ENVIRONMENTAL ASSESSMENT/ENVIRONMENTAL ASSESSMENT WORKSHEET

Willmar Rail Connector & Industrial Access Project
State Project: S.P. 3403-74
Minnesota Project: XXXXXX

From 7th Avenue NW To 28th Street and From Morris Subdivision of BNSF just west of 45th Street NW To BNSF Marshall Subdivision just east of County State Aid Highway (CSAH) 55

In Willmar Township and City of Willmar, in the County of Kandiyohi, in the State of Minnesota
Sections 7, 8, 16, 17, 18, 19, 20, 29, 30 Township 119N Range 35W

Submitted pursuant to 42 U.S.C. 4332 and M. S. 116D
By: U.S. Department of Transportation, Federal Highway Administration, Federal Railroad Administration and Minnesota Department of Transportation
for

Construction of a new 2.8-mile railway between the Marshall and Morris Subdivisions of the BNSF railway and a rail spur for industrial park access. Roadway modifications include a 2.5-mile realignment of US Trunk Highway (TH) 12, construction of two bridges over the proposed rail line, and other road modifications.

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1-26-2017
MnDOT – Chief Environmental Officer Date

Approved by:

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FHWA – Asst. Division Administrator Date

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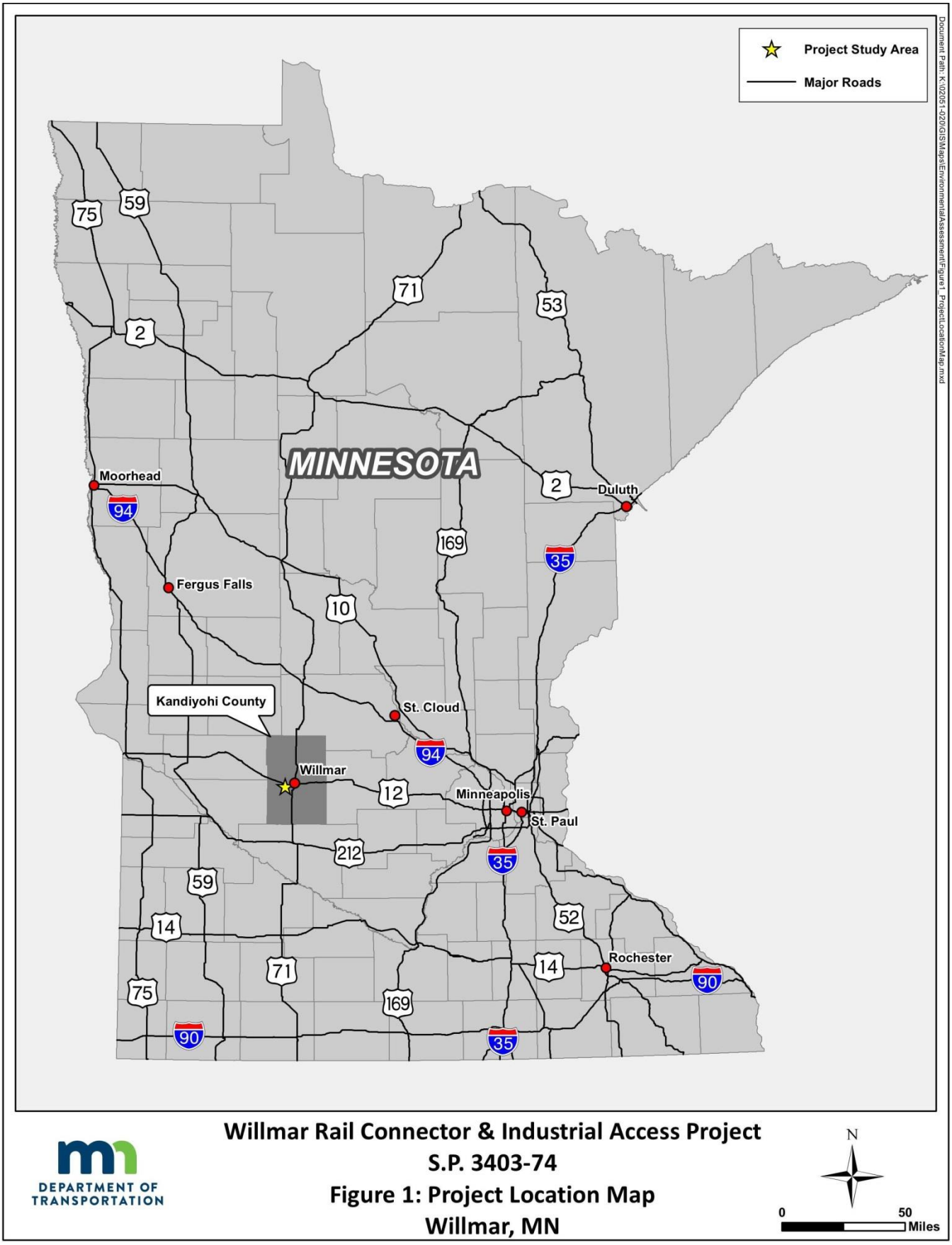
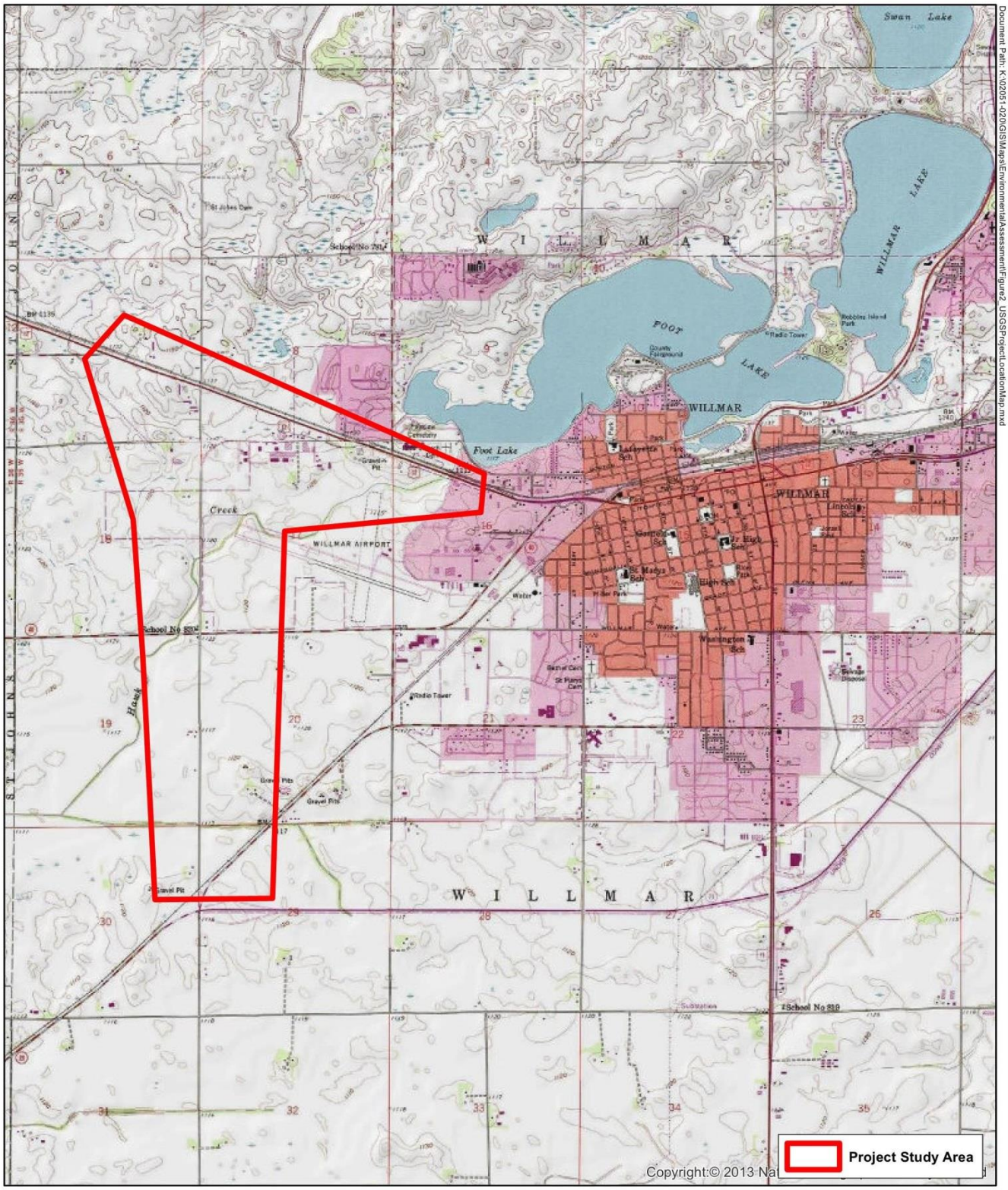


DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 1: Project Location Map
Willmar, MN



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
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Willmar, MN

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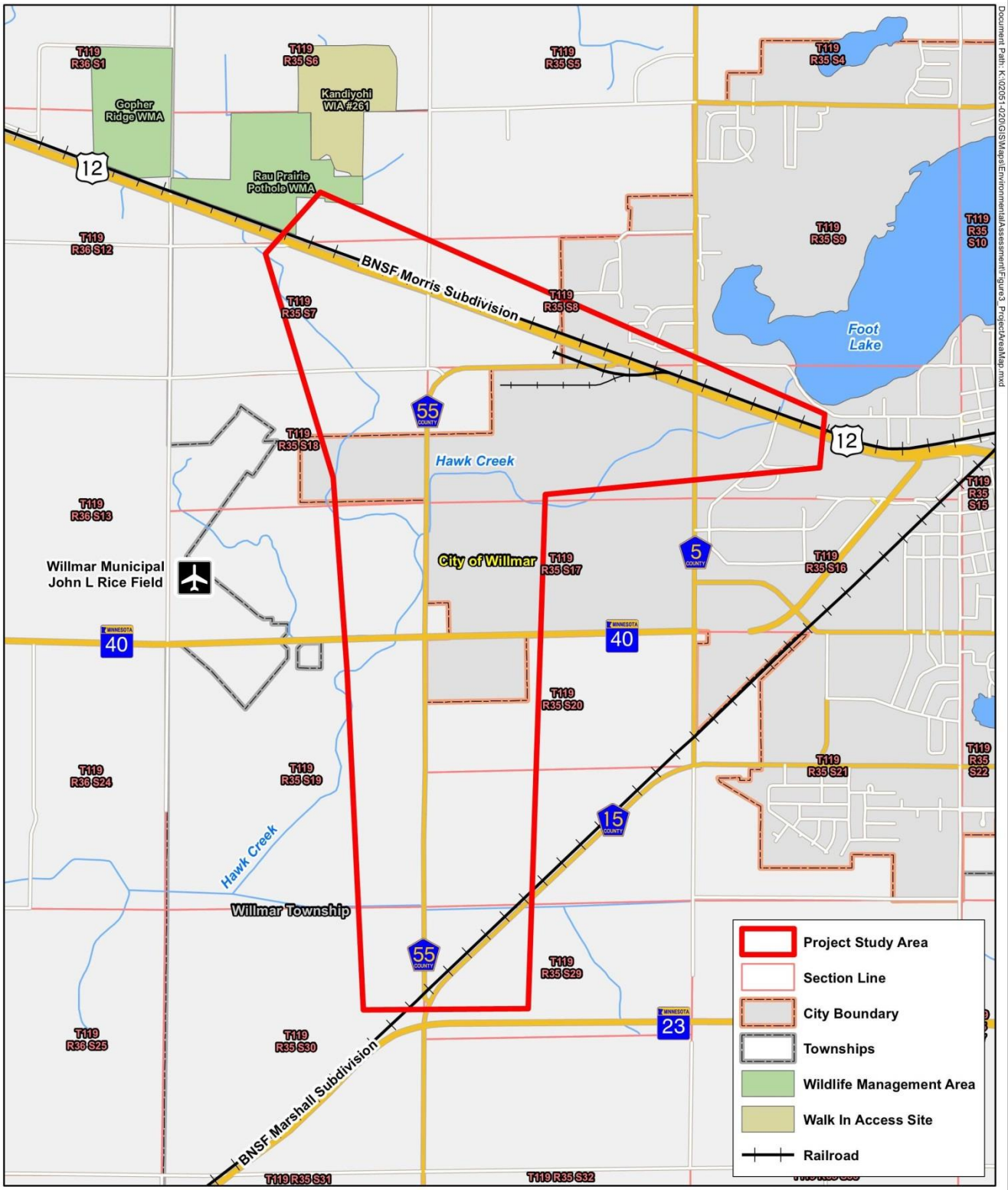
0 3,500 Feet



Willmar Rail Connector & Industrial Access Project
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N

0 2,500 Feet

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Acronyms and Abbreviations

ACS	American Community Survey
ADT	Average Daily Traffic
BCA	Benefit-Cost Analysis
BMPs	Best Management Practices
BNSF	BNSF Railway Company
CAAA	Clean Air Act Amendment
CD	County Ditch
CRU	Minnesota Department of Transportation – Cultural Resources Unit
CSAH	County State Aid Highway
CWA	Clean Water Act
DNR	Minnesota Department of Natural Resources
dB	Decibel
dBA	A-Weighted Decibels
DWSMA	Drinking Water Supply Management Area
EA	Environmental Assessment
EAW	Environmental Assessment Worksheet
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
EQB	Minnesota Environmental Quality Board
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	Findings of No Significant Impact

Acronyms and Abbreviations (continued)

FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GBV	Ground-Borne Vibration
HEI	Health Effects Institute
HMTA	Hazardous Materials Transportation Act
HSG	Hydrologic Soil Group
IRIS	Integrated Risk Information System
JD	Jurisdictional Determination
KCDA	Kandiyohi County Drainage Authority
LAWCON	Land and Water Conservation Fund Act of 1965
LGU	Local Government Unit
LRIP	Local Roadway Improvement Program
MDH	Minnesota Department of Health
MEPA	Minnesota Environmental Policy Act
MnDOT	Minnesota Department of Transportation
MnHPO	Minnesota Historic Preservation Office
MOVES	Motor Vehicle Emissions Simulator
MPCA	Minnesota Pollution Control Agency
mph	Miles Per Hour
M.S.	Minnesota Statute
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NATA	National Air Toxics Assessment

Acronyms and Abbreviations (continued)

NEPA	National Environmental Policy Act
NHIS	Natural Heritage Information System
NO_x	Nitrous Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OES	Minnesota Department of Transportation – Office of Environmental Stewardship
OHW	Ordinary High Water
OSHA	Occupational Safety and Health Administration
PM	Particulate Matter
PMT	Project Management Team
POM	Polycyclic Organic Matter
ppb	Parts Per Billion
PWI	Public Waters Inventory
QBAA	Quaternary Buried Artesian Aquifer
ROW	Right of Way
RPZ	Runway Protection Zone
SEE	Social, Economic, Environmental
SHPO	State Historic Preservation Office
SO_x	Sulfur Oxides
S.P.	State Project
SSTS	Subsurface Sewage Treatment Systems
STIP	State Transportation Improvement Program
SWPPP	Stormwater Pollution Prevention Plan
TH	Trunk Highway

Acronyms and Abbreviations (continued)

TIGER	Transportation Investment Generating Economic Recovery
TMDL	Total Maximum Daily Load
URA	Uniform Relocation Act
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Services
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WCA	Wetland Conservation Act
WIA	Walk-In Areas
WMA	Wildlife Management Areas
WPA	Waterfowl Production Areas

I. REPORT PURPOSE

This Environmental Assessment (EA) provides background information for the proposed Willmar Rail Connector and Industrial Access project in the City of Willmar and Willmar Township (page ii). This document includes a discussion of:

- Need for the proposed project
- Alternatives considered
- Environmental impacts and mitigation
- Agency coordination and public involvement

This EA was prepared as a part of the National Environmental Policy Act (NEPA) process (42 U.S.C. § 4231 et seq.) and Minnesota Environmental Policy Act (MEPA) process (M.S. 116D). At the federal level, the EA is used to provide sufficient environmental documentation to determine the need for an Environmental Impact Statement (EIS) or that a Finding of No Significant Impact (FONSI) is appropriate. At the state level, the EA is used to provide sufficient environmental documentation to determine the need for a state EIS or that a Negative Declaration is appropriate.

The proposed action includes:

- Construction of 2.8 miles of mainline railroad track connecting two existing railroad subdivisions with associated grade separations, spur lines, sidings and access roads; and
- Relocating 2.5 miles of US highway and associated local roadway modifications.

This project is receiving US Department of Transportation funds through the Transportation Investment Generating Economic Recovery (TIGER) competitive grant program, and is subject to review under NEPA. The Federal Highway Administration (FHWA) is the lead federal agency for completing the NEPA environmental document and for compliance with Section 106 of the National Historic Preservation Act (54 U.S.C. § 306108) (Section 106). The Federal Railroad Administration (FRA) is administering the TIGER grant funds for the construction of the project. The two agencies have determined that an EA is the appropriate level of environmental review for this project.

At the state level, this document serves as an Environmental Assessment Worksheet (EAW). Minnesota Rules 4410.1300 allow the EA to take the place of the EAW form, provided that the EA addresses each of the environmental effects identified in the EAW form. This EA includes each of the environmental effects identified in the EAW form.

The Minnesota Department of Transportation (MnDOT) is the proposer and Responsible Governmental Unit for the project. Preparation of an EAW is considered mandatory under Minnesota Rules 4410.4300 subp. 1, and under the following subsection(s):

> Highway Projects: 4410.4300, Subpart 22, A. - "Construction of a road on a new location over one mile in length."

There are no thresholds for railroads in the state EAW process. However, the construction of the railroad is included because it is a "connected action" and is the underlying reason that highway improvements are required.

This document is made available for public review and comment in accordance with the requirements of 23 CFR 771.119 (d) and Minnesota Rules 4410.1500 through 4410.1600.

II. PURPOSE AND NEED FOR PROJECT

The purpose and need for a project define the transportation problems that the project will address. They also provide the framework for the project alternatives, helping determine to what extent each alternative meets each project need. Alternatives that do not meet the purpose and need of the project are not studied further. Alternatives that address the purpose and need are evaluated in more detail, taking into account potential impacts. Assuming all other concerns are equal, if one alternative meets the project purpose and need better than another, then that alternative may be identified as the Recommended Alternative.

The purpose and need also help frame the project extent by defining the "who, what, where, when and why" of the transportation needs. This allows agencies to develop alternatives that satisfy a project's needs.

The Purpose and Need Section (Section II) has been divided into three subsections to provide the reader with a better understanding of the transportation problems that need to be solved. The three subsections include:

- Project Background (subsection A): The background information subsection summarizes existing conditions and discusses the project setting.

- Project Purpose (subsection B): The project purpose statement identifies the objective for addressing the project's needs that are to be met by project alternatives, and also summarizes other objectives that were taken into account when developing and evaluating alternatives.

- Project Need (subsection C): The project need subsection discusses transportation problems identified within the project area.

A. Project Background

As a note to the reader – all figures referred to in the text of this document are found in **Appendix A**.

The City of Willmar is a regional trade center for Kandiyohi County and west-central Minnesota. The local economy offers commercial, service, education, and employment opportunities for its 20,000 residents and for surrounding rural communities. Willmar is connected to the state trunk highway (TH) system via US Highway 12 (hereinafter referred to as TH 12), US Highway 71, TH 23, and TH 40. **Figures 1 – 3** at the beginning of this document and in **Appendix A** show the location of the project within the state as well as a more close-up of the project area. The project area identified in Figure 3 was determined based on the location of where improvements were anticipated to occur and where there would be direct impacts associated with potential alternatives. The project area was also informed by the needs to be addressed and the problems that were occurring.

Within Willmar, BNSF Railway Company (BNSF) operates the BNSF Willmar Terminal (hereinafter referred to as the Willmar Terminal), shown in **Figures 4 and 5**. The Willmar Terminal is located

adjacent to downtown Willmar. The Willmar Terminal is located at the intersection of three BNSF Railway subdivisions. These include:

- The Morris Subdivision runs northwest to Morris, MN, and provides a connection to Fargo, ND, Canada, and points west. The Morris Subdivision currently (2016) handles approximately nine trains per day in Willmar.

- The Marshall Subdivision runs southwest towards Sioux City, IA, and provides a connection to Kansas City, MO, and points south, eventually connecting to Houston and the Western Gulf Basin in Texas. The Marshall Subdivision currently (2016) handles approximately 10 trains per day in Willmar.

- The Wayzata Subdivision extends east towards Minneapolis and provides a connection to Chicago. The Wayzata Subdivision currently (2016) handles approximately 10 trains per day in Willmar.

While there is a direct connection between the Wayzata Subdivision to both the Morris and Marshall Subdivisions, there is not a direct connection between the Morris and Marshall Subdivisions. Trains moving north-south on the Morris Subdivision between Fargo, ND (and origins north) and those moving to Kansas City, MO (and destinations south) on the Marshall Subdivision must pull into the Willmar Terminal, reverse direction, and reposition locomotives and crews. This movement is referred to as a switching operation.

Based on train activity data provided by BNSF Railway, a maximum of 6 trains per day moved north and south between the Morris and Marshall Subdivisions to meet the demands of BNSF customers in the period between 2004 and 2015. In recent months, a combination of economic factors has reduced rail traffic relating to agricultural and energy customers across all railroads nationally. As a result, rail traffic has incurred a temporary downturn in Willmar on all subdivisions and in the Willmar Terminal. The north-south movement between the Morris and Marshall Subdivisions is currently averaging four trains per day (based on data collected by MnDOT's consultant for the project in the summer of 2016 in the Willmar Terminal) – with some days being slightly lower and some days being slightly higher. However, it is anticipated that long-term train activity will experience an upturn in the agricultural and energy sectors as the overall population of the country grows and expansion of the nation's economy occurs.

The MnDOT Statewide Rail Plan forecasts a 3 percent growth per year in rail traffic statewide. Applying the 3 percent factor to the current four trains per day over 20 years results in a 60 percent increase in daily train activity, or an increase from 4 to approximately 6 trains per day. A return to 6 or more trains a day would be anticipated to occur in the 20-year planning horizon (without any railroad improvements), and is consistent with historic patterns and fluctuations in freight movement and overall economic growth. For purposes of this document and supporting analyses (benefit-cost analysis, noise analysis, etc.), 6 trains per day was used as the reasonable estimate of train activity in all build and no build alternatives.

In the process of the switching operation to transfer trains between the Morris and Marshall Subdivisions, trains create excess emissions and noise, consume rail yard and mainline capacity, occupy several at-grade crossings, and impede the flow of vehicular traffic within Willmar, including that of emergency responders. Gate closures at railroad crossings during the switching operation

result in delays of 20 minutes per train for motorized and non-motorized traffic. Past (2014) and anticipated future delays are estimated to be closer to 30 minutes per train, due to future train activity in the Willmar Terminal. (BNSF Trainmaster, 2014); AECOM Traffic Counts, 2014).

In recent years, several major public infrastructure projects in Willmar have been implemented to support planned growth and development and to foster the growth of jobs that offer sufficient wages and benefits to support middle class economic and employment opportunities within the community. The City of Willmar has recently invested in developing basic infrastructure (some roads and utilities) for the Willmar Industrial Park, which is located on the western edge of the City in the vicinity of the old Willmar airport. There is currently no rail access to the industrial park.

B. Purpose

The purpose of the proposed project is to enhance railway operations in the Willmar area and facilitate the movement of north-south rail freight through the State of Minnesota and beyond. The existing operations have a negative impact on the movement of motorized and non-motorized traffic and diminish quality of life in downtown Willmar. Additionally, the project is intended to help advance economic development in Willmar by creating a desirable location for manufacturers with direct rail access to the Willmar Industrial Park. The purpose of the project is summarized as follows:

- Improve rail operation efficiency in the Willmar Terminal
- Facilitate the movement of north-south rail freight through Willmar
- Reduce the number of train trips that cause lengthy traffic delays at at-grade rail crossings in Willmar
- Provide rail access to the Willmar Industrial Park to promote economic development as outlined in the City of Willmar's comprehensive plan
- Improve quality of life within the City of Willmar

C. Need

The identified needs for this project are summarized below, with more detail describing these needs on the following pages. Project needs include:

- Improve regional railroad operations due to lack of direct north-south railroad connection through Willmar
- Reduce freight rail traffic fluctuations that can result in congestion/stacking on the railway subdivisions as approaching Willmar and within the Willmar Terminal during heavy train flows
- Enhance national network operations and opportunities to avoid bottlenecks and population centers in Minneapolis and Chicago

- Improve railroad operations in the Willmar Terminal
- Reduce motorized and non-motorized user delays at existing at-grade railroad crossings
- Enhance motorized and non-motorized user safety at at-grade railroad crossings due to switching operations from trains moving north-south between Morris and Marshall Subdivisions
- Promote economic development within the City of Willmar
- Enhance quality of life (noise, emissions, safety, traffic delays, aesthetics) within the City of Willmar's downtown area

1. Regional Railroad Operations Through Willmar

Willmar is a regional hub on the BNSF network. The Willmar Terminal is the confluence of three BNSF subdivisions – the Marshall, Morris and Wayzata. The Marshall Subdivision runs southwest from the City of Willmar to the South Dakota border and further to the east to Sioux City, Iowa. The Morris Subdivision runs from Willmar to East Breckenridge, Minnesota. The Wayzata Subdivision runs from Minneapolis to Willmar, where it connects with the Morris and Marshall Subdivisions in the Willmar Terminal. **Figure 6** shows connections to Willmar on BNSF's network.

Because there is no bi-directional connection between the Morris and Marshall Subdivisions within Willmar, trains moving north and south between these subdivisions must enter the Willmar Terminal to switch from one to the other. This switching operation results in delays in freight shipments at regional and local levels. It also consumes rail yard and mainline capacity that would otherwise be used for other through trains (those that do not need to switch subdivisions) and switching for local businesses. This condition causes delays in freight shipments to and through the area – not just the trains that are required to make the switch between subdivisions.

These delays, and the associated costs, increase as rail traffic grows. Additionally, there is potential for Willmar to become more of a congestion point in BNSF's network based on the role it plays in connecting to multiple subdivisions.

2. Freight Rail Traffic Fluctuations

Over the past decade, the rail industry has experienced a number of market driven fluctuations in demand for service. A peak occurred when the rail industry in the United States grew by 800,000 rail car loads in 2013, where BNSF accounted for half of that expansion. In 2014, volumes continued to increase and BNSF continued to handle the largest portion of these additional units. Rising crop yields, a growing energy industry, and the revitalization of selected manufacturing sectors contributed to the rise in train volumes.

Rail traffic levels within Willmar grew during that time period and have decreased slightly, with demand for switching between the Marshall and Morris Subdivisions now at

approximately four trains per day. **Figure 7** shows historic train volumes per day on the Marshall and Morris Subdivisions, as well as other subdivisions in the Upper Midwest.

National analysis of the railway network suggests that rail traffic growth will not be occurring at the rates previously experienced – but that rail traffic will continue to maintain its current levels as well as experience growth due to the nation's population increase and the expansion of the Panama Canal, which will increase access to and from Gulf Ports and Asian markets. Both of these reflect long-term railway demand, not necessarily immediate and intensive growth. (Source: Federal Railroad Administration, MnDOT, and economic activity data from the Association of American Railroads.)

Locally, over the 20-year planning horizon, the Willmar Terminal is expected to experience longer and more frequent trains that will put additional pressure on rail traffic in Willmar due to general economic growth.

3. National Network Operations

At the national level, bottlenecks on the railway network related to terminals in Minneapolis and Chicago can act as constraints. Increases in rail traffic related to crude oil and other freight have resulted in congestion in rail terminals and along a number of subdivisions as they have approached certain destinations, including Minneapolis and Chicago. The Minnesota Statewide Rail Plan (2015) noted that: "the North Dakota Oil boom resulted in a rapid increase in crude oil and silica sand transported by rail through Minnesota. This increase in traffic has significantly impacted rail and roadway congestion, safety and quality of life. Despite volatility and uncertainty in crude oil prices, current levels of crude-by-rail unit train activity are expected to continue, and could increase significantly with a future rise in worldwide oil prices and increasing crude oil extraction from North Dakota and Canadian sources."

In addition, the Minnesota Statewide Rail Plan indicated that BNSF has invested heavily in its network over the past several years to address capacity needs and safety needs (including upgrading of positive train control), and has identified the need for additional improvements on its network, including the Marshall, Wayzata, and Morris Subdivisions (see **Figure 6** for the location of the Subdivisions). The improvements that BNSF has previously made and has identified for future investment could enable freight trains, including unit trains transporting crude oil, to travel from North Dakota to refineries in the southern United States while avoiding bottlenecks and population centers in Minneapolis and Chicago. Presently, the lack of a direct connection between the Morris and Marshall Subdivisions limits the ability to move trains completely north-south without switching Subdivisions in Willmar or travelling through locations such as Minneapolis and Chicago.

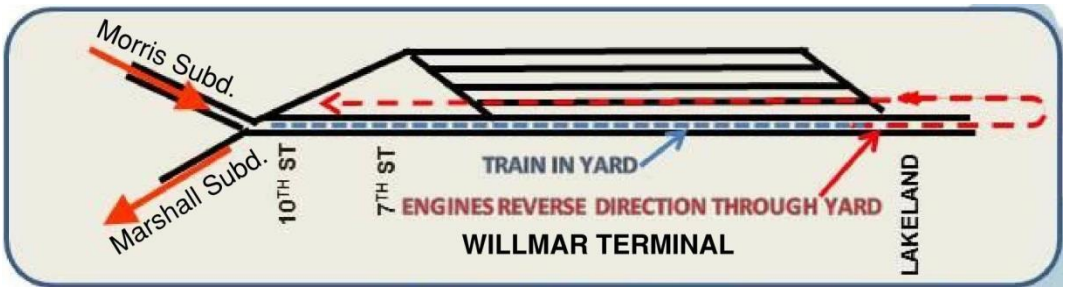
4. Railroad Operations in the Willmar Terminal

The lack of connection between the Morris and Marshall Subdivisions requires trains moving north and south between the subdivisions to enter the Willmar Terminal and remain parked within the rail yard while the engines of the train are moved from the front of the train to the back of the train. The train may then leave the yard on the other subdivision. **Exhibit A** shows the movements that must be made in order to switch between the Morris and Marshall Subdivisions within the Willmar Terminal. This move consumes yard and mainline

railway capacity that would otherwise be used for switching cars to serve local businesses and moving through trains that do not require switching.

In addition to the time that it takes to switch the engines from one end of the train to the other, there is some additional delay as the trains slow to enter and leave the rail yard. Through trains can travel at speeds of up to 30 miles per hour (mph) through the yard, but switching trains must slow down to 5 mph as they approach the yard.

Exhibit A – Switching Movements within the Willmar Terminal



Source: BNSF

5. Motorized and Non-Motorized User Delay at At-Grade Railroad Crossings

Beyond the impacts to regional and local railway operations, the switching of trains between the Morris and Marshall Subdivisions within the Willmar Terminal also has a negative impact on local traffic movements for pedestrians, bicyclists, and motor vehicle users. **Figure 8** shows the locations of the at-grade railway crossings near the Willmar Terminal along with the distances between the crossings. Most notably impacted are the 7th Street SW/NW and 10th Street NW at-grade crossings. The photo below represents a common crossing delay experienced at the 7th Street at-grade crossing.

Photo 1 – Typical Crossing Delay on 7th Street

Motorized Traffic Delays Near Willmar Terminal

The occupation of 7th Street SW/NW and 10th Street NW at-grade crossings for extended periods, multiple times per day, means that motorists and non-motorized users destined for jobs, shopping, recreation or local travel experience extremely long waits, or must alter their travel patterns, resulting in additional delay for their trips. Because train traffic is not predictable, motorists, bicyclists and pedestrians cannot anticipate when the at-grade crossings will be occupied, and they do not know what type of train (through or switching) may be approaching the intersection until the train stops. As a result, they have no way of knowing if the delay will be the typical three to five minutes for a through train or 10 minutes or more for switching trains. If a through train happens to be behind a switching train, the delays are increased. Delays are also increased on the one grade separated crossing for motorized vehicles within the Willmar Terminal, located at 1st Street/Business US 71, due to the traffic diverted from the routes with at-grade crossings.

According to traffic counts, approximately 9,550 vehicles used the at-grade crossings on 10th Street SW/NW, 7th Street NW and Lakeland Drive corridors (corridors that cross the Willmar Terminal at-grade) on a typical day (**Table 1**). While not all motorists experience the delay associated with the trains performing the switching operation, those impacted often choose between waiting at the crossing or finding an alternate route. Both of these options result in additional delay to their trip.

Table 1 – 2014 Average Daily Traffic (ADT) on At-Grade Intersections near the Willmar Terminal

Crossing	2014 ADT
Lakeland Drive	4,850
7th Street NW	2,800
10th Street SW/NW	1,900
Total Traffic Using At-Grade Intersections near the Willmar Terminal	9,550

Source: MnDOT

Video cameras were used to collect rail and motorized vehicle data in June of 2016 at the three at-grade crossings near the Willmar Terminal to observe the frequency and duration of gate closures related to the switching operations and the consequent impacts to traffic. It was observed that the trains switching between the Morris and Marshall Subdivisions result in an average gate closure at 7th Street of approximately 9.1 minutes when they enter the Willmar Terminal and again when they leave the Willmar Terminal. At 10th Street, the average gate closure was 7.3 minutes in each direction. The observed trains blocked the crossings while entering and exiting the Willmar Terminal, but had sufficient storage area between Lakeland Drive and 7th Street that they did not occupy crossings when the engines are switched from one end of the train to the other. However, the engines do cross 7th Street, 10th Street, and Lakeland Drive intersections when they are switching. Including the gate closure time for engines to go back and forth over the crossing when switching directions, it was estimated that the average gate closure time at the 7th Street and 10th Street railroad crossings for trains switching directions in the Willmar Terminal is 10 minutes when the train enters the Willmar Terminal and 10 minutes when the train exits the Willmar Terminal, or a total of 20 minutes. Time at the Lakeland Drive intersection was not included

in the delay calculations, although there is a short period of time that the gates are closed due to the engines being driven from one end of the train back to the other. As stated previously, past and future demands anticipate 30 minutes of total delay per train. Thus the 20-30 minute range of estimated delay is used throughout this document.

In order to get a good estimate of the number of vehicles impacted by these gate closures, hourly traffic counts were obtained at each of the crossings for a full week in June of 2016. Since some vehicles may choose to avoid the at-grade crossings at 7th and 10th Streets when the gates are closed and use the Business TH 71 bridge instead, alternate routes and corresponding travel times were calculated. The total distance from one side of the 7th Street railroad crossing to the Business TH 71 bridge and back to the other side of the railroad crossing is 1.4 miles and would require approximately 6 minutes of travel time. For the 10th Street crossing the distance is 1.8 miles and the travel time is 8 minutes. The actual delay for the vehicles bypassing the crossings using Business TH 71 depends on their final destination. Since the additional travel time on the detour route is comparable to the average delay time at the crossing when there is a gate closure, the average delay at the crossing was used for this analysis.

Based on information provided by BNSF and video recordings of the Willmar Terminal, a baseline scenario of up to six trains per day was estimated for future trains switching between the subdivisions. It is anticipated that the up to six trains would be spread out during the course of the day. For the analysis, trains were assigned to enter the Willmar Terminal during hours 1am-2am, 4am-5am, 7am-8am, 12pm-1pm, 5pm-6pm and 10pm-11pm and leave during the subsequent hours in each case, occupying the gates at 7th and 10th Streets for 10 minutes each way. The number of vehicles impacted at each crossing when a train passes through is calculated for each hour as:

$$\text{Vehicles Impacted} = \frac{\text{Average Gate Closure Time in minutes}}{\text{60 minutes}} \times \text{Hourly Volume}$$

The delay for these vehicles is calculated by multiplying the number of vehicles impacted by average delay expected per vehicle of 5.5 minutes.

The total volume of traffic impacted by the switching trains is estimated to be 412 vehicles on an average weekday. The total estimated delay for these 412 vehicles is 2,285 minutes per day, or 38.1 hours per day. After accounting for weekend delays, this equates to a total of 244 hours of delay per week for both crossings, or 12,677 hours per year based on existing volumes.

The cost of additional travel time according to MnDOT Office of Transportation System Management is $16.80 for automobiles and $28.30 for trucks per hour. Assuming 95 percent of the vehicles are automobiles and 5 percent are trucks, the cost of this additional delay per year is approximately $202,300 for automobiles and $17,950 for trucks for a total of $220,250 per year.

<u>Traffic Delays Beyond the Willmar Terminal</u>
In addition to delays at the at-grade crossings adjacent to the Willmar Terminal, there are delays to motorized vehicles at the at-grade crossings on both the Morris and Marshall

Subdivisions as one-mile long trains slow their speeds to approach and leave the Willmar Terminal. While approaching the Willmar Terminal on either subdivision, trains slow their speed from about 30 mph to about 5 mph in preparation for stopping. This means slowed trains occupy several at-grade public road crossings for longer durations than those that do not switch subdivisions, causing additional delay for motorists and non-motorized users. **Exhibit B** shows the at-grade crossings that can be impacted by slowing trains that will be switching between subdivisions as well as for through trains that get behind switching trains and are waiting for the switching trains to get from one subdivision to the other.

Exhibit B – Crossings that can be Occupied/Blocked due to Switching Trains

Source: BNSF

The public at-grade railway crossings that may be affected (beyond the crossings adjacent to the Willmar Terminal), depending upon train length of trains, include:

- 19th Street (Morris)
- County State Aid Highway (CSAH) 5/30th Street NW (Morris – northern crossing)
- Trott Avenue (Marshall)
- Willmar Avenue (Marshall)
- 30th Street SW (Marshall – southern crossing)

Traffic volumes at these at-grade railway crossings ranged from 1,250 vehicles at 19th Street to 7,000 on 30th Street NW/CSAH 5 in 2014.

If a train is slowing to enter the Willmar Terminal from the Morris Subdivision to go south on the Marshall Subdivision, a total of 11 crossings (ones within the Willmar Terminal are counted twice – once on the way in and once on the way out) will experience delay due to the switching of the trains.

Bicycles and Pedestrians

The delay caused by switching trains is particularly burdensome for pedestrians and bicyclists, due to the spacing and location of grade separated crossings. The distance between the at-grade crossing at 10th Street and the grade separated crossing at 1st Street/Business US 71 is over 3,700 feet, or almost three-quarters of a mile away. This does not include the distance that the pedestrian and/or bicyclists would have to backtrack to get back to 10th Street. In total, it is over a mile and a half out of the way for pedestrians and bicyclists.

Emergency Response Times

The delays and additional travel times to use alternate routes are particularly important for emergency responders (fire, police, and ambulance) and school buses that are on time-sensitive trips. Some emergency responders currently require their drivers to use the grade separated crossing at 1st Street/Business US 71 for all calls to the northern portion of the city as a matter of policy due to the uncertainty associated with the types of trains that are coming through the downtown rail yard. This can add 4-5 minutes to an emergency response call, especially for calls in the northwest part of the city.

6. Motorized and Non-Motorized User Safety at At-Grade Railroad Crossings

Within Willmar, the total number of crashes involving trains and motorized vehicles and/or pedestrians is low, as would be expected in locations with gates and active warning devices. Data from FRA's database of crossing locations for 7th and 10th Streets and Lakeland Drive have had a total of 16 crashes between 1975 and 2014. None of these crashes has resulted in an injury or a death – they were all property damage only.

There have also been crashes between motorized vehicles at all three at-grade crossings (10th Street SW/NW, 7th Street NW, and Lakeland Drive) that have likely been influenced by vehicles delayed or slowed by trains occupying the crossing. For example, there were two crashes that occurred in 2007 and 2010 on 10th Street where a vehicle was backing up and backed into another car by the railway crossing. It is likely the driver got tired of waiting for the train to pass through the area and was trying to go to an alternate route. Both crashes resulted in property damage, and no injuries. Backing into other vehicles also occurred on Lakeland Drive (in 2007) and 7th Street (in 2014) at locations near the at-grade crossings. One crash occurred at each location and resulted in property damage. Similarly, there have been rear end crashes on these routes where drivers were likely slowing due to trains crossing and were hit by another motorist. This occurred on both 7th Street and Lakeland Drive. Between 2006 and 2013 there were six of these crashes that resulted in property damage. **Appendix R** has crash data for the intersections.

Pedestrians and bicyclists that are approaching at-grade crossings may take additional risks in trying to cross the track in advance of approaching trains so that they do not have to wait for the trains to travel through the area or divert. Video surveillance from June of 2016 showed pedestrians crossing through train cars while the train was stopped/occupying at-

grade crossings in downtown Willmar. While no reported crashes between pedestrians/bicyclists and trains have been reported, the at-grade crossings with sustained delays provide risk for such an event.

7. Economic Development

Willmar is a regional trade center for Kandiyohi County and west-central Minnesota. The community was originally rooted in agriculture, but has experienced some diversification of its economy into the medical, educational, and retail sectors. Within the west-central region of Minnesota, many rural communities have experienced population and employment loss. However, Willmar has been able to maintain and attract both people and businesses.

According to the 2014 American Community Survey, the City of Willmar had just under 20,000 residents and the micropolitan statistical area [1]had approximately 42,300 residents. The median household income in the City of Willmar is approximately 45 percent below the Minnesota median household income, placing it within the low end of the income range for a middle income community. The 2014 American Community Survey estimated the percent of individuals below poverty level in the City of Willmar at 22 percent.

The city and its partners (Kandiyohi County, the Joint Economic Development Commission, the city's Airport Commission, private entities, and other governmental units) have been implementing policies and plans to help increase economic growth. Since 2005, there have been several major public investments through local, regional, state, and federal funding sources for planning and encouraging economic development. These activities have included: constructing a new municipal airport; investing in local, county and state roadway improvements; constructing a new wastewater treatment facility; building a new sewer interceptor within the southern part of the community; and developing an industrial park on the old municipal airport site, where some roadways and utilities were built in 2015. Overall, $118 million have been invested to support planned growth and development and to foster the growth of jobs that offer sufficient wages and benefits to support middle class opportunities within the community. **Figure 9** shows the public investments that have been made over the past decade.

One of the key elements that is lacking in the implementation of the city's plans is enhanced freight connectivity for the industrial development on the old municipal airport site. With a railway component, the industrial park would be served by all three major freight modes (air, rail and truck), allowing it to serve as a regional trans-shipment hub. The basic roadway infrastructure and utilities have been built, and there is easy access from TH 40 west to the new airport. The industrial park plan calls for a railroad spur line to create a competitive edge in attracting tenants to the area that offer higher-paying jobs.

[1] Micropolitan statistical areas are geographic entities delineated by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics, including U.S. Census data. A micropolitan area contains an urban core of at least 10,000 but less than 50,000 population.

8. Quality of Life

The existing conditions at the Willmar Terminal, the proximity of trains to downtown and residential areas, and the complicated operations in the Willmar Terminal cause increased noise, vibration, emissions, safety concerns, and traffic delays that all contribute to a reduced quality of life for people who live, work, visit, and play in Willmar.

The traffic delays resulting from the train switching operation between subdivisions within the Willmar Terminal, as well as delays at other at-grade crossings, create safety concerns, increased emergency response times, and added stress for community residents and workers. These conditions also contribute to additional diesel and automotive emissions that are experienced by community members. This exposure, along with the associated noise and vibration, reduces quality of life.

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III. ALTERNATIVES

In addition to the No Build Alternative, Build Alternatives, as shown in **Table 2**, were considered for:

- New railroad connection (three alternatives considered)
- Roadway modifications to TH 12 due to new railroad connection (two alternatives considered)
- Railway crossing of TH 40 (three sub-options considered)
- Railway crossing of CSAH 55/1st Ave W (three sub-options considered)

Table 2 – Alternatives Considered

Railway Alternatives	Description	Related Figure
RR-1	Connection west of CSAH 55 on existing MnDOT right of way	**Figure 10**
RR-2	Loop track east of Willmar Terminal	**Figure 11**
RR-3	Connection east of CSAH 55 (recommended)	**Figure 12**
TH 12 Alternatives	**Description**	**Related Figure**
TH12-1	Roadway reconstruction alternative – bridge on existing TH 12 alignment	**Figure 13**
TH12-2	Roadway relocation alternative – realign TH 12 (recommended)	**Figure 14**
TH 40 Crossing Sub-Options	**Description**	**Related Figure**
TH40-1	TH 40 grade separated crossing (recommended)	**Figure 15**
TH40-2	TH 40 at-grade crossing	**Figure 16**
TH40-3	TH 40 – no crossing	**Figure 17**
CSAH 55/1st Ave W Crossing Sub-Options	**Description**	**Related Figure**
CSAH 55/1st Ave-1	CSAH 55/1st Ave W at-grade crossing with quadrant interchange at TH 12/CSAH 55	**Figure 19**
CSAH 55/1st Ave-2	CSAH 55/1st Ave W closed with at-grade intersection at TH 12/CSAH 55 and new access road (recommended)	**Figure 20**
CSAH 55/1st Ave-3	CSAH 55/1st Ave W closed with at-grade intersection at TH 12/CSAH 55 (no new access road)	**Figure 21**
No Build Alternative	**Description**	**Related Figure**
No Build	No construction of the railroad connection or realignment of roadways	**Figure 3**

Due to multiple project components (rail, road), a multi-step process was followed for the alternatives analysis. Different screening criteria were applied for the various elements of the Project to better identify differences, benefits and impacts associated with the alternatives.

A. No Build Alternative

The No Build Alternative would consist of no improvements being made to the project area's railroad network or roadways. BNSF would continue to switch trains between the Morris and Marshall Subdivisions within the downtown Willmar Terminal. The No Build Alternate does not preclude ongoing maintenance work or activities related to rerouting of rail traffic to other subdivisions. The No Build Alternate provides the basis of comparison, or benchmark, for the Build Alternatives and includes impacts associated with doing nothing. As part of assessment of the No Build Alternative, discussions with BNSF were conducted to determine if rerouting traffic to another subdivision was an option to address some of the needs previously documented (commodity fluctuations, regional operations, Willmar Terminal operations, motorized and non-motorized user delay and safety, and quality of life). Discussions with BNSF indicated that it is not cost-effective for BNSF to re-route trains to avoid Willmar Terminal if traversing Willmar enables the train to execute its origin-destination in the fewest total miles. Potential alternate routes add over six hours of travel time per train and approximately 2,300 additional gallons of diesel fuel. Thus, the No Build Alternative is not considered a practical solution to address long-term needs and is not pursued. The No Build Alternative was evaluated as further described in Subsection F as a basis against which to compare the Build Alternatives in the evaluation of environmental impacts, but was not identified as the recommended alternative because it does not meet the project purpose and need.

B. Railway Alignment Alternatives

Three railway alternatives were considered for the proposed project. A comparison of the railway alignment alternatives is summarized in **Table 3**. As shown in **Table 3,** only the alignment east of CSAH 55 (Alternative RR-3) would address all of the criteria established in the Purpose and Need. Additionally, it is an alternative that could be supported by the Federal Aviation Administration (FAA). Based upon the results of this screening, only the Railroad Connection East of CSAH 55 (Alternative RR-3) will be carried forward for additional study. The paragraphs below describe the alternatives considered.

1. Railway Connection West of CSAH 55 on MnDOT Right of Way (Alternative RR-1)

MnDOT acquired right of way many years ago for a future roadway connection between TH 12 and TH 23 that is no longer going to be built. Because that property is publicly owned, and the right of way is at least 200 feet wide throughout the corridor (large enough for the 200 feet width desired for railway improvements), this location was considered for a potential new railway connection between the Morris and Marshall Subdivisions. While this alternative removes the switching operation from the Willmar Terminal, it does not provide direct railway access to the industrial park. See **Figure 10** for the location of this alternative.

Table 3 – Railway Alternatives Evaluation

Alternative	Purpose and Need Criteria					Other Factors
	Improve local and regional rail operations	Reduce number of train trips that cause traffic/train delays in downtown Willmar	Improve motorized and non-motorized safety at railroad crossings	Improve quality of life	Facilitate economic development and rail-served development	No Federal Aviation Clearance Issues
RR-1: Railway connection west of CSAH 55 on MnDOT right of way	X	X	X	X		
RR-2: Loop track east of Willmar Terminal	X			X		X
RR-3: Railway connection east of CSAH 55	X	X	X	X	X	X

This alternative was eliminated from consideration due to its proximity to the new Willmar Municipal Airport. The proposed alignment falls within the runway protection zone (RPZ) and within the Willmar Municipal Area Joint Airport Zoning Board's Zoning Area A. FAA recommends that the RPZ remain free of structures – including roadway and railway facilities. The Airport Zoning Board ordinance also discourages these structures in Zoning Area A when other alternatives exist. Discussions with the FAA and MnDOT's Aeronautics Office indicated that the agencies opposed any construction of the project within the RPZ and that other options would have to be pursued. This alternative was rejected because other alternatives outside the RPZ could work for railway improvements and an alignment in the RPZ would not be supported by FAA or MnDOT Aeronautics. Additionally, this alternative would not provide a connection to the new industrial park and as a result would not be supportive of the economic development planned for by the City of Willmar and Kandiyohi County and identified in the purpose and need.

2. Loop Track East of Willmar Terminal (Alternative RR-2)

The second alternative considered for the railway that was ultimately rejected created a loop track east of the Willmar Terminal. **Figure 11** shows the location of this alternative. It would be located on agricultural land bounded by US Highway 71 to the east and the Wayzata Subdivision to the south. This alternative would not have FAA clearance problems associated with the RPZ. This alternative would provide space for trains to turn around without occupying the at-grade crossings within Willmar Terminal but it would not remove the switching operation from the Willmar Terminal and would not provide a direct north-south connection between the Morris and Marshall Subdivisions.

This alternative was eliminated from further study because it would not eliminate bringing the north-south train traffic into the City of Willmar and through the Willmar Terminal. Therefore, it would not reduce the number of train trips that cause traffic delays in downtown Willmar or improve safety at railroad crossings. Additionally, this alternative would not facilitate rail service to the new industrial park so would not be supportive of the rail-served development as planned by the City of Willmar and Kandiyohi County in the new industrial park.

3. Railway Connection East of CSAH 55 (Alternative RR-3)

The third rail alternative consists of an approximately 2.8-mile north-south railroad connection between the Morris and Marshall Subdivisions. This alternative is located slightly east (approximately 625 feet) of CSAH 55 as shown in **Figure 12.** This connection would eliminate the need to perform the switching operation in the Willmar Terminal currently required for trains moving between the Morris and Marshall Subdivisions. This alignment would result in a reduction in the number of trains entering the Willmar Terminal, which would provide benefits for regional and local railway service by eliminating delays for trains associated with switching engines from one end to the other. It would also reduce occupation of at-grade crossings within and approaching the Willmar Terminal, reducing delay to motorized and non-motorized users, including emergency responders. In terms of the national railway network, a direct connection between the Morris and Marshall Subdivisions would enable BNSF to route north-south traffic through Willmar to points south, and avoid bottlenecks and population centers in Minneapolis and Chicago.

The location east of CSAH 55 would avoid the airport's runway protection zone as well as Zoning Area A, and was supported by the FAA. This alignment would also avoid requiring any additional road crossings on the southern end of the corridor. The location east of CSAH 55 would enable a connection to the city's industrial park north of TH 40, which would support long-term plans for economic growth and development.

As stated above, this alternative is the only railroad alternative that meets the purpose and need of the project. Thus, the Railway Connection East of CSAH 55 is the alternative that will be carried forward for additional study.

C. TH 12 Alignment Alternatives

The construction of railway improvements would require modifications to the roadway system in the project area, including grade separation of roadway crossings, to address the purpose and need for the project. The greatest amount of roadway impact is related to TH 12, a high-speed principal arterial highway with approximately 7,000 vehicles per day in 2015. The recommended railway connection would require a crossing of TH 12.

Two alternatives were considered for TH 12 in order to provide a grade separation of the railway: (1) reconstruction of the existing roadway to accommodate a railway grade separation (**Figure 13**), and (2) relocation of the roadway (**Figure 14**). Both roadway alternatives are compatible with the recommended railway alternative and meet the project's purpose and need. Additional criteria were used to evaluate the roadway alternatives as summarized in **Table 4**.

The TH 12 roadway relocation alternative (TH12-2) was selected as the recommended roadway alternative, and is carried forward for additional study. Each TH 12 alternative and related local roadway improvements are described following **Table 4**.

Table 4 –TH 12 Roadway Alternatives Evaluation Summary

Evaluation Criteria	Alternative	
	TH12-1: Reconstruction Alternative (on retaining walls)	TH12-2: Relocation Alternative
Wetlands	9.0 acres* (1.3 acre TH 12 impact)	8.2 acres* (2.6 acre TH 12 impact)
Floodplain	No impact	1.5 acres** (0.8 acre TH 12 impact)
Section 4(f)	No impact	Temporary occupancy
Historic/Archaeological	No adverse effect	No adverse effect
Threatened and Endangered Species (state and federal)	Same	Same
Contaminated Materials	Same	Same
Visual Impacts	Noise wall, raised TH 12, and new CSAH 55 alignment	New TH 12 alignment
Noise	Impacts to neighborhood on the north side of TH 12 and residents near the at-grade crossing of the railway with CSAH 55/1st Avenue	Reduces noise to the neighborhood north of TH 12. No residences impacted at CSAH 55/1st Avenue due to no at-grade crossing
Environmental Justice	Noise and visual impacts (roadway on walls) for the neighborhood on the north side of existing TH 12, which is an EJ area	Shifts TH 12 away from neighborhood on the north side of TH 12 (reduces noise)
Right of Way (permanent right of way acquisition for roadway only)	Four total acquisitions/relocations of privately held properties Strip takings from 12 parcels for 55 acres (includes city-owned property)	Three total acquisitions/relocations of privately held properties Strip takings from 17 parcels for 123 acres (includes city-owned property)
Farmland	38 acres of prime farmland, farmland of statewide importance, and prime farmland if drained	67 acres of prime farmland, farmland of statewide importance, and prime farmland if drained
Safety	Winter safety concerns due to an extended TH 12 bridge susceptible to ice and blowing snow. Elevated roadway can create a hazard at driver eye level and there is limited space for snow storage which can result in additional blowing and drifting snow conditions.	Winter safety concerns related to traditional sized TH 12 bridge susceptible to ice and blowing snow. Additional snow storage would be available beyond the bridge limits.

Table 4 –TH 12 Roadway Alternatives Evaluation Summary (Continued)

Evaluation Criteria	Alternative	
	TH12-1: Reconstruction Alternative (on retaining walls)	**TH12-2: Relocation Alternative**
Traffic Operations	Acceptable capacity and level of service	Acceptable capacity and level of service
Improves quality of life	Noise levels increase for neighborhood north of existing TH 12	Noise levels decrease for neighborhood north of existing TH 12
Enhances economic development in the industrial park	No direct access to industrial park	Direct access to industrial park
Construction Costs (roadway only)	$26.7 million	$20.2 million
Maintenance Costs	Additional annual and lifecycle costs related to tall retaining walls and skewed bridge over the railway on TH 12. Skewed bridges result in additional cracking due to uneven loads, the need for longer expansion joints, and the fact that the abutment cannot tie straight into the bridge deck. Additional retaining wall costs are associated with required inspections.	Additional annual and lifecycle costs related to extended realignment of TH 12 and new right of way maintenance activities associated with ditches and mowing.

* All roadway elements – TH 40, CSAH 55 and TH 12

** Roadway elements – TH 12 and CSAH 55. No TH 40 impacts

1. Roadway Reconstruction Alternative (Alternative TH12-1)

Figure 13 shows the roadway improvements required with the new railway connection and maintaining TH 12 on its current alignment. Starting at the southern limits of the project, the following roadway modifications would be made:

- The new railway connection would include crossing of TH 40 and CSAH 55/1st Avenue W if no roadway modifications were made. Modifications to TH 40 and CSAH 55/1st Avenue W were evaluated further as sub-options in Subsections D and E. Under the base alternative a grade separation between the new railway and TH 40 was proposed and an at-grade intersection between the new railway and CSAH 55/1st Avenue W was proposed. **Figure 13** shows the grade separation option at TH 40 and an at-grade intersection at CSAH 55/1st Ave W.

- CSAH 55 would be realigned starting approximately 2,100 feet south of the western leg of 1st Avenue West and would curve towards the west and north and reconnect with TH 12 approximately 2,400 feet west of the intersection of TH 12 and 45th Street NW (on the north side of TH 12), a total realignment of approximately 5,800 feet (including some minor local connections and cul-de-sacs. Additionally, shoulder widening would be provided on CSAH 55 within the project area where needed.

- The intersection of CSAH 55/1st Avenue W/45th Street NW (on the south side of TH 12) would be reconfigured to create a 90-degree intersection between 1st Avenue W (east-west leg) and CSAH 55 (north-south leg) and a new local cul-de-sac that would serve 45th Street NW and the businesses located along it on the south side of TH 12.

- 45th Street NW on the south side of TH 12 would be disconnected from TH 12 and would have a cul-de-sac at its northern limits. The cul-de-sac would be needed to serve the existing businesses located along 45th Street NW. This connection to TH 12 would have to be eliminated due to the crossing the new railway alignment and the elevation of TH 12.

- A new driveway connection would be needed from CSAH 55 to provide access to the mini storage site (its access would be removed from TH 12).

- 45th Street NW on the north side of TH 12 would be disconnected from its present location and rerouted approximately 2,400 feet to the west and aligned with the new CSAH 55 intersection on the south side of TH 12. The existing connection to TH 12 would be eliminated due to the crossing of the new railway alignment and the elevation of TH 12. This intersection would have an at-grade crossing with the railway. It would be located at an existing private crossing that currently serves two properties. Updates would need to be made at the crossing to install gates, lights and bells.

- TH 12 would be reconstructed from 7th Avenue W to approximately one mile to the east. TH 12 would have to be raised on retaining walls in order to accommodate the new railway connection within the limited right of way. Approximately 4,000 feet of

retaining walls would be needed that would start about five feet underground and go up to approximately 40 feet in height.

- Due to the curve in the connection of the new railway alignment into the existing Morris Subdivision mainline, the skewed TH 12 roadway would require a longer bridge span, which would limit construction options to steel beams rather than a choice of concrete or steel.

- This alternative (with the TH 40 sub-option that keeps the roadway in place – discussed in Subsection D) would require replacing the existing crossing Hawk Creek (County Ditch 10) on TH 40 west of CSAH 55 and would require the reconstruction of the existing intersection of TH 40 and CSAH 55 in order to accommodate a grade separation of the railway on TH 40 just east of the TH 40/CSAH 55 intersection.

In evaluating this alternative, some benefits were documented. Keeping TH 12 on its existing alignment (Alternative TH 12-1) would have the following benefits over Alternative TH 12-2:

- No floodplain impacts would occur under this alternative. This is approximately 1.5 acres less than TH 12-2.

- Farmland impacts would be approximately 66 acres. This is approximately 27 acres less than TH 12-2.

- Right of way acquisition would result in fewer strip takings and fewer acres. Strip takings are approximately 55 acres. This is approximately 68 acres less than TH 12-2.

A number of concerns and project risks were identified with this alternative. The raising of TH 12 over the new railway connection would create a number of issues. These issues include:

- Noise for Environmental Justice properties. There are Environmental Justice populations (discussed further in Section IV.B.3) located along the north side of TH 12. The modification in the roadway would lead to an increase in sound levels for homes located in this area. To mitigate for noise, a noise barrier would be needed, which would also contribute to changes in visual impacts in the area.

- Driver safety. Driver safety on an elevated roadway is a concern for MnDOT maintenance staff. If TH 12 were on walls for a long distance, as is the situation with option TH 12-1, it would be more exposed to winds and blowing and drifting snow, which creates icy conditions and can negatively impact driver visibility.

- Snow storage and maintenance. An elevated TH 12 would not have locations for snow storage. Snow would have to be removed from site. It could not be pushed over the side of the highway onto the BNSF Railway located adjacent to it. It also creates a condition where additional blowing and drifting can occur across the travel lanes because there are limited places for the snow to go.

- Visual impacts associated with raising TH 12 by approximately 40 feet. The size of the retaining walls would affect the character of the area for nearby properties and the travelling public. TH 12 serves as the western gateway to the City of Willmar, and raising the grade of TH 12 would provide a different view to users.

- Additional costs. The costs associated with long and tall walls for TH 12 would add to project costs as would the costs for the skewed bridge (required to use steel instead of providing an option for concrete). Along with the initial construction costs, tall walls and skewed bridges require additional maintenance activities throughout the project's lifecycle.

For the reasons listed above, Alternative TH 12-1 was rejected.

2. Roadway Relocation Alternative (Alternative TH12-2)

Due to the overall costs associated with the proposed project, and the potential impacts of 40-foot retaining walls, a value engineering process was followed to identify potential lower-cost roadway alternatives. The result was a second roadway alternative that proposed relocating TH 12 on a new alignment. This alternative (TH 12-2) is shown in **Figure 14**, and was selected as the recommended roadway alternative.

- The new railway connection would include crossing of TH 40 and CSAH 55/1st Avenue W if no roadway modifications were made. The crossings at TH 40 and CSAH 55/1st Avenue W were evaluated further as sub-options in the following subsections (Subsections D and E). Under the base alternative a grade separation between the new railway and TH 40 was proposed. **Figure 14** shows the grade separation option at TH 40.

- This alternative would allow for multiple options with CSAH 55/1st Avenue W and its intersection with the new railway alignment. These sub-options are discussed in Subsection E. **Figure 14** shows the recommended sub-option of removing the intersection between CSAH 55/1st Ave W and the railway and providing a new connection into the industrial park via realigned TH 12 east of the railway.

- TH 12 would be realigned to the south to eliminate the need for a skewed bridge over the railway and to eliminate constructing TH 12 on retaining walls. This would require approximately 12,700 feet (approximately 2.5 miles) of new alignment for TH 12. As shown on **Figure 14**, the new alignment would begin at approximately 7th Avenue NW and shift to the south, where it would cross 1st Avenue West. From there the roadway would continue slightly south and to the east where it would cross CSAH 55 and would cross the new railway connection. Once the new TH 12 would cross the railway, it would continue in an easterly direction and cross CSAH 5 at a signalized intersection. From CSAH 5, the new TH 12 alignment would extend to the east until it connected to the existing TH 12 corridor.

- Realigning TH 12 would require the removal of portions of the existing roadway. **Figure 14** shows this removal.

- The intersection of CSAH 55/ 1st Avenue W/45th Street NW (on the south side of existing TH 12) would be reconfigured to create a single intersection and a straight roadway connection. The geometrics would provide for a 90-degree intersection between the roadways.

- Shoulder widening would be provided on CSAH 55 where they are currently deficient within the project area.

- 45th Street NW on the south side of existing TH 12 would be curved to the west on the existing TH 12 alignment to provide a local connection on 45th Street NW both on the north and south sides of existing TH 12. This connection would also provide access to Willmar Poultry Farms and the fabric and tile warehouse (local businesses).

- 45th Street NW on the north side of existing TH 12 would be disconnected from its present location and rerouted approximately 2,400 feet to the west and connect to the new TH 12 as well as the existing TH 12 (discussed in the bullet above). The existing connection to TH 12 would have to be eliminated due to the crossing of the new railway alignment. This intersection would have an at-grade crossing with the railway. It would be located at an existing private crossing that currently serves two properties. Updates would need to be made at the crossing to install gates, lights and bells.

- This alternative would also include reconstructing the existing intersection of TH 12 and CSAH 5 at the eastern end of the project. There is currently a slight hump/bump between the intersection and the Morris Subdivision. The reconstruction would eliminate the hump/bump.

- This alternative (with the TH 40 sub-option that keeps the roadway in place – discussed in Subsection D) would require replacing the existing box culvert crossing Hawk Creek (County Ditch 10) on TH 40 west of CSAH 55 and would require the reconstruction of the existing intersection of TH 40 and CSAH 55 in order to accommodate a grade separation of the railway on TH 40 just east of the intersection.

A number of benefits were identified with Alternative TH12-2 over Alternative TH12-1. Realigning TH 12 to the south of its current alignment would provide the opportunity to move the railroad overpass bridge further south, eliminating the need for retaining walls and a skewed bridge. Eliminating the retaining walls would reduce project costs, lower long-term maintenance costs, and remove the visual impact associated with the expansive retaining walls. It would also provide an improved traffic condition during winter storm events by not creating an elevated hazard and improving snow storage capabilities. Another benefit is that it allows for greater stacking distance on CSAH 5 between the railroad tracks and TH 12, which should result in better operations at this intersection as the signal will no longer be tied to the railroad crossing. It would also have the benefit of reducing highway noise impacts to the neighborhood located on the north side of existing TH 12 which has a large Environmental Justice population. Realigning TH 12 to the south would also provide a

new direct access to the future industrial park. This is considered a benefit that supports the City of Willmar's long-term economic development goals.

In comparison to Alternative TH12-1, Alternative TH12-2 would result in an additional 1.5 acres of impact to the Hawk Creek floodplain, which would have to be mitigated for as part of the project. See Section IV.A.9 for more details on mitigation. It would also result in 29 acres more of farmland impacts (which are not mitigated for) and require approximately 68 more acres of right of way – much of which is owned by the City of Willmar, a project partner.

The new TH 12/CSAH 5 intersection would result in a temporary occupancy to Section 4(f) property (existing trail along CSAH 5). This impact is considered minor and would occur during a portion of the construction. See Section IV.B.7 for more details.

While this alternative would result in a new alignment, and thus change the views for drivers and a few homes near the new alignment, the overall visual impact would be less than the change in visual impacts associated with tall retaining walls and a noise wall in Alternative TH 12-1.

D. TH 40 Rail Crossing Sub-Options

TH 40, an east-west roadway owned and maintained by MnDOT, extends between the South Dakota border and the City of Willmar. TH 40 serves as the primary connection between Willmar and a number of communities to the west. Within the project area, TH 40 serves as the main connection between the city and the Willmar Municipal Airport. Three sub-options were considered for the crossing of TH 40 with the new railway alignment. The three sub-options were compatible with the recommended railway alignment and with both TH 12 alignments. The three sub-options discussed on the following pages include: (1) a grade-separated railway crossing of TH 40, (2) an at-grade railway crossing at TH 40, and (3) a closure of TH 40. **Figures 15 – 17** show the various sub-options. Additional criteria were used to evaluate the TH 40 sub-options as summarized in **Table 5**.

The grade separation is the recommended sub-option and is carried forward in the rest of the document.

1. TH 40 Grade-Separated Crossing (Sub-Option TH40-1)

The proposed railway connection, as shown in **Figure 15**, would cross TH 40 at a grade separated crossing just east of CSAH 55. With the grade separation sub-option, the intersection of TH 40 and CSAH 55 would need to be raised on all four approaches (TH 40 east and west of the intersection and CSAH 55 north and south of the intersection). Raising the intersection would require reconstructing the existing Hawk Creek box culvert ditch crossing located west of CSAH 55 on TH 40 and would require the removal of three homes currently owned by BNSF. Residents of the homes would have to be relocated.

Table 5 – TH 40 Sub-Options Evaluation

Sub-Option	Evaluation Criteria						
	Provides for rail and motor vehicle safety	Improves local and regional rail operations	Minimizes travel time and/or delay for emergency responders	Minimizes travel time and/or delay for business operations	Maintains connections to key local and regional destinations	Fewer property acquisitions	Supports economic development of industrial park
TH40-1: TH 40 grade separated crossing	X	X	X	X	X		X
TH40-2: TH 40 at-grade crossing					X	X	X
TH40-3: TH 40 closure/no RR crossing	X	X				X	

The advantage of this sub-option is that it would enable BNSF to utilize the mainline (and future siding) to park trains for up to 10–12 hours at a time in order to serve the adjacent industrial park; hold trains; and change crews without impacting motorized vehicle/non-motorized user traffic. It would allow trains to serve the industrial park without blocking vehicles. Additionally, the grade separated sub-option would allow TH 40 to remain in place and provide access to the industrial park, the Willmar Airport, and into the urbanized area of Willmar.

FHWA, FRA, MnDOT and BNSF discourage the creation of new at-grade rail and roadway intersections due to safety concerns. This sub-option would eliminate the need for an at-grade crossing on TH 40 and would enhance safety for both the train and motorized/non-motorized users.

This option would provide the best response time for emergency responders utilizing TH 40 between the urbanized area of Willmar and the Willmar Airport as they would not have to wait for trains (as with an at-grade crossing) and they would not be required to detour (as with the closure option).

2. TH 40 At-Grade Crossing (Sub-Option TH40-2)

This sub-option included an at-grade railway crossing at TH 40 (**Figure 16**). An at-grade crossing at TH 40 would not enable BNSF to park its trains on the railway without occupying the crossing. Therefore, stopping the train for an extended period to change crews or a similar purpose would either cause the same problems in this location that they currently cause in downtown Willmar or the trains would be required to go into the Willmar Terminal for these activities, thereby perpetuating the existing problems in downtown Willmar. Other reasons this sub-option was not studied for further consideration included:

- TH 40 serves as the primary connection to the airport. With an at-grade intersection, emergency response vehicles responding to emergency calls at the airport could be subject to additional delay by trains.

- Servicing the industrial park with railway connections would potentially result in trains going to the industrial park occupying the crossing at TH 40 – creating a new delay for motorists.

- It is the general practice and policy of FRA and FHWA to avoid the creation of additional at-grade rail crossings due to the potential for added safety risk. In general, BNSF does not support the creation of new at-grade crossings on its network.

3. TH 40 Closure (Sub-Option TH40-3)

The third sub-option considered terminating TH 40 in a cul-de-sac east of the proposed BNSF crossing, at the last driveway to a home along the corridor (**Figure 17**). Without TH 40 in place trains could be parked on the railway without occupying any at-grade crossings – thereby enabling the railroad to hold trains, change crews, and serve the industrial park.

The closure of TH 40 would reduce connectivity of the state and county roadway systems. The TH 40 designation would end at CSAH 55 to the west, and the remaining roadway would need to be turned back to the City of Willmar for it would no longer serve a state purpose.

Without TH 40 in place, emergency responders would have to use another route between the city and the airport. Within the project area there are very few continuous east-west routes, thereby requiring emergency responders to use TH 12 and a combination of other roadways; or 19th Avenue SW, CSAH 55 and TH 40 west of CSAH 55 in order to reach the airport. These alternative routes have the potential to add distance and time for emergency responders going to the airport. The additional travel time for emergency response was not acceptable to the City of Willmar or emergency responders. **Figure 18** shows the alternate routes.

E. CSAH 55/1st Avenue W Rail Crossing Sub-Options

Three sub-options were considered for the crossing of the proposed railway connection at CSAH 55/1st Avenue West. 1st Avenue is an east-west roadway. CSAH 55 runs north-south south of 1st Avenue W but turns eastward when it reaches 1st Avenue W. Where the roadway turns eastward, it is jointly recognized as CSAH 55/1st Avenue W until it reaches existing TH 12. The portion of roadway of interest for this sub-option evaluation is the joint CSAH 55/1st Avenue alignment.

CSAH 55/1st Ave W serves a number of industrial businesses located just south of existing TH 12 between the north-south portion of CSAH 55 and CSAH 5. Under all sub-options, the intersection between 1st Avenue West (western leg) and CSAH 55 would remain at-grade with some geometric improvements to make it a 90-degree intersection. The proposed railway would be located just east of this intersection.

A sub-option that was briefly explored, but was considered impractical, was a grade separation of CSAH 55/1st Ave W and the railway. A grade separation (roadway over the rail) at this location was not practical due to the adjoining land uses, the proximity of the intersection, and low traffic volumes. An option for the roadway to go under the railway was infeasible due to the elevation of the roadway compared to the water table.

Since grade separations were not realistic at this location, other sub-options were evaluated. The options focused on whether an at-grade crossing was appropriate or whether the crossing should be eliminated. FRA, FHWA and MnDOT all have guidelines and best practices that limit new at-grade crossings of railways for safety reasons. These crossings are generally the result of a new roadway connection on an existing railway. The agencies listed above do not have policies regarding new crossings that are created as a result of a new railway, nor do they have a set process for evaluating crossings in these situations. Due to the unique circumstances of this project and the sensitivity of a new crossing at this location, a more detailed analysis of the CSAH 55/1st Ave W sub-options considered is provided in **Appendix C**[2]. The results of the analysis are summarized in **Table 6**.

[2] Please note that alternatives and sub-options as described in the EA-EAW have different names and descriptions in the separate technical appendices, including Appendix C. For reference, Sub-Option CSAH 55/1st Ave-1 = Option 2A, Sub-Option CSAH 55/1st Ave-2 = Option 2B, and Sub-Option CSAH 55/1st Ave-3 = Option 2C.

Table 6 – CSAH 55/1st Ave W Sub-Options Evaluation

Sub-Option	Evaluation Criteria					
	At-Grade Railroad Crossing Safety Risk Factors	Annual Crash Costs	Annual Travel Time Costs	Construction Costs	Right of Way Costs	Roadway Transfers
CSAH 55/1st Ave W-1: At-grade crossing with quadrant interchange at TH 12/CSAH 55	Very Low	$3,184,585	$263,995	$5.5 million to $7.9 million	Less than $100,000	No transfer
CSAH 55/1st Ave W-2: 1st Ave W closed, at-grade intersection at TH 12/CSAH 55, and new connection to industrial area	None	$3,350,066	$359,629	$5.3 million to $8.8 million	$180,000	Approximately 1 mile of roadway jurisdiction transfer
CSAH 55/1st Ave W-3: 1st Ave W closed and an at-grade intersection at TH 12/CSAH 55. No new connection to industrial area (use existing TH 12)	None	$3,195,225	$415,456	$4.8 million to $7.98 million	None	Approximately 1 mile of roadway jurisdiction transfer

Three sub-options were evaluated for the crossing location:

- CSAH 55/1st Ave W-1: Constructing an at-grade crossing at CSAH 55/1st Ave W with a quadrant interchange at realigned TH 12/CSAH 55 (**Figure 19**)

- CSAH 55/1st Ave W-2: eliminating the CSAH 55/1st Avenue W intersection, providing an at-grade intersection at realigned TH 12/CSAH 55 rather than a quadrant interchange, and constructing a new access road from realigned TH 12 east of CSAH 55 to the industrial properties (**Figure 20**)

- CSAH 55/1st Ave W-3: eliminating the CSAH 55/1st Avenue W intersection and providing an at-grade intersection at realigned TH 12/CSAH 55 rather than a quadrant interchange (**Figure 21**)

The recommended sub-option is CSAH 55/1st Ave W-2.

As shown in **Table 6**, a variety of factors including safety, travel time, economic impacts, and jurisdictional issues were considered. The results of the detailed analysis found that the safety benefits of each option are similar. The difference between travel time impacts to the travelling public was found not to demonstrate a significant burden for any of the sub-options. Based on the findings of the detailed analysis, it was determined by FRA and FHWA that the potential benefits of an at-grade rail crossing would not justify the potential risks associated with the severity of crashes in locations with at-grade crossings. Thus, the at-grade crossing sub-option was eliminated from further analysis.

Based upon feedback from the property owners and businesses located along CSAH 55/1st Avenue W and input from local agencies, sub-option CSAH 55/1st Ave W-2 was recommended due to the fact that it included a new connection between realigned TH 12 and the businesses located along CSAH 55/1st Avenue W. This sub-option is carried forward for the remainder of the document.

The sub-options are summarized in greater detail on the following pages.

1. CSAH 55/1st Ave W At-Grade Crossing and Quadrant Interchange at TH 12/CSAH 55 (Sub-Option CSAH 55/1st Ave W-1)

Sub-option 1 (**Figure 19**) would include an at-grade railroad crossing with the new railway connection and 1st Avenue/CSAH 55 and a grade-separated intersection with TH 12 and CSAH 55.

An at-grade railway crossing at CSAH 55/1st Avenue W would maintain roadway access and traffic patterns similar to existing conditions by keeping a road connection from the businesses to the west. Motorized traffic would continue to circulate as it currently does today into the industrial area located on the north and south sides of the roadway.

Providing an at-grade railway crossing at CSAH 55/1st Avenue W would have an impact on the number of vehicles, particularly truck volumes crossing TH 12, at the intersection of TH 12/CSAH 55. Thus, a quadrant interchange design was proposed at this location. This design would reduce the number of potential conflicts at the intersection, decreasing the overall crash risk.

Advantages of this sub-option is that it had the greatest support from businesses located along CSAH 55/1st Ave W and had the lowest crash and travel time savings. Disadvantages of this alternative include the severity of crashes at locations with at-grade crossings of the railway. It was also inconsistent with FRA, FHWA and MnDOT practices with regard to limiting new at-grade railway crossings. For these reasons, this sub-option was not carried forward for further review.

2. CSAH 55/1st Ave W Closed, At-Grade Intersection at TH 12/CSAH 55, and New Connection to Industrial Area (Sub-Option CSAH 55/1st Ave W-2)

Sub-option 2 (**Figure 20**) would eliminate the at-grade crossing between CSAH 55/1st Avenue W with the proposed railway and would construct a traditional at-grade intersection between realigned TH 12 and CSAH 55. To maintain a second access in and out of the existing industrial businesses located along CSAH 55/1st Avenue W, a new local roadway connection between CSAH 55/1st Avenue and the new TH 12 alignment (east of the new railway) was identified. Several alignments for a new access road east of the proposed railway connection were discussed with the affected industrial property owners. The alignment shown in **Figure 20** was identified by the property owners as the preferred alignment for a new access road into the site.

Creating this new access road and eliminating the at-grade intersection on CSAH 55 would require transferring portions of CSAH 55 to the city and would create a new roadway that the city would be required to maintain. The project recognizes the associated costs of the new roadway and the costs to bring the portion of CSAH 55 being transferred from the county to the city up to current standards.

Since this sub-option would reduce the amount of traffic, particularly truck traffic, using CSAH 55 north of TH 12, it would decrease the volume of traffic and potential conflicts for through traffic at the TH 12/CSAH 55 intersection. Therefore, retaining an at-grade intersection at this location was considered feasible for this alternative.

This is the recommended sub-option.

3. CSAH 55/1st Ave W Closed and At-Grade Intersection at TH 12/CSAH 55. No New Connection to Industrial Area (Sub-Option CSAH 55/1st Ave W-3)

Sub-option 3 (**Figure 21**) would eliminate the at-grade crossing between CSAH 55/1st Avenue W and the proposed railway. Also, similar to Sub-option 2, the TH 12/CSAH 55 intersection would be at-grade. However, a new local roadway access between CSAH 55/1st Avenue W and realigned TH 12 would not be provided. Instead, access to CSAH 55/1st Avenue W and the industrial area would be provided only from its connection to existing TH 12 further to the east.

This sub-option would require all traffic going into the industrial properties on CSAH 55/1st Avenue W to access the area via its current connection to existing TH 12. Without a connection at on realigned TH 12, traffic coming from the south and west destined for the industrial area would have to travel further and would have to backtrack to get to their destination. This additional circulation was not supported by the local agencies and business owners due to truck traffic delay and costs associated with additional miles of travel.

F. Alternatives Under Consideration in the EA

1. No Build Alternative

Under the No Build Alternative, the proposed railroad connection would not be constructed and there would be no modifications to the local, regional, and state transportation network.

Instead, BNSF would continue to switch trains between the Morris and Marshall Subdivisions within the downtown Willmar Terminal. This would continue to perpetuate delays in regional and local railway service and limit opportunities to park trains for longer durations. Trains switching between the subdivisions would continue to occupy existing at-grade railway crossings within and approaching the Willmar Terminal resulting in continued delay and detouring of travel routes for motorized and non-motorized users, including emergency responders and school buses, which have time-sensitive travel. Unpredictability of train delays (not knowing if it is a switching train or a through train) would also be perpetuated. The potential for additional crashes, both train/vehicle and vehicle/vehicle crashes would continue and would increase as train and traffic volumes increase.

Quality of life beyond transportation delays would continue to decrease within downtown Willmar. Due to the idling of trains and motorized vehicles, emissions would continue and likely increase in the future when train traffic increases. Additionally, opportunities to serve the new industrial park with rail service, which is a key component of the city's planned economic development, would be impractical and cost prohibitive.

2. Recommended Alternative (RR-3, TH12-2, TH40-1, CSAH 55/1st Ave W-2)

The recommended alternative for further study (hereby also referred to as the Project) combines the following railway and roadway alternatives and sub-options: **RR-3** (Railway connection east of CSAH 55), **TH12-2** (TH 12 relocation), **TH40-1** (grade separated crossing), and **CSAH 55-2/1st Ave W-2** (CSAH 55/1st Ave W closed at railway, at-grade intersection at realigned TH 12/CSAH 55 and new industrial access road). This combined alternative is the alternative studied that best meets the purpose and need of the project and thus will be carried forward for additional study. See **Figure 22** for the recommended alternative layout. The following text details key components of the recommended alternative.

a. Railway components

The following paragraphs describe the key railway components of the Project.

<u>Mainline Railway Connection</u>

The railway project component (**Figure 23**) would include construction of approximately 2.8 miles (14,900 linear feet) of new north/south mainline track (the connection) between BNSF's existing Marshall and Morris Subdivision tracks that parallel TH 23 and CSAH 15 on the south, and TH 12 on the north. The new mainline track would have grade separated crossings with a realigned TH 12 and TH 40 that would enable trains to occupy the main line for extended periods while changing crews and serving the industrial park without impeding surface traffic.

The 200-foot right of way for the mainline and associated railway improvements described in the following sections would provide space for utility placement on both sides of the rail bed to serve BNSF facilities, such as signal bungalows, which are needed for operation of the mainline, siding and electric lock switches.

Railway Siding

The Project would include only the grading of a siding track paralleling the western side of the mainline for approximately 10,000 linear feet (starting approximately at the current location of CSAH 55/1st Avenue West and continuing to the south). Final construction (ballast, ties, tracks, etc.) would occur in the future if rail traffic volumes increase to the point where its use would be required. When the siding is constructed in the future, it would allow stopped trains to be passed on the main line and provide additional capacity to serve the industrial park. Current railroad volumes enable the recommended alternative to provide the operational benefits identified in this document without immediate construction of the siding.

Railway Spur Line

The Project would include rail bed grading and construction of a 500 linear feet spur line that could be extended by the City of Willmar to serve the City's industrial park, which is currently in the early stages of implementation. The construction would include a manual turnout from the new mainline south of realigned TH 12 and approximately 500 feet of alignment towards the developing industrial park on the old airport site. The proposed overpass at TH 40 would have enough room to accommodate a future spur if the industrial park expands further to the south in the future.

Railway Access Roads

The Project would include the construction of access roads for the railway. On the west side of the mainline and future siding, an access road would be constructed from the turnout on the Marshall Subdivision all the way north to the Morris Subdivision. The access road would be approximately 13 feet wide and would be unpaved. The access road would allow train crews to access the mainline track as well as the future siding (should rails be constructed in the future).

A second access road would be graded for on the east side of the railway between CSAH 55/1st Avenue W to the industrial spur turnout that will serve the industrial park. The access road on this side of the railway would enable BNSF crews to access the rail spur that serves the industrial park. The TH 40 bridge provides space for an eastern access road to be constructed in the future should the need arise for a rail spur to be extended south of TH 40. Like the other sections of access roadway, it would be unpaved and approximately 13 feet wide. **Figure 24** shows the various railway typical sections which show the mainline, spur line and access road features. **Figure 23** shows the locations of the typical sections (denoted as A-A through E-E).

Morris Mainline Extension and Turnout

The Project would consolidate two control points into a single control point and would reduce the amount of signal infrastructure needed to move trains from the Morris Line to the new mainline track. The design of the turnout from Morris Mainline 2 is proposed to be a dual control power #20 right hand turnout, consistent with BNSF design standards.

Key Track Design Elements

Track centers are proposed at 20 feet per current BNSF design standards for new construction. This standard allows for maintenance and switching activities to occur without flagging or other controlled track protection. When fully constructed (siding and spur lines) these dimensions would enable train crews to walk safely alongside a train that is parked on the siding or spur track while trains operate on the mainline at full speed. **Figure 24** shows the various railway typical sections. All railroad features would be constructed consistent with current BNSF design standards.

Large culverts (approximately 15 feet round) would be constructed to carry the railroad over Hawk Creek (County Ditch 10) just south of realigned TH 12 and County Ditch 46 (near the Marshall Subdivision). Smaller culverts would be needed at other locations on the railway to facilitate existing drainage and waterflow patterns. Filtration basins, ditch checks and other water best management practices (BMPs) would be constructed to address infiltration and water quality treatment. See Section IV.A.11 for more details.

b. Roadway components

The following paragraphs describe the key roadway components of the Project.

Relocation of TH 12

The Project would include the relocation of 2.5 miles of TH 12 between 28th Street on the southeast and just west of 7th Avenue NW on the northwest. The roadway would be constructed as a two-lane facility with dedicated left- and right-turn lanes at intersections, where appropriate. The design would be rural, with ditches used to convey stormwater runoff. Travel lanes are anticipated to be 12 feet wide, shoulders would be 10 feet wide and turn lanes would be 12 to 13 feet wide (these widths may be adjusted slightly during the detailed design phase). **Figure 25** shows the typical roadway sections for TH 12 and the other roadways included in the Project.

All proposed intersections with the realigned TH 12 would be side street stop controlled with the exception of CSAH 5. At relocated TH 12 and CSAH 5 there would be a traffic signal. A traffic signal would be needed at this location due to the traffic volumes on both roadways. See **Appendix B** for the traffic study that includes information on traffic volumes.

An existing box culvert (Bridge 8468) located at the eastern end of the realignment where the realigned TH 12 and existing TH 12 come back together would be replaced. Extension of the bridge was evaluated, but rejected as the existing bridge is inconsistent with current design and deficiency standards.

Additionally, four new larger culverts (estimated at 48 inches and greater) would need to be constructed along the realigned corridor. One would be on County Ditch 12 – located just west of CSAH 5. One would be located just east of the new industrial access roadway and two would be located west of CSAH 55. One of these is along an unnamed tributary of Hawk Creek. The culvert sizes may be adjusted during the final design phase. See Section IV.A.11 for more details and **Figure 31** for the location of larger culverts.

A grade separation of the railway would be included as part of the TH 12 relocation.

Roadway Grade Separations

The Project would include two grade separations with roadways that intersect with the railway improvements. These are located at TH 12 and at TH 40. The grade separation at TH 12 would enable BNSF to accommodate the 10,000-foot long railway siding, the mainline, and access roads.

The TH 40 grade separation allows for the railway siding, the mainline, both access roads, and the spur line (to accommodate future industrial park expansion south of TH 40). The grade separations would also accommodate drainage ditches alongside the track structure for stormwater flows. The TH 40/CSAH 55 intersection located west of the new rail connection would be raised to meet the TH 40 overpass grade as it descends westward.

Preliminary typical sections and design elements for bridge areas over the railway are provided in **Appendix D**.

Roadway Closures and New Connections

The existing 45th Street NW on the north side of existing TH 12 would have its current access with TH 12 closed. It would also have its current at-grade railway crossing closed. 45th Street NW on the north side of existing TH 12 would be realigned approximately 2,400 feet to the west and would have an improved at-grade railroad crossing (change from a private crossing with no warning systems to an active warning system with flashing lights, gates, and bells).

The existing 45th Street NW on the south side of existing TH 12 would have its current access with TH 12 closed. Instead it would bend west just south of existing TH 12 and continue west to go past a local business and then tie into existing TH 12 to provide a local roadway connection with the realigned 45th Street NW on the north side of existing TH 12.

The existing CSAH 55/1st Avenue W segment of roadway between the proposed railway and the north south portion of CSAH 55/1st Avenue West would be eliminated as part of the Project to prevent an at-grade crossing of the new railway. In order to serve the businesses located east of the railway; a new roadway connection would be constructed between the realigned TH 12 and CSAH 55/1st Avenue West east of the proposed railway.

Roadway Removals

The proposed roadway modifications would include the removal of portions of existing roadways. Roadways where removals would occur are shown on **Figure 22** and are located on TH 12, CSAH 55, 1st Avenue W, 45th Street NW, and 7th Avenue NW.

Due to the relocation of TH 12, portions of existing TH 12 would be removed. These segments are shown in Figure 22. The segments of roadway removed do not provide a direct connection to any businesses or residential properties and all properties have access from another roadway.

A small section of CSAH 55 would be removed near its junction with 1st Avenue W. The segment of roadway that would be removed includes the crossing with the new railway alignment.

A segment of 1st Ave W would be removed from its junction with the relocated TH 12 to approximately 750 feet to the east. This segment of roadway was removed to minimize access to TH 12 and due to the fact that properties along this segment of roadway would haves access off of CSAH 55.

A short segment of 45th Street NW on the north side of existing TH 12 would be removed as part of its realignment. See section above.

A short segment of 7th Avenue NW (slightly under 700 feet) would be removed between realigned TH 12 and to the west. This segment of roadway was removed due to its proximity with the start of the TH 12 realignment (too close to have an intersection after curving onto the new alignment) and due to the fact that it had another connection to TH 12.

Existing Intersection Modifications

Beyond the realignment of 45th Street NW on both sides of existing TH 12, there are two major intersection modifications and a few minor changes. The two primary intersection modifications include the 1st Avenue W, CSAH 55 and 45th Street NW (south of TH 12) intersection reconfiguration. As shown in **Figure 22**, that intersection, which currently has multiple legs, would be cleaned up to provide a 90-degree intersection between 1st Avenue W (west of the north-south segment of CSAH 55), CSAH 55 and 45th Street.

The second larger intersection modification is the intersection of TH 40 and CSAH 55. This intersection would generally keep its existing horizontal alignment, but would have to be raised vertically to accommodate the new railway grade separation to the east. Raising the roadways would require the replacement of the existing culvert on TH 40 over Hawk Creek.

Other minor intersection changes include cul-de-sacing of 1st Ave W west of CSAH 55 and 7th Ave NW west of the TH 12 realignment. Additionally, the existing intersection at TH 12 and CSAH 5 would be modified to remove the existing traffic signal (to be relocated at the intersection of CSAH 5 and relocated TH 12) and would have an existing hump/bump located on the north of the intersection and south of the Morris Subdivision removed through the reconstruction of this intersection.

Large Culvert Modifications

The Project would require the construction of numerous culverts to facilitate water flow and existing drainage patterns. Larger culvert (48 inches and larger) modifications would be needed on realigned TH 12 (as discussed above), CSAH 55 and TH 40. Culvert sizes included in this document may be adjusted during the final design and permitting phase of the project. Information included in this document is what is what is currently anticipated as being needed.

Bridge 91329, a culvert that carries TH 40 over Hawk Creek (County Ditch 10), would be replaced as a part of the intersection modifications at TH 40 and CSAH 55. The existing bridge is a 14-foot by 10-foot box culvert. The bridge is located 600 feet west of the TH

40/CSAH 55 intersection. With the grade separation of TH 40 over the proposed railroad connection, the intersection of TH 40 and CSAH 55 would need to be raised on all four approaches (TH 40 east and west of the intersection and CSAH 55 north and south of the intersection). Raising the intersection would result in a touchdown point on TH 40 that is approximately 800 feet west of the bridge. Since the road elevation would be higher than existing conditions, Bridge 91329 would be replaced. Bridge rehabilitation was not considered a feasible alternative to replacement at this location due to the elevation change.

Bridge 94149, a culvert over Hawk Creek (County Ditch 10) on CSAH 55 would be extended approximately 25 feet to account for shoulder widening on CSAH 55. The existing bridge is a 12-foot by 8-foot box culvert. Replacement of the bridge was evaluated, but rejected as an extension would provide the necessary width required for the additional shouldering in a cost effective manner. The hydraulic impacts of the modification are discussed in the Floodplain section.

Other Roadway Improvements

Shouldering will occur on CSAH 55 within the project area where existing shoulders are currently deficient. In addition, the portions of CSAH 55 that will no longer serve a state aid purpose and are not included in other project improvements (essentially the east-west portion of CSAH 55/1st Avenue W) will be upgraded to meet current state aid standards.

Key Roadway Design Elements

New TH 12 would be constructed according to MnDOT trunk highway design standards. County and city roadways would be constructed according to MnDOT state-aid design standards. Typical roadway sections are shown on **Figure 25** and roadway bridge details are included in **Appendix D**.

Existing CSAH 55 north of the realigned TH 12 would be transferred from Kandiyohi County to the City of Willmar, as the route would not have a connection to a trunk highway or another county roadway (due to the elimination of the roadway between its north/south segment and the proposed railway).

Dry ponding, infiltration basins and other water best management practices would be constructed to address infiltration and water quality treatment and areas sensitive to additional discharge from the road right of way.

G. Other Projects Near the Proposed Project

In addition to the proposed Project, there are two other transportation projects that are currently underway or being developed south of the Project that have an influence on the project area and were considered when alternatives were being developed.

In March, 2015 Kandiyohi County received environmental clearance for a project that will shift CSAH 5 east approximately 800 feet in order to grade separate the TH 23 and CSAH 5/CSAH 15 intersection. With the improvements, CSAH 5 will bridge over TH 23 and create a new T-intersection

with CSAH 15. The project is intended to improve safety conditions at the TH 23 and CSAH 5/CSAH 15 intersection, and in particular the through movement of northbound and southbound CSAH 5 traffic across TH 23. Construction will be completed in 2017. **Figure 26** shows this programmed improvement.

In addition, Kandiyohi County is pursuing a grade separated crossing of CSAH 55 over the Marshall Subdivision, to tie into the project described above currently under construction. **Figure 26** also shows this alternative. This project will include a slight realignment of CSAH 55 to provide the separation needed to get over the railway. The county is in the process of designing the proposed crossing and assembling funding for construction. It is anticipated that this county project will be completed independently within a similar timeframe as the proposed Project.

H. Benefit Cost Analysis

A benefit-cost analysis (BCA) was completed for the proposed Project in September 2016. The purpose of the BCA was to bring all the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years of the project. The primary elements that can be monetized for transportation projects are travel time, changes in vehicle operating costs, changes in crashes, and remaining capital value. After monetizing and combining these factors, projects are considered cost effective if the benefit/cost ratio is greater than 1.0 and if the net present value is greater than zero. The BCA can provide an indication of the economic desirability of an alternative, but results must be weighed by decision-makers along with the assessment of other effects and impacts.

The BCA completed for this project evaluated the difference in costs and benefits between the recommended alternative and three other alternatives including the No Build Alternative, and indicated that the recommended alternative would result in a benefit/cost ratio of 2.3 and a net present value of $49.3 million. Details are provided in **Appendix E**, Benefit-Cost Analysis Memo, dated September 2016. Based on this analysis, the recommended alternative would be desirable from an economic perspective.

I. Project Cost, Funding and Schedule

1. Project Cost

The anticipated cost of the Project is $22 million for construction of the railway components, $20.2 million for construction of the roadway components, and $2 million for right of way. Additional project costs include engineering and construction administration. The costs provided above are based on preliminary estimates. Final project costs and cost shares will be refined by the partner agencies as more detailed design is completed and final partnership agreements are executed.

2. Project Funding

This Project is being funded through a variety of local, state, federal, and private funding sources. Project funding sources and contributions are provided in **Table 7**.

Table 7 – Project Funding

Funding Source	Amount
BNSF Railway	$16 Million
Minnesota Department of Transportation (MnDOT)	$17.5 Million
U.S. Department of Transportation (TIGER Grant)	$10 Million
Local Road Improvement Program (LRIP)	$3.8 Million
Kandiyohi County	$459,000
City of Willmar	$646,000 (commitment of estimated right of way costs)
Total	**$48,405,000**

3. Project Schedule

The following is a tentative schedule of activities for the Project:

Activity	Anticipated Date
EA/EAW	February 2017
Public Hearing/Opportunity for Public Hearing	February 2017
Preliminary Design Layout	January 2017
EIS Need Determination	June 2017
Right of Way Acquisition	Spring 2018
Begin Construction	Spring 2018
Project Completion	Fall 2020

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IV. SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS (SEE)

This section discusses environmental impacts of alternatives identified in the Alternatives section. It contains two sub-sections;

- State Environmental Assessment Worksheet (EAW)
- Additional Federal Issues

The EAW is a standard format used in Minnesota for environmental review of projects meeting certain thresholds at Minnesota Rule 4410.4300. Federal environmental regulations not addressed on the EAW are addressed in separate sub-section.

A. Environmental Assessment Worksheet (EAW)

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm.

The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the EQB Monitor. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title

Willmar Rail Connector & Industrial Access

2. Proposer

Agency: Minnesota Department of Transportation
Contact: Jon Huseby
Title: District 8 Engineer
Address: 2505 Transportation Road
Address 2: Willmar, MN 56201
Phone: 320-231-5497
Fax: 320-214-6305
Email: jon.huseby@state.mn.us

3. RGU

Agency: Minnesota Department of Transportation
Contact: Paul Rasmussen, PE
Title: Project Manager
Address: 2505 Transportation Road
Address 2: Willmar, MN 56201
Phone: 320-214-6320
Email: p.rasmussen@state.mn.us

4. Reason for EAW Preparation (check one)

Required:	Discretionary:
__ EIS Scoping	__ Citizen petition
X Mandatory EAW	__ RGU discretion
	__ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
Highway Projects: 4410.4300, Subpart 22, A - "Construction of a road on a new location over one mile in length."

5. Project Location

County: Kandiyohi
City/Township: City of Willmar and Township of Willmar
PLS Location: Sections 7, 8, 16, 17, 18, 19, 20, 29, 30 Township 119N Range 35W
Watershed (81 major watershed scale): Hawk Creek Watershed
GPS Coordinates: 45.129523, -95.104225

At a minimum attach each of the following to the EAW:

- County map showing the general location of the project (**Figures 1and 3**)
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (**Figure 2**)
- Site plans showing all significant project and natural features. Pre-construction site plan and post- construction site plan (**Figures 22-25, 28, 33, 38**).

6. Project Description

a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

The Project includes a 2.8-mile railway between the Marshall and Morris Subdivisions of the BNSF railway and a rail spur for industrial park access in Willmar. Roadway modifications include a 2.5 mile realignment of Trunk Highway (TH) 12, construction of two bridges on TH 12 and TH 40 over the proposed rail line, and other road modifications.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the

environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

1. Construction, Operation, Methods and Features That Will Cause Physical Manipulation of the Environment or Will Produce Wastes
   The Minnesota Department of Transportation (MnDOT), along with its partners, the City of Willmar, Kandiyohi County, the Kandiyohi County and City of Willmar Economic Development Commission, and the BNSF Railway and in coordination with the FRA, is proposing to construct a new mainline railway connection, siding, spur line, access roads and mainline extension between the Morris and Marshall Subdivisions within Kandiyohi County in the western portion of the City of Willmar and Willmar Township. The construction of the new railway connection would impact the transportation network and would require modifications to state, county, city and township roadways.

   A full description of the Project, which identifies features that would cause physical manipulation of the environment or would produce wastes is provided in Section III.F.2 and shown on **Figure 22**.

2. Modifications to Existing Equipment or Industrial Processes
   The Project would not include modification to existing equipment or industrial processes.

3. Significant Demolition, Removal or Remodeling of Existing Structures
   The Project would not include significant demolition, removal or remodeling of existing structures. However, the Project would include the demolition of two single family homes in order to raise the TH 40 and CSAH 55 intersection. One house would also be relocated – the relocation would be on the current property, but outside of the project area.

   The Project would also include removal of portions of existing TH 12, CSAH 55, 1st Avenue W and 7th Ave NW.

4. Timing and Duration of Construction Activities
   The Project is anticipated to begin construction in spring 2018 and be completed in fall 2020. MnDOT would be the lead agency for the Project and would be responsible for any work related to the roadway improvements. BNSF would be responsible for any work related to the railway improvements. Roadway work is anticipated to be primarily completed by spring of 2020 and the railway work would begin in spring of 2020 and be completed by the fall of 2020. Some overlap of activities may occur to provide better flexibility for construction activities.

c. Project magnitude

Project magnitude data are listed in **Table 8**.

Table 8 – Project Magnitude

Total Project Acreage	Approximately 137.24 Acres
Linear project length	Approx. 2.8 miles of railway, 2.5 miles of new highway, and 2,600 feet of township roadway
Number and type of residential units	NA
Commercial building area (in square feet)	NA
Industrial building area (in square feet)	NA
Industrial building area (in square feet)	NA
Other uses – specify (in square feet)	NA
Structure height(s)	30 feet (new TH 12 and TH 40 roadway bridges over railway connection)

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

Please refer to Section II for the purpose and need for the project.

The Project is being led by MnDOT District 8. This Project is a public-private partnership with the City of Willmar, Kandiyohi County, Kandiyohi County/City of Willmar Economic Development Commission, and the BNSF Railway.

The Project would benefit a number of groups. First, rail customers that receive or produce shipments will have improved and more reliable travel times because trains would no longer be required to go into downtown Willmar and into the Willmar Terminal to transfer between lines. Switching west of the downtown prevents the trains from occupying space in the rail yard that is needed for through rail traffic. It also reduces the amount of time to switch between the subdivisions (currently engines need to be switched from one end of the train to the other before it can go out on the other rail line). Eliminating these activities would improve shipping times for all customers and improve efficiencies within the rail yard.

Second, motorists that currently have to wait for trains that are occupying at-grade crossings would benefit from reductions in wait times and travel distances.

Third, pedestrians and bicyclists would also have similar benefits – they would have fewer trains to wait for in order to cross the railway in order to get to their destinations.

Fourth, the business community within the City of Willmar has the potential to expand with the Project. The Project would provide a rail spur connection for development and expansion of the industrial park the city and county have been developing. A main focal point of the development of this industrial park is rail service which would come from the new railway connection.

e. **Are future stages of this development including development on any other property planned or likely to happen?** __ Yes _X_ No

If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

f. **Is this project a subsequent stage of an earlier project?** __ Yes _X_ No

If yes, briefly describe the past development, timeline and any past environmental review.

7. Cover Types

Estimate the acreage of the site with each of the following cover types before and after development

Cover types within the general project right of way are listed in **Table 9**. Approximately 137.2 acres of land will be disturbed.

Table 9 – Cover Types Before and After Project

Cover Type	Before (acres)	After (acres)
Cultivated crops	88.7	0
Wooded/forest	0.5	0
Wetland	15.0	4.3
Impervious/developed	69.0	98.5
Pasture/hay	11.2	0
Stormwater BMP	0.0	5.5
Deep water/streams	<0.1	<0.1
Lawn/landscaped	0.0	76.1
Total	**184.4**	**184.4**

8. Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. ***All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.***

Permits and approvals anticipated for the Project are listed in **Table 10**.

Table 10 – Permits and Approvals Needed and Status

Unit of Government	Type of Application/Approval	Status
Federal		
Federal Highway Administration (FHWA)	Environmental Assessment	Draft for public review
	Finding of No Significant Impact (anticipated outcome)	To be requested
	Section 4(f) temporary occupancy concurrence	Preliminary approval
	Section 4(f) De Minimis	Preliminary approval
MnDOT CRU on behalf of FHWA	Section 106 (Historic/Archaeological)	Consultation in process
	Tribal Consultation	Consultation completed
MnDOT OES on behalf of FHWA	Section 7 (Endangered Species Act)	Consultation completed
Federal Railroad Administration	Compliance with NEPA and related environmental laws and regulations	To be obtained
U.S. Army Corps of Engineers (USACE)	Section 404 Permit (Letter of Permission) for roadway	To be obtained
U.S. Army Corps of Engineers (USACE)	Section 404 Permit (Letter of Permission) for railway	To be obtained
Federal Aviation Administration	Obstruction Evaluation / Airport Airspace Analysis – Notice of Proposed Construction or Alteration – Off Airport	Preliminary approval
State		
MnDOT	Environmental Assessment Worksheet	Draft for public review
	EIS Need Decision	To be obtained
	Wetland Conservation Act Replacement Plan	To be obtained
	Staff Approved Geometric Layout	To be obtained
	Preliminary Construction Plans	To be obtained
Minnesota Pollution Control Agency	Section 401 Certification	To be obtained
	National Pollutant Discharge Elimination System (NPDES CSW) Stormwater Permit	To be obtained
Minnesota Department of Natural Resources	License to Cross Public Lands and Waters	To be obtained if necessary
	Construction Dewatering	To be obtained by contractor, if necessary
	NHIS Review	Consultation completed

Table 10 – Permits and Approvals Needed and Status (Continued)

Unit of Government	Type of Application/Approval	Unit of Government
Local		
City of Willmar	Municipal Consent/Project Approval	To be obtained
Kandiyohi County	Project Approval	To be obtained
	Ditch Drainage and Hydraulic Capacity Design Approval	To be obtained
	Wetland Boundary/Type Approval	To be obtained
Private		
BNSF	Railroad Agreement	To be obtained
BNSF	Railroad Permit	To be obtained

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19 **[see EAW Item No. 19 for Cumulative Effects Discussion]**

9. Land Use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Land Use

The Project is located in the City of Willmar and Willmar Township (**Figure 3**). Agriculture is the predominant land use in the project area. Residential neighborhoods are located north of the existing TH 12 and CSAH 5 intersection outside of the project limits, with scattered single family dwellings located throughout the project area. Other adjacent land uses include industrial and commercial uses along existing TH 12 and CSAH 55/1st Avenue West. The Willmar Municipal Airport is located west of the project area. **Figure 27** shows the zoning in the project area.

Wetlands and ditched waterways, including Hawk Creek and its associated riparian corridor and tributaries are also located within the project area.

City-Owned Land

The City of Willmar owns over 670 acres of land at the site of the decommissioned airport, which a portion of the land is being developed into a 200-acre industrial park expansion. The site is adjacent to other industrial sites, and is accessible via TH 40 and CSAH 5. The basic roadway infrastructure and utilities have been installed.

The new "Willmar Municipal Airport – John L. Rice Field" is located about 0.8 miles west of CSAH 55 and just north of TH 40. The new airport includes a 5,500-foot paved runway, 3,000-foot turf runway, and a modern terminal area. The paved runway is

planned to be extend to 6,500 feet at a future undetermined date. The new airport serves as regional transportation resource and is accessed from TH 40.

Park and Trails

There are no local park facilities within the project area. The Rau Prairie Pothole Wildlife Management Area (WMA), Gopher Ridge WMA and Kandiyohi Walk-In Area (WIA) #15 are located northwest of the project area. No impacts to the WMAs or WIA would result from the Project. One multiuse trail is located along the east side of CSAH 5, extending north-south between TH 12 and TH 40. This trail falls within the project limits.

Farmland

As stated above, agriculture is the primary land use in the project area. The agricultural lands are considered productive, with the soils categorized as prime farmland, farmland of statewide importance or prime farmland if drained (**Figure 28**).

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The City of Willmar Comprehensive Plan guides the existing and planned land uses in much of the project area. The Future Land Use Map (**Figure 29**) identifies urban growth areas to accommodate future population and industrial growth demands, including demands in the project area. In the northern end of the project area surrounding the Willmar Municipal Airport – John L. Rice Field, land is guided for airport related business and industry expansion. The plan suggests that the land should remain in agricultural use until annexation occurs and municipal services are extended from the east for the logical expansion of industrial uses. On the south end of the project area, a mix of industrial, commercial, and residential development is planned along the CSAH 15 and TH 23 corridors. The City has a 2030 Facilities Plan that plans for the extension of sanitary and water service into these urban growth areas.

The Kandiyohi County Comprehensive Plan identifies agriculture as the guided land use in Willmar Township (**Figure 30**). An urban growth boundary is also shown to guide future growth for the city of Willmar in an orderly fashion consistent with the City of Willmar's Future Land Use Map.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

Zoning Ordinances

The City of Willmar Zoning Ordinance and Zoning Map (**Figure 27**) applies to the incorporated areas and the city-owned land. The Kandiyohi County Zoning Ordinance applies to land within Willmar Township. The project area is zoned for business, industrial, and government (decommissioned airport site) on the north and east, and agriculture on the south and west (City of Willmar, 2009; Kandiyohi County, 2001).

Shoreland Districts

The City of Willmar Zoning Ordinance defines shoreland districts within the city, and regulates the use of any shoreland of public waters, and regulates lot size and density within shoreland districts. The city defines shoreland as land being located within 1,000 feet from the Ordinary High Water (OHW) of specified public waters. The ordinance indicates that Foot Lake is a public water to which the shoreland ordinance would apply. The Project would be located within 1,000 feet of Foot Lake and would be subject to the zoning ordinance.

Kandiyohi County defines shoreland as being any land located within 1,000 feet from the OHW of a lake, pond, or flowage or within 300 feet from a river or stream or their floodplain. Hawk Creek (County Ditch [CD] 10), CD 12, CD 46, and an unnamed tributary are all designated as County Ditches on the Kandiyohi County zoning map (**Figure 30**) and therefore the shoreland ordinance would not apply to these watercourses.

Airport Zoning Ordinance

The Willmar Municipal Airport Zoning Ordinance (adopted in 2007) applies to the project area, which regulates and restricts the height of structures and objects in the vicinity of the airport. The Willmar Municipal Airport Zoning Ordinance is enforced by the Willmar Area Joint Airport Zoning Board, a joint powers board consisting of elected members from the City of Willmar, Kandiyohi County, Willmar Township, and St. Johns Township. The ordinance identifies various zones that designate certain restrictions and requirements related to safety and height issues based on the proximity of the zone to the airport and runways. There are multiple airspace zoning designations that the proposed rail connection and road improvements will traverse.

FAA and MnDOT Aeronautics also review projects for their compliance with height restrictions and proximity to runways.

Floodplain Ordinance

The 100-year floodplain of Hawk Creek falls within the project area. Kandiyohi County has a floodplain ordinance which applies to unincorporated areas of the county. This ordinance is applicable to the watersheds in Willmar Township that are outside of Willmar's municipal boundary. Mitigation for floodplain impacts are discussed in Section IV.A.9.c. The city's Stormwater Management Ordinance specifies minimum building elevations based on 100-year flood elevations for FEMA and city-defined floodplains, but does not include floodplain regulations.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

Land Use

The Project would be consistent with the City of Willmar's future plans for the area. As discussed in 9a, industrial growth is envisioned within the former airport site and west. The Project would be consistent with the city's planned industrial expansion as the proposed railroad connection would provide additional rail line access to promote economic development and business expansion in the Willmar Industrial Park. With the introduction

of the rail access, the Willmar Industrial Park would be served by all three major freight modes (air, rail, and truck), allowing it to serve as a regional shipping hub. Impacts related to the proposed project would be similar to development related impacts anticipated with future city expansion.

Shoreland Districts

The City of Willmar's shoreland zoning ordinance specifies that public roadways should be designed to achieve maximum screening from the view of the public water and be designed and constructed to minimize and control erosion into the public water. The placement standards of the ordinance indicate that the roadway structures should be located outside of the shore impact zone, which is defined as the land located between the OHW of a public water and a line parallel at a distance of 50 percent of the structure setback. The setback for unsewered structures is 75 feet.

The Project would comply with the City of Willmar's shoreland ordinance. The existing vegetation (wooded lots adjacent to the lake) and topography (railway bed for BNSF Morris Subdivision) would serve to screen the view of the proposed roadway from Foot Lake. In addition, the roadway design would incorporate features that would minimize erosion to Foot Lake during and following construction, including silt fence during construction and filtration basins following construction. In addition, the Project would not involve placement of roads or fill within the shore impact zone (37.5 feet from the OHW of Foot Lake).

Airport

As discussed in the alternatives evaluation (Section III), the recommended alternative (located east of CSAH 55) was identified to avoid the airport's runway protection zone (RPZ) as well as Zoning Area A. To ensure compatibility with the Willmar Municipal Airport Zoning Ordinance, coordination with the FAA and Willmar Area Joint Airport Zoning Board would continue throughout design and during construction. This would include a review of all structures, including lighting improvements, within the airport influence zones to ensure they are compatible with necessary height restrictions. As plans for the Project continue to be refined, data would be supplied to the FAA to ensure compliance with regulations.

In advance of construction, construction data would be updated and supplied as part of the FAA Obstruction Evaluation/Airport Airspace Analysis – Notice of Proposed Construction or Alteration – Off Airport permit. This permit requires information about the type of construction equipment, lights, and other elements that have the potential to impact airspace and navigation at the airport

Floodplain

Floodplain would be impacted at the following locations (**Figure 31**) and total 2.9 acres (**Table 11**):

- Proposed culvert under proposed Trunk Highway 12, west of 30th Avenue NW (Crossing "A")
- Proposed railroad bridge over Hawk Creek east of CSAH 55 (Crossing "B")
- Existing Bridge 94149 on CSAH 55 over Hawk Creek (Crossing "C")
- Existing bridge 91329 on Trunk Highway 40 over Hawk Creek (Crossing "D")

- Proposed culvert under proposed Trunk Highway 12, between 1st Avenue and CSAH 55 (Crossing "E")
- Proposed railroad bridge over County Ditch 46 east of CSAH 55 (Crossing "F")
- Existing Bridge 8468 on TH 12 (Crossing "I")

Table 11: Summary of Floodplain Impacts

Project Element	Floodplain Impacts (acre)
TH 12	0.8
CSAH 55	0.7
BNSF Railway	1.4
Total	**2.9**

Additionally, two pipes would be proposed under proposed Trunk Highway 12 (labeled Crossing "G" and "H"). These culverts would be outside of the FEMA floodplain, but require a Risk Assessment due to the size (anticipated size is 48 inches). The Risk Assessments are included in **Appendix F**. Final culvert sizes may be adjusted during final design or permitting.

Per Minnesota Rules, any change that increases the 100-year floodplain by 0.5 feet or more requires Minnesota Department of Natural Resources (DNR) review. Increase the elevation by a foot or more and Federal review is also required. The floodplain for the Project was estimated using HEC-RAS model and United States Geological Survey Stream Stats regression equations for the flow. Based on the model, the stage increase of the floodplain would vary for each crossing, but would be less than 0.5 feet for all locations; therefore, there would be minimal floodplain impacts as a result of the project. A floodplain assessment has been completed and is attached (**Appendix F**). It is anticipated that there will be no net increase; however, there is some flexibility to increase this up to 0.5 feet should changes in floodplain impacts occur in final design.

Farmland

Approximately 93 acres of farmland would be converted to railroad or road right of way (**Figure 28**). A large portion of the land is currently leased, with the project partners (City of Willmar and BNSF) owning a number of farmed parcels that would be impacted by the Project. With the project area in the city's urban growth boundary, agriculture has been recognized as eventually transitioning to industrial and other business developments. In the interim, adjacent agricultural uses will continue. The Project would not prohibit the use of non-converted farmland for current farming practices.

Coordination with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has been initiated as requested by the Farmland Policy Protection Act (42 U.S.C. § 4201 et seq.). See the attached NRCS Form AD 1006 (**Appendix G**).

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

The Project would be compatible with the City of Willmar's future plans for the area and the planned industrial park development. It would also be compatible with Kandiyohi County's long-term plans for expanding the urban area around the City of Willmar.

Floodplain

Based on the FEMA map, the Hawk Creek, unnamed tributaries to Hawk Creek, CD 12 and CD 46 floodplain is fairly well contained within the banks of the creek within the project area.

The bridge and culvert crossings associated with the floodplain would be sized such that they do not create changes in the floodplain either upstream or downstream. Based on the model, the stage increase of the floodplain would be less than 0.5 feet; therefore, there would be minimal floodplain impacts as a result of the Project. The impact to the floodplain would be minimal and within the regulatory threshold, so no mitigation would be required. A floodplain assessment has been completed and is attached (**Appendix F**). It is anticipated that there will be no net increase; however, there is some flexibility to increase this up to 0.5 feet should changes in floodplain impacts occur in final design.

10. Geology, Soils and Topography/Land Forms

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

With the exception of **Figure 32, Appendix H** contains the maps and tables associated with geology and soils. Please refer to **Appendix H** for figures in this section.

The Project would include approximately 2.8 miles of railway and 2.5 miles of roadway improvements that cross a Wisconsin Age glacial terrain with thick glacial till overlying bedrock and soils that are principally derived from glacial till with alluvium along the stream terraces.

Cretaceous age sedimentary rocks and crystalline pre-Cambrian rocks underlay the thick glacial till in the Project area (**Figure H-1**). The bedrock boundary between the undivided Cretaceous rock on the north and the Middle Archean crystalline rocks lies in an east-west line dissecting the site. The bedrock is deeply buried beneath the till. There are no bedrock exposures, no karst features and no known geologic hazards due to the bedrock within the project area; however, various soil types within the project area have limitations that are discussed in more detail in the next section.

Surficial geologic mapping in the area shows the north end of the site along the approximate boundary of the Wisconsin-Age Des Moines Lobe Altamont moraine to the south and the

overriding Wisconsin-Age Wadena Lobe Alexandria Moraine to the north (**Figure H-2**). The Project will be constructed over the Des Moines lobe "washboard moraines," described as low relief (306-foot), regularly spaced mounds of glacial till that formed subglacial as basal crevasses filled and are associated with stringers of sand and gravel outwash. The hill-shade digital elevation model for the area, **Figure H-3**, illustrates the washboard natural of the local terrain.

Shallow groundwater derived from confined and unconfined glacio-fluvial aquifers and confined Cretaceous age bedrock dominate potable water supply in Kandiyohi County. A review of well logs within the project area, documented in the Minnesota Department of Health County Well Index, shows a range of well completion depths from 36 to 271 feet with completion intervals in multiple alluvial aquifers described on well logs as sand or "sand & gravel." No wells in the area encountered bedrock (**Figure H-2**). The static water levels vary from 10 to 34 feet below the surface dependent on both the topography and well depth indicating that shallow water levels are local manifestations of unconfined aquifers and in much of the area there is a direct and rapid connection between surface water and shallow groundwater.

The deeper glacial sediments and deeply buried bedrock do not present any limitations to the proposed roadway project. The shallow subsurface has materials suitable for road/railway fill and a number of small sand and gravel deposits are currently utilized for commercial aggregate. Other aggregate deposits are likely within the area, but have not been investigated and mapped (**Figure H-4**).

Excavations, borrow and grading are expected to be in the upper 20 feet of the existing surface and are not anticipated to encounter geologic bedrock hazards; however soil limitations for roadways and railways, discussed in more detail below, and a potential to impact shallow alluvial aquifers requires engineering assessments and preparation of plans and specifications that acknowledge the limitations and risks.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

Figure 32 shows the soil classification codes for soils within and near the Project. This figure is in Appendix A, the rest of the figures referred to in this section are found in Appendix H.

Soil data was obtained from the NRCS Web Soil Survey. Data was broken into two areas – north and south – due to the number of soils within the project limits. **Figure H-5** and **Figure H-6** approximate the construction areas – north and south project limits, respectively and

the soils within them. **Tables 11** and **12** list the soils present, acreages and percent of project limits. They also contain information on percent slopes and erodibility. This information was used to assess various soil limitations such as hydric characteristics (**Figure H-7**) and the limitations for local roads and streets (**Figure H-8**) as well as railways, which have similar considerations. All of these constraints require detailed analyses that take into consideration soil characteristics, load factors and construction techniques for any new infrastructure.

Table 12 lists the soils present, slopes, erodibility acreages and percentage of project area for the southern portion of the Project. **Table 13** lists the soils present, slopes, erodibility acreages and percentage of project area for the northern portion of the Project.

Table 12 – Soils in Southern Portion of the Project (**Figure H-5**)

Kandiyohi County, Minnesota (MN 067)					
Map Symbol	**Name**	**Percent Slopes**	**Erodibility Status**	**Acres**	**Percent of Project Limits**
112	Harps clay loam	0 – 2	Slight	4.1	1.6
423	Seaforth loam	1 – 3	Slight	15.4	5.8
446B	Normania loam	2 – 5	Moderate	4.5	1.7
447	Harpster silly clay loam	--	Not Rated	2.4	0.9
897B	Seaforth-Swanlake loams	2 – 6	Moderate	15.2	5.8
899	Harps-Okoboji complex	0 – 2	Slight	66.2	25.2
927	Harps-Glencoe-Seaforth complex	0 – 3	Slight	55.1	21.0
981	Canisteo-Harps loams	--	Slight	36.7	13.9
999C	Swanlake-Ves-Hawick complex	6 – 12	Severe	3.2	1.2
1900	Okoboji-Canisteo depressional complex	0 – 1	Slight	45.5	17.3
L83A	Webster clay loam	0 – 2	Slight	0.1	0.1
L163A	Okoboji silty clay loam	0 – 1	Slight	8.7	3.3
L201A	Normania loam	1 – 3	Slight	5.8	2.2
	Total			**263.0**	**100**

Table 13 – Soils in Northern Portion of the Project (Figure H-6)

Kandiyohi County, Minnesota (MN 067)					
Map Symbol	**Name**	**Percent Slopes**	**Erodibility Status**	**Acres**	**Percent of Project Limits**
112	Harps clay loam	0 – 2	Slight	4.1	1.6
114	Glencoe clay loam	0 – 1	Slight	9.9	1.3
399	Biscay clay loam, depressed	0 – 1	Slight	4.7	0.6
423	Seaforth loam	1 – 3	Slight	82.6	11.2
446B	Normania loam	2 – 5	Moderate	51.2	7.0
805B	Wadenill-Sunburg loams	2 – 6	Moderate	1.1	0.1
809	Lowlein-Estherville sandy loams	--	Slight	5.4	0.7
810	Coriff-Fieldon complex	--	Slight	14.5	2.0
842	Urban land-Udorthents complex	--	Not Rated	7.9	1.1
897B	Seaforth-Swanlake loams	2 – 6	Moderate	26.2	3.6
927	Harps-Glencoe-Seaforth complex	0 – 3	Slight	75.6	10.3
954C	Swanlake-Ves loams	6 – 12	Severe	5.8	0.8
981	Canisteo-Harps loams	--	Slight	36.7	13.9
999B	Ves-Swanlake-Hawick complex	2 – 6	Moderate	6.3	0.9
999C	Swanlake-Ves-Hawick complex	6 – 12	Severe	2.5	0.3
1016	Udorthents, loamy	--	Slight	10.1	1.4
1900	Okoboji-Canisteo depressional complex	0 – 1	Slight	18.0	2.4
L13A	Klossner muck	0 – 1	Slight	15.0	2.0
L83A	Webster clay loam	0 – 2	Slight	6.1	0.8
L163A	Okoboji silty clay loam	0 – 1	Slight	40.1	5.4
L201A	Normania loam	1 – 3	Slight	18.1	2.5
L223B	Amiret-Swanlake loams	2 – 6	Moderate	74.4	10.1
L505A	Delft clay loam	0 – 2	Slight	0.2	0.0
	Total			**735.5**	**100**

A review of the hydric soils (**Figures H-7**) in the north stages shows that slightly over 50 percent of the project construction limits have hydric soils indicating shallow water tables, soil saturation and inundation. The south stage (**Figure H-7C**) shows that slightly over 83 percent of the project construction limits have hydric soils indicating shallow water tables, soil saturation and inundation.

The Web Soil Survey of Limitations for Local Roads and Streets (**Figures H-8**) show that 86 percent of the northern project limits are rated as very limited for road/railroad construction and maintenance and that 91 percent is rated as very limited for shallow excavation. The southern project limits are rated as 91 percent very limited for road/railroad construction and maintenance and that 93 percent is rated as very limited for shallow excavation. The dominant limitations for road/railroad construction and

maintenance are the shallow depth to the saturated zone, ponding, frost action, low strength and shrink-swell characteristic of the soil. The dominant limitations for shallow excavations are the shallow water levels and soil saturation. Engineered cuts and fills, artificial drainage and soil stabilization measures will be necessary across most of the Project.

During construction, drainage and erosion control measures would be implemented as part of the project design, contracts and the NPDES Permit for Construction Site Activities. Temporary features such as silt fence, site stabilization with temporary vegetation, temporary ponds, drainage control and treatment features will be necessary for each phase of the Project. More details are discussed in section 11.b.ii. In addition, a Stormwater Pollution Prevention Plan (SWPPP) would be developed for the Project. All disturbed areas would be revegetated in accordance with the SWPPP and related permitting requirements.

Permanent drainage improvements, storm water rate control and water quality treatment features would be required as post construction water management features. More information on permanent treatment is found under the following section (Water Resources).

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

The Project is located in the Hawk Creek minor watershed and the Minnesota River (Yellow Medicine River) major watershed. Surface water resources within the watershed and near the project include various tributaries, lakes, wetlands, and wet ditches. Surface waters near the project include Foot Lake (located north of TH 12), Willmar Lake (located northeast of Foot Lake), Hawk Creek (DNR PWI M-055-145-039), and various tributaries to Hawk Creek. Hawk Creek flows southwesterly, south of TH 12 near the eastern project limits, and crosses the proposed new rail connection and CSAH 55 approximately one half-mile north of the TH 40 crossing. **Figure 33** shows surface water features in and near the project area.

Hawk Creek begins in Eagle Lake north of Willmar, crosses the Willmar Industrial Park and flows 65 miles southwesterly to the Minnesota River. Thirty-six miles of Hawk Creek were channelized in the 1960s to facilitate agricultural drainage. Hawk Creek is a Class 7 Water (Limited Resource Value Water) according to the MPCA, which indicates protection for aesthetic qualities, secondary body contact use and groundwater for use as a potable water supply. However, it does not provide enough water or suitable

habitat for aquatic life or aquatic recreation. Agriculture comprises over 87 percent of the land area of the watershed.

Based on a review of the Section 303(d) List and MPCA website, Hawk Creek is identified as an impaired river/stream for mercury in fish tissue in one portion of the project area:

- #07020004-508 extending 27.1 miles south from TH 40 to the outskirts of Clara City

  Impaired waters on the Section 303(d) List are subject to a Total Maximum Daily Load (TMDL) study, which is an assessment of a water body's ability to sustain itself from pollution. The TMDL study process consists of data collection and assessment, listing those waters not meeting water quality standards as impaired waters, developing a pollution reduction plan, implementing the plan, and then evaluating the implementation by collecting more data. Impaired segments of Hawk Creek are addressed in Minnesota's Statewide Mercury TMDL that was approved by the U.S. EPA in March 2007 (MPCA, 2014).

Modification of Hawk Creek, Unnamed tributaries to Hawk Creek, County Ditch 46, County Ditch 43, and County Ditch 12 must be approved by the Kandiyohi County Drainage Authority (KCDA), who will review the Project for drainage and hydraulic capacity and design. Hawk Creek is not mapped by the DNR as a Designated Trout Stream. Due to erratic flows downstream from the Foot Lake (DNR PWI 34018100) control structure and the shallow depths of the creek, any fish habitat in Hawk Creek would be considered marginal or poor.

No protected drinking water resources are present at or adjacent to the project area, although several domestic and industrial water wells are known in the area.

Wetland boundaries were field delineated using a routine Level 2 delineation. Wetlands were delineated in different time periods based upon changes in potential alternatives. Field delineations occurred in June 2016, September 2014, May 2014, and October 2013. Wetland delineation determined that 43 wetlands, eight wet ditches, and four tributaries are located within the proposed project area. Much of the wetland habitat in the project area and vicinity has been fragmented, degraded, or disturbed due to development and farming activities. See Section IV.A.11.b.iv for more details on wetlands.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

<u>Depth to Groundwater</u>
Depth to groundwater for the Project varies from 10 to 34 feet based on the data for individual wells.

MDH Wellhead Protection Area

The Project is located within a wellhead protection area as identified by the Minnesota Department of Health (MDH). **Figure 34** shows the location of the protection area.

Willmar obtains its drinking water supply from 16 primary wells. The drinking supply is accessed through groundwater from the Quaternary Buried Artesian Aquifer (QBAA). According to the MDH, a Willmar SW Drinking Water Supply Management Area (DWSMA) MN-00647 has been determined and a wellhead protection plan is being created for the wellhead protection areas. The project limits along TH 12, east of the proposed BNSF alignment, extends into the designated DWSMA (**Figure 34**). Minnesota Department of Health guidance would be used to evaluate the feasibility of stormwater infiltration practices within the wellhead protection area.

The east portion of the Project is in a high vulnerability DWSMA and Wellhead Protection Area. Infiltration is not acceptable in high vulnerability DWSMA based on the MDH guidance due to the potential for adverse impacts to the aquifer. A small portion of the Project is located within a moderate vulnerability DWSMA. MDH guidance indicates that infiltration is not recommended in moderate DWSMA for highway runoff due to the potential for pollutant discharge into the aquifer. West of the proposed railroad alignment is outside the DWSMA and infiltration is acceptable.

Onsite and Nearby Wells

The Minnesota Department of Health County Well Index was reviewed and 30 wells were identified in the project area. Identified wells were scattered throughout the project area and primarily serve domestic use. Twenty of the wells were noted as active, and indicated uses of the wells included domestic, industrial, and abandoned. Groundwater depth ranged from 5 to 34 feet.

Figure 34 shows the wells and **Table 14** lists the well, its status, its use and its groundwater elevation. Well logs are available in **Appendix I**.

Any wells that would be impacted by the Project would be sealed by a licensed well contractor according to Minnesota Rules, Chapter 4725, or be relocated and coordinated with the MPCA and MDH.

Table 14 – Project Area Wells

Well ID	Status	Use	Water Elevation (feet)
00778923	Active	Domestic	15
00771198	Sealed	Abandoned	5
00752254	Sealed	Abandoned	12
00755798	Active	Domestic	21
00752253	Sealed	Abandoned	17
00752252	Sealed	Abandoned	16
00664260	Active	Domestic	34
00210694	Active	Domestic	18
00210698	Active	Domestic	15
00130237	Active	Domestic	14
00137046	Active	Domestic	34
00764040	Active	Industrial	20
00401827	Active	Domestic	10
00651134	Active	Domestic	NA
00588831	Active	Domestic	23
00511576	Sealed	Abandoned	26
00511591	Active	Domestic	29
00689886	Active	Domestic	33
00505709	Active	Industrial	29
00489971	Sealed	Abandoned	7
00455090	Active	Domestic	30
00424373	Active	Domestic	18
00407471	Active	Domestic	13
00210735	Active	Domestic	12
00122613	Active	Domestic	11
00194601	Active	Domestic	19
00194384	Sealed	Abandoned	14
00194383	Sealed	Abandoned	9.6
00194382	Sealed	Abandoned	9.6
00194381	Sealed	Abandoned	8.5

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added

water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

This section is not applicable as the proposed project would not generate any wastewater nor discharge wastewater to a publicly owned treatment facility.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

This section is not applicable as the proposed project would not generate any wastewater nor discharge wastewater to a subsurface sewage treatment system.

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

This section is not applicable as the proposed project would not generate any wastewater nor discharge wastewater to surface water.

ii. Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Existing Conditions

The area is rural with an industrial area located along CSAH 55/1st Avenue W. There is a former airport located south of CSAH 55/1st Avenue W. The rest of the project area consists of primarily farmed land and wetland areas.

County Ditch 10 (CD 10), also known as Hawk Creek, runs through the project from northeast to the southwest. County Ditch 12 (CD 12) is located in the northeast corner of the project and drains to Hawk Creek. County Ditch 46 (CD 46) is located on the south side of the project and travels to the west to Hawk Creek. The majority of the existing drainage travels via overland flow to ditches, culverts, and wetlands.

The area north of TH 12 and West of 45th Street NW drains west to a pond. The area to the east of 45th Street NW drains to an adjacent wetland area. The overflow for that wetland area travels to CD 12 then to Hawk Creek (CD 10).

The area south of TH 12 and North of 1st Avenue W drains to a wetland located east of 45th Street NW. The area south of TH 12 and west of CSAH 55 primarily drains to a large wetland, which drains to Hawk Creek (CD 10).

The area south of 1st Avenue W drains to Hawk Creek. The area just north of 19th Avenue SW drains to County Ditch 46.

Ultimately, all stormwater runoff enters Hawk Creek (CD 10) (**Figure 33**).

Proposed Conditions

Construction activities would disturb 137.2 acres of land (including clearing, grading, and excavation) and would result in an increase in impervious of 29.5 acres. The 29.5 acres includes both the roadway and railroad new impervious surfaces.

The primary Project components would include:

- Proposed TH 12 realignment to the south, then east and connecting to the existing TH 12 near CSAH 5 (30th Avenue NW)
- Proposed BNSF Railway between the Marshall and Morris Subdivisions starting near 19th Avenue SW running north, parallel to CSAH 55 to existing TH 12.
- Proposed improvements on TH 40 on either side of CSAH 55.
- Proposed improvements to CSAH 55 from TH 40 to 1st Avenue West
- Realignment of existing 45th Street NW

The Project would need to comply with the National Pollution Discharge Elimination System (NPDES) construction stormwater general permit requirements, City of Willmar Stormwater Management Ordinance (No. 1227), Kandiyohi County Drainage Authority (KCDA), and MDH guidance for sites within a DWSMA. The KCDA's primary responsibility is for the proposed judicial ditch crossings. The judicial ditch crossings are discussed in detail in Section II.b.iv.b. Project construction and operation would include best management practices (BMPs) to limit impacts on Hawk Creek and other surface waters.

The primary regulatory stormwater requirements that would apply to the Project are as follows:

- **Rate Control:** Proposed conditions 10 and 100-year, 24-hour storm events and 10-year, 100-year snowmelt event must be less than existing
- **Volume Reduction:** 1 inch runoff to be infiltrated, filtrated, and/or detained for the net new impervious area
- **DWSMA:** No infiltration in high and moderate DWSMA

For linear projects, the NPDES construction stormwater permit requires that rate control and infiltration volume be provided for the net new impervious (29.5 acres). The Natural Resources Conservation Service (NRCS) soil survey was used to determine the existing soils. The soils onsite are primarily are primarily classified as moderately well drained to poorly drained loams. Primary soil types identified include the Canisteo-Harps loams (Hydrologic soil group (HSG) B/D), Harps-Seaforth-Okoboji complex (HSG

B/D), Seaforth loam (HSG C). Due to the poorly draining soils, infiltration would not be feasible. Therefore, filtration would be proposed to meet the NPDES requirements. In addition, the proximity of the project area to the Willmar Airport precludes the use of wet ponds for rate control or water quality treatment.

The Project is also required to comply with the Minnesota Department of Health (MDH) guidance on infiltration within a wellhead protection area. The MDH precludes infiltration in high vulnerability wellhead protection areas (which applies to the east portion of the Project). The proposed filtration basins meet the requirements of the MDH. The drain tile at the base of the BMPs will collect the runoff, rather than allowing the runoff to infiltrate into the groundwater.

The rate control and filtration volume requirements are discussed below for the railroad and roadway project components. The proposed best management practices (BMPs) are shown on **Figure 35**.

Railroad Improvements
The Project's rail/track bed would be constructed near existing ground elevations while still maintaining enough elevation above existing topography to protect rail infrastructure from flooding events. Generally, track bed construction would result in excavation through topographic areas higher in elevation and fill through topographic areas that that are lower in elevation. Overall, a focus in the design of the track bed was to reduce the Project footprint and reduce the amount of material excavated and/or imported to the site.

As shown in **Figures 23 a, b**, the track alignment is proposed in a north south direction. Existing drainage generally runs in a west to east direction. Accordingly, the track alignment will intercept flow at various locations including: lowland topographic areas, Hawk Creek (CD 10), and South Ditch (CD 46).

Ditching with approximately six-foot wide ditch bottoms are proposed parallel with and immediately adjacent to the east and west of the proposed track bed. Primarily, the proposed grading, conduit and ditches are designed to accomplish the following:

1. Maintain existing drainage patterns
2. Provide detention and filtration BMPs per MPCA volume reduction requirements
3. Protect track infrastructure while providing rate control

Maintenance of existing drainage patterns:
Due to the prevalence of agricultural operation in the area of proposed infrastructure, it is necessary to ensure significant alteration of existing drainage is mitigated. Accordingly, drainage subareas were delineated to establish existing drainage patterns as a benchmark. Proposed grading and ditch design will allow pre-development drainage patterns to be maintained in the post-development condition.

In addition, ditches will be utilized to meet MPCA volume reduction requirements. This will be accomplished through longitudinal filtration ponds specifically proposed at the following locations:

1. Hawk Creek (CD 10)
2. Tributary Channel to Hawk Creek
3. CD 46

Provide detention and filtration BMPs per MPCA volume reduction requirements:
As mentioned above relating to situations with poorly draining soils and FAA coordination, filtration basins are proposed to treat runoff volume resulting from 1 inch of proposed impervious surface.

Accordingly, runoff from impervious track surfaces (subballast/Class 5 gravel) will be collected in longitudinal filtration basins prior to discharge into Hawk Creek (CD 10), Tributary Channel to Hawk Creek, and the South Ditch (CD 46). Filtration will occur as runoff passes through course sand media and collected in perforated pipes where discharge will then occur to adjacent waterways. It is expected that there will be four filtration basins at each of the two ditch crossings and one filtration basin at the tributary to Hawk Creek (just south of Hawk Creek), for a total of nine filtration basins. Detention volume in these basin areas have been designed to meet or exceed the 1 inch over proposed impervious surface volume requirement set by the MPCA.

Runoff treatment will not be implemented in areas where discharge occurs away from existing watercourses or in areas less sensitive to stormwater discharge, such as downstream agricultural/cultivated areas. These areas are not sensitive to and/or would not benefit from volume treatment BMPs required by the MPCA and therefore have been excluded. Coordination with MPCA will occur to ensure BMP requirements are satisfied.

Protect track infrastructure while providing rate control:
As mentioned above, track bed construction is designed to minimize the Project footprint. In order to minimize the footprint, the vertical alignment was designed to result in a cut/excavation and a fill/embankment condition. Accordingly, existing higher topographic areas will result in an excavation condition whereas lowland areas will result in an embankment condition. In the excavation scenario, ditches are included to intercept and direct runoff to lowland locations and protect railway infrastructure from flooding or track overtopping.

It is understood additional impervious surface added to a pre-developed impervious condition will result in additional downstream runoff. However, the proposed track section in combination with a general east to west runoff flow direction creates an overall drainage area ponding scenario. Accordingly, the additional impervious surface proposed for the track will result in minimal contribution to an increased runoff rate downstream of the proposed track infrastructure.

Design focus will prioritize ensuring capacity is implemented (culvert crossings) to ensure sufficient hydraulic bypass of upstream runoff will result. This will be

accomplished with large diameter culverts at each of the two agricultural ditches (Ditches 10 and 46) along with culverts placed at lowland/receiving areas along the alignment and through the proposed track section.

As described in the aforementioned, providing sufficient hydraulic capacity will accomplish the following primary goals:

1. Protect track infrastructure
2. Ensure downstream post-development runoff rates are similar to pre-development rates (without exceeding pre-development rates).

Roadway Improvements
The Project's roadway components (the CSAH 55 reconstruction, TH 40 reconstruction and bridge, TH 12 realignment and bridge, 45th Street realignment, and new industrial connection between realigned TH 12 and CSAH 55/1st Ave W) would result in increases in runoff quantity due to increased grades for the overpass structures, additional roadway alignments and minor improvements such as shouldering. The roadway improvements would result in an increase in impervious surface of 10.3 acres.

For linear projects it is challenging to collect proposed roadway runoff in a single BMP. It would be necessary to oversize the proposed filtration basins to account for areas where it is not feasible to treat the proposed roadway runoff. It would not be feasible in all locations to daylight the proposed drain tile for the filtration basins. Therefore, several of the proposed BMPs would be dry ponds which have limited water quality treatment capacity. As noted previously, the FAA would restrict the construction of wet ponds due to the proximity to the airport. It would not be feasible to comply with the NPDES requirements for filtration volume due to these constraints. However, the NPDES allows linear projects to follow sequencing to determine other appropriate BMPs to provide water quality treatment. Some additional options for compliance with the requirements that would be evaluated for this project are ditch checks in the rural section roads, extended detention in the proposed dry ponds via multi-stage outlets, and sump manholes. This Project would not contribute to the impairment of Hawk Creek or other downstream water resources.

Nine stormwater BMPs (a combination of dry ponds and filtration basins) would be evaluated to meet the water quality and rate control requirements of the City of Willmar and NPDES stormwater permit for roadway improvements. The filtration basins would be constructed using an engineered soil media and draintile. The proposed BMPs would also provide rate control to meet the City of Willmar requirements. The proposed BMPs are shown on **Figure 35** and described below based on the proposed road runoff they would receive.

Additional options for BMPs will be refined as plans are further developed. It is likely that there would have to be some modifications to BMPs presented on the following pages to ensure that all of the stormwater can be properly treated, filtrated and that adequate rate control is provided. Updates to BMPs will be provided in the EA Update once design plans are further along.

- CSAH 55
  Four stormwater BMPs would be evaluated to treat the proposed runoff from CSAH 55. Starting on the north end near 1st Avenue West and moving south the BMPs would be dry pond 5640, dry pond 5700, filtration basin 5461, and filtration basin 5721.

  Dry pond 5640 would be located in the northeast corner of 1st Avenue West and CSAH 55. It would receive runoff from the proposed roadway ditches from the north and east. It would discharge to a vegetated buffer strip before flowing into the wetland system to the north.

  Dry pond 5700 would be located in the southwest corner of the proposed 1st Ave W and CSAH 55 intersection. It would receive runoff from a portion of CSAH 55 directly adjacent to the BMP and from offsite agricultural area to the west. The outlet would be directed to the south into an existing depression. The existing depression would be bisected by CSAH 55. An equalizer pipe would be proposed under CSAH 55. The existing depression would have to be built up 3-4 feet prior to discharging west into the unnamed channel upstream of Hawk Creek. The CSAH 55 profile elevation would be approximately 15 feet higher where it crosses the depression for proposed conditions, due to the road raise needed for the bridge over the railroad. The proposed grading to raise CSAH 55 impacts the existing storage capacity of this depression. However, proposed dry pond 5700 would provide additional storage and it is possible to expand the storage on the east side to the north. The existing CSAH 55 and 1st Avenue intersection would be removed with the Project and allow for expansion of the depression to maintain existing discharge rates.

  Filtration basins 5461 and 5721 would be bisected by CSAH 55, south of proposed TH 12 and north of Hawk Creek. Filtration basin 5461 would discharge into 5721. Filtration basin 5721 would outlet to the creek.

- TH 40
  No stormwater BMPs would be proposed for the portion of the Project along TH 40. The net new impervious associated with the work on TH 40 would be limited. The road profile would be raised for the bridge over the BNSF railroad.

- TH 12
  Three proposed areas would be evaluated to treat the proposed runoff from TH 12. Moving from west to east they would include filtration basin 5431, dry pond 5733, and dry pond 5955.

  Filtration basin 5431 would be located on the east side of realigned TH 12, just west of the storage garage facilities. This filtration basin would store the proposed ditch runoff and discharges into the existing wetland complex to the south.

  Dry pond 5733 would be located south of realigned TH 12 and east of the BNSF bridge near Hawk Creek, at the low point of realigned TH 12. It would be designed to collect runoff from the crop fields and the industrial area to the north and the

east side of the proposed access road as well as a significant portion of TH 12. It would discharge directly to Hawk Creek to the south. It would be located within an existing agricultural ditch that discharges into the creek.

Dry pond 5955 would be located between Hawk Creek and TH 12 alignment, near where proposed TH 12 connects back with existing TH 12. It would collect the runoff from a small portion of TH 12 prior to discharge into the creek. It would also collect runoff from north of TH 12 via a proposed culvert.

- 45th Street
  One dry pond (5500) and one filtration basin (5413) would be needed to treat the proposed runoff from 45th Street realignment. The proposed roadway would be a rural section and the ditches would convey runoff to the proposed dry ponds. The ditches would also provide water quality treatment. Dry pond 5500 would be located northwest of where realigned 45th Street crosses existing TH 12. The BMP would discharge west into the existing wetland complex north of TH 12. Filtration basin 5413 would be located north of BNSF railroad and south of realigned 45th Street. The pond would discharge east into the existing TH 12 ditch system. Filtration basin 5413 would also receive runoff from north of proposed realigned 45th Street via a proposed culvert.

- Industrial Park Access Road
  Runoff from the proposed access road between realigned TH 12 and CSAH 55/1st Avenue W through the industrial park would be routed to three different areas. The portion of the access road that is within the industrial park would be designed as an urban section and stormwater routed to the existing stormwater structures present in the roadside ditch south of CSAH 55/1st Avenue W. The runoff would then discharge to the existing wetland located southeast of the intersection of 1st Avenue and CSAH 55. South of the industrial park, the access road would be designed as a rural section and stormwater runoff will be directed to the south into a proposed large filtration basin at the intersection of realigned TH 12 and access road. The filtration basin will outlet into Hawk Creek.

<u>Minimization Measures (Stormwater Pollution Prevention Plan [SWPPP])</u>
A NPDES construction stormwater permit would be required to construct the Project. The permit would be submitted to the MnDOT Project Manager prior to project authorization, and a SWPPP would be included in the construction plan package. The SWPPP would include BMPs for erosion control, sedimentation control, and stabilization measures. Some of these measures would include silt fence, bioroll check dams, erosion control blanket, and filtration basins. Hawk Creek (CD 10) is listed as impaired for mercury in fish tissue, but these impairments are considered non-construction related and no additional construction BMPs would be required.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or

required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

It is anticipated that activities associated with culvert construction / replacement / extension would result in water appropriation. The locations of the culverts are shown in **Figure 31**. Dewatering BMPs would be identified in the SWPPP, and a dewatering plan would be included in the construction documents. BMPs in the SWPPP and dewatering plan would be utilized to ensure that the discharge does not adversely affect receiving waters and the inlet and the discharge points would be adequately protected from erosion and scour. Any other locations determined to require dewatering will be included in the dewatering plan. If dewatering rates during construction exceed 10,000 gallons per day or a million gallons per year, a DNR water appropriation permit would be required and would be acquired by the contractor.

The Project would not connect to an existing municipal water supply and would not impact municipal water infrastructure.

iv. Surface waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

Table 15 – Overview of Aquatic Resource Impacts

	Definition	Wetland Impacts (acres)	Tributary Impacts (acres)	Wet Ditch Impacts (acres)	Total Impact (acres)
All Aquatic Resources	Wetlands, tributaries, roadside wet ditches, stormwater features, conveyance systems, and ditches	10.7*	0.4	0.1	11.2
WCA Regulated Wetlands	Natural Wetlands (WCA does not regulate incidental wetlands such as wet ditches)	10.7*	No Regulation	No Regulation	10.7
USACE Jurisdictional Resources	Wetlands, tributaries, roadside wet ditches, stormwater features, conveyance systems and ditches which connect to a water of the U.S.	3.6*	0.4	<0.1	4.0
*some resources may fall under regulation by WCA and the USACE					

Aquatic resource impacts (wetlands, roadside wetland ditches, stormwater features, conveyance systems, tributaries, creeks, ditches) would not be completely avoidable with construction of the Project due to its extent of over two miles of roadway and railway improvements and limitations in terms of location (proximity to the Willmar Airport). Approximately 11.2 acres of aquatic resource impacts would result based on preliminary design construction limits and delineated resources (**Table 15**). However, not all of the impacted aquatic resources are regulated.

