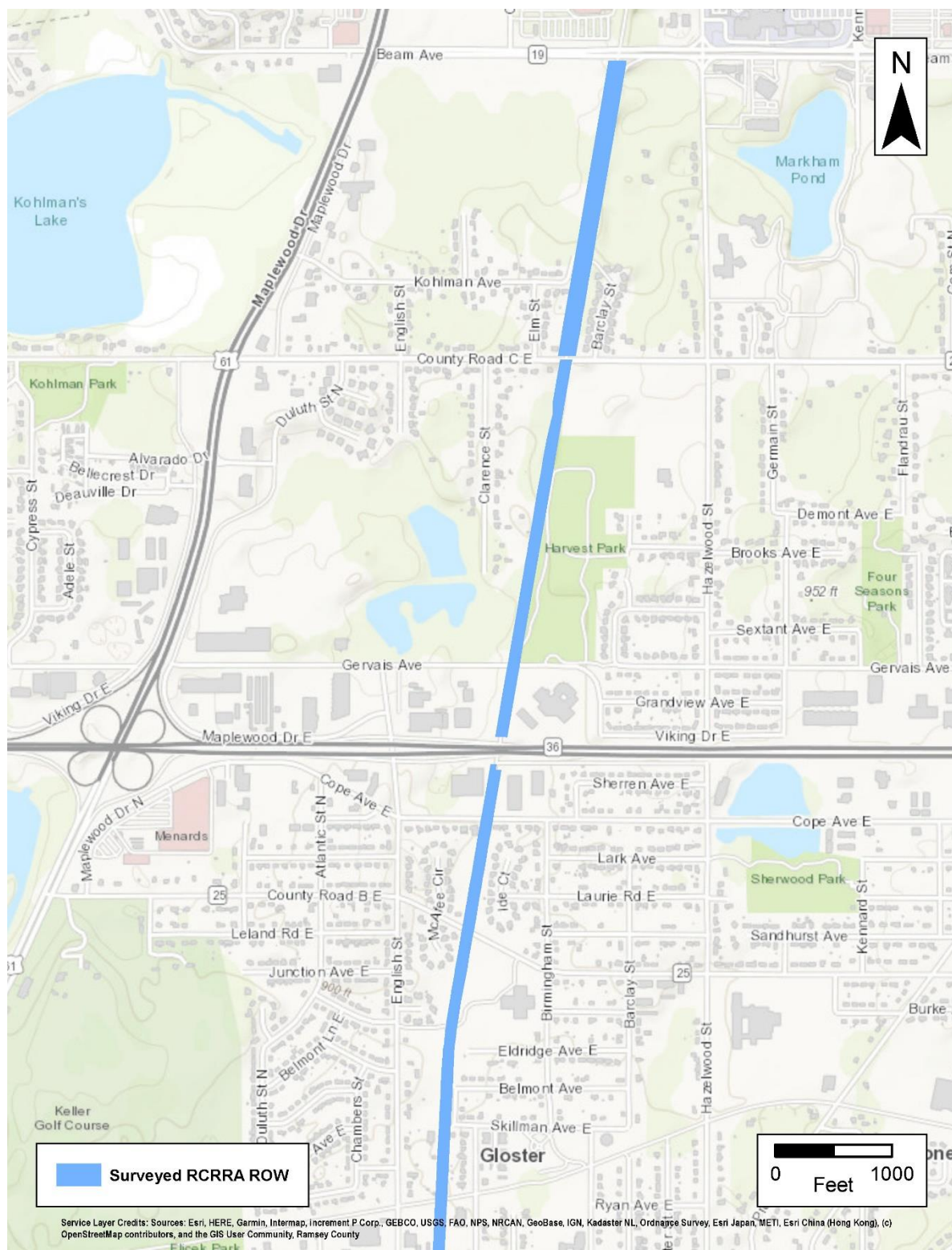
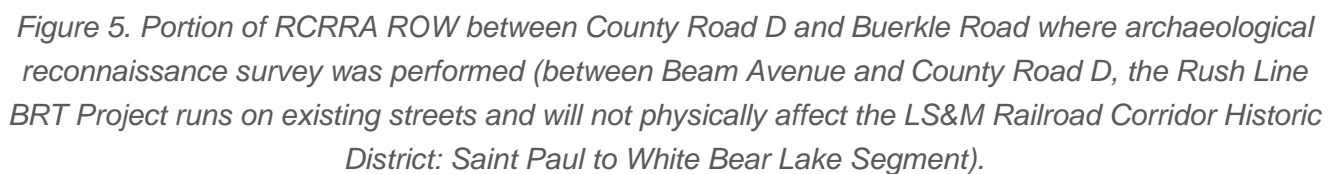


Figure 4. Northern half of RCRR ROW between Johnson Parkway and Beam Avenue showing area where archaeological reconnaissance survey was performed.

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

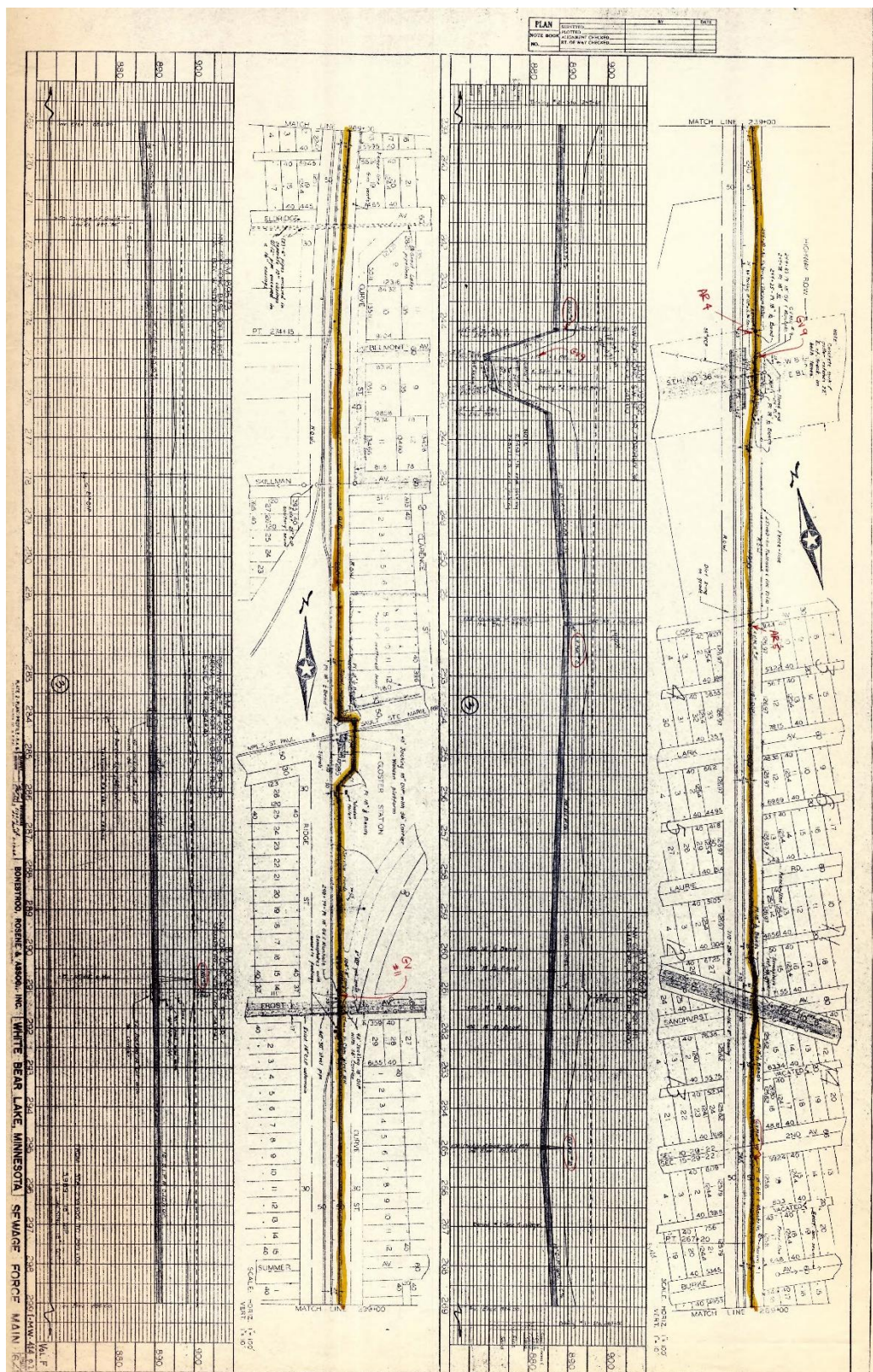


Figure 6. Sanitary sewer force main present within the RCRRA ROW.

E. GEOMORPHOLOGICAL SURVEY METHODS

Based on consultation with MnDOT CRU, geomorphological testing was recommended along areas of the former railroad roadbed embankment that would have been constructed by the LS&M in the late 1860s in areas where the 1868 railroad roadway overlaps the current RCRRA ROW (see Figure 7 through Figure 12). Geomorphological testing was performed by Strata Morph Geoexplorations to look for possible remnants of the former 1868 LS&M railroad roadway, and overseen by Dr. Michael Kolb, a trained geomorphologist. Also, although the portion of the project area from County Road D to Buerkle Avenue does overlap the RCRRA ROW (see Figure 13), this area did not overlap the former 1868 LS&M railroad roadway, so no geomorphological coring was undertaken. However, a reconnaissance level survey was performed in this area to assess the potential for other archaeological resources.

The purpose of the geomorphological testing was to determine whether the original 1868 railroad roadway could be identified within the 1880s railroad roadway, which is generally the same as the trail embankment where the Bruce Vento Trail is located. Individual geomorphological core locations were selected with consideration of historic research, modern disturbance such as utilities, and other factors such as truck access. The results of the coring are provided in Appendix D and were compared to four types of construction techniques that Strata Morph proposes were utilized during the original LS&M construction and other contemporary rail lines at that time: laying the ties directly on the soil surface; laying the ties in a thin soil ballast obtained from nearby soil adjacent to the track; cutting down high ground and laying the ties on the cut surface; and filling low ground or adding fill to adjust the grade and laying the ties on the built surface. These techniques were in turn compared to later construction events, such as the late 1880s improvements and addition of a second track; the 1900s to 1986 era, including the Northern Pacific (NP) and Burlington Northern (BN) ownership; and the construction of the Bruce Vento Trail in the early 1990s.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

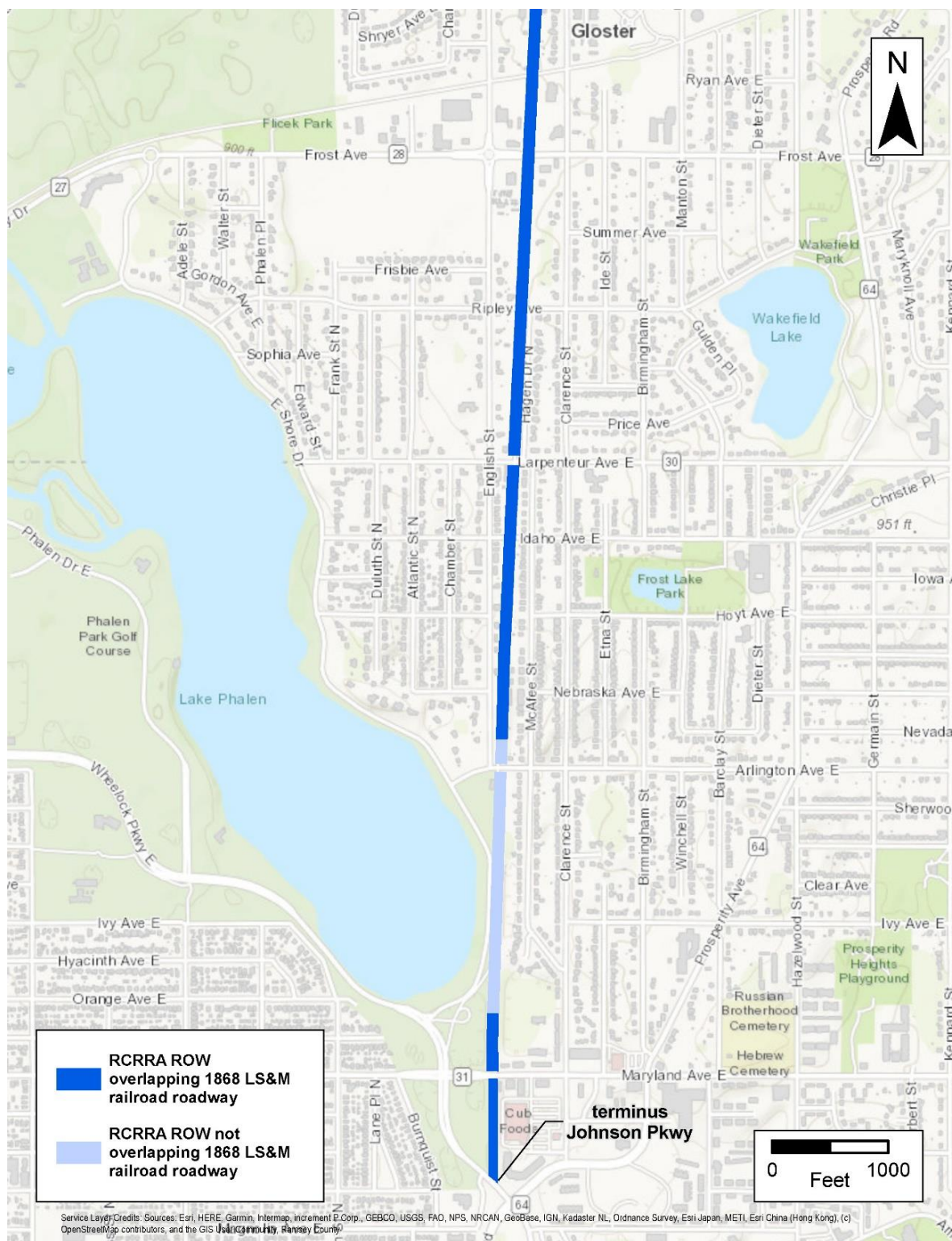


Figure 7. Southern half of RCRRRA ROW between Johnson Parkway and Beam Avenue showing area where it overlapped the 1868 LS&M ROW (based on 1870 LS&M maps) and where soil coring was recommended.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 8. Northern half of RCRRA ROW between Johnson Parkway and Beam Avenue showing area where it overlapped the 1868 LS&M ROW (based on 1870 LS&M maps) and where soil coring was recommended.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 9. Southern end of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed and location of geomorphological soil cores outlined in Appendix D.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 10. Southcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and new archaeological site discovered.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

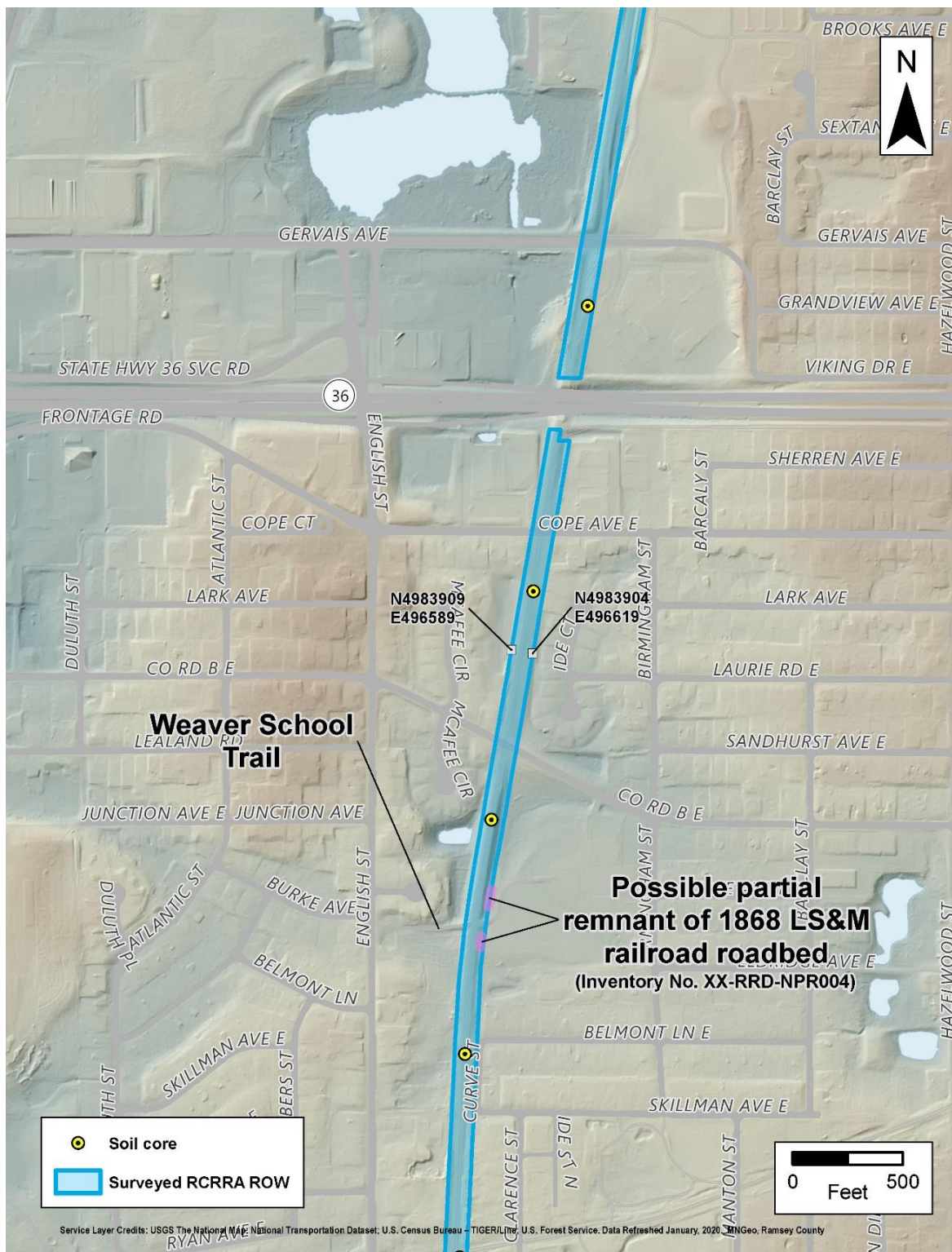


Figure 11. Northcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadway. Figure shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and location of possible portions of 1868 LS&M railroad roadbed found on the surface.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

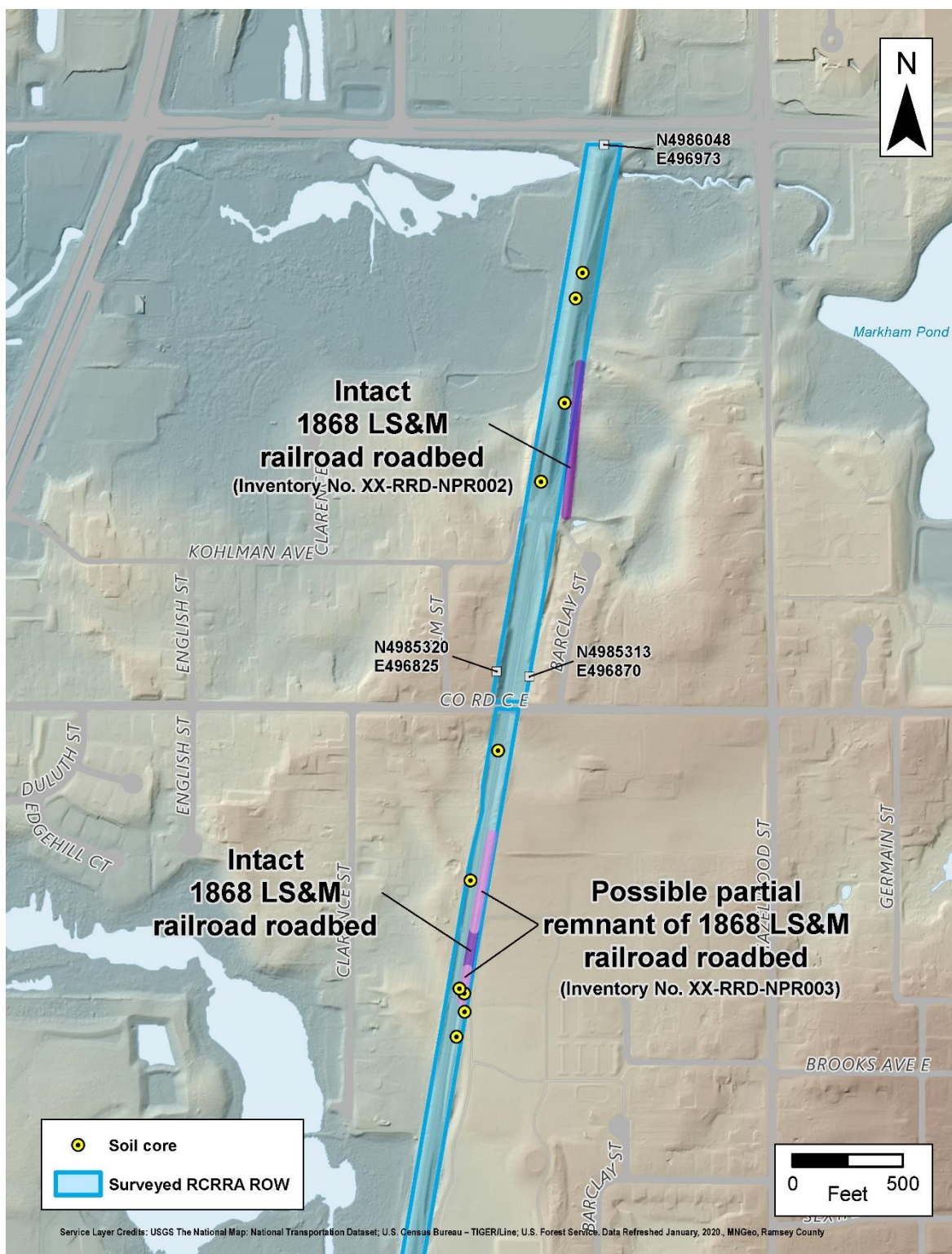


Figure 12. Northcentral portion of RCRRA ROW overlapping archaeological study area and 1868 LS&M railroad roadbed. Figures shows location of area surveyed, location of geomorphological soil cores outlined in Appendix D, and location of possible portions of 1868 LS&M roadbed found on the surface.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 13. Rush Line BRT archaeological study area between County Road D and Buerkle Avenue overlapping the RCRR ROW. No geomorphological soil cores were undertaken in this area as the original 1868 LS&M railroad roadway did not overlap this area.

3. LITERATURE SEARCH

A. PREVIOUSLY SURVEYED OR PREVIOUSLY EVALUATED PROPERTIES

Mead & Hunt, Inc. (Mead & Hunt) reviewed the Minnesota State Historic Preservation Office (SHPO) inventory files and identified that the full extent of the LS&M mainline railroad corridor from Saint Paul to Duluth was previously determined eligible for the National Register of Historic Places (National Register). Constructed between 1867 and 1868, the full extent of the LS&M mainline railroad corridor is significant within the railroad history of Minnesota as one of the earliest railroads constructed in the state and the first to connect the emerging railroad center of Saint Paul with the Great Lakes port of Duluth. There is various documentation regarding this determination.

A Phase I Inventory form for the LS&M mainline railroad corridor segment from Saint Paul to Wyoming, Minnesota (RA-SPC-6064), prepared in 2009 by The 106 Group, identified the entire LS&M mainline railroad from Saint Paul to Duluth as eligible for listing in the National Register, referencing an eligibility finding made as early as 1996:

Segments of the LS&M/StP&D/NP/BN Skally Line from St. Paul to Duluth have been previously determined eligible for listing on the NRHP under Criterion A, within the statewide context of Railroads and Agricultural Development, 1870-1940, in the areas of transportation, industry, commerce, and agriculture (Laura Henley Dean to William R. Lohr, letter dated 13 May, 1996 on file at the Minnesota SHPO, St. Paul). The entire Skally Line, from St. Paul to Duluth, has also been previously recommended as eligible under Criterion A within the statewide contexts Railroad Development in Minnesota, 1862-1956 and Railroads and Agricultural Development, 1870-1940 in the areas of transportation, industry, commerce and agriculture for the significant role the LS&M played in the development of the state's railroad transportation system (Van Erem et. al., 2009). The Skally Line has statewide significance as the first line to directly connect St. Paul with the important shipping port of Duluth. The primary historical feature of this resource is its route.⁸

In addition, as part of an Interstate Highway 35 (I-35) improvement project in Saint Louis County, Mead & Hunt correspondence with the SHPO in February 2004 confirmed the previous eligibility determination for the entire LS&M mainline railroad from Saint Paul to Duluth.⁹ Other compliance

⁸ "Lake Superior and Mississippi Railroad - RA-SPC-6064," 2009, Minnesota Historic/Architecture Inventory Form, Minnesota Historic Preservation Office, Saint Paul, Minn. The 2009 inventory form uses the line's common name: the "Skally Line."

⁹ The eligibility determination was made as early as 1996 and documented in correspondence provided to Mead & Hunt by the Minnesota SHPO for Mead & Hunt's 2004 Phase I Survey/Phase II Evaluation of the I-35 improvement project.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

projects resulted in some segments of the LS&M mainline railroad corridor having been determined to be contributing or noncontributing to the overall eligible corridor.¹⁰

Although the overall LS&M mainline railroad corridor has been previously evaluated under *Criterion A*, the documentation is over 20 years old and is not sufficient to assess proposed Rush Line BRT Project effects on this resource. In addition, two National Register Multiple Property Documents (MPDs) have been prepared since the initial eligibility determination: *Railroads in Minnesota, 1862-1956* and *Supplement to Railroads in Minnesota, 1862-1956* (draft). These MPDs provide a framework for evaluating the significance and integrity of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment within statewide historic contexts. Under *Criterion A*, additional information is needed to define the period of significance, to make an eligibility recommendation for the segment from Saint Paul to White Bear Lake, and to determine character-defining features to facilitate assessing project effects. The LS&M mainline corridor also requires evaluation under additional areas of significance and *Criteria C* and *D*.

In addition to the LS&M mainline railroad, the literature search identified five previously surveyed railroad resources along the railroad corridor between the termini covered by this evaluation (see Table 2). The Union Depot and Seventh Street Improvement Tunnels are listed in the National Register.

Table 2. Previously surveyed properties along the LS&M railroad

Inventory Number	Name	Address
RA-SPC-5255; National Register #74001040	Union Depot	214 4 th St. East, Saint Paul
RA-SPC-7115 ¹¹	Grade Separation Structure, LS&M Railroad Roadway over Fourth Street East	LS&M Railroad Roadway at 4 th Street East, Saint Paul
RA-SPC-6402; National Register #89001828	Seventh Street Improvement Tunnels	LS&M Railroad Roadway at 7 th Street East, Saint Paul

¹⁰ Segments of the LS&M mainline railroad have been evaluated as noncontributing and contributing. In 2019, the LS&M mainline railroad segment from West Duluth Junction (near South 67th Avenue West) to South Lake Avenue in Duluth was determined to be noncontributing due to a lack of integrity as part of the Twin Ports Interchange project (SHPO Inventory No. SL-DUL-2500). A 2017 evaluation of the segment from Thomson to Fond du Lac recommended the segment eligible for listing in the National Register under *Criteria C* and *D*. A 2009 Phase I Inventory form for the LS&M mainline railroad corridor segment from Saint Paul to Wyoming determined this segment to be contributing (SHPO Inventory No. RA-SPC-6064).

¹¹ According to the inventory record data provided by the SHPO for this project, RA-SPC-7115 did not have an eligibility determination.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 2. Previously surveyed properties along the LS&M railroad

Inventory Number	Name	Address
RA-WBC-0156 ¹²	Grade Separation Structure, LS&M Railroad Roadway over I-694	LS&M Railroad Roadway at I-694, White Bear Lake
RA-WBC-0121 (recommended for Phase II Evaluation as part of Rush Line BRT Project, but located outside the APE)	White Bear Lake Depot	2144 4 th St. (previously 704 4 th Street), White Bear Lake

B. HISTORIC CONTEXT RESEARCH

Primary and secondary sources were reviewed to gain an understanding of the historic context for the LS&M. These sources provided information about the mainline railroad corridor's development history. Repositories consulted to obtain historical information include:

- Minnesota Historical Society (MHS) Library
- SHPO
- University of Minnesota Libraries
- Ramsey County Historical Society
- Maplewood Historical Society

Primary and secondary sources include:

- SHPO inventory forms, previous survey reports, and project correspondence
- Plat maps, atlases, and aerial images
- Sanborn Fire Insurance Maps
- Previously prepared contexts and community surveys
- Online resources

The historic context for the LS&M is outlined in Section 6 of this document, which cites the primary and secondary sources used.

¹² The previous inventory form for RA-WBC-0156 recommended this bridge as not individually eligible.

C. ARCHAEOLOGICAL RESEARCH

Prior to the archaeological survey, historical sources were reviewed in conjunction with the development of the historic context for this study. This work included review of various historic books and articles, prior work along the former LS&M mainline railroad corridor and the *Railroads in Minnesota, 1862-1956* and *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPDs. In terms of National Register consideration for archaeology, the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD has shown that the early, pioneering period of railroad construction in Minnesota is poorly documented and likely different from later methods due to different economic and political factors that were in play. Therefore, the focus of the National Register assessment using archaeological methods was the railroad earthworks built during the initial construction of the LS&M (ca. 1864 to 1868). Historic document research performed at the Minnesota Historical Society located the 1870 LS&M ROW maps for the original LS&M mainline railroad corridor.¹³ These maps were georeferenced with 1884-1886 maps of the railroad roadway, 1945 aerial photographs, and modern aerial photographs to understand how the railroad roadway has changed since its early construction (see Appendix B).¹⁴ This georeferencing revealed areas of the original 1868 LS&M railroad roadway that would be parallel to, in the same location as, or potentially buried by the later 1880s railroad roadway, which is generally represented by the modern trail embankment and cut areas on which the current multi-use Bruce Vento Trail is located. Based on historical research, the potential areas of the current RCRRA ROW identified as having overlapped the 1868 LS&M railroad roadway include the following locations (see Figure 7 and Figure 8):

- On the embankment near Johnson Parkway south of Maryland Street to approximately 500 feet north of Maryland Street.
- On the embankment and in the cut areas of the RCRRA ROW starting from 400 feet south of Nebraska Avenue East heading north 2.4 miles to County Road C.
- The embankment starting at Kohlman Avenue (one-quarter mile north of County Road C) to Beam Avenue.

¹³ "Maps of Sections Crossed by Lake Superior and Mississippi Rail Road from St. Paul to Duluth, 1870" (Lake Superior & Mississippi Railroad, 1870), Northern Pacific Railway Company Records, Branch and Subsidiary Lines, Lake Superior & Mississippi Railroad, Box 14, Volume 60, Minnesota Historical Society, Saint Paul, Minn.

¹⁴ G.M. Hopkins, *Real Estate Atlas City of Saint Paul, Minnesota* (Philadelphia: G.M. Hopkins, 1884); G.M. Hopkins, *Atlas of the Environs of Saint Paul* (Philadelphia: G.M. Hopkins, 1886).

4. DESCRIPTION

This description of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment provides an understanding of the present setting of the railroad corridor from Union Depot in Saint Paul to the White Bear Lake Depot in White Bear Lake. Much of the 1868 railroad roadway was obliterated by the 1880s realignment of the roadway (hereafter referred to as the realignment). As a result, unless otherwise noted, the railroad roadway under discussion is the 1880s realignment. Approximately two-thirds of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment includes the multi-use Bruce Vento Trail, which sometimes follows the LS&M railroad roadway. A full glossary of terms used in this evaluation is found in Appendix C. In this Phase II Evaluation, the railroad corridor is generally referred to by its historic name—LS&M—with the exception of describing the chronology of use of the railroad corridor within the historic context.

This description section includes an overall discussion of setting and topography followed by a discussion of the LS&M Railroad Corridor Historic District organized in sections: Union Depot in downtown Saint Paul to Arcade Street, Arcade Street to Johnson Parkway, Johnson Parkway to Beam Avenue, and Beam Avenue to the White Bear Lake Depot. The LS&M Railroad Corridor Historic District was divided in this manner to consider natural divisions in the extant corridor. The portion from Union Depot to Arcade Street contains part of the Bruce Vento Trail that follows the LS&M railroad roadbed. From Arcade Street to Johnson Parkway, the railroad roadbed has largely been obliterated. From Johnson Parkway to Beam Avenue, the Bruce Vento Trail and LS&M are generally concurrent. The section from Beam Avenue to the White Bear Lake Depot is predominately active rail line.

A. OVERALL SETTING AND TOPOGRAPHY

The LS&M Railroad Corridor Historic District from Union Depot to the White Bear Lake Depot is approximately 11 miles long and located in Ramsey County in southeastern Minnesota. Ramsey County is bordered by Anoka County to the north, Washington County to the east, Dakota County to the south, and Hennepin County to the west. At the southern end, it travels through the city of Saint Paul, beginning at the southeastern corner of downtown, in the Lowertown area. From here, it travels north through the Swede Hollow area to roughly Payne Avenue, where it turns east and runs between the Payne-Phalen area (located to the north) and the Dayton's Bluff neighborhood (located to the south) before turning north again near Johnson Parkway and traversing Saint Paul's Greater East Side. At Larpenteur Avenue, it continues north through the cities of Maplewood, Gem Lake, Vadnais Heights, and White Bear Lake. The LS&M Railroad Corridor Historic District is located in archaeological SHPO Region 4e.

The Rush Line BRT architecture/history and archaeological study areas lie in the Central Lake Deciduous Region. The topography of this region includes moraines, till plains, and outwash plains. Numerous lakes are found throughout the region and the Mississippi River flows through its eastern

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

and central portions. The soils generally have medium to coarse textures, with prairie soils to the south and west and forest soils in the north and east. In early historic times, the vegetation in the southern and western parts of the region would have been dominated by the Big Woods species with numerous large inclusions of prairie and wood oak.¹⁵ The original vegetation cover of the project area would have consisted of brushland (oak openings and barrens with scattered trees and groves of scrubby oaks, with some brush and thickets and occasional pines); wet prairies, marshes, and sloughs (marsh grasses, flags, reeds, rushes, and wild rice, with willow and alder brush in places); and hardwood forests (the Big Woods), including oaks (bur, white, red, and black), elm, basswood, maple, hornbeam, aspen, birch, wild cherry, hickory, butternut, and black walnut, with some white pines.¹⁶

The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is within the Eastern Broadleaf Forest Province. This province covers nearly 12 million acres of central and southeastern Minnesota and is transitional between semi-arid portions of the state that were historically prairie and semi-humid, mixed conifer-deciduous forests to the northeast.¹⁷ The bedrock geology of the project area includes outwash, the end moraine of the Saint Croix Moraine Association, glacial outwash sediment including silt and fine sand, and the end moraine of the Saint Croix Moraine.¹⁸

The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment passes through a variety of landscapes, including urban and industrial areas and low-density suburban locations. The surrounding topography is generally flat to gently rolling, but it has been altered by extensive urban and industrial growth. In many cases, those alterations have occurred around the railroad roadway and the existing RCRRA ROW. In other cases, those alterations have either encroached on the RCRRA ROW or destroyed portions of the 1868 railroad roadway and/or 1880s railroad roadway realignment. The southern end of the LS&M Railroad Corridor Historic District near Union Depot in Saint Paul and the northern end closest to White Bear Lake overlap with active rail corridors. Central portions of the Railroad Corridor Historic District, roughly from Johnson Parkway to I-694, have been converted to the paved multi-use Bruce Vento Trail, which follows the railroad roadbed in certain areas; however, the current trail and historic railroad roadbed are not identical. The portions of the railroad roadway overlapped by the Bruce Vento Trail no longer retain steel rail line, ties, or ballast.

¹⁵ Scott Anfinson, "Archaeological Regions in Minnesota and the Woodland Period," ed. Guy E. Gibbon, *The Woodland Tradition in the Western Great Lakes: Papers Presented to Elden Johnson*, University of Minnesota Publications in Anthropology No. 4 (1990): 147–48.

¹⁶ Francis Joseph Marschner, "The Original Vegetation of Minnesota: Compiled from United States General Land Office Survey Notes" (Saint Paul, Minn.: North Central Forest Experiment State, Forest Service, U.S. Department of Agriculture, 1930).

¹⁷ State of Minnesota, Department of Natural Resources, "Ecological Provinces," 1999, https://files.dnr.state.mn.us/natural_resources/ecs/province.pdf.

¹⁸ Howard C. Hobbs and Joseph E. Goebel, "Geologic Map of Minnesota, Quarternary Geology S-1" (Minnesota Geological Survey, 1982), University of Minnesota, Geography Library.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

A more detailed description of the current physical appearance of the LS&M Railroad Corridor Historic District from Union Depot in Saint Paul to the White Bear Lake Depot in White Bear Lake follows. This includes a discussion of common elements of railroad corridor historic districts, such as railroad roadway and grade separation structures, that are found within the subject segment. The description of the portion from Union Depot to Arcade Street, which is mostly outside the Rush Line BRT architecture/history and archaeological study areas, was largely prepared utilizing historic aerials and maps and Google Street View. Minimal fieldwork was conducted in the Swede Hollow area. The description is more generally focused on current and historical setting, as most railroad-associated elements in this portion have been removed. For the portion of the LS&M Railroad Corridor Historic District from Johnson Parkway to Beam Avenue, greater detail is provided for the extant fill and cut areas and their relationship to the surrounding landscape. A description of the archaeological and geomorphological findings is presented at the end of the description section.

B. UNION DEPOT TO ARCADE STREET

This portion of the LS&M Railroad Corridor Historic District begins at the Union Depot at the southern edge of Lowertown. Lowertown is located at the southeastern corner of downtown Saint Paul and was historically the focus of railroad passenger and freight activity. The area was home to depots, warehouses, and railroad company office buildings. From Union Depot, this portion of the LS&M Railroad Corridor Historic District travels east and then north through the Bruce Vento Nature Sanctuary, Swede Hollow Park, and the Eastside Heritage Park. The Bruce Vento Trail travels along approximately 75 percent of this portion of the railroad roadway. Most of this is located outside the Rush Line BRT architecture/history and archaeological study areas but is being included in this Phase II Evaluation to incorporate the LS&M mainline corridor's terminus at Union Depot.

The Saint Paul Union Depot is the southern terminus of this portion of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. Completed in 1926, this was the second building to house a passenger station in this vicinity and is one of the remaining identifiable rail buildings associated with the LS&M mainline railroad. Historically, the area to the east of Union Depot, between what would have been Sixth Street East on the north (now I-94) and the Mississippi River on the south was filled with dozens of rail lines (see Figure 14). These lines were constructed and operated by multiple railroad companies as well as the Saint Paul Union Depot Company, which was a consortium of individual lines that utilized the depot for passenger service. Freight depots for individual lines were located to the northeast of Union Depot.

Rail lines that operated north of Saint Paul followed Trout Brook and Phalen Creek to Lowertown and Union Depot. For much of the twentieth century, these lines included the Great Northern (GN), Northern

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Pacific (NP, successor to the LS&M), Soo Line, and Omaha Road.¹⁹ Rail lines that operated south of Saint Paul followed the Mississippi River from the east and west to Lowertown and Union Depot. Between Union Depot and the wye junction just to the east, most of the lines that serviced the depot were owned by the Saint Paul Union Depot Company. Extant lines in this general area are currently operated by the Union Pacific (UP), Canadian Pacific (CP), and the Burlington Northern Santa Fe (BNSF).²⁰ Amtrak currently offers passenger service from Union Depot.

¹⁹ Railroad lines are often owned and operated by multiple companies over the course of their existence. The referenced lines are no exception and have been bought and sold numerous times. The full names (including predecessor and subsequent names) are as follows: Saint Paul & Pacific/Saint Paul, Minneapolis & Manitoba/Great Northern/Burlington Northern/Burlington Northern Santa Fe; Lake Superior & Mississippi/Saint Paul & Duluth/Northern Pacific/Burlington Northern/Burlington Northern Santa Fe; Minnesota, Saint Croix, and Wisconsin/Saint Paul & Saint Croix/Wisconsin Central/Soo Line; Saint Paul, Stillwater & Taylors Falls/Saint Paul & Sioux City/Chicago, Saint Paul, Minneapolis & Omaha/Chicago & Northwestern/Union Pacific.

²⁰ Minnesota Department of Transportation, Office of Freight and Commercial Vehicle Operations, "Twin Cities Area Freight Railroad Map," September 2015, <https://www.dot.state.mn.us/ofrw/maps/MetroRailMap.pdf>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

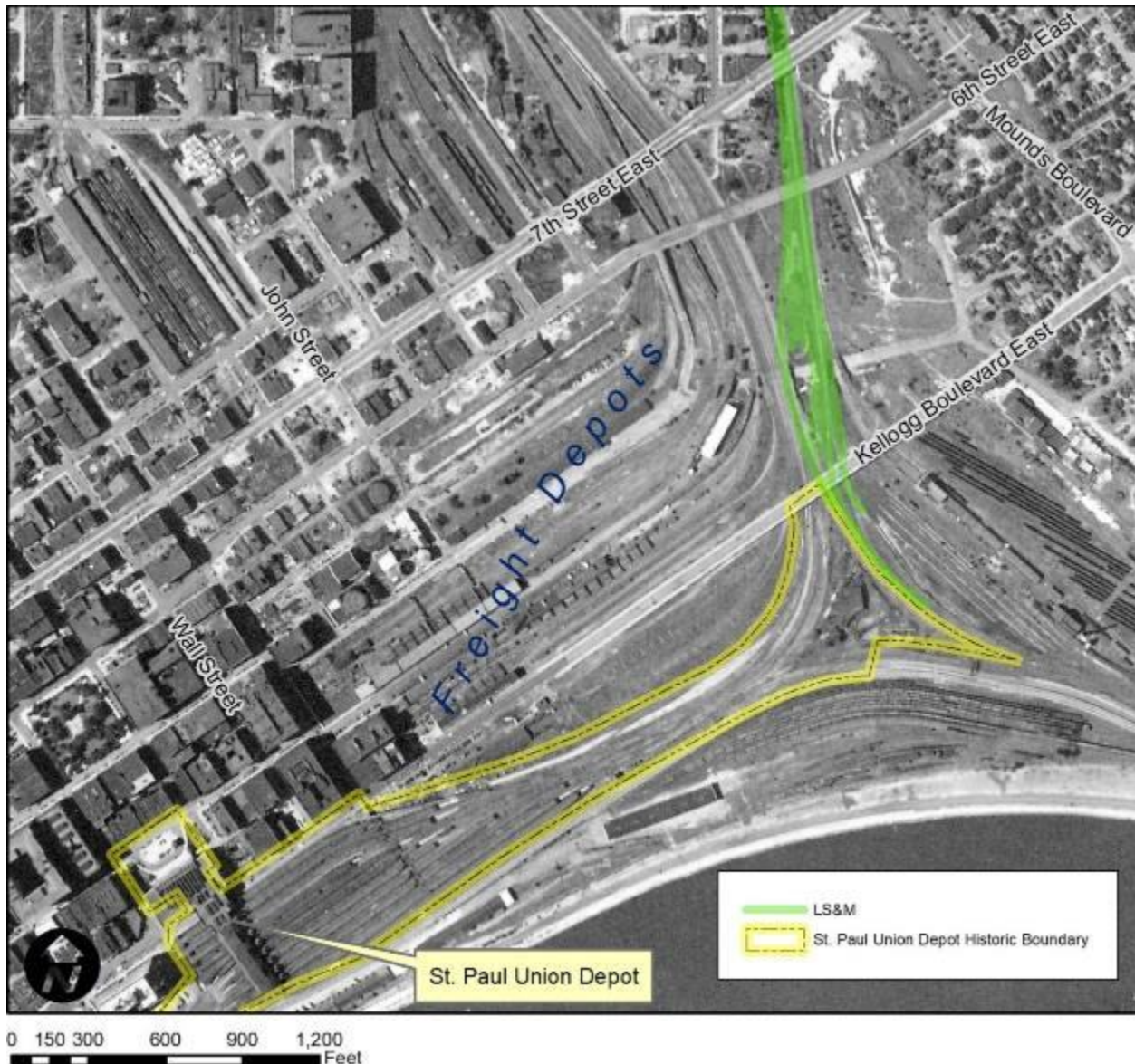


Figure 14. Aerial image of downtown Saint Paul from 1940 showing area east of Union Depot with LS&M mainline railroad roadway shown in green. Trackage between Union Depot and the LS&M mainline would have been historically built, owned, and operated by the Saint Paul Union Depot Company.

The majority of the historic rail lines that would have been located adjacent to the LS&M mainline railroad within this portion of the LS&M Railroad Corridor Historic District are nonextant. Only a handful of tracks remain, but none were historically associated with the LS&M. Heading east from Union Depot, is an existing railroad corridor (not associated with the LS&M) from the southern end of the depot's concourse to the wye junction east of TH 52, west of the Bruce Vento Nature Sanctuary, south of East Kellogg Boulevard, and north of Shepard/Warner Road. Historically, between Union Depot and the wye,

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

LS&M trains would have used Saint Paul Union Depot Company trackage. Tracks owned and operated by the LS&M would have begun at the existing wye before branching off to the northeast and onto the LS&M mainline railroad roadway at East Kellogg Boulevard. Georeferenced maps (see Map B-1 in Appendix B) indicate that the existing wye does not include trackage that was historically built and operated by the LS&M.

The setting and topography of this portion of the LS&M Railroad Corridor Historic District, northeast of the wye junction, has been greatly altered by urbanization, including the removal of numerous rail lines and various buildings, the construction of new buildings, utility installation and updates, changes along the shoreline of the Mississippi River, and the construction of I-94. Some of these changes occurred before 1970, the recommended end date for the historic district's period of significance (see Section 7.D). For example, the section of I-94 travelling east from downtown Saint Paul was open by 1966 and the section between Minneapolis and Saint Paul was open by 1968.²¹ Analysis of aerial photography shows that the railroad track remained after the initial freeway construction but was removed in the late 1980s when I-94 was reconstructed through this area (see Figure 15). A portion of this reconstruction was placed upon new areas of fill that severed the railroad roadway, placing an obstruction across it.

²¹ U.S. Geological Survey, "Aerial Photograph, Saint Paul, Minn., GS-VBOX, Roll 2 Frame 7" (U.S. Geological Survey, November 2, 1966), U.S.G.S. Earth Explorer, earthexplorer.usgs.gov; Patricia Cavanaugh, *Politics and Freeways: Building the Twin Cities Interstate System* (Center for Urban and Regional Affairs (CURA) and Center for Transportation Studies (CTS) at the University of Minnesota, October 2006), 18.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

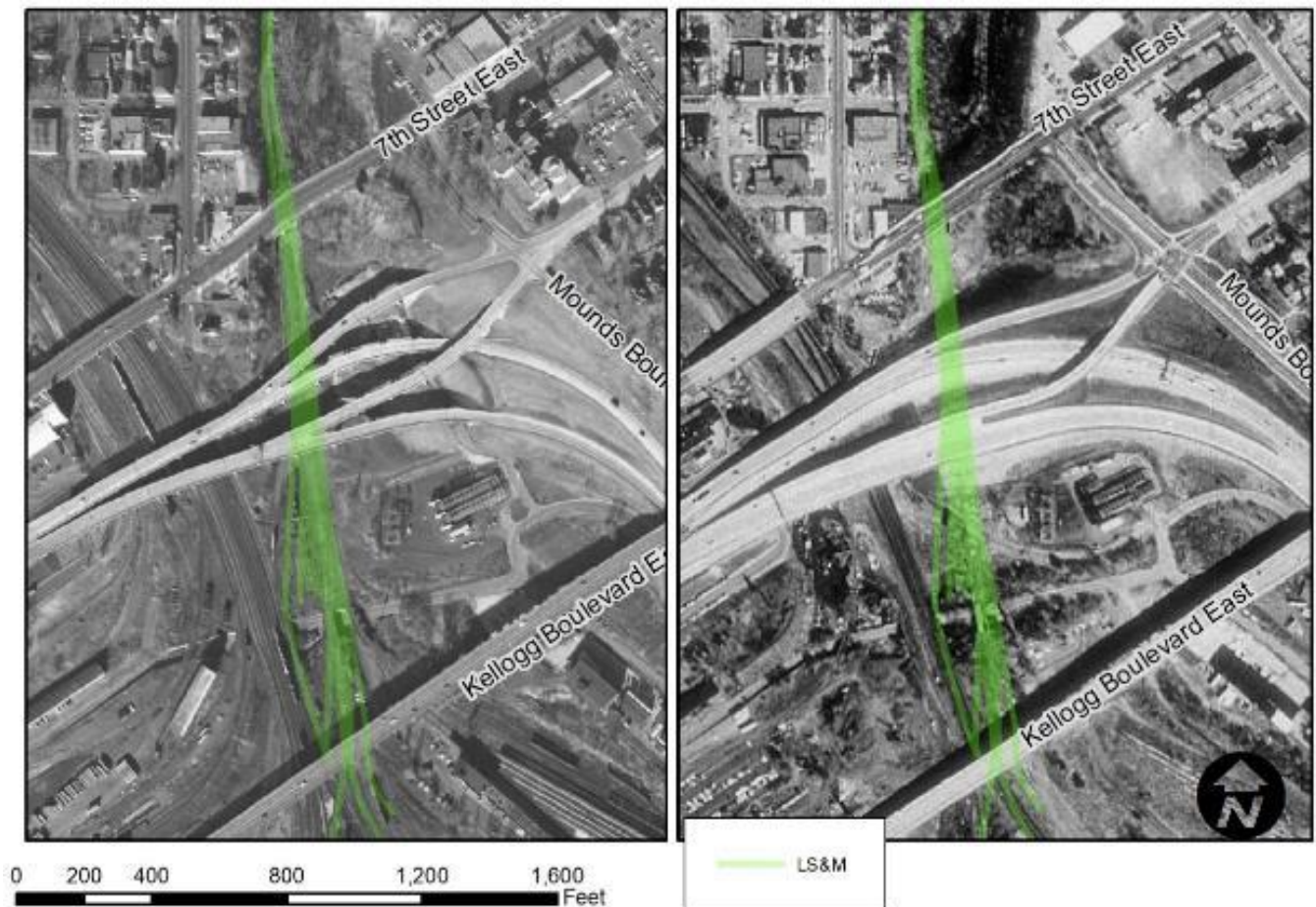


Figure 15. Aerial imagery from 1966 (left) and 1991 (right) showing initial construction of I-94 over the LS&M railroad roadway and late 1980s reconstruction atop fill that resulted in removal of the railroad track.

Based on georeferencing of Sanborn fire insurance maps and historic aerial imagery onto a current aerial, only portions of the LS&M mainline railroad roadway remain. Maps and field survey suggest that the original 1868 roadway and/or the 1880s realignment were roughly the same from the wye junction to Arcade Street. Where the original 1868 roadway and/or the 1880s realignment remains, the Bruce Vento Trail generally follows it, though the physical elements of the railroad roadbed, including ties and ballast, have been removed and replaced with an asphalt trail. South of I-94, a short portion of the Bruce Vento Trail appears to travel along the railroad roadbed within the Bruce Vento Nature Sanctuary (see Figure 16). This portion includes a 50.70-foot-long steel deck girder bridge built in 1900 that carries the trail over Fourth Street East (MnDOT Bridge L5725, RA-SPC-7115), and the bridge approaches (approximately 50 feet on the north and south).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 16. Portion of LS&M railroad roadway between Bruce Vento Nature Sanctuary and the southern end of Swede Hollow Park. Note how the roadway was largely obliterated by the reconstruction of I-94.

Fill placement for the reconstruction of I-94 obliterated the railroad roadway between the present-day Bruce Vento Nature Sanctuary and Swede Hollow Park to the north of the highway (the Bruce Vento Trail under I-94 does not follow the original rail roadway). Beginning at the southern end of Swede Hollow Park, between I-94 and Seventh Street East, the LS&M railroad roadway runs northward for approximately 4,500 feet and continues under the active Omaha Road railroad corridor and Phalen Boulevard, exiting Swede Hollow Park. In this area, the Bruce Vento Trail travels along the railroad

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

roadway. Within this stretch of the LS&M Railroad Corridor Historic District, four structures carry vehicular or rail traffic over the trail. Moving from south to north, Seventh Street East sits atop an 1884 double-arched tunnel, the Seventh Street Improvement Tunnels, through which two parallel LS&M tracks traveled (MnDOT Bridge 90386, see Figure 17). The tunnels are listed in the National Register for engineering significance (RA-SPC-6402, National Register #89001828). Minnehaha Avenue crosses the LS&M Railroad Corridor Historic District on a 1978, 148-foot-long, prestressed concrete slab bridge (MnDOT Bridge 62533, see Figure 18) and Phalen Boulevard crosses the LS&M Railroad Corridor Historic District on a 2001, 142.6-foot-long, prestressed concrete beam span (MnDOT Bridge 62616). No data was available from MnDOT for the bridge carrying the Omaha Road rail corridor over the LS&M Railroad Corridor Historic District.



Figure 17. Image of Seventh Street East carried over the LS&M Railroad Corridor Historic District by an 1884 double-arched tunnel (MnDOT Bridge 90386). Note the paved Bruce Vento Trail, which currently utilizes the westernmost tunnel. View facing north.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 18. Image of the 1978 bridge (MnDOT Bridge 62533) that carries Minnehaha Avenue across the LS&M Railroad Corridor Historic District. Note the presence of the Bruce Vento Trail (partially under water). The buildings at right are part of the former Hamm's Brewery complex (discussed below). View facing north.

Topographically, the LS&M railroad roadbed, which mostly coincides with the Bruce Vento Trail in this section, is on a modest fill embankment that inclines slightly to the northeast. The topography slopes up to the west of the trail towards modern Payne Avenue, and slopes down to the east where the former Phalen Creek bed is located (see Figure 19). The creek was placed into storm sewers in phases, and by the 1930s, the lower Phalen Creek area was entombed into two separate storm sewer lines.²² Storm sewer manholes are evident along the multi-use trails in Swede Hollow Park; however, portions of the creek appear to have been daylighted and currently run aboveground. On the west side of the LS&M Railroad Corridor Historic District, at the rear of the residential property at 622 Beaumont Street East, the topography was steep enough to require a concrete retaining wall. According to a date stamp at the top of the wall, it was constructed in 1915 (see Figure 20 and Figure 21). A second multi-use trail (part of the Swede Hollow Park trail system) parallels the area east of the former creek location. The area on either side of the trail is overgrown with trees and thick vegetation (see Figure 22). This vegetation separates the former railroad roadway from urban and industrial development along Payne Avenue to the west and the mixed industrial and residential areas of Dayton's Bluff to the east. Near Minnehaha Avenue, the latter includes the former Theodore Hamm Brewing Company Complex (RA-SPC-2926,

²² Marjorie Otto, "Phalen Creek May Soon See Some Daylight," *LillieNews.Com*, 2017, <http://www.lillienews.com/articles/2017/12/03/phalen-creek-may-soon-see-some-daylight>; Steve Trimble, "Phalen Creek," *Saint Paul Historical*, accessed February 20, 2019, <https://saintpaulhistorical.com/items/show/291>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

eligible for the National Register), in which many of the buildings are extant and lie immediately adjacent to the former railroad roadway just south of Phalen Boulevard (see Figure 18 and Figure 23).



Figure 19. Image of the Bruce Vento Trail, which generally coincides with the LS&M railroad roadbed in Swede Hollow Park, showing the topography sloping from west (left) to east (right), view facing north.



Figure 20. Concrete retaining wall constructed in 1915, located at the rear of 622 Beaumont Street East, view facing north.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 21. Closeup of the stamp at top of the concrete retaining wall, noting that the wall was built by the NP in 1915, view facing west.



Figure 22. Image of the Bruce Vento Trail in Swede Hollow Park showing the sloping topography from west (left) to east (right). The embankment at center separates the Bruce Vento Trail (which generally follows the railroad roadbed) from the former Phalen Creek bed, portions of which have been daylighted. A second trail, not associated with the LS&M mainline, is located east of the creek bed. Note the vegetation on either side of the Bruce Vento Trail. View facing north.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 23. LS&M railroad roadway through Swede Hollow Park to Phalen Boulevard and current Bruce Vento Trail. Note the proximity of Hamm's Brewery to the LS&M.

As the LS&M Railroad Corridor Historic District exits Swede Hollow Park and passes beneath Phalen Boulevard, it enters Eastside Heritage Park. This park was built as part of the Phalen Boulevard project and replaced former industrial properties. The Bruce Vento Trail and LS&M railroad roadbed are generally concurrent through the park. About 1,600 feet into the park, several additional recreational trails branch off from the main Bruce Vento Trail (see Figure 24). This stretch of the LS&M Railroad Corridor Historic District includes an underpass beneath Neid Lane, which is carried by a 142.6-foot-long, prestressed concrete beam bridge constructed in 2004 (MnDOT Bridge 62617). At the east end of the Eastside Heritage Park, the Bruce Vento Trail generally follows the LS&M railroad roadbed beneath Arcade Street (MnDOT Bridge 62062, built in 2001).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

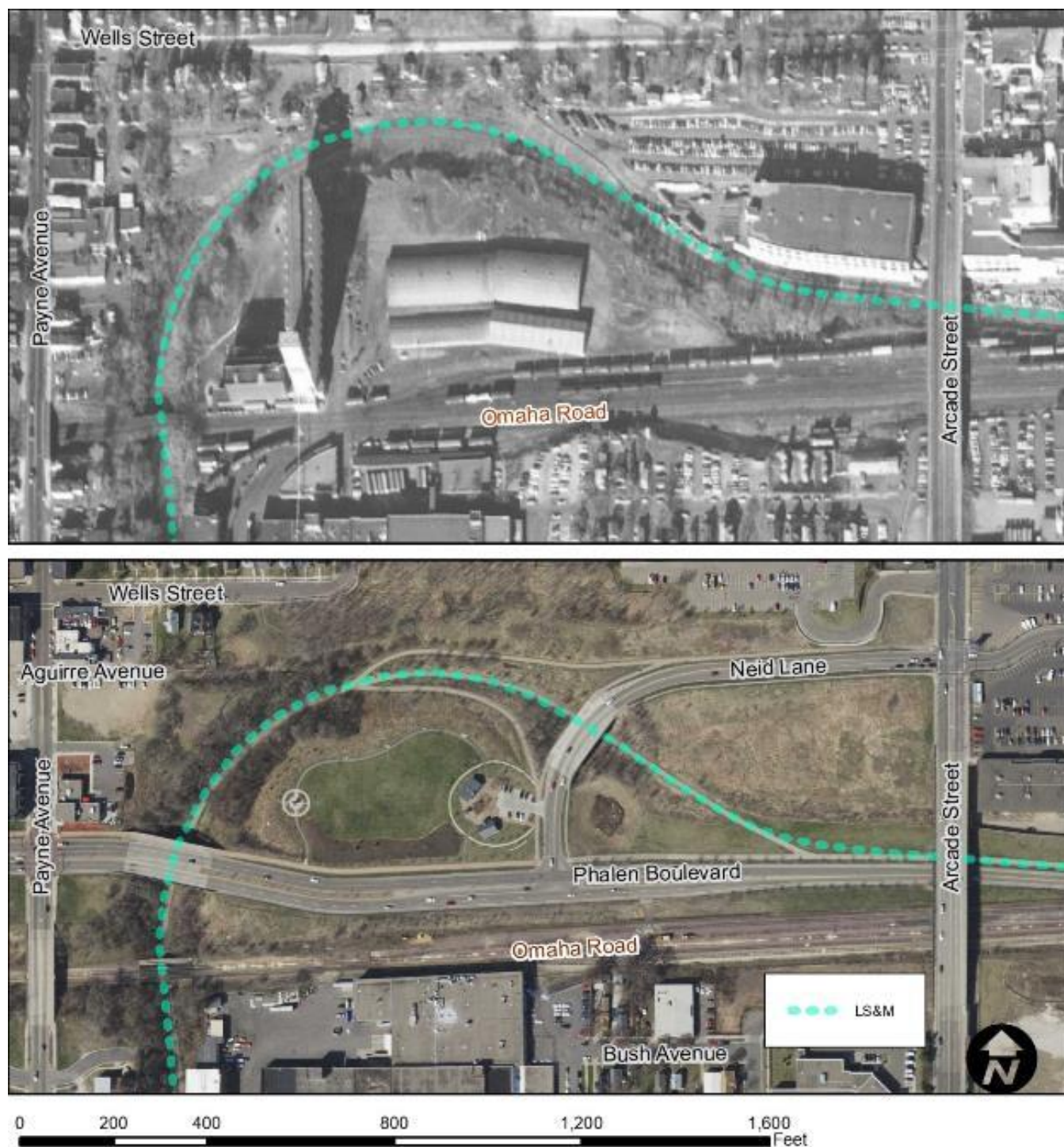


Figure 24. Comparison of 1966 aerial (top) with 2016 aerial (bottom) showing changes to the setting including construction of Phalen Boulevard, Neid Lane, and associated bridges, as well as multiple recreational paths that branch off the Bruce Vento Trail, which generally follows the LS&M railroad roadbed through the Eastside Heritage Park.

C. ARCADE STREET TO JOHNSON PARKWAY

From Arcade Street to Johnson Parkway, the construction of Phalen Boulevard (completed in 2001) has largely obliterated the LS&M mainline railroad roadway. Historically, there was no vehicular roadway in this portion of the LS&M Railroad Corridor Historic District, which was limited to rail tracks and sidings owned and operated by the LS&M and, in an adjacent corridor directly to the south, the Omaha Road (see Figure 25). The Omaha Road (now the CP) retains some of its tracks south of Phalen Boulevard, but the LS&M railroad roadway is nonextant. These tracks and sidings provided access to industrial properties that lined the LS&M Railroad Corridor Historic District between Payne Avenue and Johnson Parkway. Residential properties were located on parcels adjacent to the industrial properties. Some industrial properties are extant, as are most of the residential properties (a parcel or two removed from the LS&M Railroad Corridor Historic District). The terrain is relatively flat along this portion of the LS&M Railroad Corridor Historic District but slopes up to the north, where there is heavy urban and industrial development. Although there is some green space along the north side of Phalen Boulevard, where the Bruce Vento Trail lies, much of the area is obvious fill or has been affected by cut and fill episodes.

Within this portion of the LS&M Railroad Corridor Historic District, evidence of the LS&M railroad roadway has been removed. Georeferenced maps indicate that the railroad roadway was obliterated by Phalen Boulevard after the latter was completed in 2001. Construction of the two-lane vehicular roadway obliterated historical/architectural and archaeological evidence of the 1868 railroad roadway and/or 1880s realignment. In this portion of the LS&M Railroad Corridor Historic District, the Bruce Vento Trail is routed adjacent to Phalen Boulevard, north of the former LS&M railroad roadway (see Figure 25 and Figure 26). The trail is located approximately 10 to 50 feet north of the vehicular roadway (see Figure 27 and Figure 28). The construction of Phalen Boulevard, urban development around the boulevard, and utilities in this area, including a large sewer system, have eliminated the former railroad roadway. Several bridges carry local streets over the LS&M Railroad Corridor Historic District. These include the 2001 prestressed concrete beam bridge that carries Arcade Street (MnDOT Bridge 62062), the 1942 steel continuous beam bridge that carries Forest Street (MnDOT Bridge 5962, RA-SPC-1294), and the 2003 prestressed concrete beam bridge that carries Earl Street (MnDOT Bridge 62545).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 25. Portion of LS&M railroad roadway obliterated by construction of Phalen Boulevard, showing relationship of Bruce Vento Trail to historic railroad roadway.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 26. Portion of LS&M railroad roadway obliterated by construction of Phalen Boulevard, showing relationship of Bruce Vento Trail to historic roadway.



Figure 27. Image of Phalen Boulevard (at left) and Bruce Vento Trail (at center), view facing west toward Forest Street. The LS&M railroad roadway was obliterated by the construction of Phalen Boulevard. The Bruce Vento Trail was built north of the LS&M railroad roadway. Note the gas pipeline and manhole for access to water/sewer and/or other utilities that also would have disturbed the former railroad roadbed.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 28. Image of Phalen Boulevard (at right) and Bruce Vento Trail (at center) just east of Earl Street, view facing east. The LS&M railroad roadway was obliterated by the construction of Phalen Boulevard (at right). The Bruce Vento Trail (center) is located north of the LS&M railroad roadway.

Where the Bruce Vento Trail runs parallel to the Duluth and Case Recreational Center Park, the green space between the park and Phalen Boulevard is wooded and has obviously been heavily modified by past construction, including some deep ditches farther to the north. Closest to the intersection with Johnson Parkway, aerial photographs from 1940 show that the railroad roadway in this area was on a fill embankment that is now gone (see Figure 29). A former rail bridge over Johnson Parkway (Bridge 90422), opened in 1932 and demolished in 1998 (State Aid Project #164-129-11). The embankment and the rail bridge over Johnson Parkway were removed ca. 2000, as part of the Phalen Boulevard project.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

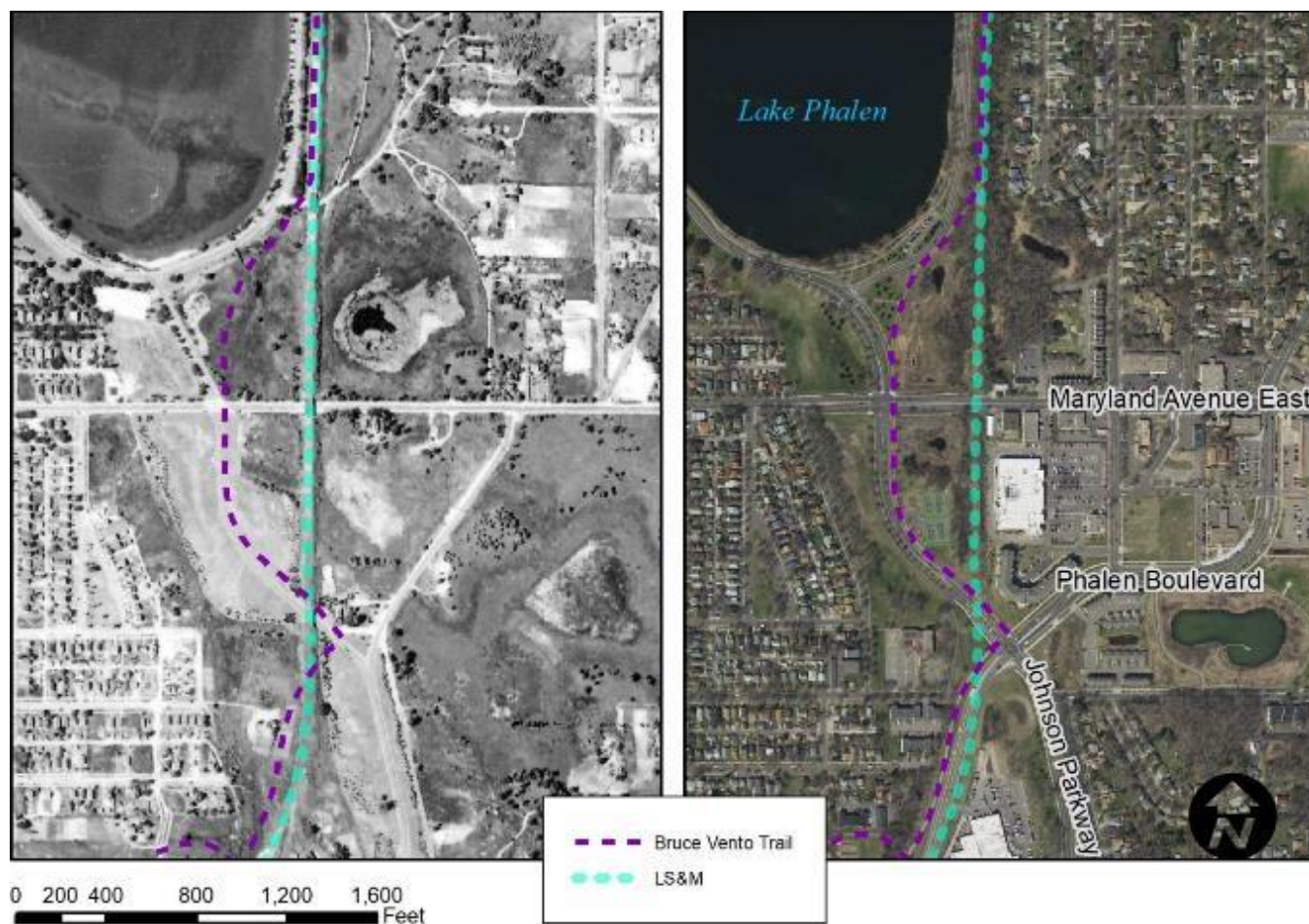


Figure 29. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations to railroad roadway at Johnson Parkway.

D. JOHNSON PARKWAY TO BEAM AVENUE

From Johnson Parkway to Beam Avenue, the LS&M Railroad Corridor Historic District passes through the Greater East Side of Saint Paul, crosses the city limits at Larpenteur Avenue, and enters the city of Maplewood. With the exception of commercial nodes at Maryland Avenue and Frost Avenue, the portion of the LS&M Railroad Corridor Historic District between Johnson Parkway and TH 36 is lined with dense residential development, the result of suburban expansion that largely began in the mid-1950s and continued into the 1970s. Between TH 36 and Beam Avenue, less development has encroached upon the railroad roadway, although several additional east-west streets constructed from the 1970s through the 2000s have cut through the fill areas of the railroad roadway. Prior to World War II, the surrounding landscape was almost exclusively agricultural, and County Roads B, C, D, and E were the only east-west roads that crossed the LS&M Railroad Corridor Historic District between Maplewood and the outskirts of White Bear Lake. Post-World War II (postwar) suburban expansion and the accompanying highway construction has more than doubled the number of crossings through the

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

LS&M Railroad Corridor Historic District, including two highways (TH 36 and I-694) and several at-grade crossings.

The portion of the LS&M Railroad Corridor Historic District between Johnson Parkway and Beam Avenue is the most intact of those portions where the tracks have been removed. It includes areas where fill was used to construct embankments to raise the railroad roadbed above grade and areas where cuts were made into the landscape to run the roadbed below grade. As such, the following description pays particular attention to elevations of the historic railroad roadbed and the locations where the Bruce Vento Trail generally follows the 1868 railroad roadway. Close attention is also paid to the extent in which postwar development, including the construction of large residential areas on former agricultural land, has encroached upon the former railroad ROW. In 1992, the BN, which owned the railroad corridor at the time, conveyed ownership to the RCRRA. The following description moves from south to north and generally proceeds one block at a time. The width of the ROW varies throughout the portion of the LS&M Railroad Corridor Historic District, generally increasing from south to north. Near Johnson Parkway, the ROW is roughly 80-feet wide. At Arlington Avenue the ROW is approximately 100-feet wide. And, at Beam Avenue, the ROW is about 150-feet wide.

The elements of the LS&M Railroad Corridor Historic District between Johnson Parkway and Beam Avenue that are most clearly visible as a linear feature are the embankment and cut areas, which are generally located in the center of the ROW (see Figure 30 through Figure 33). The embankment and cut areas are a result of the 1880s realignment. Because much of the 1880s realignment followed the original 1868 railroad roadway, the embankment from the realignment may have subsumed and include portions of the original roadway. In areas where the Bruce Vento Trail is located atop the fill embankment, grading may have occurred ca. 2000 in preparation for the paved trail.

As the LS&M Railroad Corridor Historic District travels northeast from Johnson Parkway to Beam Avenue, it is paralleled by likely borrow pits outside the ROW. These likely borrow pits were used as part of 1868 railroad construction and 1880s railroad railway realignment, the location of which are discussed in pertinent sections of this document. Many of the former borrow pits have been converted to modern retention ponds. Most of the railroad roadbed in this portion of the LS&M Railroad Corridor Historic District is located on an embankment. Where the railroad roadbed is on an embankment, the embankment is 1 to 2 feet above the surrounding ground surface in some areas and 10 to 20 feet taller in others. The maximum height above the surrounding ground surface is almost 30 feet near Beam Avenue. According to information from local residents, the rail ties and ballast were removed from the railroad roadbed for the Bruce Vento Trail construction, and the roadbed was graded to make a flat

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

surface; therefore, measurements presented in this evaluation represent current measurements.²³ The 1880s roadbed related to the roadway realignment was likely higher when the railroad track was present. Based on a 1998 project memorandum for the Burlington Northern Regional Trail between Johnson Parkway and Frost Avenue (later renamed the Bruce Vento Trail), rails and ties were removed from the abandoned railroad roadbed by 1998, which remained at the initial grade established for the trackage, which was generally less than 2 percent. Planned alterations to the LS&M Railroad Corridor Historic District as part of the Burlington Northern Regional Trail project included clearing and grubbing trees within 10 feet of the proposed trail alignment or in other areas where vegetation had grown in the former railroad roadway. The memo indicated that “generally, the only site grading will be the construction of an accessible 111.3m (365 foot) long ramp from the raised railroad roadbed to the existing paved path adjacent to Johnson Parkway.”²⁴ While grading was minimal, the construction of the Bruce Vento Trail called for scarifying the top 12 inches of the roadbed and compacting this material for use as a subbase. Six inches of Class 5 aggregate was to be compacted atop the subbase and three inches of bituminous placed atop the base. As a result, the height of the embankment where the Bruce Vento Trail is located may differ from that of the actual 1880s railroad roadbed, but the difference in most areas is likely minimal.²⁵ In areas of the LS&M Railroad Corridor Historic District that include an embankment, it is flanked by either drainage ditches (some shallow and some deeper) or steep slopes down to the ground surface. These ditches and slopes are generally included within the boundaries of the LS&M Railroad Corridor Historic District. The ditches are mostly overgrown with natural vegetation. In contrast to the embankments, some areas of the railroad roadbed are in cuts of various depth, while in other areas it is near grade. Between Johnson Parkway and County Road C, the RCRRA ROW is 100 feet wide and from County Road C to roughly Beam Avenue it widens to 150 feet. Measurements of the embankment were determined by field observation and LiDAR imagery interpretations of feet above sea level (FASL). LiDAR imagery is a remote sensing method used to examine the earth’s surface. This method helps illustrate the height or depth of fill and cut actions within and surrounding the LS&M Railroad Corridor Historic District and can also provide information on drainage, borrow pits, and modern disturbances.

²³ Strata Morph team discussion with local residents on the Bruce Vento Trail near Harvest Park between November 28 and November 29, 2018 (names not provided).

²⁴ Minnesota Department of Transportation and Ramsey County Parks and Recreation Department, “Project Memorandum for Burlington Northern (BN) Regional Trail, Frost Avenue (CSAH 28) to Johnson Parkway S.P. No. 62-090-01, TEA 6298 (031),” March 1998, Ramsey County Department of Parks and Recreation, Maplewood, Minn.

²⁵ Minnesota Department of Transportation and Ramsey County Parks and Recreation Department, “Project Memorandum for Burlington Northern (BN) Regional Trail, Frost Avenue (CSAH 28) to Johnson Parkway S.P. No. 62-090-01, TEA 6298 (031),” 2, 11.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

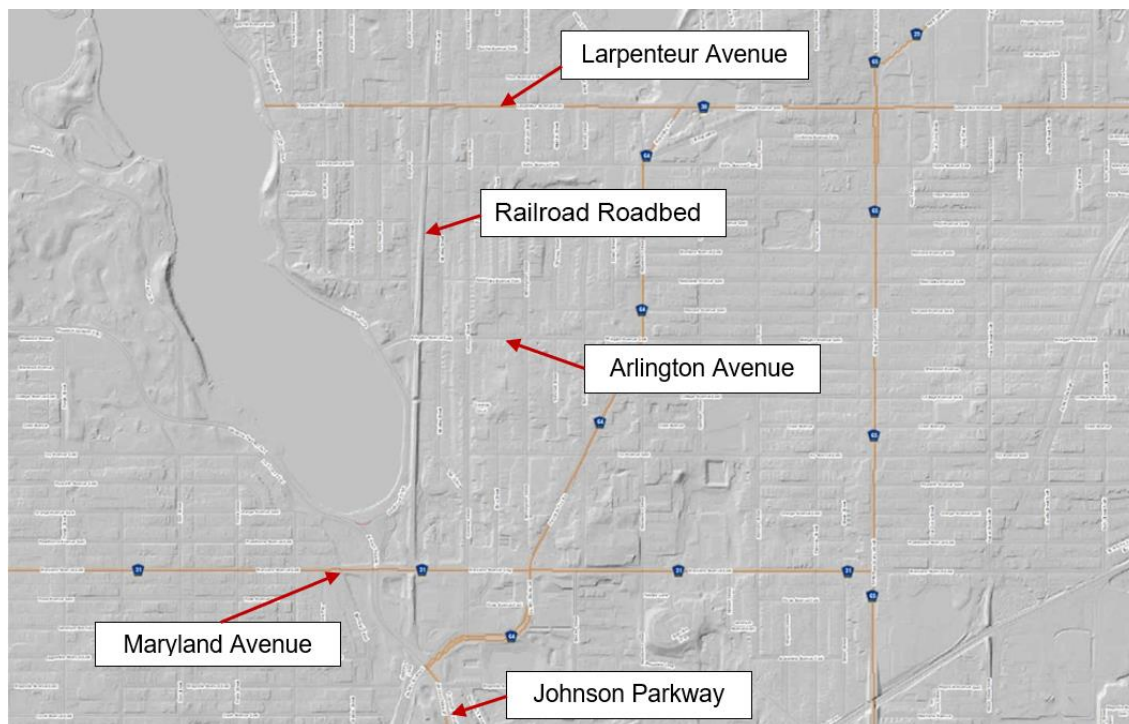


Figure 30. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between Johnson Parkway and Larpenteur Avenue.

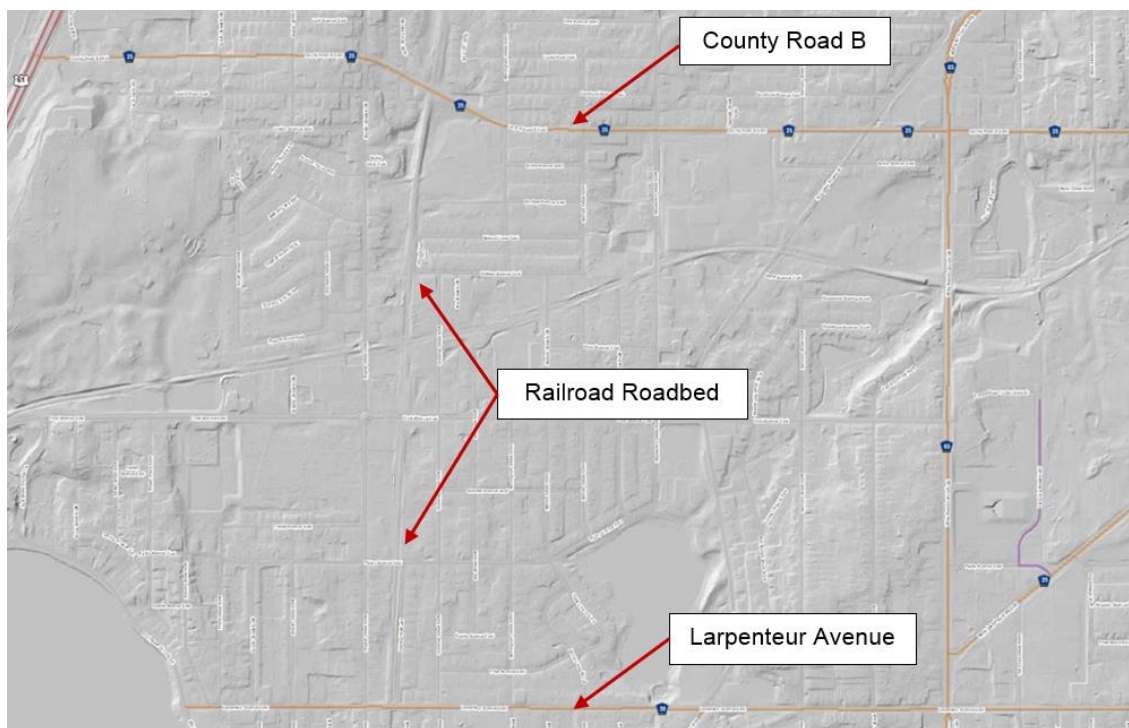


Figure 31. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between Larpenteur Avenue and County Road B.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

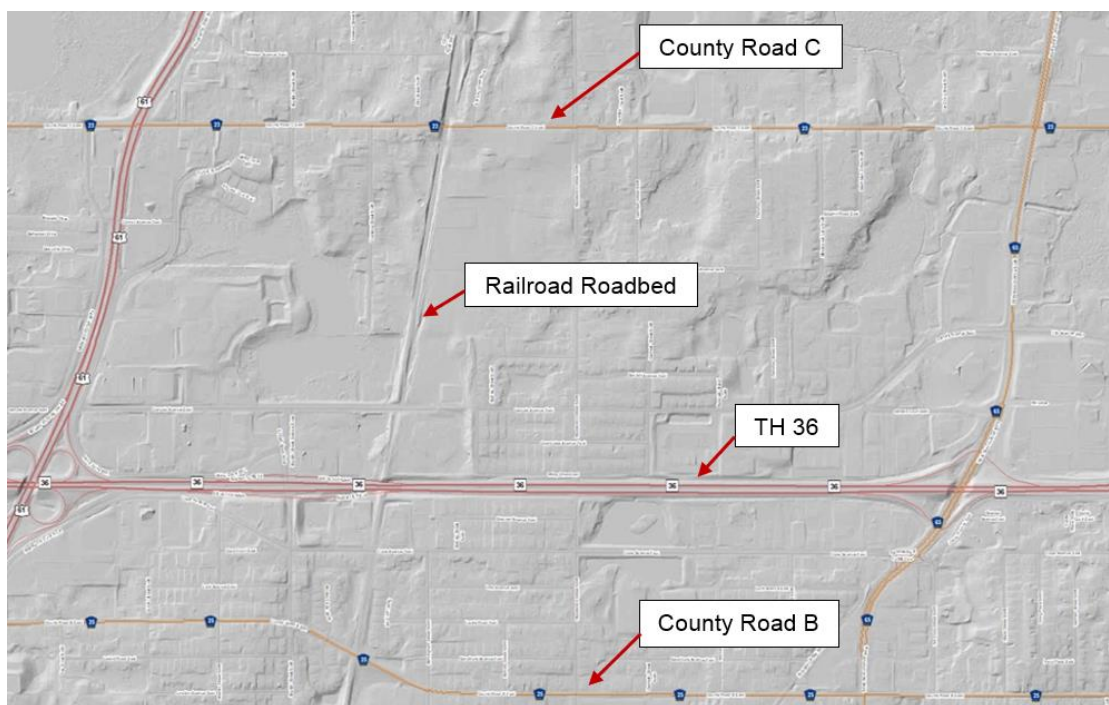


Figure 32. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between County Road B and County Road C.

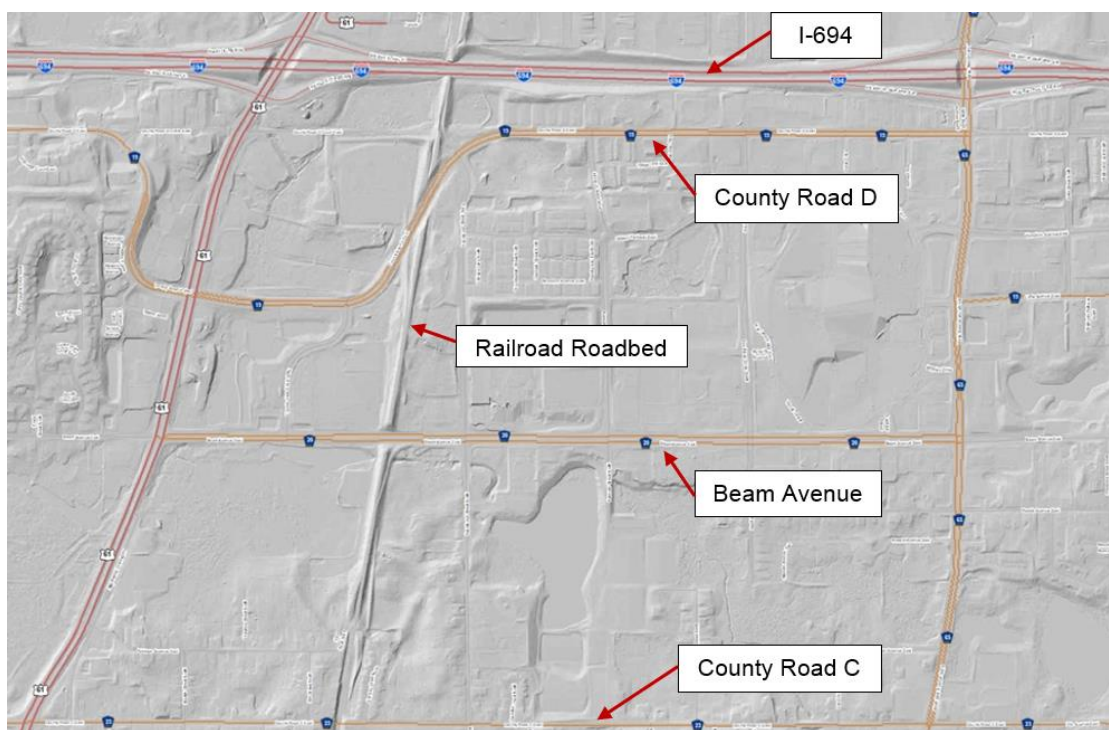


Figure 33. LiDAR imagery showing the extant fill and cut areas of the railroad roadbed between County Road C and I-694.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

At the southern end of this portion, the embankment from the railroad roadbed is still present between Johnson Parkway and Maryland Avenue. Industrial and urban expansion parallels the roadbed to the east, while the southernmost portion of Phalen Park (RA-SPC-10850, also called Phalen Regional Park) and a former borrow pit from rail construction (date unknown) parallel this area to the west.²⁶ The embankment slopes up almost immediately north of Johnson Parkway, from almost 8 feet at the southern end to almost 17 feet above the surrounding surface closer to Maryland Avenue (see Figure 34). The embankment is covered with small trees that have grown up close together, and there is a narrow worn path to a homeless encampment on the embankment. This area is not part of the Bruce Vento Trail (which runs at grade adjacent to Johnson Parkway). No evidence of intact rails, ties or ballast are present.



Figure 34. Image of the 1880s embankment south of Maryland Avenue, view facing southeast. This photo illustrates the height of the embankment in relationship to the surrounding topography, as demonstrated by the at-grade parking lot in the background.

On the north side of Maryland Avenue, the 1880s railroad roadway is nearly at grade. A likely borrow pit lies immediately to the east, but outside the LS&M Railroad Corridor Historic District. Borrow pits parallel to the railroad roadway indicate where the adjacent soil was removed, or borrowed, to help build the adjacent embankment upon which the roadbed and tracks were placed. The borrow pits may

²⁶ Keller Regional Park abuts Phalen Regional Park directly to the north and combined, the two parks are often referred to as Phalen-Keller Regional Park. However, the two parks have distinct histories, architecture, and governmental oversight (Phalen Regional Park is historically a city park while Keller Regional Park is historically a county park).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

have been used for the original 1868 roadway construction and/or the 1880s roadway realignment. However, since they cannot be assigned to a specific time period of construction, they cannot embody distinctive characteristics of early railroad construction. Therefore, they are not a contributing element to the LS&M Railroad Corridor Historic District, as discussed in Section 7 of this document.

As the LS&M Railroad Corridor Historic District heads north from Maryland Avenue, the embankment rises from grade and includes a steep slope to the east. Outside the LS&M Railroad Corridor Historic District, an open area and likely former borrow pit, is located to the west. Historical research shows that this part of the LS&M Railroad Corridor Historic District was not part of the original 1868 railroad roadway, but part of Lake Phalen, which was historically larger and surrounded by wetland. The original 1868 LS&M roadway went around the eastern edge of the historically larger lake. As part of the late 1880s realignment and regrading project, the St. Paul & Duluth (StP&D) Railroad shifted the railroad roadway to the west, constructing a series of trestles across the southeastern corner of the lake. As a result of 1899 park improvements, the lake was dredged, and the surrounding wetlands and areas of shoreline filled in; this fill moved the shoreline farther to the west and the realigned 1880s railroad roadway eventually went through that filled area. From Maryland Avenue to just under 1,000 feet to the north of it, there is a crude walking path atop the embankment (see Figure 35). At this point, the Bruce Vento Trail, which travels outside the LS&M Railroad Corridor Historic District starting near Earl Street, reenters the corridor from the west and merges onto the embankment and the LS&M railroad roadway.



Figure 35. Image of the LS&M Railroad Corridor Historic District from the top of the embankment north of Maryland Avenue, view facing south. Note the presence of a walking path.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Just under 1,000 feet north of Maryland Avenue, the embankment within the LS&M Railroad Corridor Historic District slopes down significantly on both sides, with East Shore Drive and Lake Phalen to the west and suburban neighborhoods to the east. Aerial photographs from 1940 show a rail bridge in this area that has since been removed. A 1907 concrete arch bridge (MnDOT Bridge R0438, RA-SPC-11140) carries the LS&M railroad roadbed over a pedestrian path connecting Clarence Court with East Shore Drive, approximately 750 feet south of Arlington Avenue. At Arlington Avenue, a rail bridge present in 1940 aerial images has since been removed. Lidar imagery shows that the embankment in this portion of the LS&M Railroad Corridor Historic District is built up 16 feet above the surrounding land surface on the west side, and 23 feet on the east. A former borrow pit was noted, outside the railroad roadway, southeast of the intersection of East Shore Drive and Arlington Avenue. The Bruce Vento Trail is located on the railroad roadbed for the length of this block but then veers slightly to the west, off the embankment to cross Arlington Avenue at grade, approximately 10 feet lower than the embankment.

North of Arlington Avenue, the Bruce Vento Trail quickly transitions from the at-grade crossing to the top of the embankment (see Figure 36). Between Arlington Avenue and Idaho Avenue (one block south of Larpenteur Avenue), the modern Bruce Vento Trail embankment is higher at the southern end and slopes down toward Idaho Avenue at the north, with a difference of almost 8 feet in height between the two areas. Near Arlington Avenue, the modern Bruce Vento Trail embankment is 18 feet higher than the nearby surface to the west and 14 feet higher than the surface to the east. Near Idaho Avenue, the modern Bruce Vento Trail embankment is 4 feet higher than the adjacent land to the west and 2 feet higher than the land to the east. A pronounced ditch is present on the east side of the railroad roadbed for at least the northern 500 feet (see Figure 37). The railroad roadway is surrounded by residential neighborhoods. Urban encroachment on the RCRRA ROW is exemplified in this area by an apartment building parking lot that partially overlaps with it just south of Idaho Avenue (see Figure 38).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 36. Comparison of 1940 (left) and 2016 (right) aerial imagery showing eastern shore of Lake Phalen.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 37. Example of a ditch area adjacent to the Bruce Vento Trail south of Idaho Street, view facing south.



Figure 38. Parking lot encroaching the RCRRA ROW south of Idaho Street. The ROW is marked by a green post near the chain link fence at right. View facing southwest.

Heading north from Idaho Avenue, the embankment is less pronounced; it is only 4 feet higher than the land to the west and 2 feet higher than the land to the east. Closer to Larpenteur Avenue, the embankment is relatively even with the land to the west but built up nearly 6 feet above the land to the east. A ditch at least 6 feet deep parallels the embankment on the east for this entire block. Between

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Idaho Avenue and Larpenteur Avenue the railroad roadway is surrounded by postwar residential neighborhoods. The Bruce Vento Trail continues to follow the embankment on this block and continues to follow the railroad roadbed until just south of Gervais Avenue.

The modern Bruce Vento Trail embankment between Larpenteur Avenue and Ripley Avenue is less obvious in some areas. North of Larpenteur Avenue, it is built up 6 feet compared to the land to its west, and 2 feet above the land to the east, where a slight ditch is located (see Figure 39). Residential neighborhoods lie to the east and west of the LS&M Railroad Corridor Historic District in this area.



Figure 39. Bruce Vento Trail south of Ripley Street, view facing south.

Between Ripley Avenue and Frost Avenue, the modern Bruce Vento Trail embankment is built up 2 feet relative to the land to the west. To the east, the LS&M Railroad Corridor Historic District includes either an embankment, built up 2-3 feet above the adjacent land, or a cut area of roughly 2-feet deep, depending on the location along the Corridor. A 1- to 2-foot-deep ditch parallels the embankment on the east side of the LS&M Railroad Corridor Historic District except for the area closest to Frost Avenue (see Figure 40). The LS&M Railroad Corridor Historic District is generally surrounded by residential development on both the east and the west, though some commercial properties are found to the east and the Gladstone Savannah is located on the northern half of this block. The Gladstone Savannah was historically the location of the Gladstone Shops, which were built in the 1880s as railroad shop facilities. No railroad buildings or trackage remain and the property has been developed as a city park and natural area. A rail siding that would have been related to the Gladstone Shops on the southwest

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

side of the intersection of Frost Avenue and English Street has been removed (see Figure 41).²⁷ Urban encroachment onto the RCRRA ROW is exemplified in this area by the extension of a manicured backyard onto the RCRRA ROW on the east side of the Bruce Vento Trail with a “No Trespassing” sign placed in the yard, and brush piled up to separate trail users from the yard area.



Figure 40. View of modern Bruce Vento Trail facing south at Frost Avenue. Note the minimal embankment and lack of ditched areas.

²⁷ The Gladstone Shops are recorded with the SHPO and the Office of the State Archaeologist (OSA) as an archaeological site: 21RA70. The National Register eligibility of the site is undetermined. The City of Maplewood designated the Gladstone Savanna Neighborhood Preserve as a local historic site in 2017. Summit Envirosolutions, Inc., “Gladstone Savanna Neighborhood Preserve” (Maplewood Local Designation Nomination Form, 2013), <https://maplewoodmn.gov/DocumentCenter/View/17584/Gladstone-Savanna-Local-Designation-Application?bidId=>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

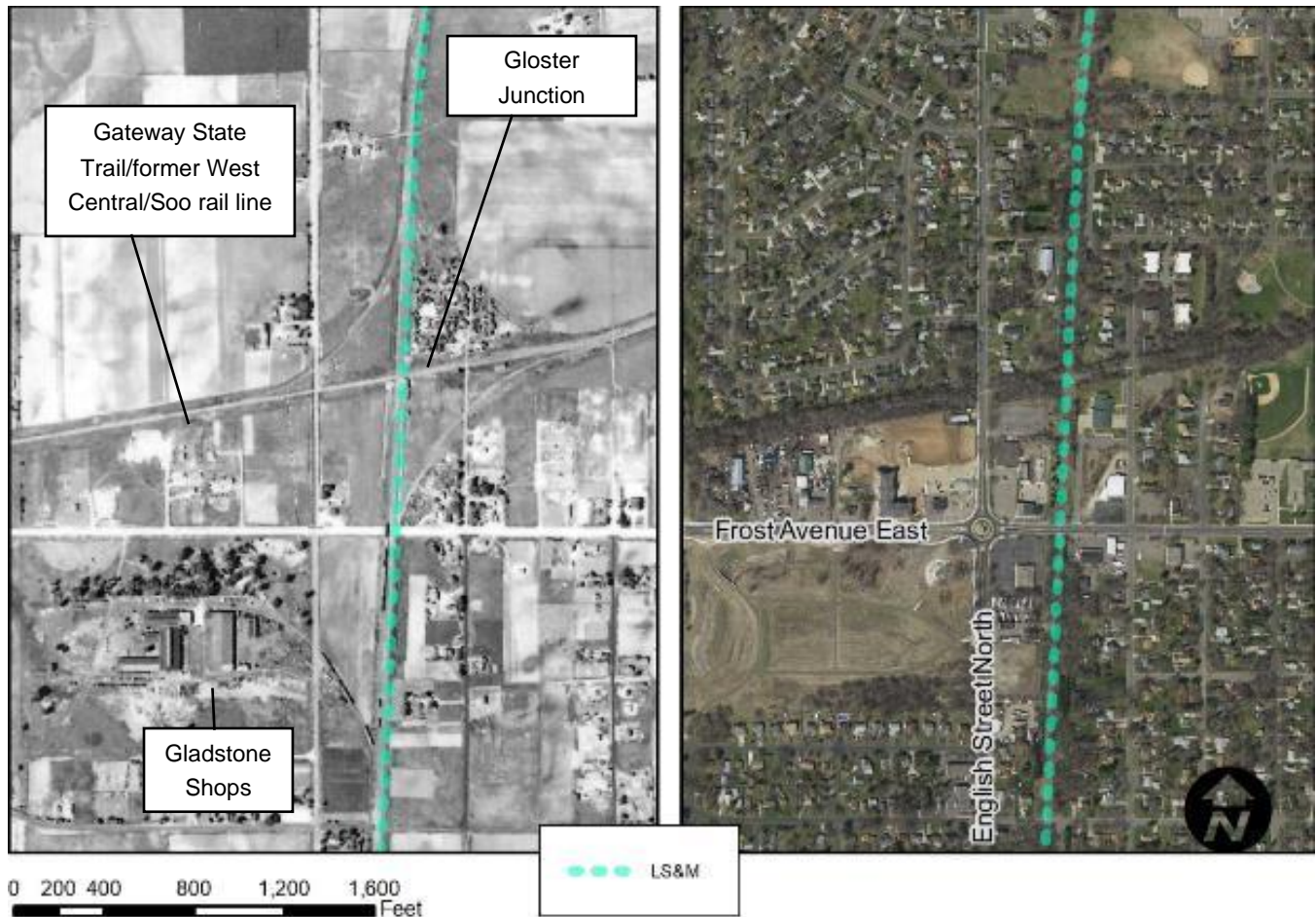


Figure 41. Comparison of 1940 (left) and 2016 (right) aerial imagery showing former Gladstone Shops/Gloster Junction area.

From north of Frost Avenue to the Gateway State Trail (former Wisconsin Central/Soo Line corridor, RA-SPC-8215), the LS&M Historic Railroad Corridor District includes an embankment that is built up slightly (1-2 feet) relative to the surrounding land (see Figure 42). There is clearly more fill on the east side than on the west. Immediately north of Frost Avenue, the LS&M Railroad Corridor Historic District is mainly surrounded by commercial development. The intersection of the Wisconsin Central/Soo Line and LS&M (at Phalen/Gloster Junction) necessitated additional curving tracks at the northwest and southeast quadrants, which allowed trains to transition between the two lines. These tracks were removed between 1991 and 2003, and the undeveloped land within these quadrants filled in with modern residential development (to the northwest) and the Maplewood Fire Department headquarters (to the southeast). A cut of approximately 4 feet is present north of the Gateway State Trail for about 1,300 feet (see Figure 43). At this point, the cut area transitions to an embankment, which is built up about 4-5 feet relative to the surrounding topography. Closer to County Road B, the embankment is almost 13 feet higher than the surface to the east and two deep borrow pits are located to the west

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

outside the RCRRA ROW, where the embankment is nearly 24 feet above the deepest borrow area. The area south of the deep borrow pits on the west of the LS&M Railroad Corridor Historic District may have also been used for borrow based on the land surface farther to the west. Judging from the surrounding topography, the area southeast of the intersection of County Road B and outside the LS&M Railroad Corridor Historic District may also have been used as a borrow area.



Figure 42. View of the LS&M railroad roadway near the intersection of the Bruce Vento Trail and the Gateway State Trail showing a small embankment, view facing north.



Figure 43. View of the LS&M railroad roadway showing a cut area north of the intersection with the Gateway State Trail, view facing north.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Between County Road B and Cope Avenue, the LS&M Railroad Corridor Historic District includes an embankment that is built up to generally 1-2 feet higher than the surrounding land (see Figure 44). The surrounding area is residential along this block. This is the most “open” portion of the LS&M Railroad Corridor Historic District, with the least amount of tree growth. A 1940 aerial photo shows Cope Avenue apparently terminating on either side of the railroad roadway, but today it cuts through the LS&M Railroad Corridor Historic District and the embankment at grade. A likely borrow pit lies to the west of the LS&M Railroad Corridor Historic District.



Figure 44. View of the LS&M railroad roadway facing north from County Road B. Note the presence of a slight embankment.

At Cope Avenue, the LS&M Railroad Corridor Historic District includes an embankment that is built up 1-2 feet higher than the surrounding land. Closer to TH 36, the topographical difference is more pronounced, with the embankment built up nearly 10 feet above the nearby surface. This increased height is likely due to changes in the area related to the construction of TH 36, which is a deep cut into the landscape. TH 36 in this area was constructed in the 1950s and a bridge (nonextant) carrying the tracks over the highway was built in 1954.²⁸ The construction of the highway to the east of the original

²⁸ Bridge 6402, which is nonextant, was contributing to the LS&M Railroad Corridor Historic District prior to its removal. The Memorandum of Agreement (SHPO #2012-0071) for the removal of the bridge included preparation of a Minnesota Historic Property Record, design review of the new bridge, and interpretive signage near the Bruce Vento Trail. Summit Envirosolutions, Inc., “Northern Pacific Railroad Bridge No. 6402 - RA-MWC-0064,” n.d., Minnesota Historic Property Record, Minnesota State Historic Preservation Office, Saint Paul, Minn.; “Memorandum of Agreement for Minnesota Bridge 6402,” 2019.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

crossing removed a portion of the preexisting embankment. This part of the LS&M Railroad Corridor Historic District is surrounded by industrial development. A bridge carrying the Bruce Vento Trail spans the highway. This bridge was constructed in 2013 (MnDOT Bridge 62004) and is offset from the LS&M railroad roadway (see Figure 45).



Figure 45. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations due to the construction of TH 36 and Gervais Avenue. Note how the bridge over TH 36 is offset to the east of the LS&M railroad roadway.

Between TH 36 and Gervais Avenue, the LS&M Railroad Corridor Historic District includes remnants of the fill embankment that historically carried both the 1868 railroad roadway and 1880s realignment. The embankment is highest closest to Gervais Avenue, where it is nearly 8 feet higher than the trail (see Figure 46). Within the central portion of this block, the embankment is less pronounced. The Bruce Vento Trail veers off the railroad roadbed slightly at Gervais Avenue, where it crosses Gervais Avenue at grade. The area surrounding the LS&M Railroad Corridor Historic District has been heavily modified by industrial development and road construction on the south side of Gervais Avenue. Aerial imagery

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

indicates that Gervais Avenue was constructed between 1985 and 1991; the road cut through the railroad roadway, resulting in the removal of portions of the embankment.



Figure 46. Image from the top of the embankment just south of Gervais Avenue, facing north. Note the Bruce Vento Trail to the left, which veers off the railroad roadbed south of this location to cross Gervais Avenue at grade.

Between Gervais Avenue and County Road C, the LS&M Railroad Corridor Historic District includes an embankment that traverses a varied topography. Nearest to Gervais Avenue, the land on the west is almost 24 feet lower than the embankment due to a marshy area associated with a nearby pond (RCRRA ROW markers were noted on the western slope of this embankment, making the nearby pond outside of the LS&M Railroad Corridor Historic District). This changes a few hundred feet north of Gervais Avenue, where on the west side the realigned embankment cuts into a remnant terrace that is almost 11 feet higher than the cut containing the realignment (and Bruce Vento Trail). Harvest Park is located east and outside of the LS&M Railroad Corridor Historic District for most of the way until close to County Road C, where community gardens are present. The Bruce Vento Trail is in a cut area made during the realignment, and ranges from 6 to 11 feet lower than the neighboring park and community garden.

North of County Road C, the width of the RCRRA ROW and thus the LS&M Railroad Corridor Historic District expands to 150 feet. Bridge 62563, a concrete slab span built in 1993, carries County Road C over the corridor, which includes an 18-foot-deep cut area. This cut continues north, ranging from 7 to 14 feet below the surrounding land until near Kohlman Avenue. At this point, the cut area transitions to an embankment to Beam Avenue. West of the embankment, a higher wooded berm (unlikely related to

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

the railroad berm) is located 13 feet above the embankment; after about 350 feet to the north, it tapers off. The embankment is almost 20 feet higher than the surrounding land to the west; just south of Beam Avenue, it is more than 30 feet higher. Beam Avenue was constructed in the mid-1970s to provide transportation infrastructure improvements, including access to Maplewood Mall (RA-MWC-0072) from TH 61. The construction of Beam Avenue necessitated a cut through the LS&M railroad roadway and its embankment and required construction of Bridge 62529 (RA-MWC-0248), a steel box girder, to carry the LS&M railroad roadbed over Beam Avenue. The bridge was completed in 1975 and has a 25.4-foot vertical clearance above Beam Avenue (see Figure 47).²⁹ The bridge was constructed following the existing grade of the railroad as shown in 1917 track profile maps; the berm was not adjusted to accommodate Beam Avenue.³⁰ As discussed in the Historic Context (see Section 6), the surrounding land was historically wetland and included a creek. The railroad roadbed had to be raised above this, resulting in the higher berm than was typical elsewhere along the LS&M railroad roadway.



Figure 47. Bridge 62529, view facing east along Beam Avenue, showing the 25-foot vertical clearance that is consistent with the height of the original LS&M railroad roadbed at this location.

E. BEAM AVENUE TO THE WHITE BEAR LAKE DEPOT

This portion of the LS&M Railroad Corridor Historic District begins near the northern city limits of Maplewood and continues north to the depot in downtown White Bear Lake. Through much of this area, the LS&M Railroad Corridor Historic District forms the municipal boundary that separates Gem Lake

²⁹ MnDOT Bridge Inventory Form, "Bridge 62529," n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>.

³⁰ Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-2," Horizontal Scale 1"=400', Vertical Scale 1"=20', June 30, 1917, Northern Pacific Railway Company Records, Valuation Engineer's Records, Track Profile Diagrams, 1917, Box 2 Roll 12, Minnesota Historical Society, Saint Paul, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

and Vadnais Heights (to the west) from the suburban residential area annexed by White Bear Lake in the postwar period (to the east). TH 61 parallels the LS&M Railroad Corridor Historic District through this area, and much of the adjacent development is commercial.

Only a small section of this portion includes the Bruce Vento Trail, which follows the LS&M railroad roadbed for approximately 930 feet from Beam Avenue to just south of County Road D. The trail briefly exits the LS&M Historic Railroad Corridor District at County Road D and returns and follows the LS&M railroad roadbed north of County Road D, and continues over I-694 on a 1966 steel through girder bridge (MnDOT Bridge 62822, RA-WBC-0156) for about 165 feet north of the freeway. At this point the trail runs parallel and just east of the LS&M railroad roadway, which reverts back to an active rail line. The trail is located atop an embankment. This embankment appears in a 1966 aerial photograph and may have been associated with the construction of a railroad shoo-fly, built to route the railroad roadway around the bridge over I-694, which was under construction at the time.³¹ The embankment is on the eastern edge of the LS&M Railroad Corridor Historic District in a sliver of RCRRA ROW. Both the Bruce Vento Trail and the RCRRA ROW terminate at Buerkle Road. From the point 165 feet north of I-694 to Buerkle Road, the western two-thirds of the LS&M Railroad Corridor Historic District includes an active rail line, located within BN ROW (see Figure 48). The active railroad roadway and the BN ROW continue along the LS&M Railroad Corridor Historic District from this point to the White Bear Lake Depot.

³¹ U.S. Geological Survey, "Aerial Photograph, Roll 3, Frame 140" (U.S. Geological Survey, November 28, 1966), 1VBOX00030140, U.S.G.S. Earth Explorer.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

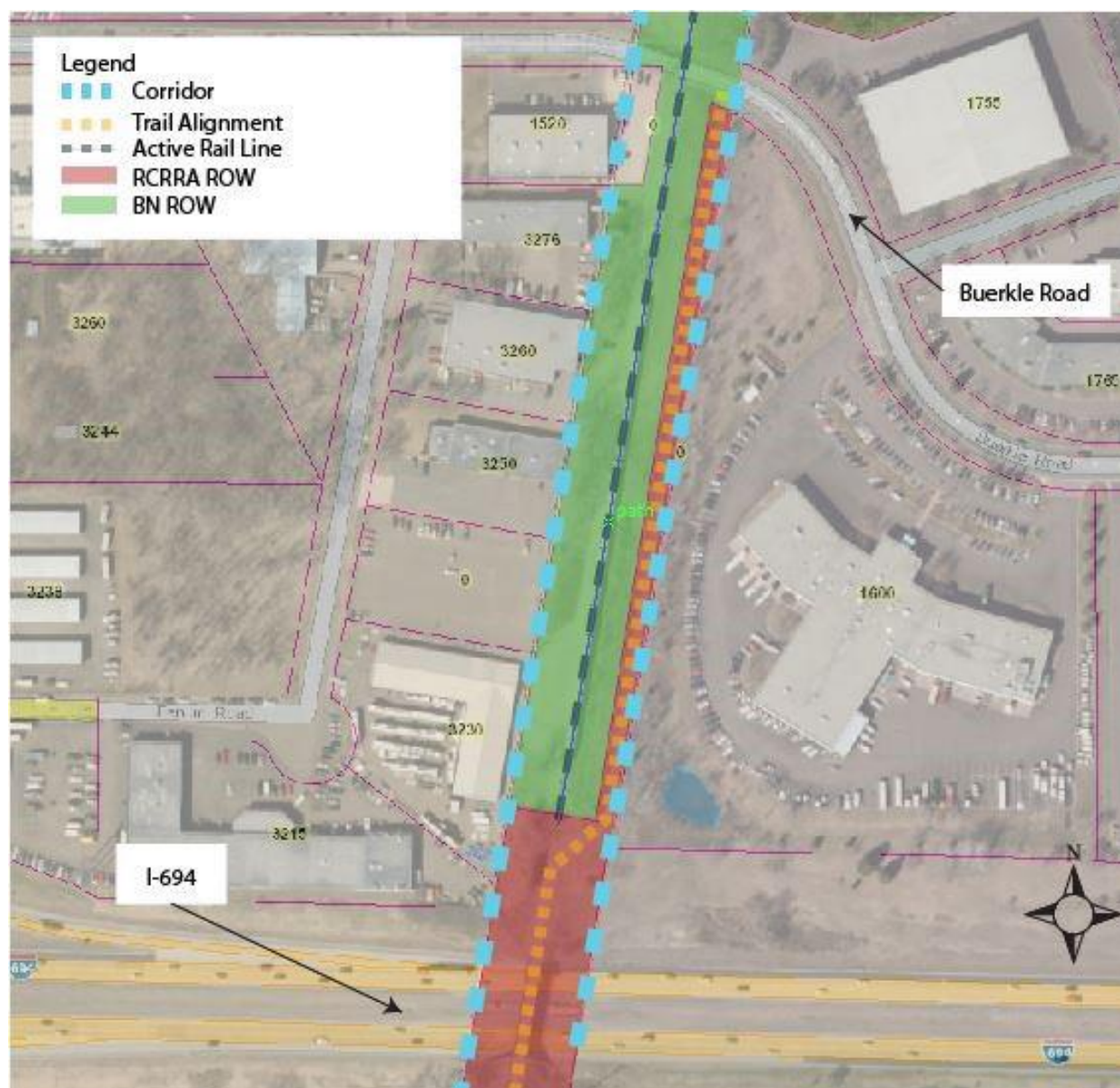


Figure 48. Ramsey County Property Assessor's map showing the shared ROW within the LS&M Railroad Corridor Historic District from just north of I-694 to Buerkle Road.³²

The LS&M Railroad Corridor Historic District from Beam Avenue to the point just north of I-694 is built on a high embankment generally surrounded by heavy vegetation. The embankment has been obliterated in two places by the construction of the east-west County Road D and I-694 roadways. Historically, County Road D crossed under the railroad roadway further north, just south of I-694. A ca.

³² Ramsey County, "Ramsey County Assessor Interactive Property Map," *MapRamsey*, 2019, <https://www.ramseycounty.us/residents/property/maps-surveys/interactive-map-gis>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

1905 bridge (StP&D Bridge No. 7, RA-WBT-004) carried the LS&M tracks over the original vehicular roadway.³³ The bridge is extant, although its substructure was modified, likely sometime after 1961 when the double track was reduced to a single track. County Road D was realigned to the south in the mid-2000s, resulting in the obliteration of approximately 500 feet of the embankment (see Figure 49). The area under the bridge was likely enclosed with fill in at this time. A portion of the embankment remains south of County Road D and a small portion of the LS&M railroad roadbed between the current County Road D and the bridge over former County Road D retains rails, ties and ballast for a single-track railroad grade, but these elements are not in an operational state and do not connect with the active BN rail corridor north of I-694 (see Figure 50 and Figure 51).



Figure 49. Comparison of 1966 (left) and 2016 (right) aerial imagery showing alterations due to construction of I-694 and realignment of County Road D.

³³ The bridge does not appear in the MnDOT bridge database and does not appear to have been previously inventoried. Susan K. Richards, "Northern Pacific Bridge No. 7 over County Road D" (History 3910 Term Paper, Spring 1981), Maplewood Area Historical Society.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 50. Remnants of the ca. 1905 StP&D Bridge No. 7 over the former County Road D vehicular roadway, view facing west. Note that the area beneath the bridge was likely enclosed with fill during the construction of the current County Road D vehicular roadway.



Figure 51. Image of the LS&M railroad roadway north of County Road D, looking south. Note the presence of rails, ties, ballast, and encroaching vegetation. Also note the County Road D vehicular roadway in the background.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The LS&M Railroad Corridor Historic District north of I-694 retains a single set of tracks, including an at-grade crossing at Buerkle Road (see Figure 52 and Figure 53). An unpaved earthen strip along the east side of the tracks may be the location of the adjacent second set of tracks removed in 1961.³⁴ At Buerkle Road the embankment carrying the Bruce Vento Trail on the east side of the LS&M Railroad Corridor Historic District meets Buerkle Road at grade, where the trail terminates. The RCRRA ROW ends and the BN maintains the ROW from Buerkle Road to the White Bear Lake Depot.



Figure 52. View of the LS&M railroad roadway at Buerkle Road, view facing south. The extant tracks (at right) coincide with the LS&M railroad roadbed. The Bruce Vento Trail travels parallel to the tracks, east (left) of the alignment, just on the other side of the chain-link fence. The berm the trail travels on here appears in a 1966 aerial photograph and may have been associated with the construction of a railroad shoo-fly, built to route the railroad roadway around the bridge over I-694, which was under construction at the time.³⁵ The trail is within the RCRRA ROW while the active railroad roadway is in BN ROW.

³⁴ Richards, "Northern Pacific Bridge No. 7 over County Road D."

³⁵ U.S. Geological Survey, "Aerial Photograph, Roll 3, Frame 140."

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 53. View of the railroad roadway from Buerkle Road, view facing north.

From Buerkle Road to County Road E, the LS&M Railroad Corridor Historic District transitions from a low roadbed near grade to a cut section (see Figure 54). A 1977 prestressed concrete beam bridge (MnDOT Bridge 62079) carries County Road E over the railroad roadway. The cut continues north of TH 61, which is carried over the railroad roadway by a prestressed-concrete beam bridge (MnDOT Bridge 62092) constructed in 2010 (see Figure 55).



Figure 54. View of the LS&M Railroad Corridor Historic District at County Road E, view facing northwest. Note the deep cut through which the active railroad roadway is routed.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 55. Comparison of 1940 (left) and 2016 (right) aerial imagery showing alterations due to realignment of US/TH 61.

From just north of TH 61, the LS&M Railroad Corridor Historic District continues along a slight fill embankment and runs parallel to Hoffman Road (a former alignment of TH 61) and crosses Scheuneman Road at grade immediately before approaching a wye on the west side of Goose Lake (see Figure 56). Following the eastern leg of the wye, the LS&M Railroad Corridor Historic District turns northeast. An abandoned extant second track travels parallel to the active railroad roadway for about 600 feet near the intersection where Hoffman Road rejoins TH 61 opposite White Bear Avenue. The single railroad track of the active line continues northeast, including at-grade crossings at Highway 96 East and Second Street, to arrive at the White Bear Lake Depot (RA-WBC-0121), which now functions as the White Bear Area Chamber of Commerce (see Figure 57). The depot was built in 1937 and appears to follow a standardized plan. It replaced an earlier depot that was located just to the south and

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

razed to make way for a realignment of TH 61.³⁶ Historically, a number of sidings branched off the mainline at Second Street and occupied the area west of the passenger depot, along with a freight depot and several warehouses and light industrial properties; a pump house and water tank were located at the northeast quadrant of Fourth Street and TH 61 (see Figure 58). A review of Sanborn fire insurance maps indicates that the freight depot was removed between 1927 and 1951 and aerial imagery indicates that the water tank and sidings were removed by 1974. Remaining warehouses were replaced by modern commercial development between 1991 and 2003.



Figure 56. View of the LS&M Railroad Corridor Historic District, facing north from Scheuneman Road. Note the wye junction just to the north of the at-grade crossing. The historic district follows the eastern leg of the wye.

³⁶ Sara Markoe Hanson, "Tracking the History of Railroads in White Bear Lake," *White Bear Lake Magazine*, March 2017, <http://whitebearlakemag.com/tracking-history-railroads-white-bear-lake>; Sara Markoe Hanson, "Next Stop, White Bear Lake," *White Bear Lake Magazine*, March 2016, <http://whitebearlakemag.com/next-stop-white-bear-lake>; Minnesota Department of Highways, *Road Life Studies - Construction Project Log Record for Section 6222 in Ramsey County*, 2015, Minnesota Department of Transportation, Saint Paul, Minn.; "White Bear Lake Depot (Both)," 1935, Photograph Collection, P2002.04.26, White Bear Lake Area Historical Society, <https://whitebearhistory.pastperfectonline.com/photo/6E0B95F2-7BE9-4741-B1E2-542442184522>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 57. View of the White Bear Lake Depot and the LS&M Railroad Corridor Historic District, view looking south.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

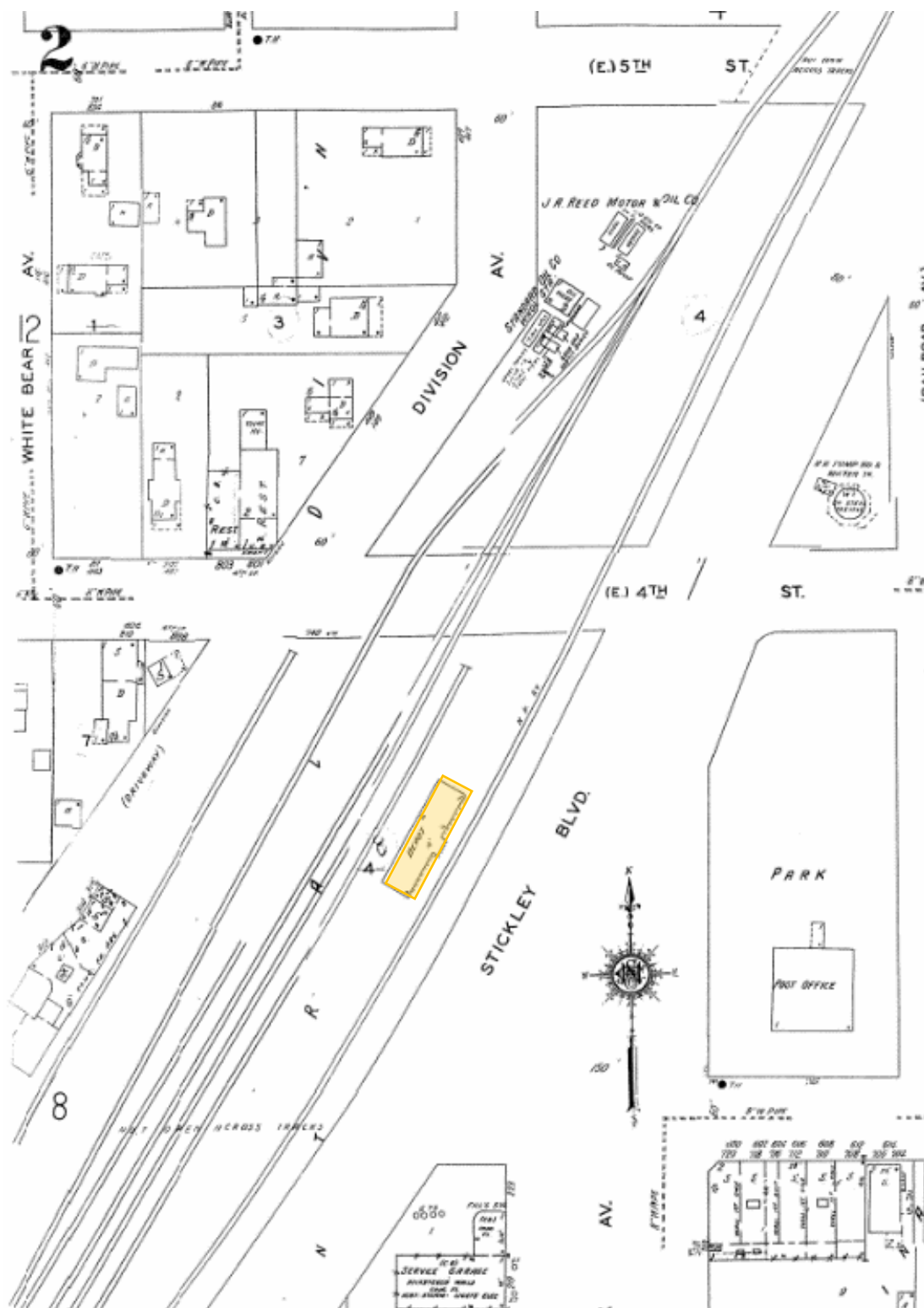


Figure 58. 1952 Sanborn map showing the White Bear Lake Depot (extant, shown in orange).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The LS&M Railroad Corridor Historic District, as described in this report, terminates at the White Bear Lake Depot. The LS&M Railroad Corridor Historic District: White Bear Lake to Hugo Segment (XX-RRD-NPR005) continues on to the north. Actively used trackage continues north for approximately 4.8 miles as a single track generally running at grade with only very modest cut or fill areas.³⁷ Crossings are at grade and the track runs parallel to TH 61, on the western side of the highway. Sidings are present just south of 130th Street North adjacent to the light industrial property operated by Wilson Tool International (12912 Farnham Ave. N) and just south of 140th St. N, where they provide access to the industrial property owned by Loadmaster Lubricants (13615 Fenway Blvd. Ct. N). The active railroad corridor terminates just south of 140th Street North, in the city of Hugo.

F. SUMMARY OF LS&M RAILROAD CORRIDOR HISTORIC DISTRICT ALTERATIONS POST-1970 (LISTED SOUTH-TO-NORTH)³⁸

The following list summarizes alterations made throughout the LS&M Railroad Corridor Historic District after 1970, which is the recommended end date of the period of significance.

- Growth of voluntary plants, shrubs, and trees along portions of the LS&M railroad roadbed abandoned by railroad companies and not converted for use as the Bruce Vento Trail.
- Removal of rails, ties, and ballast from all portions of the railroad roadbed south of County Road D (ca. 1987).³⁹
- Reconstruction of I-94 at Mounds Boulevard (obliteration of railroad roadway from Kellogg Boulevard to 150 feet south of Seventh Street) (ca. 1989).⁴⁰

³⁷ See the separate Phase II Evaluation of the LS&M Railroad Corridor Historic District: White Bear Lake to Hugo Segment (XX-RRD-NPR005).

³⁸ Unless otherwise noted, circa dates are derived from review of aerial photographs available on the Ramsey County property assessor map. Aerial photographs available date from 1940, 1953, 1974, 1985, 1991, 2003, 2006, 2008, 2009, 2011, 2015, and 2017. Ramsey County, "Ramsey County Assessor Interactive Property Map."

³⁹ Anthony Lonetree, "An East Side Renaissance," *Star Tribune*, February 5, 1995; Minnesota Department of Transportation and the City of Saint Paul, *Draft Environmental Impact Statement and Draft Section 4(f) Evaluation for Phalen Boulevard* (Saint Paul, Minn., December 1998), <https://books.google.com/books?id=Wb41AQAAMAAJ&lpg=RA2-SL265-PA17&dq=3M%20administration%20building%20SHPO%20national%20register&pg=PP1#v=onepage&q&f=false>; Paul Gustafson, "Ramsey Board Calls for More Light Rail Study," *Star Tribune*, July 28, 1987; Jackie Crosby, "Street of Dreams," *Star Tribune*, December 6, 2003; Ramsey County Regional Railroad Authority, "Request for Board Action: Authorize Acquisition of Burlington Northern Right of Way in St. Paul and Maplewood by Eminent Domain," October 13, 1990, Ramsey County Public Works, Arden Hills, Minn.