Aquatic resource delineation identified a total of 55 aquatic resources including 43 wetlands, eight wet ditches, and four tributaries within the project area. Wetland delineation was completed for the BNSF railway alignment in October, 2013 and the Notice of Decision for this delineation was received from the Local Government Unit (LGU) on February 5, 2014. Additional wetland delineation was completed for a supplemental area located in Sections 7 and 18 of Township 119 North, Range 35 West in May and September of 2014 and the Notice of Decision from the LGU for this delineation was received on August 12, 2014.

In June, 2016 additional wetland delineation was completed for all other areas of the Project that were not previously reviewed. Wetland boundaries for the final delineation have been reviewed by Kandiyohi County, the appointed LGU, and approval was received in October 2016 (**Appendix S**). The locations of wetlands are shown on **Figure 36**.

Avoidance Measures

Several alternatives were analyzed for the BNSF railway, TH 12 realignment, and other roadway improvements, each resulting in varying levels of wetland impacts. The No-Build Alternative would result in zero acres of wetland impacts, but would not address the needs of this project. The resulting wetland impacts from three alternatives and the recommended alternative are discussed in detail in a Wetland Assessment and Two-Part Finding (**Appendix J**).

The recommended alternative for this project is designed to avoid wetlands to the maximum extent where feasible. Wetland impacts from the recommended alternative are estimated to total approximately 10.7 acres (**Table 15**). Wetland types that will be impacted from this project include Type 1/Seasonally Flooded Basin, Type 2/Fresh (wet) Meadow, Type 3/Shallow Marsh, and Type 6/Scrub Shrub.

Minimization

To minimize impacts to wetlands, the northwest portion of the TH 12 realignment was shifted eastward approximately 1,000 feet to avoid crossing the largest spans of wetland. This shift reduced wetland impacts by approximately 3 acres. In addition, a 48 inch round culvert would be proposed where the proposed TH 12 crosses the large wetland complex and would allow for hydrology to be maintained between the wetland areas following construction (**Figure 31**, crossing H). Minimization measures were also taken into consideration when designing the BNSF rail line. For example, cross sections of the railway include 2:1 side slopes in order to reduce the railway footprint and to minimize wetland impacts.

USACE Regulated Aquatic Resources

In a letter dated August 25, 2015 the United States Army Corps of Engineers (USACE) issued an approved jurisdictional determination for aquatic resources within the project area. Twenty-seven delineated aquatic resources were determined to be non-jurisdictional and five delineated aquatic resources were determined to be jurisdictional by the USACE. The jurisdiction of the remaining 23 delineated aquatic resources (from delineations completed in 2016) is under review by the USACE concurrently with the wetland delineation report dated June, 2016. In January, 2017, the USACE provided a preliminary list of aquatic resources which will most likely be considered Waters of the United States. A final list with an official determination is expected in the near future and this information is anticipated to be available for inclusion in the EA Update. Correspondence received to date is included in **Appendix S**. Additional information regarding USACE jurisdiction will be included in the EA Update. Final determinations will be coordinated through the USACE permitting process.

Wetland Conservation Act (WCA) Regulated Wetlands

The recommended alternative would result in approximately 10.7 acres of impact to 22 of the 43 delineated wetlands (**Table 15**). Impacts to incidental wetlands such as wet ditches do not require compensatory mitigation under the Wetland Conservation Act.

Wetland impacts resulting from the Project would be mitigated through wetland banks. A portion of the mitigation would come from the MnDOT wetland banks, with other mitigation coming from private wetland banks. Mitigation for these wetland impacts would comply with the wetland sequencing and siting requirements of the Wetland Conservation Act and would be replaced through the purchase of approved wetland bank credits at a ratio of two to one.

As the Project progresses, aquatic resource types and impacts will be refined in accordance with the WCA and USACE permitting requirements. Wetland impacts to USACE jurisdictional wetlands would be replaced using approved bank credits. The assumed mitigation for this project would be provided at a minimum 2:1 ratio. A breakdown of wetland impacts and compensation can be found in the attached Wetland Assessment and Two-part Finding (**Appendix J**).

b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

<u>Hawk Creek</u>
Hawk Creek, also known as County Ditch (CD) 10, is an altered DNR Public Water (M-055-145) and is located within the project area (crossings B, C, D, and I; **Figure 31**). The Project would include the following work in Hawk Creek (CD 10):

- Replace the existing bridge 91329 in kind along TH 40 (crossing D).
- Replace and widen the existing box culvert bridge 94149 by 25 feet along CSAH 55 (crossing C).
- Install a culvert at the proposed railroad crossing east of CSAH 55 (crossing B). A 15-foot round culvert was analyzed to have sufficient capacity to keep the floodplain elevation change to less than 0.5 feet. However, the culvert dimensions may be modified as the design progresses as long as the floodplain elevation criteria are met.
- Replace the existing box culvert bridge 8468 on existing TH 12 with a longer box culvert that meets current design requirements (crossing I).

Hawk Creek is an altered natural watercourse and the Minnesota DNR has given authority over to the local government (Kandiyohi County). Therefore, impacts to Hawk Creek would not require a Minnesota DNR general permit for work within the

creek should the recommended alternative be constructed (see correspondence in **Appendix K**). However, Kandiyohi County would require a permit for working in and/or altering the ditch. A License to Cross Public Lands and Waters permit may be required from the Minnesota DNR. Impacts from this proposed work would be approximately 0.10 acre.

Impacts to Hawk Creek from roadway improvements at bridges 91329 and 94149 were minimized by utilizing the existing crossings. Impacts were also avoided by retaining the existing structure in Hawk Creek at bridge 34323 in the northeast portion of the Project. Various railway alternatives were considered to avoid impacts to aquatic resources as well. The proposed railway alternative would reduce the number of railroad crossings with Hawk Creek to one location. Given the existing altered state of Hawk Creek, the addition of a culvert at the proposed railroad crossing east of CSAH 55 should not have adverse effects to the creek habitat.

The Project would not change the number or type of watercraft on any waterbody.

<u>County Ditch Tributaries</u>
County Ditch 46 (crossing F; **Figure 31**) is also within the project area and would also require a permit for working in and/or altering the ditch in advance of project construction. County Ditch 46 would require an approximately 15-foot round culvert to support the proposed railway crossing at the southern end of the project area. Impacts to County Ditch 46 would be approximately 0.10 acre.

County Ditch 12 is located in the northeast corner of the Project and extends north from Hawk Creek (crossing A; **Figure 31**). On site delineation of this area determined that the ditch terminates on the ground surface near the proposed TH 12 alignment. An estimated 48-inch culvert would be installed in this location under TH 12 to maintain drainage of the area. Impacts from culvert installation at County Ditch 12 would be approximately 0.02 acre.

<u>Unnamed Tributaries</u>
The proposed TH 12 realignment would cross an unnamed tributary to Hawk Creek to the west of CSAH 55. This crossing would include the installation of an estimated 48-inch culvert under TH 12 (crossing E; **Figure 31**).

A proposed stormwater pond would impact an unnamed tributary to Hawk Creek located east of CSAH 55 and south of the proposed TH 12 realignment. This tributary extends north from Hawk Creek and terminates outside of the proposed TH 12 alignment. In this location, an estimated 3-foot by 5-foot box culvert is proposed to be installed under TH 12, just north of the delineated unnamed tributary, to maintain drainage in this area (crossing G; **Figure 31**).

A proposed railway crossing located east of CSAH 55 and west of the old airport runway would include the installation of an approximately 72-inch round culvert within the unnamed tributary to Hawk Creek (crossing B; **Figure 31**).

Wet Ditches

Eight wet ditches were delineated throughout the project area **(Figure 36)**. Wet ditches are areas, such as constructed roadside ditches, that have formed wetland characteristics over time due to the topographic position and the frequency of hydrology from runoff. These areas may meet wetland criteria, but were not constructed for the purpose of creating a wetland area. Proposed impacts to wet ditches would be estimated to be approximately 0.1 acre (**Table 15**).

The proposed impacts would not substantially alter the surface waters within the project area. Best management practices would be used to avoid unnecessary impacts to surface waters during construction and would be included in the Project SWPPP and dewatering plans. Potential BMPs to be considered would include: down-gradient perimeter sediment control such as silt fence, ditch checks, rapid stabilization measures, pump inlet/outlet protection from scouring, stabilized construction access, etc.

12. Contamination/Hazardous Materials/Wastes

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

MnDOT's Office of Environmental Stewardship reviewed the project area for potentially contaminated sites and determined that a Phase 1 investigation would not be needed due to the majority of the project area being farmed. There would be a low likelihood of encountering contaminated materials as a result of construction activities.
If encountered during construction, the presence of contaminated soil or groundwater could result in public health or environmental effects through the releasing and spreading of contaminated soil, sediment, or groundwater; altering the flow of or generating contaminated groundwater; and creating pathways for contamination to migrate through the soil column. Contaminants in airborne particulates could migrate offsite in dust particles and could cause an exposure concern. Accidental hazardous materials spills or releases from construction activities, equipment, or materials could also occur.

No known contaminated groundwater or soil was identified in the project area. Any potentially contaminated materials encountered during construction would be handled and treated in accordance with applicable state and federal regulations. It is not anticipated that construction work would release contaminated dust particles to the surrounding populace; however, minimization measures would avoid, control, and manage these efforts.

It is anticipated that three houses and associated accessory structures located adjacent to the TH 40/CSAH 55 intersection (**Figure 37**) would be demolished and removed as part of

the Project. It is likely, given the ages of the buildings, that there would be localized and limited regulated waste (such as asbestos, mercury, lead, etc. within structures or surficial contamination from fuel tanks associated with heating, etc.). There may also be contaminated soil and or groundwater associated with possible fuel oil tanks.

For any properties that would be removed/demolished as part of the Project, MnDOT would contract with experts in regulated waste to inspect the properties for the presence of regulated or contaminated materials. MnDOT would implement standard measures to help avoid, control and manage potential effects from contaminated materials, such as preparing and implementing a project-specific scope of work, site-specific health and safety plan and hazardous material management plan. Any regulated or contaminated materials identified would be disposed of in accordance with applicable federal, state and local regulations in advance of construction of the Project.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Construction of the Project would generate solid waste and construction debris normal to construction. Management of this material would be in accordance with state guidelines and regulations. All solid wastes generated by construction of the proposed project would be disposed of properly in a permitted, licensed solid waste facility. Project demolition of concrete, asphalt, and other potentially recyclable construction materials would be directed to the appropriate storage, crushing or renovation facility for recycling.

Following construction, the Project would not generate solid wastes.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

<u>Construction</u>
Toxic or hazardous materials, such as fuel for construction equipment, and construction materials (sealant, paint, contaminated rags, acids, bases, herbicides, and pesticides) would likely be used during site preparation and road and rail construction. The potential for substantial fuel or other chemical spills during and after road and rail construction activities is considered low. Best management practices would be used to minimize the chance of such spills. If a spill were to take place during construction, appropriate action to remedy

the situation would be taken immediately in accordance with MPCA guidelines and regulations.

Any contaminated spills or leaks that occur during construction would be the responsibility of the contractor, who will notify the Duty Officer and work with the MPCA to contain and remediate contaminated soil/materials in accordance with state and federal standards Once the Project has been constructed, there would be no above or below ground petroleum storage tanks within the site.

Railroad Operations

To identify and control releases of hazardous materials, regular inspections and maintenance and repair activities occur presently on the Morris and Marshall Subdivision, and would occur on the proposed connection between the two subdivisions. As a precautionary measure, BNSF Railway has prepared a Hazardous Materials Emergency Response Plan Summary for First Responders manual to provide and document the framework for BNSF and civil first responders to follow, in the event of a hazardous material incident. This response plan includes procedures for prompt notification of responders, shippers, and the public, as necessary, along with a description of their roles in response, post-incident critique, and follow-up.

Hazardous materials, including crude oil, are sometimes transported on the Morris and Marshall Subdivisions, and would continue to be transported on them as well as on the proposed connection. The Hazardous Materials Transportation Act (HMTA) gives federal enforcement authority over hazardous materials (including crude oil) transported by motor carriers and rail carriers to the FHWA and the FRA. Under the HMTA, crude oil is limited by several special provisions, including specific rules on packaging and limits on transport quantity by rail, aircraft, and stowage. BNSF would comply with all applicable regulations.

Hazardous materials and hazardous shipments are and would continue to be handled by trained staff in accordance with all Occupational Safety and Health Administration (OSHA), EPA, and USDOT regulations, as well as local and state regulations applicable to BNSF's operations including the Project.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

It is anticipated that building removal would occur as part of the Project. Buildings to be removed would be treated as demolition debris. Prior to the demolition of structures, assessments for asbestos-containing materials, lead-based paints, and other regulated materials/wastes would be performed. The appropriate notifications would be submitted to regulatory authorities prior to asbestos abatement, structure demolition or relocation activities, regardless of whether regulated waste or asbestos was discovered during the assessment. All regulated materials and waste, including hazardous waste, from such buildings would be removed and properly disposed of prior to demolition.

A certified asbestos abatement contractor would be used to remove any asbestos containing materials identified. Any green-treated wood would be documented and disposed of in a MPCA approved Mixed Municipal Solid Waste (sanitary) landfill or Industrial Waste Landfill.

Any contaminated soil removed on site will be disposed of in a MPCA approved landfill.

Following completion of the Project, the roadway and the railway would not generate hazardous wastes.

13. Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources (Rare Features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

The majority of the project area has been previously disturbed, drained and is used for agriculture or industrial development. Outside of the project area, native prairie remnants occur within the railroad right of way within one mile of the project area. These habitats lie to the northwest along the Morris Subdivision, and to the southwest along the Marshall Subdivision.

A number of wildlife management areas (WMAs), walk-in areas (WIAs) and waterfowl production areas (WPAs) are located outside of the project area and provide wildlife habitat (**Figure 38**). The Rau Prairie Pothole WMA, Gopher Ridge WMA and Kandiyohi WIA #15 are located northwest of the Project, approximately 500 feet west of the realignment of 45th Street north of TH 12, and north of the railway on the western limits of the TH 12 realignment. The Priam WPA is located approximately 1.5 miles southwest of the project area along TH 23 and the Quinn WPA is located approximately 2.5 miles west of the project area, south of 7th Avenue SW.

Small tracts of woodlands occur throughout the project area and consist mainly of planted windbreaks around farmsteads and along fence lines. Some woodland also occurs within the riparian areas along Hawk Creek.

Hawk Creek is an altered natural watercourse and county ditch with steep banks (approximately 2:1 slopes). Riprap has been placed along the banks of the creek in several areas to prevent erosion. Due to erratic flows downstream from the Foot Lake control structure and the shallow depths of the creek, any fish habitat in Hawk Creek would be considered marginal or poor.

A total of 43 wetlands were identified within or adjacent to the project area. Most of these wetland areas are seasonally flooded basins within agricultural fields, and are drained and cultivated during most years. As such, the wetland habitat in the project area and vicinity has been fragmented or degraded due to development and farming activities.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological

Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-) and/or correspondence number (ERDB) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

MnDOT has a liaison with the DNR who performs the Natural Heritage Information System (NHIS) review internally, so no LA or ERDB number has been assigned. Correspondence from the DNR is included in **Appendix K**. No additional habitat or species survey work was conducted or recommended.

A search of the NHIS Database was conducted by Minnesota DNR staff to identify rare features within the project area. The NHIS database comprises locational records of rare plants, animals, and other features including native plant communities, geologic features and animal aggregations (such as nesting colonies). In order to ensure future protection of these sensitive resources, the location information is not provided in this document. Instead, the document generally identifies the sensitive resources in the Project area and describes measures to avoid, minimize or mitigate impacts to those resources.

Resources in the NHIS identified included the following rare features:

- The Powesheik Skippering (*Oarisma poweshiek*) butterfly was sited in 1981 along TH 23 and the railroad right of way a few hundred yards outside the south end project limits. Today this species is listed as "Endangered" on both State and Federal Threatened and Endangered Species. The U.S. Fish and Wildlife Service (USFWS) does not list this area as a critical habitat area. The DNR and USFWS reviewed the project area and indicated that it was unlikely that Powesheik Skipperings would be present.

- The Regal Fritillary (*Speyeria idalia*), is listed as a species of Special Concern, and was identified in the same area as the Powesheik Skippering.

- Small White Lady's-slipper (*Cypripedium candidum*) has also been observed in the area to the west of the junction of CSAH 55 and TH 23, just outside the Project limits. This is listed as a species of Special Concern. [Note – this area is outside of the Project limits but was included in early correspondence with the DNR when alternatives were being developed and evaluated].

- Just outside the north and south ends of the Project limits, there are segments of remnant prairie between the railroad right of way and adjacent MnDOT right of way. It is possible that the adjacent MnDOT right of way could contain similar quality prairie remnants. The 1997 Minnesota State Legislature directed the DNR to conduct a field review of active railroad rights of way to identify native prairie. The DNR surveyed 3,240 miles of railroad right of way, of which 487 discontinuous miles of native prairie were identified. The prairie remnants in the vicinity of the Project were considered to be in fair condition.

- The northern long-eared bat (*Myotis septentrionalis*) is federally listed as threatened and state listed as special concern. New rules are in place that affect environments that the northern long-eared bat have been known to use as habitats. During the winter this species hibernates in caves and mines, and during the active seasons (approximately April-October) it roosts underneath bark, in cavities, or in crevices of both live and dead trees. According to the Minnesota DNR and USFW databases, there are no known maternity roost trees and/or hibernacula entrances documented for the northern long-eared bat within an approximate one-mile radius of the proposed Project.

  MnDOT's Office of Environmental Stewardship (OES) reviewed the project for Section 7 impacts (discussed in Section IV.B.9) and determined that the project may affect, but would not cause prohibited incidental take of the bat (**Appendix L**).

In addition to the NHIS search – it is noted that two wildlife management areas (Rau Prairie Pothole WMA and Gopher Ridge WMA – **Figure 38**) are located along existing TH 12 west of the project area. While the Project is not expected to impact these areas – and they are areas for potential relocation of the Small White Lady's Slipper – concerns with working adjacent or near these areas is that invasive species not be introduced with any fill or seed mixes.

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

The majority of the project area has been previously disturbed, drained and used for agriculture. Any wildlife displaced by the Project or during construction of the Project would likely relocate to suitable nearby areas, including lands immediately adjacent to the project area.

There would be vegetation impacts as a result of the Project, including herbaceous and tree impacts. Segments of right of way between the railroad and adjacent TH 12 contain prairie remnants, and the concern along these remnant prairie segments is that soil disturbance, incidental herbicide exposure, hydrologic alterations, competition from non-native, sod forming grasses, or shading by encroaching shrubs can all lead to degradation of the site. However, these remnants are located outside of the project area, and therefore impacts to these areas would be unlikely. Other herbaceous vegetation that would likely be impacted is located primarily on agricultural land and includes species that are common in frequently disturbed areas.

Tree impacts would occur as a result of the Project. The areas likely to be impacted would include wind breaks adjacent to farmsteads and along fence lines, areas adjacent to Hawk Creek and an unnamed tributary to Hawk Creek located west of TH 55.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

The following section identifies measures that would be taken to avoid, minimize or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources should the recommended alternative be constructed.

- The Powesheik Skippering (*Oarisma poweshiek*) butterfly: Both the DNR and USFWS noted that re-vegetation of the project area should include native vegetation beneficial to their use in the remote chance that they are still in the area with construction of the recommended alternatives.

- The Regal Fritillary (*Speyeria idalia*) butterfly: Although not likely to be established within the project area, the DNR noted that re-vegetation of the project area seed mix composition should include the Prairie Violet to support this species' larvae.

- Small White Lady's-slipper (*Cypripedium candidum*): It is not known if this species is in the project area. If the plant is encountered, it should be transplanted to a public land. It may be possible to move the plants to the nearby wildlife management areas north of the Project (as previously discussed). Guidelines for moving the plant are included in **Appendix K**.

- Remnant Prairie: Although outside the Project limits – some may be located near the Project. These areas should be identified as 'Area of Environmental Sensitivity' on plans for any proposed construction activities. See the attached AES best practices guidance based on MnDOT Spec 2572.3 in **Appendix K**.

  In general, the guidance includes protection measures such as:

  - Design the project to avoid impacts to any identified Areas of Environmental Sensitivity
  - Protect and preserve vegetation from damage in accordance with MnDOT Spec 2572.3
  - Prohibit vehicle and construction activities, including the location of field offices, storage of equipment and other supplies at least 25 feet outside the Area of Environmental Sensitivity to be preserved, also in accordance with MnDOT spec 2572.3
  - Redundant sediment/erosion control Best Management Practices (BMP's) may be required for protection of areas of environmental sensitivity.
  - Revegetation of disturbed soils should include native mixes in areas that are not proposed for mowed turf grass. Please utilize the native recommendations developed by BWSR (http://www.bwsr.state.mn.us/native_vegetation/) or MnDOT' in the 'Vegetation Establishment Recommendations' – dated November 13, 2015 (http://www.dot.state.mn.us/environment/erosion/seedmixes.html). This should be done in coordination with MnDOT District 8 representatives for Erosion Control & Stormwater Management Unit, Roadside Vegetation

Management Unit, and maintenance staff to determine appropriate permanent revegetation plans.
    - The use of erosion control blanket should be limited to 'bio-netting' or 'natural netting' types (category 3N or 4N), and specifically not allow plastic mesh netting.

- The northern long-eared bat (*Myotis septentrionalis*): Appropriate measures would be taken to meet the new final 4(d) rule for the northern long-eared bat. To avoid a "take" of this species and impacts on their habitat, the final 4(d) rule states: "Incidental take caused by tree removal is prohibited if it: (1) Occurs within a 0.25 mile (0.4 kilometer) radius of known northern long-eared bat hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known maternity tree during the pup season (June 1 through July 31)."

  Approximately 0.5 acres of tree removal would occur as part of the Project. There are no documented maternity roost trees and/or hibernacula within the project area. However, the project schedule would perform winter tree removal (November 1 to March 31) in order to avoid possible impacts to the species during the pup rearing season (June 1 through July 31).

- Wildlife Management Areas: Areas west of the Project. If there are any soil disturbances in the areas adjacent to the WMA, revegetation of disturbed soils should be done with native species suitable to the local habitat.

For the remainder of the project area, all revegetation of disturbed soils should be a native seed mix in those areas that are not proposed for mowed turf grass. With the new railroad connection between the existing Marshall and Morris Subdivisions, there is an opportunity to provide a new linear prairie that could improve migration between the existing remnant prairies.

Native seed mix composition should include plant species that will benefit the Poweshiek skipperling and Regal Fritillary butterflies, such as prairie violet (*Viola palmata var. pedatifida*), purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*), palespike lobelia (*Lobelia spicata*), and fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseed (*Sporobolus heterolepis*).

14. Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Summary

The project area (the area of potential effect or APE for purposes of Section 106) has been reviewed for the presence of culturally-significant archeological and/or architectural resources by MnDOT's Cultural Resource Unit (CRU). Based upon initial staff review, there was potential for historic and archaeological resources within the project area. MnDOT conducted architectural history and archaeological field studies for further analysis. Copies of the study reports are found in **Appendix M** (historic) and **Appendix N** (archaeological), and the findings are summarized in this section. Please note that initial project scope of the studies included an evaluation of an at-grade crossing of the railway at CSAH 55/1st Avenue W. The at-grade crossing was rejected as part of the alternatives analysis and is no longer included in the Project.

One site (the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District), previously determined to be eligible for listing in the National Register, was evaluated by MnDOT CRU for potential impacts due to the proposed project. MnDOT's CRU has issued a letter to the Minnesota State Historic Preservation Office (MnHPO) indicating that the Project would not result in an adverse effect to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District. MnDOT's CRU determination letter and MnHPO's concurrence letter are included in **Appendix O**.

Historic

Phase I architectural history investigation

Phase I and Phase II architectural history investigations (**Appendix M**) were completed in the project area. The Phase I architectural history investigation identified one property previously determined eligible for listing in the National Register: the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387).

One property, County Ditch No. 10 (KH-DTC-002), was identified as potentially eligible by MnDOT CRU prior to the Phase I survey. Beyond County Ditch No. 10, a total of 25 properties 45 years in age or older were surveyed, 24 of which were recommended as not eligible for listing in the National Register. The remaining property, the Willmar and Sioux Falls Railway Company main line (XX-RRD-038), was recommended as being potentially eligible for listing in the National Register.

Phase II architectural history investigation

Phase II evaluations were conducted for the County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line properties to determine their National Register eligibility. Based on the Phase II evaluations, County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line were recommended as not eligible for listing in the National Register due to a lack of significance.

CRU Evaluation of St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387) is an active rail corridor that was previously determined as eligible for listing in the National Register. This property is also referred to as the BNSF Morris Subdivision throughout this EA-EAW document.

MnDOT CRU evaluated potential project impacts to this property. The proposed construction of the railroad line that would extend off the existing main line would constitute the only direct effect to the historic district. This was determined by MnDOT CRU to not alter the existing mainline. The presence of the new railroad line would constitute a minor change in visual and historical character for a corridor that is hundreds of miles long with highway bridges and spur lines as a common feature.

MnDOT's CRU has issued a letter to the Minnesota State Historic Preservation Office (MnHPO) indicating that the Project would not result in an adverse effect to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District. MnDOT's CRU determination letter and MnHPO's response letter concurring with the determination are included in **Appendix O**.

Because the railway is also considered a Section 4(f) resource, a review of the resource was completed by FHWA and it was determined that Section 4(f) De Minimis documentation would be required. See Section IV.B.7 for more details and **Appendix Q**.

Archaeological

A Phase I archaeological survey (**Appendix N**) was also completed in the project area. One site (21KH157), an abandoned and razed farmstead, was identified. Because the farmstead was occupied by multiple households and has been previously disturbed, this site was determined by MnDOT CRU to be not eligible for listing in the National Register of Historic Places.

Tribal Coordination

In addition to investigation of the project area, MnDOT's CRU also sent out a letter regarding the proposed project to Tribal Governments. No responses to the letter were received within the 30-day comment period. **Appendix O** includes the tribal coordination letter.

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

The project area landscape consists of level terrain, resulting in views of farmsteads and open agricultural fields extending into the horizon in many areas. The Marshall and Morris BNSF subdivision railroad lines and TH 12 also provide linear visual references at the north and south ends of the project area.

The Project would alter the visual characteristics of the area for both travelers and residents or neighbors, primarily due to the new linear north-south railway connection and two grade separations where the new rail connection crosses under a realigned TH 12 and under TH 40. The railway would introduce a new visual resource to the project area; however, the view would be fairly limited to adjacent properties (limited number of residences in the project area) and would likely be visible from nearby transportation routes such as realigned TH 12, CSAH 55, CSAH 5, TH 40 and 19th Avenue SW. The grade separations would result in

bridges that could measure 30 feet in height above current terrain levels. A similar overpass exists within the city of Willmar where TH 12 is elevated over the Marshall Subdivision line near TH 12 and 11th Street.

The proposed TH 12 overpass and new rail connection would introduce a 30-foot structure, graded road elevations on embankments. The proposed TH 12 overpass would be consistent with existing adjacent transportation corridor, agricultural and industrial land uses. Road users will experience a change while traveling on realigned TH 12, as the road elevation rises to cross over the new rail connection line (which would be visible from the bridge) and remain elevated through the intersection with CSAH 55. The nearest home would be approximately 600 feet from the new TH 12 and CSAH 55 intersection.

The proposed TH 40 overpass and new rail connection would also introduce a 30-foot structure, graded road elevations on embankments and a rail line for transportation land use in a rural and agricultural location with relatively flat terrain. The Project would require additional pavement, elevated grades and a structure, removal of three homes and clearing of some trees surrounding the homes. If the three residences were not removed, the graded embankments would significantly block the views from these homes; however, it is anticipated that these homes would be removed and their residents relocated. Road users traveling east-west on TH 40 would experience a change, as the road elevation rises to cross over the new rail line (which would be visible from the bridge) and remain elevated through the intersection with CSAH 55. Although the Project is expected to remove the residences from this area and eliminate neighbors that would experience the visual change, others that will experience a visual change include the residents and travelers on CSAH 55 and travelers on TH 23/CSAH 15. The TH 40 overpass, and in some instances the rail connection would be visible from these roads, as well as realigned TH 12.

Road users travelling TH 12 would experience a change in visuals due to its location on a new alignment. However, the new views will be similar to current views of the agricultural areas outside of the City of Willmar.

The Project would introduce new light sources due to intersection lighting at the overpasses and rail connection. Lights would be placed on the overpass structures and access road along the rail connection for safety of travelers and crews changing in this area. With the agricultural setting and few residences in the area, the new lighting sources are not anticipated to create a major impact. Several industrial businesses along CSAH 55/1st Avenue W are currently lit. Due to the distant location of the remaining residences and already lighted industrial area on CSAH 55/1st Avenue W, the Project would have minimal light and visual impacts.

16. Air

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

This Project would not include permanent stationary sources of air emissions.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Introduction to Transportation Air Quality

Motorized vehicles and train locomotives affect air quality by emitting airborne pollutants. Changes in traffic volumes, travel patterns, and roadway locations affect air quality by changing the number of vehicles in an area and the congestion levels. The air quality impacts from the Project are analyzed by addressing criteria pollutants, a group of common air pollutants regulated by the Environmental Protection Agency (EPA) on the basis of criteria (information on health and/or environmental effects of pollution). The criteria pollutants identified by the EPA are ozone, particulate matter, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide. Potential impacts resulting from these pollutants are assessed by comparing projected concentrations to National Ambient Air Quality Standards (NAAQS). In addition to the criteria air pollutants, the EPA also regulates air toxics. The Federal Highway Administration (FHWA) provides guidance for the assessment of Mobile Source Air Toxic (MSAT) effects for transportation projects in the National Environmental Policy Act (NEPA) process. A qualitative evaluation of MSATs has been performed for this project as documented below. The scope and methods of the analysis performed were developed in collaboration with the Minnesota Department of Transportation (MnDOT) and Minnesota Pollution Control Agency (MPCA).

NAAQS Criteria Pollutants

Ozone

Ground-level ozone is a primary constituent of smog and is a pollution problem in many areas of the United States. Exposures to ozone can cause people to be more susceptible to respiratory infection, resulting in lung inflammation, and aggravating respiratory diseases, such as asthma. Ozone is not emitted directly from vehicles but is formed when volatile organic compounds (VOCs) and nitrogen oxides (NO_x) react in the presence of sunlight. Transportation sources emit NO_x and VOCs and can, therefore, affect ozone concentrations.

However, due to the phenomenon of atmospheric formation of ozone from chemical precursors, concentrations are not expected to be elevated near a particular roadway.

The MPCA, in cooperation with various other agencies, industries, and groups, has encouraged voluntary control measures for ozone concentrations and has begun developing a regional ozone modeling effort. Ozone concentrations in the lower atmosphere are influenced by a complex relationship of precursor concentrations, meteorological conditions, and regional influences on background concentrations. The MPCA states in the document, *Air Quality in Minnesota: 2015 Report to the Legislature*, that:

> *On November 24, 2014, the EPA announced proposed changes to the National Ambient Air Quality Standard for ozone. The proposal seeks to strengthen the ozone standard by lowering the standard from 75 ppb to a value between 65 ppb and 70 ppb. The proposal is based on scientific evidence that strongly indicates ozone impacts human health at levels below the existing standard of 75 ppb.*
>
> *Based on 2013 ozone monitoring results, all areas of Minnesota will meet the revised ozone standard if it is set at 70 ppb. If the ozone standard is set at 66 ppb or lower, the Twin Cities metropolitan area will not meet the standard. The EPA is expected to finalize the revised ozone standard in October 2015. EPA plans to use monitoring data from 2014-2016 to determine compliance. The MPCA will closely monitor ozone levels over the summer of 2015 and 2016 to assess the likelihood of violating the revised ozone standard.*

The Project is located in an area that has been designated as an unclassifiable/attainment area for ozone. This means that the project area has been identified as a geographic area that meets the national health-based standards for ozone levels, and therefore is exempt from performing further ozone analyses.

Particulate Matter

Particulate matter is the term for particles and liquid droplets suspended in air. Particles come in a wide variety of sizes and have been historically been measured by the diameter of the particle in micrometers. $PM_{2.5}$, or finer particulate matter, refers to particles that are 2.5 micrometers or less in diameter. PM_{10} refers to particulate matter that is 10 micrometers or less in diameter.

Motor vehicles (i.e., cars, trucks, and buses) emit direct PM from their tailpipes, as well as from normal brake and tire wear. Vehicle dust from paved and unpaved roads may be re-entrained, or re-suspended, in the atmosphere. Diesel train engines also emit PM as an exhaust byproduct. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. $PM_{2.5}$ can penetrate the human respiratory system's natural defenses and damage the respiratory tract when inhaled. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing;
- Decreased lung function;

- Aggravated asthma;
- Development of chronic bronchitis;
- Irregular heartbeat;
- Nonfatal heart attacks; and
- Premature death in people with heart or lung disease.
  (Source: http://www.epa.gov/air/particlepollution/health.html)

On December 14, 2012, the EPA issued a final rule revising the annual health NAAQS for fine particles ($PM_{2.5}$). The EPA website states:

> *With regard to primary (health-based) standards for fine particles (generally referring to particles less than or equal to 2.5 micrometers (mm) in diameter, $PM_{2.5}$), the EPA is strengthening the annual $PM_{2.5}$ standard by lowering the level to 12.0 micrograms per cubic meter (µg/m3). The existing annual standard, 15.0 µg/m3, was set in 1997. The EPA is revising the annual PM2.5 standard to 12.0 µg/m3 so as to provide increased protection against health effects associated with long- and short-term exposures (including premature mortality, increased hospital admissions and emergency department visits, and development of chronic respiratory disease), and to retain the 24-hour $PM_{2.5}$ standard at a level of 35 µg/m3 (the EPA issued the 24-hour standard in 2006). The EPA is revising the Air Quality Index (AQI) for $PM_{2.5}$ to be consistent with the revised primary $PM_{2.5}$ standards. (Source: http://www.epa.gov/pm/actions.html).*

The EPA also retained the existing standards for coarse particle pollution (PM_{10}). The NAAQS 24-hour standard for PM_{10} is 150 µg/m3, which is not to be exceeded more than once per year, on average, over 3 years.

The Clean Air Act conformity requirements include the assessment of localized air quality impacts of federally-funded or federally-approved transportation projects that are located within $PM_{2.5}$ nonattainment and maintenance areas and deemed to be projects of air quality concern. The Project is located in an area that has been designated as an unclassifiable/attainment area for PM. This means that the project area has been identified as a geographic area that meets the national health- based standards for PM levels, and therefore is exempt from performing PM analyses.

Nitrogen Dioxide (Nitrogen Oxides)
Nitrogen oxides, or NO_x, are the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of NO_x are motor vehicles, train engines, electric utilities, and other industrial, commercial, and residential sources that burn fuels.

Nitrogen dioxide (NO_2), which is a form of nitrogen oxide (NOx), is regularly monitored. Minnesota currently meets federal nitrogen dioxide standards, according to the *Annual Air Monitoring Network Plan for Minnesota, 2017* (August 2016). A monitoring site meets the annual NAAQS for NO_2 if the annual average is less than or equal to 53 parts per billion (ppb). The 2015 Minnesota NO_2 monitoring site averages ranged from 5 ppb to 14 ppb; therefore, Minnesota currently meets the annual NAAQS for NO2. **Chart 1** shows the

2015 averages at Minnesota sites and compares them to the standard. **Chart 2** shows the 2013-2015 average of the annual 98th percentile daily maximum 1-hour concentrations at Minnesota monitoring site, and compares them to the 1-hour standard.

Chart 1 – Annual Average NO_2

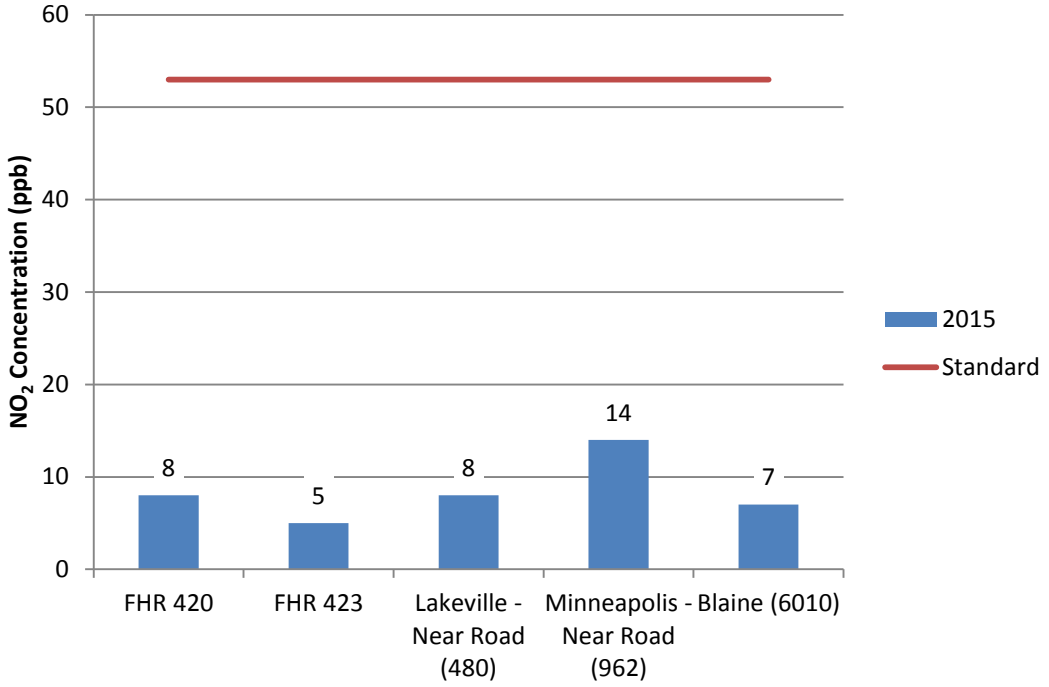
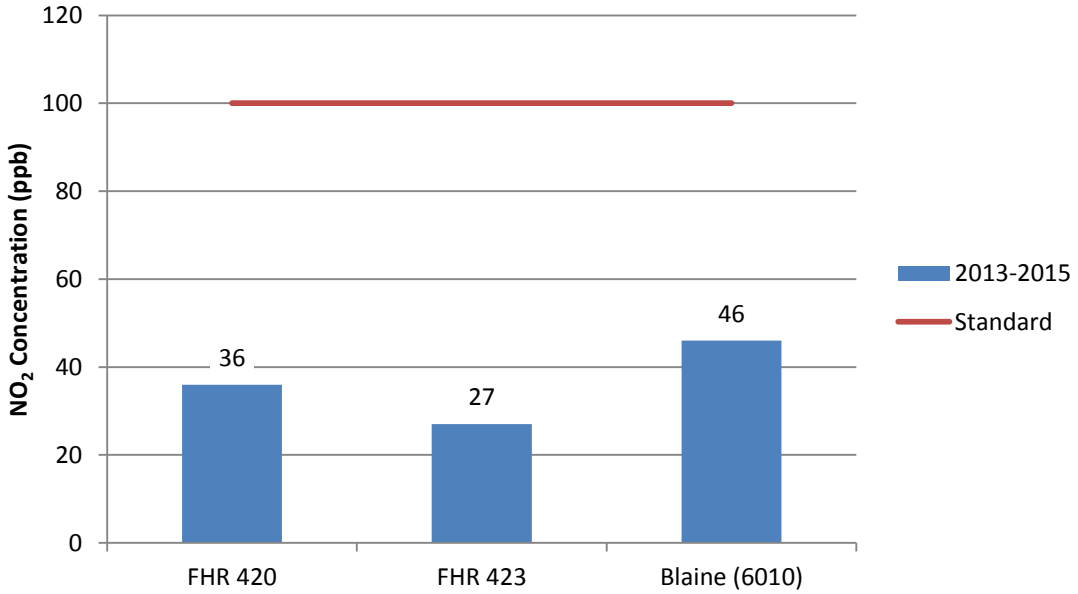


Chart 2 – Hour NO_2 Concentrations Compared to the NAAQs



The EPA's regulatory announcement, EPA420-F-99-051 (December 1999), describes the Tier 2 standards for tailpipe emissions, and states:

> *The new tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6000 pounds will be phased-in to this standard between 2004 and 2007.*
>
> *As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030. The standards also will reduce emissions by more than 2 million tons per year by 2020 and nearly 3 million tons annually by 2030.*

Within the project area, it is unlikely that NO_2 standards will be approached or exceeded based on the relatively low ambient concentrations of NO_2 in Minnesota and on the long-term trend toward reduction of NO_x emissions. Because of these factors, a specific analysis of NO_2 was not conducted for this Project.

Sulfur Dioxide

Sulfur dioxide (SO_2) and other sulfur oxide gases (SO_x) are formed when fuel containing sulfur, such as coal, oil, and diesel fuel is burned. Sulfur dioxide is a heavy, pungent, colorless gas. Elevated levels can impair breathing, lead to other respiratory symptoms, and at very high levels, can aggravate heart disease. People with asthma are most at risk when SO_2 levels increase. Once emitted into the atmosphere, SO_2 can be further oxidized into sulfuric acid, a component of acid rain. Emissions of sulfur oxides from transportation sources are a small component of overall emissions and continue to decline due to the desulphurization of fuels.

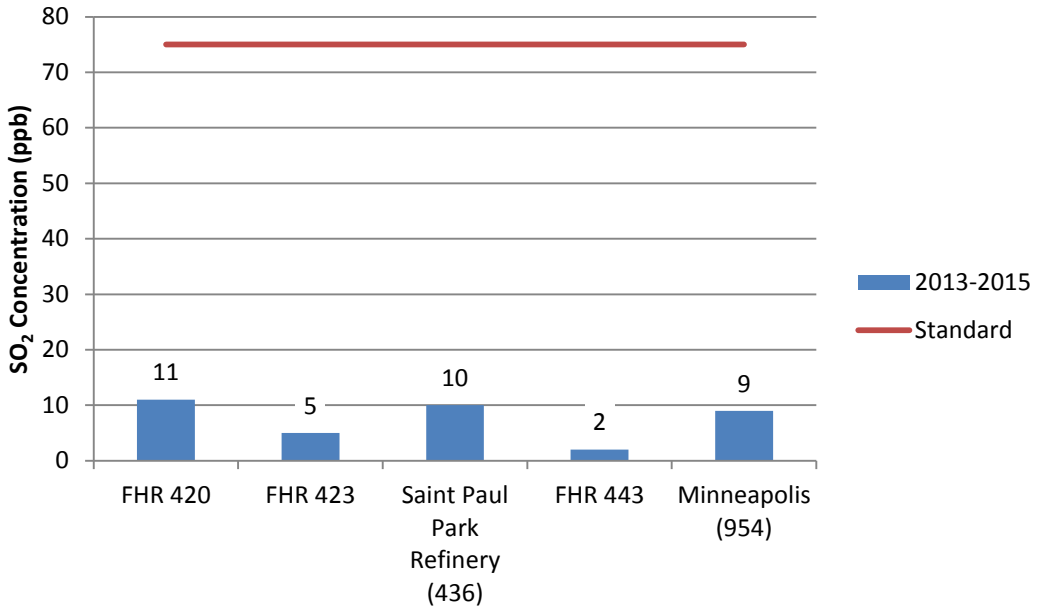
MPCA monitoring shows ambient SO_2 concentrations ranging from 2 ppb to 11 ppb for the 2013 to 2015 average 99th percentile daily maximum 1-hour SO_2 concentrations; these findings are consistently below state and federal standard of 75 ppb (Source: *Annual Air Monitoring Network Plan for Minnesota, 2017*). The MPCA has concluded that long-term trends in both ambient air concentrations and total SO_2 emissions in Minnesota indicate steady improvement.

In the *Annual Air Monitoring Network Plan for Minnesota, 2017*, it states the following with regard to SO_2:

> *On June 2, 2010, the EPA finalized revisions to the primary SO_2 NAAQS. EPA established a new 1-hour standard which is met if the three-year average of the annual 99th percentile daily maximum 1-hour SO_2 concentration is less than 75 ppb. In addition to creating the new 1-hour standard, the EPA revoked the existing 24-hour and annual standards. Figure 24 [Chart 3] below describes the 2013-2015 average 99th percentile 1-hour SO_2 concentration and compares them to the 1-hour standard. Minnesota averages ranged from 2 ppb at Flint Hills Refinery 443 to 11 ppb at Flint Hills Refinery 420; therefore, all Minnesota sites currently meet the 1-hour NAAQS for SO_2.*

Because of these factors, an analysis for sulfur dioxide was not conducted for this Project. **Chart 3** describes the 2013-2015 average 99th percentile 1-hour sulfur dioxide concentration and compares them to the 1-hour standard.

Chart 3 – 1 Hour SO_2 Concentration Compared to the NAAQS



Lead
Due to the phase out of leaded gasoline, lead is no longer a pollutant associated with vehicular emissions.

Carbon Monoxide
This Project is not located in an area where conformity requirements apply, and the scope of the project does not indicate that air quality impacts would be expected. Therefore, no further air quality analysis is necessary.

Improvements in vehicle technology and in motor fuel regulations continue to result in reductions in vehicle emission rates. The EPA MOVES 2010b emissions model estimates that emission rates will continue to fall from existing rates through year 2030. Consequently, year 2030 vehicle-related CO concentrations in the study area are likely to be lower than existing concentrations even considering any increase in development-related and background traffic.

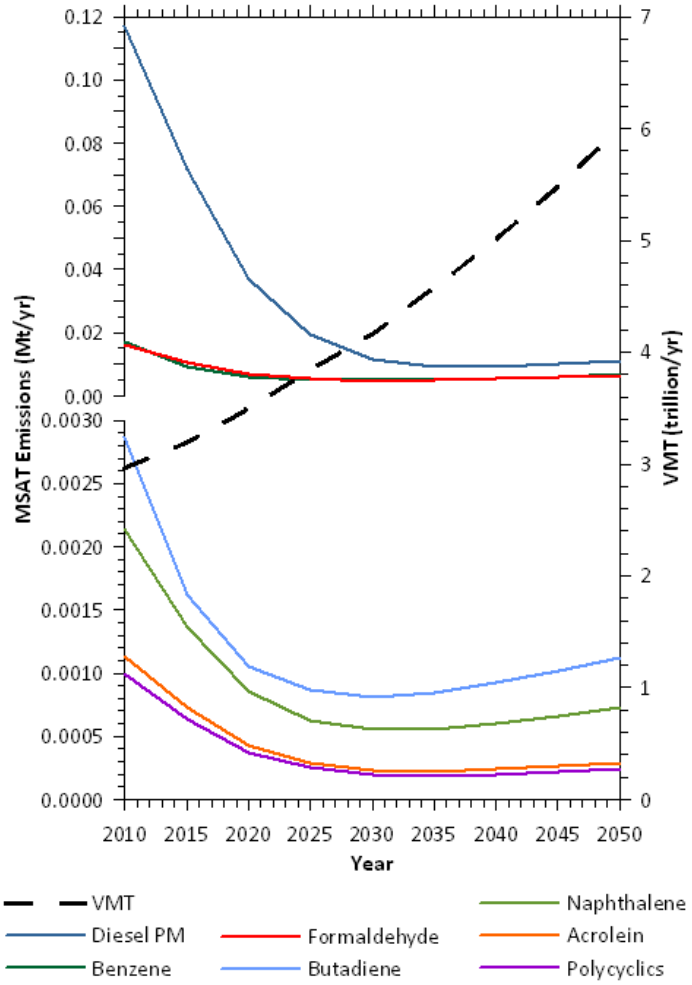
<u>Mobile Source Air Toxics (MSAT)</u>
Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS).

In addition, the EPA identified 7 compounds with significant contributions from mobile sources that are among the national- and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA). These are acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter (POM). While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

Motor Vehicle Emissions Simulator (MOVES)
EPA's Motor Vehicle Emissions Simulator (MOVES) is an emissions modeling system that estimates mobile source emissions of criteria air pollutants, greenhouse gases, and air toxics. According to EPA, MOVES improves upon the previous MOBILE emissions model in several key aspects: MOVES is based on a vast amount of in-use vehicle data collected and analyzed since the latest release of MOBILE, including millions of emissions measurements from light-duty vehicles. Analysis of this data enhanced EPA's understanding of how mobile sources contribute to emissions inventories and the relative effectiveness of various control strategies. In addition, MOVES accounts for the significant effects that vehicle speed and temperature have on PM emissions estimates, whereas MOBILE did not. MOVES2010b includes all air toxic pollutants in NATA that are emitted by mobile sources. EPA has incorporated more recent data into MOVES2010b to update and enhance the quality of MSAT emission estimates. These data reflect advanced emission control technology and modern fuels, plus additional data for older technology vehicles.

Based on an FHWA analysis using EPA's MOVES2010b model, as shown in **Chart 4**, even if vehicle-miles travelled (VMT) increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period (*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA,* December 2012).

Chart 4 – National MSAT Emission Trends 1999-2050 for Vehicles Operating on Roadways Using EPA's MOVES2010b Model



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

The implications of MOVES on MSAT emissions estimates compared to MOBILE are: lower estimates of total MSAT emissions; significantly lower benzene emissions; significantly higher diesel PM emissions, especially for lower speeds. Consequently, diesel PM is projected to be the dominant component of the emissions total.

It can be expected that improvements in air pollution controls for train locomotives will also result in continued reductions of pollutant emissions per mile of locomotive travel if freight locomotives utilize newer, higher-tech equipment. Over time, these new technologies and locomotive emission standards could contribute to an overall decrease in air pollutant emissions.

System-wide, BNSF Railway has been upgrading its fleet of train engines to improve fuel efficiency and reduce air pollution. Approximately 40 percent of the BNSF locomotive fleet

has been upgraded with clean lower emission locomotives. The fleet of train engines currently in use within the project area is part of BNSF's upgraded fleet.

MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on railway and highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA Context

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals. The NEPA also requires Federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. The NEPA requires, and FHWA and FRA are committed to, the examination and avoidance of potential impacts to the natural and human environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, we must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest. The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of project alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a project.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." Each report contains assessments of non-cancerous and cancerous effects for individual

compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures, with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA* documents. Among the adverse health effects linked to MSAT compounds at high exposures are; cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions decrease (http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.
There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282).

As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. EPA (http://www.epa.gov/risk/basicinformation.htm#g) and HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries.

The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the

goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory 2-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Qualitative MSAT Analysis

The new railway connection would eliminate the switching operation in the Willmar Terminal for trains traveling between the Morris and Marshall Subdivisions. The new railway connection would be expected to make this train operation more efficient, which could lead to a decrease in the level of emissions released by train engines. Removing the current switching operation from the Willmar Terminal would also be expected to reduce congestion that occurs within the Willmar Terminal. In addition, removing up to 6 trains per day from the Willmar Terminal would reduce delay from vehicles waiting at blocked crossings. All of this may lead to an overall reduction in train and vehicle emissions; however market demands, system activities, and actual train operations by BNSF would also be key factors in emission levels.

No increase in vehicle-related air emissions are anticipated as a result of the Project. No "new" traffic will be generated as a result of the Project (train or highway) or any congestion anticipated that would cause increases in air emissions. Since minimal change in ADT is expected throughout the project area, no changes in MSAT emissions are expected compared to the No Build Alternative. There is a potential for lower MSAT emission rates due to increased speeds; according to EPA's MOVES2010b model, emissions of all of the priority MSAT decrease as speed increases. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050.

<u>Construction-Period Strategies</u>

During project implementation, all strategies should be evaluated to determine their appropriateness and effectiveness at reducing regional and localized criteria pollutant emissions. Strategies that could be considered during construction include:

- Apply water suppression to active construction areas to minimize dust.
- Tarp trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard.

- Pave, apply water as needed, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep paved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep streets if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Utilize appropriate erosion control measures to reduce silt runoff to public roadways.
- Replant vegetation as quickly as possible to minimize erosion in disturbed areas.
- Use alternative fuels for construction equipment when feasible.
- Minimize equipment idling time.
- Maintain properly tuned equipment.

Operational Strategies

BNSF already utilizes a number of operation strategies to reduce emissions. Additional strategies that could be considered by BNSF Railway during railroad operational include:

- Reduce idling time to reduce DPM and other emissions.
- Utilize idle-control mechanisms installed on locomotives reduce air emissions and fuel consumption by automatically shutting down locomotives that aren't being used.
- Require filters for diesel particulate on locomotives.
- Use a combination of lean-NOx catalyst and diesel particulate filter.
- Continue replacing its locomotive fleet with clean lower emission locomotives.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

Dust:

Dust generated during construction would be minimized through standard dust control measures such as applying water to exposed soils and limiting the extent and duration of exposed soil conditions. Construction contractors would be required to control dust and other airborne particulates in accordance with MnDOT specifications in place at the time of project construction.

During construction, particulate emissions would temporarily increase due to the generation of fugitive dust associated with activities such as grading and other soil disturbance. The following dust control measures would be undertaken as necessary:

- Minimize the duration and extent of areas being exposed or regraded at any one time.
- Spray construction areas and haul roads with water, especially during periods of high wind or high levels of construction activity.
- Minimize the use of vehicles on unpaved surfaces when feasible.
- Tarp trucks hauling soil, sand, and other loose materials or require trucks to maintain at least two feet of freeboard.
- Pave, apply water as needed, or apply (non-toxic) soil stabilizers on unpaved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep paved access roads, parking areas and staging areas at construction sites.
- Use water sweepers to sweep streets if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- Enclose, cover, water or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Utilize appropriate erosion control measures to reduce silt runoff to public roadways.
- Replant vegetation as quickly as possible to minimize erosion in disturbed areas.
- Use alternative fuels for construction equipment when feasible.
- Minimize equipment idling time.
- Maintain properly tuned equipment.

After construction is complete, dust levels would be anticipated to be minimal because all soil surfaces exposed during construction would be in permanent cover (i.e., tracked, paved or revegetated areas). The BNSF railway connection would also include access roads along the mainline for crew access. The access roads would be approximately 13 feet wide and would be unpaved. Since the level of traffic and speeds that the vehicles travel on the access roads would be minimal, they are not expected to generate high dust levels. BNSF would be required to provide dust control measures as needed to reduce dust levels.

<u>Odors:</u>
Odors could be generated by exhaust from diesel engines engaged in construction activities and fuel storage areas. All machinery would be properly equipped to control emissions.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

The proposed Project would result in noise impacts during both construction and operation. Information on construction is provided below. Information with regard to Project

operation is discussed in Section IV.B.6 due to both state and federal impacts and evaluations.

Construction

Construction activities associated with implementation of the recommended alternative would result in increased noise levels relative to existing conditions. These impacts would primarily be associated with construction equipment and pile driving. **Table 16** shows peak noise levels monitored at 50 feet from various type of construction equipment. This equipment is primarily associated with site grading/preparation, which are generally the construction phases associated with the greatest noise levels.

Elevated noise levels are, to a degree, unavoidable for this type of project. MnDOT would require that construction equipment be properly muffled and in proper working order. While MnDOT and its contractors are exempt from local noise ordinances, it is the practice to require contractors to comply with applicable local (City of Willmar) noise restrictions and ordinances to the extent that is reasonable. Construction of the Project would be expected to last three construction seasons. Advanced notice to the City of Willmar would be provided of any abnormally loud construction activities such as use of high-impact equipment, pile driving, pavement sawing or air hammering.

Table 16 – Typical Construction Equipment Noise Levels at 50 Feet

Equipment Type[1]	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA) Range	Peak Noise Level (dBA) Average
Backhoes	5	6	74 – 92	83
Front Loaders	5	30	75 – 96	85
Dozers[2]	8	41	65 – 95	85
Graders	3	15	72 – 92	84
Scrapers	2	27	76 – 98	87
Pile Drivers	NA	NA	95 – 105	101

[1]Source: Environmental Protection Agency (EPA) and Federal Highway Administration (FHWA)
[2]Track laying machine (for railway construction) would be similar to a dozer.

Any associated high-impact equipment noise, such as pile driving, pavement sawing or jack hammering, will be unavoidable with construction of the Project. Pile driving noise is associated with the bridge construction. High-impact noise construction activities will be limited in duration to the greatest extent possible.

It is not anticipated that nighttime construction would be needed to expedite construction or minimize traffic impacts. If needed, noisy work at night would be limited as much as possible, but could occur periodically. Construction activities that generally would be prohibited between 8:30 pm and 7:00 am include pile driving, concrete pavement demolition, pavement sawing, concrete crushing operations and jack-hammering.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

Existing and Proposed Additional Parking Spaces
NA – the Project would not construct any parking spaces

Estimated Total Average Daily Traffic Generated
The Willmar Rail Connector & Industrial Access Project would provide a new 2.8-mile railway connection between the Marshall and Morris Subdivisions on the BNSF Railway along with a new rail spur for access to the Willmar Industrial Park. The new railway connection would also require a number of roadway modifications that are included as part of the Project. The roadway improvements are described in the Alternatives Analysis (Section III) and discussed in this section. The proposed action is a transportation project and would not generate additional parking spaces. The Project is not expected to generate additional traffic, but rather create a more efficient roadway and railway network in the vicinity of Willmar Terminal.

The proposed project would not generate new trips in the same way as a new development, because the railway project is not a destination or generation point for trips like a new residential neighborhood or school would be. Eventually, the City of Willmar will develop the area identified as a future industrial park – that development (industrial park) would produce additional trips, but the railway project and associated highway alignments would only produce limited trips for vehicles utilizing the railway access roads.

It is anticipated that the Project would result in some diversions of trips from other routes onto CSAH 55 since it would have a more direct and better connection with the realigned TH 12 than it currently does today. Additionally, it is anticipated that there would be some trips that would use CSAH 5 rather than use CSAH 55 to access the industrial park located along 1st Avenue West/CSAH 55 due to the Project not including an at-grade railway crossing on 1st Avenue West/CSAH 55. See **Appendix B** for details on the traffic shifts. Given the existing traffic volumes on roadways compared to the capacity of these roadways, no problems would be anticipated as volumes are within industry standards for two-lane facilities.

Estimated Maximum Peak Hour Traffic Generated and Time of Occurrence/Source of Trip Generation Rates
The proposed project would not be anticipated to generate new vehicular traffic in the area with the exception of railway crews that are accessing the mainline to provide periodic track maintenance activities or to bring out new crews to operate the train. The number of trips generated as a result of constructing the new access roads would be expected to be less than 10 trips a day.

Availability of Transit and/or Other Alternative Transportation Modes
The Project would not impact the availability of transit and/or other alternative transportation modes within the project area. Kandiyohi Area Transit provides a variety of public transit services for Kandiyohi County and the Willmar Area, including fixed route, ADA, and dial-a-ride services. There are no fixed route bus services in the project area.

The Project would reduce the number of trains per day in downtown Willmar and would result in more opportunities for transit vehicles, pedestrians and bicyclists to cross existing at-grade intersections near the Willmar Terminal (due to the trains not having to go into the Willmar Terminal to switch directions) and along the Morris and Marshall Subdivisions as they approach and leave the Willmar Terminal.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system*. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW*. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (*available at: http://www.dot.state.mn.us/accessmanagement/resources.html*) or a similar local guidance.

Construction of the Project would not increase traffic congestion. As noted in the alternatives description and evaluation and description of the recommended alternative, the Project would construct a new railway connection between the Morris and Marshall Subdivisions of the BNSF Railway. Intersecting roadways (realigned TH 12 and TH 40) would have grade separations with the railway alignment or would have their crossing with the railway removed (CSAH 55/1st Avenue West). Because there would be no at-grade crossings with the railway, motorized vehicular traffic would not be slowed or impeded in their travel as a result of the Project.

Additionally, the Project would reduce the number of trains that are currently travelling into downtown Willmar and are occupying at-grade railway crossings on both the Morris and Marshall Subdivisions as they approach and leave the Willmar Terminal. There are 11 at-grade crossings that the trains currently must travel through to enter and leave the Willmar Terminal. For every train there are 11 at-grade crossings that get closed and require motorized traffic to wait for the train to clear. The proposed Project would eliminate the delays and congestion associated with the closing of gates through these intersections.

In terms of impacts to the roadways within the project area – the proposed Project would not be anticipated to generate new vehicular traffic in the area with the exception of railway crews that are accessing the mainline to provide maintenance activities or to bring out new crews to operate the train. The number of trips generated as a result of constructing the new access roads would be expected to be less than 10 trips a day, which would not alter traffic flow on surrounding city, county or state roadways.

As noted, there could be shifting of some agricultural vehicles to CSAH 55 and CSAH 5 as result of the Project due to the removal of a portion of CSAH 55/1st Avenue West between

the new railway and the existing north-south alignment of CSAH 55. Traffic shifts would be anticipated to be less than 500 vehicles and would not result in congestion of the existing county facilities, TH 40, or realigned TH 12. Existing traffic volumes on those roadways are well within industry standards of two-lane, rural roadways. See **Appendix B** for information on existing and future traffic volumes and potential traffic shifts.

During project construction, traffic congestion would not be anticipated due to the majority of construction occurring on new roadway and railway alignments, which would limit the need for road closures. Bypasses, lane shifts, and temporary detours would be utilized to limit congestion. Alternate routes would also assist in limiting traffic congestion during construction.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

One of the purposes of the proposed Project is to mitigate for existing transportation problems associated with the Willmar Terminal for railway operations, roadway operations and non-motorized users. The proposed Project would improve railway efficiencies within the vicinity of the Willmar Terminal, would reduce the amount of delay associated at 11 at-grade intersection crossings on the Morris and Marshall Subdivisions as they enter and leave the City of Willmar on the western side of the community, and would reduce occupations of at-grade crossings in the downtown area for extended periods of time.

The Project was designed to incorporate grade-separated crossings of the proposed railway connection on the two trunk highways (realigned TH 12 and TH 40) it will cross. The grade separated crossings would enable the trains to flow freely without slowing down and would allow motorized traffic and non-motorized traffic using realigned TH 12 and TH 40 to travel without interruptions due to train traffic.

Additionally, the Project would remove a portion of CSAH 55/1st Avenue to eliminate the need for an at-grade rail crossing. This would eliminate delay for vehicles destined for industrial/grain elevator locations on the corridor due to train crossings. It would however, introduce a slight delay for vehicles due to the fact that they can no longer utilize CSAH 55/1st Avenue to access the industrial/grain elevator area – vehicles would need to use the new connection located on realigned TH 12 just east of CSAH 55. The new route would introduce delay, but the delay was determined to be minimal. For more detailed information associated with vehicle delay with the new connection between realigned TH 12 and 1st Avenue, refer to the CSAH 55/1st Avenue memo in **Appendix C**.

As noted, the Project would likely result in some shifting of traffic between CSAH 55 and CSAH 5. The shift in traffic and travel patterns is not anticipated to impact traffic levels on the associated roadways enough to warrant construction of additional travel lanes. No increase in congestion is expected on the routes. See traffic memo in **Appendix B**.

During construction, bypass and lane shifting is anticipated to minimize existing roadway traffic disruptions. Construction related to roadways new alignments would not require closure of current routes. Where tie-ins to existing alignments are required, lane shifts, by-passes, and temporary detours may be utilized. A temporary bypass may be utilized to keep

TH 40 open during construction of the proposed TH 40 bridge. Railroad improvements would be anticipated to occur upon completion of the roadway improvements.

19. Cumulative Potential Effects

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

Cumulative effects are defined as "the impact on the environment which result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency or persons undertakes such actions." The geographic areas considered are those areas directly adjacent to the western edge of the City of Willmar and the Willmar Municipal Airport – John L. Rice Field, and the timeframe of the next few years.

Project related environmental effects that could combine with other environmental effects and the geographic extent of the anticipated impacts are summarized in **Table 17** starting on the following page.

Table 17 – Project Related Environmental Effects and Geographical Extent

Reference (Section in EA)	Topic/Issue	Project-Related Environmental Effects	Geographic Extent
Section IV.A.9 (EAW Item 9)	Land Use	Reduction in farmland (93 acres)	Throughout project area.
Section IV.A10 (EAW Item 10)	Geology, Soils and Topography	Disturbed ground/soils during project construction.	Throughout project area.
Section IV.A.11 (EAW Item 11)	Water Resources	▪ Increase in impervious surface (29.5 acres) ▪ Impacts to all aquatic resources (11.2 acres) ▪ Impacts to WCA wetlands (10.7 acres) ▪ Impacts to USACE Jurisdictional Resources (4.0 acres) ▪ Water appropriation during construction	Throughout project area (all but last item) Appropriation at the two new railway crossings – one over Hawk Creek the other over County Ditch 46. Appropriation for CSAH 55 shouldering/reconstruction over Hawk Creek. Appropriation for TH 12 realignment construction over unnamed tributary. Appropriation for TH 40 culvert replacement over Hawk Creek.
Section IV.A.12 (EAW Item 12)	Contamination	Regulated waste removal from three residential properties	Intersection of TH 40 and CSAH 55
Section IV.A.13 (EAW Item 13)	Fish, Wildlife, Plant Communities and Sensitive Ecological Resources	▪ Remnant prairie and wildlife management areas ▪ Tree removal – bat habitat	Limited areas just outside of project limits near the existing railways (prairie and wildlife management areas) Tree removal primarily in northern half of project area

Table 17 – Project Related Environmental Effects and Geographical Extent (Continued)

Reference (Section in EA)	Topic/Issue	Project-Related Environmental Effects	Geographic Extent
Section IV.A.14 (EAW Item 14)	Historic	▪ Connection to an historic resource – no adverse effect determined	Connection between the new railway and the BNSF Morris Mainline
Section IV.A.17 (EAW Item 17) and Section IV.B.6	Construction Noise	▪ Modeled train noise levels result in moderate increase in sound ▪ Modeled noise levels above state standards	Train noise impact at the connection with realigned 45th Street on the north side of existing TH 12 Highway noise impacts along realigned TH 12
Section IV.A.18 (EAW Item 18)	Transportation	▪ Improved traffic operations and safety in downtown Willmar ▪ Improved operations in the Willmar Terminal ▪ Improved travel time and reliability	Most benefits to the project are in downtown Willmar near the Willmar Terminal. Overall travel time and reliability will be enhanced in the project area and in the downtown area.
Section IV.B.5 (EA Item 5)	Right of Way Acquisition	▪ Kandiyohi County railway project south of this project (see next section) would require right of way acquisition. Property owners would be compensated for land needed to construct the highway and bridge overpass of the Marshall Subdivision	South of the project area along CSAH 55 and the Marshall Subdivision.
Section IV.B.6 (EA Item 6)	Noise	▪ Modeled train noise levels result in moderate increase in sound ▪ Modeled noise levels above state standards	Train noise impact at the connection with realigned 45th Street on the north side of existing TH 12 Highway noise impacts along realigned TH 12
Section IV.B.9 (EA Item 9)	Federal Species	▪ Tree removal – bat habitat	Tree removal primarily in northern half of project

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

The 2016 – 2019 State Transportation Improvement Program (STIP) and the Kandiyohi County 5-Year Plan were reviewed to identify present and other reasonably foreseeable future transportation projects near the limits of the Project. Information from the City of Willmar regarding future developments and city projects was also collected. **Table 18** lists the present and reasonably foreseeable future projects identified within and near the study area.

Table 18 – Present and Reasonably Foreseeable Future Projects in/near the Study Area

STIP Number	Agency	Description	Location	Timeframe
1301	MnDOT	TH 23 Mill and overlay from Bridge #12012 to 0.45 miles east of CSAH 5 (just outside of project area)	City of Willmar/Willmar Township	2017
NA	Kandiyohi County	Grade separation over the BNSF Marshall Line and Willmar Wye Connection on CSAH 55	Willmar Township (see **Figure 26**)	2017
NA	Kandiyohi County	Reconstruction of CSAH 5 between TH 40 and CSAH 15 (just outside the project area); Reconstruction of CSAH 15 between US 71 and CSAH 55 (just outside the project area)	Willmar and Willmar Township	2018
NA	City of Willmar	Development of industrial park area west of CSAH 5 between realigned TH 12 and TH 40. Includes potential extension of the spur line into the industrial park area.	City of Willmar	Undetermined – anticipated to be developed by 2040

MnDOT will be completing a mill and overlay of TH 23 just outside of the project area in 2017. In addition, Kandiyohi County will be constructing a grade separation of the BNSF Marshall line just south and west of the Project. Both of these projects will be going through their own permitting and environmental review process. In addition, the county will be reconstructing portions of CSAH 5 (east of the project area) and CSAH 15 (south and east of the project area) in 2018. Like the MnDOT project and the Kandiyohi County bridge project, the reconstruction projects will be going through their own permitting and environmental review process.

Activities that are expected to occur within the Project area include the development of a new industrial park between the proposed railway and CSAH 5 from just south of the realigned TH 12 to TH 40. Exact timing and site plans have yet to be developed for the area, but the City's Comprehensive Plan and land use maps identify the area as future industrial park. It is expected that the park will develop following completion of the Project. The analysis in this document took into consideration that the industrial park would be fully developed by 2040 for purposes of traffic operations and analyses.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Past actions that have occurred in and near the project area over the past 11 years included the following:

- New Willmar Municipal Airport (west of project area) – 2005
- New CSAH 5 Highway Alignment (eastern end of project area) – 2007
- New Wastewater Treatment Facility (west of project area) – 2010
- Southern Interceptor Sewer (crosses through project area) – 2010
- Western Interceptor Sewer (within project area) – 2013
- Willmar Avenue (east of project area) – 2014
- Willmar Industrial Park Improvements (roadway and utility work – within general project area – not in project limits) – 2015

Figure 9 shows the projects identified in the list above.

In addition to those projects, in March, 2015 Kandiyohi County received environmental clearance for a project that shifted CSAH 5 approximately 800 feet to the east near its juncture with TH 23 (just outside the project limits) to grade separate the TH 23 and CSAH 5/CSAH 15 intersection. With the improvements, CSAH 5 will bridge over TH 23 and create a new T-intersection with CSAH 15. The project is intended to improve safety conditions at the TH 23 and CSAH 5/CSAH 15 intersection, and in particular the through movement of northbound and southbound CSAH 5 traffic across TH 23. Construction will be completed in 2017. **Figure 26** shows this programmed improvement as well as the anticipated grade separation of the Marshall Subdivision and Willmar Wye Connection planned for 2017 and 2018.

All previous work that occurred in and around the Project was considered as part of existing conditions. In terms of future projects identified in **Table 18** – the following is noted:

<u>TH 23 Mill and Overlay</u>
The TH 23 mill and overlay project is not expected to result in cumulative impacts within the project area due to the nature of the project. Mill and overlay projects are typically limited to milling off the top layer of road surface and replacing it with a new layer. Excavation, soil disturbance, and other more invasive activities beyond the roadway surface are not expected to occur.

Kandiyohi County Grade Separation

The Kandiyohi County grade separation project (**Figure 26**) is likely to result in additional wetland impacts due to the alignment of the grade separation and connection into CSAH 55. Final wetland impacts have not been determined at this time, but it is anticipated that approximately 1.5 acres of wetland would be impacted. The County would be required to mitigate for impacts based upon local and state requirements during the permitting process. Other impacts would include a reduction in approximately 7 acres of farmland.

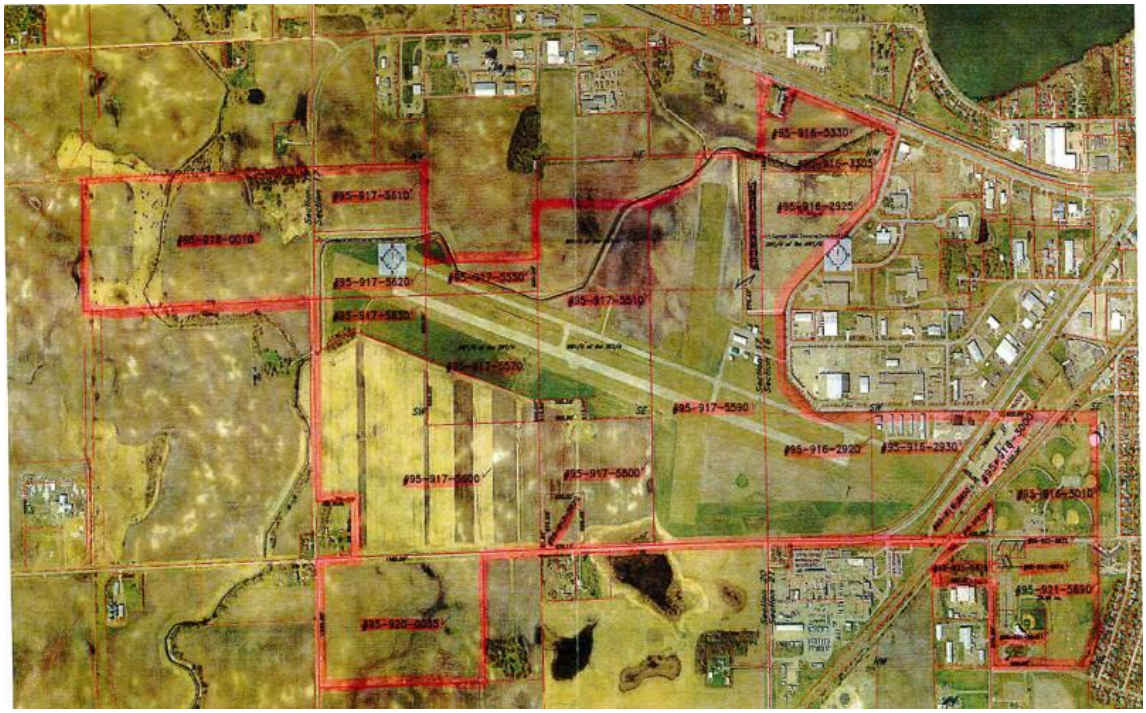
Kandiyohi County Roadway Reconstruction

Kandiyohi County has preliminarily identified reconstruction of two county roadways near the Project for 2018. The roadway projects would include reconstructing CSAH 5 between TH 40 and CSAH 15 and reconstructing CSAH 15 between US 71 and CSAH 55. Both roadways would be brought up to current design standards, so there would be some additional right of way that would likely need to be acquired to accommodate wider shoulders, turn lanes and other geometric improvements. It is likely that some of the land needed would be in agricultural use. There would also be the potential for impacts to wetlands. Preliminary plans have not been completed for the two projects, so exact impacts are not known. It would be expected that less than 5 acres of wetlands and less than 10 acres of agricultural land would be impacted.

Industrial Park

In general, farming practices are expected to continue in the area around the Project. In addition, it is anticipated that industrial development will occur within the new Willmar Industrial Park (located on the former airport site as shown in **Exhibit C**), which was in the planning and implementation stages prior to this Project. While some development has occurred, site specific plans (individual lots size, building footprints, stormwater treatment, etc.) have not yet been developed for the majority of the site. The City is waiting for interested businesses to approach the community with their needs so that appropriate roadway, stormwater treatment, railway access, and other associated development improvements can be determined. Since specific impacts to project-area resources are not known at this time, information from an EA that was completed by the City of Willmar in 2010 for release of the former airport site and general planning for a future industrial park is referenced in **Table 19**. While the EA covers property beyond the limits of the project area, it is useful in providing general impacts in the vicinity of the Project. A copy of the draft EA can be found on the web at: https://mn.gov/deed/assets/section-v-4_tcm1045-256763.pdf

Exhibit C – Willmar Municipal Airport EA Study Area



Source: Willmar Municipal Airport Draft Environmental Assessment, 2010

Table 19 – Impacts Associated with Development of Former Airport Site

Topic/Issue	Environmental Impacts
Historic	The main terminal hangar for the former airport was identified as having historic significance. Hangar was placed on National Register of Historic Places in 2013. Hangar is likely to be removed by current owner (not City property).
Air	None anticipated. Any industrial use that generates emissions would have to be documented and appropriately mitigated.
Social Impacts	Existing public services are adequate to deal with the anticipated increase in population and business activity.
Construction Impacts	Redevelopment of former airport site required removal and disposal of concrete and bituminous runway materials. There was adequate capacity in area landfills to handle materials that could not be recycled.
Environmental Justice	Increased employment opportunities considered beneficial. Residential indirect effects not anticipated.
Economics	Economic development would be positive and consistent with City's long-range plans.
Floodplain	No development would be allowed within the designated floodplain, and 100-foot buffers of native vegetation would be maintained for any buildings and other infrastructure constructed
Noise and Vibration	None anticipated. Any industrial use that generates noise and vibration would have to be documented. Due to the location of the new railway, industrial uses sensitive to noise and vibration would be encouraged to read this environmental document and its attachments related to noise and vibration impacts to better understand potential impacts that could influence development plans.
Section 4(f)	Section 4(f) resources outside of project area (similar to those for the proposed project) would not be affected.
Land Use	Redevelopment of old airport site, resulting in 300-acre reduction in farmland as part of industrial park expansion consistent with City's comprehensive plan. Farmland to remain as interim use until development occurs.
Water Resources	Increased impervious surface; possible loss of up to 27 acres of wetlands within/near former airport site. Stormwater management implementation may improve quantity of site runoff and water quality.
Fish, Wildlife, Plant Communities and Sensitive Ecological Resources	Change from agricultural lands to industrial development would expand habitat for species associated with suburban environments. Mammals include deer, rodents, shrews, and coyotes. Birds include geese, blackbirds, sparrows, and robins.
Visual	Change in landscape from rural to urban.
Contamination	Building removals and site disturbances may generate contaminated and hazardous wastes. At this time most of the buildings have been removed and materials have been disposed of off-site. Potential garbage pit/disposal site exists on old farm site.
Federal Species	None anticipated due to existing land use as farmland and former airport site with limited habitat areas.

Source: Willmar Municipal Airport Draft Environmental Assessment, 2010

Traffic forecasts for the Project took into consideration full development of the industrial park. The forecasts indicate that the roadways in the project area would remain below capacity and that future operations would provide adequate levels of service.

Additionally, the exact alignment and length of the rail spur that will serve the industrial park will be constructed at an undetermined future date to connect with the new railway connection. Any present or future development projects are required to go through local development review processes. While the spur line was not specifically discussed in the 2010 former airport site environmental assessment, spur line development would be consistent with the proposed industrial park development and potential environmental impacts would be similar to those summarized in **Table 19**.

The potential cumulative effect of impacts would have to be mitigated by each future project through the permitting or environmental review processes on a case-by-case basis.

20. Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

This Project is not believed to cause any anticipated adverse environmental impacts that have not been addressed by this EAW or in the accompanying Environmental Assessment related to federal issues.

RGU CERTIFICATION. (The Environmental Quality Board will only accept SIGNED Environmental Assessment Worksheets for public notice in the EQB Monitor.)

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature _____ Date 1-26-2017

Title Chief Environmental Officer

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Minnesota Department of Administration, Office of Geographic and Demographic Analysis. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-201-2492, or **http://www.eqb.state.mn.us**

B. Additional Federal Issues

FHWA Technical Advisory T 6640.8A, Guidance for Preparing Environmental and Section 4(f) Documents, effective November 27, 1987 provides guidance in the format, content and processing of NEPA and Section 4(f) studies and documents. It includes the following impact categories not addressed in the EAW:

- Social Impacts
- Considerations Relating to Pedestrians and Bicyclists
- Environmental Justice
- Economics
- Right of Way and Relocations
- Noise and Vibration
- Section 4(f) – Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites
- Section 6(f) – Land and Water Conservation Act
- Section 7 – Endangered Species Act
- Section 404 – Clean Water Act
- Section 401 – Clean Water Act
- Indirect Effects

1. Social Impacts

The following social impacts were evaluated for the Project:

- Travel patterns and access
- Accessibility
- Community facilities and public services
- Community and neighborhood cohesiveness
- Transportation sensitive populations
- Income equity
- Quality of life

<u>Travel Patterns and Access</u>

Vehicular travel patterns would have the potential to shift slightly as a result of the Project due to the realignment of TH 12 and closure of CSAH 55/1st Avenue W at the new railroad connection. With the relocated access to the existing industrial area around the grain elevator from realigned TH 12 and a new local roadway (located east of CSAH 55) versus a direct connection via CSAH 55, some truck traffic from the south may utilize CSAH 5 to access the grain elevator and surrounding businesses. Additionally, the existing access off of the current TH 12 alignment would be improved to allow better turning movements for larger vehicles to access the area. This is shown in **Figure 22**. **Appendix B** discusses potential shifts in traffic.

In addition, because TH 12 would be realigned as part of the Project, vehicles utilizing that route would follow the new alignment rather than the old, which will be partially removed. For some businesses located along existing TH 12, the new alignment would divert traffic from the front of their business and would require users to access their sites from a local roadway connection rather than TH 12. This was noted as concern by one of the businesses

currently located along TH 12. The existing driveways would remain in place as a result of the Project, but would not have thru traffic travelling past them.

Another shift in travel would come along 45th Street which would require users of the township roadway to travel an additional 2,400 feet to the west in order to access TH 12. This is also shown in **Figure 22**. 45th Street currently is estimated to have less than 100 vehicles a day using that route. As a result, impacts are expected to be minimal. Also, 7th Avenue N, which currently connects to TH 12 west of the proposed 45th Street NW intersection, would be converted into a cul-de-sac to eliminate its connection to TH 12. The access to 7th Avenue N would be from 60th Street NW, where a connection to TH 12 would remain. 7th Avenue N serves three residential properties.

Accessibility

Accessibility accommodations for pedestrians and bicyclists would be provided at the intersection of realigned TH 12 and CSAH 5. At the signalized intersection pedestrian ramps, accessible pedestrian signals and crosswalks would be included in the intersection design. There are no other signalized intersections that would result as part of the Project.

Given the largely undeveloped/rural nature of the Project, it is not anticipated that the design would include any other accessibility options. There are no other pedestrian or bicycle facilities in the area that would be connected as a result of the Project. The Project would; however, provide for shoulders on realigned TH 12 and CSAH 55 which could be used by pedestrians and/or bicyclists.

Community Facilities and Public Services

The Project would not result in access changes to community facilities such as schools, recreation areas, churches or public buildings, as there are none of these facilities within the Project limits.

Emergency responders would have some changes in terms of accessing a limited number of businesses located along existing TH 12 due to the realignment. See **Figure 22** for existing and future accessibility. Delays in reaching these locations would be expected to be minimal.

Because the Project would include grade separated crossings of the railway, there would be no new delays for emergency responders utilizing realigned TH 12 or TH 40.

Community and Neighborhood Cohesiveness

The project area consists of primarily agricultural lands/farmsteads with the northern area including some rural industrial properties. Due to the rural nature of the Project and limited number of total acquisitions (see Section IV.B.5), long-term adverse effects to the project area's communities and neighborhoods would not be anticipated.

Transportation Sensitive Populations

Transportation sensitive populations, including transit dependent, elderly, and handicapped individuals that rely on public transportation would not be impacted by the Project. The Project would not alter the availability of transit within the City of Willmar or Kandiyohi County.

Income Equity

The Project would not place an unequal burden on lower income individuals or transportation sensitive populations. The Project would not charge for individuals to utilize highway facilities or local roadways. Existing routes would continue to be accessible by those with lower incomes or who are transit dependent. There would be no expected changes in use of rail facilities by these groups – they are not likely to utilize commercial rail service today and would not likely utilize it in the future.

Quality of Life

The Project would be expected to reduce delays in railway traffic experienced due to the directional switching that occurs within the Willmar Terminal for train movements between the Morris and Marshall subdivisions. The proposed railway connection would allow trains destined between the two subdivisions to make a direct connection and bypass the Willmar Terminal, which is adjacent to downtown Willmar. Willmar's downtown and Willmar in general is a hub of employment, commerce and education for the region, and is the Kandiyohi County seat. Due to the current train operational movement between the Morris and Marshall subdivisions, workers destined for jobs, services or school experience inconvenient waits without schedule, and cannot anticipate when these blockages will occur. Emergency service providers are impeded and local bus services also experience wait times.

The Project would be expected to provide a positive long-term social impact for residents, businesses, and the greater Willmar community. By relocating this train movement and eliminating the switching operation (that can occur on average six times per day), delays for rail traffic would be reduced in the Willmar Terminal and corresponding delays for automobile traffic and non-motorized users would be reduced in the adjacent at-grade rail crossings.

Associated quality of life improvements would also result, such as decreased noise, vibration, and delay in travel time. Other improvements would include improved air quality due to reductions in train and motor vehicle idling, improved emergency response travel time reliability and more predictable travel times for motorized and non-motorized users.

Beyond downtown Willmar, the residential area north of TH 12 near CSAH 5 (just outside of the project area) would also experience benefits associated with noise due to the realignment of TH 12 approximately 800 feet to the south. Shifting TH 12 away from this neighborhood would shift traffic and its associated noise away from the residents in this area. This area is home to EJ populations. See Section IV.B.3 and Section IV.B.6 for more detailed information on EJ populations and noise.

2. Considerations Relating to Pedestrians and Bicyclists

The Project would not negatively impact any existing non-motorized transportation facility or activity on a permanent basis. The project would briefly interrupt pedestrian and bicycle flow on the trail paralleling CSAH 5 (eastern end of the project limits) during construction. The proposed Project would create a new intersection with realigned TH 12 and CSAH 5, which would impact the trail; however the trail would remain open during construction (see Section 4(f) impact discussion in Section IV.B.7). Post construction, there would be no negative impacts to pedestrian or bicycle movements.

The project area is located to the west of the urbanized Willmar area and the existing conditions in the project area currently have limited pedestrian and bicycle accommodations. While TH 12 and CSAH 5 (between TH 40 and TH 12) have paved shoulders, the remaining roadways (TH 40, CSAH 55/1st Avenue) have narrow shoulders which are not conditions that are conducive to pedestrian and bicycle use.

The Project would improve pedestrian and bicycle conditions in a number of ways:

1. The Project would remove trains from existing at-grade crossings in downtown Willmar and would reduce the amount of time that gates at the existing at-grade would be closed. This will facilitate pedestrian and bicycle crossings of the railway and reduce the amount of time users have to wait for trains to travel through the crossings and/or reduce the distance they would have to travel to utilize a grade separated crossing.

2. The Project would improve American with Disabilities Conditions at the signalized intersection of realigned TH 12 and CSAH 5. This intersection would be reconstructed in a new location and would include properly located pedestrian ramps, countdown timers and other enhancements.

3. The Project would provide adequate shoulders for pedestrian and/or bicycle use on realigned TH 12 and on CSAH 55 between TH 40 and realigned TH 12.

Because the project area consists primarily of agricultural and industrial uses outside of the urbanized area, it was determined that additional bicycle and pedestrian facilities are not appropriate. The City of Willmar Future Land Use Map (**Figure 29**) identifies portions of the project area within the Urban Growth Boundary. Sidewalk and/or trail facilities may be installed in the future with development should the area urbanize and there is greater demand for these facilities.

3. Environmental Justice

The analyses presented in this subsection were prepared in compliance with the Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), the U.S. Department of Transportation (USDOT) *Order to Address Environmental Justice in Minority Populations and Low-Income Populations* (USDOT Order 5610.2(a), April 15, 1997), and the Federal Highway Administration's (FHWA) Environmental Justice Order 6640.23 (FHWA Order 6640.23, December 2, 1998).

a. Regulatory context

Executive Order 12898 directs Federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

USDOT Order 5610.2(a) sets forth the USDOT policy to consider environmental justice (EJ) principles in all (USDOT) programs, policies, and activities. It describes how the objectives of EJ will be integrated into planning and programming, rulemaking, and policy formulation.

The Order sets forth steps to prevent disproportionately high and adverse effects to minority or low-income populations through Title VI analyses and EJ analyses conducted as part of Federal transportation planning and NEPA provisions. It also describes the specific measures to be taken to address instances of disproportionately high and adverse effects and sets forth relevant definitions.

FHWA Order 6640.23 establishes policies and procedures for the Federal Highway Administration (FHWA) to use in complying with Executive Order 12898, as described above. The Project would receive federal funding and would have federal permit requirements; therefore, it is considered a federal project for the purposes of compliance with Executive Order 12898, USDOT Order 5610.2(a), and FHWA Order 6640.23.

Executive Order 12898, USDOT Order 5610.2(a), and FHWA Order 6640.23 set forth the requirement that proposed actions be reviewed to determine if there are "disproportionately high and adverse" impacts on EJ populations. *Disproportionate* is defined in two ways: the impact is *predominantly borne* by the minority or low income population group, or the impact is *appreciably more severe* than that experienced by non-minority or non-low income populations.

b. Identification of minority and low-income populations

The first step in the environmental justice determination process is to identify the presence of minority and low-income populations within the study area. For the purposes of this analysis, the study area is defined as a census block groups or census blocks within or partially within the project study area (**Figure 3**). These are shown in **Figures 39** and **40**.

For the purposes of EJ, a minority and/or low-income population means any readily identifiable group of persons who live in geographic proximity; who will be similarly affected by a proposed USDOT program, policy, or activity; and who meet the racial or income criteria set forth in USDOT Order 5610.2(a). Data on population characteristics within the study area were obtained primarily from the 2010 Decennial Census (i.e., for poverty data) and from the 2010–2014 American Community Survey (ACS) (for racial and ethnic composition data), along with discussions with local staff.

Minority Populations
According to USDOT Order 5610.2(a), minority populations include persons who are American Indian or Alaskan Native, Asian American, Native Hawaiian or Other Pacific Islander, African American (not of Hispanic Origin), and Hispanic or Latino. 2010 Census data were used to identify minority residents in the study area. This information was validated based on conversations with local project staff and outreach activities.

Table 20 summarizes the racial and ethnic composition of Kandiyohi County, Willmar, and the census blocks in the study area. Based on the 2010 census, the population of Kandiyohi County was approximately 42,240. Of this, about 5,420 (14.9 percent) were minorities. As of the 2010 census, the population of Willmar was approximately 19,610. Of this, 6,275 (27.6 percent) were minorities. In aggregate, the census blocks within the study area had a total population of 1,800 and a total minority population of 765 (42.4 percent), which is higher than Kandiyohi County and the City of Willmar.

Table 20 – Census Blocks with Minority Populations

Location	Total Population	White Only (number)	White Only (%)	Non-White Minority (number)	Non-White Minority (%)	Black (number)	Black (%)	Asian (number)	Asian (%)	Native American /Alaskan (number)	Native American /Alaskan (%)	Hispanic (number)	Hispanic (%)
Kandiyohi Co.	*42,239*	*35,964*	*85.1*	*6,275*	*14.9*	*952*	*2.3*	*167*	*0.4*	*107*	*0.3*	*4,710*	*11.2*
Willmar	*19,610*	*14,192*	*72.4*	*5,418*	*27.6*	*908*	*4.6*	*106*	*0.5*	*80*	*0.4*	*4,099*	*20.9*
Study Area Block Total	*1,804*	*1,039*	*57.6*	*765*	***42.4***	*207*	***11.5***	*7*	***0.4***	*9*	***0.5***	*512*	***28.4***
Block 2015	722	471	65.2	251	**34.8**	162	**22.4**	1	0.1	4	**0.6**	69	9.6
Block 2027	529	205	38.8	324	**61.2**	15	**2.8**	4	**0.8**	5	**0.9**	288	**54.4**
Block 2028	77	24	31.2	53	**68.8**	24	**31.2**	0	0.0	0	0.0	28	**36.4**
Block 2030	46	7	15.2	39	**84.8**	0	0.0	0	0.0	0	0.0	39	**84.8**
Block 2032	48	3	6.3	45	**93.8**	3	**6.3**	0	0.0	0	0.0	42	**87.5**
Block 2033	89	68	76.4	21	**23.6**	0	0.0	0	0.0	0	0.0	21	**23.6**
Block 2041	14	10	71.4	4	**28.6**	0	0.0	0	0.0	0	0.0	3	**21.4**
Block 2031	32	27	84.4	5	**15.6**	0	0.0	0	0.0	0	0.0	5	**15.6**

Note: Numbers in **bold** and gray represent percentages higher than those for Kandiyohi County, the City of Willmar, or both.
Source: U.S. Census (2010), Summary File 1

There are a total of 55 census blocks included in the study area. Of these, 31 have a population of zero and three have a population of five or less (all of which are located in largely rural/undeveloped areas). The remaining 21 study area census blocks were reviewed to identify locations in which concentrations of minority populations reside. Of these, eight had a proportion of minority populations higher than Kandiyohi County, the City of Willmar, or both (see **Table 18**). As shown on **Figure 39**, the census blocks with a high concentration of minority populations were generally located north of the existing TH 12 alignment in developments both east and west of 30th Street (CSAH 5). This includes the three census blocks that contain Parkwood Estates, a manufactured home community located north of TH 12 and west of CSAH 5. Census blocks 2027, 2030, and 2032 encompass Parkwood Estates and some portions of the surrounding neighborhood.

Low-Income Populations

Based on the criteria set forth in USDOT Order 5610.2(a), a low-income person is one whose median household income is at or below the Department of Health and Human Services poverty guidelines. A low-income population is any readily identifiable group or groups of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed or transient persons who will be similarly affected by a proposed USDOT, program, policy, or activity. ACS data (2010–2014) were used to identify census block groups within the study area where there are residents meeting the Department of Health and Human Services poverty guidelines. This information was validated based on conversations with local project staff and based on outreach activities within the study area.

Table 21 summarizes the number of individuals below the poverty level in Kandiyohi County, the City of Willmar, and the census block groups included in the study area. Based on ACS data (2010–2014), the total population of Kandiyohi County was approximately 41,640. Of this, about 5,561 (13.4 percent) were individuals below the poverty level. Based on the ACS, the total population of the City of Willmar was approximately 19,050. Of this, 4,088 (21.5 percent) individuals were below the poverty level. In aggregate, the census block groups within the study area had a total population of 7,044 and a total of 1,110 (15.8 percent) individuals below the poverty level, which is a higher proportion of low-income individuals than Kandiyohi County, but lower than the City of Willmar.

Table 21 – Low-Income Populations within the Study Area

Location - Census Tract (Block Group)	Population	Individuals Below Poverty Level	Percent
Kandiyohi County	*41,642*	*5,561*	*13.4*
City of Willmar	*19,051*	*4,088*	*21.5*
Study Area Block Group Total	*7,044*	*1,110*	***15.8***
7805 (2)	2,295	435	**19.0**
7805 (3)	1,263	318	**25.2**
7806 (1)	1,198	83	6.9
7806 (2)	1,277	108	8.5
7807 (1)	1,011	166	**16.4**

Note: **Bold** and gray represents percentages higher than those for Kandiyohi County, the City of Willmar, or both.
Source: American Community Survey (2010–2014)

As shown in **Table 21**, three Census block groups contained a higher proportion of low-income individuals than that of Kandiyohi County, the City of Willmar, or both (Block Groups 2 and 3 within

Census Tract 7805 and Block Group 1 within Census Tract 7807). These census block groups are illustrated in **Figure 40**. Block Group 2 in Tract 7805 is located north of TH 12 and is bordered generally by 45th Street to the west, Foot Lake and 1st Street to the east, and Horizon Hills Road to the north. This block group includes the Parkwood Estates manufactured home community; however, there are other single family and multi-family residential areas located within this block group. The median household income of this block group ($44,940) is lower than that of Kandiyohi County ($52,043) and there are a higher percentage of low-income individuals in this area (19.0 percent) than at the countywide level (13.4 percent), but a lower percentage than that of the City of Willmar (21.5 percent).

Block Group 3 in Tract 7805 is bordered by TH 12 on the south, Foot Lake on the west and north, and by 7th Street on the east. Block Group 3 constitutes a relatively small geographic area north of downtown Willmar. In Block Group 3, the median household income ($37,958) is more than $10,000 lower than the countywide average, and the proportion of low-income individuals (25.2 percent) is nearly double the proportion for Kandiyohi County and slightly higher than the City of Willmar.

Block Group 1 in Census Tract 7807 comprises a large portion of the study area, and is bounded by 60th Street in the west; 7th Street in the east; TH 40, the BNSF railroad, and Monongalia Avenue in the south, and generally TH 12 in the north. This area includes the western section of downtown Willmar, along with a portion of the outlying areas (i.e., rural/agricultural) to the west. In this area, the median household income ($49,792) is slightly lower than the countywide median income, and the percentage of low-income individuals (16.4 percent) is slightly higher than the proportion of the county as a whole, but lower than that of the City of Willmar.

EJ Population Summary
In summary, there are concentrations of both minority and low-income populations within the study area (see **Figures 39 and 40**). These EJ populations are generally located in the residential subdivisions north of the existing TH 12 alignment, within close proximity to 30th Street (CSAH 5), which include the Parkwood Estates manufactured home community.

c. Engagement of EJ communities

As described in Section V, Public and Agency Involvement, the project team prepared a public engagement plan for the Project, recognizing the need to communicate and engage with multiple audiences within the study area and the region as a whole, and specifically focusing on EJ communities. The project team used several avenues of communication and outreach to engage affected minority and low-income communities, as described below. Refer to S**ection V, Public and Agency Involvement**, for a complete listing of public and stakeholder engagement activities, which include efforts to engage minority/low income communities.

- **Engaged community leaders:** Reached out to established neighborhood groups, community leaders, and private organizations composed of and connected to minority and low-income communities in the study area, including the following:
    - AG Church (Latino)
    - E-Free/Living Hope Center (Latino)
    - Willmar Public Schools
    - Islamic Society of Willmar

- **Outreach meetings/presentations:** Community outreach meetings were held with groups which serve EJ communities (see **Section V.B.7**. for meeting summaries)

- **Public events:** Held informal pop-up meetings and events in locations that serve interests of EJ communities, including the Willmar Public Library, the Kandiyohi County Farmers Market, churches, and mosques (see **Section V**)

- **Translations:** Provided project information and meeting materials in alternative languages (Spanish and Somali) at public meetings and events.

- **Interpreters:** Included an offer to provided language interpreters at public events in meeting notices and invitations.

d. Environmental Justice analysis

Executive Order 12898 requires that the proposed action be reviewed to determine if there are *disproportionately high and adverse* impacts on minority or low income populations within the project area. A disproportionately high and adverse impact on a minority or low income population means the adverse effect is *predominantly borne* by such population or is *appreciably more severe* or greater in magnitude on the minority or low-income population than the adverse effect suffered by the non-minority or non-low-income population.

This EA/EAW documents the range of beneficial and adverse impacts associated with the recommended alternative, along with proposed mitigation measures to address adverse effects. All environmental categories evaluated in this EA/EAW were reviewed to identify those that will result in adverse impacts, based on the analyses described in Section IV – Social, Economic, and Environmental Impacts. Environmental categories that have the potential to result in adverse effects were evaluated to determine if and to what extent these adverse effects would have the potential to be disproportionately high and adverse impacts on EJ populations. The following subject areas were considered in the EJ Analysis:

- Water resources
- Air
- Noise and vibration
- Transportation
- Relocation

As previously described, there were concentrations of EJ populations located within the study area. However, these populations were generally concentrated north of the existing TH 12 alignment and north of the physical improvements associated with the Project. Therefore, the Project is unlikely to result in disproportionately high and adverse impacts on these populations.

Water Resources
As described in Section IV.A.11, the Project would result in impacts to floodplains and wetlands within the study area, both of which will be mitigated in accordance with applicable regulations. None of these impacts were located in areas identified as containing concentrations of EJ populations. Water resource impacts would be experienced by all populations in the study area, regardless of race, ethnicity, or socioeconomic status, and, therefore, the Project would not have a disproportionately high and adverse impact on EJ populations related to water resources.

Air
As described in Section IV.A.16, the Project would not include any stationary sources of air emissions, and would be expected to reduce train emissions associated with idling, and would not be expected to result in an increase in vehicle-related air emissions.

The Project would have the potential to generate dust during construction. Dust generated during construction would be minimized through standard dust control measures such as applying water to exposed soils and limiting the extent and duration of exposed soil conditions. Construction contractors would be required to control dust and other airborne particulates in accordance with MnDOT specifications. In addition, odors could be generated by exhaust from diesel engines engaged in construction activities and fuel storage areas. All machinery would be properly equipped to control emissions.

Construction activities would generally not occur within areas identified as containing concentrations of EJ populations and related air quality impacts such as dust and odor would be experienced by all populations in the study area, regardless of race, ethnicity, or socioeconomic status. Therefore, the Project would not have a disproportionately high and adverse impact on EJ populations related to air quality.

Noise and Vibration
As described in Section IV.B.6, a detailed noise and vibration analysis was conducted. The analysis concluded that the Project would likely result in moderate noise impacts related to train horns and in increase in highway sound levels along realigned TH 12 and other project area roadways. However, the identified impacts are not located in areas identified as containing concentrations of EJ populations for the recommended alternative. The analysis concluded that the Project would have no vibration impacts.

There is a residential area north of TH 12 near 30th Street (CSAH 5) which contains EJ populations. The Project would shift TH 12 approximately 800 feet to the south at this location, pulling the highway and associated highway traffic farther away from these residences. This is anticipated to reduce highway traffic noise levels at this residential area, providing a benefit for EJ populations. The proposed project would also reduce the number of trains and the amount of trains idling nearby some neighborhoods would also potentially reduce noise and vibration.

Based on a review of the location of project related noise and vibration impacts, and considering the beneficial effects on existing EJ populations to the north, the Project would not have a disproportionately high and adverse impact on EJ populations related to noise and vibration.

Transportation
As described in Section IV.A.18, the Project would require roadway improvements to multiple roads including regional routes TH 12, TH 40, and CSAH 55 as a result of the proposed railway alignment The roadway improvements were included as part of the proposed project, and the resulting traffic operations would be expected to function as well as or better than current conditions. Measures taken to minimize or mitigate roadway modifications required due to the proposed rail improvements were addressed in the alternatives analysis and would be incorporated into the project design phase. In addition, the Project is anticipated to alleviate road congestion to at-grade rail crossings in downtown Willmar that occurs during trains switching between the Morris and Marshall Subdivisions in the Willmar Terminal.

Relocation
As described in Section IV.B.5, the Project would require acquisition of three residential properties (single family homes) and would require residents to relocate. These properties are located at the TH 40 and CSAH 55 intersection (refer to Section IV.B.5 for more information). The properties are not located within a census block with minority populations as outlined in **Figure 39**. The properties are located within a block group with low-income populations as outlined in **Figure 40**. Based on discussions with city staff, it was determined that the low-income population within this block group was concentrated toward the east end of the block group near downtown Willmar, not within the project area which is largely agricultural. The Project is not anticipated to result in the displacement of any businesses.

All right of way acquisition and resulting relocations would be done in accordance with the *Uniform Relocation and Real Property Acquisitions Policies Act* of 1970, as amended, (42 U.S.C. 4601 et seq.). In accordance with the Uniform Relocation Act (URA), property owners would be paid fair market value for their land and buildings and, where applicable, be assisted in finding replacement sites for residential dwellings. In addition, any tenant of the property to be acquired would be required to receive relocation assistance, if desired.

Since there is no concentration of EJ populations within the project area, the Project would not adversely impact any residences occupied by EJ populations or businesses that predominantly serve EJ populations, as a result of property acquisitions. All project related acquisitions would comply with the URA, which ensures fair treatment during the acquisition process. Therefore, the Project would not have a disproportionately high and adverse impact on EJ populations related to relocations.

e. Environmental Justice finding

While there would be some adverse impacts related to the Project (as described in Section IV), they would affect both EJ and non-EJ populations. Considering the proposed mitigation and minimization measures described in Section IV, all adverse impacts (on EJ and non-EJ populations alike) would be effectively mitigated, minimized, or avoided. Therefore, the Project would not result in disproportionately high and adverse effects on EJ populations.

Both EJ and non-EJ populations in the study area would also benefit from the Project. The Project would provide a positive long-term social impact for Willmar residents, businesses, and the greater Willmar community. By relocating train movements and eliminating the switching operation, corresponding delays in automobile traffic would be anticipated to be reduced in the Willmar Terminal and adjacent railroad crossings. Associated quality of life improvements would also result, such as decreased noise, vibration, delay time on trips and improved air quality, emergency response reliability and traveler accessibility/mobility.

Based on the above discussion and analysis, and taking into account benefits to EJ populations, the proposed action would not result in disproportionately high and adverse effects on minority or low-income populations.

4. Economics

This section describes the potential effects of the Project on economic activity, including a review of potential changes in local tax revenue related to the Project, potential impacts to local businesses resulting from changes in roadway access, operational changes to the existing freight rail network,

the effect of the Project on economic development within the City of Willmar, and the effect of capital investment related to Project construction on employment.

Property Tax Revenue

The Project would result in the acquisition of privately-owned property for additional right of way for rail and roadway improvements. The economic effect of acquiring privately owned parcels would be the permanent removal of these parcels from the tax base of the affected county, cities, and school district, thus potentially lowering property tax collections. Acquisition of private property for the Project is expected to be minimal with three homes being displaced and no businesses being acquired. In addition, there would be strip takings from some privately held residential/agricultural and a limited number of industrial properties. The property tax revenue associated with these acquisitions represents a very small proportion of the overall county, city, and school district tax base and overall economic effect of the Project is expected to be minimal. Refer to Section IV.B.5 for more information on acquisitions.

Travel Time Impacts to Local Businesses

As described in Section III.F, the Project would result in the modification of the local roadway network. The economic effect of these roadway modifications would be changes in access to local businesses (particularly the businesses along CSAH 55/1st Avenue W and TH 12), which could affect travel distance and time for customers, employees, and shippers. Under the recommended alternative, vehicles arriving from the west on realigned TH 12 would go through the at-grade intersection with CSAH 55 and then turn north onto the new local roadway connection to CSAH 55/1st Avenue W and would be subject to additional intersection delays and travel distance. Travel to the one business located on existing TH 12 west of CSAH 55/1st Ave W, would have to go through the intersection with CSAH 5 and realigned TH 12 and then continue north on CSAH 5 and then take a left and travel west on what would be old TH 12. This would create additional travel time and distance for customers, employees and shippers.

In order to compare the travel time, distance and travel costs between the recommended alternative and existing conditions (i.e., No Build Alternative) in an equitable way, travel time to a point midway along 1st Avenue/CSAH 55 was calculated from the intersection of realigned TH 12 and 1st Avenue West and from 19th Avenue/CSAH 55 intersection for all three options. Refer to the 1st Avenue Traffic Analysis Memorandum in **Appendix C** for more information on the travel time and distance methodology.

As shown in **Table 22**, the recommended alternative would result in a slight increase in travel distance (0.4 miles) for businesses along CSAH 55/1st Avenue W, and an increase in travel time of just over one minute.

Table 22 – Travel Time and Distance Comparison for Properties Along CSAH 55/1st Avenue W

From/To 1st Avenue	No Build Alternative		Recommended Alternative		Change (No Build to Recommended Alternative)	
	Distance (miles)	Travel Time (minutes)	Distance (miles)	Travel Time (minutes)	Distance (miles)	Travel Time (minutes)
From/To 19th Ave/CSAH 55 Intersection	2.8	3.6	3.2	5	0.4	1.4
From/To TH 12/New 45th St Intersection	1.2	1.9	2.1	3.5	0.9	1.6

Based on a review of the additional travel time and their associated costs (**Appendix C**), the differences were determined to be similar by FHWA and FRA. When taken into context with rail safety, the slight increase in costs and travel times were not outweighed by the safety risk of allowing an at-grade rail crossing.

Freight Rail

The proposed railway connection would improve local and regional rail system operational efficiency, train velocity and fluidity, and rail network optionality and connectivity and therefore would not have an adverse economic impact on freight rail operators or shippers.

City of Willmar Economic Development

As noted in the Purpose and Need section (Section II.C.6), significant infrastructure investments have been made to establish an industrial park on the former airport site and support planned growth and development in Willmar. The Project's railway component would allow for a spur line to serve the industrial park, making it possible for the industrial park to be served by all three major freight modes (air, rail and truck) and allowing it to serve as a regional transshipment hub. This is expected to bring new business and employment opportunities into Willmar, benefiting the area's economy.

As noted in the Purpose and Need section (Section II), Willmar is a regional trade center for Kandiyohi County and west-central Minnesota. The community was originally rooted in agriculture, but has been able to provide some diversification of its economy into the medical, educational, and retail sectors. Within the region, many rural communities have experienced population and employment loss; however, Willmar has been able to maintain and attract both people and businesses.

The city and its partners (Kandiyohi County, the joint economic development commission, the city's airport commission, private entities, and other governmental units, etc.) have been implementing the policies and plan elements to help increase economic growth and awareness. Since 2005 there have been several major investments through local, regional, state and federal sources for planning for and encouraging sound economic development. These activities have included constructing a new municipal airport, investing in local, county and state roadway improvements, constructing a new wastewater treatment facility, building a new sewer interceptor within the southern part of the community and developing an industrial park on the old municipal airport site (some roadways and utilities were put into place in 2015). Overall, $118 million dollars have been put in place to support planned growth and development that fosters the growth of jobs that offer sufficient wages and benefits to support middle class opportunities within the community.

One of the key elements that is lacking in the implementation of the city's plans is enhanced freight connectivity for the industrial development on the old municipal airport site. In 2015 the city made improvements to this site (basic roadway infrastructure and utilities) and the airport is due west of the industrial park with easy access from TH 40. However, there is currently no rail service to the site, which was a key component of the industrial park plans. The plans called for a spur line to serve the industrial park in order to create a competitive edge in attracting tenants to the area that offer higher-paying jobs. With a railway component of the Project, the industrial park would be served by all three major freight modes (air, rail and truck), allowing it to serve as a regional transshipment hub and providing enhanced economic development opportunities to the region.

Capital Investment

In addition to the economic effects described above, construction of the Project would represent a substantial capital investment in the regional economy that will increase employment, earnings, and economic output during the short-term construction period.

5. Right of Way Acquisition and Relocation

Right of way refers to a piece of land that is used as a transportation corridor. Property owned by MnDOT, Kandiyohi County, the City of Willmar or BNSF is therefore called right of way. Many railway and highway projects require purchasing land that the agency or railway does not currently own. If a property or a portion of a property is needed in order to construct a project, the act of the agency or railway purchasing the needed property is called right of way acquisition. If an entire parcel of property is needed, it is considered a total take. If there is a home or a business that is on a parcel for which a total take is required, that resident or business would need to be relocated at the agency's or railway's expense.

Much of the property needed for construction of the Project is currently owned by the City of Willmar as a result of the relocation of the Willmar Airport approximately a decade ago. The City of Willmar has committed to provide the property that it owns that is needed for railway, highway and local roadway right of way as part of its funding commitment for the Project.

Like the City of Willmar, BNSF and MnDOT own property within the project area that they have committed to utilize as part of the Project.

There are; however, properties or portions of properties that would need to be acquired as part of the Project that are currently held by private property owners – both residential in nature and commercial. The following subsections discuss total acquisitions and partial acquisitions that would be required from private property owners to construct the Project.

Total Takes – Full Parcel Acquisition

Based on the proposed design for the Project, there would be seven total parcel acquisitions from six different property owners in order to construct the Project. Four of the parcels are located at the intersection of TH 40 and CSAH 55 (on three residential properties). Their acquisition would be required to raise the roadway grades of both TH 40 and CSAH 55 to accommodate the grade separated crossing of TH 40 just to the east of the intersection. The other two parcels are located at the southeast corner of the current CSAH 55/1st Avenue curve and at the southern limits of the Project. A total of 65.7 acres would be acquired from these seven parcels. See **Figure 41** for impacted properties.

Six of the seven properties identified in **Figure 41** were acquired by BNSF prior to the Project receiving federal funding. Their previous acquisition did not influence the evaluation and selection

of a recommended alternative. While BNSF did not specifically utilize the Uniform Relocation and Real Property Acquisition procedures, a review of the acquisition process was conducted by FHWA. In its review of the acquisition, FHWA determined that the procedures utilized by BNSF were consistent and in accordance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation Uniform Relocation Assistance Act of 1987 and 49 CFR, Part 24, effective April 1989.

Partial Acquisitions

Partial acquisitions can be both permanent and temporary. Permanent acquisition or acquisition of permanent easements enable the agency (MnDOT, Kandiyohi County, City of Willmar) or railway (BNSF) to have ownership or use of the property in perpetuity. Temporary easements are portions of property that are needed in order to construct the Project (access to the parcel, grading, storage of equipment or materials, etc.) but remain the property of the property owner.

The Project would result in both permanent and temporary acquisitions as summarized in **Table 23**. **Table 24** lists the number of parcels impacted and their associated acreage. **Figure 42** shows the property that would be needed to construct the Project. Because the Project will be refined further as design progresses, it is anticipated that some right of way impacts would be modified through the right of way negotiation process and as design is completed. An update on right of way impacts will be provided in the EA Update. Estimates of right of way acquisition are included in **Tables 23** and **24** and shown on **Figure 42**.

Table 23 – Right of Way Impacts (Total and Strip Acquisitions)

Type of Acquisition	Acres	Number of Parcels	Number of Property Owners
Permanent Right of Way / Permanent Easement	293.9	21	20
Temporary Easement	19.1	21	20

Table 24 – Individual Parcel Impacts

Parcel Number	Permanent Right of Way / Permanent Easement	Temporary Easement
1	4.8	1.5
2	0.4	0.2
3	1.9	0.5
4	3.8	0.9
5		0.5
6		< 0.1
7		0.2
8	27.1	
9	6.1	2.5
10		0.3
11	67.0	5.6
12	20.6	1.3
13	19.6	
14		0.3
15		0.5
16	1.7	0.4
17	29.5	2.7
18	7.5	0.8
19	<0.1	0.1
20	0.3	0.3
21	0.1	0.1
22		0.5
23	0.7	0.3
24	65.6	
25	12.1	
26	21.0	
27	1.8	
28	2.3	
Total	293.9	19.1

All remaining right of way acquisition would be done in accordance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation Uniform Relocation Assistance Act of 1987 and 49 CFR, Part 24, and effective April 1989. MnDOT would be responsible for all right of way acquisition related to the proposed roadway improvements. BNSF Railway would be responsible for all right of way acquisition related to the proposed railway improvements.

6. Noise and Vibration

Noise was studied for both highways and trains as part of the Project evaluation. In addition, vibration associated with train travel was also completed. A full copy of the noise evaluation is found in **Appendix P**. Please note that some of the information with regard to train horns contained in the study included an at-grade crossing of the railway at CSAH 55/1st Avenue W (an alternative that was rejected). Due to the fact that there will not be an at-grade crossing, information regarding an increase in sound associated with train whistle blowing would not occur as part of the Project.

The following sub-sections discuss noise and vibration impacts associated with operation of the Project.

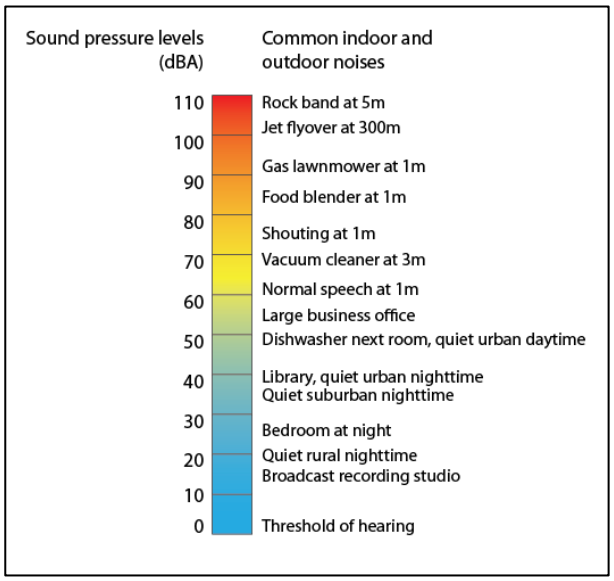
a. Highway traffic noise analysis

Traffic noise was evaluated in accordance with the Federal Highway Administration's (FHWA) Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) and the Minnesota Department of Transportation's (MnDOT) Noise Policy (effective date: June 15, 2015). This analysis evaluates the changes to the roadway network and includes modeled traffic noise levels for existing (2016) and future (2040) No Build and Build conditions.

<u>Introduction</u>

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels (dB) represent the logarithm of the ratio of a sound energy relative to a reference sound energy. For environmental noise, an adjustment, or weighting, of the high- and low-pitched sound is often made to approximate the way that an average person hears sound. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). A sound increase of 3 dBA is barely noticeable by the human ear, a 5 dBA increase is clearly noticeable, and a 10 dBA increase is perceived as twice as loud. The adjacent illustration provides a rough comparison of the noise levels of some common noise sources.

Chart 5 – Common Sound Levels



In Minnesota, traffic noise is evaluated by measuring and/or modeling the traffic noise levels that are expected to be exceeded 10 percent and 50 percent of the time during the hours of the day and/or night that have the loudest traffic noise levels. The noise level descriptors used to characterize traffic noise are the L_{10} and L_{50}. The L_{10} is the noise level that is exceeded for a total of 10 percent, or 6 minutes, of an hour. The L_{50} is the noise level that is exceeded for a total of 50 percent, or 30 minutes, of an hour.

Along with the volume of traffic and other factors (e.g., topography of the area and vehicle speed) that contribute to the loudness of traffic noise, the distance of a receptor from a sound's source is also an important factor. Sound level decreases as distance from a source increases. A rule of thumb regarding sound level decrease due to increasing distance from a line source (roadway) that is commonly used is: beyond approximately 50 feet from the sound source, each doubling of distance from the line source over hard ground (such as pavement or water) will reduce the sound level by 3 dBA, whereas each doubling of distance over soft ground (such as vegetated or grassy ground) results in a sound level decrease of 4.5 dBA.

The Minnesota Pollution Control Agency (MPCA) established noise standards for daytime and nighttime periods. For residential land uses (identified as Noise Area Classification 1 or NAC-1), the MPCA standards for L_{10} are 65 dBA for daytime and 55 dBA for nighttime; the standards for L_{50} are 60 dBA for daytime and 50 dBA for nighttime. The MPCA defines daytime as 7:00 AM to 10:00 PM and nighttime from 10:00 PM to 7:00 AM. State noise standards are depicted in **Table 25**.

Table 25 – Minnesota State Noise Standards

Land Use	Code	Daytime (7 AM – 10 PM) dBA		Nighttime (10 PM – 7 AM) dBA	
Residential	NAC-1	L_{10} of 65	L_{50} of 60	L_{10} of 55	L_{50} of 50
Commercial	NAC-2	L_{10} of 70	L_{50} of 65	L_{10} of 70	L_{50} of 65
Industrial	NAC-3	L_{10} of 80	L_{50} of 75	L_{10} of 80	L_{50} of 75

FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise is presented in the Code of Federal Regulations, Title 23 Part 772 (23 CFR 772). This regulation establishes the noise abatement criteria (NAC) for various land uses. Noise abatement measures are considered when the predicted noise levels approach (within 1 dBA) or exceed values shown for the appropriate activity category in **Table 26**, or when the predicted traffic noise levels substantially exceed the existing noise levels. MnDOT has defined an increase over existing noise levels of 5 dBA or greater as a substantial noise level increase.

Table 26 – FHWA Noise Abatement Criteria

Activity Category	Activity Criteria ([1, 2]) L_{10} dBA	Evaluation Location	Activity Description
A	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	70	Exterior	Residential
C	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[3]	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities manufacturing, mining, rail yards, retail facilities, shipyards, utilities, and warehousing
G	--	--	Undeveloped lands that are not permitted

[1] L_{10} shall be used for impact assessment
[2] The L_{10} Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[3] Includes undeveloped lands permitted for this activity category.

Traffic Noise Evaluation and Results

Field measurements of existing noise levels were measured at three sites within the project area. Field measurements were tested against model results. Each set of predicted and measured data was found to be within the acceptable + or - 3 dBA tolerance; therefore, the model and modeler are considered to be validated.

Traffic noise modeling was completed using the "MINNOISEV31" model, a version of FHWA's STAMINA model adapted by MnDOT for use in Minnesota. Traffic noise levels were modeled for existing conditions (2016), the future (2040) No Build Alternative, and the future (2040) Build Alternative (recommended alternative). The 4:00 p.m. to 5:00 p.m. period was identified as the loudest hour during the daytime, and the 6:00 a.m. to 7:00 a.m. period was identified as the loudest hour during the nighttime. Traffic noise levels were modeled at 32 representative receptor locations throughout the project corridor. A majority of these receptor locations represented residential land uses.

Detailed analysis results for each modeled receptor location can be found in the Noise and Vibration Assessment Report in **Appendix P**. The analysis results are summarized below. **Figure 43** shows the receptor locations and **Tables 27** and **28** show existing and future sound levels both with and without the Project for daytime and nighttime hours.

- Existing (2016) daytime traffic noise levels range from 47.8/40.9 dBA (L_{10}/L_{50}) to 64.0/56.6 dBA (L_{10}/L_{50}), whereas nighttime noise levels range from 44.3/34.8 dBA (L_{10}/L_{50}) to 59.3/50.0 dBA (L_{10}/L_{50}).

- Future (2040) No Build daytime traffic noise levels range from 48.0/41.1 dBA (L_{10}/L_{50}) to 65.1/57.4 dBA (L_{10}/L_{50}), whereas nighttime traffic noise levels range from 44.6/35.1 dBA (L_{10}/L_{50}) to 60.2/51.1 dBA (L_{10}/L_{50}).

- Under future Build (2040) Alternative daytime traffic noise levels range from 47.4/43.6 dBA (L_{10}/L_{50}) to 66.4/56.3 dBA (L_{10}/L_{50}). Nighttime traffic noise levels range from 44.6/39.1 dBA (L_{10}/L_{50}) to 61.5/49.8 dBA (L_{10}/L_{50}).

- Modeled future Build noise levels (daytime and nighttime) vary -14.1 dBA to 9.1 dBA from existing (2016) conditions. Modeled traffic noise levels exceed the MPCA daytime L_{10} standard at 1 of 32 receptors and the daytime L_{50} standard at 0 of 32 receptors. Modeled traffic noise levels exceed the MPCA nighttime L_{10} standard at 4 of 32 receptors and the nighttime L_{50} standard at 0 of 32 receptors.

- Modeled future Build noise levels are predicted to substantially exceed (greater than 5 dBA) existing noise levels at 2 of 32 receptors. Modeled traffic noise levels exceed the FHWA criteria at 0 of 32 receptors.

Table 27 – Highway Traffic Sound Levels – Existing and Future Conditions – Daytime

Receptor ID	Type	NAC Class	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing and No Build	Modeled Build (2040)		Difference between Existing and Build
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. Underline numbers approach/exceed federal standards for residential and commercial										
State Daytime Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**		**65**	**60**	
Commercial	**NAC-2**		**70**	**65**	**70**	**65**		**70**	**65**	
Industrial	**NAC-3**		**80**	**75**	**80**	**75**		**80**	**75**	
1	Residential	NAC-1	56.3	49.7	56.6	50.1	0.3	57.4	50.9	1.1
2	Residential	NAC-1	56.7	50.0	56.9	50.4	0.2	57.8	51.4	1.1
3	Residential	NAC-1	47.8	42.7	48.0	43.1	0.2	53.9	49.4	**6.1**
4	Residential	NAC-1	53.7	44.6	53.8	44.8	0.1	55.2	45.4	1.5
5	Residential	NAC-1	50.9	41.6	51.0	41.8	0.1	58.7	52.8	**7.8**
6	Residential	NAC-1	50.4	40.9	50.5	41.1	0.1	53.9	45.7	3.5
7	Residential	NAC-1	61.0	50.4	61.7	51.4	0.7	63.5	53.5	2.5
8	Residential	NAC-1	60.0	50.5	61.1	52.0	1.1	62.6	53.7	2.6
9	Residential	NAC-1	64.0	53.4	**65.1**	54.8	1.1	**66.4**	56.3	2.4
10	Residential	NAC-1	62.4	55.4	63.0	56.1	0.6	48.3	44.3	-14.1
11	Residential	NAC-1	58.6	52.4	59.1	53.1	0.5	47.4	43.6	-11.2
12	Residential	NAC-1	58.8	52.6	59.4	53.4	0.6	48.1	44.1	-10.7
13	Residential	NAC-1	58.9	52.7	59.4	53.5	0.5	48.5	44.5	-10.4
14	Residential	NAC-1	59.0	52.9	59.6	53.6	0.6	48.7	44.6	-10.3
15	Residential	NAC-1	59.7	53.3	60.3	51.1	0.6	49.3	45.1	-10.4
16	Residential	NAC-1	59.6	53.3	60.2	54.1	0.6	49.4	45.2	-10.2
17	Residential	NAC-1	60.0	53.6	60.6	54.4	0.6	49.6	45.4	-10.4
18	Residential	NAC-1	59.9	53.5	60.5	54.3	0.6	49.7	45.4	-10.2
19	Residential	NAC-1	59.9	53.5	60.5	54.3	0.	49.7	45.5	-10.2

Table 27 – Highway Traffic Sound Levels – Existing and Future Conditions – Daytime (Continued)

Receptor ID	Type	NAC Class	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing and No Build	Modeled Build (2040)		Difference between Existing and Build
			L10	L50	L10	L50	L10	L10	L50	L10
BOLD numbers are above state standards. Underline numbers approach/exceed federal standards for residential and commercial										
State Daytime Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**		**65**	**60**	
Commercial	**NAC-2**		**70**	**65**	**70**	**65**		**70**	**65**	
Industrial	**NAC-3**		**80**	**75**	**80**	**75**		**80**	**75**	
20	Residential	NAC-1	59.8	53.5	60.4	54.3	0.6	49.8	45.5	-10.0
21	Residential	NAC-1	58.7	52.6	59.3	53.4	0.6	50.3	45.9	-8.4
22	Residential	NAC-1	58.1	52.1	58.7	52.9	0.6	50.1	45.7	-8.0
23	Residential	NAC-1	57.4	51.6	58.0	52.4	0.6	49.8	45.5	-7.6
24	Residential	NAC-1	57.0	51.3	57.6	52.1	0.6	49.6	45.4	-7.4
25	Residential	NAC-1	58.6	52.5	59.1	53.3	0.5	50.3	45.9	-8.3
26	Residential	NAC-1	58.0	52.1	59.6	52.9	0.6	50.1	45.8	-7.9
27	Residential	NAC-1	57.3	51.5	57.9	52.3	0.6	49.8	45.5	-7.5
28	Residential	NAC-1	56.9	51.2	57.5	52.0	0.6	49.7	45.4	-7.2
29	Residential	NAC-1	57.4	51.6	58.0	52.4	0.6	50.7	46.2	-6.7
30	Residential	NAC-1	56.9	51.2	57.5	52.0	0.6	50.4	46.0	-6.5
31	Residential	NAC-1	63.9	56.6	64.6	57.4	0.7	53.5	48.5	-10.4
32	Residential	NAC-1	57.6	51.7	58.2	52.5	0.6	58.0	52.2	0.4

Table 28 – Highway Traffic Sound Levels – Existing and Future Conditions – Nighttime

Receptor ID	Type	NAC Class	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing and No Build	Modeled Build (2040)		Difference between Existing and Build
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. Underline numbers approach/exceed federal standards for residential and commercial										
State Nighttime Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**		**55**	**50**	
Commercial	**NAC-2**		**70**	**65**	**70**	**65**		**70**	**65**	
Industrial	**NAC-3**		**80**	**75**	**80**	**75**		**80**	**75**	
1	Residential	NAC-1	53.3	45.3	53.7	45.8	0.4	54.5	46.6	1.2
2	Residential	NAC-1	53.7	45.6	54.1	46.2	0.4	54.9	47.0	1.2
3	Residential	NAC-1	44.3	37.9	44.6	38.3	0.3	51.1	45.0	**6.8**
4	Residential	NAC-1	48.3	38	48.6	38.3	0.3	50.4	39.1	2.1
5	Residential	NAC-1	46.4	35.8	46.6	36.0	0.2	**55.5**	48.0	**9.1**
6	Residential	NAC-1	45.8	34.8	46.0	35.1	0.2	50.2	40.6	4.4
7	Residential	NAC-1	**55.5**	43.3	**56.4**	44.6	0.9	**58.8**	47.2	3.3
8	Residential	NAC-1	53.7	42.5	**55.9**	45.1	2.2	**57.8**	47.2	4.1
9	Residential	NAC-1	**58.6**	46.4	**60.0**	48.0	1.4	**61.5**	49.8	2.9
10	Residential	NAC-1	**58.1**	49.2	**58.9**	**50.1**	0.8	45.4	39.8	-12.7
11	Residential	NAC-1	54.7	46.6	**55.3**	47.4	0.6	44.6	39.1	-10.1
12	Residential	NAC-1	54.7	46.6	**55.4**	47.5	0.7	45.2	39.5	-9.5
13	Residential	NAC-1	54.7	46.6	**55.5**	47.6	0.8	45.6	39.8	-9.1
14	Residential	NAC-1	54.8	46.7	**55.6**	47.7	0.8	45.7	39.9	-9.1
15	Residential	NAC-1	**55.4**	47.1	**56.2**	48.1	0.8	46.3	40.4	-9.1
16	Residential	NAC-1	**55.3**	47.0	**56.1**	48.1	0.8	46.4	40.4	-8.9
17	Residential	NAC-1	**55.7**	47.3	**56.5**	48.3	0.8	46.6	40.6	-9.1
18	Residential	NAC-1	**55.6**	47.2	**56.4**	48.3	0.8	46.6	40.6	-9.0
19	Residential	NAC-1	**55.6**	47.2	**56.4**	48.2	0.8	46.7	40.7	-8.9

Table 28 – Highway Traffic Sound Levels – Existing and Future Conditions – Nighttime (Continued)

Receptor ID	Type	NAC Class	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing and No Build	Modeled Build (2040)		Difference between Existing and Build
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. Underline numbers approach/exceed federal standards for residential and commercial										
State Nighttime Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**		**55**	**50**	
Commercial	**NAC-2**		**70**	**65**	**70**	**65**		**70**	**65**	
Industrial	**NAC-3**		**80**	**75**	**80**	**75**		**80**	**75**	
20	Residential	NAC-1	**55.5**	47.1	**56.3**	48.2	0.8	46.7	40.7	-8.8
21	Residential	NAC-1	54.4	46.3	**55.2**	47.4	0.8	47.2	41.0	-7.2
22	Residential	NAC-1	53.9	45.9	54.7	47.0	0.8	46.9	40.8	-7.0
23	Residential	NAC-1	53.3	45.4	54.0	46.5	0.7	46.7	40.6	-6.6
24	Residential	NAC-1	52.9	45.1	53.7	46.2	0.8	46.5	40.5	-6.4
25	Residential	NAC-1	54.3	46.2	**55.1**	47.3	0.8	47.2	41.0	-7.1
26	Residential	NAC-1	53.8	45.8	54.6	46.9	0.8	47.0	40.8	-6.8
27	Residential	NAC-1	53.1	45.3	53.9	46.4	0.8	46.7	40.6	-6.4
28	Residential	NAC-1	52.8	45.1	53.6	46.1	0.8	46.5	40.5	-6.3
29	Residential	NAC-1	53.2	45.4	54.0	46.5	0.8	47.4	41.2	-5.8
30	Residential	NAC-1	52.8	45.0	53.6	46.1	0.8	47.2	41.0	-5.6
31	Residential	NAC-1	**59.3**	50.0	**60.2**	**51.1**	0.9	50.4	43.6	-8.9
32	Residential	NAC-1	53.4	45.4	54.2	46.5	0.8	54.0	46.2	0.6

Traffic Noise Abatement Analysis

Noise abatement measures (i.e., noise barriers) were evaluated within the project area at receptor locations where modeled noise levels were projected to: 1) exceed state daytime and/or nighttime noise standards, 2) approach or exceed Federal NAC, or 3) result in a substantial increase (i.e., increase by 5 dBA or greater from existing to future Build Alternative conditions).

The noise barrier analysis was completed on a total of 4 potential locations along the corridor for the recommended alternative. Of the 4 barriers analyzed, none met the feasibility and reasonableness criteria and are proposed as part of the Project. A summary description of the proposed noise barriers is provided below. Additional details of the noise barrier analysis including the evaluated locations are provided in the Noise and Vibration Assessment Report in **Appendix P**.

Noise Barrier F

An approximately 4,168-foot long, 20-foot high noise barrier was modeled along the east side of the new TH 12 alignment. The modeled barrier provides a reduction of 2.9 dBA to 4.5 dBA, benefiting two receptors. The modeled Barrier F does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the Project.

Noise Barrier G

An approximately 277-foot long, 20-foot high noise barrier was modeled along the west side of CSAH 55 north of TH 40. The modeled barrier provides a reduction of 1.6 dBA, benefiting one receptor. The modeled Barrier G does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the Project.

Noise Barrier H

An approximately 399-foot long, 20-foot high noise barrier was modeled along the east side of CSAH 55 and along the north side of TH 40. The modeled barrier provides a reduction of 5.2 dBA, benefiting one receptor. The modeled Barrier H does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the Project.

Noise Barrier I

An approximately 247-foot long, 10-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The modeled barrier provides a reduction of 6.3 dBA. The modeled Barrier I does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the Project.

Traffic Noise Conclusions

In general, construction of the Project will result in increases in traffic noise levels compared to existing conditions. Changes in daytime traffic noise levels (L10) for the recommended alternative are projected to vary from -14.1 dBA to 9.1 dBA from existing to future (2040) Build conditions.

The reasonableness of possible noise barriers was evaluated. Noise barriers were not found to be feasible and reasonable under the recommended alternative and are not proposed as part of the Project. The analysis of possible noise barriers is provided in greater detail in **Appendix P**.

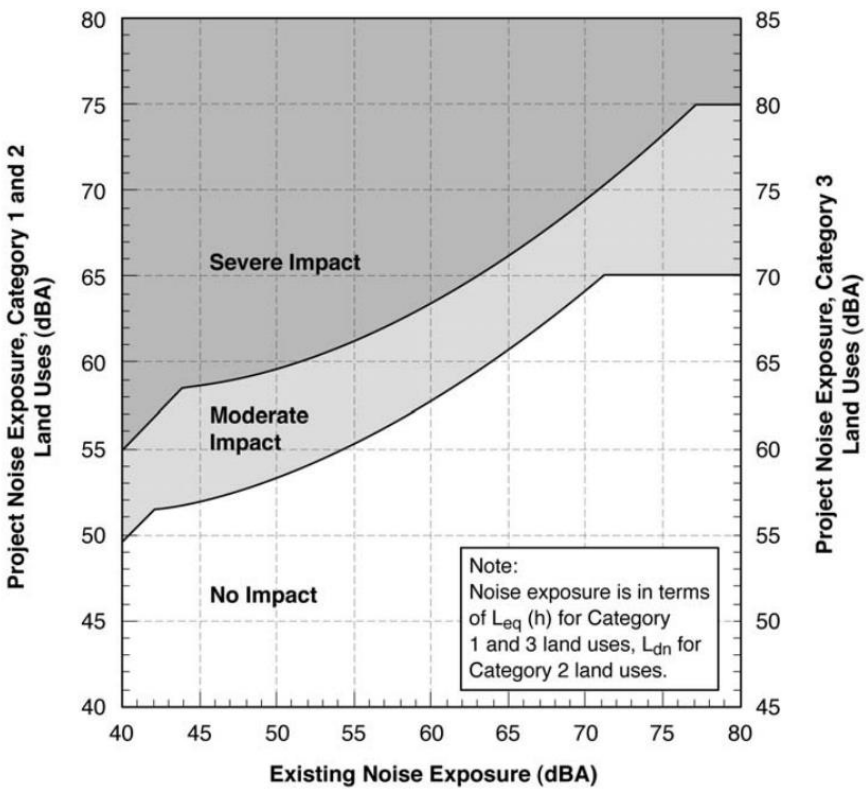
b. Train noise and vibration analysis

Appendix P contains information related to train noise. Please note, the analysis was completed with an at-grade intersection in place at CSAH 55/1st Ave W in place to provide a worst case scenario with a train horn sounding at this location. With the intersection removed as part of the recommended alternative, sounds associated with blowing the horn at this location would not occur.

It should also be noted that the noise and vibration analyses also took into a worst case scenario with the railway where there would be a second southern connection between the new railway and the Marshall Subdivision that could serve the industrial park. This design element was determined not to be needed, that the industrial park could be fully served from the turnoff near the old airport. There are no impacts as a part of removing this design element.

Train noise and vibration were evaluated in accordance with the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment manual (2006). **Chart 6** from the FTA Transit Noise and Vibration Impact Assessment manual shows the noise impact criteria, which are based on the land use category and the existing noise exposure in the area.

Chart 6 – FTA Noise Impact Criteria for Transit Projects



Source: Federal Transit Administration

Noise-sensitive receptors are divided into one of three land use categories:

- Category 1: land where quiet is an essential element (e.g. amphitheaters and concert pavilions)

- Category 2: residences and buildings where people sleep

- Category 3: institutional land uses with primarily daytime and evening use (e.g. schools, libraries, and churches)

Category 1 and category 3 receptors are evaluated using the equivalent-average sound level (L_{eq}) from the noisiest hour of transit-related activity during hours of noise sensitivity. The L_{eq} represents a constant sound that, over the hour, has the same acoustic energy as the time varying signal.

Category 2 receptors are evaluated using the day-night sound level (L_{dn}), because category 2 receptors are sensitive to noise during all hours of the 24-hour day. The L_{dn} describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 PM and 7:00 AM increased by 10 decibels to account for greater nighttime sensitivity to noise.

Modeled project noise levels are compared to the noise impact criteria to evaluate the potential for noise impacts as defined by the FTA. No impact indicates project noise levels are unlikely to cause annoyance. A moderate impact is a noise level increase that is noticeable to most people, yet generally not sufficient enough to cause adverse reactions to the Project. A severe impact is a noise level increase that could cause annoyance to a significant percentage of people.

For purposes of identifying the noise and vibration study area, it was determined that the anticipated increase (for both build and no build alternatives) from 4 to 6 trains per day for train activity between the Marshall and Morris Subdivisions through the rural areas north and south of the project area would not likely exceed noise thresholds. And if they did, the sparse receptor density would not make mitigation reasonable or feasible. Thus, the affected environment is the area near the proposed railroad tracks and a portion of the existing mainline where an existing private at-grade crossing at 45th Street would be converted to a public at-grade crossing. This area includes residential land uses, which fall under category 2 as defined by FTA. No category 1 or category 3 receptors were identified in the affected area. Existing noise levels in the project area were monitored in June 2016 at the following locations:

- Monitoring Location 1 (ML1) was located south of TH 12 off of CSAH 55. ML1 was representative of the existing noise exposure in the northern portion of the project area.

- Monitoring Location 2 (ML2) was located near existing tracks and was east of CSAH 55 and northwest of CSAH 5 SW. ML2 was representative of the existing noise exposure in the southern portion of the project area.

<u>Noise Screening</u>

Noise screening distances can be determined using guidance in the FTA guidance manual or calculated using the FTA spreadsheet model. Using the FTA spreadsheet model results in a screening distance based on project-specific conditions; the appropriate screening distance is where the project noise reaches 50 dBA. The primary train noise sources throughout the southern portion of the project area are the locomotives and railcars. Based on the project data listed above, total project noise from the locomotives and railcars would reach 50 dBA at a distance of 485 feet. Therefore, a screening distance of 485 feet was applied to the project rail alignment.

The Project includes the addition of locomotive horns on the existing Morris Subdivision mainline where an existing private at-grade crossing near 45th Street would be converted to a public at-grade crossing. A second at-grade crossing location was evaluated where a railroad connection could cross

CSAH 55/1st Avenue W, but that at-grade crossing was not included as part of the recommended alternative. Please note: the impacts associated with that crossing as identified in the full report in Appendix P are not applicable due to the fact that the intersection would not exist and there would be no horn blown at that location. **Figure 44** shows the locations of noise impact near the existing at-grade private crossing that will be the new 45th Street NW public crossing.

Based on the project data listed above, total project noise from the locomotives, railcars, and locomotive horn would reach 50 dBA at a distance of 3,000 feet from the existing mainline. The FRA requires the train engineer to begin sounding the horn when the train is within 15 to 20 seconds of an at-grade crossing (when speeds are below 60 miles per hour). With a project speed of 30 miles per hour, the locomotive horn could be used within 880 feet of the at-grade crossing. Therefore, the screening distance of 3,000 feet was applied to the rail alignment that is within 880 feet of the existing mainline at-grade crossing.

General noise assessments were performed at 21 receptors. For receptors located within the intersection of the noise screening buffers, locomotive warning horns for at-grade crossings were included as noise sources in the FTA general noise assessment. Additional details of the noise screening analysis including the evaluated locations are provided in the Noise and Vibration Assessment Report in **Appendix P**.

Noise Mitigation

For the recommended alternative, the FTA general noise assessment identified moderate impacts at four receptors related to the at-grade crossing of the existing mainline near 45th Street: R13–R16. No severe impacts were identified. The dominant noise source at receptors R13–R16 was the locomotive warning horn for the mainline at-grade crossing.

Mitigation measures for the moderate impact at the four receptors were evaluated. Noise barriers are a common measure for mitigating noise from surface transportation. However, noise barriers are unfeasible for mitigating noise at receptors near at-grade crossings (where locomotive warning horns are used) because the roadway creates a large gap in the barriers. This gap greatly diminishes the noise reduction of the barriers. In addition to feasibility concerns, noise mitigation measures for a small number of receptors are not cost effective. Therefore noise mitigation measures are not proposed as part of this Project.

Vibration Screening

Vibration consists of rapidly fluctuating motions. Ground-borne vibration (GBV) can be a serious concern for residents or at facilities that are vibration-sensitive, such as laboratories or recording studios. In contrast to airborne noise, ground-borne vibration is not an everyday experience for most people. Most perceptible indoor vibration is caused by sources within a building such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads, though in most soils GBV dissipates very rapidly.

Vibration screening distances were determined using information in the FTA *Transit Noise and Vibration Impact Assessment Guidance Manual*. The project includes diesel locomotive trains in an area with residential receptors; therefore, a screening distance of 200 feet was identified and applied to the Project rail alignment. No vibration-sensitive receptors were identified within the vibration screening buffer, so no further vibration assessments were performed. **Figure 45** shows the area studied for noise and vibration.

c. Construction noise

Information with regard to construction noise anticipated as part of the Project is discussed in the EAW Section IV.A.17.

7. Section 4(f) – Parks, Recreation Areas, Wildlife and Waterfowl Refuges, and Historic Sites

a. Background

Section 4(f) refers to the original section within the U.S. Department of Transportation Act of 1966 that set the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in transportation project development. The law, now codified in two places (49 USC 303 and 23 USC 138), is implemented by FHWA through regulations found at 23 CFR Part 774. FRA's Procedures for Considering Environmental Impacts (64 Federal Register 25445, May 26, 1999) contains the FRA processes and protocols for analyzing the potential use of Section 4(f) properties. FRA is not subject to the 23 CFR Part 774 regulations; however FRA uses these regulations and associated policy guidance as additional guidance when conducting a Section 4(f) analysis. The 23 CFR Part 774 regulations utilized by FHWA are applied for the analysis in this EA. Section 4(f) applies to all projects that receive funding from or require approval by an agency of the U.S. Department of Transportation (USDOT).

FHWA defines a Section 4(f) "use" as either a direct use or constructive use. A direct use occurs when land is permanently incorporated into a transportation facility or when there is a temporary occupancy of land that is adverse to a resource protection under Section 4(f). Constructive use occurs when a project's proximity impacts are so severe that the protected activities, features or attributes that qualify a resource for protection under Section 4(f) are "substantially impaired."

Before approving a project that "uses" a Section 4(f) resource, FHWA must find that there is no prudent and feasible alternative and that the selected alternative minimizes harm to the resource. If there is a prudent and feasible alternative that completely avoids Section 4(f) resources it must be selected. If there is no prudent and feasible alternative that avoids Section 4(f) resources, FHWA has some discretion in selecting that alternative that causes the least harm to those resources.

In addition, FHWA regulations state that when a Section 4(f) use is anticipated, applicable regulations also require consultations with the official having jurisdiction over the resource to verify the site's significance and coordinate conclusions on use of the land, including efforts to avoid or mitigate the impacts.

FHWA may allow the selection of an alternative that causes a temporary occupancy (not use) of a Section 4(f) resource if all of the following are true:

- Duration is temporary (less than needed for project construction)
- No change in ownership of the land
- Scope of work is minor (i.e., the nature and magnitude of the changes to the resource are minimal)
- No anticipated permanent adverse physical impacts
- No interference with the activities or purpose of the resource (either temporary or permanent)
- The land used will be fully restored (to a condition at least as good as before the project)

- There is documented agreement from the official with jurisdiction over the resource regarding the above conditions

b. Project Section 4(f) resources

Figure 46 shows Section 4(f) resources inside and outside the project area. There are two Section 4(f) resources impacted by the Project. Each resource is discussed on the following pages.

<u>Morris Subdivision (St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District)</u>

Description of Section 4(f) Property
The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District (HE-MPC-16387) is an active rail corridor that has previously been determined eligible for listing in the National Register of Historic Places. The rail corridor was once part of the Great Northern Railway, and the period of significance for this and other Minnesota railroads was between 1862 and 1956. The property is a 203-mile long linear railroad corridor that extends between Breckenridge, MN, and Minneapolis, MN. See Section IV.A.14 and **Appendix O**.

The subject railroad corridor is currently owned and operated by BNSF Railway as part of the Morris Subdivision, which extends between Breckenridge and Willmar. Within the city of Willmar, the railroad line connects to the Wayzata Subdivision to the east. The subject site is located west of the City of Willmar near the existing intersection of TH 12 and 45th Street NW. At this location, the railroad line runs adjacent to the north side of the TH 12 roadway.

The active railroad corridor consists of a railroad line (steel tracks, wooden rail ties) and access road built upon a railroad embankment. Ditches run along each side of the railroad embankment. The railroad corridor runs adjacent to and at a similar elevation to TH 12. One main track exists at 45th Street NW, and extends to the west. Approximately 1,000 feet east of the 45th Street NW at-grade crossing, a second track ties into the main track. The access road ends prior to the second track, where it provides access to track switching mechanical and electrical equipment. Both tracks extend east into Willmar. In the subject area, a public at-grade crossing is located at 45th Street NW, and a private at-grade crossing is located approximately 2,000 feet to the west.

Probable Use of the Section 4(f) Property
The Project would not alter the existing alignment of the subdivision, but would provide a permanent new linkage to it with the construction of the new railway alignment. The proposed Project would include tying a new north-south railroad connection between the Morris Subdivision – the Section 4(f) property – near the current 45th Street NW at-grade crossing location – to the Marshall Subdivision, approximately 2.8 miles to the south. Approximately 4,000 feet of existing track would be replaced within the Morris Subdivision as part of the new railroad connection to the south. In addition, 45th Street NW north of the railroad corridor would be redirected to cross the railroad corridor approximately 2,000 feet to the west, eliminating the existing 45th Street NW at-grade crossing and converting an existing private at-grade crossing into a public at-grade crossing. The converted public at-grade crossing would be upgraded with an active warning system.

Efforts to Avoid and Minimize Impacts to the Section 4(f) Property
The Section 4(f) resource could not be avoided. In order to avoid an impact, no new linkage or connection could be made to the Morris Subdivision between the Twin Cities (St. Anthony) and

Breckenridge, Minnesota. This would preclude any railway alternatives that would address the Project's purpose and need.

Since the resource could not be avoided, impacts were minimized to the extent practicable; a single connection would be made to the Morris Subdivision that links the mainline to the Marshall Subdivision. The proposed connection would not alter the existing Morris mainline either horizontally or vertically and would not introduce new stations or other elements that would alter the character of the historic district.