⁴⁰ Minnesota Department of Transportation, *Road Life Studies - Construction Project Log Record for Section 6283A in Ramsey County*, 2016, Minnesota Department of Transportation, Saint Paul, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

- Construction of Eastside Heritage Park (ca. 2000).
- Construction of Phalen Boulevard (ca. 2000).
- Grading of portions of railroad roadbed as part of Bruce Vento Trail construction from 1,000 feet north of Maryland Avenue to 225 feet north of I-694, including construction of connector ramps, trail junctions, and at-grade crossings as described in Section 4 (ca. 1992-2004).⁴¹
- Demolition of Gladstone Shops (ca. 1979).⁴²
- Removal of Gloster Junction curved tracks (southern leg removed by 1940, northern leg removed ca. 1980).
- Construction of new bridges (no crossing present prior to 1970):⁴³
 - Phalen Boulevard over the railroad roadway (2001, Bridge 62616)
 - Neid Lane over the railroad roadway (2004, Bridge 62617)
 - Railroad roadbed over Beam Avenue (1975, Bridge 62529)
- Removal/replacement of bridges after 1970:
 - Minnehaha Avenue over the railroad roadway (replaced in 1978 by Bridge 62533)
 - Reaney Avenue over the railroad roadway (removed, ca. 1980)
 - Arcade Street over the railroad roadway (replaced in 2001 by Bridge 62062)
 - Earl Street over the railroad roadway (replaced in 2003 by Bridge 62545)
 - Railroad roadway over Johnson Parkway (removed in 1998)
 - Maryland Avenue over railroad roadway (removed ca. 2000)
 - Arlington Avenue over railroad roadway (removed ca. 2000)
 - Railroad roadway over TH 36 (replaced in 2013 by Bridge 62004)
 - County Road C over the railroad roadway (replaced in 1993 by Bridge 62563)
 - County Road E over the railroad roadway (replaced in 1977 by Bridge 62079)
 - TH 61 over the railroad roadway (replaced in 2010 by Bridge 62092)

⁴¹ Minnesota Department of Transportation and Ramsey County Parks and Recreation Department, "Project Memorandum for Burlington Northern (BN) Regional Trail, Frost Avenue (CSAH 28) to Johnson Parkway S.P. No. 62-090-01, TEA 6298 (031)"; Kimley-Horn and Associates, Inc., "Bruce Vento Trail Extension, From 750' South of Beam Avenue to Buerkle Road, City Project 04-02," May 28, 2004, Ramsey County Department of Parks and Recreation, Maplewood, Minn.

⁴² Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study* (City of Maplewood Heritage Preservation Commission, August 2014), 20.

⁴³ Build dates and bridge numbers attained from the MnDOT bridge database. Minnesota Department of Transportation, "BridgeInfo3," 2019, <http://dotapp9.dot.state.mn.us/bridgeinfo3/>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

- Post-1970 east-west vehicular roadway construction cutting through railroad embankment
 - Cope Avenue (ca. 1970)
 - Gervais Avenue (ca. 1990)
 - Beam Avenue (1975)
 - County Road D (ca. 2005)
 - Buerkle Road (ca. 1970)

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5. ARCHAEOLOGICAL RECONNAISSANCE AND GEOMORPHOLOGICAL CORING FOR JOHNSON PARKWAY TO BEAM AVENUE

Along the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, surface evidence of the original 1868 LS&M railroad roadbed was present in some specific areas.

Geomorphological coring resulted in the identification of areas where the original 1868 LS&M railroad roadbed is present under the later post-1880s railroad roadway embankment. Some other general observations were noted as described below.

North of Maryland Avenue, to the west of the portion of the Bruce Vento Trail embankment, some of the surrounding topography has obviously been filled in (see Figure 59). To the east, below the modern embankment where the Bruce Vento Trail is located, a small depression 11.5 feet east-west by 14 feet north-south was noted. This depression had modern refuse nearby (part of an outdoor grill and part of a bedframe). Several remnants of homeless encampments were also noted in this area, such as fire pits with modern garbage strewn around them. Since this area would have been part of Lake Phalen during the earliest era of LS&M mainline railroad construction, and modern materials were noted around the depression, it appears to be modern rather than related to the 1868 railroad construction or 1880s railroad realignment, and it was not recorded as an archaeological site.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

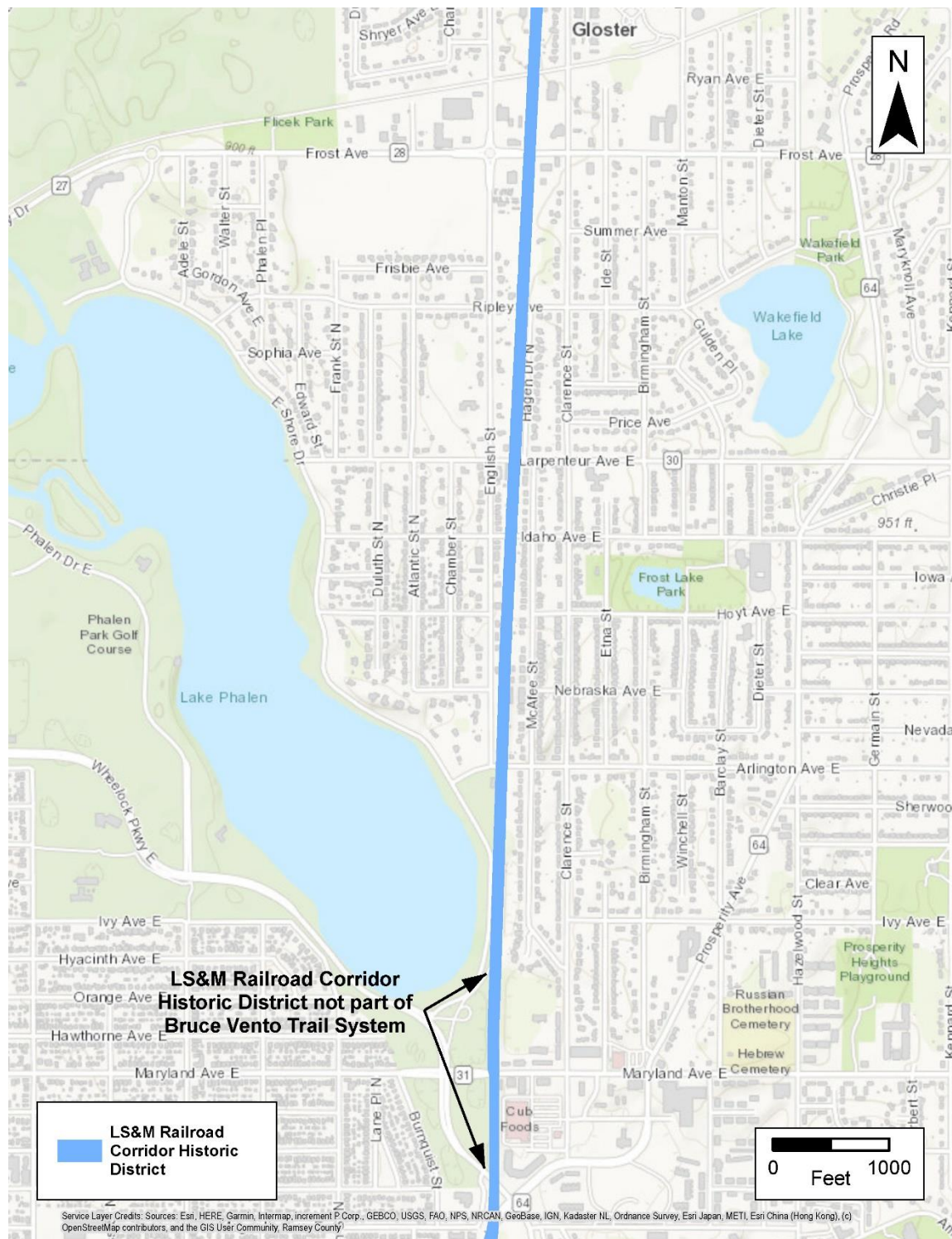


Figure 59. Map showing the portion of the LS&M Railroad Corridor Historic District that does not include the Bruce Vento Trail. The topography just north and west of the location where the trail enters the LS&M Railroad Corridor Historic District has been filled in. This was observed during field survey and confirms historical accounts.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Between Frost Avenue and the Gateway State Trail, buildings associated with two former depots in the area have been removed. Remnants of privies associated with one of the former depots in this location were identified during Phase II archaeological investigations in November 2018. Georeferencing of historic depot maps helped determine the approximate locations of the former privies in the Gladstone/Gloster area (see Figure 60). Heavy equipment was used to strip the fill in the area and to look for evidence of potential intact privy deposits. The privies, or privy (likely one building with two pits), adjacent to the post-1897 privy just north of Frost Avenue was identified. Although this wood-lined privy had some intact walls, the top of it was truncated by cut and fill actions in the area. The soil in the privy did not appear to be “night soil” but topsoil from the surrounding areas. Although there were a few bottles in one side of the privy, it appears it had been cleared out on a regular basis. This privy dates from 1897 to 1917 and was assigned the site number 21RA0082. Due to the amount of disturbance and the fact that there was very little in terms of cultural material present, this site did not have individual significance or integrity. As noted in Section 7, due to the loss of integrity, the Gladstone/Gloster privy is a noncontributing element to the LS&M Railroad Corridor Historic District. It is within the RCRRA ROW, east of the existing Bruce Vento Trail. The results of this work are presented in the separate *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project* prepared by MVAC.⁴⁴

⁴⁴ Mississippi Valley Archaeology Center, *Phase IA Literature Review, Phase I Archaeological Investigations and Phase II Archaeological Investigations of 21RA82 for the Rush Line Bus Rapid Transit Project (DRAFT)*.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

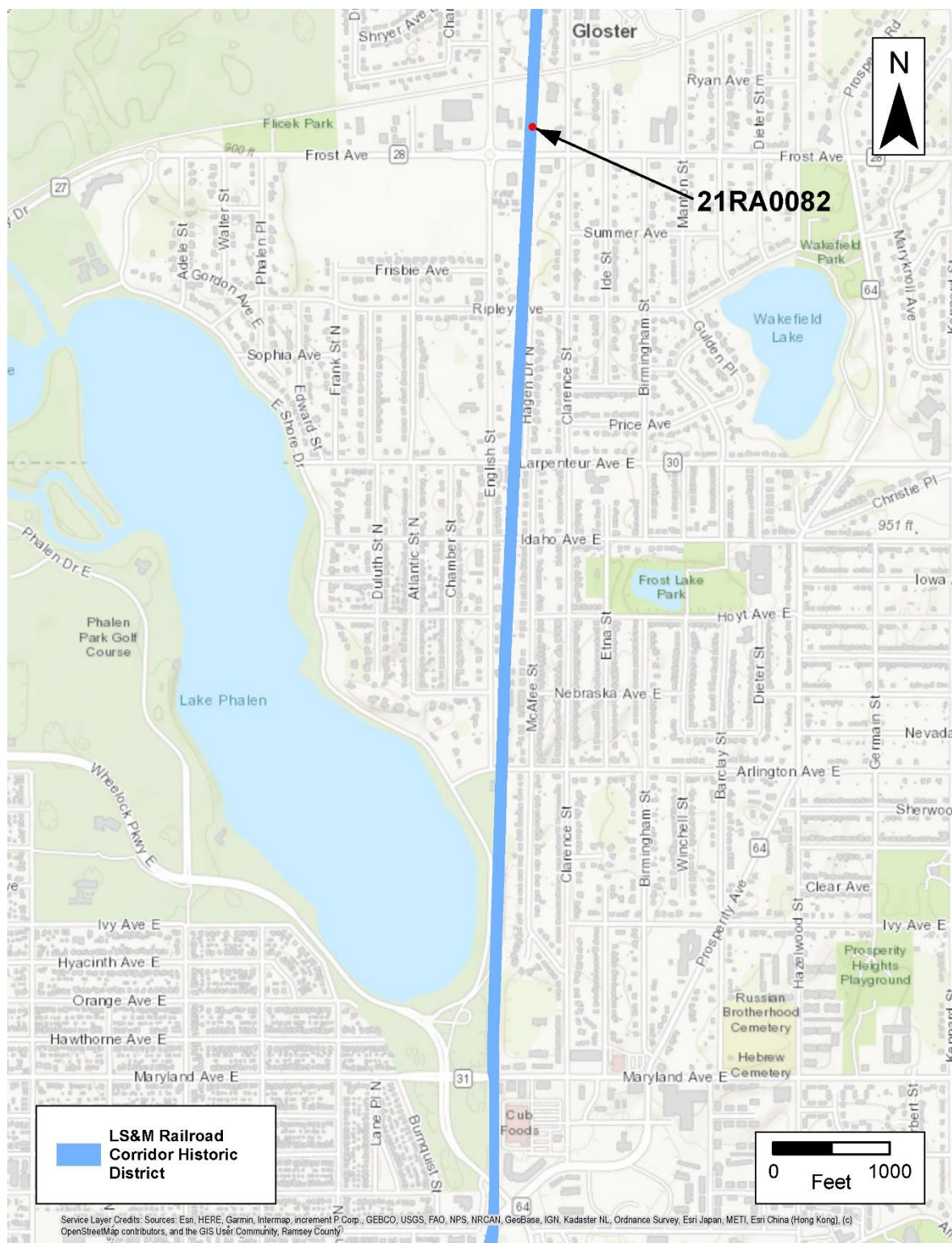


Figure 60. Map of the LS&M Railroad Corridor Historic District showing the location of the Gladstone property site, 21RA0082.

A. SURFACE EVIDENCE OF THE 1868 LS&M RAILROAD ROADWAY

North of the Gateway State Trail and south of County Road B, remnants of what are believed to be portions of the original 1868 LS&M railroad roadbed are located on the surface at the eastern edge of the LS&M Railroad Corridor Historic District. Strata Morph Geoexploration's soil coring report indicated that the coring did not find buried evidence of the 1868 LS&M railroad roadbed north of the Gateway State Trail up to County Road B under the Bruce Vento Trail embankment. Based on the georeferenced maps of the 1870 LS&M ROW, the 1868 LS&M railroad roadway seemed to be farther to the east of the Bruce Vento Trail (and associated trail embankment), and whether that would lie within or outside the archaeological study area (which is the RCRRA ROW in this area) was not clear. Therefore in April 2019, once the weather was favorable, Kimley-Horn helped gain permission to enter the Madeline L. Weaver Elementary School (RA-MWC-0106) grounds between the Gateway State Trail and County Road B. Upgrades to the existing Weaver School pedestrian trail are proposed for the Rush Line BRT Project, and this seemed like the ideal place to test for evidence of 1868 railroad roadway features outside the RCRRA ROW. Shovel testing was undertaken near the proposed Weaver School trail improvement, on the east side of the Bruce Vento Trail embankment. MVAC placed four shovel tests along the proposed trail upgrades on the Weaver School property, and two shovel tests near the fence separating the schoolyard from the RCRRA ROW (see Figure 61 and Figure 62). The tests showed that some of the area closest to the trail had been disturbed previously, probably during trail construction. Three shovel tests had evidence of disturbance and fill near the surface, with no topsoil, and the other three had topsoil (10YR 2/2 very dark brown silt loam) ranging from 28 to 35 centimeters below ground surface (cmbgs) over sterile subsoil (10Y/R 5/8 yellowish brown and 10YR 4/4 dark yellowish brown sand). No prehistoric cultural materials or cultural materials related to the LS&M railroad roadbed were found.

At this same time, MVAC also undertook a closer inspection of the ditch within the RCRRA ROW on the east side of the Bruce Vento Trail embankment near the Weaver School trail to look for surface evidence of the 1868 LS&M roadbed. The trail embankment in this area is raised above the surrounding surface. Evidence of a very slight berm (possibly the 1868 LS&M railroad roadbed) was noticed approximately 50 feet south and 70 feet north of the Weaver School trail (see Figure 61). Since these berms were not very pronounced, they were less visible during the previous visit in the fall of 2018, when there was a light layer of snow on the ground. The slight berm south of the Weaver School trail was within the RCRRA ROW and was approximately 60 feet long (see Figure 63). This berm was not apparent further to the south, as that area has been disturbed by modern development. A shovel test at the northern edge of this suspected berm area had a soil profile of 10YR2/2 very dark brown sandy loam from 0 to 50 cmbgs over 10YR 4/4 dark yellowish-brown sand. This shovel test did not have any evidence of ballast or cinder, but it did have an over-thickened A horizon, indicating that the rails may have been placed on the former ground surface in this area.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The slight berm presumed to be the 1868 LS&M railroad roadbed (XX-RRD-NPR004) north of the existing Weaver School trail was slightly higher than the berm south of the school trail and was near the edge of the RCRRA ROW. The western edge of this northern berm was identifiable, but the eastern edge disappeared within the trees on the school property adjacent to the RCRRA ROW (see Figure 64). This slight berm was a little over 75 feet long.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

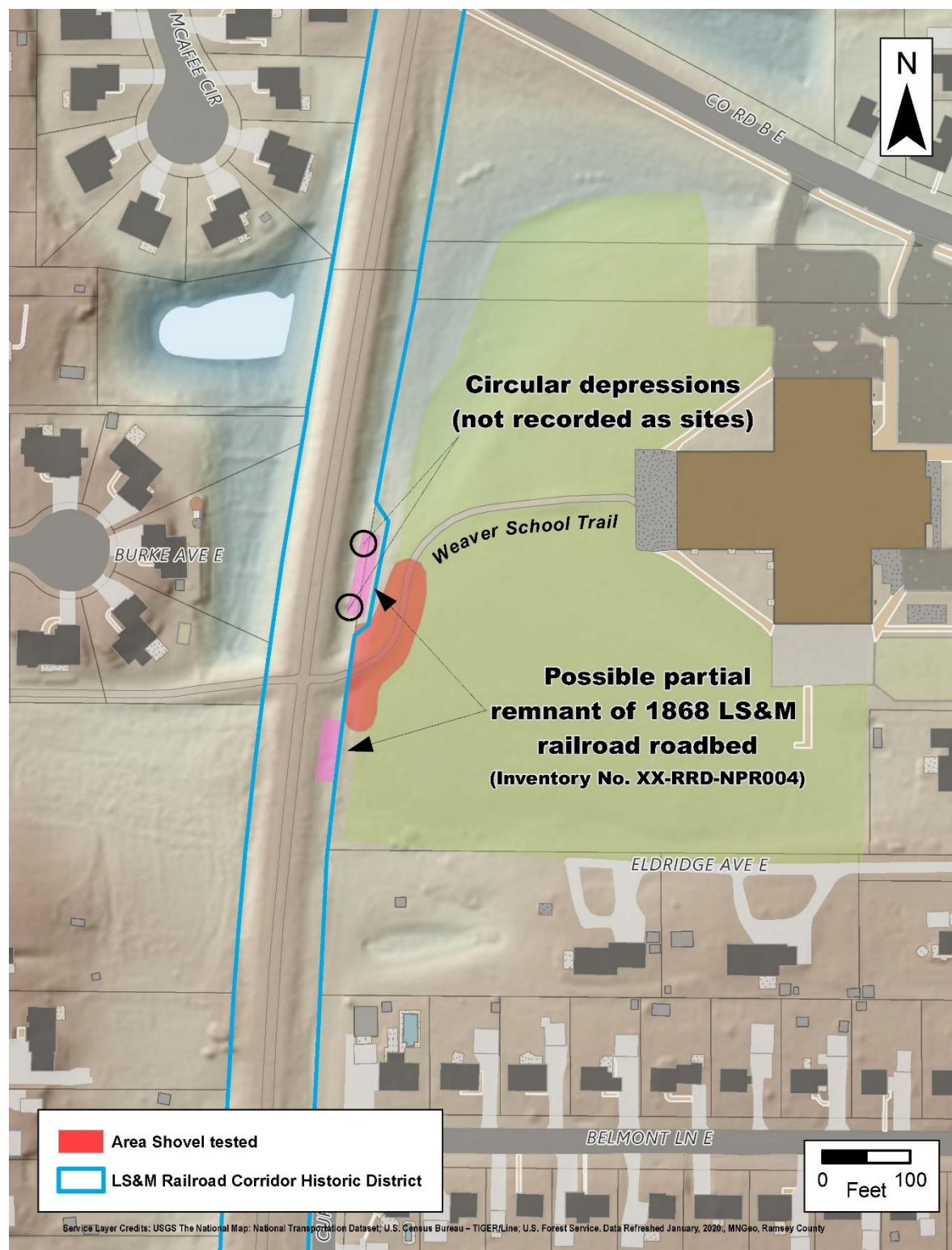


Figure 61. Portions of 1868 LS&M railroad roadbed on the surface near the Weaver School trail, along with area shovel tested, and circular depressions noted in the RCRRRA ROW.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 62. Shovel testing on school grounds near Weaver School trail. View facing west towards Bruce Vento Trail.



Figure 63. Slight raised area, possibly representing 1868 LS&M railroad roadbed, south of Weaver School trail, and east of the Bruce Vento Trail. View facing south.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 64. Raised area (where MVAC personnel to left in photo is standing), possibly representing 1868 LS&M railroad roadbed north of the Weaver School trail and east of the Bruce Vento Trail. View facing south. Note the difference in elevation between the two MVAC personnel. A green RCRRA ROW marker is near MVAC personnel to left in photo.

Rail ties were noticed in the ditch area east of the Bruce Vento Trail embankment. The ties were in poor context and were randomly scattered around the ditch. Two circular depressions were also noted in the ditch area, east of the trail embankment, and north of the existing Weaver School trail (see Figure 61). The first depression was 144 feet north of the Weaver School trail and 38 feet from the eastern edge of the paved Bruce Vento Trail. This depression measured about 240 cm (7.87 feet) north–south, 220 cm (7.22 feet) east–west, and 40 cm deep. A broken rail tie was sticking up out of the depression, and a small tree was growing out of it. A shovel test placed in the depression showed at least 30 cm of dark soil over sterile subsoil. A few pieces of clear bottle glass were found, but they were too fragmentary to identify a type of bottle. The displaced rail tie sticking out of this depression was in poor context and did not appear to be related to the depression. The second depression 81.7 feet north of the Weaver School trail was about 35.75 feet east of the Bruce Vento Trail, and was in the ditch between the existing Bruce Vento Trail and the fence separating the trail from the school grounds. The RCRRA ROW edge is a just a few feet west of the fence line. This depression measured about 125 cm (4.1 feet) north–south, 97 cm (3.18 feet) east–west, and 45 cm deep. A shovel test was placed in the center. The top 10 cm of soil had a few pieces of modern hard plastic refuse. The topsoil was a 10YR 2/2 sandy loam measuring 23 cm deep over sterile subsoil.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Shovel tests placed in the depressions did not find evidence that could relate them to a specific rail use or to any other specific type of activity, so they were not recorded as archaeological sites. They might be the result of the removal of large trees from the ditch area during the construction of the Bruce Vento Trail. The rail ties in the ditch area were in good condition, appeared relatively modern, and were probably deposited during construction of the Bruce Vento Trail in the 1990s. The area immediately surrounding the Weaver School trail has been affected by a drainage ditch under that trail, which has disturbed any remnant of the 1868 LS&M railroad roadbed in this area. Due to the amount of disturbance, no other evidence of the original LS&M could be found to the north as far as County Road B, or to the south as far as the Gateway State Trail.

Between Gervais Avenue and County Road C, remnants of what are believed to be portions of the original 1868 LS&M railroad roadway (XX-RRD-NPR003) are located at the eastern edge of the LS&M Railroad Corridor Historic District (see Figure 65). At this location, the original 1868 LS&M railroad roadbed is atop a fill area. By contrast, the 1880s railroad roadway was routed through a cut area. The Bruce Vento Trail follows the 1880s railroad roadway through the cut area. The portion of the 1868 LS&M railroad roadbed at this location is higher than the berm where the trail is currently situated but slightly lower than the adjacent Harvest Park to the east. This original 1868 LS&M railroad roadbed was identified by a distinct berm with slight ditching. The ditching was affected by development of the adjacent park and the 1880s railroad realignment. Despite this, the berm indicating the original 1868 LS&M railroad roadbed is still obvious.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

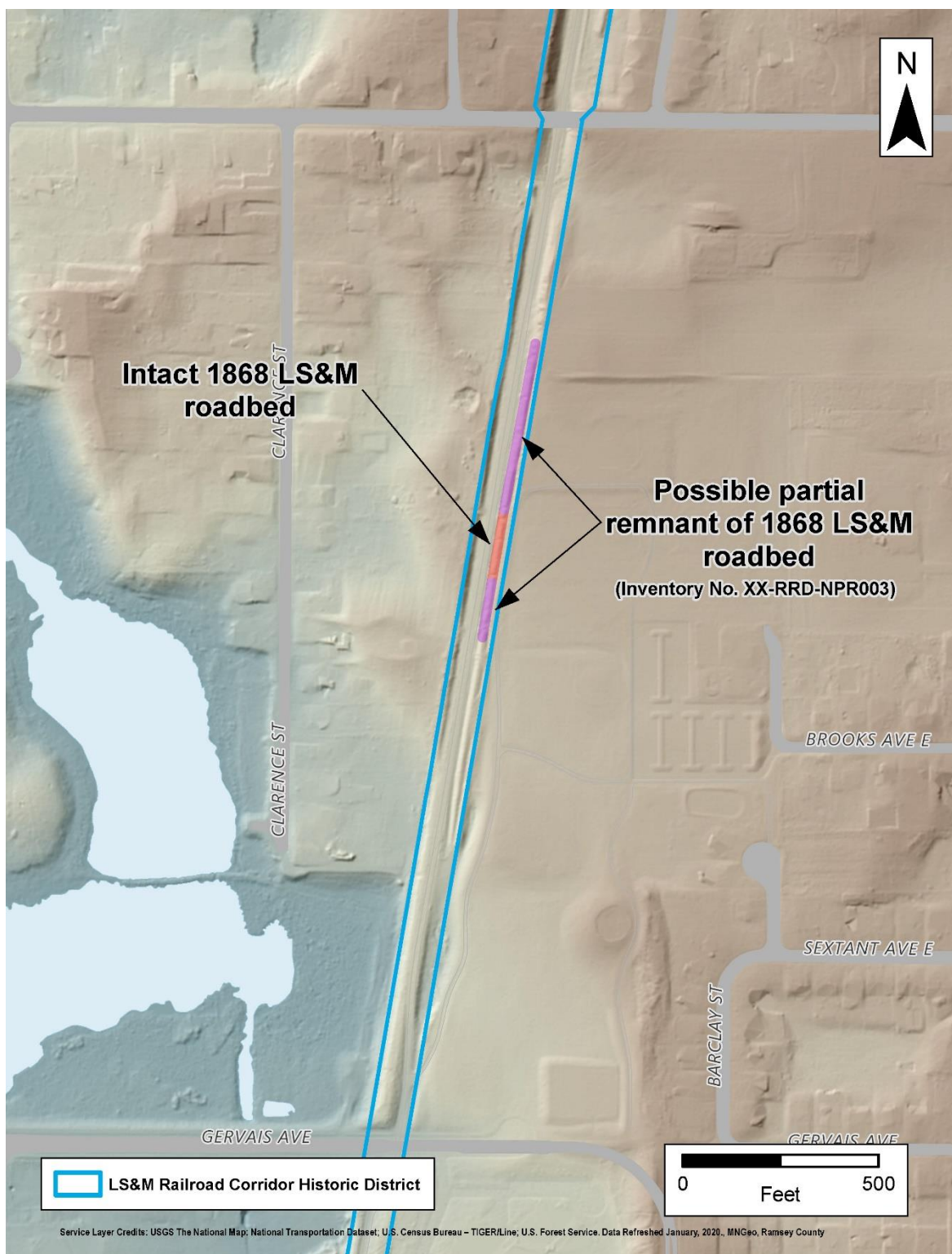


Figure 65. Map of the RCRRA ROW showing the location of possible partial remnants of the original 1868 LS&M railroad roadbed.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Some suspected portions of the original 1868 LS&M railroad roadbed are near the northern portion of Harvest Park, from about 549 feet south of County Road C to about 980 feet south of County Road C (431 feet). A relatively flat bermed area covered with trees runs parallel to the Bruce Vento Trail with a slight ditch to the east (see Figure 66 and Figure 67). This may be a partial remnant of the original 1868 LS&M railroad roadbed considering that 1870 LS&M ROW maps show the LS&M railroad roadway slightly to the east of the 1880s railroad roadway in this area. The potential remnant also matches up with an area that is more certainly the original 1868 LS&M railroad roadbed just to the south. Beginning approximately 980 feet south of County Road C, a distinct berm parallel to the park land and the Bruce Vento Trail is apparent on the east side of the trail. This berm is ditched on the east side and has a distinct edge on the west side, where it slopes down to the Bruce Vento Trail. The berm measures at least 188 feet to the south (to 1,168 feet south of County Road C) and is approximately 58 inches above the ground surface east of the trail area. This berm has a relatively flat top and measures more than 10 feet, 2 inches across (where the flatter top of the berm could be discerned). The draft 2017 *Evaluation of the Lake Superior and Mississippi Railroad: Thomson to Fond du Lac Segment (XX-RRD-26) Carlton and St. Louis Counties, Minnesota* found standard railroad roadbed widths of 12 to 14 feet in other portions of the LS&M Railroad Corridor Historic District: Thomson to Fond du Lac Segment, located further north. Adding ditch and embankment edges, the width would fit within the roadbed standard width identified in the draft evaluation of the Thomson to Fond du Lac Segment.⁴⁵ Also, erosion or environmental factors may have affected the measuring of the width accurately in the field.

Four geomorphological cores clustered within this bermed area found evidence that this is probably the original 1868 LS&M railroad roadbed (see Appendix D). Three of the four cores were taken from the berm east of the Bruce Vento Trail. For comparison, the fourth was taken in the cut area where the trail is located to the west of the 1868 LS&M railroad roadway. At least two of the cores had fill over a buried Ab horizon. Either the fill or the Ab horizon contained cinder and gravel, possibly indicating the original 1868 LS&M railroad roadbed. The fill may have been redeposited soil for the 1880s railroad roadway to the west. Two other cores on the berm showed no evidence of this fill. However, the A horizon in these two cores are overthickened (one only slightly), possibly from the addition of a small amount of soil ballast from an adjacent A horizon source. It is surmised that the original LS&M tracks may have been laid directly on the original soil surface in this area. From 1,168 feet south of County Road C to 1,310 feet south of County Road C (a distance of 142 feet), there may be some additional remnants of the LS&M railroad roadbed parallel to the Bruce Vento Trail, as evidenced by more berm sections. This is in line with the area to the north perceived to be the 1868 LS&M railroad roadbed, but the eastern edge appears to have been cut off by later railroad roadway construction. This berm is exhibited on LiDAR

⁴⁵ Sigrid Arnott and David Maki, *Evaluation of the Lake Superior and Mississippi Railroad: Thomson to Fond Du Lac Segment (XX-RRD-26) Carlton and St. Louis Counties, Minnesota* (draft) (Draft report submitted to the Minnesota Department of Transportation, Cultural Resources Unit, 2017), 86.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

imagery, is on 1945 aerial photographs, and matches up with 1870 LS&M ROW maps (see Figure 68 through Figure 70).



Figure 66. Likely remnant of the 1868 LS&M railroad roadbed west of Harvest Park and east of the Bruce Vento Trail, view facing south. The orange flags (center right and center left) denote approximate outer edge of the top of berm, where the top begins to slope downward.



Figure 67. Image of likely 1868 berm remnant near Harvest Park, view facing east. Archaeologists pictured are measuring the berm height while the photographer is standing on the Bruce Vento Trail.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

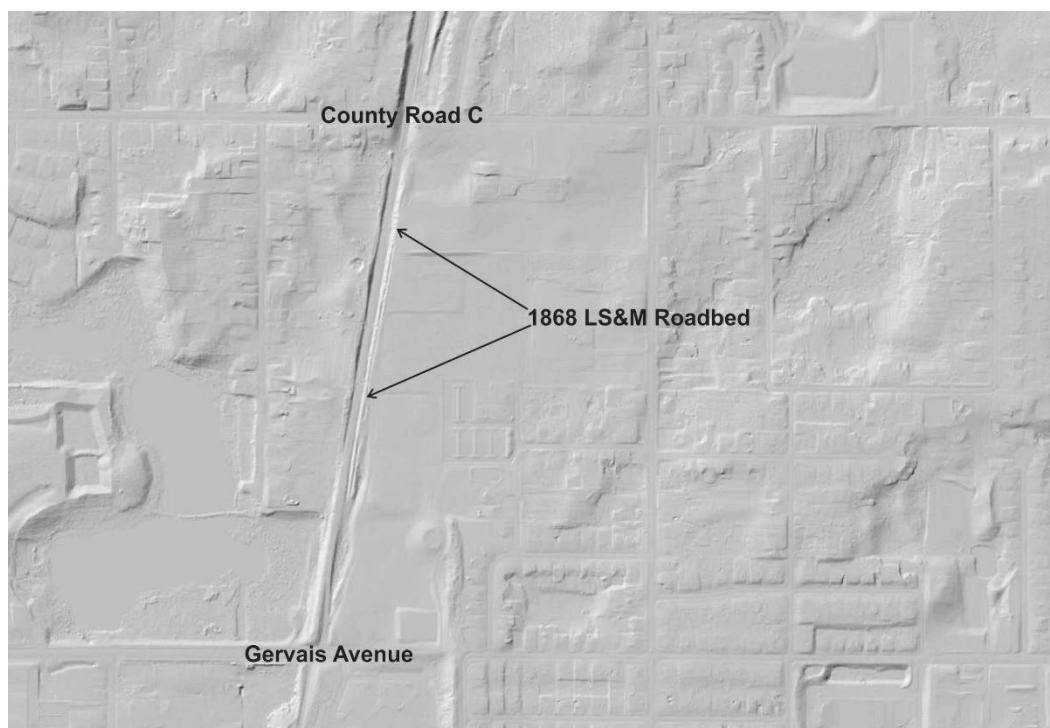


Figure 68. LiDAR imagery of likely 1868 LS&M railroad roadbed and berm adjacent to and east of the cut area that currently carries the Bruce Vento Trail near Harvest Park, between Gervais Avenue and County Road C.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 69. 1945 aerial image showing likely original 1868 LS&M railroad roadbed, east of railroad tracks.⁴⁶

⁴⁶ "Aerial Photograph, Ramsey County, Minn., A12-16," 1945, John R. Borchert Map Library, University of Minnesota, <http://geo.lib.umn.edu/twin-cities-metro-area/1945/A-12-164.jpg>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

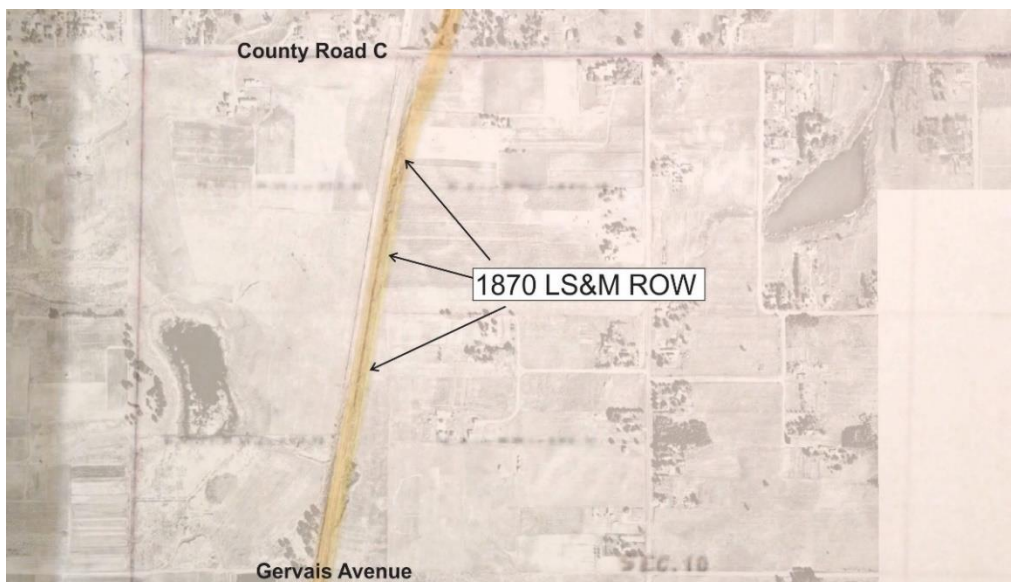


Figure 70. Georeferenced map showing the 1870 LS&M ROW (in yellow) relative to the 1945 aerial image (see Figure 69).

North of County Road C, the LS&M Railroad Corridor Historic District again includes evidence of the likely original 1868 LS&M railroad roadbed (XX-RRD-NPR002, see Figure 71). This evidence is to the east of the 1880s roadway/Bruce Vento Trail embankment, just north of Kohlman Avenue (see Figure 72 through Figure 74). Evidence of the 1868 LS&M railroad roadbed appears as a raised embankment that extends for almost 400 feet and lowers as it gets closer to Beam Avenue. At first it was not clear if this was a siding or a portion of the 1868 LS&M railroad roadway. Initially, this discrepancy was thought to be a possible georeferencing error, since the 1870 LS&M ROW maps and the 1884-1886 roadway maps had to be “stretched” to match modern aerial photographs. However, comparison of this area to georeferenced 1870 LS&M ROW maps indicates that this section of the original 1868 LS&M railroad roadway was not “covered” or removed by the 1880s construction of the realigned roadway, which shifted to the west of the 1868 LS&M railroad roadway and located atop an embankment. However, geomorphological soil cores placed in the Bruce Vento Trail embankment did not find evidence of the 1868 LS&M railroad roadbed. This added support to the idea that the smaller embankment to east of the 1880s railroad roadway is probably the 1868 LS&M railroad roadbed. To the south of Kohlman Avenue is a residential area, and remnants of the 1868 LS&M railroad roadbed appear to have been destroyed by construction. Nearest to Kohlman Avenue, the 1868 LS&M railroad roadbed is approximately 7 feet, 2 inches in height and the top of the embankment is approximately 11 feet, 5 inches wide. Adding ditch and embankment edges, this measurement would fit within the railroad roadway standard 12- to 14-foot width found in the LS&M Railroad Corridor Historic District: Thomson to Fond du Lac Segment.⁴⁷ Also, erosion or environmental factors may have affected the measuring of the width accurately in the field.

⁴⁷ Arnott and Maki, *Evaluation of the Lake Superior and Mississippi Railroad: Thomson to Fond Du Lac Segment* (XX-RRD-26) Carlton and St. Louis Counties, Minnesota (Draft), 86.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

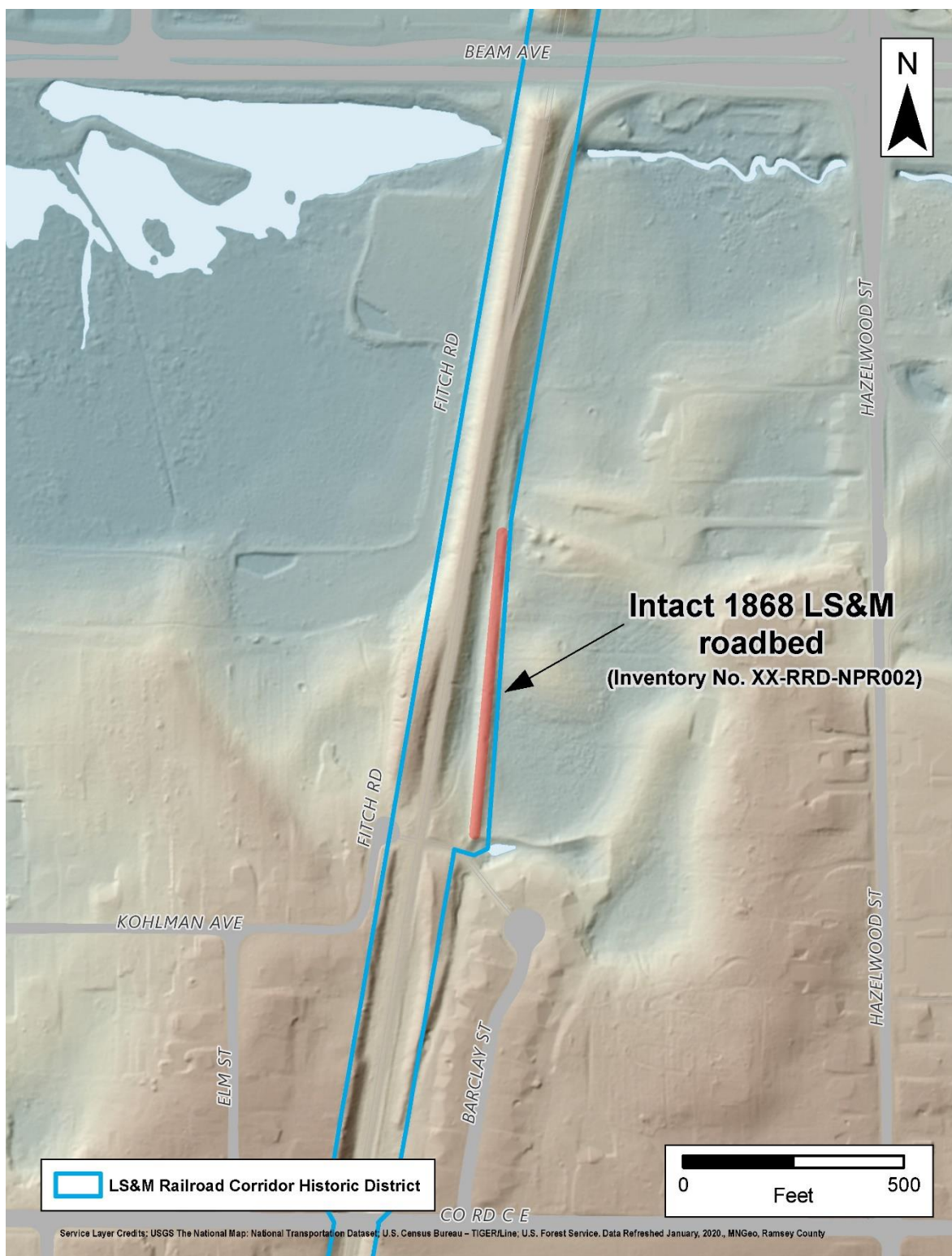


Figure 71. Map of the LS&M Railroad Corridor Historic District showing the location of possible partial remnants of the original 1868 LS&M railroad roadbed between County Road C and Beam Avenue.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

At the southern end of this section of the original 1868 LS&M railroad roadbed, closest to Kohlman Avenue, both the 1868 LS&M railroad roadbed and the 1880s railroad roadway (which is generally the same as the Bruce Vento Trail embankment) are located atop embankments located approximately 48.5 feet apart (measurement taken from the base of the two embankments). Farther to the north, towards Beam Avenue, the LS&M railroad roadbed embankment slowly begins to decrease in height. MVAC personnel walked to almost the end of this embankment, where it flattens out, approximately 650 feet north of the cul-de-sac near Kohlman Avenue. North of this area is perhaps another 188 feet of 1868 LS&M railroad roadbed that is flatter. Since the boundary between the RCRRA ROW and adjacent private property in this area was not clear, it was not inspected closely. The number of trees between the two berms made it difficult to accurately measure with a tape, so the estimated measurements were taken from the Bruce Vento Trail. Weather was not optimal during the visits to this area. As a result, the top few inches of the ground had already frozen and the top of the 1868 LS&M railroad roadbed could not be hand cored to determine whether there was ballast present. Additionally, the number of trees and the steepness of this embankment precluded access by the coring truck. The distance between the 1868 LS&M railroad roadbed and the 1880s railroad roadway and Bruce Vento Trail embankment becomes narrower as the two embankments proceed north. At one point, the two are only 15-16 feet apart.

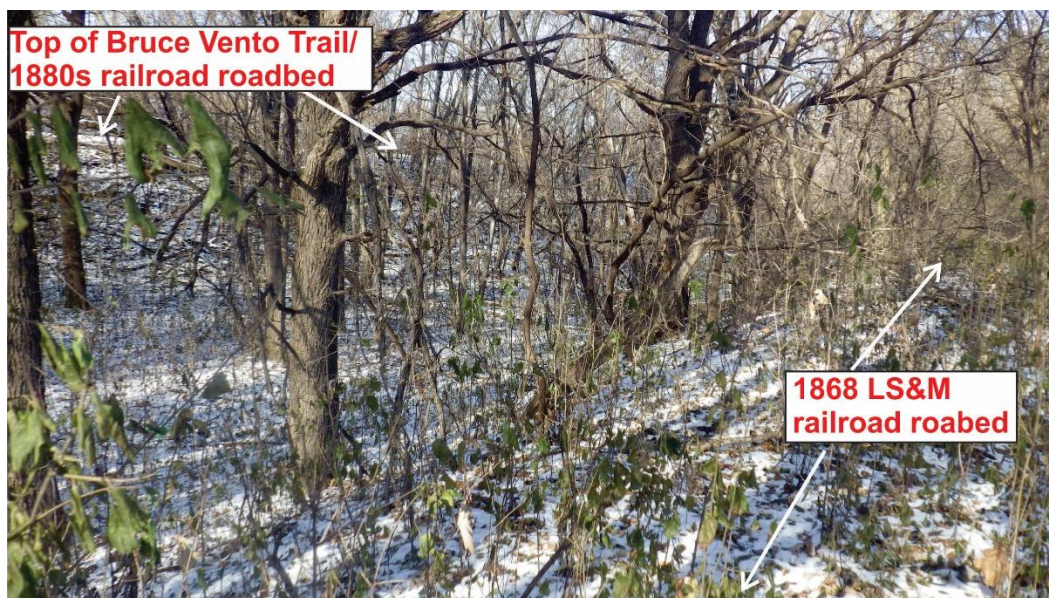


Figure 72. View of two embankments south of Kohlman Avenue. The likely 1868 LS&M railroad roadbed is at right while the 1880s railroad roadway, currently used by the Bruce Vento Trail, is at left.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 73. View of the likely 1868 LS&M railroad roadbed north of Kohlman Avenue, view facing east. Flags in the foreground show the relative ground surface between the 1868 and 1880s rail embankments.

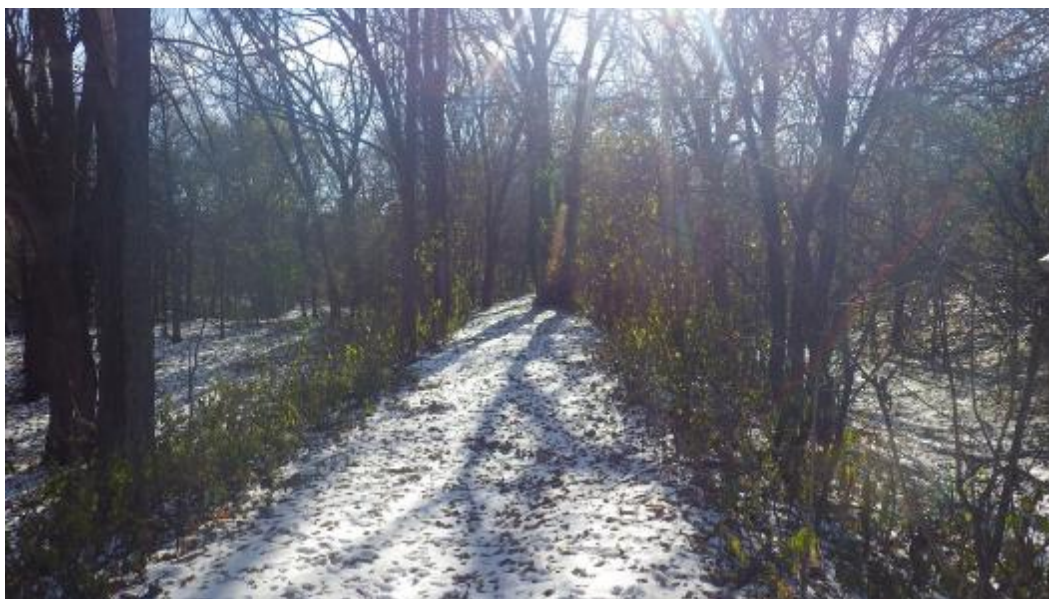


Figure 74. Northern end of the likely 1868 LS&M railroad roadbed north of Kohlman Avenue as it starts to slope down toward Beam Avenue, view facing south (towards Kohlman Avenue).

LiDAR imagery shows the original 1868 LS&M railroad roadbed in this area (see Figure 75), as do 1945 (see Figure 76) and 1974 aerial photographs (by 1991, aerial photographs show the southern portion of the 1868 LS&M railroad roadbed near County Road C had been destroyed by residential development).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The 1868 LS&M railroad roadbed on the aerial photographs matches the 1870 LS&M ROW maps (see Figure 77). The LiDAR imagery shows three berms north of Kohlman Avenue, on the western edge of the LS&M Railroad Corridor Historic District. The westernmost berm (possibly natural or human made) is adjacent to, but separate from, the embankment related to the post-1880s railroad roadway and the 1868 LS&M railroad roadbed. LiDAR imagery shows that just north of Kohlman Drive, there is a 9.28-foot height difference between the 1880s railroad roadbed, currently used by the Bruce Vento Trail, and the presumed 1868 LS&M railroad roadbed, the berm west of the trail is 914.11 FASL, the embankment is 904.86 FASL, and the presumed 1868 LS&M railroad roadbed is 894.73 FASL. The 9.28-foot difference between the two railroad roadbeds is the Bruce Vento Trail height (904.86 FASL) minus the presumed LS&M railroad berm height (894.73 FASL). Considering that informants have reported that the Bruce Vento Trail embankment was stripped to remove ballast, it probably was a few feet higher. As such, the difference in height between the 1880s railroad roadbed carrying the trail and the 1868 LS&M railroad roadbed is not as relevant as the difference in height between the two embankments during the period when the 1880s railroad roadbed carried active trackage. Heading north, the height difference between the two embankments is more pronounced. Almost 350 feet north of Kohlman Avenue, the modern Bruce Vento Trail embankment is at 905.03 FASL, and the top of the presumed 1868 LS&M railroad roadbed is at 892.09 FASL, showing a height difference of 12.94 feet. The ground surface between the two embankments at that point is 881 FASL. Almost 600 feet north of Kohlman Avenue, the LS&M slopes down. At this point, the embankment for the trail is 906.19 FASL, and the presumed 1868 LS&M railroad roadbed is 888.42 FASL, showing a 17.87-foot difference between the two. Closer to Beam Avenue, the evidence of the original 1868 LS&M railroad roadbed is not visible. Further evidence may be obscured by a ramp connector that travels west from Beam Avenue to the Bruce Vento Trail, which is located atop the 1880s railroad roadway/Bruce Vento Trail embankment. It is unknown if remnants of the 1868 LS&M railroad roadbed are intact under this ramp connector.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

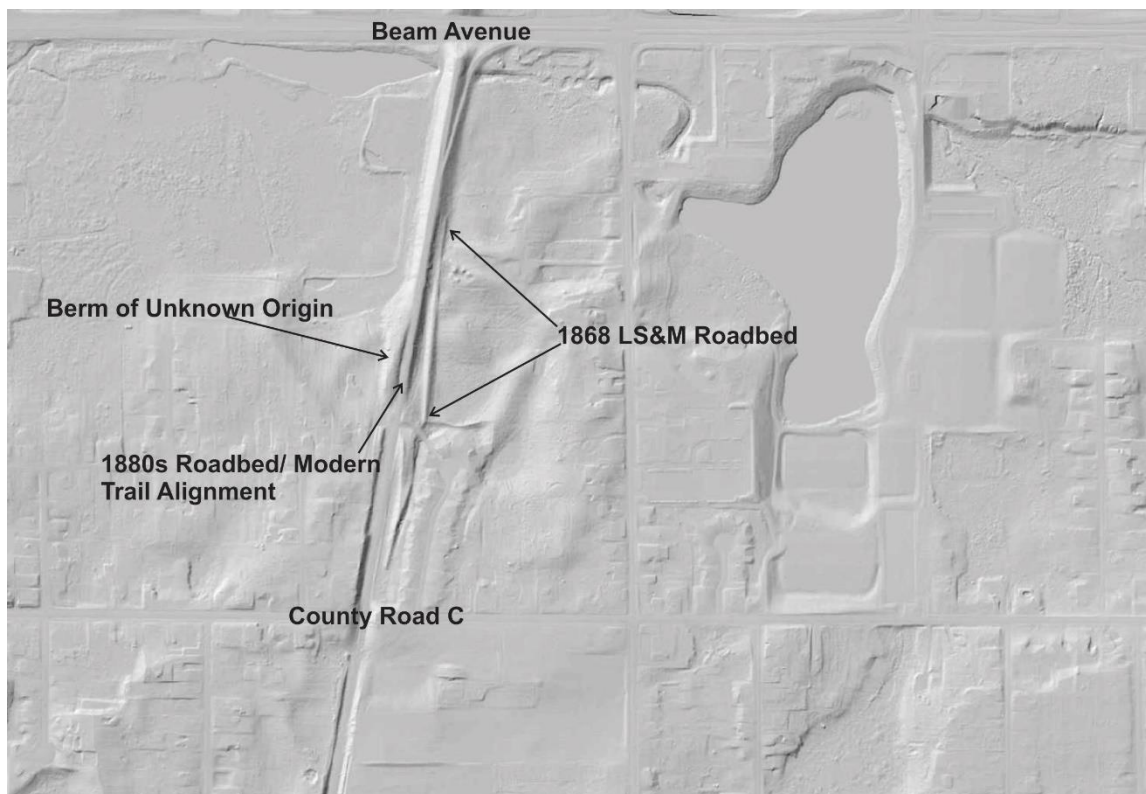


Figure 75. LiDAR imagery between Beam Avenue and County Road C, showing likely 1868 railroad roadbed east of the 1880s railroad roadbed/Bruce Vento Trail.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

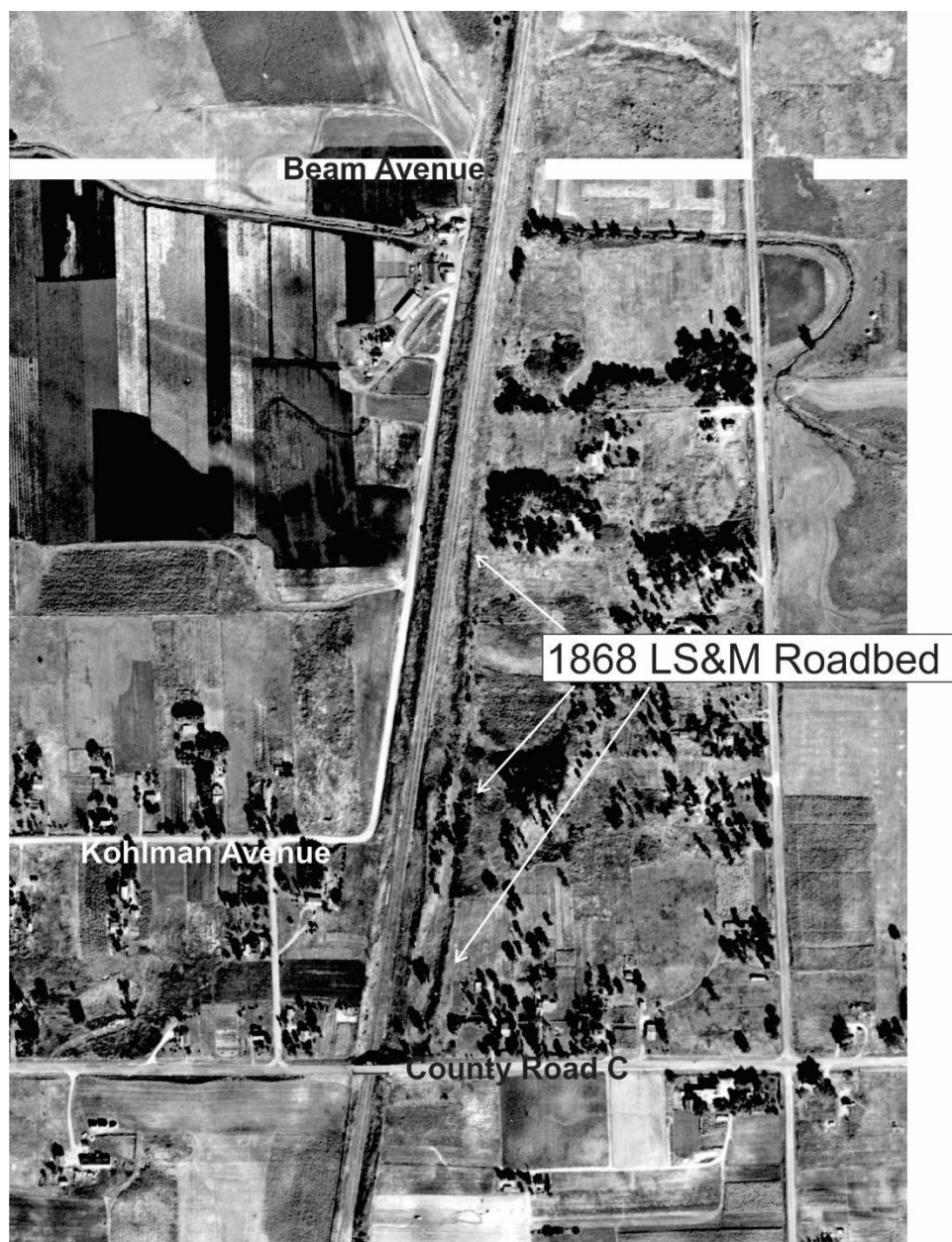


Figure 76. 1945 aerial imagery showing the likely 1868 original LS&M railroad roadbed east of the railroad tracks between the current locations of County Road C and Beam Avenue. Beam Avenue did not exist in 1945, so the modern vehicular roadway is shown here as an overlay. Note that Kohlman Avenue currently terminates just north of where it turns to the north in this photograph.⁴⁸

⁴⁸ "Aerial Photograph, Ramsey County, Minn., A13-18," 1945, John R. Borchert Map Library, University of Minnesota, <http://geo.lib.umn.edu/twin-cities-metro-area/1945/A-13-018.jpg>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

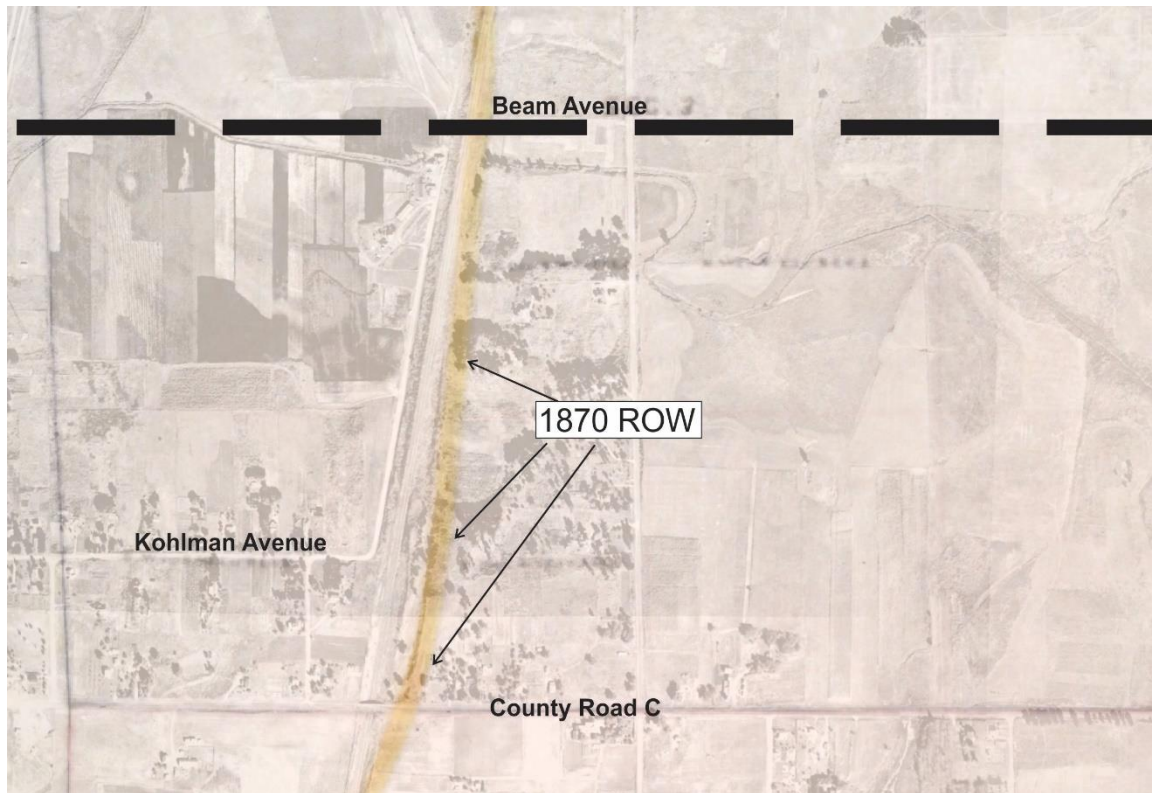


Figure 77. Georeferenced map showing the 1870 LS&M ROW map (in yellow) relative to the 1945 aerial image (see Figure 76). Beam Avenue did not exist in 1945, so the modern vehicular roadway is shown here as an overlay.

B. BURIED REMNANTS OF 1868 LS&M ROADBED

Aside from the three areas described above, portions of the area believed to be the original LS&M railroad roadway or at least the original 1868 LS&M railroad roadbed were found in some areas between Johnson Parkway and Gervais Avenue below the 1880s roadway/Bruce Vento Trail embankment. The locations of specific soil cores are shown on Figure 78 and Figure 79, and detailed information is presented in Appendix D, but the basic results of the geomorphological soil coring are:

- Johnson Parkway to Maryland Avenue – Due to the steep slope of the embankment and thick vegetation, the geomorphological coring truck could not access this location to test for the original LS&M railroad roadbed. However, based on the results of the other coring, the 1868 LS&M railroad roadbed may be present in this portion of the 1880s roadway/Bruce Vento Trail embankment.
- Maryland Avenue to Arlington Avenue – A soil core showed that the area immediately north of Maryland Avenue was affected by the removal of a former rail bridge over Maryland Avenue, which

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

was part of the 1880s railroad roadway. There is no remaining evidence of the 1868 LS&M railroad roadbed present.