Section 4(f) De Minimis Impact Finding
MnDOT's Cultural Resource Unit (CRU) reviewed the proposed project and determined that there would be "no adverse effects" to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District as currently proposed. According to CRU's determination, the construction of the railroad line that would extend off the main line, which would constitute the only direct effect to the historic district, would not alter the existing location/alignment, materials, workmanship, design, feeling and association of the main line. While the presence of the new railroad line constitutes a minor change in setting, it is one that is in keeping with historic character of the main line, from which numerous branch lines, spur tracks, and switch tracks extended between 1862 and 1956, the period of significance for Minnesota railroads.

Other project components, including the crossing at TH 40, would be over 1.25 miles distant in a fairly level landscape, and therefore would not be visible from the historic district. The realignment of TH 12 would result in the road no longer running next to the main line, which would constitute a minor visual change in a district that is hundreds of miles long. None of the propose project components would create increases in traffic, noise or vibrations, or affect air quality in the vicinity of the historic district.

The Minnesota Historic Preservation Office (MnHPO), the official with jurisdiction, has provided a letter stating that the proposed railroad connection, including consideration of the mitigation, will not adversely affect the activities, features and attributes that are important to the resource. See Section 4(f) correspondence in **Appendix O**.

Because the railway would be impacted by the Project, a Section 4(f) De Minimis impact finding was completed as part of this review (**Appendix P**). A Section 4(f) De Minimis is completed when there is an impact to a Section 4(f) resource, but the impact has been determined to have "no adverse effect." MnHPO will be informed of FHWA's intent to make the De Minimis impact finding.

The Section 4(f) De Minimis determination and impact finding will be finalized at the time of the EA Update, following public review and comment. A copy of the letter from FHWA to MnHPO regarding the De Minimis impact finding and any comments from MnHPO and the public will be included in the EA Update.

<u>CSAH 5 Recreational Trail</u>
The second resource within the project area is a recreational trail located along the east side of CSAH 5 at the eastern project limits (**Figure 46**). The trail is owned and operated by Kandiyohi County. The trail is approximately 0.9 miles long and is within county right of way. The 10-foot wide trail was constructed in 2008 and 2009 as part of a larger CSAH 5 project that established a new roadway segment for CSAH 5 between existing TH 12 and TH 40. The trail provides access to other trails and residential neighborhoods north of existing TH 12. Because of its recreational nature and use, the trail along CSAH 5 is considered a Section 4(f) resource.

The trail would be subject to a temporary occupancy as a result of the construction of the CSAH 5 and realigned TH 12 intersection. The Project would construct a new signalized intersection, impacting a portion of the trail. To provide a new roadway crossing for the trail, the Project would include installing pedestrian ramps, painting crosswalks, and incorporating pedestrian countdown timers at the new roadway intersection. While the Project would require temporary occupancy during construction due to physical impact of the existing recreational trail, it would not be a temporary use. The Project would not be considered a Section 4(f) "use" due to the following:

- Duration is temporary (less than needed for project construction): The trail would stay open throughout the anticipated three year project construction. The trail would remain as it currently functions until the new intersection construction begins. At the time of intersection construction, a temporary connection (bypass/detour) would be provided to enable users to traverse the area during construction. Upon completion of the new intersection, the temporary bypass would be removed and trail users would utilize the new intersection crossing.

- No change in ownership of the land: The trail would remain in CSAH 55 right of way under the jurisdiction of Kandiyohi County.

- Scope of work is minor (i.e., the nature and magnitude of the changes to the resource are minimal): The impact to the trail is minimal – a new intersection crossing of TH 12 would be provided that would be better than the current crossing of TH 12 (new intersection would meet ADA requirements, have countdown timers and would have a striped crosswalk). The impact of the 0.9 mile trail is at the new intersection location. The remaining trail would continue to function as it exists today. During construction a temporary connection would allow trail users to traverse the entire trail length.

- No anticipated permanent adverse physical impacts: No permanent adverse physical impacts would be expected to occur. The trail would be back in place following intersection construction and would remain 10 feet wide.

- No interference with the activities or purpose of the resource (either temporary or permanent): As noted above, the trail would remain open during construction, and pedestrians and bicyclists would be able to continue to utilize the trail during most of the Project's construction. When the intersection area where the trail is located is under construction, a temporary connection (bypass/detour) would be provided to ensure the trail remains open during construction.

- The land used will be fully restored (to a condition at least as good as before the project): At the completion of the intersection construction, there would be intersection improvements for the new trail crossing that would include pedestrian ramps, pedestrian countdown timers and a striped crosswalk. The intersection would be ADA compliant. The trail would remain 10 feet wide.

- There is documented agreement from the official with jurisdiction over the resource regarding the above conditions: Kandiyohi County, the agency with official jurisdiction of the resource has provided a letter documenting agreement with the above conditions (**Appendix Q**).

c. Section 4(f) resources outside the project area

As noted under the Section 4(f) background information, a "use" can occur when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are "substantially impaired." There are three potential Section 4(f) resources located outside of the project area that would need to be considered. These resources include the Rau Prairie Pothole Wildlife Management Area (WMA), Gopher Ridge WMA and Kandiyohi County Walk-In Area (WIA) (**Figures 38, 46**).

Given the distance of these resources from the Project and the limited impacts anticipated with the Project, it is not anticipated that the Project would result in a Section 4(f) "use." As a preventative measure, and in coordination with DNR requests, plans developed for the Project would note these areas as environmentally sensitive (if they approach construction area). Additionally, the Project would use native seed mixes as noted in Section IV.A.13 to prevent the spread of noxious weeds that could affect the WMAs and WIA.

8. Section 6(f) – Land and Water Conservation Act

Section 6(f) of the Land and Water Conservation Fund Act of 1965 (LAWCON) stipulates that any land or facility planned, developed, or improved with LAWCON funds cannot be converted to uses other than parks, recreation, or open space unless land of at least equal fair market value and reasonably equivalent usefulness is provided. Anytime a transportation project (rail or highway) would cause such a conversion, regardless of funding sources, replacement land must be provided.

The Minnesota DNR maintains a list of properties that are subject to Section 6(f) requirements. This list is available on the DNR's website. There are no lands or facilities within the Project that have been planned, developed, or improved with LAWCON funds. Therefore, there would be no Section 6(f) impacts.

9. Section 7 – Federal Endangered Species

a. Background

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to review any action that it funds, authorizes, or carries out to determine whether it may affect federally listed threatened, endangered or proposed species or listed critical habitat. Federal agencies (or their designated representatives) must consult with the U.S. Fish and Wildlife Service (USFWS) if any such effects may occur as a result of their actions. Consultation with the USFWS is not necessary if the proposed action will not directly or indirectly affect listed species or critical habitat. If a federal agency (or its representative) finds that an action will have no effect on listed species or critical habitat, it should maintain a written record of that finding that includes supporting rationale.

b. Project area species and effects

MnDOT's Office of Environmental Stewardship (OES), is FHWA's designated representative to review Section 7 resources within Minnesota for federally funded projects. OES staff reviewed the project area for federally listed species. There was one species, the northern long-eared bat (Myotis septentrionalis) that was identified within Kandiyohi County.

The northern long-eared bat is a federally-listed threatened species and has the potential to be present within Kandiyohi County. The northern long-eared bat hibernates in caves and mines in the

winter months and roosts and forages in upland forests during spring and summer. Although no critical habitat has been designated for this species, removal of trees can result in a loss of habitat. Approximately 0.52 acres of tree removal would occur as part of the Project.

Staff from OES determined that the Project "may affect, but will not cause prohibited incidental take" of the northern long-eared bat. OES staff noted that the Project would occur within the northern long-eared bat's range, but there are no documented maternity roosts and/or hibernacula within the project area. No tree removals would occur within 0.25-mile of a known hibernaculum or within 150 feet from a maternity roost tree. OES staff shared its determination with representatives from the USFWS (**Appendix L**). USFWS did not object or rebut the conclusion reached by OES staff.

OES staff did recommend that the Project should include minimization measures to prevent effects to the bat. The Project should perform winter tree removal (November 1 to March 31) in order to avoid possible impacts to the species during the pup rearing season (June 1 through July 31). Disturbed areas should be revegetated using native seed mixes per DNR, MnDOT, and USFWS guidance. In addition, the Project should utilize bio-netting or natural netting for erosion control, which would reduce the risk of bat or other wildlife entrapment. MnDOT has agreed to these requests for construction and these measures would be noted in construction documents and requests for proposals for construction.

10. Section 404 – Clean Water Act

a. Background

Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into the Waters of the United States (wetlands, tributaries, lakes, etc.), excluding those wetlands that are hydrologically isolated on the landscape. Section 404 of the CWA is under the purview of the United States Army Corps of Engineers (USACE) and requires a permit to be issued by the USACE prior to the placement of any dredged or fill material into any Water of the United States, including wetlands. The USACE is responsible for administering the Section 404 permitting program, conducting Approved or Preliminary Jurisdictional Determinations (JD), developing policy and guidance, and enforcing all other Section 404 provisions.

Projects with less than 0.5 acre of impact to Waters of the United States are covered by a General Permit. Projects with impacts between 0.5 and three acres require a Letter of Permission, and more than three acres of impact requires an Individual Permit.

b. Project impacts

Fifty-five water resources were identified within or near the project area. In a letter dated August 25, 2015 (**Appendix S**) the USACE issued an approved jurisdictional determination (JD) for delineated aquatic resources within the project area. Twenty-seven delineated aquatic resources were determined to be non-jurisdictional and five delineated aquatic resources were determined to be jurisdictional by the USACE.

The jurisdiction of the remaining 23 delineated aquatic resources has not yet been determined and is currently being reviewed by the USACE concurrently with the most recent wetland delineation report dated June 2016, with approvals anticipated in February 2017. Jurisdictional determination of these aquatic resources would be determined prior to permitting.

Of the 23 aquatic resources which have not yet been reviewed for USACE jurisdiction, five wetlands, three wet ditches, and two tributaries would be impacted as a result of the recommended alternative and compensatory mitigation may be required for these aquatic resources. If compensatory mitigation is required for the impacts to aquatic resources that the USACE has jurisdiction, or has the potential to claim jurisdiction over, it is anticipated that the Project would need a Standard Individual Permit. A Standard Individual Permit is required for projects that impact more than 3 acres of aquatic resources for private projects (i.e., railway) and 5 acres of aquatic resources for public transportation projects (i.e., roadway). The USACE has indicated that the railway and roadway are two separate projects, and will require two permits.

The total Project would be anticipated to result in approximately 4.0 acres of impacts to USACE-regulated aquatic resources (**Table 15**). Impacts by resource type are shown in **Table 29**. The railway portion of the Project will impact approximately 0.8 acres of USACE-regulated wetlands. The roadway portion of the Project will impact approximately 3.2 acres of USACE-regulated wetlands. Both the railway portion of the Project and roadway portion of the Project are expected to qualify for a Letter of Permission.

Table 29 – Approximate Impacts to USACE Regulated Aquatic Resources

Aquatic Resource	Approximate Impact (acres)
Wetland	3.6
Wet Ditch	<0.1
Tributary	0.4
Total Impact	**4.0**

11. Section 401 – Clean Water Act

a. Background

Section 401 of the Clean Water Act establishes a program under which any applicant for a Federal license or permit to conduct an activity that may result in discharge of a pollutant in to a water of the United States must provide the licensing or permitting agency with a certificate from the State in which the activity is occurring that states that the discharge is in compliance with the Clean Water Act. In Minnesota, this program is administered by the MPCA.

b. Project impacts

Any waters that are determined to be under the jurisdiction of the USACE will also require Section 401 Water Quality Certification. As described in Section 10 above, this will involve approximately 4.0 acres of USACE-regulated aquatic resources.

In Minnesota, The USACE and the MPCA have a joint application form. Permits from the USACE, including General Permits and Letters of Permission, include pre-certification from the MPCA demonstrating compliance with Section 401.

12. Indirect Effects

a. Background

The Council on Environmental Quality's *Regulation for Implementing the Procedural Permissions of the National Environmental Policy Act* requires that both direct and indirect impacts of a proposed action be evaluated. Direct effects are caused by, and coincide in time and place, with the proposed action. Indirect effects are caused by the action but are later in time or further removed in the distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects related to changes in the pattern of land use, population density, or growth rate and related effects on air, water and other natural systems.

b. Project Impacts

The proposed project is consistent with long-term plans for the City of Willmar and Kandiyohi County that are intended to provide orderly growth and development in the western limits in the City of Willmar. It is anticipated that construction of the railway would promote growth and development of the planned industrial park on the former airport site (located between realigned TH 12 and TH 40 and west of CSAH 5). Growth of the industrial park would have the potential to impact air, water, and other natural systems. An environmental assessment for the former airport site was completed by the City of Willmar in 2010 as part of the FFA land release to the City. The Cumulative Potential Effects section (Section IV.A.19) summarizes potential environmental impacts associated with the development of the land into an industrial park.

Possible indirect effects would likely occur in both the No Build Alternative and Recommended Alternative due to the public investments already made in the project area as described in the Cumulative Potential Effects section (Section IV.A.19). However, the Recommended Alternative and its future rail spur may increase the attractiveness of the industrial park, leading to a shortened build-out timeframe. For future actions, including industrial park development, there would be regulations and permits that would have to be followed and obtained as that development occurs, minimizing the indirect impacts associated with the Project.

V. PUBLIC AND AGENCY INVOLVEMENT (AND PERMITS/APPROVALS)

The following section describes the public involvement activities, stakeholder and agency coordination and the required permits and approvals of the project.

A. Public Engagement Plan

A Public Engagement Plan was crafted early in the project development process, and public and stakeholder engagement activities were implemented throughout the process. The Public Engagement Plan established a framework for communication between MnDOT and project stakeholders and has given MnDOT a better understanding of the issues and opportunities presented by the proposed project from the perspective of the public and partner agencies. This document has also served as a means to inform the public and partner agencies about the purpose of the project, as well as the standards, procedures, and constraints that MnDOT must take into consideration while developing the project.

The Public Engagement Plan outlines the goals of the project, its principles and the desired outcomes of the public engagement efforts. The plan also describes the key stakeholder groups that the project is seeking to engage and includes a detailed description of the methods in which these stakeholders will be reached. The key stakeholder groups identified include:

- Willmar residents and the general public
- Property owners within close vicinity to the project
- Local businesses
- Kandiyohi County
- Kandiyohi County & City of Willmar Economic Development Commission
- Freight shippers
- Manufacturers
- City of Willmar
- Local officials
- State and Federal legislators
- BNSF Railway
- MnDOT

The project public engagement process was designed to provide meaningful and interactive outreach opportunities for all stakeholders. It is intended to be inclusive and accessible to stakeholders and the public regardless of age, ethnicity, language, income or disability.

The overarching goals for public engagement are: to build public support for the project through proactive and transparent public outreach; inform and educate stakeholders and the public about the background and purpose of the project; and to provide opportunities for interested parties to identify issues, concerns and priorities. The following sections describe the Project's public and agency engagement efforts in more detail.

B. Public and Engagement Opportunities

There were a range of both in-person and online public engagement opportunities throughout the project development process. The following is a summary of the events held and activities conducted as well as those that are expected to occur during and following the release of this document to the public. Additional detail is included in the Public Engagement Plan and the open house meeting summaries, which can be found on the project webpage (http://www.dot.state.mn.us/d8/projects/willmarwye/index.html).

1. Open Houses

A total of three open houses were held to provide an occasion to introduce the project to the local and regional community and obtain their input in-person. Open houses were held at accessible locations, such as the Willmar Public Library and local MnDOT offices, as a way to engage individuals who do not usually participate in the public process and who otherwise would not be reached. The dates of the open houses were as follows:

- Open House #1: February 25, 2016
- Open House #2: August 2, 2016
- Open House #3: October 18, 2016

In addition, a public meeting/hearing will be held as part of the public comment period for this EA/EAW, as noted in Section V.F. The public meeting will provide a venue for attendees to ask questions and formally submit public comments verbally and/or in writing.

In general, the public is supportive of the proposed project. There are a few property owners and business owners that have individual concerns with regard to connectivity to their properties and individual property impacts such as increased highway and railway noise and traffic congestion. In terms of connectivity, comments tended to support maintaining the existing CSAH 55/1st Avenue connection and allowing an at-grade intersection with the proposed railway (which is not included as part of the recommended alternative). Other comments from one property owner indicated support for an alternative that would not realign TH 12 so that thru traffic on TH 12 would continue to pass by their business.

Comments from residents/property owners closer to downtown indicated a desire for quiet zones at 7th and 10th Streets (near the Willmar Terminal).

Summaries of the open house meetings can be found on the project webpage: http://www.dot.state.mn.us/d8/projects/willmarwye/index.html

2. Focus Group Meetings

Focus group meetings were held with individual stakeholder groups to allow small groups to dive deeper into common issues, concerns and needs of people in the project area. Focus group meetings were held with two groups as described below:

- Freight businesses
  - A meeting with Willmar area businesses was held on Tuesday, November 15.
  - The purpose of the meeting was to provide freight haulers and shippers with information on the project background, schedule, and next steps; present the recommended alternative; and to collect feedback.

- The meeting was promoted through direct phone and email contacts with businesses who participated in the recently completed MnDOT, District 8 Freight Study (*Manufacturers' Perspectives on Minnesota's Transportation System: A Pilot Study in Southwest and West Central Minnesota, February 2014*). Invitations were also sent via direct mail to businesses within a 30-mile radius of the project area. In total, approximately 3,500 contacts were made.
- A total of 22 people attended the meeting, including residents and businesses; representatives from Kandiyohi County and the City of Willmar, and project staff (MnDOT and consultant team).
- Participants expressed general support for the proposed project.
- There was some concern over the ease of access for trucks traveling to or from businesses along 1st Avenue under the recommended alternative.
- There was some discussion over the proposed traffic control at the new Highway 12/County Road 55 intersection.
- There was also discussion on project construction phasing. It was noted that there is heavy seasonal traffic during the fall harvest and suggested that construction be phased to avoid major disruptions during this period.

- Law enforcement, fire & emergency responders
  - A meeting with Willmar area police, fire, and ambulance providers was held on Tuesday, November 15.
  - The purpose of the meeting was to provide emergency responders with information on the project background, schedule, and next steps; present the recommended alternative; and to collect feedback.
  - A total of nine people attended the meeting, including representatives from the Minnesota State Patrol, Kandiyohi Sheriff's Department, Willmar Police, Rice Ambulance, and project staff (MnDOT and consultant team).
  - The planned Willmar Industrial Park was discussed and it was noted that the project would be designed to provide future roadway access off of the new Highway 12 alignment to this location.
  - There was discussion over winter maintenance and it was noted that ice on bridges is a concern. The pavement on bridges would be "grooved" to provide traction and facilitate drainage. MnDOT also pretreats bridges prior to winter storm events.
  - One participant asked if there would be lighting along the proposed new Highway 12 alignment. Lighting is proposed at intersections, but not continuous lighting.
  - There was discussion on project construction phasing. Participants requested advanced notice prior to any temporary closures during construction.
  - There was discussion over impacts to residents and landowners, and the right-of-way acquisition process.

3. City Council, County Board, Township and Chamber of Commerce Presentations

The project team made presentations to the Willmar City Council, Kandiyohi County Board, and Willmar Chamber of Commerce to provide project updates and help foster consent building. The dates of the presentations are listed below. City Council meetings were also broadcasted on the local community access television channel.

A copy of city council agendas and a video of the city council meetings are available on the city's website at: http://www.willmarmn.gov/government/meetings/4/year. Click on the date you are interested in (see dates on the following page).

A copy of Kandiyohi County Board of Commissioners meeting agendas and minutes are available on the county's website at: http://www.co.kandiyohi.mn.us/departments/commissioners/board_information/. Click on the date you are interested in (see dates below).

- Willmar City Council
  - August 1, 2016
  - October 17, 2016
  - December 2016/January 2017 (anticipated – to be updated following meeting)

- Kandiyohi County Board of Commissioners
  - August 2, 2016
  - September 12, 2016 (Annual Kandiyohi County Township Meeting)
  - October 18, 2016
  - December 2016/January 2017 (anticipated – to be updated following meeting)

- Willmar Township Board – The Township Board wanted an update on the project status and to see what improvements were included in the Township. MnDOT provided an overview of the project and highlighted the realignment of 45th Street as an improvement within the Township. The Board expressed general support for the project. Meeting was held on October 10, 2016.

- Willmar Chamber of Commerce
  - September 22, 2016 (Chamber Board) – The Board received an update on the status of the project and the timing of construction. The group discussed the alternatives under consideration for the at-grade crossing at CSAH 55/1st Avenue.

  - October 7, 2016 (Policy Committee) – The policy committee received a general overview of the project and its various components. Of particular interest to the group was the connection/at-grade crossing with the new railway and CSAH 55/1st Avenue. Members of the group indicated that they would like to see the at-grade intersection as part of the project. Comments were also received that expressed frustration over the fact that local agencies could not make a determination on the crossing.

4. Pop-Up Meetings

In order to facilitate dialogue with community members who may not attend traditional public meetings, the following pop-up meetings were held at popular events within the Willmar area:

- Kandiyohi County Fair: August 11, 2016
- Willmar YMCA: October 1, 2016

Comments from the meetings indicated general support for the project, with one individual commenting that the project was too expensive and not a good use of public dollars. Specific points of interest noted at the meeting included:

- A number of commenters noted that they would like to keep the at-grade intersection with the railway and CSAH 55/1st Avenue.

- Of primary concern to attendees were the train horns in downtown Willmar and blocked railroad crossings. Lakeland Avenue and 7th and 10th Streets were noted as being particularly problematic.

5. Website and News Releases

MnDOT is hosting a project webpage to serve as an information resource that is used to provide updates during key milestones in addition to the in-person engagement opportunities described above. (http://www.dot.state.mn.us/d8/projects/willmarwye/index.html).
MnDOT also partnered with local media to cover the project at key milestones and released periodic project news releases to local media television, radio, and print outlets.

6. Radio Interviews

MnDOT's project manager participated in radio interviews as part of the Open Mike programming on KWLM. The initial interview was from 10:00 am to 11:00 am on August 26, 2016. A second interview was held on October 21, 2016 for the same program. Additional interviews are likely to be conducted as the project is further refined. Information on additional interviews will be included in the EA Update.

7. Additional Meetings with Other Groups

MnDOT also participated in a number of meetings with organizations within the Willmar area that wanted a one- or two-time update on the project. Groups that have had a meeting or are scheduled to have a presentation include:

- Willmar Township Board – The Township Board wanted an update on the project status and to see what improvements were included in the Township. MnDOT provided an overview of the project and highlighted the realignment of 45th Street as an improvement within the Township. The Board expressed general support for the Project. Meeting was held on October 10, 2016.

- City of Willmar and Kandiyohi County Economic Development Commission – On October 13, 2016 MnDOT presented information about the project to the EDC. The focus of the presentation was the background on the efforts that have been underway (including facilitating development of the new industrial park) to help quality of life and economic development. MnDOT provided an overview on the development of alternatives and the recommended alternative that would be presented at a public open house meeting on October 18, 2016. Comments from the meeting indicated support for the rail spur. There were also questions on the at-grade crossing at CSAH 55/1st Avenue.

- Islamic Society of Willmar – On October 15, 2016 MnDOT hosted a meeting with local mosque representatives to discuss the project. Attendees indicated support for the project and for improvements that would help reduce trains blocking the railway crossings. Current train usage sometimes makes it challenging to the get to the mosque during prayer time. MnDOT noted that the project would improve the situation, but that it would not eliminate trains from going to downtown Willmar and occupying the railroad crossings.

- Willmar Noon Lions Club – MnDOT staff presented an overview of the project to the Willmar Noon Lions Club on November 2, 2016. Approximately 25 members were in attendance.

- Rotary Club – A meeting with the Willmar Rotary Club was held on November 2, 2016. MnDOT staff presented an overview of the project to approximately 40 members consisting of community business leaders.

- City of Willmar Human Rights Commission – On November 15, 2016 MnDOT staff gave a presentation to the City's Human Rights Commission. The presentation provided an overview on the alternatives being considered and the project schedule. The meeting also included a discussion about possible connections to targeted populations that the Commission may be able to provide. Limited immediate feedback was provided, but an invitation was extended to provide additional input to MnDOT. The Commission was engaged in the presentation and several questions regarding the project. The dialogue was overall positive.

- Kiwanis Club – A meeting with the Willmar Rotary Club was held on November 29, 2016. MnDOT staff presented an overview of the project to approximately 30 members.

- Discussion with Somali Community Leaders – A meeting was held on December 1, 2016, with MnDOT staff and two leaders of the Somali Community. Both men are active in efforts to bridge cultural differences in the community. The meeting was an introductory meeting to the project and its public engagement efforts. MnDOT extended invitations for future meetings with the Somali community to provide information and receive feedback.

- Latino Community – On December 4, 2016 a meeting was held with individuals from the Latino community. The meeting was held at the Assembly of God Latino Ministry Membership. A presentation was provided to approximately 37 members. The presentation included an overview of the Project and the alternatives that are under consideration. Information on the timing of the project was also provided. Handouts were distributed to those in attendance. Attendees asked a number of questions about the Project and expressed general support for what the Project was trying to accomplish.

C. Partner Agency Coordination

In addition to the public engagement opportunities described above, there were multiple means of communication with project partners and other public agencies, as described below.

1. Project Management Team (PMT) Meetings

MnDOT met weekly (initially) with internal staff to discuss the Project and different project elements. The meetings were used to keep the different functional groups with MnDOT informed about the project development and to address technical issues arising from the project. Items related to design, environmental documentation, property acquisition, agreements with partner agencies, and permitting were discussed.

Once the draft environmental document was developed and preliminary design elements were established, meetings decreased in frequency.

2. Partner Group Meetings

MnDOT and its partners met weekly (initially) by telephone to discuss issues and items related to the project development. Similar to PMT meetings discussed above, the meetings were used to keep the partners abreast of the project progression and to address technical and sometimes political issues arising from the project. Items related to design, environmental documentation, technical analyses, property acquisition, agreements among the partner agencies and permitting were discussed.

In addition to meetings by telephone, the project partners occasionally met in person to discuss more complex issues that required face-to-face coordination. As the project progressed, meetings occurred less frequently.

Regular meeting attendees included representatives from MnDOT District 8, MnDOT Office of Environmental Stewardship, MnDOT Office of Land Management, MnDOT Central Office staff, Kandiyohi County, City of Willmar, Kandiyohi County and City of Willmar Economic Development Commission, FHWA, FRA, and BNSF. Other attendees included consulting firm representatives for the different partners.

3. Advisory Committee Meetings

The purpose of the Advisory Committee was to provide key decision-makers and elected officials with regular updates on the Project and to collect their feedback and direction on important project decisions. Members included representatives from the Office of the Governor, MnDOT, FHWA, FRA, Kandiyohi County, City of Willmar, and BNSF.

4. Master Agreement Team Meetings

The Willmar Rail Connector and Industrial Access Project was funded through a variety of resources, including federal money from the U.S. Department of Transportation (USDOT) and money and in-kind services from the various project partners, including MnDOT, Kandiyohi County, the City of Willmar, the Kandiyohi County and City of Willmar Economic Development Commission and BNSF. As part of receiving money from the USDOT, MnDOT and its partners needed to make several different commitments in terms of project timeline, other funding sources, project development responsibilities, etc. To get the partners in agreement on who was responsible for the various elements and to establish firm commitments, a Master Agreement was developed between the project partners. The Master Agreement Team met on a regular basis to identify partner responsibilities and commitments and to draft an agreement that will be signed by the project partners.

5. Right of Way Committee Meetings

MnDOT and FHWA and BNSF met to discuss how to address right of way that had been previously acquired by BNSF prior to the Project receiving federal funding. The intent of the meetings was to review the processes and procedures followed by BNSF as they relate to the Uniform Relocation Act (URA) to ensure that the Project was in compliance. The group met as needed. It was determined that the process followed by BNSF met the intent of the URA.

It is anticipated that this group, along with BNSF and the City of Willmar will reconvene during the right of way acquisition process to discuss previous and future right of way acquisition activities and agreements.

6. **Environmental Working Group Meetings**
   Staff from MnDOT, FHWA, FRA, BNSF and consultants working for the various agencies had phone calls to discuss items pertaining to the development of the EA/EAW. As part of the meetings, approaches to developing the Purpose and Need Statement and alternatives analysis process were discussed. Coordination with the two primary federal agencies involved in the development of the EA/EAW was undertaken to ensure the proper document format was utilized and topics relevant to each agency were addressed.

D. Cooperating Agencies

Cooperating Agencies provided input related to their relevant areas of expertise during the project development and NEPA document preparation process. Cooperating agencies are federal agencies other than the lead agency which have jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal or reasonable alternative. The following agencies were invited by FHWA to be Cooperating Agencies for this project, and have accepted:

- Federal Railroad Administration (FRA)
- U.S. Army Corps of Engineers (USACE)

E. Permits and Approval Requirements

See Section IV.A.8

F. Public Comment Period and Public Hearing

Comments from the public and agencies affected by this project are requested during the public comment period described on the transmittal letter distributing this Environmental Assessment. A combined public informational meeting/public hearing will be held after this Environmental Assessment has been distributed to the public and to the required and interested federal, Native American Tribes, state and local agencies for their review.

At the informational meeting/public hearing, preliminary design layouts for the alternatives under consideration along with other project documentation will be available for public review. The public will also be given the opportunity to express their comments, ideas and concerns about the proposed project. These comments will be received at the hearing and during the remainder of the comment period, and will become a part of the official hearing record.

G. Report Distribution

Copies of this document have been sent to agencies, local government units, libraries and others as per Minnesota Rule 4410.1500 (Publication and Distribution of an EAW). A copy of the EA is also available at the MnDOT District 8 Willmar Office (2505 Transportation Road, Willmar)

Local units of government with copies of the document include the City of Willmar (City Hall – 333 6th Street SW) and Kandiyohi County (County Office Building – 400 SW Benson Avenue, Willmar). A copy was also provided to the Willmar Library (410 5th Street SW, Willmar).

H. Process Beyond the Hearing

Following the comment period, MnDOT and FHWA will make a determination as to the adequacy of the environmental documentation. If further documentation is necessary it could be accomplished by preparing an Environmental Impact Statement (EIS), by revising the Environmental Assessment, or by clarification in the Findings of Fact and Conclusion, whichever is appropriate.

When the environmental documentation is determined adequate, MnDOT will choose a project alternative, either the No Build or the alternatives under consideration.

If an EIS is not necessary, as currently anticipated, MnDOT will prepare a "Negative Declaration" for the state environmental requirements. MnDOT will also prepare a request for a "Finding of No Significant Impacts" (FONSI) that will be submitted to the FHWA. If the FHWA agrees that this finding is appropriate, it will issue a FONSI.

Notices of the federal and state decisions and availability of the above documents will be placed in the Federal Register and the Minnesota Environmental Quality Boards (EQB) Monitor. MnDOT will also distribute the Negative Declaration and FONSI to the Environmental Assessment Worksheet (EAW) distribution list and publish notices in local newspapers announcing the environmental and project alternative decisions that were made.

VI. APPENDICES

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Appendix I: Well Logs
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Appendix K: DNR Correspondence
Appendix L: MnDOT Office of Environmental Stewardship Section 7 Correspondence
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Appendix N: Phase I Archaeological Survey Report
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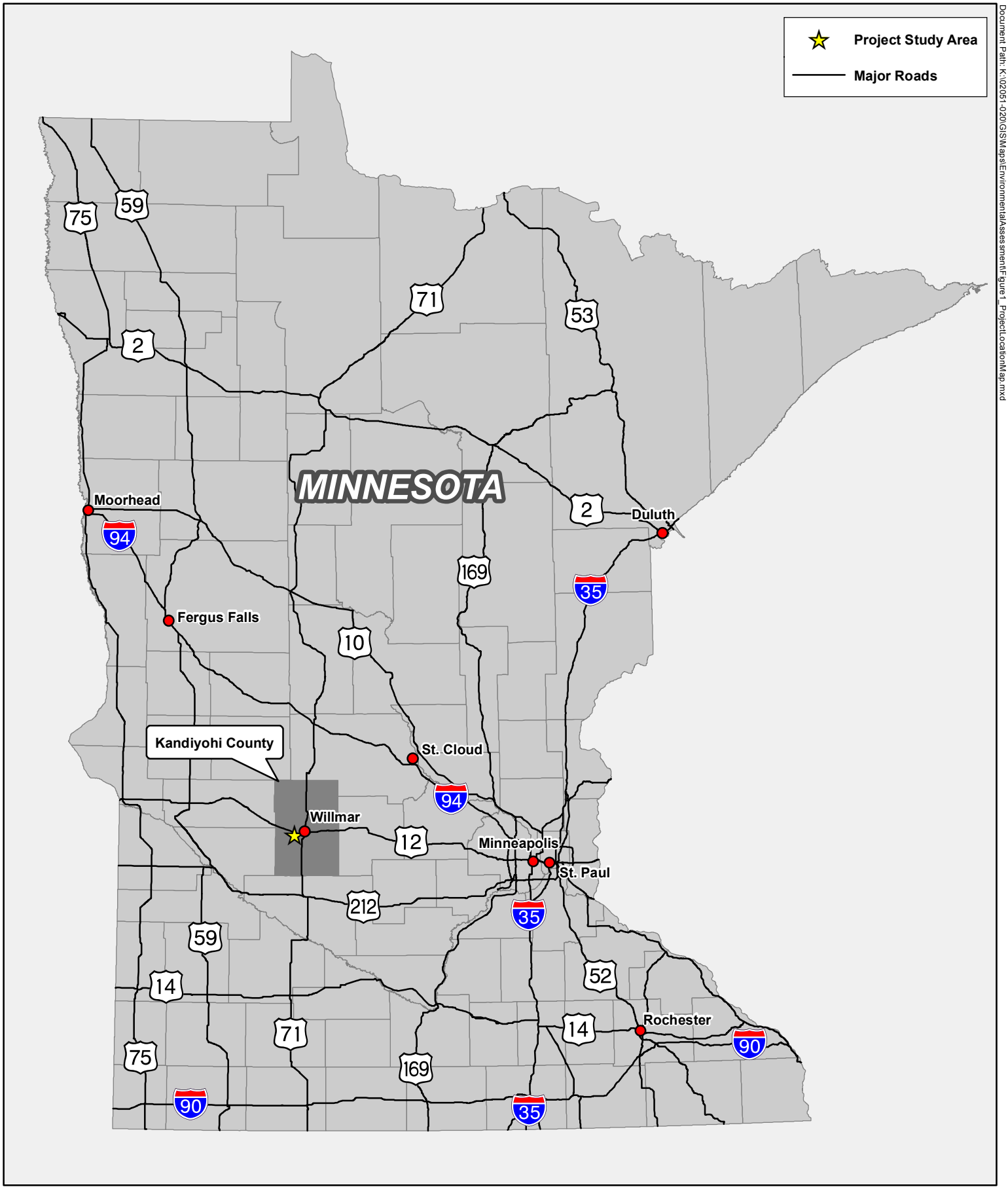

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DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

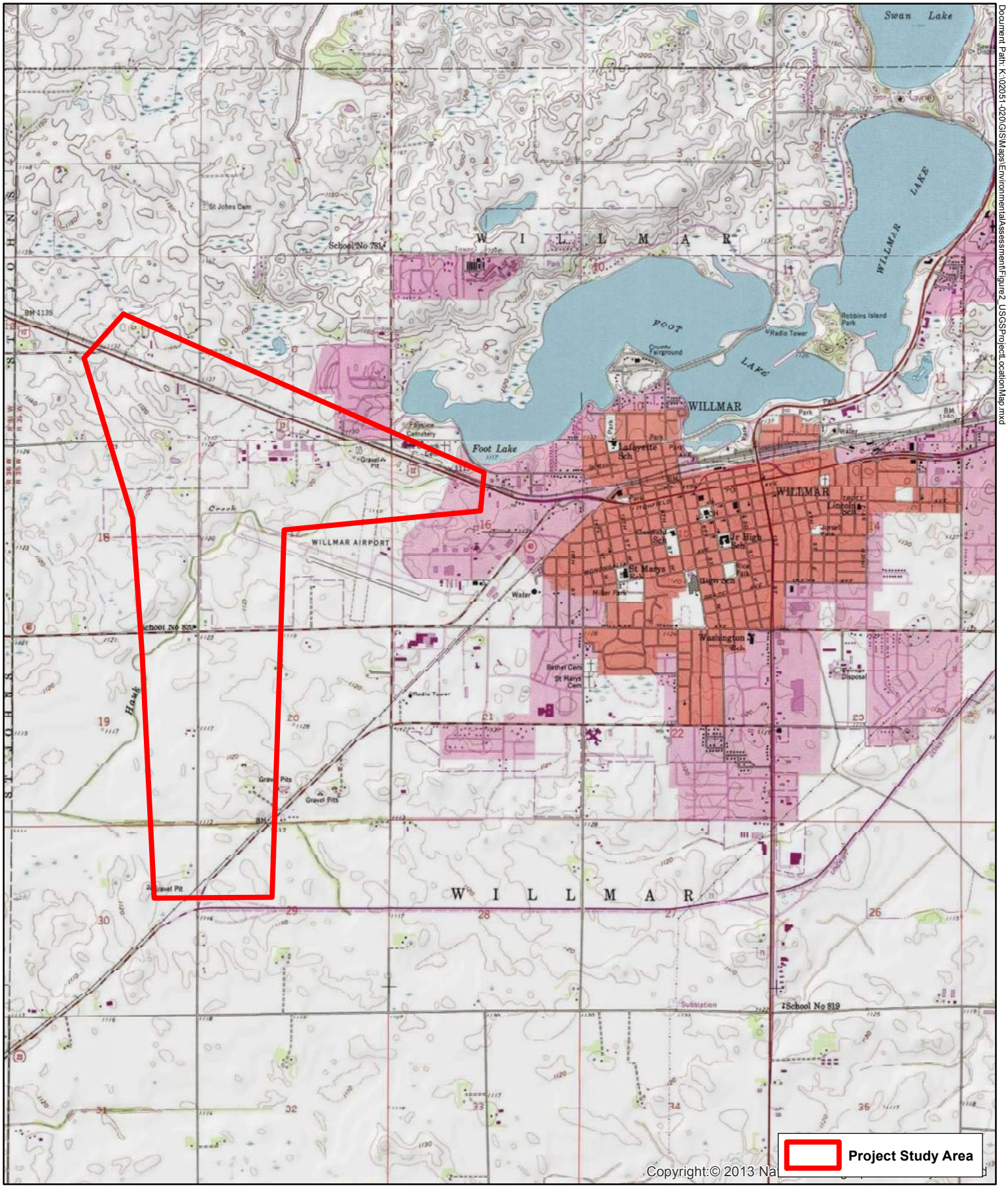
S.P. 3403-74

Figure 1: Project Location Map

Willmar, MN

N

0 50 Miles



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

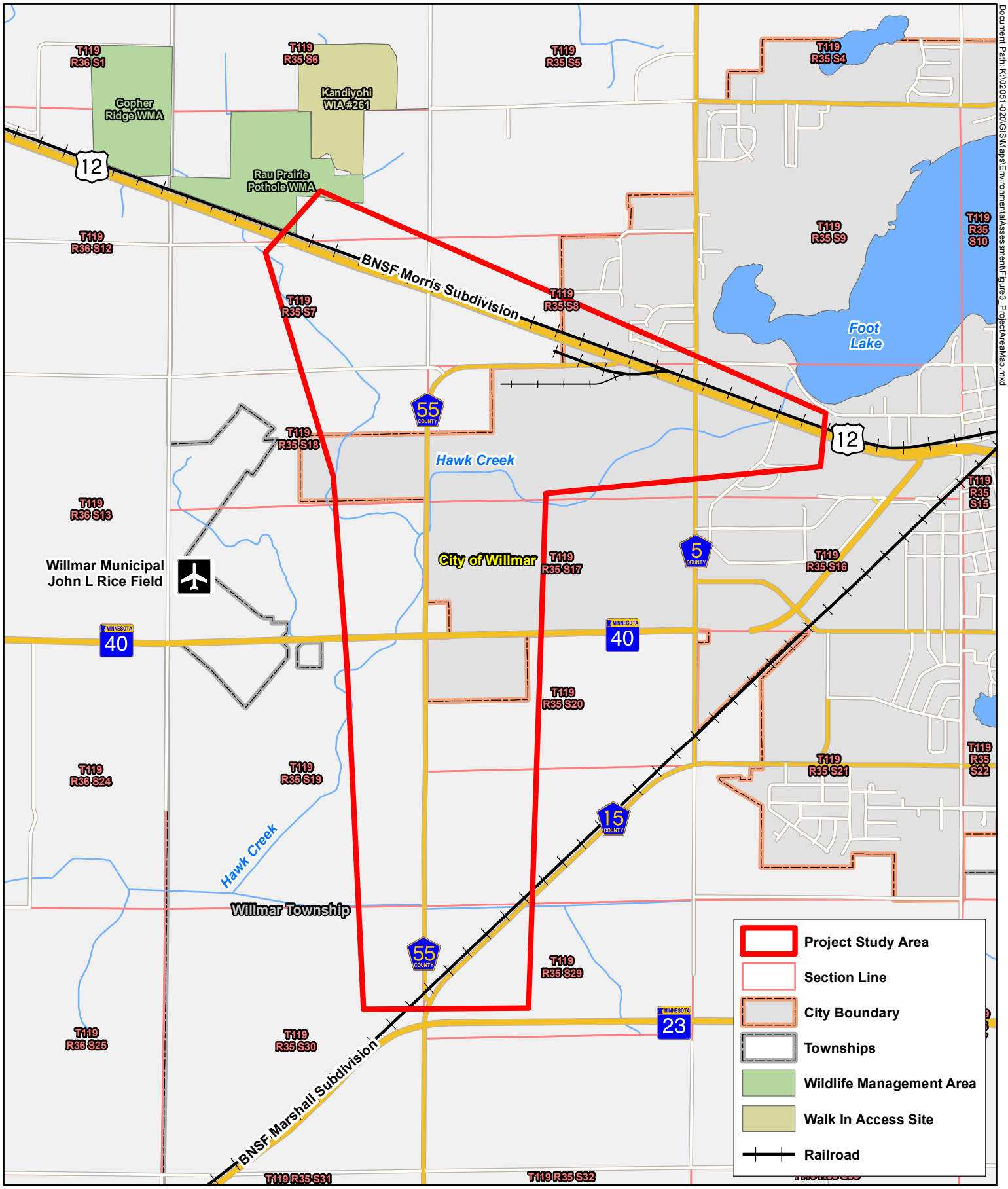
Figure 2: USGS Project Location Map

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 3,500 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 3: Project Study Area Map

Willmar, MN

DEPARTMENT OF TRANSPORTATION

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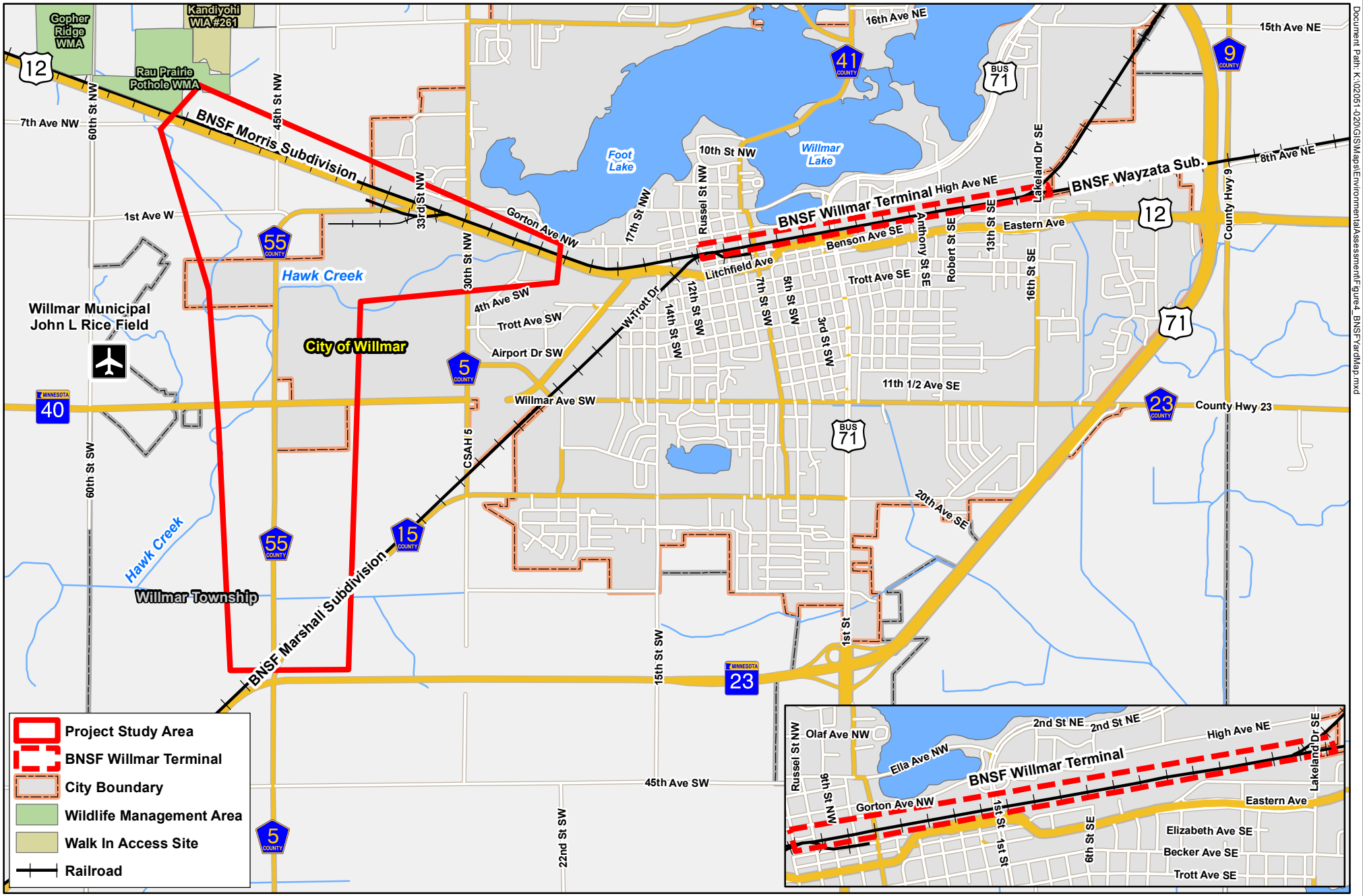
0 2,500 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 4: BNSF Willmar Terminal Map

Willmar, MN

DEPARTMENT OF TRANSPORTATION

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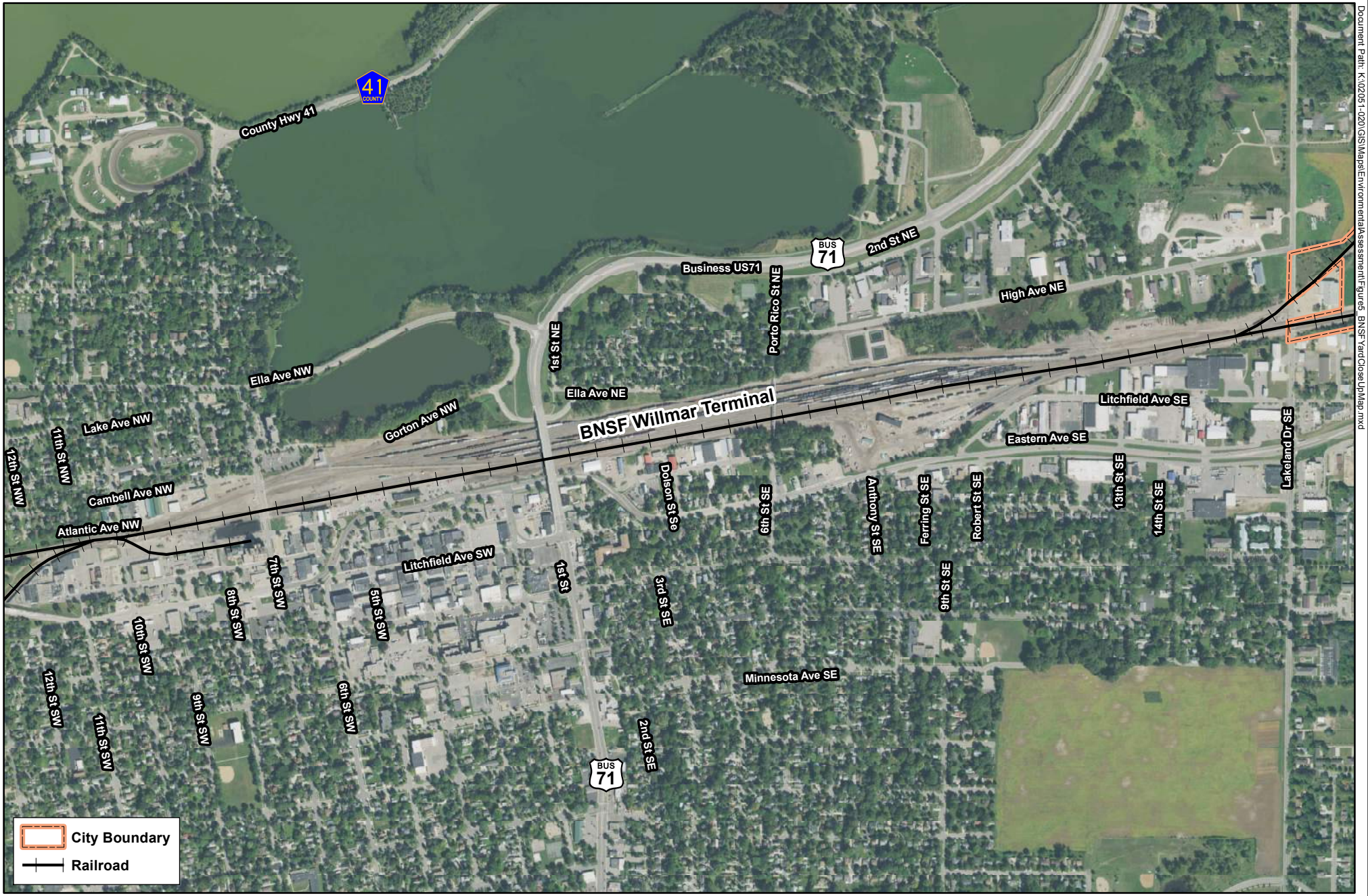

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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 5: BNSF Willmar Terminal Close Up Map

Willmar, MN

DEPARTMENT OF TRANSPORTATION

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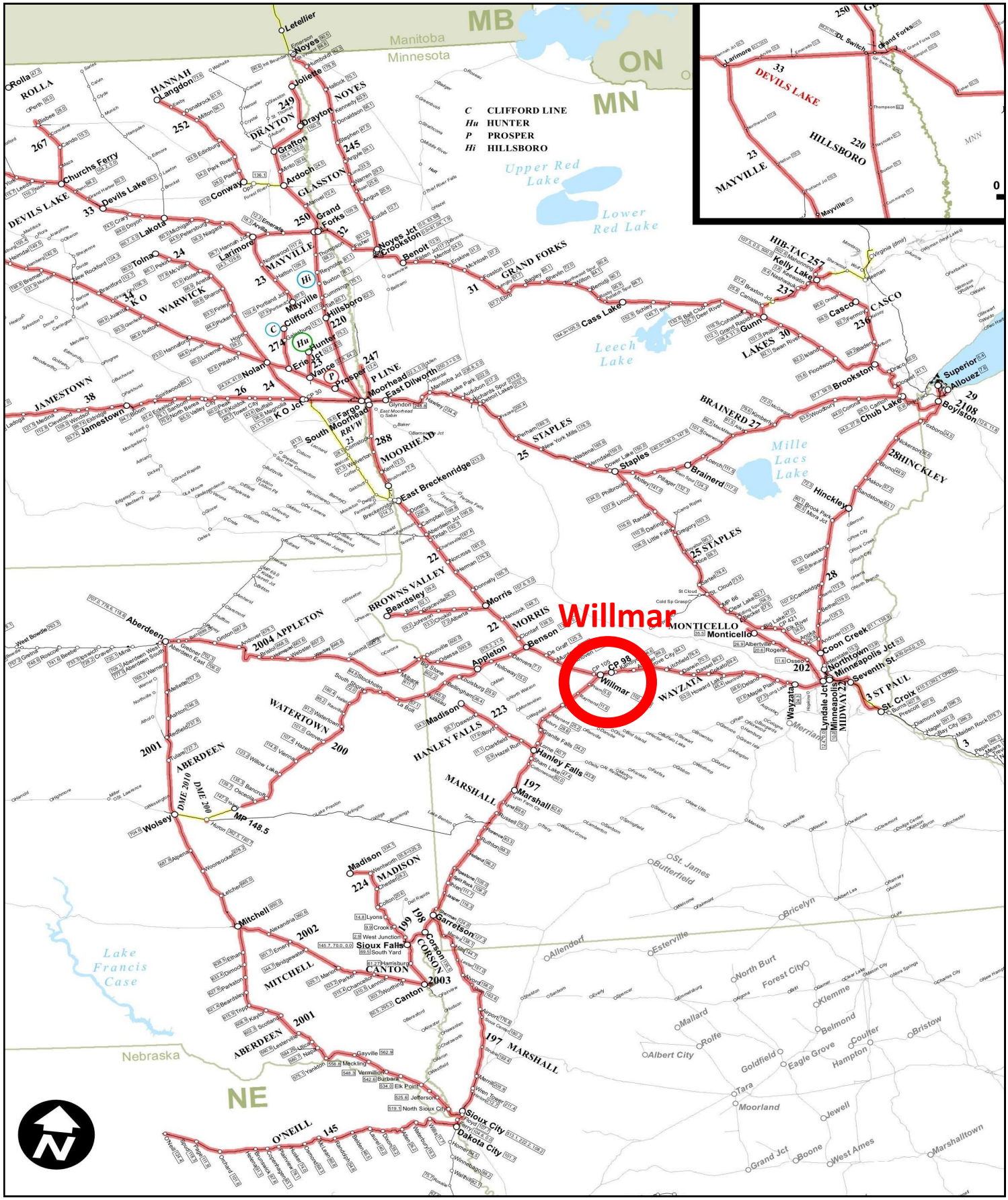
0 1,000 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 6: BNSF Railway Connections Into and Out of Willmar

Willmar, MN

Source: BNSF Twin Cities Operating Division Map 2013

N

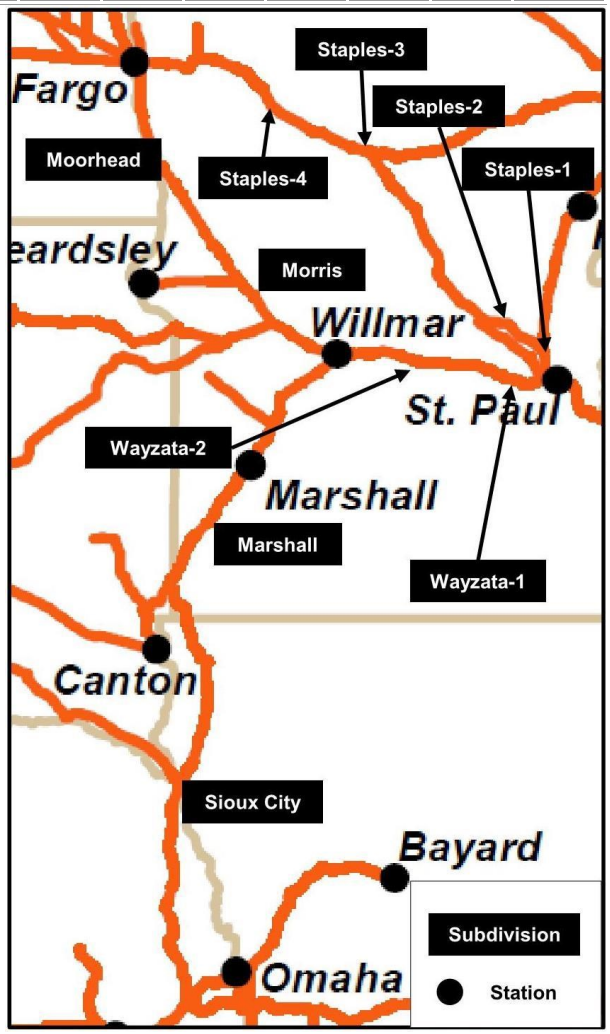
Trains Per Day by Subdivision

Subdivision	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	*2016
MARSHALL	10	11	12	11	11	10	10	10	11	13	12	11	10
MOORHEAD	7	8	8	8	7	5	5	6	6	6	3	3	3
MORRIS	8	9	9	10	8	6	7	8	8	9	9	10	9
SIOUX CITY	9	10	11	10	10	9	10	10	12	14	14	12	11
STAPLES-1	55	60	54	45	46	39	54	51	57	62	63	55	47
STAPLES-2	38	41	39	37	38	33	46	44	50	55	55	49	42
STAPLES-3	38	40	39	37	38	31	36	35	39	44	45	40	33
STAPLES-4	43	46	46	45	45	38	43	40	44	48	51	44	35
WAYZATA-1	9	10	11	10	12	12	21	23	21	24	23	23	22
WAYZATA-2	9	11	11	10	12	9	9	11	9	12	11	11	10

*** - Through Q1 2016**

Trains Per Day by Subdivision

Subdivision	MIN	RANGE	MAX	*2016
MARSHALL	10	3	13	10
MOORHEAD	3	5	8	3
MORRIS	6	4	10	9
SIOUX CITY	9	5	14	11
STAPLES-1	39	24	63	47
STAPLES-2	33	22	55	42
STAPLES-3	31	14	45	33
STAPLES-4	38	13	51	35
WAYZATA-1	9	15	24	22
WAYZATA-2	9	3	12	10



Source: BNSF

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 7: Historic Train Volumes
Willmar, MN

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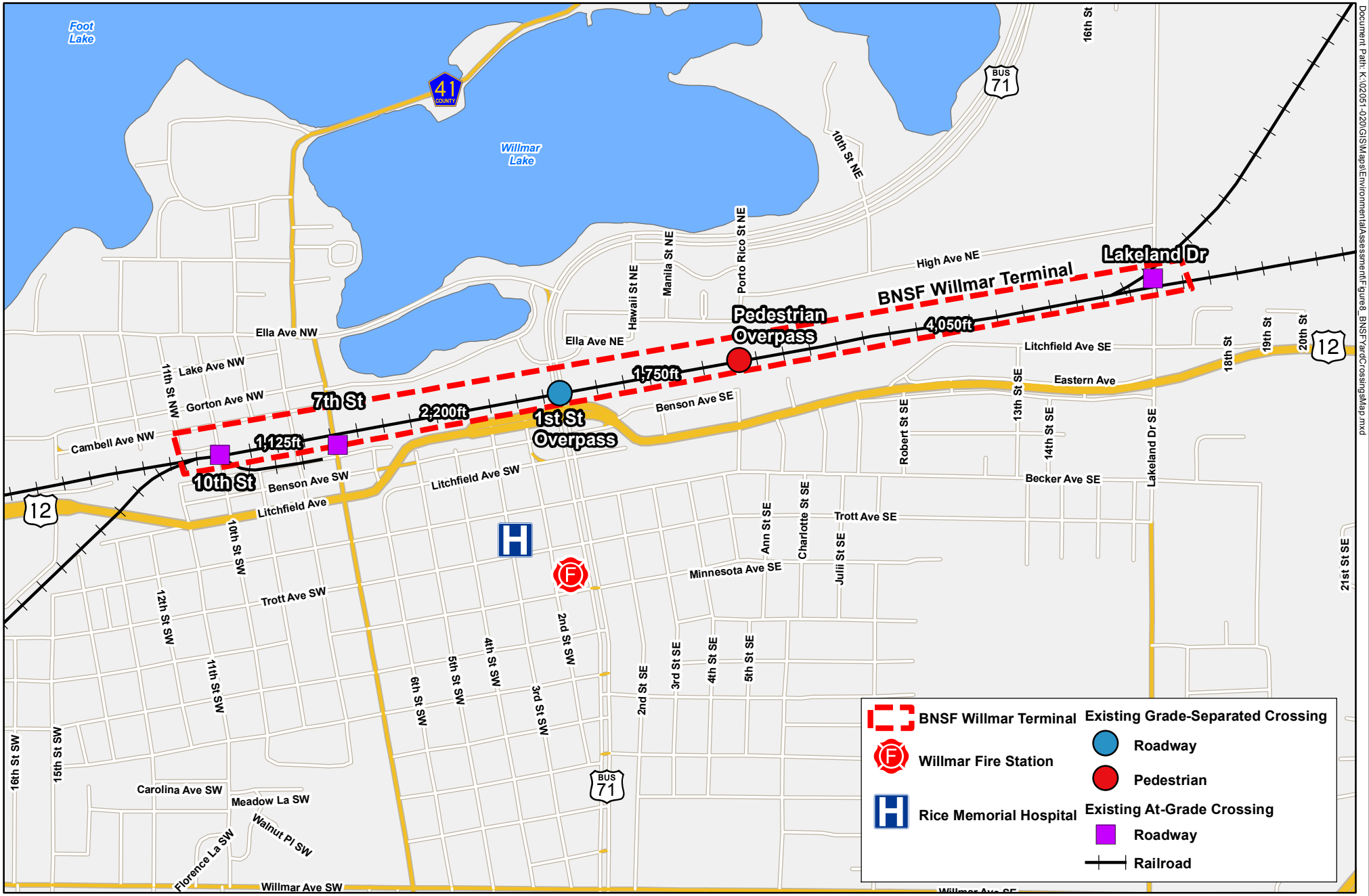

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DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 8: At-Grade & Grade-Separated Crossings in Willmar Terminal

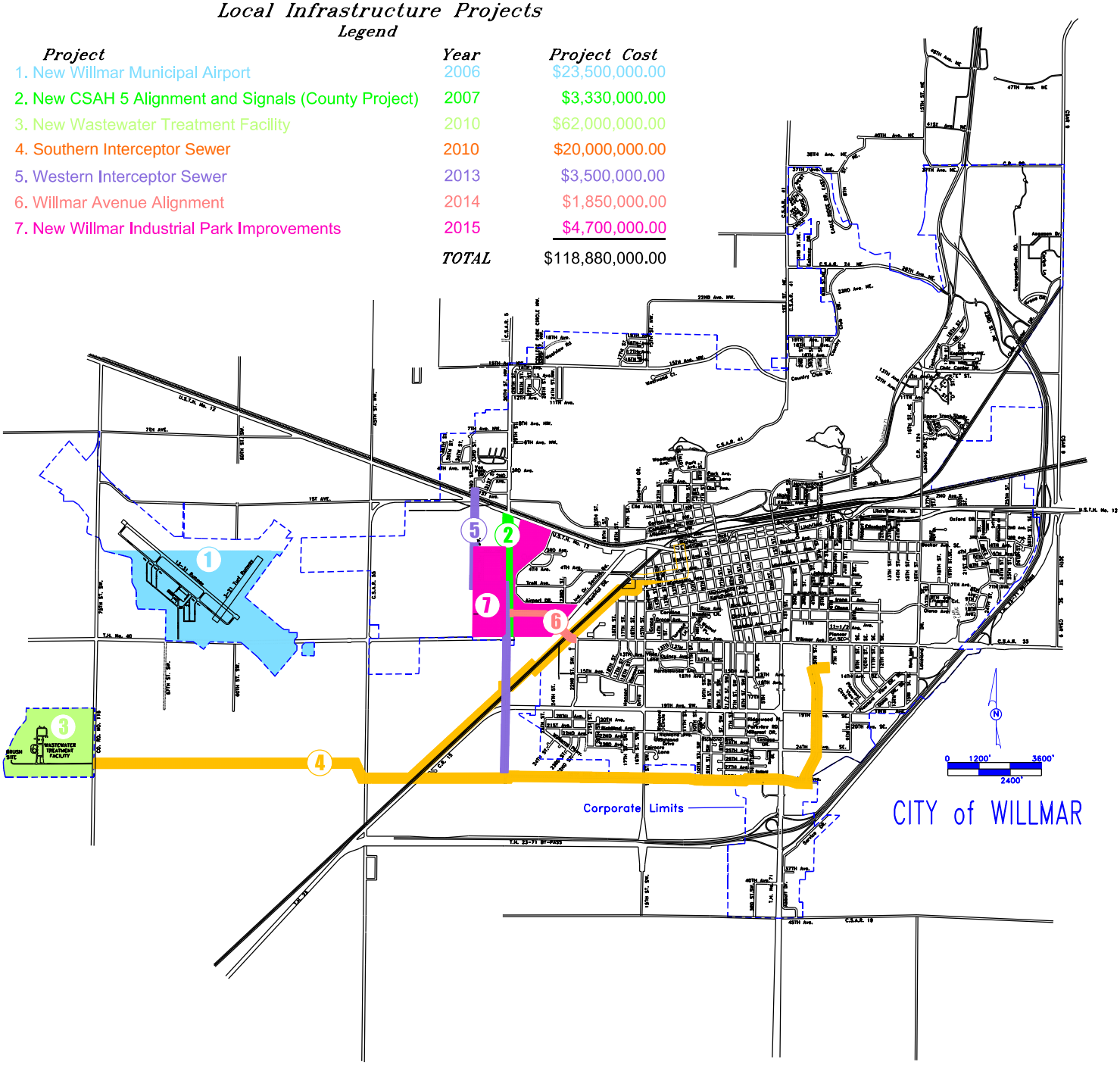
Willmar, MN

City of Willmar

Local Infrastructure Projects

Legend

Project	Year	Project Cost
1. New Willmar Municipal Airport	2006	$23,500,000.00
2. New CSAH 5 Alignment and Signals (County Project)	2007	$3,330,000.00
3. New Wastewater Treatment Facility	2010	$62,000,000.00
4. Southern Interceptor Sewer	2010	$20,000,000.00
5. Western Interceptor Sewer	2013	$3,500,000.00
6. Willmar Avenue Alignment	2014	$1,850,000.00
7. New Willmar Industrial Park Improvements	2015	$4,700,000.00
	TOTAL	$118,880,000.00



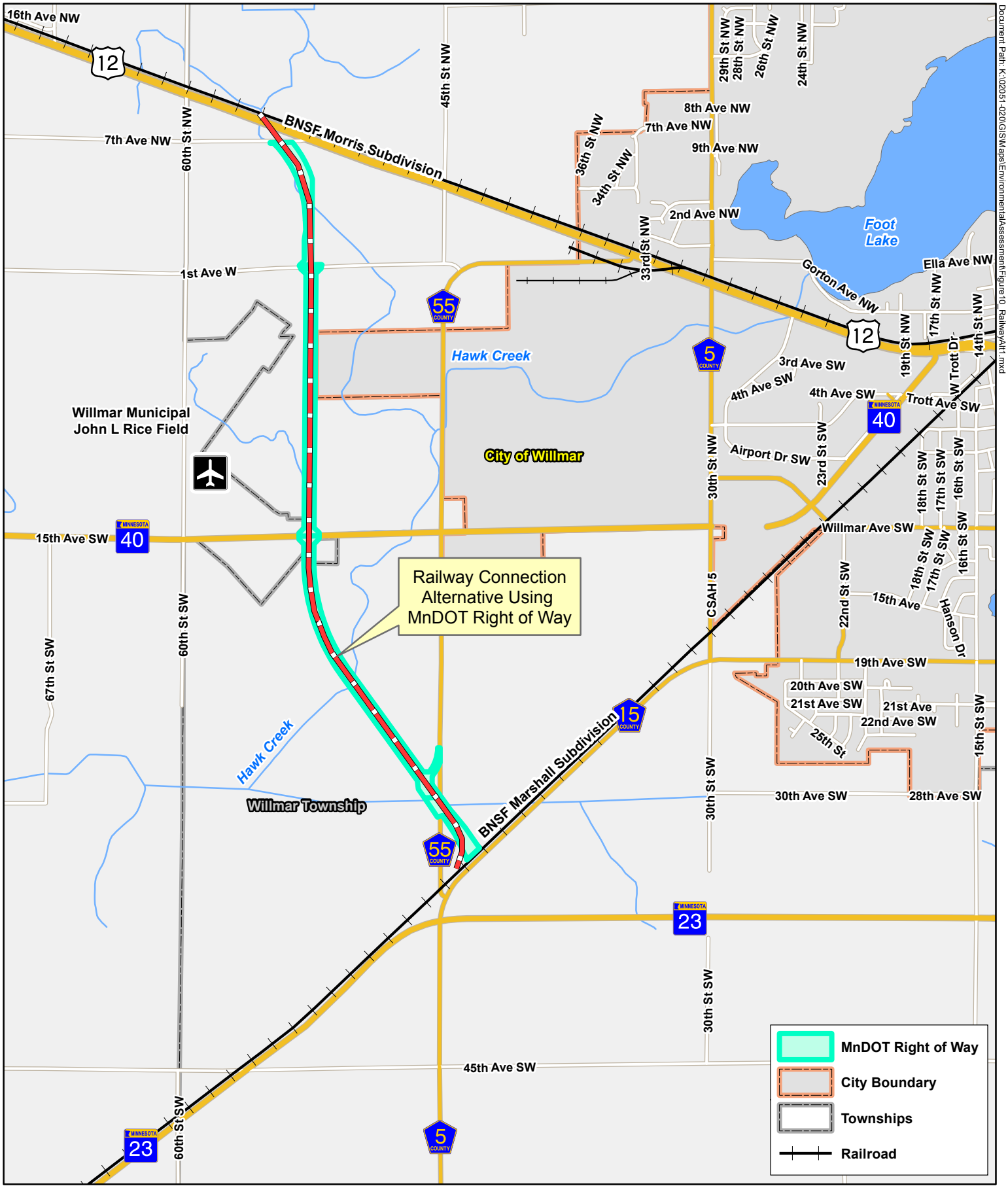
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

SP 3403–74

Figure 9: Recent Public Investments

Willmar, MN



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 10: Alternative RR-1

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,500 Feet

Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure10_RailwayAlt1.mxd

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DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

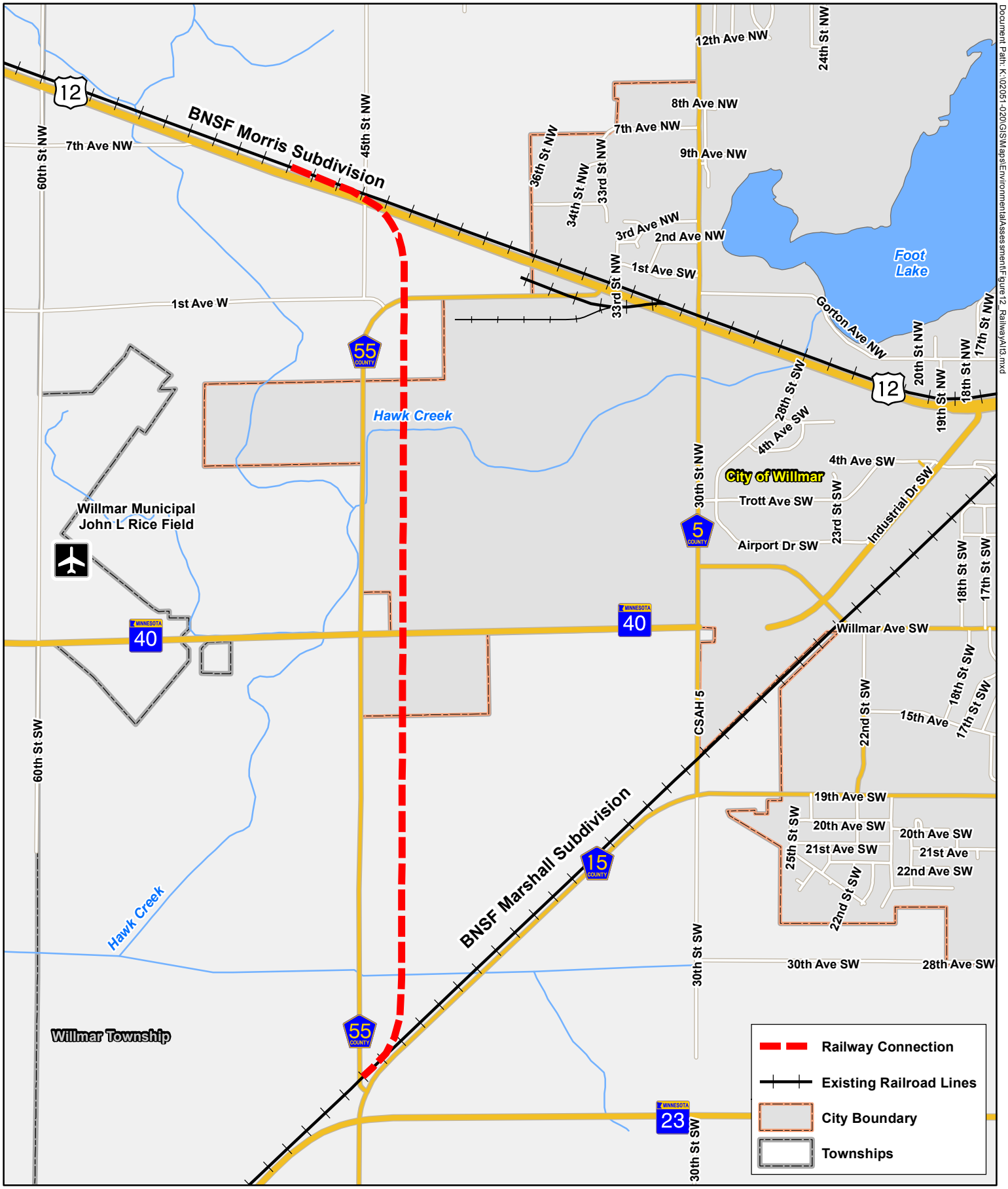
S.P. 3403-74

Figure 11: Alternative RR-2

Willmar, MN

N

0 1,650 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 12: Alternative RR-3

Willmar, MN

DEPARTMENT OF TRANSPORTATION

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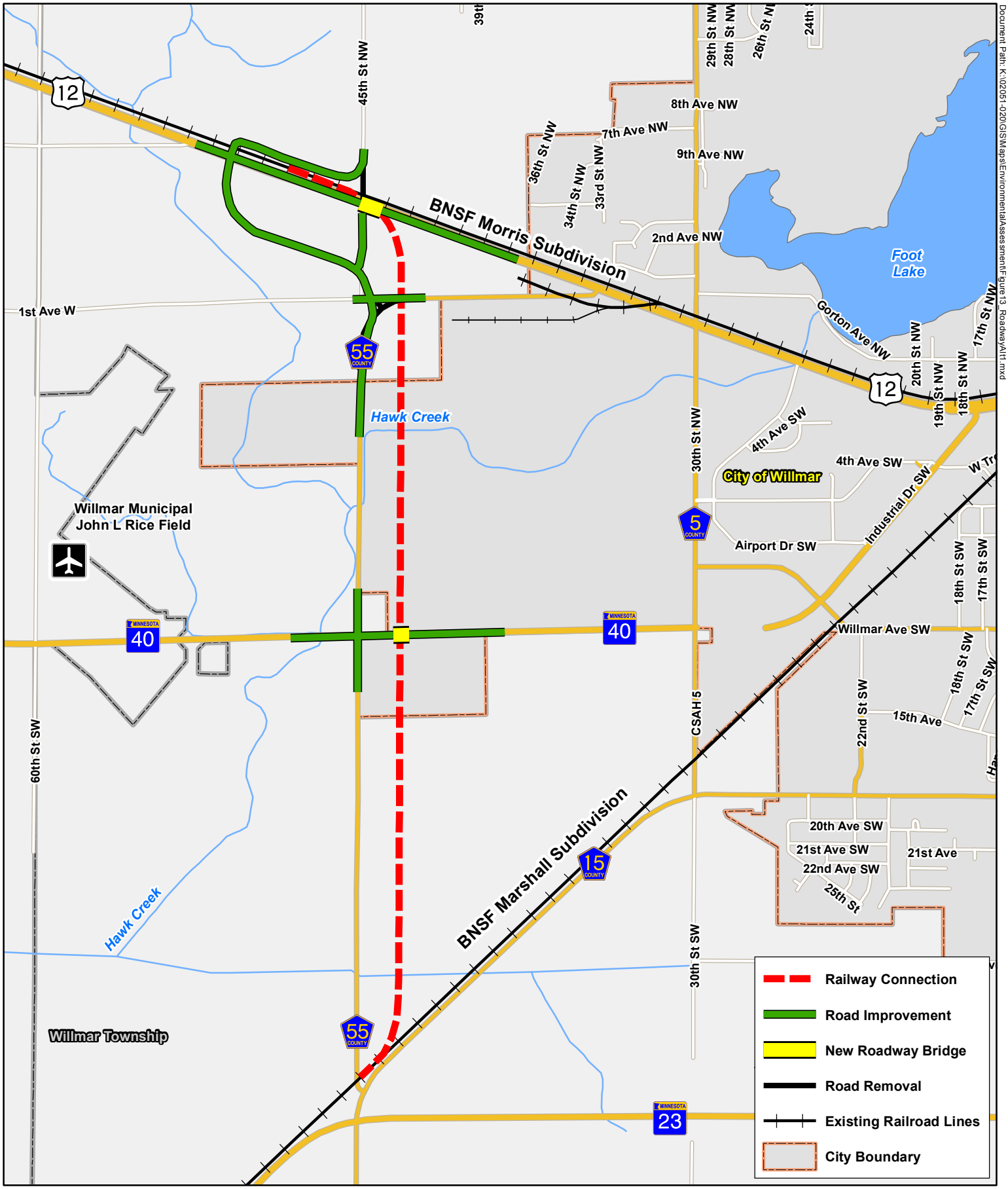


Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

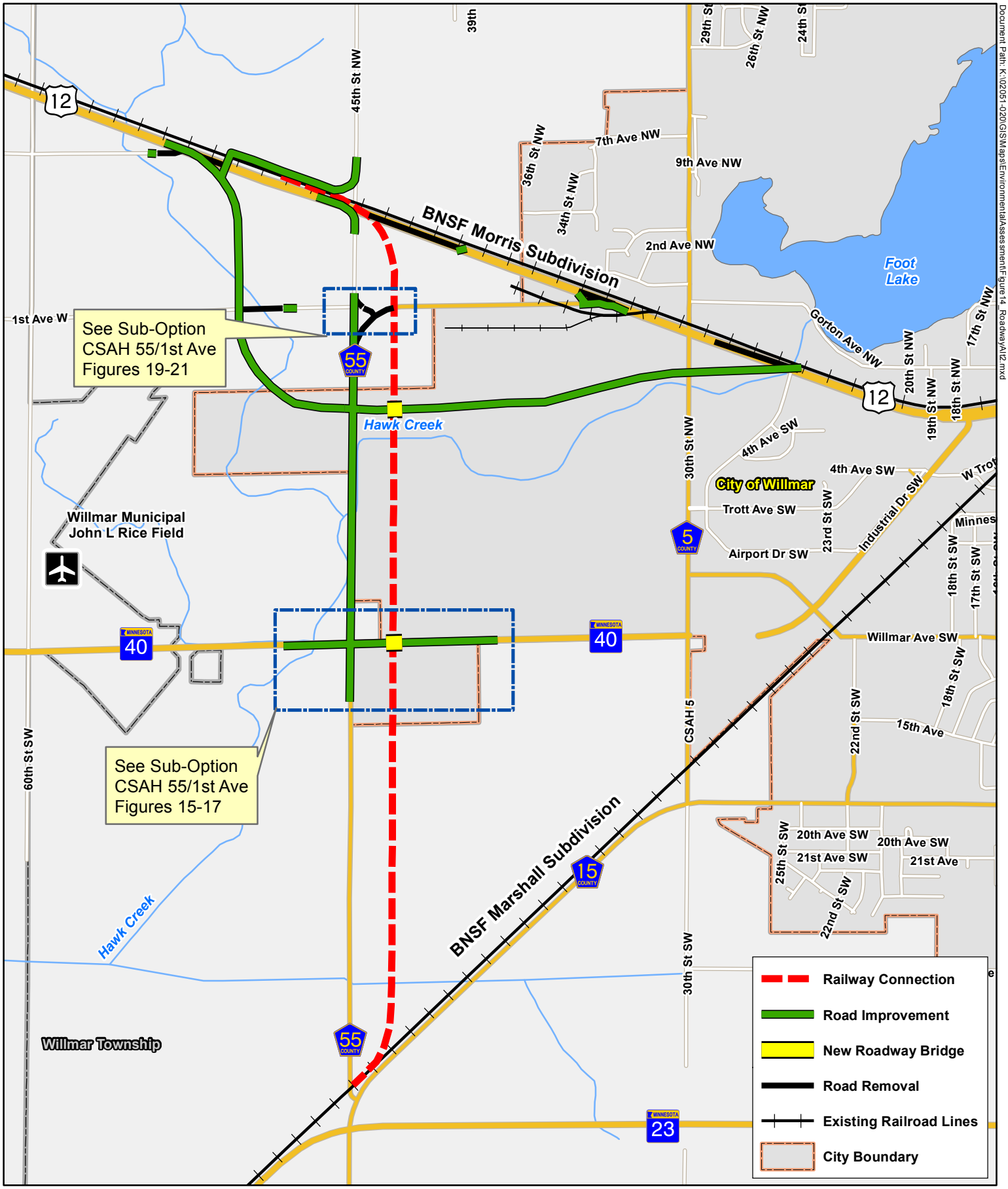
Figure 13: Alternative TH12-1

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,000 Feet



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

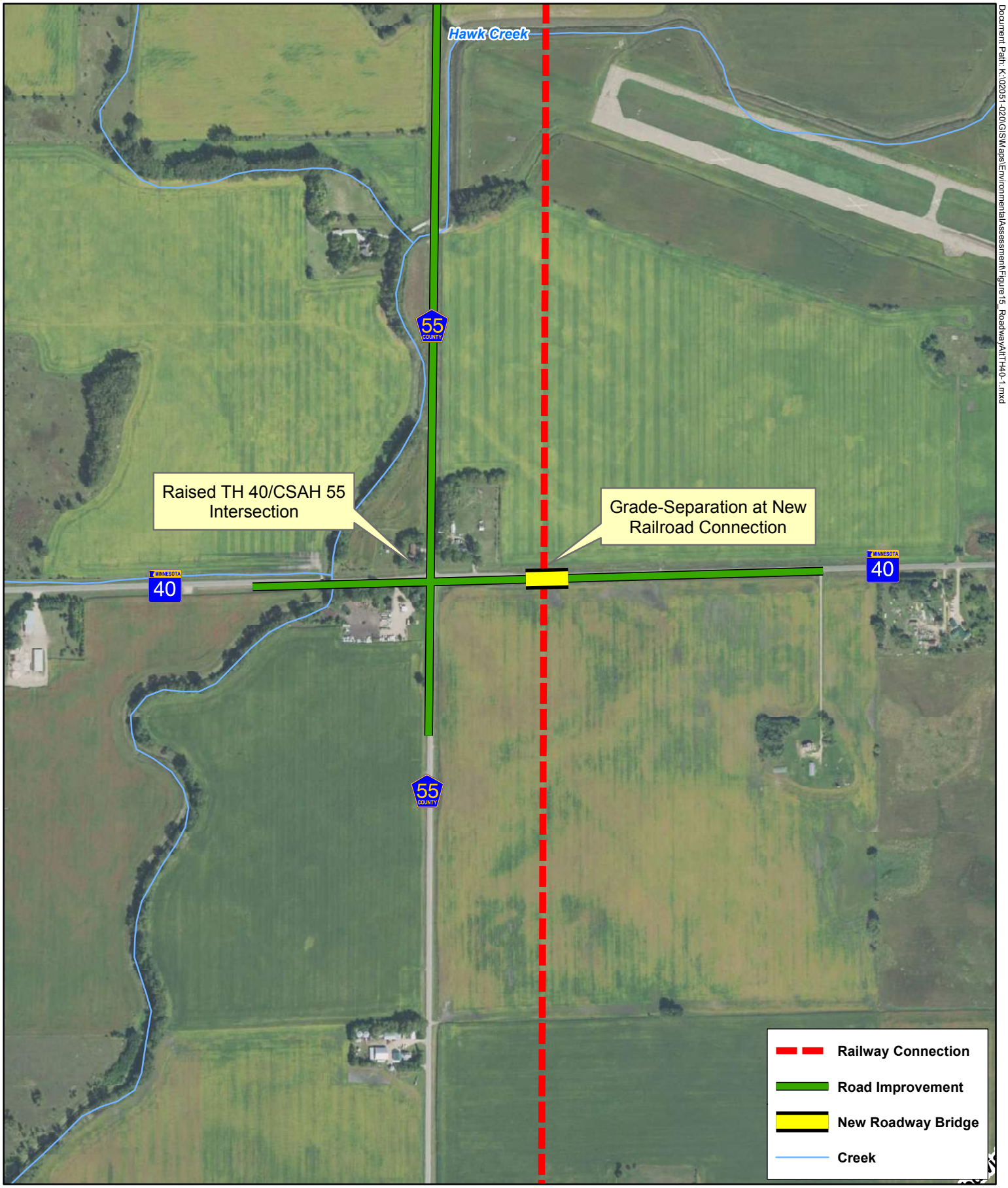
Figure 14: Alternative TH12-2

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,000 Feet



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

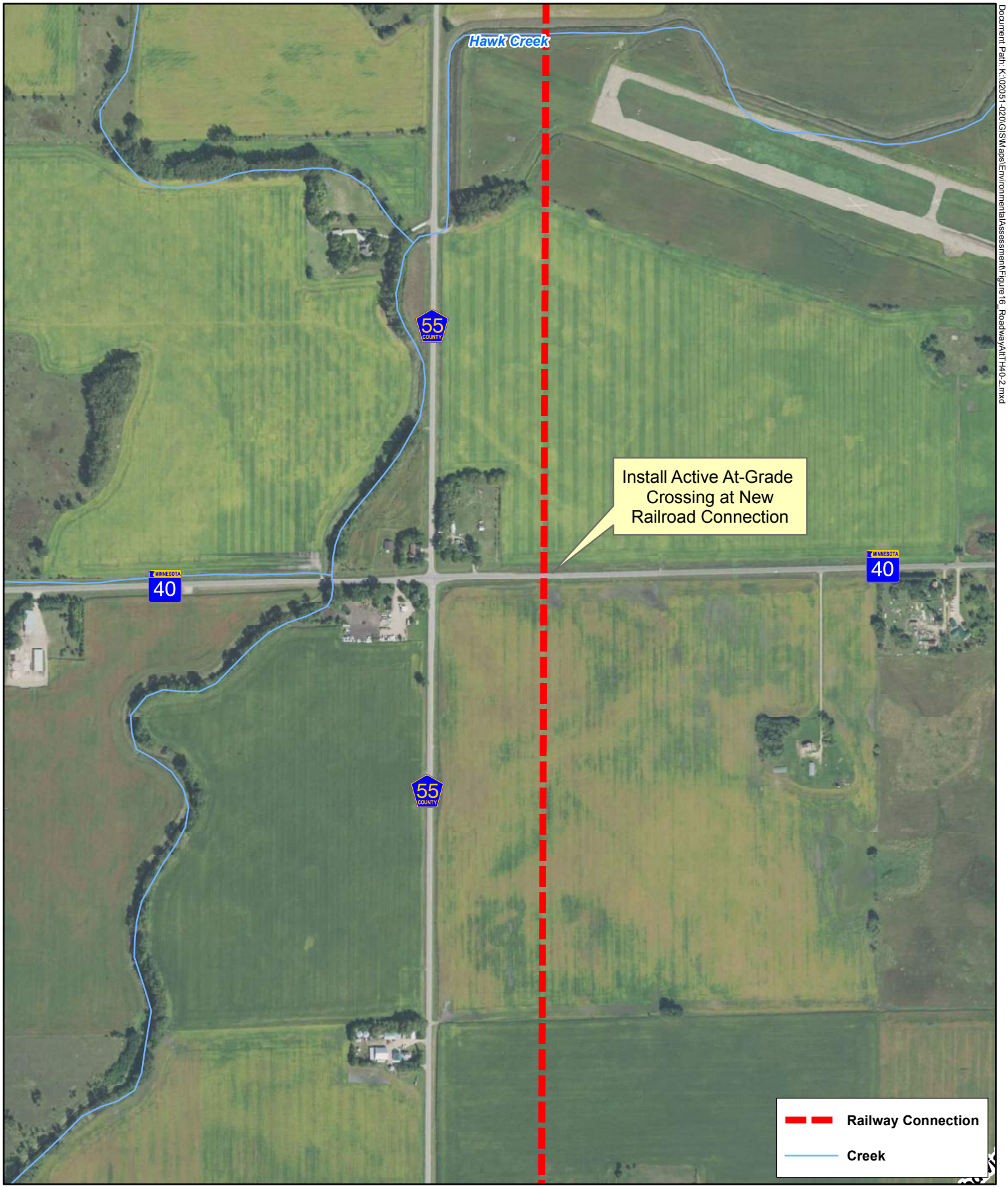
Figure 15: Sub-Option TH40-1

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 750 Feet



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

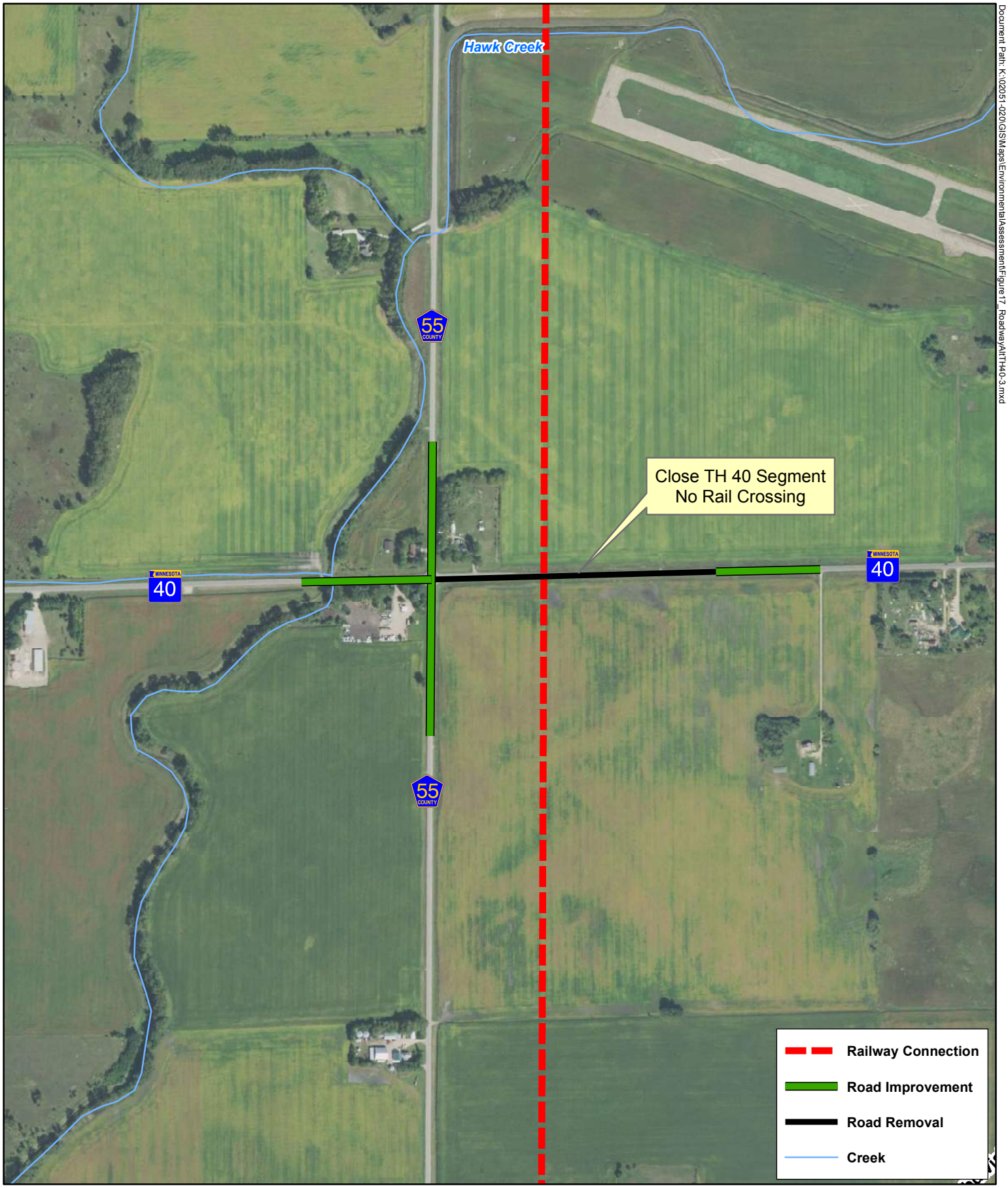
Figure 16: Sub-Option TH40-2

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 750 Feet



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Willmar Rail Connector & Industrial Access Project

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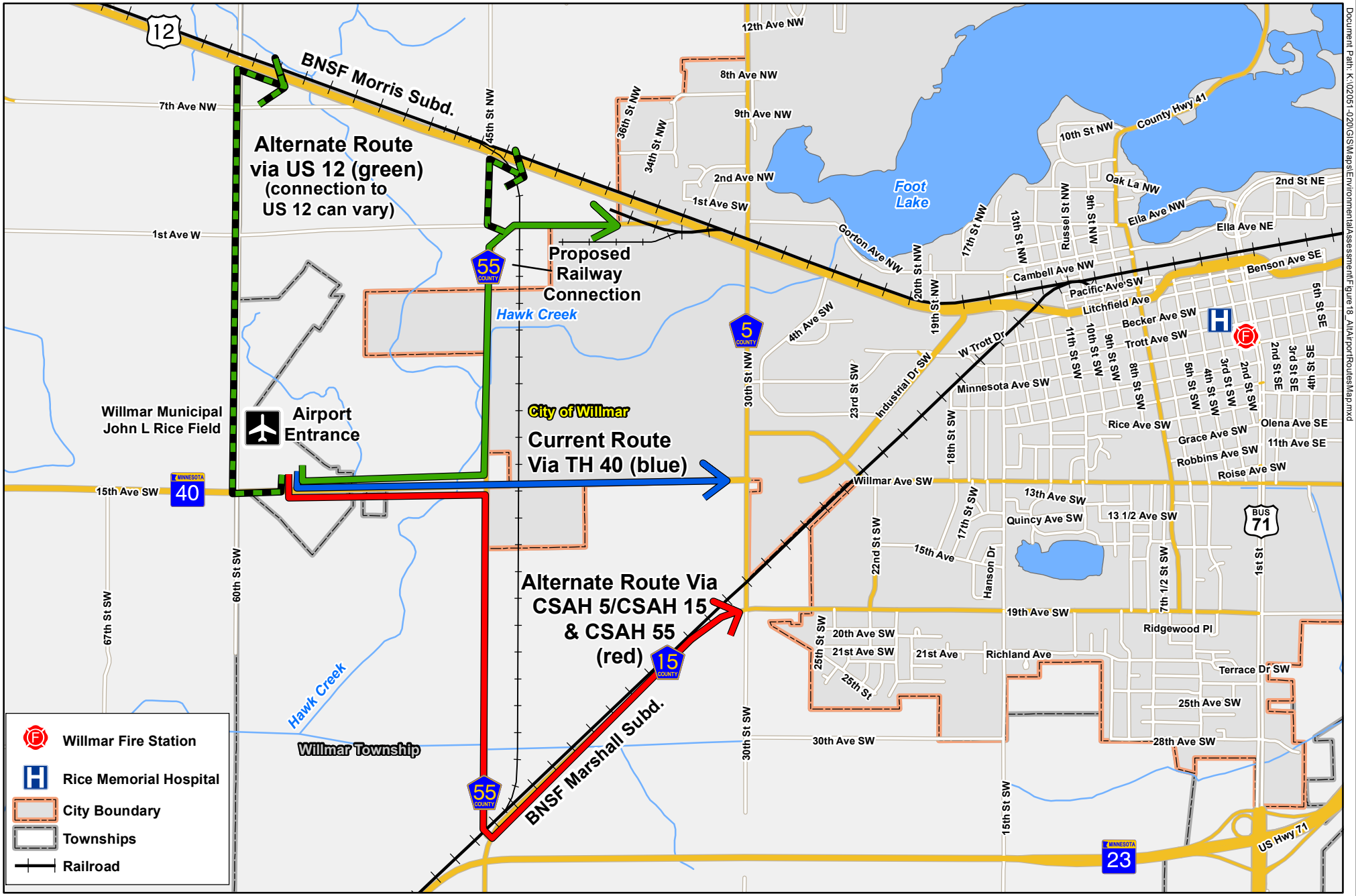
Figure 17: Sub-Option TH40-3

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 750 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 18: Alternate Routes to Airport

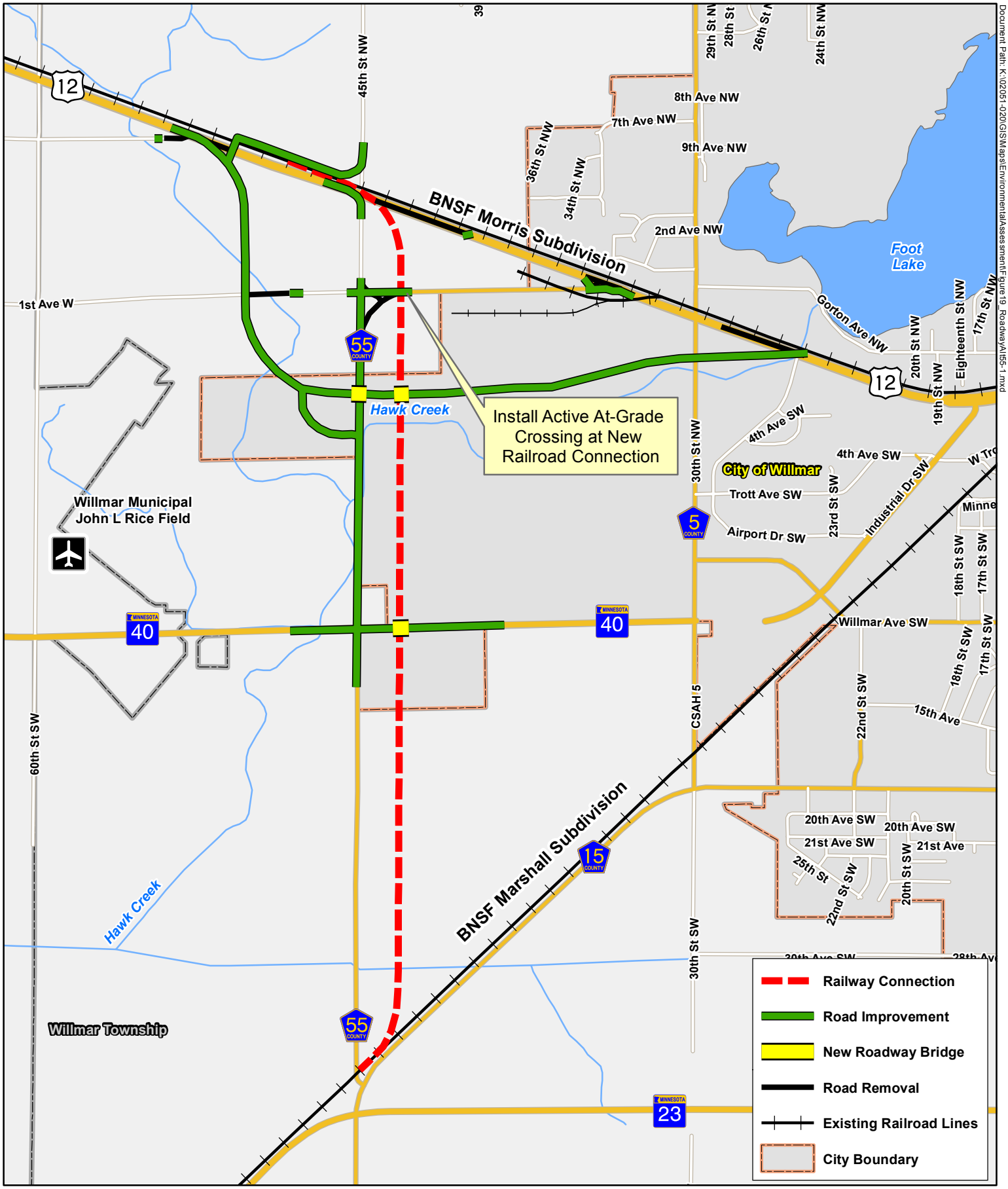
Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,650 Feet

Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure18_AltAirportRoutesMap.mxd



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

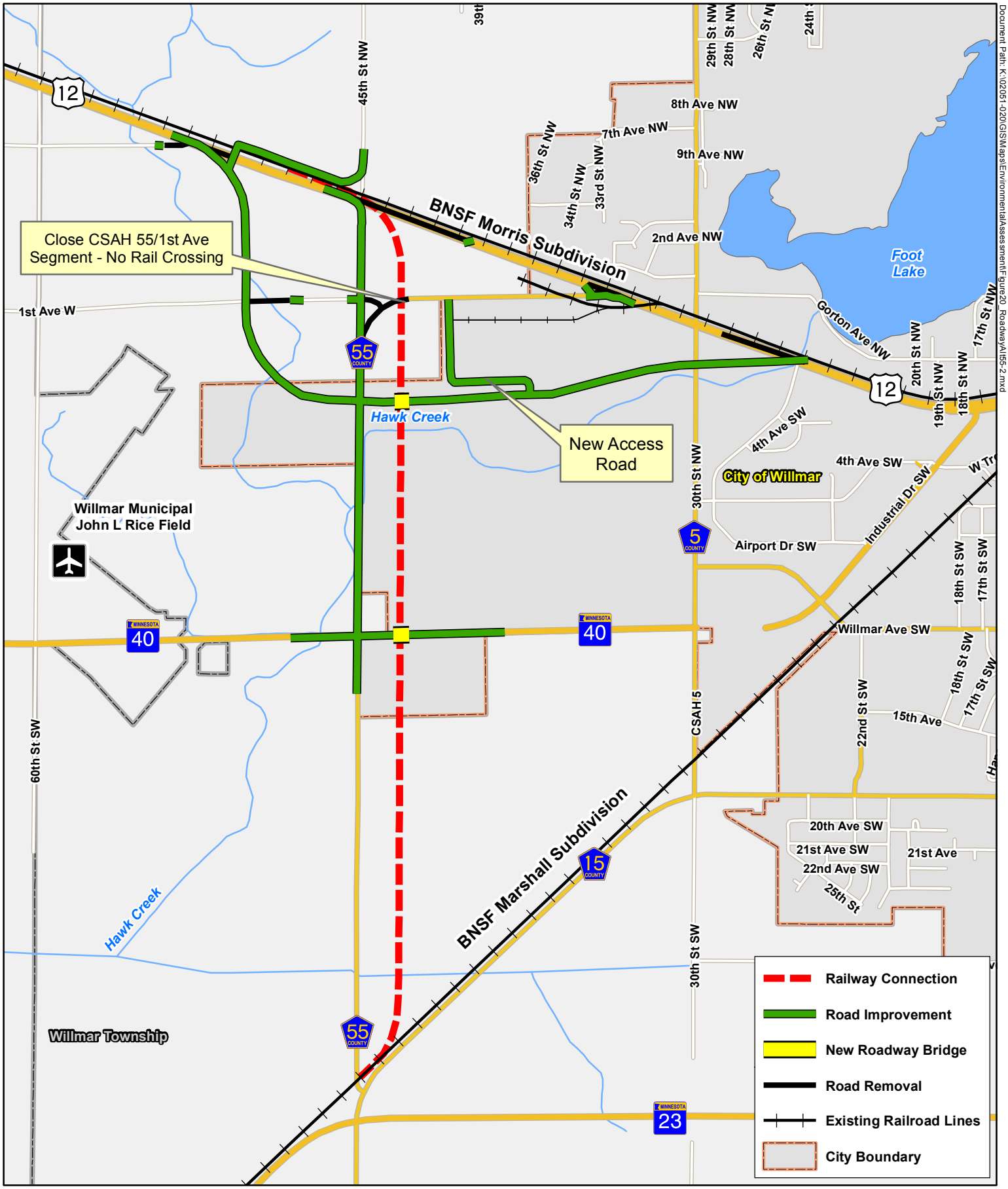
Figure 19: Sub-Option CSAH 55/1st Ave-1

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,000 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure20_RoadwayAlt55-2.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

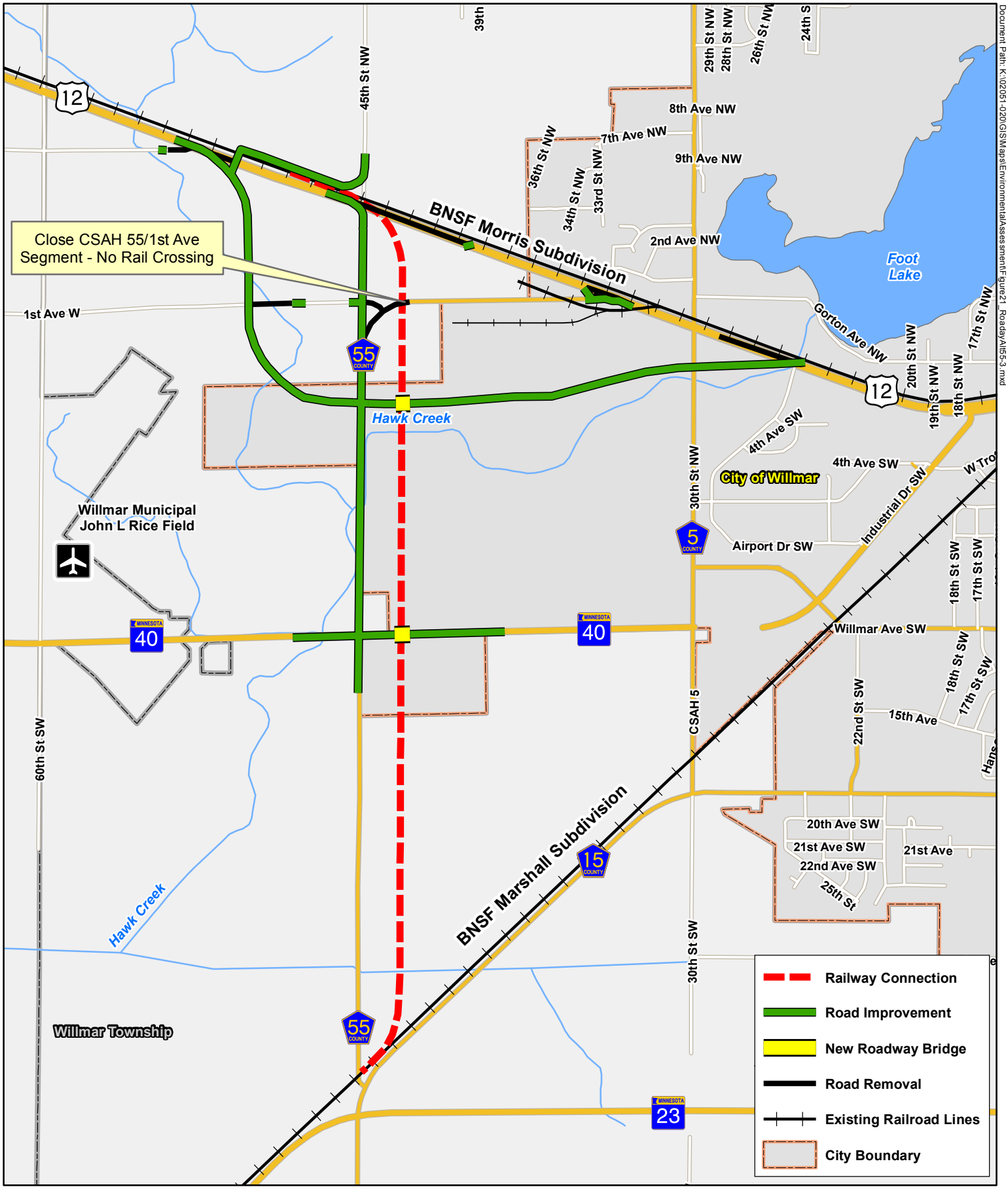
Figure 20: Sub-Option CSAH 55/1st Ave-2

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,000 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 21: Sub-Option CSAH 55/1st Ave-3

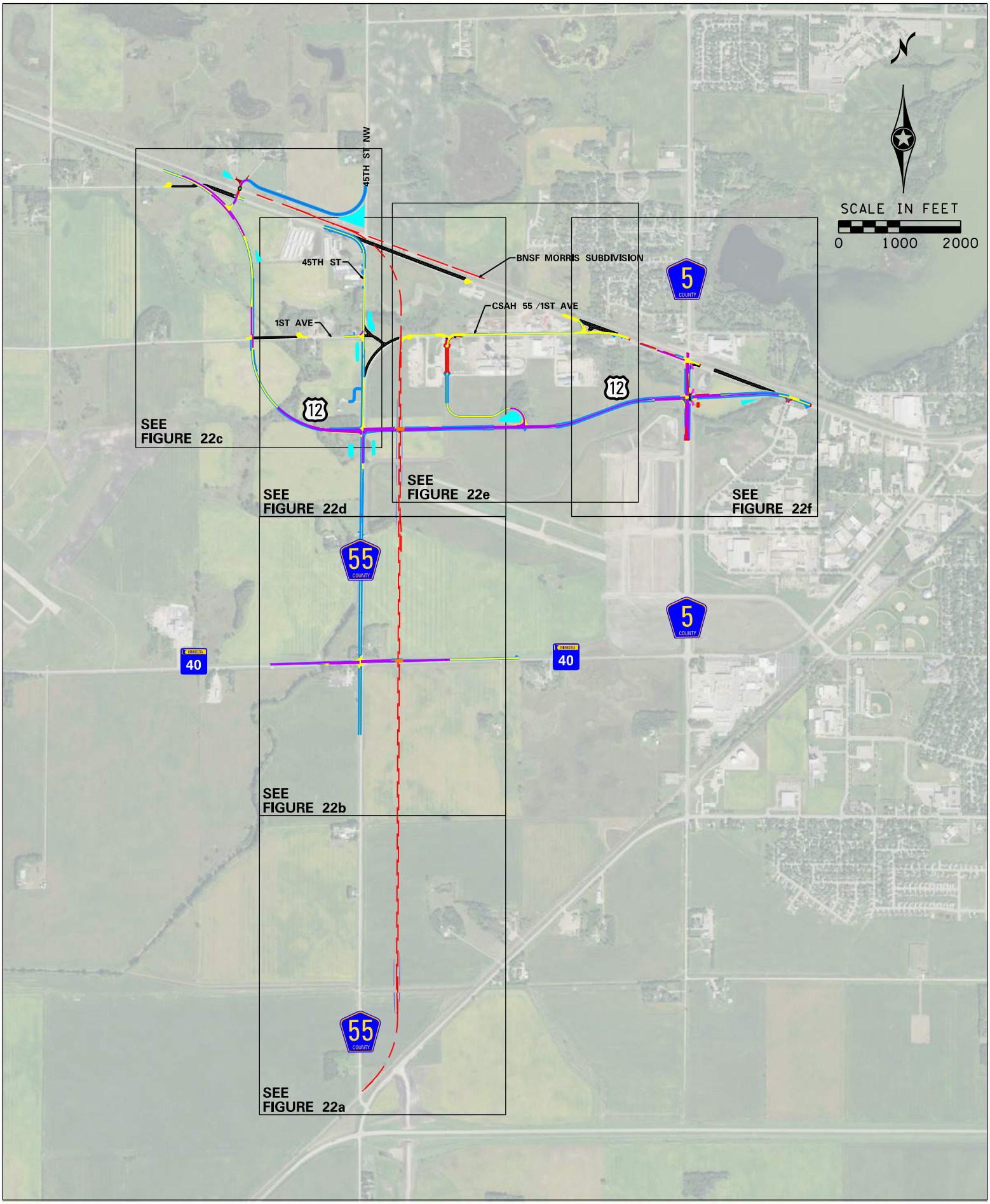
Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

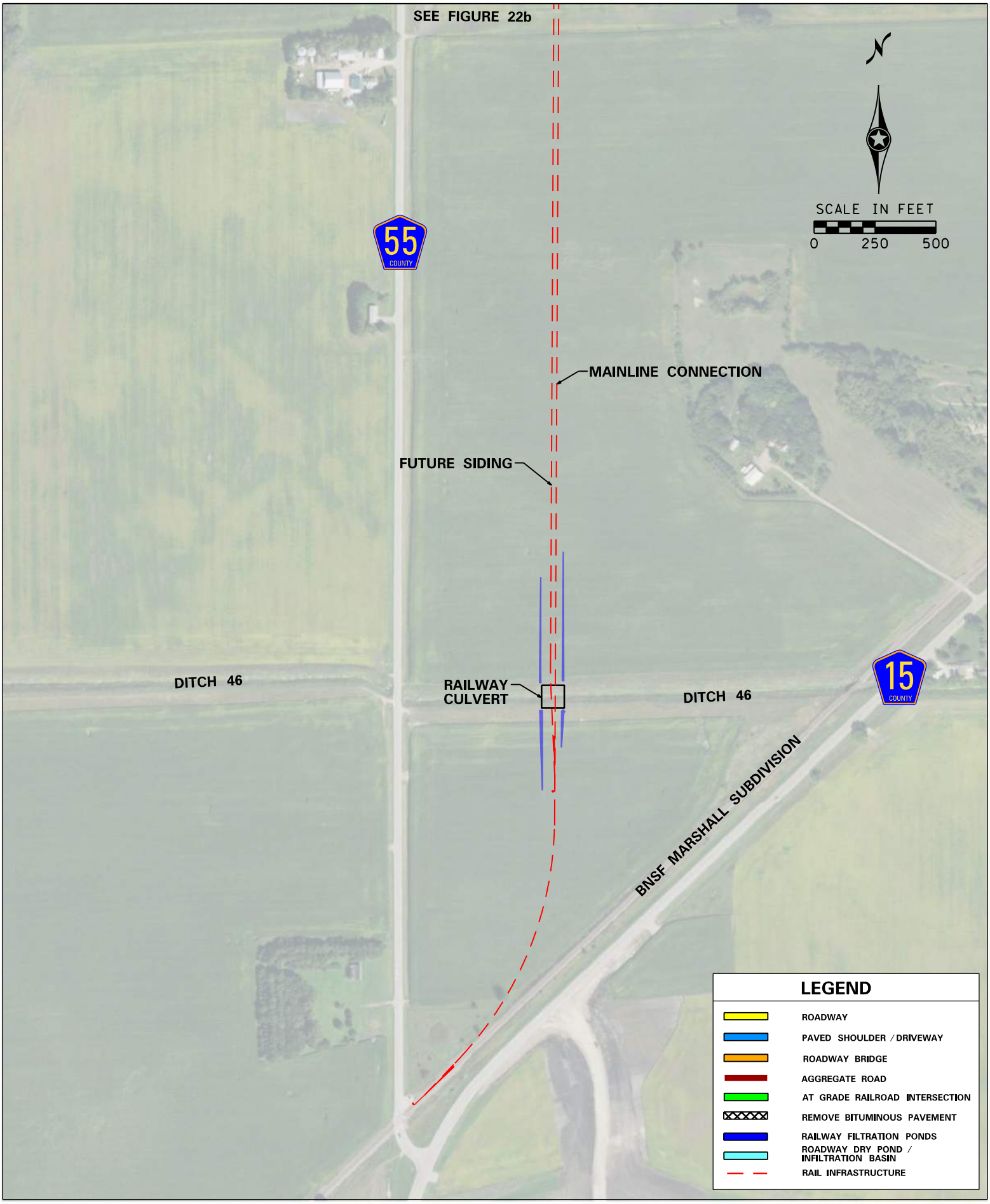
0 2,000 Feet

Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure21_RoadayAlt55-3.mxd



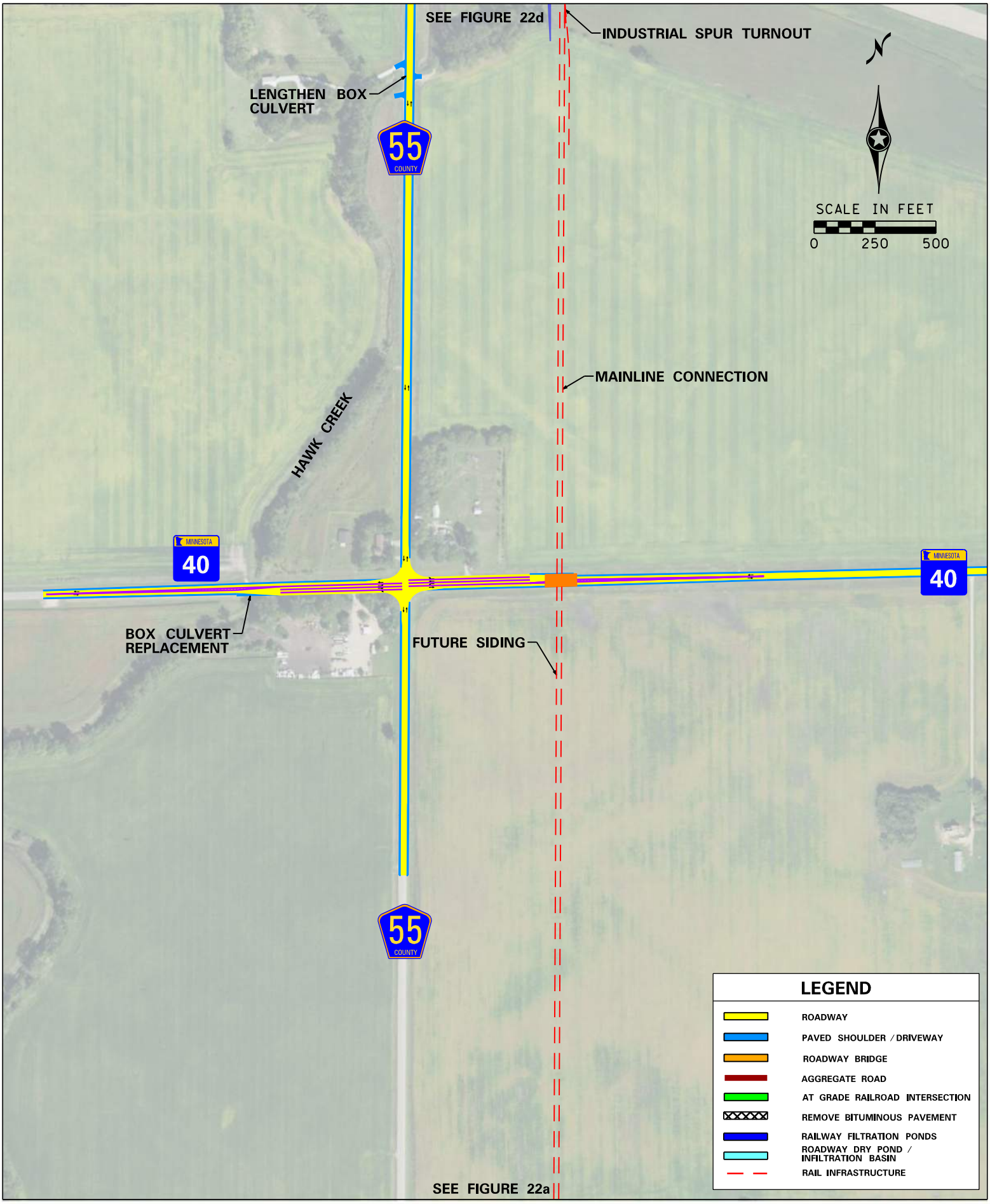
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22 : Recommended Alternative Overview
Willmar, MN



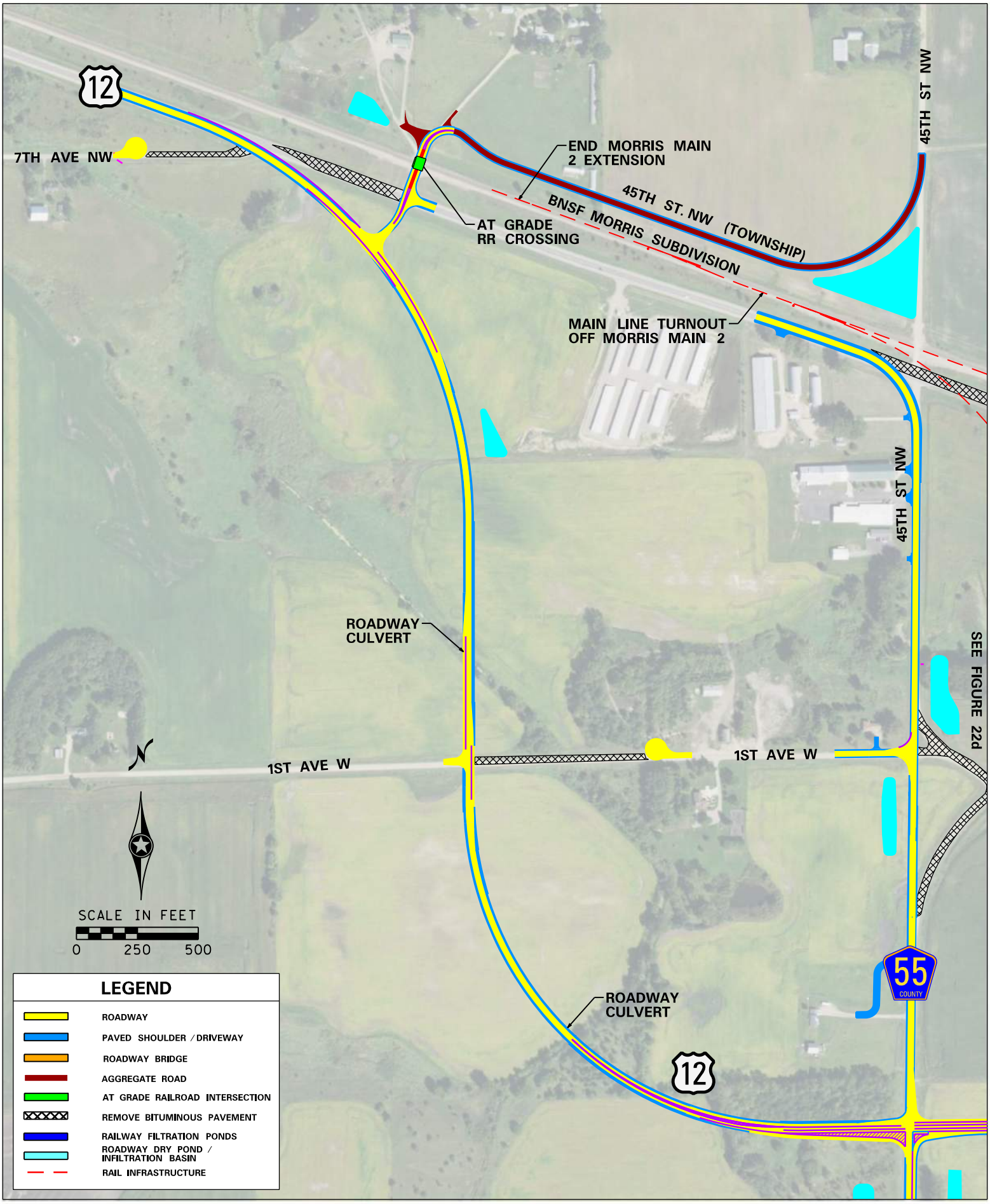
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22a : Recommended Alternative
Willmar, MN



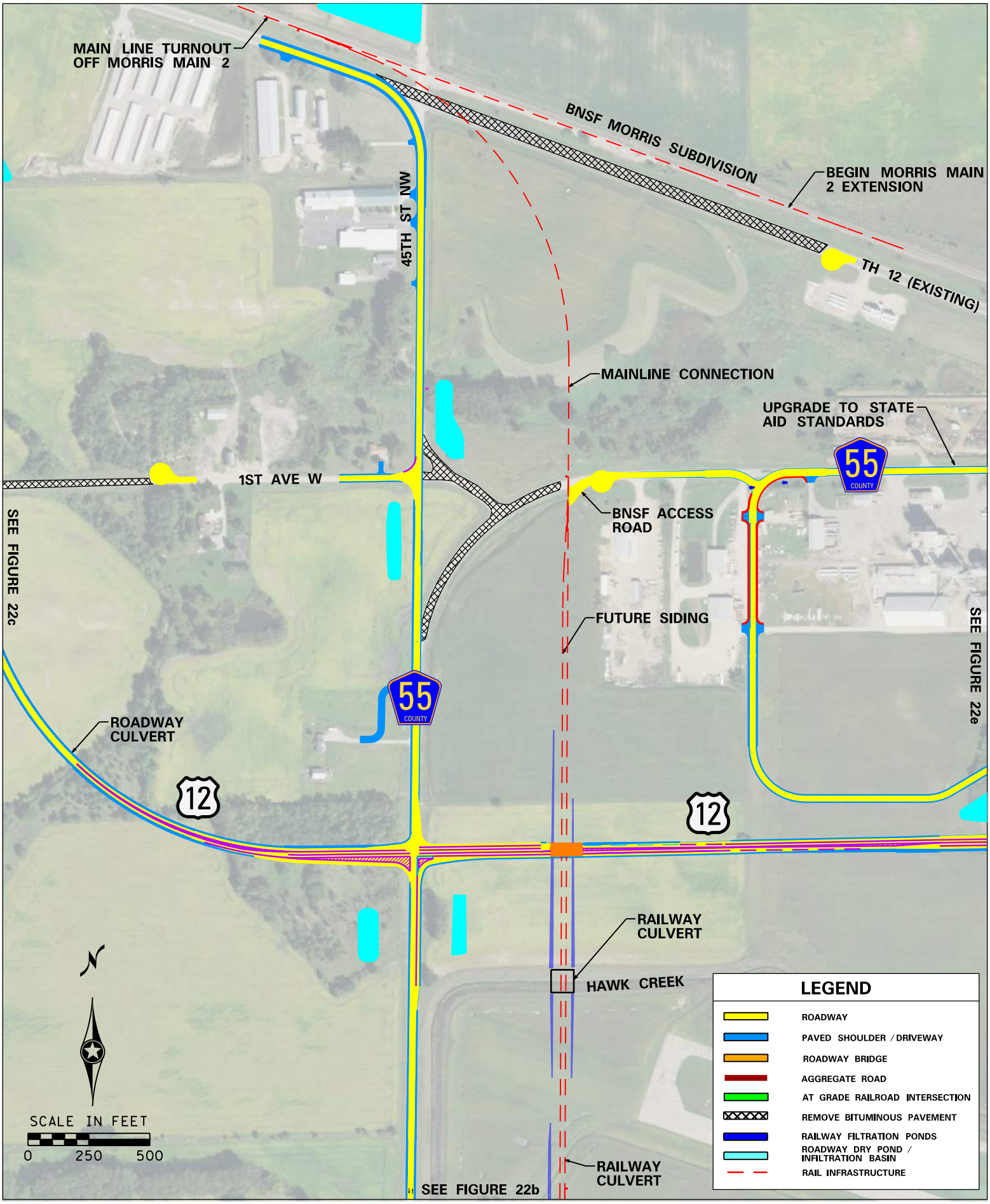
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22b : Recommended Alternative
Willmar, MN



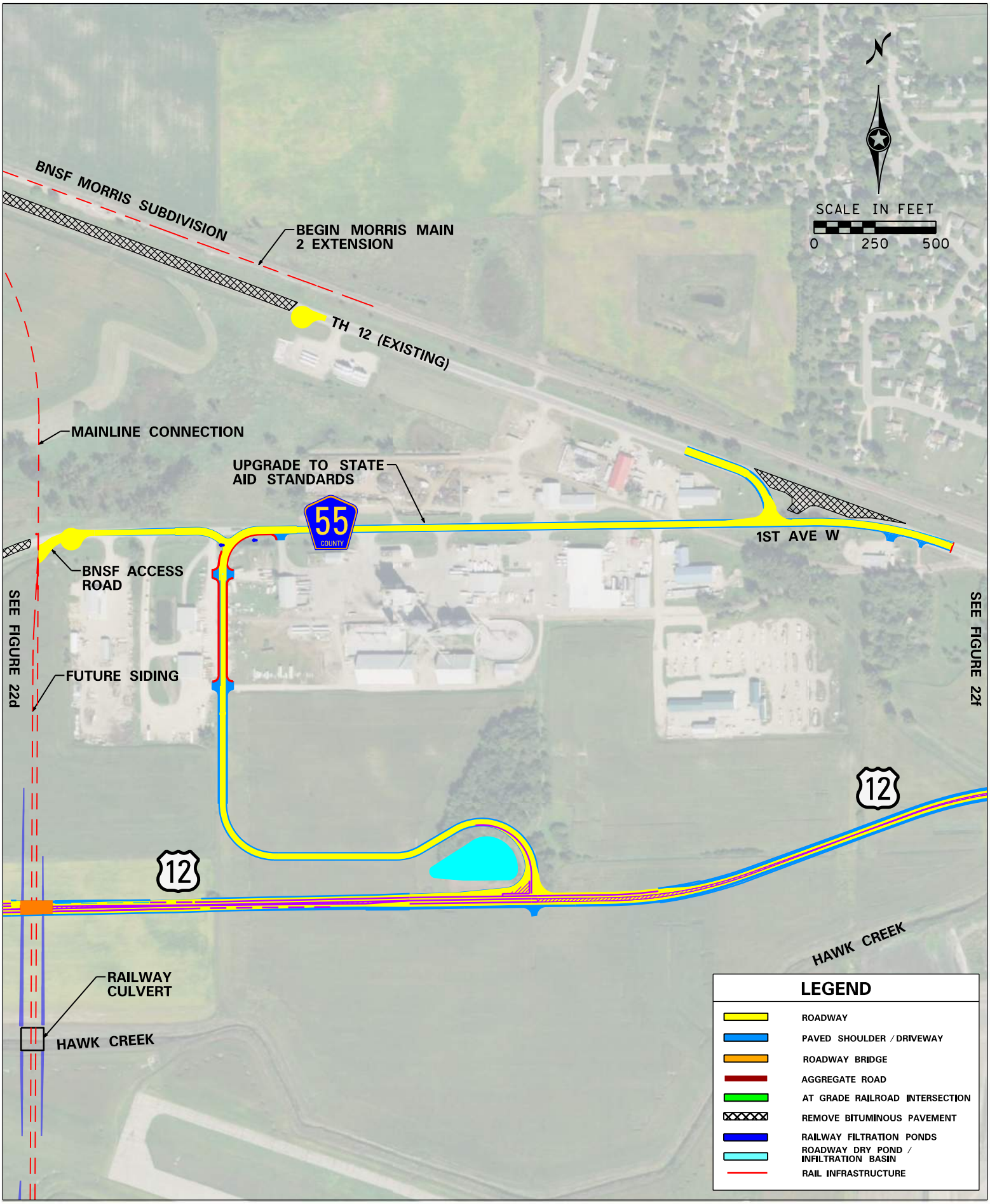
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22c : Recommended Alternative
Willmar, MN



DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22d : Recommended Alternative
Willmar, MN

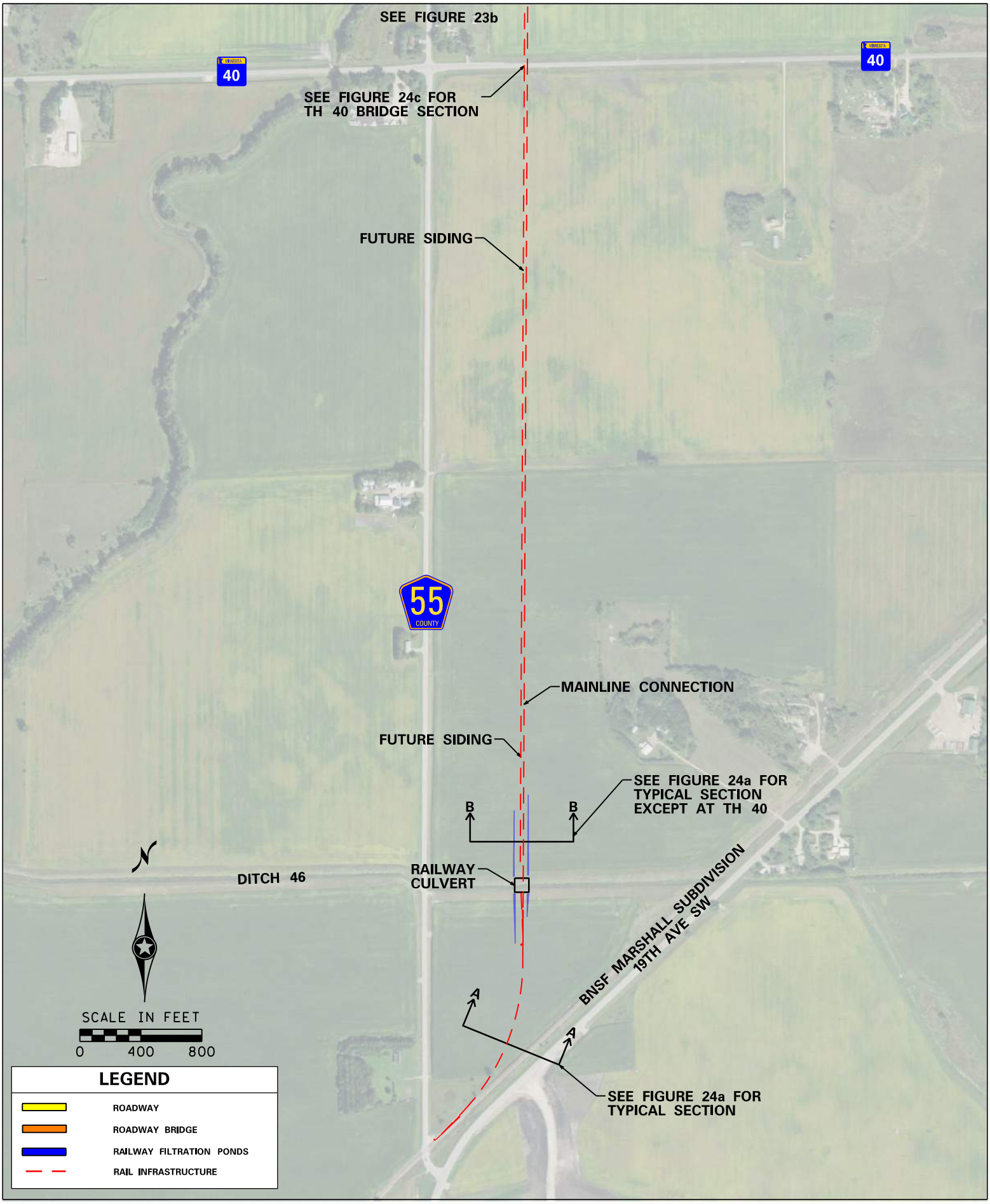


DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22e : Recommended Alternative
Willmar, MN

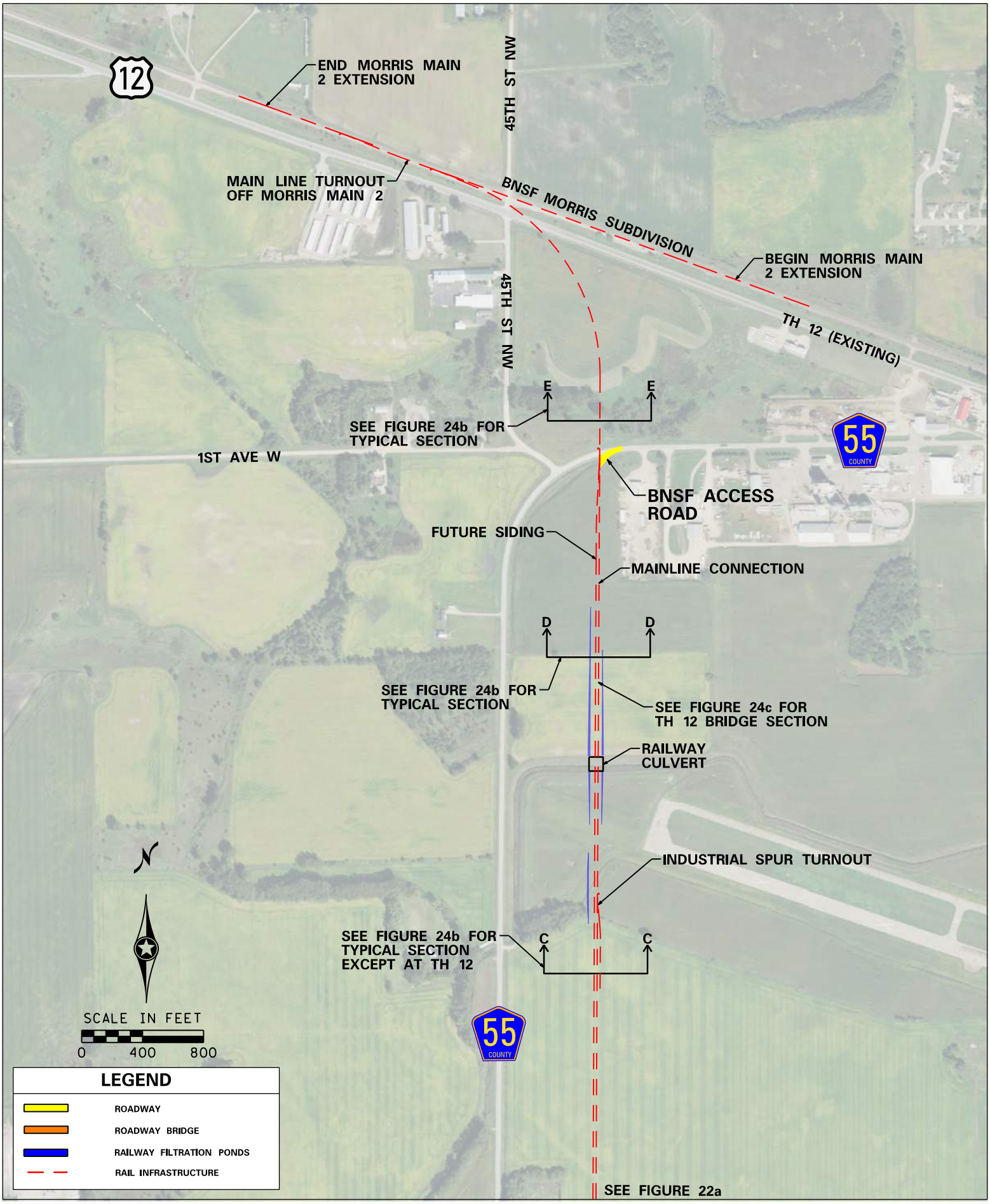
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 22f : Recommended Alternative
Willmar, MN



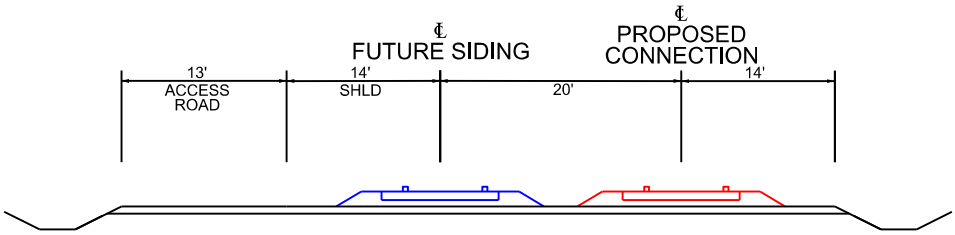
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 23a : Proposed Railway Connection
Willmar, MN

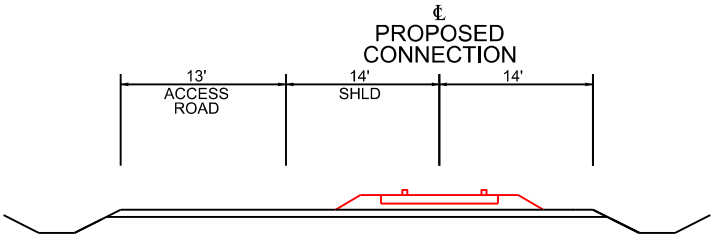


DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 23b : Proposed Railway Connection
Willmar, MN



SECTION B-B
MAINLINE CONNECTION, SIDING, AND ACCESS ROAD

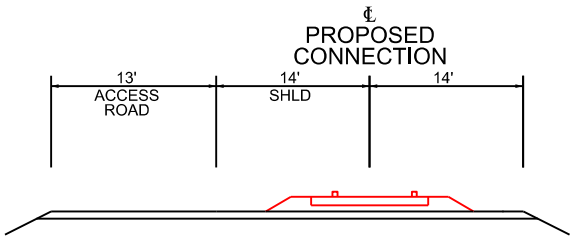


SECTION A-A
MAINLINE CONNECTION AND ACCESS ROAD

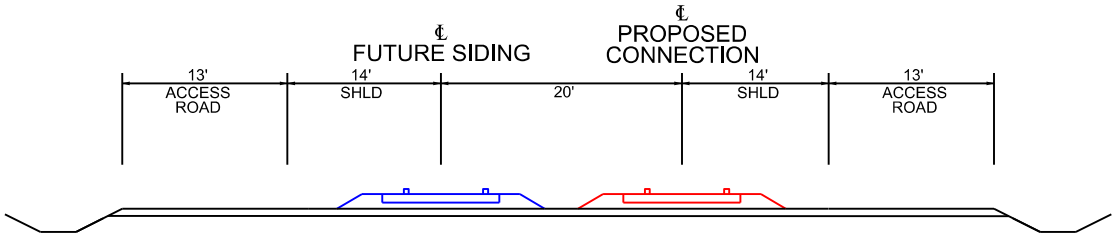
NOTE: SEE FIGURE 23a FOR SECTION LOCATIONS.

DEPARTMENT OF TRANSPORTATION

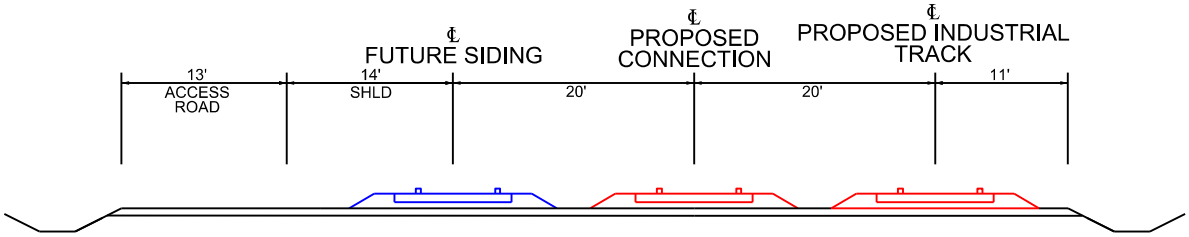
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 24a : Proposed Railway Typical Sections
Willmar, MN



SECTION E-E
MAINLINE CONNECTION AND ACCESS ROAD



SECTION D-D
MAIN CONNECTION, SIDING, AND ACCESS ROAD

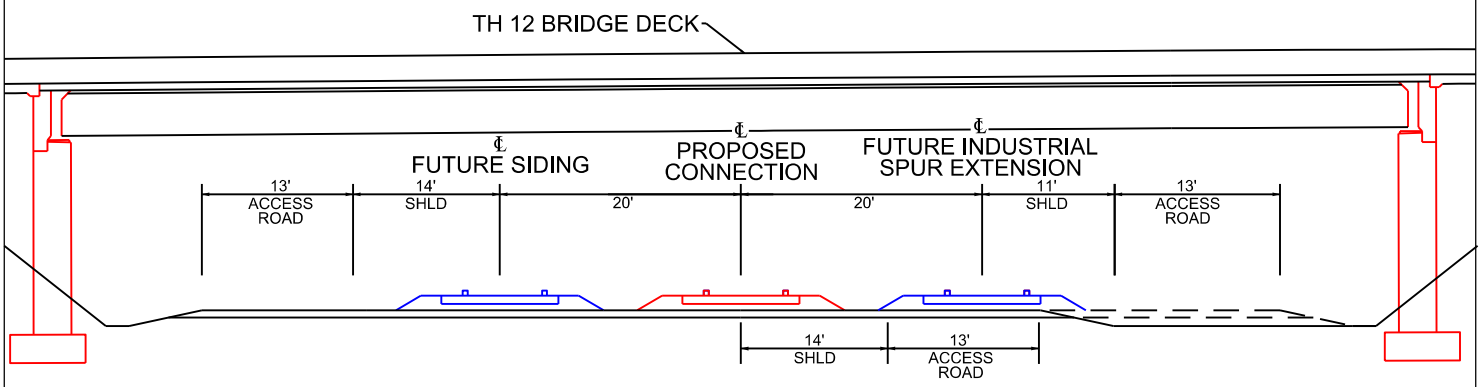


SECTION C-C
MAIN CONNECTION, SIDING, INDUSTRIAL, AND ACCESS ROAD

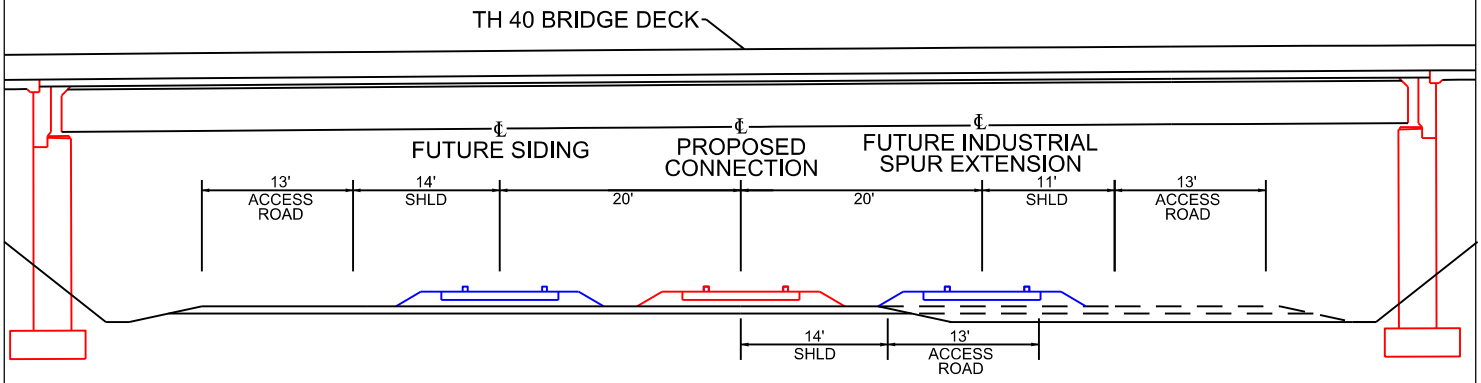
NOTE: SEE FIGURE 23b FOR SECTION LOCATIONS.