- Arlington Avenue to Idaho Avenue – Although gravel in the fill resulted in low recovery of a soil sample, a geomorphological soil core in this area found likely evidence of the original 1868 LS&M railroad roadbed, indicated by a buried soil under the post-1880s railroad embankment.
- Idaho Avenue to Larpenteur Avenue – A soil core in this area found indications of the probable original LS&M railroad roadbed, indicated by a minimally disturbed or truncated buried soil under the post-1880s railroad embankment. Judging from the results of the core, the rail ties of the 1868 LS&M railroad construction were probably placed on the original ground surface or on a layer of soil ballast.
- Larpenteur Avenue to Ripley Avenue – A soil core in this area revealed that the 1868 LS&M railroad roadbed was likely present, and the ties from the 1868 LS&M railroad construction were probably placed on the topsoil or on a thin layer of soil ballast. This surface appears to have been truncated by cutting and filling for post-1880 rail improvements.
- Ripley Avenue to Frost Avenue – A soil core along this block found potential indications of the 1868 LS&M railroad roadbed, and likely the original LS&M landscape surface, under 0.66 meters of fill from the post-1880s railroad embankment.
- Frost Avenue to Gateway State Trail (former West Central/Soo line) – Three cores in this area showed fill to depths from 0.5 to 0.7 meters (1.6 to 2.3 feet). In two of the cores, cinder and slag were present in the fill. This area probably has portions of the 1868 LS&M railroad roadbed or original LS&M landscape surface present in the fill beneath the modern ground surface, or in the buried soil below the fill.
- Gateway State Trail to County Road B – Geomorphological coring in this area consisted of two soil cores. The soil core closer to the Gateway State Trail showed no evidence of the 1868 LS&M railroad roadbed; however, based on historic maps, the 1868 LS&M railroad roadway may have been to the east of the core location. A second core placed closer to County Road B had the same results. The 1868 LS&M railroad roadway is likely east of the current trail area. Follow-up reconnaissance work and shovel testing by MVAC in the spring of 2019 in this area found what appeared to be evidence of the original 1868 LS&M railroad roadbed near the Weaver School Trail. Shovel testing outside the LS&M Railroad Corridor Historic District on the Weaver School property near proposed school trail improvements did not find evidence of the 1868 LS&M railroad roadbed. However, evidence of a very slight berm (possibly the 1868 LS&M railroad roadbed) was noticed

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

approximately 50 feet south of the Weaver School Trail and approximately 70 feet north of the Weaver School Trail. These were harder to see during the fall of 2018, when there was a light layer of snow on the ground. The slight berm to the south is within the LS&M Railroad Corridor Historic District and approximately 60 feet long. This berm was not noticed further to the south, as that area appeared to be disturbed by modern development. The berm to the north of the Weaver School Trail was slightly higher than that to the south and is near the edge of the LS&M Railroad Corridor Historic District. The western edge of this berm was identifiable, but the eastern edge disappeared within the trees on the private school property adjacent to the railroad roadway. This slight berm was a little more than 75 feet in length. No other evidence of the original 1868 LS&M roadbed could be found to the north out to County Road B, or to the south out to Gateway State Trail due to the amount of disturbance. Some rail ties were noticed in this area along with two round depressions that were not seen with the snow on the ground. The rail ties were in poor context and randomly scattered around the ditch in this area. Shovel tests placed in the depression did not find evidence that could relate them to a specific rail use. The area immediately surrounding the Weaver School Trail has been disturbed by a drainage ditch under the Weaver School Trail.

- County Road B to Cope Avenue – A geomorphological soil core showed cinder in the fill, and the 1868 LS&M railroad roadbed is likely buried under the later 1880s roadway/Bruce Vento Trail embankment. Based on the soil core results, during construction of the 1868 LS&M railroad roadway, rail ties were likely placed either on the original ground surface or on a layer of soil ballast.
- TH 36 to Gervais Avenue – Geomorphological testing on this post-1880s railroad embankment near Gervais Avenue could not reach original topsoil as the core met with refusal at 3.02 meters (10.5 feet).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 78. Location map (1 of 2) of soil cores found along the corridor.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 79. Location map (2 of 2) of soil cores found along the corridor.

C. SUMMARY

Visual reconnaissance and geomorphological coring of the former rail roadway within the LS&M Railroad Corridor Historic District between Johnson Parkway and Beam Avenue found that georeferenced maps of the original 1870 LS&M ROW with the modern land surface was a good predictor of where evidence of the 1868 LS&M railroad roadbed would be found. The combined visual reconnaissance of the LS&M Railroad Corridor Historic District and the geomorphological coring found evidence of the original 1868 LS&M railroad roadbed either on the surface, or under the 1880s roadway/Bruce Vento Trail embankment within large portions of the RCRRA ROW between Johnson Parkway and Beam Avenue. The portions of the 1868 LS&M railroad roadbed still visible on the surface are at the northern end of this portion of the LS&M Railroad Corridor Historic District and are preserved in place. In a few locations, where the original 1868 LS&M railroad roadway differed from the 1880s railroad roadway, evidence of the original 1868 LS&M railroad roadbed was not found in the cores but could be approximated using the 1870 LS&M ROW maps and was likely set off farther east from the current Bruce Vento Trail area. MVAC looked at these areas in the spring of 2019 and found likely evidence of the 1868 LS&M railroad roadbed within the LS&M Railroad Corridor Historic District and slightly crossing onto private land. However, some of the area had been affected by modern disturbance. In two areas that could not be cored, the 1868 LS&M railroad roadbed is likely present in these areas buried under the later rail fill (based on the results of the other cores). For the areas where the likely 1868 LS&M railroad roadbed or rail surface was identified under the later rail fill, it is presumed that the 1868 LS&M railroad roadbed is protected and likely preserved by the 1880s rail embankment placed on top of the 1868 roadbed. Table 3 breaks down the location, results of identification, and integrity of the original 1868 LS&M railroad roadbed. If integrity is suggested as “good” in Table 3, it is presumed that any 1868 LS&M railroad roadbed or rail surface buried by the 1880s realigned railroad roadway/modern Bruce Vento Trail embankment could be disturbed if the grading for the project is down to the depth of the LS&M roadbed identified in the Strata Morph report (Appendix D). As a point of reference, between Johnson Parkway and County Road C, the RCRRA ROW is roughly 100 feet wide. Between County Road C and Beam Avenue, the RCRRA ROW is roughly 150-feet wide.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 3. Results of reconnaissance and geomorphological investigations

Location	Original LS&M Roadway Results	Relationship to LS&M Railroad Corridor Historic District	Condition
Johnson Parkway to Maryland Avenue	No access for coring due to thick trees and steep topography. Although no coring could take place, based on coring in other similar areas, LS&M railroad roadbed presumed to be intact below post-1880 fill.	Within the boundary	Presumed to be good (likely protected by later fill)
Maryland Avenue to Nebraska Avenue	Small portion of LS&M railroad roadbed close to Maryland Avenue in this area destroyed by bridge removal. For the rest of the area, the LS&M railroad roadbed was set off to the east outside the pre-1890 shoreline of Lake Phalen.	Destroyed	None
Nebraska Avenue to Frost Avenue	Presumed 1868 LS&M railroad roadbed found below 1880s railway fill.	Within the boundary	Presumed to be good (likely protected by later fill)
Frost Avenue to Gateway State Trail (Wisconsin Central/Soo Line)	Presumed 1868 LS&M railroad roadbed found below 1880s railway fill.	Within the boundary	Presumed to be good (likely protected by later fill)

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 3. Results of reconnaissance and geomorphological investigations

Location	Original LS&M Roadway Results	Relationship to LS&M Railroad Corridor Historic District	Condition
Gateway State Trail to County Road B	LS&M not found in cores near existing trail. LS&M likely east of Bruce Vento Trail area based on historic maps. Intact portions of the 1868 LS&M railroad roadbed visible on the surface within this area (some within and some outside the archaeological study area) but the areas closest to County Road B and approximately 100 feet south of the Weaver School Trail had been affected by disturbance.	Partially within and partially outside the boundary (XX-RRD-NPR004)	Good in some areas, poor in others
County Road B to TH 36	Presumed 1868 LS&M railroad roadbed found below 1880s railway fill.	Within the boundary	Presumed to be good (likely protected by later fill) except at TH 36, which destroyed a portion of railroad roadbed during construction
TH 36 to Gervais Avenue	Core was rejected in fill, but 1868 LS&M railroad roadbed may be below 1880s railroad roadway fill based on other cores.	Within the boundary	Unknown
Gervais Avenue to County Road C	Intact portions of the 1868 LS&M railroad roadbed visible on the surface and immediately adjacent to Bruce Vento Trail embankment.	Within the boundary (XX-RRD-NPR003)	Some aspects have been affected, but a large portion of this area has good integrity of all aspects
County Road C to Kohlman Avenue	Would have veered off to east of Bruce Vento Trail embankment.	Destroyed	Destroyed by subdivision

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 3. Results of reconnaissance and geomorphological investigations

Location	Original LS&M Roadway Results	Relationship to LS&M Railroad Corridor Historic District	Condition
Kohlman to Beam Avenue	Intact portions of the 1868 LS&M railroad roadbed visible on the surface, and set off to the side of modern Bruce Vento Trail embankment.	Partially within and partially outside the boundary (XX-RRD-NPR002)	All aspects good

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6. HISTORIC CONTEXT

A. INTRODUCTION

The history of the area surrounding Saint Paul is dominated by the Mississippi River, which was historically one of the busiest commercial waterways in the U.S. In Minnesota, the river cuts through high rock bluffs, winds among glacial hills, and meanders across low marshy plains.⁴⁹ In the area surrounding Saint Paul, the topography near the river is characterized by high limestone bluffs and hills. A number of creeks (now largely run through underground storm sewers) flowed through breaks in the bluffs on their way to the Mississippi River. North of the present site of the city of Saint Paul toward White Bear Lake, a series of marshes and lakes dotted a landscape that alternated from rolling hills to flatter sections of prairie.

This natural geography of the greater Saint Paul area played a key role in its settlement and development as a trade and transportation center. Due to the rich resources of the Mississippi River and its tributaries, Native American populations had lived in the Saint Paul area for thousands of years prior to the Euro-American settlement of the area. At the time of Euro-American contact, the area that later became Saint Paul was home to the Dakota people. The earliest Euro-American settlements in the area were located just upstream of the present-day site of Saint Paul. Fort Snelling was established in 1819 at the junction of the Minnesota (then named the Saint Peter) and Mississippi Rivers and served as the military outpost controlling the fur trade between Native Americans and Euro-American traders. A non-military settlement of Euro-American traders was established across the river from the fort at Mendota by 1825. The Euro-American settlement of what became Saint Paul began in 1838, when a group of settlers from the Selkirk Colony in the Red River Valley (present-day Manitoba) who had been living on military land near Fort Snelling were evicted. These settlers staked out sizable claims along the river and also included discharged Fort Snelling soldiers like Edward Phalen, who eventually settled in a wide ravine between two bluffs where a creek that eventually bore his name flowed into the Mississippi.⁵⁰

Dakota presence in the area was greatly diminished after the U.S.-Dakota War that began in 1862. As the fur trade between Euro-Americans and Native Americans began to wane in the 1830s, native groups were pressured to cede land to the U.S. government. In the 1830s, 1840s, and 1850s, Dakota

⁴⁹ Constance Jefferson Sansome, *Minnesota Underfoot* (Stillwater, Minn.: Voyageur Press, 1983), 85.

⁵⁰ Mendota/West St. Paul Chapter of the Dakota County Historical Society, "Mendota: Walking in the Foot Steps of History, Walking Tour Pamphlet," n.d., <https://www.dakotahistory.org/images/HistoryMaps/Mendota-History-Map.pdf>; Virginia Brainard Kunz, *Saint Paul: The First 150 Years* (Saint Paul, Minn.: The St. Paul Foundation, Inc., 1991), 6–8; J. Fletcher Williams, *A History of the City of Saint Paul to 1875* (Saint Paul, Minn.: Minnesota Historical Society Press, 1983), 42–43.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

bands ceded lands first on the east and then on the west side of the Mississippi River. Under the Mendota Treaty of 1851, the Dakota bands in the Saint Paul area ceded their lands and were placed on a reservation in the western part of what would become Minnesota, along the Minnesota River. In 1862, the U.S. government withheld annuity payments that were promised under this treaty. This act pushed already strained relations to a breaking point, sparking retaliation from the Dakota and leading to the U.S.-Dakota War, which ended with the Dakota expelled from the state and Euro-Americans free to settle throughout the southern half of Minnesota.⁵¹

Early Euro-American settlers in Saint Paul found that the natural break in the limestone bluff at Phalen Creek proved to be an ideal location for a steamboat landing. For steamboats on the Mississippi River, Saint Paul was one the northernmost navigable ports.⁵² The natural river, prior to the lock and dam system, had hundreds of islands that divided the river and dispersed its waters into innumerable side channels and backwaters.⁵³ Islands, low water, and the Saint Anthony Falls in Minneapolis limited further navigation upstream. The breaks in the bluffs—one on either side of what would become downtown Saint Paul—provided easy access to the riverbank from the high bluffs. East of downtown, the Lower Landing (or levee) was located at the foot of present-day Jackson Street and the mouth of Phalen Creek. Farther west, the Upper Landing (or levee) was located at the foot of Chestnut Street (now Eagle Parkway; see Figure 80). Both the Lower and Upper Landing spurred the early growth of Saint Paul. Ultimately, the presence of railroad termini at the Lower Landing, the first of which was established in 1862, led it to become the dominant steamboat landing. The business district that developed near the Lower Landing was given the name Lowertown.⁵⁴

⁵¹ John Anfinson, *River of History: A Historic Resources Study of the Mississippi National River and Recreation Area* (Saint Paul, Minn.: U.S. Army Corps of Engineers, Saint Paul District, 2003), 67–72, https://www.nps.gov/miss/learn/historyculture/historic_resources.htm; Mary Lethert Wingerd, *North Country: The Making of Minnesota* (Minneapolis: University of Minnesota Press, 2010).

⁵² Kunz, *Saint Paul: The First 150 Years*, 13.

⁵³ Anfinson, *River of History: A Historic Resources Study of the Mississippi National River and Recreation Area*, 78.

⁵⁴ Kunz, *Saint Paul: The First 150 Years*, 13.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

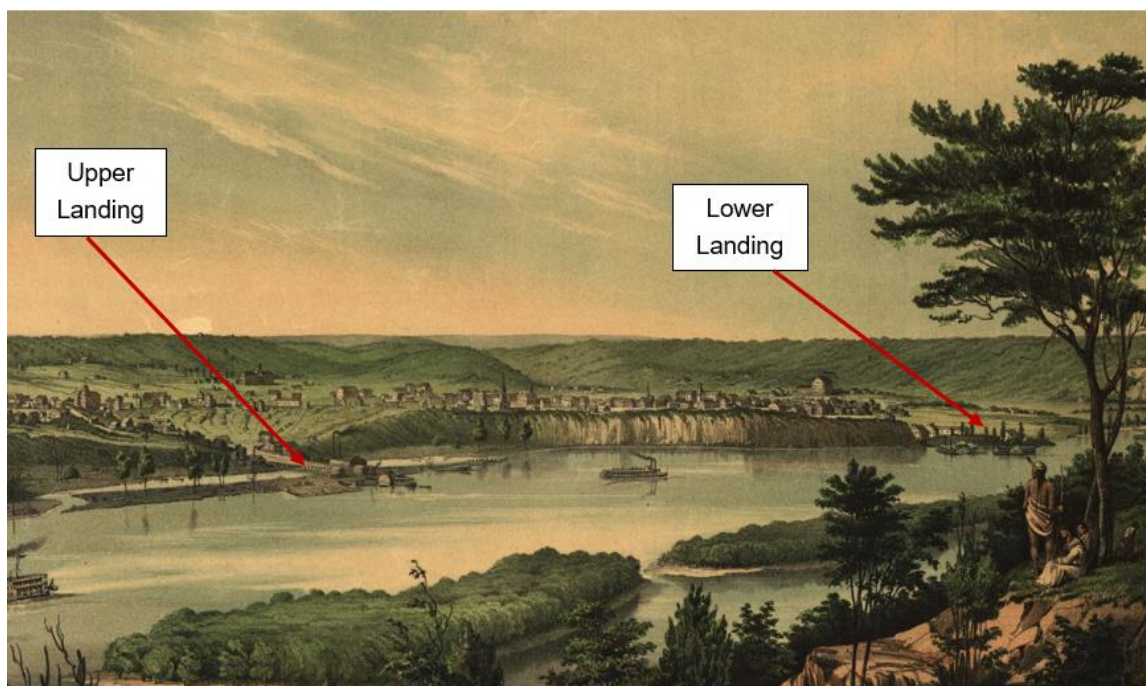


Figure 80. 1853 image of Saint Paul. Note the topography of the city and surrounding area including what became downtown on the high bluff at center and the breaks in the bluff on either side, creating Upper and Lower Landings.⁵⁵

B. RAILROAD HISTORY

The first railroad line in Saint Paul (and the whole of Minnesota) was begun in 1862 as the St. Paul & Pacific Railroad. This line would change names several times, becoming first the St. Paul, Minneapolis, & Manitoba and then the Great Northern (GN) Railroad. As these names imply, the goal of this railroad was to connect Saint Paul to points north and west. At the same time, planning and construction was underway for a second Minnesota railway, one that would connect Saint Paul to points east via the Great Lakes. This railroad was built as the Lake Superior & Mississippi (LS&M) Railroad. It would later be renamed the St. Paul & Duluth (StP&D) Railroad before being purchased and subsumed into the Northern Pacific (NP) Railroad. In 1970, the NP was further consolidated into the Burlington Northern (BN) and then the Burlington Northern Santa Fe (BNSF). The operational and construction histories of the LS&M and the StP&D are described below, with particular attention paid to the portion of the line between Saint Paul and White Bear Lake. Historic photographs are provided throughout the text, with additional photographs presented in Appendix E.

⁵⁵ Thompson Ritchie, *City of St. Paul, Capital of Minnesota*, 1853, Library of Congress Geography and Map Division, <http://hdl.loc.gov/loc.gmd/g4144s.pm004061>.

(1) Lake Superior & Mississippi Railroad

The origins of the LS&M Railroad date to 1857, when the Territorial Legislature of Minnesota awarded a charter to the Nebraska & Lake Superior (N&LS) Railroad Company. The chartered railroad line was intended to run from Lake Superior to a junction with the transcontinental Union Pacific Railroad in Nebraska, thus creating a Lake Superior-Pacific Ocean connection through Minnesota. The N&LS was unable to raise sufficient funds for the ambitious project and no construction of the line took place, thus negating the charter. In March 1861, the Minnesota State Legislature authorized a charter to the LS&M. This new charter downsized the originally proposed line, calling for a railroad that ran from Lake Superior to the Mississippi and Saint Croix Rivers.⁵⁶

The purpose of this new connection between Minnesota's major navigable rivers and the Great Lakes was to ship agricultural goods. The production of wheat as a cash crop began in Minnesota in the 1840s in the triangular shaped area between the Saint Croix and Mississippi Rivers, referred to as the Saint Croix Triangle.⁵⁷ Previously Ojibwe and Dakota land, this area was opened to Euro-American settlement in 1837 after Ojibwe and Dakota representatives ceded the land to the U.S. government.⁵⁸ By the mid-1870s, wheat production had spread first along areas closest to the Mississippi and Minnesota Rivers and then throughout all of southern Minnesota. Before the arrival of railroads, wheat was shipped by riverboat, ultimately destined for terminal markets like Chicago, Milwaukee, or New Orleans. The construction of the LS&M provided an early rail connection between two navigable waterways—the Mississippi River and Lake Superior—that provided connections between wheat producing areas of Minnesota and eastern terminal markets. More specifically, this connection was intended to bypass existing railroads (mostly in Wisconsin) that charged higher rates. Additionally, just as the LS&M helped ship wheat and other agricultural products east, the line also made connections that allowed finished goods and raw materials like coal to be shipped from the east to southern Minnesota via the same route.⁵⁹

For all railroads, when constructing railroad track, it was critical to have a roadway that was relatively level and well drained. Trains ran more efficiently and safely on level track with minimal changes in grade and a limited number of sharp curves. Additionally, water could easily undermine a track structure, so good drainage was important.⁶⁰ Where land was dry and flat, minimal ground modification was needed. Where the landscape was hillier, the land was graded to create a smooth and level roadbed for the tracks. This involved cutting into high ground to remove material and lower the grade and filling low ground with earth (called fill) to raise the grade. Where land was wetter, as in wetlands or

⁵⁶ Lorenz P. Schrenk, "North from St. Paul: 'The Skally,'" *The Mainstreeter* 18, no. 3 (1999): 5.

⁵⁷ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," E-141.

⁵⁸ Wingerd, *North Country: The Making of Minnesota*, 132–35.

⁵⁹ Schrenk, "North from St. Paul: 'The Skally,'" 5–7; National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," E-141-E-143.

⁶⁰ William R. Haycraft, *Yellow Steel: The Story of the Earthmoving Equipment Industry* (Urbana, Ill.: University of Illinois Press, 2000), 5.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

seasonally inundated lands, or where terrain was rougher, more extensive cuts and fills were often needed to keep the track dry and the grade minimal.⁶¹

Where land was relatively level, early railroad builders laid track directly on the undisturbed ground. To create a more stable track on level ground, builders would simply build a low earthen railroad roadbed, using fill from ditches dug alongside the line. This work was generally done by hand, utilizing a team of workers with wheelbarrows and carts. Although the rail-mounted steam shovel was first invented in 1838, its use in the nineteenth century remained limited.⁶² Early track was initially laid on bare dirt and not ballasted. In the latter part of the nineteenth century, the use of ballast became more common, as it provided a more stable foundation, reduced dust, and increased drainage. In the nineteenth century, ballast could consist of materials like stone, slag, gravel, sand, cinders, or burned clay. By the twentieth century, railroad companies generally used crushed granite.⁶³ Before the Civil War, rails in the U.S. were generally iron rails rolled into a T-shape that was common by the 1840s. After the Civil War, the Bessemer process for forging steel meant that steel rails also came into use. Steel rails were tougher, more elastic, and lighter than iron rails. In the late nineteenth century, steel rails were generally reserved for the most traveled routes.⁶⁴

Between Saint Paul and White Bear Lake, the choice of route and construction methods of the LS&M were shaped by the area's topography. The LS&M's chief engineer, Gates A. Johnson, began surveying the route for the new line in 1864. Johnson recommended the grading of the route begin at the Saint Paul end of the line as the laborers and supplies would be readily available there.⁶⁵ He also determined that the valley through which Phalen Creek ran was the most direct and easiest for construction.⁶⁶ This route allowed the LS&M to use the natural break between river bluffs to move from the Lower Landing up and out of the river valley at a relatively gentle grade. Although following Phalen Creek avoided climbing the bluffs directly, the grade was still steep: approximately 100 feet per mile. By following Phalen Creek, the LS&M was routed along the east side of Lake Phalen (from which Phalen Creek flows), where it turned north toward White Bear Lake and eventually Duluth (see Figure 81 and Figure 82).⁶⁷

⁶¹ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," 185.

⁶² Haycraft, *Yellow Steel: The Story of the Earthmoving Equipment Industry*, 5–6; Thomas Curtis Clarke, *The American Railway: Its Construction, Development, Management, and Trains* (New York: Skyhorse Publishing, 2012), n.p.

⁶³ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," 24.

⁶⁴ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," 23–24.

⁶⁵ Betsy H. Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad* (Prepared for The Surface Transportation Board, Burlington Northern Santa Fe Railway Company, The Minnesota State Historic Preservation Officer, and The City of Maplewood, Minnesota, August 2006), 6.

⁶⁶ Gates A. Johnson, *Report of the Engineer of the Lake Superior and Mississippi Railroad Company* (N.p.: n.p., 1864).

⁶⁷ Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad*, 6.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

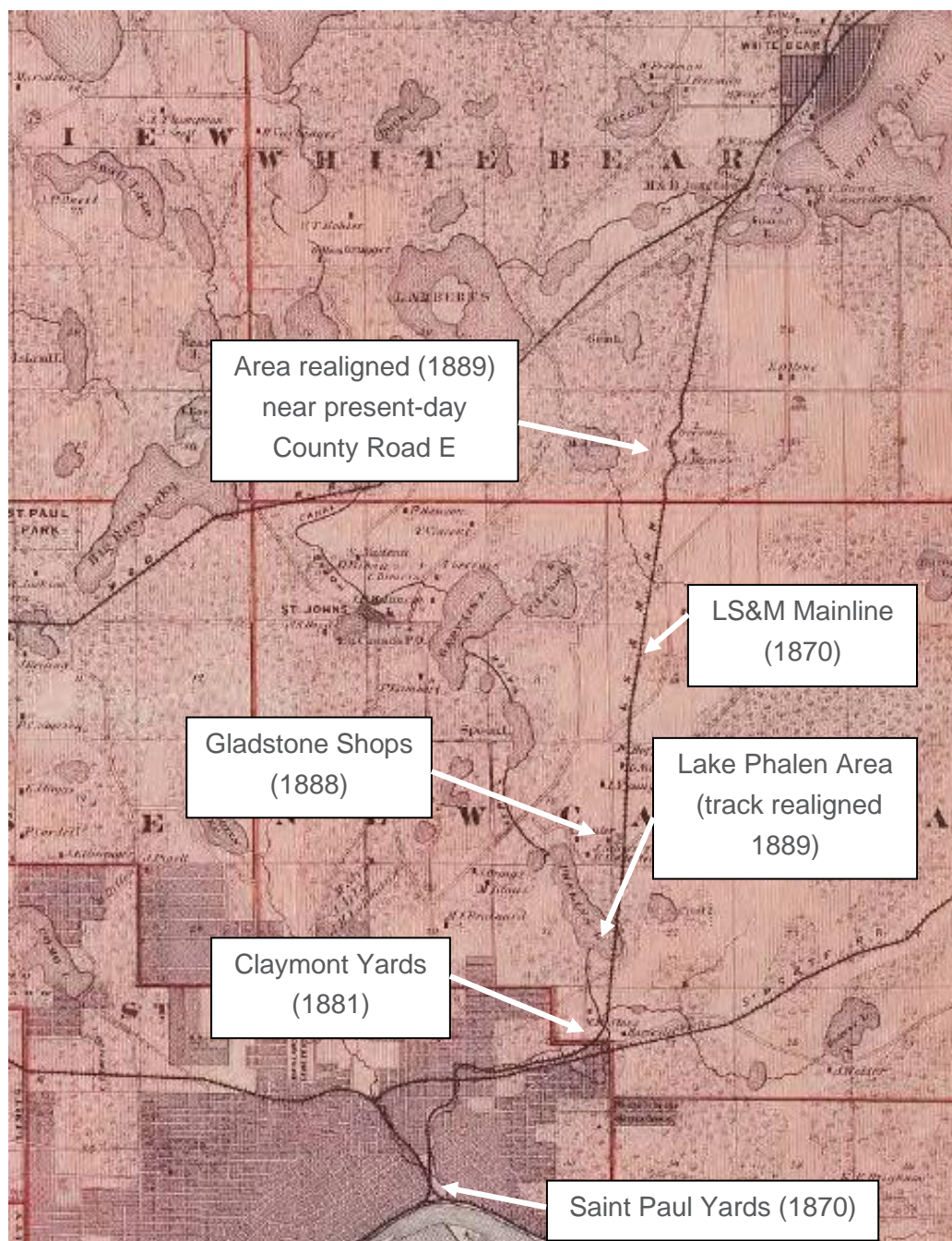


Figure 81. 1874 map showing the LS&M mainline railroad from Saint Paul (bottom center) to White Bear Lake (top right). This map represents the 1868 LS&M mainline railroad and calls out future locations of yards, shops, and significant realignment with construction dates in parentheses. Please note that the railroad roadway alignment at Lake Phalen shown here is incorrect and would have swung to the east around the lake in 1874.⁶⁸

⁶⁸ Alfred Theodore Andreas, "Map of Ramsey County, Minnesota in An Illustrated Historical Atlas of the State of Minnesota" (Chicago: A.T. Andreas, 1874), <https://reflections.mndigital.org/catalog/mhs:1192>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

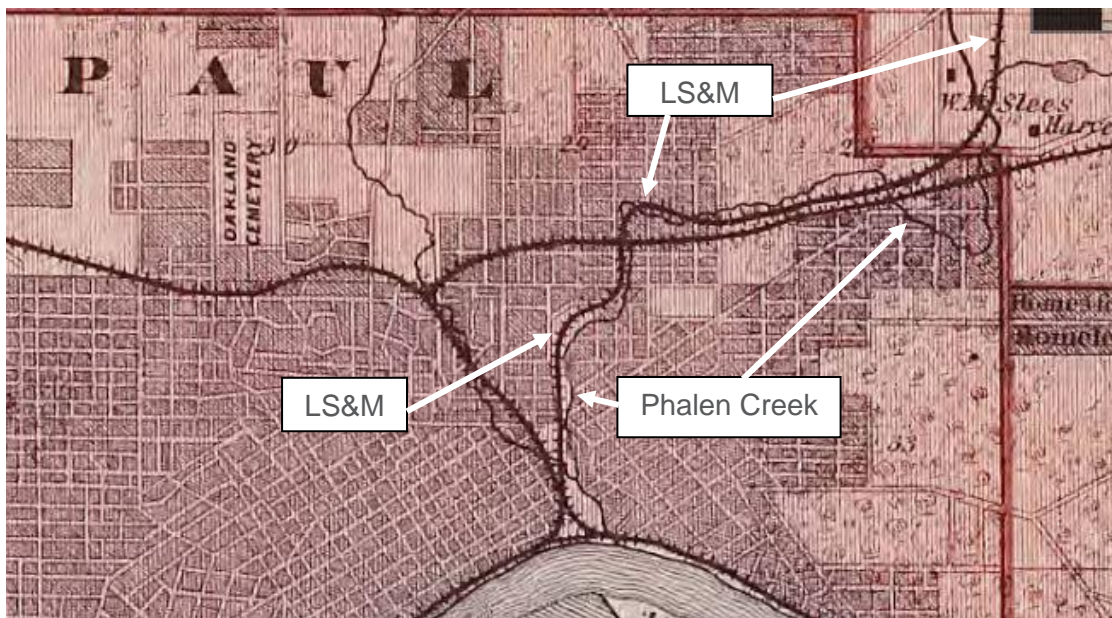


Figure 82. Closeup of 1874 map showing how the rail lines in Saint Paul followed creek beds between the bluffs in order to lessen the grade as lines transitioned from the Mississippi River bed to the tops of the bluffs.⁶⁹

The work of grading the railroad roadway from Saint Paul to White Bear Lake was undertaken by the contractor William Branch. In Saint Paul, where the roadway originated at the Lower Landing and followed Phalen Creek up and out of the bluffs to the east side of Lake Phalen, it generally stuck to low ground, which was predominantly wetland. Building on this type of land required the use of fill to raise the railroad roadbed and the construction of a series of culverts, bridges, and trestles (all of these structures from the 1868 railroad roadway alignment appear to be nonextant) from the Phalen Creek valley to the area around Lake Phalen (see Table 4).⁷⁰ The work from the Lower Landing to Lake Phalen was done by hand by work units of various sizes, from 75 to 200 men.⁷¹ North of Lake Phalen, where the land was dryer and flatter, a “digging machine” drawn by a team of eight oxen was used to speed up the process of grading.⁷² While grading began in 1864, the first 30 miles of track was not

⁶⁹ Andreas, “Map of Ramsey County, Minnesota in An Illustrated Historical Atlas of the State of Minnesota.”

⁷⁰ *Report of the Saint Paul & Duluth Railroad Company for the Seven Months Ending December 31st, 1879* (Saint Paul, Minn.: H.M. Smyth Printing Company, 1880), 23.

⁷¹ John C. Luecke, *The Northern Pacific in Minnesota* (Saint Paul, Minn.: Grenadier Publications, 2005), 3.

⁷² Luecke, *The Northern Pacific in Minnesota*, 3; Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad*, 7.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

completed until 1868.⁷³ The LS&M used iron T-style rails to construct a single mainline on the newly graded railroad roadbed.⁷⁴

Table 4. Bridges on the LS&M between Saint Paul and White Bear Lake in 1879⁷⁵

LS&M Bridge No.	Approximate Location (streets are present-day)	Miles from Saint Paul	Type of Structure	Length (in feet)	Height (in feet)	Over what Obstacle
1	Phalen Creek valley	0	Pile bridge	636	14	Phalen Creek/Marshland
2	Phalen Creek valley	0	Stone culvert	14	15	Phalen Creek/Marshland
3	Arcade Street	1.5	Trestle	160	10	Phalen Creek
4	Mendota Street	1.625	Trestle	20	22	Phalen Creek
5	Duluth Street	2.25	Stone culvert	140	3	Phalen Creek
6	Maryland Avenue East	3	Trestle	120	12	Lake Phalen Marshland
7	Arlington Avenue East	3.5	Trestle	110	11	Lake Phalen Marshland

On October 6, 1868, the first LS&M train from Saint Paul arrived in the lakeside resort town of White Bear Lake (see Figure 83). The completion of the railroad roadway to White Bear Lake would not have been possible without the financial backing of Philadelphia financier Jay Cooke, who, a year earlier in 1867, had purchased control of the LS&M. Cooke and his associates were convinced of the viability of the LS&M and, in particular, its connection with Duluth, which Cooke believed would be an important port city at the western end of the Great Lakes. With Cooke's backing, the LS&M completed construction to Wyoming, Minnesota, by December 1868 and all the way to Duluth by August 1870.

⁷³ Lester Burrell Shippee, "The First Railroad between the Mississippi and Lake Superior," *Mississippi Valley Historical Review* 5, no. 2 (September 1918): 141.

⁷⁴ Shippee, "The First Railroad between the Mississippi and Lake Superior," 141; Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad*, 14.

⁷⁵ *Report of the Saint Paul & Duluth Railroad Company for the Seven Months Ending December 31st, 1879*, 23.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

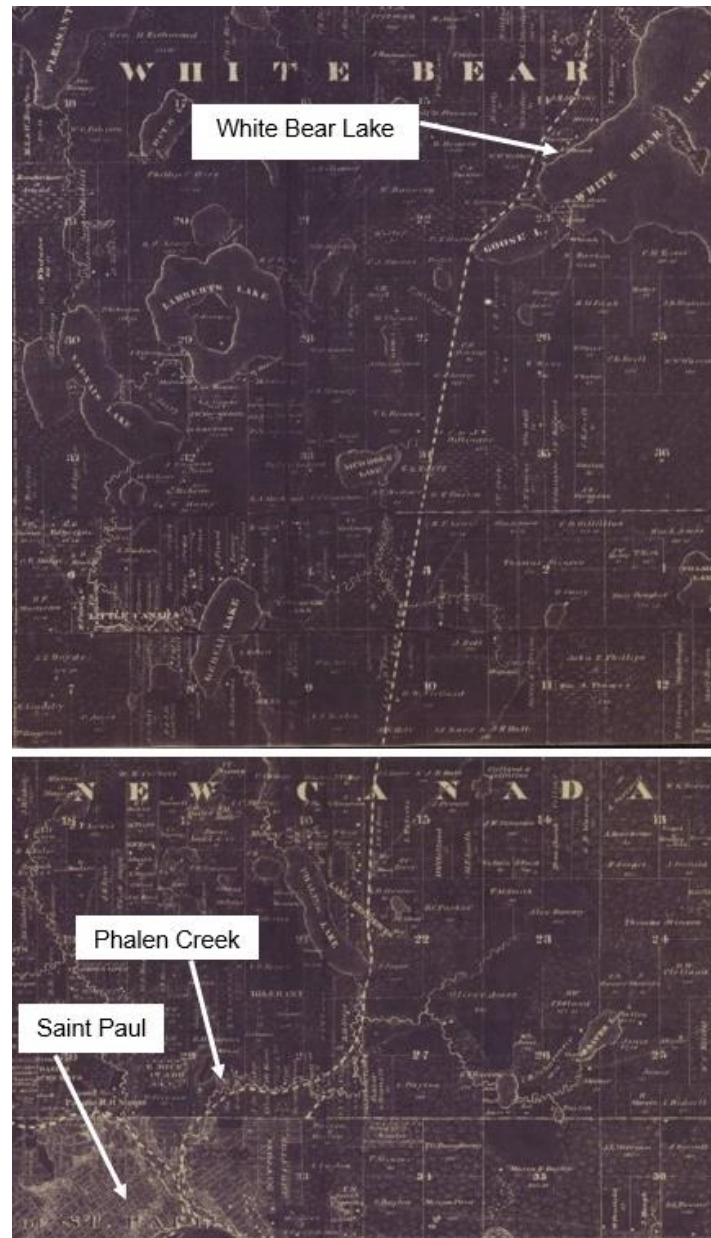


Figure 83. 1867 etching plate showing the (then under construction) route of the LS&M Railroad from downtown Saint Paul to White Bear Lake. Note how the route follows Phalen Creek between the Mississippi River and Lake Phalen. Since this etching was done before construction was completed, there are some differences between the projected and the as-built alignment.⁷⁶ For example, the area near present-day County Road E appears straight in this image, while the 1874 map above (see Figure 81 and Figure 82) shows several curves in that area.

⁷⁶ L.G. Bennett, "Map of Ramsey and Manomin Counties and Hennepin East, Minnesota," 1867, James K. Hosmer Special Collections, Hennepin County Library, <https://reflections.mndigital.org/catalog/mps:250>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

As part of this construction, the LS&M built railyards and shop facilities in Saint Paul along Phalen Creek near its outlet into the Mississippi River and in Duluth on Rice's Point. Underscoring the importance of wheat for the early railroad, the LS&M also constructed a grain elevator on the shore of Lake Superior at the line's terminus.⁷⁷ The yards in Saint Paul were built on the low marshy ground along Phalen Creek, adjacent to the Lower Landing. Again, building on such a low site required a large amount of fill to attempt to raise the railyards and facilitate drainage. An 1869 *St. Paul Pioneer Press* article colorfully describes the construction in the yard, including the use of fill from nearby Dayton's Bluff:

All will remember the bluntly, broken and uneven nature of the ground between those two streams [Trout Brook and Phalen Creek]. . . . A more unpromising piece of ground it would be hard to find. On one side was a high bank or bluff, and on the other a deep ravine, all very romantic and all that, but not exactly such land as would be selected as building sites. All this, however, has been changed. During the past few months the company have [sic] dug away the bluff some 400 feet in width, and over 1,000 feet in length, filling out the ravine 200 feet in width, and several hundred feet in length, leaving a fine level plateau of ground some 600 by 1,500 feet, all of which will soon be covered with large substantial buildings, machine shops, blacksmiths shops, round house, car shops, etc., with a complete network of iron all through it.⁷⁸

In addition to the yards, shops, and grain elevator, the LS&M also built 14 stations, five engine houses, and nearly a dozen water stations for its steam-powered locomotives between the termini of Saint Paul and Duluth.⁷⁹

In 1872, the NP began to lease the LS&M line, operating it as a subsidiary. The NP was operated by Jay Cooke and his associates, who had earlier invested heavily in the construction of the LS&M. In 1872, the NP was constructing its mainline from the NP Junction near Carlton, Minnesota (just west of Duluth), to the Pacific Northwest. The lease of the LS&M line allowed Cooke and associates to avoid building a parallel track from Carlton to Duluth and gave them control of wheat shipments from both southern Minnesota and the Red River Valley. In 1873, Cooke's banking operations failed, precipitating a nationwide financial panic. As a result of the Panic of 1873, the NP was no longer able to pay its lease fees to the LS&M and, therefore, abrogated its lease in 1874. On its own once again, the LS&M struggled for another year before declaring bankruptcy in 1875.⁸⁰

⁷⁷ Schrenk, "North from St. Paul: 'The Skally,'" 8–9.

⁷⁸ Luecke, *The Northern Pacific in Minnesota*, 18–19.

⁷⁹ Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad*, 14.

⁸⁰ Schrenk, "North from St. Paul: 'The Skally,'" 10.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

(2) St. Paul & Duluth Railroad

In May 1877 a group of LS&M investors organized a new railroad company, the StP&D, after purchasing the LS&M at a foreclosure sale. By the 1880s, the U.S. economy had largely recovered from the Panic of 1873 and business was booming for the StP&D. As a result, traffic increased dramatically and the StP&D had to expand and improve its rail lines to keep pace with demand. This expansion included the leasing of a number of branch lines (see Figure 84), an increase in the company's rolling stock such as locomotives and rail cars, and the improvement of the physical facilities and tracks used by the railroad.

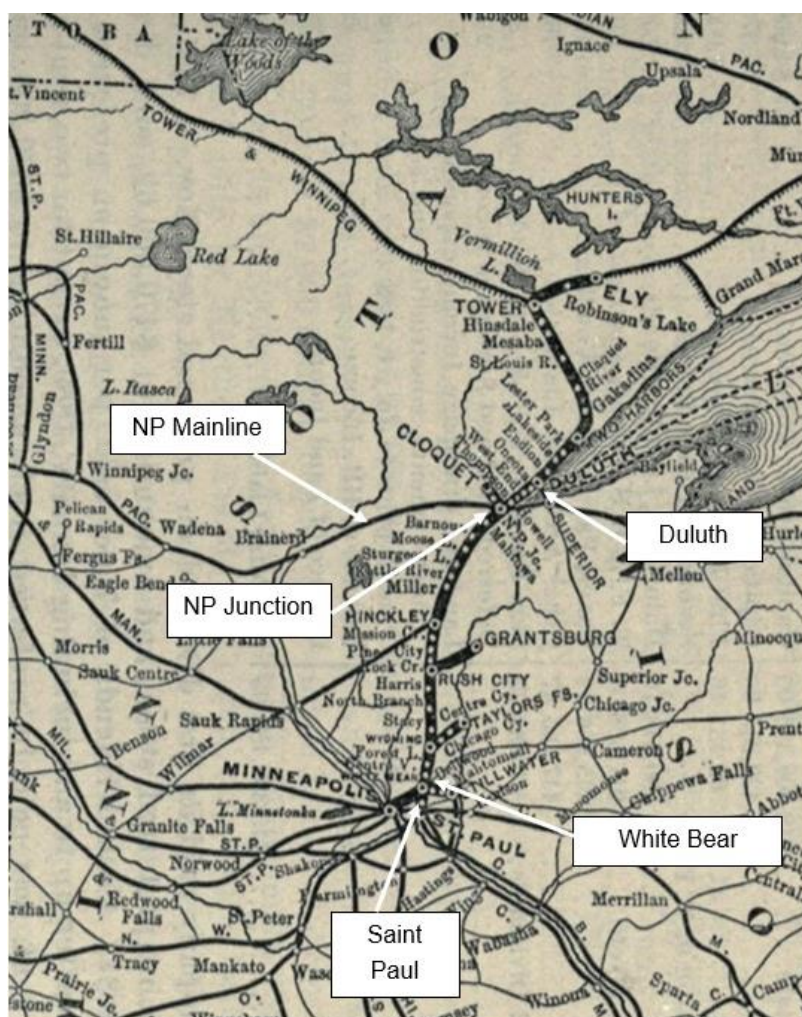


Figure 84. 1891 map of the StP&D line (dark black) and its connections. Note the StP&D branch lines as well as its connections with the NP at the NP Junction.⁸¹

⁸¹ *Poor's Manual of the Railroads of the United States* (New York: Poor's Publishing Co., 1891), 499, https://commons.wikimedia.org/wiki/File:1891_Poor%27s_St._Paul_and_Duluth_Railroad.jpg.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

During the 1880s, the StP&D operated several branch lines in addition to its Saint Paul to Duluth mainline. These branch lines allowed the StP&D to make important connections to other railroads and important cities and towns. A branch line to Minneapolis, for example, gave the StP&D access to that city's flour mills as well as new passenger traffic. Likewise, the branch line that connected Duluth to Tower and Ely gave the StP&D access to the newly opened Iron Range. Other branch lines reached communities like Taylors Falls and Cloquet, as well as Hudson and Grantsburg, Wisconsin. To help service these branch lines and the overall increase in traffic, the StP&D had to acquire additional rolling stock. In the StP&D annual report for 1881, the company directors reported that the StP&D was unable to fully capitalize on demand for their services due to a lack of rolling stock, stating, "The earnings . . . are much less than they would have been had the road been fully equipped with the necessary engines and cars, while the expenses have been somewhat increased by a comparatively large use of the cars of the other roads."⁸² In response, the StP&D purchased three second-hand engines and 300 freight cars in 1881 alone. That same year, the StP&D built 30 flat cars, 13 box cars, one mail car, one express car, and four cabooses in its own shops.⁸³ Five years later, in 1886, the railroad purchased four locomotives, two switching engines, two sleeping cars, 500 box cars, and four cabooses.⁸⁴

In addition to the company's rolling stock, the original yards and shops in Saint Paul were also outdated. These yards and shops, originally constructed in 1869, were overcrowded and flooded regularly because of their location in the swampy Phalen Creek valley.⁸⁵ Construction on additional yards and a new roundhouse began in 1881 at a site called Claymont, named for its clay deposits. Fill from grading the Claymont site was used to raise the Saint Paul yard. According to the 1881 StP&D annual report, "The want of room at St. Paul, and experience of the past season [flooding], demonstrate the necessity of filling the [original 1869] yard above the high-water mark. This can be, in part, done by using the earth necessary to be removed in grading the yard and track at Claymont, near Post's Side Track."⁸⁶ Once Claymont was graded, track scales were added in 1881 and a 10-stall roundhouse was

⁸² *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1881* (Saint Paul, Minn.: West Publishing Company, 1882), 5.

⁸³ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1881*, 5–6.

⁸⁴ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1886* (Saint Paul, Minn.: H.M. Smyth Printing Company, 1887), 5.

⁸⁵ Bob Jensen, "The St. Paul and Duluth Railroad," *Maplewood Area Historical Society Newsletter*, July 2018, Maplewood Area Historical Society, Maplewood, Minn.; Summit Envirosolutions, Inc., "Gladstone Savanna Neighborhood Preserve," 4; *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1885* (Saint Paul, Minn.: H.M. Smyth Printing Company, 1886), 8.

⁸⁶ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1881*, 9.

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

The site plan shows a large rectangular area divided into lots, with a central circular area labeled "COURT YARD". To the right, a curved road is labeled "OLD ST. PAUL & DANFORTH R.R. RAILROAD AVENUE". A north arrow is located in the bottom left corner, pointing towards the top left. The plan includes various dimensions and labels for different areas and features.

Despite the new construction at Claymont and the improved yard in Phalen Creek, the StP&D was still expanding in the early 1880s and required more facilities. The 1885 annual report, for example, complained of “serious delays at St. Paul on account of insufficient yard room . . . making an extra

⁹⁰ "St. Paul, Minn., 1903 - Revised 1904," 1:600 (New York: Sanborn Map Company, 1904), 215.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

expense to the company and vexatious delays to shippers.”⁹¹ Between 1887 and 1888, the StP&D constructed what became known as the Gladstone Shops (named after the English statesman William Gladstone) at the southwest quadrant of the intersection of Frost Avenue and English Street.⁹² Although this location was approximately five miles north of downtown Saint Paul, it was chosen for several reasons. First, the Wisconsin Central Railroad (later the Soo Line) crossed the StP&D just to the north of the Frost Avenue-English Street intersection starting in 1884. This junction was called Phalen Junction until 1910, after which it was more commonly referred to as Gloster Junction.⁹³ Second, aside from the Claymont site, the location was one of the first large, level areas of ground after the steep climb out of Phalen Creek (see Figure 86).⁹⁴



Figure 86. 1926 image looking north from Gloster Junction, showing the northern wye connection with the Wisconsin Central/Soo Line (coming from left). Note the relatively flat landscape, which made the area conducive for constructing the Gladstone Shops.⁹⁵

⁹¹ Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1885, 8.

⁹² Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study*, 20; Summit Envirosolutions, Inc., "Gladstone Savanna Neighborhood Preserve," 4.

⁹³ Summit Envirosolutions, Inc., "Northern Pacific Railroad Bridge No. 6402 - RA-MWC-0064," 2; Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study*, 20.

⁹⁴ Pete Boulay, *The Lost City of Gladstone* (Maplewood, Minn.: P.J. Boulay, 1997), 25; Summit Envirosolutions, Inc., "Gladstone Savanna Neighborhood Preserve," 4.

⁹⁵ Photograph courtesy of the Maplewood Area Historical Society. See Appendix E for a series of photographs showing trackage, crossings, and the depot near Gloster junction.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Finally, the construction of the new shops was part of a land speculation deal. Businessman William Dawson had purchased 10,000 acres of land in the area, 30 of which he agreed to donate to the StP&D. In return, Dawson moved his St. Paul Plow Works to the Gladstone area, on a choice piece of property at Phalen/Gloster Junction, which provided freight rail access on both the StP&D and Wisconsin Central. Additionally, Dawson platted the townsite of Gladstone, selling lots to those working at the shops or at the plow works (see Figure 87).⁹⁶ The new shops proved to be adequate to service the new locomotives and rolling stock the StP&D put into service during its 1880s expansion, but the distance from downtown Saint Paul proved to be expensive and, shortly after opening, one annual report noted that, “The location of the new shops at Gladstone, five miles out of Saint Paul, has materially increased the cost of operation. Claymont, at the head of the grade out of Saint Paul, was the natural location for them, and would have been better in every way.”⁹⁷

⁹⁶ Research did not reveal if Dawson received additional payments, shipping discounts, or other benefits directly from the railroad as a part of this deal. Jensen, “The St. Paul and Duluth Railroad”; Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study*, 20; “Gladstone,” *Saint Paul Globe*, August 14, 1887, 14.

⁹⁷ *Report of the St. Paul & Duluth Railroad Company for the Year Ending December 31, 1888* (New York: Gibb Bros. & Moran, 1889), 16.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

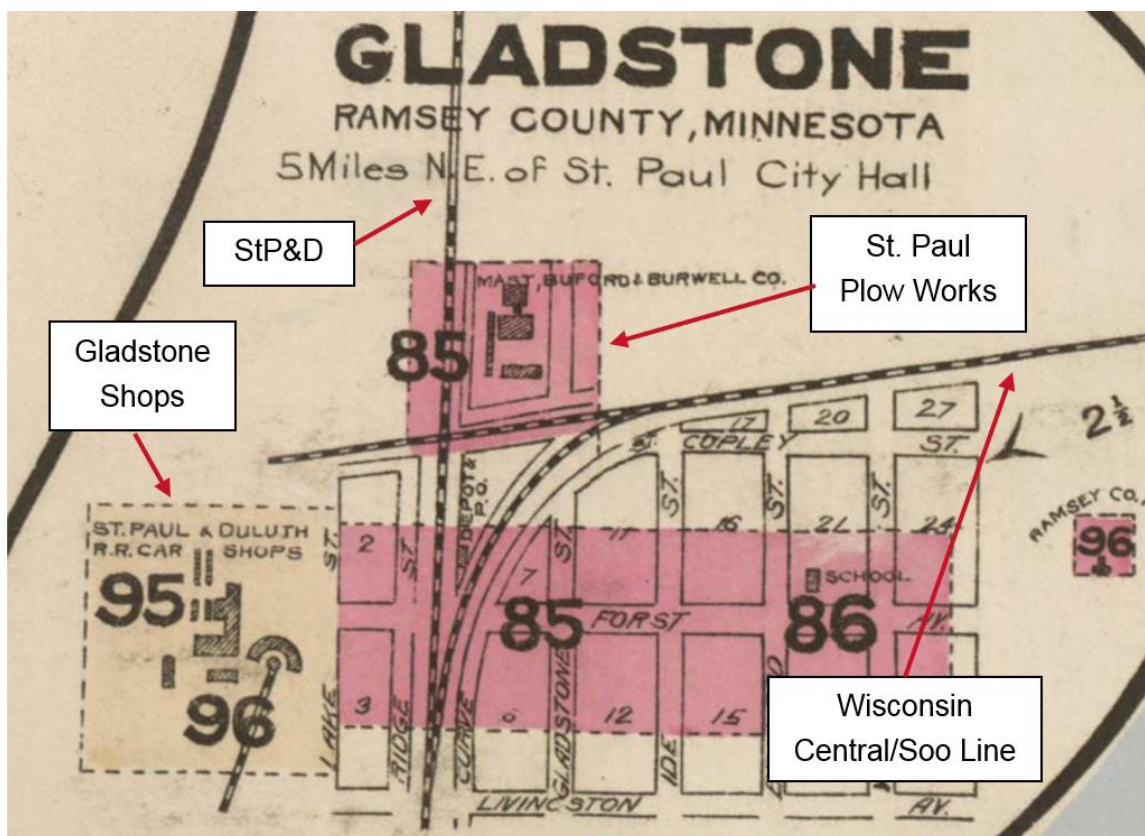


Figure 87. Inset of an 1891 atlas of Saint Paul showing the small platted community of Gladstone. Note the rail lines and the two major industries: the Gladstone Shops and the St. Paul Plow Works.⁹⁸

While shop facilities were being built to accommodate the increased numbers of rolling stock, the rail line itself was also overhauled. The original railroad roadway had been completed in 1868 as quickly as possible to meet the requirements of the charter, which triggered a transfer of title for over 1.5 million acres of public land to the LS&M.⁹⁹ Because it was built in haste, the track needed maintenance and rebuilding soon after construction. The LS&M completed some of this work, but the majority of it was done under the StP&D. Some of this work was minor and included adding stone gravel or ballast to the roadbed or fencing along the ROW (animals crossing the railroad track were a hazard to passing locomotives). According to StP&D 1880 timesheets, the work of ballasting the tracks was occasionally done by steam shovel and may have made use of gravel from a pit in Saint Paul.¹⁰⁰ More involved

⁹⁸ *Atlas of St. Paul, Minnesota (Plat Book), Volume 1* (Chicago: Rascher Insurance Map Publishing Company, 1891), <https://reflections.mndigital.org/catalog/spp:480>.

⁹⁹ Schrenk, "North from St. Paul: 'The Skally,'" 10.

¹⁰⁰ *Northern Pacific Rail Road Timesheets and Associated Notes*, 1880, Northern Pacific Railway Company Records, Engineering Department Records, Chief Engineer, Old Vault Files, Box 7, Folder 58, Minnesota State Historical Society Archives, Saint Paul, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

construction projects included repair and replacement of bridges and trestles. For example, all of the bridges and trestles in Table 4 were repaired or replaced between 1872 and 1879. Also in 1879, Trout Brook (a tributary to Phalen Creek near the Mississippi River) was diverted into a storm sewer and filled over.¹⁰¹ Bridge and trestle work took place throughout the length of the line, including structures over the Grindstone, Kettle, and Willow Rivers, as well over the rough terrain along the Saint Louis River (all located further north).¹⁰²

The most extensive improvements completed by the StP&D occurred after 1880. In 1885, on the northern reaches of the railroad line, the StP&D began expanding its yard and shop facilities on Rice's Point in Duluth.¹⁰³ The following year, in 1886, the StP&D approved construction of a double track from West Duluth to downtown Duluth in an effort to meet increased passenger and freight demands.¹⁰⁴ In 1887, the company began to regrade the entire mainline between White Bear Lake and the NP Junction.¹⁰⁵ This regrading included replacing the earlier iron rails with new steel rails that were lighter but more durable.¹⁰⁶ One of the largest improvement projects during this time took place at the Duluth end of the line with the construction of the Duluth Short Line. Built between 1886 and 1888, the Duluth Short Line replaced an earlier roadway alignment that ran through difficult topography along the Saint Louis River. The new Short Line was aligned further to the north to avoid the most difficult of that topography, reducing the overall distance of the railroad track (hence the name) and cutting the grade of the railroad nearly in half.¹⁰⁷

During the 1880s, summer passenger traffic between Saint Paul and the resort town of White Bear Lake led to additional improvements along this segment. Tourists were coming to Minnesota as early as the 1850s, when steamboats would bring visitors from the southern and eastern parts of the United States on "fashionable tours" up the Mississippi River, which offered a cool respite from the summer heat elsewhere. Doctors and civic boosters touted the cool climate as a cure for a variety of illnesses. The construction of railroad lines expanded the areas popular with tourists. Two of the earliest railroad-

¹⁰¹ *Northern Pacific Rail Road Timesheets and Associated Notes.*

¹⁰² Bradley, *The Transportation Corridor between St. Paul and Duluth: A Historic Context for the Rail Line Operated by The Lake Superior & Mississippi Railroad, The St. Paul & Duluth Railroad, The Northern Pacific Railway, and The Burlington Northern Railroad*, 15.

¹⁰³ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1885*, 1.

¹⁰⁴ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1886*, 9.

¹⁰⁵ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1887* (Saint Paul, Minn.: H.M. Smyth Printing Company, 1888), 7.

¹⁰⁶ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1886*, 9–10.

¹⁰⁷ Schrenk, "North from St. Paul: 'The Skally,'" 12–13; Lorenz P. Schrenk, "North from St. Paul: The Skally, Part II," *The Mainstreeter* 18, no. 4 (1999): 5–6, 17–20; *Report of the St. Paul & Duluth Railroad Company for the Year Ending December 31, 1888*, 7–8.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

era tourist destinations were Lake Minnetonka, southwest of Minneapolis, and White Bear Lake, north of Saint Paul.¹⁰⁸

One of the earliest recorded tourists to White Bear Lake visited in 1853, but the railroad provided the connection that solidified the village as a tourist destination.¹⁰⁹ The LS&M provided a direct connection between Saint Paul and White Bear Lake, helping to nearly double the population of the village between 1875 and 1880.¹¹⁰ The village was most popular with tourists in the late nineteenth and early twentieth centuries and offered visitors hotels, cottages, beaches, fishing, pavilions, and even an amusement park at the southeastern end of the lake.¹¹¹ At the same time, the railroad also connected tourists with destinations farther from urban centers, including Duluth and the northern lakes area.¹¹²

The railroad helped expand the summer tourist business in White Bear Lake and points further north, which, in turn, increased demand on the railroad, leading to expanded operations. In 1886, the StP&D declared: "White Bear Lake is already a very popular summer resort, and the traffic between it and Saint Paul is very heavy and increasing; between these points the line should be straightened, the heavy grades reduced and a double track laid."¹¹³ By straightening and regrading lines and adding a second track, the StP&D was able to run longer trains more frequently and at faster speeds, thus increasing the capacity for traffic and revenue.

The regrading and realignment of the railroad roadway between Saint Paul and White Bear Lake was underway by 1887.¹¹⁴ The double track began at East Seventh Street and extended 11 miles to White Bear Lake.¹¹⁵ The work of grading and laying the steel double track continued through 1888 and was completed in 1889.¹¹⁶ The regrading work reduced the overall grade of that section of railroad roadway to 15 feet per mile. The only exception was the railroad roadway near Claymont, which still had a

¹⁰⁸ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," E-164.

¹⁰⁹ Nancy L. Woolworth, *The White Bear Lake Story* (White Bear Lake, Minn.: White Bear Lake Chamber of Commerce, 1968), 17-18; Cynthia Vadnais, *Looking Back at White Bear Lake: A Pictorial History of the White Bear Lake Area* (White Bear Lake, Minn.: White Bear Stereoptics Co., 2004), xiv.

¹¹⁰ Vadnais, *Looking Back at White Bear Lake: A Pictorial History of the White Bear Lake Area*, xiv.

¹¹¹ Woolworth, *The White Bear Lake Story*, 32-41.

¹¹² National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," E-165.

¹¹³ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1886*, 9.

¹¹⁴ *Report of the Saint Paul & Duluth Railroad Company for the Year Ending December 31, 1887*, 7.

¹¹⁵ "The Railway World," *Saint Paul Globe*, December 16, 1887, 5, Newspapers.com.

¹¹⁶ *Report of the St. Paul & Duluth Railroad Company for the Year Ending December 31, 1888*, 19; "Report of the St. Paul & Duluth Railroad Company, 1890," July 1, 1890, np, Northern Pacific Railway Company Records, Branch and Subsidiary Lines, St. Paul & Duluth Railroad, Box 36, Minnesota Historical Society, Saint Paul, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

steeper grade of 80 feet per mile. In 1890, gravel ballast was added to the double track to add stability to the railroad roadbed.¹¹⁷

The improvements between Saint Paul and White Bear Lake included realigning the railroad roadway. For most of this segment, the realignment was slight. In two areas, however, it was more extreme. One of these areas was along the southeastern shore of Lake Phalen. When the LS&M first constructed the mainline in the late 1860s, it routed the railroad roadway to the east of the lake. The railroad continued around Lake Phalen for a little under one-half mile, until approximately 400 feet south of the current Nebraska Avenue East, where it then straightened out and headed in a northeast/southwest direction. As part of the late 1880s realignment and regrading project, the StP&D shifted the railroad roadway at Lake Phalen to the west, constructing a series of trestles across the southeastern corner of the lake. The exact date of the realignment in this area cannot be determined as sources are contradictory. Newspaper accounts note that trains began using the trestle over the lake in June 1889.¹¹⁸ Although some maps as late as 1900 continue to show the 1868 roadway alignment, other maps, like the 1898 Ramsey County plat map and the 1900 Rice's Map of Saint Paul, show the realigned route across the corner of the lake (see Figure 88).¹¹⁹ The extent of this realignment can be seen by georeferencing 1870 LS&M ROW maps and 1884-1886 plat maps with aerial photographs taken in 1945 (see Figure 89).¹²⁰ Review of the 1945 aerial photo indicates that the 1868 LS&M railroad roadway alignment was used as a local vehicular road into the postwar era (see Figure 90).¹²¹ This roadway is nonextant and was removed when a suburban development was constructed in the area. See Appendix B for a full set of georeferenced maps showing the original 1868 LS&M railroad roadway between Saint Paul and White Bear Lake.

¹¹⁷ "Report of the St. Paul & Duluth Railroad Company, 1890," np.

¹¹⁸ "Suburban Social," *Saint Paul Globe*, June 16, 1889, Newspapers.com.

¹¹⁹ Peter M. Dahl, *Plat Book of Ramsey County* (Minneapolis, Minn.: Northwestern Publishing Company, 1898), <http://cdm16022.contentdm.oclc.org/cdm/compoundobject/collection/mhs/id/1299/rec/3>; "Phalen Park Map," 1900, The Michael Fox Map Collection, Minnesota Historical Society Collections, <http://collections.mnhs.org/cms/display?irn=10643518>; G. Jay Rice, "Rice's Map of St. Paul, Minnesota," 1900, The Michael Fox Map Collection, Minnesota Historical Society Collections, <http://collections.mnhs.org/cms/display?irn=10062029>.

¹²⁰ *Maps of Sections Crossed by Lake Superior and Mississippi Rail Road from St. Paul to Duluth, 1870* (Lake Superior & Mississippi Railroad, 1870); G.M. Hopkins, *Atlas of the Environs of Saint Paul* (Philadelphia: G.M. Hopkins, 1886); "Aerial Photograph, Ramsey County, A-12-108," 1945, John R. Borchert Map Library, University of Minnesota, <http://geo.lib.umn.edu/twin-cities-metro-area/1945/A-12-108.jpg>.

¹²¹ "Aerial Photograph, Ramsey County, A-12-108."

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 88. 1889 plat map of Ramsey County showing the railroad roadway realignment across the southeastern corner of Lake Phalen.¹²²

¹²² Rice, "Rice's Map of St. Paul, Minnesota." Note: the quality of the 1889 plat map is of low resolution and cannot be reproduced.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

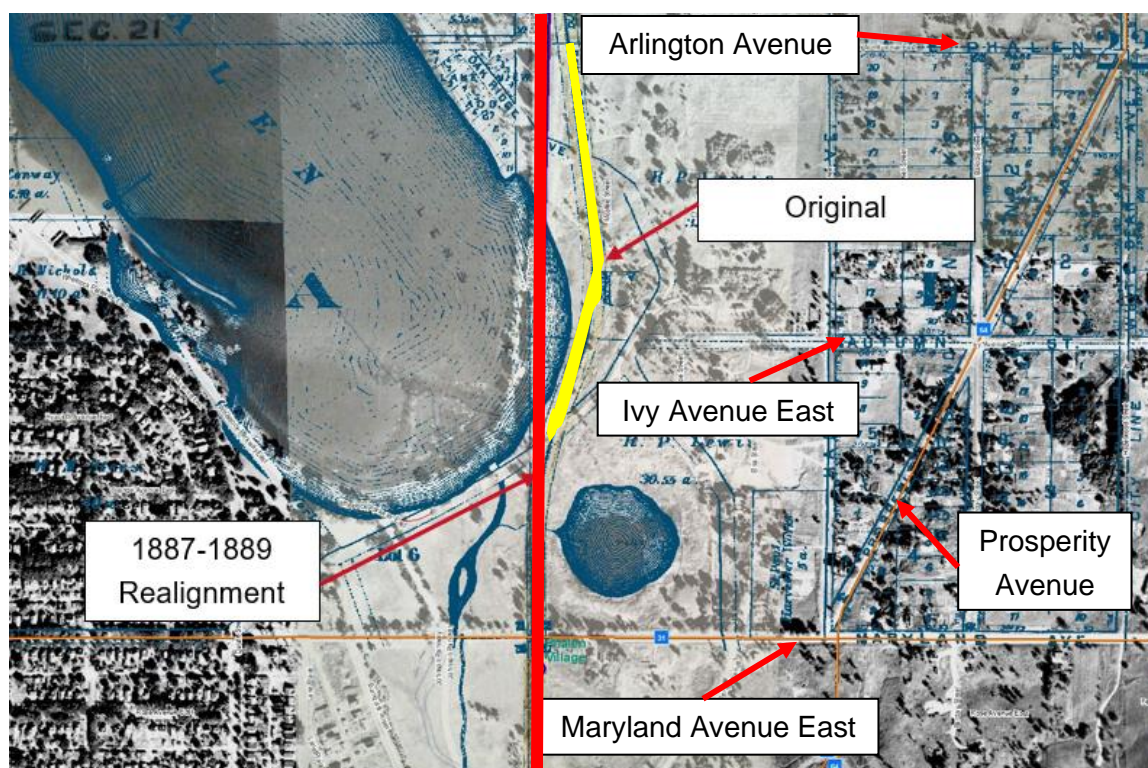


Figure 89. Georeferenced image showing the 1887-1889 railroad roadway realignment (red) of the StP&D line. This realignment shifted the roadbed west and required the construction of a trestle or series of trestles across Lake Phalen. Base map is a 1945 aerial photograph, georeferenced with an 1870 LS&M ROW map and 1884-1886 plat map.¹²³ Note that streets are labeled using modern names and that on the plat map Ivy Avenue was labeled Autumn Street and Arlington Avenue was labeled Phalen.

¹²³ "Maps of Sections Crossed by Lake Superior and Mississippi Rail Road from St. Paul to Duluth, 1870"; Hopkins, *Atlas of the Environs of Saint Paul*; "Aerial Photograph, Ramsey County, A-12-108."

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

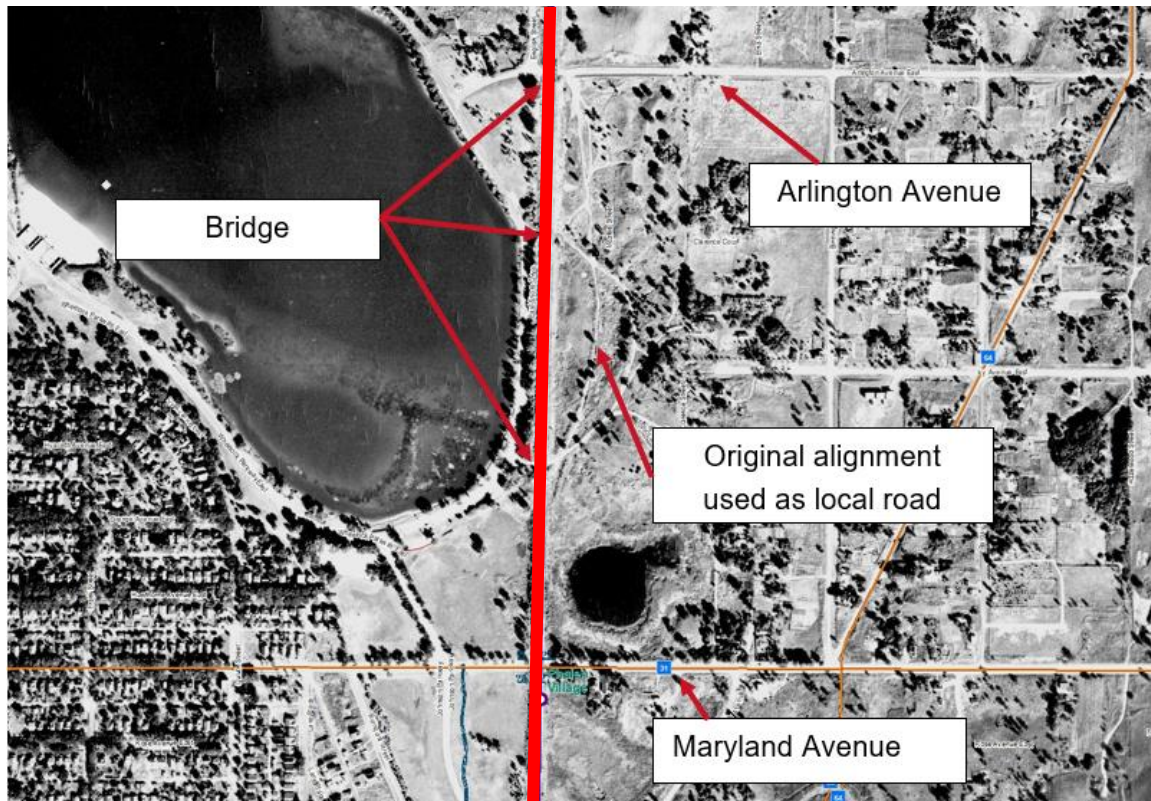


Figure 90. 1945 aerial photograph showing that the 1868 LS&M railroad roadway was used as a local road following the 1887-1889 realignment. This road is nonextant and the area is a postwar suburban development within the city limits of Saint Paul. Note also that the trestle across the lake has been filled in and is an earthen berm that includes three bridge structures allowing local traffic to pass beneath the railroad.¹²⁴

Between 1897 and 1898, possibly in response to the presence of a sinkhole near this area, the trestle was filled in.¹²⁵ It is unclear if all or part of the 1887-1889 trestle was removed at that time. According to 1917 track profile drawings, the earthen berm that resulted contained four trestle or bridge structures that may or may not have been related to the original series of trestles (see Table 5).¹²⁶ These structures served as underpasses for vehicular and foot traffic (see Figure 90). The bridge at Maryland Avenue is nonextant and the status of the structure just to the north, at the southeastern corner of Lake

¹²⁴ "Aerial Photograph, Ramsey County, A-12-108."

¹²⁵ Luecke, *The Northern Pacific in Minnesota*, 269; "Inspecting His Road: Mr. Plough Looking Over the St. Paul & Duluth," *Saint Paul Globe*, May 19, 1898, 7, Newspapers.com; *Report of the St. Paul & Duluth Railroad Company for the Fiscal Year Ending June 30, 1898*, 1898, 7.

¹²⁶ Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-1," Horizontal Scale 1"=400', Vertical Scale 1"=20', June 30, 1917, Northern Pacific Railway Company Records, Valuation Engineer's Records, Track Profile Diagrams, 1917, Box 2 Roll 12, Minnesota Historical Society, Saint Paul, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Phalen, is nonextant. The middle structure (near Clarence Court) is extant (see Figure 91), while the structure at Arlington Avenue is nonextant (see Figure 92). In addition to work done to fill in a portion of the lake, beginning in 1899, the Saint Paul Board of Park Commissioners attempted to “tame” the lake shore by dredging the lake and surrounding wetlands to create park land.¹²⁷ This is likely when the lake was filled in to its current footprint.



Figure 91. 14-foot-wide concrete arch bridge near Clarence Court (MnDOT Bridge R0438, RA-SPC-11140, contributing). This structure carried the StP&D railroad roadway (currently the Bruce Vento Trail) and allowed local traffic to pass under it. It may have been installed when the 1887-1889 trestle was filled in 1908.¹²⁸

¹²⁷ Bill Bartodziej and Simba Blood, “Injecting Biology along Riprap Shorelines,” *Land and Water*, April 2005, 7.

¹²⁸ MnDOT Bridge Inventory Form, “Bridge R0438,” n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>; F.C. Sempf, Manager, Industrial Development, Northern Pacific Railway Company, “Letter to Arthur Tews, City Engineer, City of St. Paul,” January 7, 1958.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 92. 1926 image of StP&D Railroad bridge over Arlington Avenue (nonextant).¹²⁹

Table 5. Bridges on the StP&D between Saint Paul and White Bear Lake as of 1917¹³⁰

StP&D Bridge No.	Approximate Location (streets are present-day)	Type	Length (in feet)	Over what Obstacle	Extant/Nonextant
0A	East 4 th Street	75-foot DPG and 1B	Unknown	East 4 th Street	Possibly extant (MnDOT Bridge L5725) ¹³¹
0B	Near corner of Beaumont and Drewry Street	16-foot I Beam	Unknown	Unclear	Nonextant

¹²⁹ Image courtesy of the Maplewood Area Historical Society.

¹³⁰ Unless otherwise noted, information in the table and following discussion was gleaned solely from the 1917 track profiles; text in the table is taken verbatim. Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-2"; Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-1." The structure was not visible during architecture/history field survey and it is unknown if any substructure remains below ground.

¹³¹ Bridge L5725 (RA-SPC-7115), which is described in the MnDOT bridge database as a 50.70-foot-long steel deck girder bridge, does not match the description of the bridge in the 1917 Track Profile, which is a 75-foot structure. The bridge construction date in the MnDOT bridge database dates the structure to 1900 and a visual review of the structure appears that this date is plausible. Although Bridge L5725 was determined not individually eligible in the Hess Roise Bridge Study (a SHPO inventory number was not assigned for that study) it is recommended as contributing to the LS&M Railroad Corridor Historic District (see Section 8.F.). Hess, Roise, and Company, *Management Plan for Historic Bridges in Minnesota* (prepared for the Minnesota Department of Transportation, 1997).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

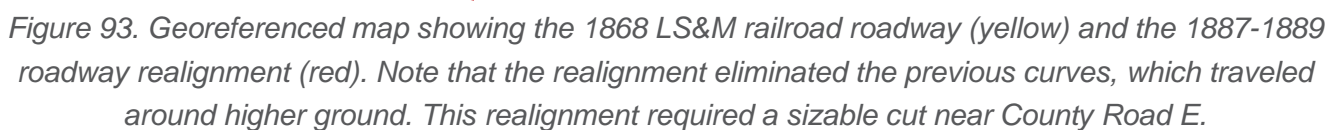
Table 5. Bridges on the StP&D between Saint Paul and White Bear Lake as of 1917¹³⁰

StP&D Bridge No.	Approximate Location (streets are present-day)	Type	Length (in feet)	Over what Obstacle	Extant/Nonextant
2	Near Johnson Parkway	Double R. Concrete Box	58	Phalen Creek	Nonextant
2A	Maryland Avenue East	3-span Pile and Trestle	Unknown	Lake Phalen marshland/later road	Nonextant
3	South edge of Lake Phalen	4-span Pile	62	Lake Phalen marshland/later road	Nonextant
3B	Arlington Avenue	4-span Pile	61	Arlington Avenue	Nonextant
7	County Road D	1-Span, 1-Beam	25.7	County Road D	Extant (does not have MnDOT Bridge Number, RA-WBT-004)

The second area between Saint Paul and White Bear Lake where the 1887-1889 project resulted in an extensive realignment was near Hoffman's Corner, or the current location of County Road E. Here the LS&M railroad originally curved around a steep hill.¹³² During 1887-1889, a deep cut was made into the hill to straighten the roadway (see Figure 93).

¹³² "Maps of Sections Crossed by Lake Superior and Mississippi Rail Road from St. Paul to Duluth, 1870."

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Regrading the railroad roadway between Saint Paul and White Bear Lake required several cuts to run the railroad track below grade and the construction of a number of berm areas, where the railroad roadbed ran above grade on fill. Track profile maps from 1917 provide a general sense of where berms were constructed and cuts made during the 1887-1889 regrading and realignment project. Moving south to north, the following discussion briefly notes the location of cuts and berms 20 feet or more in depth or height, as indicated on the 1917 track profiles.¹³³ See Table 6 for a summary of areas where regrading required cuts or the construction of berms in excess of 20 feet. The cutoff of 20 feet was chosen arbitrarily, to limit the following discussion to only those areas with relatively large cuts or fills.

Table 6. Notable cut/fill areas based on 1917 track profile maps

Approximate Location	Cut or Fill	Approximate Length	Approximate Maximum Depth or Height
Case Avenue to Larpenteur Avenue	Fill	1.5 miles	40 feet
North of Gervais Avenue to South of County Road C	Cut	2,500 feet	20 feet
Kohlman Avenue to north of I-694	Fill	1 mile	30 feet
South of County Road E to County Road F	Cut	1.25 miles	45 feet

One of the largest areas of fill between Saint Paul and White Bear Lake resulted in a berm that stretched from roughly Case Avenue in Saint Paul to Larpenteur Avenue at the boundary between Saint Paul and Maplewood. This berm was built to carry the realignment of the railroad roadway over the marshy landscape surrounding Lake Phalen. Through the Gladstone area to north of Phalen/Gloster Junction, only minimal grading was needed and the roadbed was generally constructed at grade. North of roughly Junction Street to north of Gervais Avenue, moderate fill was needed, and a berm constructed that, according to plans, did not exceed 20 feet in height.

Just north of Gervais Avenue, or about 1,400 feet south of County Road C, a deep cut began that carried the railroad roadway under County Road C. By 1917, an overpass carried vehicular traffic above the railroad roadway at County Road C. The four-span pile bridge was replaced with a concrete structure by 1926 (see Figure 94). As discussed below, the current bridge carrying County Road C over the railroad roadway was built in 1993.¹³⁴

¹³³ Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-2"; Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-1."

¹³⁴ MnDOT Bridge Inventory Form, "Bridge 62563," n.d., Minnesota Department of Transportation, BridgeInfo3, <http://dotapp9.dot.state.mn.us/bridgeinfo3/>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 94. 1926 image of the concrete bridge (nonextant) carrying County Road C over the railroad roadway. A cut in the landscape allowed the roadway to travel under the bridge rather than meet County Road C at grade.¹³⁵ The current bridge at this location (MnDOT Bridge 62563) was constructed in 1993.¹³⁶

About 1,000 feet north of County Road C, the cut ends and a new area of fill begins. From roughly Kohlman Avenue to about 200 feet north of present-day I-694, a large berm was constructed on fill and a single-span deck girder bridge on concrete abutments carried the railroad over what was then County Road D (now County Road D Court, which dead ends just prior to the former bridge site).¹³⁷ The berm was needed here to traverse swampland and two creeks that flowed into Kohlman Lake (see Figure 95). The County Road D bridge is extant, although the superstructure has been altered. This likely occurred in the 1960s, when the double track was reduced to a single track, and the area beneath the bridge was enclosed with fill sometime in the 2000s, at the time of the realignment of County Road D, discussed below.¹³⁸

¹³⁵ Image courtesy of the Maplewood Area Historical Society.

¹³⁶ MnDOT Bridge Inventory Form, "Bridge 62563."

¹³⁷ Richards, "Northern Pacific Bridge No. 7 over County Road D."

¹³⁸ It is not known if modifications were made to the bank at the time of the track removal in the 1960s.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

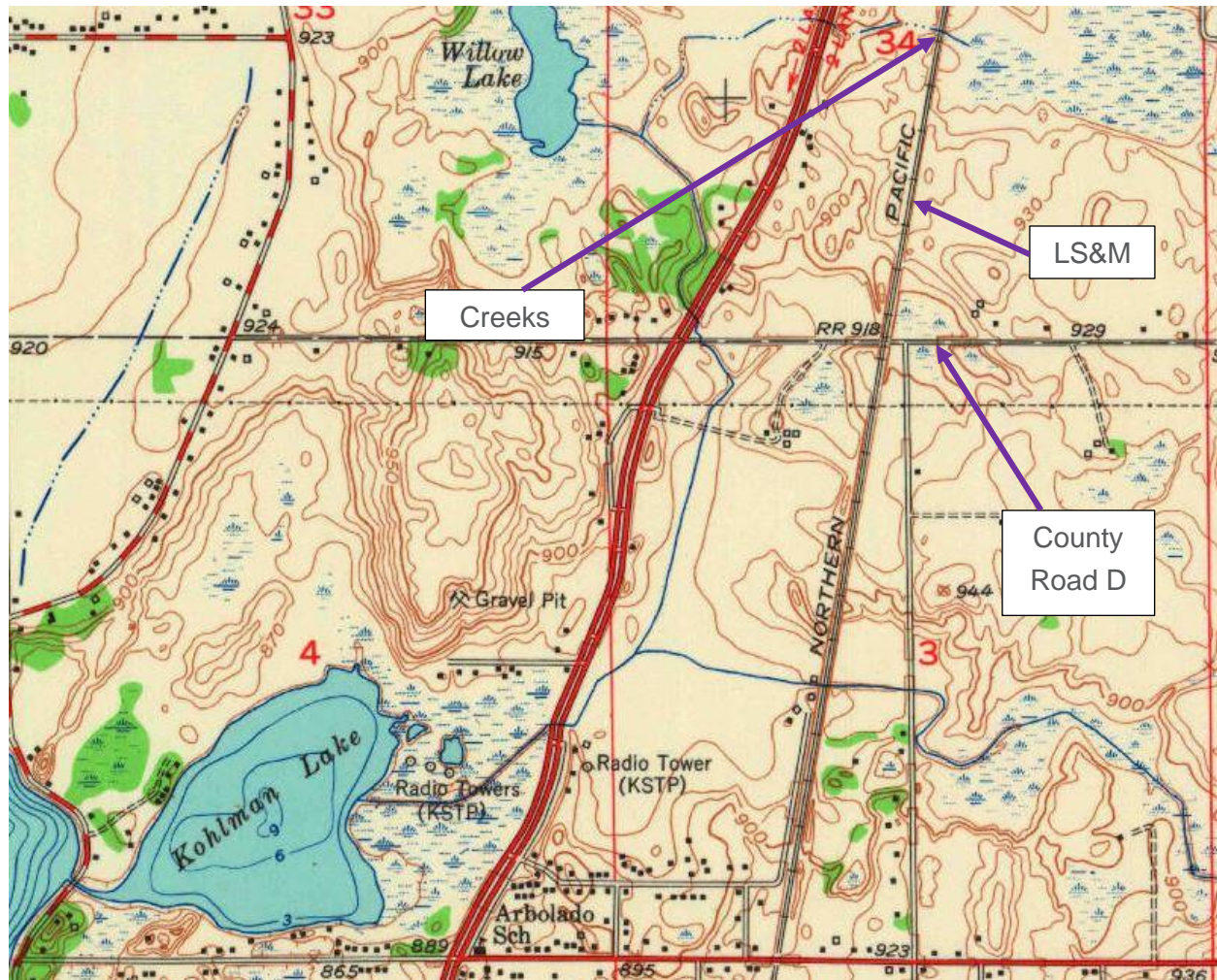


Figure 95. 1952 topographic map showing the swampy swampland and creeks the LS&M railroad roadway had to traverse near County Road D.¹³⁹

For roughly 2,100 feet north of I-694, only moderate cuts and fill were needed. About 1,100 feet south of County Road E, however, a deep cut began that ran to roughly County Road F. County Road E crossed over this cut and, in 1917, was carried by a nine-span wooden bridge.¹⁴⁰ Starting in the 1920s, this small section of County Road E over the railroad roadway was designated TH 61. TH 61 was realigned in the 1950s and, as a result, currently travels parallel to the railroad roadway on the west,

¹³⁹ U.S. Geological Survey, "White Bear Lake, Minnesota, West Quadrangle, 7.5 Minute Series (Topographic)" (Washington, D.C.: U.S. Geological Survey, 1952).

¹⁴⁰ Northern Pacific Chief Engineer, "Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-2."

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

before crossing it further to the north, near Cedar Avenue (see the aerial photographs in Figure 55).¹⁴¹ The current structure carrying County Road E across the railroad roadway was constructed in 1977 and the current TH 61 bridge was built in 2010.¹⁴² Grading was minimal from County Road F to White Bear Lake.

The StP&D expansion and improvement efforts were costly and in 1888, the company overextended itself and could not meet its operating expenses. That year, several executive officers resigned, and new cost-cutting measures were put into place.¹⁴³ Construction that was already underway, including the regrading and construction of the double track, continued until it was completed in 1889.¹⁴⁴ By 1890, the StP&D had returned to profitability, where it remained until another nationwide economic crisis, the Panic of 1893, decreased traffic and income for the company. By the late 1890s, the StP&D was once again profitable.¹⁴⁵

(3) Northern Pacific acquisition and subsequent history

From its beginnings in the 1860s, the LS&M had a close working relationship with the NP. In 1900, the NP purchased the StP&D, which was then operated as part of its Lake Superior Division.¹⁴⁶ After 1903, the railroad from White Bear Lake to Duluth continued to operate as Lake Superior Division, while the portion from Saint Paul to White Bear Lake was folded into the Saint Paul Division, which also operated a branch line from Saint Paul to Staples, Minnesota, via Saint Cloud.¹⁴⁷

One of the most immediate effects of the acquisition of the former LS&M railroad corridor by the NP was the closure of the Claymont roundhouse and Gladstone Shops. Prior to the acquisition, the NP had constructed its own, larger, more centrally located yards and shop facilities in Saint Paul along Como Avenue (see Figure 96). The acquisition thus made Claymont and Gladstone redundant. The NP continued to use the downtown Saint Paul yards, in Phalen Creek valley, but the Claymont roundhouse was abandoned by 1904 and demolished sometime between 1927 and 1940. By 1915, some of the sidings at the Gladstone Shops had been removed and several of the buildings had been leased out to

¹⁴¹ Minnesota Department of Highways, *Road Life Studies - Construction Project Log Record for Section 6222 in Ramsey County*.

¹⁴² MnDOT Bridge Inventory Form, "Bridge 62092," n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>; MnDOT Bridge Inventory Form, "Bridge 62079," n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>.

¹⁴³ "Three General Officers of the Saint Paul & Duluth Resign," *Saint Paul Globe*, September 1, 1888, Newspapers.com; Schrenk, "North from St. Paul: 'The Skally,'" 12.

¹⁴⁴ *Report of the St. Paul & Duluth Railroad Company for the Year Ending December 31, 1888*, 14.

¹⁴⁵ Schrenk, "North from St. Paul: 'The Skally,'" 12.

¹⁴⁶ Schrenk, "North from St. Paul: 'The Skally,'" 5.

¹⁴⁷ J.B. Klassen, "Operating Divisions of the Northern Pacific," *Northern Pacific Railway Historical Association*, 1956, <http://www.nprha.org/Miscellaneous%20Documents/NP%20Division%20Points.htm>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

railroad contractors. The Gladstone site was later leased by the Seeger Refrigeration Company. In 1979, most of the remaining buildings were razed.¹⁴⁸

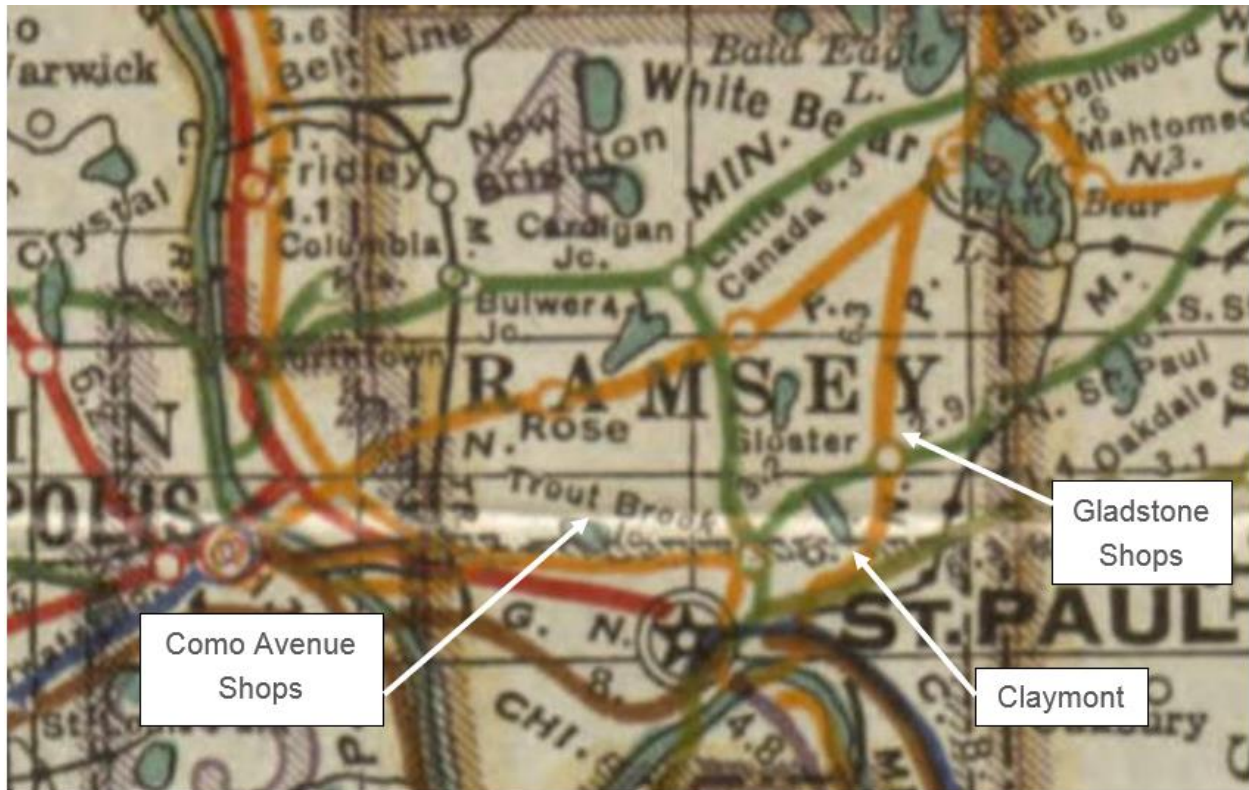


Figure 96. 1919 railroad map showing the NP network in the northern Twin Cities in orange, with locations of the Como Avenue Shops, Claymont, and Gladstone labeled. Note how the Como Avenue Shops sat between the downtowns of Minneapolis and Saint Paul, providing the NP with more centrally located facilities.

In 1994, the City of Maplewood purchased the Gladstone site to develop it as a park called Gladstone Savannah.¹⁴⁹ Today, no buildings remain at the site. In 2012, however, geophysical testing and limited archaeological monitoring and surveying identified the remains of what are most likely the roundhouse, several buildings, and other features intact below the ground surface. These areas contain contaminated soil that has been capped, so no detailed archaeological investigations were undertaken.¹⁵⁰

¹⁴⁸ Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study*, 20.

¹⁴⁹ Thomas R. Zahn & Associates, *City of Maplewood Historic Context Study*, 20; Summit Envirosolutions, Inc., "Gladstone Savanna Neighborhood Preserve," 4.

¹⁵⁰ Summit Envirosolutions and Laurie Ollila, *Archaeological Monitoring and Visual Assessment for the Gladstone Savannah Neighborhood Preserve and Gloster Park Project*, Letter Report (City of Maplewood, Ramsey County, 2012).

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

While the Gladstone Shops were quickly phased out after acquisition by NP, the rail line itself continued to operate and carry both freight and passenger service, albeit with some changes. For example, because of the additional curves and grade, freight trains out of Saint Paul did not generally follow the old LS&M mainline roadway but traveled along the Wisconsin Central/Soo Line to Phalen/Gloster Junction, just north of the Gladstone Shops, before traveling north on the LS&M. At the other end of the line, in Duluth, the NP handled much of the switching and transfer service for the port because both the NP and the LS&M had established much of the trackage along the waterfront prior to the arrival of other railroads.¹⁵¹ Local freight traffic, however, continued to use the LS&M mainline between Gladstone and the Saint Paul yards into the 1980s.¹⁵²

Passenger service continued on the LS&M mainline as well and included local, limited, and overnight service. With growing popularity of automobiles and improved highways following World War II, however, demand for passenger service decreased. By 1962, only two trains per day, each with only one passenger car, travelled between Saint Paul and Duluth. In January 1967, passenger service was discontinued on the line.¹⁵³ Sometime after 1961 the double track was reduced to a single track.

The increasing popularity of automobiles and improved highways meant new bridges over new or widened vehicular roads. Along the LS&M mainline between Saint Paul and White Bear Lake, for example, bridges were constructed over the newly constructed TH 36 (1954, nonextant), I-694 (1966, Bridge 62822, RA-WBC-0156), and Beam Avenue (1975, Bridge 62529, RA-MWC-0248). The bridge over TH 36 was replaced in 2013 (MnDOT Bridge 62004) while the original bridges over I-694 and Beam Avenue are extant.¹⁵⁴

Bridge 62529 was part of the then Village of Maplewood's effort to extend Beam Avenue, west from White Bear Avenue to TH 61. This extension would provide a connection between TH 61 and the proposed Maplewood Mall (RA-MWC-0072), which was opened in 1974.¹⁵⁵ As part of this extension, a

¹⁵¹ Schrenk, "North from St. Paul: 'The Skally,'" 21.

¹⁵² "Aerial Photograph, St. Paul, Minn., 1980," *Historic Aerials by NETROnline*, accessed July 12, 2018, historicaerials.com.

¹⁵³ Schrenk, "North from St. Paul: 'The Skally,'" 22.

¹⁵⁴ Summit Envirosolutions, Inc., "Northern Pacific Railroad Bridge No. 6402 - RA-MWC-0064"; MnDOT Bridge Inventory Form, "Bridge 62822," n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>; MnDOT Bridge Inventory Form, "Bridge 62004," n.d., <http://dotapp9.dot.state.mn.us/bridgeinfo3/>; MnDOT Bridge Inventory Form, "Bridge 62529."

¹⁵⁵ Jim Broede, "Maplewood Will Seek Legislation to Build Beam Ave. Interchange," *Saint Paul Dispatch*, November 7, 1972, Clipping included in Maplewood City Council Minutes available at <https://docs.maplewoodmn.gov/weblinkpublic/browse.aspx?startid=75976&dbid=0&cr=1>; Kaylin Creason, "Maplewood Mall Celebrates 40 Years," *Lillie News*, August 22, 2014, <http://www.lillienews.com/articles/2014/08/22/maplewood-mall-celebrates-40-years>.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

new bridge was built over Beam Avenue, south of County Road D. The Village of Maplewood rather than the railroad company (the BN at the time) constructed the Beam Avenue bridge between 1973 and 1975. As a part of this construction, a portion of the berm was removed.¹⁵⁶ Crossings at both Beam Avenue and I-694 were made using the existing railroad grade, which means that the Beam Avenue crossing in particular has a higher grade separation (25.4 feet) than is typical.¹⁵⁷ This existing grade is evidenced on 1917 track profile maps, which shows an embankment berm beginning just north of County Road C and ending approximately 800 feet north of the original County Road D alignment, which is currently just north of I-694.¹⁵⁸ As discussed above, one reason for the berm in this area is to raise the railroad roadbed above surrounding swampland and two creeks (see Figure 81 above). Aerial photographs and topographic maps confirm the presence of this berm into the 1960s and 1970s.¹⁵⁹ Additionally, a newspaper photograph from 1974 shows workers atop the berm and notes that, “Beam Avenue will cut beneath the track” (see Figure 97).¹⁶⁰ Review of newspapers, city council meeting minutes, construction plans, and similar sources did not indicate that a major regrading of the existing railroad berm took place as part of constructing the Beam Avenue bridge. It would be expected that this would have been a major financial undertaking for the Village of Maplewood and potentially caused even greater disruption to ongoing rail operations.

¹⁵⁶ MnDOT Bridge Inventory Form, “Bridge 62529”; Broede, “Maplewood Will Seek Legislation to Build Beam Ave. Interchange”; “Maplewood City Council Minutes,” September 5, 1974, 6, City of Maplewood, <https://docs.maplewoodmn.gov/webblinkpublic/browse.aspx?startid=75976&dbid=0&cr=1>.

¹⁵⁷ MnDOT Bridge Inventory Form, “Bridge 62822”; MnDOT Bridge Inventory Form, “Bridge 62529.”

¹⁵⁸ Northern Pacific Chief Engineer, “Northern Pacific Railway Track Profile, St. Paul Division Main Line, St. Paul to White Bear, Minn., V-5-2.”

¹⁵⁹ U.S. Geological Survey, “White Bear Lake West, Minn.,” 1 Inch = 24,000 Feet (Washington, D.C.: U.S. Department of the Interior, Geological Survey, 1967); “Aerial Photograph, Maplewood, Minn., GS-VDCU, Roll 1, Frame 108,” October 16, 1972, U.S.G.S. Earth Explorer, earthexplorer.gov.

¹⁶⁰ “Beam Avenue Bridge Construction Photo,” *Saint Paul Dispatch*, November 7, 1974, Maplewood City Council Meeting Minutes, maplewoodmn.gov.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment



Figure 97. 1974 Saint Paul Dispatch clipping showing construction of the Beam Avenue bridge atop the railroad embankment. The caption notes that “Beam Avenue will cut beneath the track.”¹⁶¹

As the popularity of railroads decreased in response to greater use of automobiles, formerly independent rail lines began to merge operations. The NP merged with the GN and the Chicago, Burlington, and Quincy Railroad to become the Burlington Northern (BN) Railroad in 1970. With this merger the BN had two mainlines connecting the Twin Cities and Duluth and the newly formed company chose to use the GN mainline as its primary route, decreasing traffic on the former LS&M mainline. With less rail traffic using the former LS&M mainline, the BN began to abandon and remove the least used sections in 1977. That year, 15 miles of the Duluth Short Line roadway was abandoned and roughly 30 miles of track between

¹⁶¹ “Beam Avenue Bridge Construction Photo.”

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Hinckley and Moose Lake were removed.¹⁶² The railroad roadway between Saint Paul and White Bear Lake continued to operate for a few more years but the portion along Phalen Creek from the Saint Paul yards to I-694 was abandoned in the 1980s. In 1987, the BN received authorization from the Minnesota Transportation Regulation Board to begin removing trackage on this section.¹⁶³ Sometime between 1991 and 2003, bridges over Johnson Parkway (built ca. 1925 with parkway construction), Maryland Avenue, and Arlington Avenue were removed; none were replaced.¹⁶⁴

During the 1980s and 1990s, government agencies in the Twin Cities metro area began purchasing abandoned railroad corridors for future light rail transit use. Between 1981 and 1996, 47 miles of abandoned corridors had been purchased for this purpose. By 1991, 36 miles of purchased rail lines were used as recreational trails.¹⁶⁵ Following this trend, in 1992 the RCRRA purchased a 6.5-mile portion of the former LS&M mainline corridor from roughly Kellogg Boulevard in Saint Paul to Beam Avenue in Maplewood for future use as a light rail transit corridor.¹⁶⁶

Shortly after purchasing the former LS&M mainline corridor, Ramsey County began to develop it as a recreational trail. The section of the trail from Frost Avenue to Beam Avenue was constructed in 1992 and included the replacement of the County Road C bridge under which the trail was constructed.¹⁶⁷ The new bridge (built in 1993) had to be wide enough to accommodate future use as both a light rail transit corridor and a recreational trail.¹⁶⁸ The trail section between Seventh Street East and Johnson Parkway was constructed in 1993. Plans for the trail section between Johnson Parkway and Frost Avenue included only

¹⁶² Schrenk, "North from St. Paul: 'The Skally,'" 22.

¹⁶³ Lonetree, "An East Side Renaissance," 1B, 5B; Minnesota Department of Transportation and the City of Saint Paul, *Draft Environmental Impact Statement and Draft Section 4(f) Evaluation for Phalen Boulevard*; Gustafson, "Ramsey Board Calls for More Light Rail Study," 23; Crosby, "Street of Dreams," 1A, 23A; Ramsey County Regional Railroad Authority, "Request for Board Action: Authorize Acquisition of Burlington Northern Right of Way in St. Paul and Maplewood by Eminent Domain."

¹⁶⁴ Allan Torstenson, "Letter to the Saint Paul Planning Commission, Regarding Review and Recommendations on the Proposed Master Plan for the Burlington Northern Regional Trail Corridor," May 19, 1993, 2, Ramsey County Department of Parks and Recreation; Landscape Research, LLC, *Historic Resources Evaluation for the North Portion of Saint Paul's Grand Round, Saint Paul, Ramsey County, Minnesota* (Prepared for the City of Saint Paul and SEH, Inc., June 2016), 27.

¹⁶⁵ Laurie Blake, "No Trains - Lots of Bikes," *Star Tribune*, May 27, 1996, B1, 3B.

¹⁶⁶ Torstenson, "Letter to the Saint Paul Planning Commission, Regarding Review and Recommendations on the Proposed Master Plan for the Burlington Northern Regional Trail Corridor," 2; Burlington Northern Railroad Company, "QuitClaim Deed, BN to RCRRA," December 17, 1992, Ramsey County Public Works, Arden Hills, Minn.

¹⁶⁷ Minnesota Department of Transportation and Ramsey County Parks and Recreation Department, "Project Memorandum for Burlington Northern (BN) Regional Trail, Frost Avenue (CSAH 28) to Johnson Parkway S.P. No. 62-090-01, TEA 6298 (031)," 2.

¹⁶⁸ MnDOT Bridge Inventory Form, "Bridge 62563"; Gregory A. Mack Director of Ramsey County Parks and Recreational Department, "Letter to Kenneth Weltzin, Ramsey County Public Works Director and County Engineer," November 3, 1989, Ramsey County Department of Parks and Recreation, Maplewood, Minn.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

minimal changes to the existing berm, most notably the removal of portions at Johnson Parkway, Maryland Avenue, and Arlington Avenue to allow the trail to intersect the streets at grade.¹⁶⁹ Plans for the trail extension from just south of Beam Avenue to Buerkle Road were developed in 2004.¹⁷⁰ See Table 7 for a list of extant bridges along the Bruce Vento Trail between Johnson Parkway and Beam Avenue.

Table 7. Extant bridges on the Bruce Vento Trail¹⁷¹

Bridge Location	MnDOT Bridge No.	Construction Date	Bridge Type	Length
Clarence Court	R0438	1907	Concrete Arch	14 feet
TH 36	62004	2013	Prestressed Concrete Beam	201 feet
Beam Avenue	62529	1975	Steel Box Girder	265.5 feet
I-694	62822	1966	Steel Thru Girder	132.3 feet

In 2000, the trail was named after Minnesota Congressman Bruce Vento. The Bruce Vento Trail currently runs 7.97 miles, from the Bruce Vento Nature Sanctuary near the Mississippi River in the Phalen Creek valley to Buerkle Road in White Bear Lake.¹⁷² From roughly I-694 north through White Bear Lake to Hugo, the railroad roadway is actively used by the Class III Minnesota Commercial Railroad.¹⁷³ In Maplewood, the Gateway Trail (previously the Wisconsin Central/Soo Line) crosses the Bruce Vento Trail at the former railroad crossing just north of the Gladstone Shops site. In Pine, Carlton, and Saint Louis Counties, large sections of the LS&M mainline corridor, including the Duluth Short Line, have been converted into the Willard Munger State Trail, which runs from Hinckley to West Duluth.¹⁷⁴

¹⁶⁹ Minnesota Department of Transportation and Ramsey County Parks and Recreation Department, "Project Memorandum for Burlington Northern (BN) Regional Trail, Frost Avenue (CSAH 28) to Johnson Parkway S.P. No. 62-090-01, TEA 6298 (031)," 2.

¹⁷⁰ Kimley-Horn and Associates, Inc., "Bruce Vento Trail Extension, From 750' South of Beam Avenue to Buerkle Road, City Project 04-02."

¹⁷¹ All information in this table is from the online MnDOT Bridge Inventory. The Clarence Court bridge has a slight error in its mapping; it is mapped further south than its actual location. A review of bridge reports available through the MnDOT website confirm that Bridge R0438 is the Clarence Court bridge and not the bridge identified above as the four-span pile bridge at the south end of Lake Phalen, which appears to be nonextant. Minnesota Department of Transportation, *BridgeInfo3*, <http://dotapp9.dot.state.mn.us/bridgeinfo3/>, accessed December 5, 2018.

¹⁷² "Bruce Vento Regional Trail," *TrailLink*, July 11, 2018, <https://www.trailink.com/trail/bruce-vento-regional-trail/>.

¹⁷³ Minnesota Department of Transportation, Office of Freight and Commercial Vehicle Operations, "Twin Cities Area Freight Railroad Map."

¹⁷⁴ "Willard Munger State Trail Map" (Minnesota Department of Natural Resources, 2014), https://files.dnr.state.mn.us/maps/state_trails/willard_munger.pdf.

7. STATEMENT OF SIGNIFICANCE

The National Register MPDs *Railroads in Minnesota, 1862-1956* and *Supplement to Railroads in Minnesota, 1862-1956* (draft) establish guidelines for the National Register eligibility of railroads in Minnesota. For this Phase II Evaluation, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment was evaluated under *Criterion A: Transportation*, *Criterion C: Engineering* and *Criterion D: Information Potential*. According to the MPD guidelines, railroad corridors were the work of large corporations and therefore do not represent the work of individuals and are not eligible under *Criterion B: Significant Person*.

A. CRITERION A

The *Railroads in Minnesota, 1862-1956* MPD outlines four areas of significance that a railroad corridor historic district may meet to be considered eligible for the National Register under *Criterion A: Transportation*. Those areas are discussed below.

- 1. The railroad corridor opened settlement of a region by providing the only long-distance transportation available due to the lack of navigable waterways and roads leading to subsequent population increase.**

The construction of the LS&M mainline railroad took place several decades after settlement was first established in Saint Paul in the 1830s and Duluth in the late 1850s and therefore it did not open settlement in the region. The Mississippi River and Lake Superior provided the dominant means of transportation for both communities during this early period of settlement. As a result, this area of significance does not apply.

- 2. The railroad corridor provided transportation between a significant class of resources or manufacturing/commercial area and an important transfer point or terminal market. In addition, the corridor either established a connection that did not previously exist or served as the dominant corridor that led to the expansion of industrial, commercial or agricultural practices.**

As noted in the historic context, construction of the LS&M mainline provided an early rail connection between two navigable waterways—the Mississippi River and Lake Superior—that provided connections between wheat producing areas of Minnesota and eastern terminal markets. More specifically, this connection was intended to bypass existing railroads (mostly in Wisconsin) that charged higher rates. Additionally, just as the LS&M helped ship wheat and other agricultural products east, it also made connections that allowed finished goods and raw materials like coal to be shipped from the east to southern Minnesota via the same route. Finally, the Saint Paul to White Bear Lake segment of the LS&M mainline provided an important connection between downtown Saint Paul and

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

the summer tourism industry of White Bear Lake and points further north. As a result, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment meets this area of significance.

3. The railroad corridor was an influential component of the state's railroad network, or it made important early connections within the network or with other modes of transportation.

Constructed between 1867 and 1870, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is significant within the railroad history of Minnesota as one of the earliest railroads constructed in the state and the first to connect the emerging railroad center of Saint Paul with the Great Lakes port in Duluth. The LS&M mainline provided a year-round connection between the two cities and was instrumental in linking goods and building materials produced in Saint Paul and the surrounding area to the Great Lakes port city. The LS&M mainline railroad served as a primary connection between Saint Paul and Duluth from its completion in 1870 until 1970, when it became part of the larger Burlington Northern (BN) system and no longer served as the primary railroad corridor between the two cities. The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment meets this area of significance.

4. The railroad corridor provided a critical link or junction between two or more important railroad corridors leading to a significant expansion of the operations in the transportation network or in commerce or industry.

While the LS&M mainline railroad connected to a number of other railroad corridors in Saint Paul, the railroad corridor terminated in Duluth and linked to the port and Great Lakes shipping rather than an important railroad corridor. As a result, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment does not have significance under this area.

B. CRITERION C

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) provides that railroad corridor historic districts may be considered significant under *Criterion C: Design/Construction*, if they embody the distinctive characteristics of a historically important period, type, or method of construction. The historic context developed in the supplement establishes that the initial era of railroad construction in Minnesota was shaped by significant political and economic circumstances that are reflected in unique early engineering design and construction methods. The original 1868 LS&M railroad roadbed was identified within the archaeological study area both on the surface and as a buried feature under the later 1880s railroad embankment. The original 1868 LS&M roadbed is recommended eligible under *Criterion C* because it embodies distinctive characteristics of a type, period and method of construction directly related to the design and engineering choices specific to the LS&M corporation and its investors

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

between the late 1860s and 1870, and that of the early pioneer “western railroad” in Minnesota. The 1868 LS&M railroad roadbed is a contributing resource/feature of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment.

C. **CRITERION D**

Based on the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD and discussions with MnDOT CRU, resources associated with the late 1880s and subsequent straightening and upgrading of the corridor are not considered for significance under *Criterion D* since by this time, railroad construction was fairly standard across the Midwest (and United States). As a result, the 1880s and later straightening and upgrading of the line would not represent a unique contribution to the understanding of early railroads in Minnesota and extant physical features, such as cut areas and fill embankments constructed as a part of that effort, are not being considered for National Register eligibility.

Based on the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, the portion of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, from Johnson Parkway to Beam Avenue, is considered significant under National Register *Criterion D* except where the 1868 LS&M railroad roadway veered away from the modern RCRRA ROW (near Lake Phalen and from County Road C to Kohlman Avenue), since the 1868 LS&M railroad roadway in these areas has been destroyed by modern development. The portion of the resource considered significant under *Criterion D* includes the full RCRRA ROW width, which is 100 feet between Johnson Parkway and County Road C, and 150 feet between Kohlman Avenue and Beam Avenue. The areas where the 1868 LS&M railroad roadbed is exposed on the surface preserve a data set that has the potential to provide new or supplemental information that adds to our understanding of past significant human activities and historic patterns and is recommended eligible under *Criterion D*. The presumed portions of the original LS&M railroad roadbed buried under the post-1880 fill also have similar potential. These areas are recommended eligible as they contribute to research areas including: Pre-Industrial Transportation Landscapes and Railroad Spaces: 1858-1910; Initial, Pioneering, and Expansion Railroads: Engineering, Construction, and Ruination: 1858-1910; and Machines in the Garden: Railroads and Evidence of Environmental Change in Minnesota: 1858-1945. Although the post-1880s rail roadway and urban development limit the ability to find external features that might shed light on the living experiences of railroad workers, the railroad roadway does have the potential to provide important information regarding the engineering decisions for a new industrial transportation corridor built in southeastern Minnesota in the 1860s to 1870. Alterations related to the 1880s and subsequent railroad roadway, the Bruce Vento Trail, and the general urban setting have left no apparent indications of artifacts or structures that would provide important information on the operation of the early railroad itself. A few adjacent borrow pits might shed light on the construction efforts; however, it is unlikely that

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

additional research would clarify if the borrow pits were used for the original 1868 LS&M railroad roadway, the late 1880s railroad roadway, or possibly later railroad construction activities. Therefore, the borrow pits are not considered contributing elements to the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. In theory, the 1868 LS&M railroad roadway and how it intersects with the previous cultural landscape could also be studied; however, the amount of urban sprawl around the railroad roadway affecting the natural environment would make this difficult.

Questions regarding engineering, design, and construction of the LS&M mainline railroad corridor can be considered under *Criterion D* such as:

- *Did construction of the 1868 railroad roadway differ from contemporary engineering designs? Was some topsoil removed before the rail embankment was constructed? How does this portion of the LS&M railroad roadway differ from other contemporary areas along the Saint Paul to Duluth line, such as the Tomson to Fond du Lac Segment? Were some specific design or engineering methods used to accommodate the local landscape? How much earth did workers have to move manually to construct the cut and filled areas along this portion of the LS&M? How was the earth moved – by human and animal workers?*
- *What was the quality of the “western railroad” or pioneering railroad construction in Minnesota and how would it differ from railroad engineering manuals of the period? How did the construction of this segment of the LS&M differ from what contemporary engineering documents describe as best practices?*
- *Do the types of building methods show the level of investment of time and resources for the railroad segment? Can we see the scale of construction compared to later construction efforts? What corporate decisions were made to change railroad roadway, including abandoning the location of some of the roadway, deciding to make a straight versus curved railroad roadway alignment, and deciding to bury some of the original 1868 roadway with the improvements to the railroad corridor in the late 1880s? What types of construction methods were used to place the rails? Did the topography drive these decisions, or ease of construction?*

D. PERIOD OF SIGNIFICANCE

Guidance in the *Railroads in Minnesota, 1862-1956* MPD outlines that the period of significance of a railroad corridor historic district “will begin with its date of construction or establishment of significant operations...” and also notes “Railroad corridors may have relatively long periods of significance and

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

context with which they are associated, but the period will end no later than 1956.”¹⁷⁵ The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD expands this and notes the “period of significance can begin at the date of corridor survey by the railroad company and end at a defined period of economic or operational viability.”¹⁷⁶

Under *Criterion A*, the period of significance for the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment begins with the completion of the railroad roadway in 1868 and extends until 1970. In 1970, the Northern Pacific (then-owner of the LS&M corridor) merged with the Great Northern (GN) and the Chicago, Burlington, and Quincy Railroad to become the Burlington Northern (BN) Railroad. With this merger the BN had two mainlines connecting the Twin Cities and Duluth and the newly formed company chose to use the other GN mainline as its primary route, decreasing traffic on the former LS&M mainline. Therefore, the period of significance was defined to end when the line was no longer the primary route to Duluth. Under *Criterion C* the period of significance coincides with the initial grading and construction of the railroad roadway and spans from 1864 to 1868 since the specific years that the work was completed is not known. Under *Criterion D*, the period of significance begins in 1864 to coincide with the initial mainline grading and construction, and ends in 1868 with the completion of the LS&M mainline between Saint Paul and White Bear Lake.

E. INTEGRITY

The essential characteristics of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment are the railroad roadbed and railroad-related support buildings and structures, including grade separation structures and retaining walls from the period of significance. The following integrity discussion is organized by National Register Criteria. Table 8 at the end of this section lists the associated elements within the overall LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment.

(1) *Criterion A*

The *Railroads in Minnesota, 1862-1956* MPD provides guidance and requirements for assessing the integrity of railroad corridor historic districts. It states that a railroad corridor historic district must retain integrity of location, design, and materials based on its configuration at the end of the period of significance (1970, in this case). Furthermore, a railroad corridor historic district must have a railroad roadway that retains historic integrity. Additional contributing elements that retain at least integrity of location, design and materials may also be included in the historic district but are not required.

¹⁷⁵ National Register of Historic Places, Multiple Property Documentation Form, “Railroads in Minnesota, 1862-1956,” F-197.

¹⁷⁶ National Register of Historic Places, Multiple Property Documentation Form, *Supplement to Railroads in Minnesota, 1862-1956* (draft), F-101.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Retention of a railroad corridor's historic setting can mitigate for the loss of railroad elements, such as tracks or support buildings, provided the railroad roadbed and other elements are intact. If the corridor retains integrity of location, design, materials, and setting, it will also retain integrity of feeling and association. The MPD states that while some specific elements within a corridor may exhibit high degrees of workmanship, this aspect will generally not be a factor in evaluating integrity "due to the utilitarian nature of the resource and standardized design of its components." The following assessment of integrity therefore focuses most heavily on location, design, materials, and setting (noting whether these aspects cumulatively confer integrity of feeling and association) and does not address workmanship.¹⁷⁷

The following provides additional guidance from the *Railroads in Minnesota, 1862-1956* MPD on the pivotal aspects of integrity in order of importance:

- **Location – "To retain integrity of *location*, a railroad corridor historic district must conform to the horizontal and vertical alignment present at the end of the period of significance."**¹⁷⁸

While two noncontiguous portions of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment are nonextant and no longer retain the alignment, this is a relatively small percentage of the overall 11-mile-long railroad corridor historic district, accounting for approximately 1.75 miles (15 percent). These include the portion from the Saint Paul Union Depot to the tunnels under Seventh Street East (obliterated by reconstruction of I-94 between 1985 and 1991) and the portion from the north side of Eastside Heritage Park to the north side of the intersection of Phalen Boulevard and Johnson Parkway/Wheelock Parkway (obliterated by construction of Phalen Boulevard).¹⁷⁹ The remaining 9.25 miles (85 percent) of the LS&M Railroad Corridor Historic District retains the alignment, both vertical and horizontal, from the end of the period of significance (1970). Much of the railroad roadbed serves as the Bruce Vento Trail, which is situated on it. While some portions of the Bruce Vento Trail may have had minimal roadbed alignment adjustments made during the trail conversion, these are negligible and do not detract from the overall vertical railroad roadbed alignment. Therefore, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains integrity of location.

¹⁷⁷ For detailed guidance on assessing integrity, refer to "Integrity Requirements" in National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," Section F, 198-201.

¹⁷⁸ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," F-199.

¹⁷⁹ Based on 1985 and 1991 aerial imagery available at Ramsey County, "Ramsey County Assessor Interactive Property Map."

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

- **Design** – “To retain integrity of *design*, a railroad corridor historic district must retain integrity of *location*. In addition, the elements of the railroad roadway – railroad bed, fills or cuts, and ditches – should retain sufficient visual presence to convey their historic functions.”¹⁸⁰

The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains integrity of location. Although the railroad roadbed is not visually present in those areas where it is nonextant, it is present throughout the majority of the district, including the portion that follows the Bruce Vento Trail. The realignments at Lake Phalen and County Road E were completed within the period of significance. In addition, much of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains the general embankment with cuts and fills that convey the historic railroad function. Therefore, it retains integrity of design.

- **Materials** – “A railroad corridor historic district must retain some of the physical *materials*, from its period of significance. The loss of tracks does not necessarily result in a loss of integrity of materials.”¹⁸¹

The 3.6-mile portion of the railroad corridor north of I-694 was not incorporated into the Bruce Vento Trail retains a single-track roadway with ballast, ties, and rails. Although it is unknown whether the ballast, ties, and rails date to the period of significance for the entire length of the portion, the *Railroads in Minnesota, 1862-1956* MPD does not consider in-kind replacement of tracks to represent a substantial loss of integrity of materials. The conversion of approximately two-thirds of the railroad roadbed to the Bruce Vento Trail has resulted in the removal of the ballast, ties and rails between Seventh Street and I-694 (with the exception of a small portion between the current County Road D that is not in an operational state and does not connect with the active railroad portion north of I-694), which has diminished the integrity of materials along this portion of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment. According to the *Railroads in Minnesota, 1862-1956* MPD, “when the tracks have been removed altogether. . .a railroad corridor historic district loses part (though not all) of its historic characteristics and its ability to convey its historic significance is diminished.” This, in turn, “increases the relative importance of other elements of the roadway and of other support buildings and structures in the district” to retain integrity of materials. The roadway elements include the roadbed, shoulders, and ditches.

¹⁸⁰ National Register of Historic Places, Multiple Property Documentation Form, “Railroads in Minnesota, 1862-1956,” F-199-200.

¹⁸¹ National Register of Historic Places, Multiple Property Documentation Form, “Railroads in Minnesota, 1862-1956,” F-200.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Support buildings, structures and other related resources historically present along the railroad roadway include bridges, depots and the Gladstone Shops. Depots built during the period of significance are present at both termini (although the Union Depot is outside the boundary) and the last of several depots at Gloster Junction/Gladstone was removed in 1967, within the period of significance and therefore does not affect the corridor's integrity. The removal of the Claymont Roundhouse (sometime between 1927 and 1940) was also within the period of significance and does not affect the corridor's integrity. However, the Gladstone Shops, accessed via spurs on the west side of the railroad roadway just south of Frost Avenue, were demolished in 1979. Of the bridges and other structures historically present, seven of 13 bridges and one retaining wall from the period of significance are contributing. The remaining eight bridges have been removed, altered or replaced by modern structures or at-grade crossings.

Although the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment now lacks approximately half of its original support buildings and structures, the embankment itself is present and visually distinct (aside from areas where the railroad roadway is nonexistent, including Phalen Boulevard and isolated locations where post-1970 street construction crosses the railroad roadway, such as Beam Avenue and the County Road D realignment). The substantial cut and fill sections serve to clearly define the railroad roadway from the surrounding landscape. Therefore, while the loss of the Gladstone Shops, bridges, and ballast, ties and rails does diminish the integrity of materials of this portion of the LS&M Railroad Corridor Historic District, the retention of the distinctive embankment constitutes a sufficient degree of integrity of materials to convey the railroad corridor historic district's historic function and significance.

- **Setting – “To retain integrity of setting, the general land uses adjacent to a corridor must be similar to the historic land uses.” Adjacent buildings and landscapes should retain enough integrity to convey the sense of the period of significance.¹⁸²**

To retain integrity of setting, the general land uses adjacent to the railroad corridor must be similar to the historic land uses and surrounding buildings and structures must retain sufficient historic appearance to convey their functions during the period of significance. Overall, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains its integrity of setting. The former Hamm's Brewery and other industrial buildings at the north end of Swede Hollow are largely extant, and the Omaha Road corridor that crossed the LS&M mainline at the end of the period of significance remains active. Although postwar residential development has transformed the general area along portions of the railroad roadway north of Johnson Parkway, much of this development

¹⁸² National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," F-201.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

occurred within the period of significance and it does not encroach on the ROW. Aerial imagery shows that south of Larpenteur Avenue (within Saint Paul), the majority of the residences that abut the railroad corridor were constructed by the late 1960s, within the period of significance. Extensive commercial and residential development of the formerly undeveloped area between Beam Avenue and I-694 from the 1980s onward is visible from the LS&M Railroad Corridor Historic District, but vegetation at the edges of the ROW and open areas provide sufficient separation to retain the character of the immediate setting.

Construction of Beam Avenue in the mid-1970s also cut through the 1868 LS&M embankment, as did the substantial realignment of County Road D in the mid-2000s. The *Railroads in Minnesota, 1862-1956* MPD states that changes in the historic setting are acceptable if the corridor retains a “high degree of integrity of location, design, and materials, and the corridor’s ROW is sufficiently wide to maintain the feeling and association of the railroad corridor historic district despite alterations to adjacent properties.” Although portions of the railroad corridor have a degree of diminished integrity of materials, as a whole it retains sufficient integrity of location and design, and overall the historic ROW retains sufficient width at approximately 100 feet to provide a visual frame and convey the linear aspect of the railroad corridor historic district, thereby conveying its significance. Although some alterations have occurred, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains sufficient integrity of setting.

- **Feeling and Association**

According to the MPD, a railroad corridor historic district retains its integrity of feeling and association if it retains integrity of location, materials, design, and setting. As the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment retains sufficient integrity of location, materials, design, and setting, it also retains sufficient integrity of feeling and association.

(2) Criterion C

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD was developed to provide guidance on evaluating railroad properties under *Criteria C* and *D*. These criteria of significance can be applicable to the evaluation of railroad properties that do not retain sufficient historic integrity to be considered eligible under *Criterion A*. Because the 1868 LS&M railroad roadbed is only partially preserved within the LS&M Railroad Corridor Historic District, it does not retain adequate integrity to be considered a contributing resource under *Criterion A*. Therefore, the 1868 LS&M railroad roadbed was evaluated under *Criteria C* and *D*, per the supplemental guidance, using archaeological methods.

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD indicates that a railroad corridor historic district can be considered eligible under *Criterion C* if it preserves distinctive characteristics of a

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

type, period or method of construction. The portions of the 1868 LS&M railroad roadbed that were not upgraded and are relatively intact and exposed on the surface (portions north of the Gateway State Trail and near the Weaver School trail, portions between Gervais Avenue and County Road C, and between Kohlman Avenue to Beam Avenue) preserve a unique example of a particular economic and technological period in Minnesota rail history.

Integrity of design

The *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD indicates that within *Criterion C*, “NRHP eligible properties retain enough integrity of the linear road structure with its supporting patterning to convey the plan, elevation of the grade, and construction methods.” The overall plan of the original 1868 LS&M railroad roadway can be conveyed within the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, except in those areas that veer outside the archaeological study area which have been destroyed by modern development. The soil coring documented the presence of the presumed original LS&M railroad roadbed in many areas under the 1880s rail embankment (which in a sense is protecting the 1868 LS&M railroad roadbed). In the portions of the 1868 LS&M railroad roadbed found by coring, some areas show truncated soils, indicating later railroad actions within the area.