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 24b : Proposed Railway Typical Sections
Willmar, MN



TH 12 BRIDGE MAINLINE CONNECTION, SIDING, INDUSTRIAL, AND ACCESS ROAD

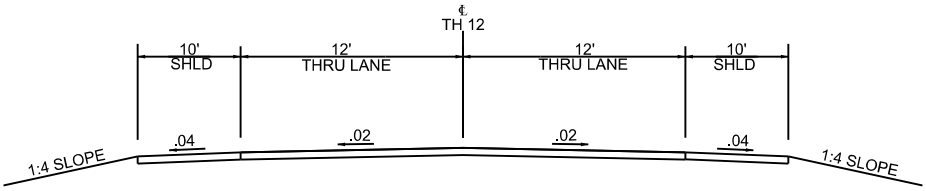


TH 40 BRIDGE MAINLINE CONNECTION, SIDING, INDUSTRIAL, AND ACCESS ROAD

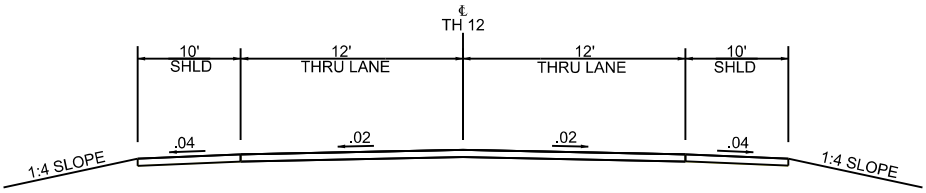
NOTE: SEE FIGURE 23a AND 23b FOR SECTION LOCATIONS.

DEPARTMENT OF TRANSPORTATION

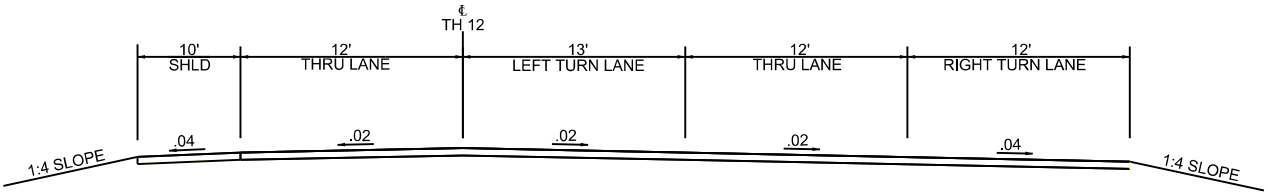
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 24c : Proposed Railway Typical Sections
Willmar, MN



EXISTING TYPICAL SECTION - TH 12



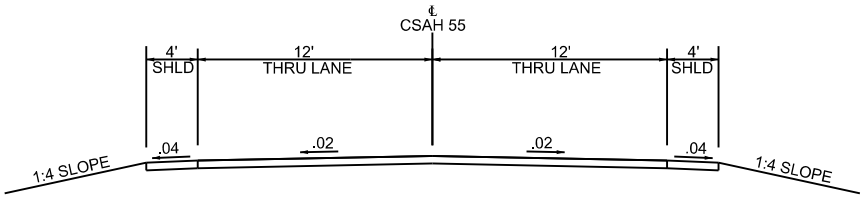
PROPOSED TYPICAL SECTION - TH 12



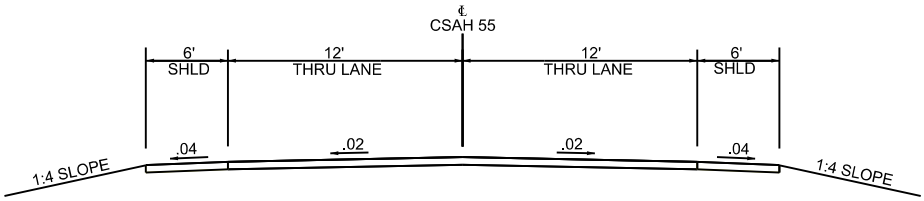
PROPOSED TYPICAL SECTION - TH 12 INTERSECTION

DEPARTMENT OF TRANSPORTATION

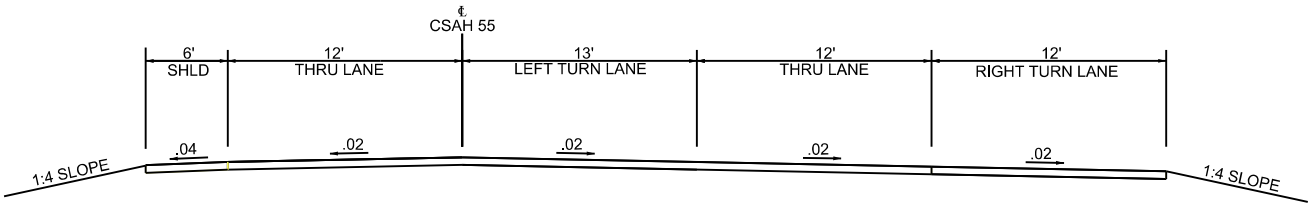
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 25a : Roadway Typical Sections (TH 12)
Willmar, MN



EXISTING TYPICAL SECTION - CSAH 55



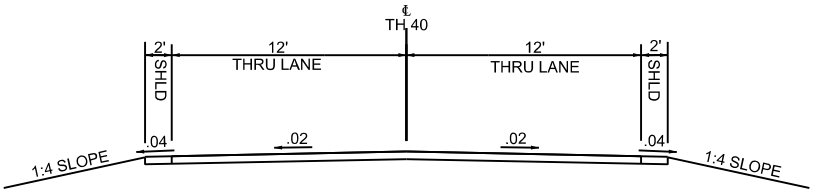
PROPOSED TYPICAL SECTION - CSAH 55



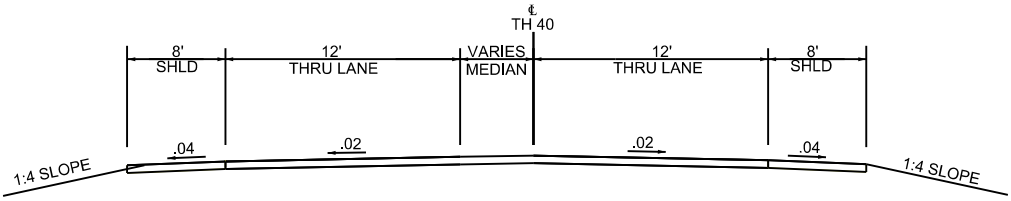
PROPOSED TYPICAL SECTION - CSAH 55 INTERSECTION

DEPARTMENT OF TRANSPORTATION

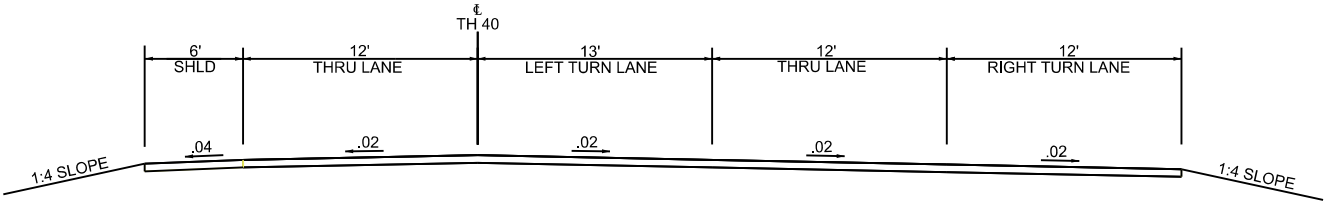
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 25b : Roadway Typical Sections (CSAH 55)
Willmar, MN



EXISTING TYPICAL SECTION - TH 40



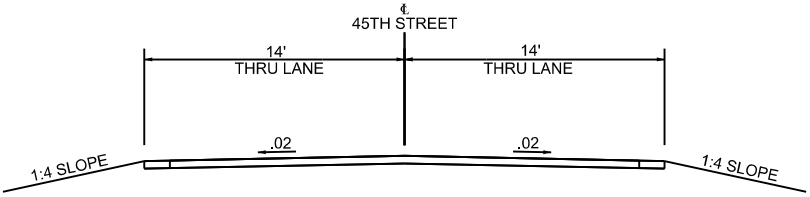
PROPOSED TYPICAL SECTION - TH 40



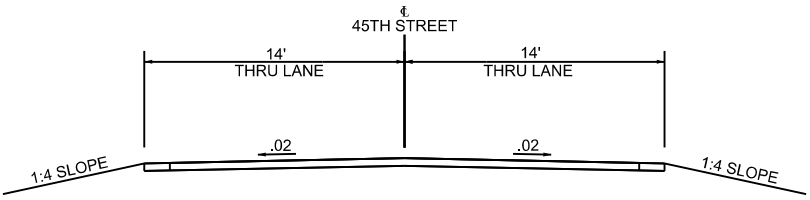
PROPOSED TYPICAL SECTION - TH 40 INTERSECTION

DEPARTMENT OF TRANSPORTATION

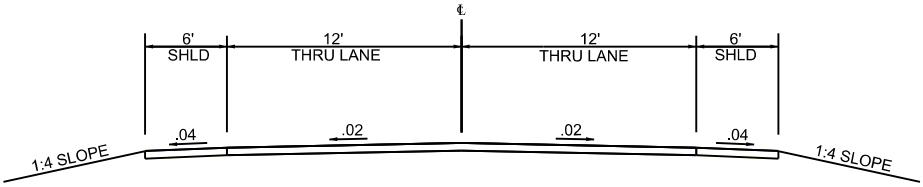
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 25c : Roadway Typical Sections (TH 40)
Willmar, MN



EXISTING TYPICAL SECTION - 45TH STREET NW
(GRAVEL)



PROPOSED TYPICAL SECTION - 45TH STREET NW
(GRAVEL)

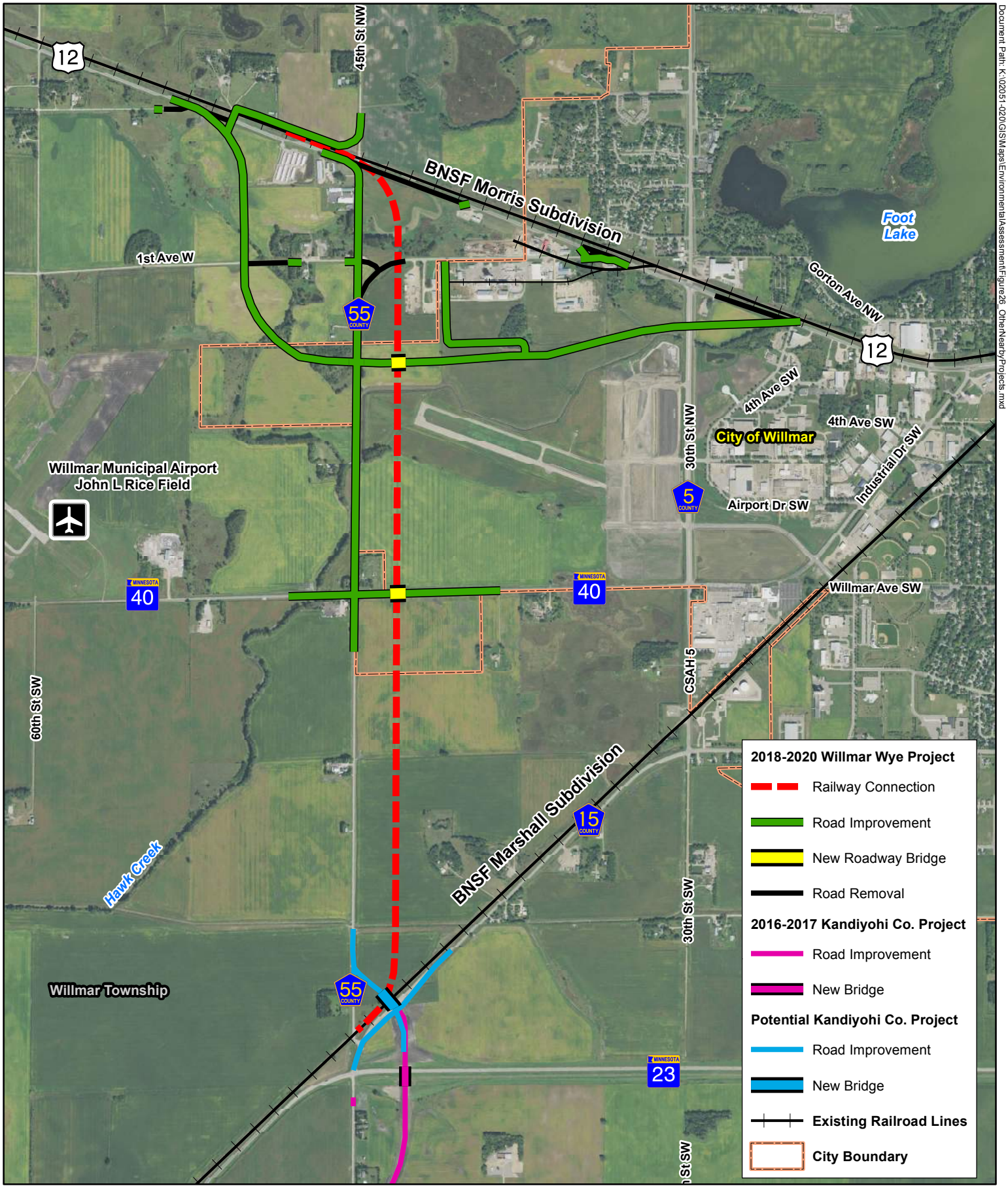


PROPOSED TYPICAL SECTION - NEW LOCAL ACCESS ROAD TO 1ST AVENUE WEST

NOTE: SEE APPENDIX FOR BRIDGE TYPICAL SECTIONS.

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 25d : Roadway Typical Sections (45th Street/ New Access Road)
Willmar, MN



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Willmar Rail Connector & Industrial Park Access Project

S.P. 3403-74

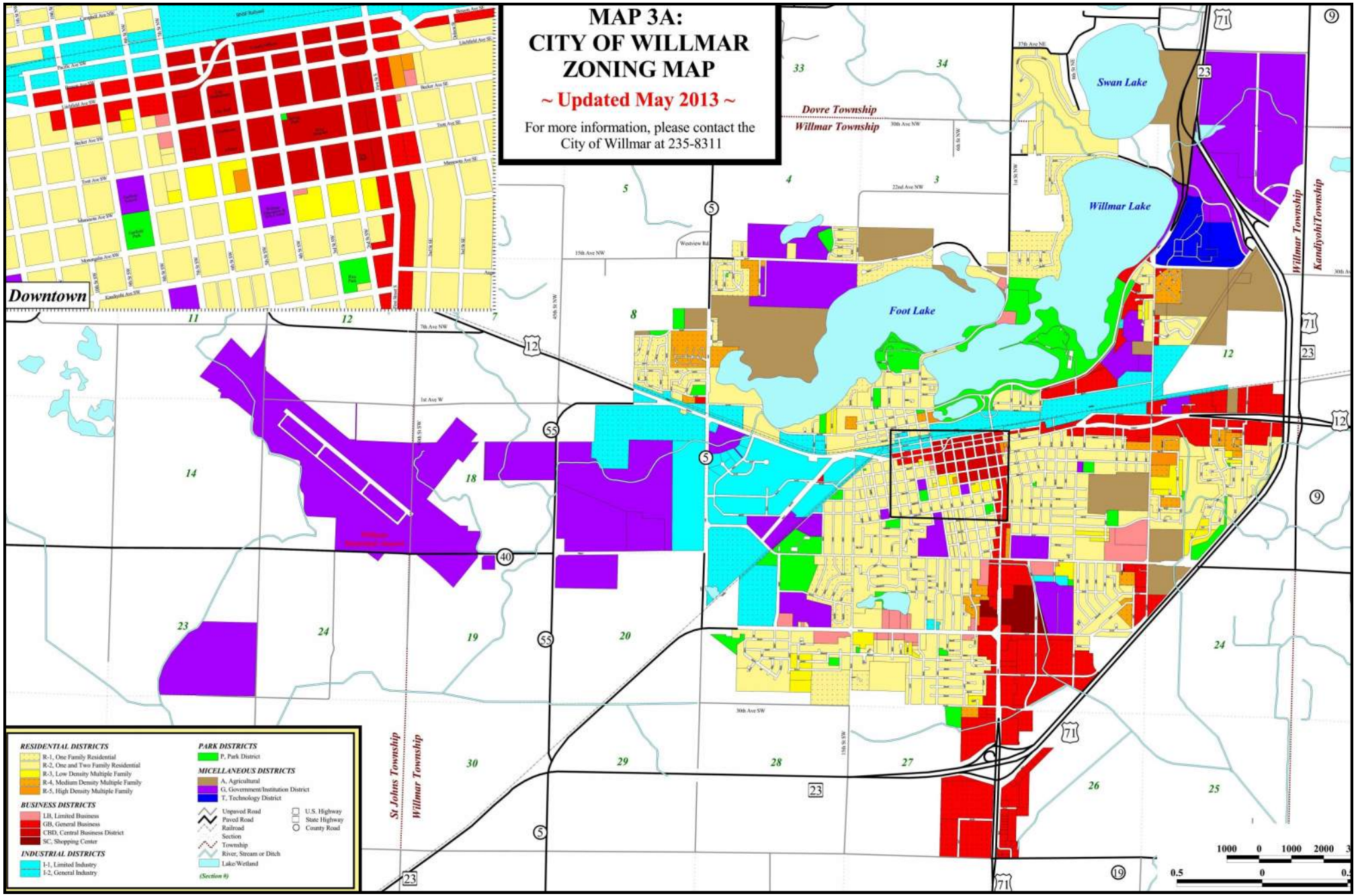
Figure 26: Other Nearby Projects

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,500 Feet



Willmar Rail Connector & Industrial Access Project

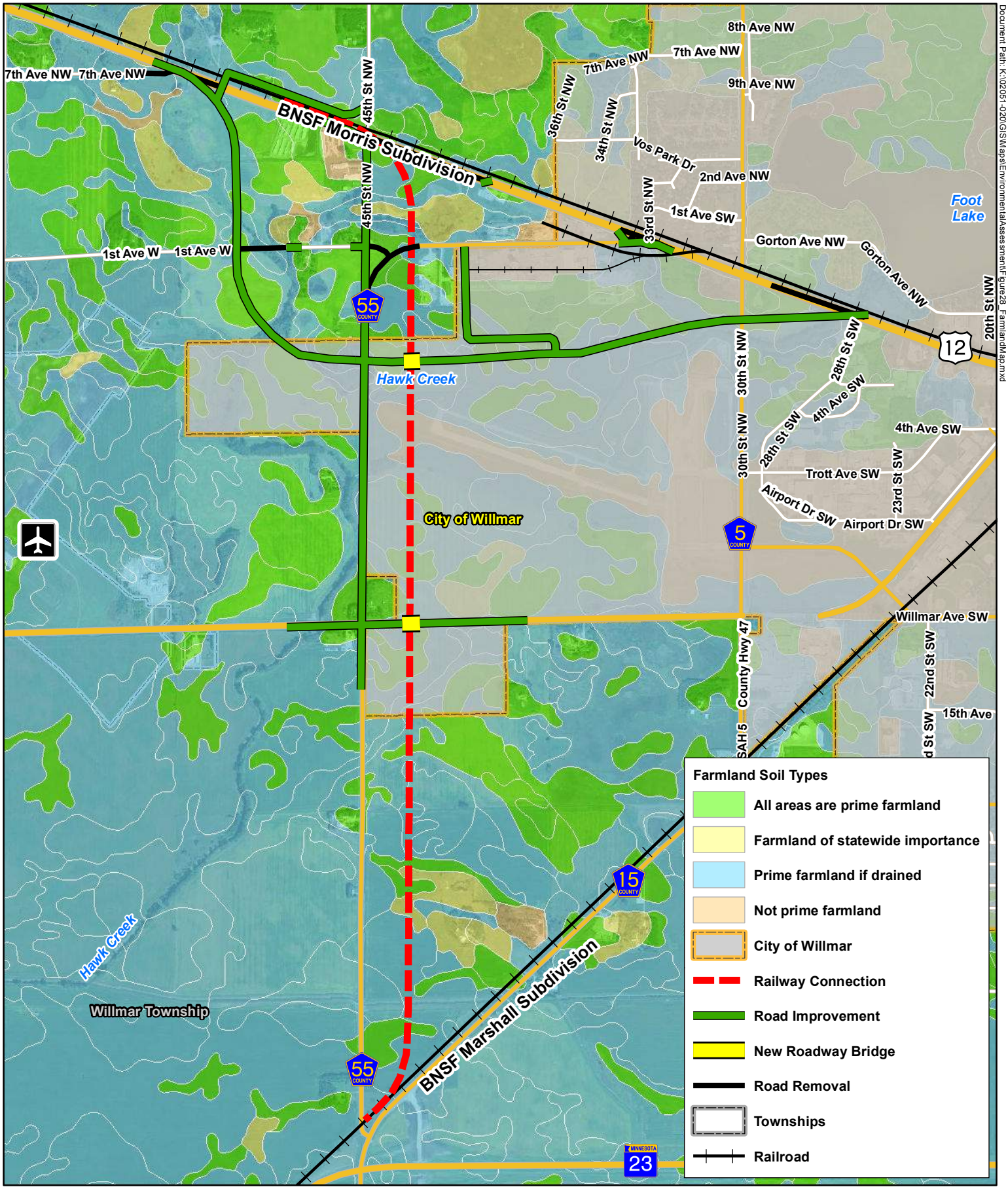
S.P. 3403-74

Figure 27: City of Willmar Zoning Map

Willmar, MN

Source: City of Willmar

DEPARTMENT OF TRANSPORTATION



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure28_FarmlandMap.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

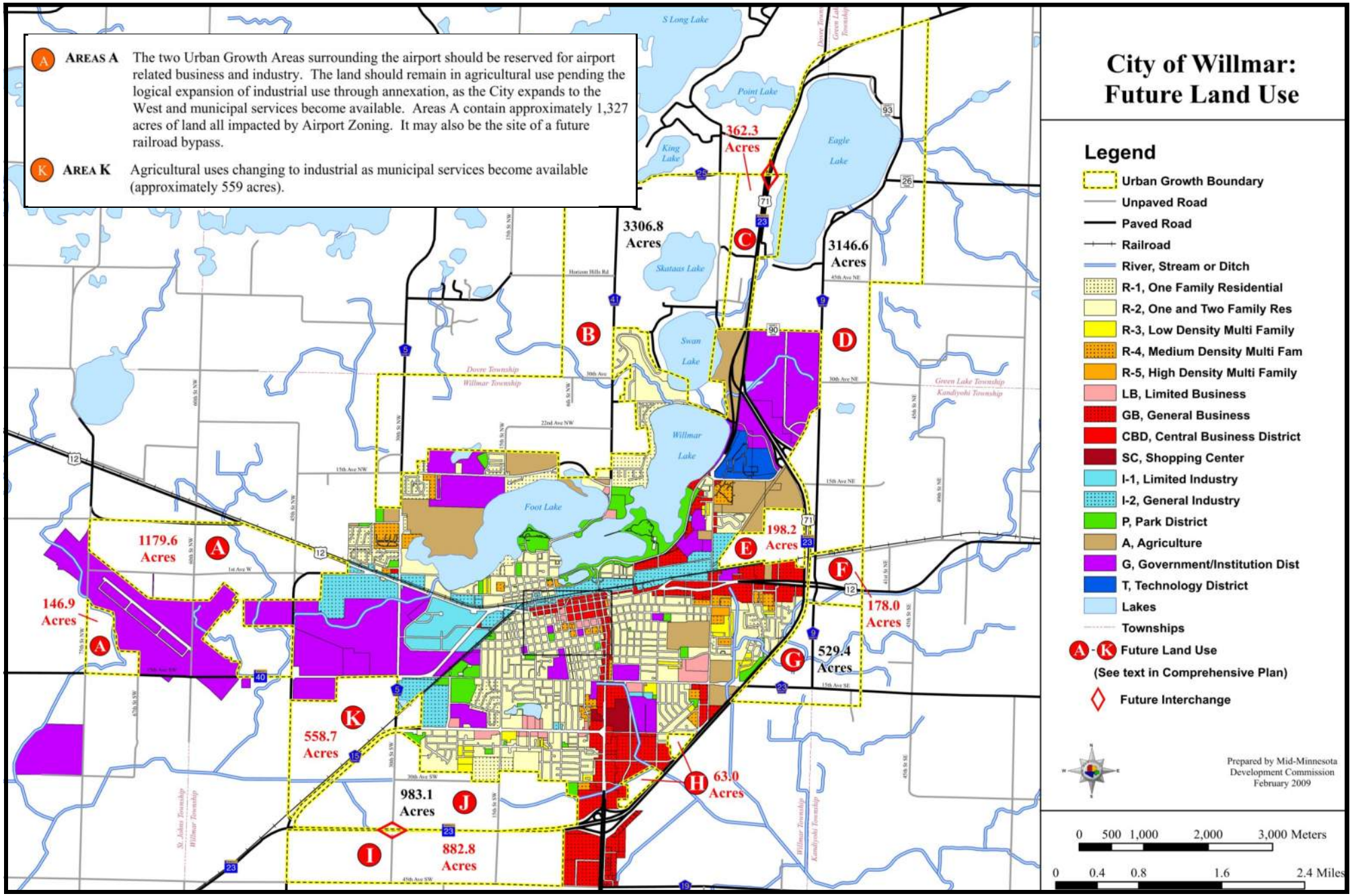
Figure 28: Farmland Soils

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 1,750 Feet



Source: City of Willmar

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

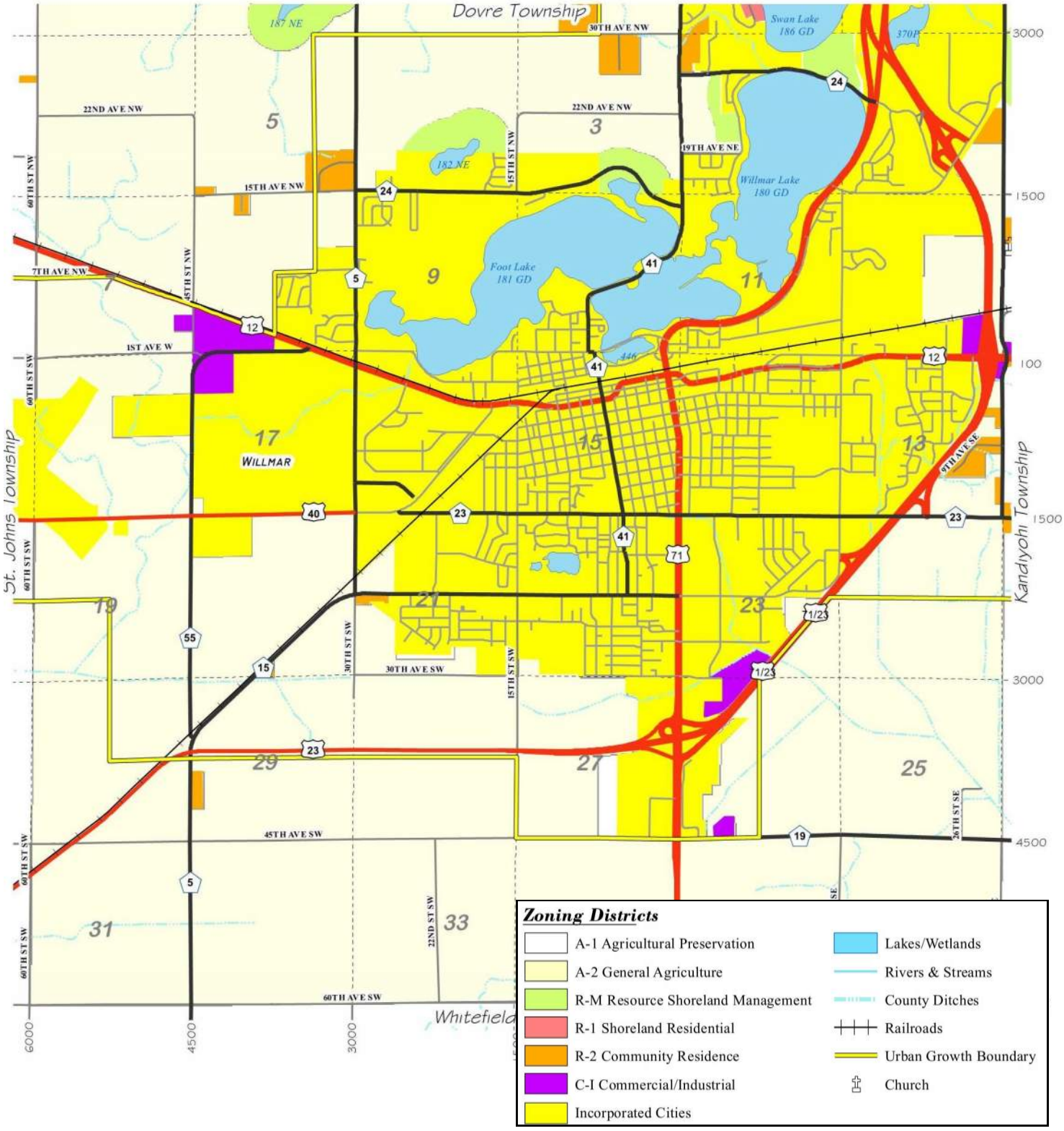
Figure 29: City of Willmar Future Land Use Map

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

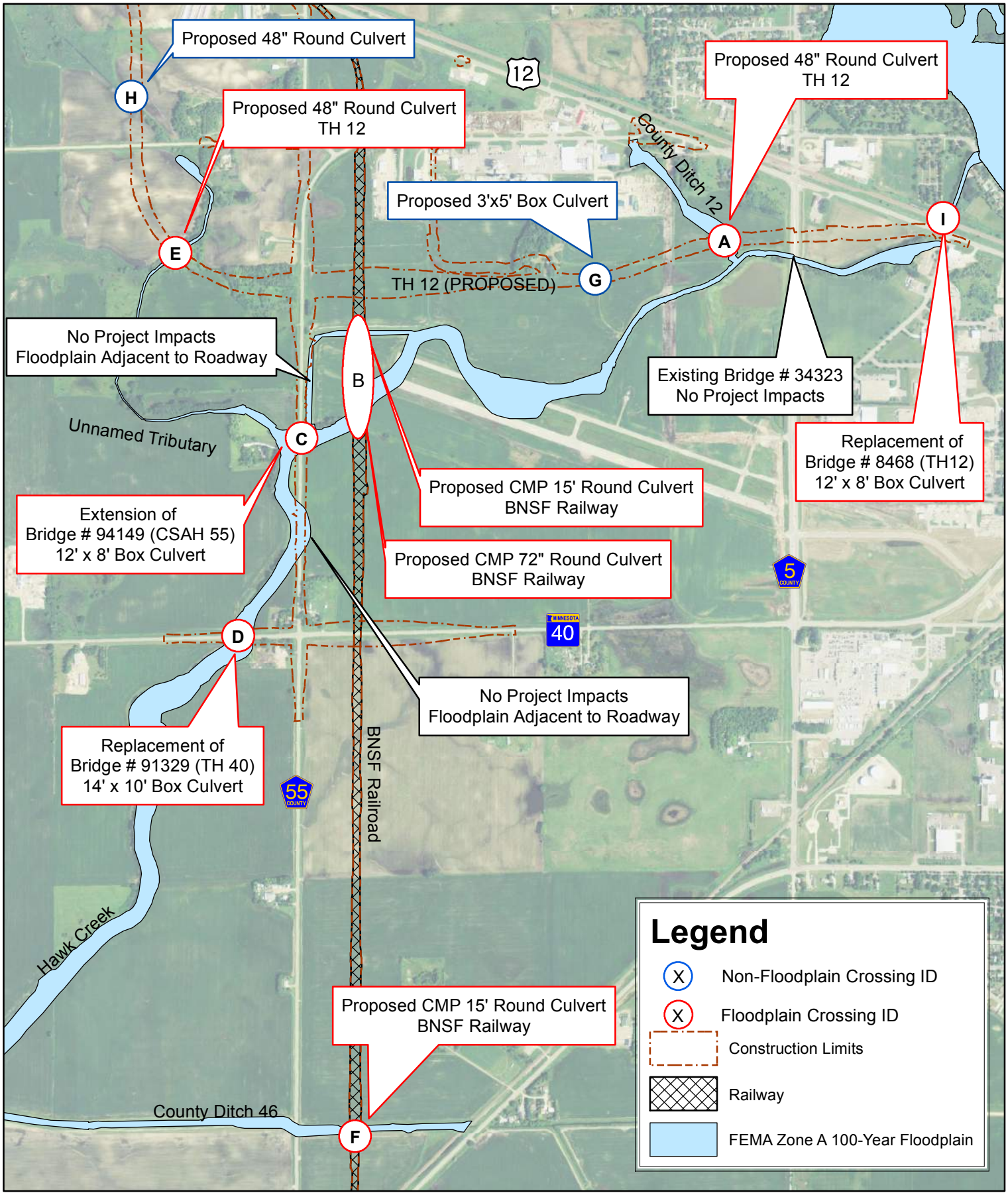
Willmar Township
Zoning Districts



Source: Kandiyohi County

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 30: Willmar Township Zoning Map
Willmar, MN

DEPARTMENT OF TRANSPORTATION



DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

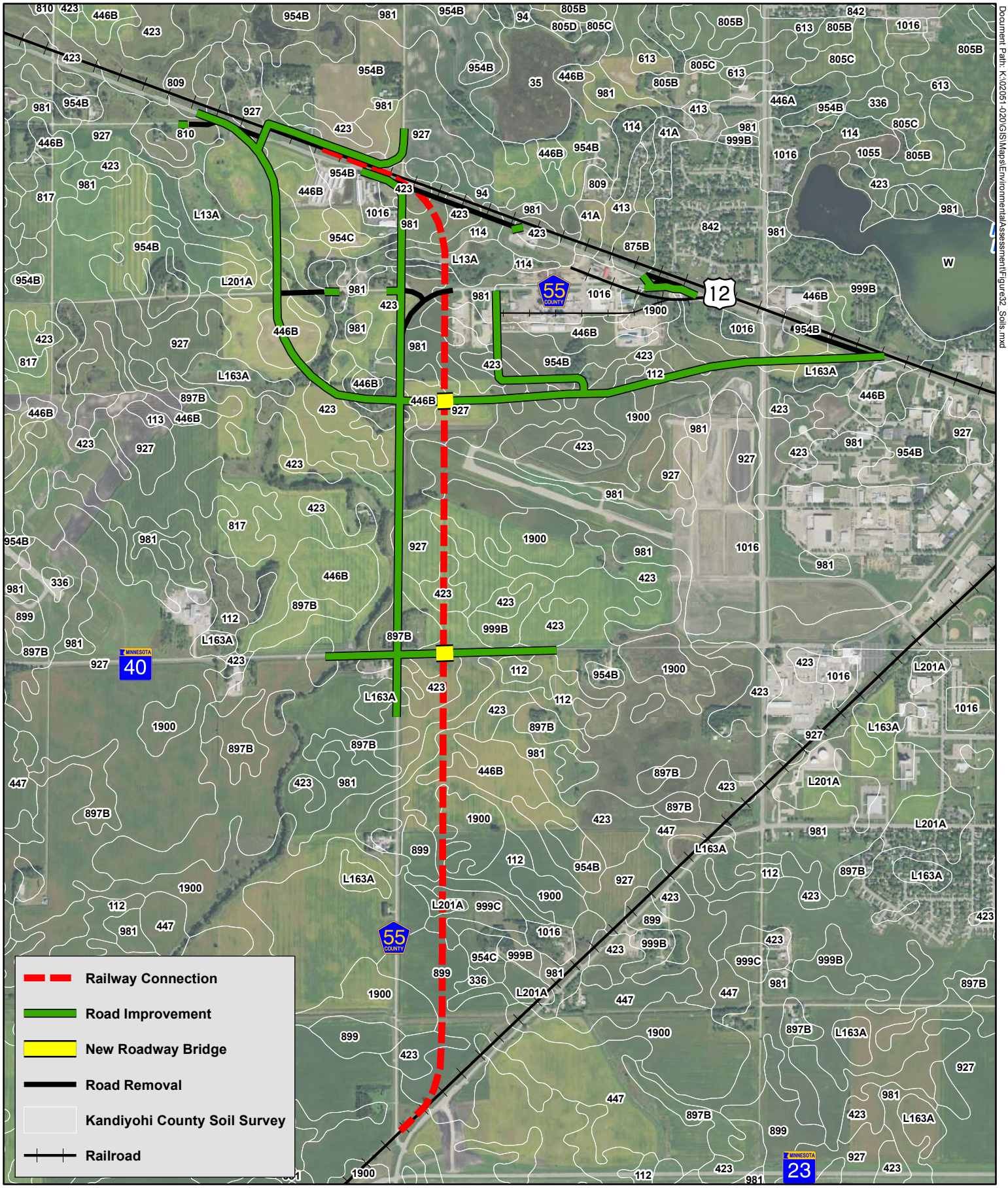
Figure 31: Proposed Floodplain Impacts and Crossings

Willmar, MN

N

0 400 800 1,600

Feet



DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 32: Soil Survey of Kandiyohi County
Willmar, MN

N

0 1,850 Feet

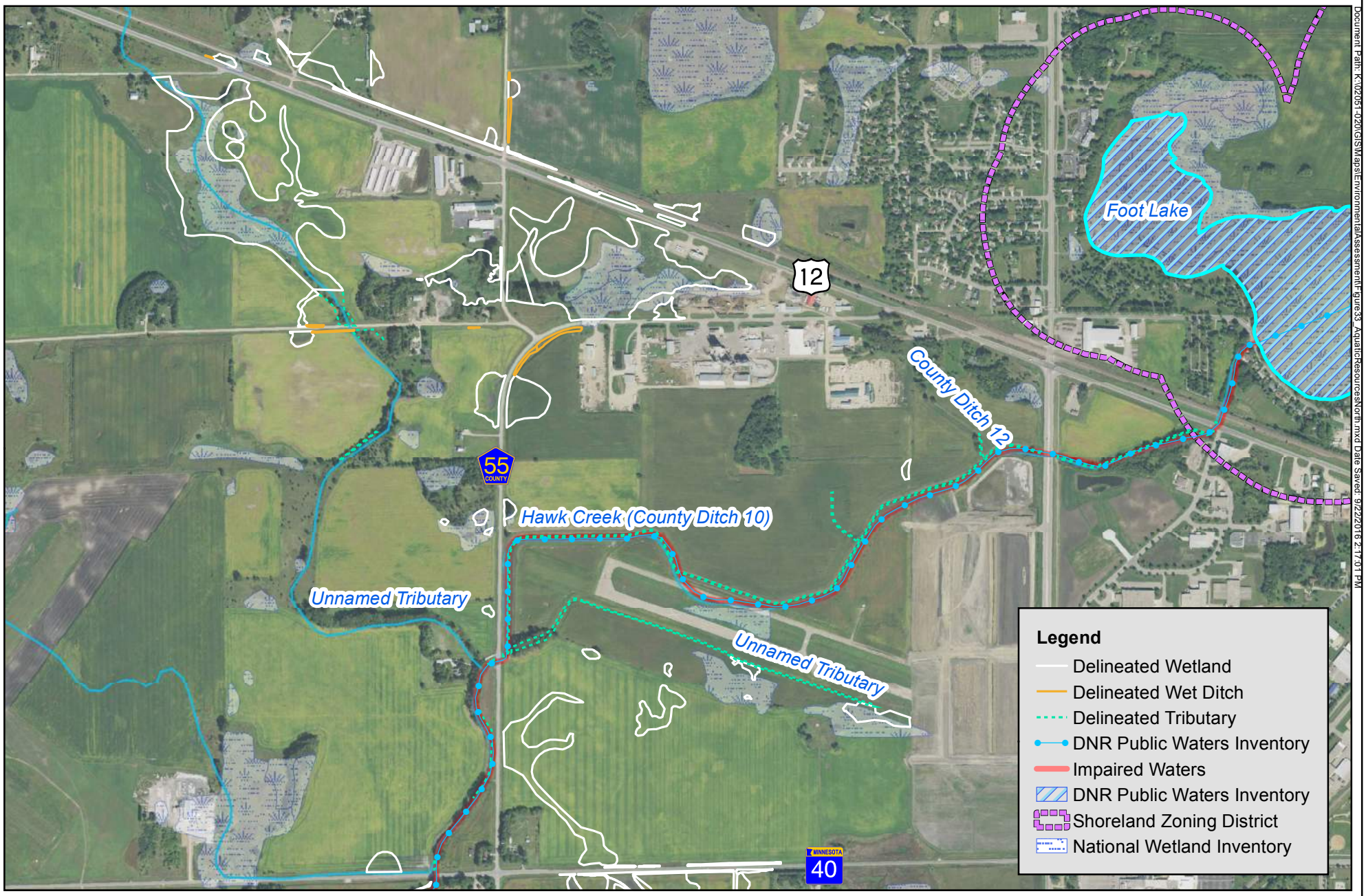
Document Path: K:\02051-020\GIS\Maps\EnvironmentalAssessment\Figure33_AquaticResourcesSouth.mxd Date Saved: 9/22/2016 2:20:12 PM

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 33a: Aquatic Resources
Willmar, MN

N

0 1,000 Feet



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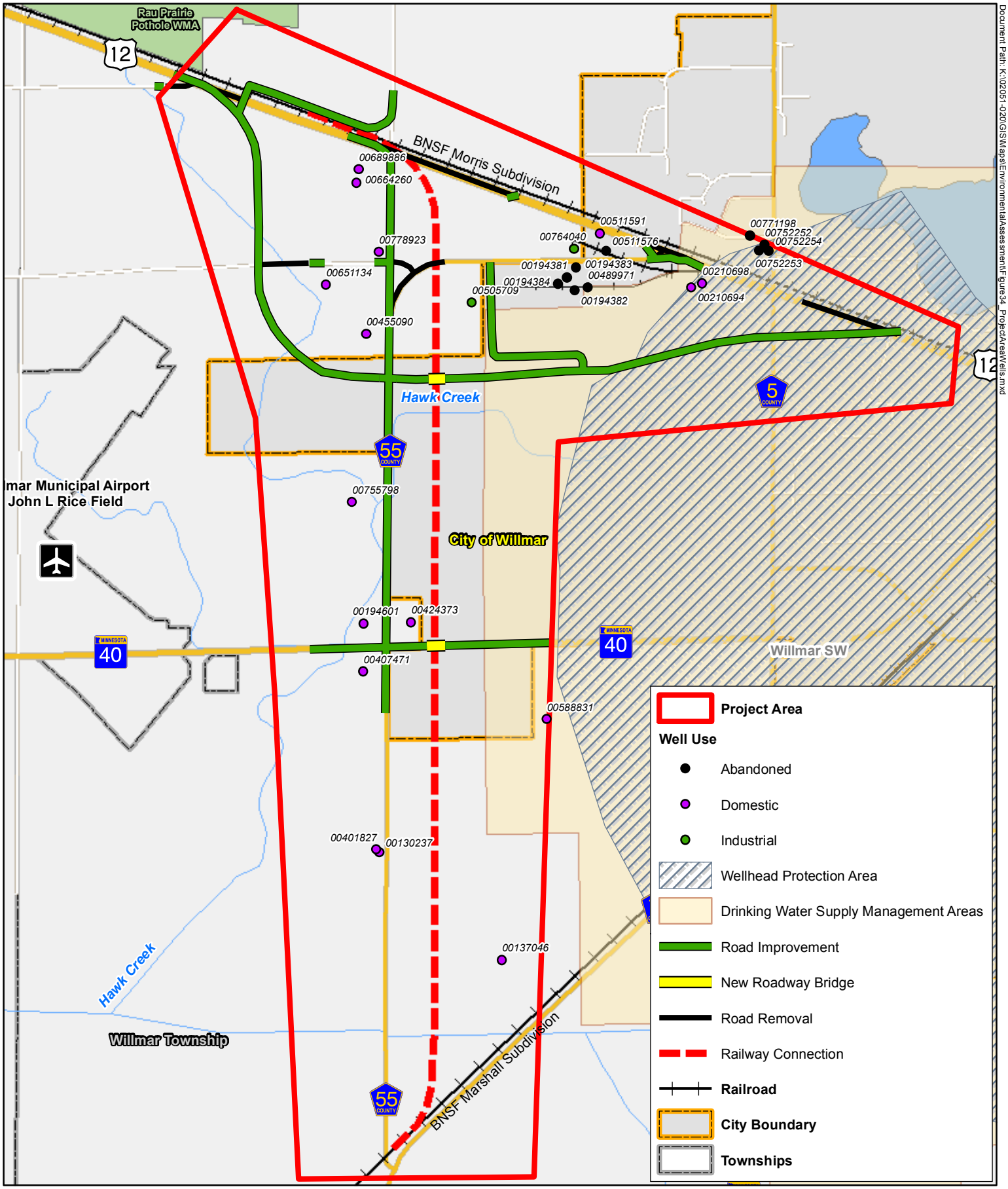
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 33b: Aquatic Resources
Willmar, MN

N

0 1,000 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure34_ProjectAreaWells.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

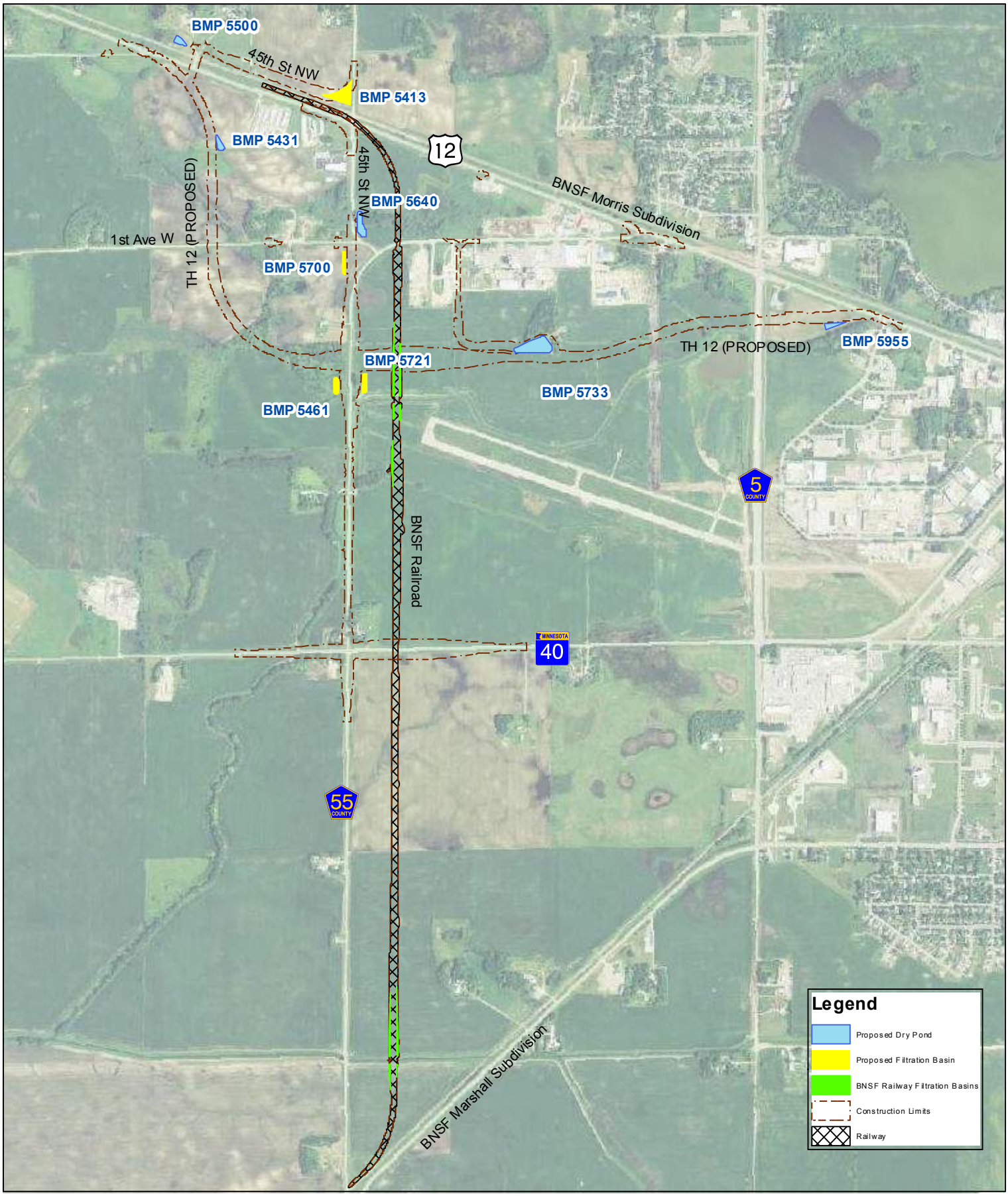
Figure 34: Project Area Wells

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,500 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 35: Stormwater Treatment

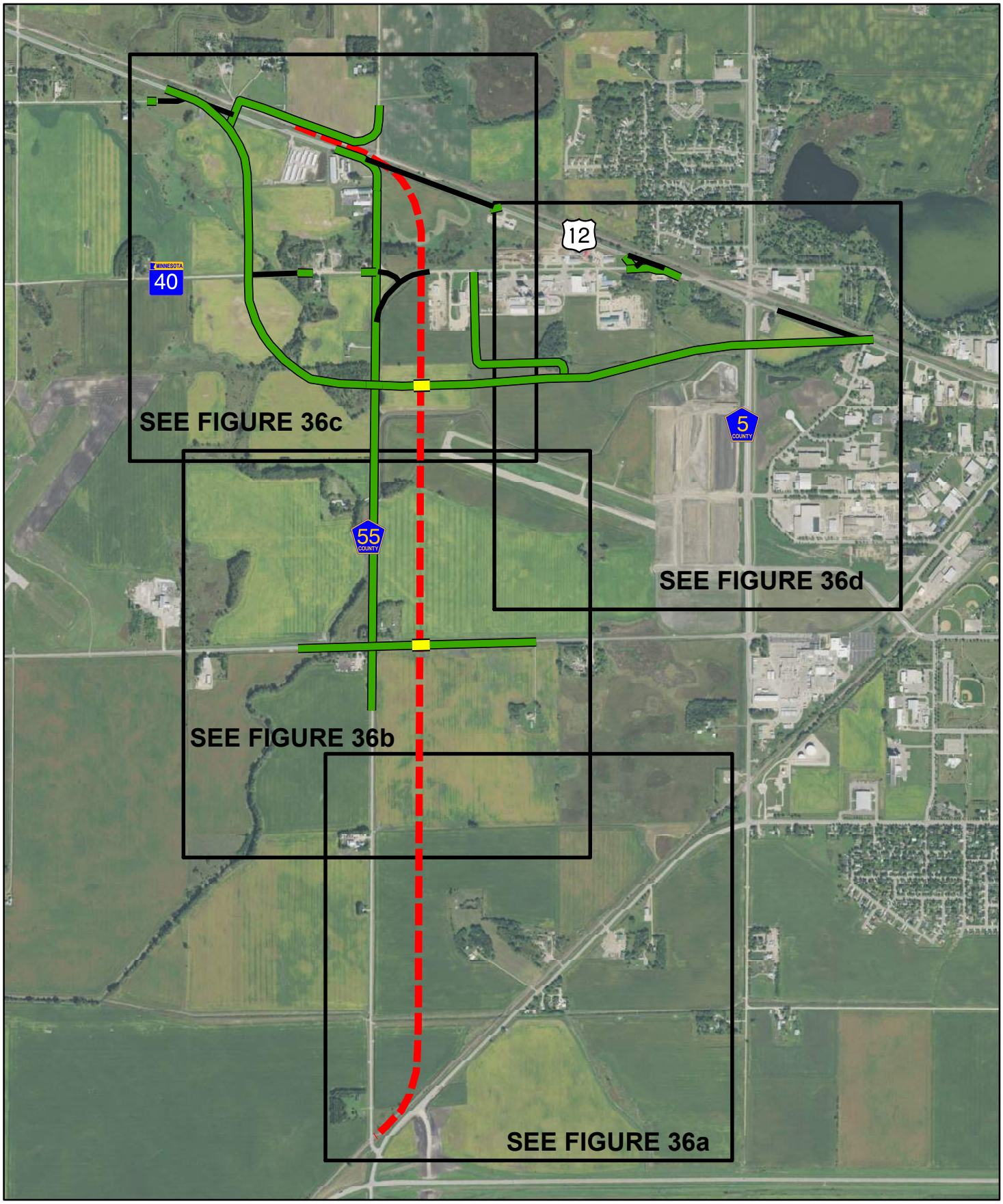
Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 600 1,200

Feet



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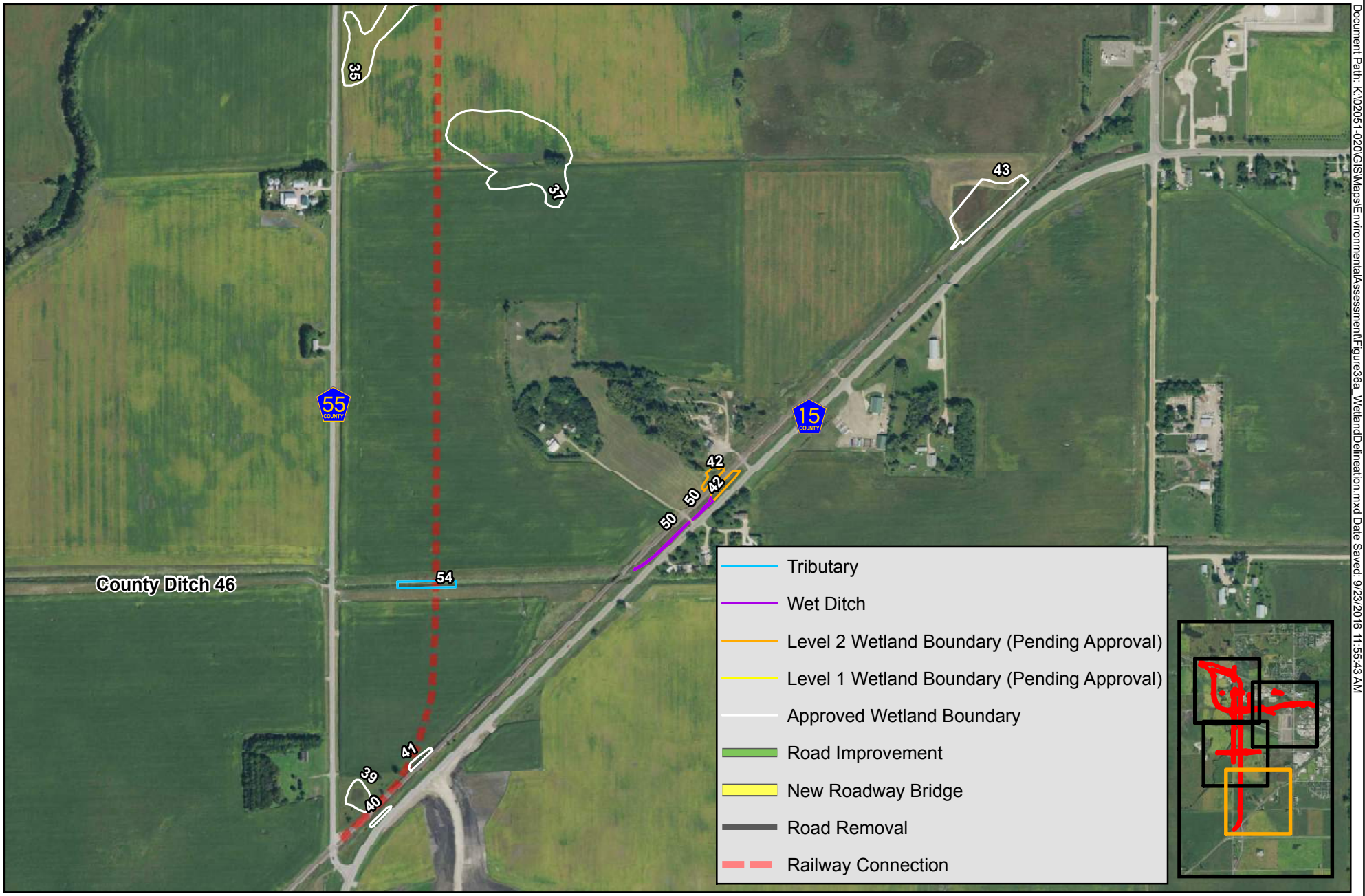
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 36 Overview: Wetland Delineation
Willmar, MN

N

0 1,000 Feet



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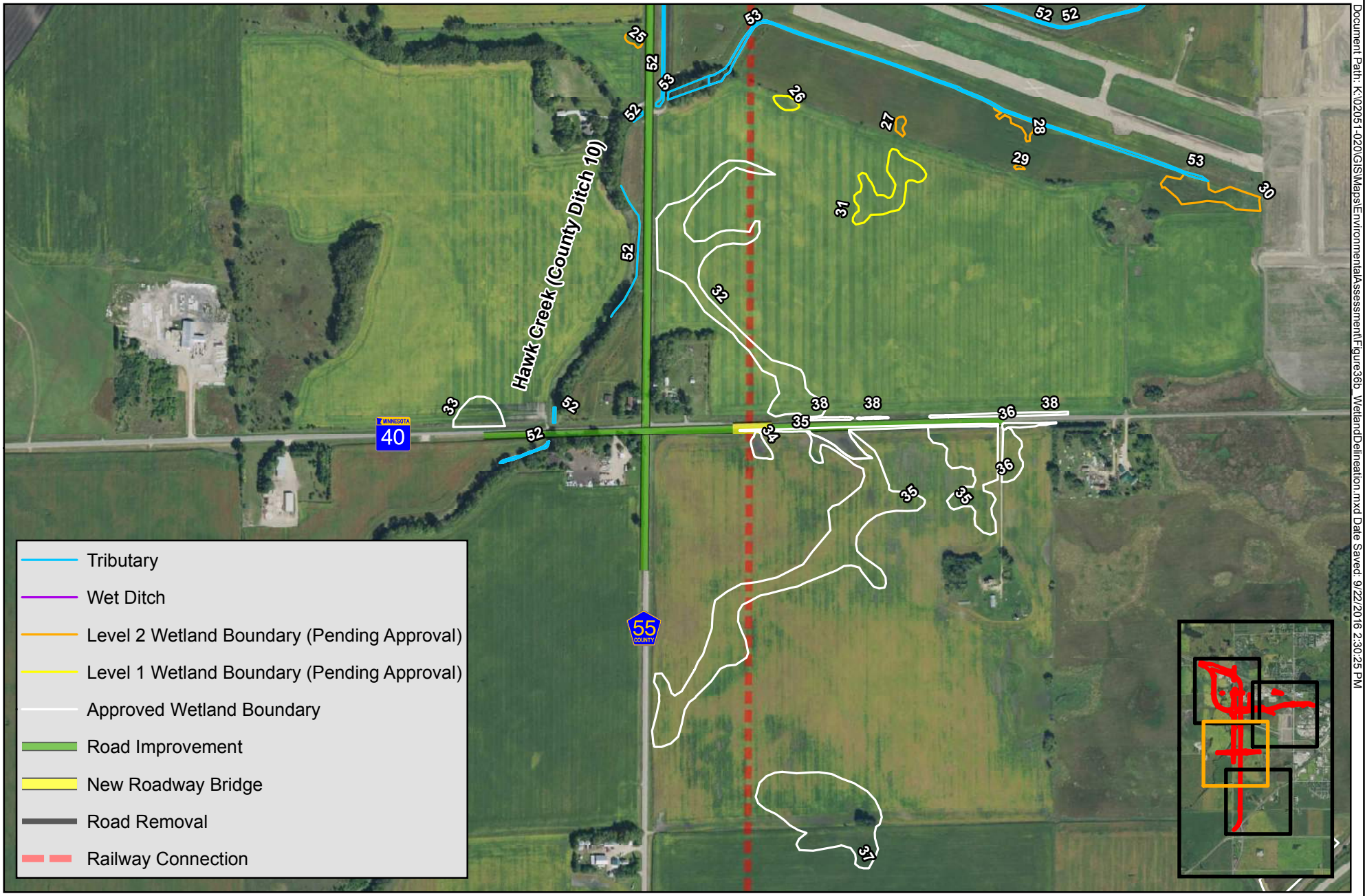
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 36a: Wetland Delineation
Willmar, MN

N

0 1,000 Feet



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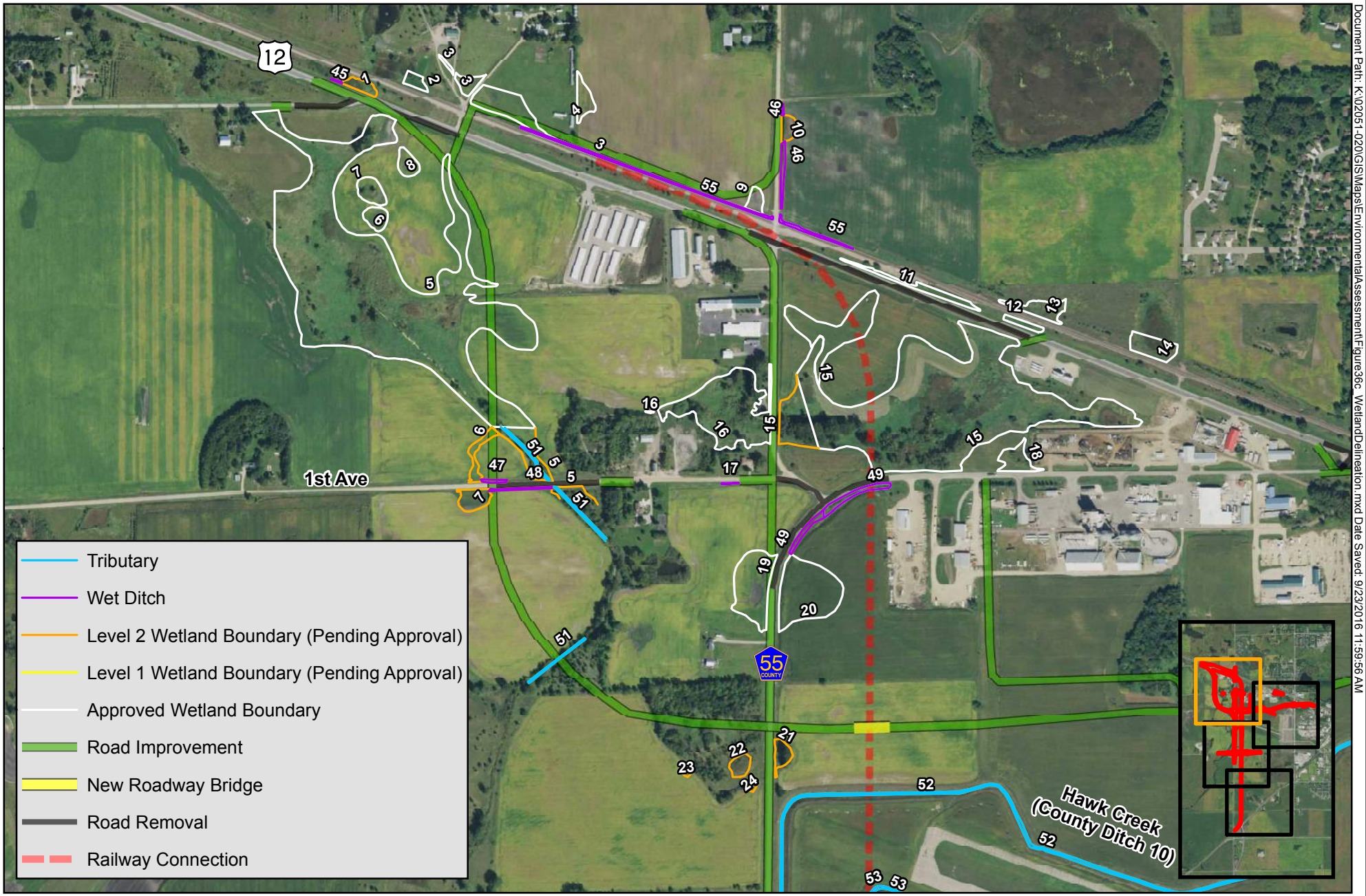
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 36b: Wetland Delineation
Willmar, MN

N

0 1,000 Feet



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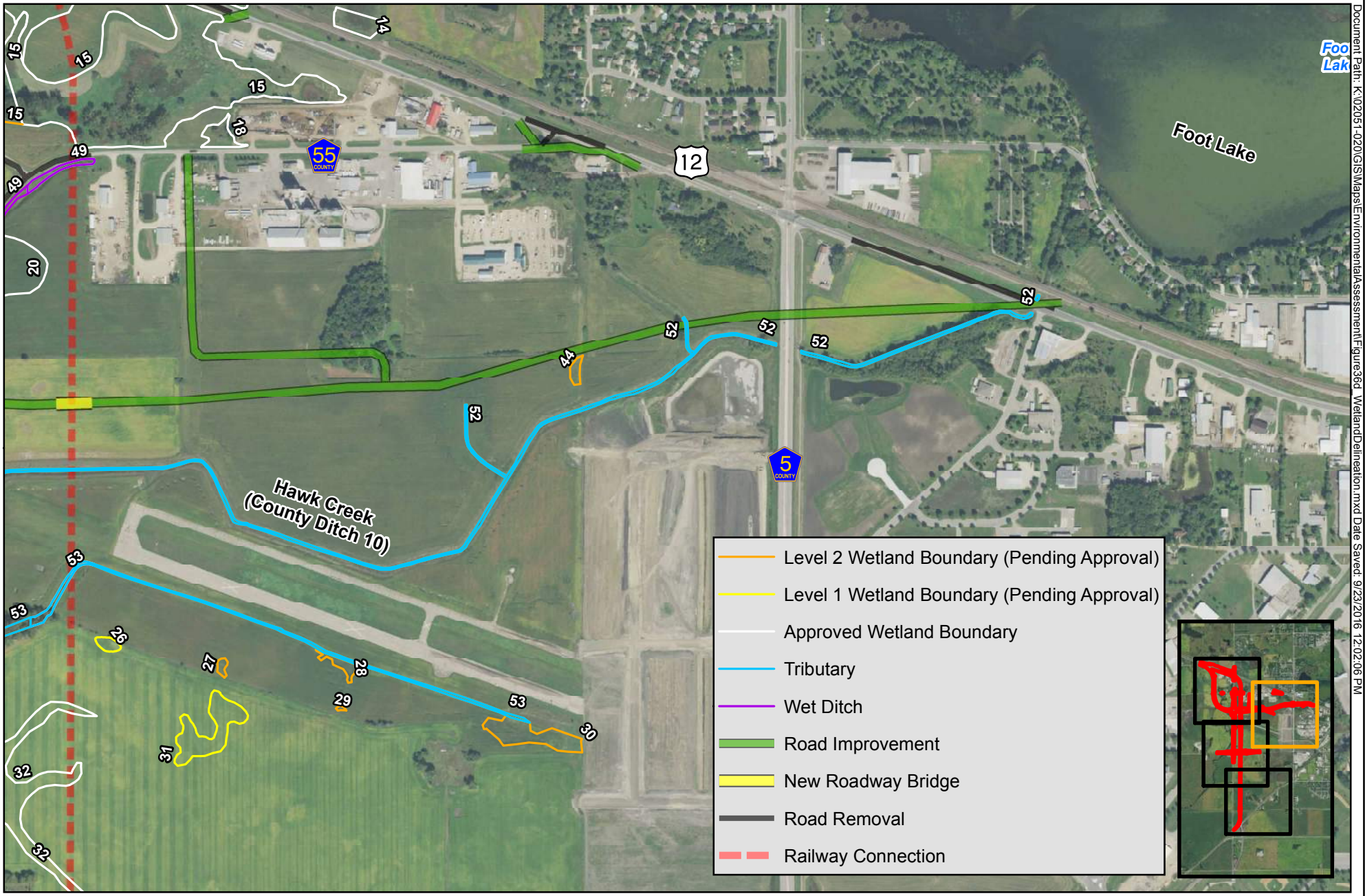
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 36c: Wetland Delineation
Willmar, MN

N

0 1,000 Feet



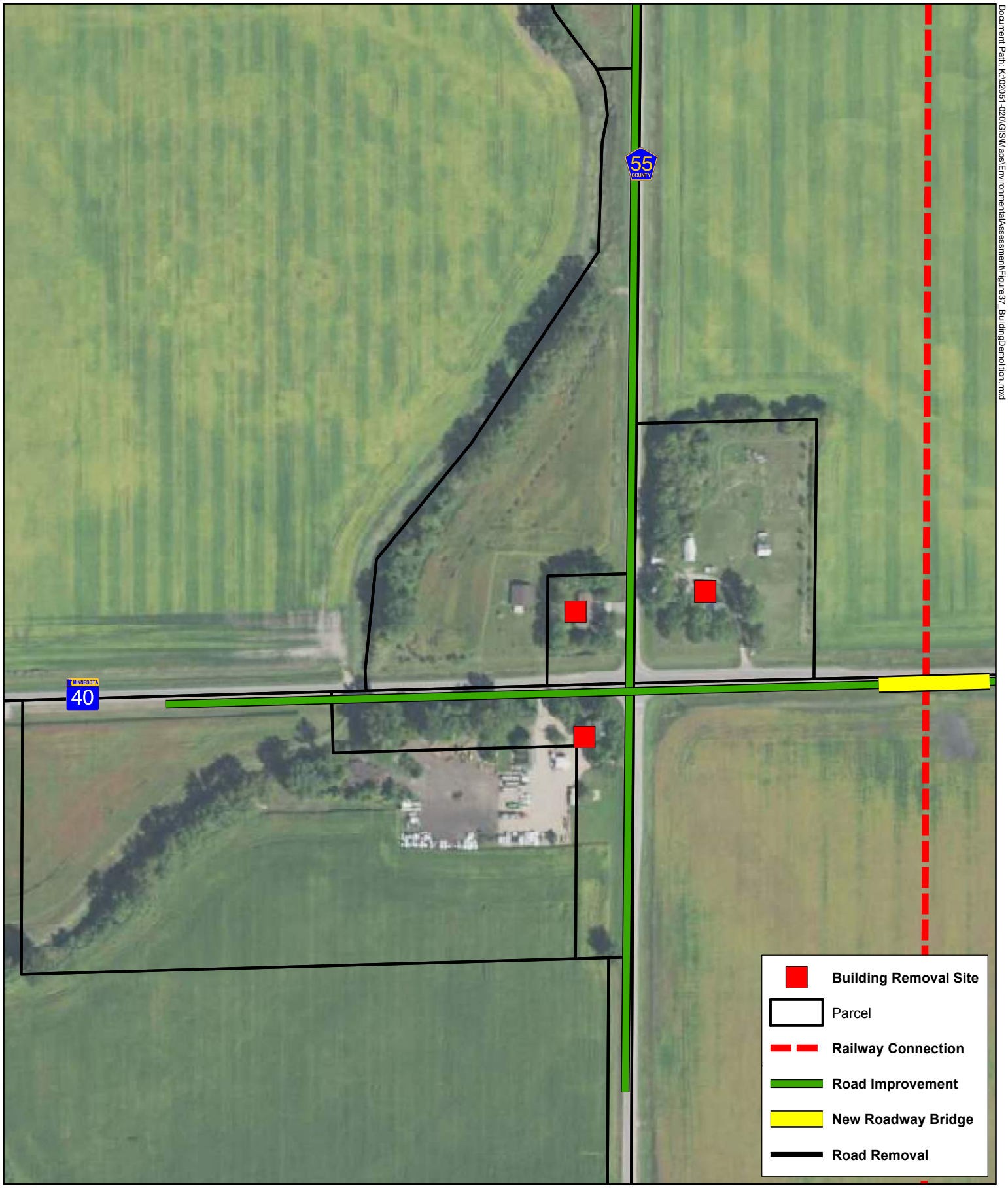
Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure36d_WetlandDelineation.mxd Date Saved: 9/23/2016 12:02:06 PM

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure 36d: Wetland Delineation
Willmar, MN

N

0 1,000 Feet



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DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

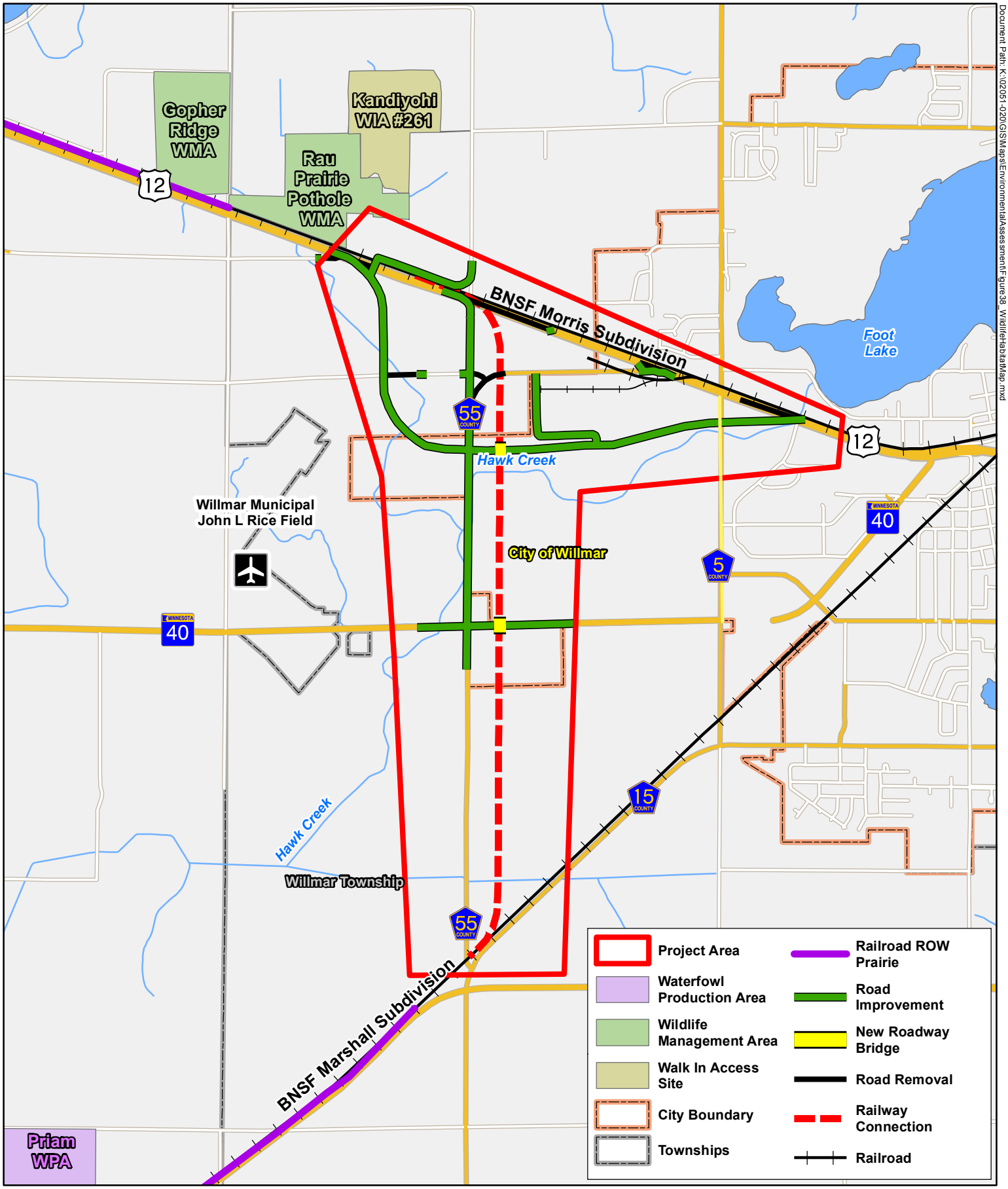
S.P. 3403-74

Figure 37: Building Removal

Willmar, MN

N

0 300 Feet



Document Path: K:\02051-020\GIS\Maps\EnvironmentalAssessment\Figure38_WildlifeHabitatMap.mxd

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

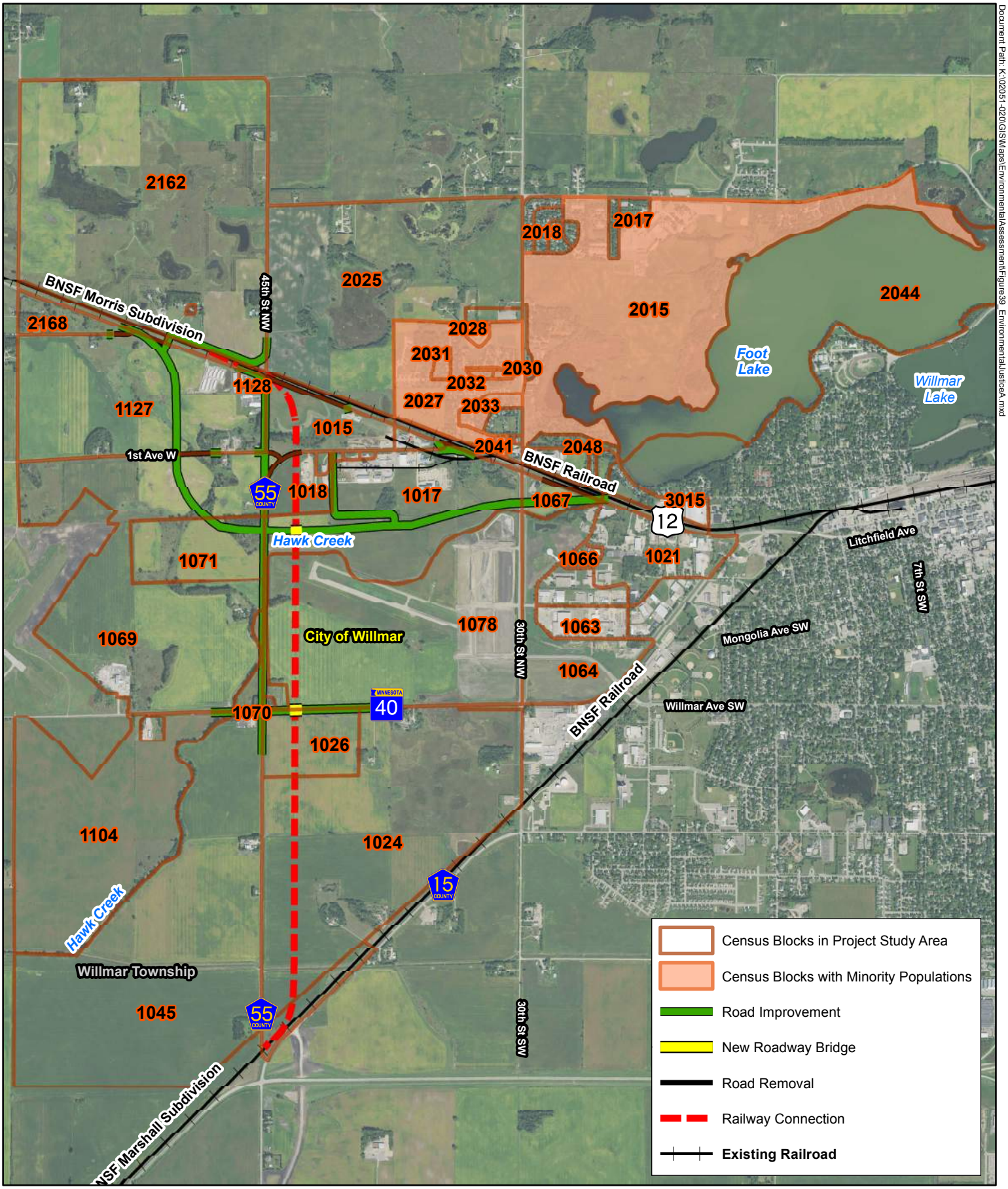
S.P. 3403-74

Figure 38: Wildlife Habitats

Willmar, MN

N

0 2,500 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure39_EnvironmentalJusticeA.mxd

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

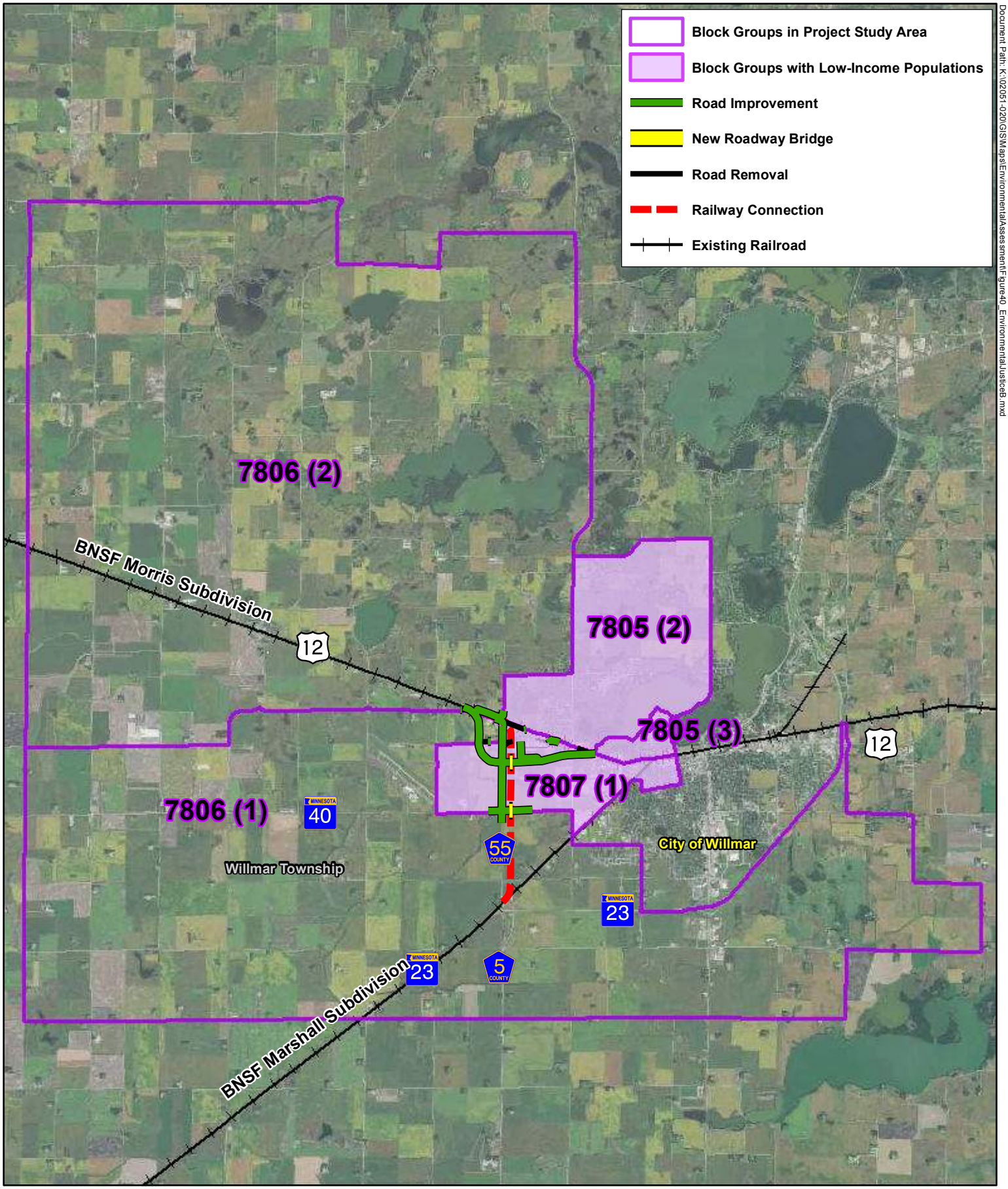
S.P. 3403-74

Figure 39: Census Blocks with Minority Populations

Willmar, MN

N

0 2,500 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure40_EnvironmentalJusticeB.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

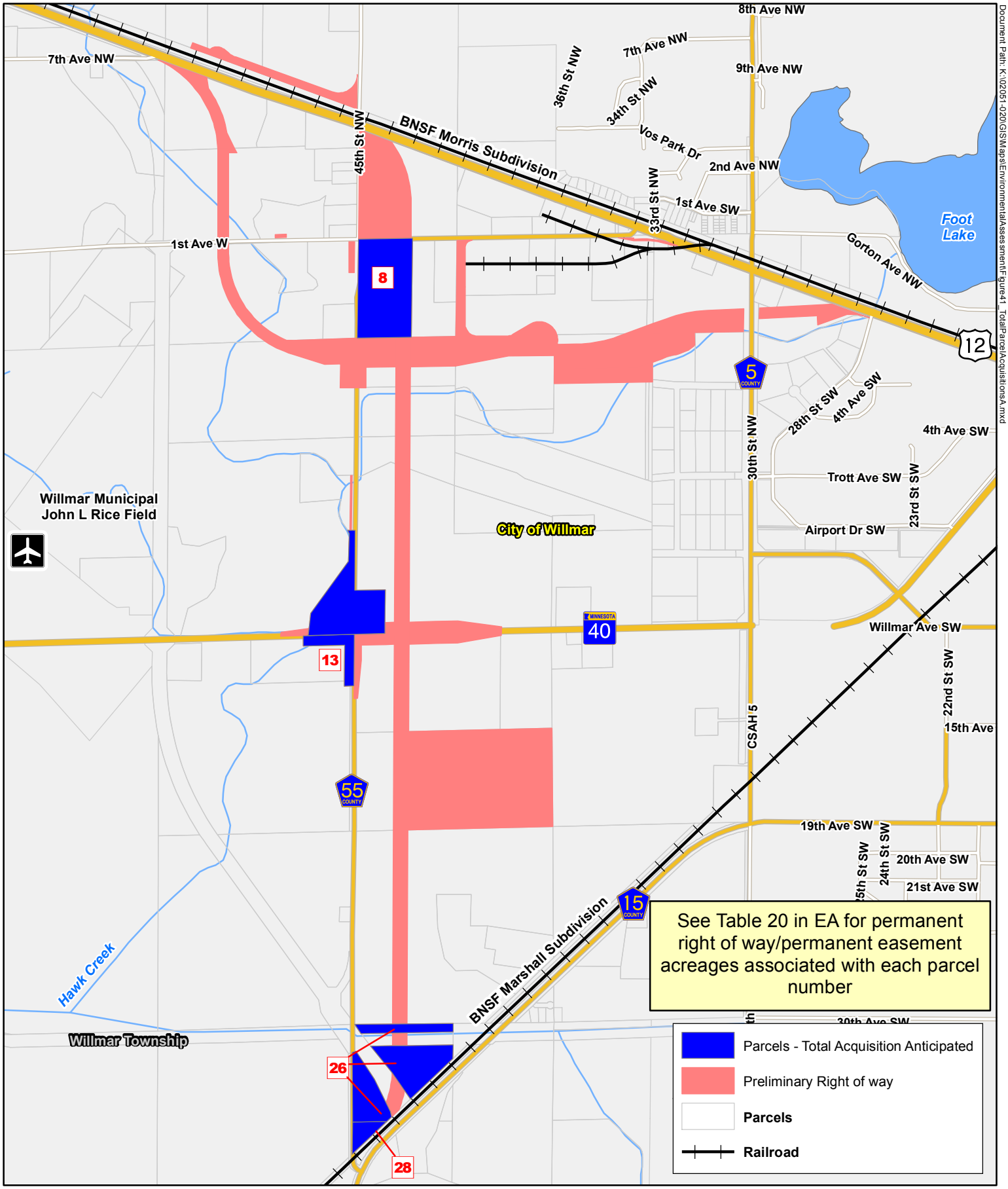
Figure 40: Census Block Groups with Low-Income Populations

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 9,600 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure41_TotalParcelAcquisitionsA.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

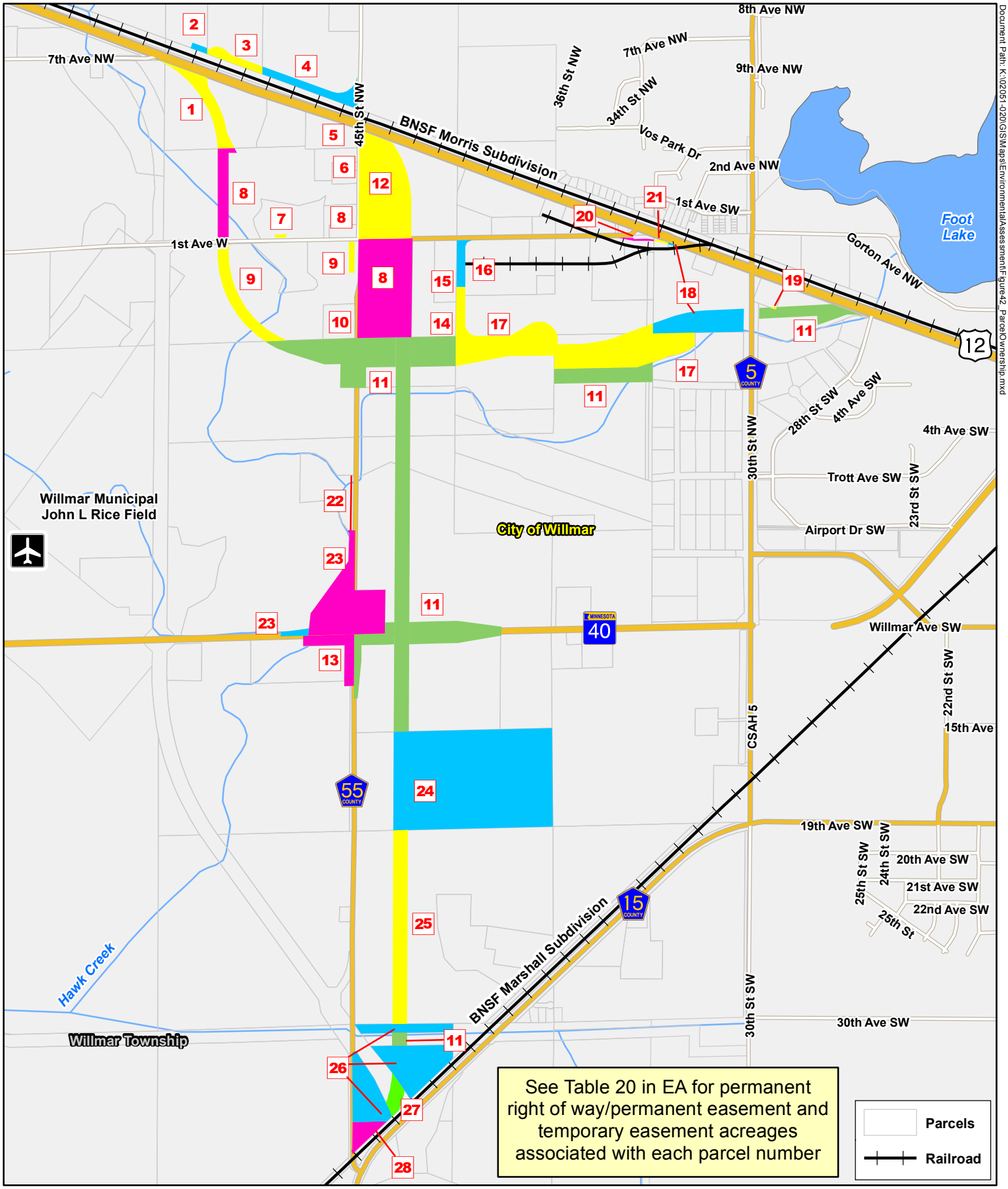
Figure 41: Total Parcel Acquisitions

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 1,700 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

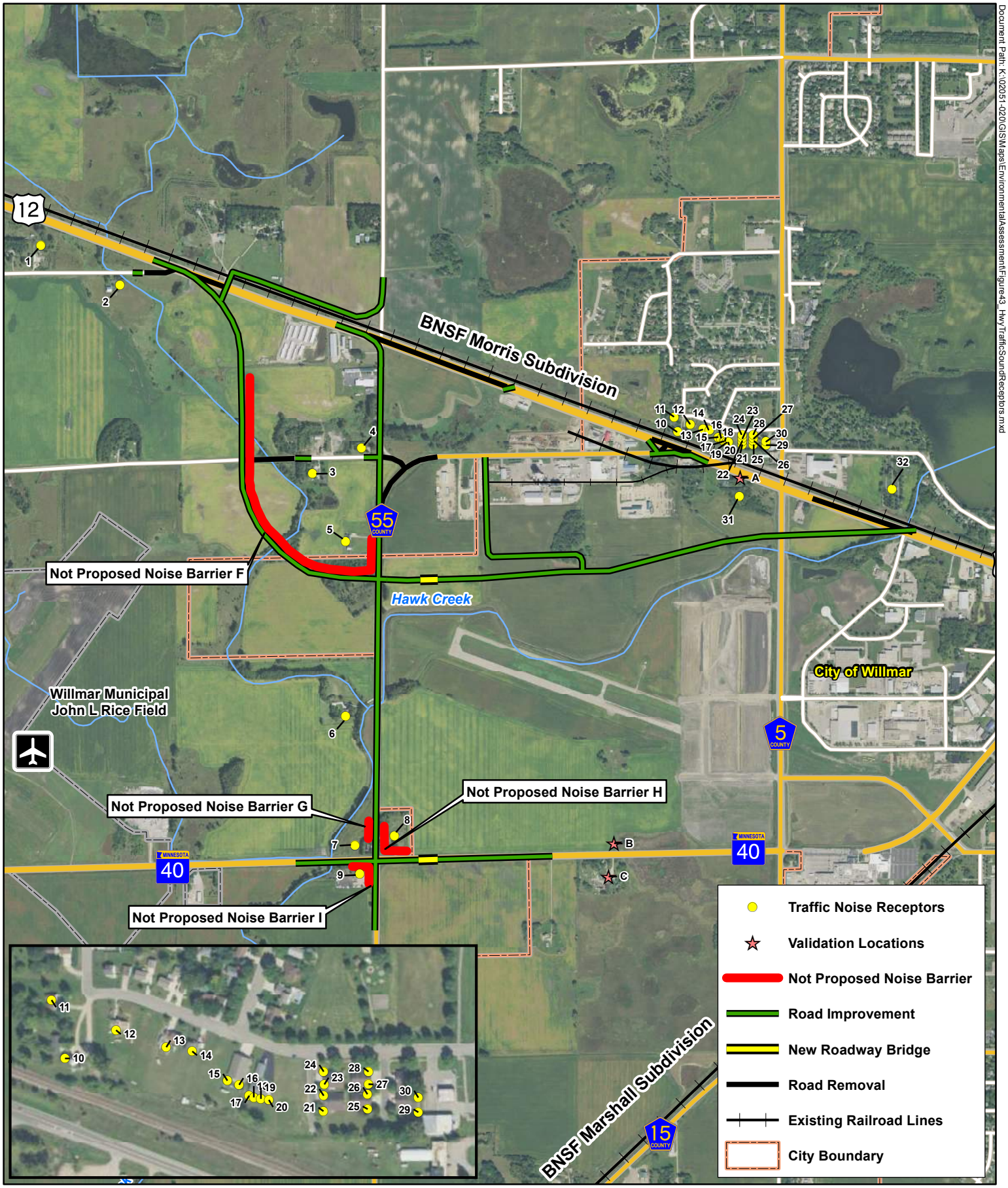
Figure 42: Right of Way Impacts

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 1,700 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure43_HwyTrafficSoundReceptors.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

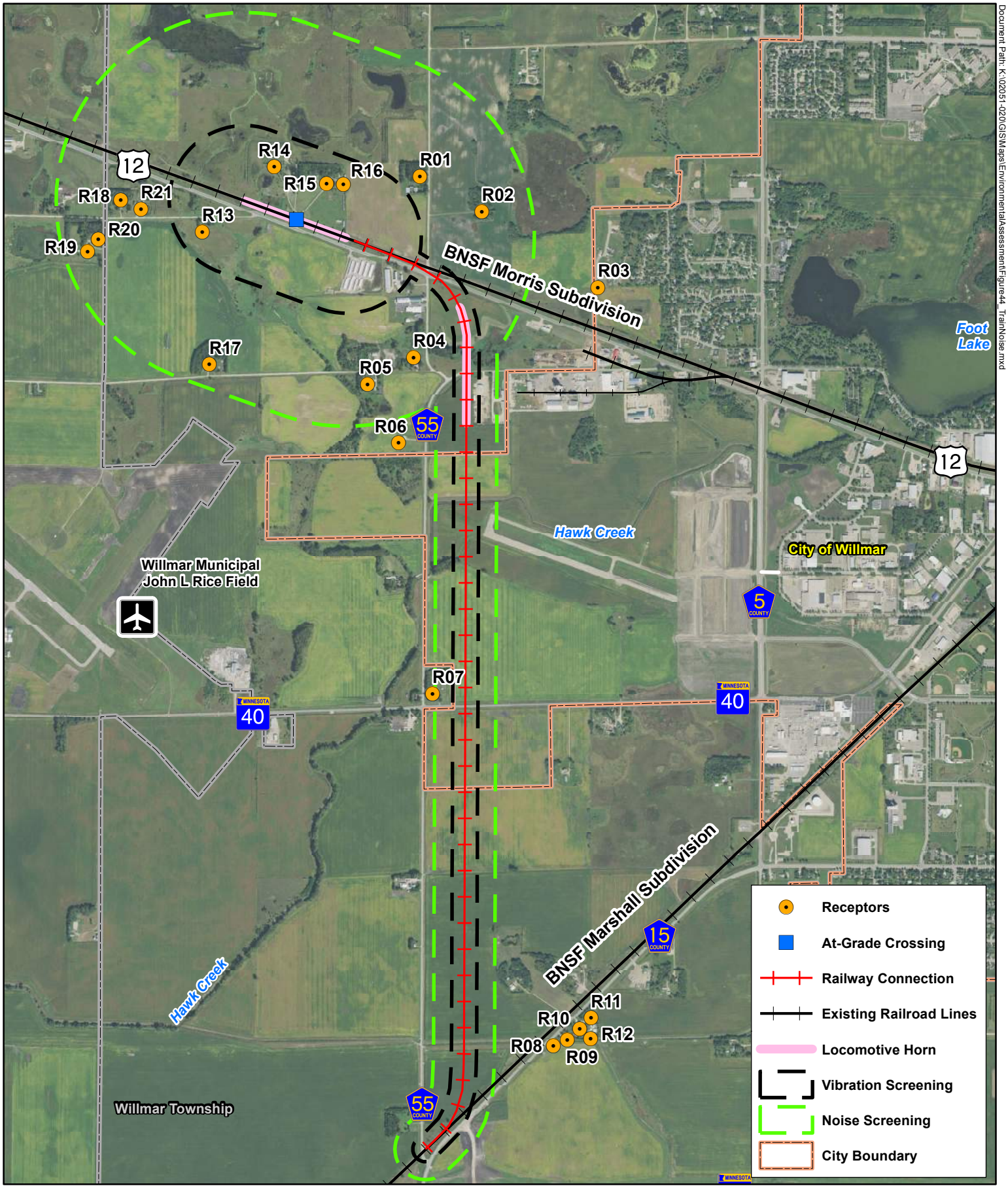
Figure 43: Highway Traffic Sound Receptors

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 1,500 Feet



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure44_TrainNoise.mxd

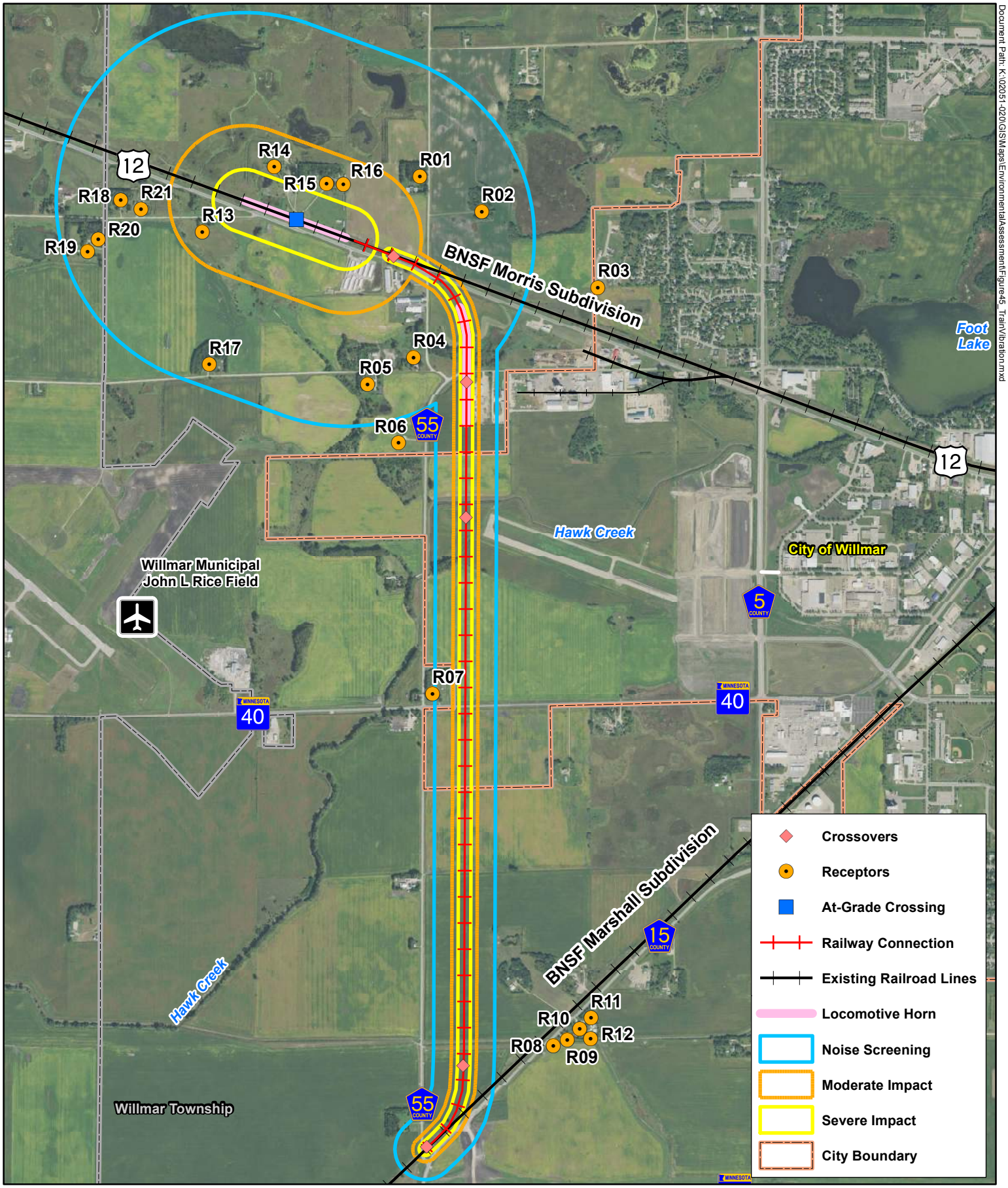
DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 44: Train Noise

Willmar, MN



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Figure45_TrainVibration.mxd

DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project

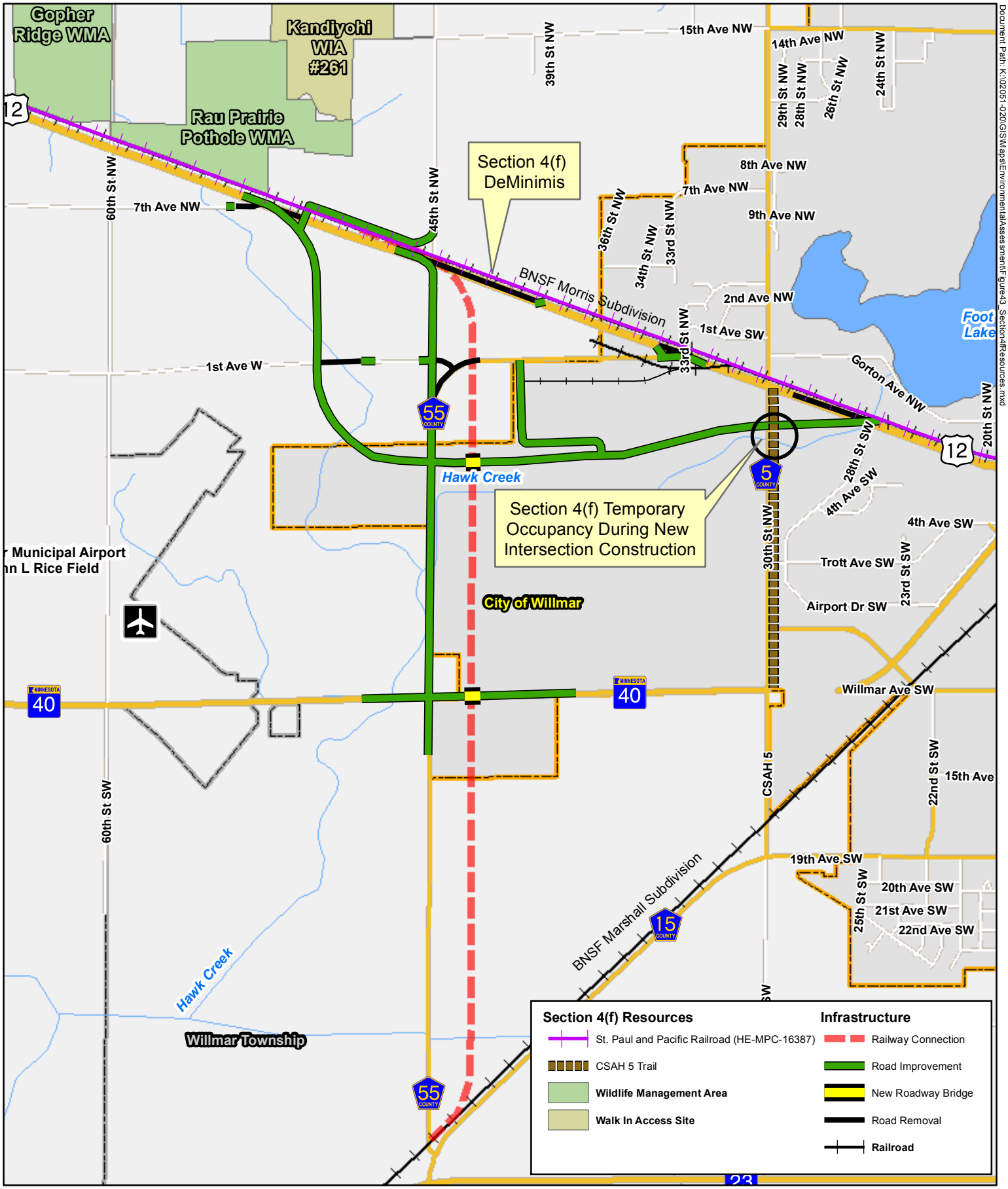
S.P. 3403-74

Figure 45: Train Vibration

Willmar, MN

N

0 2,000 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 46: Section 4(f) Resources

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 2,500 Feet

Appendix B – Traffic Memo

Building a legacy – *your* legacy.

701 Xenia Avenue South
Suite 300
Minneapolis, MN 55416
Tel: 763-541-4800
Fax: 763-541-1700

To: ***MnDOT***

From: ***Sudheer Dhulipala, PE, PTOE***

Cc: ***Tony Heppelmann, PE, Jack Corkle, AICP***

Date: ***September 23, 2016***

Re: ***Traffic forecasting Assumptions and Methodology***
WSB Project No. 02051-020

Introduction

This memo summarizes the assumptions and methodology used in forecasting traffic volumes on roadways near Willmar for the Willmar Wye project. The proposed Willmar Wye project is located in the western portion of the City of Willmar. The project includes constructing a new railway connection between the Morris and Marshall Subdivisions of the BNSF Railway. The proposed railway alignment would cross three existing roadways; Trunk Highway (TH) 12, TH 40 and 1st Avenue/CSAH 55. Because the railway will impact the highway transportation network, two primary alternatives were developed to address the impacts associated with the railway on TH 12. Alternative 1 (Figure 1) leaves TH 12 on its present alignment but requires TH 12 to be placed on walls within a portion of the project area. It also includes a grade separated crossing of the railway. Alternative 2 (Figure 2) realigns TH 12 to the south in order to eliminate the retaining walls. It too includes a grade separated crossing over the railway for TH 12. Three sub-alternatives within Alternative 2 were analyzed. Alternative 2A (Figure 2) provides access to 1st Avenue from the west through an at-grade crossing and includes a quadrant interchange at the intersection of TH 12 and CSAH 55. In Alternative 2B (Figure 3), instead of a grade crossing on 1st Avenue, a local access road is constructed from TH 12 to provide west access to 1st Avenue. In Alternative 2C (Figure 4), there is no access from the west to 1st Avenue and vehicles would need to find alternative routes to reach their destinations on 1st Avenue. In Alternatives 2B and 2C the intersection of TH 12 and CSAH 55 is at grade. It is anticipated that the project will include an overpass of the proposed railway on TH 40. Traffic forecasts were developed for all alternatives.

Existing Traffic Volumes

Existing hourly turning movement traffic counts by mode were obtained in second week of June, 2016 at the intersections of CSAH 55/45th St NW, CSAH 55/TH 40, 45th St/TH 12, and TH 12/CSAH 5 for 24 hours. The traffic counts are shown in the appendix.

Figure 5 shows the existing 2016 ADT from recent traffic counts where available and from MnDOT traffic data for locations that were not counted.

Year 2020 Forecasts

Year 2020 forecasts were estimated using the MnDOT traffic projection factor for Kandiyohi County and adjustments for changes in the transportation network. The MnDOT traffic projection factor for Kandiyohi County is 1.0 which means that the anticipated growth rate of traffic in the area is 0%. (Source: http://www.dot.state.mn.us/stateaid/csah/projection-factors.pdf). It should be noted that Year 2020 No-Build forecasts are the same as existing counts as there is no change that will cause traffic volumes to change and growth rate is 0%.

As part of this project, the intersections of CSAH 55 and TH 40 and 45th Street with TH 12 will be reconstructed. The intersection of CSAH 55 and 19th Avenue is also proposed to be upgraded by Kandiyohi County. So, year 2020 traffic volumes are expected to be the same as existing volumes in Alternative 1 except for some diversion of traffic to CSAH 55 due to improvements being proposed along CSAH 55. WSB estimated how much traffic would divert to CSAH 55 based on the new alignment of roadways. It was estimated that 10% of the traffic from US 12 destined to the Southeast part of Willmar and 5% of the traffic from TH 23 to the Northwest part of Willmar would redirect to CSAH 55 due to improvements along CSAH 55. Figure 6 shows the estimated traffic diversion due to the improvements on CSAH 55.

The Year 2020 forecast for Alternative 1 shown in Figure 7 was obtained by adding the diverted traffic to existing ADTs. The existing 45th Street intersection on TH 12 will be closed and so the vehicles that were on 45th Street before are also redistributed based on the new alignment.

In Alternative 2A, 2B and 2C, the Year 2020 forecasts were obtained by adding the estimated diverted traffic volumes to the existing counts. In Alternative 2A, there is connection from TH 12 and the new 45th Street intersection to 1st Avenue and an at-grade rail crossing is provided. It is estimated that 400 vehicles a day access the developments on 1st Avenue from the west based on existing traffic counts. Half of these vehicles will use the existing alignment of US 12 to access 1st Avenue while the other half will arrive from the south via CSAH 55. In Alternative 2B there is a local road connection from the new TH 12 to 1st Avenue. Vehicles arriving from the west and south use this access to reach their destinations on 1st Avenue.

Alternative 2C is similar to 2B except that there is no local road connection to 1st Avenue from the west. This would cause vehicles going to 1st Avenue from the South and West to choose alternate routes to access their destinations on 1st Avenue. The estimated impacts of these 400 vehicles choosing different routes are shown in the appendix. These are added to the existing counts and diversion to CSAH 55 impacts similar to Alternative 2B to obtain the forecasted 2020 ADT for Alternative 2C.

The Year 2020 forecasts for Alternatives 2A, 2B and 2C are shown in Figures 8, 9 and 10.

Year 2040 Forecasts

The 2040 Forecasts assume zero percent growth in background traffic and full build-out of the industrial park proposed near CSAH 5 and TH 40. Therefore 2040 Traffic forecasts are the 2020 forecasts plus the traffic from the proposed Industrial Park. The location of the proposed industrial park is shown in Figure 11. The site plan for the proposed industrial park is shown in Figure 12. Figure 13 shows the estimated percentage of the site generated trips by approach direction. These trips are assigned to the transportation network based on the shortest travel time between the origins and destinations. Trip approach direction for the trips shows which direction will be the origin or ultimate destination of the trips from the industrial park. The trip assignment shows which route the vehicles are likely to choose to come from these origins or reach these destinations.

The estimated trip generation from the industrial park was calculated using ITE Trip Generation Manual 9th Edition. The estimated trip generation for the industrial park is shown in the table below.

Table 1: Trip Generation From Industrial Park

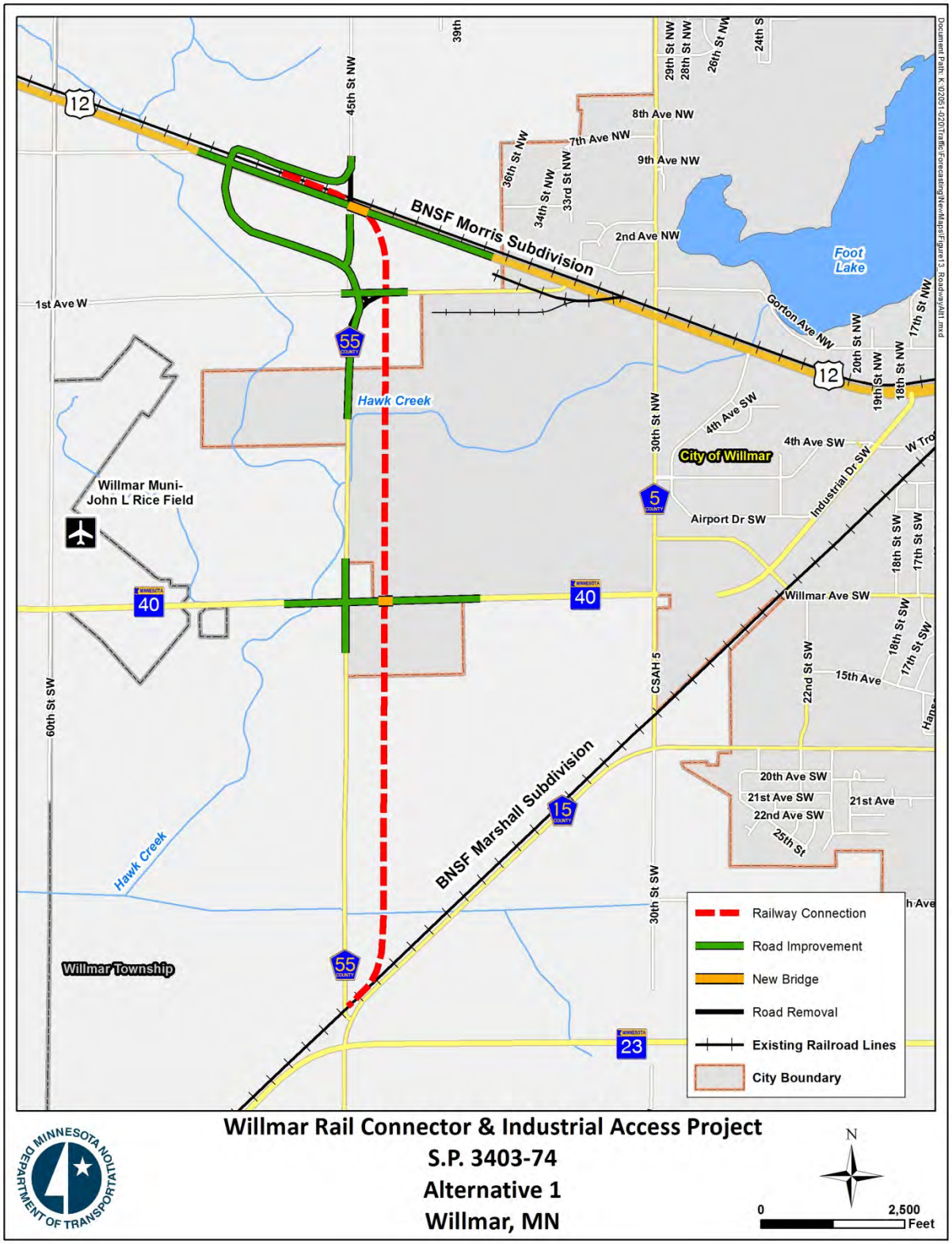
Acres	Weekday Trips	Peak Hour Trips	
		AM	PM
78.82	4289	506	495

In both AM and PM peak periods, approximately 500 trips are generated. The daily and peak hour trips are assigned to the network as shown in Figures 14 and 15. There will be no significant difference in the industrial park impacts between the Alternatives 2A, 2B and 2C, so one figure is shown for Alternative 2.

Year 2040 Forecasts for a No-Build alternative were developed by adding the industrial park traffic to the existing traffic. The assumptions in this scenario were that there would be no diversion of traffic to CSAH 55 from US 12 or TH 23 and that the industrial park would be in place and fully built out. The forecasted ADT for this alternative is shown in Figure 16.

The ADTs for Year 2040 for Alternative 1 are shown in Figure 17 and for Alternatives 2A, 2B and 2C in Figures 18, 19 and 20 respectively.

Figure 1



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 1
Willmar, MN

Figure 2

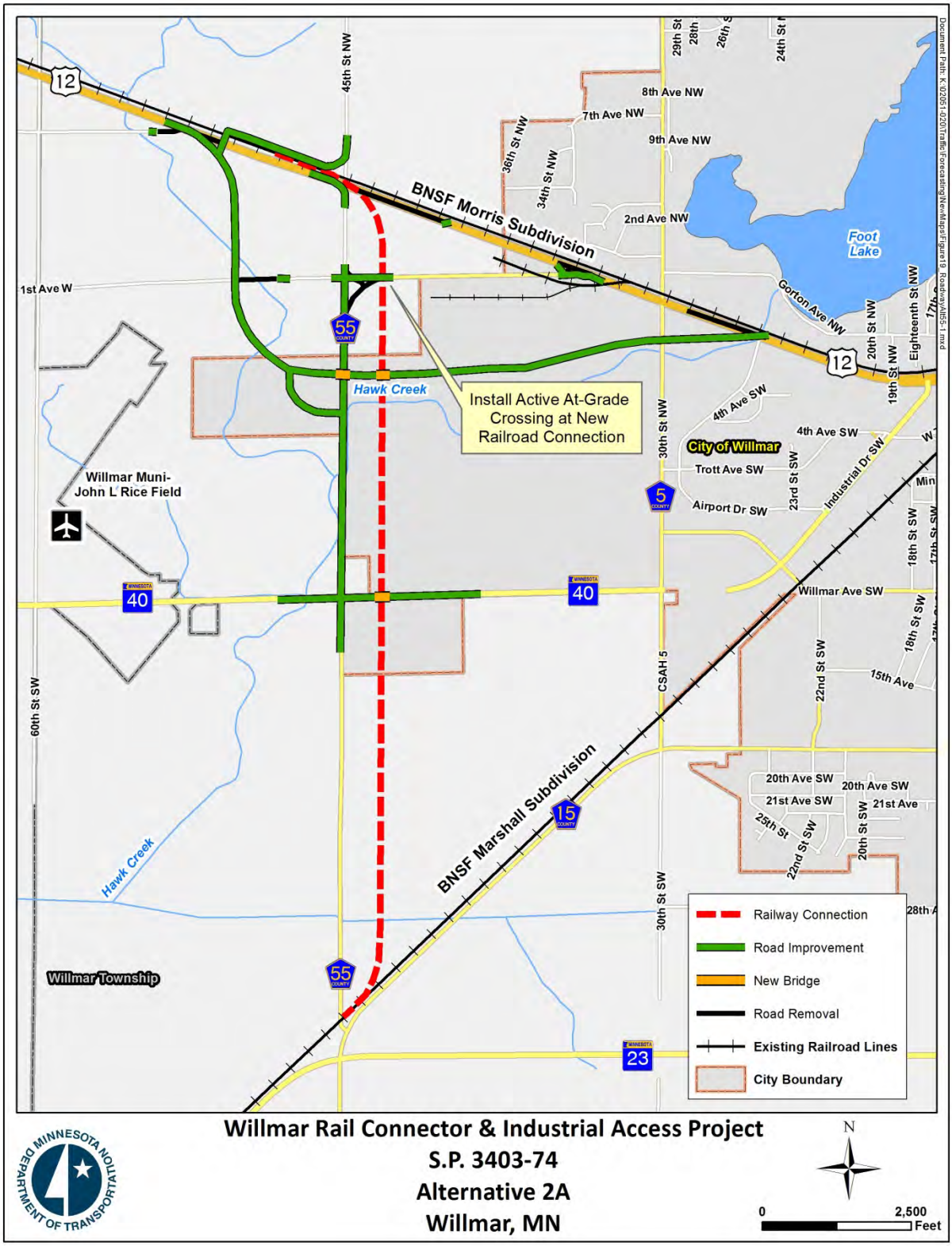
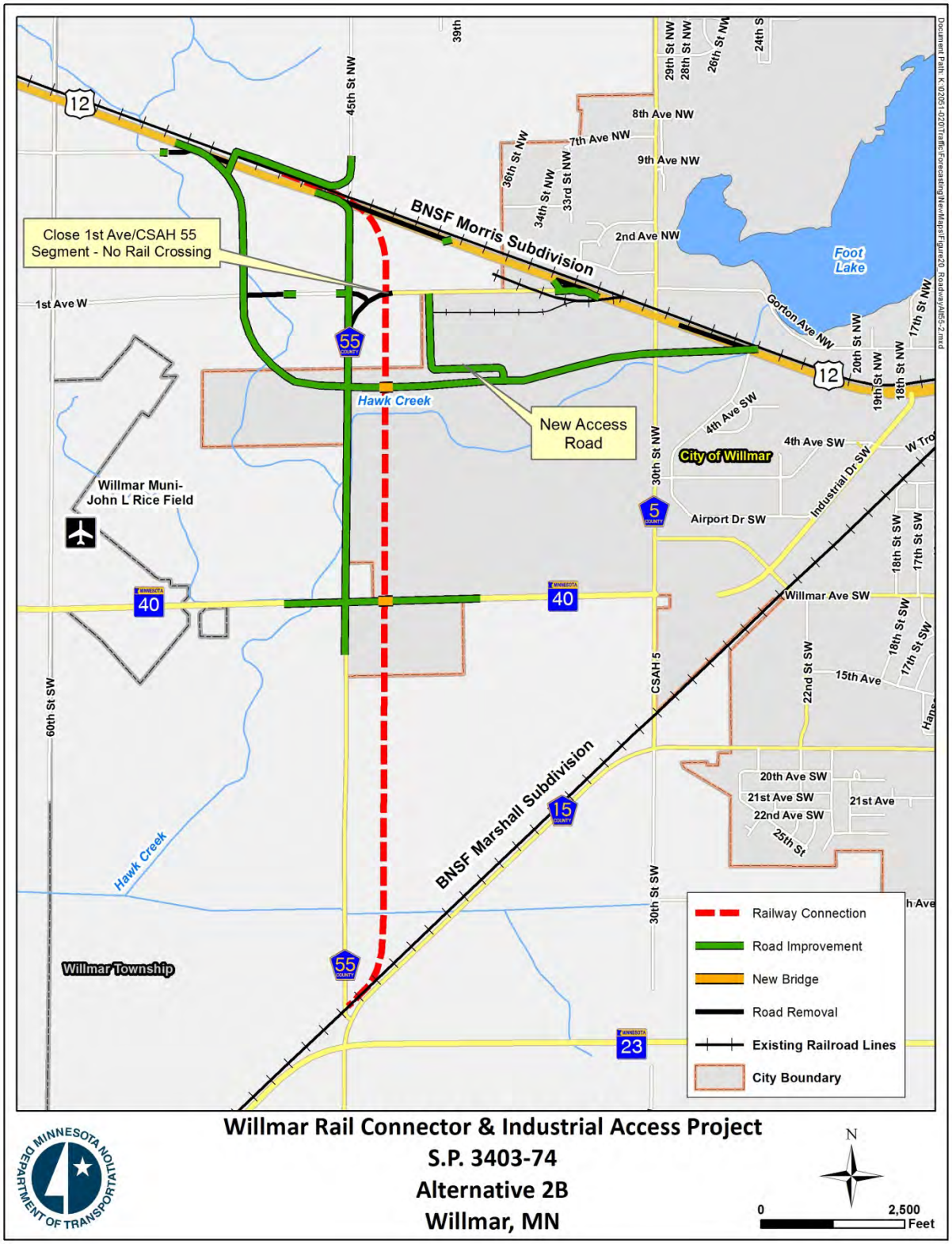
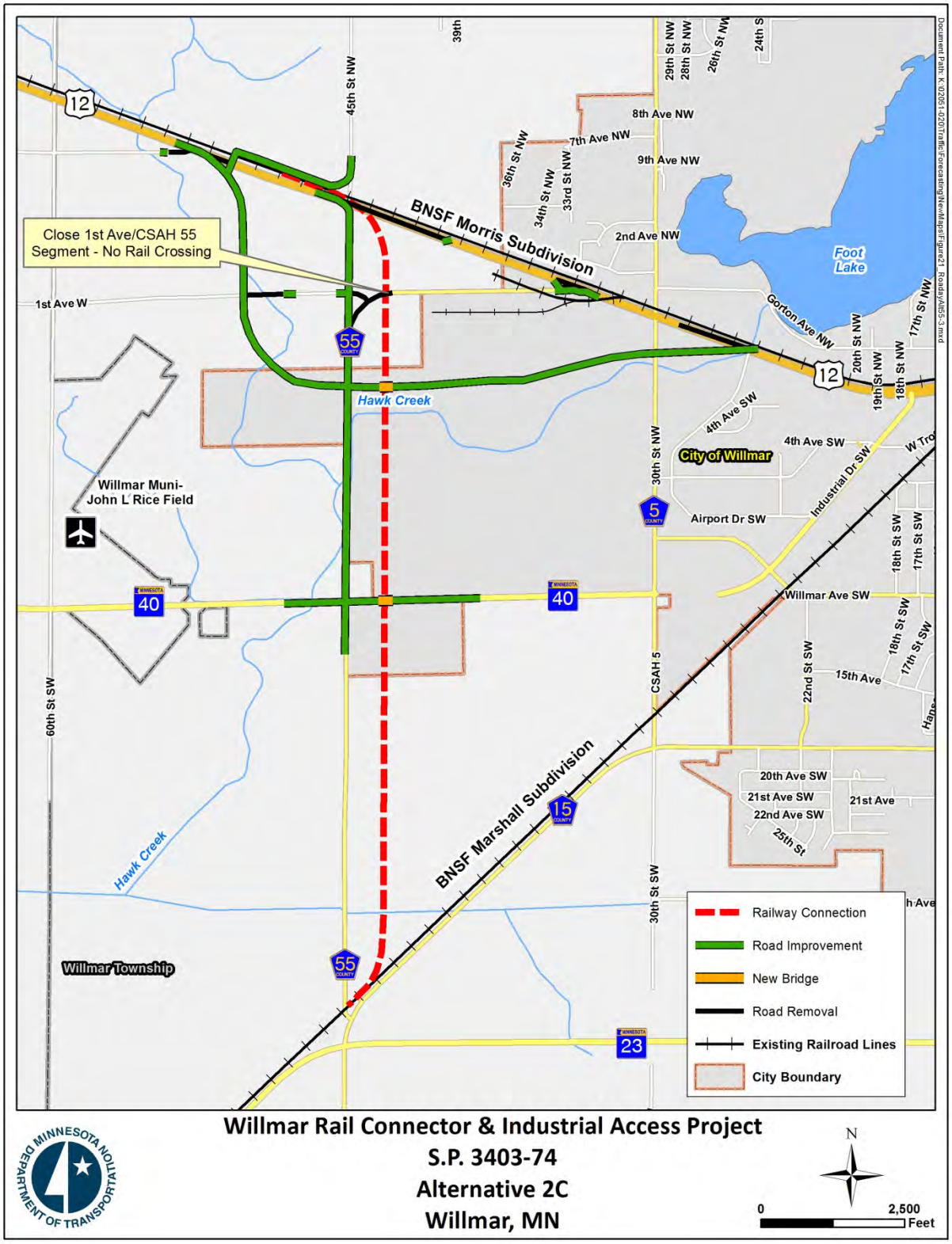

BNSF Morris Subdivision
BNSF Marshall Subdivision
Install Active At-Grade Crossing at New Railroad Connection
Hawk Creek
Foot Lake
Willmar Muni-John L Rice Field
City of Willmar
Willmar Township
45th St NW
30th St NW
60th St SW
CSAH 5
Gorton Ave NW
Willmar Ave SW
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2A
Willmar, MN
N
0
2,500
Feet

Figure 3



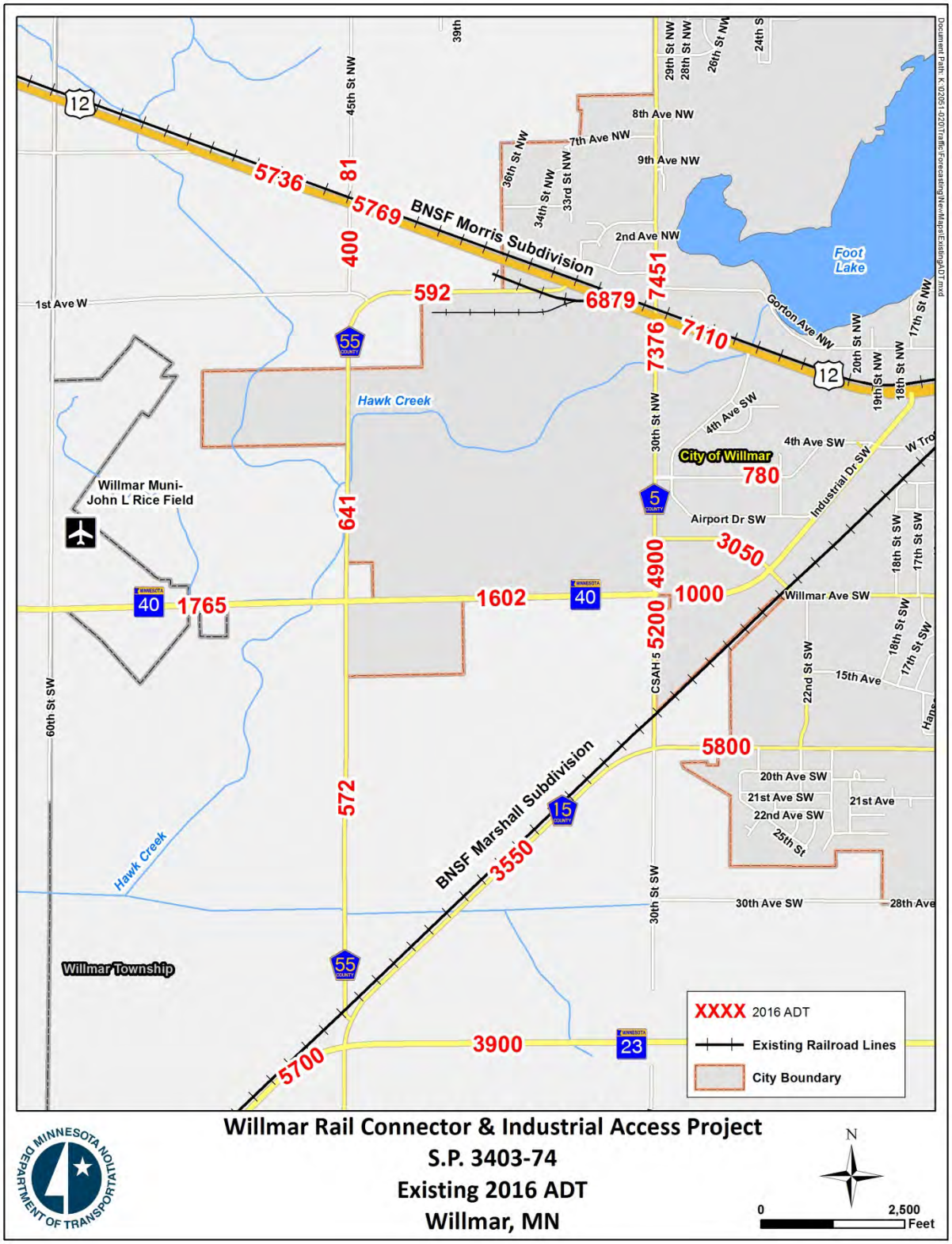
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2B
Willmar, MN

Figure 4



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2C
Willmar, MN

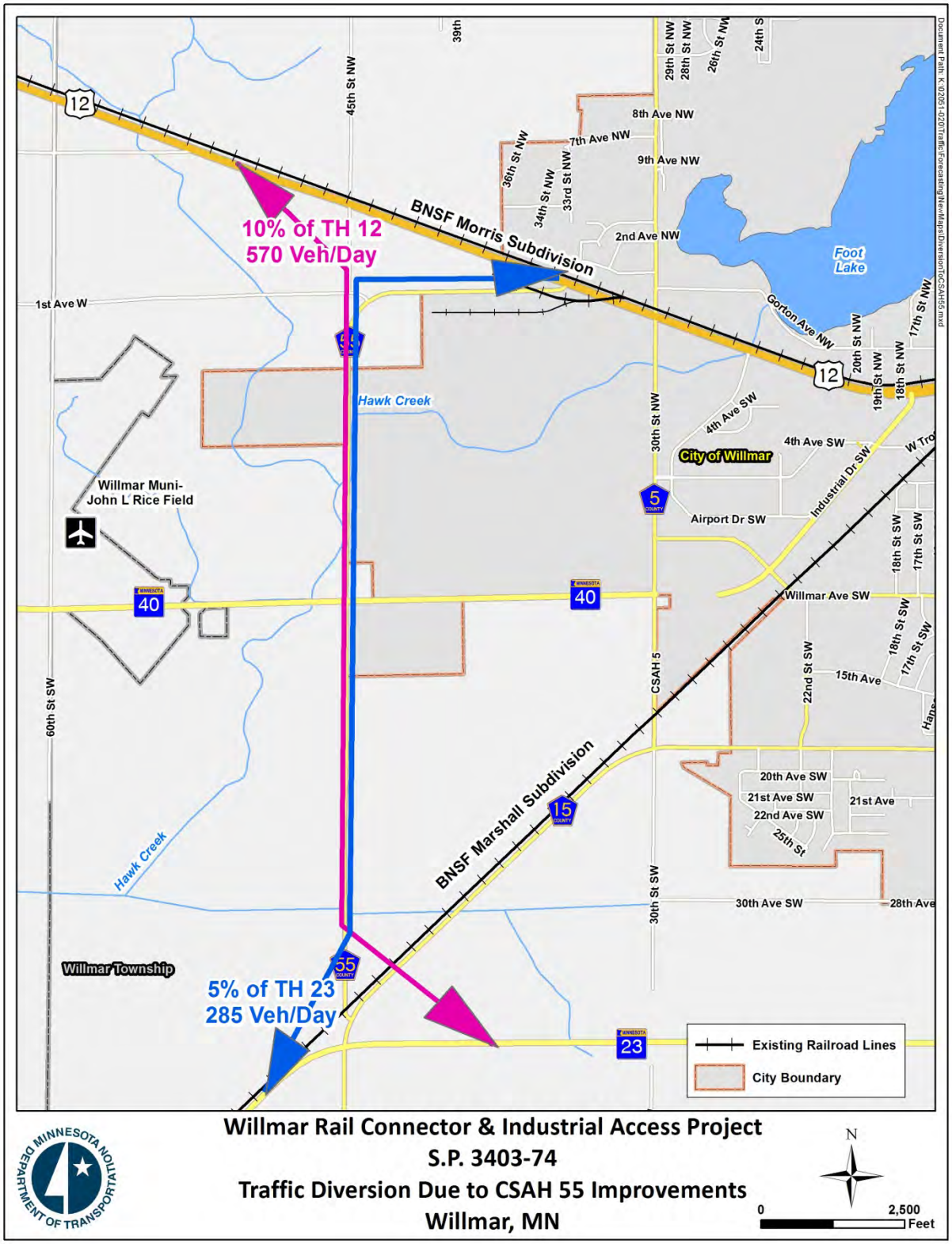
Figure 5



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Existing 2016 ADT
Willmar, MN

Source: Traffic Counts Collected by WSB in 2016 and MnDOT Traffic Data ADT Map

Figure 6



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Traffic Diversion Due to CSAH 55 Improvements
Willmar, MN

Figure 7

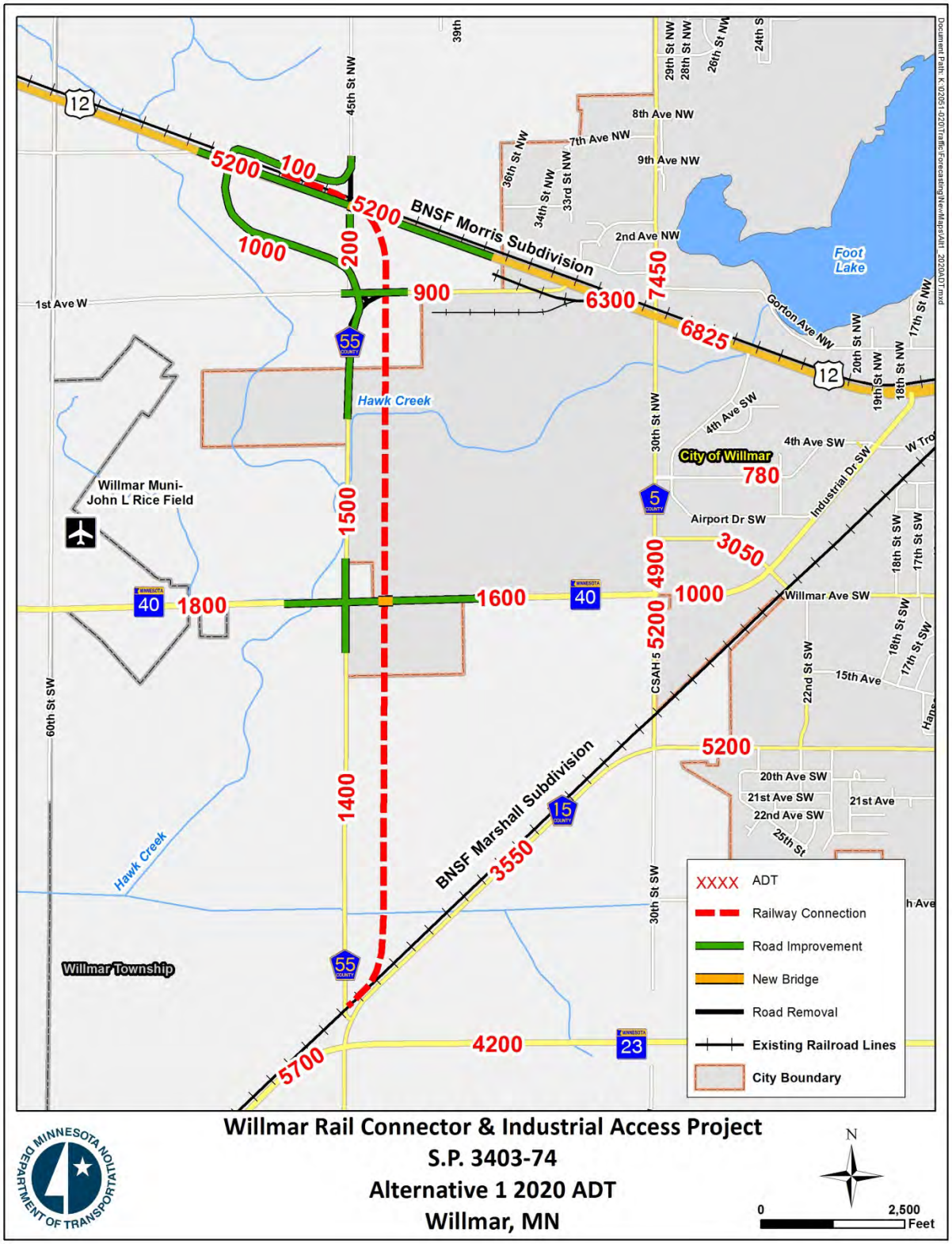
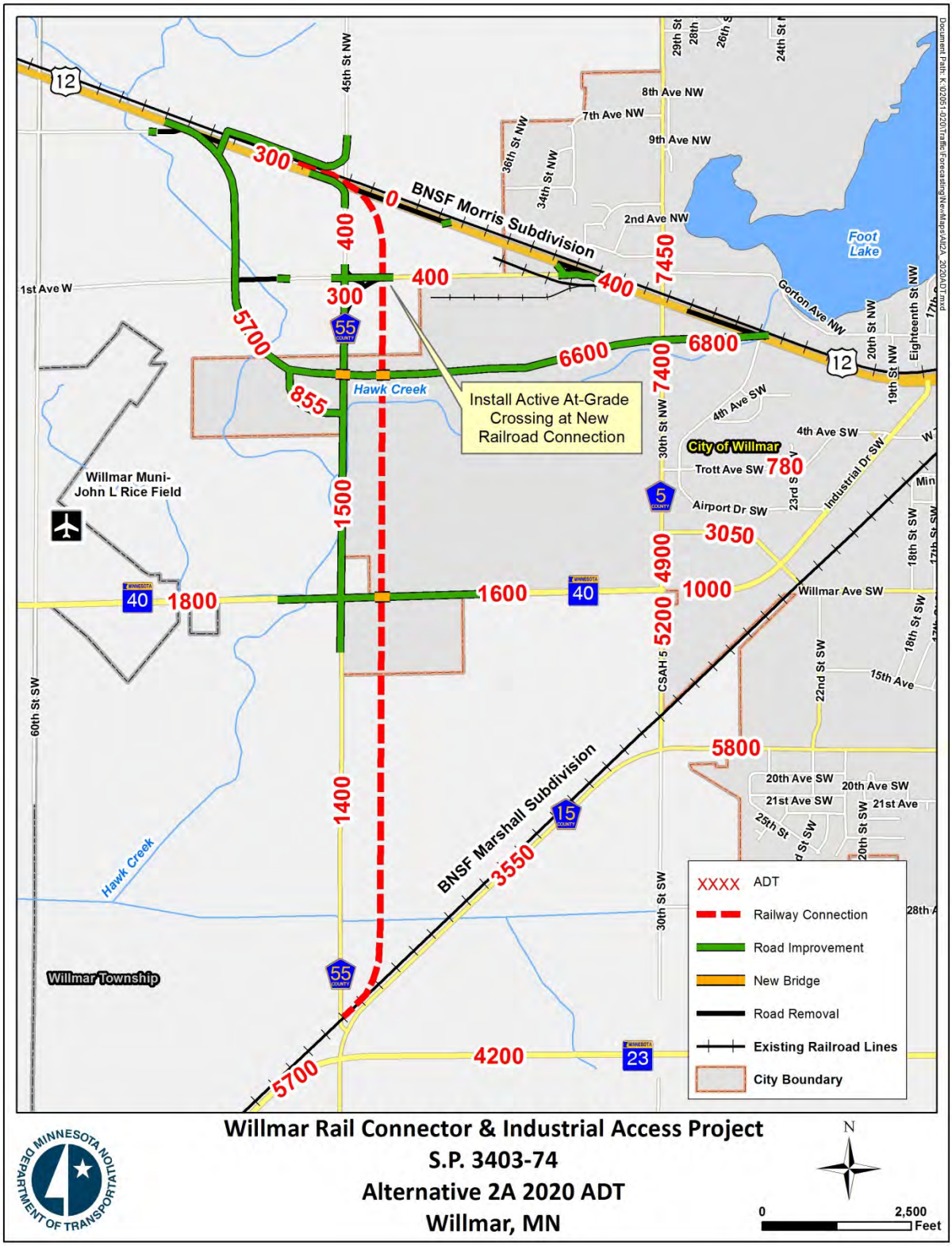
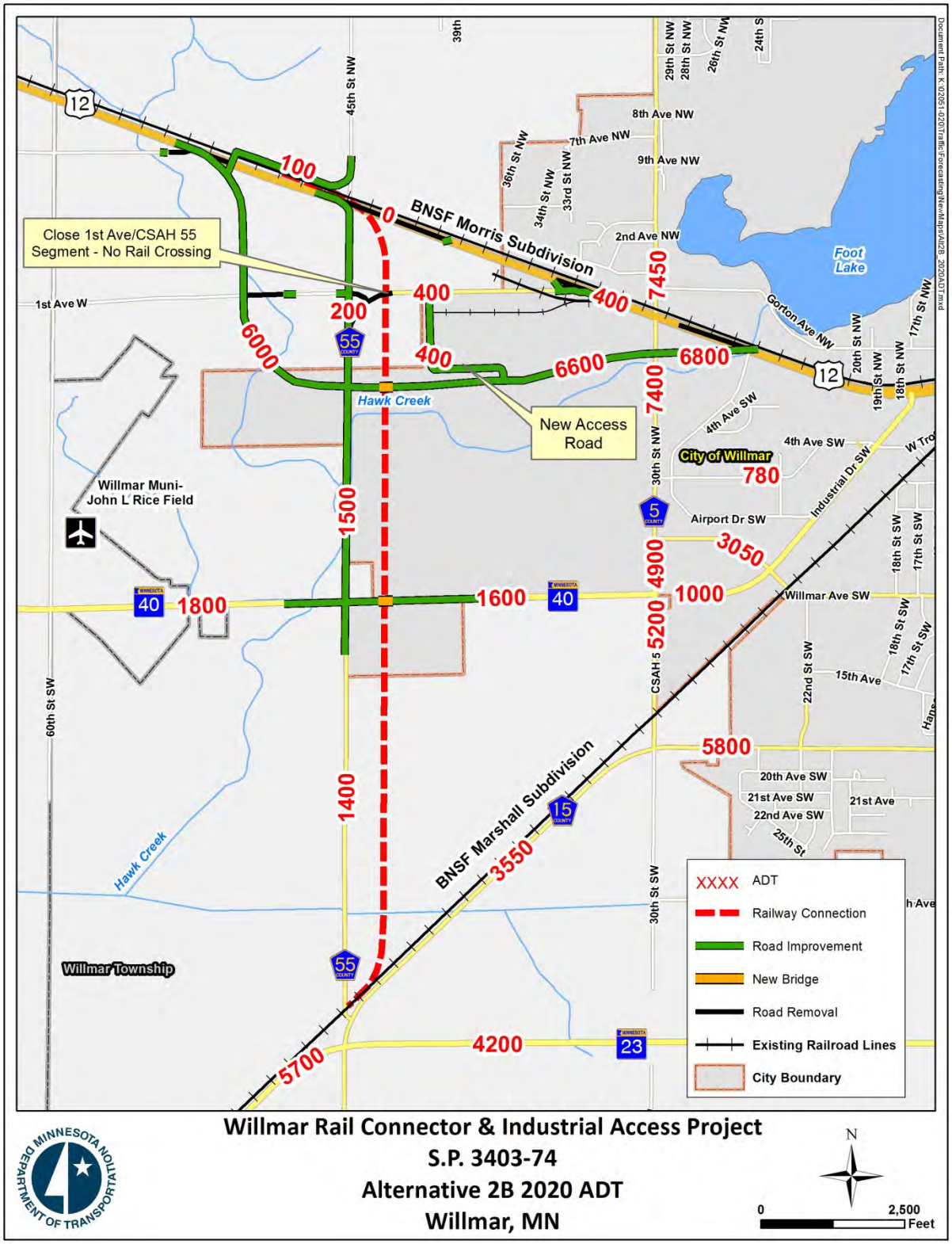