The design plan is more pronounced in the areas of the 1868 LS&M railroad roadbed exposed on the surface where the 1868 LS&M roadway is set off from the post-1880s roadway realignment (north of the Gateway State Trail near the Weaver School trail, between Gervais Avenue and County Road C, and between Kohlman and Beam Avenue). The portions of the original 1868 LS&M railroad roadbed exposed on the surface between Gervais Avenue and County Road C are entirely within the archaeological study area (RCRRA ROW in this area) and are approximately 12 to 13 feet wide, including the downslopes of the embankment. The portion of the original 1868 LS&M railroad roadbed exposed on the surface between Kohlman and Beam Avenues is 13 to 14 feet wide including the downslopes of the embankment. MVAC was able to clarify in the spring of 2019, based on ROW markers, that the portion of the 1868 LS&M railroad roadbed closest to Kohlman Avenue was just outside the current RCRRA ROW, which was the limit of the archaeological study area in this location. As the original 1868 LS&M railroad roadbed headed north, it angled northwest towards the Bruce Vento Trail embankment, so another RCRRA ROW marker was noted on the western (interior) downslope of the original 1868 LS&M embankment, making the downslope within the archaeological study area and the top of the original LS&M railroad roadbed embankment just outside of the archaeological study area. A third ROW marker was not identified, but as the railroad roadway gets closer to Beam Avenue, it would be farther inside the archaeological study area.

In these three areas of exposed railroad roadbed, the elevation of the roadbed retains integrity, and the vertical arrangements can be measured in terms of width, inslope, and downslope gradient. Rise over

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

run measurements were not taken near the Weaver School trail, since the berms were very slight. However, representative rise over run measurements were taken in both of the surface roadbed remnants. For the area between Gervais and County Road C, where the best example of the original 1868 LS&M roadbed is exposed, the rise is 58 inches and the run is 190 inches to the base of the slope (58/190 or 1:0.31). For the 1868 LS&M railroad roadbed remnants between Kohlman Avenue and Beam Avenue, two rise over run examples were taken. The first measurement, closest to Kohlman Avenue, had a rise of 53 inches and a run of 208 inches (53/208 or 1:0.26). The second measurement, 100 feet to the north near the highest point of the roadbed, had a rise of 75 inches and a run of 267 inches (75/267 or 1:0.28). Other design elements, such as ditches and plan of alignment, can be viewed and measured easily. The overall scale, arrangement of materials, and roadway configuration are preserved.

The exposed portions of the roadbed on the surface (near the Weaver School trail, between Gervais Avenue and County Road C, and between Kohlman Avenue and Beam Avenue) exhibit elements of the grade and layout of the 1868 LS&M railroad roadbed within the terrain and can be measured. The three portions of the 1868 LS&M roadbed that are exposed on the surface embody distinctive characteristics of a type, period and method of construction directly related to the design and engineering choices specific to the LS&M corporation and its investors between the late 1860s and 1870, and that of the early pioneer “western railroad” in Minnesota. The methods of construction include: laying the ties directly on the soil surface; laying ties on a thin soil (dirt) ballast obtained from the soil adjacent to the track; cutting down high ground and laying ties on the cut surface; and filling low ground or adding fill to adjust the grade and laying ties on the build surface. The essential features, scale, level of investment, and basic engineering design of the railroad are exemplified in these areas by these roadbed remnants.

Some small areas have been destroyed and covered by subdivisions, businesses and houses (near Lake Phalen, and north of County Road C for about one-quarter mile to Kohlman Avenue). One intrusion that slightly reduces the integrity of design is the sanitary force main that runs through a large portion of the LS&M railroad roadway and has affected the vertical and horizontal layout of a portion of the 1868 roadway (from at least Larpenteur Avenue to at least TH 36). This would only reduce integrity of design in the areas of the 1868 LS&M railroad roadway between these blocks. Based on mechanical stripping in one area of the roadway looking for privies related to post-1880 depots, it is estimated that the trench for the force main might be about 10 feet wide. If this is accurate, at least 90 percent of the 100-foot-wide RCRRA ROW has not been affected by the trenching.

In the late 1850s, the standard railroad roadway, unless otherwise directed, was 22 feet wide at grade in earth excavations and 18 feet wide in rock excavations. During construction, both earth and rock were to be taken out 18 inches below grade for the entire width of the roadway. Whenever soft earth, such as mud or muck, was encountered in excavations or embankments within 2 feet of subgrade, it

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

was to be removed and replaced with compact earth or gravel.¹⁸³ Since the portion of the 1868 LS&M railroad roadbed between Beam Avenue and Kohlman Avenue is the least disturbed, potential cores within the exposed 1868 LS&M roadbed compared to soil cores of the earth surrounding it might indicate whether some of the topsoil was removed before the placement of the 1868 LS&M embankment for the roadbed. At the time of the 2018 survey, the embankment had a light cover of snow. Further investigations during optimal field conditions might indicate whether clearing occurred around the embankment, and if there is evidence of additional clearing to make a 22-foot wide roadway.

The *Evaluation of the Lake Superior and Mississippi Railroad: Thomson to Fond Du Lac Segment* found standardized roadway widths of 12 to 14 feet within all cuts and embankments for the Thomson to Fond du Lac Segment of the LS&M railroad mainline.¹⁸⁴ The two LS&M roadbed embankments exposed on the surface between Gervais Avenue and Beam Avenue measure 12-13 feet or 13-14 feet on the surface of the embankment. If the downslope to the edge of the embankment is also considered, the measurements of the roadway between Gervais Avenue and Beam Avenue would be comparable to the measurements of the Thomson to Fond du Lac Segment.

Integrity of materials

For the portions of the 1868 LS&M railroad roadbed exposed at the surface (near the Weaver School trail, south of Beam to Kohlman Avenue, and between County Road C to Gervais Avenue), the material element that can be measured quantitatively is the native soil used to make the embankments and railroad roadbed. Cutting and filling episodes within the natural landscape are present, along with the narrow railroad roadbed. Evidence of associated materials, such as stone for masonry work (walls or some bridges), wood used for pilings, telegraph poles, and metal (fish plates, spikes other equipment) are not present; they were affected by later rail construction, the multi-use trail construction, and general urban development. Portions of the 1868 LS&M railroad roadbed buried under the post-1880s and later roadway might also show integrity of materials; however, some portions were truncated by later rail construction and removal of the ballast, and presumably some of the soil beneath it, to construct the multi-use trail. The sample size of the cores is small, however, and consistent integrity of materials along the linear roadway cannot be confirmed in the areas buried by later rail fill.

¹⁸³ George L. Vose, *Handbook of Railroad Construction: For the Use of American Engineers* (Boston, Mass.: James Munroe and Company, 1857), 57.

¹⁸⁴ Arnott and Maki, *Evaluation of the Lake Superior and Mississippi Railroad: Thomson to Fond Du Lac Segment* (XX-RRD-26) Carlton and St. Louis Counties, Minnesota (Draft), 86.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Integrity of workmanship

In the areas of the 1868 LS&M railroad roadbed exposed on the surface, integrity of workmanship is indicated by the presence of the existing roadbed and how it was laid. More specific elements such as blacksmithing or stone working are not evident because of the later rail improvements and multi-use trail construction.

Integrity of location, setting and feeling

The original 1868 LS&M railroad roadway from Johnson Parkway to Beam Avenue is primarily in its original location. The setting of the railroad roadway, including the physical environment and natural landscape (topography and vegetation), has been altered in some areas by adjacent urbanization. Heavy urban development south of Gervais Avenue to Johnson Parkway has affected the overall setting (e.g., topography, natural landscapes and general vegetation). The setting related to the portions of the original 1868 LS&M railroad roadbed currently exposed on the surface (near the Weaver School trail, near Harvest Park between Gervais Avenue and County Road C, and south of Beam Avenue) has experienced less urban development and is better preserved. The overall topography, original landscape and vegetation have been preserved except for some grading within the adjacent Harvest Park. Because there are no buildings near the railroad roadway near Harvest Park, an argument could be made that the general setting is intact. The setting of the 1868 LS&M railroad roadway south of Beam Avenue to Kohlman Avenue remains similar to what it was during the early period of significance when the first roadway was built and in use. The feeling of the railroad corridor is still present for the area between Johnson Parkway and Beam Avenue, since the later upgrades follow the earlier LS&M railroad roadway.

Integrity of association

According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, association is related to all aspects of integrity since it relies heavily on integrity of design, workmanship, location, setting, and feeling to communicate historic engineering choices. Integrity of association is present in the areas of the 1868 LS&M railroad roadbed exposed on the surface (near the Weaver School trail, between County Road C and Gervais Avenue, and south of Beam Avenue), since integrity of all aspects is present and there is a direct link between the railroad roadway and its historic significance. The material remains convey an association to the design solution used within a specific historic context. For the area between Johnson Parkway and Gervais Avenue, where some of the 1868 LS&M railroad roadbed was found below post-1880 rail fill, an argument could also be made that there is some integrity of association since the location, general setting, and feeling of a railroad roadway are also present.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

(3) *Criterion D*

According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, two specific research areas are relevant: Initial, Pioneering, and Expansion Railroads: Engineering, Construction, and Ruination: 1858-1910; and Pre-Industrial Transportation Landscapes and Railroad Spaces: 1858-1910. The entire 1868 LS&M railroad roadway between Johnson Parkway and Beam Avenue and within the archaeological study area can be considered a source of information regarding various engineering choices, design, and construction methods of a railroad planned and built within a particular period of Minnesota railroad history.

The need for the transition to a larger rail roadway came as a result of industry and technological changes. As locomotives became faster, larger, and heavier, the early pioneer lines needed to be rebuilt. Curves that could be negotiated by the smaller trains at lower speeds could not be negotiated by the increasingly larger machines. Also, the “economical” initial construction that was completed to get land grants was often of poor quality, and as these initial lines weather, they could not support the larger machines.¹⁸⁵ When comparing the portion of the presumed 1868 LS&M roadbed that lies east of the current trail and south of Beam Avenue with the post-1880s roadbed, it is clear that construction standards significantly changed when the mainline was upgraded. The robust size of the post-1880 railroad roadbed gives the impression that the corporation’s investment was intended to last for a long time, compared to the early roadbed, which was smaller in both height and width. As previously discussed, LiDAR imagery shows that just north of Kohlman Drive, there is a 9.28-foot-height difference between the current Bruce Vento Trail (located on the top of the realigned 1880s railroad roadway) and the presumed 1868 LS&M railroad roadbed. The 9.28-foot difference between the two embankments is the multi-use trail height (904.86 FASL) (which is sitting on top of the 1880s realignment embankment) minus the presumed 1868 LS&M roadbed height (894.73 FASL). Heading north, the height difference between the two berms is more pronounced. Almost 350 feet north of Kohlman Avenue, the modern Bruce Vento Trail embankment is at 905.03 FASL, and the top of the presumed original 1868 LS&M roadbed embankment is at 892.09 FASL, showing a height difference of 12.94 feet. Almost 600 feet north of Kohlman Avenue, the 1868 LS&M railroad roadbed embankment slopes down. At this point, the modern Bruce Vento Trail embankment is 906.19 FASL, and the presumed original 1868 LS&M railroad roadbed is 888.42 FASL, showing a 17.77-foot difference between the two embankment heights. The width of the 1868 LS&M embankment is approximately 11.41 feet wide. The width at the surface of the modern Bruce Vento Trail embankment (which represents the post-1880 railway realignment) is at least 36 feet across, and would be larger including downslopes (which were hard to measure due to the steep slope).

¹⁸⁵ National Register of Historic Places, Multiple Property Documentation Form, *Supplement to Railroads in Minnesota, 1862-1956* (draft), 40–41.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

On the larger 1880s railroad embankment, the height and general size give the impression that larger and more numerous trains were moving over it, with a higher investment in the roadway by the company. The decision to bury some of the original roadway or abandon parts of it for the later upgrades suggest that the railroad did not meet changing industrial standards as the rail company continued to grow.

In the early days of railroad construction, earth was commonly used for surfacing the railroad roadway. This was especially true in prairie localities where harder and more suitable materials were not readily available. Although earth could hold track in place horizontally and vertically over the short term, it was not good for ballast. In dry weather it was dusty, while in wet weather it became muddy even when sharply sloped. It was not firm enough to afford the best foundation, and it tended to attract vegetation and moisture, which hastened decay of the ties. These problems led early railroad builders to search for a more suitable material.¹⁸⁶

Four construction techniques proposed by Strata Morph include laying ties directly on the soil surface; laying ties on a thin ballast of dirt obtained from the adjacent soil; cutting down high ground and laying ties on the cut surface; and filling low ground or adding fill to adjust the grade and laying ties on the built surface. Strata Morph developed a simple model (see Appendix D) for expected stratigraphic sequences to interpret the anthropogenic stratigraphy created by four events related to railroad construction and maintenance, and Bruce Vento Trail construction. These four events consisted of initial construction of the LS&M railroad roadway (1860s); initial post-construction track repair, including a second track addition (mid-to-late 1880s); NP/BN era (1900-1986); and construction of the Bruce Vento Trail (early 1990s). The 2018 coring found evidence of various types of construction methods, including placing the rails on the ground surface, using a thin layer of soil ballast from the surrounding area, and using a thin layer of rock ballast.

Integrity of design

Within a railroad corridor historic district, integrity of design is based on artifact patterning and features created within the period of significance, which allow for interpretations to be made within significant research areas. According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, integrity of design would include data sets such as artifacts and features that are present in sufficient quantities to be visible and analytically extractable; that are not mixed with unrelated material; and that preserve patterns that allow for interpretation. Between Gervais Avenue and Beam Avenue, the visible, large-scale feature is the portion of the 1868 LS&M railroad roadbed south of Beam Avenue that can be directly measured; the portion of the 1868 LS&M railroad roadbed visible on the surface near Harvest

¹⁸⁶ Elmer Howson, ed., *Railway Engineering and Maintenance Cyclopedica* (New York: Simmons-Boardman Publishing Co., 1926), 145.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Park (south of County Road C) can also be measured. The portion of the 1868 LS&M railroad roadbed near the Weaver School trail can also be measured, although the height is much less pronounced than the areas closer to Beam Avenue and Harvest Park. The portion of the 1868 LS&M railroad roadbed south of Beam Avenue is slightly weathered but does not appear to have been altered, except near the far northern end, where it feeds into the path that rises from Beam Avenue to the top of the multi-use trail on the post-1880 railroad embankment. The area that makes up the roadway form, plan, space, and style is still present in this area. The portion of the 1868 LS&M railroad roadbed visible on the surface near Harvest Park is also slightly weathered and has been somewhat affected by the construction of the 1880s roadway and Bruce Vento Trail construction, and actions related to Harvest Park. However, at least 188 feet of this exposed railroad roadbed appears to have only been slightly affected by these actions. Other areas to the north and south of this section are likely remnants of the railroad berm, mixed slightly more with the trees and parkland. The portions of the LS&M Railroad Corridor Historic District near the Weaver School trail have been weathered and affected by the construction of the Weaver School trail, the Bruce Vento Trail, and the fence separating the school grounds from the RCRRA ROW. Using the concepts of archaeological stratigraphy and superimposition, interfaces of excavation, cuts and fill could provide a way to document the industrial landscape and possibly place construction and excavation episodes in chronological order related to distinct events.

The rest of the former 1868 LS&M railroad roadbed within the Rush Line BRT architecture/history study area is nonextant (north of Maryland Avenue), under the post-1880s roadway that houses the Bruce Vento Trail, to the side of the post-1880s roadway (based on soil core data compared to 1870 ROW maps), or at about the same level as the post-1880s roadway. The portions of the 1868 LS&M roadbed south of Gervais Avenue are not necessarily mixed with unrelated material, but are covered by later material. Within the portions of the original 1868 LS&M railroad roadbed buried under the later post-1880 rail embankment, the cutting and filling from the later embankment construction and the 1868 construction efforts might be more difficult to separate; however, the stratigraphy of the 1868 LS&M railroad roadbed is presumed to be relatively intact based on coring results, and could place excavation episodes in chronological order related to construction activities. Unfortunately, urban development and the post-1880 railroad roadway appear to have left no additional cultural material, artifact scatters, or culverts to support integrity of design. Although there are adjacent borrow pits, there is no way to determine what phase of railroad construction they are associated with.

Integrity of materials

According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, “Material integrity of a railroad corridor historic district eligible under *Criterion D* preserves the artifacts, ecofacts, and features needed to study significant patterns of behavior within a railroad environment.” The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment presents some of the integrity of

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

materials needed to study significant patterns. Mainly this includes some of the earthen constructs; the later railroad roadway and urban development have affected features such as artifact scatters and masonry that might once have been present. There is good preservation of the character-defining physical elements of modified earth in the areas of the 1868 LS&M railroad roadbed still visible on the surface. In areas where the soil from this original railroad roadbed appears to be preserved below the surface, preservation of the modified earth is also likely and has the potential to be studied over a larger area.

Integrity of workmanship

To have integrity of workmanship, there should be physical evidence of crafts, labor, and skill during a given period. According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, the importance of workmanship is dependent on the nature of the site and its research importance. Artifact scatters or other features related to the daily life of workers could not be identified within this portion of the 1868 LS&M railroad roadway due to the effects of the later rail line 1880s railroad realignment construction improvements and urban development. However, the railroad roadbed itself, whether exposed or buried by the post-1880s railroad roadway, does provide tangible evidence of workers and their labor and handwork. A particular example is where the original LS&M railroad roadbed is set off from the post-1880s roadway, south of Beam Avenue. This more-than-7-foot-high embankment would have been placed by hand, and likely by horse and cart. The workmanship is expressed through the scale of the visible feature of the railroad roadbed. South of County Road C, near Harvest Park, there is also integrity of workmanship. Some of the characteristics that could be surmised from the construction efforts include information on construction materials that would have been readily available, most typically soil. The way the 1868 LS&M railroad roadbed was built can provide information on construction efforts as well as the disbursement of capital, resources, labor efforts, and construction methods, which in turn can provide information on the feasibility of construction efforts. The physical aspects of the railroad roadbed are present for almost 200 feet (and probably more to the north and south) even though the edges of the railroad roadway have been altered slightly by the later work along the park. For the portions of the former LS&M railroad roadbed buried by the later post-1880 railroad roadway, the presumed railroad roadbed surface still provides tangible evidence of human labor and handwork, although not as easily measured because of the overlying fill.

Integrity of location, setting and feeling

Since most of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment between Johnson Parkway and Beam Avenue is in its original location, it retains integrity of location. Some of the railroad roadbed is preserved on the surface, while much of it appears to be preserved or at least partially preserved below the post-1880s roadway/modern Bruce Vento Trail embankment. Since a later rail embankment was built over the earlier one in several areas, the feeling of a railroad corridor is present. Combined, the demonstrated integrity of the design, materials and workmanship

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

contribute to the integrity of location and feeling. The topography, soils and other elements of the pre- and post-industrial landscape contribute to the overall setting, but in the areas of the 1868 LS&M railroad roadbed exposed on the surface, the integrity of setting is greater than the areas south of Gervais Avenue. The overall setting for the portion between Johnson Parkway and Gervais Avenue has been affected by urban expansion, but according to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, integrity of setting is not generally required under *Criterion D*.

Integrity of association

According to the *Supplement to Railroads in Minnesota, 1862-1956* (draft) MPD, for integrity of association, there should be a direct link between the data sets and the identified historic research areas. From an archaeological perspective, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment has integrity of association since the material remains (even those buried by the post-1880s roadway) can be used to answer research questions that would be directly related to the historical significance of the resource.

F. HISTORIC BOUNDARY

As stated in the *Railroads in Minnesota, 1862-1956* MPD:

The boundaries of a railroad corridor historic district will be the historic right of way of the railroad company that built and operated the corridor. If the current railroad right of way is different than the historic railroad right of way, the historic right of way will be the boundaries of the railroad corridor historic district. If, however, portions of the historic right of way that are not important to convey the associative linear characteristic of the district are no longer within the railroad right of way and have lost historic integrity, the boundaries of a railroad corridor historic district may be limited to the current right of way.¹⁸⁷

Following the MPD, the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment boundary is considered to be the current boundary of the RCRRA and BN ROW with minor adjustments as discussed below. It generally follows the original 1860s LS&M ROW. The RCRRA and BN ROW were identified using current parcel data from Ramsey County. For much of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment, the parcel lines correspond to the LS&M ROW following the 1880s realignment. Where modern construction has rendered the ROW difficult to discern through current parcel data, historic imagery including 1870 ROW maps, Sanborn maps from 1903 to 1951, and aerial imagery from 1966 were used to develop a boundary that corresponds to the initial 1860s ROW as closely as possible. In two isolated areas, portions of the original 1868 railroad roadbed remain and are located outside the current RCRRA and BN ROW; the historic district's boundary was extended to encompass these areas as well and includes the extent of

¹⁸⁷ National Register of Historic Places, Multiple Property Documentation Form, "Railroads in Minnesota, 1862-1956," F-184.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

the railroad roadway as discerned using LIDAR data. The southern terminus corresponds to the ROW of the mainline at the wye junction just east of Union Depot. Neither the wye junction nor Union Depot are within the historic district's boundary. Although additional spurs existed in this area, none are extant and no available sources clearly delineate a ROW that encompasses these spurs without taking in large amounts of adjacent land. The boundary in this area instead follows the mainline to Kellogg Boulevard at the north end of the wye junction, which also corresponds to the northern limits of the historic boundary for the Union Depot. The width of the ROW varies throughout the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment but generally exhibits standard widths of 70, 80, 100, or 150 feet.

The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment boundary is depicted on the historic boundary maps in Appendix F, and a list of extant elements with their contributing or noncontributing status is presented in Table 8, which is organized generally south to north. As previously noted, research completed to date has not clarified whether identified borrow pits were used for the original 1868 alignment, the late 1880s alignment, or both. It is unlikely further research would help determine the dates of these borrow pits. Therefore, borrow pits are not considered contributing elements to the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment.

Table 8. List of Extant Elements in the LS&M Railroad Corridor Historic District and Contributing Status

Resource Name	Element type	Location	Build date	Status
MnDOT Bridge L5725 (RA-SPC-7115, possibly StP&D Bridge No. 0A) over Fourth Street	Grade Separation Structure	Fourth Street East	1900	Contributing
Seventh Street Improvement Tunnels (MnDOT Bridge 90386, RA-SPC-6402, National Register #89001828)	Grade Separation Structure	Seventh Street East	1884	Contributing
Retaining Wall (no inventory number, outside project APE)	Retaining Wall	Southern edge of parcel at 622 Beaumont Street East	1915	Contributing

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 8. List of Extant Elements in the LS&M Railroad Corridor Historic District and Contributing Status

Resource Name	Element type	Location	Build date	Status
Omaha Road Bridge (no bridge number, RA-SPC-11130) over roadway ¹⁸⁸	Grade Separation Structure	260 feet east of Payne Avenue	ca. 1920	Contributing
Phalen Boulevard Bridge (MnDOT Bridge 62616) over roadway	Grade Separation Structure	Phalen Boulevard	2001	Noncontributing (outside period of significance [POS])
Neid Lane Bridge (MnDOT Bridge 62617) over roadway	Grade Separation Structure	Neid Lane	2004	Noncontributing (outside POS)
Arcade Street Bridge (MnDOT Bridge 62062) over roadway	Grade Separation Structure	Arcade Street	2001	Noncontributing (outside POS)
Forest Street Bridge (MnDOT Bridge 5962, RA-SPC-1294) over roadway ¹⁸⁹	Grade Separation Structure	Forest Street	1942	Contributing
Earl Street Bridge (MnDOT Bridge 62545) over roadway	Grade Separation Structure	Earl Street	2003	Noncontributing (outside POS)
Bridge R0438 near Clarence Court carrying railroad over former local road (now pedestrian path connecting McAfee Street to East Shore Drive, RA-SPC-11140) which travels through tunnel	Grade Separation Structure	750 feet south of Arlington Avenue	1907	Contributing

¹⁸⁸ RA-SPC-11130 carries the StPS&TF/Omaha Road over the LS&M mainline corridor. It is also a contributing structure within the StPS&TF/Omaha Road Railroad Corridor Historic District (XX-RRD-CNW001), which was recommended eligible for the National Register as part of the Rush Line BRT Project.

¹⁸⁹ RA-SPC-1294 carries Forest Street over the LS&M mainline and StPS&TF/Omaha Road corridors. It is also a contributing structure within the StPS&TF/Omaha Road Railroad Corridor Historic District (XX-RRD-CNW001), which was recommended eligible for the National Register as part of the Rush Line BRT Project.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 8. List of Extant Elements in the LS&M Railroad Corridor Historic District and Contributing Status

Resource Name	Element type	Location	Build date	Status
Privy site 21RA0082	Archeological Site	North of Frost Avenue	1897-1917	Noncontributing (diminished integrity)
1868 Railroad Roadway not concealed by realignment embankment (XX-RRD-NPR004)	Railroad roadway, including ground modification (cuts, fills, and grades), railroad bed, and ditches	Gateway State Trail to County Road B	1864-1868	Contributing
MnDOT Bridge 62004 carrying roadway over TH 36	Grade Separation Structure	TH 36	2013	Noncontributing (outside POS)
1868 Railroad Roadway not concealed by realignment embankment (XX-RRD-NPR003)	Railroad roadway, including ground modification (cuts, fills, and grades), railroad bed, and ditches	Gervais Avenue to County Road C	1864-1868	Contributing
County Road C Bridge (MnDOT Bridge 62563) over roadway	Grade Separation Structure	County Road C	1993	Noncontributing (outside POS)
1868 Railroad Roadway not concealed by realignment embankment (XX-RRD-NPR002)	Railroad roadway, including ground modification (cuts, fills, and grades), railroad bed, and ditches	Kohlman Avenue to Beam Avenue	1864-1868	Contributing
Railroad Bridge (MnDOT Bridge 62529, RA-MWC-0248) over Beam Avenue	Grade Separation Structure	Beam Avenue	1975	Noncontributing (outside POS)
StP&D Bridge No. 7 (RA-WBT-004, no MnDOT Bridge Number)	Grade Separation Structure	600-feet south of I-694 at original alignment of County Road D	Ca. 1905	Noncontributing (alterations)

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

Table 8. List of Extant Elements in the LS&M Railroad Corridor Historic District and Contributing Status

Resource Name	Element type	Location	Build date	Status
Railroad Bridge (MnDOT Bridge 62822, RA-WBC-0156) over I-694	Grade Separation Structure	I-694	1966	Contributing
County Road E Bridge (MnDOT Bridge 62079) over roadway (no inventory number, outside project APE)	Grade Separation Structure	County Road E	1977	Noncontributing (outside POS)
TH 61 Bridge (MnDOT Bridge 62092) over roadway	Grade Separation Structure	TH 61	2010	Noncontributing (outside POS)
White Bear Lake Depot (RA-WBC-0121)	Railroad Depot	180 feet south of TH 61 and Fourth Street	1937	Contributing
1880s Roadway Realignment	Railroad roadway, including ground modification (cuts, fills, and grades), railroad bed, and ditches	Throughout LS&M Railroad Corridor Historic District	1887-1889	Contributing
1868 Railroad Roadway “under” later fill embankment realignment	Railroad roadway, including ground modification (cuts, fills, and grades), railroad bed, and ditches	Johnson Parkway to Maryland Ave East and Arlington Ave East to Gervais Ave	1864-1868	Contributing
Bruce Vento Regional Trail	Multi-Use Recreational Trail Alignment	Portions of LS&M Railroad Corridor Historic District from Bruce Vento Nature Sanctuary to Buerkle Road	1992-2004	Noncontributing (outside POS)

8. RECOMMENDATION

The approximately 11-mile-long LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment is significant under National Register *Criterion A: Transportation* as an early segment of what would become the primary rail connection between the navigable waterways of the Mississippi River and Lake Superior and as an important railroad connection between downtown Saint Paul and the summer tourism industry of White Bear Lake. As noted in the *Railroads in Minnesota, 1862-1956* MPD, the LS&M was “instrumental in providing direct service for shipping agricultural products and building materials between Minneapolis/St. Paul and the Lake Superior docks.”¹⁹⁰ It is associated with the following historic contexts identified in the MPD: Railroad Development in Minnesota, 1862-1956; Railroads and Agricultural Development, 1870-1940; Urban Centers, 1870-1940; and Minnesota Tourism and Recreation in the Lake Regions, 1870-1945. Under *Criterion A*, the period of significance begins with the completion of the railroad roadway in 1868 and extends until 1970.

Under *Criterion C: Design/Engineering*, the three exposed roadbed portions (XX-RRD-NPR002, XX-RRD-NPR003, XX-RRD-NPR004) between Johnson Parkway and Beam Avenue and within the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment provide an example of early railroad engineering in Minnesota from the mid-1860s to 1870 and are significant under the research domain Railroad Spaces: Industrialized Transportation and the Transformation of the Minnesota Landscape. The period of significance is 1864-1868 to coincide with the initial grading and construction.

The portion of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment from Johnson Parkway to Beam Avenue is considered significant under *Criterion D* except where the 1868 LS&M roadway veered away from the 1880s roadway and modern Bruce Vento Trail embankment (near Lake Phalen and from County Road C to Kohlman Avenue), which is outside the modern RCRRA ROW (and LS&M Corridor Historic District) and appears to have been destroyed by modern development. The presumed portions of the original LS&M railroad roadbed identified on the surface and found buried under the post-1880 fill have similar potential and contribute to the following research areas: Pre-Industrial Transportation Landscapes and Railroad Spaces: 1858-1910; Initial, Pioneering, and Expansion Railroads: Engineering, Construction, and Ruination: 1858-1910; and Machines in the Garden: Railroads and Evidence of Environmental Change in Minnesota: 1858-1945. The period of significance under *Criterion D* begins in 1864 with the initial grading and construction and ends in 1868 with the completion of the LS&M between Saint Paul and White Bear Lake.

The majority of the LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment—85 percent—retains sufficient overall historic integrity to convey its historic function and significance. Despite changes, including the two noncontiguous portions of the LS&M mainline railroad roadway obliterated by vehicular roadway construction after 1970, this accounts for only approximately 1.75

¹⁹⁰ National Register of Historic Places, Multiple Property Documentation Form, “Railroads in Minnesota, 1862-1956,” E-128.

Phase II Evaluation

LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment

miles of the total corridor (15 percent) and does not detract substantially from the overall integrity. Although the portion of the LS&M railroad roadway leading into the Saint Paul Union Depot is nonextant, the *Railroads in Minnesota, 1862-1956* MPD states that “if the significant connection was a terminal or transfer, contributing segments of the railroad corridor historic district must extend at least to the metropolitan area or urban center where the connection was made, though not to the specific connection point.” The segment extends from White Bear Lake to the Saint Paul Union Depot historic boundary, and therefore continues to demonstrate its significant connection.

The LS&M Railroad Corridor Historic District: Saint Paul to White Bear Lake Segment’s character-defining features include the railroad roadway, grade separation structures, retaining walls, depots, exposed and buried portions of the 1868 railroad roadbed, and the overall sense of linearity emphasized by the setting, comprised of the adjacent land uses and vegetation between present along the edge of the railroad ROW.

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APPENDIX A. RUSH LINE BUS RAPID TRANSIT PROJECT CORRIDOR MAPS

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Legend

- Proposed Route
- Proposed Station
- Proposed Station and Park-and-Ride

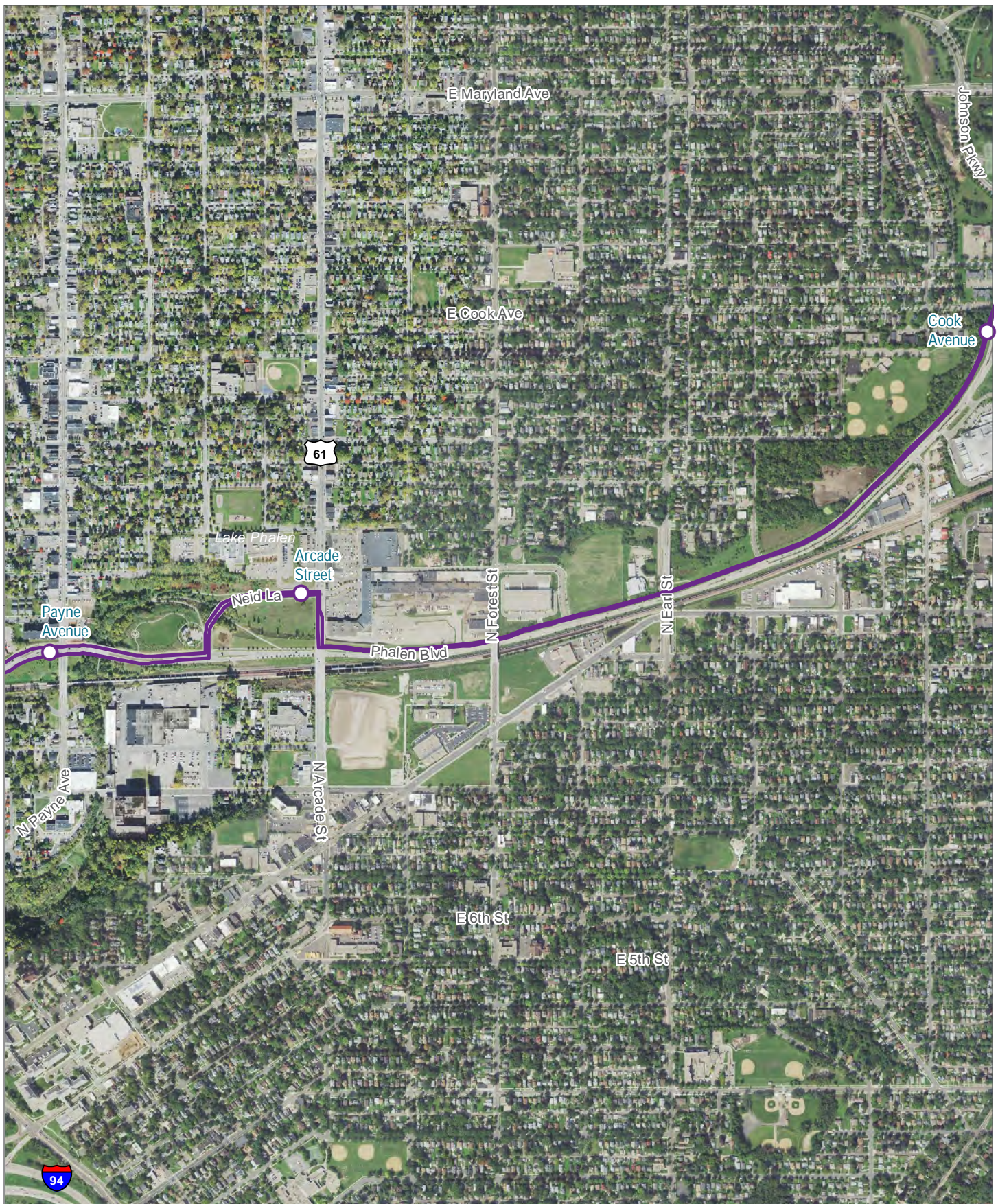
Rush Line BRT Project

July 16, 2019

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Legend

- Proposed Route
- Proposed Station
- Proposed Station and Park-and-Ride

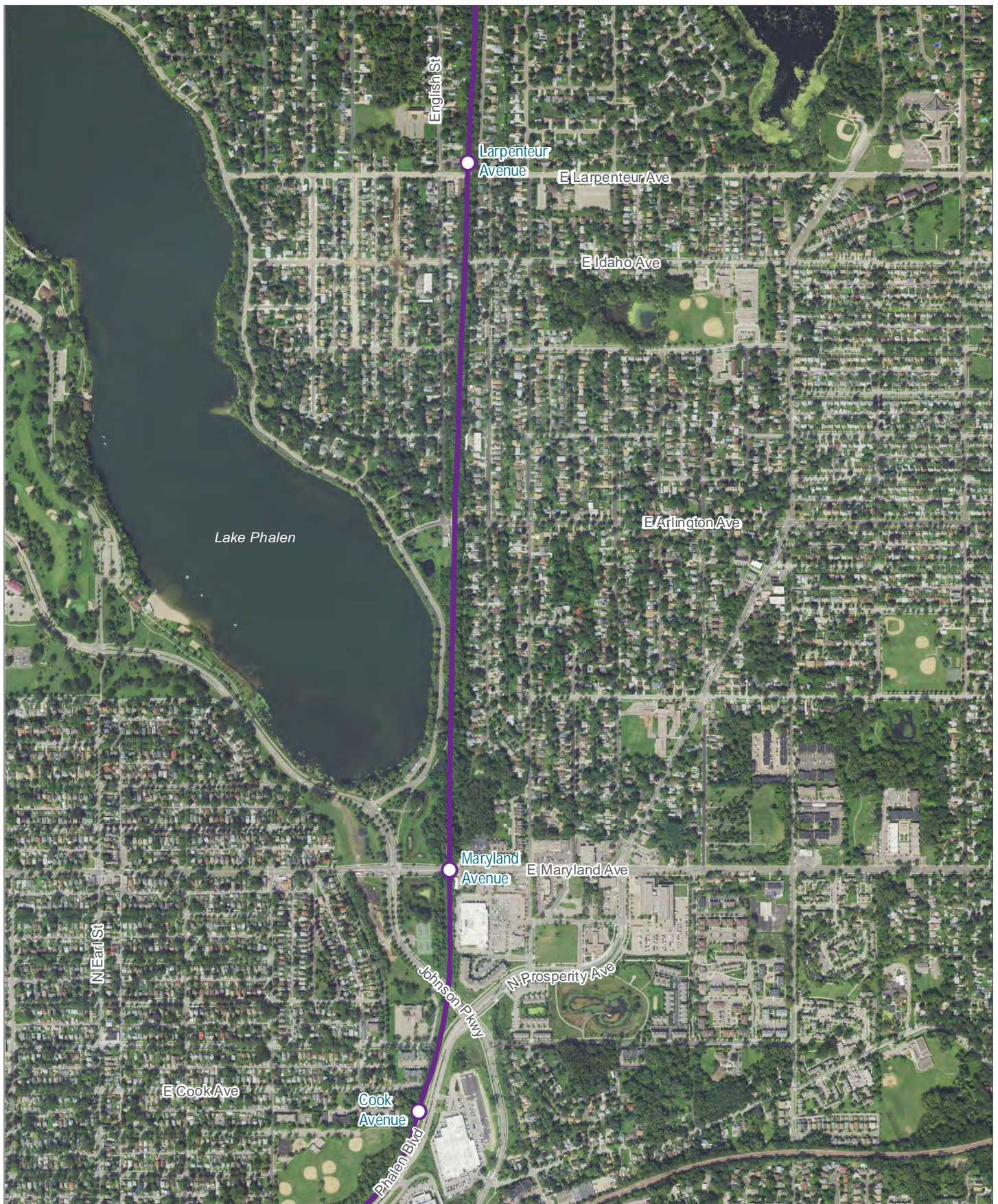
Rush Line BRT Project

July 16, 2019

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Legend

- Proposed Route
- Proposed Station
- Proposed Station and Park-and-Ride

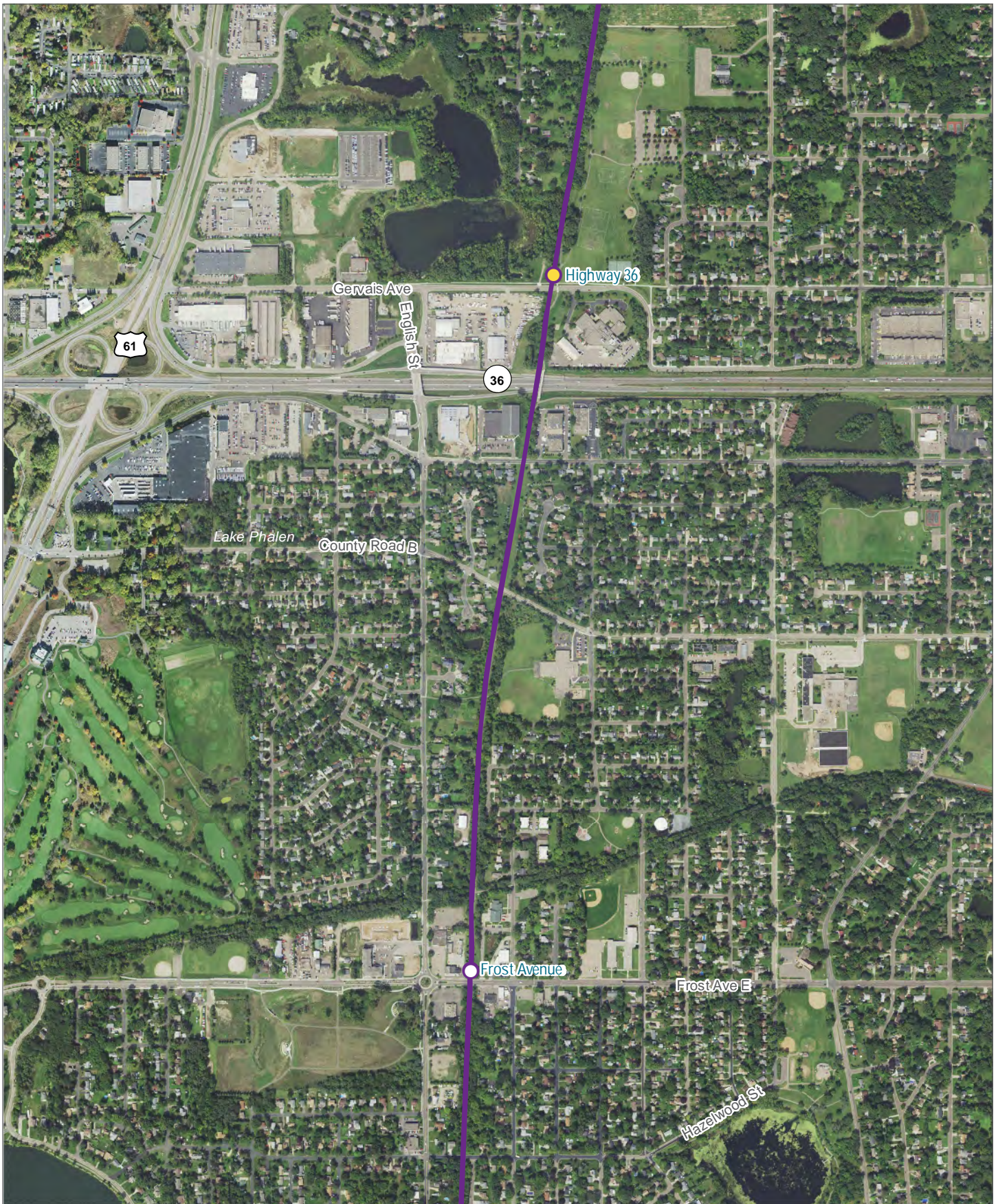
Rush Line BRT Project

July 16, 2019




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Legend

-  Proposed Route
-  Proposed Station
-  Proposed Station and Park-and-Ride

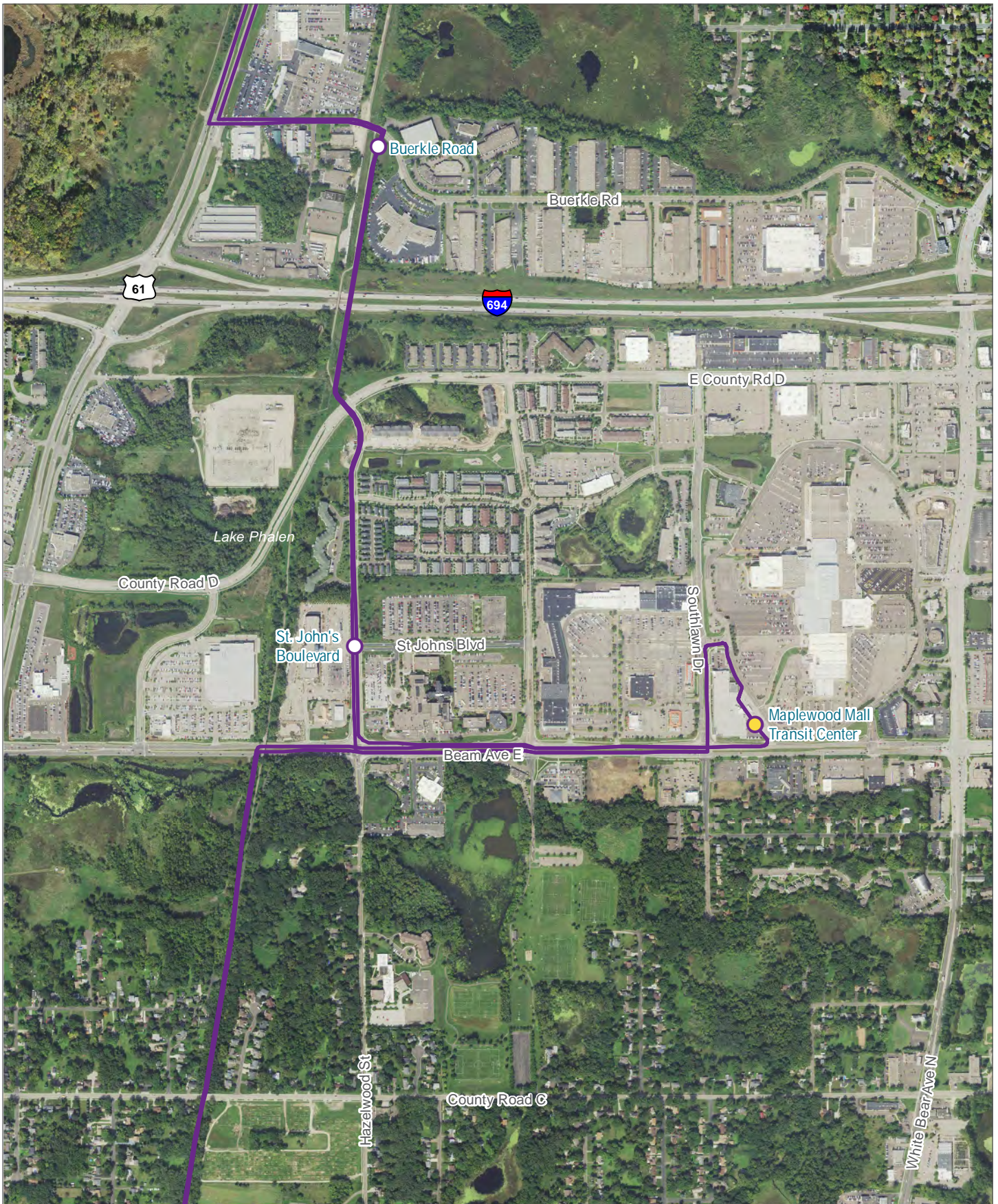
Rush Line BRT Project

July 16, 2019

Page 4



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Legend

- Proposed Route
- Proposed Station
- Proposed Station and Park-and-Ride

Rush Line BRT Project

July 16, 2019

Page 5



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Legend

- Proposed Route
- Proposed Station
- Proposed Station and Park-and-Ride

Rush Line BRT Project

July 16, 2019

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**APPENDIX B. ORIGINAL LS&M 1870 RAILROAD RIGHT-
OF-WAY GEOREFERENCED WITH 1884-
1886 MAPS, 1945 AERIAL PHOTOGRAPHS,
AND MODERN AERIAL PHOTOGRAPHS**

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1870 LS&M ROW Atlas



1884-6 Hopkins Atlases

NORTH



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1870 LS&M ROW Atlas



1884-6 Hopkins Atlases





1870 LS&M ROW Atlas



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1870 LS&M ROW Atlas



1884-6 Hopkins Atlases



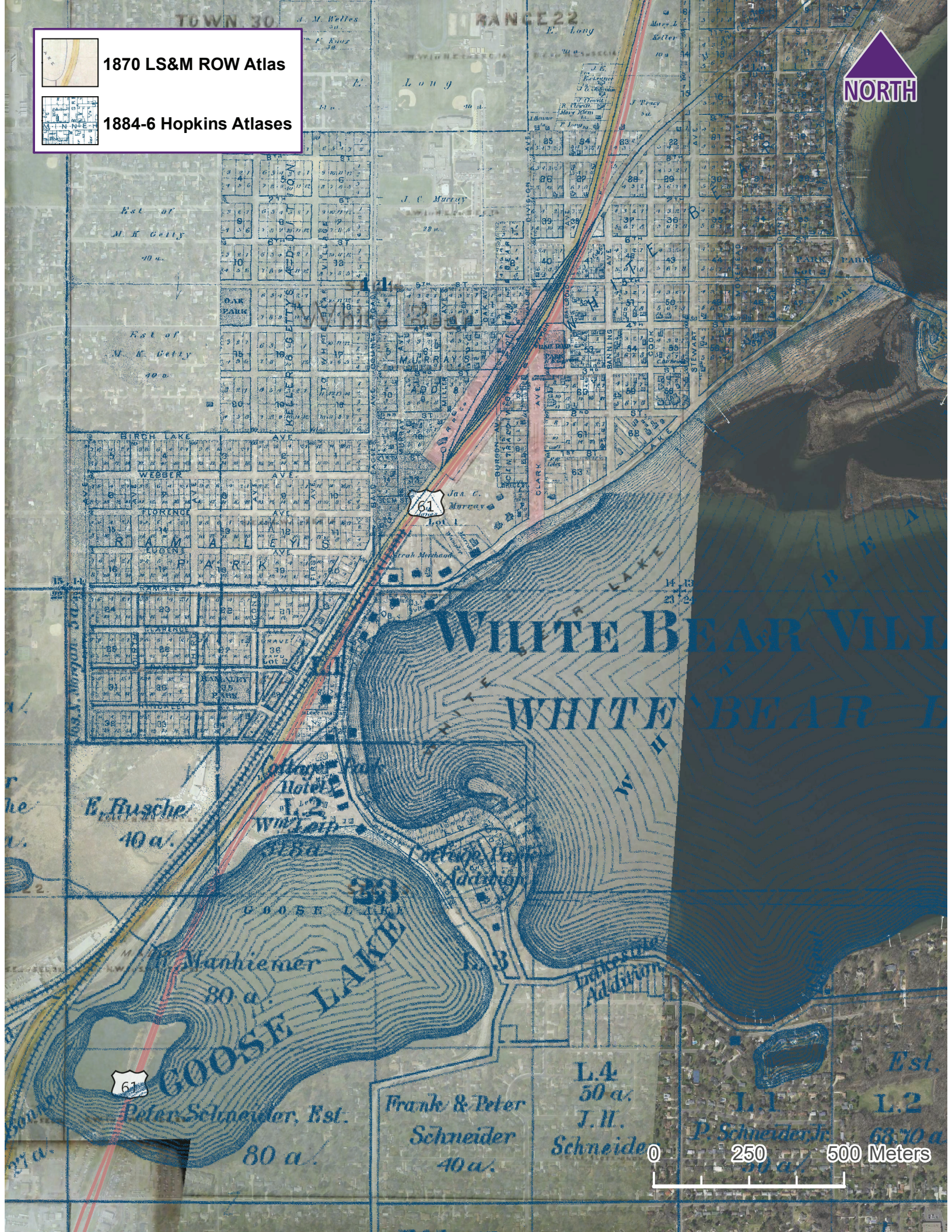




1870 LS&M ROW Atlas



1884-6 Hopkins Atlases



APPENDIX C. GLOSSARY OF TERMS

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Appendix C. Glossary of Terms

The following is a list of definitions of terms used in the preparation of this Phase II document. The terms are as included in the Glossary of Railroad Terms in the 2013 National Register of Historic Places Multiple Property Document “Railroads in Minnesota, 1862-1956,” and “Guidelines for Inventory and Evaluation of Railroads in Minnesota,” with minor typo and grammatical corrections made.¹⁹¹ These railroad terms were supplemented with the following terms defined for this Phase II document: trail alignment, original alignment, realignment, segment, single track, ditch and retaining wall.

Alignment: The position of a feature in a horizontal or vertical plane.

At-grade crossing: Intersection of a street or highway with a set of railroad tracks at the same level. Often slangly called a crossing.

Ballast: Material placed on a railroad roadbed to hold the ties in place, and to aid in uniform drainage. May include crushed stone on lines with heavy or higher speed traffic, gravel, cinders during the steam era, and occasionally slag on some lines serving steel mills. Many early railroads, lightly used branch lines and temporary lines, such as logging railroads, often had little or no ballast.

Branch line: A secondary line that branches off of a mainline to serve an area, terminal or an industrial site.

Bridge: A structure that replaces the roadbed for some distance to provide passage over a body of water, chasm, road or other feature that cannot support or interrupts the roadbed. It usually consists of two parts: substructure (abutments and piers) and superstructure.

Car shop: A railroad repair building in large shop complexes where rolling stock is repaired and rebuilt.

Cut: That part of the right-of-way which is excavated to provide a more gentle gradient for ascent or descent of a hill or mountain.

Depot: A building to receive, sort and load any combination of passengers and freight. Also commonly called “stations” since they were at stations on a railroad (see “Station”). Most are located parallel to the tracks, but at some major depots, terminals were located at the end of stub end tracks or over the tracks.

¹⁹¹ National Register of Historic Places, Multiple Property Documentation Form, *Railroads in Minnesota, 1862-1956*; Minnesota State Historic Preservation Office and Minnesota Department of Transportation, *Guidelines for Inventory and Evaluation of Railroads in Minnesota*, March 2019, https://mn.gov/admin/assets/Minnesota%20Railroad%20Inventory%20and%20Evaluation%20Guidelines_tcm36-392445.pdf.

Combination depot: A depot designed to receive both passengers and freight in locations where the amount of freight or the volume of passenger business does not warrant the construction of a separate freight-house or passenger depot. Mostly found in towns and small cities, combination depots had a waiting room, ticket office, and a room for holding baggage, mail, Railway Express Agency freight, and less-than-carload freight.

Flag depot: A small passenger shelter at which a limited number of trains (usually only local trains) stop, usually on the signal of a flag. Historically, a flag depot may have been as simple as an open platform, but may have been a small, simple, open-air or enclosed, gable- or shed-roofed building with a simple platform.

Passenger depot: A depot designed solely for the accommodation of passenger business. Typically found in larger communities, passenger depots provided space for many additional functions, including restrooms; smoking rooms; dining rooms; offices for mail, telegraph, and wire services; newsstands; supply rooms; lounges for conductors and trainmen; and administrative offices.

Union depot (station or terminal): A union depot united all of the railroads serving a city in a single facility, consolidating the various railroads' station facilities within a building or complex. Typically included facilities for passengers and their baggage, Railway Express Agency freight, and mail.

Ditch: Excavated area, often adjacent to a roadbed (see "Roadbed") intended to collect and aid in the drainage of water away from the roadbed.

Double track: Mainline constructed of two tracks, in which one track supports traffic flow in one direction, and the other track supports traffic flow in the opposite direction.

Embankment: A thick wall of earth that is built to carry a railway or road over an area of low ground.

Fill: Earth or rock used to make a level roadbed across a valley or depression.

Grade: The ratio of elevation gained or lost per distance traveled measured in feet, expressed as a percent. The base is 100 feet, so a 1 percent grade represents a 1-foot elevation change in 100 feet of travel.

Grade separation: A railroad crossing where the grade of the railroad bed or bridge is separated from another railroad line, a vehicular roadway, a water course, or a topographic feature.

Junction: A place where two or more railroad lines converge.

Mainline: Rail line used for through trains or as the principal artery of a system, to which branches, yards, and spurs are connected. Mainline tracks are typically constructed for the operation of trains at higher speeds, and these trains are typically given preference in time tables over branch lines. Mainlines are also maintained to a higher standard than yards and branch lines. The LS&M mainline extends from Saint Paul to Duluth and consists of numerous segments.

Rail yard: A system or grouping of tracks connected to, but not part of, a mainline; used for switching, making up trains, and storing cars. Also defined in the MPD as “Yard.”

Railroad corridor: The linear area that encompasses the right-of-way within which a railroad operated and includes all of the buildings, structures and objects that worked together for the dedicated purpose of running trains to transport freight and passenger.

Railroad roadbed: The portion of the railroad right-of-way modified to support the railroad tracks; includes the area between the natural ground and the ballast. Typically an elevated bed with angled sides to raise the railroad tracks, provide for minimal grades, and improve drainage. In some instances, the roadbed may be elevated on an embankment. The roadbed is a part of the railroad roadway (see definition below).

Railroad Roadway: The earthwork within the railroad right-of-way worked to prepare for reception of tracks. The roadway includes the roadbed under the tracks, roadbed shoulders and ditches. It consists of a combination of the following structural components: ground modification (cuts, fills and grades), a railroad bed, ballast, tracks, and ditches. The outer shoulders of the ditch slopes are the edges of the roadway. In low-lying or frequently inundated areas, the roadway may also include an earthen embankment with elevates the roadbed.

Railroad shops: Structures and buildings in which the building and repairing of railroad equipment is performed, such as back shops, car shops, diesel shops, and roundhouses.

Railroad track: A structure consisting of a pair of parallel rails resting on ties, on which a train runs.

Retaining wall: Wall used to retain, hold back or stabilize soil.

Railroad right-of-way (ROW): The area owned by a railroad for the purpose of operating a railroad along a corridor. Includes the track, roadbed, depots, and other features.

Rolling stock: General term for the various types of freight, passenger and MOW cars owned and operated by a railroad.

Roundhouse: A building with a circular form, usually arc-shaped but sometimes a full circle at major facilities, designed to house locomotives during servicing. The roundhouse had multiple stalls and customarily faced a turntable that was used to direct a locomotive to and from the track for the appropriate roundhouse stall. The stall tracks radiate out from the turntable to the roundhouse.

Segment: The extent of a railroad corridor historic district considered for evaluation. The Saint Paul to White Bear Lake Segment of the LS&M mainline is evaluated in this report. The White Bear Lake to Hugo Segment of the LS&M mainline (XX-RRD-NPR005) is included in the report titled *Phase I Architecture/History Survey and Phase II Evaluation for the Rush Line Bus Rapid Transit Project*.

Shoo-fly: A temporary track used to avoid an obstacle that blocks movement on the normal track section.

Single track: A single track that supports traffic flow in each direction.

Station: Location on a railroad line with a specific name designation in a timetable. A station can be any point on a railroad and may or may not have a depot. A station can be as basic as a siding or a junction with another railroad. Many depots are also commonly called “stations” since they are located at a “station” on the railroad.

Tie or Cross-tie: Ties are a component of the track structure that supports the rails. They are laid perpendicular to the rails and are bedded in the upper portion of the ballast. They can be wood, concrete, or occasionally a composite material. They can measure from 6-by-8 inches to 9-by-11 inches in cross section, and 8 to 9 feet in length; however, longer ties are located under switches.

Toe: The base of an embankment where the slope levels off to the naturally occurring ground surface.

Trestle: A structure used to cross a deep river valley or to cross minor streams and gullies; usually a braced framework with 12- to 14-foot spans of wood piles or framed lumber.

**APPENDIX D. *A GEOMORPHOLOGICAL INVESTIGATION
OF PORTIONS OF THE RUSH LINE BRT
PRELIMINARY CORRIDOR BETWEEN BEAM
AVENUE AND MARYLAND AVENUE IN
RAMSEY COUNTY, MINNESOTA***

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A Geomorphological Investigation of Portions of the Rush Line BRT Preliminary
Corridor Between Beam Avenue and Maryland Avenue in Ramsey County,
Minnesota

By
Michael Kolb and Andrew Jalbert

Strata Morph Geoexploration

Report of Investigations No. 301

January 2019

Prepared for
Mississippi Valley Archaeology Center
University of Wisconsin-La Crosse

Introduction

The purpose of the geomorphological investigation is to locate and assess the condition of the initial mid 1860's - 1870 Lake Superior and Mississippi (LS&M) rail grade along the Bruce Vento Trail portion of the proposed Rush Line Bus rapid transit (BRT) corridor. Only portions of the Bruce Vento Trail where historic maps indicate the route of the mid 1860's - 1870 LS&M rail line is parallel to or coeval with (superimposed by) the latter rail line were investigated (Figure 1). Field investigations were conducted in two parts: (1) An initial walk through and assessment on November 4 and 5, 2018; and (2) Core extraction from November 26 - 30, 2018. A total of 22 cores ranging in length from 2.13 m to 7.62 m (7 feet – 25 feet) were extracted.

Geomorphic Setting and Previous Research

Glacial Landscape

The glacial landscape consists of landforms created by stagnating glacial ice and meltwater flows associated with the Grantsburg sub lobe of the Des Moines Lobe, and the Superior Lobe (Hobbs and Goebel 1982). The deposits consist of loamy glacial till, and sandy and gravelly outwash of the New Ulm Formation, and sandy loam glacial till of the Cromwell Formation (Meyer 2007). The New Ulm Formation was deposited around 13,000 ¹⁴C years BP (16,000 cal years BP) (Lusardi 2016). The Cromwell Formation underlies the New Ulm Formation and was deposited somewhat earlier, perhaps 15,000-18,000 ¹⁴C years BP (Johnson and Mooers 1998). The glacial landforms have been the landscape surface up until they were covered during urbanization or Holocene paludal deposits. Archaeological deposits resulting from occupations on the glacial landforms would be located near the landform surface.

The following is taken from a geologic map of the Twin Cities area (Meyer 2007): At Maryland Avenue the proposed corridor crosses a lowland mapped as peat and muck north and east of Johnson Parkway and south of Lake Phalen. These organic deposits occupy the same basin as Lake Phalen. The route proceeds north on outwash skirting some high relief ice contact terrain (Cromwell Formation) just east of the south end of the lake and on across more low relief hummocky outwash (New Ulm Formation) up to a perennial stream and some peat and muck at Beam Avenue.

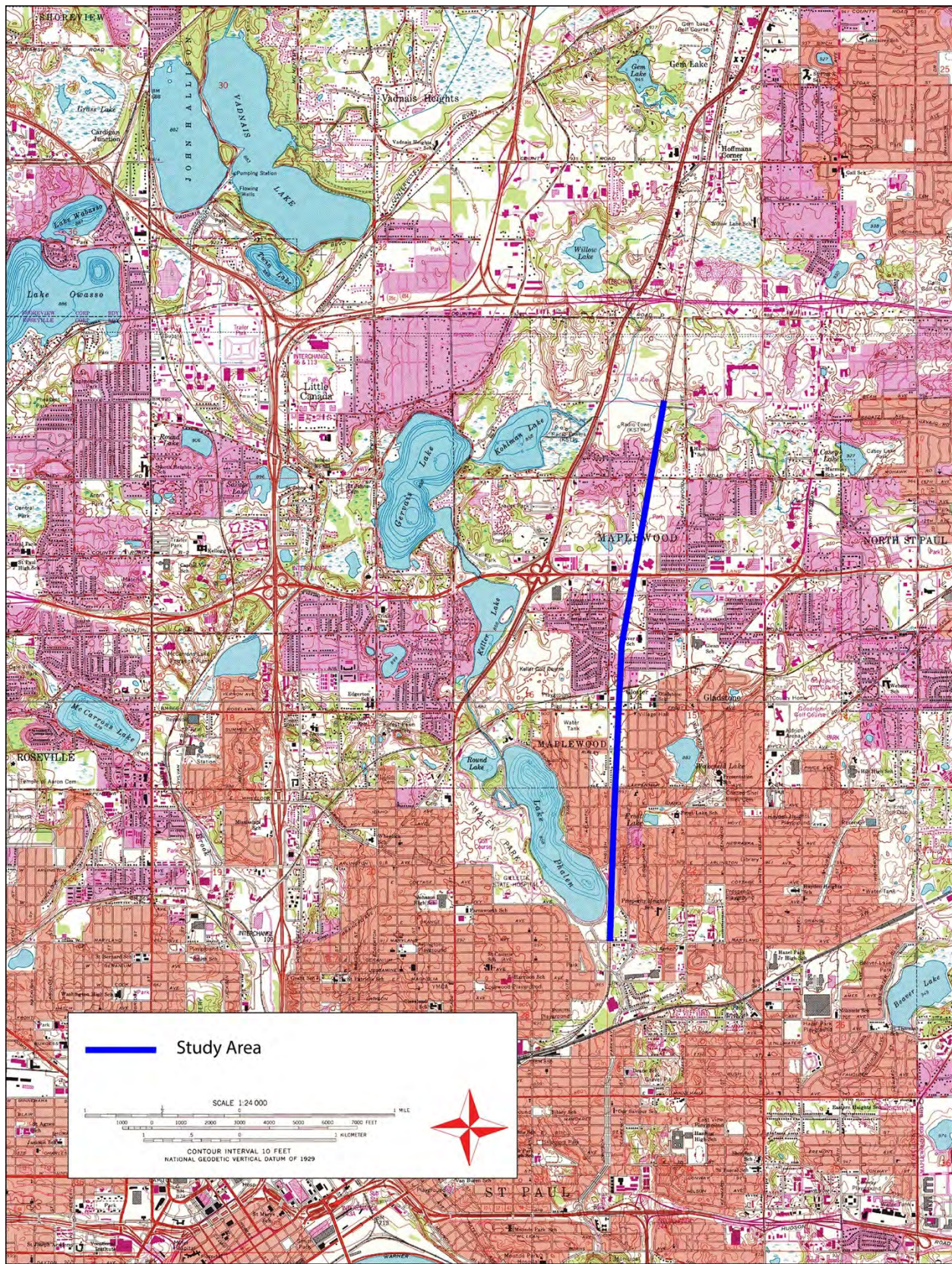


Figure 1. Study area between Beam Avenue and Maryland Avenue illustrated on a USGS 7.5' quadrangle.

Soil and Deposits

Soil surveys were used to characterize the morphology of the soil formed prior to urbanization in the meltwater stream and till deposits associated with glaciation and deglaciation and the post glacial paludal deposits. Two soil surveys have been conducted in Ramsey County. The first one was published in 1916 (Smith and Kirk 1916). The second was conducted post 1970's after the area was more heavily urbanized and is published on Web Soil Survey (USDA n.d.). The early soil surveys used a taxonomic system based on texture so soil series as defined today are difficult to correlate with the early survey data. Four soil series are mapped in the project area on the 1916 soil map: Thurston, Marsh, Merrimac and Miami (Smith and Kirk 1916). The Thurston and Merrimac series are formed in outwash and the Miami Series is formed in outwash or till. Marsh parent material is organic deposits.

Between Maryland Avenue and Interstate 694 the following soils are mapped during the modern surveys: Chetek, Webster, Nessel, Seelyeville, orthents, and urban land (USDA n.d.). The orthent and urban land map units are not relevant because they are the result of urbanization and have no information on pre-urbanization soil morphology. Chetek is well-developed with 7.5YR and 5YR hue Bt horizons formed in sandy loam and sand outwash with gravel in the lower solum. The Webster and Nessel soils are also well-developed soils but formed in clay loam and loam till. Seelyeville series is formed in organic deposits.

Soils indicate the trail/rail corridor was built across a landscape underlain primarily by outwash with smaller areas of till and localized areas of paludal/marsh deposits. These soils are well-developed and easily distinguishable from each other and fill.

A thin stratum of loess is common in soils in the region (Hole 1976; Mason et al. 1994) and locally (Hall and Sardeson 1899). Loess thickness is variable in the range of 0.3 to 1.0 m. It imparts a silt loam texture to the upper solum.

Methods

Cores were extracted along the proposed route where the original LS&M line is mapped adjacent to or on the younger rail corridor/trail. Sections of the route where truck access was not possible (such as the berm south of Maryland Avenue) were omitted. A truck mounted Geoprobe® was used to extract 5 cm (2 inch) diameter cores where truck access was possible.

Core samples were described in the field using standard systems from soils (Schoeneberger et al. 1998; Soil Survey Staff 1975) and geology (Collinson and Thompson 1982; Folk 1974) and returned to the borehole. Coring activities were conducted in coordination with buried utility clearances and as such, are not sequential from north to south.

Results

Construction Events and Stratigraphy

A simple model was developed as a framework for interpreting the anthropogenic stratigraphy. The model uses historically documented construction techniques to build expected stratigraphic sequences (Figure 2) for comparison to actual sequences revealed by coring. Construction techniques or “grading work” used on the construction of the Transcontinental Railroad, during the same time period as the LS&M construction, consisted of cutting and filling using shovels, horse drawn plows or, for bigger jobs, steam shovels to cut and dig borrow from nearby sources (Ambrose 2000). Rail routes were located to minimize the labor/time of construction and therefore costs of grading in a given terrain. A series of events related to railroad construction/grading, maintenance, and post-railroad trail construction created the stratigraphy observed today. These events are: (1) initial construction of the LS&M railroad (mid 1860’s to 1870); (2) post initial construction track repair and improvement with the addition of a second track (mid to late 1880’s); (3) Northern Pacific/Burlington Northern era (1900-1986); and (4) construction of the Bruce Vento Trail (early 1990’s). Railroad construction not only modified the landscape but it also resulted in linear widespread distribution of artifacts in the form of cinder and rock ballast. Other artifacts associated with the railroad are also present but are unlikely to be located in small cores.

Event 1: Construction Techniques of the Initial LS&M Railroad

According to historical research the original LS&M line was built using four construction techniques: (1) laying the ties directly on the soil surface, (2) laying the ties on a thin soil (dirt) ballast obtained from the soil adjacent to the track, (3) cutting down high ground and laying the ties on the cut surface, and (4) filling low ground or adding fill to adjust the grade and laying the ties on the built surface (Figure 2). As covered earlier, the soils formed in till and outwash are relatively well developed and are easily recognizable. Soil formed in organic deposits are also

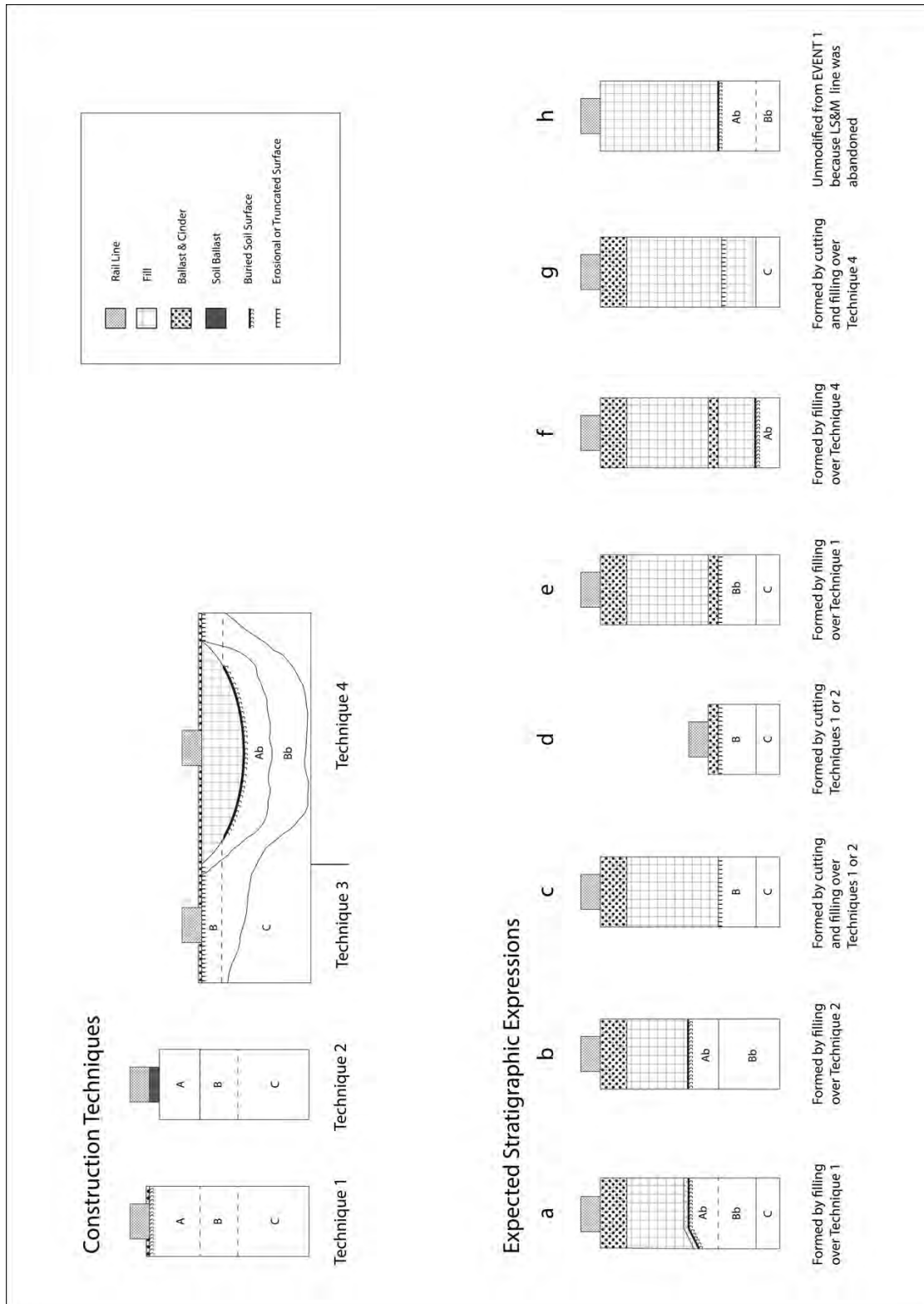


Figure 2. Diagram illustrating the stratigraphy for each of the four possible construction techniques employed during the initial construction of the LS&M rail line and the expected stratigraphic sequences after rebuilding and improving the rail corridor.

easily recognizable. Construction Technique 1 would result in stratigraphy that consists of the ties sitting on the soil's A horizon. Construction Technique 2 would result in minor soil truncation adjacent to the tracks with a thin deposit of soil ballast beneath the ties and likely disturbance of the soil's A horizon. Construction Technique 3 stratigraphy is the result of cutting to create a truncated soil and then placing the ties directly on top of the soil's B or C horizons. Construction Technique 4 stratigraphy is the result of burying the soil surface with fill and placing the ties and rail on the fill. Artifacts associated with the operation of the railroad, primarily cinder and coal, might collect on the soil or cut surfaces if they were exposed during railroad operation. These stratigraphic sequences were created during the initial construction of the LS&M line in the 1860's.

Event 2: Post Construction Improvement with the Addition of a Second Track (mid to late 1880's)

Almost immediately the sequences would have begun to be modified by track repair and improvement, lowering the grade, and taking out curves in the mid to late 1880's. A double track and rock ballast were added in the late 1880's. Although we do not know the exact nature of the engineering activities or their spatial distribution it certainly involved additional cutting and filling. Cutting truncated the original Event 1 stratigraphy and filling without cutting likely preserved the Event 1 stratigraphy. A number of stratigraphic sequences are illustrated in Figure 2. In four of these sequences (a, b, e and f) the LS&M surface is preserved by simple burial. In sequence g the LS&M fill and surface is preserved because the original track route was abandoned and a parallel line was constructed adjacent to the old line.

Event 3: Northern Pacific/Burlington Northern era (1900-1986)

A period of anthropogenic stability with potentially minor changes to the grade during regular maintenance with little deep impact.

Event 4: Construction of the Bruce Vento Trail (early 1990's)

Removal of ballast and perhaps fill below the ballast in places during the early 1990 when the county developed the Bruce Vento Trail. Coring indicated that very little ballast remains. The entire trail was modified during Event 4.

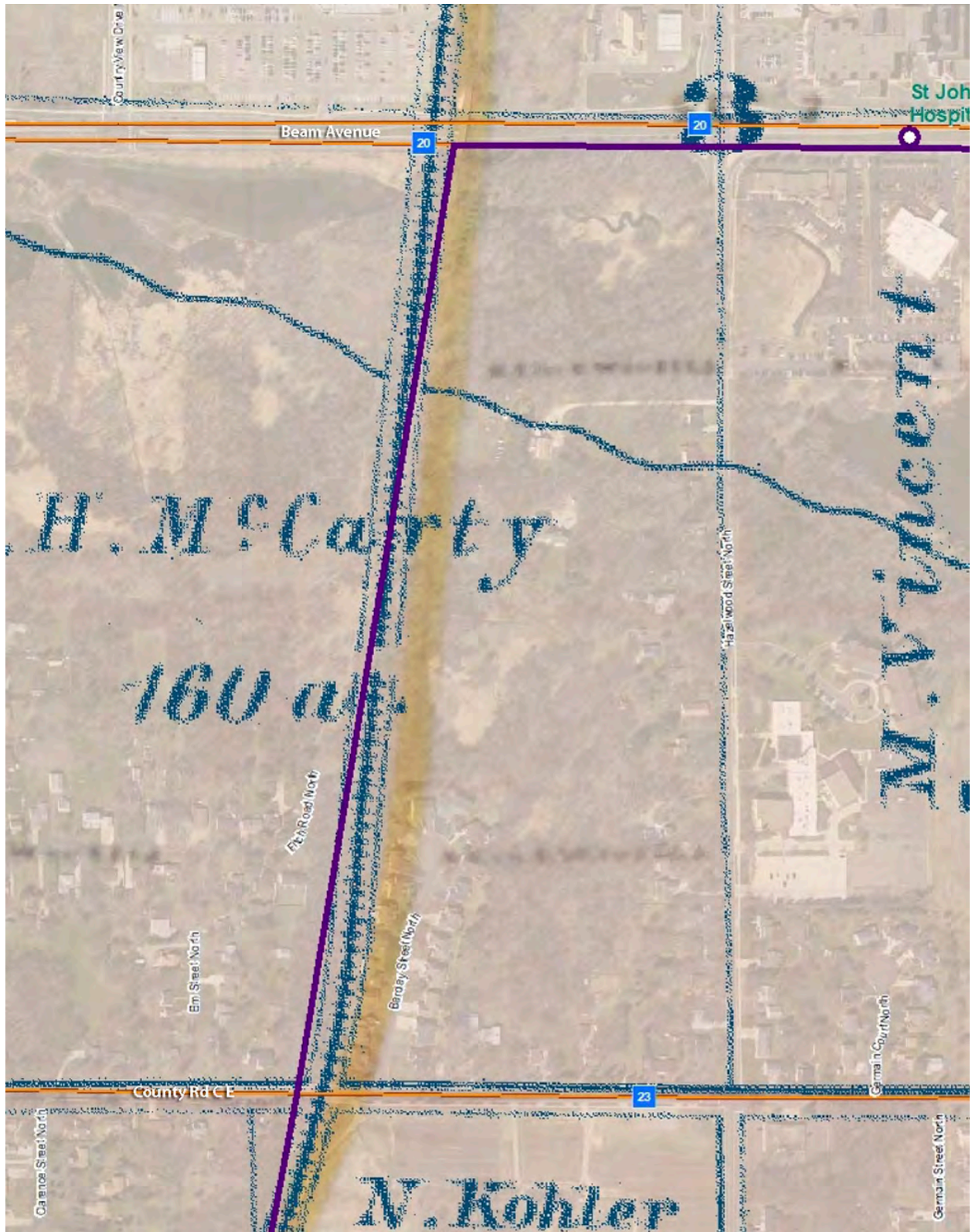


Figure 3.Historic map of Beam Avenue to County Road C E Segment illustrating the original LS&M line in yellow.



Figure 4. LIDAR image of Beam Avenue to County Road C E Segment.

Beam Avenue to County Road C East Segment

The plot of the original LS&M line on historic maps show the track parallel to but east of the later rail lines and the modern trail (Figure 3). A grade is visible on the east side of the trail on the hillshade LIDAR (Figure 4) that is likely the original LS&M line grade. The trail is on fill from Beam Avenue to within 250 m of Highway C. Grade fill is 7.6 m (25 feet) thick where it crosses the lowland just south of Beam Avenue as measures from LIDAR contours. The lowland appears to have been modified by urbanization and borrowing (Figure 4). Field observations also indicate a distinct grade is present parallel and east of the trail from Beam Avenue south for 530 m to where the trail intersects Kohlman Avenue. South of Kohlman Avenue to County Road C the grade is partially destroyed by post LS&M rail/trail construction and housing.

Four cores were extracted along the Beam Avenue to County Road C Segment (Figure 5). Core 4 is on the west side of the trail at the edge of the pavement (Figure 5). Stratigraphy consists of 6.40 m of fill to the base of the core (Table 1, Appendix A). The fill appears to come from both outwash and till sources. Fill at the modern surface consists of gravel and sand mixed with cinder overlain by topsoil. This is fill that remained after the ballast was removed during Event 4. The fill below 0.26 m was emplaced during Event 2 when the route and grade was changed and a second track added.

Core 5 is located on the east side of the trail (Figure 5). Stratigraphy consists of 7.6 m of fill to the base of the core (Table 1, Appendix A). The lower meter could be C horizon formed in sand outwash but it seems unlikely the soil would have been removed in a location where they were filling. The upper 0.35 m at the modern surface consists of silt loam top soil over sand-sized cinder mixed with natural source sand, likely deposited during Event 4. Below 0.35 m fill was emplaced during Event 2 when the route and grade was changed and a second track added.

Core 6 is located north of Core 4 (Figure 5). Stratigraphy consists of 6.7 m of fill to the base of the core (Table 1, Appendix A). The upper 0.31 m consists of topsoil over fine cinder mixed with gravel emplaced during Event 4 over fill emplaced during Event 2.

Core 7 is south of the other cores at the locality where the LIDAR shows the rail grade as thinner (Figure 4). Stratigraphy consists of an upper stratum of topsoil over cinder and gravel to



Figure 5. Geoprobe locations within the Beam Avenue to County Road C E Segment.

Table 1. Data from cores extracted along the Bruce Veneto Trail. ((T) = truncated soil, Core # in bold and italic are in trail corridor away from LS&M line).

Core #	Core Length (cm)	Fill Thickness (cm)	Litho-Stratigraphy Below Fill	Soil Horizon Sequence Below Fill	LS&M Rail Bed
1	213	57	loess/outwash	(T) Bwb1-Bwb2-C1-C2-C3	coeval with trail; modified during Event 2
2	302	74	loess/outwash	Ab-ABb-Btb-Bwb-BCb-C1-Btj-C2	coeval with trail; overthickened Ab horizon may be rail bed surface buried during Event 2
3	213	49	loess/outwash	(T) Bw1-Bw2-Bw3-BC1-BC2	coeval with trail; modified during Event 2
4	670	570	not sampled	NA	east of trail; fill emplaces during Event 2
5	762	762	not sampled	NA	east of trail; fill emplaces during Event 2
6	671	671	not sampled	NA	east of trail; fill emplaces during Event 2
7	487	487	not sampled	NA	east of trail; fill emplaced during Event 2
8	213	92	loess	Ab-ABb-Cg	east of trail; Ab horizon may be rail bed surface buried during Event 2
9	302	160	outwash	(T) C horizons	east of trail; modified during Event 2
10	304	100	outwash	Ab-Bwb1-Bwb2-Bwb3-Bwb4	berm east of trail; LS&M track position
11	213	0	loess/outwash	Ap-A-Bw1-Bw2-Bw3-C	berm east of trail: LS&M track position
12	302	152	outwash	(T) Bwb1-Bwb2-Bwb3-BCb1-BCb2	East of trail
13	213	0	loess/outwash	A-AB-Bw-BC-C	berm east of trail; LS&M track position
14	304	304	not sampled	NA	refusal in fill
15	213	76	loess/outwash	Ab-ABb-Bt-Bw	Slightly east of trail; Ab horizon may be rail bed surface buried during Event 2
16	213	130	loess/outwash	(T) Bwb1-Bwb2	coeval with trail; modified during Event 2
17	213	66	loess/outwash	Ab1-C-Ab2-Bw1-Bw2-BC	coeval with trail; Ab horizon may be rail bed surface buried during Event 2
18	396	220	outwash	(T) BCb-C1-C2-C3	coeval with trail; modified during Event 2
19	302	220	loess/outwash	Ab&C-Eb-Bwb1-Bwb2	west of trail; Ab horizon may be rail bed surface buried during Event 2.
20	396	230	loess/outwash	Ab-Bw-C	west of trail; Ab horizon may be rail bed surface buried during Event 2.
21	396	24	outwash	A-Bw-BE1-BE2-Bw1-Bw2-Bw3-C	coeval with trail; rail grade fill was removed
22	396	396	not sampled	NA	east of trail; borrow pit area

a depth of 0.33 m emplaced during Event 4 over local source fill emplaced during Event 2 to the base of the core at a depth of 4.87 m.

County Road C East to Highway 36 Segment

The LS&M line is plotted immediately adjacent to the east side of the trail on the historic maps (Figure 6). The trail is cut into the landscape with remnants of the original LS&M line grade along the top of the east side of the cut (Figure 7). The southern 380 m of the locality is mapped

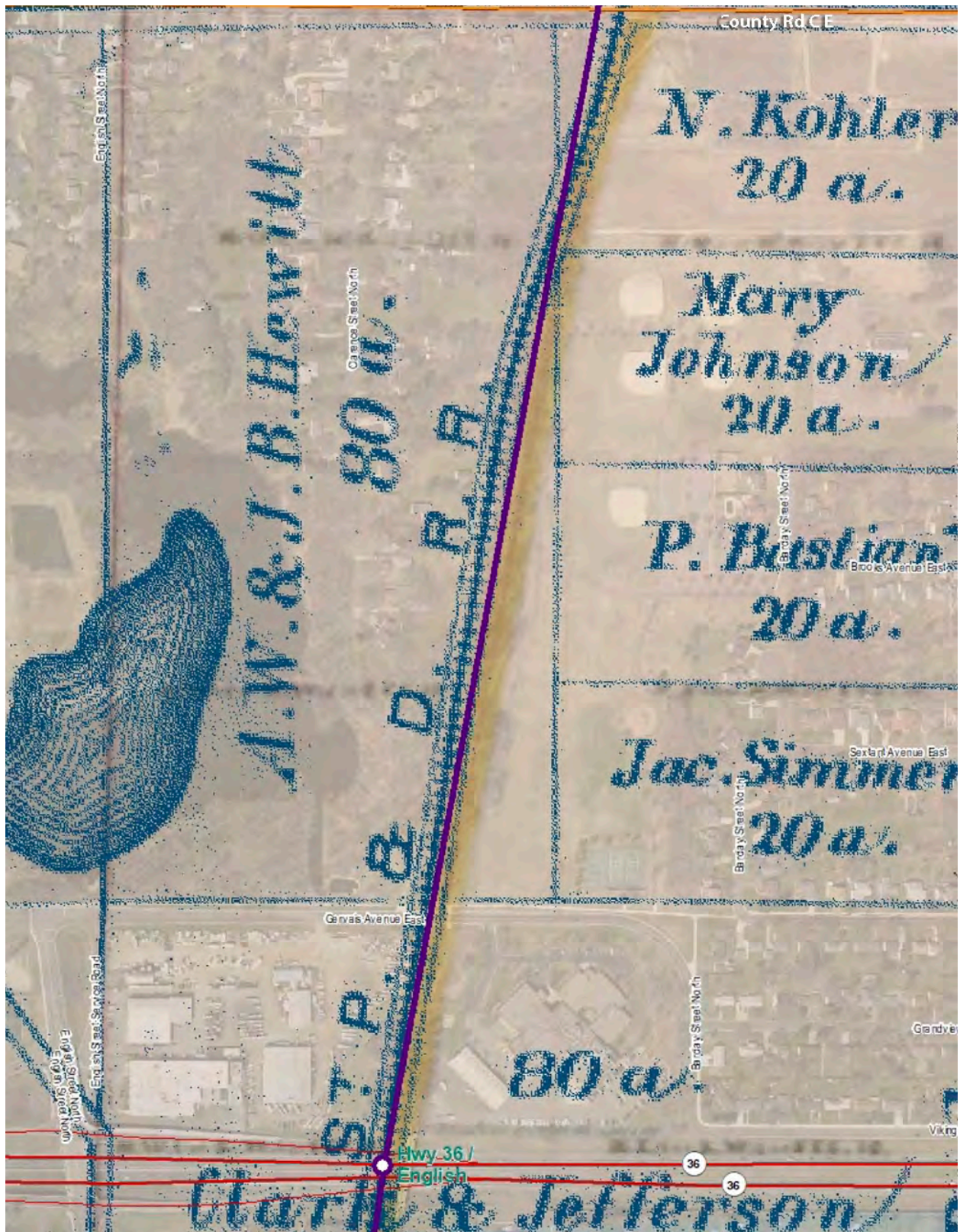


Figure 6. Historic map of County Road C E to Highway 36 Segment illustrating the original LS&M line in yellow.



Figure 7. LIDAR image of County Road C E to Highway 36 Segment.

as a gravel pit on the soil maps (USDA n.d.) and is expressed as a cut out or sculpted area on the LIDAR (Figure 7). On the ground this area is a low basin with a channel modified for storm water detention and control that may have exploited the depression left by the gravel operations. Houses on Barclay Street and a short segment of Gervais Avenue 240 m east of the trail are built around a gravel pit (Figure 7) that is shown on the 1952 1:24,000 scale USGS White Bear West Quadrangle.

Core 8 is located 65 m south of County Road C (Figure 8). Stratigraphy consists of fill to a depth of 0.92 m over a buried soil with an Ab-ABb-Cg horizon sequence formed in silty clay loam lacustrine or reworked loess deposits to a depth of 2.13 m (Appendix A). The lower 20 cm of fill contains relatively large pebbles that is likely ballast that may or may not be in primary contexts. The fill was emplaced sometime during Events 2 or 4 over a buried soil that marks the LS&M surface. The presence of stratigraphic sequence (a) indicates the LS&M line was constructed using technique 1.

Core 9 is 175 m south of Core 8 on the west side of the trail (Figure 8). Stratigraphy consists of fill to a depth of 1.6 m over a truncated soil with series of C horizons formed in bedded and laminated outwash sand (Table 1, Appendix A). The upper fill stratum consists of topsoil over dark colored gravelly silt loam to a gravel lag at a depth of 0.43 m emplaced during Event 4. Fill below 0.43 m was emplaced over a truncated soil during Event 2 after the corridor was cut. The LS&M line is east of this core's location.

Cores 10-13 are clustered in an area where a berm, thought to be the original LS&M grade, is accessible by truck (Figure 8). A swale is present east of the berm (the side opposite the Bruce Vento trail). The slope descending to the trail is west of the berm. Cores 10, 11, and 13 were taken from the berm east of the trail (Figure 8). Core 12 is in the trail/rail cut just west of Core 10.

Core 10 stratigraphy consists of fill to a depth of 1.05 m over a buried soil with an Ab-Bwb1-Bwb2-Bwb3-Bwb4 soil horizon sequence formed in sand and sandy loam with gravel outwash to a depth of 3.02 m (Table 1, Appendix A). The Ab horizon contains cinder indicating it



may be the LS&M rail bed. If so, the rail line was modified by filling during the early stages of Event 2 prior to completion of the second track. The fill over the buried soil may also have been emplaced after the track was moved west, perhaps during construction of the park path or rail corridor maintenance. The presence of stratigraphic sequence (a) indicates the LS&M line was constructed using technique 1.

Core 11 is located on the berm south of Core 10 and east of the trail (Figure 8). Stratigraphy in Core 11 consists of a soil with an Ap-A-Bw1-Bw2-Bt-C1 horizon sequence formed in sandy and gravelly outwash deposits (Table 1, Appendix A). No fill is present but the A horizon is overthickened possibly from the addition of a small amount of soil ballast from an adjacent A horizon source. The berm morphology is the result of small addition of A horizon soil at the surface and the presence of swales on both sides of the berm. The LS&M line is at the modern landscape surface of the berm.

Core 12 is in the existing rail cut just west of Core 10 (Figure 8). Stratigraphy consists of sandy and silty fill to a depth of 1.52 m over a slightly truncated soil with a Bwb1-Bwb2-Bwb3-BCb1-BCb2 horizon sequence formed in sandy outwash to a depth of 3.02 m (Table 1, Appendix A). The upper 0.36 m contains small amounts of gravel and cinder modified or emplaced during Event 4. The remainder of the fill was emplaced after the original soil, likely formed in a topographic low, was slightly truncated during initial cutting of the corridor and then filled to bring the surface up to the new grade. This occurred during Event 2. The LS&M line is east of this core location.

Core 13 is south of Core 11 on the berm at the top of the slope along the east side of the rail/trail cut (Figure 8). Stratigraphy consists of a soil with an A-AB-Bw-BC-C horizon sequence formed in silt loam over sandy loam, sand, and gravelly sand outwash to a depth of 2.13 m (Appendix A). No fill is present and the A horizon is only slightly overthickened. At Core 13 the soil has not been modified or buried but the LS&M tracks could have laid on the soil surface.

Core 14 is south of Gervais Avenue east of the trail on a remnant of the rail grade berm (Figure 8). Gervais Avenue did not cross the trail/rail until sometime between 1977 and 1991. On the 1977 1:24,000 scale topographic map it does not cross the tracks and on the 1991 topographic map it does cross the tracks. I assume the crossing construction involved removing

the rail grade and cutting the trail down to meet the road grade as it does today. The core met refusal at 3.02 m of fill and work there was terminated.

Highway 36 to the Gateway Trail Segment

On the historic maps the LS&M line is plotted on or slightly to the east of the existing trail (Figure 9). The segment is slightly raised from Highway 36 up to about 200 m north of the Gateway Trail except where it crosses borrow pits where it is significantly raised relative to the adjacent landscape (Figure 10). The last 200 m is cut into the landscape. Three cores were extracted along this segment (Figure 11).

Core 15 is located east of the trail on a section of mowed grass. Stratigraphy consists of fill to a depth of 0.74 m over a buried soil with an Ab-ABb-Btb-Bwb horizon sequence formed sandy outwash with a thin silty cap to a depth of 2.13 m (Table 1, Appendix A). Most of the fill stratum contain small amounts of gravel. Cinder is present between depths of 0.46 and 0.72. The fill may have been emplaced during Events 1 and 2 or both and then modified during Event 4. The LS&M tracks may have been located on the fill stratum top at 0.46 m or on the buried soil. Additional fill was added during Event 2 and perhaps truncated during removal of the ballast during Event 4. The presence of stratigraphic sequence (a) indicates the LS&M line was constructed using technique 1 or 2.

Core 22 is located east of the trail and south of County Road B East where the trail/rail is raised above borrow pits. At this point the LS&M line is east of the trail on the historic maps and may be much lower on the landscape than the trail (Figures 9 and 10). Stratigraphy consists of fill to the base of the core at a depth of 3.96 m. Below 3.13 m the fill consists of thin strata of upper solum source soil. This fill was likely emplaced during Event 2 when the rail was moved to the west and rail bed was raised to fit the grade line.

Core 16 stratigraphy consists of fill to a depth of 1.30 m over a truncated soil with a Bwb1-Bwb2 horizon sequence formed in sandy outwash to the base of the core at 2.13 m (Table 1, Appendix A). The upper 0.14 m of the fill contains pebbles that are likely remnants of ballast left from Event 4 ballast removal. Below 0.14 the fill was emplaced on a slightly truncated soil during Event 2. The LS&M line landscape surface is not present and the track itself was likely east of this core location.

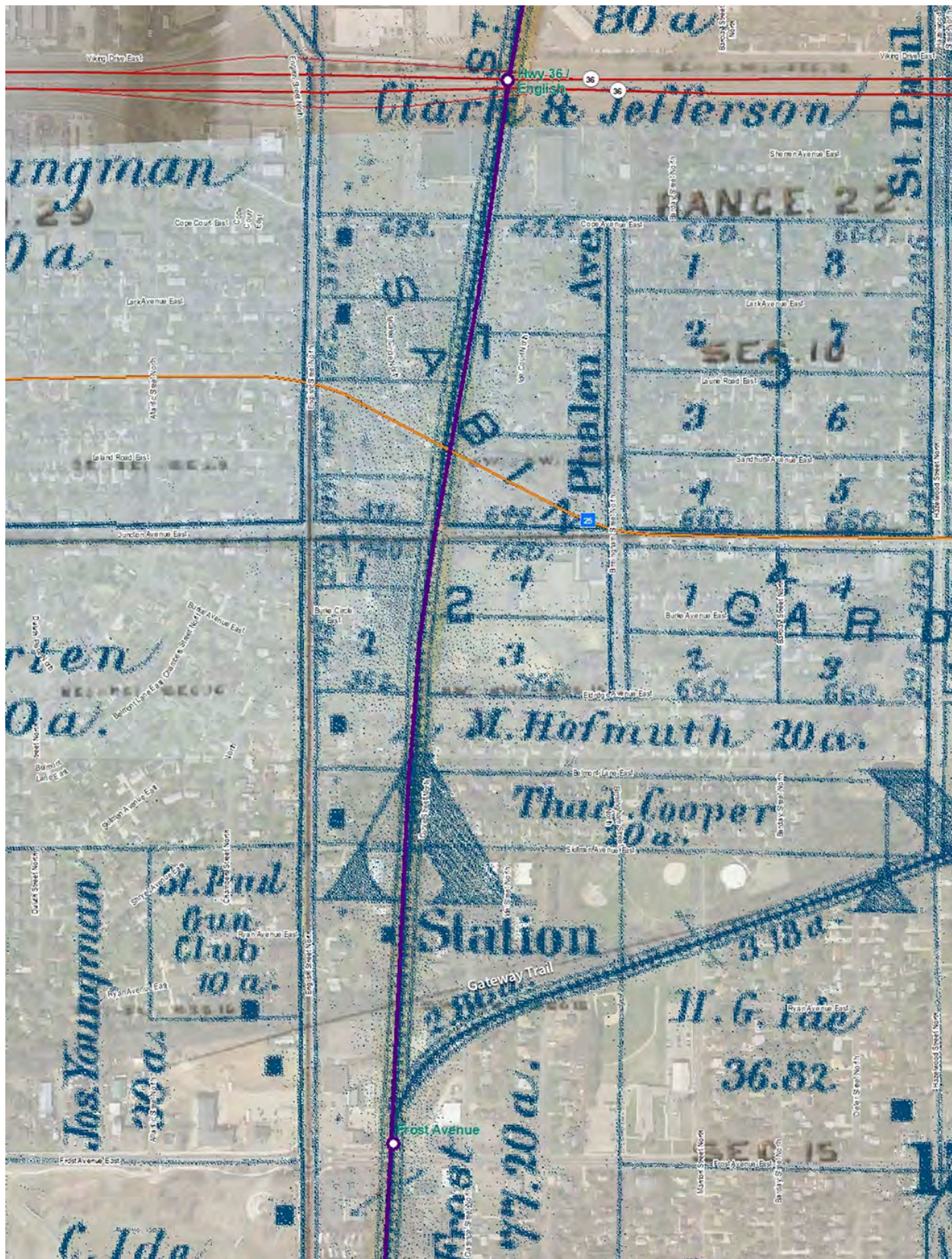


Figure 9. Historic map of Highway 36 to Gateway Trail Segment illustrating the original LS&M line in yellow.



Figure 10. LIDAR image of Highway 36 to Gateway Trail Segment.

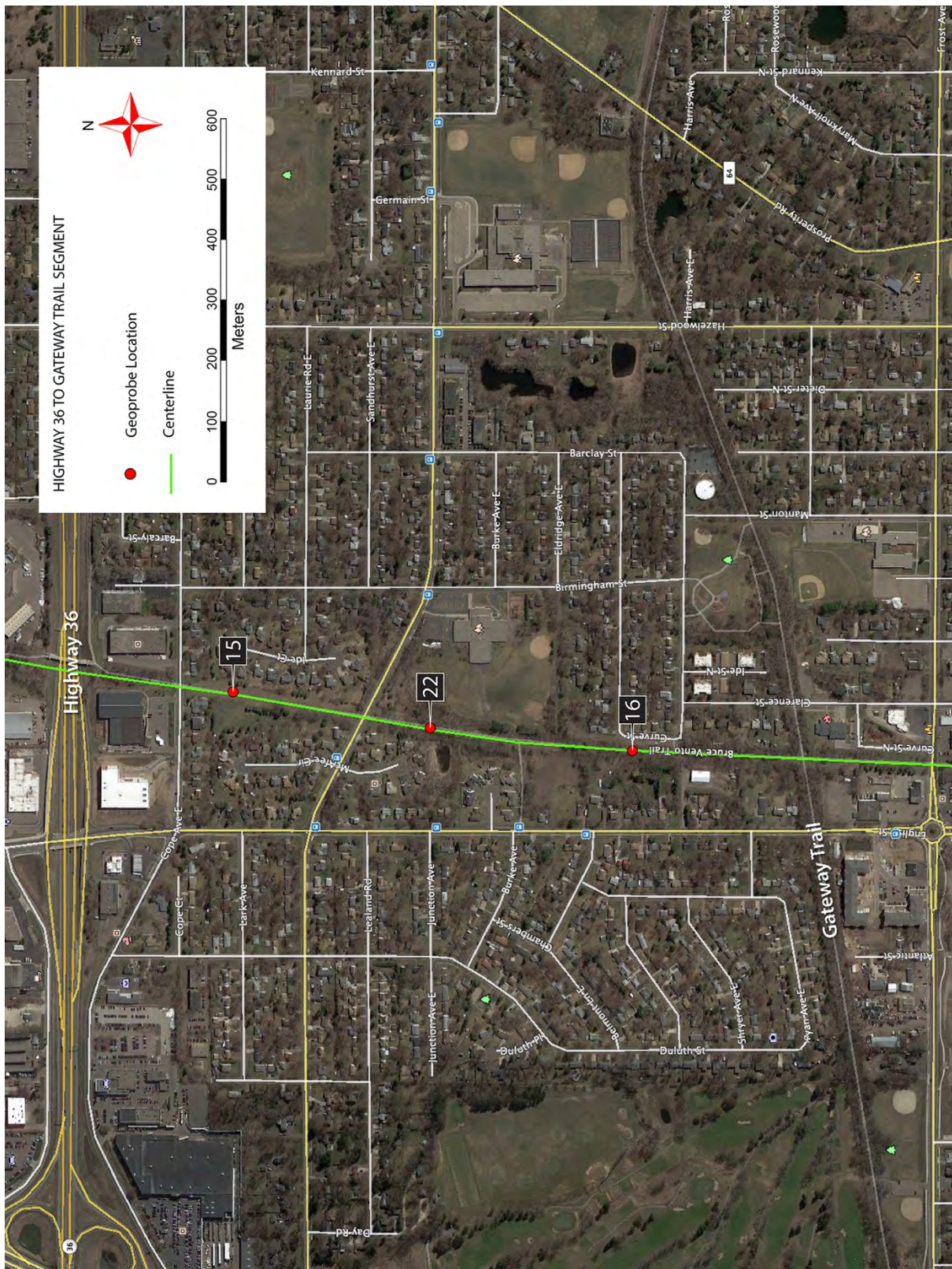


Figure 11. Geoprobe locations within the Highway 36 to Gateway Trail Segment.

Gateway Trail to Frost Avenue Segment

The Gateway Trail to Frost Avenue Segment is slightly raised above the surrounding urban landscape (Figure 12). On the historic maps the LS&M line is coeval with the existing rail/trail (Figure 13). The Gladstone Rail station is located along this segment. Three cores were extracted along the east side of the existing trail (Figure 14). Core 1 is farthest south. Stratigraphy consists of fill to a depth of 0.57 m over a soil with a Bwb1 horizon formed in loess over a Bwb2-BCb-C horizon sequence formed in outwash sand (Table 1, Appendix A). Fill consists of gravelly silt loam topsoil over a layer of cinder to a depth of 0.46 m, over interlayered silty clay loam and cinder. The upper solum is missing from the underlying soil resulting in a truncated soil profile. The fill between 0.35 and 0.57 m consists of cinder over interlayered cinder and silty clay loam that may be a rail or road bed. The presence of the interlayered natural soil and cinder indicates the fill was emplaced after cinder was present in the area after the initial LS&M build during Event 2 resulting in stratigraphic sequence d.

Core 2 is north of Core 1 (Figure 14). Stratigraphy consists of fill to a depth of 0.74 m over a buried soil with an Ab-ABb-Btb-Bwb-BCb formed in loess to a depth of 2.10 m, over a C horizon formed in gravelly sand, over a beta B horizon formed in bedded fine sand and medium-coarse sand, over sand to the base of the core at 3.02 m (Table 1, Appendix A). Fill consists of a thin layer of topsoil over cinder and slag that overlies a well-preserved Ab horizon. The Ab horizon is overthickened (54 cm thick) likely the result of anthropogenic activity. This buried soil is completely intact and may have been the LS&M rail bed or marks the landscape surface on which the LS&M line was constructed (stratigraphic sequence a).

Core 3 is just south of the Gateway Trail (Figure 14). Stratigraphy consists of fill to a depth of 0.49 m over a truncated buried soil with a Bwb1 horizon formed in loess to a depth of 0.70 m, over Bwb2-Bwb3-BCb1-BCb2 soil horizon sequence formed in outwash to a depth of 2.13 m (Table 1, Appendix A). The fill consists of dark colored soil and gravel with minor amounts of soil from subsoil sources emplaced after the soil was truncated likely during Events 1 or 2 (stratigraphic sequence b).



Figure 12. LIDAR image of Gateway Trail to Frost Avenue Segment.

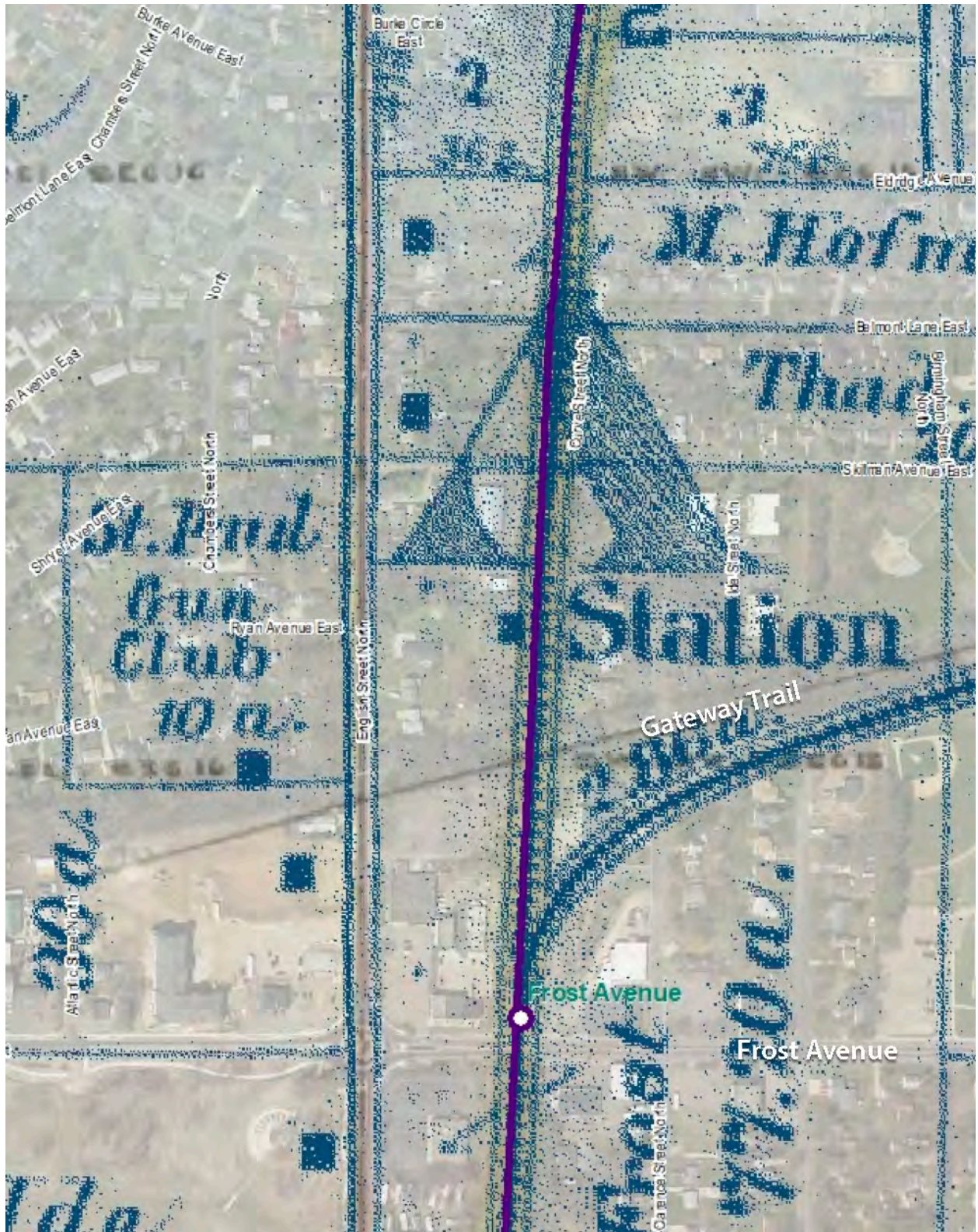


Figure 13. Historic map of Gateway Trail to Frost Avenue Segment illustrating the original LS&M line in yellow.

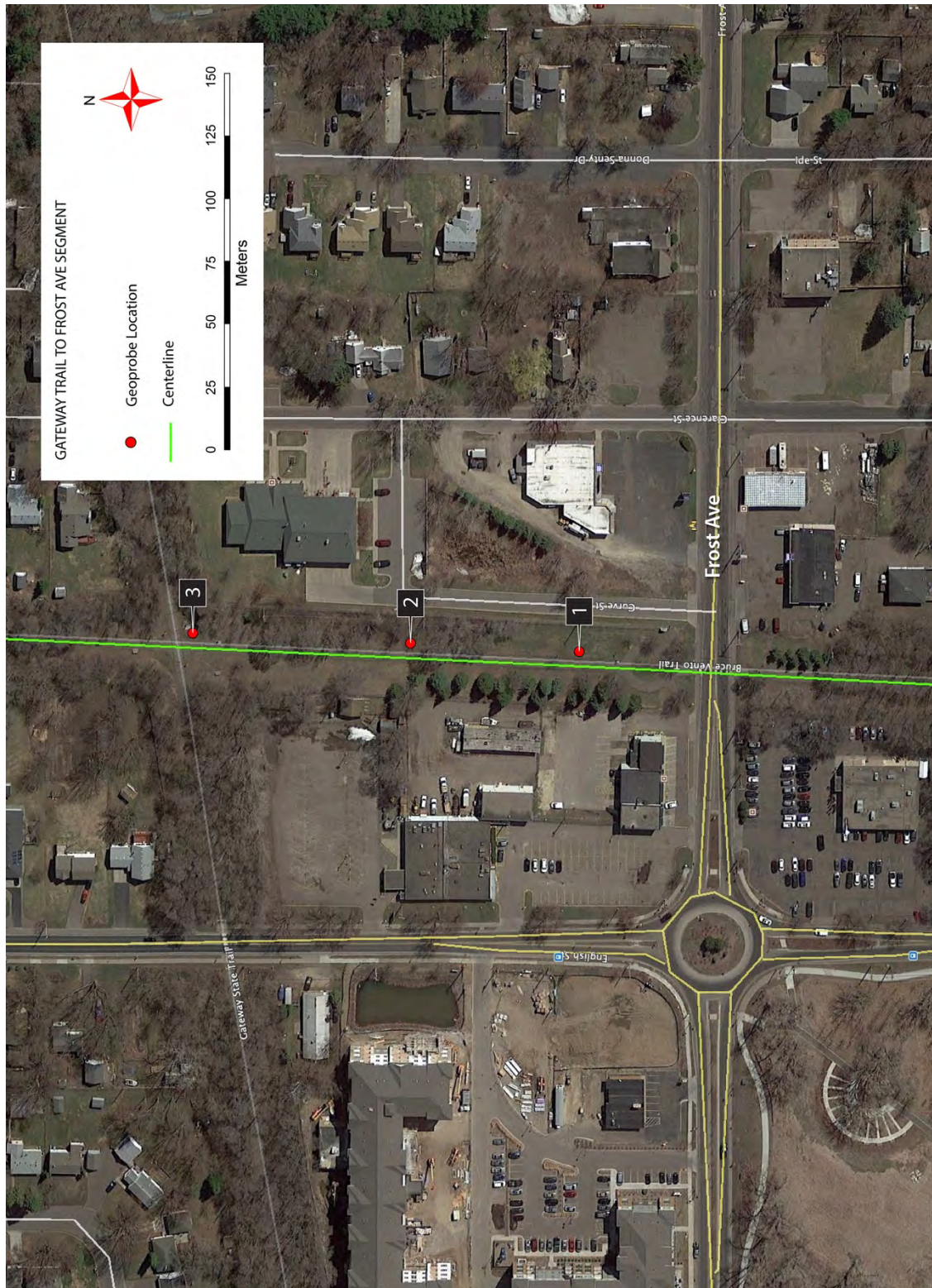


Figure 14. Geoprobe locations within the Gateway Trail to Frost Avenue Segment.

According to historic maps the LS&M tracks are in the same location as the later tracks and the trail (Figure 13). The LS&M track would likely have been on the soil surface that is today covered with fill. The truncation of the soil surface in two of the cores may have occurred during (1) the original build if soil (dirt) ballast was used during Event 1 when the original LS&M line was installed, (2) Event 2 when the original track was replaced and a second track added, or (3) construction and maintenance of the depot if the cores are slightly east of the actual track location. Ballast that was present during Event 4 was removed in the early 1990's when the county developed the trail.

Frost Avenue to Nebraska Avenue Segment

Historic maps show the trail and the original LS&M line coeval between Frost Avenue and Larpenteur Avenue where Cores 17 and 18 are located (Figure 15). Between Larpenteur Avenue and Nebraska Avenue where Cores 19 and 20 are located, the LS&M line is mapped west of the existing trail. The trail is slightly raised where parallel borrows are not present (Figure 16). The LS&M line berm or cut is not visible on the LIDAR image where it is mapped west of the existing trail.

Core 17 is located on the east side of the trail (Figure 17). The trail is slightly raised relative to the west side of the trail with a low ditch on the east side of the trail. Stratigraphy consists of fill to a depth of 0.66 m over a buried soil with an Ab1-C-Ab2-Bwb1-Bw2b-BCb horizon sequence formed in loess over outwash to the base of the core at 2.13 m. Fill is from an upper solum source and could have been emplaced during either Event 1 or 2. The Ab horizon complex may be the LS&M rail bed and certainly marks the LS&M landscape surface. The presence of stratigraphic sequence (a) indicates the rail was built using techniques 1 or 2.

Core 18 is located on the west side of the trail (Figure 17). The corridor at this location is bounded by a wide berm along Hagen Drive North on the east then, moving west, there is a swale between the berm and the slightly raised paved trail with a slope down to a narrow linear borrow on the west side (Figure 16). Stratigraphy consists of fill to a depth of 2.20 m over a truncated soil with an BCb-C1-C2-C3 soil horizon sequence formed in outwash to the base of the core at 3.96 m (Table 1, Appendix A). The upper 0.47 m of fill consists of topsoil over loamy fill with occasional gravel and cinder likely the result of reworking during Event 4 ballast removal. Below

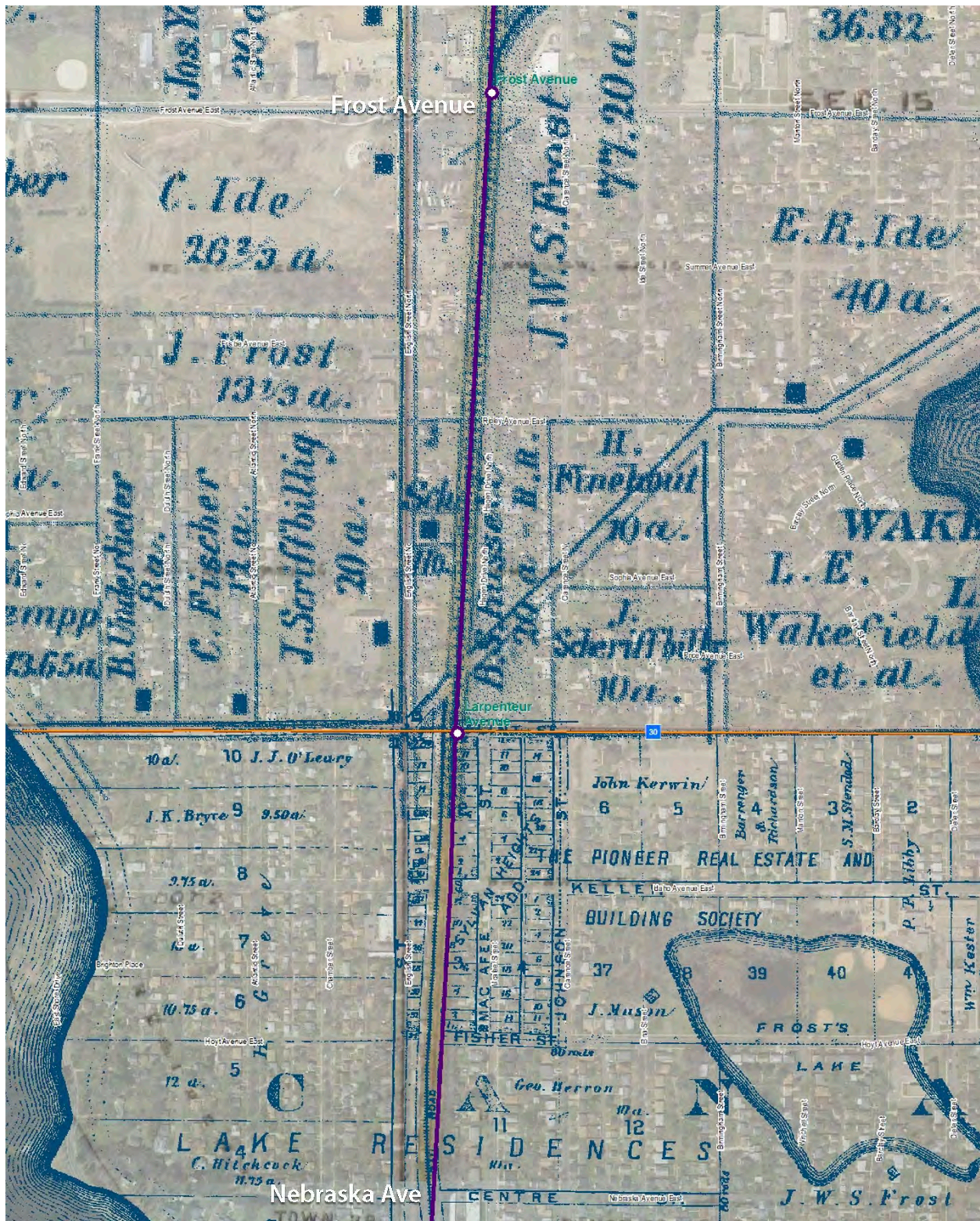


Figure 15. Historic map of Frost Avenue to Nebraska Avenue Segment illustrating the original LS&M line in yellow.



Figure 16. LIDAR image of Frost Avenue to Nebraska Avenue Segment.



0.47 m fill consists of loamy and silty natural source fill with a few sandy loam beds above a lag marking the contact between the fill and the underlying outwash. The presence of stratigraphic sequence (b) indicates the LS&M line was constructed using techniques 1 or 2 and the LS&M surface was truncated during Event 2.

At Core 19 the trail is raised with a low borrow on the west side and a ditch/swale on the east side (Figures 16 and 17). Stratigraphy consists of fill to a depth of 2.24 m over a buried soil with a stratified Ab/C over an Eb-Bwb1-Bwb2 soil horizon sequence formed in loess over outwash to a depth of 3.02 m (Table 1, Appendix A). Fill is silty and loamy natural source soils likely emplaced during Event 2. The upper buried soil is stratified as a result of anthropogenic activity and may be the LS&M rail bed. The buried soil is minimally disturbed or truncated. The presence of stratigraphic sequence (a) indicates techniques 1 or 2 were employed likely during Event 1 construction.

Core 20 is south of Core 19 on a slightly raised segment of the trail (Figures 16 and 17). Stratigraphy is similar to Core 19 and consists of fill to a depth of 2.30 m over a buried soil with an Ab-Bw horizon sequence formed in loess over gravelly sand outwash. Gravel in the fill and underlying soil plugged up the sampler below 2.13 m resulting in low recovery. The samples of the buried soil that were recovered are similar to those recovered in Core 19. The buried soil may be where the original LS&M tracks were located.

Nebraska Avenue to Maryland Avenue Segment

The historic maps show the original LS&M line angling east away from the trail at Nebraska Avenue, roughly paralleling the southeast corner of Lake Phalen until it returns to the trail location near Maryland Avenue (Figure 18). The segment is raised until just north of Maryland Avenue where it is at the same grade as Maryland Avenue (Figure 19). This occurred after the rail line was abandoned and the bridge over Maryland Avenue was removed. Borrow pits are located on both sides of the abandoned rail line along this segment (Figure 19).

Core 21 is located at grade with Maryland Avenue (Figure 20). Stratigraphy consists of mixed soil, debris and fill to a depth of 0.29 m over a truncated soil with a Bw1-BE1-BE2-Bw2-Bw3-C horizon sequence formed in outwash to the base of the core at 3.96 m (Table 1, Appendix A). The location of Core 21 was likely covered with a rail grade berm prior to removal of the

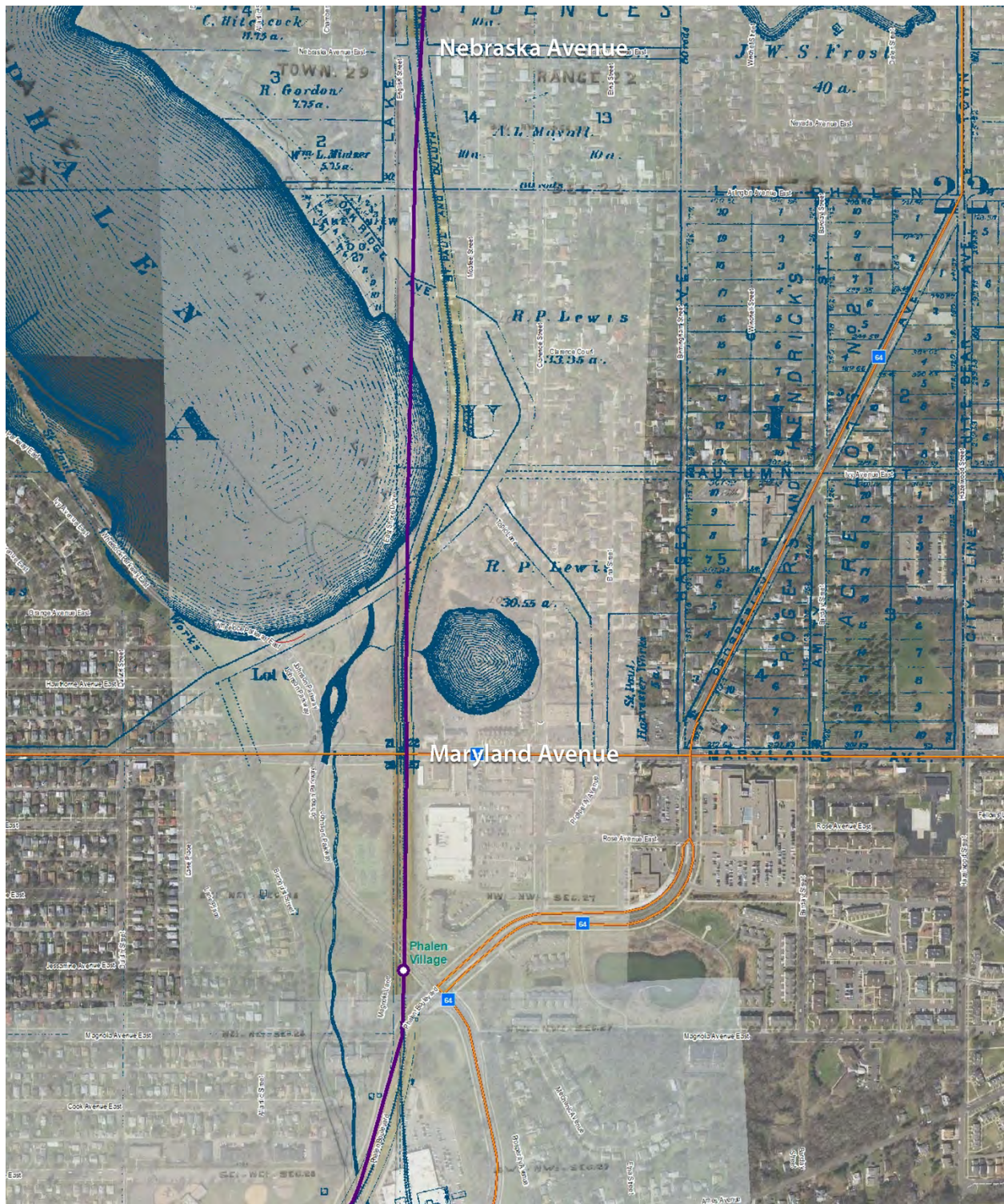


Figure 18. Historic map of Nebraska Avenue to Maryland Avenue Segment illustrating the original LS&M line in yellow.