12
5200
100
5200
BNSF Morris Subdivision
1000
200
900
6300
7450
6825
1st Ave W
55
Hawk Creek
Willmar Muni-
John L Rice Field
1500
40
1800
1600
40
4900
1000
5200
3050
780
City of Willmar
Airport Dr SW
Willmar Ave SW
60th St SW
1400
BNSF Marshall Subdivision
3550
15
5200
Hawk Creek
Willmar Township
55
5700
4200
23
Foot Lake
8th Ave NW
7th Ave NW
9th Ave NW
2nd Ave NW
45th St NW
39th
36th St NW
34th St NW
33rd St NW
29th St NW
28th St NW
26th St NW
24th S
Gorton Ave NW
20th St NW
19th St NW
18th St NW
17th St NW
4th Ave SW
4th Ave SW
Industrial Dr SW
30th St NW
CSAH 5
22nd St SW
15th Ave
18th St SW
17th St SW
20th Ave SW
21st Ave SW
22nd Ave SW
21st Ave
25th St
30th St SW
XXXX ADT
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 1 2020 ADT
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 8



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2A 2020 ADT
Willmar, MN

Figure 9



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2B 2020 ADT
Willmar, MN

Figure 10

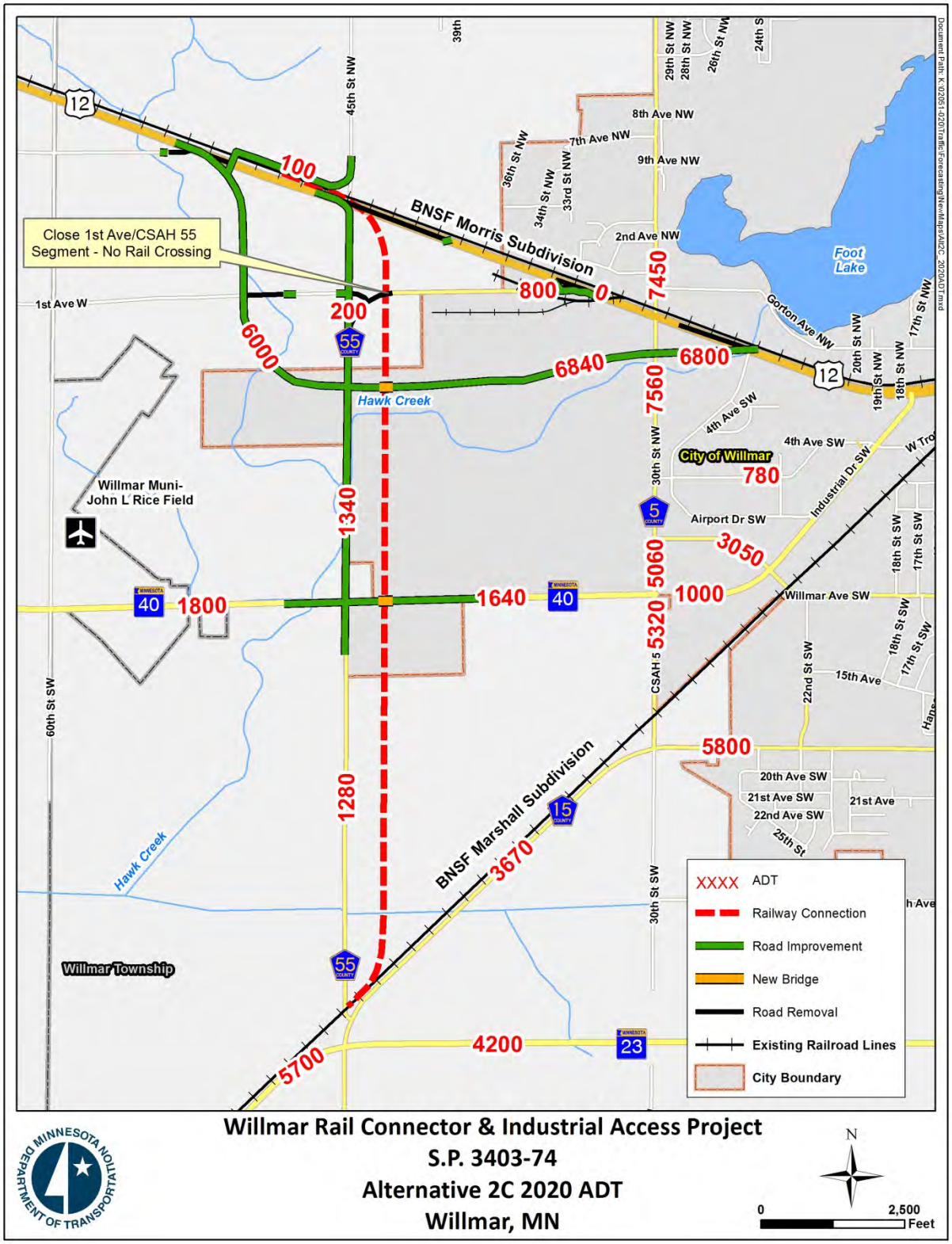
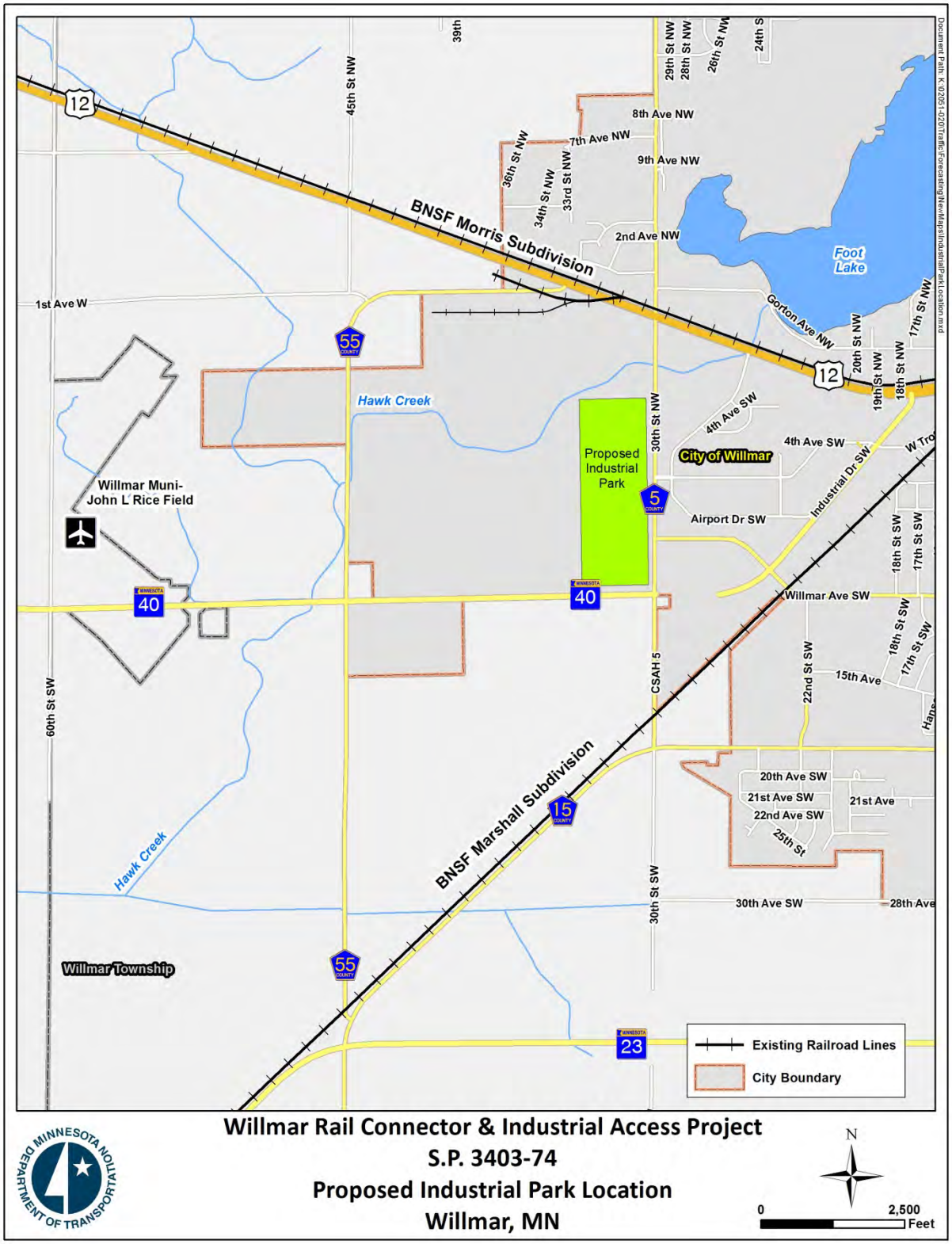

Close 1st Ave/CSAH 55 Segment - No Rail Crossing
BNSF Morris Subdivision
BNSF Marshall Subdivision
Hawk Creek
Foot Lake
City of Willmar
Willmar Muni-John L Rice Field
Willmar Township
45th St NW
1st Ave W
8th Ave NW
7th Ave NW
9th Ave NW
2nd Ave NW
Gorton Ave NW
4th Ave SW
Industrial Dr SW
Airport Dr SW
Willmar Ave SW
15th Ave
20th Ave SW
21st Ave SW
22nd Ave SW
21st Ave
25th St
30th St SW
CSAH 5
60th St SW
100
200
800
0
7450
6000
6840
6800
7560
780
1340
3050
5060
1800
1640
1000
5320
5800
1280
3670
5700
4200
XXXX ADT
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2C 2020 ADT
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 11



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Proposed Industrial Park Location
Willmar, MN

N

0 2,500 Feet

Figure 12

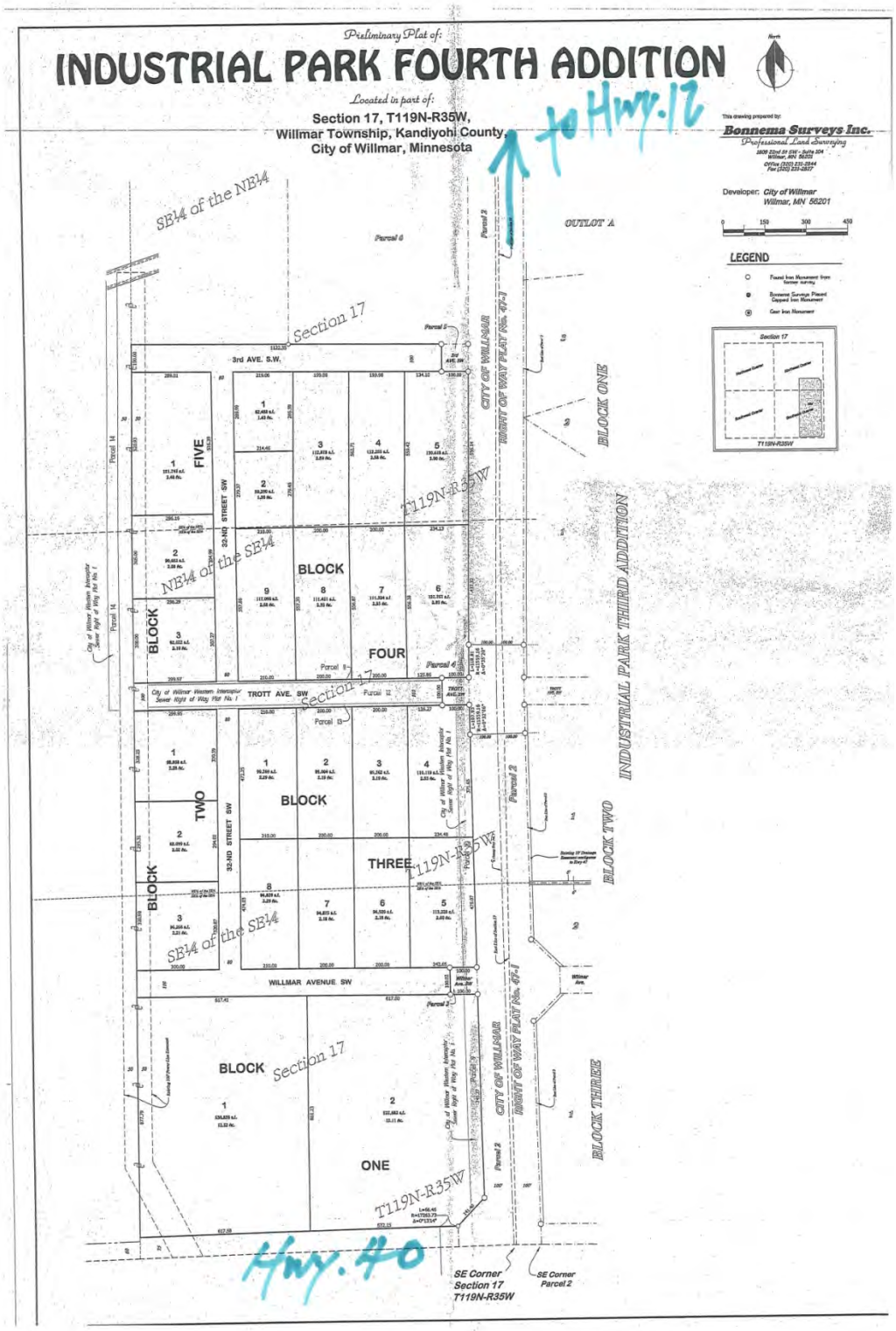

Preliminary Plat of:
INDUSTRIAL PARK FOURTH ADDITION
Located in part of:
Section 17, T119N-R35W,
Willmar Township, Kandiyohi County,
City of Willmar, Minnesota
to Hwy. 12
Bonnema Surveys Inc.
Professional Land Surveying
Developer: City of Willmar
Willmar, MN 56201
LEGEND
SE¼ of the NE¼
Section 17
3rd AVE. S.W.
OUTLOT A
BLOCK ONE
INDUSTRIAL PARK THIRD ADDITION
BLOCK TWO
BLOCK THREE
CITY OF WILLMAR
RIGHT OF WAY PLAT No. 67-1
T119N-R35W
NE¼ of the SE¼
SE¼ of the SE¼
32-ND STREET SW
TROTT AVE. SW
WILLMAR AVENUE SW
BLOCK FIVE
BLOCK FOUR
BLOCK TWO
BLOCK THREE
BLOCK ONE
Hwy. 40
SE Corner
Section 17
T119N-R35W
SE Corner
Parcel 2

Figure 13

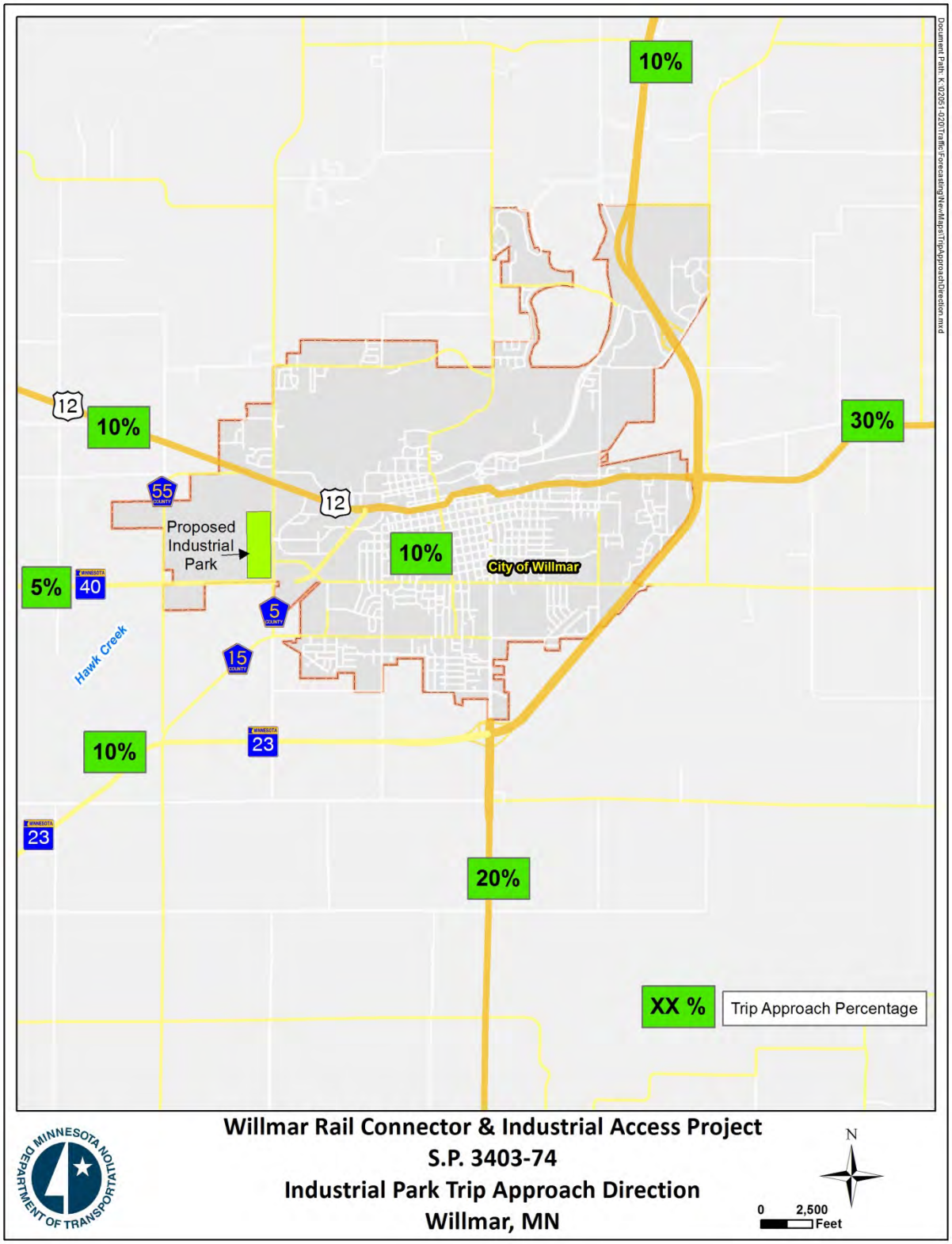

10%
12
10%
30%
55
12
Proposed
Industrial
Park
10%
City of Willmar
5%
40
5
Hawk Creek
15
10%
23
23
20%
XX %
Trip Approach Percentage
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Industrial Park Trip Approach Direction
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 14

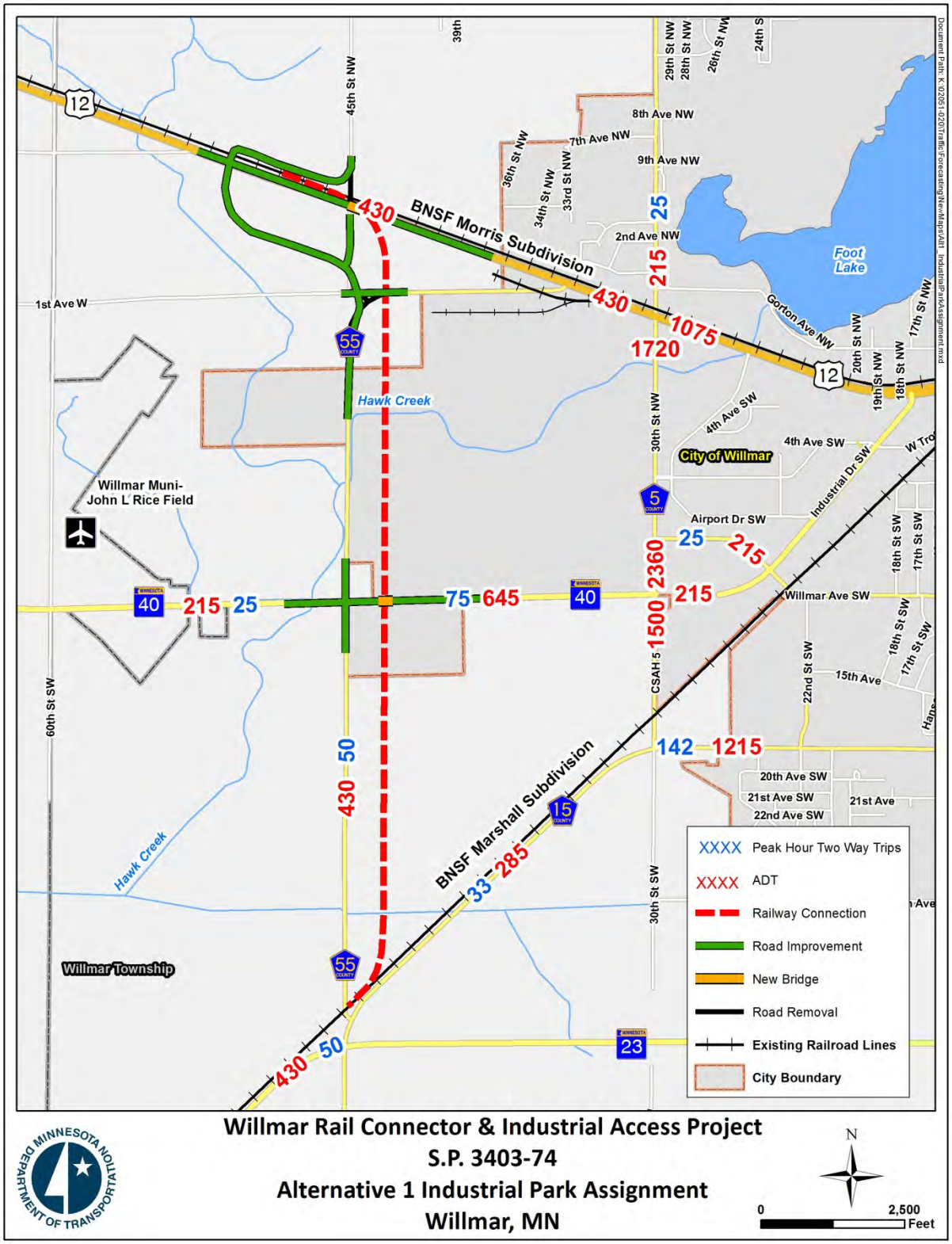
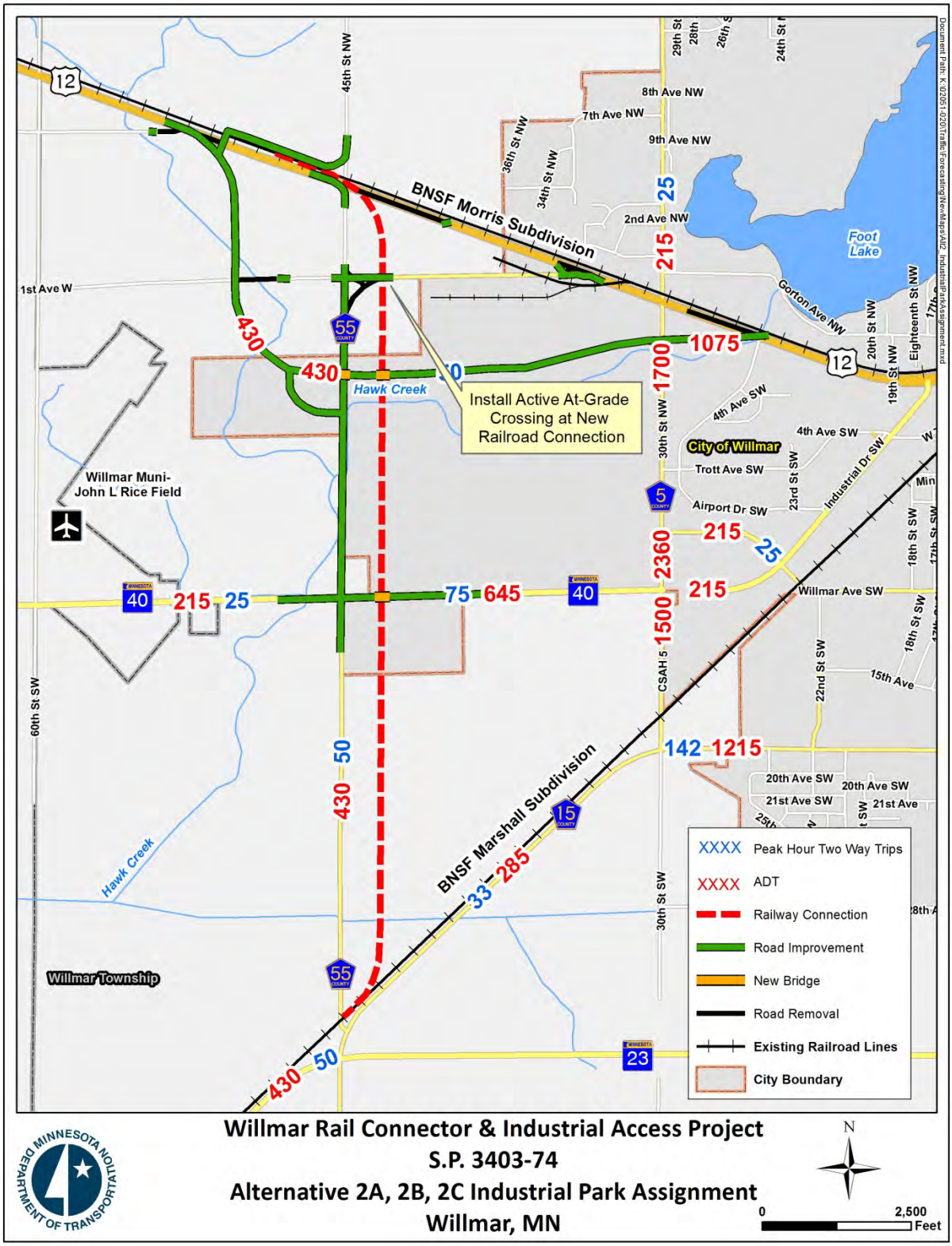
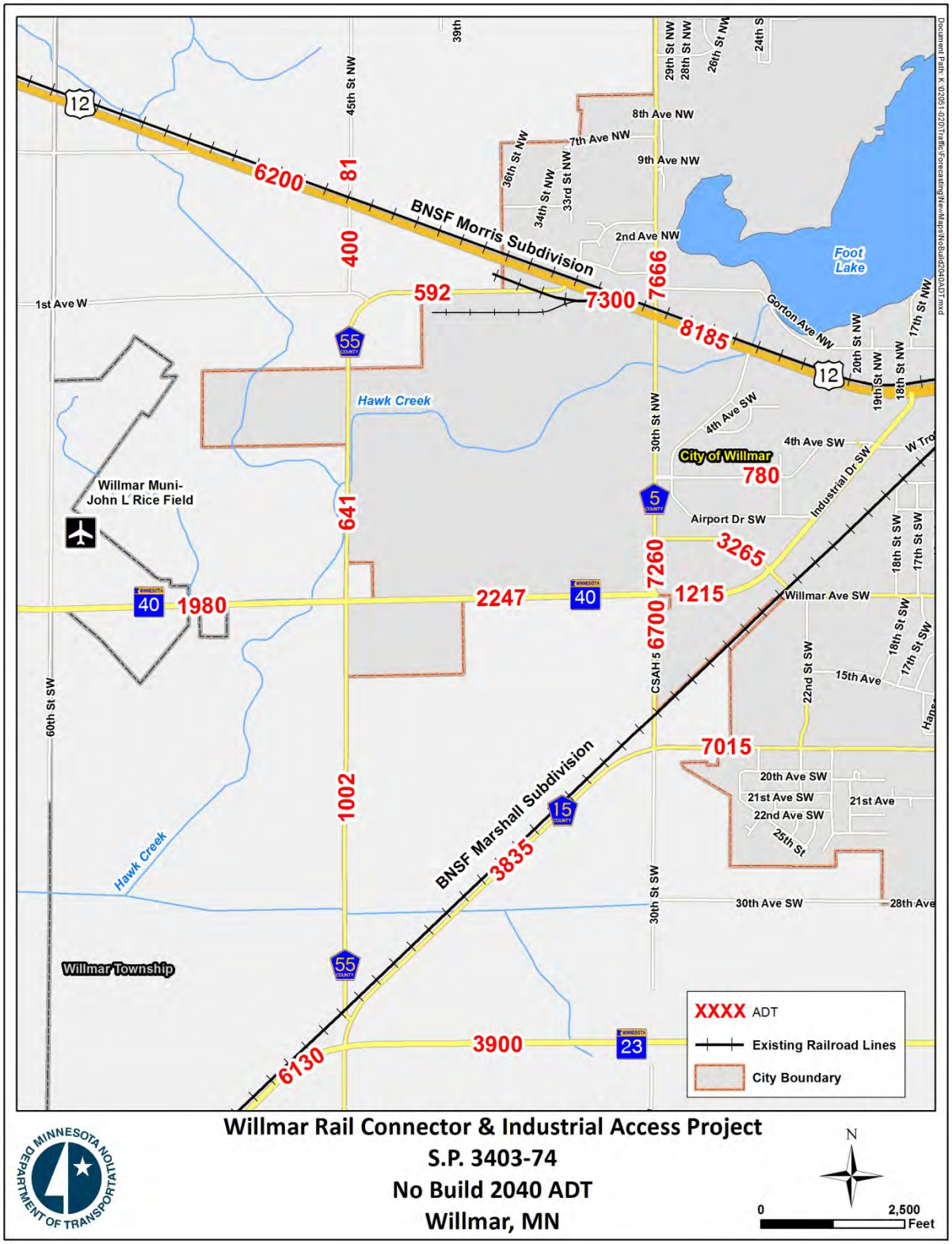

BNSF Morris Subdivision
BNSF Marshall Subdivision
Foot Lake
Hawk Creek
City of Willmar
Willmar Muni-
John L Rice Field
Willmar Township
45th St NW
39th
29th St NW
28th St NW
26th St NW
24th S
8th Ave NW
7th Ave NW
9th Ave NW
36th St NW
34th St NW
33rd St NW
2nd Ave NW
1st Ave W
Gorton Ave NW
20th St NW
19th St NW
18th St NW
17th St NW
4th Ave SW
4th Ave SW
Industrial Dr SW
Airport Dr SW
Willmar Ave SW
30th St NW
CSAH 5
22nd St SW
15th Ave
18th St SW
17th St SW
60th St SW
20th Ave SW
21st Ave SW
22nd Ave SW
21st Ave
30th St SW
430
25
215
1075
1720
2360
1500
75
645
50
142
1215
33
285
XXXX Peak Hour Two Way Trips
XXXX ADT
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 1 Industrial Park Assignment
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 15



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2A, 2B, 2C Industrial Park Assignment
Willmar, MN

Figure 16



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
No Build 2040 ADT
Willmar, MN

Figure 17

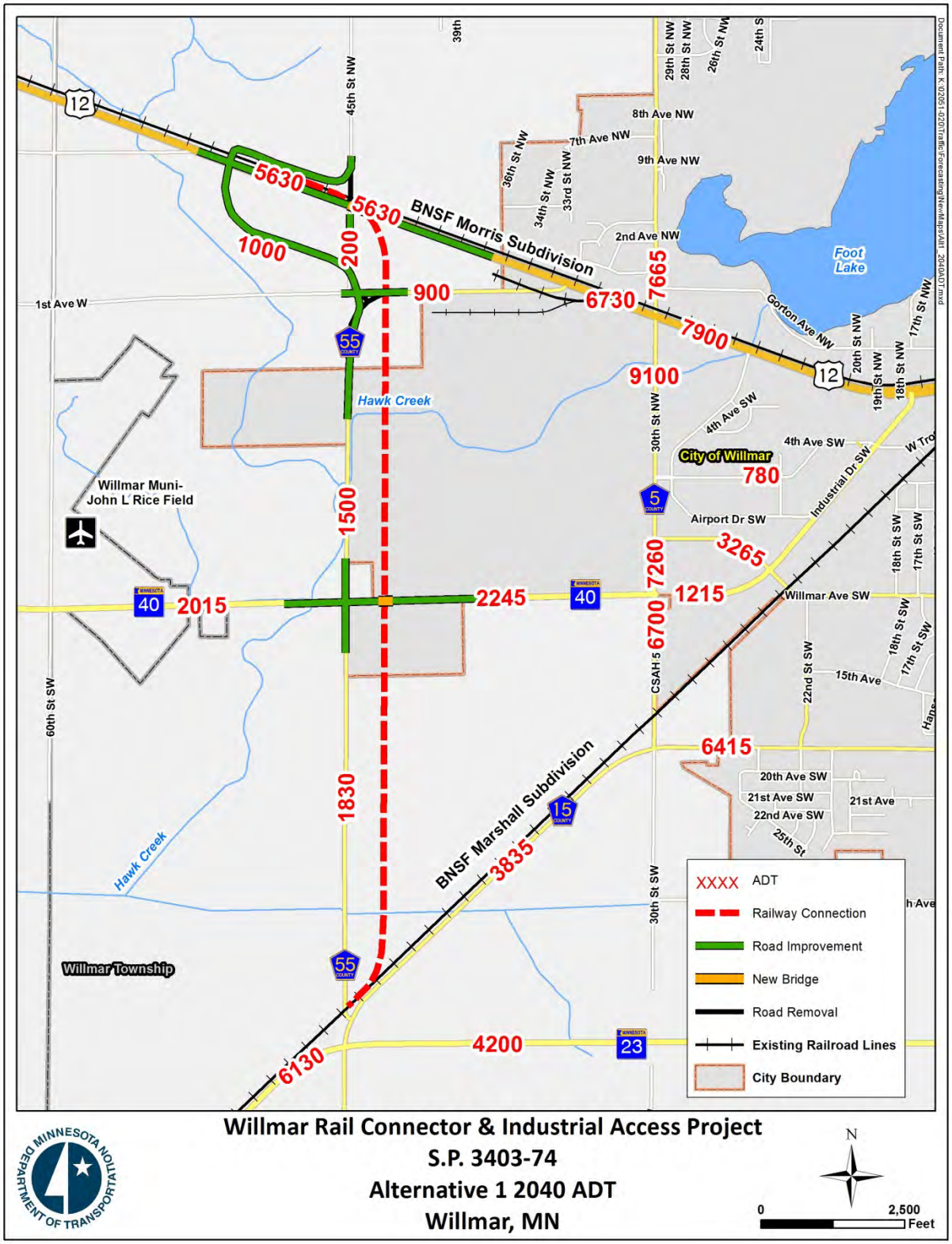
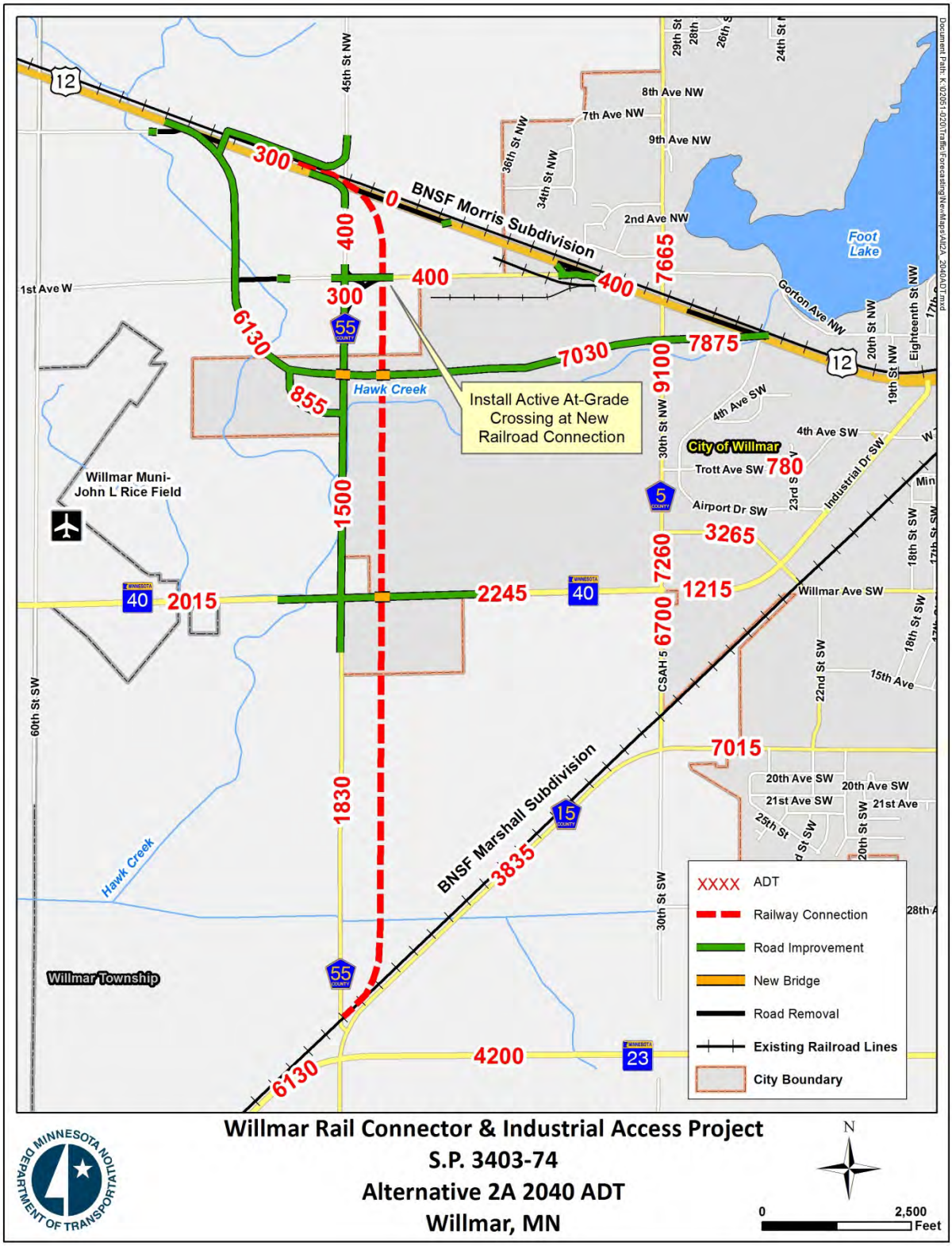

5630
5630
1000
200
900
6730
7665
7900
9100
780
3265
7260
1215
2015
2245
6700
1500
1830
6415
3835
6130
4200
BNSF Morris Subdivision
BNSF Marshall Subdivision
Foot Lake
Hawk Creek
Willmar Muni-
John L Rice Field
City of Willmar
Willmar Township
45th St NW
39th
29th St NW
28th St NW
26th St NW
24th S
8th Ave NW
7th Ave NW
9th Ave NW
36th St NW
34th St NW
33rd St NW
2nd Ave NW
1st Ave W
Gorton Ave NW
20th St NW
19th St NW
18th St NW
17th St NW
4th Ave SW
4th Ave SW
Industrial Dr SW
Airport Dr SW
30th St NW
CSAH 5
Willmar Ave SW
18th St SW
17th St SW
22nd St SW
15th Ave
60th St SW
20th Ave SW
21st Ave SW
22nd Ave SW
21st Ave
25th St
30th St SW
XXXX ADT
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 1 2040 ADT
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 18



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2A 2040 ADT
Willmar, MN

Figure 19

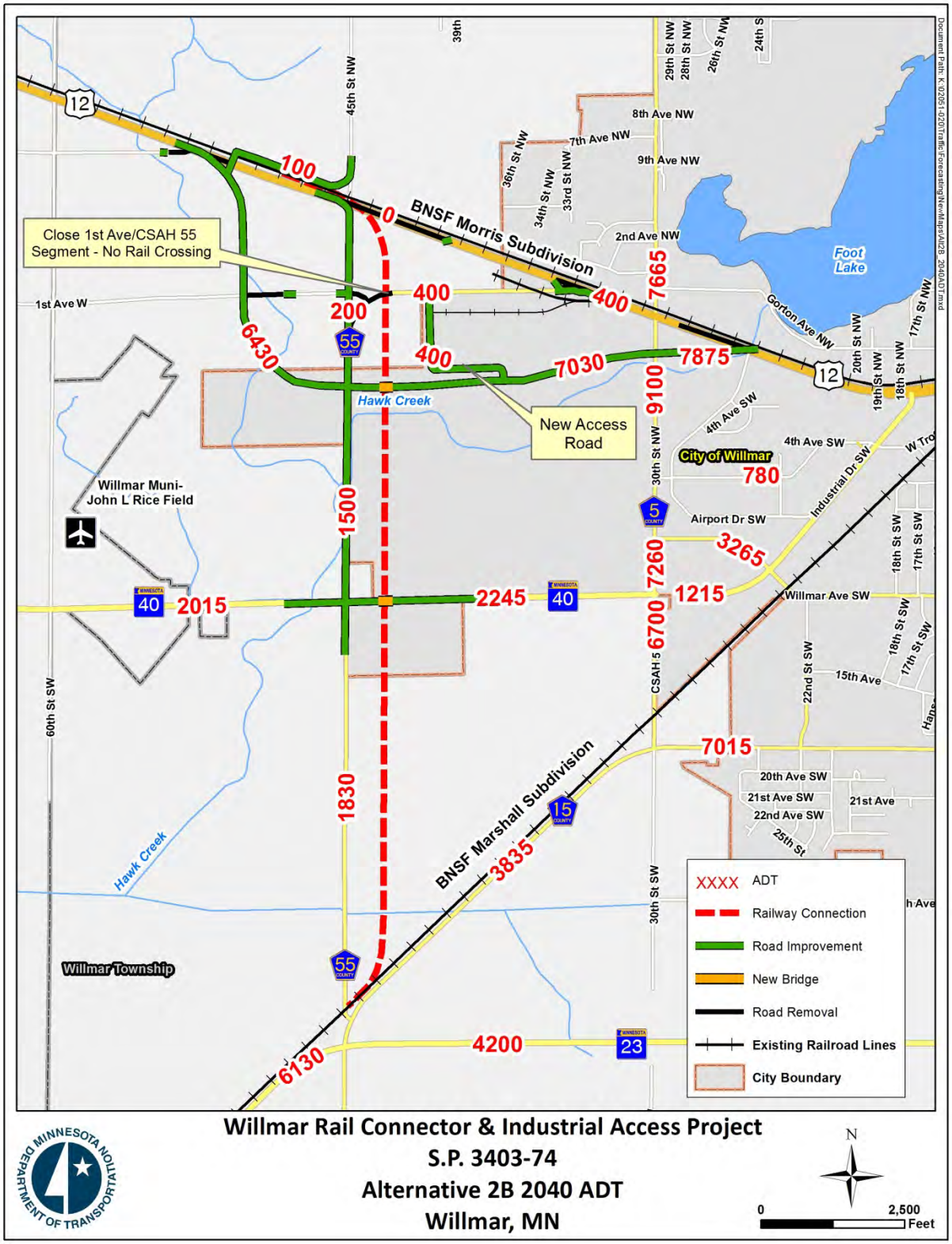
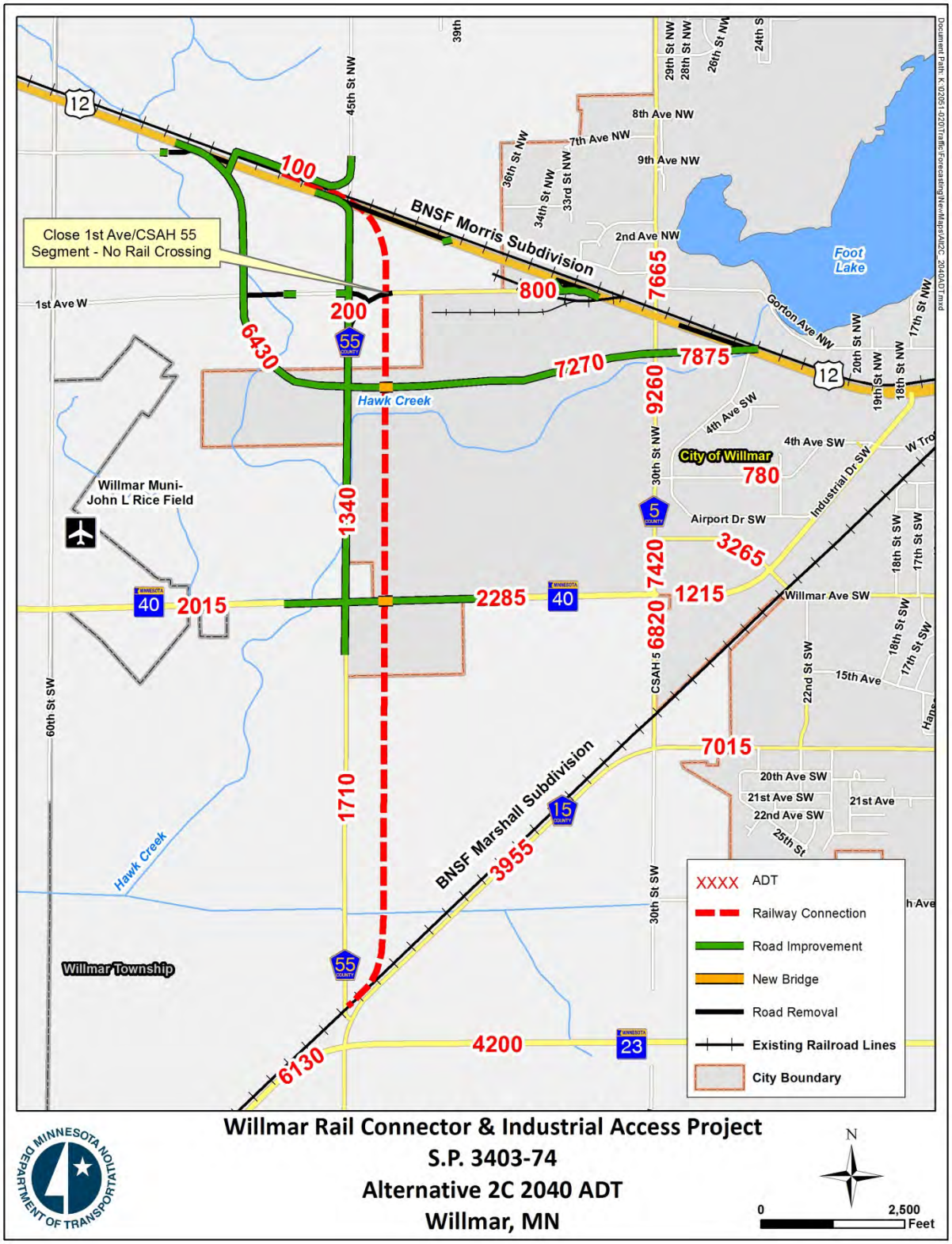

Close 1st Ave/CSAH 55 Segment - No Rail Crossing
New Access Road
BNSF Morris Subdivision
BNSF Marshall Subdivision
Willmar Muni-John L Rice Field
Willmar Township
City of Willmar
Hawk Creek
Foot Lake
45th St NW
1st Ave W
8th Ave NW
7th Ave NW
9th Ave NW
2nd Ave NW
Gorton Ave NW
4th Ave SW
Airport Dr SW
Industrial Dr SW
Willmar Ave SW
15th Ave
20th Ave SW
21st Ave SW
22nd Ave SW
21st Ave
60th St SW
30th St NW
CSAH 5
100
0
400
200
6430
400
7030
7875
7665
9100
780
1500
3265
2015
2245
7260
1215
6700
7015
1830
3835
6130
4200
XXXX ADT
Railway Connection
Road Improvement
New Bridge
Road Removal
Existing Railroad Lines
City Boundary
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2B 2040 ADT
Willmar, MN
MINNESOTA DEPARTMENT OF TRANSPORTATION
N
0
2,500
Feet

Figure 20



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2C 2040 ADT
Willmar, MN

Hourly Volume Estimates for Noise Analysis

The forecasted trips from the industrial park were allocated to each hour of the day using the hourly distribution of traffic found on TH 12 in the vicinity of the study area. The table below shows the assumed hourly distribution of the trips from the industrial park.

Table 2: Hourly Distribution of Industrial Park Traffic

Hour of Day	Cars	Small Trucks	Heavy Trucks
1	0%	0%	1%
2	0%	1%	2%
3	0%	0%	2%
4	0%	0%	1%
5	1%	0%	2%
6	2%	1%	4%
7	5%	1%	6%
8	8%	10%	5%
9	5%	12%	6%
10	5%	12%	5%
11	5%	7%	6%
12	6%	10%	7%
13	6%	7%	5%
14	7%	8%	5%
15	7%	9%	7%
16	7%	8%	6%
17	9%	10%	5%
18	9%	1%	5%
19	6%	2%	3%
20	4%	1%	3%
21	3%	0%	4%
22	3%	0%	3%
23	1%	1%	2%
24	1%	0%	2%
Total	100%	100%	100%

The average truck trip percentage for industrial parks from the Trip Generation manual, which is 13%, was utilized to estimate truck trips in 2040 forecast. Based on truck percentages observed in existing traffic volumes it was estimated that 3% of traffic from the industrial park will be small trucks and 10% will be heavy trucks.

The hourly volumes by mode are calculated for the required locations and are shown in separate spreadsheets for the purpose of noise analysis. The locations where forecasts are needed were labeled using unique identifiers in each alternative. The counts in the spreadsheets correspond to these location identifiers as shown in figures A4 and A5 in the

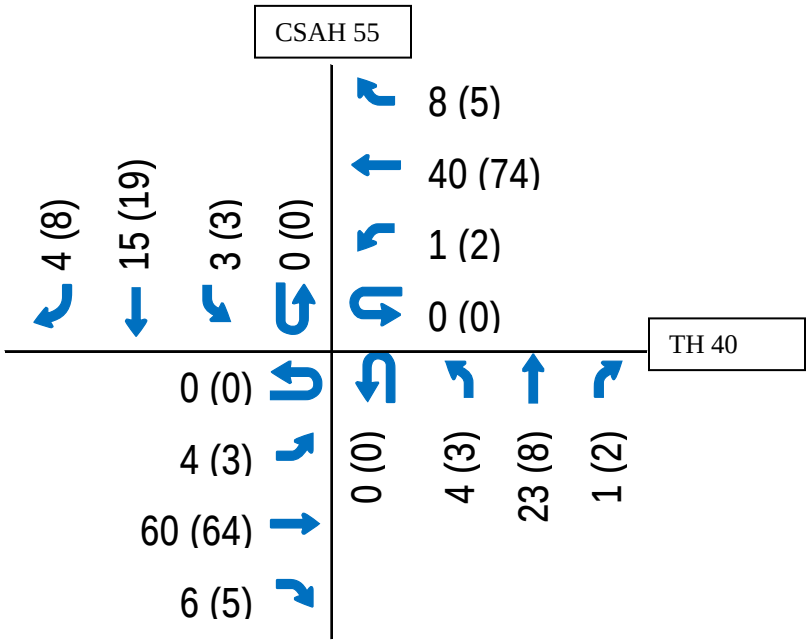
appendix. It should be noted that Alternative 2 shown in noise forecasts is slightly different from the sub alternatives 2A, 2B and 2C as there is an at-grade crossing on 1st Avenue in this alternative like Alternative 2A but there is no quadrant interchange at TH 12 and CSAH 55. The intersection of TH 12 and CSAH 55 in this alternative is at grade.

Turning Movement Counts

Forecasted turning movement counts at the key intersections are calculated similar to the ADT forecasts by adding the estimated traffic that will divert to the new roadways to the existing turning movements.

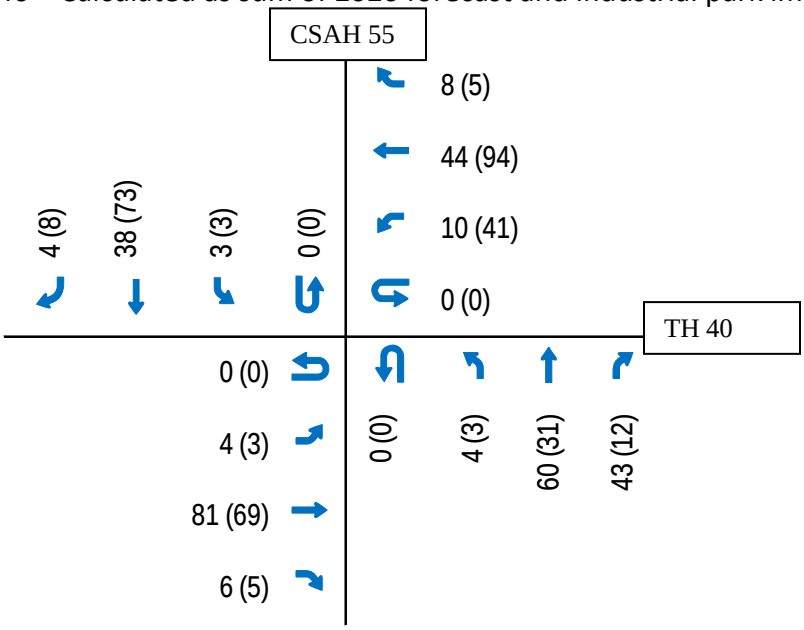
CSAH 55 and TH 40

Existing Counts are shown below. North is up in all figures and numbers in parentheses are (PM) volumes while the numbers not in parentheses are AM volumes.



AM (PM) peak hour volume

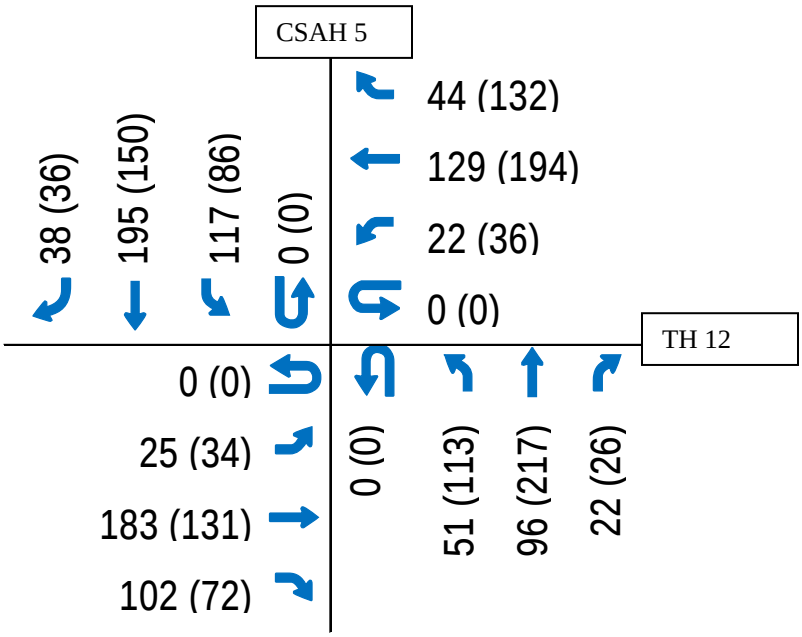
Peak Hour forecast 2040 – Calculated as sum of 2020 forecast and industrial park impact



AM (PM) peak hour volume

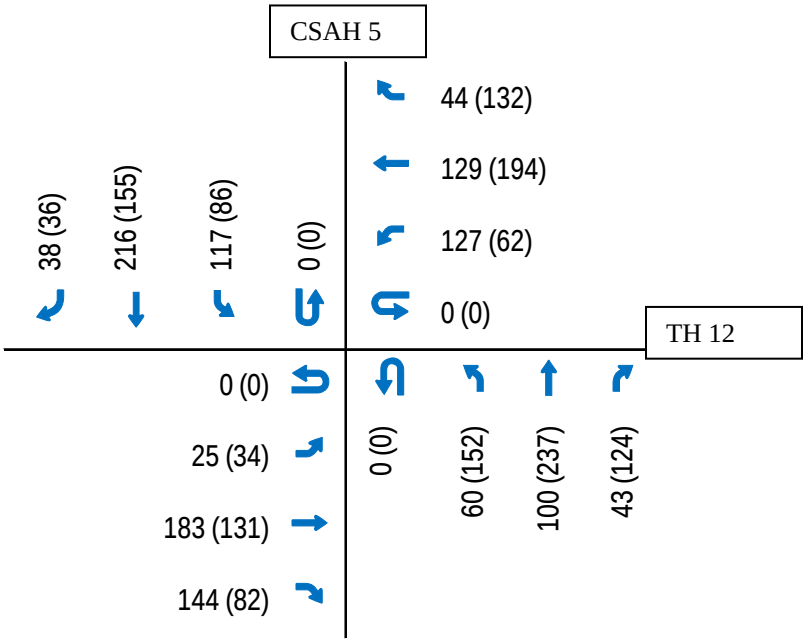
CSAH 5 and TH 12

Existing Counts at this intersection are shown below.



AM (PM) peak hour volume

Forecasted 2040 Turning Movement Counts are shown below.

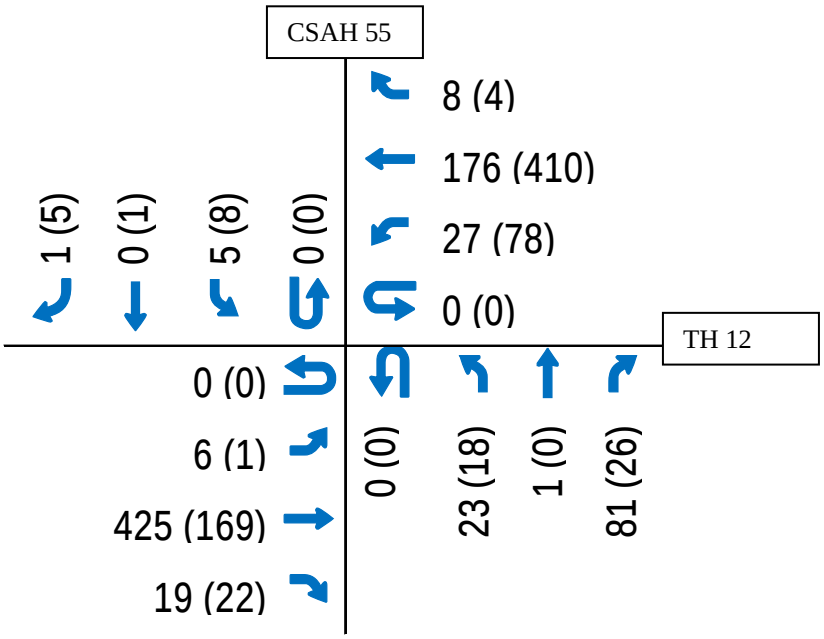


AM (PM) peak hour volume

CSAH 55 and TH 12

This intersection does not exist in existing conditions and in Alternative 1.

Forecasted 2040 Turning Movement Counts for Alternative 2 are shown below.



AM (PM) peak hour volume

Building a legacy – *your* legacy.

701 Xenia Avenue South
Suite 300
Minneapolis, MN 55416
Tel: 763-541-4800
Fax: 763-541-1700

Appendix

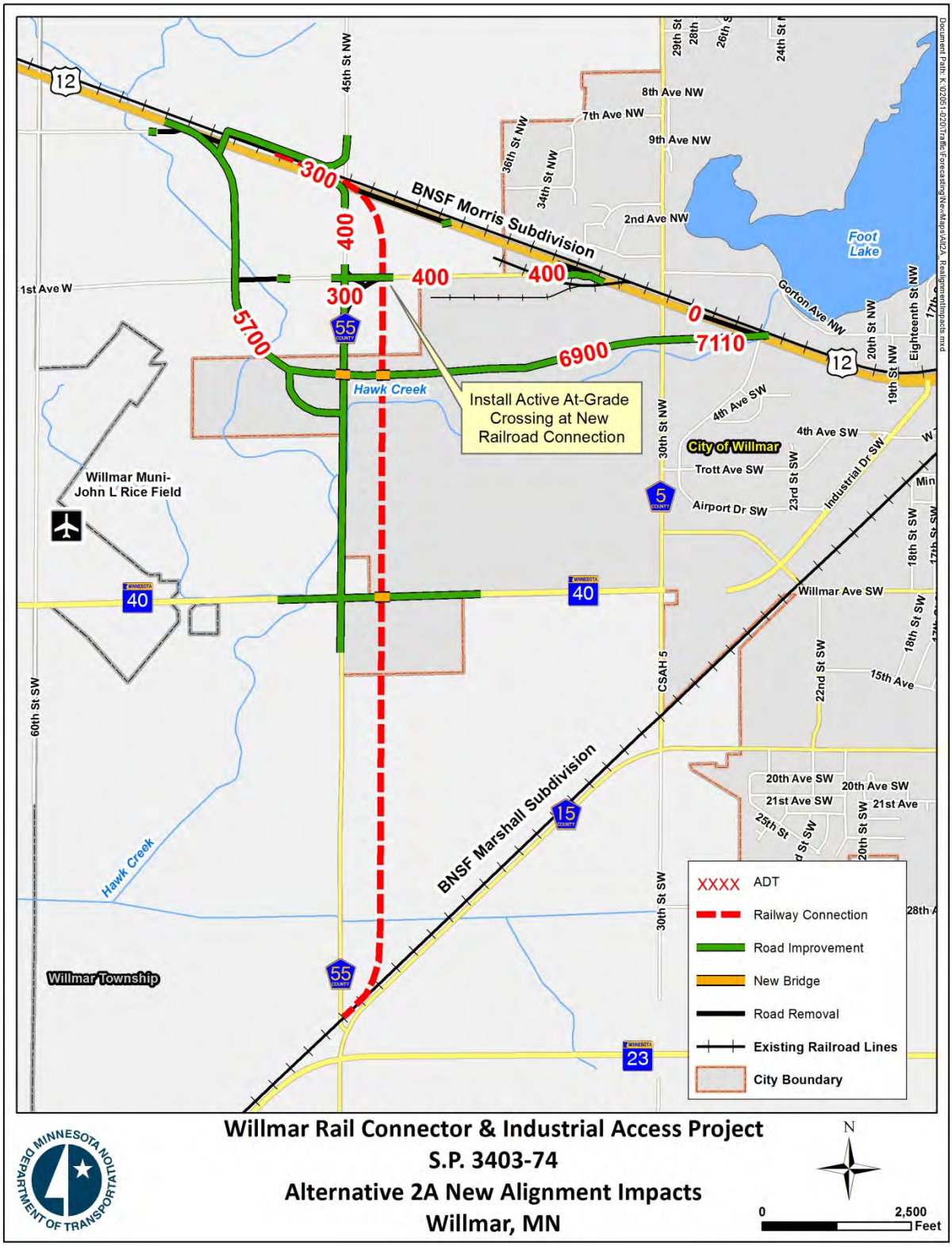
Contents

New Alignment Impacts
Turning Movement Counts Supporting Information
Noise Analysis Location Identifiers
Existing 24 Hour Counts Collected by WSB

New Alignment Impacts

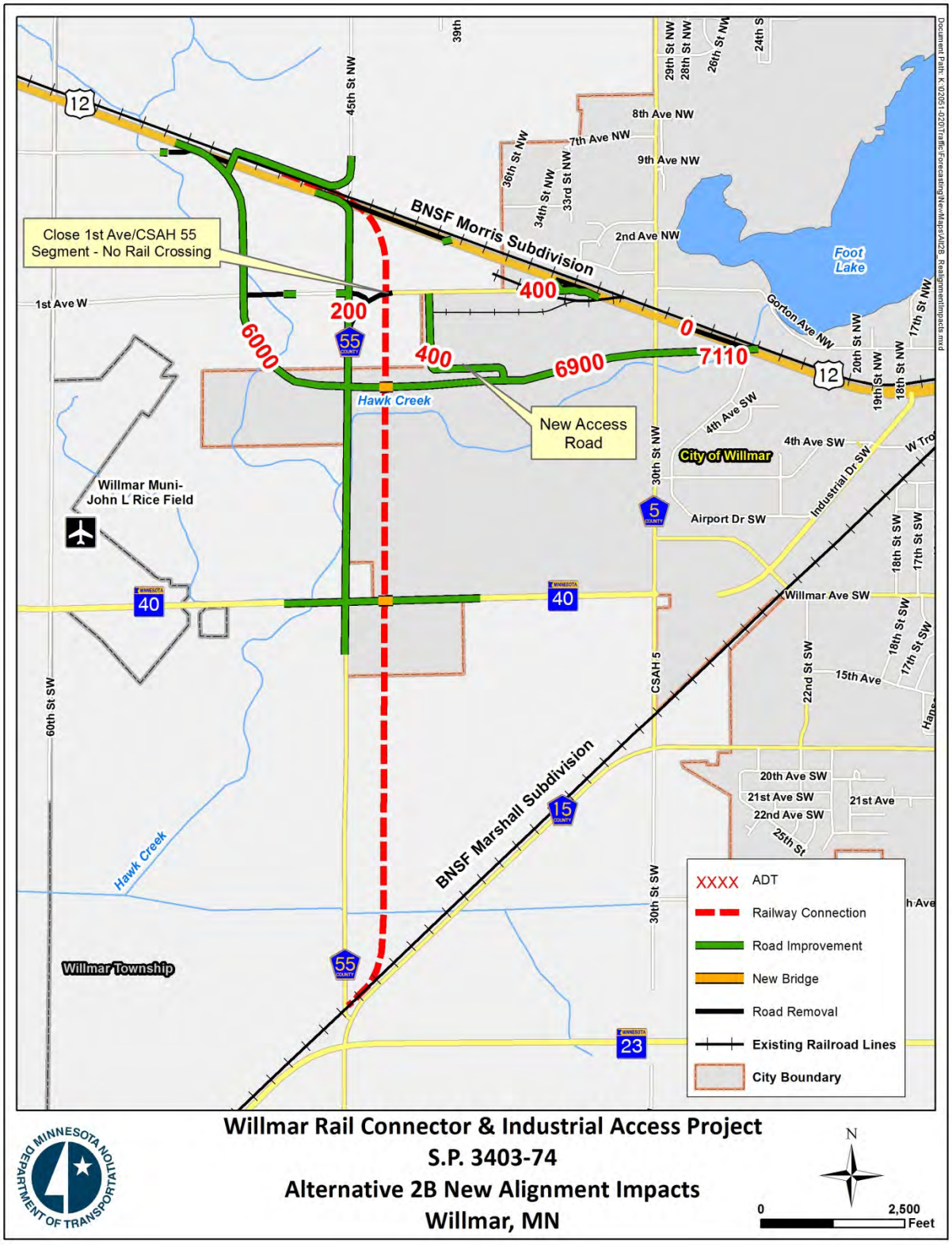
Impacts of realigning the roadways in Alternatives 2A, 2B and 2C are shown in figures below.

Figure A1



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2A New Alignment Impacts
Willmar, MN

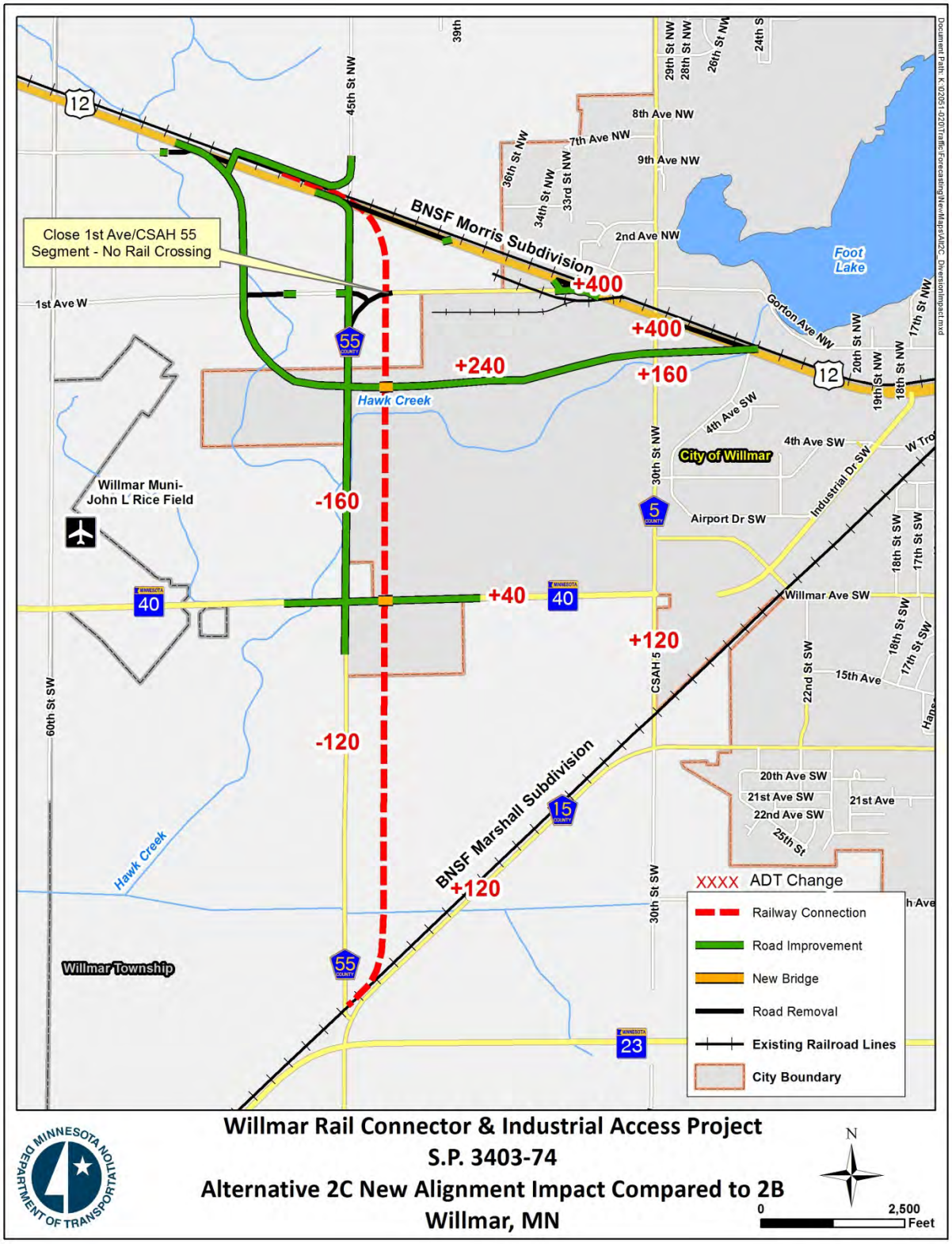
Figure A2



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2B New Alignment Impacts
Willmar, MN

Alternative 2C is very similar to Alternative 2B except that there is no west access to 1st Avenue in 2C. The difference between Alternative 2B and 2C due to absence of western access to 1st Avenue is shown in the figure below.

Figure A3



Turning Movement Counts Supporting Information

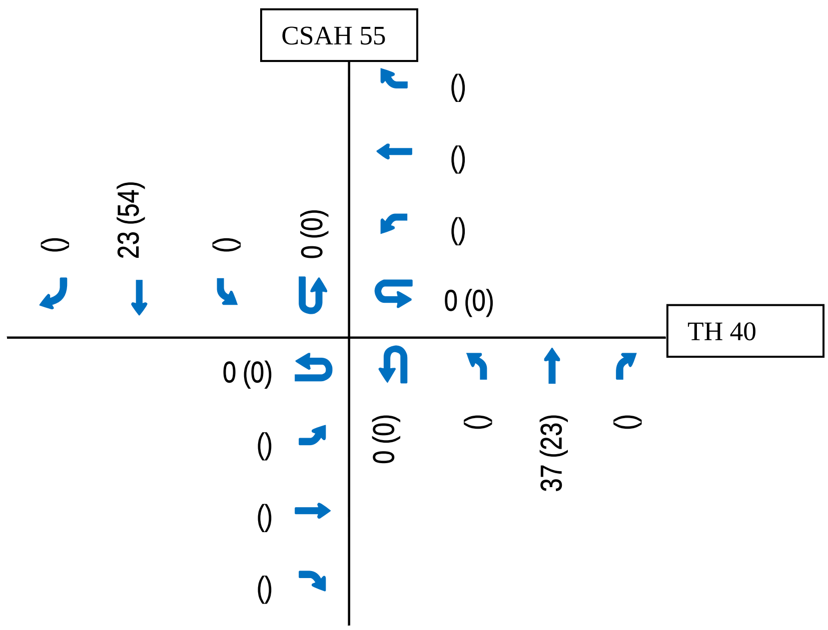
In the AM and PM peak hours, the inbound and outbound trips from the industrial park will be distributed according to the following percentages based on the ITE Trip Generation Manual. These distributions are useful in generating intersection turning movement counts.

Table A1: Peak Hour Inbound/Outbound Percentage

AM		PM	
In	Out	In	Out
83%	17%	21%	79%

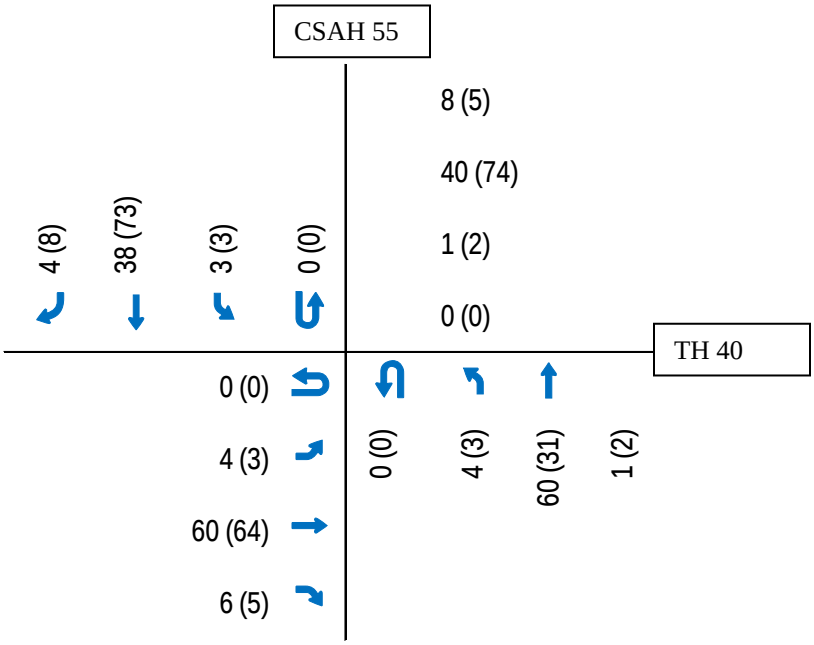
CSAH 55 and TH 40

Impact of diversion to CSAH 55 from TH 12 and TH 23 is shown below. The peak hour volumes were estimated based on existing peak hour proportions.



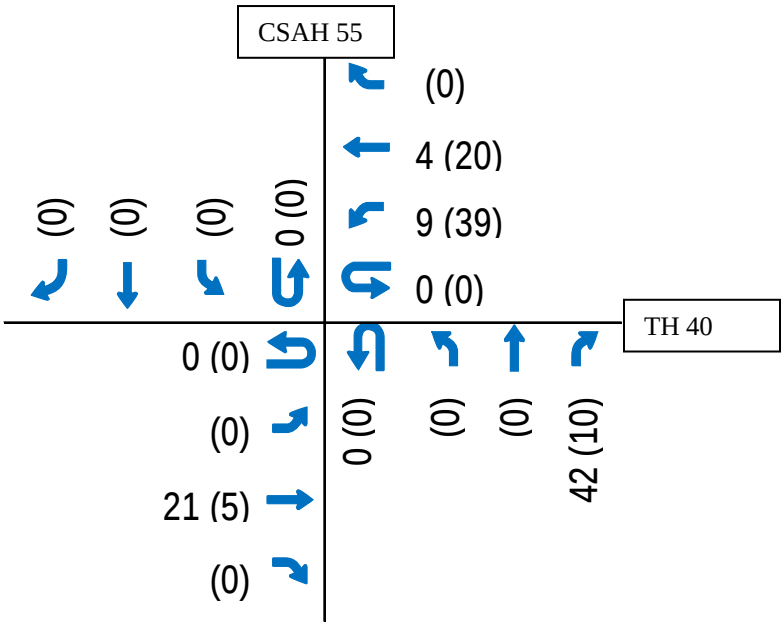
AM (PM) peak hour volume

Forecasted 2020 Peak Hour Turning Movement Counts – Sum of existing counts and diversion impacts.



AM (PM) peak hour volume

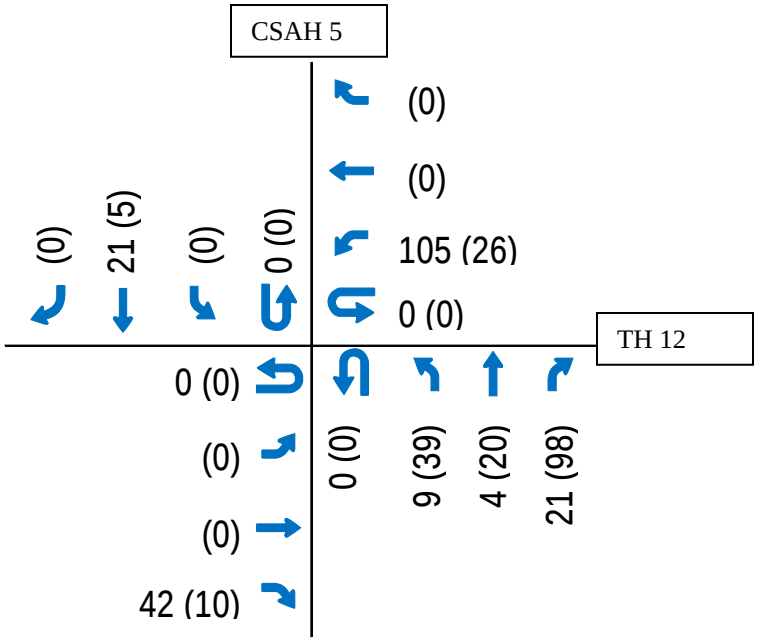
2040 Industrial Park Impacts at this intersection are shown below. These are added to 2020 counts to get 2040 counts.



AM (PM) peak hour volume

CSAH 5 and TH 12

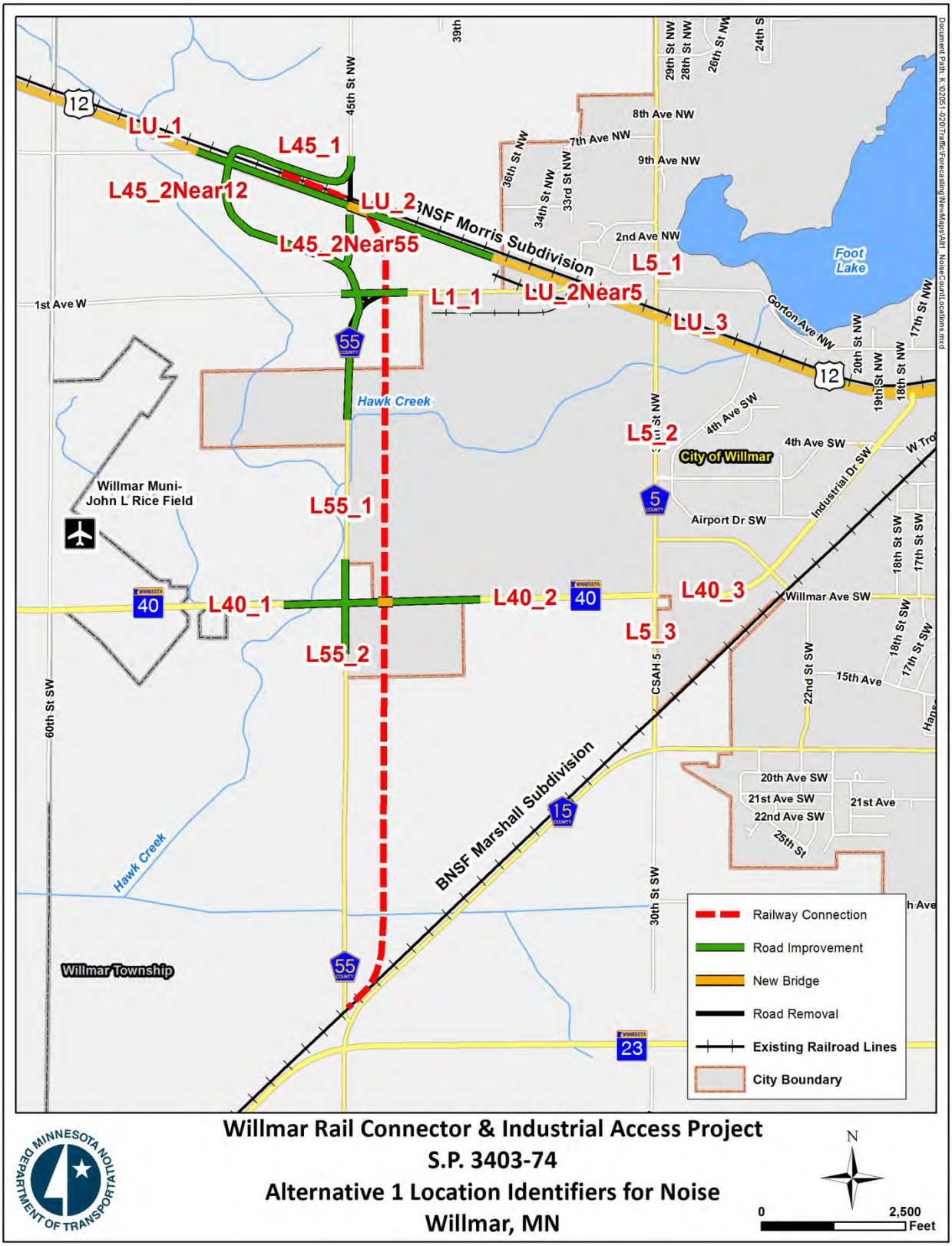
Industrial Park Impacts: The differences between Alternatives 2A, 2B and 2C during peak hour are ignored and one estimate is used for all alternatives.



AM (PM) peak hour volume

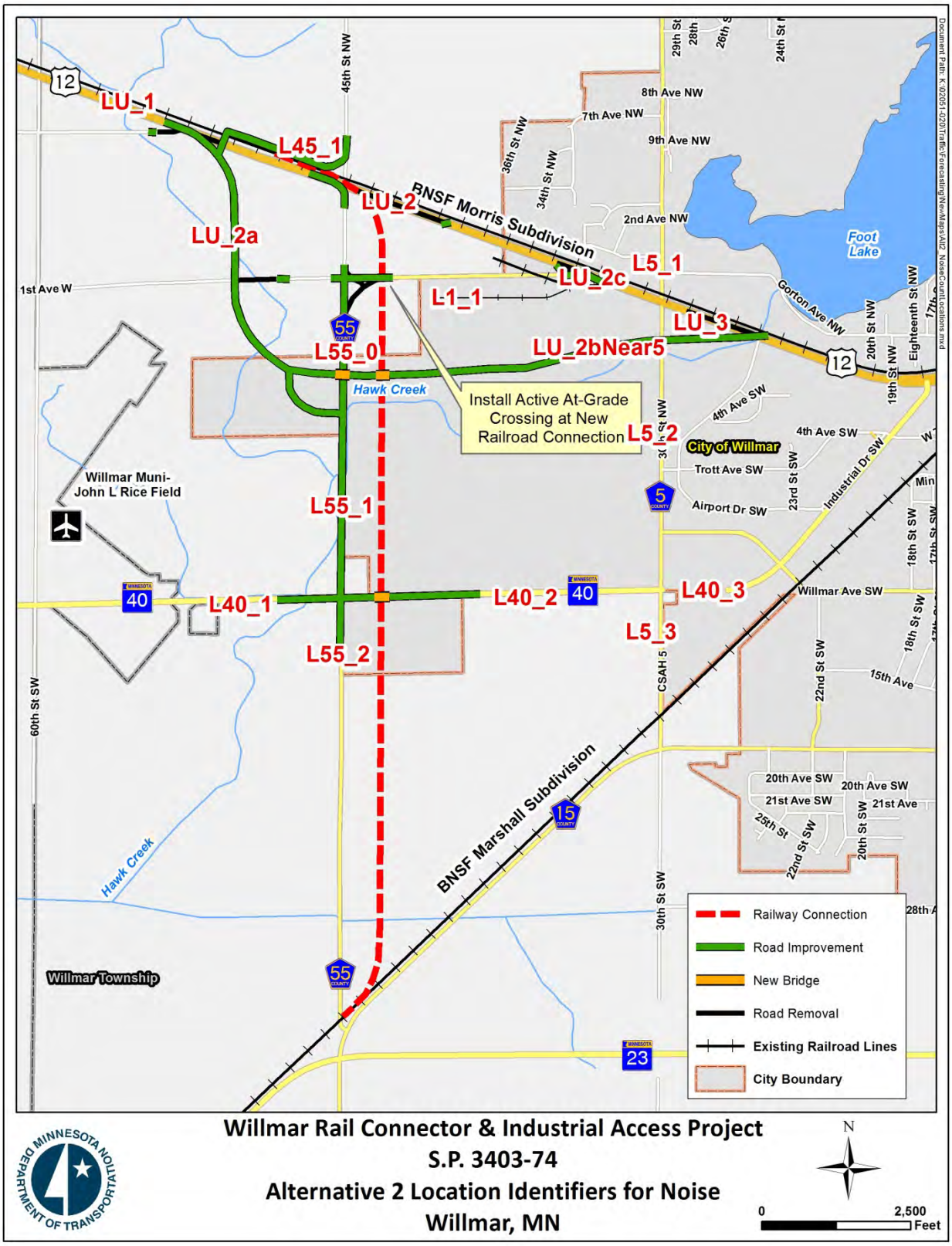
Noise Analysis Location Identifiers

Figure A4



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 1 Location Identifiers for Noise
Willmar, MN

Figure A5



Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Alternative 2 Location Identifiers for Noise
Willmar, MN

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles - small trucks - heavy trucks

	CSAH 55 From North						From East				CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	4
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5
05:00 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
05:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	4
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	1	0	2	4
Total	1	4	0	0	5	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	13
06:00 AM	1	3	0	0	4	0	0	0	0	0	0	2	1	0	3	1	0	1	0	2	9
06:15 AM	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	8
06:30 AM	1	2	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	9
06:45 AM	1	3	0	0	4	0	0	0	0	0	0	3	2	0	5	2	0	3	0	5	14
Total	3	12	0	0	15	0	0	0	0	0	0	12	3	0	15	5	0	5	0	10	40
07:00 AM	1	2	0	0	3	0	0	0	0	0	0	4	2	0	6	1	0	2	0	3	12
07:15 AM	2	4	0	0	6	0	0	0	0	0	0	5	2	0	7	1	0	1	0	2	15
07:30 AM	0	7	0	0	7	0	0	0	0	0	0	11	2	0	13	2	0	2	0	4	24
07:45 AM	4	3	0	0	7	0	0	0	0	0	0	5	3	0	8	0	0	5	0	5	20
Total	7	16	0	0	23	0	0	0	0	0	0	25	9	0	34	4	0	10	0	14	71
08:00 AM	9	5	0	0	14	0	0	0	0	0	0	3	4	0	7	1	0	0	0	1	22
08:15 AM	3	4	0	0	7	0	0	0	0	0	0	4	0	0	4	4	0	1	0	5	16
08:30 AM	1	3	0	0	4	0	0	0	0	0	0	3	0	0	3	0	0	2	0	2	9
08:45 AM	5	5	0	0	10	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	12
Total	18	17	0	0	35	0	0	0	0	0	0	11	4	0	15	6	0	3	0	9	59
09:00 AM	1	2	0	0	3	0	0	0	0	0	0	4	0	0	4	6	0	3	0	9	16
09:15 AM	0	6	0	0	6	0	0	0	0	0	0	1	5	0	6	0	0	2	0	2	14
09:30 AM	0	2	0	0	2	0	0	0	0	0	0	2	1	0	3	2	0	1	0	3	8
09:45 AM	2	1	0	0	3	0	0	0	0	0	0	6	1	0	7	4	0	4	0	8	18
Total	3	11	0	0	14	0	0	0	0	0	0	13	7	0	20	12	0	10	0	22	56

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles - small trucks - heavy trucks

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	2	2	0	0	4	0	0	0	0	0	0	4	1	0	5	1	0	2	0	3	12
10:15 AM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	7
10:30 AM	0	6	0	0	6	0	0	0	0	0	0	5	1	0	6	4	0	2	0	6	18
10:45 AM	1	7	0	0	8	0	0	0	0	0	0	3	4	0	7	1	0	1	0	2	17
Total	4	17	0	0	21	0	0	0	0	0	0	14	6	0	20	7	0	6	0	13	54
11:00 AM	2	1	0	0	3	0	0	0	0	0	0	4	0	0	4	2	1	4	0	7	14
11:15 AM	4	1	0	0	5	0	0	0	0	0	0	4	2	0	6	0	0	2	0	2	13
11:30 AM	1	5	0	0	6	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	9
11:45 AM	0	5	0	0	5	0	0	0	0	0	0	3	2	0	5	0	0	2	0	2	12
Total	7	12	0	0	19	0	0	0	0	0	0	11	4	0	15	3	1	10	0	14	48
12:00 PM	1	6	0	0	7	0	0	0	0	0	0	2	3	0	5	2	0	1	0	3	15
12:15 PM	1	2	0	0	3	0	0	0	0	0	0	3	6	0	9	1	0	1	0	2	14
12:30 PM	2	2	0	0	4	0	0	0	0	0	0	2	3	0	5	2	0	0	0	2	11
12:45 PM	0	3	0	0	3	0	0	0	0	0	0	2	1	0	3	2	0	2	0	4	10
Total	4	13	0	0	17	0	0	0	0	0	0	9	13	0	22	7	0	4	0	11	50
01:00 PM	2	5	0	0	7	0	0	0	0	0	0	3	0	0	3	1	0	2	0	3	13
01:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	2	0	3	0	0	1	0	1	5
01:30 PM	2	4	0	0	6	0	0	0	0	0	0	5	5	0	10	1	0	0	0	1	17
01:45 PM	3	4	0	0	7	0	0	0	0	0	0	7	1	0	8	1	0	1	0	2	17
Total	7	14	0	0	21	0	0	0	0	0	0	16	8	0	24	3	0	4	0	7	52
02:00 PM	1	5	0	0	6	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	15
02:15 PM	1	3	0	0	4	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	10
02:30 PM	2	5	0	0	7	0	0	0	0	0	0	2	1	0	3	2	0	2	0	4	14
02:45 PM	2	3	0	0	5	0	0	0	0	0	0	0	0	0	0	2	1	3	0	6	11
Total	6	16	0	0	22	0	0	0	0	0	0	15	2	0	17	5	1	5	0	11	50
03:00 PM	1	5	0	0	6	0	0	0	0	0	0	6	1	0	7	2	0	2	0	4	17
03:15 PM	1	4	0	0	5	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	8
03:30 PM	2	7	0	0	9	0	0	0	0	0	0	3	1	0	4	3	0	1	0	4	17
03:45 PM	0	2	0	0	2	0	0	0	0	0	0	2	2	0	4	4	0	6	0	10	16
Total	4	18	0	0	22	0	0	0	0	0	0	11	5	0	16	10	0	10	0	20	58
04:00 PM	1	6	0	0	7	0	0	0	0	0	0	2	1	0	3	2	0	2	0	4	14
04:15 PM	1	3	0	0	4	0	0	0	0	0	0	2	2	0	4	5	0	2	0	7	15
04:30 PM	1	4	0	0	5	0	0	0	0	0	0	4	3	0	7	5	0	2	0	7	19
04:45 PM	2	5	0	0	7	0	0	0	0	0	0	2	2	0	4	1	0	2	0	3	14
Total	5	18	0	0	23	0	0	0	0	0	0	10	8	0	18	13	0	8	0	21	62
05:00 PM	4	10	0	0	14	0	0	0	0	0	0	3	2	0	5	0	0	1	0	1	20
05:15 PM	2	8	0	0	10	0	0	0	0	0	0	4	4	0	8	2	0	5	0	7	25
05:30 PM	1	6	0	0	7	0	0	0	0	0	0	2	2	0	4	5	0	1	0	6	17
05:45 PM	2	2	0	0	4	0	0	0	0	0	0	1	1	0	2	3	0	0	0	3	9
Total	9	26	0	0	35	0	0	0	0	0	0	10	9	0	19	10	0	7	0	17	71
06:00 PM	1	0	0	0	1	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	6
06:15 PM	1	4	0	0	5	0	0	0	0	0	0	1	1	0	2	3	0	0	0	3	10
06:30 PM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
06:45 PM	2	1	0	0	3	0	0	0	0	0	0	1	1	0	2	0	0	2	0	2	7
Total	5	7	0	0	12	0	0	0	0	0	0	8	3	0	11	3	0	2	0	5	28
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	3	0	4	5
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	1	0	3	4
07:30 PM	1	1	0	0	2	0	0	0	0	0	0	1	2	0	3	2	0	0	0	2	7
07:45 PM	3	3	0	0	6	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	8
Total	4	4	0	0	8	0	0	0	0	0	0	3	3	0	6	5	0	5	0	10	24

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles - small trucks - heavy trucks

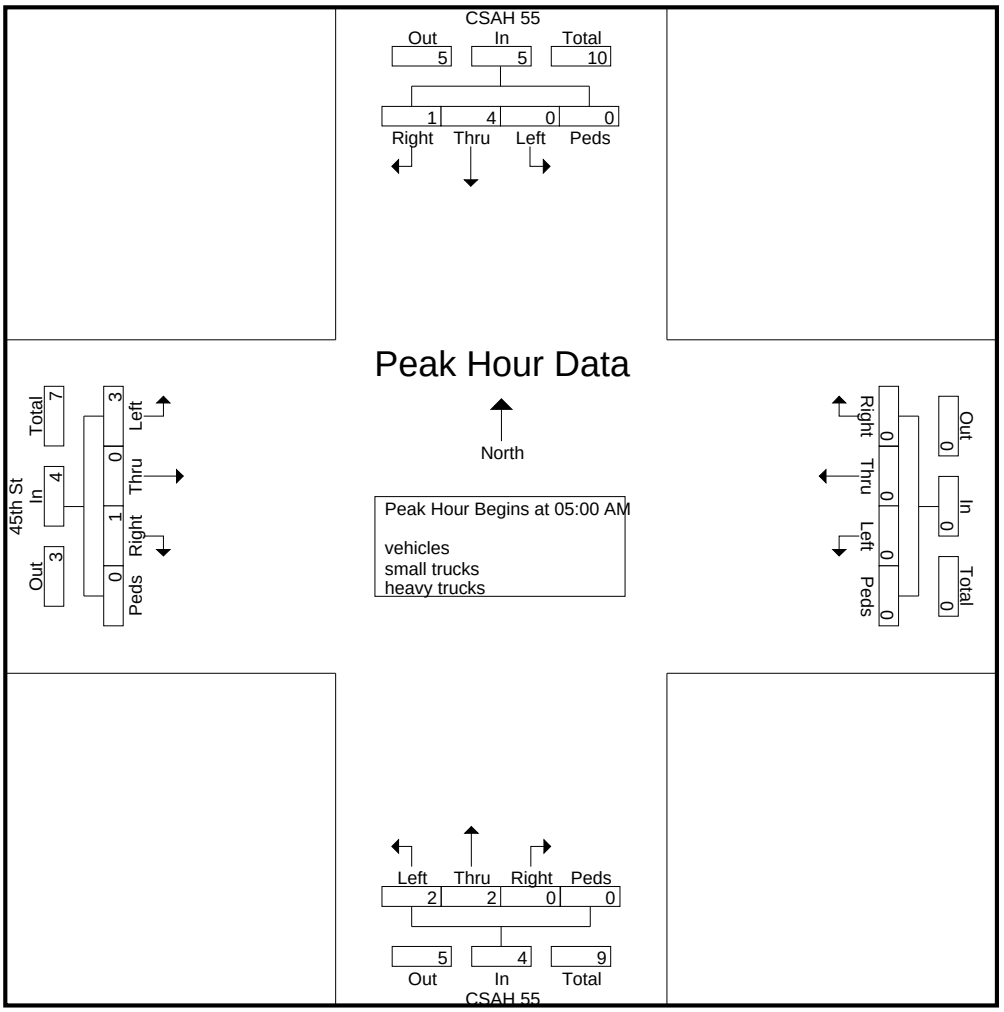
	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	2	0	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	2	0	2	5
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	1	0	3	4
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2	1	0	0	0	1	4
Total	2	1	0	0	3	0	0	0	0	0	0	0	5	0	5	3	0	3	0	6	14
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	3
09:15 PM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	5
09:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	3
09:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	4	0	0	4	0	0	0	0	0	0	5	3	0	8	0	0	2	0	2	14
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
10:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
10:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
10:45 PM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	4
Total	1	2	0	0	3	0	0	0	0	0	0	4	2	0	6	0	0	1	0	1	10
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	90	216	0	0	306	0	0	0	0	0	0	187	96	0	283	97	2	99	0	198	787
Apprch %	29.4	70.6	0	0		0	0	0	0		0	66.1	33.9	0		49	1	50	0		
Total %	11.4	27.4	0	0	38.9	0	0	0	0	0	0	23.8	12.2	0	36	12.3	0.3	12.6	0	25.2	
vehicles	72	161	0	0	233	0	0	0	0	0	0	134	77	0	211	88	1	76	0	165	609
% vehicles	80	74.5	0	0	76.1	0	0	0	0	0	0	71.7	80.2	0	74.6	90.7	50	76.8	0	83.3	77.4
small trucks	8	12	0	0	20	0	0	0	0	0	0	6	8	0	14	5	0	8	0	13	47
% small trucks	8.9	5.6	0	0	6.5	0	0	0	0	0	0	3.2	8.3	0	4.9	5.2	0	8.1	0	6.6	6
heavy trucks	10	43	0	0	53	0	0	0	0	0	0	47	11	0	58	4	1	15	0	20	131
% heavy trucks	11.1	19.9	0	0	17.3	0	0	0	0	0	0	25.1	11.5	0	20.5	4.1	50	15.2	0	10.1	16.6

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 AM	**1**	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	1	3
05:30 AM	0	1	0	0	1	0	0	0	0	0	0	**1**	**1**	0	**2**	0	0	1	0	1	**4**
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	**1**	0	1	0	**2**	4
Total Volume	1	4	0	0	5	0	0	0	0	0	0	2	2	0	4	1	0	3	0	4	13
% App. Total																					
PHF	.250	.500	.000	.000	.625	.000	.000	.000	.000	.000	.000	.500	.500	.000	.500	.250	.000	.750	.000	.500	.813

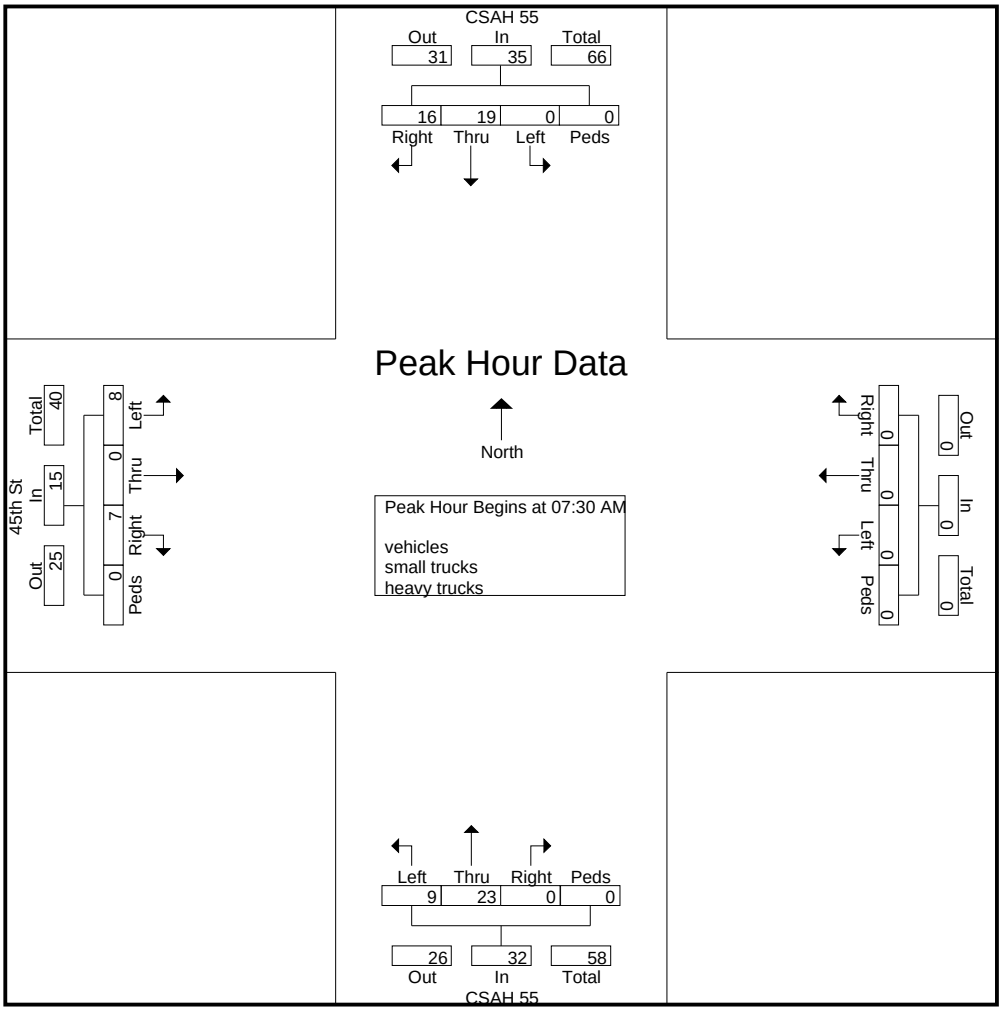


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	**7**	0	0	7	0	0	0	0	0	0	**11**	2	0	**13**	2	0	2	0	4	**24**
07:45 AM	4	3	0	0	7	0	0	0	0	0	0	5	3	0	8	0	0	**5**	0	**5**	20
08:00 AM	**9**	5	0	0	**14**	0	0	0	0	0	0	3	**4**	0	7	1	0	0	0	1	22
08:15 AM	3	4	0	0	7	0	0	0	0	0	0	4	0	0	4	**4**	0	1	0	5	16
Total Volume	16	19	0	0	35	0	0	0	0	0	0	23	9	0	32	7	0	8	0	15	82
% App. Total																					
PHF	.444	.679	.000	.000	.625	.000	.000	.000	.000	.000	.000	.523	.563	.000	.615	.438	.000	.400	.000	.750	.854



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
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sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- heavy trucks

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
06:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
07:15 AM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	4
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	5
07:45 AM	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
Total	1	2	0	0	3	0	0	0	0	0	0	9	2	0	11	0	0	0	0	0	14
08:00 AM	2	4	0	0	6	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	8
08:15 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	6
08:30 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	3	8	0	0	11	0	0	0	0	0	0	4	0	0	4	2	0	0	0	2	17
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
09:15 AM	0	3	0	0	3	0	0	0	0	0	0	0	2	0	2	0	0	1	0	1	6
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
09:45 AM	1	0	0	0	1	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	5
Total	1	3	0	0	4	0	0	0	0	0	0	5	2	0	7	1	0	2	0	3	14

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- heavy trucks

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
10:30 AM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	4
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	4	2	0	6	0	0	1	0	1	8
11:00 AM	2	0	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	6
11:15 AM	1	1	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
11:30 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	3	5	0	0	8	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	14
12:00 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:15 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
Total	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	6
01:00 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:45 PM	1	1	0	0	2	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	5
Total	1	4	0	0	5	0	0	0	0	0	0	5	2	0	7	0	0	1	0	1	13
02:00 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
02:15 PM	1	0	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	1	4	0	0	5	0	0	0	0	0	0	2	1	0	3	0	1	0	0	1	9
03:00 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	3	0	3	7
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
05:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	4
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- heavy trucks

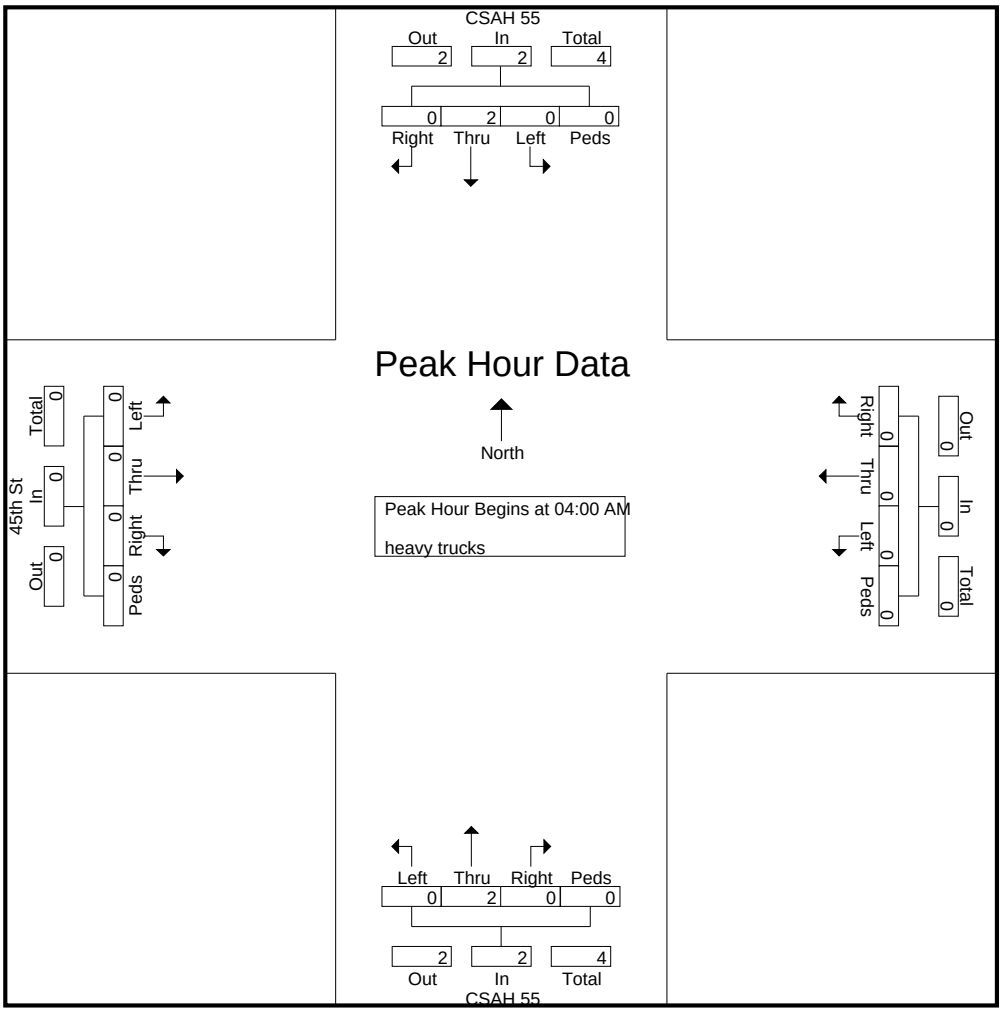
	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
09:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	4
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	10	43	0	0	53	0	0	0	0	0	0	47	11	0	58	4	1	15	0	20	131
Apprch %	18.9	81.1	0	0		0	0	0	0		0	81	19	0		20	5	75	0		
Total %	7.6	32.8	0	0	40.5	0	0	0	0	0	0	35.9	8.4	0	44.3	3.1	0.8	11.5	0	15.3	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 AM																					
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	1
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:45 AM	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Total Volume	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
% App. Total																					
PHF	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.000	.000	.000	.500

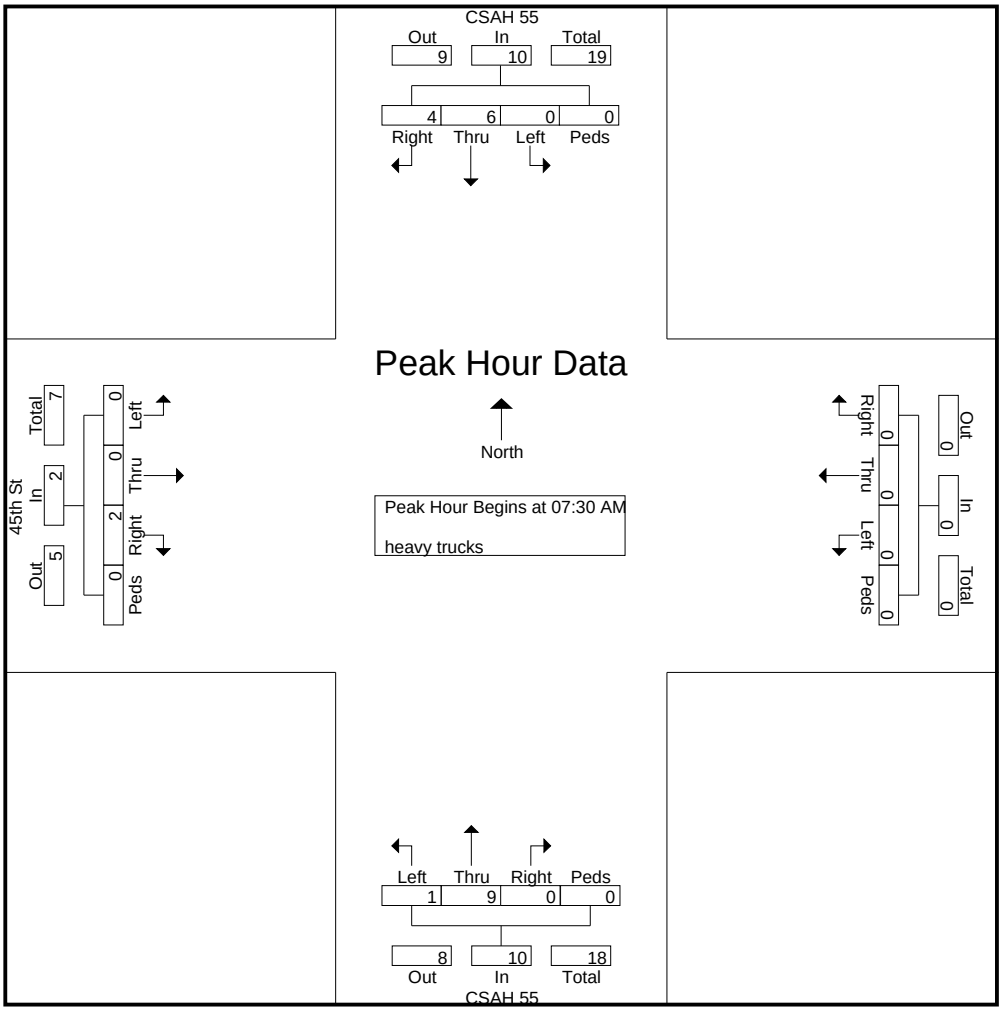


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	**3**	**1**	0	**4**	0	0	0	0	0	5
07:45 AM	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
08:00 AM	**2**	**4**	0	0	**6**	0	0	0	0	0	0	1	0	0	1	**1**	0	0	0	**1**	**8**
08:15 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	6
Total Volume	4	6	0	0	10	0	0	0	0	0	0	9	1	0	10	2	0	0	0	2	22
% App. Total																					
PHF	.500	.375	.000	.000	.417	.000	.000	.000	.000	.000	.000	.750	.250	.000	.625	.500	.000	.000	.000	.500	.688



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- small trucks

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	1	1	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	3
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
07:45 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Total	2	2	0	0	4	0	0	0	0	0	0	0	2	0	2	0	0	1	0	1	7
08:00 AM	3	0	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4
08:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	5	1	0	0	6	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	7
09:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	3
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2	4

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- small trucks

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	4
10:45 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	7
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	3
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
11:30 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	2	0	2	6
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	3
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
05:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	4
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- small trucks

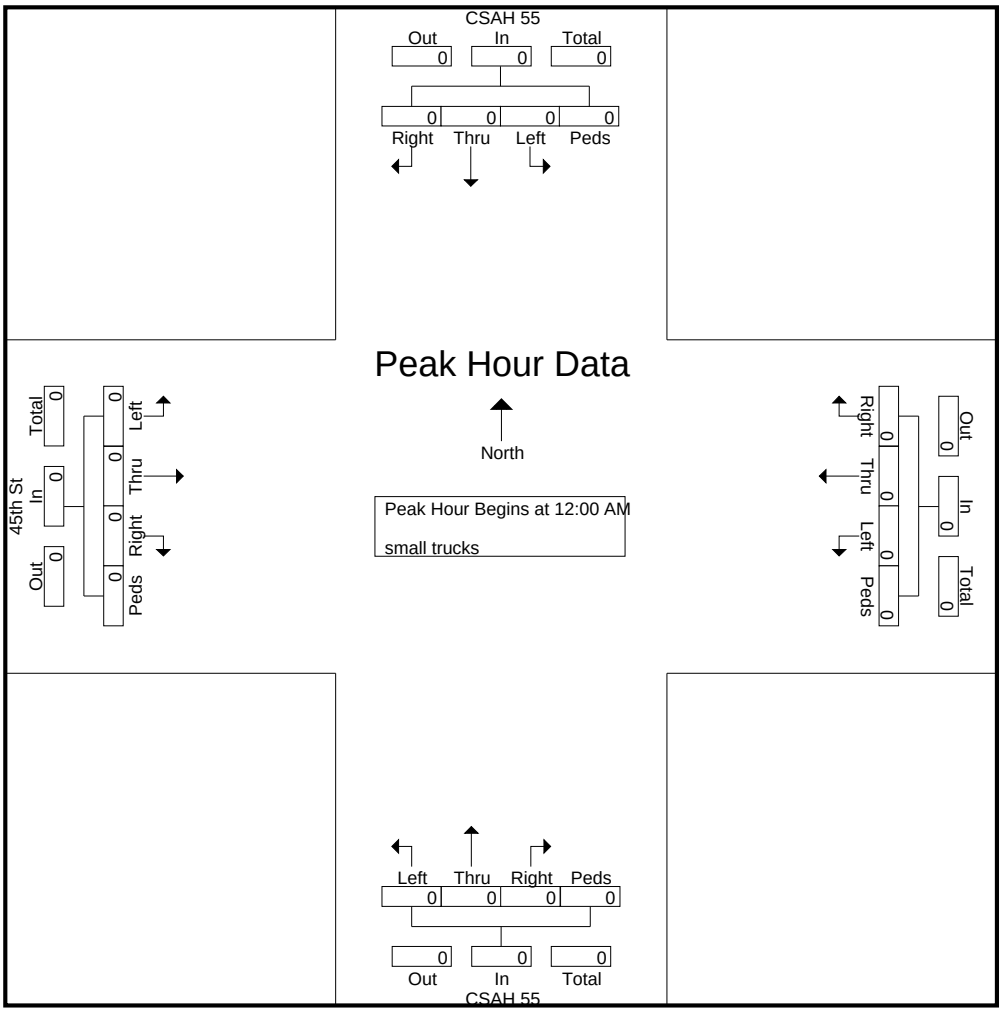
	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	8	12	0	0	20	0	0	0	0	0	0	6	8	0	14	5	0	8	0	13	47
Apprch %	40	60	0	0		0	0	0	0		0	42.9	57.1	0		38.5	0	61.5	0		
Total %	17	25.5	0	0	42.6	0	0	0	0	0	0	12.8	17	0	29.8	10.6	0	17	0	27.7	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:00 AM																					
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

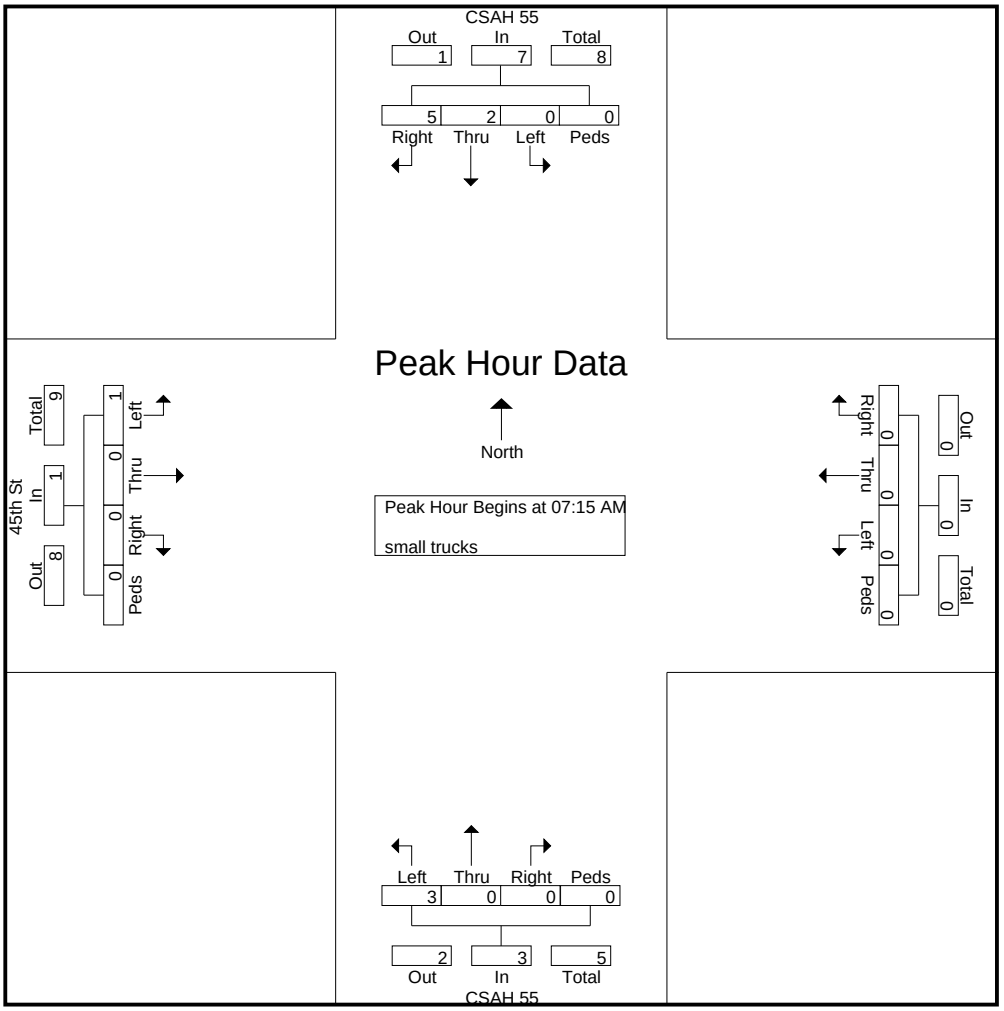


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	1	**1**	0	0	2	0	0	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	3
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
07:45 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	2
08:00 AM	**3**	0	0	0	**3**	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	**4**
Total Volume	5	2	0	0	7	0	0	0	0	0	0	0	3	0	3	0	0	1	0	1	11
% App. Total																					
PHF	.417	.500	.000	.000	.583	.000	.000	.000	.000	.000	.000	.000	.750	.000	.750	.000	.000	.250	.000	.250	.688



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:00 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
05:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	3
Total	1	4	0	0	5	0	0	0	0	0	0	1	2	0	3	1	0	2	0	3	11
06:00 AM	1	3	0	0	4	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	8
06:15 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	6
06:30 AM	1	1	0	0	2	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	7
06:45 AM	1	3	0	0	4	0	0	0	0	0	0	2	2	0	4	2	0	3	0	5	13
Total	3	10	0	0	13	0	0	0	0	0	0	9	2	0	11	5	0	5	0	10	34
07:00 AM	1	2	0	0	3	0	0	0	0	0	0	2	2	0	4	1	0	2	0	3	10
07:15 AM	1	2	0	0	3	0	0	0	0	0	0	3	0	0	3	1	0	1	0	2	8
07:30 AM	0	5	0	0	5	0	0	0	0	0	0	8	0	0	8	2	0	2	0	4	17
07:45 AM	2	3	0	0	5	0	0	0	0	0	0	3	3	0	6	0	0	4	0	4	15
Total	4	12	0	0	16	0	0	0	0	0	0	16	5	0	21	4	0	9	0	13	50
08:00 AM	4	1	0	0	5	0	0	0	0	0	0	2	3	0	5	0	0	0	0	0	10
08:15 AM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	3	0	1	0	4	9
08:30 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	2	0	2	7
08:45 AM	4	3	0	0	7	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	9
Total	10	8	0	0	18	0	0	0	0	0	0	7	3	0	10	4	0	3	0	7	35
09:00 AM	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	4	0	2	0	6	11
09:15 AM	0	3	0	0	3	0	0	0	0	0	0	1	3	0	4	0	0	1	0	1	8
09:30 AM	0	2	0	0	2	0	0	0	0	0	0	1	1	0	2	2	0	1	0	3	7
09:45 AM	1	1	0	0	2	0	0	0	0	0	0	2	1	0	3	3	0	4	0	7	12
Total	2	7	0	0	9	0	0	0	0	0	0	7	5	0	12	9	0	8	0	17	38

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	2	1	0	0	3	0	0	0	0	0	0	3	1	0	4	1	0	1	0	2	9
10:15 AM	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	6
10:30 AM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	4	0	1	0	5	10
10:45 AM	1	6	0	0	7	0	0	0	0	0	0	2	3	0	5	1	0	1	0	2	14
Total	4	12	0	0	16	0	0	0	0	0	0	8	4	0	12	7	0	4	0	11	39
11:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	1	1	0	4	5
11:15 AM	3	0	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	2	0	2	8
11:30 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	6
11:45 AM	0	3	0	0	3	0	0	0	0	0	0	2	2	0	4	0	0	2	0	2	9
Total	3	7	0	0	10	0	0	0	0	0	0	4	3	0	7	3	1	7	0	11	28
12:00 PM	1	4	0	0	5	0	0	0	0	0	0	2	3	0	5	2	0	1	0	3	13
12:15 PM	1	0	0	0	1	0	0	0	0	0	0	3	4	0	7	1	0	1	0	2	10
12:30 PM	2	2	0	0	4	0	0	0	0	0	0	2	3	0	5	2	0	0	0	2	11
12:45 PM	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	2	0	1	0	3	8
Total	4	9	0	0	13	0	0	0	0	0	0	8	11	0	19	7	0	3	0	10	42
01:00 PM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	7
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2
01:30 PM	2	4	0	0	6	0	0	0	0	0	0	4	5	0	9	1	0	0	0	1	16
01:45 PM	2	3	0	0	5	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	12
Total	6	9	0	0	15	0	0	0	0	0	0	10	6	0	16	3	0	3	0	6	37
02:00 PM	1	2	0	0	3	0	0	0	0	0	0	7	0	0	7	1	0	0	0	1	11
02:15 PM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
02:30 PM	2	5	0	0	7	0	0	0	0	0	0	2	1	0	3	2	0	2	0	4	14
02:45 PM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	0	2	0	2	0	4	8
Total	5	12	0	0	17	0	0	0	0	0	0	13	1	0	14	5	0	4	0	9	40
03:00 PM	1	3	0	0	4	0	0	0	0	0	0	5	1	0	6	2	0	2	0	4	14
03:15 PM	1	4	0	0	5	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	8
03:30 PM	2	6	0	0	8	0	0	0	0	0	0	3	1	0	4	2	0	0	0	2	14
03:45 PM	0	2	0	0	2	0	0	0	0	0	0	2	2	0	4	3	0	3	0	6	12
Total	4	15	0	0	19	0	0	0	0	0	0	10	5	0	15	8	0	6	0	14	48
04:00 PM	1	4	0	0	5	0	0	0	0	0	0	2	1	0	3	2	0	2	0	4	12
04:15 PM	1	3	0	0	4	0	0	0	0	0	0	2	2	0	4	5	0	2	0	7	15
04:30 PM	1	4	0	0	5	0	0	0	0	0	0	4	3	0	7	5	0	0	0	5	17
04:45 PM	2	5	0	0	7	0	0	0	0	0	0	2	2	0	4	1	0	2	0	3	14
Total	5	16	0	0	21	0	0	0	0	0	0	10	8	0	18	13	0	6	0	19	58
05:00 PM	4	8	0	0	12	0	0	0	0	0	0	3	2	0	5	0	0	1	0	1	18
05:15 PM	2	8	0	0	10	0	0	0	0	0	0	4	2	0	6	2	0	3	0	5	21
05:30 PM	1	6	0	0	7	0	0	0	0	0	0	2	2	0	4	3	0	1	0	4	15
05:45 PM	2	2	0	0	4	0	0	0	0	0	0	1	1	0	2	3	0	0	0	3	9
Total	9	24	0	0	33	0	0	0	0	0	0	10	7	0	17	8	0	5	0	13	63
06:00 PM	1	0	0	0	1	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	6
06:15 PM	1	2	0	0	3	0	0	0	0	0	0	1	1	0	2	3	0	0	0	3	8
06:30 PM	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5
06:45 PM	2	1	0	0	3	0	0	0	0	0	0	1	1	0	2	0	0	2	0	2	7
Total	5	5	0	0	10	0	0	0	0	0	0	8	3	0	11	3	0	2	0	5	26
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	3	0	4	5
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	3
07:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	2	0	2	2	0	0	0	2	5
07:45 PM	3	3	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	7
Total	4	3	0	0	7	0	0	0	0	0	0	0	3	0	3	5	0	5	0	10	20

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles

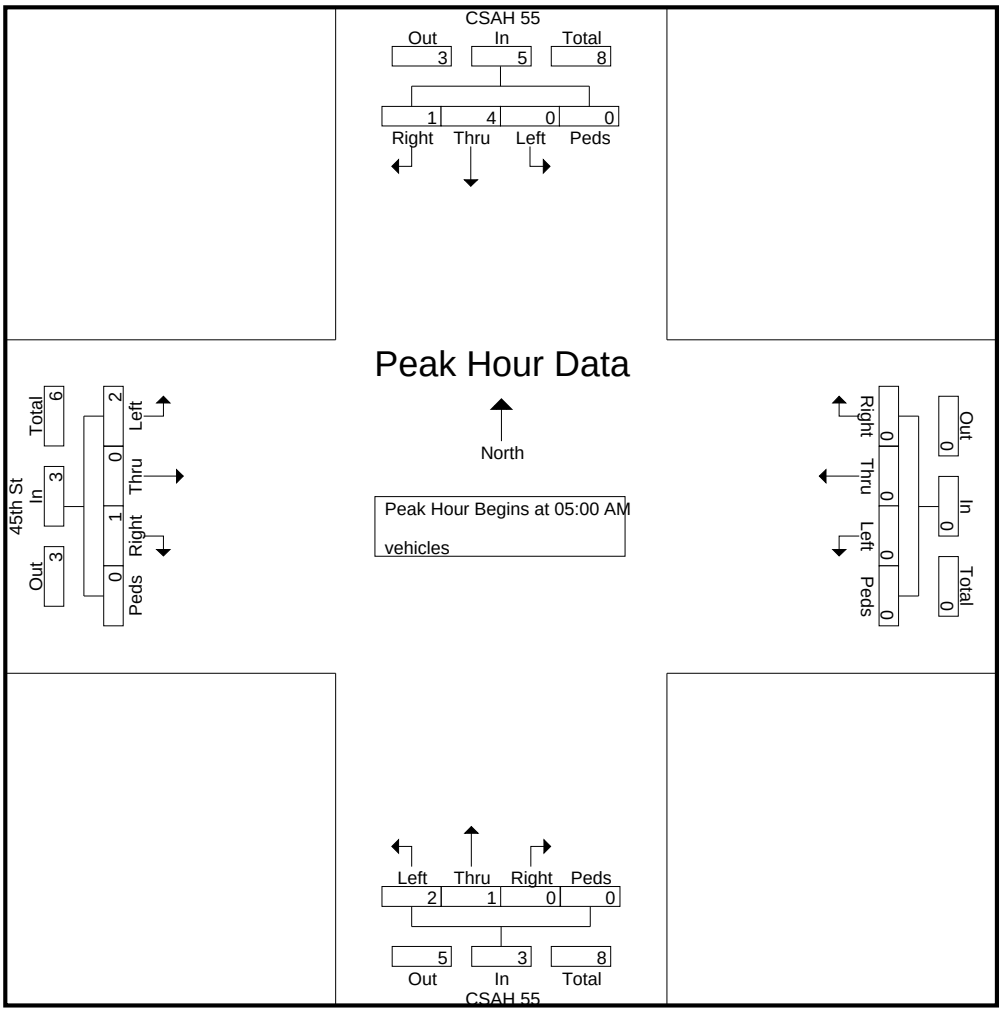
	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	2	0	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	2	0	2	5
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	1	0	3	4
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	2	0	2	1	0	0	0	1	4
Total	2	1	0	0	3	0	0	0	0	0	0	0	5	0	5	3	0	3	0	6	14
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
09:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
09:45 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total	0	3	0	0	3	0	0	0	0	0	0	4	3	0	7	0	0	0	0	0	10
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
10:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
10:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
Total	1	2	0	0	3	0	0	0	0	0	0	3	1	0	4	0	0	1	0	1	8
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	72	161	0	0	233	0	0	0	0	0	0	134	77	0	211	88	1	76	0	165	609
Apprch %	30.9	69.1	0	0		0	0	0	0		0	63.5	36.5	0		53.3	0.6	46.1	0		
Total %	11.8	26.4	0	0	38.3	0	0	0	0	0	0	22	12.6	0	34.6	14.4	0.2	12.5	0	27.1	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:15 AM	**1**	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	1	**3**
05:30 AM	0	1	0	0	1	0	0	0	0	0	0	**1**	**1**	0	**2**	0	0	0	0	0	3
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	**1**	0	1	0	**2**	3
Total Volume	1	4	0	0	5	0	0	0	0	0	0	1	2	0	3	1	0	2	0	3	11
% App. Total																					
PHF	.250	.500	.000	.000	.625	.000	.000	.000	.000	.000	.000	.250	.500	.000	.375	.250	.000	.500	.000	.375	.917

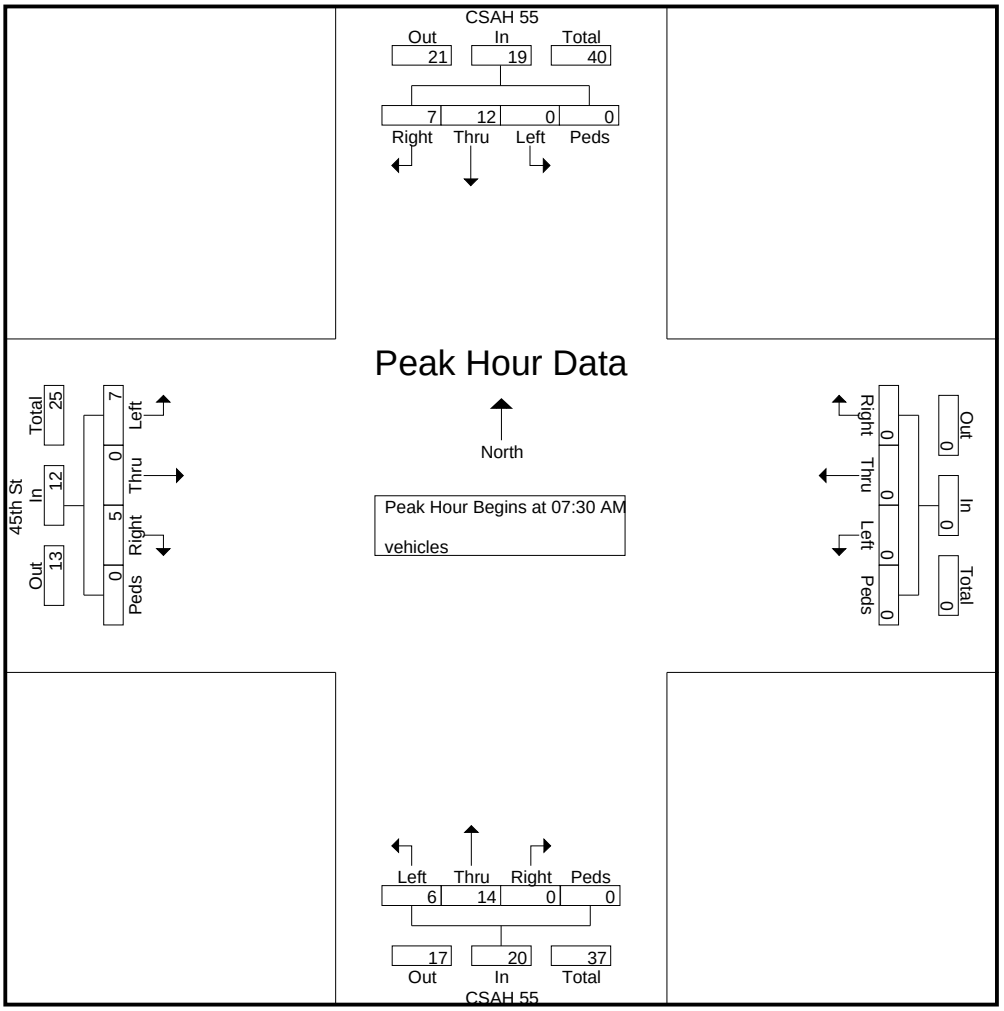


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hr count
Willmar, MN
sunny

File Name : csah 55 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					From East					CSAH 55 From South					45th St From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	**5**	0	0	**5**	0	0	0	0	0	0	**8**	0	0	**8**	2	0	2	0	**4**	**17**
07:45 AM	2	3	0	0	5	0	0	0	0	0	0	3	**3**	0	6	0	0	**4**	0	4	15
08:00 AM	**4**	1	0	0	5	0	0	0	0	0	0	2	3	0	5	0	0	0	0	0	10
08:15 AM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	**3**	0	1	0	4	9
Total Volume	7	12	0	0	19	0	0	0	0	0	0	14	6	0	20	5	0	7	0	12	51
% App. Total																					
PHF	.438	.600	.000	.000	.950	.000	.000	.000	.000	.000	.000	.438	.500	.000	.625	.417	.000	.438	.000	.750	.750



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles - small trucks - heavy trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	2	0	0	2	0	1	1	0	2	0	1	0	0	1	5
12:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	4	0	0	4	0	1	1	0	2	0	2	0	0	2	8
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	4
01:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	5
01:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
01:45 AM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	2	1	0	3	6
Total	0	0	0	0	0	0	8	0	0	8	0	3	0	0	3	0	6	1	0	7	18
02:00 AM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
02:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
02:45 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
Total	0	0	0	0	0	0	5	0	0	5	0	2	0	0	2	0	3	0	0	3	10
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4
03:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	2
03:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	0	1	0	4	0	0	4	1	0	0	0	1	1	1	0	0	2	8
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	1	0	0	1	0	1	0	0	1	2	1	0	0	3	0	0	0	0	0	5
04:30 AM	0	0	0	0	0	0	2	0	0	2	3	4	0	0	7	0	2	0	0	2	11
04:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	5
Total	0	3	0	0	3	0	3	0	0	3	5	5	0	0	10	0	4	1	0	5	21
05:00 AM	1	1	0	0	2	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	5
05:15 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	1	5	0	0	6	12
05:30 AM	1	0	0	0	1	0	13	0	0	13	0	1	0	0	1	1	2	1	0	4	19
05:45 AM	1	3	0	0	4	0	4	0	0	4	0	2	0	0	2	0	7	1	0	8	18
Total	4	4	0	0	8	0	25	0	0	25	0	3	0	0	3	2	14	2	0	18	54
06:00 AM	1	2	0	0	3	0	3	0	0	3	0	2	0	0	2	1	8	1	0	10	18
06:15 AM	2	2	0	0	4	0	2	0	0	2	0	1	0	0	1	1	7	1	0	9	16
06:30 AM	0	3	0	0	3	0	11	0	0	11	0	2	0	0	2	2	11	3	0	16	32
06:45 AM	2	0	2	0	4	2	12	0	0	14	0	4	3	0	7	1	13	0	0	14	39
Total	5	7	2	0	14	2	28	0	0	30	0	9	3	0	12	5	39	5	0	49	105
07:00 AM	2	3	0	0	5	2	15	0	0	17	0	1	0	0	1	3	8	1	0	12	35
07:15 AM	1	3	0	0	4	1	8	0	0	9	0	8	1	0	9	1	18	1	0	20	42
07:30 AM	1	8	1	0	10	0	5	1	0	6	1	11	1	0	13	2	16	0	0	18	47
07:45 AM	0	1	2	0	3	5	12	0	0	17	0	3	2	0	5	0	18	2	0	20	45
Total	4	15	3	0	22	8	40	1	0	49	1	23	4	0	28	6	60	4	0	70	169
08:00 AM	1	2	1	0	4	2	6	0	0	8	0	5	2	0	7	2	11	1	0	14	33
08:15 AM	3	10	0	0	13	0	7	0	0	7	0	4	1	0	5	2	6	0	0	8	33
08:30 AM	1	2	0	0	3	0	5	0	0	5	3	2	2	0	7	0	15	3	0	18	33
08:45 AM	4	5	1	0	10	0	10	0	0	10	0	1	2	0	3	1	10	0	0	11	34
Total	9	19	2	0	30	2	28	0	0	30	3	12	7	0	22	5	42	4	0	51	133
09:00 AM	2	3	2	0	7	2	7	0	0	9	0	2	1	0	3	1	12	1	0	14	33
09:15 AM	1	1	1	0	3	1	4	0	0	5	0	5	2	0	7	3	12	1	0	16	31
09:30 AM	5	2	0	0	7	0	11	0	0	11	0	3	1	0	4	1	10	0	0	11	33
09:45 AM	1	3	0	0	4	0	10	0	0	10	0	3	1	0	4	2	8	2	0	12	30
Total	9	9	3	0	21	3	32	0	0	35	0	13	5	0	18	7	42	4	0	53	127

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles - small trucks - heavy trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	1	4	0	0	5	1	7	0	0	8	0	3	1	0	4	1	11	1	0	13	30
10:15 AM	1	2	0	0	3	2	8	0	0	10	1	0	2	0	3	1	8	0	0	9	25
10:30 AM	4	4	0	0	8	0	9	0	0	9	0	5	3	0	8	2	13	2	0	17	42
10:45 AM	6	6	2	0	14	0	5	0	0	5	0	8	3	0	11	1	4	0	0	5	35
Total	12	16	2	0	30	3	29	0	0	32	1	16	9	0	26	5	36	3	0	44	132
11:00 AM	1	1	0	0	2	0	5	0	0	5	3	1	2	0	6	2	12	2	0	16	29
11:15 AM	3	1	1	0	5	0	6	0	0	6	1	7	2	0	10	0	8	0	0	8	29
11:30 AM	0	2	0	0	2	0	10	0	0	10	1	0	0	0	1	3	9	0	0	12	25
11:45 AM	3	4	1	0	8	1	12	4	0	17	2	2	2	0	6	0	11	2	0	13	44
Total	7	8	2	0	17	1	33	4	0	38	7	10	6	0	23	5	40	4	0	49	127
12:00 PM	2	3	1	0	6	2	9	0	0	11	0	3	2	0	5	1	8	0	0	9	31
12:15 PM	1	1	1	0	3	3	9	1	0	13	0	8	0	0	8	3	14	0	0	17	41
12:30 PM	1	4	0	0	5	3	11	0	0	14	0	0	0	0	0	1	5	2	0	8	27
12:45 PM	4	1	0	0	5	1	11	1	0	13	0	2	1	0	3	0	5	0	0	5	26
Total	8	9	2	0	19	9	40	2	0	51	0	13	3	0	16	5	32	2	0	39	125
01:00 PM	2	3	1	0	6	0	9	2	0	11	0	2	1	0	3	2	9	4	0	15	35
01:15 PM	2	1	0	0	3	1	12	0	0	13	2	2	1	0	5	2	17	0	0	19	40
01:30 PM	2	2	0	0	4	1	6	0	0	7	1	6	1	0	8	0	11	0	0	11	30
01:45 PM	2	2	0	0	4	0	17	0	0	17	1	2	1	0	4	0	11	8	0	19	44
Total	8	8	1	0	17	2	44	2	0	48	4	12	4	0	20	4	48	12	0	64	149
02:00 PM	4	3	0	0	7	0	12	0	0	12	1	6	1	0	8	0	13	1	0	14	41
02:15 PM	1	0	2	0	3	1	15	0	0	16	1	3	3	0	7	1	19	4	0	24	50
02:30 PM	2	4	0	0	6	0	16	0	0	16	1	2	2	0	5	2	16	1	0	19	46
02:45 PM	1	4	1	0	6	0	15	2	0	17	0	2	1	0	3	2	8	0	0	10	36
Total	8	11	3	0	22	1	58	2	0	61	3	13	7	0	23	5	56	6	0	67	173
03:00 PM	3	2	1	0	6	2	17	0	0	19	0	4	0	0	4	0	10	0	0	10	39
03:15 PM	2	5	0	0	7	1	15	0	0	16	1	0	2	0	3	2	18	1	0	21	47
03:30 PM	2	6	0	0	8	0	20	2	0	22	0	2	1	0	3	3	23	2	0	28	61
03:45 PM	1	6	2	0	9	2	22	0	0	24	1	2	0	0	3	0	13	0	0	13	49
Total	8	19	3	0	30	5	74	2	0	81	2	8	3	0	13	5	64	3	0	72	196
04:00 PM	2	7	0	0	9	0	9	0	0	9	1	3	1	0	5	2	7	0	0	9	32
04:15 PM	2	4	1	0	7	0	21	0	0	21	5	3	1	0	9	0	9	1	0	10	47
04:30 PM	2	5	4	0	11	2	14	0	0	16	0	3	3	0	6	0	7	2	0	9	42
04:45 PM	2	3	1	0	6	2	19	0	0	21	1	1	3	0	5	0	14	0	0	14	46
Total	8	19	6	0	33	4	63	0	0	67	7	10	8	0	25	2	37	3	0	42	167
05:00 PM	1	6	0	0	7	2	23	0	0	25	0	2	1	0	3	0	10	2	0	12	47
05:15 PM	3	4	0	0	7	0	17	0	0	17	0	5	3	0	8	1	11	1	0	13	45
05:30 PM	2	5	1	0	8	3	11	0	0	14	0	2	1	0	3	0	16	1	0	17	42
05:45 PM	1	8	1	0	10	1	13	0	0	14	0	2	3	0	5	2	21	1	0	24	53
Total	7	23	2	0	32	6	64	0	0	70	0	11	8	0	19	3	58	5	0	66	187
06:00 PM	0	0	0	0	0	1	14	1	0	16	0	1	0	0	1	1	10	1	0	12	29
06:15 PM	3	3	1	0	7	0	12	0	0	12	0	4	2	0	6	1	11	0	0	12	37
06:30 PM	1	1	0	0	2	0	8	0	0	8	0	2	1	0	3	0	7	0	0	7	20
06:45 PM	1	0	0	0	1	1	4	0	0	5	0	0	1	0	1	0	10	1	0	11	18
Total	5	4	1	0	10	2	38	1	0	41	0	7	4	0	11	2	38	2	0	42	104
07:00 PM	1	2	1	0	4	0	9	0	0	9	0	0	1	0	1	0	11	0	0	11	25
07:15 PM	0	0	0	0	0	0	8	0	0	8	0	1	0	0	1	0	8	2	0	10	19
07:30 PM	0	2	0	0	2	0	10	0	0	10	0	2	0	0	2	0	4	0	0	4	18
07:45 PM	0	1	1	0	2	0	5	0	0	5	0	2	0	0	2	1	5	0	0	6	15
Total	1	5	2	0	8	0	32	0	0	32	0	5	1	0	6	1	28	2	0	31	77

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles - small trucks - heavy trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	2	0	0	2	1	5	0	0	6	0	1	1	0	2	0	5	0	0	5	15
08:15 PM	0	1	0	0	1	0	9	0	0	9	1	2	0	0	3	0	5	1	0	6	19
08:30 PM	0	0	3	0	3	0	5	0	0	5	0	0	0	0	0	1	7	0	0	8	16
08:45 PM	0	1	1	0	2	2	6	0	0	8	0	1	0	0	1	1	9	1	0	11	22
Total	0	4	4	0	8	3	25	0	0	28	1	4	1	0	6	2	26	2	0	30	72
09:00 PM	1	0	0	0	1	0	5	1	0	6	1	0	0	0	1	0	14	0	0	14	22
09:15 PM	0	2	0	0	2	1	11	0	0	12	1	0	0	0	1	0	6	0	0	6	21
09:30 PM	0	1	1	0	2	0	2	0	0	2	0	0	0	0	0	0	8	0	0	8	12
09:45 PM	0	2	1	0	3	1	4	0	0	5	2	1	0	0	3	0	6	0	0	6	17
Total	1	5	2	0	8	2	22	1	0	25	4	1	0	0	5	0	34	0	0	34	72
10:00 PM	0	1	0	0	1	0	2	0	0	2	0	1	1	0	2	1	4	0	0	5	10
10:15 PM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	6
10:30 PM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	9	0	0	9	12
10:45 PM	0	3	0	0	3	0	2	0	0	2	1	0	0	0	1	0	2	0	0	2	8
Total	0	5	1	0	6	0	8	0	0	8	1	1	1	0	3	1	18	0	0	19	36
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
11:15 PM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	9
11:30 PM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	5
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4	4
Total	0	1	0	0	1	0	7	0	0	7	0	0	0	0	0	0	11	1	0	12	20
Grand Total	105	194	41	0	340	53	714	15	0	782	40	182	75	0	297	66	739	66	0	871	2290
Apprch %	30.9	57.1	12.1	0		6.8	91.3	1.9	0		13.5	61.3	25.3	0		7.6	84.8	7.6	0		
Total %	4.6	8.5	1.8	0	14.8	2.3	31.2	0.7	0	34.1	1.7	7.9	3.3	0	13	2.9	32.3	2.9	0	38	
vehicles	90	137	36	0	263	50	672	11	0	733	30	122	55	0	207	49	708	48	0	805	2008
% vehicles	85.7	70.6	87.8	0	77.4	94.3	94.1	73.3	0	93.7	75	67	73.3	0	69.7	74.2	95.8	72.7	0	92.4	87.7
small trucks	7	13	4	0	24	1	25	4	0	30	8	8	6	0	22	9	20	3	0	32	108
% small trucks	6.7	6.7	9.8	0	7.1	1.9	3.5	26.7	0	3.8	20	4.4	8	0	7.4	13.6	2.7	4.5	0	3.7	4.7
heavy trucks	8	44	1	0	53	2	17	0	0	19	2	52	14	0	68	8	11	15	0	34	174
% heavy trucks	7.6	22.7	2.4	0	15.6	3.8	2.4	0	0	2.4	5	28.6	18.7	0	22.9	12.1	1.5	22.7	0	3.9	7.6