Figure 19. LIDAR image of Nebraska Avenue to Maryland Avenue Segment.



Figure 20. Geoprobe locations within the Nebraska Avenue to Maryland Avenue Segment.

Maryland Avenue rail bridge. Neither the landscape surface or fill associated with the LS&M line or subsequent grade berms remains at this location.

Discussion

The focus of this investigation is locating and assessing the condition of the 1870 LS&M rail bed and/or grade. Historic mapping and field observations indicate the location of the LS&M route was either along the same route as subsequent rail lines or is located adjacent and parallel to subsequent rail lines. If the LS&M route is coeval with the existing rail/trail route then the grade berm or bed surface may be (1) buried and preserved below post LS&M rail grade fill or (2) destroyed if the original landscape (soil) was cut prior to filling. Where the LS&M line is parallel and adjacent to the existing rail/trail it can be totally or partially preserved at the modern landscape surface.

Along the Beam Avenue to County Road C East Segment a berm, interpreted to be the LS&M grade, is present east of the Bruce Vento Trail. The LS&M track was on top of this berm and is not present within the fill sequence beneath the trail to the west. Cores taken from the trail surface did not penetrate the 7-8 m thick fill.

Along the County Road C East to Highway 36 Segment a low partially modified berm is present at the east edge of the trail corridor and above the elevation of the trail. The LS&M line was built rapidly with minimal energy expended in modifying the route corridor. With this in mind the berm is interpreted as the LS&M track location because (1) it is a low berm when viewed from the relatively undisturbed landscape east of the rail corridor, (2) its apparent morphology is enhanced by the presence of swales/ditches on both side of the berm, (3) its surface is only minimally modified by minor filling (soil ballast), (4) cinder is present on the soil surface in one of the three cores taken from the berm, and (5) the soil that marks the pre-LS&M landscape is intact. Essentially the LS&M track was laid on the existing relatively flat level landscape surface. The LS&M landscape surface is also preserved away from the berm in Core 8 which is at the eastern edge of the trail corridor. In the cores on the berm the soil formed in the glacial deposits is intact. It is buried in Core 10 and the upper solum is overthickened in Cores 11 and 13. Cinder is present on the buried soil in Core 10. The burial and overthickening is interpreted to be the result of construction and modification to the original LS&M line. Alternatively, and less likely,

the modification to the soil may be the result of other non-railroad activity. It seems less likely because where the berm is located would have been railroad property up until it was purchased by the county. Ultimately the LS&M grade was simply abandoned during Event 2 when the existing rail corridor was cut and moved a few meters to the west.

Along the Highway 36 to the Gateway Trail Segment the LS&M line is plotted on or slightly east of the trail. The LS&M landscape surface is present beneath 0.74 m of fill near the northern end of the segment in Core 15. Core 22 is located between two borrow pits where the LS&M line is mapped east of the trail and appears on the ground to be lower than the trail. Stratigraphy consists of at least 3.96 m of fill. Core 16 stratigraphy consists of fill emplaced during Events 2 and 4 over a truncated soil. At the locations of Cores 22 and 16 the LS&M landscape surface is absent beneath the trail. The LS&M line was likely located west of the existing trail.

Along the Gateway Trail to Frost Avenue Segment the LS&M line and the trail are coeval. This is also the location of the Gladstone Depot and hence a hub of anthropogenic activity that may have contributed to the observed stratigraphy. The LS&M landscape surface is intact in one of the three cores (Core 2). In the two other cores the soil is truncated into the upper B horizon. The LS&M landscape is present marked by an intact or slightly truncated buried soil. The LS&M track bed could also be preserved just to the west of the cores.

Along the Frost Avenue to Nebraska Avenue Segment historic maps show the trail and the original LS&M line coeval between Frost Avenue and Larpenteur Avenue and to the west of the trail between Larpenteur Avenue and Nebraska Avenue. The trail is slightly raised where parallel borrows are not present. No berm or cut is visible on the LIDAR image where the LS&M line is mapped west of the existing trail. The LS&M bed and/or landscape surface is present beneath fill in three of the cores extracted along this segment. In one core (#18) the buried soil is truncated into the lower solum.

One core was extracted in the Maryland Avenue North segment where a berm or bridge abutment was located prior to removal of the rail bridge. The LS&M line and the post LS&M rail grade are coeval on the historic maps. Borrows are present on both sides of the segment. Stratigraphy indicates the LS&M landscape surface where the rail bed may have been located is

missing. If the LS&M line was built on fill it was destroyed during Event 2 when the high grade, still present north of the segment, was constructed.

Subsurface investigation and surface field observations indicate the historic maps comparing the position of the LS&M rail line to the later rail lines is an accurate guide to where the LS&M line is parallel and where it may be preserved in the subsurface. Where the original LS&M line is parallel to the later rail lines on the historic maps and/or visible in the field as a berm we found no evidence of the LS&M line in the subsurface beneath the later railroad grade fill along the existing trail.

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APPENDIX A

Core Logs

Core 1

Depth (cm)	Horizon	Description
0-35	F1	<i>Fill</i> Top soil over gravelly silt loam over sandy loam.
35-46	F2	Cinder.
46-57	F3	Layered silty clay loam and cinder fill; very abrupt boundary.
57-69	Bwb1	<i>Loess</i> Dark yellowish brown (10YR 4/4) SILTY CLAY LOAM; poorly sorted; sand % increases with depth; very abrupt boundary.
69-72	Bwb2	<i>Outwash</i> Grayish brown (7.5YR 4/5) LOAM with fine gravel; abrupt gradational boundary.
72-110	BCb	Brown (7.5YR 4/4) medium and coarse SAND with gravel.
110-142	C1	Yellowish brown and dark yellowish brown (10YR 5/4 – 4/4) light SANDY LOAM; abrupt gradational boundary.
142-154	C2	Yellowish brown (10YR 5/4) LOAMY SAND; clear boundary.
154-213	C3	Brown – yellowish brown (10YR 5/4 – 5/3) medium and coarse SAND.

Core 2

Depth (cm)	Horizon	Description
0-8	F1	<i>Fill</i> Top Soil.
8-74	F2	Cinder/slag; very abrupt boundary.
74-132	Ab	<i>Loess</i> Very dark grayish brown (10YR 3/2) SILT LOAM; 1 piece of sand stone; bio-mixing mottling increases in expression with depth; anthro-enhanced; very abrupt boundary.
132-142	ABb	Dark grayish brown (10YR 4/2) SILT LOAM with few pieces of gravel; abrupt boundary.
142-165	Btb	Yellowish brown (10YR 5/6) heavy SILT LOAM; strong coarse parting to medium angular blocky structure with dark grayish brown argillans; abrupt boundary.
165-173	Bwb	Yellowish brown – brownish yellow (10YR 5/6 – 6/6) SILT LOAM; strong coarse parting to medium angular blocky structure; thin patchy argillans; clear boundary.
173-213	BCb	Yellowish brown (10YR 6/6) SILT LOAM; weak pedo-structure.
213-244	C1	<i>Outwash</i> Yellowish brown (10YR 5/4) gravelly medium and coarse SAND.
244-254		Layered brown (10YR 4/4) fine SAND and 7.5YR 4/4 medium and coarse SAND and 7.5YR 4/2 medium and coarse SAND.
254-302	C2	Yellowish brown (10YR 5/4) gravelly medium and coarse SAND.

Core 3

Depth (cm)	Horizon	Description
0-49	F1	<i>Fill</i> Topsoil; mixed, graded, dark color; soil with some subsoil; very abrupt boundary.
49-70	F2	Brown – dark yellowish brown (10YR 4/3 – 4/4) heavy SILT LOAM; weak gravel lag at base; very abrupt boundary.
70-110	Bwb1	<i>Outwash</i> Dark yellowish brown (10YR 4/4) SANDY LOAM with common gravel.
110-128	Bwb2	Yellowish red (5YR 4/6) medium and coarse SAND with $\pm 1\%$ fine gravel; clear boundary.
128-180	BCb1	Brown (10YR 5/3) medium – coarse SAND; $\pm 5\%$ fine gravel and granules; abrupt boundary.
180-213	BCb2	Reddish brown (5YR 4/4) gravelly coarse SAND; Superior Lobe source.

Core 4

Depth (cm)	Horizon	Description
0-26	F1	<i>Fill</i> Topsoil over cinder and gravel; large piece of quartzite.
26-54	F2	Dark yellowish brown (10YR 4/4) gravelly SAND; very abrupt boundary.
54-64	F3	Dark yellowish brown (10YR 4/4) LOAM with matrix-supported gravel; very abrupt boundary.
64-154	F4	Dark yellowish brown (10YR 4/4) gravelly SAND; very abrupt boundary.
154-200	F5	Olive brown (2.5Y 4/3) heavy SILT LOAM diamicton.
200-285	F6	Mixed SAND and layered SILT – LOAM; few pebbles.
285-346	F7	Interbedded dark yellowish brown – yellowish brown (10YR 4/4 – 4/3) SILT LOAM with lags of medium sand; very abrupt boundary.
346-350	F8	Dark grayish brown (10YR 4/2) LOAM diamicton; very abrupt boundary.
350-546	F9	SAND and GRAVEL with silty clay loam between 423 & 429.
546-570	F10	LOAM diamicton.
570-640	F11	Brown (10YR 4/3) with dark SANDY LOAM fill at top over LOAM diamicton; few large pebbles; very thin layered below 604 cm.

Core 5

Depth (cm)	Horizon	Description
0-15	F1	<i>Fill</i> Topsoil.
15-35	F2	Black (10YR 2/1) fine – medium cinder-rich SAND mixed with gravel.
35-671	F3	Dark yellowish brown – yellowish brown (10YR 4/4 – 5/4) medium and coarse SAND with $\pm 2\%$ gravel with interbeds of layered loam and sandy loam.
671-730	F4	Brown – pale brown (10YR 5/3 – 6/3) medium and coarse sand; trace of gravel.

Core 6

Depth (cm)	Horizon	Description
0-31	F1	<i>Fill</i> Topsoil and cinder with gravel.
31-190	F2	Dark yellowish brown (10YR 4/4) coarse SAND with +1% gravel with loamy interbeds.
190-280	F3	Brown (10YR 4/3) LOAM – SANDY LOAM diamicton; dark grayish brown (10YR 4/2) below 250cm.
280-375	F4	Thin layered yellowish brown (10YR 5/4) LOAM; sand fraction is predominantly coarse; few light olive brown (2.5Y 5/3) silty clay loam inclusions; few pebbles.
375-490	F5	Dark yellowish brown and brown (10YR 4/4 & 4/3) sticky LOAM layered with light clayey inclusions.
490-510	F6	Dark yellowish brown (10YR 4/4) SILT LOAM with $\pm 15\%$ sand; common faint redox features; few softer, rounded pebbles.
510-580	F7	Layered grayish brown (2.5Y 5/2) SILT LOAM and brown (10YR 5/3 – 4/3) LOAM and SILT LOAM.
580-625	F8	Poorly sorted coarse and very coarse SAND over layered SANDY LOAM.

Core 7

Depth (cm)	Horizon	Description
0-14	F1	<i>Fill</i> Topsoil.
14-33	F2	Gravel and cinder in SANDY LOAM; rail structure; abrupt boundary.
33-76	F3	Dark grayish brown (10YR 4/4) medium and coarse SAND with $\pm 1\%$ gravel; abrupt boundary.
76-110	F4	Mixed LOAM and SILTY CLAY LOAM.
110-200	F5	Dark yellowish brown (10YR 4/4) medium SAND with 1% gravel.
200-257	F6	Brown – dark grayish brown (10YR 4/3 – 4/2) SANDY LOAM with some layering around 236cm; abrupt boundary.
257-330	F7	Brown (10YR 4/3 – 5/3) medium and coarse SAND; few pebbles.
330-347	F8	Thin layered yellowish brown, dark yellowish brown, and very dark grayish brown heavy SILT LOAM; base of fill; very abrupt boundary.
347-360	F9	Very dark gray (10YR 3/1) SILT LOAM; homogeneous color.
360-387	--	Gap.
387-470	F10	Thin layered sandy loam and sand fill.

Core 8

Depth (cm)	Horizon	Description
0-49	F1	<i>Fill</i> Very dark grayish brown (10YR 3/2) SILT LOAM and SANDY LOAM fill; $\pm 1\%$ fine gravel; abrupt boundary.
49-92	F2	Black – very dark (10YR 2/1 – 3/1) SILT LOAM with medium sand mode; large pebble ballast below 70cm; very abrupt boundary.
92-127	Ab	<i>Loess</i> Black (10YR 2/1) SILTY CLAY LOAM; no gravel; homogeneous color; moderate medium parting to fine angular blocky structure; clear boundary.
127-135	ABb	Dark gray (2.5Y 4/1) SILTY CLAY LOAM; moderate medium parting to fine angular blocky structure; abrupt boundary.
135-213	Cg	Dark greenish gray (10Y 4/1) SILTY CLAY LOAM; few distinct redox features; massive.

Core 9

Depth (cm)	Horizon	Description
0-16	F1	<i>Fill</i> Topsoil.
16-43	F2	Black – very dark gray (10YR 2/1 – 3/2) SILT LOAM with granules and gravel.
43-160	F3	Coarse and medium sand fill.
160-170	C1	<i>Outwash</i> Dark yellowish brown (10YR 4/4) fine – medium SAND.
170-183	C2	Laminated brown (10YR 4/3) very fine SANDY LOAM; very abrupt boundary.
183-205	C3	Brown (10YR 5/3) fine SAND.
205-220	C4	Laminated brown (10YR 4/3) very fine SANDY LOAM; very abrupt boundary.
220-250	C5	Brown (10YR 3/3) medium SAND; trace of gravel.
250-260	C6	Dark brown (10YR 3/3) poorly sorted coarse and very coarse LOAMY SAND.
260-302	C7	Brown – dark brown (10YR 4/3 – 3/3) heavy SIL LOAM; $\pm 1\%$ sand.

Core 10

Depth (cm)	Horizon	Description
0-16	F1	<i>Fill</i> Dark brown (7.5YR 3/2) LOAMY SAND; very abrupt boundary.
16-76	F2	Brown (10YR 4/3) coarse SAND over medium SAND; trace of gravel; abrupt boundary.
76-100	F3	Dark grayish brown (10YR 4/2) gravelly coarse and very coarse SAND.
100-138	Ab	<i>Outwash</i> Black (10YR 2/1) SAND and gravel; sand fraction is medium; angular cinders; abrupt boundary.
138-176	Bwb1	Brown (7.5YR 4/4) medium and coarse SAND with gravel; abrupt boundary.
176-182	Bwb2	Brown (7.5YR 4/3) light SANDY LOAM; weak pedo-structure; very abrupt boundary.
182-240	Bwb3	Brown (7.5YR 4/4) light SANDY LOAM; gravel; few fine gravel interbeds; clear boundary.
240-302	Bwb4	Grayish brown (10YR 4/6) medium to coarse SAND; $< 1\%$ gravel; bright 5YR masses at base.

Core 11

Depth (cm)	Horizon	Description
0-14	Ap	<i>Loess</i> Very dark grayish brown (10YR 3/2) SILT LOAM; very abrupt boundary.
14-48	A	Black (10YR 2/1) to very dark gray (10YR 3/1) SILT LOAM; moderate medium subangular blocky parting to fine angular blocky structure; abrupt boundary.
48-81	Bwb1	Brown (7.5YR 4/3 – 4/4) SILT LOAM; weak medium parting to fine angular blocky structure; 1 piece of gravel at 76cm; very abrupt boundary.
81-132	Bwb2	<i>Outwash</i> Brown (7.5YR 4/4) medium and coarse SAND with 1% fine gravel.
132-172	Bwb3	Brown (7.5YR 4/4 – 5/4) SANDY LOAM; moderate medium subangular blocky structure; slightly sticky; very abrupt boundary.
172-213	C1	Pale brown (10YR 4/3) medium – coarse SAND; 1-2% fine gravel.

Core 12

Depth (cm)	Horizon	Description
0-35	F1	Very dark gray (10YR 3/1) SILT LOAM with small % cinder and gravel; very abrupt boundary.
35-62	F2	Brown (10YR 5/3) medium SAND mixed with very dark brown (10YR 3/2) SAND in upper half; abrupt boundary.
62-65	F3	Dark yellowish brown (10YR 4/4) SANDY LOAM; very abrupt boundary.
65-74	F4	Brown (10YR 5/3) medium SAND mixed with very dark brown (10YR 3/2) SAND in upper half; abrupt boundary.
74-132	F5	Brown (10YR 5/3) SILT LOAM; abrupt boundary.
132-140	F6	Brown (10YR 4/3) medium and coarse SAND.
140-152	F7	Laminated brown (10YR 5/3) SILT LOAM; very abrupt boundary.
152-190	Bw1b	<i>Outwash</i> Strong brown (7.5YR 6/4) medium – coarse SAND; gravel fraction.
190-227	Bw2b	Brown (7.5YR 4/6) coarse and very coarse SAND $\pm 1\%$ gravel; fine pebbles; abrupt boundary.
227-240	Bw3b	Strong brown (7.5YR 6/4) medium SAND with $\pm 5\%$ gravel; abrupt boundary.
240-256	BCb1	Interlaminated dark brown (7.5YR 3/2) slightly sticky LOAMY SAND and brown (7.5YR 5/4) SILT LOAM.
256-302	BCb2	Brown – pale brown (10YR 5/3 – 6/3) fine SAND.

Core 13

Depth (cm)	Horizon	Description
0-23	A	<i>Loess</i> Very dark gray (10YR 3/1) SILT LOAM; 10% sand; clear boundary.
23-35	AB	Dark brown (7.5YR 3/2) SILT LOAM; $\pm 15\%$ sand; abrupt boundary.
35-100	Bw	<i>Outwash</i> Brown (7.5YR 4/4) SANDY LOAM; slightly sticky; moderate medium subangular blocky parting to weak fine angular blocky structure.
100-145	BC	Brown (7.5YR 4/4) medium and coarse SAND; loose.
145-213	C	Pale brown (10YR 6/3) coarse SAND with $\pm 10\%$ fine gravel.

Core 14

Depth (cm)	Horizon	Description
0-110	F1	<i>Fill</i> Sandy fill with minor gravel.
110-190	F2	Sand and gravel fill with sandy loam beds.
190-302	F3	sand

Core 15

Depth (cm)	Horizon	Description
0-23	F1	<i>Fill</i> Very dark gray (10Yr 3/1) SILT LOAM – very fine SANDY LOAM; topsoil; abrupt boundary.
23-35	F2	Very dark gray (10YR 3/1) SILT LOAM with ±30% sand; few fine pebbles; very abrupt boundary.
35-45	F3	Yellowish brown (10YR 5/4) medium and coarse SAND; abrupt boundary.
45-74	F4	Dark yellowish brown (10YR 4/4) heavy SILT LOAM diamicton; few cinders; gravel is very fine; very abrupt boundary.
74-76	F5	Very dark grayish brown (10YR 3/2) loamy medium – coarse SAND; very abrupt boundary.
76-87	Ab	<i>Loess</i> Black (7.5YR 2.5/1) heavy SILT LOAM; trace of sand; very abrupt boundary.
87-110	ABb	<i>Outwash</i> Dark brown (7.5YR 3/2) SANDY LOAM; poorly sorted; few granules and fine pebbles.
110-131	Bt	Dark brown (2.5YR 6/5) SANDY LOAM with ±1% gravel; slightly sticky; abrupt boundary.
131-213	Bw	Brown (7.5YR 4/4) coarse SAND with gravel and fine gravel.

Core 16

Depth (cm)	Horizon	Description
0-14	Ap/F1	<i>Fill</i> Very dark gray (10YR 3/1) SILT LOAM – SANDY LOAM; sand is fine textured; ballast-like gravel; abrupt boundary.
14-29	F2	Black – very dark gray (10YR 2/1 – 3/1) SANDY LOAM; abrupt boundary.
29-39	F3	Brown – dark brown (10YR 4/3 – 3/3) medium to coarse SAND; very abrupt boundary.
39-95	F4	Brown (10YR 4/3 – 5/3) loam diamicton; few pebbles.
95-130	F5	Mixed dark yellowish brown, very dark grayish brown, and brown (10YR 4/4, 3/2 & 4/3) heavy SILT LOAM; very abrupt boundary.
130-161	Bwb1	<i>Fill</i> Brown (7.5YR 4/4) silt loam diamicton – sandy loam diamicton; common gravel; abrupt boundary.
161-213	Bwb2	Brown – strong brown (7.5YR 4/4 – 4/6) very coarse SAND with granules; fine gravel.

Core 17

Depth (cm)	Horizon	Description
0-66	F	<i>Fill</i> Fill; loam with gravel; dark colored; very abrupt boundary.
66-76	Ab	Very dark gray (7.5YR 3/1) heavy SILT LOAM; very abrupt boundary.
76-78	C	Brown (10YR 4/3) SILT LOAM; very abrupt boundary.
78-105	Ab2	<i>Loess</i> Very dark gray (7.5YR 3/1) heavy SILT LOAM; mixing from below; very abrupt boundary.
105-131	Bwb1	Brown (2.5YR 4/3) heavy SILT LOAM; ±2% sand with few pebbles; weak pedo-structure; very abrupt boundary.
131-151	Bwb2	<i>Outwash</i> Brown (7.5YR 4/4) medium and coarse SAND with 1% gravel; clear boundary.
151-213	BCb	Brown (7.5YR 4/4 – 4/3) coarse SAND with 15% gravel and granules

Core 18

Depth (cm)	Horizon	Description
0-15	F1	<i>Fill</i> Mixed light and dark natural source fill; very abrupt boundary.
15-47	F2	Loamy fill with gravel and few cinders; very abrupt boundary.
47-100	F3	Thin layered dark colored silt loam natural source fill over this dark sand bed; poorly sorted.
100-132	F4	Dark, heavy silt loam – silty clay loam fill; very abrupt boundary.
132-138	F5	Very dark gray (10YR 3/1) light coarse SANDY LOAM; very abrupt boundary.
138-151	F6	Brown (10YR 4/3 – 5/3) medium SAND; very abrupt boundary.
151-200	F7	Brown and yellowish brown (10YR 4/3 & 6/4) loamy and silty fill.
200-220	F8	Brown and yellowish brown (10YR 4/3 & 6/4) loamy and silty fill with matrix-supported gravel; gravel lag at base; very abrupt boundary..
220-251	BCb1	<i>Outwash</i> Brown (10YR 4/3) very coarse SAND with few pebbles; abrupt boundary.
251-280	C1	Yellowish brown (10YR 5/4) SILT with ±10% very fine sand; coarse silt modes.
280-350	C2	Light yellowish brown (10YR 6/4) SILT (mostly coarse textured.)
350-396	C3	Pale brown (10YR 6/3) very fine – fine SAND.

Core 19

Depth (cm)	Horizon	Description
0-16	F1	<i>Fill</i> Mixed dark and light fill; 1 piece of ballast.
16-61	F2	Brown (10YR 4/3) medium and coarse SAND; trace of gravel.
61-100	F3	Brown – dark yellowish brown (10YR 4/3 – 4/4) SANDY LOAM – LOAM; few pebbles.
100-146	F4	Dark yellowish brown (10YR 4/4) silt loam – loam diamicton; intervals of fine layering; very abrupt boundary.
146-176	F5	Dark yellowish brown (10YR 4/4) SANDY LOAM; layered; abrupt boundary.
176-205	F6	Brown (7.5YR 4/4) SILT LOAM.
205-220	F7	Brown (10YR 4/3) poorly sorted LOAMY SAND; very abrupt boundary.
220-224	Ab1	<i>Anthropogenic</i> Dark brown and very dark brown (10YR 5/3 & 3/2) SANDY LOAM; matrix-supported pebble; charcoal; very abrupt boundary.
224-226	C1	Bed of poorly sorted SAND with pebbles.
226-232	C2	Dark yellowish brown (10YR 4/4) SILT LOAM; $\pm 10\%$ sand; very abrupt boundary.
232-235	ACb	Very dark gray and brown (10Yr 3/1 & 4/3) SILT LOAM; fine roots; very abrupt boundary.
235-240	Ab2	Very dark gray (10YR 3/1) SILT LOAM; roots; clear boundary.
240-251	Eb	<i>Loess</i> Brown (10YR 4/3) SILT LOAM; abrupt boundary.
251-278	Bwb	Brown – strong brown (7.5YR 4/4 – 4/6) heavy SILT LOAM; weak medium angular blocky parting to moderate fine angular blocky structure; clear gradational boundary.
278-302	Bwb	<i>Outwash</i> Strong brown (7.5YR 4/6) LOAM; weak pedo-structure.

Core 20

Depth (cm)	Horizon	Description
0-49	F1	<i>Fill</i> Pebbles mixed with light and dark SAND LOAM and LOAM fill; layered.
49-128	F2	Dark yellowish brown (10YR 4-4) to yellowish brown (10YR 5/4) SILT LOAM – SANDY LOAM with matrix-supported fine pebbles; few sandier layers; very abrupt boundary at cobble.
128-230	Ab	<i>Outwash</i> Yellowish brown (10YR 5/4) medium SAND with $\pm 20\%$ gravel and fine pebbles.
230-308	Bwb	Strong brown (10YR 4/6) heavy SILT LOAM over cobble.

Core 21

Depth (cm)	Horizon	Description
0-24	A/F	<i>Fill</i> Very dark gray (10YR 3/1) SILT LOAM; 10% sand and gravel; rubber fragment at base; very abrupt boundary.
24-43	Bw1	<i>Outwash</i> Brown (7.5YR 4/4) SANDY LOAM with fine gravel; abrupt boundary.
43-74	BC1	Brown – dark yellowish brown (7.5YR 4/4 – 10YR 4/4) medium and coarse SAND.
74-110	BC2	Brown (10YR 5/3) medium SAND.
110-140	Bw2	Brown 97.5YR 4/4) fine – medium SAND; abrupt boundary.
140-161	Bw3	Brown (7.5YR 4/4) fine – medium SAND.
161-216	Bw4	Brown – strong brown (7.5YR 4/4 – 4/6) medium SAND; abrupt boundary.
216-302	C1	Yellowish brown (10YR 5/3) medium SAND with very coarse sand mode.
302-360	C2	Brown (10YR 5/3 – 4/3) coarse SAND with gravel.

Core 22

Depth (cm)	Horizon	Description
0-23	F1	<i>Fill</i> Very dark grayish brown (10YR 3/2) gravelly SANDY LOAM; abrupt boundary.
23-35	F2	Dark grayish brown (10YR 4/2) medium – coarse SAND mixed with material from above horizon; abrupt boundary.
35-134	F3	Brown – dark yellowish brown (10YR 4/3 – 4/4) medium and coarse SAND; $\pm 2\%$ granules and fine gravel.
134-180	F4	Layered light and dark SILT LOAM and heavy SILT LOAM with matrix-supported sand and fine pebbles; very abrupt boundary.
180-200	F5	Very dark grayish brown – dark brown (10YR 3/2 – 3/3) medium LOAMY SAND with $<1\%$ gravel.
200-232	F6	Brown (10YR 4/3) medium and coarse SAND with granules and fine pebbles; abrupt boundary.
232-246	F7	Coarse SAND.
246-256	F8	Fine-layered dark yellowish brown (10YR 4/4) SANDY LOAM; abrupt boundary.
256-265	F9	Coarse SAND.
265-270	F10	Fine-layered dark yellowish brown (10YR 6/4) SANDY LOAM – SILT LOAM.
270-313	F11	Coarse sand with very coarse/granular mode.
313-320	F12	Very dark gray (10Yr 3/1) heavy SILT LOAM (A-Horizon source) over dark yellowish brown (10YR 4/4) SILT LOAM with 15% sand.
320-325	F13	Coarse SAND.
325-335	F14	Mixed and layered dark yellowish brown (10YR 4/4) heavy SILT LOAM; poorly sorted.
335-341	F15	Layered dark SILT LOAM and light SILT LOAM – SANDY LOAM; very abrupt boundary.
341-396	F16	Coarse SAND with $\pm 1\%$ granules and fine gravel.

**APPENDIX E. HISTORIC PHOTOGRAPHS (COURTESY OF
MAPLEWOOD AREA HISTORICAL
SOCIETY)**

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Appendix E. Historic Photographs

All photographs courtesy of the Maplewood Area Historical Society



NP tracks looking north over Maryland Avenue bridge and towards Mile Post 3, 1926.



NP tracks looking north at Larpeur Avenue crossing, 1926.



NP tracks looking north at Ripley Street crossing, 1926.



NP tracks looking north over County Road D bridge, 1926.



County Road D looking east under bridge carrying NP tracks, 1926.



Gloster Junction showing Soo Line crossover, 1963.



NP track looking north from Soo Line switch at north end of Gloster Junction, 1963.



NP track looking south towards Gloster Junction, 1963.



Gate guards on Soo Line track looking east towards Gloster Junction, 1963.



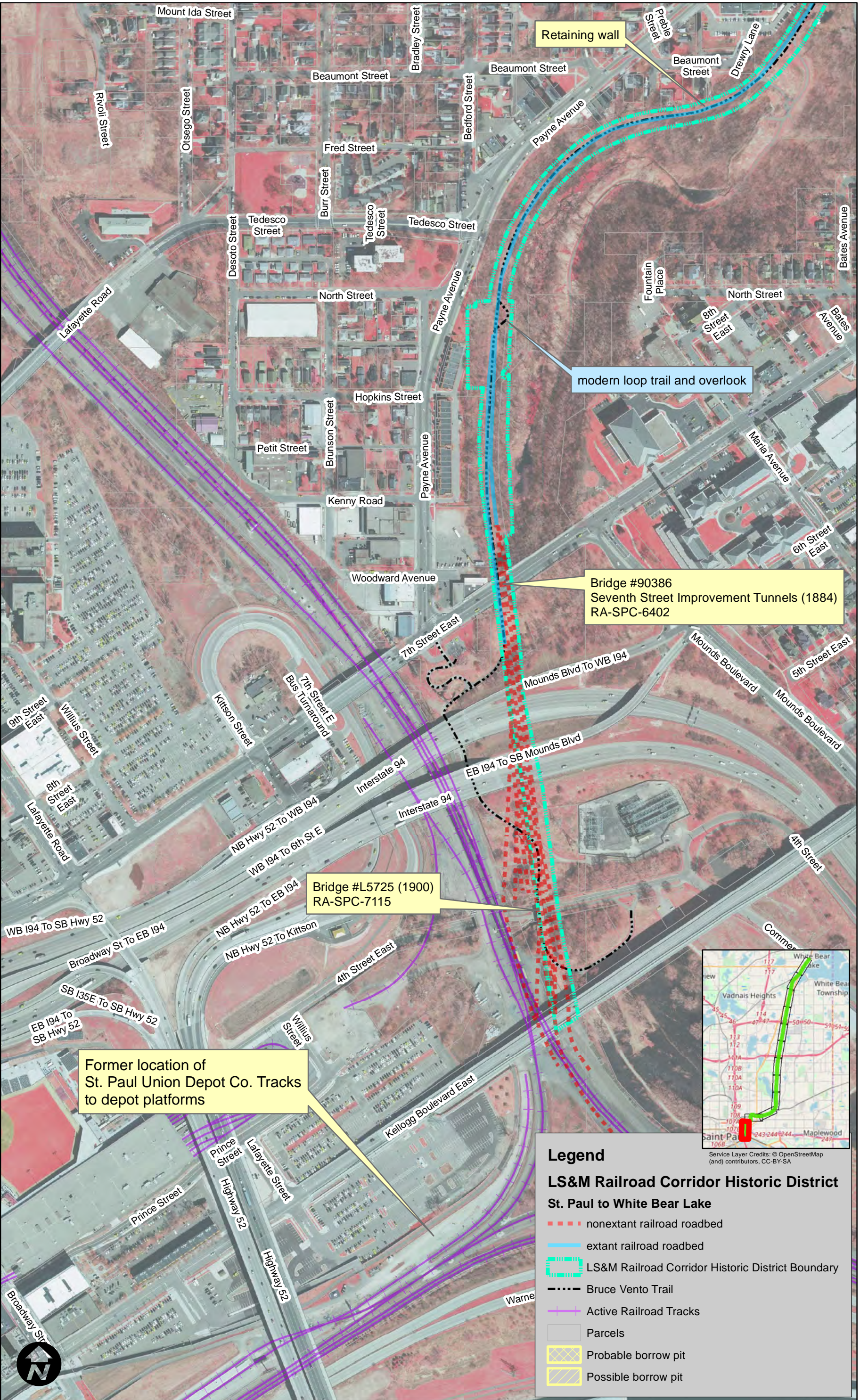
Single gate at Gloster Junction, 1963.



Looking south on NP tracks away from Gloster Junction, 1963.

**APPENDIX F. LS&M RAILROAD CORRIDOR HISTORIC
DISTRICT BOUNDARY MAPS**

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Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

nonextant railroad roadbed

extant railroad roadbed

LS&M Railroad Corridor Historic District Boundary

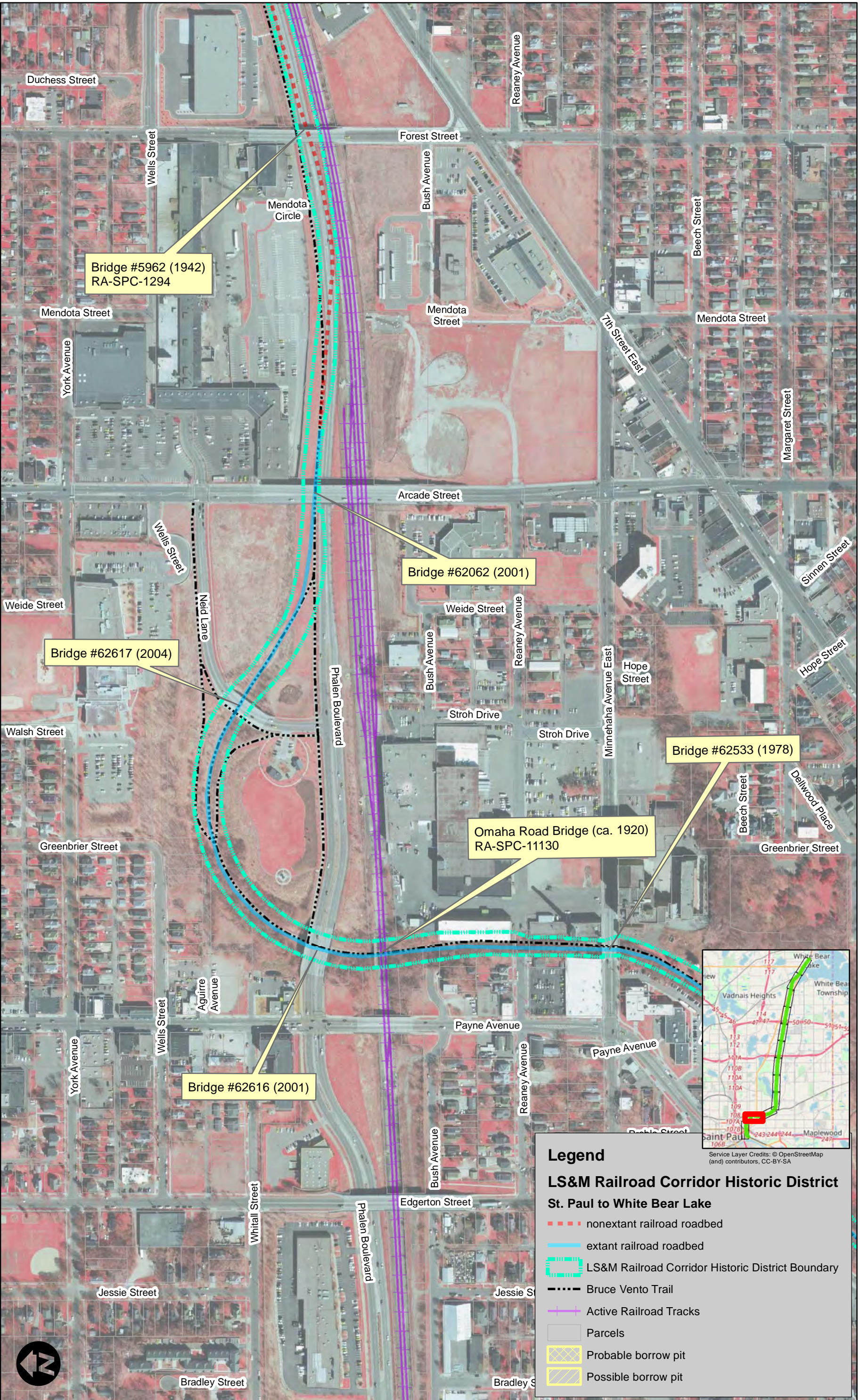
Bruce Vento Trail

Active Railroad Tracks

Parcels

Probable borrow pit

Possible borrow pit



Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

- nonextant railroad roadbed
- extant railroad roadbed
- LS&M Railroad Corridor Historic District Boundary
- Bruce Vento Trail
- Active Railroad Tracks
- Parcels
- Probable borrow pit
- Possible borrow pit

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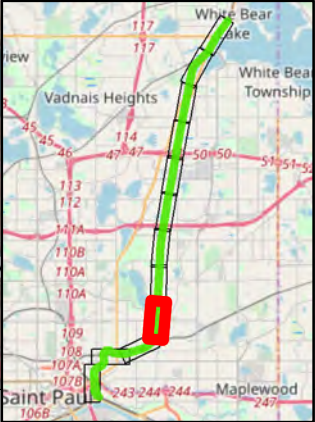




Bridge #R0438 (1907)
RA-SPC-11140

bridge removed

bridge removed



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Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

nonextant railroad roadbed

extant railroad roadbed

LS&M Railroad Corridor Historic District Boundary

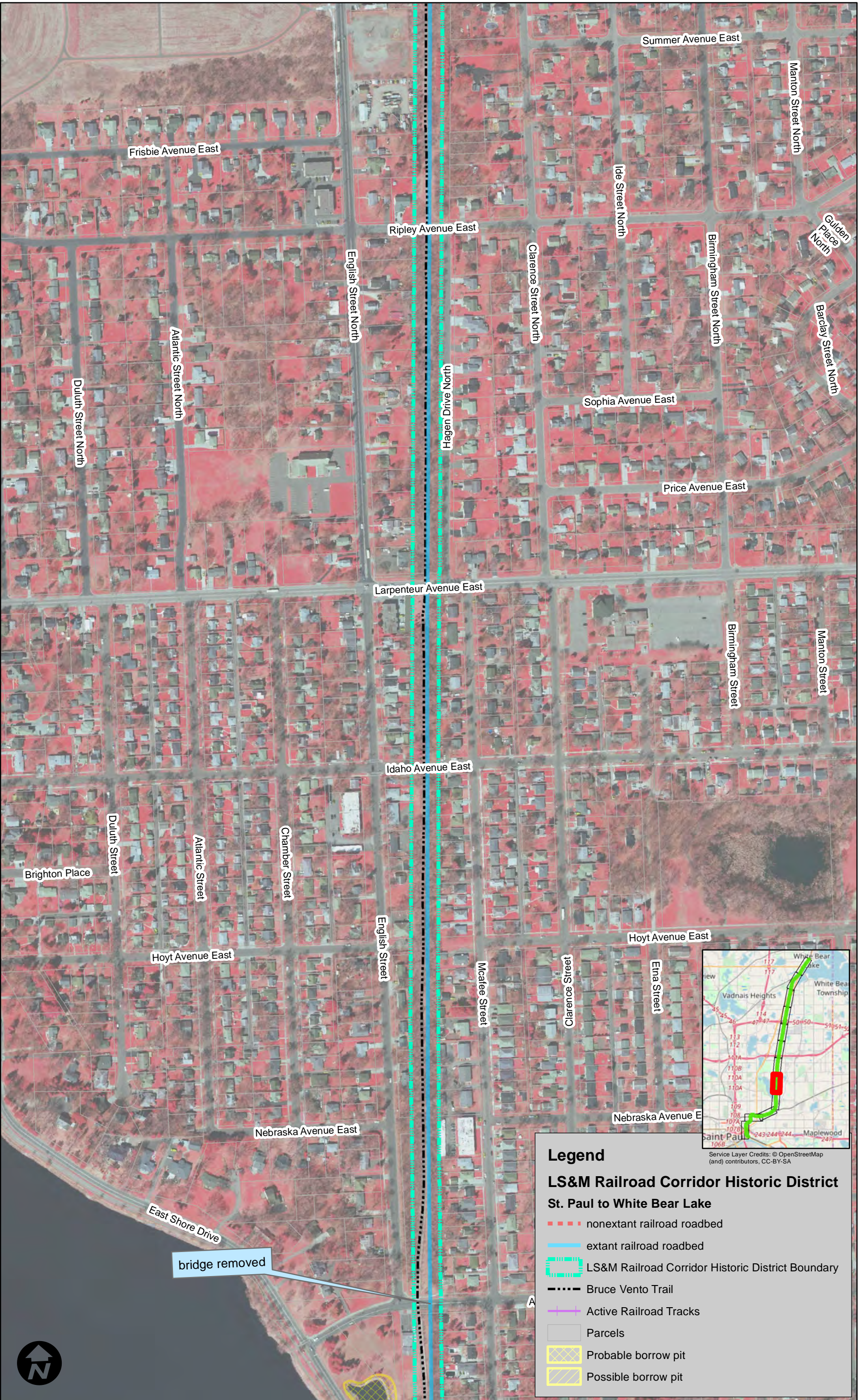
Bruce Vento Trail

Active Railroad Tracks

Parcels

Probable borrow pit

Possible borrow pit



Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

nonextant railroad roadbed

extant railroad roadbed

LS&M Railroad Corridor Historic District Boundary

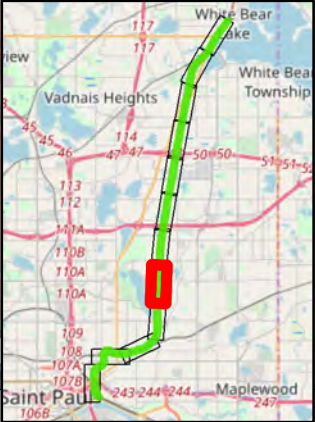
Bruce Vento Trail

Active Railroad Tracks

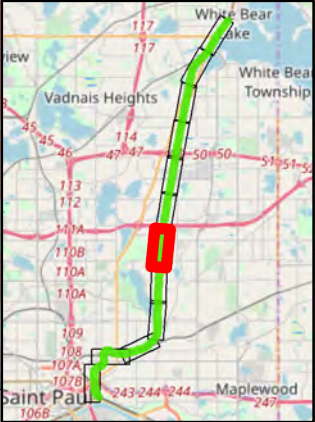
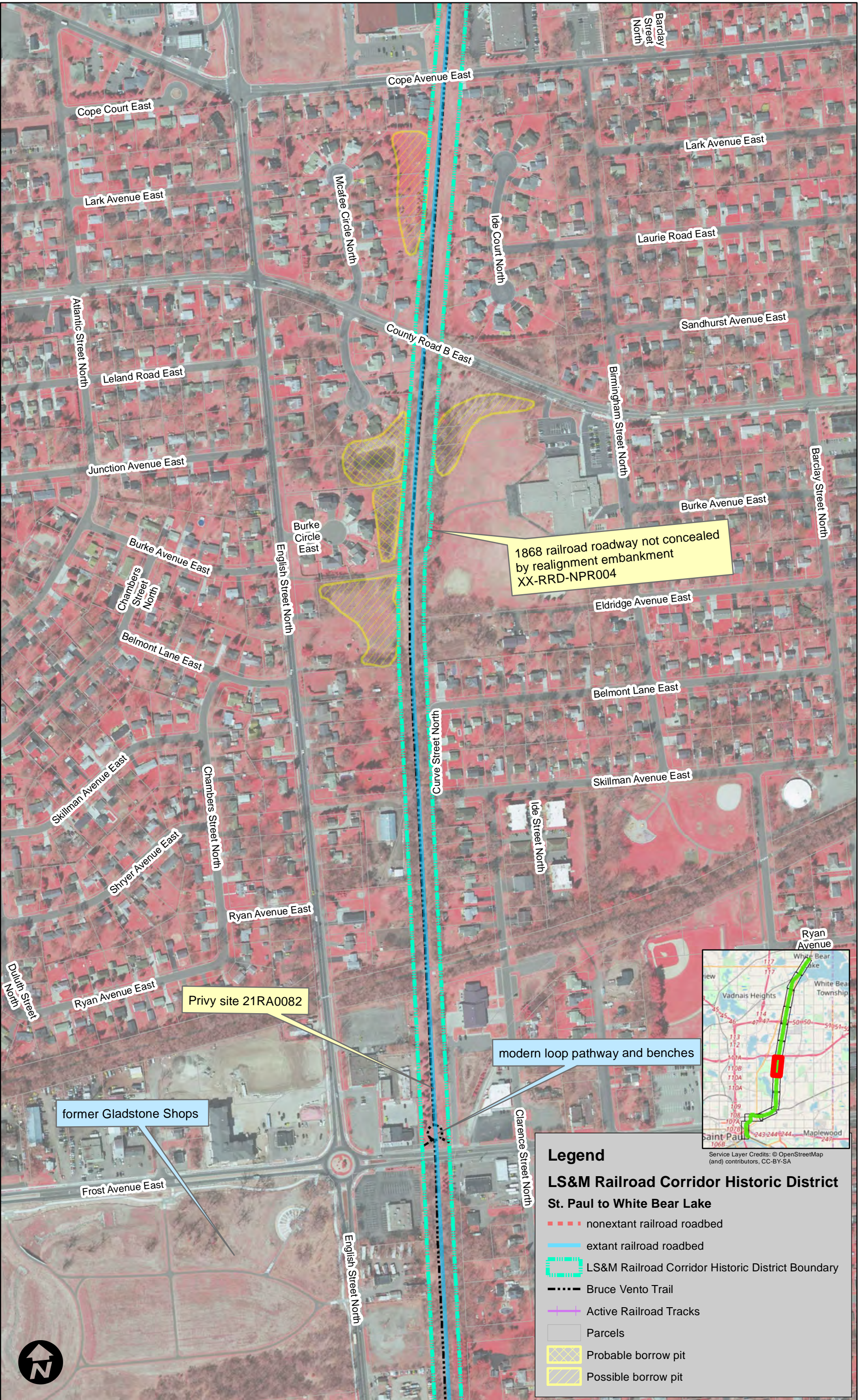
Parcels

Probable borrow pit

Possible borrow pit



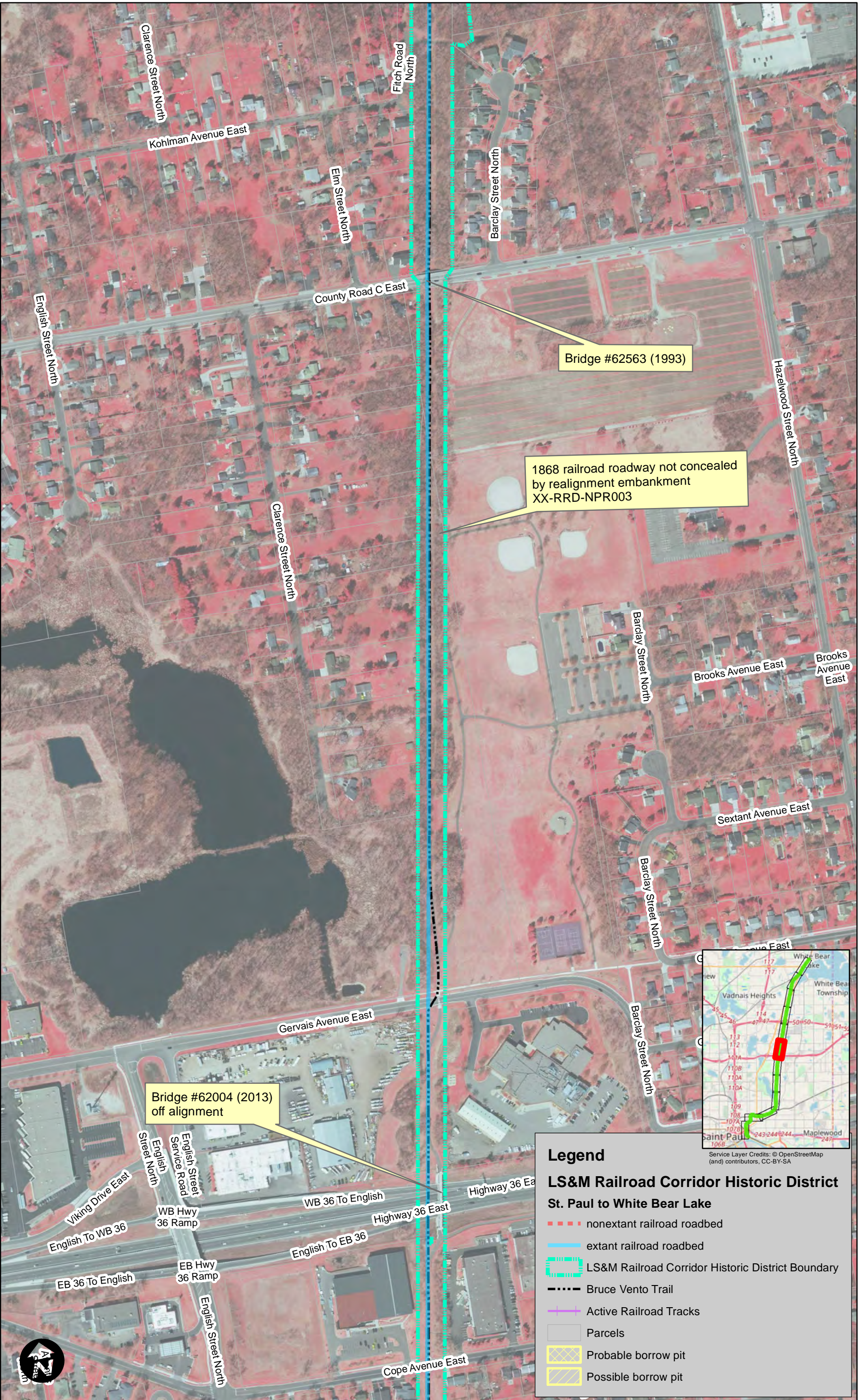
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Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

- nonextant railroad roadbed
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Bridge #62563 (1993)

1868 railroad roadway not concealed
by realignment embankment
XX-RRD-NPR003

Bridge #62004 (2013)
off alignment

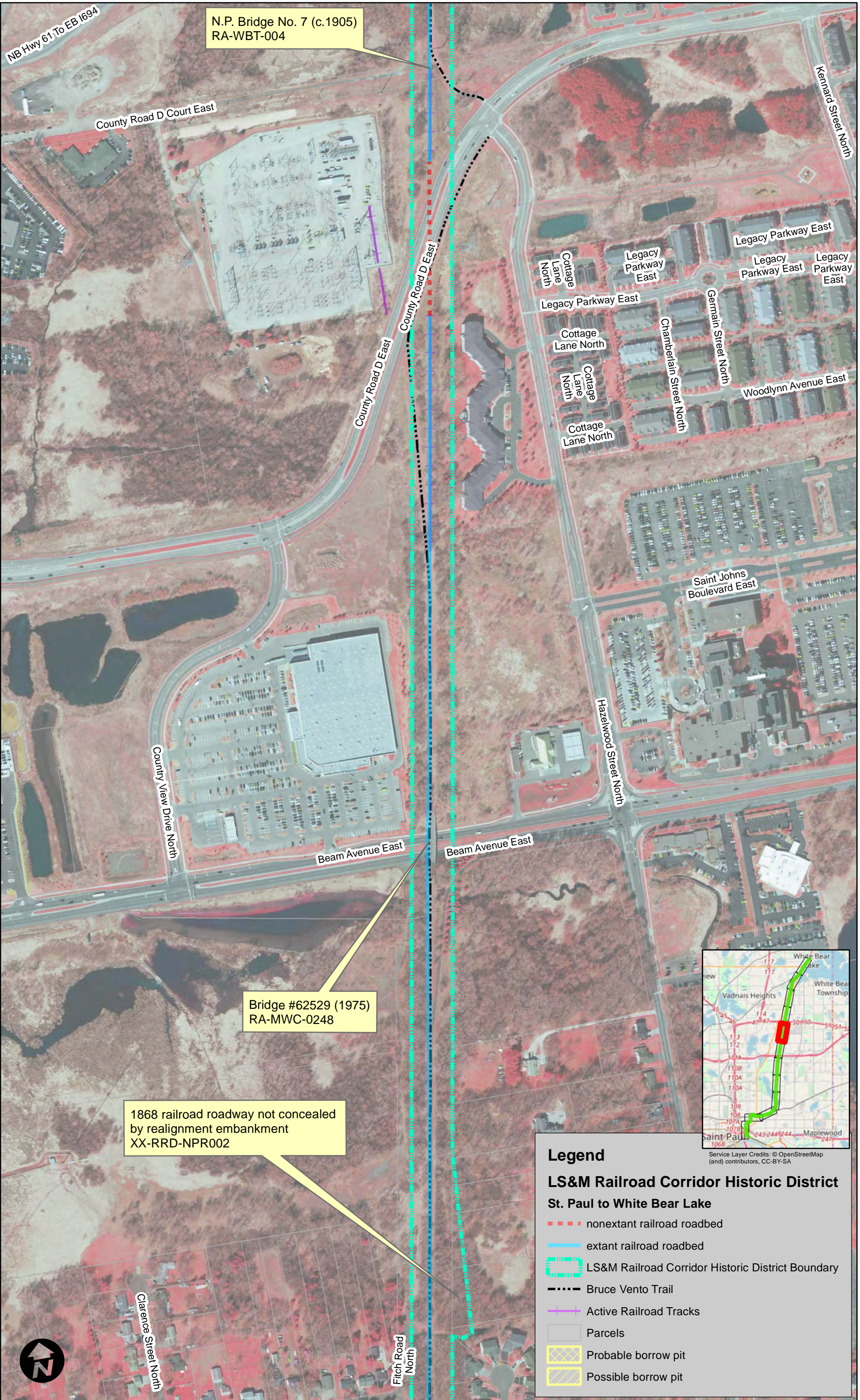
Legend

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St. Paul to White Bear Lake

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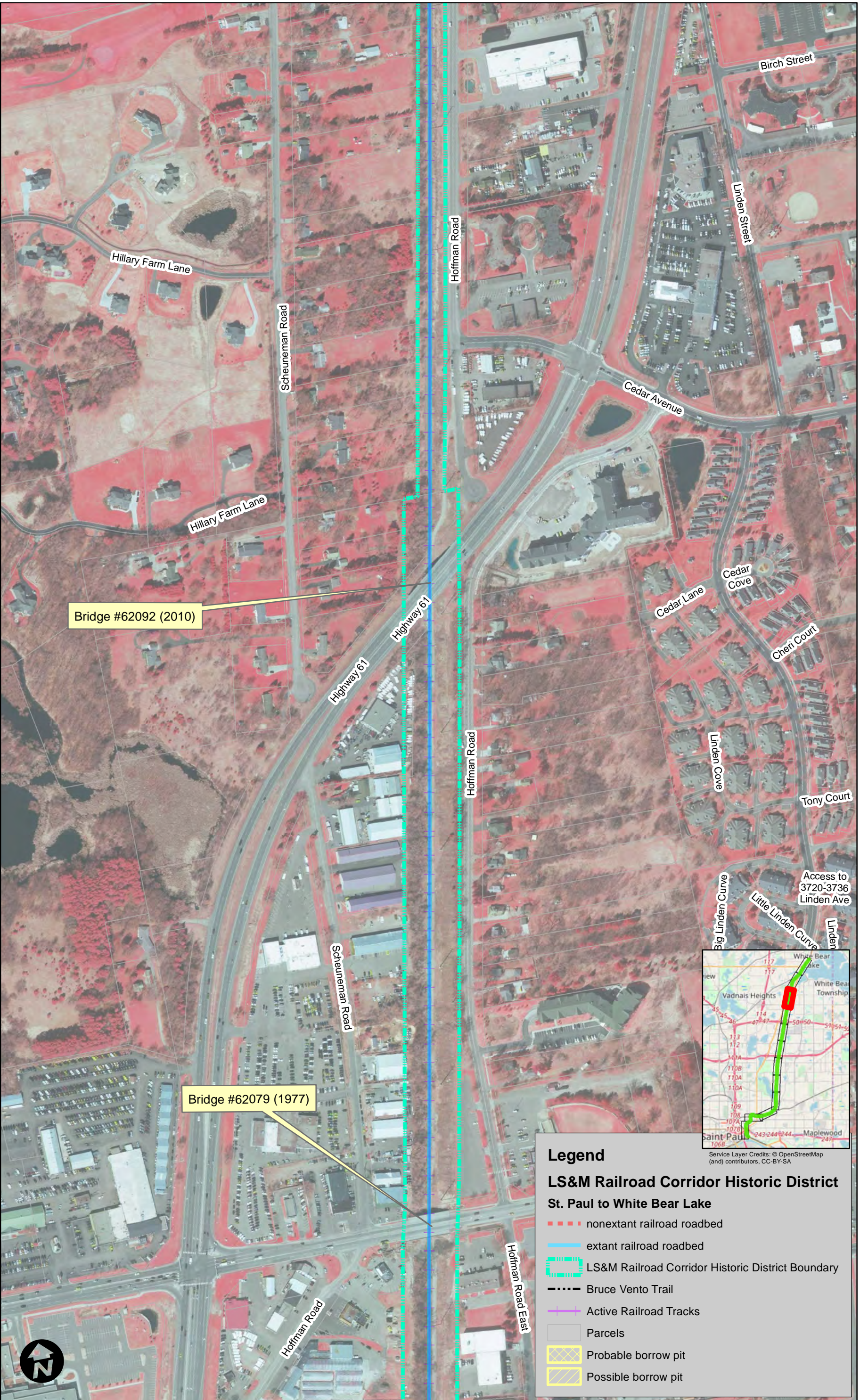
Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

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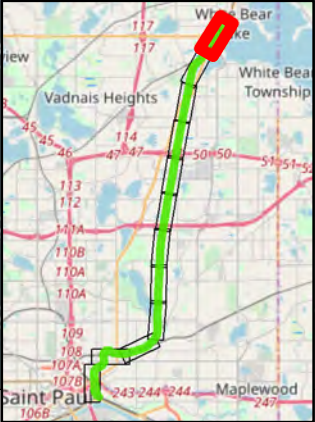
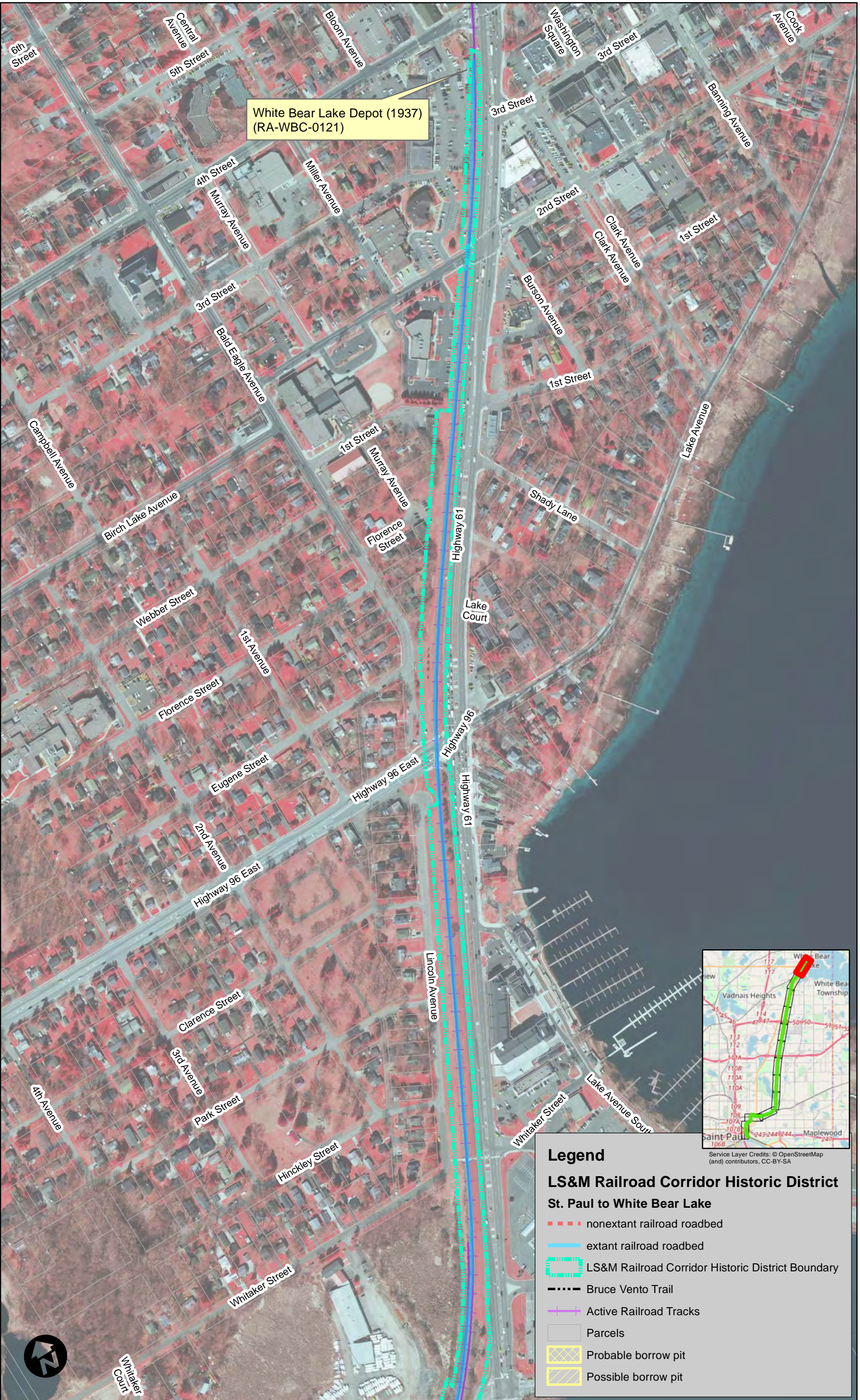


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Legend

LS&M Railroad Corridor Historic District St. Paul to White Bear Lake

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Legend

LS&M Railroad Corridor Historic District
St. Paul to White Bear Lake

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