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
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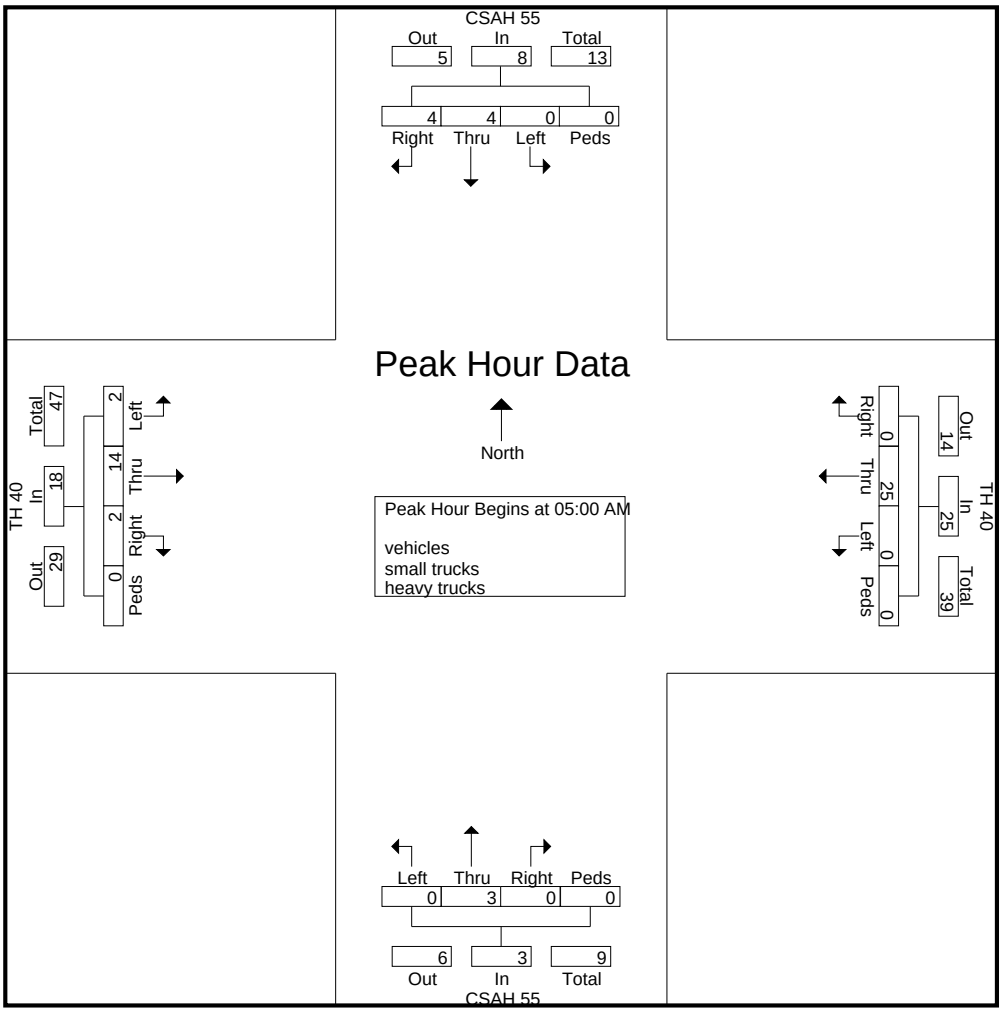
	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	**1**	1	0	0	2	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	5
05:15 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	**1**	5	0	0	6	12
05:30 AM	1	0	0	0	1	0	**13**	0	0	**13**	0	1	0	0	1	1	2	**1**	0	4	**19**
05:45 AM	1	**3**	0	0	**4**	0	4	0	0	4	0	**2**	0	0	**2**	0	**7**	1	0	**8**	18
Total Volume	4	4	0	0	8	0	25	0	0	25	0	3	0	0	3	2	14	2	0	18	54
% App. Total																					
PHF	1.00	.333	.000	.000	.500	.000	.481	.000	.000	.481	.000	.375	.000	.000	.375	.500	.500	.500	.000	.563	.711

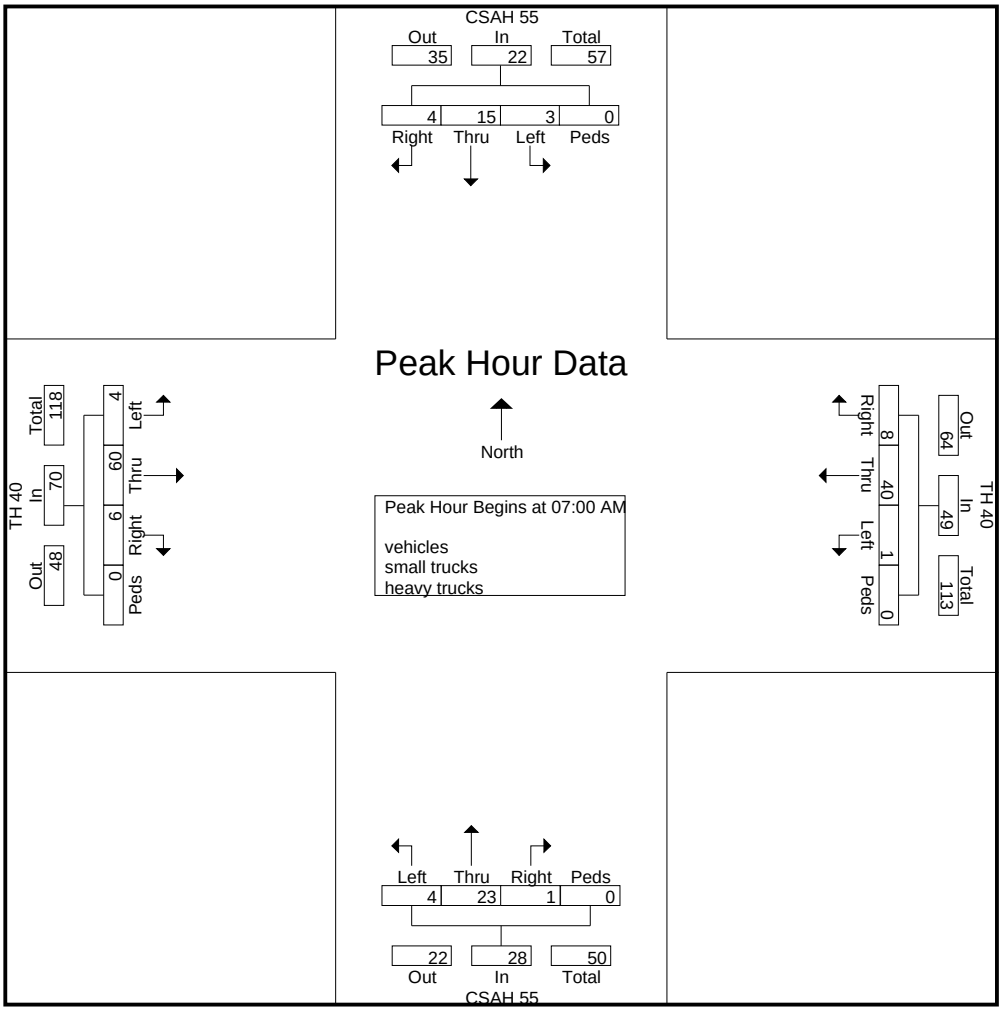


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**2**	3	0	0	5	2	**15**	0	0	**17**	0	1	0	0	1	**3**	8	1	0	12	35
07:15 AM	1	3	0	0	4	1	8	0	0	9	0	8	1	0	9	1	**18**	1	0	**20**	42
07:30 AM	1	**8**	1	0	**10**	0	5	**1**	0	6	**1**	**11**	1	0	**13**	2	16	0	0	18	**47**
07:45 AM	0	1	**2**	0	3	**5**	12	0	0	17	0	3	**2**	0	5	0	18	**2**	0	20	45
Total Volume	4	15	3	0	22	8	40	1	0	49	1	23	4	0	28	6	60	4	0	70	169
% App. Total																					
PHF	.500	.469	.375	.000	.550	.400	.667	.250	.000	.721	.250	.523	.500	.000	.538	.500	.833	.500	.000	.875	.899



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TH 40 & CSAH 55
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File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
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Groups Printed- heavy trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	2
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
04:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	6
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	3
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
06:45 AM	1	0	0	0	1	0	0	0	0	0	0	1	1	0	2	0	1	0	0	1	4
Total	1	1	0	0	2	0	0	0	0	0	0	3	1	0	4	0	1	1	0	2	8
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
07:15 AM	1	0	0	0	1	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	5
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	5
07:45 AM	0	0	0	0	0	0	1	0	0	1	0	1	1	0	2	0	0	0	0	0	3
Total	1	1	0	0	2	0	1	0	0	1	0	8	2	0	10	1	0	1	0	2	15
08:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	5
08:15 AM	0	5	0	0	5	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	8
08:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	3
08:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	8	0	0	9	0	0	0	0	0	0	4	3	0	7	0	0	2	0	2	18
09:00 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	3
09:15 AM	1	1	0	0	2	0	1	0	0	1	0	2	1	0	3	0	1	0	0	1	7
09:30 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
09:45 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
Total	1	4	0	0	5	0	2	0	0	2	0	5	1	0	6	0	1	1	0	2	15

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- heavy trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	1	0	0	1	0	1	1	0	2	0	0	0	0	0	3
10:15 AM	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	3
10:30 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	5
10:45 AM	0	2	0	0	2	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	5
Total	0	4	0	0	4	1	2	0	0	3	0	5	1	0	6	1	1	1	0	3	16
11:00 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	1	0	1	0	2	4
11:15 AM	1	0	0	0	1	0	1	0	0	1	0	2	1	0	3	0	1	0	0	1	6
11:30 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
11:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
Total	1	3	0	0	4	0	2	0	0	2	1	3	1	0	5	1	2	2	0	5	16
12:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:15 PM	1	1	0	0	2	0	1	0	0	1	0	2	0	0	2	1	0	0	0	1	6
12:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	3	0	0	4	0	2	0	0	2	0	2	0	0	2	1	0	0	0	1	9
01:00 PM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	3	0	3	6
01:15 PM	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	4
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	1	1	0	0	2	0	0	0	0	0	0	5	0	0	5	1	0	5	0	6	13
02:00 PM	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	5
02:15 PM	0	0	0	0	0	0	1	0	0	1	0	2	1	0	3	0	0	0	0	0	4
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
02:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	1	3	0	0	4	0	1	0	0	1	0	4	1	0	5	0	2	0	0	2	12
03:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
03:15 PM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
03:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	0	1	0	0	1	4
03:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	0	0	4	0	2	0	0	2	0	2	1	0	3	0	1	0	0	1	10
04:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
04:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	1	1	0	0	2	7
05:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2
Total	0	2	0	0	2	1	1	0	0	2	0	1	1	0	2	0	0	1	0	1	7
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- heavy trucks

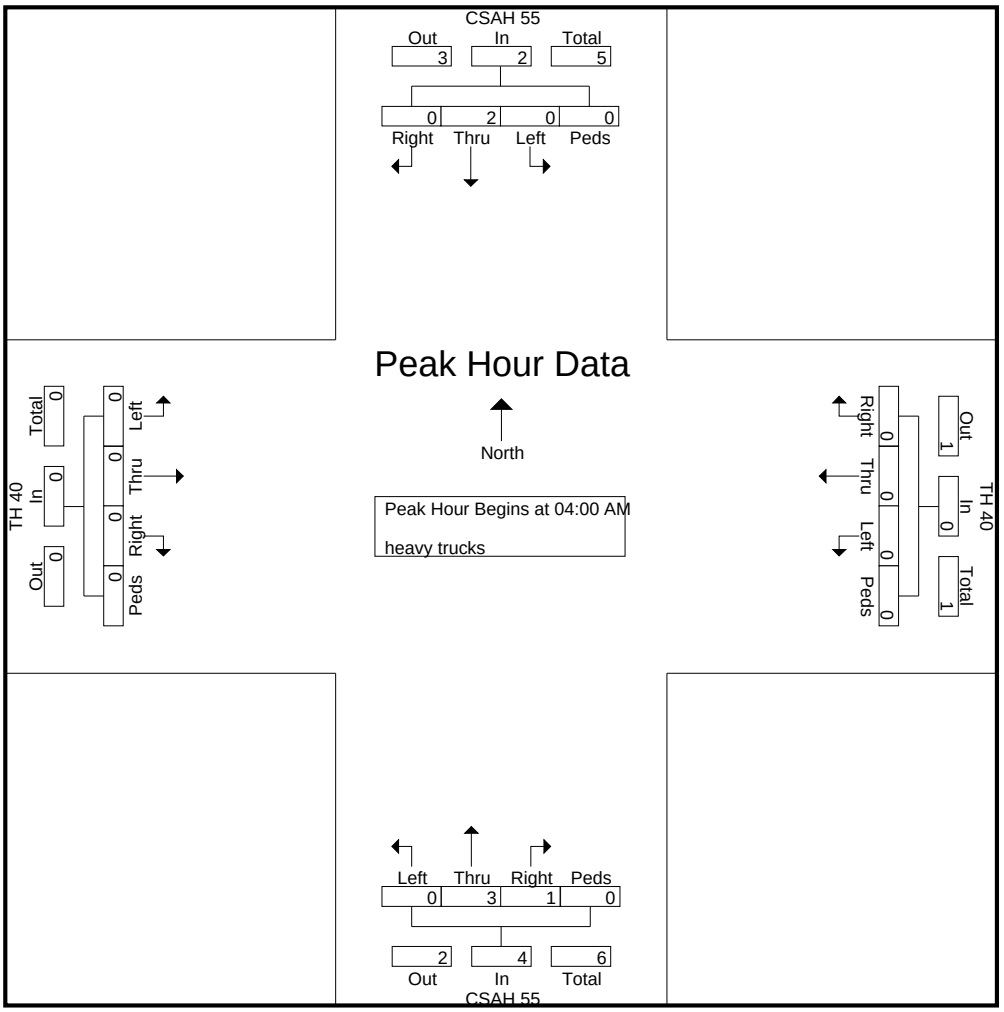
	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	3
08:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
Total	0	2	1	0	3	0	0	0	0	0	0	2	0	0	2	1	2	0	0	3	8
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	2
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	3
Grand Total	8	44	1	0	53	2	17	0	0	19	2	52	14	0	68	8	11	15	0	34	174
Apprch %	15.1	83	1.9	0		10.5	89.5	0	0		2.9	76.5	20.6	0		23.5	32.4	44.1	0		
Total %	4.6	25.3	0.6	0	30.5	1.1	9.8	0	0	10.9	1.1	29.9	8	0	39.1	4.6	6.3	8.6	0	19.5	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 AM																					
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	**1**	1	0	0	**2**	0	0	0	0	0	**2**
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	**2**	0	0	2	0	0	0	0	0	2
04:45 AM	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	6
% App. Total																					
PHF	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250	.375	.000	.000	.500	.000	.000	.000	.000	.000	.750

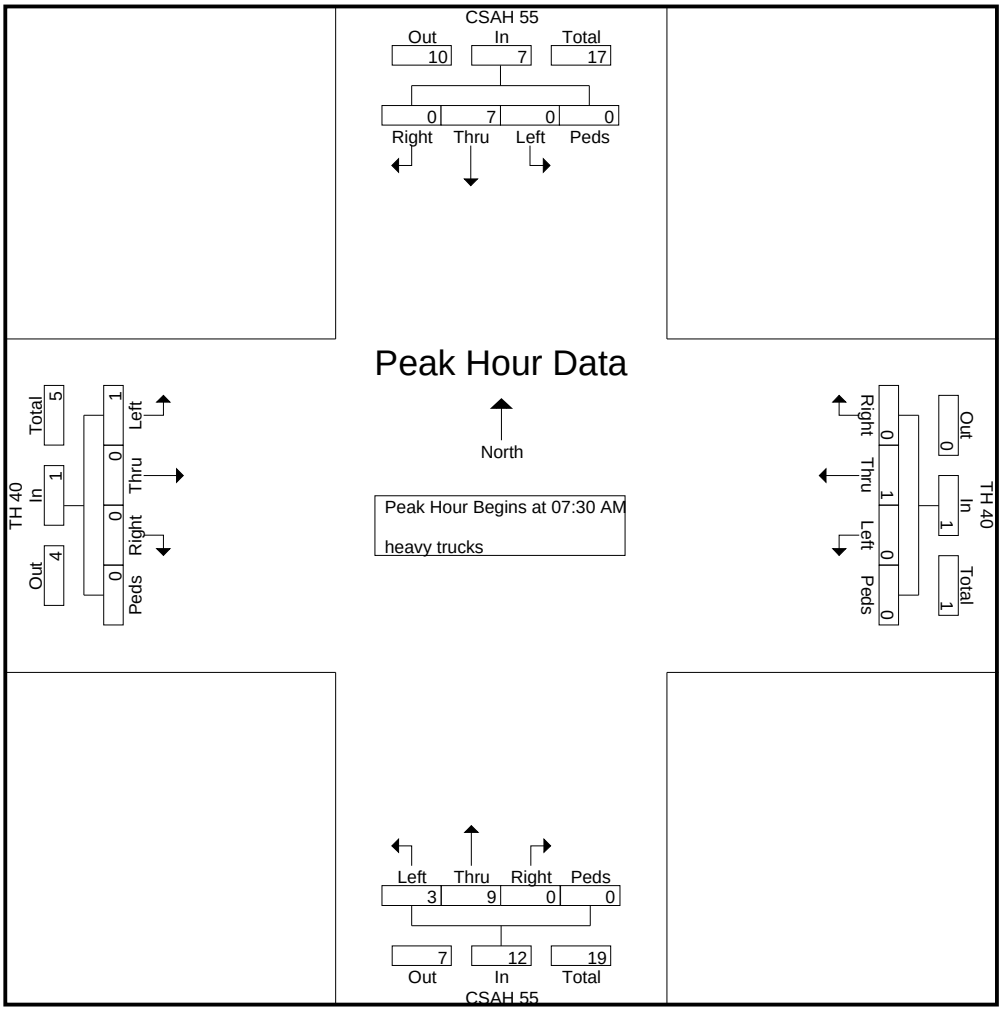


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	1	0	0	1	0	0	0	0	0	0	**4**	0	0	**4**	0	0	0	0	0	5
07:45 AM	0	0	0	0	0	0	**1**	0	0	**1**	0	1	**1**	0	2	0	0	0	0	0	3
08:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	1	0	3	0	0	**1**	0	**1**	5
08:15 AM	0	**5**	0	0	**5**	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	**8**
Total Volume	0	7	0	0	7	0	1	0	0	1	0	9	3	0	12	0	0	1	0	1	21
% App. Total																					
PHF	.000	.350	.000	.000	.350	.000	.250	.000	.000	.250	.000	.563	.750	.000	.750	.000	.000	.250	.000	.250	.656



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- small trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	4
07:30 AM	1	1	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	4
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	0	2	0	2	0	0	2	0	1	0	0	1	0	4	0	0	4	9
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	3
08:30 AM	0	0	0	0	0	0	0	0	0	0	3	0	1	0	4	0	0	0	0	0	4
08:45 AM	1	2	0	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
Total	1	3	0	0	4	0	3	0	0	3	3	0	1	0	4	1	0	0	0	1	12
09:00 AM	1	0	1	0	2	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	4
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	3
09:30 AM	0	1	0	0	1	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	3
09:45 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total	1	2	1	0	4	0	4	0	0	4	0	0	2	0	2	1	0	1	0	2	12

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- small trucks

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
10:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10:30 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	0	1	3
10:45 AM	1	1	1	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
Total	1	1	1	0	3	0	3	0	0	3	0	1	0	0	1	1	0	1	0	2	9
11:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	2	3
11:45 AM	1	1	0	0	2	0	0	3	0	3	1	0	2	0	3	0	0	0	0	0	8
Total	1	1	0	0	2	0	1	3	0	4	2	0	2	0	4	2	0	0	0	2	12
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
12:15 PM	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	1	1	0	0	2	5
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	2	4	0	0	6	9
01:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
01:15 PM	1	0	0	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	3
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
01:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	1	1	0	0	2	0	2	0	0	2	1	0	0	0	1	0	2	1	0	3	8
02:00 PM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	3
02:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
02:30 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
02:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
Total	0	1	0	0	1	0	4	0	0	4	0	1	0	0	1	1	3	0	0	4	10
03:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	0	2	0	0	2	5
04:00 PM	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	2	0	0	2	4
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
04:30 PM	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	0	0	2	0	2	0	2	0	0	2	2	0	1	0	3	0	2	0	0	2	9
05:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	3
Total	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	0	1	0	0	1	5
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- small trucks

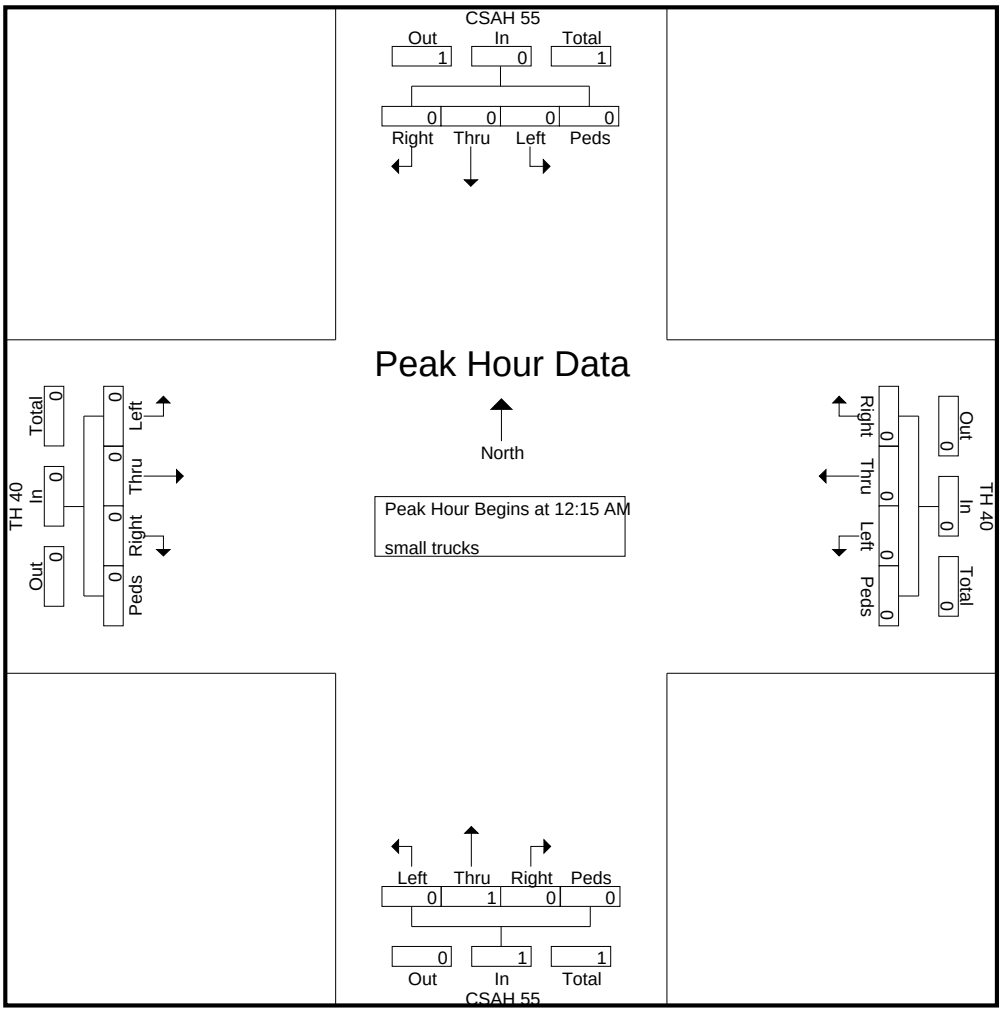
	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	7	13	4	0	24	1	25	4	0	30	8	8	6	0	22	9	20	3	0	32	108
Apprch %	29.2	54.2	16.7	0		3.3	83.3	13.3	0		36.4	36.4	27.3	0		28.1	62.5	9.4	0		
Total %	6.5	12	3.7	0	22.2	0.9	23.1	3.7	0	27.8	7.4	7.4	5.6	0	20.4	8.3	18.5	2.8	0	29.6	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 12:15 AM																					
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	**1**
Total Volume	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250

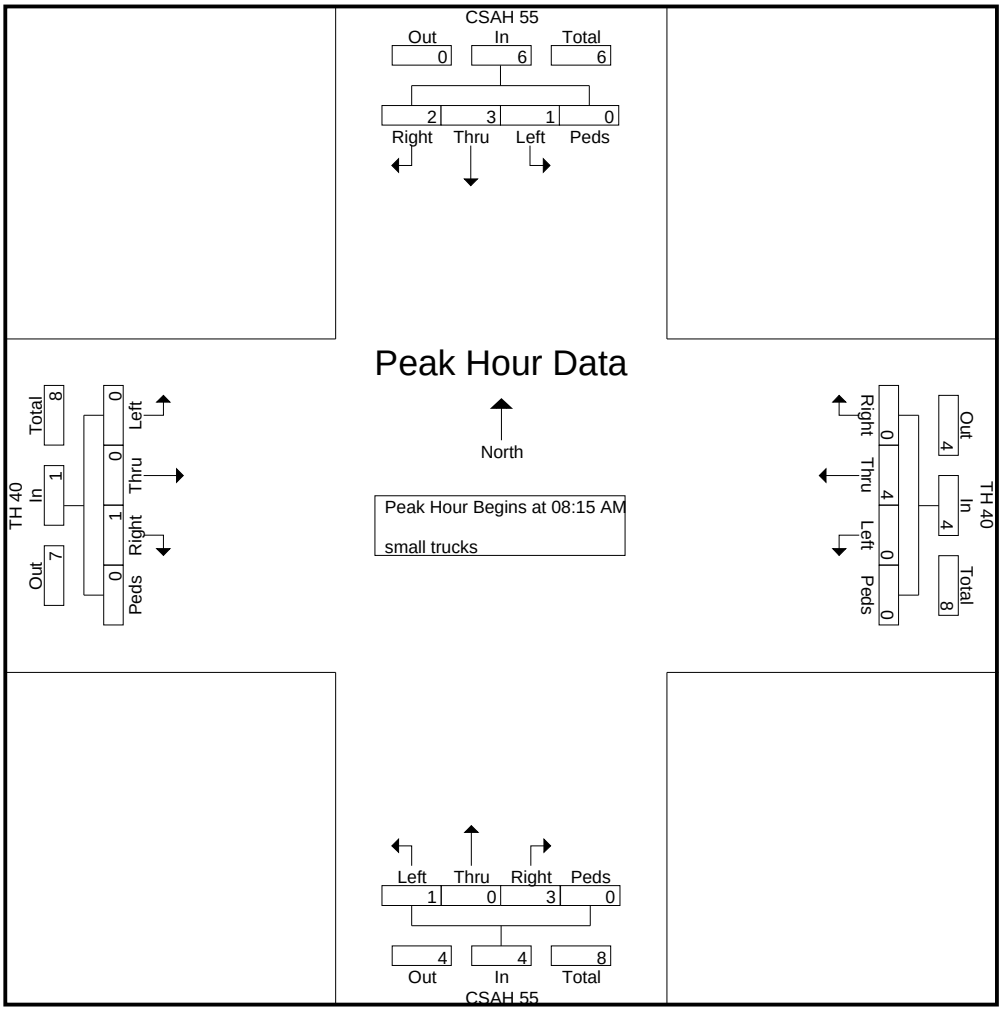


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:15 AM																					
08:15 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	**1**	0	0	0	**1**	3
08:30 AM	0	0	0	0	0	0	0	0	0	0	**3**	0	**1**	0	**4**	0	0	0	0	0	**4**
08:45 AM	**1**	**2**	0	0	**3**	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
09:00 AM	1	0	**1**	0	2	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	4
Total Volume	2	3	1	0	6	0	4	0	0	4	3	0	1	0	4	1	0	0	0	1	15
% App. Total																					
PHF	.500	.375	.250	.000	.500	.000	.500	.000	.000	.500	.250	.000	.250	.000	.250	.250	.000	.000	.000	.250	.938



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	2	0	0	2	0	1	1	0	2	0	1	0	0	1	5
12:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	4	0	0	4	0	1	1	0	2	0	2	0	0	2	8
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2	3
01:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	5
01:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
01:45 AM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	2	1	0	3	6
Total	0	0	0	0	0	0	8	0	0	8	0	2	0	0	2	0	6	1	0	7	17
02:00 AM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
02:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
02:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	5	0	0	5	0	1	0	0	1	0	3	0	0	3	9
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4
03:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	2
03:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	1	0	0	0	1	0	4	0	0	4	1	0	0	0	1	1	1	0	0	2	8
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	1	0	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	3
04:30 AM	0	0	0	0	0	0	2	0	0	2	3	2	0	0	5	0	2	0	0	2	9
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	3
Total	0	1	0	0	1	0	3	0	0	3	4	2	0	0	6	0	4	1	0	5	15
05:00 AM	1	1	0	0	2	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	5
05:15 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	11
05:30 AM	1	0	0	0	1	0	13	0	0	13	0	1	0	0	1	1	2	1	0	4	19
05:45 AM	1	1	0	0	2	0	4	0	0	4	0	1	0	0	1	0	7	1	0	8	15
Total	4	2	0	0	6	0	25	0	0	25	0	2	0	0	2	1	14	2	0	17	50
06:00 AM	1	2	0	0	3	0	3	0	0	3	0	2	0	0	2	1	8	1	0	10	18
06:15 AM	2	1	0	0	3	0	2	0	0	2	0	0	0	0	0	1	7	0	0	8	13
06:30 AM	0	3	0	0	3	0	11	0	0	11	0	1	0	0	1	2	11	3	0	16	31
06:45 AM	1	0	2	0	3	2	11	0	0	13	0	3	2	0	5	1	11	0	0	12	33
Total	4	6	2	0	12	2	27	0	0	29	0	6	2	0	8	5	37	4	0	46	95
07:00 AM	2	3	0	0	5	2	15	0	0	17	0	0	0	0	0	3	7	0	0	10	32
07:15 AM	0	3	0	0	3	1	7	0	0	8	0	5	0	0	5	0	16	1	0	17	33
07:30 AM	0	6	1	0	7	0	4	1	0	5	1	7	1	0	9	2	15	0	0	17	38
07:45 AM	0	1	2	0	3	5	11	0	0	16	0	2	1	0	3	0	18	2	0	20	42
Total	2	13	3	0	18	8	37	1	0	46	1	14	2	0	17	5	56	3	0	64	145
08:00 AM	1	1	1	0	3	2	5	0	0	7	0	3	1	0	4	2	11	0	0	13	27
08:15 AM	3	4	0	0	7	0	6	0	0	6	0	2	0	0	2	1	6	0	0	7	22
08:30 AM	1	1	0	0	2	0	5	0	0	5	0	2	0	0	2	0	15	2	0	17	26
08:45 AM	2	2	1	0	5	0	9	0	0	9	0	1	2	0	3	1	10	0	0	11	28
Total	7	8	2	0	17	2	25	0	0	27	0	8	3	0	11	4	42	2	0	48	103
09:00 AM	1	2	1	0	4	2	4	0	0	6	0	2	1	0	3	1	12	0	0	13	26
09:15 AM	0	0	1	0	1	1	3	0	0	4	0	3	0	0	3	2	11	0	0	13	21
09:30 AM	5	0	0	0	5	0	10	0	0	10	0	2	0	0	2	1	10	0	0	11	28
09:45 AM	1	1	0	0	2	0	9	0	0	9	0	1	1	0	2	2	8	2	0	12	25
Total	7	3	2	0	12	3	26	0	0	29	0	8	2	0	10	6	41	2	0	49	100

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	1	4	0	0	5	1	6	0	0	7	0	2	0	0	2	0	11	1	0	12	26
10:15 AM	1	1	0	0	2	1	7	0	0	8	1	0	2	0	3	1	7	0	0	8	21
10:30 AM	4	3	0	0	7	0	8	0	0	8	0	2	3	0	5	1	13	0	0	14	34
10:45 AM	5	3	1	0	9	0	3	0	0	3	0	6	3	0	9	1	4	0	0	5	26
Total	11	11	1	0	23	2	24	0	0	26	1	10	8	0	19	3	35	1	0	39	107
11:00 AM	1	1	0	0	2	0	4	0	0	4	2	0	2	0	4	1	12	1	0	14	24
11:15 AM	2	1	1	0	4	0	5	0	0	5	1	5	1	0	7	0	7	0	0	7	23
11:30 AM	0	1	0	0	1	0	9	0	0	9	0	0	0	0	0	1	8	0	0	9	19
11:45 AM	2	1	1	0	4	1	12	1	0	14	1	2	0	0	3	0	11	1	0	12	33
Total	5	4	2	0	11	1	30	1	0	32	4	7	3	0	14	2	38	2	0	42	99
12:00 PM	2	3	1	0	6	2	8	0	0	10	0	3	2	0	5	0	8	0	0	8	29
12:15 PM	0	0	1	0	1	3	8	0	0	11	0	4	0	0	4	1	13	0	0	14	30
12:30 PM	1	2	0	0	3	3	11	0	0	14	0	0	0	0	0	1	3	2	0	6	23
12:45 PM	4	1	0	0	5	1	11	1	0	13	0	2	1	0	3	0	4	0	0	4	25
Total	7	6	2	0	15	9	38	1	0	48	0	9	3	0	12	2	28	2	0	32	107
01:00 PM	2	2	1	0	5	0	8	2	0	10	0	0	1	0	1	2	9	0	0	11	27
01:15 PM	0	1	0	0	1	1	11	0	0	12	1	0	1	0	2	1	17	0	0	18	33
01:30 PM	2	2	0	0	4	1	6	0	0	7	1	5	1	0	7	0	9	0	0	9	27
01:45 PM	2	1	0	0	3	0	17	0	0	17	1	2	1	0	4	0	11	6	0	17	41
Total	6	6	1	0	13	2	42	2	0	46	3	7	4	0	14	3	46	6	0	55	128
02:00 PM	3	1	0	0	4	0	11	0	0	11	1	4	1	0	6	0	11	1	0	12	33
02:15 PM	1	0	2	0	3	1	13	0	0	14	1	1	2	0	4	1	19	4	0	24	45
02:30 PM	2	3	0	0	5	0	15	0	0	15	1	2	2	0	5	2	13	1	0	16	41
02:45 PM	1	3	1	0	5	0	14	2	0	16	0	1	1	0	2	1	8	0	0	9	32
Total	7	7	3	0	17	1	53	2	0	56	3	8	6	0	17	4	51	6	0	61	151
03:00 PM	3	1	1	0	5	1	17	0	0	18	0	3	0	0	3	0	9	0	0	9	35
03:15 PM	2	4	0	0	6	1	13	0	0	14	1	0	2	0	3	2	17	1	0	20	43
03:30 PM	2	5	0	0	7	0	20	2	0	22	0	1	0	0	1	3	22	2	0	27	57
03:45 PM	1	4	2	0	7	2	21	0	0	23	1	2	0	0	3	0	13	0	0	13	46
Total	8	14	3	0	25	4	71	2	0	77	2	6	2	0	10	5	61	3	0	69	181
04:00 PM	2	6	0	0	8	0	8	0	0	8	0	3	1	0	4	1	5	0	0	6	26
04:15 PM	2	3	1	0	6	0	21	0	0	21	4	2	1	0	7	0	9	1	0	10	44
04:30 PM	2	4	2	0	8	2	13	0	0	15	0	3	2	0	5	0	7	2	0	9	37
04:45 PM	2	3	1	0	6	2	19	0	0	21	1	1	2	0	4	0	13	0	0	13	44
Total	8	16	4	0	28	4	61	0	0	65	5	9	6	0	20	1	34	3	0	38	151
05:00 PM	1	5	0	0	6	2	22	0	0	24	0	2	1	0	3	0	10	2	0	12	45
05:15 PM	3	4	0	0	7	0	16	0	0	16	0	4	3	0	7	1	11	1	0	13	43
05:30 PM	2	4	1	0	7	2	11	0	0	13	0	1	1	0	2	0	16	1	0	17	39
05:45 PM	1	7	1	0	9	1	13	0	0	14	0	1	2	0	3	2	20	0	0	22	48
Total	7	20	2	0	29	5	62	0	0	67	0	8	7	0	15	3	57	4	0	64	175
06:00 PM	0	0	0	0	0	1	14	1	0	16	0	1	0	0	1	1	10	1	0	12	29
06:15 PM	3	3	1	0	7	0	11	0	0	11	0	3	1	0	4	1	11	0	0	12	34
06:30 PM	1	1	0	0	2	0	8	0	0	8	0	2	1	0	3	0	6	0	0	6	19
06:45 PM	1	0	0	0	1	1	4	0	0	5	0	0	1	0	1	0	10	1	0	11	18
Total	5	4	1	0	10	2	37	1	0	40	0	6	3	0	9	2	37	2	0	41	100
07:00 PM	1	2	1	0	4	0	9	0	0	9	0	0	1	0	1	0	11	0	0	11	25
07:15 PM	0	0	0	0	0	0	8	0	0	8	0	1	0	0	1	0	8	2	0	10	19
07:30 PM	0	2	0	0	2	0	10	0	0	10	0	2	0	0	2	0	4	0	0	4	18
07:45 PM	0	1	1	0	2	0	4	0	0	4	0	2	0	0	2	0	5	0	0	5	13
Total	1	5	2	0	8	0	31	0	0	31	0	5	1	0	6	0	28	2	0	30	75

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles

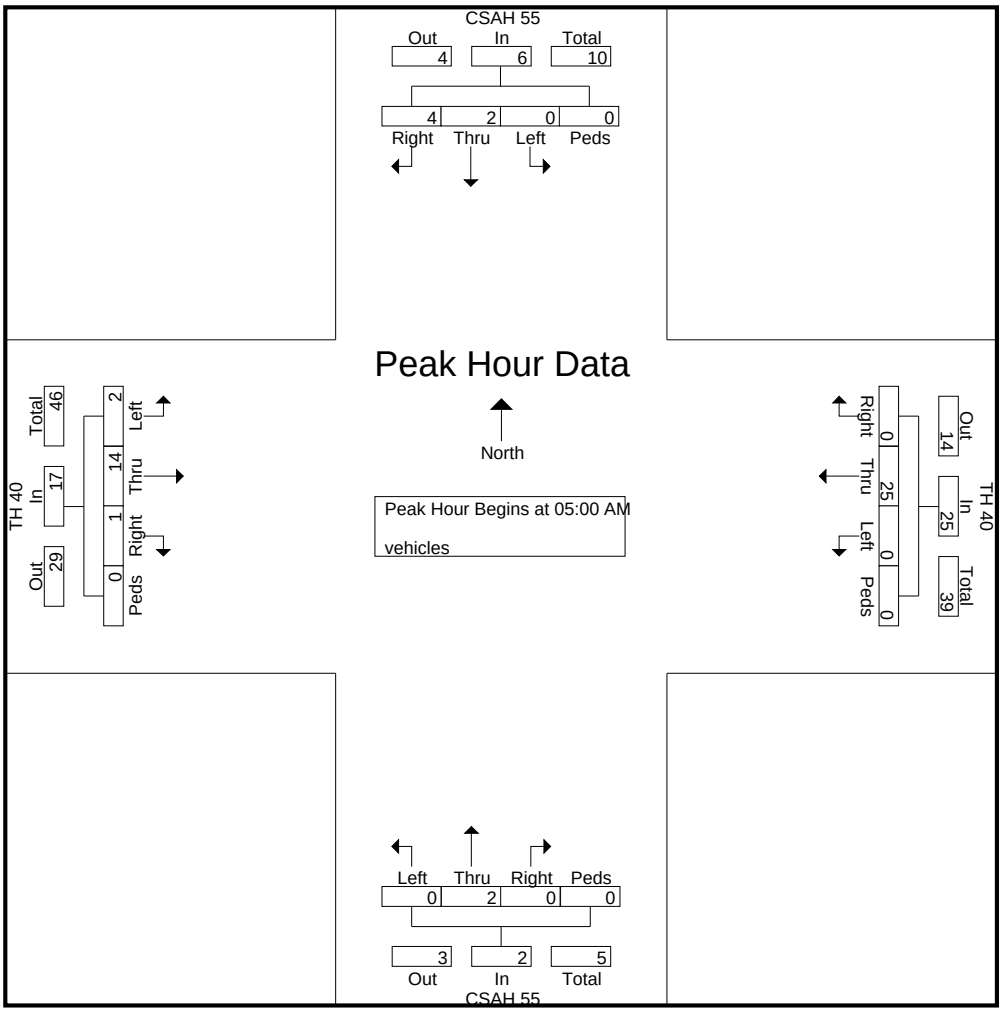
	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	1	0	0	1	1	5	0	0	6	0	0	1	0	1	0	4	0	0	4	12
08:15 PM	0	0	0	0	0	0	9	0	0	9	1	2	0	0	3	0	5	1	0	6	18
08:30 PM	0	0	2	0	2	0	5	0	0	5	0	0	0	0	0	0	7	0	0	7	14
08:45 PM	0	1	1	0	2	2	6	0	0	8	0	0	0	0	0	1	8	1	0	10	20
Total	0	2	3	0	5	3	25	0	0	28	1	2	1	0	4	1	24	2	0	27	64
09:00 PM	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	0	14	0	0	14	21
09:15 PM	0	2	0	0	2	1	10	0	0	11	1	0	0	0	1	0	6	0	0	6	20
09:30 PM	0	1	1	0	2	0	2	0	0	2	0	0	0	0	0	0	8	0	0	8	12
09:45 PM	0	1	1	0	2	1	4	0	0	5	2	1	0	0	3	0	6	0	0	6	16
Total	0	4	2	0	6	2	21	1	0	24	4	1	0	0	5	0	34	0	0	34	69
10:00 PM	0	1	0	0	1	0	2	0	0	2	0	0	1	0	1	1	4	0	0	5	9
10:15 PM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	6
10:30 PM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	9	0	0	9	12
10:45 PM	0	3	0	0	3	0	1	0	0	1	1	0	0	0	1	0	2	0	0	2	7
Total	0	5	1	0	6	0	7	0	0	7	1	0	1	0	2	1	18	0	0	19	34
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
11:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	8
11:30 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	4
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Total	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	11	0	0	11	17
Grand Total	90	137	36	0	263	50	672	11	0	733	30	122	55	0	207	49	708	48	0	805	2008
Apprch %	34.2	52.1	13.7	0		6.8	91.7	1.5	0		14.5	58.9	26.6	0		6.1	88	6	0		
Total %	4.5	6.8	1.8	0	13.1	2.5	33.5	0.5	0	36.5	1.5	6.1	2.7	0	10.3	2.4	35.3	2.4	0	40.1	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	**1**	**1**	0	0	**2**	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	5
05:15 AM	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	11
05:30 AM	1	0	0	0	1	0	**13**	0	0	**13**	0	**1**	0	0	**1**	**1**	2	**1**	0	4	**19**
05:45 AM	1	1	0	0	2	0	4	0	0	4	0	1	0	0	1	0	**7**	1	0	**8**	15
Total Volume	4	2	0	0	6	0	25	0	0	25	0	2	0	0	2	1	14	2	0	17	50
% App. Total																					
PHF	1.00	.500	.000	.000	.750	.000	.481	.000	.000	.481	.000	.500	.000	.000	.500	.250	.500	.500	.000	.531	.658



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 40 & CSAH 55
24 hour count
Willmar, MN
sunny

File Name : csah 55 & th 40
Site Code : 00000004
Start Date : 6/7/2016
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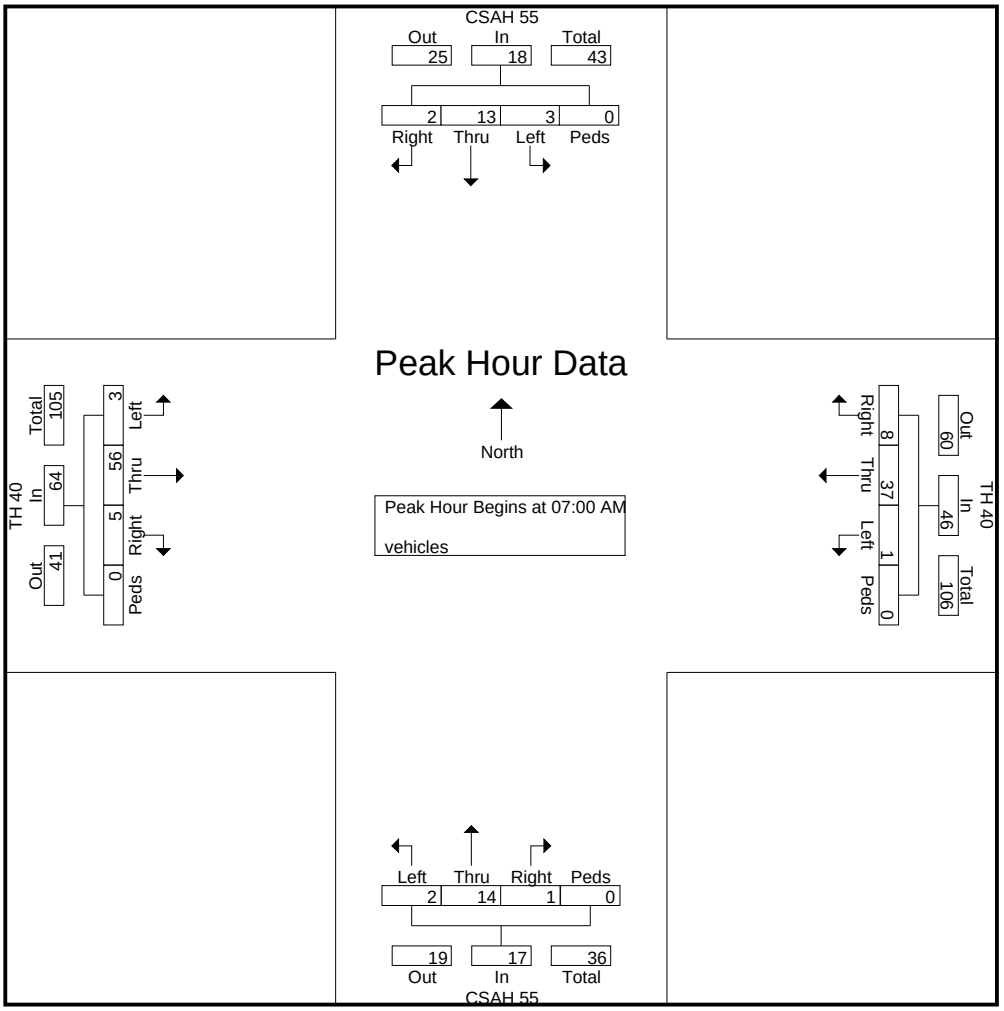
	CSAH 55 From North					TH 40 From East					CSAH 55 From South					TH 40 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**2**	3	0	0	5	2	**15**	0	0	**17**	0	0	0	0	0	**3**	7	0	0	10	32
07:15 AM	0	3	0	0	3	1	7	0	0	8	0	5	0	0	5	0	16	1	0	17	33
07:30 AM	0	**6**	1	0	**7**	0	4	**1**	0	5	**1**	**7**	**1**	0	**9**	2	15	0	0	17	38
07:45 AM	0	1	**2**	0	3	**5**	11	0	0	16	0	2	1	0	3	0	**18**	**2**	0	**20**	**42**
Total Volume	2	13	3	0	18	8	37	1	0	46	1	14	2	0	17	5	56	3	0	64	145
% App. Total																					
PHF	.250	.542	.375	.000	.643	.400	.617	.250	.000	.676	.250	.500	.500	.000	.472	.417	.778	.375	.000	.800	.863



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- heavy trucks

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
12:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	5
01:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
01:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	5
02:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
02:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	7
05:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
05:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
05:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	1	0	0	2	5
05:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	1	5	0	0	6	15
06:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
06:15 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
06:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	5
06:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
Total	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	6	0	0	6	12
07:00 AM	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	2	0	0	2	5
07:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	6
07:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	6
07:45 AM	0	1	0	0	1	0	2	1	0	3	0	0	0	0	0	0	4	0	0	4	8
Total	0	1	0	0	1	0	10	1	0	11	1	0	2	0	3	0	10	0	0	10	25
08:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	4	0	0	5	8
08:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	1	1	0	0	2	7
08:30 AM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	1	0	0	1	7
08:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
Total	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	2	10	0	0	12	29
09:00 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
09:15 AM	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	0	3	0	0	3	10
09:30 AM	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	12
09:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
Total	0	1	0	0	1	0	16	0	0	16	0	0	1	0	1	0	14	0	0	14	32

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- heavy trucks

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	4	0	0	5	8
10:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
10:30 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
10:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	1	9	0	0	10	22
11:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:30 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
11:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	8	0	0	8	10
Total	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	15	0	0	15	24
12:00 PM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	2	0	0	2	5
12:15 PM	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	3	0	0	3	7
12:30 PM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	0	2	0	0	2	6
12:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	2	0	0	3	6
Total	0	0	0	0	0	0	7	7	0	14	0	0	0	0	0	1	9	0	0	10	24
01:00 PM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	10
01:15 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	6
01:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
01:45 PM	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	1	6	0	0	7	13
Total	0	0	0	0	0	0	18	0	0	18	1	0	0	0	1	1	14	0	0	15	34
02:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
02:15 PM	0	0	0	0	0	0	5	0	0	5	1	0	2	0	3	0	7	0	0	7	15
02:30 PM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	10
02:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	6	0	0	7	9
Total	0	0	0	0	0	0	16	0	0	16	1	0	2	0	3	1	21	0	0	22	41
03:00 PM	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	3	0	0	3	9
03:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	7
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	0	0	9	9
03:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4	1	0	0	5	6
Total	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	6	17	0	0	23	31
04:00 PM	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	6	0	0	6	11
04:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	3	0	0	3	7
04:30 PM	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	2	0	0	2	8
04:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	3	0	0	3	6
Total	0	0	0	0	0	0	14	2	0	16	0	0	2	0	2	0	14	0	0	14	32
05:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	9	0	0	9	11
05:15 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
05:30 PM	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	1	0	0	1	3
05:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	12	0	0	12	20
06:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
06:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
06:30 PM	0	0	0	0	0	0	2	0	0	2	2	0	0	0	2	0	2	0	0	2	6
06:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
Total	0	0	0	0	0	0	7	0	0	7	2	0	0	0	2	0	6	0	0	6	15
07:00 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	2	1	0	0	3	7
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
07:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
07:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	2	4	0	0	6	13

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- heavy trucks

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
08:15 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	5
08:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3
08:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	4
Total	0	0	1	0	1	0	7	0	0	7	0	0	0	0	0	0	8	0	0	8	16
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
09:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	3	0	0	4	6
09:45 PM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	5
Total	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	1	5	0	0	6	13
10:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:15 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
11:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	8
Grand Total	0	2	1	0	3	0	194	13	0	207	5	0	7	0	12	16	200	0	0	216	438
Apprch %	0	66.7	33.3	0		0	93.7	6.3	0		41.7	0	58.3	0		7.4	92.6	0	0		
Total %	0	0.5	0.2	0	0.7	0	44.3	3	0	47.3	1.1	0	1.6	0	2.7	3.7	45.7	0	0	49.3	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
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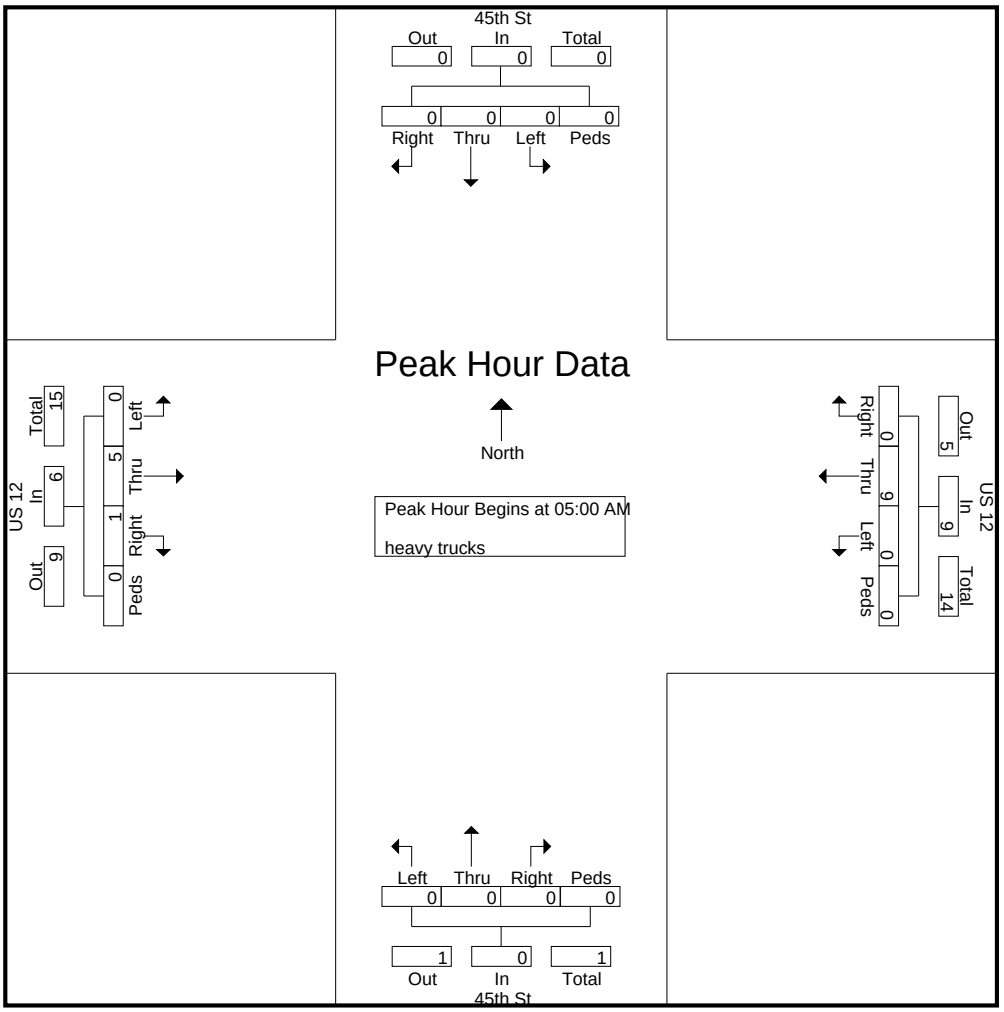
	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	0	0	0	0	0	**3**	0	0	**3**	0	0	0	0	0	0	1	0	0	1	4
05:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	**2**	0	0	**2**	4
05:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	**1**	1	0	0	2	**5**
05:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
Total Volume	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	1	5	0	0	6	15
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.000	.000	.000	.000	.000	.250	.625	.000	.000	.750	.750

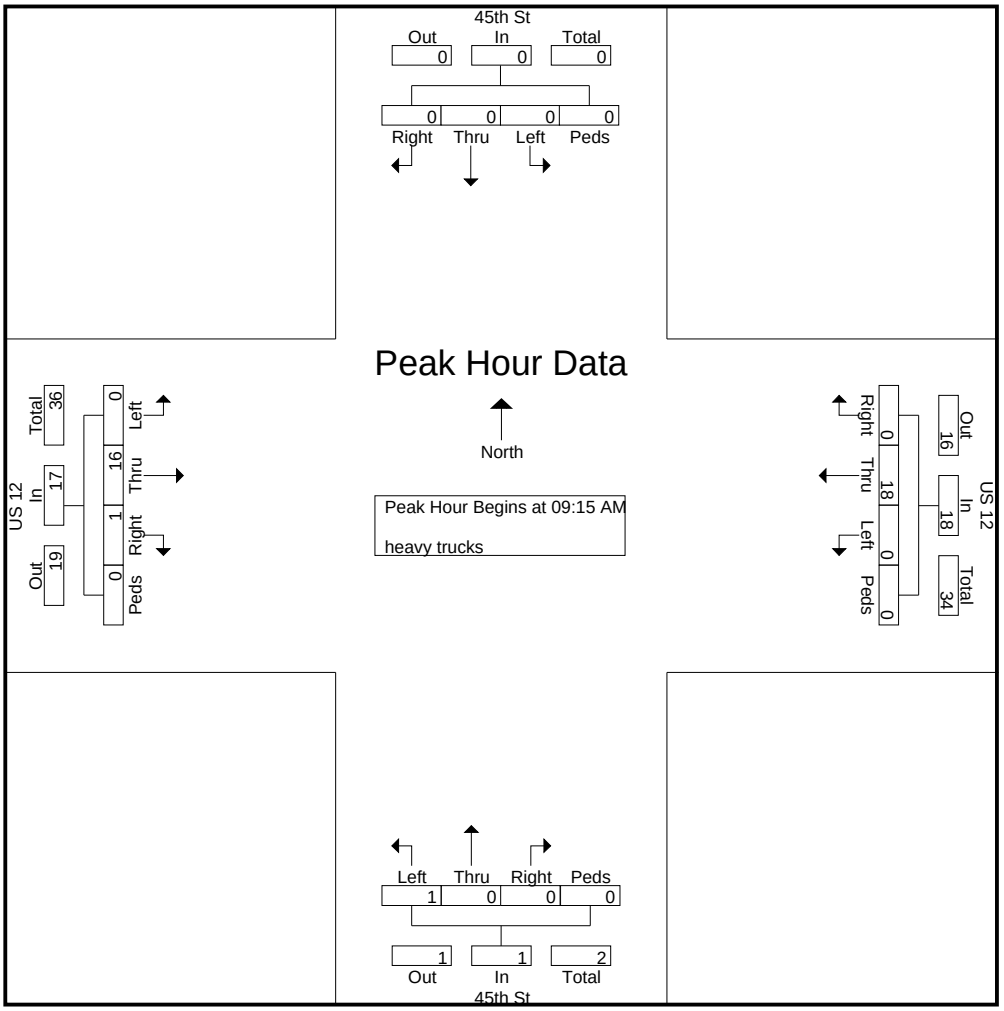


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 09:15 AM																					
09:15 AM	0	0	0	0	0	0	6	0	0	6	0	0	**1**	0	**1**	0	3	0	0	3	10
09:30 AM	0	0	0	0	0	0	**7**	0	0	**7**	0	0	0	0	0	0	**5**	0	0	**5**	**12**
09:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	6
10:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	**1**	4	0	0	5	8
Total Volume	0	0	0	0	0	0	18	0	0	18	0	0	1	0	1	1	16	0	0	17	36
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.643	.000	.000	.643	.000	.000	.250	.000	.250	.250	.800	.000	.000	.850	.750



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
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Groups Printed- small trucks

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	0	0	0	0	3
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	2	0	0	2	5
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	2
08:00 AM	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	0	1	0	0	1	5
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	5	0	0	5	1	0	1	0	2	0	1	0	0	1	8
09:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
09:15 AM	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0	1	3
09:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	2
09:45 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total	0	0	0	0	0	0	4	1	0	5	1	0	0	0	1	1	2	0	0	3	9

WSB & Associates
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File Name : us 12 & 45th st
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Groups Printed- small trucks

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
10:30 AM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	2
10:45 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	2	3
Total	0	0	0	0	0	1	3	1	0	5	0	0	0	0	0	1	1	0	0	2	7
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	0	0	2	4
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	1	0	1	0	0	2	0	2	0	0	0	0	0	3
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	0	3	1	0	4	0	0	2	0	2	0	0	0	0	0	6
01:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
01:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	1	1	0	0	2	7
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- small trucks

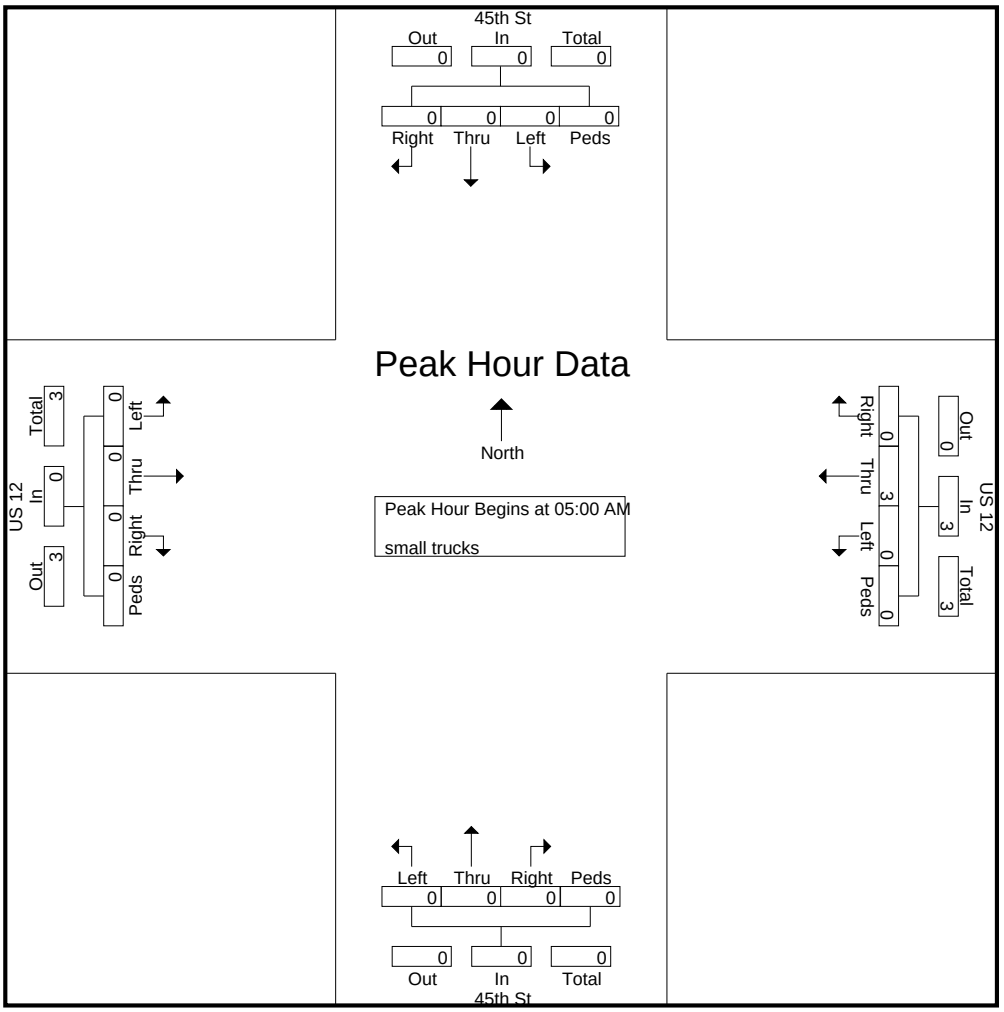
	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
09:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	1	27	4	0	32	2	1	5	0	8	5	18	0	0	23	63
Apprch %	0	0	0	0		3.1	84.4	12.5	0		25	12.5	62.5	0		21.7	78.3	0	0		
Total %	0	0	0	0	0	1.6	42.9	6.3	0	50.8	3.2	1.6	7.9	0	12.7	7.9	28.6	0	0	36.5	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	**2**
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.375	.000	.000	.375	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.375

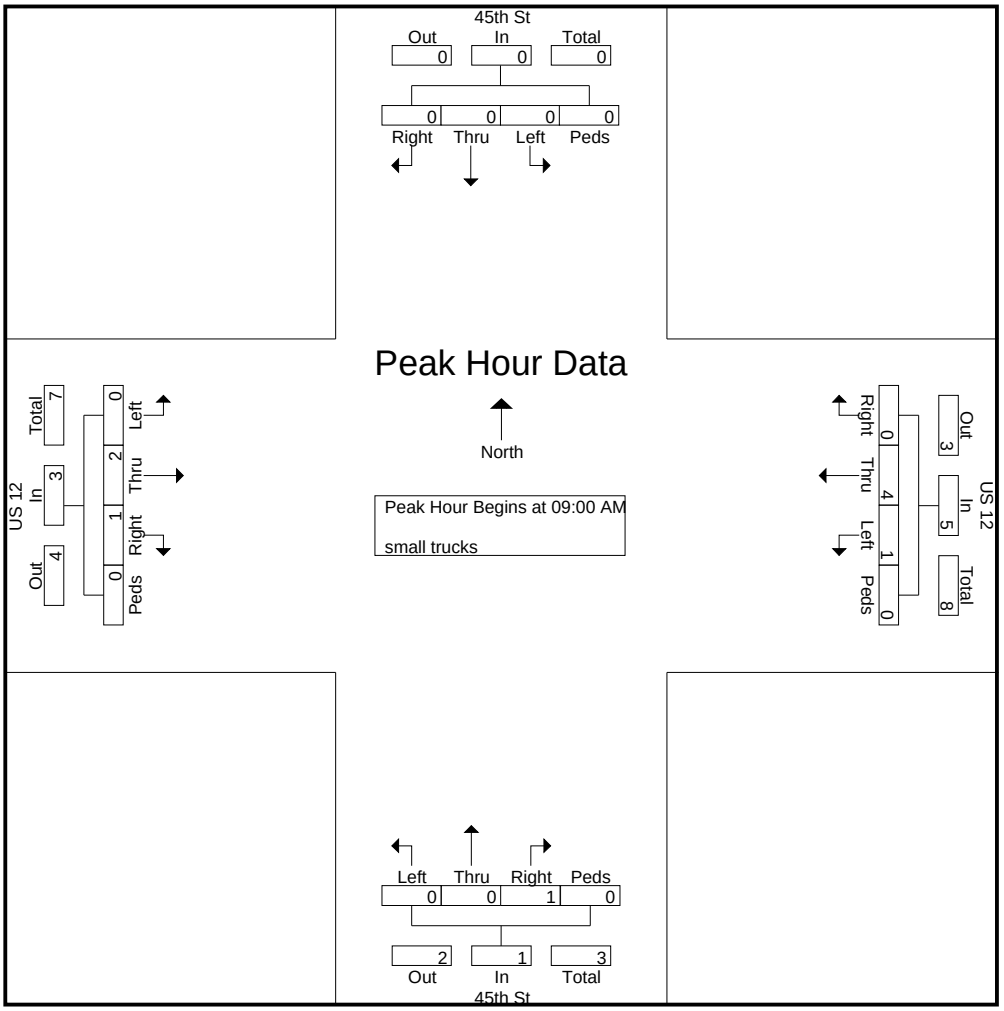


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 09:00 AM																					
09:00 AM	0	0	0	0	0	0	0	**1**	0	1	0	0	0	0	0	0	0	0	0	0	1
09:15 AM	0	0	0	0	0	0	1	0	0	1	**1**	0	0	0	**1**	**1**	0	0	0	**1**	**3**
09:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	**1**	0	0	1	2
09:45 AM	0	0	0	0	0	0	**2**	0	0	**2**	0	0	0	0	0	0	1	0	0	1	3
Total Volume	0	0	0	0	0	0	4	1	0	5	1	0	0	0	1	1	2	0	0	3	9
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.500	.250	.000	.625	.250	.000	.000	.000	.250	.250	.500	.000	.000	.750	.750



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4	1	0	5	9
12:15 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
12:30 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	8
12:45 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	7
Total	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	11	1	0	12	27
01:00 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
01:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	8
01:30 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
01:45 AM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	0	11	1	0	12	0	0	0	0	0	0	6	0	0	6	18
02:00 AM	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	7
02:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	0	4	0	0	4	8
02:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	2	0	0	2	4
02:45 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	9	0	0	9	0	0	2	0	2	0	8	0	0	8	20
03:00 AM	0	1	1	0	2	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	6
03:15 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3
03:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
03:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	7
Total	1	1	1	0	3	0	9	0	0	9	0	0	0	0	0	0	7	0	0	7	19
04:00 AM	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	2	0	0	2	7
04:15 AM	0	0	0	0	0	0	7	0	0	7	1	0	0	0	1	1	4	0	0	5	13
04:30 AM	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	1	8	0	0	9	13
04:45 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	14
Total	0	0	0	0	0	0	19	2	0	21	1	0	0	0	1	2	23	0	0	25	47
05:00 AM	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	17	0	0	17	25
05:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	1	26	0	0	27	33
05:30 AM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	20	0	0	20	26
05:45 AM	0	0	0	0	0	0	9	0	0	9	0	0	1	0	1	3	36	0	0	39	49
Total	0	0	0	0	0	0	27	1	0	28	0	0	2	0	2	4	99	0	0	103	133
06:00 AM	0	1	0	0	1	0	15	1	0	16	1	0	0	0	1	1	18	0	0	19	37
06:15 AM	0	0	0	0	0	0	25	1	0	26	0	0	0	0	0	1	48	0	0	49	75
06:30 AM	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	57	0	0	57	75
06:45 AM	0	0	0	0	0	1	20	2	0	23	0	0	2	0	2	5	49	0	0	54	79
Total	0	1	0	0	1	1	78	4	0	83	1	0	2	0	3	7	172	0	0	179	266
07:00 AM	0	3	1	0	4	1	19	4	0	24	0	0	0	0	0	2	47	0	0	49	77
07:15 AM	1	0	0	0	1	0	18	2	0	20	1	0	2	0	3	2	65	0	0	67	91
07:30 AM	0	0	0	0	0	0	39	2	0	41	1	0	0	0	1	2	73	0	0	75	117
07:45 AM	0	0	0	0	0	0	44	6	0	50	0	0	3	0	3	1	108	0	0	109	162
Total	1	3	1	0	5	1	120	14	0	135	2	0	5	0	7	7	293	0	0	300	447
08:00 AM	0	0	0	0	0	0	24	3	0	27	0	0	2	0	2	0	59	0	0	59	88
08:15 AM	0	0	1	0	1	0	21	3	0	24	0	0	1	0	1	2	46	0	0	48	74
08:30 AM	0	0	0	0	0	0	22	1	0	23	0	0	1	0	1	3	40	0	0	43	67
08:45 AM	0	0	0	0	0	0	19	0	0	19	1	0	0	0	1	0	49	0	0	49	69
Total	0	0	1	0	1	0	86	7	0	93	1	0	4	0	5	5	194	0	0	199	298
09:00 AM	0	0	1	0	1	0	20	0	0	20	0	0	1	0	1	2	20	0	0	22	44
09:15 AM	0	0	2	0	2	0	33	1	0	34	3	1	2	0	6	1	34	0	0	35	77
09:30 AM	1	0	0	0	1	0	23	0	0	23	0	0	1	0	1	2	33	0	0	35	60
09:45 AM	0	0	0	0	0	0	30	1	0	31	1	1	0	0	2	3	38	0	0	41	74
Total	1	0	3	0	4	0	106	2	0	108	4	2	4	0	10	8	125	0	0	133	255

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	0	1	0	1	0	23	3	0	26	1	0	2	0	3	2	35	0	0	37	67
10:15 AM	0	0	0	0	0	1	33	3	0	37	1	0	1	0	2	0	27	0	0	27	66
10:30 AM	1	2	0	0	3	2	29	2	0	33	2	0	0	0	2	1	47	0	0	48	86
10:45 AM	0	0	0	0	0	0	23	1	0	24	2	1	1	0	4	1	29	0	0	30	58
Total	1	2	1	0	4	3	108	9	0	120	6	1	4	0	11	4	138	0	0	142	277
11:00 AM	1	0	1	0	2	0	35	0	0	35	1	0	1	0	2	1	26	0	0	27	66
11:15 AM	0	0	0	0	0	0	34	3	0	37	1	0	3	0	4	2	35	0	0	37	78
11:30 AM	0	0	0	0	0	0	31	3	0	34	4	0	0	0	4	1	47	0	0	48	86
11:45 AM	0	0	0	0	0	0	26	1	0	27	6	0	3	0	9	4	38	0	0	42	78
Total	1	0	1	0	2	0	126	7	0	133	12	0	7	0	19	8	146	0	0	154	308
12:00 PM	0	0	0	0	0	0	49	2	0	51	3	0	1	0	4	1	29	0	0	30	85
12:15 PM	0	0	0	0	0	0	28	2	0	30	2	0	2	0	4	1	32	0	0	33	67
12:30 PM	1	0	0	0	1	0	31	4	0	35	3	0	1	0	4	1	36	0	0	37	77
12:45 PM	0	0	0	0	0	0	36	3	0	39	1	0	0	0	1	1	43	0	0	44	84
Total	1	0	0	0	1	0	144	11	0	155	9	0	4	0	13	4	140	0	0	144	313
01:00 PM	0	0	0	0	0	2	29	4	0	35	1	0	1	0	2	2	37	0	0	39	76
01:15 PM	0	0	0	0	0	0	29	0	0	29	0	0	0	0	0	0	38	0	0	38	67
01:30 PM	0	0	0	0	0	2	30	1	0	33	2	0	4	0	6	1	37	0	0	38	77
01:45 PM	0	0	0	0	0	0	34	1	0	35	1	0	3	0	4	0	38	0	0	38	77
Total	0	0	0	0	0	4	122	6	0	132	4	0	8	0	12	3	150	0	0	153	297
02:00 PM	1	1	1	0	3	0	35	0	0	35	1	0	0	0	1	0	31	0	0	31	70
02:15 PM	0	0	0	0	0	1	28	0	0	29	0	0	0	0	0	0	34	0	0	34	63
02:30 PM	0	0	1	0	1	0	44	1	0	45	1	1	1	0	3	2	37	0	0	39	88
02:45 PM	0	0	0	0	0	4	41	0	0	45	0	0	1	0	1	1	38	0	0	39	85
Total	1	1	2	0	4	5	148	1	0	154	2	1	2	0	5	3	140	0	0	143	306
03:00 PM	0	0	0	0	0	0	53	0	0	53	2	0	0	0	2	3	41	0	0	44	99
03:15 PM	0	0	1	0	1	1	49	1	0	51	1	0	0	0	1	0	47	1	0	48	101
03:30 PM	1	0	1	0	2	2	48	2	0	52	2	0	0	0	2	0	37	0	0	37	93
03:45 PM	0	0	1	0	1	1	47	1	0	49	3	0	0	0	3	3	28	0	0	31	84
Total	1	0	3	0	4	4	197	4	0	205	8	0	0	0	8	6	153	1	0	160	377
04:00 PM	0	0	0	0	0	0	52	0	0	52	1	1	1	0	3	4	46	0	0	50	105
04:15 PM	0	0	0	0	0	1	73	1	0	75	7	1	1	0	9	3	33	0	0	36	120
04:30 PM	0	0	0	0	0	0	86	2	0	88	4	1	3	0	8	2	51	1	0	54	150
04:45 PM	0	0	0	0	0	0	88	3	0	91	7	0	4	0	11	0	45	0	0	45	147
Total	0	0	0	0	0	1	299	6	0	306	19	3	9	0	31	9	175	1	0	185	522
05:00 PM	0	0	0	0	0	0	97	1	0	98	5	1	3	0	9	0	50	0	0	50	157
05:15 PM	0	0	0	0	0	0	89	2	0	91	2	0	2	0	4	3	37	0	0	40	135
05:30 PM	0	0	0	0	0	0	67	0	0	67	1	0	3	0	4	3	45	0	0	48	119
05:45 PM	0	1	0	0	1	0	68	0	0	68	0	0	0	0	0	0	40	0	0	40	109
Total	0	1	0	0	1	0	321	3	0	324	8	1	8	0	17	6	172	0	0	178	520
06:00 PM	0	0	1	0	1	0	54	1	0	55	0	0	1	0	1	0	35	0	0	35	92
06:15 PM	0	0	0	0	0	0	34	2	0	36	2	0	1	0	3	2	39	0	0	41	80
06:30 PM	0	0	0	0	0	0	31	0	0	31	1	0	0	0	1	0	34	0	0	34	66
06:45 PM	0	0	1	0	1	0	29	0	0	29	1	0	0	0	1	0	33	0	0	33	64
Total	0	0	2	0	2	0	148	3	0	151	4	0	2	0	6	2	141	0	0	143	302
07:00 PM	0	0	0	0	0	0	26	0	0	26	1	0	1	0	2	0	27	0	0	27	55
07:15 PM	0	1	1	0	2	0	41	1	0	42	0	0	0	0	0	1	26	0	0	27	71
07:30 PM	0	0	0	0	0	1	40	0	0	41	0	0	2	0	2	2	26	0	0	28	71
07:45 PM	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	0	16	0	0	16	41
Total	0	1	1	0	2	1	132	1	0	134	1	0	3	0	4	3	95	0	0	98	238

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles

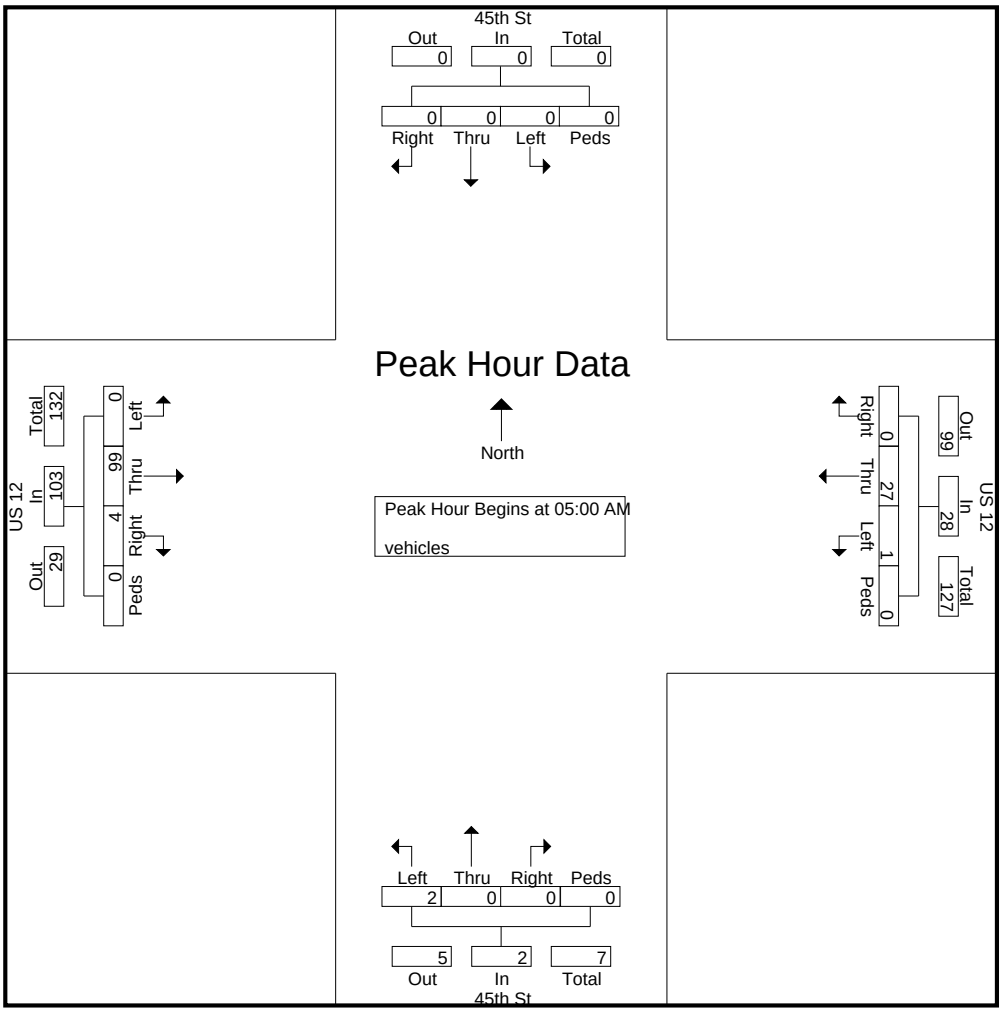
	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	30	0	0	30	1	0	0	0	1	0	20	0	0	20	51
08:15 PM	0	0	1	0	1	0	29	0	0	29	0	0	0	0	0	2	15	0	0	17	47
08:30 PM	1	0	0	0	1	0	28	0	0	28	0	0	0	0	0	1	14	0	0	15	44
08:45 PM	0	0	0	0	0	0	27	0	0	27	0	0	1	0	1	0	21	1	0	22	50
Total	1	0	1	0	2	0	114	0	0	114	1	0	1	0	2	3	70	1	0	74	192
09:00 PM	0	0	0	0	0	1	38	0	0	39	0	0	0	0	0	0	17	0	0	17	56
09:15 PM	0	0	0	0	0	0	27	0	0	27	0	0	1	0	1	0	7	0	0	7	35
09:30 PM	0	0	0	0	0	0	25	0	0	25	0	1	0	0	1	1	14	0	0	15	41
09:45 PM	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	0	14	0	0	14	37
Total	0	0	0	0	0	1	113	0	0	114	0	1	1	0	2	1	52	0	0	53	169
10:00 PM	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	6	0	0	6	22
10:15 PM	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	13	1	0	14	33
10:30 PM	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	5	0	0	5	19
10:45 PM	0	0	0	0	0	1	12	0	0	13	0	0	1	0	1	0	6	0	0	6	20
Total	0	0	0	0	0	1	61	0	0	62	0	0	1	0	1	0	30	1	0	31	94
11:00 PM	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	0	6	0	0	6	17
11:15 PM	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	13
11:30 PM	0	0	2	0	2	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	10
11:45 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	7
Total	0	0	3	0	3	0	26	0	0	26	1	0	0	0	1	0	17	0	0	17	47
Grand Total	9	11	20	0	40	22	2539	82	0	2643	84	9	69	0	162	85	2557	5	0	2647	5492
Apprch %	22.5	27.5	50	0		0.8	96.1	3.1	0		51.9	5.6	42.6	0		3.2	96.6	0.2	0		
Total %	0.2	0.2	0.4	0	0.7	0.4	46.2	1.5	0	48.1	1.5	0.2	1.3	0	2.9	1.5	46.6	0.1	0	48.2	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 4

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	0	0	0	0	0	7	**1**	0	8	0	0	0	0	0	0	17	0	0	17	25
05:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	**1**	0	**1**	1	26	0	0	27	33
05:30 AM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	20	0	0	20	26
05:45 AM	0	0	0	0	0	0	**9**	0	0	**9**	0	0	1	0	1	**3**	**36**	0	0	**39**	**49**
Total Volume	0	0	0	0	0	0	27	1	0	28	0	0	2	0	2	4	99	0	0	103	133
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.750	.250	.000	.778	.000	.000	.500	.000	.500	.333	.688	.000	.000	.660	.679

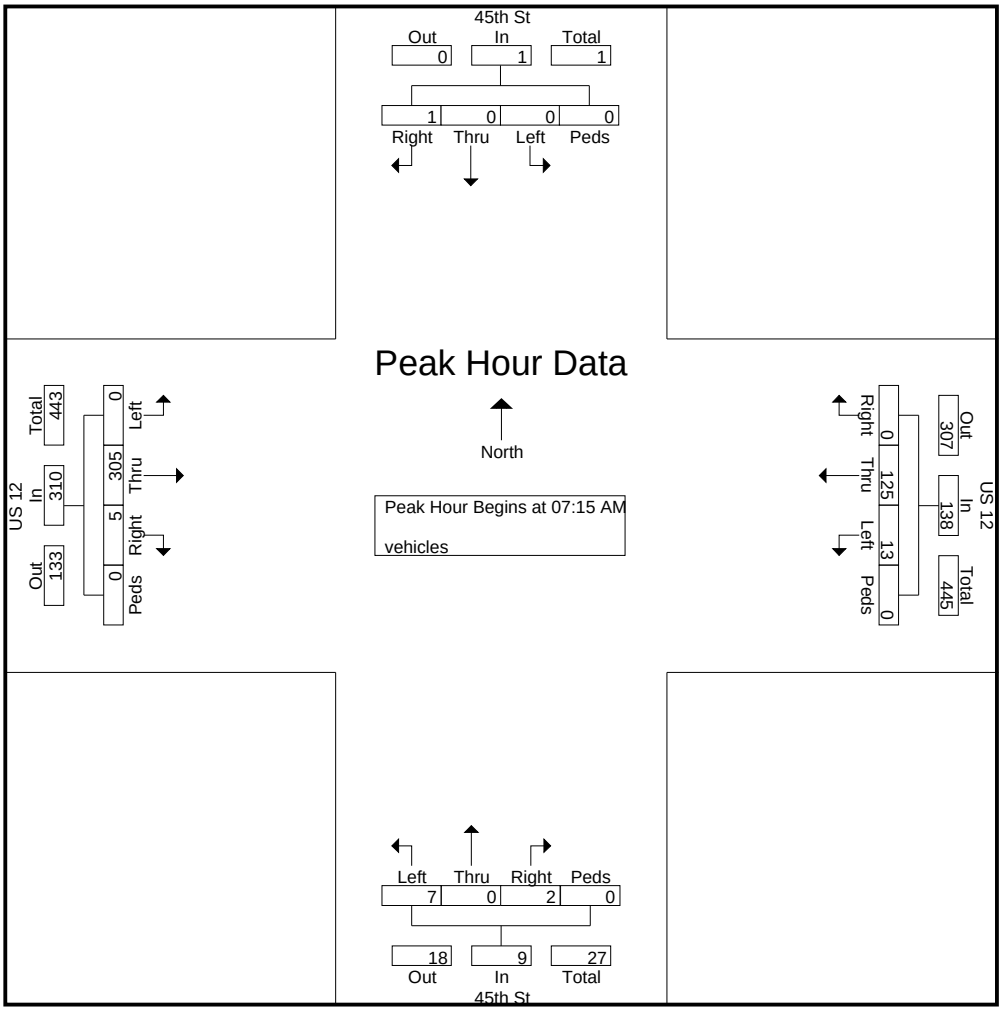


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & 45th St
24 hour count
Willmar, MN
sunny

File Name : us 12 & 45th st
Site Code : 00000004
Start Date : 6/7/2016
Page No : 5

	45th St From North					US 12 From East					45th St From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**1**	0	0	0	**1**	0	18	2	0	20	**1**	0	2	0	**3**	**2**	65	0	0	67	91
07:30 AM	0	0	0	0	0	0	39	2	0	41	1	0	0	0	1	2	73	0	0	75	117
07:45 AM	0	0	0	0	0	0	**44**	**6**	0	**50**	0	0	**3**	0	3	1	**108**	0	0	**109**	**162**
08:00 AM	0	0	0	0	0	0	24	3	0	27	0	0	2	0	2	0	59	0	0	59	88
Total Volume	1	0	0	0	1	0	125	13	0	138	2	0	7	0	9	5	305	0	0	310	458
% App. Total																					
PHF	.250	.000	.000	.000	.250	.000	.710	.542	.000	.690	.500	.000	.583	.000	.750	.625	.706	.000	.000	.711	.707



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 1

Groups Printed- heavy trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	3	0	3	2	0	0	0	2	0	1	0	0	1	6
12:30 AM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	4
12:45 AM	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	0	0	0	0	0	3
Total	0	0	0	0	0	0	3	4	0	7	2	0	1	0	3	0	3	0	0	3	13
01:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	2
01:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	3
01:30 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	2	0	0	3	4
01:45 AM	0	0	0	0	0	0	0	1	0	1	0	1	2	0	3	2	1	0	0	3	7
Total	0	0	0	0	0	1	1	2	0	4	0	1	3	0	4	3	5	0	0	8	16
02:00 AM	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2	0	1	0	0	1	4
02:15 AM	0	1	0	0	1	0	0	1	0	1	1	0	2	0	3	1	0	0	0	1	6
02:30 AM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
02:45 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	3
Total	2	1	0	0	3	0	2	1	0	3	3	0	2	0	5	2	2	0	0	4	15
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	2	3
03:15 AM	0	0	0	0	0	0	1	1	0	2	2	0	0	0	2	0	0	0	0	0	4
03:30 AM	0	0	0	0	0	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	3
03:45 AM	1	0	0	0	1	0	0	1	0	1	0	0	1	0	1	1	0	0	0	1	4
Total	1	0	0	0	1	0	2	2	0	4	3	2	1	0	6	2	1	0	0	3	14
04:00 AM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	2	0	0	2	5
04:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	2	3
04:30 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
04:45 AM	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	0	1	0	0	1	3
Total	0	0	0	0	0	1	3	0	0	4	2	1	0	0	3	2	4	0	0	6	13
05:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	1	0	0	3	4
05:15 AM	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	4	2	0	0	6	11
05:30 AM	0	0	0	0	0	0	1	1	0	2	0	1	0	0	1	1	0	0	0	1	4
05:45 AM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	0	2	0	0	2	6
Total	0	1	0	0	1	0	8	3	0	11	0	1	0	0	1	7	5	0	0	12	25
06:00 AM	0	1	0	0	1	0	1	3	0	4	0	0	0	0	0	1	1	1	0	3	8
06:15 AM	0	0	0	0	0	0	2	1	0	3	5	0	2	0	7	1	2	0	0	3	13
06:30 AM	1	2	0	0	3	0	4	2	0	6	0	0	1	0	1	1	2	0	0	3	13
06:45 AM	1	0	0	0	1	2	5	1	0	8	2	1	1	0	4	0	4	1	0	5	18
Total	2	3	0	0	5	2	12	7	0	21	7	1	4	0	12	3	9	2	0	14	52
07:00 AM	0	1	0	0	1	0	1	0	0	1	2	1	1	0	4	0	2	0	0	2	8
07:15 AM	1	1	0	0	2	0	2	0	0	2	1	0	2	0	3	1	3	1	0	5	12
07:30 AM	0	0	0	0	0	0	1	1	0	2	1	0	0	0	1	1	1	0	0	2	5
07:45 AM	2	0	1	0	3	1	1	1	0	3	1	2	0	0	3	1	2	2	0	5	14
Total	3	2	1	0	6	1	5	2	0	8	5	3	3	0	11	3	8	3	0	14	39
08:00 AM	1	0	0	0	1	2	3	3	0	8	1	0	1	0	2	4	1	1	0	6	17
08:15 AM	1	0	0	0	1	0	3	0	0	3	1	1	1	0	3	0	0	1	0	1	8
08:30 AM	0	0	0	0	0	0	2	1	0	3	2	0	1	0	3	0	3	0	0	3	9
08:45 AM	0	0	1	0	1	0	3	1	0	4	0	1	1	0	2	0	3	1	0	4	11
Total	2	0	1	0	3	2	11	5	0	18	4	2	4	0	10	4	7	3	0	14	45
09:00 AM	2	1	0	0	3	0	1	0	0	1	2	0	0	0	2	0	1	2	0	3	9
09:15 AM	1	0	0	0	1	1	5	0	0	6	3	3	1	0	7	1	1	0	0	2	16
09:30 AM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	6
09:45 AM	2	0	0	0	2	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	6
Total	6	1	0	0	7	1	12	0	0	13	5	3	1	0	9	1	5	2	0	8	37

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 2

Groups Printed- heavy trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	1	0	0	0	1	0	4	1	0	5	1	0	0	0	1	1	3	1	0	5	12
10:15 AM	0	0	0	0	0	0	2	0	0	2	2	0	1	0	3	0	1	1	0	2	7
10:30 AM	2	1	0	0	3	0	4	0	0	4	3	0	0	0	3	0	2	1	0	3	13
10:45 AM	1	0	0	0	1	1	1	2	0	4	0	0	0	0	0	0	2	0	0	2	7
Total	4	1	0	0	5	1	11	3	0	15	6	0	1	0	7	1	8	3	0	12	39
11:00 AM	0	0	1	0	1	0	3	2	0	5	0	0	2	0	2	0	3	2	0	5	13
11:15 AM	1	1	0	0	2	0	1	0	0	1	2	0	0	0	2	1	3	0	0	4	9
11:30 AM	2	0	0	0	2	0	2	1	0	3	0	0	1	0	1	1	1	0	0	2	8
11:45 AM	0	0	0	0	0	1	1	0	0	2	0	0	3	0	3	2	3	1	0	6	11
Total	3	1	1	0	5	1	7	3	0	11	2	0	6	0	8	4	10	3	0	17	41
12:00 PM	0	1	1	0	2	1	1	1	0	3	1	0	0	0	1	0	1	1	0	2	8
12:15 PM	0	0	1	0	1	0	6	0	0	6	2	1	0	0	3	0	0	0	0	0	10
12:30 PM	2	0	0	0	2	0	4	0	0	4	0	0	0	0	0	0	2	1	0	3	9
12:45 PM	1	0	1	0	2	0	3	2	0	5	0	0	1	0	1	0	2	1	0	3	11
Total	3	1	3	0	7	1	14	3	0	18	3	1	1	0	5	0	5	3	0	8	38
01:00 PM	0	2	1	0	3	0	5	1	0	6	0	0	0	0	0	1	1	0	0	2	11
01:15 PM	1	0	0	0	1	0	1	2	0	3	1	0	1	0	2	2	1	0	0	3	9
01:30 PM	2	0	0	0	2	0	2	0	0	2	1	0	2	0	3	0	0	0	0	0	7
01:45 PM	0	0	0	0	0	0	2	0	0	2	1	1	3	0	5	0	3	0	0	3	10
Total	3	2	1	0	6	0	10	3	0	13	3	1	6	0	10	3	5	0	0	8	37
02:00 PM	0	2	0	0	2	0	2	0	0	2	1	0	0	0	1	4	1	0	0	5	10
02:15 PM	0	0	0	0	0	0	4	2	0	6	1	0	2	0	3	1	5	0	0	6	15
02:30 PM	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	1	1	0	0	2	6
02:45 PM	0	3	1	0	4	0	4	2	0	6	1	0	1	0	2	0	4	3	0	7	19
Total	0	5	1	0	6	0	13	5	0	18	3	0	3	0	6	6	11	3	0	20	50
03:00 PM	0	0	1	0	1	0	3	0	0	3	1	0	1	0	2	0	3	0	0	3	9
03:15 PM	2	1	0	0	3	0	1	1	0	2	1	0	1	0	2	2	5	0	0	7	14
03:30 PM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	2	3	0	0	5	8
03:45 PM	1	1	0	0	2	0	2	1	0	3	0	0	0	0	0	1	0	0	0	1	6
Total	3	2	1	0	6	0	8	3	0	11	2	0	2	0	4	5	11	0	0	16	37
04:00 PM	0	2	0	0	2	0	1	2	0	3	0	1	0	0	1	1	3	1	0	5	11
04:15 PM	0	1	0	0	1	0	6	1	0	7	2	0	0	0	2	3	2	0	0	5	15
04:30 PM	1	1	2	0	4	0	2	1	0	3	3	0	0	0	3	1	1	0	0	2	12
04:45 PM	0	0	0	0	0	0	2	1	0	3	2	1	0	0	3	0	2	0	0	2	8
Total	1	4	2	0	7	0	11	5	0	16	7	2	0	0	9	5	8	1	0	14	46
05:00 PM	0	0	0	0	0	0	0	1	0	1	0	3	1	0	4	2	9	0	0	11	16
05:15 PM	1	1	1	0	3	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	10
05:30 PM	0	0	1	0	1	0	3	0	0	3	0	0	1	0	1	0	1	0	0	1	6
05:45 PM	0	1	0	0	1	0	0	2	0	2	0	0	0	0	0	0	2	0	0	2	5
Total	1	2	2	0	5	0	7	3	0	10	0	3	2	0	5	2	15	0	0	17	37
06:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	1	1	0	2	4
06:15 PM	0	1	0	0	1	0	0	1	0	1	0	1	1	0	2	0	1	0	0	1	5
06:30 PM	0	0	0	0	0	0	2	0	0	2	0	1	2	0	3	1	1	1	0	3	8
06:45 PM	0	0	1	0	1	0	2	1	0	3	1	0	1	0	2	0	1	0	0	1	7
Total	0	2	1	0	3	0	4	2	0	6	1	2	5	0	8	1	4	2	0	7	24
07:00 PM	0	0	0	0	0	1	1	0	0	2	1	0	2	0	3	0	0	0	0	0	5
07:15 PM	1	0	0	0	1	0	1	1	0	2	0	1	1	0	2	1	1	0	0	2	7
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 PM	0	0	0	0	0	0	2	0	0	2	1	0	2	0	3	0	0	0	0	0	5
Total	1	0	0	0	1	1	4	1	0	6	2	1	5	0	8	1	2	0	0	3	18

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 3

Groups Printed- heavy trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	3	1	0	4	6
08:15 PM	0	0	0	0	0	0	4	0	0	4	1	0	2	0	3	1	1	0	0	2	9
08:30 PM	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	1	1	0	0	2	4
08:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	4	0	0	4	6
Total	1	0	0	0	1	0	5	3	0	8	1	0	3	0	4	2	9	1	0	12	25
09:00 PM	0	0	0	0	0	0	1	0	0	1	1	1	1	0	3	0	3	0	0	3	7
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
09:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	2	0	0	3	4
09:45 PM	0	0	0	0	0	1	1	0	0	2	0	0	3	0	3	0	1	0	0	1	6
Total	0	0	0	0	0	1	3	0	0	4	1	1	4	0	6	1	7	0	0	8	18
10:00 PM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	3
10:15 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	2
10:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	1	2	0	0	3	6
10:45 PM	0	0	0	0	0	0	1	1	0	2	1	1	0	0	2	0	0	0	0	0	4
Total	1	0	0	0	1	0	3	2	0	5	1	2	1	0	4	3	2	0	0	5	15
11:00 PM	0	0	0	0	0	0	0	0	0	0	2	1	1	0	4	2	1	0	0	3	7
11:15 PM	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	1	0	0	0	1	4
11:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	0	0	0	1	3
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	2
Total	0	0	0	0	0	0	1	0	0	1	3	2	4	0	9	4	2	0	0	6	16
Grand Total	37	28	14	0	79	13	160	62	0	235	66	29	62	0	157	65	148	26	0	239	710
Apprch %	46.8	35.4	17.7	0		5.5	68.1	26.4	0		42	18.5	39.5	0		27.2	61.9	10.9	0		
Total %	5.2	3.9	2	0	11.1	1.8	22.5	8.7	0	33.1	9.3	4.1	8.7	0	22.1	9.2	20.8	3.7	0	33.7	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
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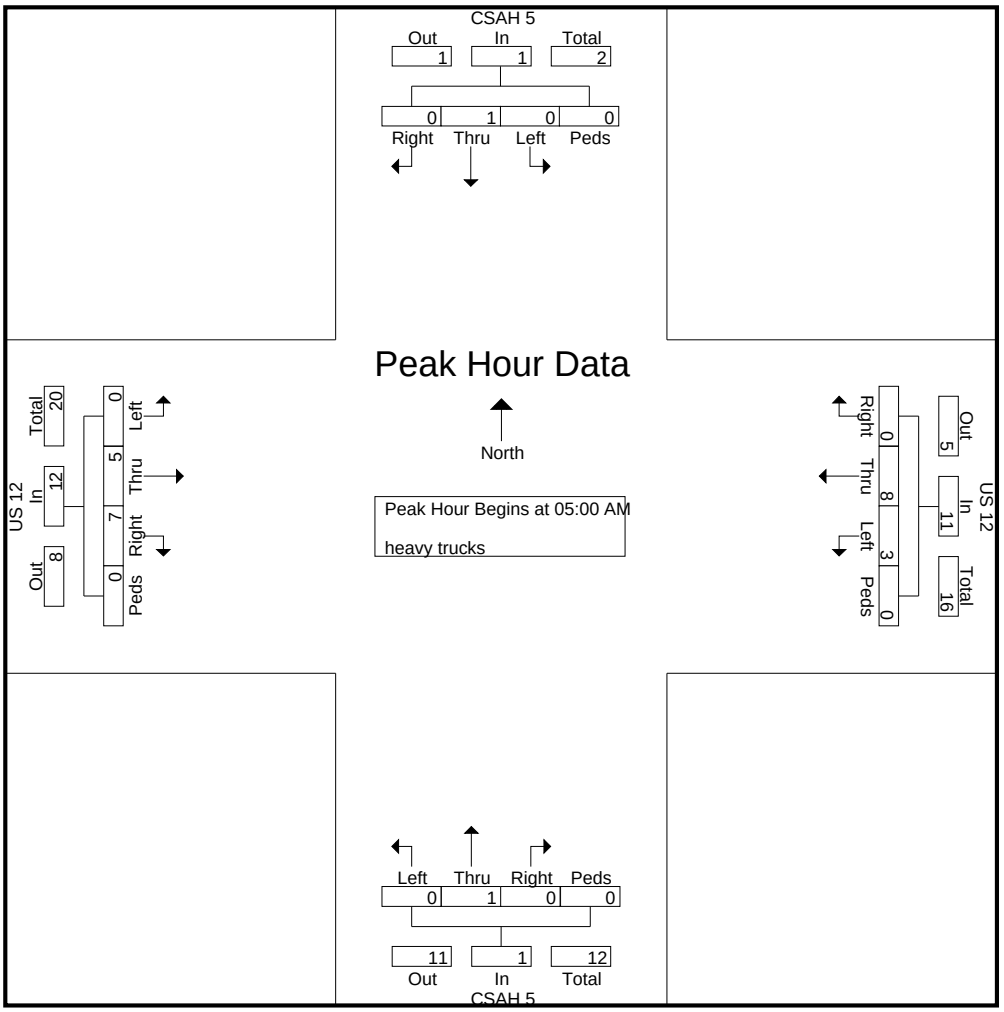
	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	1	0	0	3	4
05:15 AM	0	**1**	0	0	**1**	0	**4**	0	0	**4**	0	0	0	0	0	**4**	**2**	0	0	**6**	**11**
05:30 AM	0	0	0	0	0	0	1	1	0	2	0	**1**	0	0	**1**	1	0	0	0	1	4
05:45 AM	0	0	0	0	0	0	2	**2**	0	4	0	0	0	0	0	0	2	0	0	2	6
Total Volume	0	1	0	0	1	0	8	3	0	11	0	1	0	0	1	7	5	0	0	12	25
% App. Total																					
PHF	.000	.250	.000	.000	.250	.000	.500	.375	.000	.688	.000	.250	.000	.000	.250	.438	.625	.000	.000	.500	.568



WSB & Associates
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sunny

File Name : us 12 & csah 5
Site Code : 00000001
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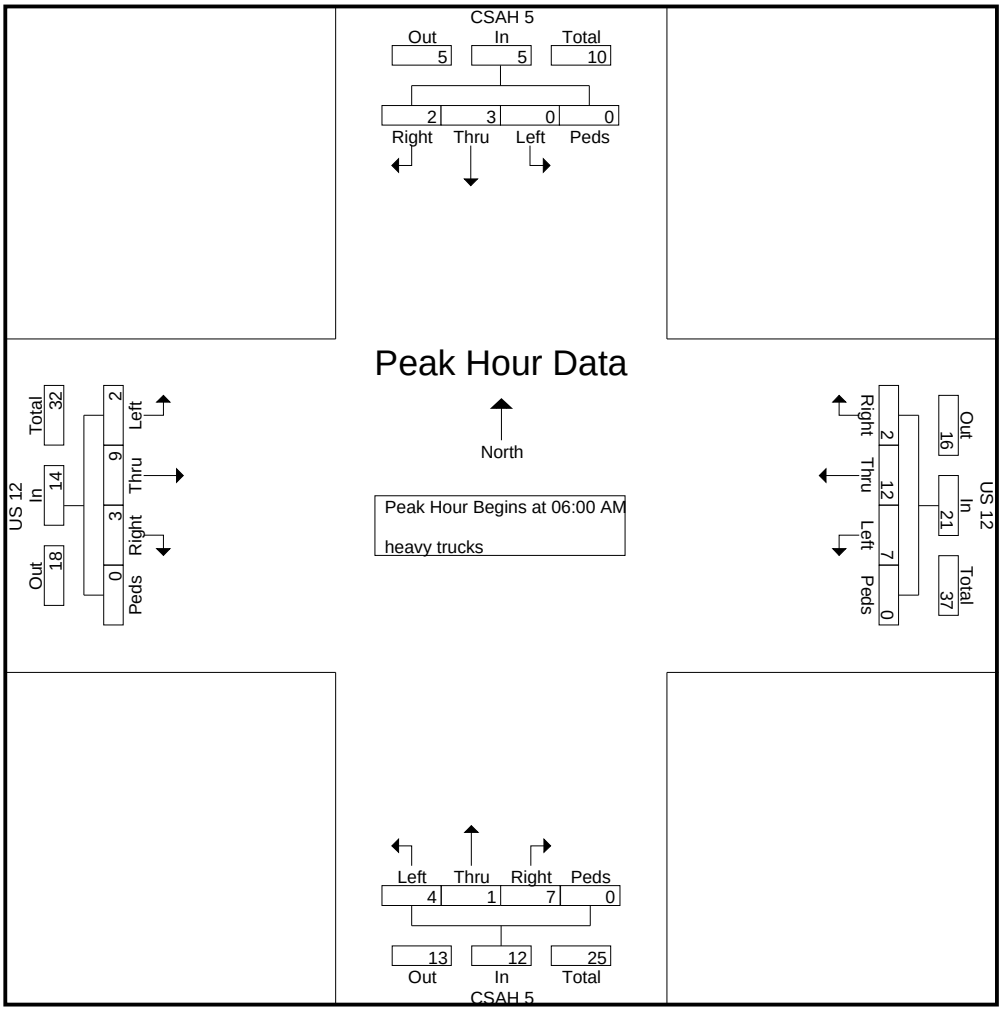
	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:00 AM																					
06:00 AM	0	1	0	0	1	0	1	**3**	0	4	0	0	0	0	0	**1**	1	**1**	0	3	8
06:15 AM	0	0	0	0	0	0	2	1	0	3	**5**	0	**2**	0	**7**	1	2	0	0	3	13
06:30 AM	**1**	**2**	0	0	**3**	0	4	2	0	6	0	0	1	0	1	1	2	0	0	3	13
06:45 AM	1	0	0	0	1	**2**	**5**	1	0	**8**	2	**1**	1	0	4	0	**4**	1	0	**5**	**18**
Total Volume	2	3	0	0	5	2	12	7	0	21	7	1	4	0	12	3	9	2	0	14	52
% App. Total																					
PHF	.500	.375	.000	.000	.417	.250	.600	.583	.000	.656	.350	.250	.500	.000	.429	.750	.563	.500	.000	.700	.722



WSB & Associates
701 Xenia Ave S
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US 12 & CSAH 5
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Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
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Groups Printed- small trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	3
06:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
07:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	6	0	0	6	1	2	0	0	3	0	2	1	0	3	12
07:45 AM	0	0	0	0	0	4	4	0	0	8	0	2	1	0	3	0	2	0	0	2	13
Total	0	0	0	0	0	4	10	1	0	15	1	4	1	0	6	0	4	1	0	5	26
08:00 AM	1	0	0	0	1	2	2	1	0	5	0	2	0	0	2	0	3	2	0	5	13
08:15 AM	0	2	0	0	2	0	2	0	0	2	0	1	0	0	1	1	1	0	0	2	7
08:30 AM	0	1	0	0	1	0	1	2	0	3	1	0	2	0	3	0	0	1	0	1	8
08:45 AM	2	0	0	0	2	0	1	0	0	1	0	3	0	0	3	0	1	0	0	1	7
Total	3	3	0	0	6	2	6	3	0	11	1	6	2	0	9	1	5	3	0	9	35
09:00 AM	0	1	1	0	2	0	2	2	0	4	0	1	0	0	1	1	4	0	0	5	12
09:15 AM	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	1	3	0	0	4	7
09:30 AM	0	0	2	0	2	1	2	0	0	3	0	2	0	0	2	0	3	0	0	3	10
09:45 AM	0	0	0	0	0	0	1	0	0	1	0	2	1	0	3	1	0	1	0	2	6
Total	0	2	3	0	5	1	5	3	0	9	0	6	1	0	7	3	10	1	0	14	35

WSB & Associates
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File Name : us 12 & csah 5
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Groups Printed- small trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	0	1	2	0	3	0	0	1	0	1	1	0	0	0	1	0	1	1	0	2	7
10:15 AM	1	0	0	0	1	0	2	0	0	2	1	0	0	0	1	0	1	0	0	1	5
10:30 AM	1	2	0	0	3	0	2	2	0	4	1	0	0	0	1	0	0	0	0	0	8
10:45 AM	0	0	0	0	0	1	2	2	0	5	0	1	1	0	2	0	0	0	0	0	7
Total	2	3	2	0	7	1	6	5	0	12	3	1	1	0	5	0	2	1	0	3	27
11:00 AM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	1	2	0	0	3	7
11:15 AM	1	2	0	0	3	1	2	2	0	5	0	1	0	0	1	0	3	0	0	3	12
11:30 AM	2	2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	7
11:45 AM	1	1	0	0	2	0	0	1	0	1	3	0	0	0	3	1	1	0	0	2	8
Total	4	7	0	0	11	1	2	3	0	6	3	3	0	0	6	2	8	1	0	11	34
12:00 PM	0	1	1	0	2	0	1	0	0	1	0	1	0	0	1	0	1	1	0	2	6
12:15 PM	0	0	1	0	1	2	0	0	0	2	2	1	0	0	3	2	1	0	0	3	9
12:30 PM	0	0	0	0	0	0	1	1	0	2	2	0	0	0	2	0	1	1	0	2	6
12:45 PM	0	0	0	0	0	1	1	1	0	3	1	0	0	0	1	0	2	0	0	2	6
Total	0	1	2	0	3	3	3	2	0	8	5	2	0	0	7	2	5	2	0	9	27
01:00 PM	0	0	1	0	1	1	1	0	0	2	2	1	0	0	3	2	2	0	0	4	10
01:15 PM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
01:30 PM	1	0	0	0	1	2	1	2	0	5	1	1	0	0	2	0	0	0	0	0	8
01:45 PM	1	0	0	0	1	0	0	2	0	2	0	2	2	0	4	0	2	1	0	3	10
Total	3	0	1	0	4	3	2	4	0	9	3	5	2	0	10	2	4	1	0	7	30
02:00 PM	1	1	2	0	4	0	0	0	0	0	0	1	1	0	2	0	1	0	0	1	7
02:15 PM	1	0	0	0	1	2	1	1	0	4	0	0	0	0	0	0	1	1	0	2	7
02:30 PM	1	1	0	0	2	0	1	0	0	1	0	1	0	0	1	1	1	0	0	2	6
02:45 PM	0	1	0	0	1	1	1	2	0	4	0	1	0	0	1	0	3	0	0	3	9
Total	3	3	2	0	8	3	3	3	0	9	0	3	1	0	4	1	6	1	0	8	29
03:00 PM	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	1	1	0	0	2	5
03:15 PM	1	1	1	0	3	0	1	0	0	1	0	1	1	0	2	0	1	0	0	1	7
03:30 PM	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	0	4	0	0	4	7
03:45 PM	0	1	3	0	4	0	0	2	0	2	1	1	0	0	2	0	2	0	0	2	10
Total	1	3	5	0	9	2	3	2	0	7	1	2	1	0	4	1	8	0	0	9	29
04:00 PM	0	0	0	0	0	1	3	1	0	5	0	1	0	0	1	0	3	1	0	4	10
04:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:30 PM	1	1	2	0	4	0	2	1	0	3	0	2	0	0	2	0	1	0	0	1	10
04:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	3	0	0	4	5
Total	1	1	2	0	4	2	7	2	0	11	0	3	0	0	3	1	7	1	0	9	27
05:00 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	2	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
06:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:15 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
06:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	3
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	3	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	6
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 3

Groups Printed- small trucks

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
10:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	18	26	20	0	64	23	50	28	0	101	18	38	10	0	66	14	60	14	0	88	319
Apprch %	28.1	40.6	31.2	0		22.8	49.5	27.7	0		27.3	57.6	15.2	0		15.9	68.2	15.9	0		
Total %	5.6	8.2	6.3	0	20.1	7.2	15.7	8.8	0	31.7	5.6	11.9	3.1	0	20.7	4.4	18.8	4.4	0	27.6	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
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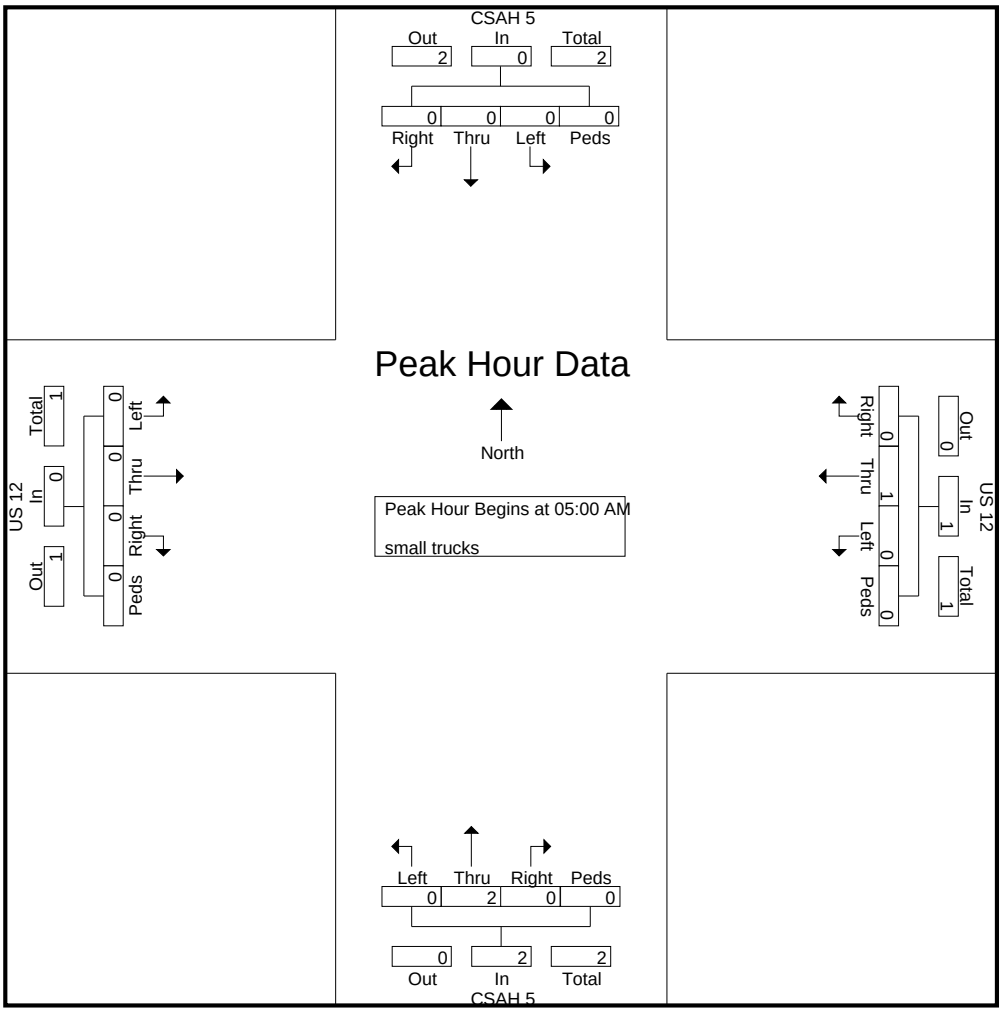
	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	0	0	0	0	0	**1**
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	1
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	3
% App. Total																					
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.500	.000	.000	.500	.000	.000	.000	.000	.000	.750



WSB & Associates
701 Xenia Ave S
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US 12 & CSAH 5
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sunny

File Name : us 12 & csah 5
Site Code : 00000001
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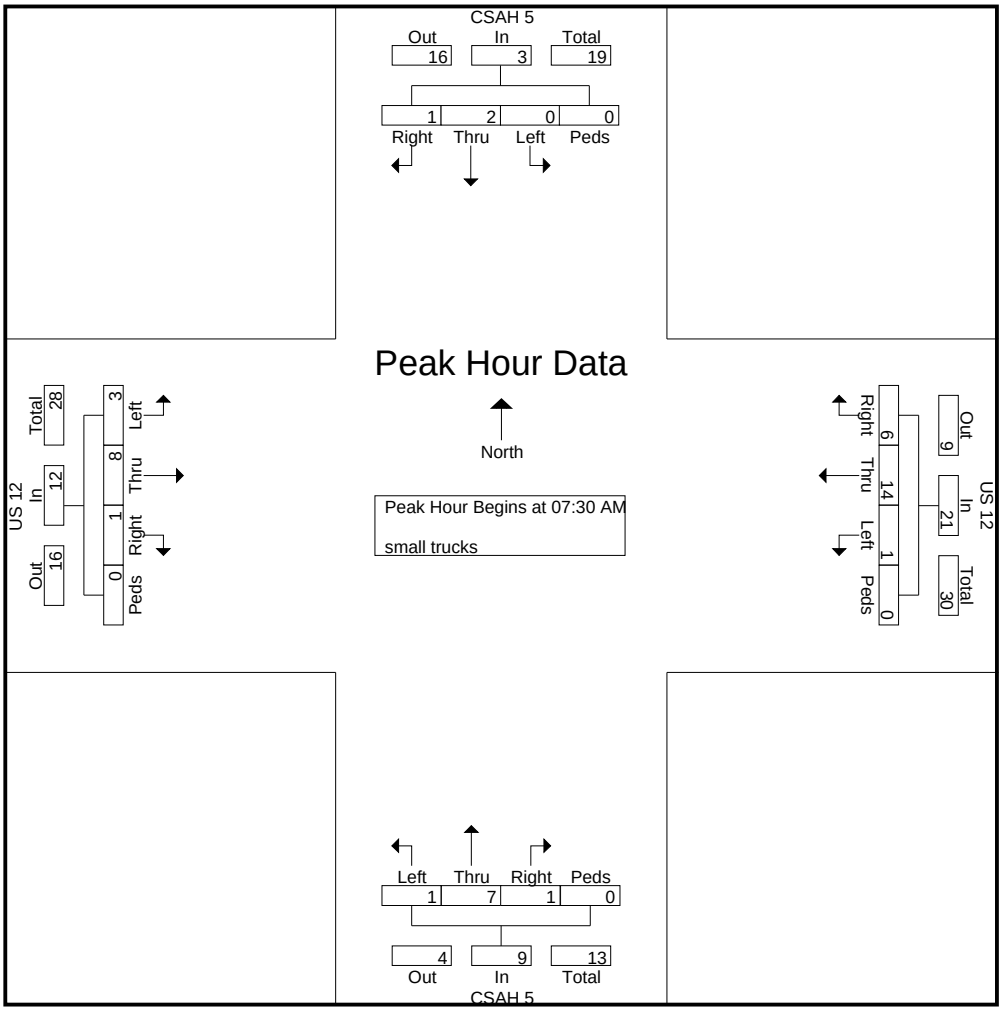
	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	0	**6**	0	0	6	**1**	**2**	0	0	**3**	0	2	1	0	3	12
07:45 AM	0	0	0	0	0	**4**	4	0	0	**8**	0	2	**1**	0	3	0	2	0	0	2	**13**
08:00 AM	**1**	0	0	0	1	2	2	**1**	0	5	0	2	0	0	2	0	**3**	**2**	0	**5**	13
08:15 AM	0	**2**	0	0	**2**	0	2	0	0	2	0	1	0	0	1	**1**	1	0	0	2	7
Total Volume	1	2	0	0	3	6	14	1	0	21	1	7	1	0	9	1	8	3	0	12	45
% App. Total																					
PHF	.250	.250	.000	.000	.375	.375	.583	.250	.000	.656	.250	.875	.250	.000	.750	.250	.667	.375	.000	.600	.865



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 1

Groups Printed- vehicles

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:00 AM	0	3	2	0	5	8	3	2	0	13	3	3	2	0	8	0	3	0	0	3	29
12:15 AM	0	6	5	0	11	6	1	2	0	9	1	5	1	0	7	0	1	0	0	1	28
12:30 AM	0	3	1	0	4	6	1	2	0	9	0	3	2	0	5	2	3	0	0	5	23
12:45 AM	0	2	3	0	5	3	3	2	0	8	0	4	1	0	5	0	1	0	0	1	19
Total	0	14	11	0	25	23	8	8	0	39	4	15	6	0	25	2	8	0	0	10	99
01:00 AM	0	3	3	0	6	2	2	0	0	4	5	14	1	0	20	0	0	0	0	0	30
01:15 AM	0	6	2	0	8	4	2	2	0	8	3	7	1	0	11	1	1	0	0	2	29
01:30 AM	0	1	3	0	4	3	6	1	0	10	1	2	0	0	3	0	2	0	0	2	19
01:45 AM	1	4	2	0	7	2	2	0	0	4	4	6	1	0	11	0	2	0	0	2	24
Total	1	14	10	0	25	11	12	3	0	26	13	29	3	0	45	1	5	0	0	6	102
02:00 AM	0	0	0	0	0	1	3	0	0	4	1	0	1	0	2	0	4	0	0	4	10
02:15 AM	0	0	1	0	1	0	1	1	0	2	0	3	2	0	5	2	5	0	0	7	15
02:30 AM	0	0	0	0	0	4	0	0	0	4	0	4	1	0	5	0	3	1	0	4	13
02:45 AM	0	2	2	0	4	1	1	0	0	2	0	1	0	0	1	0	0	0	0	0	7
Total	0	2	3	0	5	6	5	1	0	12	1	8	4	0	13	2	12	1	0	15	45
03:00 AM	0	0	1	0	1	1	3	0	0	4	5	0	1	0	6	0	2	0	0	2	13
03:15 AM	2	2	0	0	4	1	4	0	0	5	2	1	0	0	3	0	2	0	0	2	14
03:30 AM	0	1	1	0	2	0	2	0	0	2	0	1	0	0	1	0	3	0	0	3	8
03:45 AM	2	3	0	0	5	0	3	1	0	4	0	2	0	0	2	1	1	0	0	2	13
Total	4	6	2	0	12	2	12	1	0	15	7	4	1	0	12	1	8	0	0	9	48
04:00 AM	2	0	2	0	4	2	2	0	0	4	1	2	1	0	4	2	2	0	0	4	16
04:15 AM	2	4	1	0	7	0	4	1	0	5	0	2	3	0	5	2	0	0	0	2	19
04:30 AM	1	4	3	0	8	3	2	1	0	6	1	2	1	0	4	7	4	0	0	11	29
04:45 AM	1	4	6	0	11	0	4	1	0	5	0	3	5	0	8	2	7	2	0	11	35
Total	6	12	12	0	30	5	12	3	0	20	2	9	10	0	21	13	13	2	0	28	99
05:00 AM	0	9	3	0	12	2	11	2	0	15	1	3	1	0	5	3	5	0	0	8	40
05:15 AM	0	17	12	0	29	1	3	7	0	11	0	4	4	0	8	4	23	1	0	28	76
05:30 AM	2	13	7	0	22	2	3	9	0	14	0	3	4	0	7	15	12	1	0	28	71
05:45 AM	4	15	11	0	30	5	6	9	0	20	3	7	5	0	15	15	17	1	0	33	98
Total	6	54	33	0	93	10	23	27	0	60	4	17	14	0	35	37	57	3	0	97	285
06:00 AM	5	18	7	0	30	8	11	6	0	25	6	2	2	0	10	9	7	6	0	22	87
06:15 AM	7	32	6	0	45	6	17	9	0	32	1	8	4	0	13	15	22	3	0	40	130
06:30 AM	2	49	17	0	68	5	18	9	0	32	3	13	10	0	26	25	37	4	0	66	192
06:45 AM	7	52	27	0	86	6	26	5	0	37	6	18	3	0	27	21	29	5	0	55	205
Total	21	151	57	0	229	25	72	29	0	126	16	41	19	0	76	70	95	18	0	183	614
07:00 AM	8	41	21	0	70	5	21	4	0	30	6	13	9	0	28	18	25	6	0	49	177
07:15 AM	12	38	17	0	67	8	25	6	0	39	3	17	8	0	28	23	45	4	0	72	206
07:30 AM	8	62	31	0	101	11	37	5	0	53	4	29	14	0	47	24	41	2	0	67	268
07:45 AM	7	52	47	0	106	15	31	4	0	50	3	30	16	0	49	34	60	9	0	103	308
Total	35	193	116	0	344	39	114	19	0	172	16	89	47	0	152	99	171	21	0	291	959
08:00 AM	6	34	31	0	71	12	26	8	0	46	1	18	6	0	25	21	29	7	0	57	199
08:15 AM	5	18	10	0	33	12	24	5	0	41	1	24	5	0	30	21	29	8	0	58	162
08:30 AM	4	23	14	0	41	14	20	5	0	39	0	26	11	0	37	16	18	8	0	42	159
08:45 AM	3	22	15	0	40	16	15	1	0	32	1	38	4	0	43	21	24	8	0	53	168
Total	18	97	70	0	185	54	85	19	0	158	3	106	26	0	135	79	100	31	0	210	688
09:00 AM	2	18	15	0	35	14	17	7	0	38	3	22	12	0	37	15	26	3	0	44	154
09:15 AM	4	12	12	0	28	14	20	5	0	39	3	26	12	0	41	18	18	5	0	41	149
09:30 AM	5	15	18	0	38	11	15	3	0	29	2	18	15	0	35	15	21	4	0	40	142
09:45 AM	3	29	15	0	47	13	15	3	0	31	1	15	10	0	26	11	18	3	0	32	136
Total	14	74	60	0	148	52	67	18	0	137	9	81	49	0	139	59	83	15	0	157	581

WSB & Associates
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US 12 & CSAH 5
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File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 2

Groups Printed- vehicles

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
10:00 AM	3	21	11	0	35	11	32	7	0	50	7	12	15	0	34	21	18	1	0	40	159
10:15 AM	2	23	9	0	34	15	16	4	0	35	5	11	9	0	25	18	29	4	0	51	145
10:30 AM	2	16	12	0	30	16	17	3	0	36	7	20	8	0	35	19	20	4	0	43	144
10:45 AM	1	31	10	0	42	8	23	7	0	38	2	18	9	0	29	24	18	4	0	46	155
Total	8	91	42	0	141	50	88	21	0	159	21	61	41	0	123	82	85	13	0	180	603
11:00 AM	2	24	16	0	42	9	15	2	0	26	2	12	24	0	38	15	23	3	0	41	147
11:15 AM	5	26	11	0	42	11	16	2	0	29	3	23	28	0	54	21	31	3	0	55	180
11:30 AM	5	18	20	0	43	15	18	5	0	38	4	17	9	0	30	15	31	4	0	50	161
11:45 AM	7	36	15	0	58	19	25	2	0	46	5	31	11	0	47	15	18	3	0	36	187
Total	19	104	62	0	185	54	74	11	0	139	14	83	72	0	169	66	103	13	0	182	675
12:00 PM	5	39	13	0	57	23	17	3	0	43	5	39	29	0	73	15	18	2	0	35	208
12:15 PM	3	30	18	0	51	10	22	6	0	38	6	15	18	0	39	23	29	1	0	53	181
12:30 PM	5	27	12	0	44	26	21	5	0	52	5	18	20	0	43	15	29	2	0	46	185
12:45 PM	3	29	17	0	49	8	29	5	0	42	6	33	17	0	56	11	38	2	0	51	198
Total	16	125	60	0	201	67	89	19	0	175	22	105	84	0	211	64	114	7	0	185	772
01:00 PM	4	28	18	0	50	24	43	5	0	72	6	21	19	0	46	16	29	6	0	51	219
01:15 PM	18	28	27	0	73	16	15	9	0	40	5	23	28	0	56	15	25	5	0	45	214
01:30 PM	10	27	18	0	55	24	21	2	0	47	4	27	17	0	48	21	29	3	0	53	203
01:45 PM	9	45	27	0	81	20	24	4	0	48	2	18	8	0	28	13	39	5	0	57	214
Total	41	128	90	0	259	84	103	20	0	207	17	89	72	0	178	65	122	19	0	206	850
02:00 PM	10	31	31	0	72	13	25	9	0	47	3	12	25	0	40	23	22	5	0	50	209
02:15 PM	4	29	22	0	55	22	24	3	0	49	2	21	8	0	31	28	25	7	0	60	195
02:30 PM	9	24	23	0	56	12	27	6	0	45	2	33	21	0	56	17	14	3	0	34	191
02:45 PM	7	62	23	0	92	22	35	8	0	65	2	24	24	0	50	11	25	5	0	41	248
Total	30	146	99	0	275	69	111	26	0	206	9	90	78	0	177	79	86	20	0	185	843
03:00 PM	4	32	22	0	58	18	32	6	0	56	4	18	11	0	33	10	22	1	0	33	180
03:15 PM	5	48	30	0	83	23	39	13	0	75	8	35	21	0	64	12	32	9	0	53	275
03:30 PM	5	41	28	0	74	27	39	13	0	79	15	49	26	0	90	16	25	8	0	49	292
03:45 PM	5	32	27	0	64	27	25	12	0	64	14	23	24	0	61	14	25	8	0	47	236
Total	19	153	107	0	279	95	135	44	0	274	41	125	82	0	248	52	104	26	0	182	983
04:00 PM	3	34	15	0	52	30	34	9	0	73	7	50	19	0	76	17	22	8	0	47	248
04:15 PM	8	24	19	0	51	26	48	4	0	78	4	46	30	0	80	15	30	3	0	48	257
04:30 PM	10	50	30	0	90	35	46	9	0	90	5	53	35	0	93	15	33	13	0	61	334
04:45 PM	13	37	18	0	68	39	48	7	0	94	3	63	29	0	95	19	31	8	0	58	315
Total	34	145	82	0	261	130	176	29	0	335	19	212	113	0	344	66	116	32	0	214	1154
05:00 PM	7	31	13	0	51	46	37	7	0	90	3	66	46	0	115	30	41	17	0	88	344
05:15 PM	6	39	21	0	66	29	46	5	0	80	5	55	45	0	105	17	28	9	0	54	305
05:30 PM	3	39	12	0	54	31	29	5	0	65	5	50	39	0	94	13	30	5	0	48	261
05:45 PM	6	37	16	0	59	24	29	6	0	59	4	34	27	0	65	18	24	11	0	53	236
Total	22	146	62	0	230	130	141	23	0	294	17	205	157	0	379	78	123	42	0	243	1146
06:00 PM	5	23	14	0	42	19	25	3	0	47	4	41	31	0	76	20	25	4	0	49	214
06:15 PM	3	24	28	0	55	14	21	4	0	39	2	36	14	0	52	19	22	7	0	48	194
06:30 PM	6	24	13	0	43	11	9	1	0	21	5	37	20	0	62	14	25	4	0	43	169
06:45 PM	2	23	14	0	39	16	19	1	0	36	6	26	11	0	43	20	16	3	0	39	157
Total	16	94	69	0	179	60	74	9	0	143	17	140	76	0	233	73	88	18	0	179	734
07:00 PM	4	27	7	0	38	15	14	2	0	31	2	14	13	0	29	12	14	3	0	29	127
07:15 PM	1	17	12	0	30	25	10	2	0	37	1	35	26	0	62	11	10	5	0	26	155
07:30 PM	1	25	8	0	34	18	19	2	0	39	2	23	23	0	48	13	17	3	0	33	154
07:45 PM	5	17	12	0	34	7	17	3	0	27	1	18	14	0	33	5	6	4	0	15	109
Total	11	86	39	0	136	65	60	9	0	134	6	90	76	0	172	41	47	15	0	103	545

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 3

Groups Printed- vehicles

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
08:00 PM	2	22	15	0	39	13	16	3	0	32	3	26	16	0	45	12	14	3	0	29	145
08:15 PM	2	12	11	0	25	18	14	3	0	35	0	29	10	0	39	9	14	1	0	24	123
08:30 PM	4	24	18	0	46	11	8	4	0	23	2	41	19	0	62	5	8	3	0	16	147
08:45 PM	5	25	8	0	38	17	13	5	0	35	3	29	10	0	42	6	10	4	0	20	135
Total	13	83	52	0	148	59	51	15	0	125	8	125	55	0	188	32	46	11	0	89	550
09:00 PM	2	12	13	0	27	26	25	2	0	53	3	34	14	0	51	4	15	5	0	24	155
09:15 PM	3	18	15	0	36	15	12	5	0	32	4	33	14	0	51	3	5	1	0	9	128
09:30 PM	5	17	12	0	34	10	8	0	0	18	2	30	13	0	45	5	7	1	0	13	110
09:45 PM	1	13	13	0	27	19	12	5	0	36	1	26	10	0	37	4	12	1	0	17	117
Total	11	60	53	0	124	70	57	12	0	139	10	123	51	0	184	16	39	8	0	63	510
10:00 PM	0	14	15	0	29	15	7	4	0	26	1	38	9	0	48	2	4	1	0	7	110
10:15 PM	3	12	13	0	28	12	6	1	0	19	1	17	5	0	23	3	9	1	0	13	83
10:30 PM	0	14	6	0	20	10	9	5	0	24	2	11	4	0	17	0	5	1	0	6	67
10:45 PM	0	6	10	0	16	9	13	3	0	25	1	16	3	0	20	0	6	0	0	6	67
Total	3	46	44	0	93	46	35	13	0	94	5	82	21	0	108	5	24	3	0	32	327
11:00 PM	0	9	2	0	11	12	6	1	0	19	1	4	4	0	9	2	7	0	0	9	48
11:15 PM	2	6	5	0	13	10	6	2	0	18	0	13	2	0	15	1	3	1	0	5	51
11:30 PM	1	5	0	0	6	8	7	1	0	16	1	7	1	0	9	1	2	0	0	3	34
11:45 PM	0	4	0	0	4	9	3	2	0	14	1	7	1	0	9	2	5	0	0	7	34
Total	3	24	7	0	34	39	22	6	0	67	3	31	8	0	42	6	17	1	0	24	167
Grand Total	351	2048	1242	0	3641	1245	1626	385	0	3256	284	1960	1165	0	3409	1088	1666	319	0	3073	13379
Apprch %	9.6	56.2	34.1	0		38.2	49.9	11.8	0		8.3	57.5	34.2	0		35.4	54.2	10.4	0		
Total %	2.6	15.3	9.3	0	27.2	9.3	12.2	2.9	0	24.3	2.1	14.6	8.7	0	25.5	8.1	12.5	2.4	0	23	

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701 Xenia Ave S
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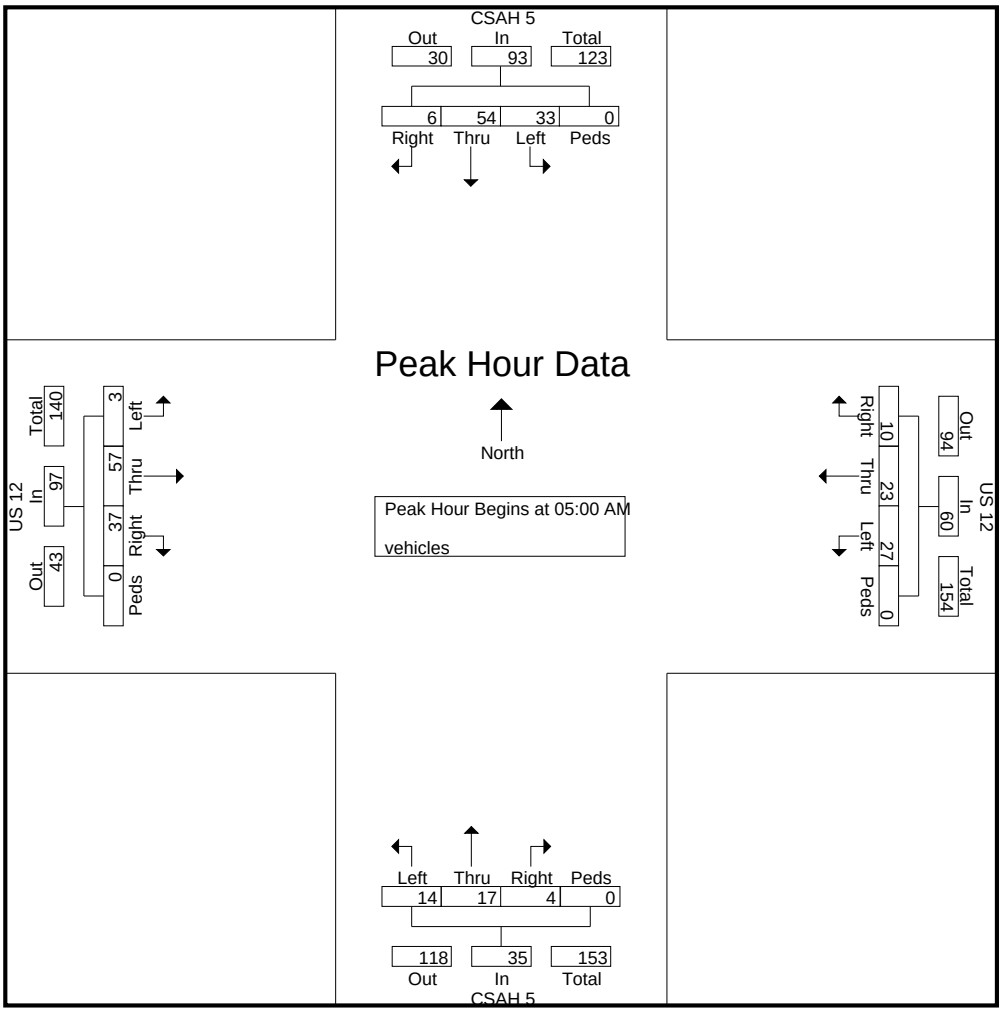
US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 4

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 05:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 AM																					
05:00 AM	0	9	3	0	12	2	**11**	2	0	15	1	3	1	0	5	3	5	0	0	8	40
05:15 AM	0	**17**	**12**	0	29	1	3	7	0	11	0	4	4	0	8	4	**23**	**1**	0	28	76
05:30 AM	2	13	7	0	22	2	3	**9**	0	14	0	3	4	0	7	**15**	12	1	0	28	71
05:45 AM	**4**	15	11	0	**30**	**5**	6	9	0	**20**	**3**	**7**	**5**	0	**15**	15	17	1	0	**33**	**98**
Total Volume	6	54	33	0	93	10	23	27	0	60	4	17	14	0	35	37	57	3	0	97	285
% App. Total																					
PHF	.375	.794	.688	.000	.775	.500	.523	.750	.000	.750	.333	.607	.700	.000	.583	.617	.620	.750	.000	.735	.727



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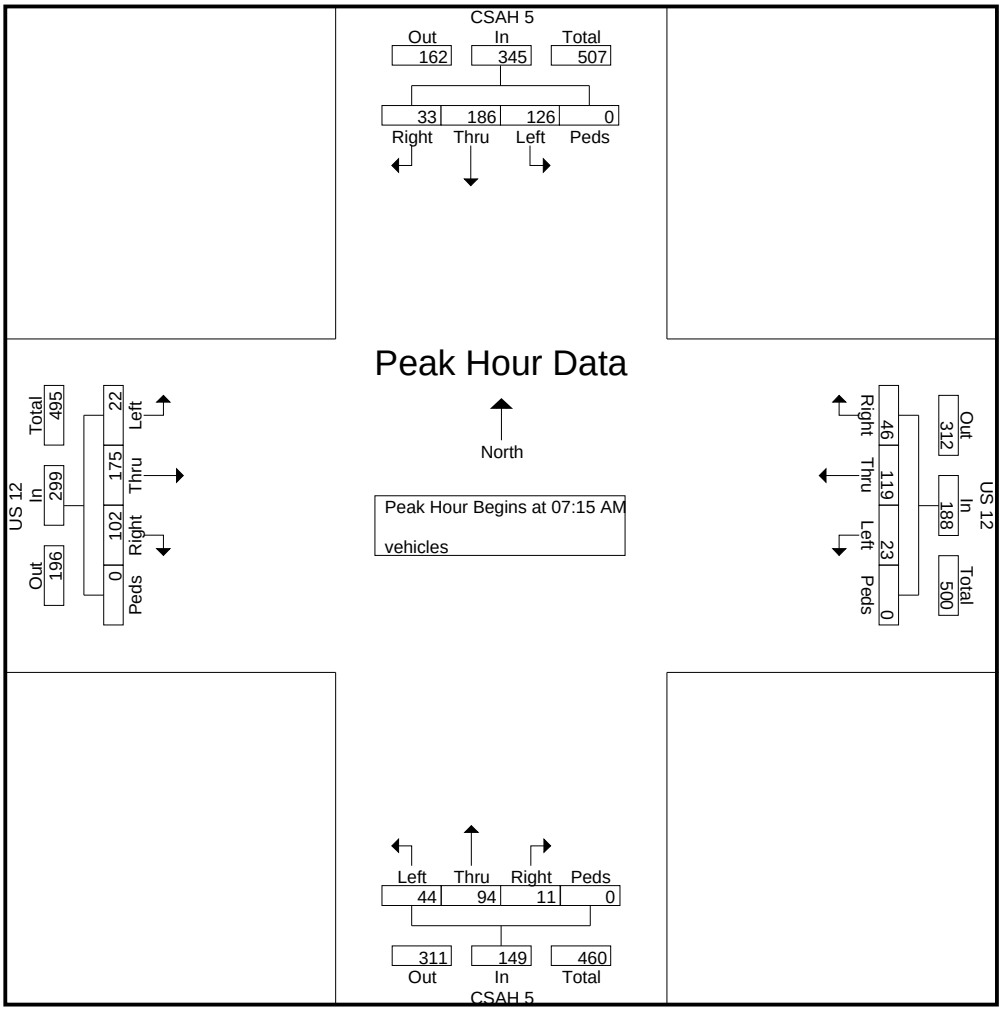
Minneapolis, MN

US 12 & CSAH 5
24 hour count
Willmar, MN
sunny

File Name : us 12 & csah 5
Site Code : 00000001
Start Date : 6/7/2016
Page No : 5

	CSAH 5 From North					US 12 From East					CSAH 5 From South					US 12 From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**12**	38	17	0	67	8	25	6	0	39	3	17	8	0	28	23	45	4	0	72	206
07:30 AM	8	**62**	31	0	101	11	**37**	5	0	**53**	**4**	29	14	0	47	24	41	2	0	67	268
07:45 AM	7	52	**47**	0	**106**	**15**	31	4	0	50	3	**30**	**16**	0	**49**	**34**	**60**	**9**	0	**103**	**308**
08:00 AM	6	34	31	0	71	12	26	**8**	0	46	1	18	6	0	25	21	29	7	0	57	199
Total Volume	33	186	126	0	345	46	119	23	0	188	11	94	44	0	149	102	175	22	0	299	981
% App. Total																					
PHF	.688	.750	.670	.000	.814	.767	.804	.719	.000	.887	.688	.783	.688	.000	.760	.750	.729	.611	.000	.726	.796



Appendix C – CSAH 55/1st Avenue W At-Grade Intersection Evaluation

701 Xenia Avenue South | Suite 300 | Minneapolis, MN 55416 | (763) 541-4800

Memorandum

To: ***Paul Rasmussen, P.E.***

From: ***Jack Corkle, PTP, AICP***
Jon Chiglo, PE

Date: ***September 30, 2016***

Re: ***1st Avenue***

I. Introduction/Memo Purpose

This memo is intended to document an evaluation of a proposed railroad crossing on 1st Avenue/County State Aid Highway (CSAH) 55 in the City of Willmar as part of the Willmar Wye TIGER Project. The Willmar Wye TIGER project includes federal, state, local and private investment of a new railway line between the Morris and Marshall Subdivisions of the BNSF Railway (BNSF). The intent of the project is to prevent having trains that move from one subdivision to the other travel through downtown Willmar and the Willmar Terminal. A number of alternatives were developed and analyzed to realign the railway. The analysis included in this memo documents the impacts of an at-grade crossing and options to avoid an at-grade crossing.

This analysis is being undertaken because of the unique circumstances of this project. The Federal Railroad Administration (FRA), the Federal Highway Administration (FHWA) and the Minnesota Department of Transportation (MnDOT) have guidelines and best practices that limit new at-grade crossings of railways for safety reasons. These crossings are generally the result of a new roadway connection on an existing railway. In the case of the Willmar Wye project, which consists of a new railway alignment to bypass downtown Willmar, new rail/roadway intersections are created on existing roadways at TH 12, 1st Avenue and TH 40 due to the construction of the railway (see Section II – Project Background). The agencies listed above do not have policies regarding new crossings that are created as a result of a new railway, nor do they have a set process for evaluating crossings at these locations.

This memo provides an evaluation of the proposed railroad crossing and options to an at-grade crossing of 1st Avenue (crossings on TH 12 and TH 40 are proposed as grade separated). Items included in the analysis include safety, economic impacts, overall project crossings, roadway jurisdiction impacts, and other considerations.

II. Project Background

The proposed Willmar Wye project is located in the western portion of the City of Willmar (**Figure 1**). The project includes constructing a new railway connection between the Morris and Marshall Subdivisions of the BNSF Railway (**Figure 2**). The proposed railway alignment would cross three existing roadways; Trunk Highway (TH) 12, TH 40 and 1st Avenue/CSAH 55. Because the railway will impact the highway transportation network, two primary alternatives were developed to address the impacts associated with the railway on TH 12. Alternative 1 (**Figure 3**) leaves TH 12 on its present alignment but requires TH 12 to be placed on walls within a portion of the project area. It also includes a grade separated crossing of the railway. Alternative 2A (**Figure 4**) realigns TH 12 to the south in order to eliminate the retaining walls. It too includes a grade separated crossing over the railway. As shown in Figures 3 and 4, it is anticipated that the project will include an overpass of the proposed railway on TH 40.

Under evaluation is whether or not an at-grade intersection is acceptable at 1st Avenue/CSAH 55 under Alternative 2. There are three sub-options considered:

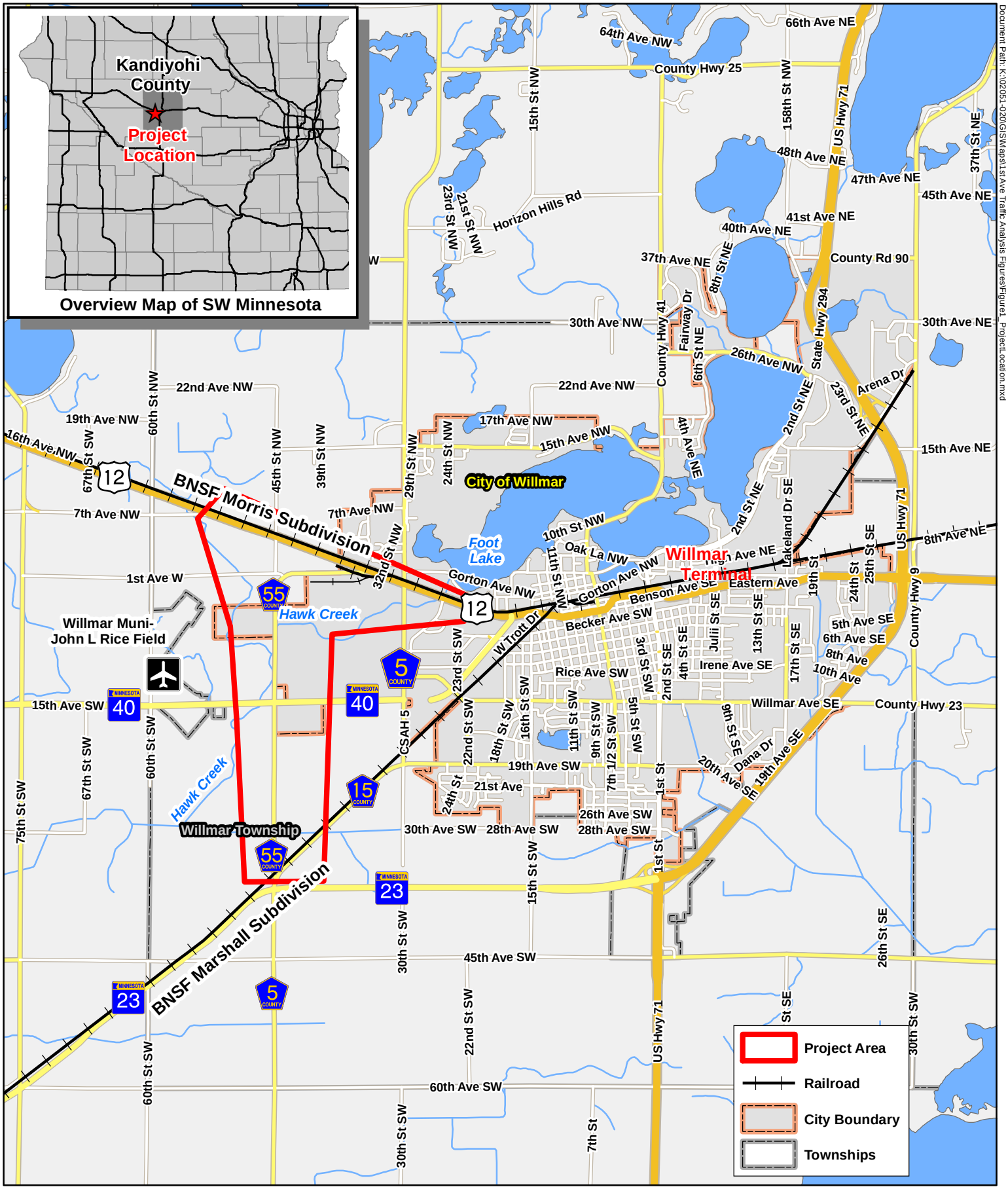
- Option 2A – includes an at-grade intersection with the railroad at 1st Avenue/CSAH 55 and grade separated intersections with the railway on realigned TH 12 and TH 40. Other elements of this option include a grade-separated intersection with TH 12 and CSAH 55 (**Figure 4**).

- Option 2B – eliminates the at-grade crossing between 1st Avenue/CSAH 55 with the proposed railway and includes grade separated intersections between the railway on realigned TH 12 and TH 40. Other elements of this option include an at-grade intersection on realigned TH 12 and CSAH 55 and a new local roadway connection to 1st Avenue/CSAH 55 from realigned TH 12 east of the proposed railway (**Figure 5**). This option requires reconfiguring operations on the Farm Service Elevator site and providing a connection to the west to serve two other businesses (Quam Construction and PALS, Inc).

- Option 2C – eliminates the at-grade crossing between 1st Avenue/CSAH 55 with the proposed railway and includes grade separated intersections between the railway on realigned TH 12 and TH 40. Other elements of the project include an at-grade intersection on realigned TH 12 and CSAH 55. There are no direct connections between realigned TH 12 and 1st Avenue/CSAH 55 with this option (**Figure 6**).

In addition to the three options described above, MnDOT also looked at the feasibility of constructing an overpass or an underpass of the proposed railway at 1st Avenue/CSAH 55. An underpass was rejected due to the proximity of the water table.

An overpass is technically feasible, but was estimated to be $1 million in construction costs and would likely require the acquisition and relocation of Quam Construction (business located on 1st Avenue/CSAH 55). At 2.5 times the assessed value (acquisition and relocation), right of way impacts were estimated at $875,000. Additionally, the touchdown point of the roadway to the east would mean that driveways and internal circulation/operations of another business (PALS) would also have to be modified. Overall, it was anticipated that a grade separation would add approximately $2 million to the cost of the project. Maintenance costs associated with bridges and retaining walls would further increase long-term costs associated with constructing an overpass.



1st Avenue At-Grade Analysis
Figure 1: Project Location
Willmar, MN

N

0 2,500 Feet

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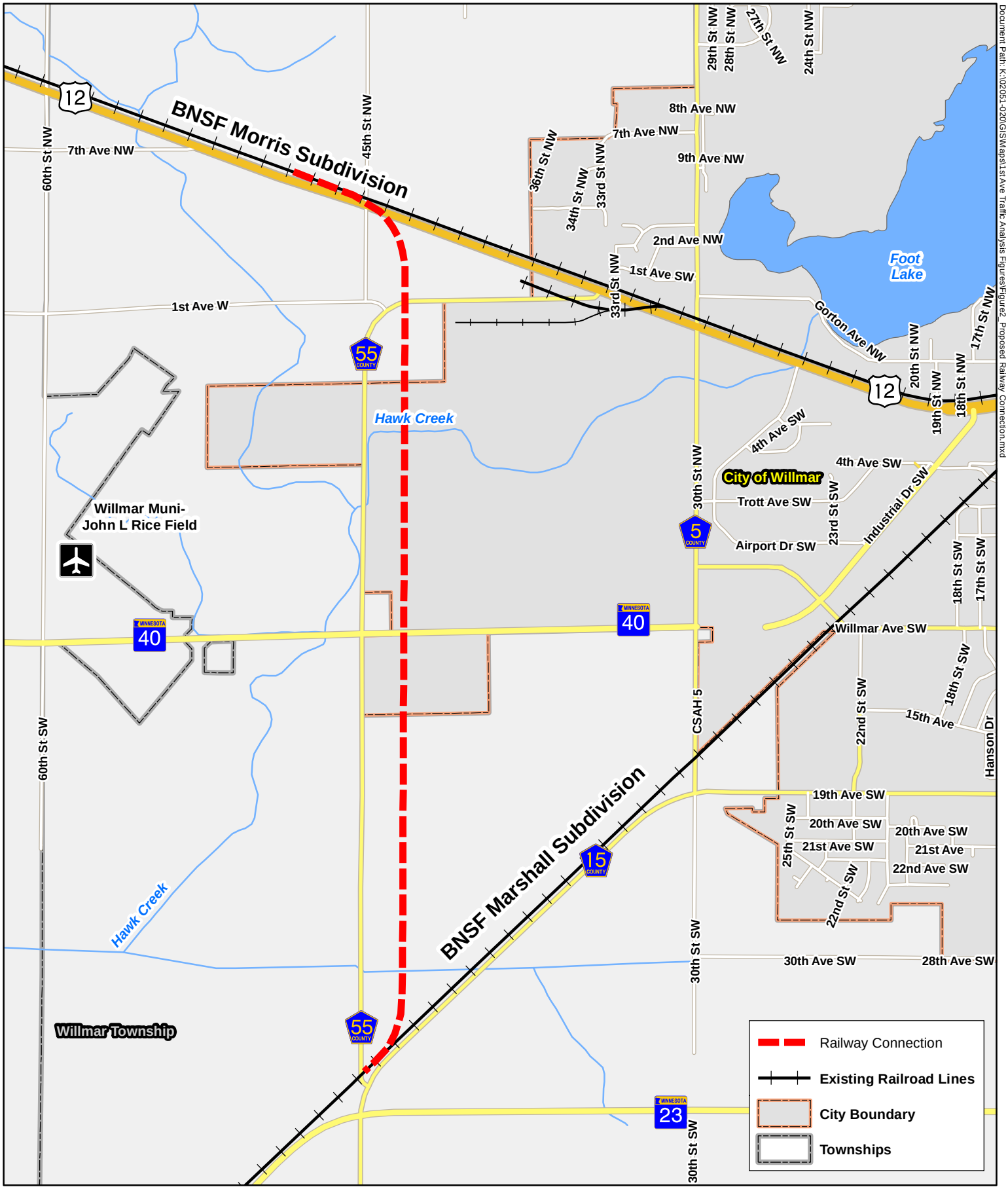

1st Avenue At-Grade Analysis
Figure 2: Proposed Railway Connection
Willmar, MN

N

0 2,500 Feet

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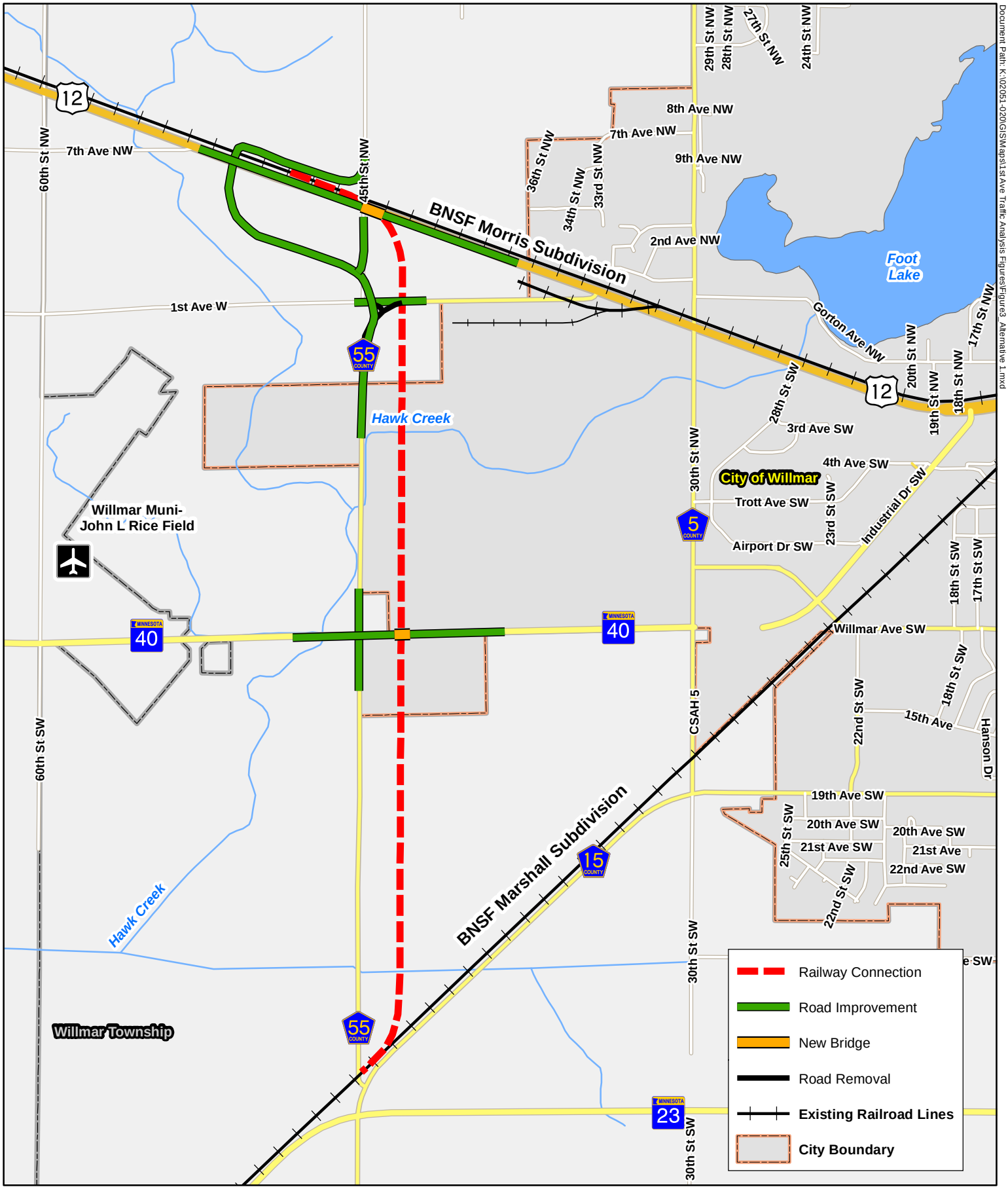

1st Avenue At-Grade Analysis
Figure 3: Alternative 1
Willmar, MN

N

0 2,500 Feet

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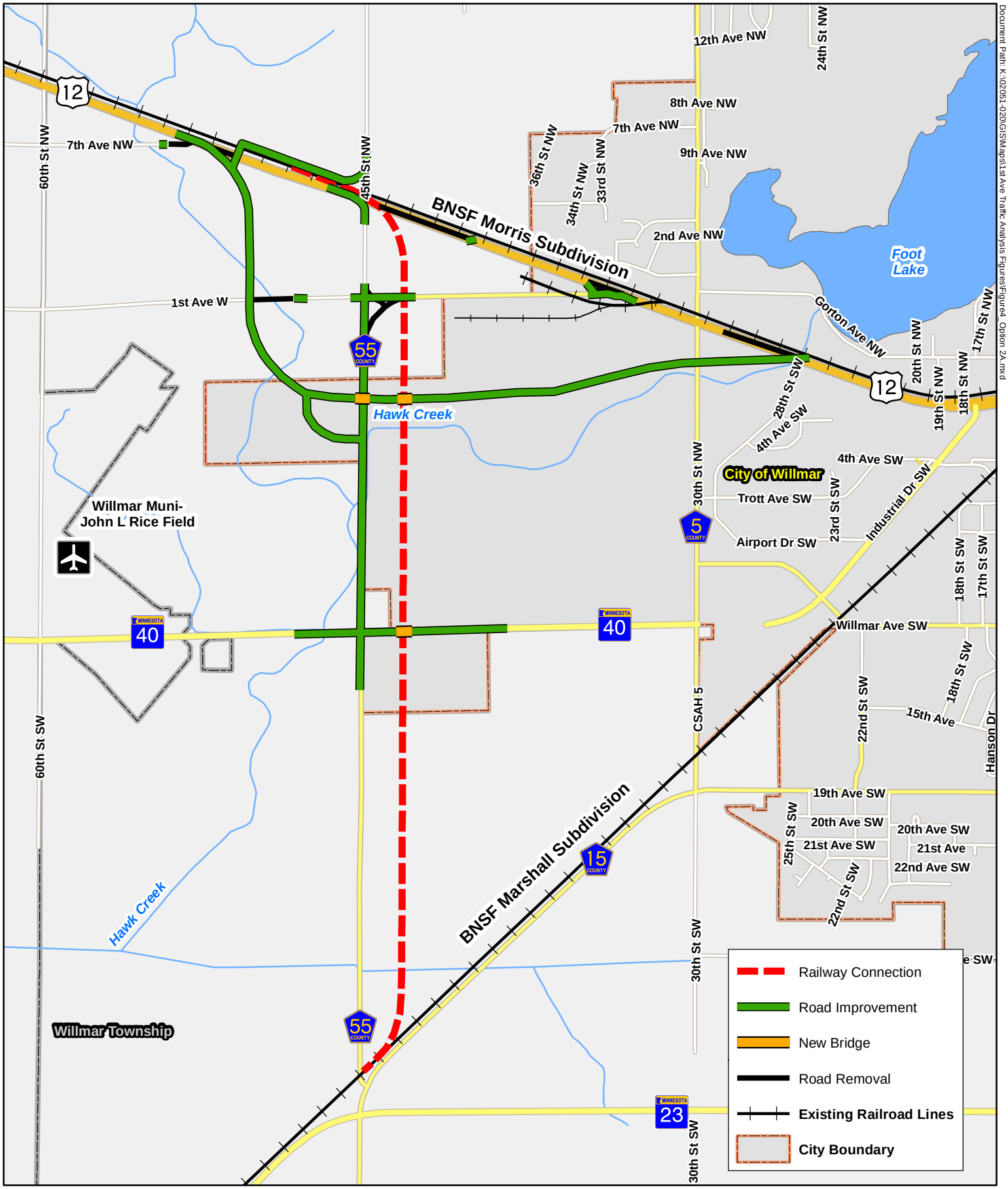

1st Avenue At-Grade Analysis
Figure 4: Option 2A
Willmar, MN

N

0 2,500 Feet

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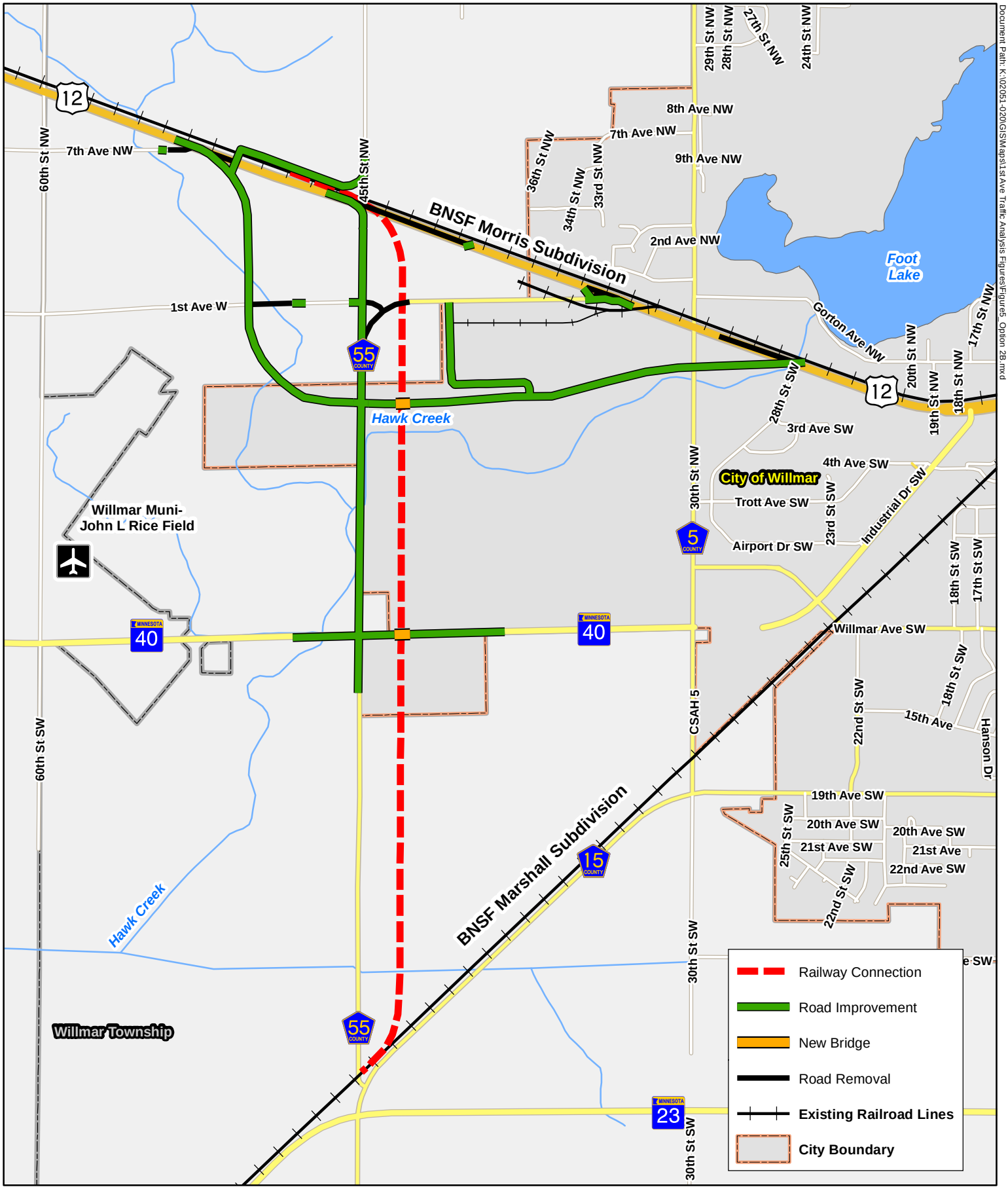

1st Avenue At-Grade Analysis
Figure 5: Option 2B
Willmar, MN

N

0 2,500 Feet

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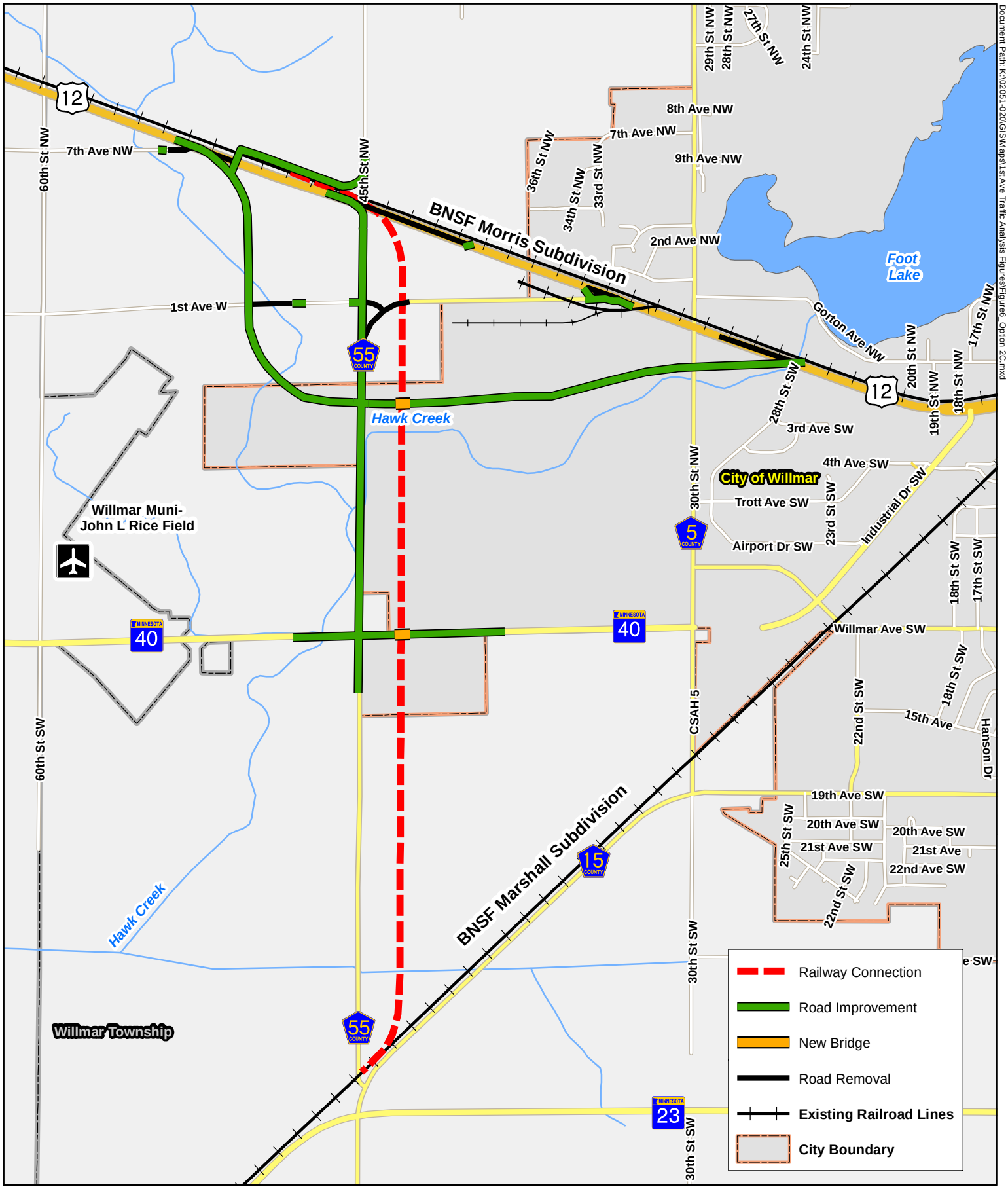


1st Avenue At-Grade Analysis
Figure 6: Option 2C
Willmar, MN

N

0 2,500 Feet

Document Path: K:\02051-020\GIS\Maps\1st Ave Traffic Analysis Figures\Figure6_Option 2C.mxd

Figure 7 shows the businesses that would likely be impacted as a result of an overpass. Due to the impacts and costs associated with an underpass or overpass options, they were not pursued or investigated in more detail.

III. Safety

There were two safety analyses that were conducted. The first analysis focused on the likelihood and severity of a railway crash at 1st Avenue/CSAH 55 as compared to the likelihood and severity of crashes on the highway network if an at-grade intersection of the railway is determined unacceptable. This information is discussed in Section III A.

The second analysis evaluated the risk factors associated with an at-grade railway intersection at 1st Avenue/CSAH 55. The risk factors are from a report recently prepared for MnDOT's Office of Freight and Commercial Vehicles Operations – Rail Administration Section. This information is discussed in Section III B.

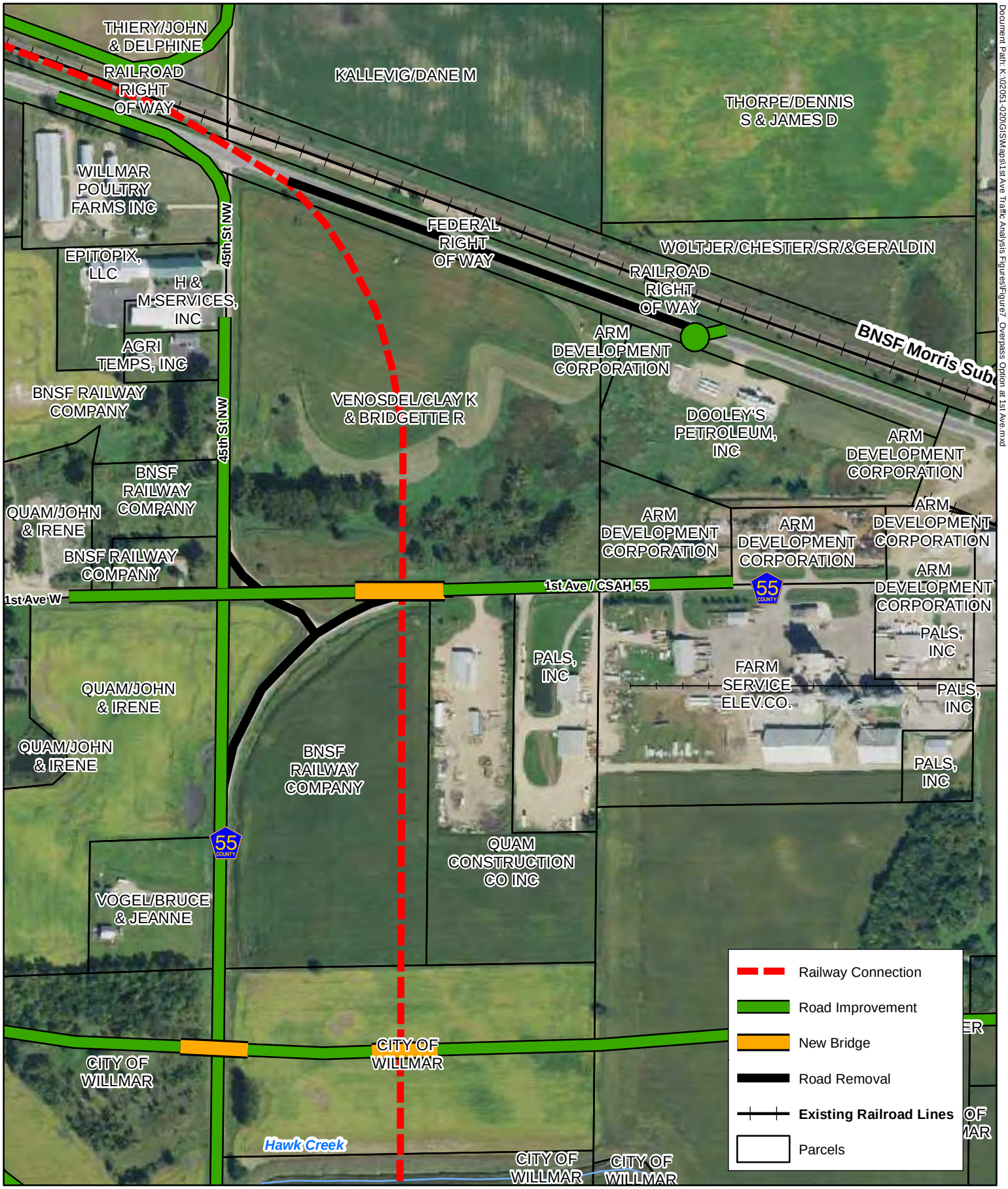
A. Railway and Highway Crash Probability and Severity

The first safety analysis addresses the number of crashes, the severity of crashes and the potential crash costs of each of the alternatives. The number, severity, and potential crash costs were estimated for both the at-grade rail crossing as well as for the at-grade intersections on the roadways where traffic volumes and access locations change if there is not an at-grade rail crossing. It should be noted that Option 2A provides a grade separated interchange for realigned TH 12 and CSAH 55 whereas the other alternatives do not.

2040 full build out scenario traffic volumes previously developed for ICE reports were used in the analysis. The 2040 full build analysis assumed limited background growth in traffic (district growth factor is 1) but did assume the future industrial park (located on the old airport site west of CSAH 5, north of TH 40 and south of realigned TH 12) would be in place.

It should be noted that there are a number of truck trips in the project area. Trucks represent approximately 8 percent of the traffic on TH 40 and 7 to 10 percent of the traffic on TH 12. These trucks are hauling grain, fertilizer and other agricultural products as well as salvage and recyclable materials. These vehicles have multiple axles and are slow to stop and start, which can have an influence on safety. This is particularly true for vehicles that have to come to a complete stop and then cross a major highway or railway. It is also true for vehicles that have to move from one highway to the left lane of another when starting from a complete stop. While this is challenging to factor into the safety analysis, some of the slower speeds and ability to slow down are accounted for in the travel time analyses in Section IVB.

Based on existing and forecast traffic counts and the existing land uses on 1st Avenue/CSAH 55, it was estimated that approximately 400 vehicles per day would use the 1st Avenue/CSAH 55 at-grade rail crossing, with half the vehicles (200) coming from and going to TH 12 locations to the west and the other half (200) coming from and going to TH 23 via CSAH 55.



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1st Avenue At-Grade Analysis

Figure 7: Overpass Option at 1st Avenue

Willmar, MN

N

0 500 Feet

Traffic coming from and going to TH 40 was expected to have similar patterns to the TH 23 traffic and were included in the estimated TH 23 traffic. It was assumed that all traffic from the west and southwest would use the at-grade crossing on 1st Avenue/CSAH 55 in Option 2A since this would be the shortest and fastest route. It was assumed that all traffic from the west and southwest would use the new local road access on realigned TH 12 in Option 2B. In Option 2C there are three different routes between 19th Avenue/CSAH 55 intersection and the mid-point of 1st Avenue/CSAH 55 for the 200 vehicles. The three possible routes and assumed vehicle usage of each route:

- CSAH 55 to US 12 to CSAH 5 and 1st Avenue (20 percent of vehicles or 40 vehicles/day)
- CSAH 55 to TH 40 to CSAH 5 and 1st Avenue (20 percent of vehicles or 40 vehicles/day)
- 19th Avenue to CSAH 5 and 1st Avenue/CSAH 55 (60 percent of vehicles or 120 vehicles/day)

The intersections included in the crash analysis are shown in **Figure 8**. The routes travelled are shown in **Figure 9** and are described below.

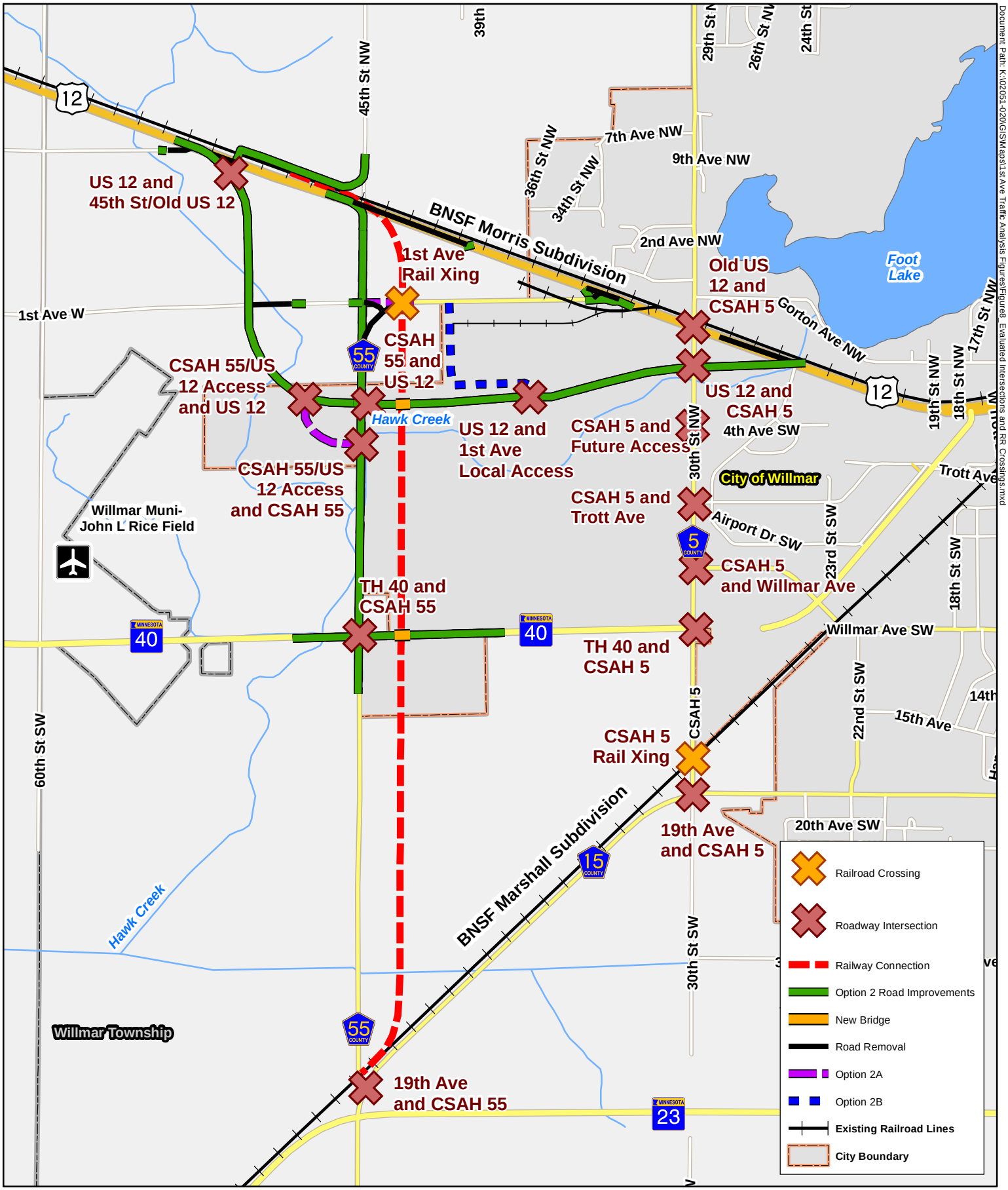
<u>Option 2A</u>
From/To West: The shortest route from TH 12 to the west is to turn at the intersection of 45th Street and follow 45th Street to 1st Avenue /CSAH 55 and turn left onto 1st Avenue/CSAH 55. Vehicles on this route would go through 3 intersections (2 with minor ADT) and cross the railroad at-grade. The reverse route is similar.

From/To South: The shortest route from the CSAH 55 and 19th Avenue intersection is on CSAH 55 to 1st Avenue/CSAH 55 and then turn right on 1st Avenue/CSAH 55. Vehicles on this route would go through 4 intersections (3 with minor ADT) including the CSAH 55 and 19th Avenue intersection and cross the railroad at-grade at 1st Avenue/CSAH 55. The reverse route is similar.

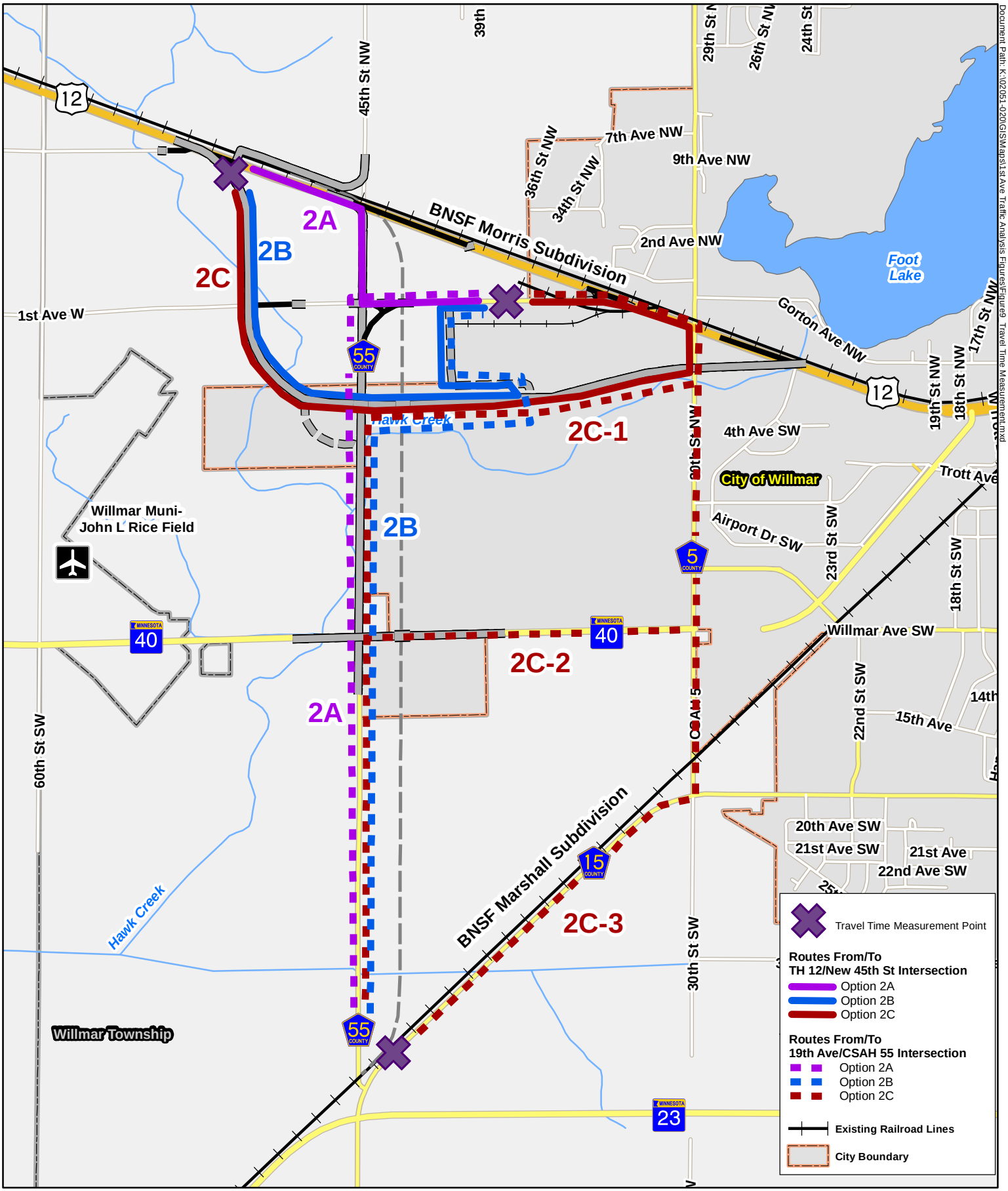
<u>Option 2B</u>
From/To West: The shortest route from TH 12 to the west is to follow TH 12 to the new business access off of the north side of TH 12. Vehicles on this route would go through 4 intersections (1 with minor ADT) and there would be no at-grade railroad crossing. Three are major intersections as they are on TH 12. The reverse route is similar.

From/To South: The shortest route from the CSAH 55 and 19th Avenue intersection is on CSAH 55 to TH 12, right on TH 12 to new business access off of the north side of TH 12 to 1st Avenue/CSAH 55. Vehicles on this route would go through 5 intersections (1 with minor ADT). Vehicles must turn right onto TH 12 and accelerate uphill and then make a left turn at the new business access. The reverse route is similar. Vehicles would again have to accelerate uphill from the business access and then make a left at CSAH 55.

<u>Option 2C</u>
From/To West: The shortest route from TH 12 to the west is to follow TH 12 to CSAH 5, turn left on CSAH 5 to the CSAH 5 and old TH 12 intersection and then turn left on old TH 12. Vehicles on this route would go through 6 intersections (2 with minor ADT) and there would be no at-grade railroad crossing. Three are major intersections on TH 12 one is from CSAH 5 which also has a higher ADT. The reverse route is similar.



1st Avenue At-Grade Analysis
Figure 8: Evaluated Intersections and Railroad Crossings
Willmar, MN



1st Avenue At-Grade Analysis
Figure 9: Travel Time Measurement and Routes
Willmar, MN

N

0 2,500 Feet

From/To South: There are three routes vehicles can choose in this alternative. On all routes, the vehicles have common intersections they go through, which are CSAH 55 and 19th Avenue, CSAH 5 and TH 12 signal, CSAH 5 and Old TH 12. Between CSAH 55 and 19th Avenue intersection and CSAH 5 and TH 12 intersection, there are three choices for the vehicles.

- The first choice is to go through CSAH 55 and cross TH 40, turn at TH 12, and proceed on TH 12 to CSAH 5 and then left onto old TH 12 (5 intersections).

- The second choice is to go through CSAH 55 and turn at TH 40, turn at TH 40/CSAH 5 intersection onto CSAH 5 and proceed to CSAH 5/ TH12 intersection and then left onto old TH 12 (7 intersections).

- The third choice is to go through 19th Avenue, turn onto CSAH 5, cross the existing at-grade rail crossing, cross TH 40, and proceed to TH 12/CSAH 5 intersection and then left onto old TH 12 (7 intersections).

The total number of crashes estimated per year in each scenario is calculated as the sum of the estimated crashes at the 1st Avenue/CSAH 55 at-grade railroad crossing and the estimated crashes at the highway intersections under each option. In Option 2C, the potential increase in crashes was estimated for the CSAH 5 at-grade railroad crossing because additional traffic is expected to use this route.

<u>Railway Crashes</u>

The estimated at-grade rail crossing crashes were calculated using the procedure documented in "FHWA Railroad-Highway Grade Crossing Handbook – Revised August 2007" which is the source document for the procedure described in "MnDOT Rail Grade Crossing Safety Project Selection – June 2016", and "FHWA – Assessment of Crossing Safety and Operation – Chapter 3, August 2007" referenced by MnDOT. The procedure described in these documents provides a method of predicting crashes at existing at-grade rail crossings and ranking them for investigation. There is no explicit procedure documented for new crossings with no crash history. For this analysis the number of observed collisions was set to statewide averages for the proposed 1st Avenue/CSAH 55 at-grade railroad crossing (information is from the Railroad Grade Crossing Safety Project Selection, June 2016. Howard Preston, Veronica Richfield and Maureen Jensen).

There is an existing at-grade rail crossing on CSAH 5 near 19th Avenue that is used by redirected vehicles in Option 2C and crashes were estimated at this crossing using the same procedure. The FRA inventory data for this crossing was used to determine the characteristics of this this crossing. A grade separation was assumed at the existing at-grade rail crossing on CSAH 55 near 19th Avenue in all options (Kandiyohi County is constructing a grade separated crossing in this location in 2017).

The basic collision prediction formula is expressed as a series of factors that, when multiplied together, yield an initial predicted number of collisions per year at a crossing. Each factor in the formula represents a characteristic of the crossing described in the national inventory. The general expression of the basic formula is shown below:

a=K x EI x MT x DT x HP x MS x HT x HL

a = initial collision prediction, collisions per year at the crossing

K = formula constant

EI = factor for exposure index based on product of highway and train traffic

MT = factor for number of main tracks

DT = factor for number of through trains per day during daylight

HP = factor for highway paved (yes or no)

MS = factor for maximum timetable speed

HT = factor for highway type

HL = factor for number of highway lanes

The final collision prediction formula is expressed as follows:

$$B = \frac{T_0}{T_0 + T}(a) + \frac{T}{T_0 + T}\left(\frac{N}{T}\right)$$

Where:

B = final collision prediction, collisions per year at the crossing

a = initial collision prediction from basic formula, collisions per year at the crossing

N/T = collision history prediction, collisions per year, where N is the number of observed collisions in T years at the crossing

T0 = Formula weighting factor,

$$T_0 = \frac{1.0}{(0.05 + a)}$$

The factors for the formulas are provided as reference in **Table 1**.

Table 1 – Railway Collision Formula Factors

Crossing Category	Formula Constant K	Exposure Index Factor EI	Main Tracks Factor MT	Day Thru Trains Factor DT	Highway Paved Factor HP	Maximum Speed Factor MS	Highway Type Factor HT	Highway Lanes Factor HL
Passive	0.002268	$\left(\frac{c \times t + 0.2}{0.2}\right)^{0.8334}$	$e^{0.2094mt}$	$\left(\frac{d + 0.2}{0.2}\right)^{0.1886}$	$e^{-0.6160(hp-1)}$	$e^{0.0077ms}$	$e^{-0.1000(ht-1)}$	1.0
Flashing Lights	0.003646	$\left(\frac{c \times t + 0.2}{0.2}\right)^{0.2958}$	$e^{0.1088mt}$	$\left(\frac{d + 0.2}{0.2}\right)^{0.0470}$	1.0	1.0	1.0	$e^{0.1880(hl-1)}$
Gates	0.001088	$\left(\frac{c \times t + 0.2}{0.2}\right)^{0.8116}$	$e^{0.2912mt}$	1.0	1.0	1.0	1.0	$e^{0.1036(hl-1)}$

The proposed crossing is assumed to be an active crossing with gates, bells, lights and medians. The existing crossing on CSAH 5 is also active; however it does not have medians. The K value for both crossings is 0.001088.

The variable 'c' is the number of vehicles expected to use the crossing per day which is estimated to be 400 for the 1st Avenue/CSAH 55 crossing. The 'c' value for the CSAH 5 at-grade railroad crossing is 6,700 for Options 2A and 2B and is 6,820 in Options 2C due to the redirected vehicles.
The variable 't' is the average total train movements per day which is estimated to be 6 for the 1st Avenue/CSAH 55 at-grade railroad crossing and 16 for the CSAH 5 crossing (FRA data inventory).

The factor 'mt' represents the number of main tracks at the crossing. This is 1 for both crossings. The final factor affecting gated crossings is the number of highway lanes, which is 2 for 1st Avenue/CSAH 55 and 4 for CSAH 5.

After calculating the initial collision prediction, the final collision prediction is calculated using T as 5 years and N as 0 for the 1st Avenue crossing (new crossing - no crash history). FRA crash data was reviewed for the existing crossing on CSAH 5 and it was determined that there were no crashes at this location in the past five years, so N is 0 for this crossing as well.

Once the estimated collisions per year B is calculated, the next step is to determine the crash severity. The probability of a fatal crash is calculated as:

$$P(FA|A) = \frac{1}{1+CF \times MS \times TT \times TS \times UR}$$

Where CF = 695, MS is a factor based on maximum timetable speed, which is 25 miles per hour (mph) for the 1st Avenue/CSAH 55 crossing and 49 mph for the CSAH 5 crossing, TT is a factor based on number of thru trains per day which is 6 at 1st Avenue/CSAH 55 and 16 at CSAH 5 crossing, TS is switch train factor which is 1 since the number of switch trains is assumed to be zero at both crossings and UR is factor based on whether the crossing is urban or rural, and it is rural for both crossings. The injury crashes are predicted using the formula:

$$P(LA|A) = \frac{1-P(F\,A|A)}{1+ CI \times MS \times TK \times UR}$$

Where P(FA|A) is the fatal crash probability calculated above, CI is 4.28, MS is maximum timetable speed factor which is same as above, TK is number of tracks factor which is based on 1

track at both crossings, and UR is urban/rural crossing factor which is based on rural value for both crossings.

It is assumed that the injury collision probability provided above corresponds to severe injury crashes. The crash probability of all other types of crashes is not provided in the references, but, is calculated as:

$$P(Other|A) = 1-P(FA|A)-P(IA|A)$$

These probabilities were applied to the final crash prediction B to estimate the number of crashes per year by crash type. **Table 3** (following the discussion on roadway crashes) shows estimated crashes at both at-grade crossings.

Roadway Crashes

Crashes at existing intersections for the past five years (2011 – 2015) were used to calculate crash rates for the various options. For locations with new intersections, crash rates from the 2015 MnDOT "green sheets" for intersections (http://www.dot.state.mn.us/stateaid/trafficsafety.html) were used. The "green sheets" show statewide average crash rates for intersections classified by control type, years of crash history, location type (urban or rural), roadway volume class (high or low volume), and roadway speed class (low or high speed). The calculations for this project were based on the most recent five years of crash data. The statewide average rates for Rural Thru/Stop and were used for Thru/Stop intersections which will be created or reconfigured as part of this project. For the CSAH 5 and realigned TH 12 intersection the rate for Low Volume, High Speed Signal was used since the posted speed limit on realigned TH 12 will exceed 45 mph and the expected ADT on the highest volume leg is less than 15,000. **Table 2** shows a section of the 2015 green sheet for intersections that is applicable to this project.

Table 2 – 2011 to 2015 Green Sheet Intersection Crash Data

	Intersection Type	Crash Rate	Severity Rate	Fatality Rate[1]	Fatal and Type A Crash Rate[1]
Signalized Intersection	Low Volume, Low Speed	0.52	0.71	0.09	0.42
	Low Volume, High Speed	0.40	0.55	0.06	0.32
	High Volume, Low Speed	0.70	0.97	0.12	0.76
	High Volume, High Speed	0.45	0.63	0.11	0.48
Non-Signalized Intersection	Urban Thru/Stop	0.18	0.26	0.09	0.33
	Rural Thru/Stop	0.25	0.41	0.45	1.05
	All Way Stop	0.35	0.50	0.14	0.57
	Other	0.16	0.21	0.05	0.17

The average ADT on the major and minor legs of the intersections are used in the calculation of vehicles entering the intersections. For 3-leg intersections, this halves the ADT of the minor leg being used in the calculations since the other half is zero.

The severe injury crash rate was estimated by subtracting the FR from FAR value.

The costs for the crashes are calculated using rates provided in "MnDOT Office of Transportation System Management Benefit-Cost Analysis Standard Value Tables - July 2016" (http://www.dot.state.mn.us/planning/program/appendix_a.html). The cost of fatal crashes according to this source is $10.7 million and Type A injury crash is $570,000. The average crash costs for other types of crashes is $87,200 and this is applied to the rest of the crashes. The $87,200 is calculated by using an average cost of the other crash types.

The estimated number of crashes per year, classified by severity and the associated crash costs are shown in **Table 3** on the following page.

Table 3 – Railway and Highway Crashes by Intersection[1]

				OPTION																				
				Option 2A							Option 2B							Option 2C						
Intersection	Crash Rate[2]	Fatal Crash Rate[4]	Severe Crash Rate[4]	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year
1st Ave Rail Xing							0.0100	0.0010	0.0030	0.0060														
CSAH 5 Rail Xing							0.0653	0.0072	0.0197	0.0383				0.0653	0.0072	0.0197	0.0383				0.0655	0.0072	0.0198	0.0385
TH 12/CSAH 55 access and TH 12	0.25	0.45	0.60	6,525	425	6,950	0.6397	0.0114	0.0153	0.6131														
TH 12/CSAH 55 Access and CSAH 55	0.25	0.45	0.60	900	425	1,325	0.1220	0.0022	0.0029	0.1169														
CSAH 55 and TH 12	0.25	0.45	0.60								6,825	800	7,625	0.7019	0.0125	0.0167	0.6726	6,745	760	7,505	0.6908	0.0123	0.0165	0.6621
TH 12 and New 45th St	0.25	0.45	0.60	6,125	200	6,325	0.5822	0.0103	0.0139	0.5580	6,225	100	6,325	0.5822	0.0103	0.0139	0.5580	6,225	100	6,325	0.5822	0.0103	0.0139	0.5580
TH 12 and 1st Ave Local access	0.25	0.45	0.60								7,200	200	7,400	0.6811	0.0121	0.0162	0.6528							
CSAH 55 and TH 40	1.18	0.45	0.60	2,125	1,675	3,800	1.6367	0.0062	0.0083	1.6221	2,125	1,675	3,800	1.6367	0.0062	0.0083	1.6221	2,150	1,575	3,725	1.6044	0.0061	0.0082	1.5901
19th Ave and CSAH 55	0.25	0.45	0.60	3,925	925	4,850	0.4464	0.0079	0.0106	0.4278	3,925	925	4,850	0.4464	0.0079	0.0106	0.4278	3,985	865	4,850	0.4464	0.0079	0.0106	0.4278
19th Ave and CSAH 5	1.80	0.45	0.60	5,425	3,400	8,825	5.7980	0.0144	0.0194	5.7642	5,425	3,400	8,825	5.7980	0.0144	0.0194	5.7642	5,485	3,460	8,945	5.8769	0.0146	0.0196	5.8426
CSAH 5 and Willmar Ave	0.25	0.45	0.60	8,000	2,300	10,300	0.9481	0.0168	0.0226	0.9086	8,000	2,300	10,300	0.9481	0.0168	0.0226	0.9086	8,160	2,300	10,460	0.9628	0.0171	0.0230	0.9227
CSAH 5 and Trott Ave	0.25	0.45	0.60	7,000	400	7,400	0.6811	0.0121	0.0162	0.6528	7,000	400	7,400	0.6811	0.0121	0.0162	0.6528	7,160	400	7,560	0.6959	0.0124	0.0166	0.6669
CSAH 5 and 3rd Ave	0.25	0.45	0.60	8,000	425	8,425	0.7755	0.0138	0.0185	0.7432	8,000	425	8,425	0.7755	0.0138	0.0185	0.7432	8,160	425	8,585	0.7902	0.0140	0.0188	0.7573
CSAH 5 and TH 40	1.18	0.45	0.60	7,900	1,750	9,650	4.1563	0.0158	0.0212	4.1193	7,900	1,750	9,650	4.1563	0.0158	0.0212	4.1193	8,040	1,775	9,815	4.2273	0.0160	0.0215	4.1897
TH 12 and CSAH 5 (Signal)	0.40	0.06	0.26	8,400	7450	15,850	2.2991	0.0036	0.0151	2.2805	8,400	7,450	15,850	2.2991	0.0036	0.0151	2.2805	8,680	7,570	16,250	2.3571	0.0037	0.0154	2.3380
CSAH 5 and old TH 12	0.25	0.45	0.60	7,700	200	7,900	0.7272	0.0129	0.0173	0.6969	7,700	200	7,900	0.7272	0.0129	0.0173	0.6969	7,900	400	8,300	0.7640	0.0136	0.0182	0.7322
Total							**18.888**	**0.136**	**0.204**	**18.548**				**19.499**	**0.146**	**0.216**	**19.137**				**19.064**	**0.135**	**0.202**	**18.726**
							Cost[3]	$1,450,872	$116,345	$1,617,368				Cost[3]	$1,558,214	$123,083	$1,668,769				Cost[3]	$1,447,024	$115,294	$1,632,907
							Total Cost – All Types: $3,184, 585							Total Cost – All Types: $3,350, 066							Total Cost – All Types: $3,195, 225			

[1] Ent. = entering Vols. = Volumes Fatals = Fatal Crashes

[2] Crashes per 1 million entering vehicles per 2015 MnDOT Green Sheet on new intersections or intersections without crash data. Actual crash rates were used on locations that exist with crash data.

[3] Based on a per crash cost from MnDOT Office of Transportation System Management: $10.7 million for fatal; $0.57 million for severe injury and $0.0872 million for all other crashes

[4] Crashes per 100 million entering vehicles per 2015 MnDOT Green Sheet. Severe rate is fatal and severe rate 1.05 minus the fatal rate of 0.45.

The estimated crashes at the at-grade rail crossings per year are relatively low. For the proposed 1st Avenue/CSAH 55 at-grade railroad crossing it is estimated that 2.1 crashes would occur every 100 years. For the CSAH 5 at-grade rail crossing it is estimate that 6.55 crashes would occur every 100 years.

The difference in overall estimated crashes for each of the options (Option 2A, Option 2B and Option 2C) is very small. Option 2A has the lowest number of estimated crashes and the lowest crash costs. Option 2B has the highest because it introduces another intersection on realigned TH 12. Option 2C has slightly higher crash expectancy and crash costs than Option 2A due to the additional exposure of redirected vehicles at various intersections. The crash estimates in **Table 3** do not include the additional vehicle miles of travel on the roadway system that will occur with Option 2C and the corresponding exposure to crashes on those roadway segments.

MnDOT's Office of Traffic Safety provided crash rates for 4-leg and 3-leg intersections for consideration in the analysis. Those rates are summarized in **Tables 4** and **5**.

Table 4 - 4 Legged Intersections (41 statewide, 2 lane intersection, Major ADT 5000-7200, Minor ADT 500-1500)

Crash Rate Type	Group Average	Statewide Average
Crash Rate	0.29	0.26
Fatal and Serious Rate	1.60	1.06

Table 5 - 3 Legged Intersections (24 statewide, 2 lane intersection, Major ADT 5000-7200, Minor ADT 500-1500)

Crash Rate Type	Group Average	Statewide Average
Crash Rate	0.30	0.26
Fatal and Serious Rate	1.00	1.06

Table 6 shows the results using the above data in place of the statewide averages on the green sheets. The crash costs are higher for all options. The crash costs are still lowest on Option 2A and highest on Option 2B.

The data combines fatal and serious crashes. For the purposes of this analysis, fatal and serious crashes were based on the proportion of fatal and serious crashes in the statewide average rate (Fatal rate: 0.45/1.05 x 1.6 = 0.68; Severe Rate: 1.60-0.68 = 0.92) For the 3-leg intersections, the crash rates were estimated at 0.43 for fatal and 0.57 for severe injury based on an FAR rate of 1.0 (Fatal rate: 0.45/1.05 x 1.0 = 0.43; Severe Rate: 1.0-0.43 = 0.57).

Table 6 - Railway and Highway Crashes by Intersection with Using Higher Rates[1]

				OPTION																				
				Option 2A							Option 2B							Option 2C						
Intersection	Crash Rate[2]	Fatal Crash Rate[4]	Severe Crash Rate[4]	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year	Major Ent. Vols.	Minor Ent. Vols.	Total Ent. Vols.	Crashes Per Year	Fatals Per Year	Severe Injury Per Year	Other Crashes Per Year
1st Ave Rail Xing							0.0100	0.0010	0.0030	0.0060														
CSAH 5 Rail Xing							0.0653	0.0072	0.0197	0.0383				0.0653	0.0072	0.0197	0.0383				0.0655	0.0072	0.0198	0.0385
TH 12/CSAH 55 access and TH 12	0.30	0.43	0.57	6,525	425	6,950	0.7610	0.0108	0.0145	0.7357														
TH 12/CSAH 55 Access and CSAH 55	0.30	0.43	0.57	900	425	1,325	0.1451	0.0021	0.0028	0.1403														
CSAH 55 and TH 12	0.29	0.68	0.92								6,825	800	7,625	0.8071	0.0190	0.0255	0.7626	6,745	760	7,505	0.7944	0.0187	0.0251	0.7506
TH 12 and New 45th St	0.25	0.45	0.60	6,125	200	6325	0.5822	0.0103	0.0139	0.5580	6225	100	6325	0.5822	0.0103	0.0139	0.5580	6,225	100	6,325	0.5822	0.0103	0.0139	0.5580
TH 12 and 1st Ave Local access	0.25	0.45	0.60								7,200	200	7,400	0.6811	0.0121	0.0162	0.6528							
CSAH 55 and TH 40	1.18	0.45	0.60	2,125	1,675	3,800	1.6367	0.0062	0.0083	1.6221	2,125	1,675	3,800	1.6367	0.0062	0.0083	1.6221	2,150	1,575	3,725	1.6044	0.0061	0.0082	1.5901
19th Ave and CSAH 55	0.25	0.45	0.60	3,925	925	4,850	0.4464	0.0079	0.0106	0.4278	3,925	925	4,850	0.4464	0.0079	0.0106	0.4278	3,985	865	4,850	0.4464	0.0079	0.0106	0.4278
19th Ave and CSAH 5	1.80	0.45	0.60	5,425	3,400	8,825	5.7980	0.0144	0.0194	5.7642	5,425	3,400	8,825	5.7980	0.0144	0.0194	5.7642	5,485	3,460	8,945	5.8769	0.0146	0.0196	5.8426
CSAH 5 and Willmar Ave	0.25	0.45	0.60	8,000	2,300	10,300	0.9481	0.0168	0.0226	0.9086	8,000	2,300	10,300	0.9481	0.0168	0.0226	0.9086	8,160	2,300	10,460	0.9628	0.0171	0.0230	0.9227
CSAH 5 and Trott Ave	0.25	0.45	0.60	7,000	400	7,400	0.6811	0.0121	0.0162	0.6528	7,000	400	7,400	0.6811	0.0121	0.0162	0.6528	7,160	400	7,560	0.6959	0.0124	0.0166	0.6669
CSAH 5 and 3rd Ave	0.25	0.45	0.60	8,000	425	8,425	0.7755	0.0138	0.0185	0.7432	8,000	425	8,425	0.7755	0.0138	0.0185	0.7432	8,160	425	8,585	0.7902	0.0140	0.0188	0.7573
CSAH 5 and TH 40	1.18	0.45	0.60	7,900	1,750	9,650	4.1563	0.0158	0.0212	4.1193	7,900	1,750	9,650	4.1563	0.0158	0.0212	4.1193	8,040	1,775	9,815	4.2273	0.0160	0.0215	4.1897
TH 12 and CSAH 5 (Signal)	0.40	0.06	0.26	8,400	7,450	15,850	2.2991	0.0036	0.0151	2.2805	8,400	7,450	15,850	2.2991	0.0036	0.0151	2.2805	8,680	7,570	16,250	2.3571	0.0037	0.0154	2.3380
CSAH 5 and old TH 12	0.25	0.45	0.60	7,700	200	7,900	0.7272	0.0129	0.0173	0.6969	7,700	200	7,900	0.7272	0.0129	0.0173	0.6969	7,900	400	8,300	0.7640	0.0136	0.0182	0.7322
Total							**19.032**	**0.135**	**0.203**	**18.694**				**19.604**	**0.152**	**0.225**	**19.227**				**19.167**	**0.142**	**0.211**	**18.815**
							Cost[3]	$1,444,073	$115,859	$1,630,092				Cost[3]	$1,628,197	$128,091	$1,676,611				Cost[3]	$1,515,905	$120,224	$1,640,625
							Total Cost – All Types: $3,190,024							Total Cost – All Types: $3,432,899							Total Cost – All Types: $3,276,754			

[1] Ent. = entering Vols. = Volumes Fatals = Fatal Crashes

[2] Crashes per 1 million entering vehicles per 2015 MnDOT Green Sheet on new intersections or intersections without crash data. Actual crash rates were used on locations that exist with crash data.

[3] Based on a per crash cost from MnDOT Office of Transportation System Management: $10.7 million for fatal; $0.57 million for severe injury and $0.0872 million for all other crashes

[4] Crashes per 100 million entering vehicles per 2015 MnDOT Green Sheet. Severe rate is fatal and severe rate 1.05 minus the fatal rate of 0.45.

B. At-Grade Crossing Risk Factors

In June, 2016 MnDOT's Office of Freight and Commercial Vehicles Operations – Railway Administration Section published a report, "Rail Grade Crossing Safety Project Selection," that evaluated current railway crash prediction models (FRA Accident Prediction Model and the Texas Hazard Index) as they relate to railway/roadway crashes in Minnesota over the past 10 years.[1] Additionally, the study identified a set of risk factors for both active and passive crossings that were over-represented in locations where crashes were present. The intent of the report was to help MnDOT prioritize investments for safety improvements at-grade rail crossings at most risk for crashes. While the report concludes that closing crossings reduces inventory, reduces maintenance costs and eliminates the possibility of vehicle-train collisions; it acknowledges that it is challenging to do so.

The report documents that vehicle/train collisions at at-grade intersections are rare. For data in a 10-year period between 2003 and 2014 there were 445 crashes at over 4,000 at-grade intersections. Of the 445 crashes, 52 resulted in fatalities and 129 resulted in injuries. This equates, as the report documents, to less than 0.06 percent of all crashes and 1 percent of fatalities tracked by MnDOT. The report notes; however, that the probability of someone being fatally injured in a crash with a train as being 20 times greater than other types of traffic-related crashes. Approximately 0.5 percent of all traffic crashes result in a fatality, whereas 12 percent of vehicle-train crashes result in a fatality.

To understand if the FRA and Texas Hazard Index prediction models reliably produce accurate results for rail/vehicle crashes in Minnesota, the 10-year crash data was reviewed and analyzed. Results of the study indicate that the models were not accurate for data in Minnesota over the past decade – that is – focusing on past crash history was not a significant indicator that additional crashes were likely to occur. Instead, the study identified a number of characteristics or factors that were common in locations where crashes were actually occurring. These factors were different depending upon whether the crossing type was active or passive. These factors, the report concluded, were promising to use to identify and prioritize grade crossings for future safety investments.

Factors (for both active and passive crossings) were grouped into four categories – volumes, speeds, design and surroundings. These factors were summarized in the report as follows:

<u>Volumes:</u>
The risk for rail/train crashes increases when roadway volumes, train volumes, or their product (roadway volumes times train volumes) exceed minimum levels.

For crossings with active devices the minimum level of traffic is 2,500 vehicles a day and 10 trains per day. The minimum level of their product is 20,000.

For passive crossings, the minimum level of traffic is 150 vehicles per day and 4 trains per day. The minimum level of their product is 750.

[1] Railroad Grade Crossing Safety Project Selection, June 2016. Howard Preston, Veronica Richfield and Maureen Jensen

Speeds:
The risk for rail/train crashes increases when highway roadway speed limits and maximum train timetable speeds exceed certain minimums.

For crossings with active devices the minimum threshold roadway speed is 45 miles per hour and a train timetable speed of 31 miles per hour.

For crossings with passive devices there is no minimum threshold roadway speed and a train timetable speed of 36 miles per hour.

Design:
There are two characteristics associated with the actual design of the at-grade intersection that impact risk. If there are multiple mainline tracks the risk increases (on active crossings – there was no change in risk associated with passive crossings) and if the intersection is at a skew greater than 15 degrees.

Surroundings:
There are four characteristics associated with the area surrounding the at-grade intersection that influence risk.

Distance to nearby intersection (roadway)
For active crossings – having an intersection immediately adjacent to the crossing up to a distance of 99 feet increases the risk. For passive crossings, the distance was between 40 and 160 feet.

Distance to nearest crossing (at-grade crossing)
For both active and passive crossings, having another at-grade crossing between half a mile and one mile away increases the risk.

Clearing Sight Distance
Failing/poor clearing distance in any quadrant (regardless of active/passive) increases risk.

Approach Sight Distance
For passive crossings – failing approach sight distance is associated with increased risk.

These factors are summarized in **Table 7**.

Table 7 – Risk Factors by Crossing Type

Risk Factor	Active Crossing		Passive Crossing	
	Minimum	Maximum	Minimum	Maximum
Volumes				
Roadway Daily Traffic	2,500	Unlimited	150	Unlimited
Total Trains Per Day	10	Unlimited	4	Unlimited
Volume Product (vehicles times trains)	20,000	Unlimited	750	Unlimited
Speeds				
Roadway Speed Limit	45	Unlimited	NA	
Maximum Timetable Speed	31	Unlimited	36	Unlimited
Design				
Number of Mainline Tracks	2	Unlimited	NA	
Crossing Skew	> 15 degrees		> 15 degrees	
Surroundings				
Distance to Nearby Intersection	1 foot	99 feet	40 feet	160 feet
Distance to Nearest Crossing	0.5 mile	1 mile	0.5 mile	1 mile
Clearing Sight Distance	Any Quadrant Fails		Any Quadrant Fails	
Approaching Sight Distance	NA		Any Quadrant Fails	

The above factors were then applied to the at-grade crossings within the state. The report indicates approximately 8 percent of the crossings had seven or more risk factors that exceeded the minimum thresholds. Crash density in these locations is between three and six times greater than those with fewer risks. The report concludes that the risk factors are a useful method for identifying locations that are high risk for crashes.

As shown in **Table 8**, if the above factors were considered in the case of 1st Avenue/CSAH 55 (where the crossing type would be active), the crossing would be identified as very low risk. Additionally, the report identifies additional design features that can make active systems more effective – these items include installing gates and narrow median islands on the approaches to the crossing.

Table 8 shows the risk factors for 1st Avenue/CSAH 55 against the thresholds. As shown in the Table, only Distance to Nearest Crossing is identified as exceeding the minimum thresholds.

Table 8 – 1st Avenue/CSAH 55 Risk Factors

Risk Factor	Active Crossing		1st Avenue / CSAH 55	
	Minimum	Maximum	Factor	Exceed Threshold – Yes or No
Volumes				
Roadway Daily Traffic	2,500	Unlimited	730[1]	No
Total Trains Per Day	10	Unlimited	6	No
Volume Product (vehicles times trains)	20,000	Unlimited	4,380	No
Speeds				
Roadway Speed Limit	45	Unlimited	35[2]	No
Maximum Timetable Speed	31	Unlimited	25	No
Design				
Number of Mainline Tracks	2	Unlimited	1	No
Crossing Skew	> 15 degrees		< 15 degrees	No
Surroundings				
Distance to Nearby Intersection	1 foot	99 feet	>99 feet	No
Distance to Nearest Crossing	0.5 mile	1 mile	< 1 mile	**Yes**
Clearing Sight Distance	Any Quadrant Fails		No	
Approaching Sight Distance	NA		No	

[1] 730 vehicles is a conservative estimate – some traffic is expected to use realigned TH 12 to go to Willmar or to the more rural areas of the west. 730 vehicles is the existing ADT on 1st Avenue/CSAH 55.

[2] Kandiyohi County has indicated that they would reduce the speed limit as part of the project.

IV. Economic Impact – Construction Costs and Travel Times/Distances

Like safety considerations, there were multiple economic considerations evaluated. The first focused on the various construction and right of way costs associated with building Ooptions 2A, 2B and 2C. This information is discussed in Section IV A.

The second analysis evaluated the costs associated with additional travel times and distances. Costs were applied to calculate additional wear and tear on vehicles and the additional time to get to and from the businesses. This information is discussed in Section IV B.

A. Construction and Right of Way Costs

Construction and right of way costs were estimated for Options 2A, 2B and 2C. The right of way cost estimates do not take into consideration the "cost to cure" – that is the money needed to bring internal circulation and operations to functionality similar to preconstruction conditions. So there will be additional costs that are not accounted for in the estimates presented below for some of the options.

The following sections describe the costs associated with each of the design options. Information regarding construction costs; basic right of way costs for elements beyond the realigned TH 12 and existing CSAH 55 alignment are noted; and other factors that may influence costs are noted.

<u>Option 2A</u>

Option 2A (**Figure 4**) includes a quadrant interchange at realigned TH 12 and CSAH 55 and at-grade crossing of the proposed railway at 1st Avenue/CSAH 55. Right of way for this option would not require additional property acquisition for the quadrant interchange and would need minimal amounts of property from one property owner beyond BNSF Railway in order to straighten out 1st Avenue/CSAH 55 to cross the railway without any skew. In addition to construction and right of way costs, there would be ongoing maintenance costs associated with the at-grade rail crossing.

Roadway Construction Costs are Estimated at: $5.5 million to $7.9 million
Right of Way Costs are Estimated at: less than $100,000
Total Costs are Estimated at: $5.6 million to $8 million

<u>Option 2B</u>

Option 2B (**Figure 5**) includes an at-grade intersection at realigned TH 12 and CSAH 55. It also includes construction of a new roadway between realigned TH 12 and the grain elevator located along 1st Avenue/CSAH 55. Right of way would be needed from two parcels in order to construct the new roadway. Additionally, extra costs for modifying the spur line located south of 1st Avenue/CSAH 55 would be required in order to maintain propane deliveries and storing it on site. This will require realigning approximately 150 to 200 feet of railway.

Construction Costs are Estimated at: $5.3 million to $8.8 million
Railway Construction Costs are Estimated at: $400,000
Right of Way Costs are Estimated at: $180,000
Total Costs are Estimated at: $5.88 million to $9.38 million

Option 2C

Option 2 C (**Figure 6**) would utilize the at-grade intersection at realigned TH 12 and CSAH 55. No right of way would be needed for this alternative that is not already a part of the project.

Total/Construction Costs are Estimated at: $4.8 million to $7.98 million. (please note, this is the cost of Option 2B less the local roadway connection between realigned TH 12 and 1st Ave)

Attachment A has a breakdown of construction costs.

B. Travel Time/Distances

The travel time and travel distances to the businesses on 1st Avenue/CSAH 55 vary by option for traffic that is coming from the west and southwest depending upon where the access to 1st Avenue/CSAH 55 is provided. In Option 2A, vehicles that need to access properties on 1st Avenue from the west and southwest will use the at-grade rail crossing to do so. Travel time for these vehicles would include the distance to travel to the site as well as expected delays at the rail crossing.

In Option 2B, there is no at-grade railway crossing. Vehicles arriving from west on realigned TH 12 would go through the at-grade intersection with CSAH 55 and then turn onto the new local roadway connection to 1st Avenue/CSAH 55. Because there are no railways with this option, there would be no rail crossing delays in this alternative, only the intersection delays and additional travel distance.

In Option 2C, there is no at-grade railway crossing and there is no new local roadway connection between realigned TH 12 and 1st Avenue/CSAH 55. Vehicles are required to use alternate routes to access properties on 1st Avenue/CSAH 55 from CSAH 5 as discussed in the safety analysis section. The anticipated travel time for the vehicles in this scenario would also include the delays expected at the at-grade railway crossing of the Marshall Subdivision on CSAH 5 near 19th Avenue.

In order to compare the travel time, distance and travel costs between the three options equitably, travel time to a point midway along 1st Avenue/CSAH 55 was calculated from the intersection of realigned TH 12 and 1st Avenue West and from 19th Avenue/CSAH 55 intersection for all three options. The travel time measurement points are shown in **Figure 9**.

Total travel time and distance is summarized in **Table 9** and explained in more detail following the table. Travel time is expressed in minutes and travel distance is expressed in miles.

Table 9 – One way Distance and Travel Time to Midpoint of 1st Avenue/CSAH 55

From/To Midpoint of 1st Avenue/CSAH 55	Option 2A		Option 2B		Option 2 C	
	Distance (miles)	Time (minutes)	Distance (miles)	Time (minutes)	Distance (miles)	Time (minutes)
19th Ave/CSAH 55 Intersection	2.7	4.1	3.2	5.0	3.5	6.2
TH 12/ New 45th St Intersection	1.2	2.6	2.1	3.5	2.7	4.8

In Option 2A, the route from realigned TH 12/new 45th Street intersection to the mid-point of 1st Avenue/CSAH 55 would involve travel on the new 45th Street, travel through old

alignment of TH 12, travel on old alignment of 45th Street, and travel on 1st Avenue/CSAH 55. There would be some potential delay at the 1st Avenue/CSAH 55 at-grade rail crossing.

In Option 2B, the route from TH 12/new 45th Street intersection to the mid-point of 1st Avenue/CSAH 55 would involve travel on realigned TH 12, travel on the new local road connection from realigned TH 12 to 1st Avenue/CSAH 55 and travel on 1st Avenue/CSAH 55.

In Option 2C, the route from TH 12/new 45th Street intersection to the mid-point of 1st Avenue/CSAH 55 would involve travel on realigned TH 12 to the traffic signal at realigned TH 12 and CSAH 5, travel on CSAH 5 to old TH 12 and from there travel on to 1st Avenue/CSAH 55.

In Option 2C, there are three different routes between 19th Avenue/CSAH 55 intersection and the mid-point of 1st Avenue/CSAH 55 and all of them involve going through the signal at CSAH 5 and TH 12, travel on CSAH 5 and travel on 1st Avenue/CSAH 55. The traffic volume split between the different routes is discussed in the safety section of this memo. The travel time for this option was calculated as a weighted average of the three routes.

It is estimated that there will be 0.3 minutes of delay (18 seconds) for vehicles at through-stop intersections and 0.5 minutes (30 seconds) of delay at the signal. The rail delays were calculated and factored into the totals, as follows:

It is estimated that the 1st Avenue/CSAH 55 crossing will have six trains per day with three at night and three during the day. The CSAH 5 crossing is estimated to have 16 trains per day with 8 during day and 8 at night based on the FRA inventory. The average time the crossing is closed for each train is estimated to be 6.75 minutes, which is an average of the range of train crossing times. Based on this data it is estimated the 1st Avenue/CSAH 55 crossing is closed an average of 3 x 6.75 or 20.5 minutes during the day and 20.5 minutes during the night each. Similarly, the CSAH 5 crossing is closed an average of 7x 6.75 or 47.25 minutes during the day and 47.25 minutes during the night. It is estimated that 70 percent of the vehicle traffic crosses the railroad during the day and 30 percent of the traffic crosses during night. The number of vehicles impacted at each crossing during the day and night are calculated in proportion to the amount of time the crossings are closed and an average delay of 6.75/2 or 3.375 minutes is applied to each vehicle. The rest of the vehicles are assumed to have zero delay at the crossings. The weighted average delay per vehicle expected at each crossing is then calculated for all vehicles for the day. This equates to 0.09 minutes per vehicle at the 1st Avenue/CSAH 55 crossing and 0.25 minutes per vehicle at the CSAH 5 crossing. These delays are added to the travel times of the vehicles using the corresponding routes.

As can be seen form **Table 9**, Option 2A has the shortest travel distance and lowest travel time. Option 2C has the longest distance and highest travel times. Option 2B is in the middle of the two other options.

The costs associated with travel distance and travel time were also calculated for each option using "MnDOT Office of Transportation System Management Benefit-Cost Analysis Standard Value Tables - July 2016" (http://www.dot.state.mn.us/planning/program/appendix_a.html) and are tabulated below. For these calculations, it was estimated that 80 percent of the vehicles accessing 1st Avenue/CSAH 55 are trucks.

The travel times and distances from **Table 9** were used to identify vehicle miles travelled (VMT) and vehicles hours traveled (VHT). These numbers help understand the costs associated

with additional time spent on the road and the extra miles travelled. **Table 10** shows total VMT and VHT with each of the options.

Table 10 – Vehicle Miles of Travel (VMT) and Vehicle Hours of Travel (VHT) Per Day

	Route	Option 2A	Option 2B	Option 2C
VMT/Day	From/To 19th Avenue/CSAH 55 Intersection	547.32	640.1	694.9
	From/To TH 12/new 45th Street Intersection	235.4	426.3	536.9
VHT/Day	From/To 19th Avenue/CSAH 55 Intersection	13.6	16.7	20.8
	From/To TH 12/new 45th Street Intersection	8.6	11.8	16.0

Total annual operating and emissions costs for the vehicles in each option are shown in **Table 11**. The annual operating costs are based on $0.30 per mile for autos and $1.08 per mile for trucks. These costs were applied to 200 vehicles per route with 20 percent of the vehicles being autos and 80 percent being trucks.

Table 11 – Total Operating and Emissions Cost by Option

Route	Units	Option 2A		Option 2B		Option 2C	
		Auto	Truck	Auto	Truck	Auto	Truck
From/To 19th Avenue/CSAH 55 Intersection	Cost Per Day	$33	$473	$38	$553	$42	$600
From/To TH 12/new 45th Street Intersection	Cost Per Day	$14	$203	$26	$368	$32	$464
Total for Both Routes	Cost Per Day	$47	$676	$64	$921	$74	$1,064
Total for Autos and Trucks	Cost Per Day	$723		$985		$1,138	
Annual Estimate (Both Routes/Autos and Trucks)	Cost Per Year	$263,995		$359,629		$415,456	

The estimated differences in travel time costs for each alternative are shown below. The travel time costs were based on recommended MnDOT values from its Benefit/Cost Analysis guidelines of $16.80 per person per hour for autos and $28.30 per person per hour for trucks. This was applied to the 400/2 or 200 vehicles per route with 20 percent being autos and 80 percent being trucks. The results are shown in **Table 12**.

Table 12 – Annual Travel Time Costs

Route	Units	Option 2A		Option 2B		Option 2C	
		Auto	Truck	Auto	Truck	Auto	Truck
From/To 19th Avenue/CSAH 55 Intersection	Cost Per Day	$46	$307	$56	$378	$70	$471
From/To TH 12/new 45th Street Intersection	Cost Per Day	$29	$194	$40	$268	$54	$362
Total for Both Routes	Cost Per Day	$74	$501	$96	$646	$124	$833
Total for Autos and Trucks	Cost Per Day	$576		$742		$956	
Annual Estimate (Both Routes/Autos and Trucks)	Cost Per Year	$210,092		$270,655		$348,975	

As can be seen from **Tables 11 and 12**, Option 2C has the highest operating and emission costs and highest travel time costs. Option 2A has the lowest.

V. Project Associated Railroad Crossings

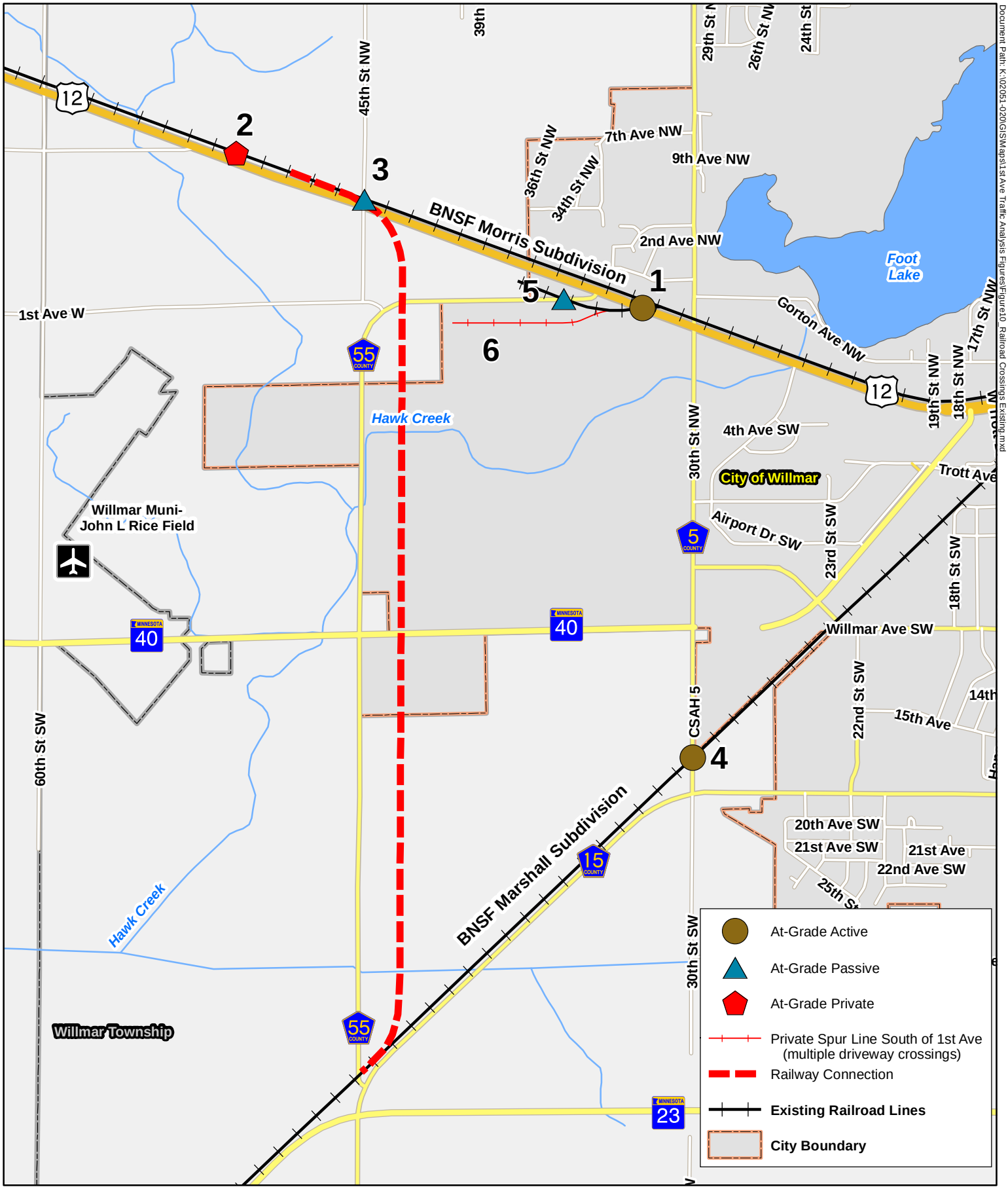
This section of the memo identifies the existing railroad crossings within the project area as well as future conditions under the different options. Information discussed includes: locations of existing crossings as well as crossings under Options 2A, 2B and 2C; what type of railway is crossed – mainline or spur; if the crossing is at-grade or grade separated; warning type; and crashes within the past 10 years (under existing conditions).

Please refer to **Figures 10 - 12** to see crossing locations.

Existing Conditions

Existing railway crossings are shown on **Figure 10** and listed in **Table 13**. Under existing conditions, there are six locations with crossings or a spur line with multiple driveways. All of the crossings are at-grade. Three of the crossings are private, with no warning systems in place. There is one passive system with a yield condition on the approach. Two of the crossings are considered active, with more elements at the location on CSAH 5.

One of the locations – Crossing Number 3 – 45th Street – has had one crash in the past 10 years. This crash occurred in 2015 and was an injury crash. The driver of the vehicle failed to yield the right of way. This was the only crash to occur at any of the existing crossings. This location does not have active warning devices. This location will be closed as part of the Willmar Wye TIGER project regardless of alternative/option selected.



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1st Avenue At-Grade Analysis
Figure 10: Railroad Crossings - Existing
Willmar, MN

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Table 13 – Existing Railway Crossings

Number	Roadway	Location	Railway	At-Grade	Grade Separated	Warning Type – Active or Passive	Crashes in Past 10 Years[1]
1	TH 12	West of CSAH 5	Spur	Yes	No	Active – flashers – no gates	0
2	NA	East of 7th Ave – North side of TH 12	Morris	Yes	No	Nothing – private crossing	0
3	45th St	North side of TH 12	Morris	Yes	No	Passive – Yield sign	1 – injury driver failed to yield
4	CSAH 5	North of 19th Ave	Marshall	Yes	No	Active – everything but median	0
5	1st Ave / CSAH 55	West of TH 12	Spur	Yes	No	Nothing – private crossing	0
6	NA	South of 1st Ave – behind the grain elevator	Spur	Yes	No	Nothing – private crossing	0

[1] Data from FRA Crossing reports

Option 2A

Under Alternative 2A, two grade separated crossings would be constructed. The first crossing would be on TH 40, just east of CSAH 55. The second crossing would be on a realigned TH 12, just east of CSAH 55. Both of these crossings would go over the new Willmar Wye line. The grade separation on TH 12 would improve safety for a large number of highway users. Under current conditions approximately 6,400 vehicles cross an at-grade crossing on TH 12 for a spur line (volumes of trains are low). Under Option 2A, these vehicles would be grade separated and would not have that exposure.

Under Option 2A, a new at-grade crossing would be constructed on 1st Avenue/CSAH 55. Presently approximately 750 vehicles use this roadway. It is expected that there would be approximately 400 vehicles continuing to use this route (some of the traffic will be accessing TH 12 rather than continuing on 1st Avenue/CSAH 55), these vehicles would have exposure to approximately 6 trains per day.

Under Option 2A, the crossing at existing 45th Street would be closed. Under Option 2A, the private crossing on existing TH 12 would become a public crossing and would be upgraded to an active crossing.

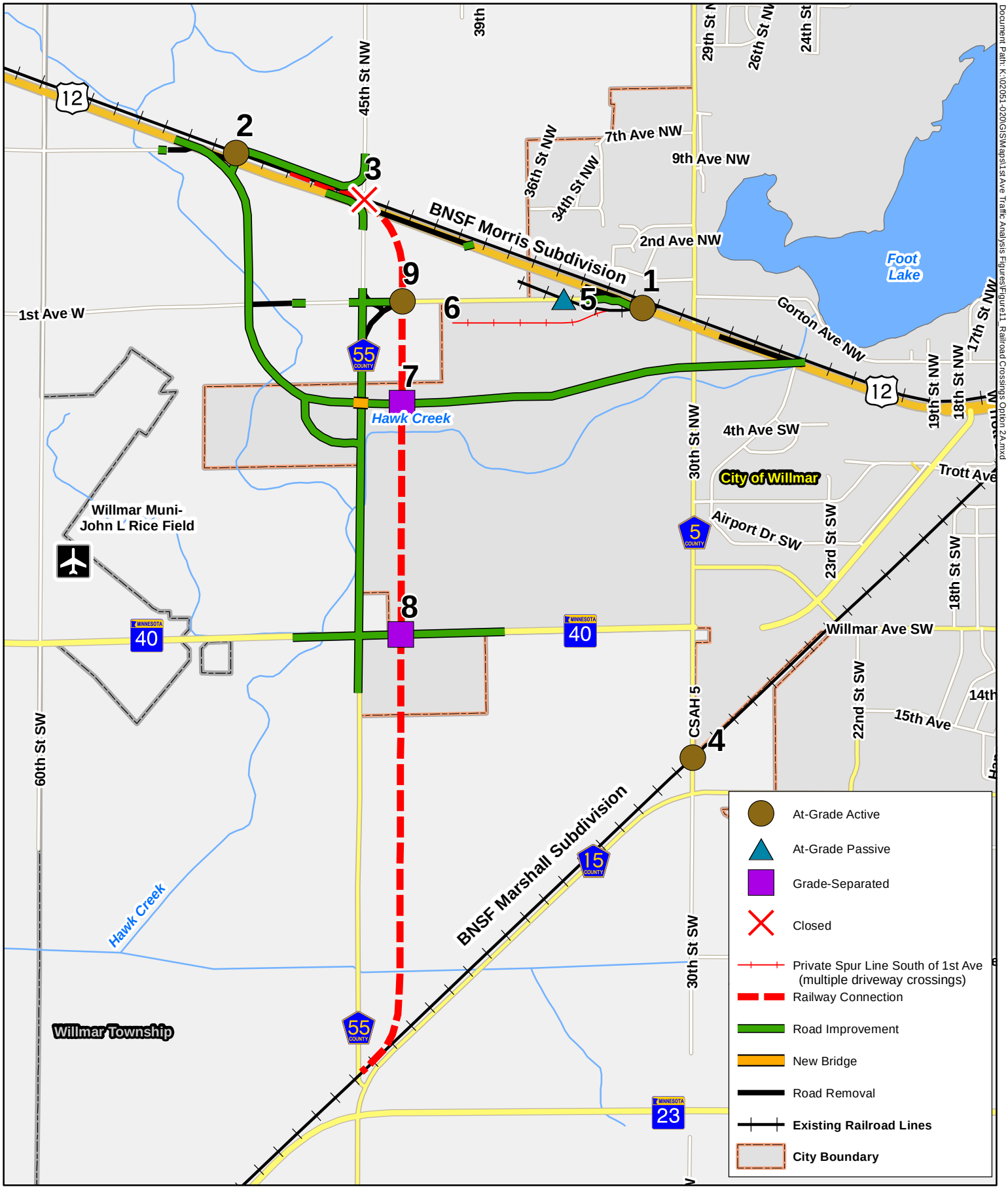
The existing spur crossing on 1st Avenue/CSAH 55 west of existing TH 12 and the spur crossing south of 1st Avenue/CSAH 55 would remain in place with no planned modifications. The existing at-grade crossing on CSAH 5 would also remain in place with no planned modifications. **Figure 11** shows the crossings under Option 2A and **Table 14** identifies crossing conditions at each location under Option 2A.

As a whole, conditions under Option 2A are slightly better than present conditions with regard to at-grade crossings. One crossing is added, one crossing is closed, one crossing is upgraded to a full complement of active devices and two grade separations are created.

Option 2B

Option 2B has slightly different grade crossings than Option 2A. Under Option 2B a new at-grade crossing would not be constructed on 1st Avenue/CSAH 55. This would reduce the risk of exposure for 400 cars for 6 trains per day. Instead of crossing on 1st Avenue, vehicles destined for the grain elevator would use a new local roadway connection from realigned TH 12 and come in on the back side of the elevator. This will require shortening the existing spur line located south of 1st Avenue/CSAH 55 that serves the grain elevator. If the railway cannot be shortened, vehicles would be required to cross the spur line at-grade. **Figure 12** shows the crossings under Option 2B and 2C and **Table 15** identifies crossing conditions at each location under Option 2B.

As a whole, conditions under Option 2B are better than present conditions with regard to at-grade crossings and slightly better than conditions under Option 2A due to the closure of a crossing and the upgrades to the existing crossing located on TH 12 east of 7th Avenue.



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1st Avenue At-Grade Analysis
Figure 11: Railroad Crossings - Option 2A
Willmar, MN

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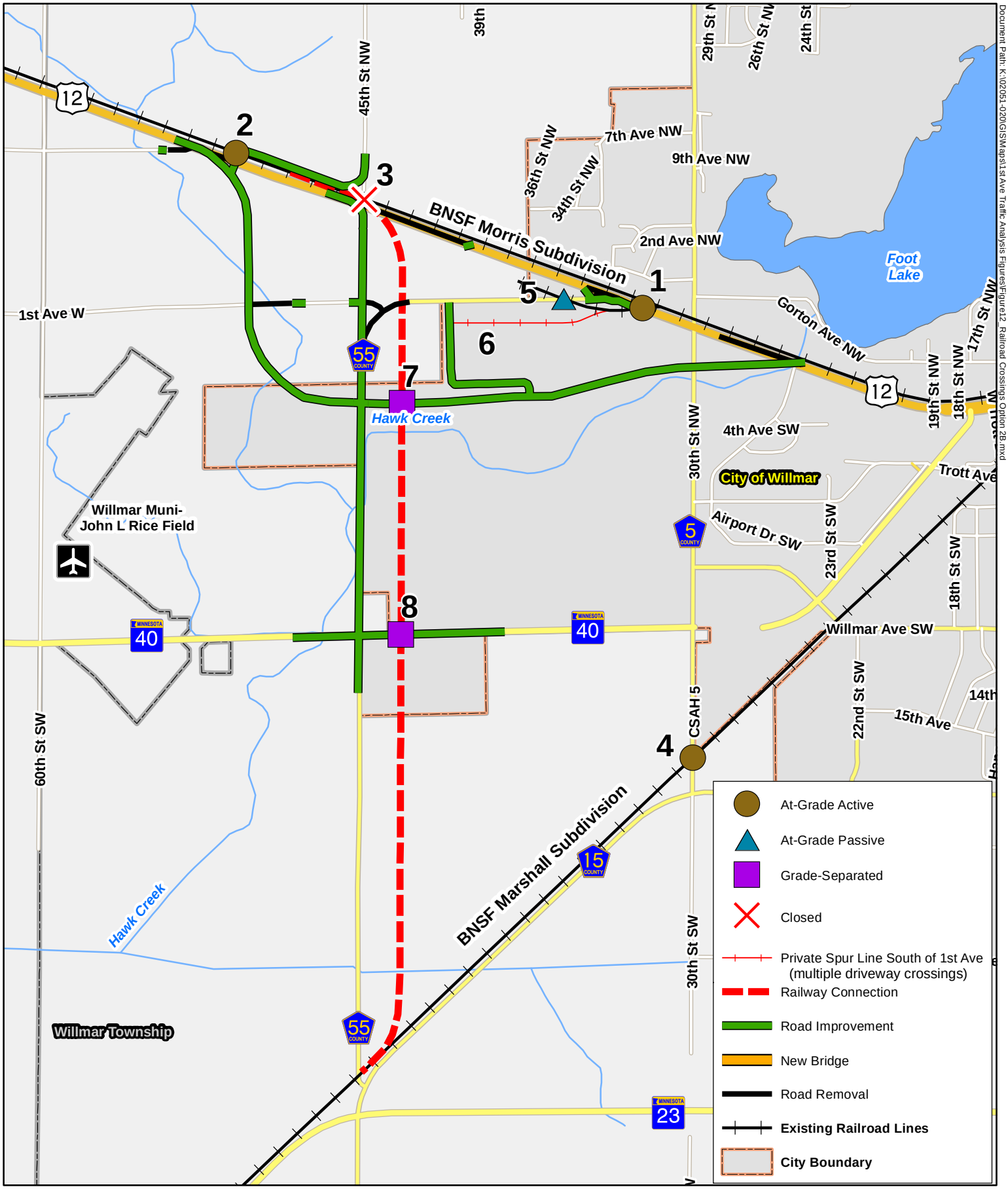

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1st Avenue At-Grade Analysis
Figure 12: Railroad Crossings - Option 2B
Willmar, MN

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Table 14 – Option 2A Crossings

Number	Roadway	Location	Railway	At-Grade	Grade Separated	Warning Type – Active or Passive
1	TH 12	West of CSAH 5	Spur	Yes	No	Active – flashers – no gates
2	New 45th St	East of 7th Ave	Morris	Yes	No	UPGRADED TO ACTIVE – flashers, gates, median
3	45th St	North side of TH 12	Morris	CLOSED		
4	CSAH 5	North of 19th Ave	Marshall	Yes	No	Active – everything but median
5	1st Ave / CSAH 55	West of TH 12	Spur	Yes	No	Nothing – private crossing
6	NA	South of 1st Ave – behind the grain elevator	Spur	Yes	No	Nothing – private crossing
7	TH 12	New alignment	Wye	No	Yes	NA
8	TH 40	East of CSAH 55	Wye	No	Yes	NA
9	1st Ave / CSAH 55	East of CSAH 55	Wye	Yes - ADDED	No	Active – flashers, gates, median

Table 15 – Alternative 2B Crossings

Number	Roadway	Location	Railway	At-Grade	Grade-Separated	Warning Type – Active or Passive
1	TH 12	West of CSAH 5	Spur	Yes	No	Active – flashers – no gates
2	TH 12	East of 7th Ave	Morris	Yes	No	UPGRADED TO ACTIVE – flashers, gates, median
3	45th St	North side of TH 12	Morris	CLOSED		
4	CSAH 5	North of 19th Ave	Marshall	Yes	No	Active – everything but median
5	1st Ave / CSAH 55	West of TH 12	Spur	Yes	No	Nothing – private crossing
6	NA	South of 1st Ave – behind the grain elevator	Spur	Yes	No	Nothing – private crossing
7	TH 12	New alignment	Wye	No	Yes	NA
8	TH 40	East of CSAH 55	Wye	No	Yes	NA
9	1st Ave	East of CSAH 55	Wye	NA – DOES NOT EXIST		

Option 2C

Option 2C is quite different for roadway traffic patterns than the other options. Under this scenario, all of the traffic destined for the grain elevator and surrounding businesses on 1st Avenue/CSAH 55 must access 1st Avenue/CSAH 55 off of what will be old TH 12. There is no access to 1st Avenue/CSAH 55 from the south or west – everything is funneled to the east. This means that all vehicles destined for the businesses on 1st Avenue will cross the spur line on old TH 12 west of CSAH 5.

In addition, it will also increase the amount of traffic through the at-grade crossing on CSAH 5. This crossing currently has 5,200 vehicles crossing it a day. Under Option 2C it is expected that the volume will increase due to traffic diverting from CSAH 55 to CSAH 5 due to shorter travel times/distances.

No separate table of crossings or a figure was created for Option 2C because the crossing types and locations are the same as under Option 2B. The changes come in the number of vehicles using the different crossings and the additional travel times/distances for those travelling to 1st Avenue.

It should also be noted that Kandiyohi County will be constructing grade separation of the Marshall Subdivision and Willmar Wye in 2017 to eliminate an at-grade crossing that currently exists. This project is part of a larger vision by Kandiyohi County to make CSAH 55 and realigned TH 12 as a western bypass for the City of Willmar.

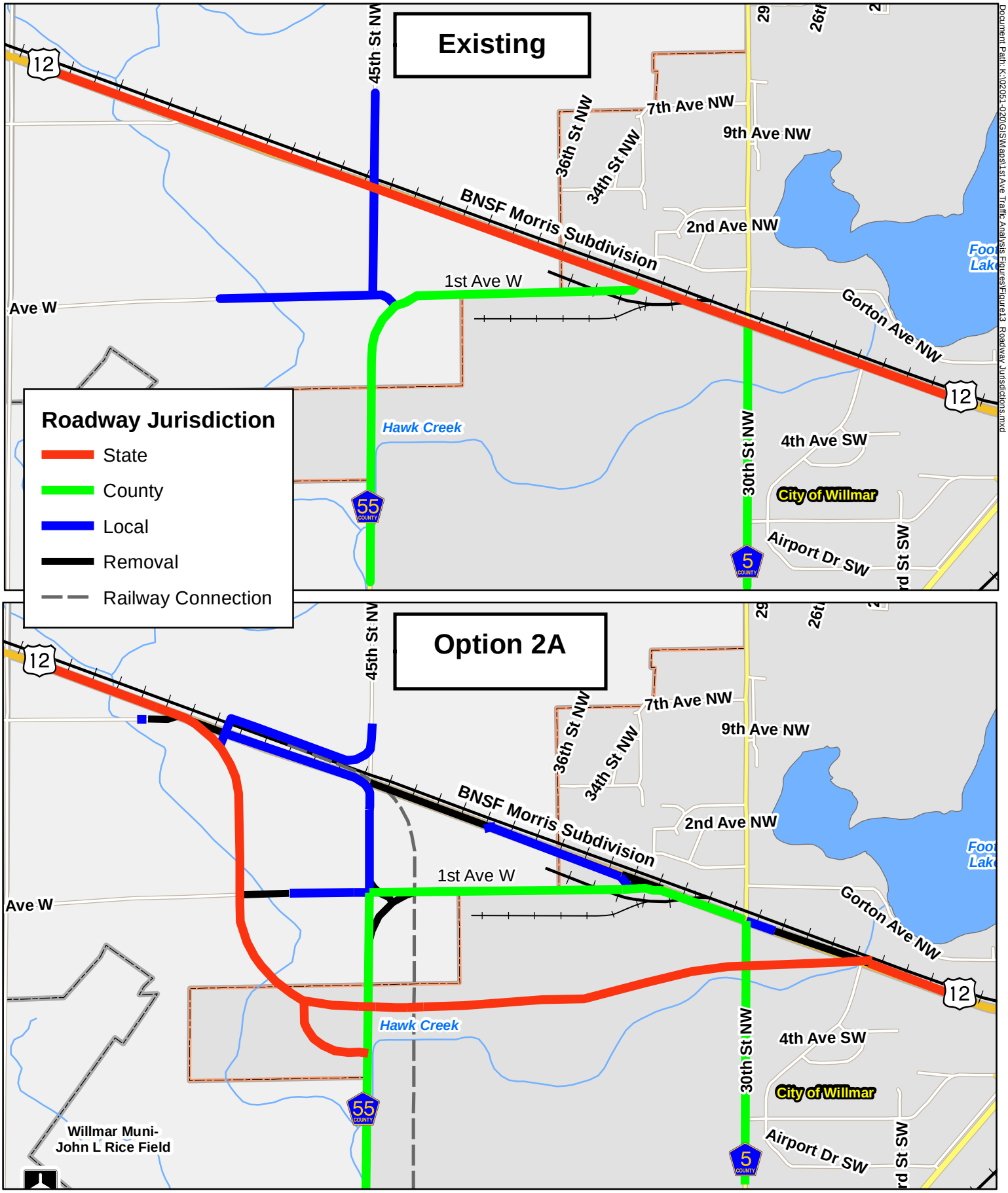
VI. Roadway Jurisdiction

Another factor under consideration with regard to a railway crossing at 1st Avenue/CSAH 55 is ownership of the roadway. Under present conditions, 1st Avenue/CSAH 55 is a county state aid highway (CSAH) that is owned and maintained by Kandiyohi County. In Minnesota, these roadways receive money from the state for ongoing maintenance and reconstruction. In order to receive money from the state, the agency receiving the money has to follow certain design standards, connectivity requirements, and follow other requirements established by MnDOT. One of the requirements for CSAH status is a direct connection to a state trunk highway or to another county state aid highway.

Under Option 2A (**Figure 13**), 1st Avenue/CSAH 55 would remain under the jurisdiction of Kandiyohi County and would still be a CSAH. Old TH 12 would be turned back to the county and would be renumbered as CSAH 55. The route would connect to both TH 12 and to CSAH 5 (at the east end of the corridor).

Under Option 2B (**Figure 14**), 1st Avenue/CSAH 55 would be turned over to the City of Willmar north of realigned TH 12 due to the fact that it would not connect to another trunk highway or another CSAH route. Under this scenario old TH 12 would not become a CSAH route because it lacks connectivity. The transfer of the roadway to the City of Willmar would mean that the city would be responsible for maintaining the roadway. In addition to the receiving 1st Avenue/CSAH 55, the new roadway connection from the north side of realigned TH 12 to the grain elevator site would fall under the jurisdiction of the City of Willmar.

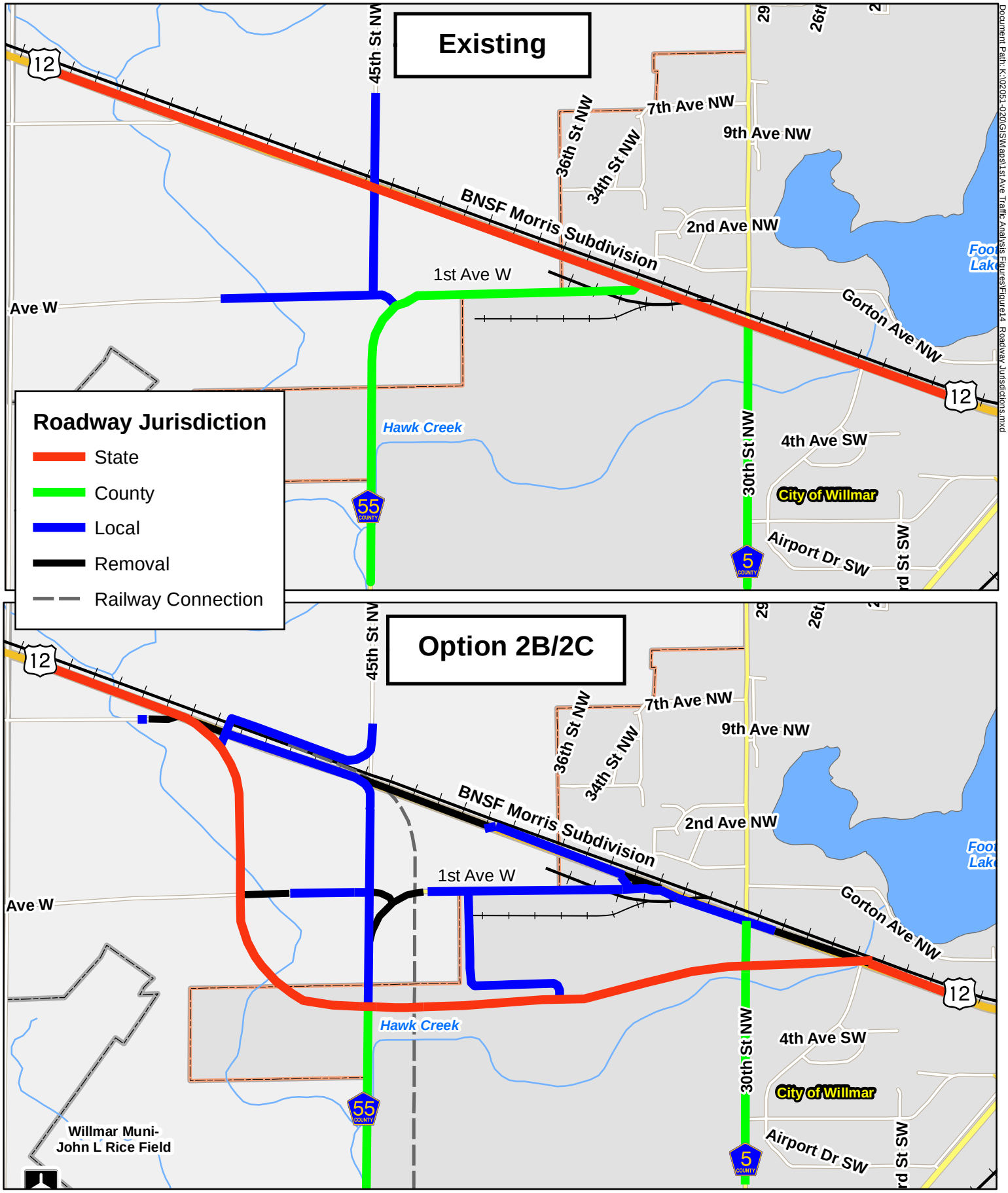
Under Option 2C (**Figure 14**), 1st Avenue/CSAH 55 would be turned over to the City of Willmar north of realigned TH 12 for the same reasons as Option 2B.



1st Avenue At-Grade Analysis
Figure 13: Roadway Jurisdiction - Option 2A
Willmar, MN

N

0 2,500 Feet



1st Avenue At-Grade Analysis
Figure 14: Roadway Jurisdiction - Option 2B/2C
Willmar, MN

N

0 2,500 Feet

VII. Other Considerations

Legal

1st Avenue/CSAH 55 by the potential roadway/railway crossing serves commercial, industrial and agricultural uses. No residential developments are located along it. Not providing an at-grade crossing on 1st Avenue/CSAH 55 is not anticipated to result in a legal finding in terms of access for businesses located on the roadway. Access would still be provided to the businesses via a connection to old TH 12 under Option 2C or via a new local street on the north side of realigned TH 12 under Option 2B.

Property Owner Input

As part of the public and property owner engagement process, MnDOT staff has met with all of the businesses along 1st Avenue/CSAH 55 that would be impacted by a crossing/no crossing situation. There are five businesses in this area (some with multiple sites off of 1st Avenue/CSAH 55). They include:

- Quam Construction Company – utilities, heavy construction – grading, roadway construction, etc.
- PALS, Inc – farm equipment supplier; propane (multiple sites)
- Farm Service Elevator – grain elevator; retail for feed (multiple sites)
- Timber Wholesalers, Inc – pressure treated wood/lumber manufacturer
- SW Inc – retail – surplus warehouse; salvage/damage recovery material storage (multiple sites)
- Northern Metal and Recycling – recycling

Although Option 2B was developed with input from the business owners as being the least disruptive to their operations and the best location for a new roadway connection from the south, businesses have indicated that they do not like the idea of getting rid of their access from the west via CSAH 55. They have stated that they would prefer to continue to be able to access the area from the west after the railway is constructed.

VIII. Summary

This memo provided a lot of information for a number of topics. **Table 16** on the following page summarizes costs and qualitative information by option for the different topics included in the memo.

Table 16 – Summary of 1st Avenue/CSAH 55 At-Grade Crossing Factors

Topic Area	Option 2A	Option 2B	Option 2C
Safety			
Crash Costs[1]	$3,184,585	$3,350,066	$3,195,225
Risk Factors	Very Low	None	None
Economic			
Travel Time Costs	$263,995	$359,629	$415,456
Operation and Maintenance Costs	$210,092	$270,655	$348,975
Total Annual Costs (crashes, travel time and operations/maintenance)	$3,658,672	$3,980,350	$$3,959,656
Construction[2]			
Construction Costs	$5.5 million to $7.9 million	$5.7 million to $9.2 million	$4.8 million to $7.98 million
Right of Way Costs	Less than $100,000	$180,000	None
Jurisdiction			
Roadway Transfers	No transfer	1 mile transferred from county to city	1 mile transferred from county to city

[1] Crash costs in Table 17 are from Table 3 (lower of the costs).

[2] Costs for railway realignment south of 1st Ave/CSAH 55 need to be added to Option 2B

Attachment A – Construction Cost Estimates

Willmar Wye - Engineers Estimate ALT 2A - Quadrant Roadway

WSB Project: Willmar Wye
Project Location: MnDOT District 8
WSB Project No: 02051-020
Date: 8/2/2016

					Engineers Project Total		ICE Project Total		TH 12		CSAH 55		1st		SW Ramp		
SHEET	Item Number	Description	Unit	Estimated Quantity	Engineer Unit Price	Estimated Cost	ICE Unit Price	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Comments
	2016.601	QUALITY MANAGEMENT	LUMP SUM	1	$12,000.00	$12,000	$50,700.00	$50,700	0.35	$17,745.00	0.46	$23,322.00	0.07	$3,549.00	0.12	$6,084.00	Assume approx 0.5% of total Direct cost
	2016.601	QUALITY MANAGEMENT SPECIAL	LUMP SUM	1	$12,000.00	$12,000	$12,000.00	$12,000	0.35	$4,200.00	0.46	$5,520.00	0.07	$840.00	0.12	$1,440.00	Used Engineers price lack of detail
	2021.501	MOBILIZATION (2.5%)	LUMP SUM	1	$182,878.98	$182,879	$236,471.40	$236,471	0.35	$82,764.99	0.46	$108,776.85	0.07	$16,553.00	0.12	$28,376.57	Use 5% of total Direct cost
	2031.501	FIELD OFFICE TYPE D	EACH	1	$20,000.00	$20,000	$35,000.00	$35,000	0.35	$12,250.00	0.46	$16,100.00	0.07	$2,450.00	0.12	$4,200.00	Assume $2500/mon X 14 mon (incl utilities/misc)
	2031.503	FIELD LABORATORY TYPE D	EACH	1	$12,000.00	$12,000	$18,000.00	$18,000	0.35	$6,300.00	0.46	$8,280.00	0.07	$1,260.00	0.12	$2,160.00	Assume $1500/mon X 12 mon
	2051.501	MAINT & RESTORATION OF HAUL ROADS	LUMP SUM	1	$12,000.00	$12,000	$1.00	$1	0.35	$0.35	0.46	$0.46	0.07	$0.07	0.12	$0.12	Covered in earthwork items
	2101.501	CLEARING	ACRE	23	$3,000.00	$68,790	$2,000.00	$45,860	8	$16,051.00	11	$21,095.60	2	$3,210.20	3	$5,503.20	Simple clearing not a lot of trees
	2101.506	GRUBBING	ACRE	23	$3,000.00	$68,790	$2,000.00	$45,860	8	$16,051.00	11	$21,095.60	2	$3,210.20	3	$5,503.20	Simple clearing not a lot of trees
	2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD	8,160	$5.27	$43,004	$2.75	$22,441			6,447	$17,728.03	734	$2,019.65	979	$2,692.87	
	2104.505	REMOVE BITUMINOUS SHOULDER PAVEMENT	SQ YD	3,194	$4.00	$12,778	$1.50	$4,792			2,524	$3,785.36	287	$431.24	383	$574.99	
	2104.513	SAWING BIT PAVEMENT (FULL DEPTH)	LIN FT	36	$1.54	$55	$2.00	$72					36	$72.00			Assume $.25/in/ft @ 8" deep
	2105.601	DEWATERING	LUMP SUM	1	$20,000.00	$20,000	$20,000.00	$20,000	0.35	$7,000.00	0.46	$9,200.00	0.07	$1,400.00	0.12	$2,400.00	Used Engineers price lack of detail
	2106.501	EXCAVATION - COMMON	CU YD	48,145	$6.90	$332,201	$5.25	$252,761	21,616	$113,484.00	10,311	$54,132.75	3,923	$20,595.75	12,295	$64,548.75	Assume majority of work done with scrapers and close haul
	2106.522	SELECT GRANULAR EMBANKMENT (CV)	CU YD	23,926	$18.00	$430,668	$12.00	$287,112	15,822	$189,864.00	2,248	$26,976.00	3,187	$38,244.00	2,669	$32,028.00	Assume material borrowed from offsite and truckhauled
	2106.523	COMMON EMBANKMENT (CV)	CU YD	332,031	$12.00	$3,984,372	$5.25	$1,743,163	323,213	$1,696,868.25	3,193	$16,763.25	2,366	$12,421.50	3,259	$17,109.75	Assume majority of work done with scrapers and close haul incl restoration of borrow site
	2118.607	AGGREGATE SURFACING (CV) CLASS 5	CU YD	587	$32.52	$19,089	$35.00	$20,545	292	$10,220.00	169	$5,915.00	59	$2,065.00	67	$2,345.00	Purchased and hauled in appears to be source within 10+/- miles
	2211.503	AGGREGATE BASE (CV) CLASS 5	CU YD	10,440	$23.35	$243,774	$22.00	$229,680	6,970	$153,340.00	961	$21,142.00	1,341	$29,502.00	1,168	$25,696.00	Purchased and hauled in appears to be source within 10+/- miles
	2232.603	MILLED RUMBLE STRIPS-INTERMITTENT	LIN FT	17,795	$0.15	$2,669	$0.15	$2,669	9,609	$1,441.41	8,186	$1,227.86					
	2232.603	MILLED RUMBLE STRIPS-CENTERLINE	LIN FT	8,898	$0.20	$1,780	$0.15	$1,335	4,805	$720.70	4,093	$613.93					
	2360.501	TYPE SP 12.5 WEARING COURSE MIX (2,B) - SHLD	TON	4,166	$54.53	$227,172	$62.00	$258,292	2,491	$154,442.00	885	$54,870.00	425	$26,350.00	365	$22,630.00	
	2360.501	TYPE SP 12.5 WEARING COURSE MIX (5,H) - MAIN	TON	16,527	$54.53	$901,217	$58.00	$958,566	10,779	$625,182.00	1,636	$94,888.00	2,290	$132,820.00	1,822	$105,676.00	
		BRIDGE A (TH 12 BRIDGE OVER CSAH 55)	SQ FT	5,674	$150.00	$851,100	$120.00	$680,880	5,674	$680,880.00							Simple structures with Precast Girders
	2406.553	BRIDGE APPROACH PANELS	SQ YD	236	$75.00	$17,700	$75.00	$17,700	236	$17,700.00							
	2406.603	EXPANSION JOINTS, DESIGN E8 SPECIAL	LIN FT	88	$250.00	$22,000	$250.00	$22,000	88	$22,000.00							Used Engineers price lack of detail
	TOTAL ESTIMATE (W/O MOBILIZATION & TRAFFIC CONTROL)					$7,315,159		$4,729,428									
	TOTAL ESTIMATE					**$7,498,038**		**$4,965,899**		**$3,828,505** to **$5,780,680**		**$511,433** to **$772,215**		**$296,994** to **$448,432**		**$328,968** to **$496,711**	

1) Yellow highlite in Engineers columns are items/qtys not included in original
2) Brown highlite in columns are items figured as % of total direct cost
3) No items for retaining walls at the structures
4) No items/costs for geotech mitigation at the structure embankments

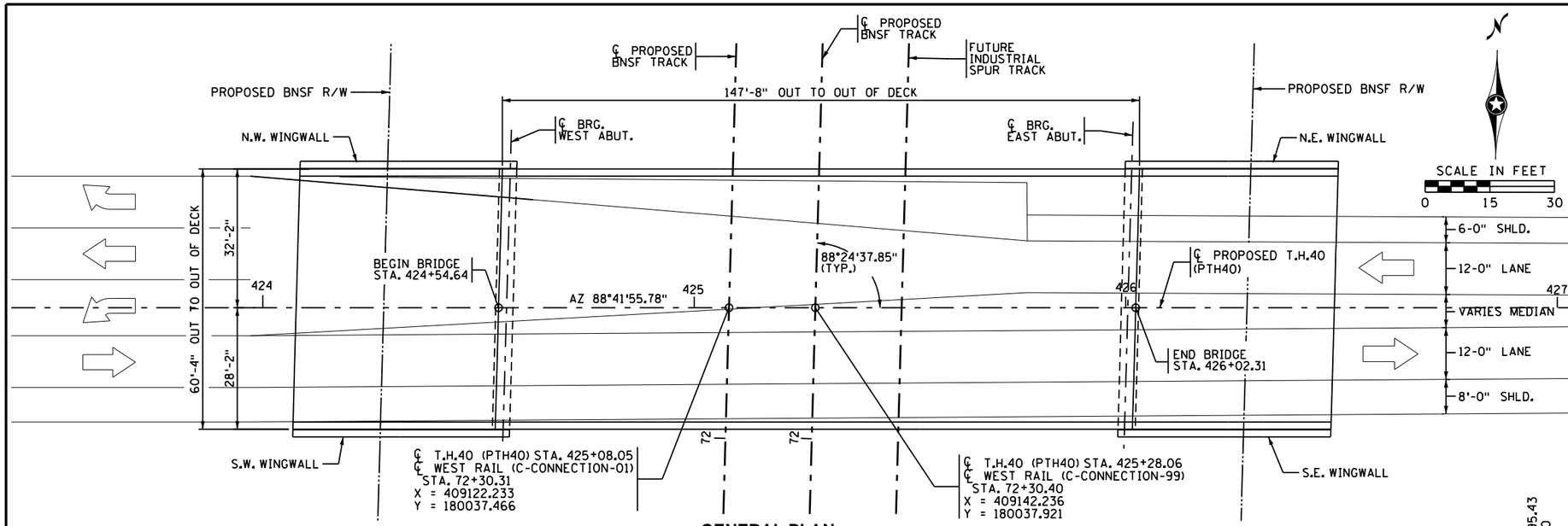
Willmar Wye - Engineers Estimate ALT 2B - At-Grade Intersection

WSB Project: Willmar Wye
Project Location: MnDOT District 8
WSB Project No: 02051-020
Date: 8/2/2016

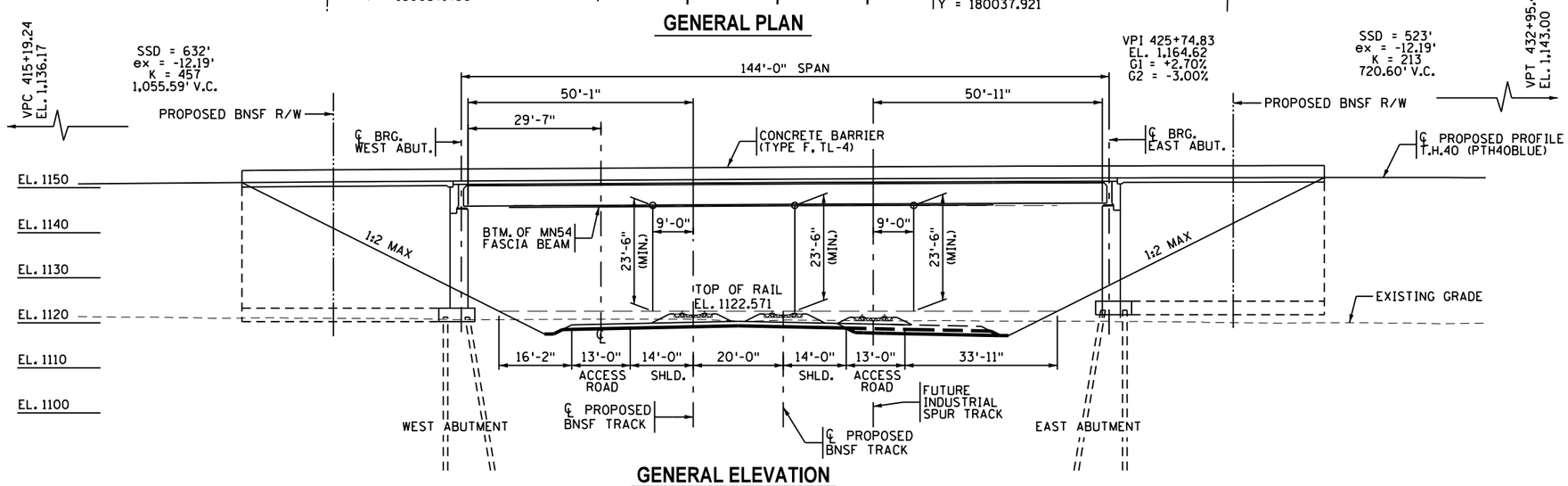
					Engineers Project Total		ICE Project Total		TH 12		CSAH 55		1st		Industrial Access Rd		
SHEET	Item Number	Description	Unit	Estimated Quantity	Engineer Unit Price	Estimated Cost	ICE Unit Price	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	Comments
	2016.601	QUALITY MANAGEMENT	LUMP SUM	1	$12,000.00	$12,000	$50,700.00	$50,700	0.35	$17,745.00	0.46	$23,322.00	0.07	$3,549.00	0.12	$6,084.00	Assume approx 0.5% of total Direct cost
	2016.601	QUALITY MANAGEMENT SPECIAL	LUMP SUM	1	$12,000.00	$12,000	$12,000.00	$12,000	0.35	$4,200.00	0.46	$5,520.00	0.07	$840.00	0.12	$1,440.00	Used Engineers price lack of detail
	2021.501	MOBILIZATION (2.5%)	LUMP SUM	1	$214,014.83	$214,015	$252,961.25	$252,961	0.35	$88,536.44	0.46	$116,362.17	0.07	$17,707.29	0.12	$30,355.35	Use 5% of total Direct cost
	2031.501	FIELD OFFICE TYPE D	EACH	1	$20,000.00	$20,000	$35,000.00	$35,000	0.35	$12,250.00	0.46	$16,100.00	0.07	$2,450.00	0.12	$4,200.00	Assume $2500/mon X 14 mon (incl utilities/misc)
	2031.503	FIELD LABORATORY TYPE D	EACH	1	$12,000.00	$12,000	$18,000.00	$18,000	0.35	$6,300.00	0.46	$8,280.00	0.07	$1,260.00	0.12	$2,160.00	Assume $1500/mon X 12 mon
	2051.501	MAINT & RESTORATION OF HAUL ROADS	LUMP SUM	1	$12,000.00	$12,000	$1.00	$1	0.35	$0.35	0.46	$0.46	0.07	$0.07	0.12	$0.12	Covered in earthwork items
	2101.501	CLEARING	ACRE	20	$3,000.00	$59,100	$2,000.00	$39,400	6.9	$13,790.00	9.1	$18,124.00	1.4	$2,758.00	2.4	$4,728.00	Simple clearing not a lot of trees
	2101.506	GRUBBING	ACRE	20	$3,000.00	$59,100	$2,000.00	$39,400	6.9	$13,790.00	9.1	$18,124.00	1.4	$2,758.00	2.4	$4,728.00	Simple clearing not a lot of trees
	2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD	8,871	$5.27	$46,749	$2.75	$24,394			6,653	$18,295.82	2,217.68	$6,098.61			
	2104.505	REMOVE BITUMINOUS SHOULDER PAVEMENT	SQ YD	3,456	$4.00	$13,823	$1.50	$5,184			2,592	$3,887.66	863.93	$1,295.89			
	2104.513	SAWING BIT PAVEMENT (FULL DEPTH)	LIN FT	36	$1.54	$55	$2.00	$72					36.00	$72.00			Assume $.25/in/ft @ 8" deep
	2105.601	DEWATERING	LUMP SUM	1	$20,000.00	$20,000	$20,000.00	$20,000	0.35	$7,000.00	0.46	$9,200.00	0.07	$1,400.00	0.12	$2,400.00	Used Engineers price lack of detail
	2106.501	EXCAVATION - COMMON	CU YD	54,681	$6.90	$377,297	$5.25	$287,074	27,196	$142,779.00	6,711	$35,232.75	1,818	$9,544.50	18,955	$99,513.75	Assume majority of work done with scrapers and close haul
	2106.522	SELECT GRANULAR EMBANKMENT (CV)	CU YD	27,438	$18.00	$493,885	$12.00	$329,257	15,124	$181,488.00	7,146	$85,752.00	475	$5,700.00	4,693	$56,316.00	Assume material borrowed from offsite and truckhauled
	2106.523	COMMON EMBANKMENT (CV)	CU YD	489,359	$12.00	$5,872,313	$5.25	$2,569,137	356,077	$1,869,404.25	131,133	$688,448.25	10	$52.50	2,139	$11,229.75	Assume majority of work done with scrapers and close haul incl restoration of borrow site
	2118.607	AGGREGATE SURFACING (CV) CLASS 5	CU YD	512	$32.52	$16,646	$35.00	$17,915	293	$10,255.00	159	$5,565.00	10	$350.00	50	$1,750.00	Purchased and hauled in appears to be source within 10+/- miles
	2211.503	AGGREGATE BASE (CV) CLASS 5	CU YD	11,914	$23.35	$278,202	$22.00	$262,118	6,645	$146,190.00	3,000	$66,000.00	215	$4,730.00	2,054	$45,188.00	Purchased and hauled in appears to be source within 10+/- miles
	2232.603	MILLED RUMBLE STRIPS-INTERMITTENT	LIN FT	18,442	$0.15	$2,766	$0.15	$2,766	8,299	$1,244.86	10,143	$1,521.50					
	2232.603	MILLED RUMBLE STRIPS-CENTERLINE	LIN FT	9,221	$0.20	$1,844	$0.15	$1,383	4,150	$622.43	5,072	$760.75					
	2360.501	TYPE SP 12.5 WEARING COURSE MIX (2,B) - SHLD	TON	3,754	$54.53	$204,712	$62.00	$232,755	2,230	$138,260.00	793	$49,166.00	90	$5,580.00	641	$39,742.00	
	2360.501	TYPE SP 12.5 WEARING COURSE MIX (5,H) - MAIN	TON	19,184	$54.53	$1,046,101	$58.00	$1,112,669	10,287	$596,646.00	5,425	$314,650.00	270	$15,660.00	3,203	$185,774.00	
		BRIDGE A (TH 12 BRIDGE OVER CSAH 55)	SQ FT		$150.00		$120.00										
	2406.553	BRIDGE APPROACH PANELS	SQ YD		$75.00		$75.00										
	2406.603	EXPANSION JOINTS, DESIGN E8 SPECIAL	LIN FT		$250.00		$250.00										
	TOTAL ESTIMATE (W/O MOBILIZATION & TRAFFIC CONTROL)					$8,560,593		$5,059,225									
	TOTAL ESTIMATE					**$8,774,608**		**$5,312,186**		**$3,250,501** to **$5,369,141**		**$1,484,312** to **$2,451,770**		**$81,806** to **$135,126**		**$495,609** to **$818,641**	

1) Yellow highlite in Engineers columns are items/qtys not included in original
2) Brown highlite in columns are items figured as % of total direct cost
3) No items for retaining walls at the structures
4) No items/costs for geotech mitigation at the structure embankments

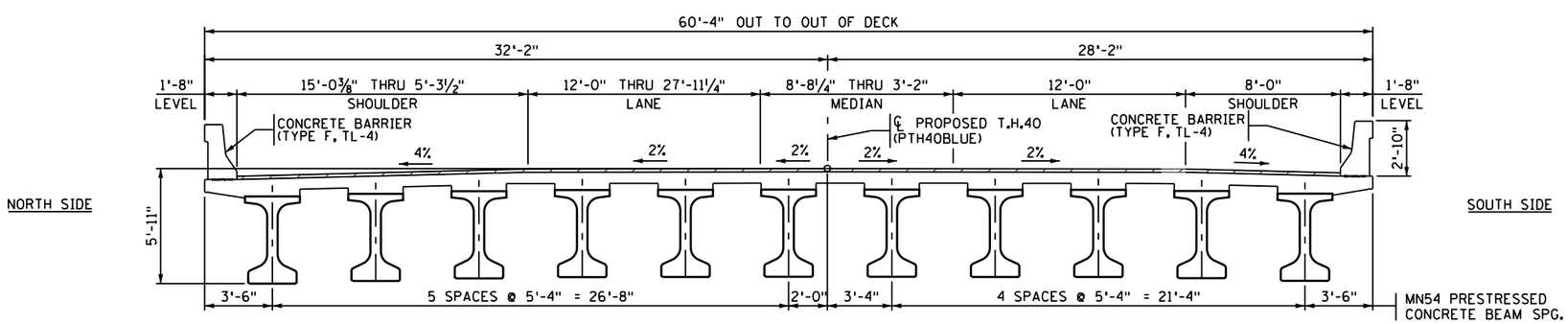
Appendix D - Bridges



GENERAL PLAN



GENERAL ELEVATION



TRANSVERSE SECTION THRU DECK

CONSTRUCTION NOTES

THE PROPOSED GRADE SEPARATION PROJECT SHALL NOT INCREASE THE QUANTITY AND/OR CHARACTERISTICS OF THE FLOW IN THE RAILROAD'S DITCHES AND/OR DRAINAGE STRUCTURES.

THE ELEVATION OF THE EXISTING TOP-OF-RAIL PROFILE SHALL BE VERIFIED BEFORE BEGINNING CONSTRUCTION. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE RAILROAD PRIOR TO CONSTRUCTION.

THE CONTRACTOR MUST SUBMIT A PROPOSED METHOD OF EROSION AND SEDIMENT CONTROL AND HAVE THE METHOD APPROVED BY THE RAILROAD.

ALL SHORING SYSTEMS THAT IMPACT THE RAILROAD'S OPERATIONS AND/OR SUPPORTS THE RAILROAD'S EMBANKMNET SHALL BE DESIGNED AND CONSTRUCTED PER CURRENT RAILROAD GUIDELINES FOR TEMPORARY SHORING.

ALL DEMOLITIONS WITHIN THE RAILROAD'S RIGHT-OF-WAY AND/OR DEMOLITION THAT MAY IMPACT THE RAILROAD'S TRACKS OR OPERATIONS SHALL BE IN COMPLIANCE WITH THE RAILROAD'S DEMOLITON GUIDELINES.

ERECTION OVER THE RAILROAD'S RIGHT-OF-WAY SHALL BE DESIGNED TO CAUSE NO INTERUPTION TO THE RAILROAD'S OPERATION, ENABLING THE TRACK(S) TO REMAIN OPEN TO TRAFFIC PER THE RAILROAD REQUIREMENTS.

RAILROAD REQUIREMENTS DO NOT ALLOW WORK WITHIN 50 FEET OF THE TRACK CENTERLINE WHEN A TRAIN PASSES THE WORK SITE AND ALL PERSONNEL MUST CLEAR THE AREA WITHIN 25 FEET OF THE TRACK CENTERLINE AND SECURE ALL EQUIPMENT.

FALSE-WORK CLEARANCES SHALL COMPLY WITH MINIMUM CONSTRUCTION CLEARANCES.

ALL PERMANENT CLEARANCES SHALL BE VERIFIED BEFORE PROJECT CLOSING.

DIRECT DRAINAGE ONTO THE RAILROAD RIGHT-OF-WAY IS NOT ALLOWED.

TEMPORARY HORIZONTAL AND VERTICAL CONSTRUCTION CLEARANCES SHALL MEET THE MINIMUM REQUIREMENTS OF THE UPRR GRADE SEPARATION GUIDELINES AND WILL BE PROVIDED IN THE DETAILED CONSTRUCTION PLAN.

PROPOSED TYPE OF STRUCTURE

DECK:
MN54 PRESTRESSED CONCRETE BEAMS
SEPARATE CONCRETE WEARING COURSE
EPOXY COATED REINFORCEMENT
SINGLE SPAN

SUBSTRUCTURE:
SEMI-INTREGRAL ABUTMENTS SUPPORTED ON PILE SUPPORTED FOUNDATION

AESTHETICS:
LEVEL C

WSB & Associates, Inc.
701 Xenia Avenue
Suite 300
Minneapolis, MN 55416
763-541-4800
FAX 763-541-1700
INFRASTRUCTURE - ENGINEERS - PLANNERS

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONCEPTUAL PLAN
Bridge No. 34032

PROPOSED T.H.40 (PTH40) OVER
PROPOSED BNSF RAILROAD
0.1 MILES EAST OF C.R. 55 AND
1.0 MILES SOUTH OF C.R. 55
144'-0"
PRESTRESSES CONCRETE BEAM SPAN
54'-9" CLEAR ROADWAY
88°24'37.85" SKEW
TYPE F (TL-4 CONC. RAILINGS

SPAN IDENTIFICATION NO. 501

PLAN AND PROFILE

SEC. 20 TWP. 119N R. 35W
WILLMAR TOWNSHIP KANDIYOHI COUNTY

APPROVED: _____ _____
STATE BRIDGE ENGINEER DATE

DES: SWH	DR: SWH	34032
CHK: CBO	CHK: CBO	

SHEET NO. 1 OF 1 SHEETS

MN PROJECT NO. BR	(T.H. 40)	STATE PROJECT NO. 3403-74

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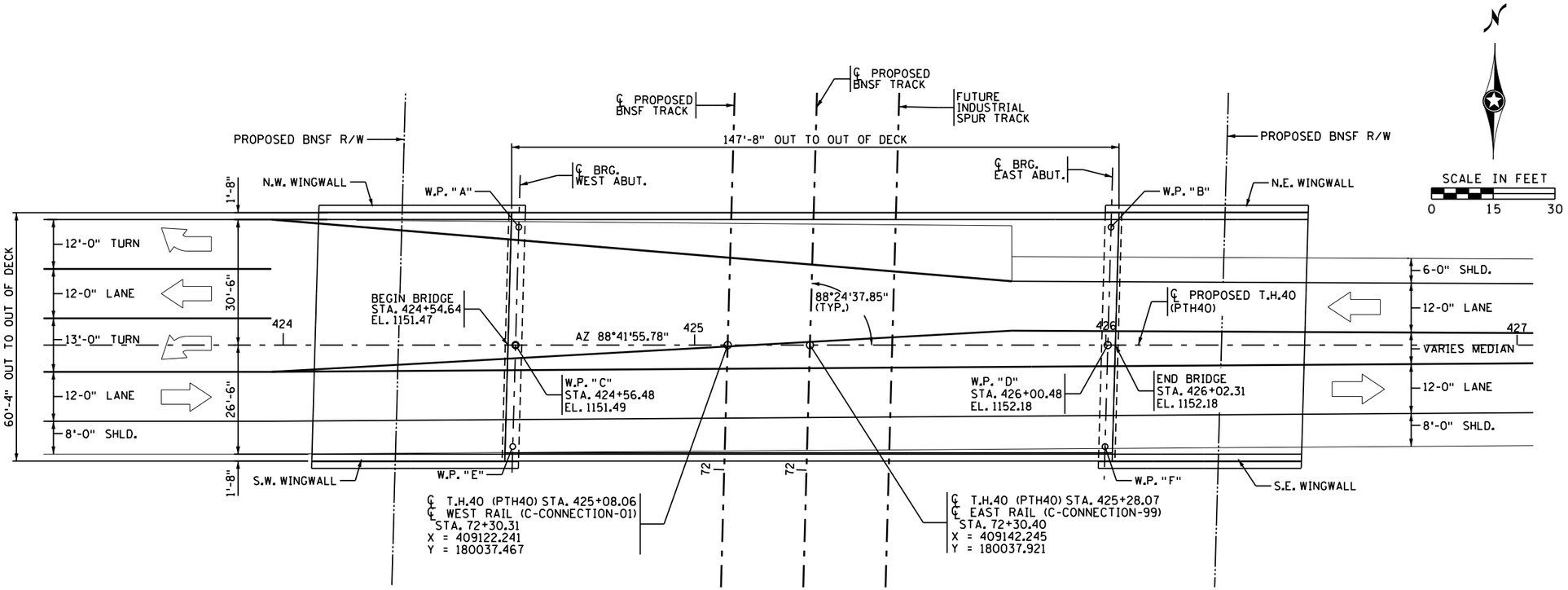
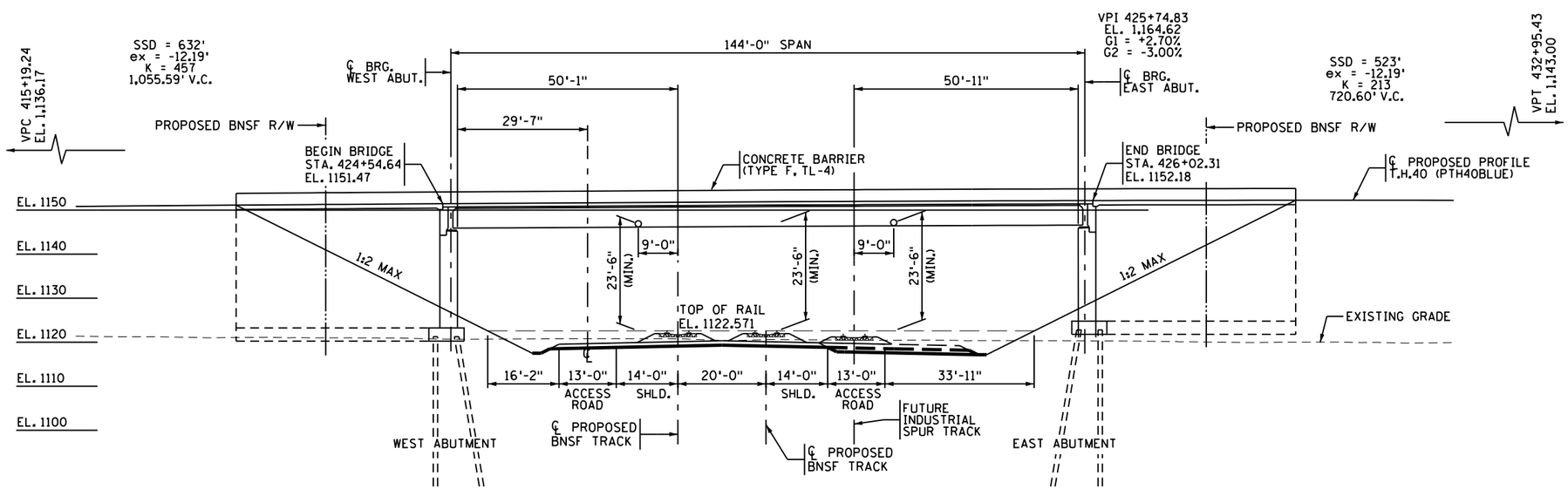


GENERAL PLAN



GENERAL ELEVATION

DESIGN DATA

DESIGNED IN ACCORDANCE WITH 2014 AND CURRENT INTERIM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
HL93 LIVE LOAD
DEAD LOAD INCLUDES 20 PSF ALLOWANCE FOR FUTURE WEARING COURSE MODIFICATIONS.

MATERIAL DESIGN PROPERTIES:
REINFORCED CONCRETE:
f'c = 4 KSI CONCRETE
fy = 60 KSI PLAIN AND EPOXY COATED BARS
n = 8 FOR REINFORCEMENT
PRESTRESSED CONCRETE:
f'c = 9 KSI n = 1
fpu = 270 KSI LOW RELAXATION STRANDS
0.75 fpu FOR INITIAL PRESTRESS

DESIGN SPEED:
OVER = XX MPH
UNDER = N/A
APPROXIMATE DECK AREA: = 8,614 SQUARE FEET
PROJECTED ADT FOR 2034 = XXXXX

LIST OF SHEETS

NO.	DESCRIPTION
1	GENERAL PLAN AND ELEVATION
2	TRANSVERSE SECTION THRU DECK
3	BRIDGE LAYOUT
4	AESTHETIC DETAILS
5	BRIDGE SURVEY
6	BRIDGE SURVEY - PLAN & PROFILE

PROPOSED TYPE OF STRUCTURE

DECK:
MN54 PRESTRESSED CONCRETE BEAMS
SEPARATE CONCRETE WEARING COURSE
EPOXY COATED REINFORCEMENT
SINGLE SPAN
SUBSTRUCTURE:
SEMI-INTREGRAL ABUTMENTS SUPPORTED ON PILE SUPPORTED FOUNDATION
AESTHETICS:
LEVEL C

WSB & Associates, Inc.
701 Xenia Avenue
Suite 300
Minneapolis, MN 55416
763-541-4800
FAX 763-541-1700
INFRASTRUCTURE - ENGINEERS - PLANNERS

MINNESOTA DEPARTMENT OF TRANSPORTATION

PRELIMINARY PLAN
Bridge No. 34032

PROPOSED T.H.40 (PTH40) OVER
PROPOSED BNSF RAILROAD
0.1 MILES EAST OF C.R. 55 AND
1.0 MILES SOUTH OF C.R. 55
144'-0"
PRESTRESSES CONCRETE BEAM SPAN
55'-0" CLEAR ROADWAY
88°24'37.85" SKEW
TYPE F (TL-4 CONC. RAILINGS

SPAN IDENTIFICATION NO. 501

PLAN AND ELEVATION

SEC. 20 TWP. 119N R. 35W
WILLMAR TOWNSHIP KANDIYOHI COUNTY

APPROVED: _____ _____
STATE BRIDGE ENGINEER DATE

NO	DATE	BY	CHK	REVISIONS

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
www.wsbeng.com
763-541-4800 - Fax 763-541-1700
INFRASTRUCTURE • ENGINEERING • PLANNING • CONSTRUCTION

WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **GENERAL PLAN AND ELEVATION**

DES: SWH	DR: SWH	
CHK: CBO	CHK: CBO	
Sheet 1 of 6 Sheets		Bridge No. 34032

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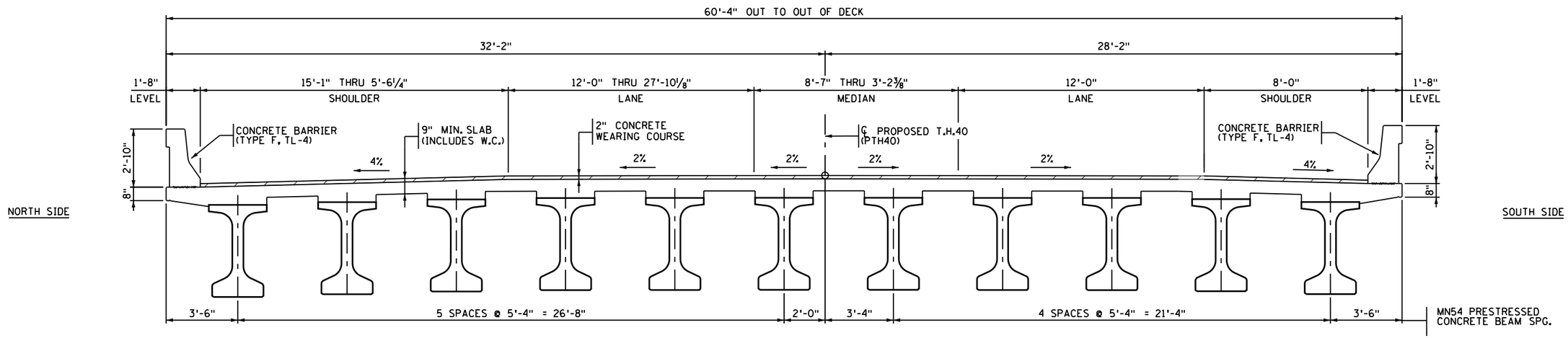

TRANSVERSE SECTION THRU DECK

CONSTRUCTION NOTES

THE PROPOSED GRADE SEPARATION PROJECT SHALL NOT INCREASE THE QUANTITY AND/OR CHARACTERISTICS OF THE FLOW IN THE RAILROAD'S DITCHES AND/OR DRAINAGE STRUCTURES.

THE ELEVATION OF THE EXISTING TOP-OF-RAIL PROFILE SHALL BE VERIFIED BEFORE BEGINNING CONSTRUCTION. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE RAILROAD PRIOR TO CONSTRUCTION.

THE CONTRACTOR MUST SUBMIT A PROPOSED METHOD OF EROSION AND SEDIMENT CONTROL AND HAVE THE METHOD APPROVED BY THE RAILROAD.

ALL SHORING SYSTEMS THAT IMPACT THE RAILROAD'S OPERATIONS AND/OR SUPPORTS THE RAILROAD'S EMBANKMNET SHALL BE DESIGNED AND CONSTRUCTED PER CURRENT RAILROAD GUIDELINES FOR TEMPORARY SHORING.

ALL DEMOLITIONS WITHIN THE RAILROAD'S RIGHT-OF-WAY AND/OR DEMOLITION THAT MAY IMPACT THE RAILROAD'S TRACKS OR OPERATIONS SHALL BE IN COMPLIANCE WITH THE RAILROAD'S DEMOLITON GUIDELINES.

ERECTION OVER THE RAILROAD'S RIGHT-OF-WAY SHALL BE DESIGNED TO CAUSE NO INTERUPTION TO THE RAILROAD'S OPERATION, ENABLING THE TRACK(S) TO REMAIN OPEN TO TRAFFIC PER THE RAILROAD REQUIREMENTS.

RAILROAD REQUIREMENTS DO NOT ALLOW WORK WITHIN 50 FEET OF THE TRACK CENTERLINE WHEN A TRAIN PASSES THE WORK SITE AND ALL PERSONNEL MUST CLEAR THE AREA WITHIN 25 FEET OF THE TRACK CENTERLINE AND SECURE ALL EQUIPMENT.

FALSE-WORK CLEARANCES SHALL COMPLY WITH MINIMUM CONSTRUCTION CLEARANCES.

ALL PERMANENT CLEARANCES SHALL BE VERIFIED BEFORE PROJECT CLOSING

DIRECT DRAINAGE ONTO THE RAILROAD RIGHT-OF-WAY IS NOT ALLOWED.

TEMPORARY HORIZONTAL AND VERTICAL CONSTRUCTION CLEARANCES SHALL MEET THE MINIMUM REQUIREMENTS OF THE UPRR GRADE SEPARATION GUIDELINES AND WILL BE PROVIDED IN THE DETAILED CONSTRUCTION PLAN.

NO	DATE	BY	CHK	REVISIONS

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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **TRANSVERSE SECTION**

DES: SWH	DR: SWH	
CHK: CBO	CHK: CBO	

Sheet 2 of 6 Sheets

Bridge No. 34032

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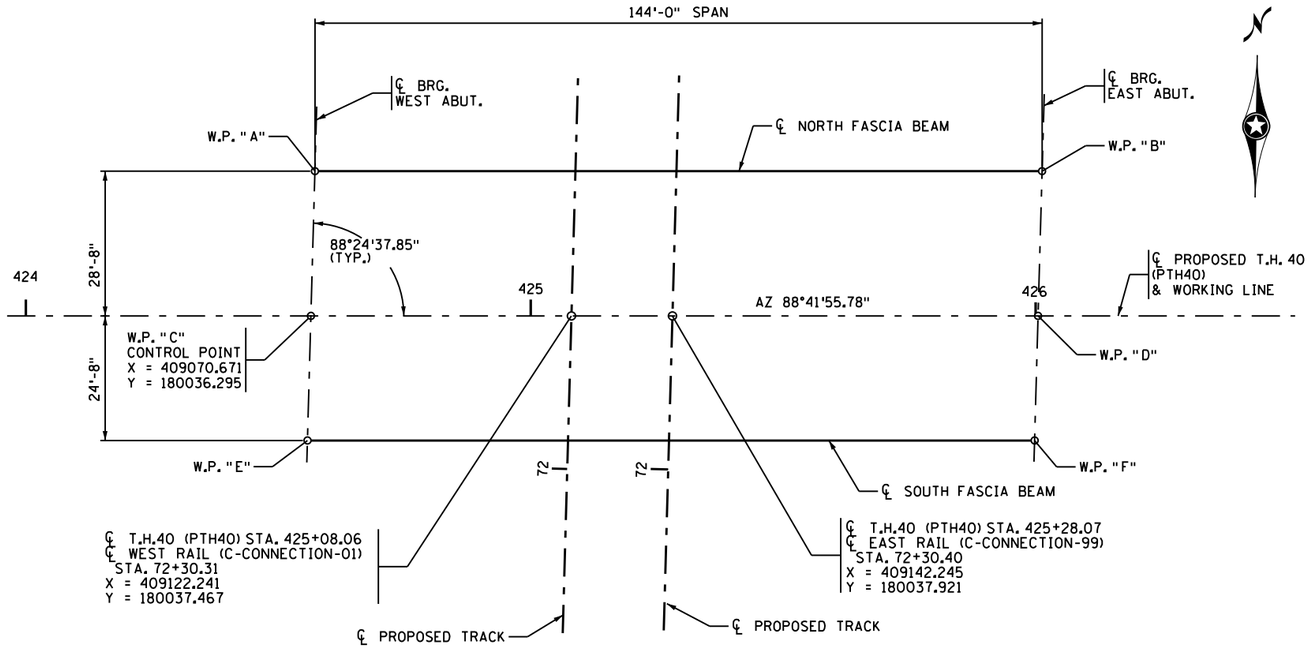
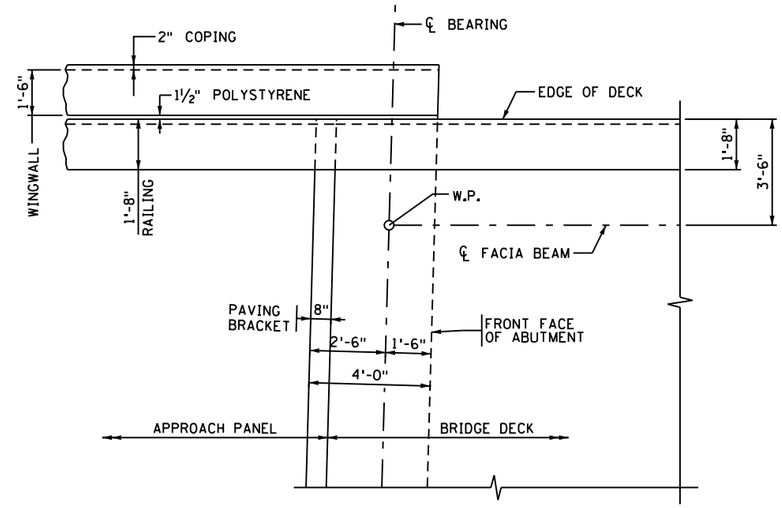


WORKING POINT LAYOUT

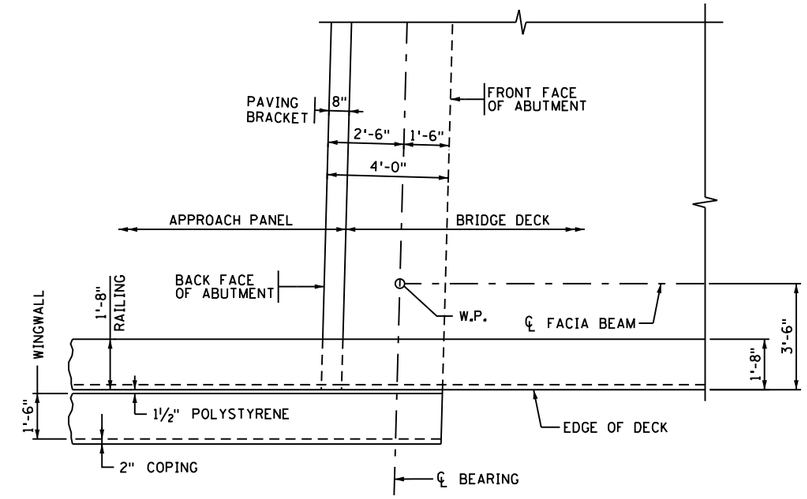


CORNER DETAIL

N.W. CORNER SHOWN. S.E. CORNER SIMILAR

TOP OF ROADWAY TO BRIDGE SEAT					
	SLAB THICKNESS	STOOL HEIGHT	BEAM HEIGHT	BEARING HEIGHT	TOTAL
WEST ABUT.	9"	4"	54"	X	X
EAST ABUT.	9"	4"	54"	X	X

DIMENSIONS BETWEEN WORKING POINTS										ELEVATIONS			
POINT	STATION	X-COORD	Y-COORD	A	B	C	D	E	F	TOP OF DECK	TOP OF DECK TO BRIDGE SEAT	BRIDGE SEAT	POINT
A	424+57.27	409070.815	180064.972		144.00	28.68	146.05		152.17	X	X	X	A
B	426+01.27	409214.778	180068.243			147.61	28.68	154.95		X	X	X	B
C	424+56.48	409070.671	180036.295				144.00	24.68	145.42	X	X	X	C
D	426+00.48	409214.634	180039.565					146.77	24.68	X	X	X	D
E	424+55.79	409070.547	180011.619						144.00	X	X	X	E
F	425+99.79	409214.510	180014.889							X	X	X	F



CORNER DETAIL

S.W. CORNER SHOWN. N.E. CORNER SIMILAR

NO	DATE	BY	CHK	REVISIONS

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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **BRIDGE LAYOUT**

DES: SWH	DR: SWH
CHK: CBO	CHK: CBO

Sheet 3 of 6 Sheets

Bridge No. 34032

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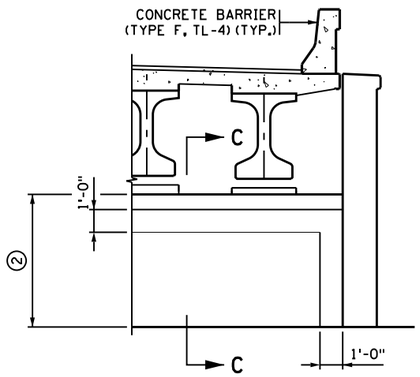
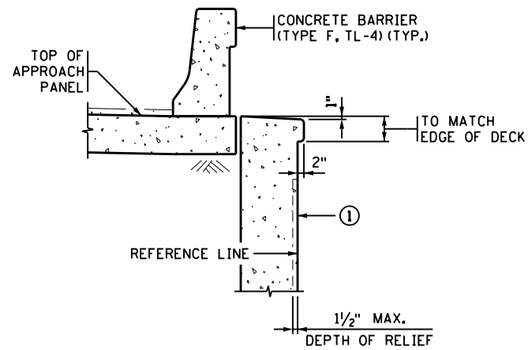


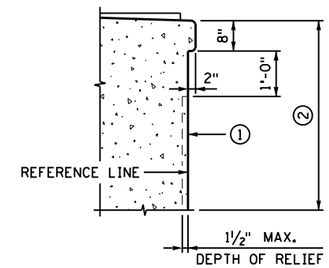
ELEVATION VIEW A-A

ABUTMENT FACE



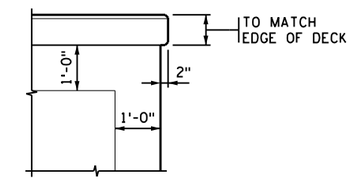
SECTION B-B

WINGWALL SECTION
SEMI-INTEGRAL TYPE ABUTMENT SHOWN
OTHER ABUTMENT TYPES SIMILAR



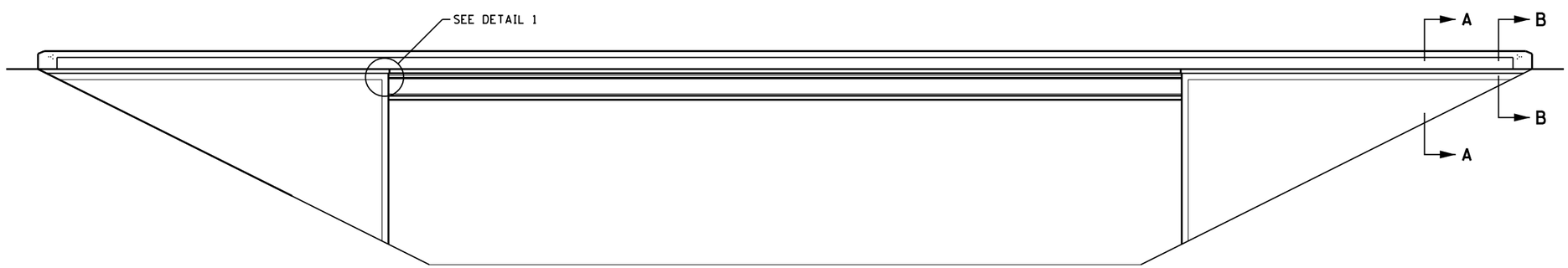
SECTION C-C

ABUTMENT SECTION
SEMI-INTEGRAL TYPE ABUTMENT SHOWN
OTHER ABUTMENT TYPES SIMILAR



DETAIL 1

WINGWALL



ELEVATION

NO	DATE	BY	CHK	REVISIONS

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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **AESTHETIC DETAILS**

DES: SWH	DR: SWH	
CHK: CBO	CHK: CBO	
Sheet 4 of 6 Sheets		

Bridge No. 34032

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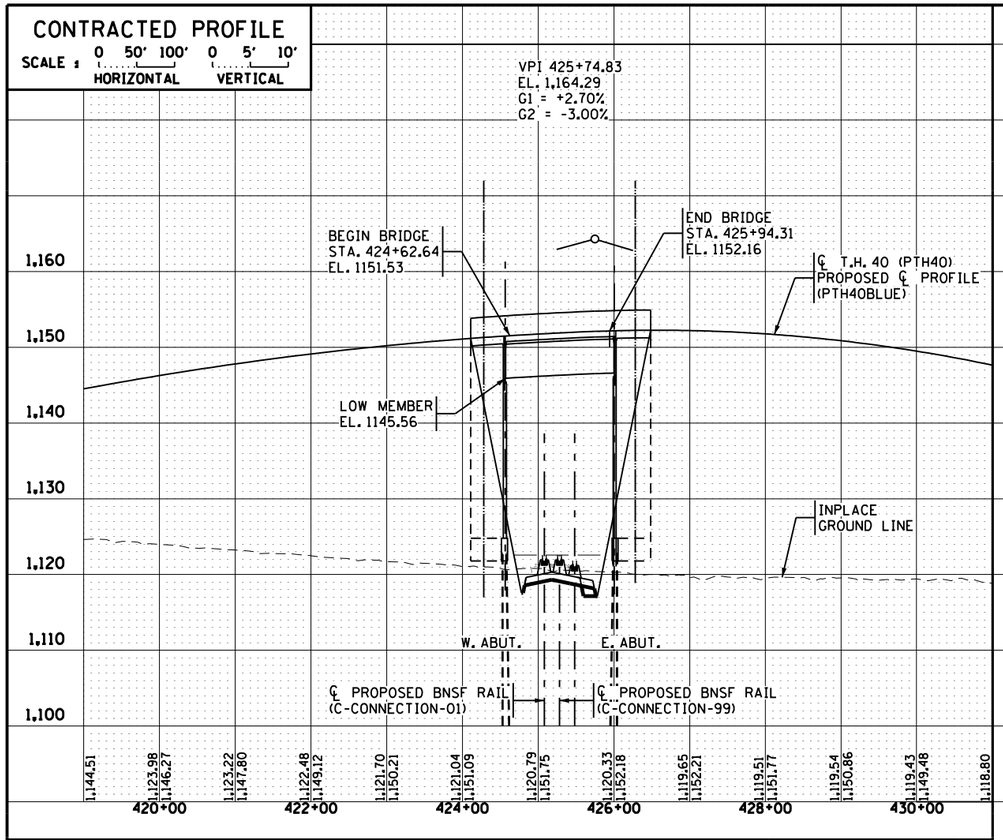
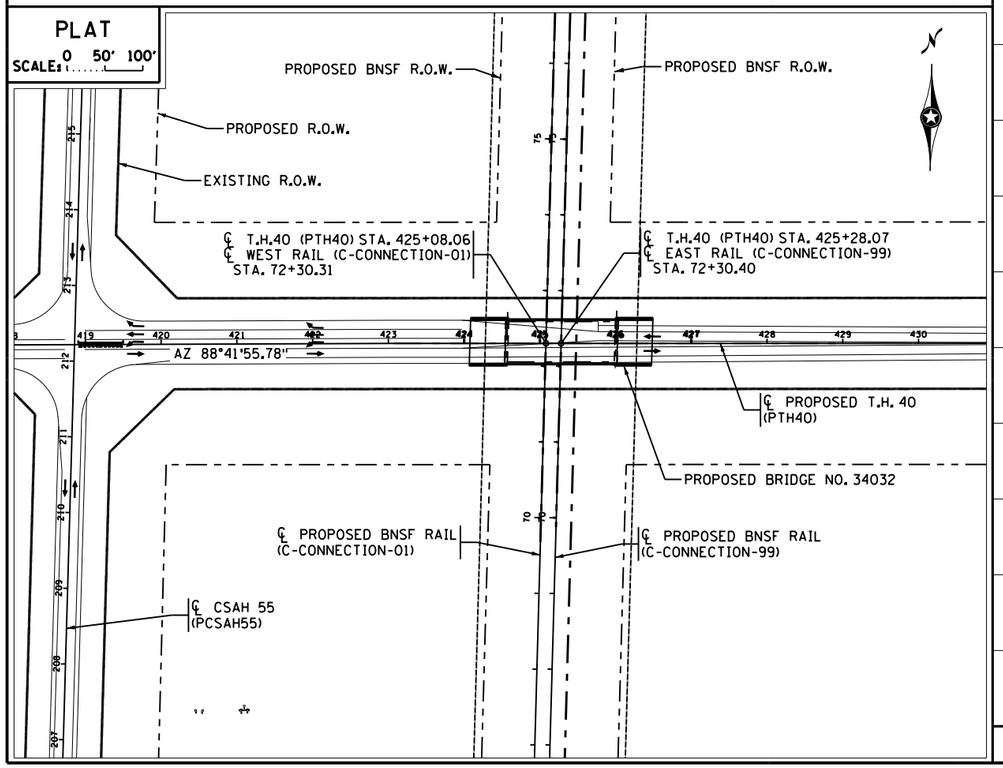
CONTRACTED PROFILE

SCALE : 0 50' 100' HORIZONTAL 0 5' 10' VERTICAL



PLAT

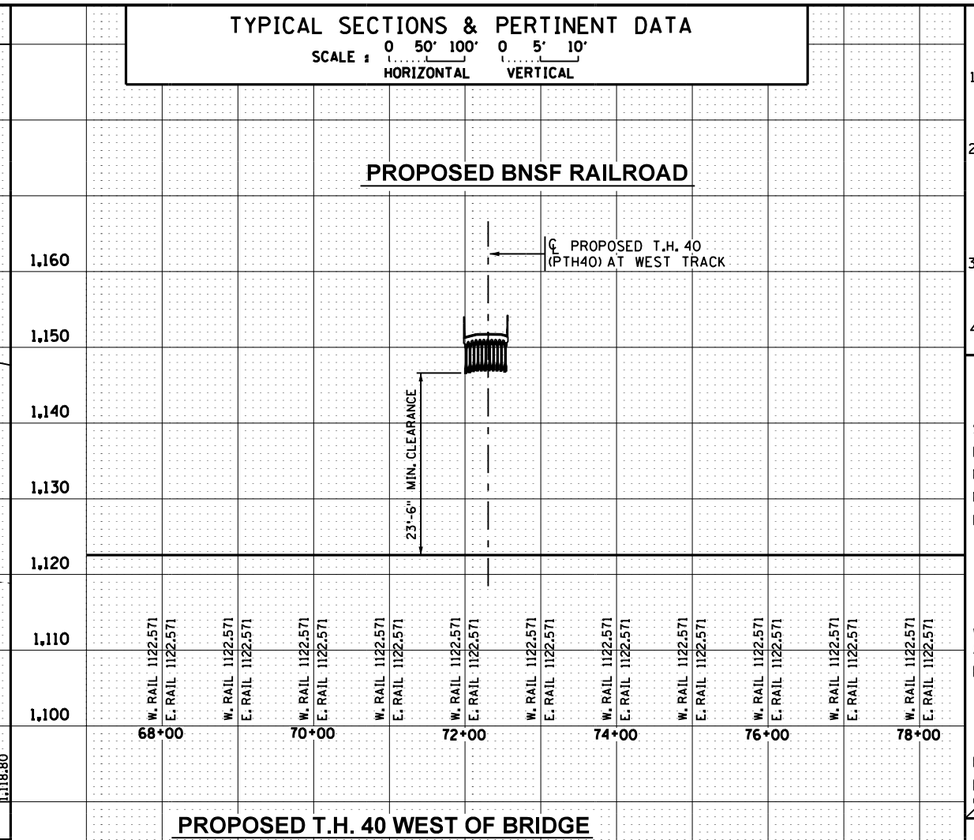
SCALE: 0 50' 100'



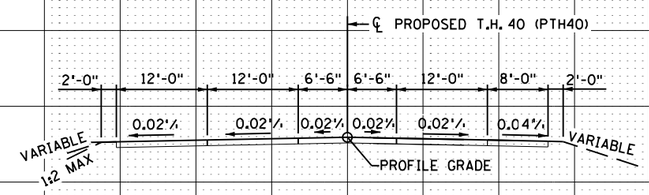
TYPICAL SECTIONS & PERTINENT DATA

SCALE : 0 50' 100' HORIZONTAL 0 5' 10' VERTICAL

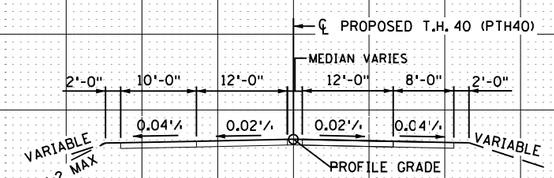
PROPOSED BNSF RAILROAD

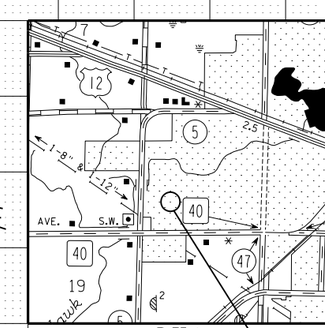


PROPOSED T.H. 40 WEST OF BRIDGE



PROPOSED T.H. 40 EAST OF BRIDGE





INDEX MAP
(FOUR SECTIONS)

LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

1. SPECIAL FEATURES: NONE
2. OTHER BRIDGES OR CULVERTS OVER THE SAME STREAM ~~XXXXXXXX~~

   DOWN STREAM:
3. APPARENT HIGHWATER ELEVATION: ~~XXXXXXXXX~~
   OBTAINED FROM: N/A
4. OTHER DATA: NONE

HYDRAULIC ENGINEERS RECOMMENDATION

DATE: XX/XX/2012

STREAM OR DITCH DESIGNATION: XXXXXXXX
DRAINAGE AREA: XX.X SQ. MI.
MAX. FLOOD ON RECORD: C.F.S. XXX
MAXIMUM OBSERVED HIGHWATER ELEVATION: XXX
DESIGN FLOOD (100 YR. FREQ.): XXX C.F.S.
HEADWATER ELEVATION: XXX.X FT.
DESIGN MEAN VELOCITY THROUGH STRUCTURE: X.X F.P.S.
TOTAL STAGE INCREASE: X.X FT.
LOW MEMBER AT OR ABOVE ELEVATION: XXX.X FT.
WATERWAY AREA REQUIRED BELOW ELEV. XXX.X FT. = XXXSQ. FT. AT RIGHT ANGLES TO CHANNEL
BASIC FLOOD (100 YR. FREQ.): XXX C.F.S.
HEADWATER ELEVATION: XXX.X FT.
TOTAL STAGE INCREASE: X.X FT.
MEAN VELOCITY THROUGH STRUCTURE: X.X F.P.S.
FLOWLINE ELEVATION: XXX.X FT. SKEW ANGLE: XX°
ESTIMATED PRELIMINARY TOTAL SCOUR AT PIER EL. N/A FT. (500 YR. FREQ.)

SCOUR CONFIRMATION RECOMMENDATION

DATE: N/A

TOTAL SCOUR AT PIER EL. N/A (500 YR. FREQ.)
SCOUR CODE: X

BRIDGE SURVEY SHEETS MADE FROM :
MNDOT SURVEY
BENCH MARK ELEVATION 1123.380 (N.A.V.D. 88 ADJ.)
LOCATION:
B.M. DISK PEHL MNDT
2.64 MILES SOUTHWEST OF WILLMAR, 0.7 MILE WEST ALONG TRUNK HIGHWAY 40 FROM JUNCTION OF TRUNK HIGHWAY 40 AND COUNTY ROAD 5 IN WILLMAR, THEN 2.2 MILES WEST-SOUTHWEST ON TRUNK HIGHWAY 40, AT TRUNK HIGHWAY 40 MILEPOINT 71.70, 49 FEET NORTH ON COUNTY ROAD 55 SOUTHWEST, AT NORTHEAST CORNER OF TRUNK HIGHWAY 40 AND COUNTY ROAD 55, 17.7 FEET EAST OF COUNTY ROAD 55, 69.3 FEET EAST-SOUTHEAST OF POWER POLE, 50.44 FEET SOUTH OF REFERENCE MARK 1, 43.31 FEET WEST OF REFERENCE MARK 2, 58.2 FEET SOUTH-SOUTHWEST OF WITNESS POST.

HORIZONTAL DATUM NAD 83 (2011 ADJ)
VERTICAL DATUM IS NAVD 88

BRIDGE SURVEY

PROPOSED BRIDGE LOCATED ON T.H. 40
0.1 MILES EAST OF C.R. 55 AND
1.0 MILES SOUTH OF C.R. 5W

SEC 17 T 119 R 35 W

COUNTY: KANDIYOHI

CITY: WILLMAR

BRIDGE NO. 34032

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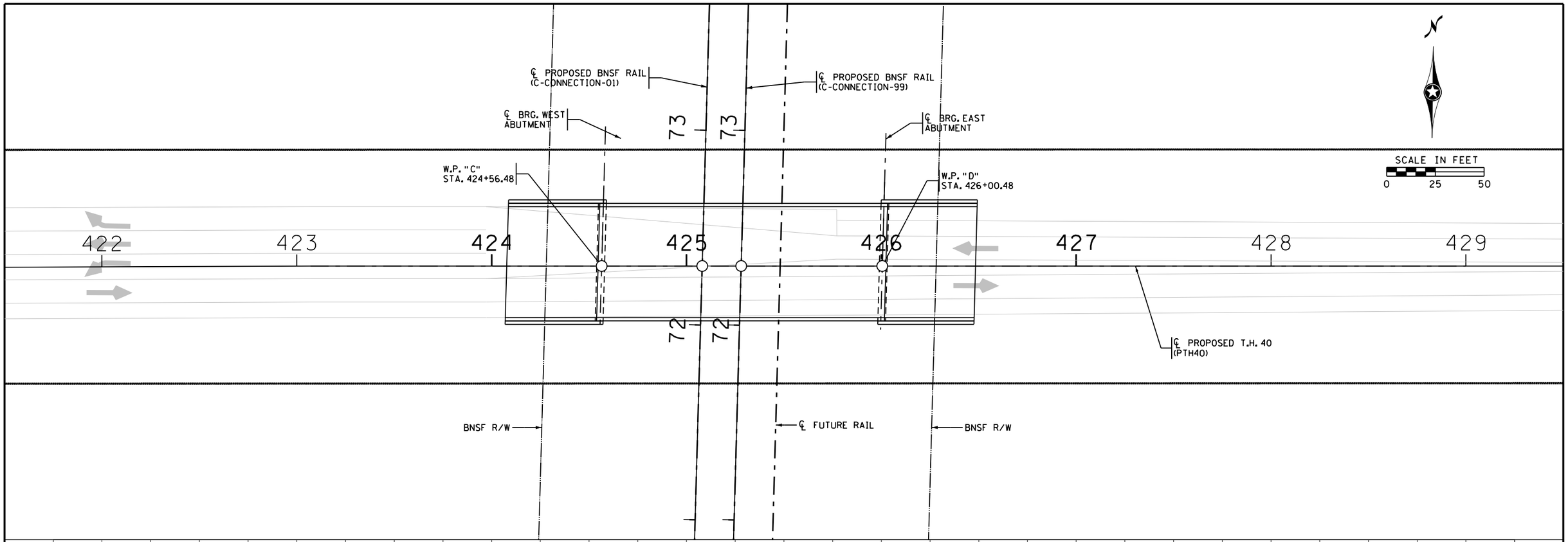

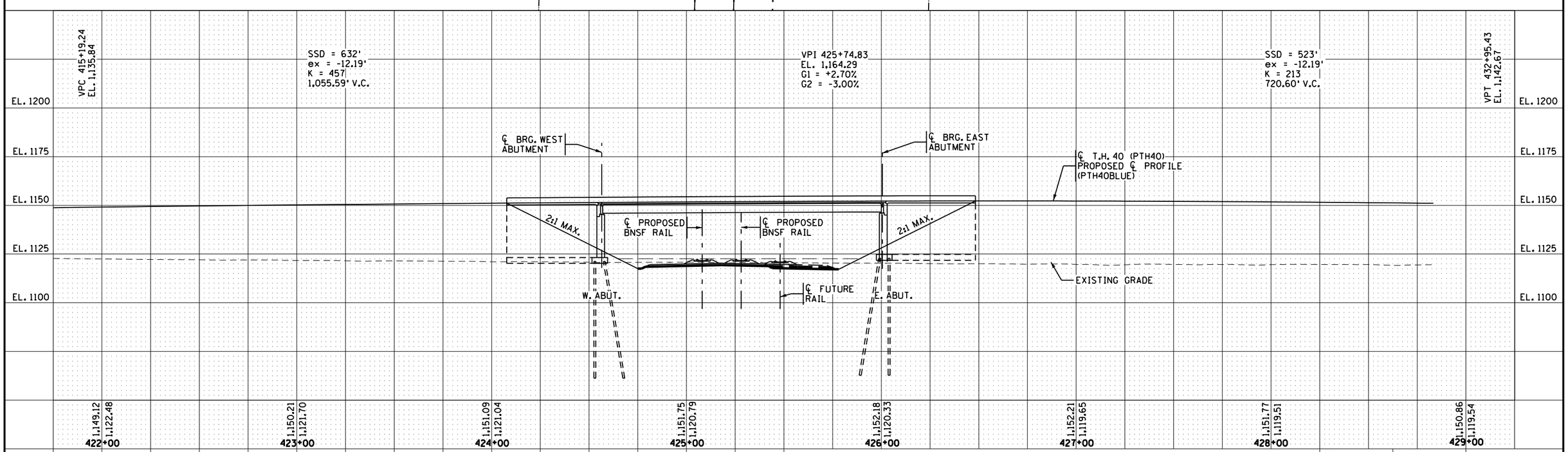

BRIDGE SURVEY - PLAN AND PROFILE

DR: SWH CHK: CBO

STATE PROJECT NO. S.P. XXX-XXX-XXX

SHEET NO. 6 OF 6 SHEETS

BRIDGE NO. 34032

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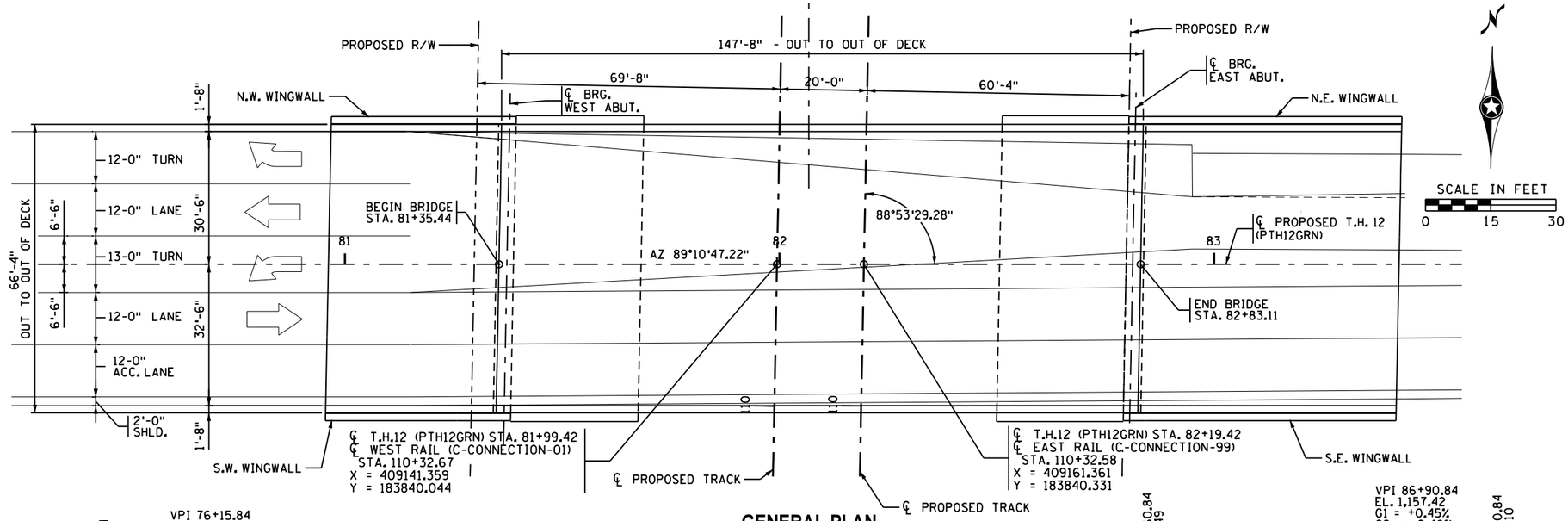
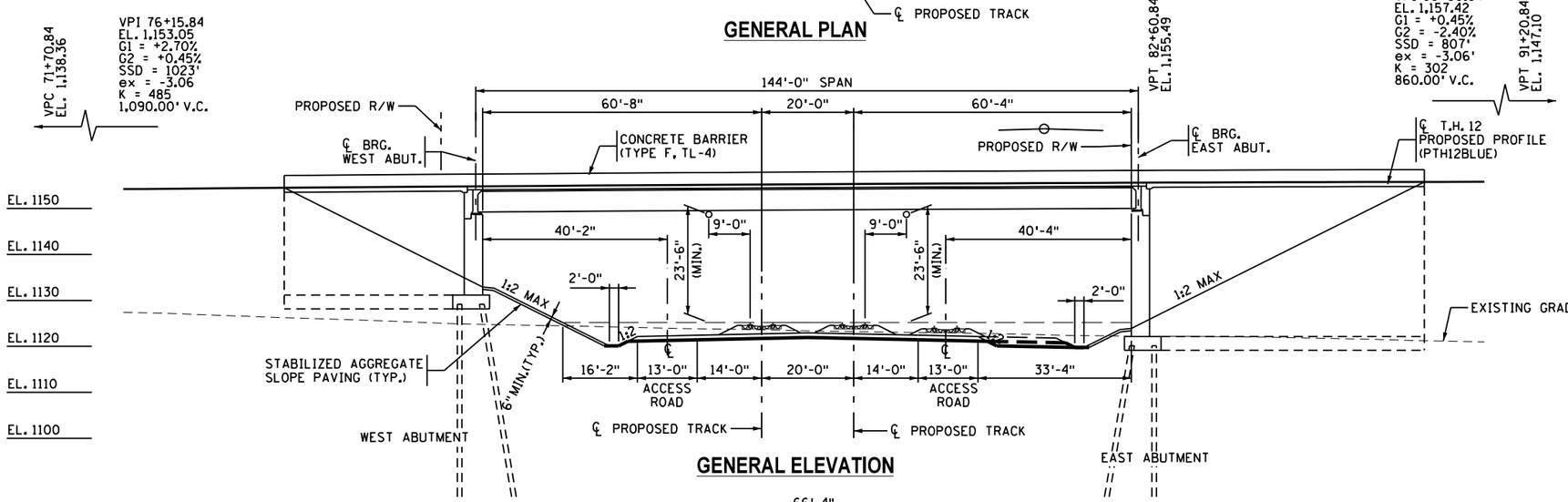
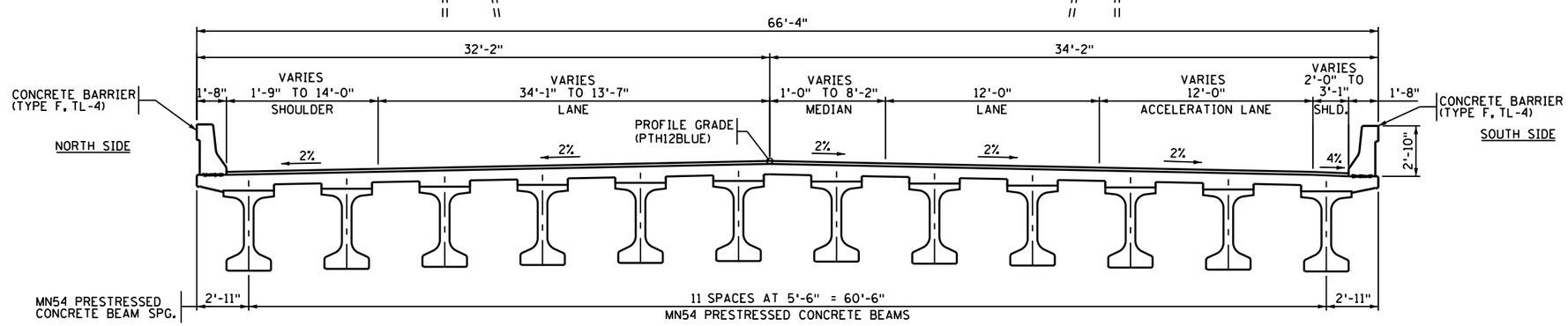


GENERAL PLAN



GENERAL ELEVATION



TRANSVERSE SECTION THRU DECK

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TEMPORARY HORIZONTAL AND VERTICAL CONSTRUCTION CLEARANCES SHALL MEET THE MINIMUM REQUIREMENTS OF THE UPRR GRADE SEPARATION GUIDELINES AND WILL BE PROVIDED IN THE DETAILED CONSTRUCTION PLAN.

PROPOSED TYPE OF STRUCTURE

DECK:
- MN54 PRESTRESSED CONCRETE BEAMS
- SEPARATE CONCRETE WEARING COURSE
- EPOXY COATED REINFORCEMENT
- SINGLE SPAN

SUBSTRUCTURE:
- SEMI-INTEGRAL ABUTMENTS SUPPORTED ON PILE SUPPORTED FOUNDATION

AESTHETICS:
- LEVEL C

WSB & Associates, Inc.
701 Xenia Avenue
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Minneapolis, MN 55416
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FAX 763-541-1700
INFRASTRUCTURE - ENGINEERS - PLANNERS

MINNESOTA DEPARTMENT OF TRANSPORTATION

CONCEPTUAL PLAN
Bridge No. 34031

PROPOSED T.H.12 (PTH12GRN) OVER
PROPOSED BNSF RAILROAD
0.1 MILES EAST OF C.R. 55 AND
0.2 MILES SOUTH OF C.R. 5W
144'-0"
PRESTRESSES CONCRETE BEAM SPAN
59'-0" CLEAR ROADWAY
88°53'29.28" SKEW
TYPE F (TL-4 CONC. RAILINGS

SPAN IDENTIFICATION NO. 501

PLAN AND PROFILE

SEC. 17 TWP. 119N R. 35W
WILLMAR TOWNSHIP KANDIYOHI COUNTY

APPROVED: _____ _____
STATE BRIDGE ENGINEER DATE

DES: SWH	DR: SWH	34031
CHK: CBO	CHK: CBO	

SHEET NO. 1 OF 1 SHEETS

MN PROJECT NO. BR	(T.H. 12)	STATE PROJECT NO. 3403-74

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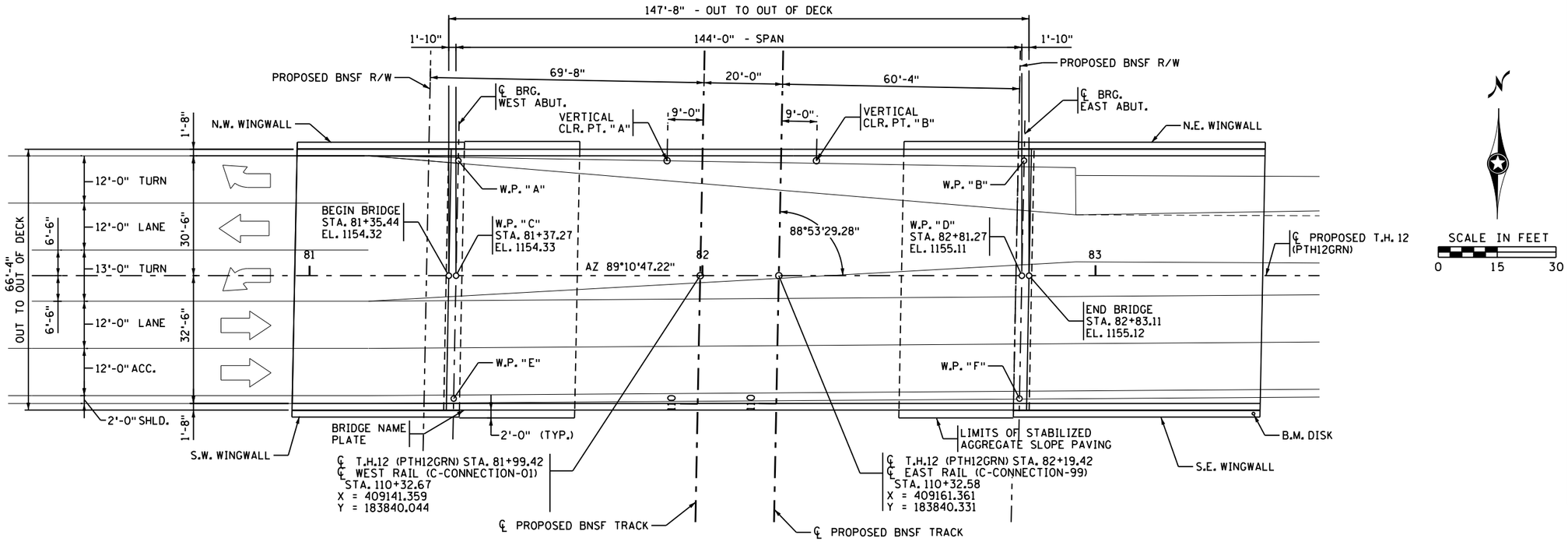
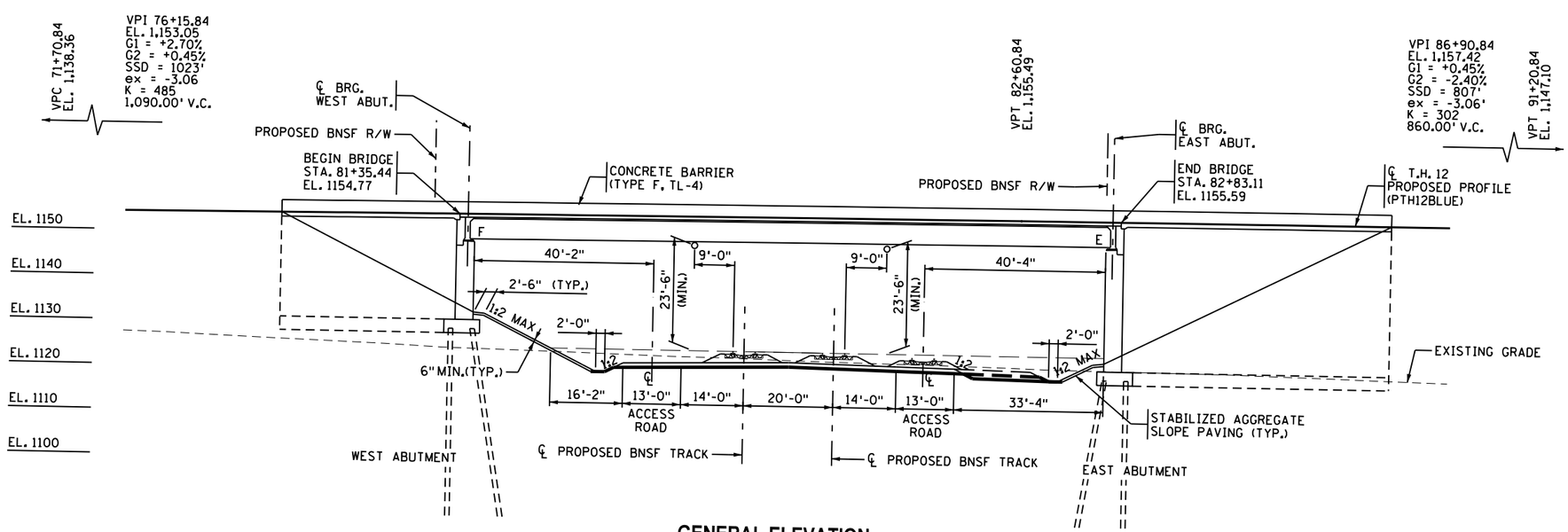


GENERAL PLAN



GENERAL ELEVATION

DESIGN DATA

DESIGNED IN ACCORDANCE WITH 2014 AND CURRENT INTERIM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
HL93 LIVE LOAD
DEAD LOAD INCLUDES 20 PSF ALLOWANCE FOR FUTURE WEARING COURSE MODIFICATIONS.

MATERIAL DESIGN PROPERTIES:
REINFORCED CONCRETE:
f'c = 4 KSI CONCRETE
fy = 60 KSI PLAIN AND EPOXY COATED BARS
n = 8 FOR REINFORCEMENT
PRESTRESSED CONCRETE:
f'c = 9 KSI n = 1
fpu = 270 KSI LOW RELAXATION STRANDS
0.75 fpu FOR INITIAL PRESTRESS

DESIGN SPEED:
OVER = XX MPH
UNDER = N/A
APPROXIMATE DECK AREA: = 9,205 SQUARE FEET
PROJECTED ADT FOR 2034 = XXXXX

LIST OF SHEETS

NO.	DESCRIPTION
1	GENERAL PLAN AND ELEVATION
2	TRANSVERSE SECTION THRU DECK
3	BRIDGE LAYOUT
4	AESTHETIC DETAILS
5	BRIDGE SURVEY
6	BRIDGE SURVEY - PLAN & PROFILE

PROPOSED TYPE OF STRUCTURE

DECK:
MN54 PRESTRESSED CONCRETE BEAMS
SEPARATE CONCRETE WEARING COURSE
EPOXY COATED REINFORCEMENT
SINGLE SPAN
SUBSTRUCTURE:
SEMI-INTEGRAL ABUTMENTS SUPPORTED ON PILE SUPPORTED FOUNDATION
AESTHETICS:
LEVEL C

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INFRASTRUCTURE - ENGINEERS - PLANNERS

MINNESOTA DEPARTMENT OF TRANSPORTATION

PRELIMINARY PLAN
Bridge No. 34031

PROPOSED T.H.12 (PTH12GRN) OVER
PROPOSED BNSF RAILROAD
0.1 MILES EAST OF C.R. 55 AND
0.2 MILES SOUTH OF C.R. 5W
144'-0"
PRESTRESSES CONCRETE BEAM SPAN
59'-0" CLEAR ROADWAY
88°53'29.28" SKEW
TYPE F (TL-4 CONC. RAILINGS

SPAN IDENTIFICATION NO. 501

PLAN AND PROFILE

SEC. 17 TWP. 119N R. 35W
WILLMAR TOWNSHIP KANDIYOHI COUNTY

APPROVED: _____ _____
STATE BRIDGE ENGINEER DATE

NO	DATE	BY	CHK	REVISIONS

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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **GENERAL PLAN AND ELEVATION**

DES: SWH	DR: SWH
CHK: CBO	CHK: CBO

Sheet 1 of 6 Sheets

Bridge No. 34031

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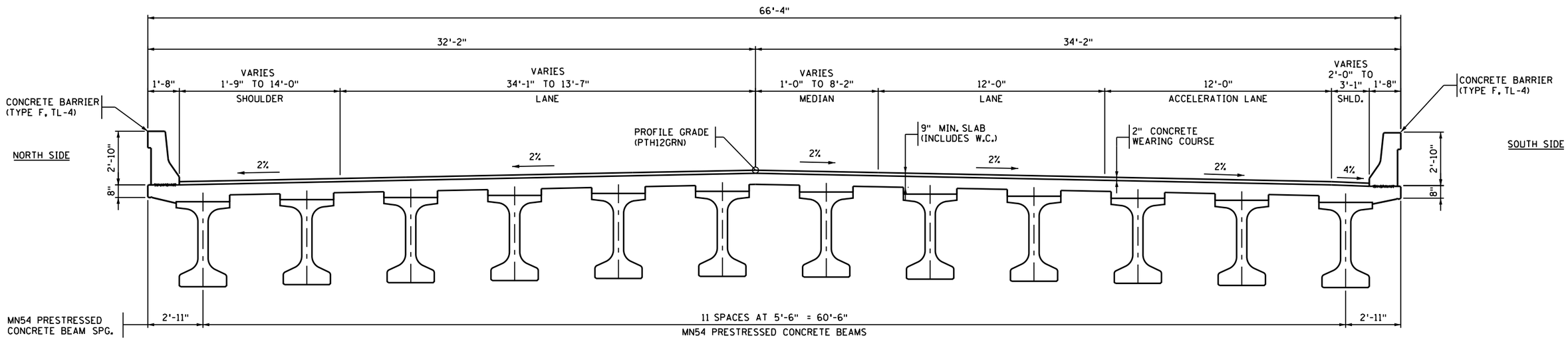


TRANSVERSE SECTION THRU DECK

CONSTRUCTION NOTES

THE PROPOSED GRADE SEPARATION PROJECT SHALL NOT INCREASE THE QUANTITY AND/OR CHARACTERISTICS OF THE FLOW IN THE RAILROAD'S DITCHES AND/OR DRAINAGE STRUCTURES.

THE ELEVATION OF THE EXISTING TOP-OF-RAIL PROFILE SHALL BE VERIFIED BEFORE BEGINNING CONSTRUCTION. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE RAILROAD PRIOR TO CONSTRUCTION.

THE CONTRACTOR MUST SUBMIT A PROPOSED METHOD OF EROSION AND SEDIMENT CONTROL AND HAVE THE METHOD APPROVED BY THE RAILROAD.

ALL SHORING SYSTEMS THAT IMPACT THE RAILROAD'S OPERATIONS AND/OR SUPPORTS THE RAILROAD'S EMBANKMNET SHALL BE DESIGNED AND CONSTRUCTED PER CURRENT RAILROAD GUIDELINES FOR TEMPORARY SHORING.

ALL DEMOLITIONS WITHIN THE RAILROAD'S RIGHT-OF-WAY AND/OR DEMOLITION THAT MAY IMPACT THE RAILROAD'S TRACKS OR OPERATIONS SHALL BE IN COMPLIANCE WITH THE RAILROAD'S DEMOLITON GUIDELINES.

ERECTION OVER THE RAILROAD'S RIGHT-OF-WAY SHALL BE DESIGNED TO CAUSE NO INTERUPTION TO THE RAILROAD'S OPERATION, ENABLING THE TRACK(S) TO REMAIN OPEN TO TRAFFIC PER THE RAILROAD REQUIREMENTS.

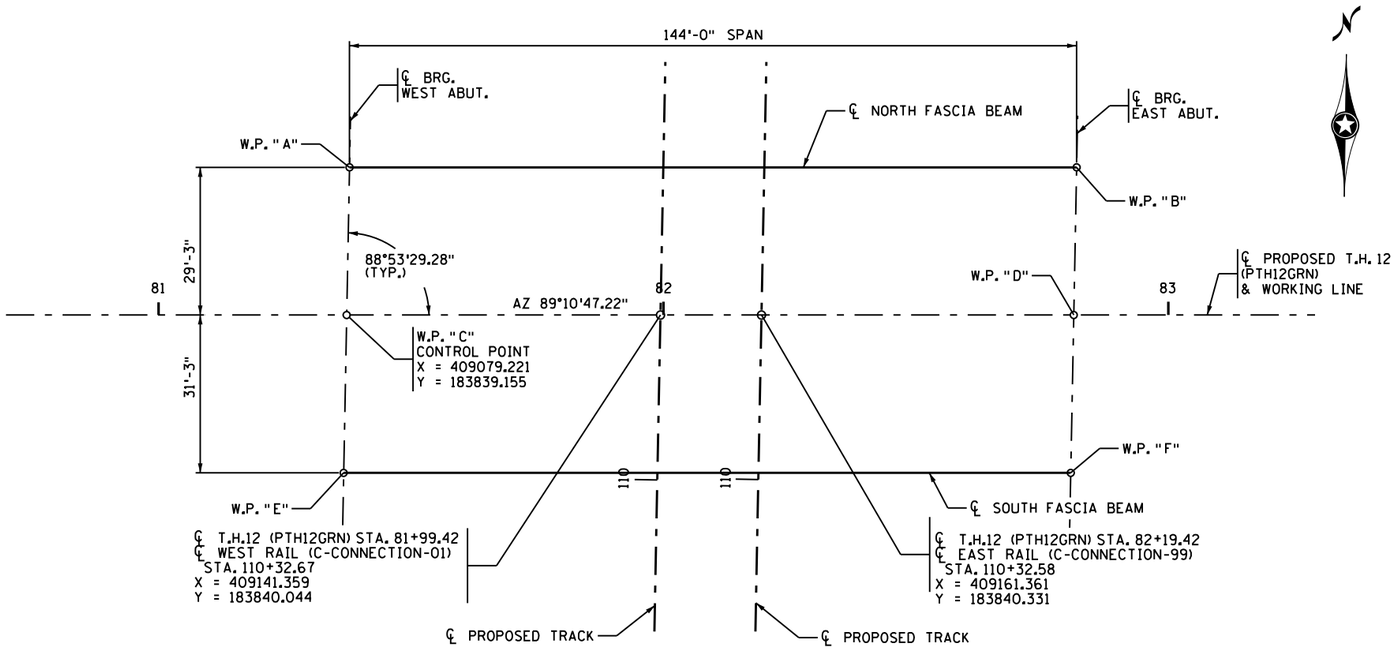
RAILROAD REQUIREMENTS DO NOT ALLOW WORK WITHIN 50 FEET OF THE TRACK CENTERLINE WHEN A TRAIN PASSES THE WORK SITE AND ALL PERSONNEL MUST CLEAR THE AREA WITHIN 25 FEET OF THE TRACK CENTERLINE AND SECURE ALL EQUIPMENT.

FALSE-WORK CLEARANCES SHALL COMPLY WITH MINIMUM CONSTRUCTION CLEARANCES.

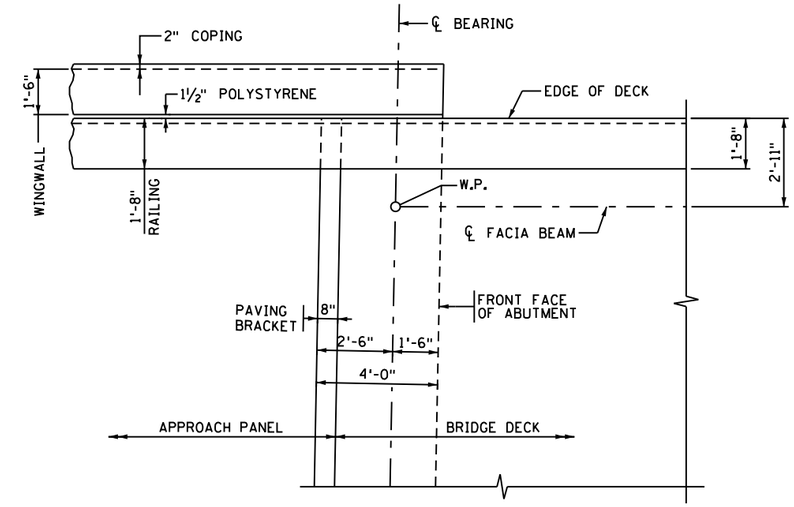
ALL PERMANENT CLEARANCES SHALL BE VERIFIED BEFORE PROJECT CLOSING

DIRECT DRAINAGE ONTO THE RAILROAD RIGHT-OF-WAY IS NOT ALLOWED.

TEMPORARY HORIZONTAL AND VERTICAL CONSTRUCTION CLEARANCES SHALL MEET THE MINIMUM REQUIREMENTS OF THE UPRR GRADE SEPARATION GUIDELINES AND WILL BE PROVIDED IN THE DETAILED CONSTRUCTION PLAN.

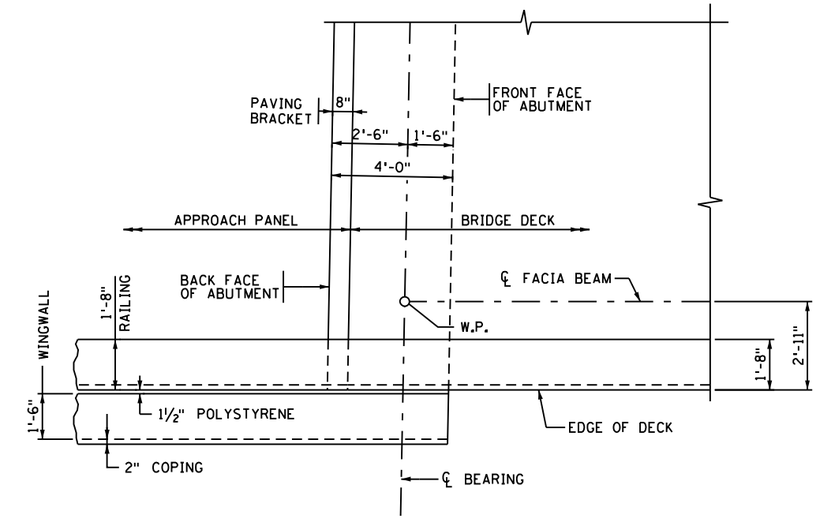


WORKING POINT LAYOUT



CORNER DETAIL

N.W. CORNER SHOWN. S.E. CORNER SIMILAR



CORNER DETAIL

S.W. CORNER SHOWN. N.E. CORNER SIMILAR

TOP OF ROADWAY TO BRIDGE SEAT					
	SLAB THICKNESS	STOOL HEIGHT	BEAM HEIGHT	BEARING HEIGHT	TOTAL
WEST ABUT.	9"	4"	54"	X	X
EAST ABUT.	9"	4"	54"	X	X

DIMENSIONS BETWEEN WORKING POINTS										ELEVATIONS			
POINT	STATION	X-COORD	Y-COORD	A	B	C	D	E	F	TOP OF DECK	TOP OF DECK TO BRIDGE SEAT	BRIDGE SEAT	POINT
A	81+37.84	409079.368	183868.410		144.00	29.26	146.39		155.11	X	X	X	A
B	82+81.84	409223.353	183870.471			147.50	29.26	157.27		X	X	X	B
C	81+37.27	409079.221	183839.155				144.00	31.26	146.76	X	X	X	C
D	82+81.27	409223.206	183841.216					147.94	31.26	X	X	X	D
E	81+36.67	409079.063	183807.900						144.00	X	X	X	E
F	82+80.67	409223.049	183809.961							X	X	X	F

NO	DATE	BY	CHK	REVISIONS

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **BRIDGE LAYOUT**

DES: SWH	DR: SWH	
CHK: CBO	CHK: CBO	
Sheet 3 of 6 Sheets		

Bridge No. 34031

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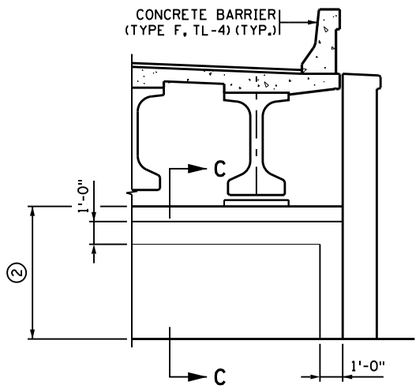
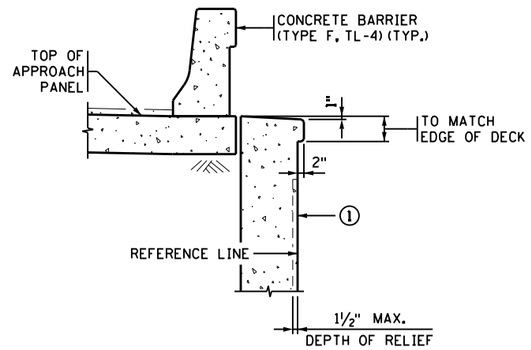


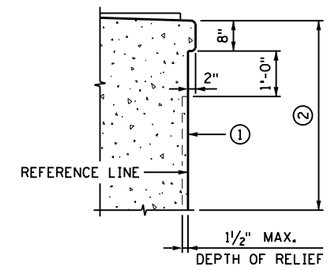
ELEVATION VIEW A-A

ABUTMENT FACE



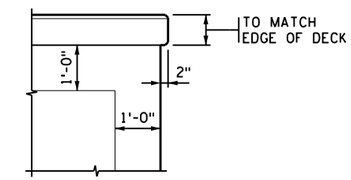
SECTION B-B

WINGWALL SECTION
SEMI-INTEGRAL TYPE ABUTMENT SHOWN
OTHER ABUTMENT TYPES SIMILAR



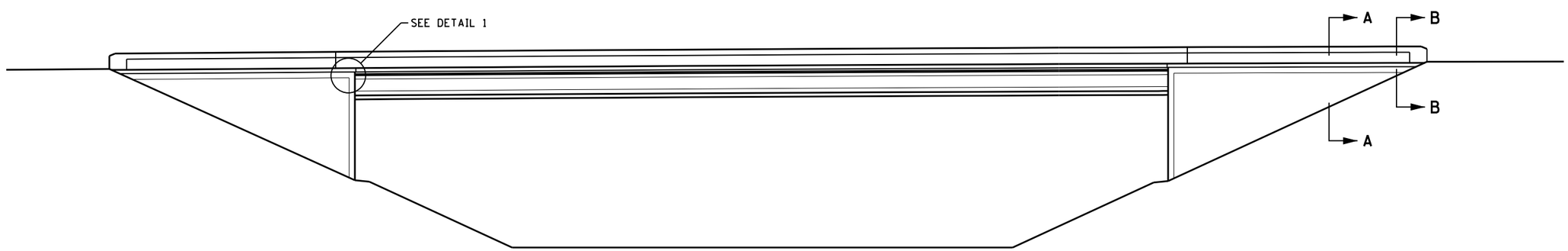
SECTION C-C

ABUTMENT SECTION
SEMI-INTEGRAL TYPE ABUTMENT SHOWN
OTHER ABUTMENT TYPES SIMILAR



DETAIL 1

WINGWALL



ELEVATION

NO	DATE	BY	CHK	REVISIONS

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WILLMAR WYE BRIDGES
KANDIYOHI COUNTY
STATE PROJECT NO. 3403-74

TITLE: **AESTHETIC DETAILS**

DES: SWH	DR: SWH	
CHK: CBO	CHK: CBO	
Sheet 4 of 6 Sheets		

Bridge No. 34031

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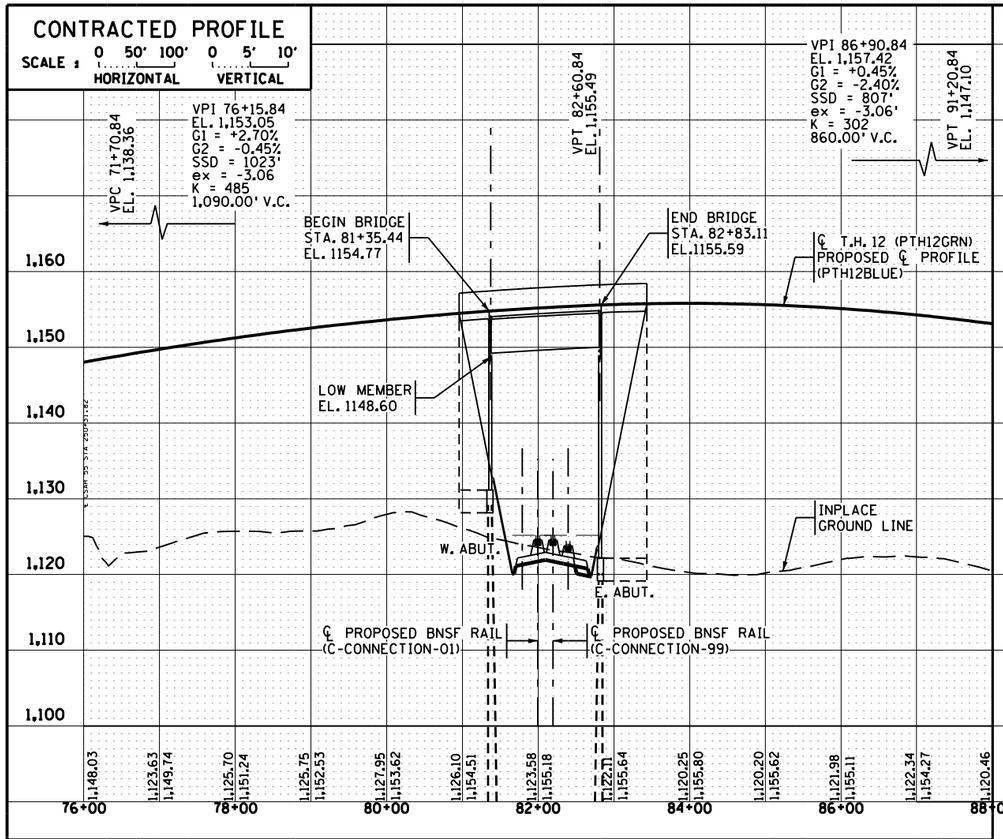
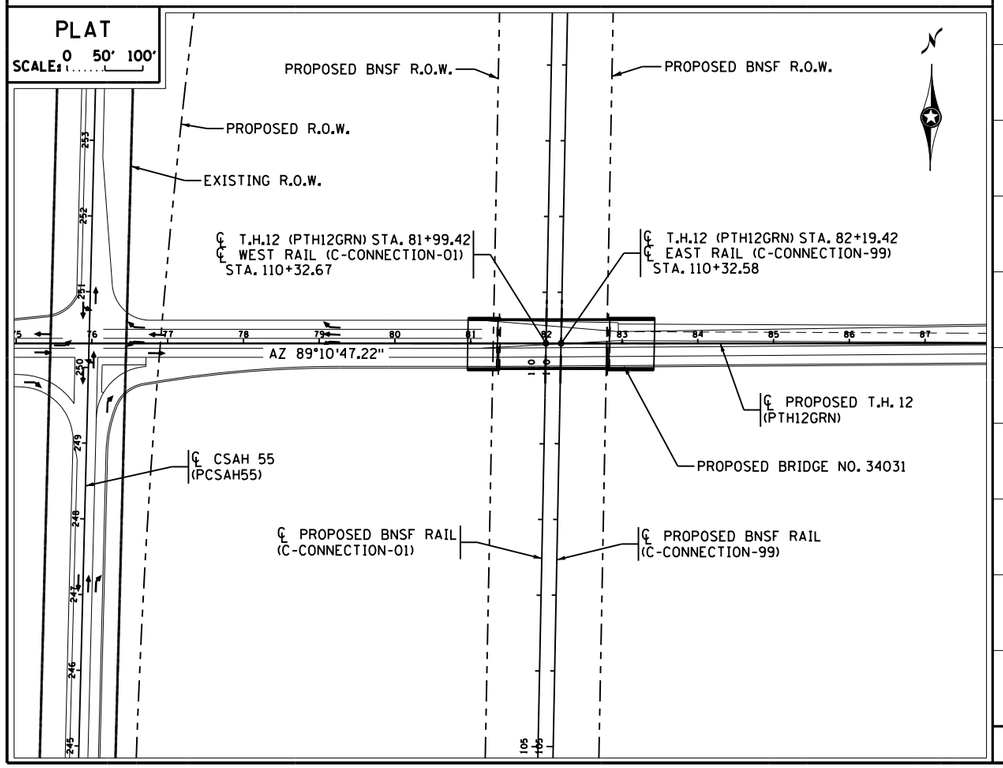
CONTRACTED PROFILE

SCALE : 0 50' 100' HORIZONTAL 0 5' 10' VERTICAL



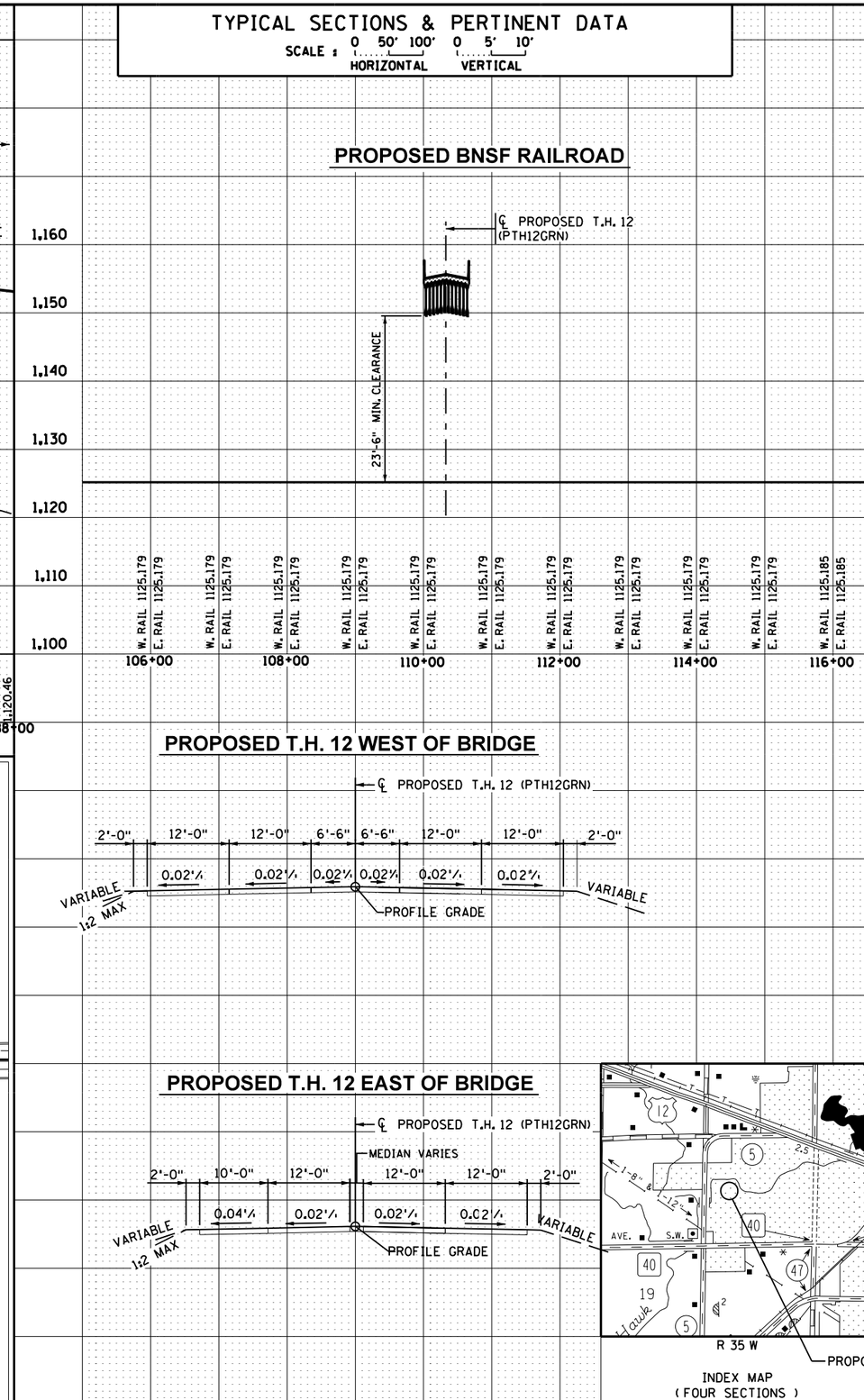
PLAT

SCALE: 0 50' 100'



TYPICAL SECTIONS & PERTINENT DATA

SCALE : 0 50' 100' HORIZONTAL 0 5' 10' VERTICAL



LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

1. SPECIAL FEATURES: NONE
2. OTHER BRIDGES OR CULVERTS OVER THE SAME STREAM: ~~XXXXXXXX~~

   DOWN STREAM:
3. APPARENT HIGHWATER ELEVATION: ~~XXXXXXXXX~~
   OBTAINED FROM: N/A
4. OTHER DATA: NONE

HYDRAULIC ENGINEERS RECOMMENDATION

DATE: XX/XX/2012

STREAM OR DITCH DESIGNATION: XXXXXXXX
DRAINAGE AREA: XX.X SQ. MI.
MAX. FLOOD ON RECORD: C.F.S. XXX
MAXIMUM OBSERVED HIGHWATER ELEVATION: XXX
DESIGN FLOOD (100 YR. FREQ.): XXX C.F.S.
HEADWATER ELEVATION: XXX.X FT.
DESIGN MEAN VELOCITY THROUGH STRUCTURE: X.X F.P.S.
TOTAL STAGE INCREASE: X.X FT.
LOW MEMBER AT OR ABOVE ELEVATION: XXX.X FT.
WATERWAY AREA REQUIRED BELOW ELEV. XXX.X FT. = XXXSQ. FT. AT RIGHT ANGLES TO CHANNEL
BASIC FLOOD (100 YR. FREQ.): XXX C.F.S.
HEADWATER ELEVATION: XXX.X FT.
TOTAL STAGE INCREASE: X.X FT.
MEAN VELOCITY THROUGH STRUCTURE: X.X F.P.S.
FLOWLINE ELEVATION: XXX.X FT. SKEW ANGLE: XX°
ESTIMATED PRELIMINARY TOTAL SCOUR AT PIER EL. N/A FT. (500 YR. FREQ.)

SCOUR CONFIRMATION RECOMMENDATION

DATE: N/A

TOTAL SCOUR AT PIER EL. N/A (500 YR. FREQ.)
SCOUR CODE: X

BRIDGE SURVEY SHEETS MADE FROM :
MNDOT SURVEY

BENCH MARK ELEVATION 1116.737 (N.A.V.D. 88 ADJ.)

LOCATION:
B.M. DISK WILLPORT AZ MK
2.55 MILES WEST OF WILLMAR, AT OLD AIRPORT, AT WEST-NORTHWEST END OF RUNWAY 10, 0.2 MILE NORTH ALONG COUNTY ROAD 5 FROM JUNCTION OF COUNTY ROAD 5 AND TRUNK HIGHWAY 40 IN WILLMAR, 54 FEET NORTH-NORTHEAST OF TAXIWAY, 30 FEET NORTHEAST OF END MARKER AT WEST END OF TAXIWAY, 31.8 FEET NORTH OF WITNESS POST.

HORIZONTAL DATUM NAD 83 (2011 ADJ)
VERTICAL DATUM IS NAVD 88

BRIDGE SURVEY

PROPOSED BRIDGE LOCATED ON T.H. 12
0.1 MILES EAST OF C.R. 55 AND
0.2 MILES SOUTH OF C.R. 5W

SEC 17 T 119 R 35 W

COUNTY: KANDIYOHI

CITY: WILLMAR

BRIDGE NO. 34031

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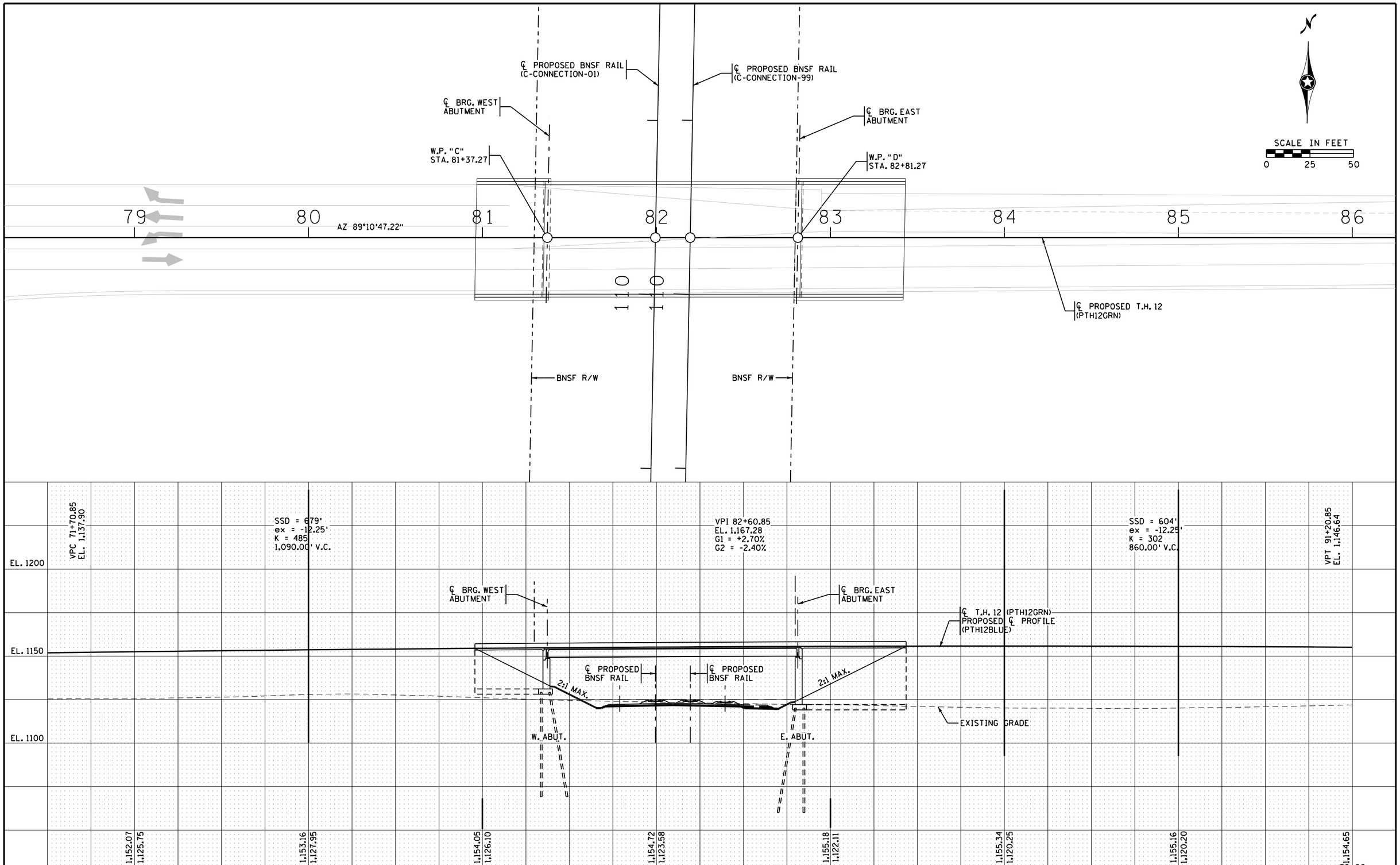

BRIDGE SURVEY - PLAN AND PROFILE

DR: SWH CHK: CBO

STATE PROJECT NO. S.P. XXX-XXX-XXX

SHEET NO. 6 OF 6 SHEETS

BRIDGE NO. 34031

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Appendix E – Benefit Cost Analysis

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Minneapolis, MN 55416
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Technical Memorandum

To: ***Paul Rasmussen, PE***

From: ***Tony Heppelmann, PE***
Adam Smith, AICP

Date: ***October 31, 2016***

Re: ***Willmar Wye Rail Connector and Industrial Access Project***
Benefit-Cost Analysis Memo
S.P. 3403-74
WSB Project No. 02051-020

Introduction

This memorandum summarizes the assumptions, methodology, and results of the benefit-cost analysis of several alternatives evaluated as part of the Environmental Assessment/ Environmental Assessment Worksheet (EA/EAW) for the Willmar rail connector and industrial access project.

The objective of a benefit-cost analysis (BCA) is to translate the effects of an investment into monetary terms and to account for the fact that benefits generally accrue over a long period of time while capital costs are incurred primarily in the initial years. The primary transportation-related elements that can be monetized are travel time costs, vehicle operating and inventory costs, safety costs, ongoing maintenance costs, and remaining capital value (a combination of capital expenditure and salvage value). After monetizing and combining these factors, projects are considered cost-effective if the benefit-cost ratio is greater than 1.0 and if the net present value is greater than zero.

The project is located in the City of Willmar and Willmar Township, which are located in central Kandiyohi County. The BNSF Railway Company (BNSF) owns the Morris and Marshall Rail Subdivisions, which meet in the BNSF Willmar Terminal within the City of Willmar's downtown. The Morris Subdivision runs northwest to Morris, MN, and provides connection to Fargo, ND, Canada, and points west. The Marshall Subdivision runs southwest towards Sioux City and provides connection to Kansas City, MO, and points south. At the Willmar Terminal, these subdivisions connect with the Wayzata Subdivision, which extends east toward Minneapolis and provides connections to Chicago. Within the project area, there are a number of major roadways that may require modification to facilitate construction of the proposed rail

connector, including Trunk Highway (TH) 12, TH 40, and County State Aid Highway (CSAH) 55. TH 12 is an east-west principal arterial which extends from the South Dakota-Minnesota state border in the west through the project area to the Minneapolis/St. Paul metropolitan area in the east. TH 40 is an east-west minor arterial which extends from the western border of the state and terminates in Willmar. CSAH 55 is a north-south collector roadway which extends from its junction with CSAH 15 south of the project area to a junction with TH 12. For the purposes of the benefit-cost analysis, the study area is bounded by three primary corridors: along the Morris/Wayzata Subdivisions and TH 12 from its junction with 7th Avenue through downtown Willmar to Lakeland Drive, along the Marshall/Wayzata Subdivisions from CSAH 55 to Lakeland Drive, and along CSAH 55 from its crossing with the Marshall Subdivision north to the Morris Subdivision and TH 12 (see **Figure 1**).

Description of Alternatives

Based on input from the Project Partners and Project Management Team, four alternatives have been developed and are analyzed in this benefit-cost analysis. Forecasts were developed to evaluate the performance of each alternative between the assumed year of opening (2021) and the design year (2040).

The No Build Alternative

Analysis of the No Build Alternative assumes that the existing rail and roadway configurations within the study area would remain in place in the future, including the existing at-grade crossing. Trains needing to switch between the Morris and Marshall Subdivisions would continue to use the Willmar Terminal, occupying at-grade intersections within the local roadway network. It is assumed that overall rail volumes will remain constant throughout the analysis period; however, vehicle traffic is projected to increase within the study area, based on development of the Willmar Industrial Park.

Build Alternatives

Three build alternatives were analyzed in the benefit-cost analysis. Each includes construction of a rail connector east of CSAH 55 between the Morris and Marshall Subdivisions, along with roadway improvements on TH 12, TH 40, CSAH 55/1st Avenue W, and 45th Street NW. Each build alternative includes construction of a new north-south railroad connection (along with a rail siding) slightly east (approximately 625 feet) of CSAH 55, connecting the Morris and Marshall Subdivisions. The rail concept includes a grade separation at TH 40 and at TH 12. In addition to allowing trains to bypass Willmar Terminal to switch between the Morris and Marshall Subdivisions, the rail connection would also serve the adjacent industrial park and allow BNSF to hold trains and change crews without impacting motorized vehicle traffic. Railway bridges or culverts would be constructed to cross Hawk Creek (County Ditch 10), an unnamed tributary to Hawk Creek and County Ditch 46. The descriptions below focus on the roadway modifications associated with each build alternative. As with the no build alternative, overall train volumes are assumed to remain constant throughout the analysis period; however, up to six trains per day would be diverted to the new rail connector, bypassing the Willmar

Terminal. Motor vehicle volumes are anticipated to increase due to traffic associated with the development of the Willmar Industrial Park.

Alternative 1 – TH 12 Reconstructed in Place

In addition to the rail improvements, Alternative 1 includes a number of roadway modifications, as shown in **Figure 2**. Starting at the southern limits of the project, the following roadway modifications would be made:

- The intersection of TH 40 and CSAH 55 would be raised and reconstructed. The reconstruction would extend approximately 3,600 feet on TH 40 and approximately 1,600 feet on CSAH 55.
- CSAH 55 would be realigned starting approximately 2,100 feet south of the western leg of 1st Avenue West and would curve towards the west and north and reconnect with US Highway 12 (TH 12) approximately 2,200 feet west of the intersection of TH 12 and 45th Street West, a total realignment of approximately 5,800 feet.
- The intersection of CSAH 55 and 1st Avenue West would be reconfigured to create a single intersection and a straight roadway connection. East of this intersection, there would be a new at-grade railroad crossing on 1st Avenue West.
- 45th Street Northwest on the south side of TH 12 would be disconnected from TH 12 and would have a cul-de-sac at its northern limits. The cul-de-sac would be needed to serve the existing businesses located along 45th Street Northwest.
- A new driveway connection would be needed off of CSAH 55 to provide access to the mini storage site (its access would need to be removed from TH 12).
- 45th Street Northwest on the north side of TH 12 would be disconnected from its present location and rerouted approximately 2,400 feet to the west and align with the new CSAH 55 intersection on the south side of TH 12. This intersection would have an at-grade crossing with the railway. It would be located at an existing crossing that currently serves two properties. Updates would need to be made at the crossing to install gates, lights and bells.
- TH 12 would be reconstructed from 7th Avenue West to approximately one mile to the east. TH 12 would have to be raised on retaining walls in order to accommodate the new railway connection within the limited right of way. Approximately 4,000 feet of walls would be needed that would start about five feet underground and go up to over 40 feet in height. The height is needed to provide clearance over the railway connection. Due to the curve in the connection of the new railway into the Morris Subdivision, the bridge on TH 12 would have to be constructed on a skew which would also require a longer span.

This alternative would require crossings of Hawk Creek (County Ditch 10) and would require the reconstruction of the existing crossing west of CSAH 55 on TH 40.

Alternative 2A – TH 12 Realigned with 1st Avenue West At-Grade Crossing

In addition to the rail improvements described above, Alternative 2A includes a number of roadway modifications, as shown in **Figure 3**. At the southern end of the project Alternative 2A is similar to Alternative 1. The intersection of TH 40 and CSAH 55 would be raised and reconstructed. The reconstruction would extend approximately 3,600 feet on TH 40 and approximately 1,600 feet on CSAH 55. Further north, Alternative 2A would include the following components:

- TH 12 would be realigned to the south. This would require approximately 2.5 miles of new alignment for TH 12. As shown on **Figure 3**, the new alignment would begin at approximately 7th Avenue NW and shift to the south, where it would cross 1st Avenue West. From there the roadway would continue slightly south and to the east where it would cross CSAH 55 and the new BNSF railway with two grade separations. A new connector roadway would be constructed southwest of the TH 12 bridge over CSAH 55 to provide access between TH 12 and CSAH 55. East of the new railway section, TH 12 would continue in an easterly direction and cross CSAH 5 at an at-grade intersection. This intersection would be signalized. From CSAH 5 the new TH 12 alignment would extend to the east until it connects to the existing TH 12 corridor. Realigning TH 12 would require the removal of portions of the existing roadway.
- The intersection of CSAH 55/1st Avenue West/45th Street NW would be reconfigured to create a single intersection and a straight roadway connection. The geometrics would provide for more of a 90 degree intersection between the roadways.
- 45th Street NW on the south side of existing TH 12 would be curved to the west on the existing TH 12 alignment to provide a local connection on 45th Street NW both on the north and south sides of existing TH 12. This connection would also provide access to Willmar Poultry Farms and the fabric and tile warehouse (local businesses).
- 45th Street Northwest on the north side of existing TH 12 would be disconnected from its present location and rerouted approximately 2,400 feet to the west and connect into the new TH 12. The existing connection to TH 12 would have to be eliminated due to the crossing of the new railway alignment. This intersection would have an at-grade crossing with the railway. It would be located at an existing crossing that currently serves two properties. Updates would need to be made at the crossing to install gates, lights and bells.
- The existing intersection at 1st Avenue West/CSAH 55 and existing TH 12 would include geometric modifications to make it easier for trucks to enter and leave existing TH 12.

Alternative 2B – TH 12 Realigned without 1st Avenue West At-Grade Crossing

Alternative 2B includes the same rail improvements and many of the same roadway modifications as described under Alternative 2A, including the new alignment for TH 12 (see **Figure 4**). However, this alternative would vary from Alternative 2A in the following components:

- The TH 12 and CSAH 55 intersection would not be grade separated; instead, the intersection would be constructed at a raised alignment sufficient for the TH 12 grade

separation with the railroad connector to the east. Because access between TH 12 and CSAH 55 would be provided, a new connector roadway would not be constructed.

- The intersection of CSAH 55 and 1st Avenue West would be reconfigured to create a single intersection and a straight roadway connection. The curving portion of CSAH 55/1st Avenue West between CSAH 55 and the proposed railroad connector would be removed to avoid the addition of an at-grade railroad crossing.
- East of the railroad connector, a new roadway would be constructed from TH 12 to the north, connecting with 1st Avenue West, in order to provide continued access to the grain elevator and other properties.

Analysis Methodology and Key Assumptions

Transportation improvement projects generally increase the capacity of existing facilities or systems, and/or improve the safety of existing facilities or systems. Analysis of these types of projects involves quantifying data related to the cost of construction, cost of maintenance, cost to the users (vehicle operating costs and time), external costs (climate and health-related emissions), monetary benefit of safety improvements, and remaining capital value at the end of the analysis period. The analysis is based on the following components for both the No Build and Build Alternatives:

1. Travel times on the roadway network.
2. Operating and inventory costs, including external costs related to emissions.
3. Safety based on number of crashes and severity.
4. Initial capital expenses including construction and right-of-way costs.
5. Track and roadway maintenance costs over the analysis period.
6. Remaining capital value of the constructed track and roadway components at the end of the analysis.

Based on traffic forecasts developed for the project, traffic operations under the build alternatives were projected and compared to operations under the base No Build Alternative. The traffic network analyzed included the following existing and/or proposed roadways: TH 12, TH 40, CSAH 55, CSAH 15/19th Avenue SW, CSAH 5, 1st Avenue West, 45th Street, and access roads to TH 12 from CSAH 55 and 1st Avenue West. Forecasts also included assumptions to account for the development of the Willmar Industrial Park, which is anticipated to reach full build-out between 2020 and 2040. Finally, the traffic forecasts include a separate analysis of two at-grade crossings in downtown Willmar (10th Avenue Southwest and 7th Avenue Southwest) where vehicles currently experience delays associated with trains switching between the Morris and Marshall subdivisions.

In terms of train volumes, under each of the build alternatives, it was assumed that up to six trains per day would be diverted away from the Willmar Terminal and would use the new rail connector. This number was also assumed to be constant throughout the analysis period. Based on estimates from the 2015 TIGER Grant Application, each train diverted to the new rail connector would save 2.5 hours because trains switching between the Morris and Marshall subdivisions would no longer need to switch in the Willmar Terminal.

Based on an assignment of vehicles to the study area network, estimates of daily Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) were developed for the No Build Alternative and each of the Build Alternatives. VHT and VMT estimates were developed for the years 2016 and 2040 for the No Build and Build Alternatives, and data for each year in between was interpolated in order to provide a comparison of the alternatives over the life of the study period. Estimates were also developed for 2021 (the assumed first full year of benefit) for each of the Build Alternatives. Based on these estimates, projections of annual VMT and VHT were developed and monetized for the analysis period.

The analysis assumes the construction of the project will be completed in 2020. Therefore, 2021 would be the first full year of benefit. The analysis timeframe is for 20 years, 2021 to 2040. The present values of all monetized benefits and costs were calculated with 2016 as the current year.

The economic valuation of vehicle costs related to time and operations was calculated using values published by the MnDOT Office of Investment Management (Benefit-Cost Analysis Standard Value Tables, dated July 2016; see Table 2 in **Appendix A**). The economic valuation of train costs related to time, operations, and inventory was used from a previous benefit-cost analysis for the project. A per-train-hour operating cost was developed based on BNSF's total operating expenses and train hours in service. The inventory cost is associated with the opportunity costs of holding assets in inventory rather than using them for another purpose. An inventory cost was developed based on the value and tonnage of rail freight in Minnesota, average per train tonnage, and a commercial discount rate of 4.0 percent. The MnDOT published discount rate of 1.6 percent was used for all of the other portions of the analysis.

Vehicle occupancy and vehicle types influence the cost of travel on the roadways. The economic valuation is based on a per person analysis assuming a static auto occupancy rate of 1.31 persons per vehicle and a truck occupancy rate of 1.02 persons per vehicle based on the 2009 National Household Travel Survey (Minnesota data). The truck percentage used in the analysis was 6.1 percent throughout the analysis period, based on the average of vehicle classification counts and forecasts for the various scenarios.

For each alternative, safety benefits were estimated through two different analyses. Changes in crash frequency and severity for ten at-grade railroad crossings (nine existing crossings and one proposed public crossing) were estimated using the methodology associated with FRA's grade crossing model (GradeDec.NET) based on an earlier benefit-cost analysis prepared for the project. Where applicable, assumptions related to train operations and the analysis period were revised to reflect the current concept. Average crash costs were also modified to reflect MnDOT benefit-cost analysis guidance.

Other safety benefits were estimated based on the change in number of entering vehicles by intersection type (e.g. low volume/high speed) and the change in VMT by segment type (e.g. rural 2-lane with ADT between 0 and 1,499) at the intersections and roadway segments within

the study area. Crash rates for the different facility types were obtained from the MnDOT five-year crash data (2015) green sheets. In addition to the crash rates, data from the MnDOT Crash Data Toolkit was used to provide an estimate of crash distribution by level of severity (i.e. fatality, incapacitating injury, non-incapacitating injury, possible or unknown injury, and property damage only). This data was used to quantify the crash frequency and severity by facility type. For example, a reduction of vehicles using higher-risk facilities through the construction of lower-risk facilities would be anticipated to reduce crashes, providing a net benefit as a result of the build alternatives.

The capital construction costs for the Build Alternatives were estimated and allocated to the anticipated year of expenditure, 2020. The capital costs include the construction of each component of the rail connector as well as the roadway modifications and grade separations, and are broken into elements such as engineering, right of way, major structures (e.g. bridges and retaining walls), roadway grading and drainage, roadway sub-base and base, and roadway surface. The construction costs were then discounted back to the year of analysis, 2016. No construction costs are anticipated for the No Build condition.

For Alternative 1, right of way costs were based on the estimate developed for the 2015 benefit-cost analysis. For Alternatives 2A and 2B, preliminary construction limits were used to develop an estimate of the area that would be acquired, and an average $1.00 per square foot cost was used to estimate total acquisition costs. Note that these average costs are intended to provide an estimate of overall right of way acquisition costs—acquisition of individual parcels may require lower or higher costs on per-square foot basis.

Constructed infrastructure typically retains some value at the end of the benefit-cost analysis period, 20 years after construction. This value is called remaining capital value and is evaluated at the end of the analysis period (in the final year of analysis) and discounted to the year of analysis. The remaining capital value at the end of the analysis period is estimated by using useful life estimates for each roadway construction element published in MnDOT Benefit-Cost Analysis Guidance. Useful life estimates for rail elements were based on depreciation rates published by the Bureau of Economic Analysis, consistent with the previous benefit-cost analysis.

Maintenance costs were developed on a per lane-mile basis for the No Build and Build Alternatives. The per-mile costs associated with roadway maintenance under the No Build scenario were assumed to be higher than those for the Build Alternatives due to the cost of maintaining older surfaces. For each Build Alternative, an estimate of newly constructed or reconstructed lane-miles was generated in order to produce an estimated total maintenance cost. An estimate of lane-miles was also generated for the No Build Alternative based on those roadway segments where ongoing maintenance would be necessary only if a build alternative was not constructed. As with the construction costs, annual maintenance costs were discounted back to 2016, the year of analysis.

The benefit-cost analysis summarizes the cost of construction, cost of maintenance, cost to the users (travel distance and time), external costs (climate and health-related emissions), monetary benefit of safety improvements, and remaining capital value at the end of the analysis period. The benefits and costs are discounted back to the year of analysis (2016) and compared to provide a ratio for comparison.

Results

The benefit-cost analysis provides a measure of economic desirability for a roadway improvement project; the greater the benefit/cost ratio (B/C Ratio) above 1.0 and the greater the net present value above zero, the more desirable the project. The benefit-cost is calculated as a comparison of the build alternatives relative to the no-build alternative. In the case of costs the construction and right of way costs are reduced by the salvage value and reduced maintenance costs. In the case of benefits the crash reduction savings, vehicle operating cost savings and annual travel time cost savings are relative to the no-build alternative. For Alternatives 2A and 2B, the annual vehicle operating and travel time costs are higher than the no build alternative because the vehicle miles of travel are greater due to a small increase in the distance and time traveled for vehicles within the study area. This is also the case for those estimated vehicle crashes not associated with the at-grade rail crossings.

Each of the build alternatives resulted in a B/C Ratio higher than 1.0 and a positive net present value. The analysis tables are presented in **Appendix A**, and the results are summarized in **Tables 1–3**. Based on this analysis, each of the alternatives would be desirable from an economic perspective. Alternative 1 has the highest present value ($62.8 million) and B/C Ratio (2.46). Alternatives 2A and 2B have a similar present value ($49.7 million for Alternative 2A and $49.3 for Alternative 2B), but Alternative 2B has a somewhat higher B/C Ratio (2.30) than does Alternative 2A (2.22).

Table 1. Alternative 1 Benefit-Cost Summary

	Present Value		Net Present Value	B/C Ratio
	Cost	Benefit		
Construction/Right-of-way	$ 63,541,510			
Salvage Value of Construction	$ (21,246,722)			
Maintenance	$ 774,382			
At-Grade Crossing Crash Reduction Savings		$ 488,815		
Other Crash Reduction Savings		$ 3,149,788		
Auto/Truck Operating Cost Savings		$ 33,157		
Auto/Truck Travel Time Cost Savings		$ 2,033,146		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 43,069,170**	**$ 105,841,097**	**$62,771,927**	**2.46**

Note: numbers may not sum due to rounding.

Table 2. Alternative 2A Benefit-Cost Summary

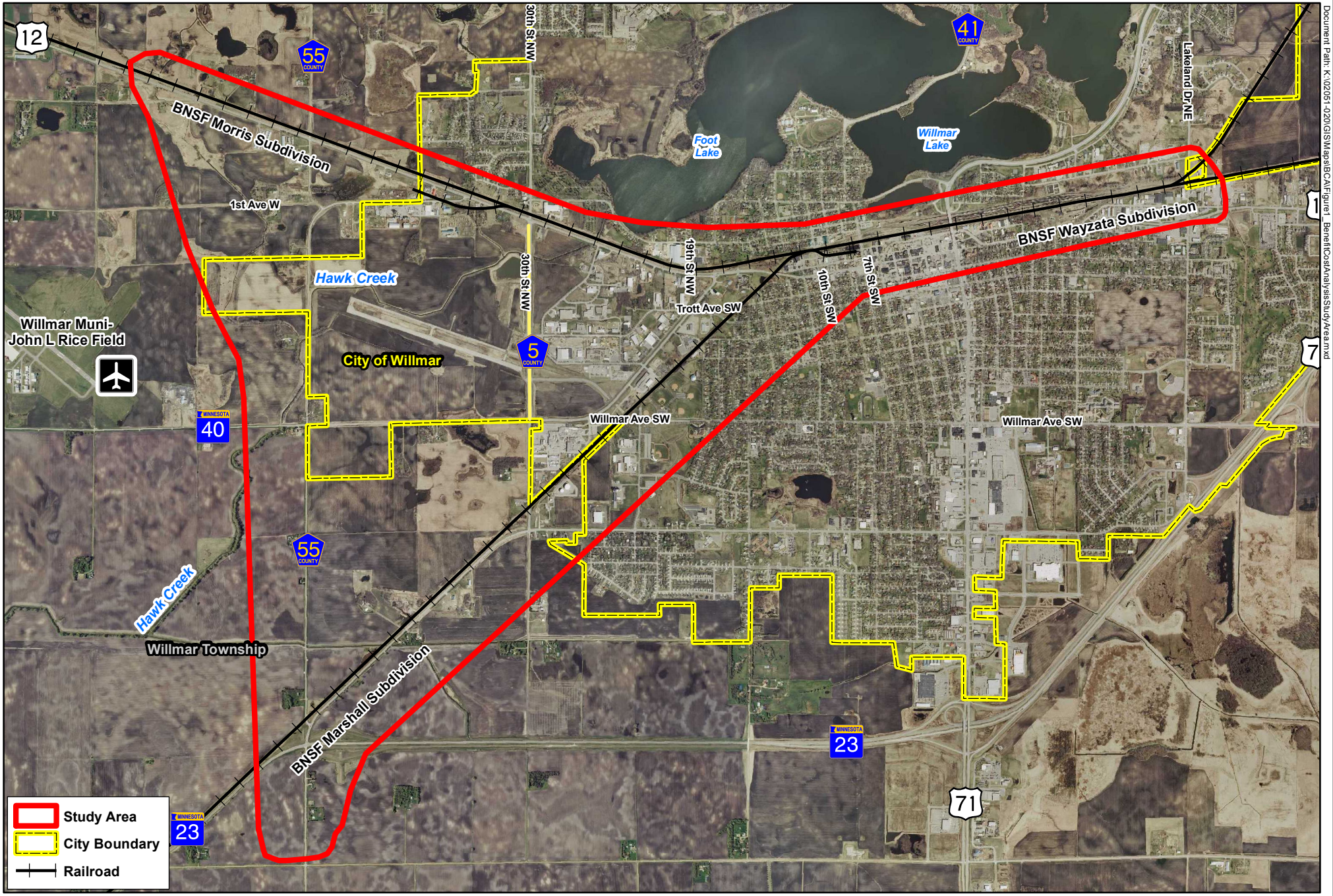
	Present Value		Net Present Value	B/C Ratio
	Cost	Benefit		
Construction/Right-of-way	$ 58,050,000			
Salvage Value of Construction	$ (17,965,229)			
Maintenance	$ 665,890			
At-Grade Crossing Crash Reduction Savings		$ 488,815		
Other Crash Reduction Savings		$ (1,737,943)		
Auto/Truck Operating Cost Savings		$ (5,976,231)		
Auto/Truck Travel Time Cost Savings		$ (2,428,561)		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 40,750,661**	**$ 90,482,270**	**$49,731,609**	**2.22**

Note: numbers may not sum due to rounding.

Table 3. Alternative 2B Benefit-Cost Summary

	Present Value		Net Present Value	B/C Ratio
	Cost	Benefit		
Construction/Right-of-way	$ 54,750,000			
Salvage Value of Construction	$ (17,577,330)			
Maintenance	$ 665,890			
At-Grade Crossing Crash Reduction Savings		$ 1,458,424		
Other Crash Reduction Savings		$ (4,247,115)		
Auto/Truck Operating Cost Savings		$ (6,823,462)		
Auto/Truck Travel Time Cost Savings		$ (3,344,180)		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 37,838,561**	**$ 87,179,858**	**$49,341,297**	**2.30**

Note: numbers may not sum due to rounding.



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Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

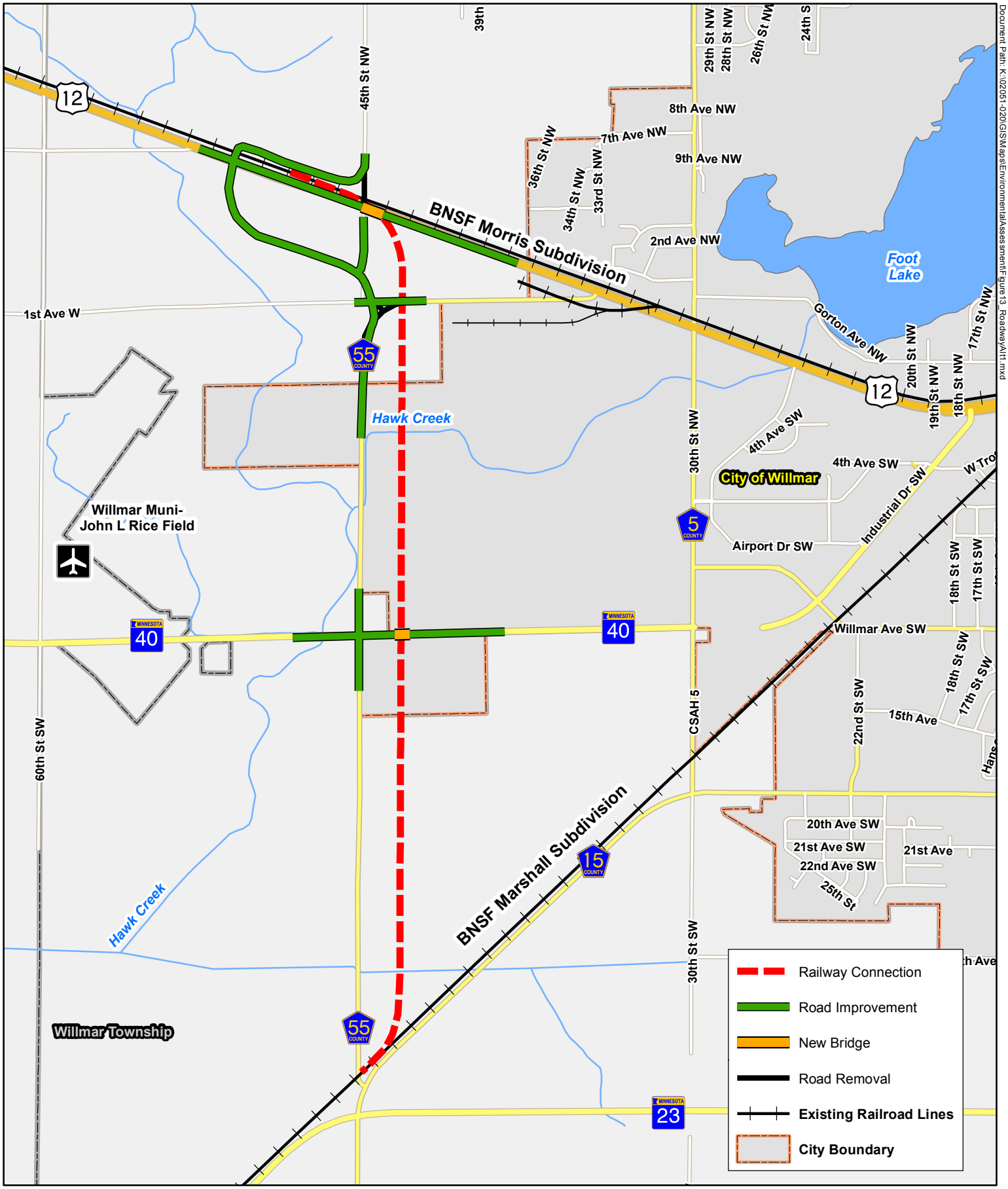
Figure 1: Benefit Cost Analysis Study Area

Willmar, MN

MINNESOTA DEPARTMENT OF TRANSPORTATION

N

0 3,500 Feet



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 2: Alternative 1

Willmar, MN

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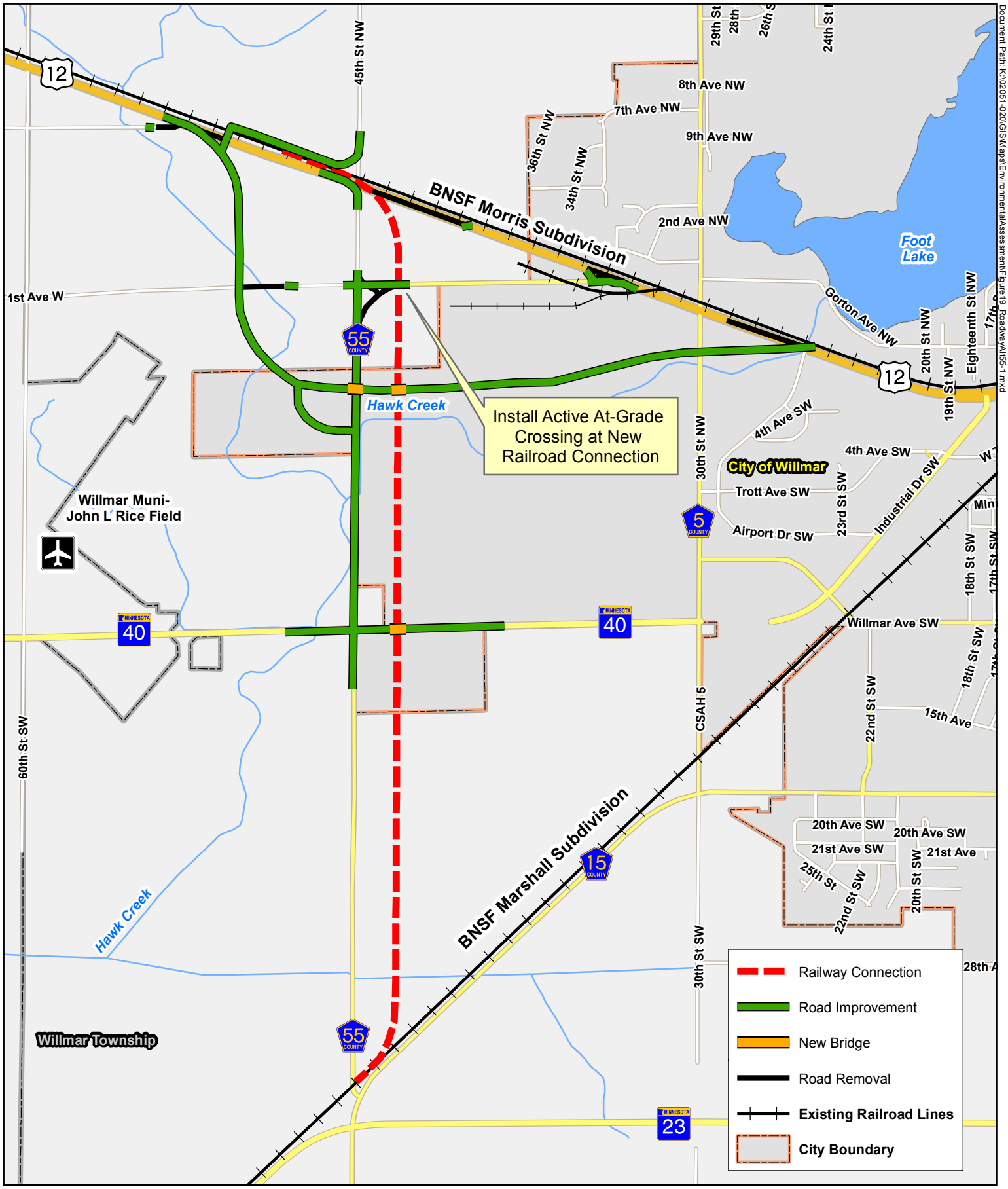

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 3: Alternative 2A

Willmar, MN

N

0 2,500 Feet

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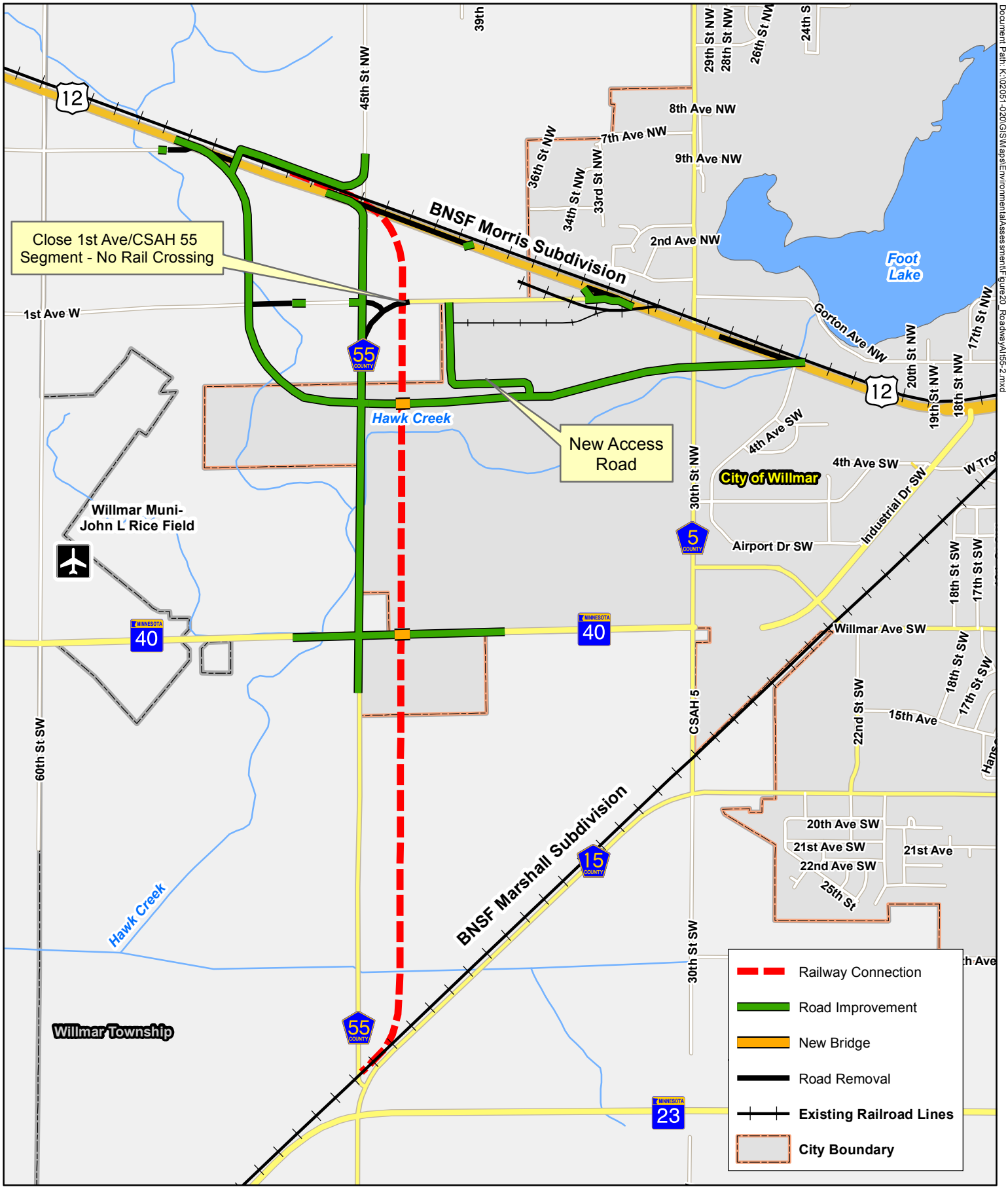

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Figure 4: Alternative 2B

Willmar, MN

N

0 2,500 Feet

Appendix A: Benefit-Cost Analysis Tables

Willmar Wye Rail Connector and Industrial Access Project

October 31, 2016

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Introduction

This appendix presents the calculation tables used for the benefit-cost analysis. Each of the three build alternatives has been compared to the no-build alternative, and this appendix presents the main sets of tables associated with the analysis for each alternative. This introductory section provides a brief description of each of these tables, including the sources of information, the purpose of the table, and its relationship to other portions of the analysis. Each of the tables is identical across alternatives in terms of its calculations and assumptions—the only differences are based on variations inherent to the alternatives themselves.

Table 1: Daily Network Statistics by Scenario

The general purpose of this group of tables is to provide inputs relating to vehicle miles traveled (VMT), vehicle hours traveled (VHT), and the number of vehicles entering various types of intersections and roadway segments within the analysis network. Changes in VMT are the primary driver for measuring changes in vehicle operating costs, while changes in VHT are the primary driver for changes in travel time costs. Data related to the number of vehicles using different intersection or roadway facility types are used in the analysis of crash costs.

Most of the data in this table was derived from traffic forecasts. Forecasts were developed for four different scenarios: existing conditions, the no build alternative in 2040, the build alternative in the year of opening (assumed 2021), and the build alternative in 2040. For each scenario, daily VMT and VHT forecasts were identified.

As referenced above, Table 1.5 is used as part of the crash analysis. This table identifies estimates of the number of vehicles entering certain roadway and intersection types. As described in more detail under Table 3, this is because crash rates differ for different types of facilities. Therefore, having an estimate of the number of vehicles exposed to the various facility types will provide a basis for comparing the number of crashes that may be expected to occur as part of the different scenarios. Note that the safety implications of the project for at-grade rail crossings were analyzed separately, and are described in further detail below under the discussion of railroad-specific analyses.

Table 2 – Recommended Economic Values Worksheet

This group of tables is intended to provide a number of assumptions to be used in monetizing the various costs or benefits associated with the alternatives. This information is provided from MnDOT, and can be accessed at the following website: http://www.dot.state.mn.us/planning/program/appendix_a.html. Because the data in these tables does not vary by alternative, these tables are identical for each alternative.

In addition to economic assumptions such as discount rate, Table 2.1 provides estimates for value of time (per person-hour) and vehicle operating costs, both separated by autos and trucks. In Table 5, these numbers will be multiplied by VHT and VMT, respectively, in order to monetize the relative costs (or benefits) associated with implementing an alternative. This table also provides assumptions for crash costs organized by severity.

Table 2.2 provides recommended remaining capital value factors. These factors provide a basis for monetizing the residual value of a capital asset at the end of a 20-year analysis period. Consistent with an earlier benefit-cost analysis completed for the project, service life estimates specific to rail infrastructure were identified from the Bureau of Economic Analysis.

Table 3 – Crash Worksheet

Based on MnDOT data related to crash severity and facility type (MnDOT green sheets and MnDOT Crash Data Toolkit), individual crash rates were identified for several severity levels for each of the facility types proposed by one or more of the alternatives (Table 3.1). Crash rates for intersections are expressed as the number of crashes per million entering vehicles and crash rates for roadway segments are expressed as the number of crashes per million VMT.

Data from Table 1.5 is then multiplied by 365 in order to develop annual figures for entering vehicles (for intersections) and VMT (for segments) for each of the four scenarios (Table 3.2). In Table 3.3, these annual figures are multiplied by the crash rates and by the crash costs from Table 2.1 to develop an annual estimate of crash costs for each of the scenarios. These numbers will be used in Table 5 to develop a crash cost for each year of the analysis period for both the no-build and the build alternative.

Table 4 – Construction Costs and Right of Way

The main purpose of the group of tables within Table 4 is to provide an estimate of construction and right of way costs associated with the build alternative and to provide an estimate of maintenance costs for both the no build and the build alternatives. In Table 4.1, an average of two independent construction cost estimates was entered by category. As described in the main body of the memo, estimates for right of way acquisition requirements were developed and estimated costs were entered in the spreadsheet. The capital construction costs for the build alternatives were estimated and allocated to the anticipated year of expenditure, 2020.

Tables 4.2 and 4.3 are focused on maintenance costs. Based on previous projects, per lane-mile annual maintenance costs were developed to reflect the varying costs of maintaining an older facility versus a newer one ($25,000 per lane-mile for the no build alternative, and $5,000 per lane-mile for each build alternative). An estimate of the lane-miles of new or reconstructed roadway that would need to be maintained under the build alternative was developed, along with a parallel estimate of the lane-miles that would need to be maintained under the no build alternative. These estimates were multiplied by the annual per lane-mile maintenance cost and applied across the analysis period to develop an overall present value for each alternative. The net present value in Table 4.2 represents the maintenance cost savings that would accrue as a result of implementing the build alternative.

Table 5 – Summary Benefit/Cost for Build Alternative Compared to No-Build

Table 5 combines all of the information developed in the previous tables in order to calculate and summarize benefits and costs related to construction expenditures, vehicle operating costs, travel time, and crashes. Table 5.1 provides a recap of some data that had been developed in the previous tables, along with the percentage of trucks in the study area, and general assumptions related to the project timeline and analysis period (2021 to 2040). The timing assumptions are used primarily as a way of interpolating data to develop flows of costs and benefits for each year within the analysis period and to calculate the present value of those costs and benefits.

In Table 5.2, information about the project costs (developed in Table 4) and assumptions regarding salvage value (based on Table 2 assumptions) are combined to calculate the present value of the capital cost and remaining capital value.

Relying on data developed in Table 3, Table 5.3 calculates annual crash costs for the no build and build alternatives for each year within the analysis timeframe. Annual crash costs are assumed to increase on a linear basis between the base year and 2040. Once calculated, the costs for the no build alternative are then subtracted from those for the build alternative to provide an annual benefit for each year. These benefits are then

discounted back to the year of analysis and summed to provide the present value of crash benefits.

Table 5.4 is comprised of a similar framework as used in Table 5.3. For the no build and build alternatives, an annual VMT estimate is developed for each year of the analysis period based on data developed in Table 1 (and interpolation between the base year and 2040). Operating costs for each alternative and each year are then calculated by breaking down the VMT into a proportion for cars and a proportion for trucks and multiplying these numbers by their respective per-mile vehicle operating costs (from Table 2). Again, the no build alternative costs are subtracted from the build alternative costs, discounted back to present value, and summed across the analysis period in order to provide an overall operating cost associated with the project.

In Table 5.5, similar calculations are applied. Annual VHT is developed for each year and each alternative based on data from Table 1 and interpolation. Travel time savings are then monetized by multiplying VHT by the cost of time, taking into account the different per person-hour costs for autos versus trucks provided in Table 2, along with different vehicle occupancy rates (for autos, assumed to be 1.31; for trucks, an occupancy rate of 1.02 was assumed). As with the previous two tables, benefits are calculated for each year, discounted back to present value, and summed across the years to provide a present value of travel time benefits.

Other Supporting Documentation – Railroad-specific Analyses

Due to the nature of the project, several other benefit and cost categories specific to changes in railroad operations were also taken into account. A benefit-cost analysis was prepared previously for this project (in 2015). Where applicable, revisions have been made to the inputs used for rail-related elements based on changes in the project since the previous analysis (for example, the number of trains that would be affected by construction of the rail connector). Because train operations are not anticipated to vary across the build alternatives, there is only one set of tables for these elements.

Estimates of the operational and inventory benefits to the railroad were developed based on the expectation that the build alternatives will result in fewer train delays. While similar to the vehicle operating cost and travel time cost analyses described above, different methodologies and inputs are used specific to operating costs for freight rail and the value of time for freight that is in transit. Similarly, as with autos and trucks, the social costs of emissions associated with train operations were incorporated into the analysis. Reduced delays associated with the build alternatives were translated into a reduction in emissions and monetized to measure these benefits.

Because at-grade roadway/rail crossings carry safety risks independent of typical crash rates for roadway facilities, a separate analysis was also prepared to account for the

difference in the number (and value) of crashes estimated to occur at the various at-grade intersections within the study area. The Federal Railroad Administration (FRA) has developed GradeDec.net, a model used to analyze and support decision-making for grade crossings. The GradeDec.net methodology for analyzing safety was applied to the grade crossings in the project area to estimate the differential safety risks associated with the number of trains and number of motor vehicles anticipated to use each crossing over the course of the analysis period. As with the “traditional” safety analysis described above, the estimated crashes were categorized by severity and monetized using MnDOT’s average crash costs.

Table 1. Alternative 1 Benefit - Cost Summary

	Present Worth			
	Cost	Benefit	Net Present Value	B/C Ratio
Construction/Right-of-way	$ 63,541,510			
Salvage Value of Construction	$ (21,246,722)			
Maintenance	$ 774,382			
At-Grade Crossing Crash Reduction Savings		$ 488,815		
Other Crash Reduction Savings		$ 3,149,788		
Auto/Truck Operating Cost Savings		$ 33,157		
Auto/Truck Travel Time Cost Savings		$ 2,033,146		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 43,069,170**	**$ 105,841,097**	**$62,771,927**	**2.46**

Table 1
Daily Network Statistics by Scenario

Table 1.1

Synchro Model Daily Network Statistics by Scenario[a, b]

Scenario		Daily	
		Vehicle Miles Traveled	Vehicle Hours Traveled
Existing	Based on 2016 Counts	27,364	887
No Build	Projected 2040	31,327	1,009
Build Year of Open	Projected 2021	28,488	900
Build Alt. 1	Projected 2040	31,304	987

Table 1.2

Daily Entering Vehicles (for intersections) and VMT (for grade-separated through traffic)

Scenario		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500,4999]	Rural 2-lane: ADT∈[5000,7999]	Rural 4-lane Divided	Rural 4-lane Undivided
Existing	Based on 2016 Counts	52,258	14,425	2,075	5,920	9,468	6,751	2,639
No Build	Projected 2040	71,831	16,050	2,632	6,825	10,157	8,302	3,401
Build Year of Open	Projected 2021	45,838	14,125	3,681	5,920	8,986	6,751	2,639
Build Alt. 1	Projected 2040	64,678	15,850	2,229	9,233	9,668	8,302	3,401

Table 2

Recommended Economic Values Worksheet[a]

Table 2.1 Recommended standard values for use in B/C analysis in SFY 2017

Discount Rate	Percent [b]
Real	1.6%
Value of Time	**Dollars per person hour [c]**
Auto	$16.80
Truck	$28.30
Variable Operating and Emissions Costs	**Dollars per mile [d, e]**
Auto variable vehicle operating costs	$0.25
Auto climate and health-related emissions costs	$0.05
Auto total operating and emissions costs	$0.30
Truck variable vehicle operating costs	$0.85
Truck climate and health-related emissions costs	$0.23
Truck total operating and emissions costs	$1.08
Mn/DOT Crash Values	**Dollars per crash [f]**
Fatal	$10,700,000
Injury Type A only	$570,000
Injury Type B only	$170,000
Injury Type C only	$84,000
Property damage only	$7,600

Table 2.2 Recommended remaining capital value factors for use in benefit-cost analysis

Expected life (years)	Factor, 20-year analysis
25	0.23
30	0.39
35	0.50
40	0.58
50	0.69
60	0.76
100	0.9

(a) Recommended standard values for use in economic analysis in SFY 2017 Minnesota Department of Transportation, Office of Investment Management, July 2016.
(b) This is based on the five-year average for real interest rates (market rate less inflation) on 30-year Treasury Notes and Bonds.
(c) Adapted from U.S. DOT's "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis" published July 9, 2014, with Minnesota earnings rates.
(d) Variable vehicle operating costs based on updated cost levels from "The Per-Mile Costs of Operating Automobiles and Trucks," G. Barnes, 2003. Variable costs include fuel, maintenance, tires, repair and depreciation.
(e) Emissions and health costs apply U.S. DOT dollars-per-ton monetization factors to average vehicle emission rates modeled by EPA to account for the social cost of carbon (at benefit-cost analysis period midpoint) and health damages from criteria pollutants including volatile organic compounds (ozone precursor), nitrogen oxides, particulate matter (PM2.5), and sulfur dioxide.
(f) Reflects Minnesota's three-year crash history and recommended value of life published by the U.S. Department of Transportation, June 17, 2015

Table 3
Crash Worksheet

Table 3.1 Crash Rates by Facility Type and Severity Type

Crash Type	Rural Thru/Stop		Low Volume/High Speed		Rural 2-lane: ADT∈[0,1499]		Rural 2-lane: ADT∈[1500,4999]		Rural 2-lane: ADT∈[5000,7999]		Rural 4-lane Divided		Rural 4-lane Undivided	
	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT
Fatal	0.016	0.0045	0.008	0.0006	0.026	0.0045	0.022	0.0045	0.017	0.0045	0.006	0.0045	0.004	0.0045
A	0.026	0.006	0.008	0.006	0.040	0.006	0.029	0.006	0.028	0.006	0.010	0.006	0.022	0.006
B	0.137	0.034	0.080	0.032	0.183	0.073	0.139	0.043	0.121	0.038	0.086	0.026	0.084	0.022
C	0.218	0.055	0.245	0.098	0.198	0.079	0.197	0.061	0.204	0.063	0.179	0.054	0.187	0.049
PDO	0.603	0.151	0.660	0.264	0.552	0.221	0.613	0.190	0.630	0.195	0.719	0.216	0.703	0.183
Total	1.000	0.250	1.000	0.400	1.000	0.400	1.000	0.310	1.000	0.310	1.000	0.300	1.000	0.260
(a) **Crash Rate**	**0.25**		**0.40**		**0.40**		**0.31**		**0.31**		**0.30**		**0.26**	

Table 3.2 Annual Entering Vehicles (for intersections) and VMT (for grade-separated through traffic) by Facility Typ

		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided
No Build Base Year (2015)	Annual ADT	19,074,170	5,265,125	757,375	2,160,800	3,455,820	2,464,115	963,235
2040 No Build	Annual ADT	26,218,315	5,858,250	960,680	2,491,125	3,707,305	3,030,230	1,241,365
Build Base Year (2021)	Annual ADT	16,730,870	5,155,625	1,343,565	2,160,800	3,279,890	2,464,115	963,235
2040 Build Alt. 1	Annual ADT	23,607,470	5,785,250	813,585	3,370,045	3,528,820	3,030,230	1,241,365

Table 3.3 Annual Crashes for Project Sub-Area by Facility Type

	Crash Type	Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane : ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided	Annual Crash Cost
		Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	
No Build Base Year (2015)	Fatal	0.09	0.00	0.00	0.01	0.02	0.01	0.00	$1,424,158
	A	0.11	0.03	0.00	0.01	0.02	0.01	0.01	$116,761
	B	0.65	0.17	0.06	0.09	0.13	0.06	0.02	$201,040
	C	1.04	0.51	0.06	0.13	0.22	0.13	0.05	$180,261
	PDO	2.87	1.39	0.17	0.41	0.67	0.53	0.18	$47,307
	Total	4.77	2.11	0.29	0.66	1.06	0.75	0.25	**$1,969,527**
2040 No Build	Fatal	0.12	0.00	0.00	0.01	0.02	0.01	0.01	$1,850,410
	A	0.16	0.04	0.01	0.01	0.02	0.02	0.01	$148,795
	B	0.90	0.19	0.07	0.11	0.14	0.08	0.03	$255,830
	C	1.43	0.57	0.08	0.15	0.23	0.16	0.06	$225,962
	PDO	3.95	1.55	0.21	0.47	0.72	0.65	0.23	$59,186
	Total	6.55	2.34	0.37	0.76	1.14	0.93	0.33	**$2,540,183**
Build Base Year (2021)	Fatal	0.08	0.00	0.01	0.01	0.01	0.01	0.00	$1,330,379
	A	0.10	0.03	0.01	0.01	0.02	0.01	0.01	$109,776
	B	0.57	0.16	0.10	0.09	0.12	0.06	0.02	$193,014
	C	0.91	0.50	0.11	0.13	0.21	0.13	0.05	171586.6474
	PDO	2.52	1.36	0.30	0.41	0.64	0.53	0.18	$45,127
	Total	4.18	2.06	0.52	0.66	1.01	0.75	0.25	**$1,849,882**
2040 Build Alternative 1	Fatal	0.11	0.00	0.00	0.02	0.02	0.01	0.01	$1,750,873
	A	0.14	0.03	0.00	0.02	0.02	0.02	0.01	$141,509
	B	0.81	0.18	0.06	0.15	0.13	0.08	0.03	$243,747
	C	1.29	0.57	0.06	0.21	0.22	0.16	0.06	$215,961
	PDO	3.56	1.53	0.18	0.64	0.69	0.65	0.23	$56,806
	Total	5.90	2.32	0.31	1.03	1.08	0.93	0.33	**$2,408,895**

Notes: (a) MnDOT crash data by roadway facility type, Sources: MnDOT section green sheets (2015 Data; 5-Year Average) and crash history

Table 4

Construction Costs & Right of Way

Table 4.1 Construction and Right of Way Costs

Cost Component	Build Alternative	
	2016 $	2020 $
Env. Rev/Eng/Const. Eng. (25%)	**$ 12,177,207**	**$ 12,975,453**
R/W (Land)	**$ 2,655,476**	**$ 2,829,549**
R/W (Buildings)	**$ -**	**$ -**
Construction		
Structures	**$ 8,636,000**	**$ 9,202,111**
Grading & Drainage	**$ 6,212,707**	**$ 6,619,965**
Subbase & Base	**$ 8,759,000**	**$ 9,333,174**
Surface	**$ 1,895,000**	**$ 2,019,222**
Other	**$ 6,230,000**	**$ 6,638,392**
Track Elements	**$ 10,638,369**	**$ 11,335,740**
Rail Systems and Signals	**$ 6,337,752**	**$ 6,753,207**
SubTotal Construction	**$ 48,708,827**	**$ 51,901,810**
Total Cost	**$ 63,541,510**	**$ 67,706,812**

Roadway Elements		**2016 $**
Env. Rev/Eng/Const. Eng. (25%)	$	6,518,500
R/W (Land)	$	1,370,676
R/W (Buildings)	$	-
Structures	$	8,636,000
Grading & Drainage	$	554,000
Subbase & Base	$	8,759,000
Surface	$	1,895,000
Other	$	6,230,000
Track Elements	$	-
Rail Systems and Signals	$	-
SubTotal Construction	$	26,074,000
Total Cost	$	33,963,176

Sources: 2016 Preliminary Design Construction Cost Estimate

Rail Elements		**2016 $**	
Env. Rev/Eng/Const. Eng. (25%)	$	5,658,707	
R/W (Land)	$	1,284,800	
R/W (Buildings)	$	-	
Structures	$	-	
Grading & Drainage	$	5,658,707	25%
Subbase & Base	$	-	
Surface	$	-	
Other	$	-	
Track Elements	$	10,638,369	47%
Rail Systems and Signals	$	6,337,752	28%
Subtotal Construction	$	22,634,827	
Total Cost	$	29,578,334	

Source: 2016 Cost Estimate

Table 4.2 Summary of Maintenance Costs

Maintenance Costs	Costs (Present Value)
Build Present Value	**$ 3,526,570**
No Build Present Value	**$ 2,752,187**
Net Present Value	**$ 774,382**

Per Track Mile Annual Maintenance Costs

First 10 years:	$	10,000
After first 10 years:	$	15,000
Project Track Miles:		5.14

Source: BNSF
Note: assumes no change in maintenance costs for existing track

Per Roadway Lane-Mile Annual Maintenance Costs

No Build:	$25,000
Build:	$5,000

Maintenance Roadway Lane-Miles

	Alt 1
No Build:	6.9
Build:	8.5

Bridge Annual Maintenance Costs

TH 12 Steel Bridge	$	99,604
TH 40 Pres Concrete Bridge	$	15,900

Source: 2015 Willmar Wye Benefit Cost Analysis Spreadsheet "05BCA_2015.xlsx"
Inflated to 2016 dollars using GDP Chained Price Index

Table 4.3 Annual Maintenance Costs

Year	No Build Annual Maintenance Costs	No Build Present Worth Maintenance Costs	Build Annual Maintenance Costs	Build Present Worth Maintenance Costs
2021	$ 172,500	$ 159,338	$ 209,204	$ 193,242
2022	$ 172,500	$ 156,829	$ 209,204	$ 190,199
2023	$ 172,500	$ 154,359	$ 209,204	$ 187,204
2024	$ 172,500	$ 151,929	$ 209,204	$ 184,255
2025	$ 172,500	$ 149,536	$ 209,204	$ 181,354
2026	$ 172,500	$ 147,181	$ 209,204	$ 178,498
2027	$ 172,500	$ 144,863	$ 209,204	$ 175,687
2028	$ 172,500	$ 142,582	$ 209,204	$ 172,920
2029	$ 172,500	$ 140,337	$ 209,204	$ 170,197
2030	$ 172,500	$ 138,127	$ 209,204	$ 167,517
2031	$ 172,500	$ 135,951	$ 234,904	$ 185,133
2032	$ 172,500	$ 133,810	$ 234,904	$ 182,218
2033	$ 172,500	$ 131,703	$ 234,904	$ 179,348
2034	$ 172,500	$ 129,629	$ 234,904	$ 176,524
2035	$ 172,500	$ 127,588	$ 234,904	$ 173,744
2036	$ 172,500	$ 125,578	$ 234,904	$ 171,008
2037	$ 172,500	$ 123,601	$ 234,904	$ 168,315
2038	$ 172,500	$ 121,654	$ 234,904	$ 165,664
2039	$ 172,500	$ 119,739	$ 234,904	$ 163,055
2040	$ 172,500	$ 117,853	$ 234,904	$ 160,488

Table 5
Summary Benefit/Cost for Build Alternative Compared to No-Build

Table 5.1 Summary of Analysis Data (From Previous Tables)

	No Build	Build Alt.
Base Year VMT (daily)	28,488	28,478
Base Year VHT (hours/day)	900	890
2040 VMT (daily)	31,327	31,304
2040 VHT (hours/day)	1,009	987
Base Year Annual Crash Cost	$2,106,484	$1,849,882
2040 Annual Crash Cost	$2,540,183	$2,408,895
Percent Trucks	6.1%	6.1%
Base Year	2021	2021
Horizon Year	2040	2040
Year of Analysis	2016	
Initial Year	2020	
Days/Year	365	
Benefit Period (years)	20	

Table 5.2 Capital Costs of Build Alternative 1 and Salvage Value

	Project Cost 2020 $	Component Service Life (Years)	Salvage Value 20 Years	Remaining Capital Value Factor
Eng/Const Admin	$ 12,975,452.53	0		
R/W (Land)	$ 2,829,548.96	100	($2,546,594)	0.90
R/W (Buildings)	$ -	0	$0	
Structures	$ 9,202,110.95	60	($6,993,604)	0.76
Grading & Drainage	$ 6,619,964.95	50	($4,567,776)	0.69
Subbase & Base	$ 9,333,173.91	40	($5,413,241)	0.58
Surface	$ 2,019,221.89	25	($464,421)	0.23
Other	$ 6,638,391.76	0	$0	
Track Elements	$ 11,335,739.92	38	($6,219,968)	0.55
Rail Systems and Signals	$ 6,753,206.76	54	($4,893,002)	0.72
	$ 67,706,811.63		($31,098,606)	
	$ 63,541,510	<- PW Project Costs		
	$ (21,246,722)	<- PW Salvage Value		
	$ 774,382	<- PW Net Maintenance Costs		
	$ 43,069,170	<- PW Capital Cost and Remaining Capital Value		

Table 5.3 Annual Crash Cost Savings

Year	No Build Crash Costs	Build Alt. Crash Costs	Crash Benefits	Present Worth Crash Benefits	
2020			$0	$0	
2021	$2,106,484	$1,849,882	$256,603	$237,024	
2022	$2,129,311	$1,879,303	$250,007	$227,295	
2023	$2,152,137	$1,908,725	$243,412	$217,814	
2024	$2,174,963	$1,938,147	$236,816	$208,575	
2025	$2,197,789	$1,967,569	$230,221	$199,573	
2026	$2,220,616	$1,996,990	$223,625	$190,802	
2027	$2,243,442	$2,026,412	$217,030	$182,259	
2028	$2,266,268	$2,055,834	$210,434	$173,937	
2029	$2,289,094	$2,085,256	$203,839	$165,832	
2030	$2,311,921	$2,114,677	$197,243	$157,939	
2031	$2,334,747	$2,144,099	$190,648	$150,254	
2032	$2,357,573	$2,173,521	$184,052	$142,772	
2033	$2,380,399	$2,202,943	$177,457	$135,487	
2034	$2,403,226	$2,232,364	$170,861	$128,397	
2035	$2,426,052	$2,261,786	$164,266	$121,497	
2036	$2,448,878	$2,291,208	$157,670	$114,782	
2037	$2,471,704	$2,320,630	$151,075	$108,249	
2038	$2,494,530	$2,350,051	$144,479	$101,893	
2039	$2,517,357	$2,379,473	$137,884	$95,710	
2040	$2,540,183	$2,408,895	$131,288	$89,697	
				$3,149,788	**<- PW Crashes**

Source: Crash cost linearly interpolated between base year and 2040.

Table 5.4 Annual Vehicle Operating Cost Savings

Year	No Build Annual VMT	No Build Operating Costs	Build Alt. Annual VMT	Build Alt. Operating Costs	Annual Operating Benefits	Present Worth Operating Benefits
2020					$0	$0
2021	10,398,120	$3,614,179	10,394,303	$3,612,852	$1,327	$1,226
2022	10,452,659	$3,633,135	10,448,601	$3,631,725	$1,410	$1,282
2023	10,507,197	$3,652,092	10,502,898	$3,650,597	$1,494	$1,337
2024	10,561,736	$3,671,048	10,557,196	$3,669,470	$1,578	$1,390
2025	10,616,275	$3,690,005	10,611,494	$3,688,343	$1,662	$1,441
2026	10,670,813	$3,708,961	10,665,792	$3,707,216	$1,745	$1,489
2027	10,725,352	$3,727,918	10,720,089	$3,726,089	$1,829	$1,536
2028	10,779,891	$3,746,874	10,774,387	$3,744,961	$1,913	$1,581
2029	10,834,429	$3,765,831	10,828,685	$3,763,834	$1,997	$1,624
2030	10,888,968	$3,784,788	10,882,983	$3,782,707	$2,080	$1,666
2031	10,943,507	$3,803,744	10,937,280	$3,801,580	$2,164	$1,706
2032	10,998,046	$3,822,701	10,991,578	$3,820,453	$2,248	$1,744
2033	11,052,584	$3,841,657	11,045,876	$3,839,326	$2,332	$1,780
2034	11,107,123	$3,860,614	11,100,174	$3,858,198	$2,415	$1,815
2035	11,161,662	$3,879,570	11,154,471	$3,877,071	$2,499	$1,849
2036	11,216,200	$3,898,527	11,208,769	$3,895,944	$2,583	$1,880
2037	11,270,739	$3,917,483	11,263,067	$3,914,817	$2,667	$1,911
2038	11,325,278	$3,936,440	11,317,365	$3,933,690	$2,750	$1,940
2039	11,379,816	$3,955,397	11,371,662	$3,952,562	$2,834	$1,967
2040	11,434,355	$3,974,353	11,425,960	$3,971,435	$2,918	$1,994

Source: Annual VMT linearly interpolated between base year and 2040.
Vehicle operating costs applied to annual VMT to calculate annual operating costs.

$33,157 <- PW Operating

Table 5.5 Annual Travel Time Cost Savings

Year	No Build Annual VHT (hours)	No Build Time Costs	Build Alt. Annual VHT (hours)	Build Alt. Time Costs	Annual Time Benefits	Present Worth Time Benefits
2020					$0	$0
2021	328,500	$7,367,052	324,919	$7,286,737	$80,315	$74,187
2022	330,594	$7,414,012	326,779	$7,328,446	$85,566	$77,792
2023	332,688	$7,460,971	328,638	$7,370,154	$90,817	$81,266
2024	334,782	$7,507,931	330,498	$7,411,863	$96,068	$84,611
2025	336,876	$7,554,890	332,358	$7,453,572	$101,319	$87,831
2026	338,970	$7,601,850	334,218	$7,495,280	$106,570	$90,928
2027	341,064	$7,648,809	336,078	$7,536,989	$111,821	$93,906
2028	343,158	$7,695,769	337,937	$7,578,697	$117,072	$96,767
2029	345,252	$7,742,729	339,797	$7,620,406	$122,323	$99,515
2030	347,346	$7,789,688	341,657	$7,662,115	$127,574	$102,152
2031	349,439	$7,836,648	343,517	$7,703,823	$132,825	$104,682
2032	351,533	$7,883,607	345,377	$7,745,532	$138,076	$107,107
2033	353,627	$7,930,567	347,236	$7,787,240	$143,327	$109,429
2034	355,721	$7,977,526	349,096	$7,828,949	$148,578	$111,652
2035	357,815	$8,024,486	350,956	$7,870,657	$153,829	$113,778
2036	359,909	$8,071,446	352,816	$7,912,366	$159,080	$115,808
2037	362,003	$8,118,405	354,676	$7,954,075	$164,331	$117,747
2038	364,097	$8,165,365	356,535	$7,995,783	$169,582	$119,596
2039	366,191	$8,212,324	358,395	$8,037,492	$174,833	$121,358
2040	368,285	$8,259,284	360,255	$8,079,200	$180,083	$123,034

Source: Annual VHT linearly interpolated between base year and 2040.
Person value of time costs applied to annual VHT to calculate annual travel time costs.

$2,033,146 <- PW Time

Table 1. Alternative 2A Benefit - Cost Summary

	Present Worth			
	Cost	Benefit	Net Present Value	B/C Ratio
Construction/Right-of-way	$ 58,050,000			
Salvage Value of Construction	$ (17,965,229)			
Maintenance	$ 665,890			
At-Grade Crossing Crash Reduction Savings		$ 488,815		
Other Crash Reduction Savings		$ (1,737,943)		
Auto/Truck Operating Cost Savings		$ (5,976,231)		
Auto/Truck Travel Time Cost Savings		$ (2,428,561)		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 40,750,661**	**$ 90,482,270**	**$49,731,609**	**2.22**

Table 1
Daily Network Statistics by Scenario

Table 1.1

Synchro Model Daily Network Statistics by Scenario[a, b]

Scenario		Daily	
		Vehicle Miles Traveled	Vehicle Hours Traveled
Existing	Based on 2016 Counts	27,364	887
No Build	Projected 2040	31,327	1,009
Build Year of Open	Projected 2021	31,476	929
Build Alt. 2A	Projected 2040	35,331	1,035

Table 1.2

Daily Entering Vehicles (for intersections) and VMT (for grade-separated through traffic)

Scenario		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500,4999]	Rural 2-lane: ADT∈[5000,7999]	Rural 4-lane Divided	Rural 4-lane Undivided
Existing	Based on 2016 Counts	52,258	14,425	2,075	5,920	9,468	6,751	2,639
No Build	Projected 2040	71,831	16,050	2,632	6,825	10,157	8,302	3,401
Build Year of Open	Projected 2021	53,633	18,050	3,601	5,920	12,207	6,751	2,639
Build Alt. 2A	Projected 2040	72,928	23,550	1,749	9,233	13,019	8,142	3,401

Table 2

Recommended Economic Values Worksheet[a]

Table 2.1 Recommended standard values for use in B/C analysis in SFY 2017

Discount Rate	Percent [b]
Real	1.6%
Value of Time	**Dollars per person hour [c]**
Auto	$16.80
Truck	$28.30
Variable Operating and Emissions Costs	**Dollars per mile [d, e]**
Auto variable vehicle operating costs	$0.25
Auto climate and health-related emissions costs	$0.05
Auto total operating and emissions costs	$0.30
Truck variable vehicle operating costs	$0.85
Truck climate and health-related emissions costs	$0.23
Truck total operating and emissions costs	$1.08
Mn/DOT Crash Values	**Dollars per crash [f]**
Fatal	$10,700,000
Injury Type A only	$570,000
Injury Type B only	$170,000
Injury Type C only	$84,000
Property damage only	$7,600

Table 2.2 Recommended remaining capital value factors for use in benefit-cost analysis

Expected life (years)	Factor, 20-year analysis
25	0.23
30	0.39
35	0.50
40	0.58
50	0.69
60	0.76
100	0.9

(a) Recommended standard values for use in economic analysis in SFY 2017 Minnesota Department of Transportation, Office of Investment Management, July 2016.
(b) This is based on the five-year average for real interest rates (market rate less inflation) on 30-year Treasury Notes and Bonds.
(c) Adapted from U.S. DOT's "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis" published July 9, 2014, with Minnesota earnings rates.
(d) Variable vehicle operating costs based on updated cost levels from "The Per-Mile Costs of Operating Automobiles and Trucks," G. Barnes, 2003. Variable costs include fuel, maintenance, tires, repair and depreciation.
(e) Emissions and health costs apply U.S. DOT dollars-per-ton monetization factors to average vehicle emission rates modeled by EPA to account for the social cost of carbon (at benefit-cost analysis period midpoint) and health damages from criteria pollutants including volatile organic compounds (ozone precursor), nitrogen oxides, particulate matter (PM2.5), and sulfur dioxide.
(f) Reflects Minnesota's three-year crash history and recommended value of life published by the U.S. Department of Transportation, June 17, 2015

Table 3
Crash Worksheet

Table 3.1 Crash Rates by Facility Type and Severity Type

Crash Type	Rural Thru/Stop		Low Volume/High Speed		Rural 2-lane: ADT∈[0,1499]		Rural 2-lane: ADT∈[1500,4999]		Rural 2-lane: ADT∈[5000,7999]		Rural 4-lane Divided		Rural 4-lane Undivided	
	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT
Fatal	0.016	0.0045	0.008	0.0006	0.026	0.0045	0.022	0.0045	0.017	0.0045	0.006	0.0045	0.004	0.0045
A	0.026	0.006	0.008	0.006	0.040	0.006	0.029	0.006	0.028	0.006	0.010	0.006	0.022	0.006
B	0.137	0.034	0.080	0.032	0.183	0.073	0.139	0.043	0.121	0.038	0.086	0.026	0.084	0.022
C	0.218	0.055	0.245	0.098	0.198	0.079	0.197	0.061	0.204	0.063	0.179	0.054	0.187	0.049
PDO	0.603	0.151	0.660	0.264	0.552	0.221	0.613	0.190	0.630	0.195	0.719	0.216	0.703	0.183
Total	1.000	0.250	1.000	0.400	1.000	0.400	1.000	0.310	1.000	0.310	1.000	0.300	1.000	0.260
(a) **Crash Rate**	**0.25**		**0.40**		**0.40**		**0.31**		**0.31**		**0.30**		**0.26**	

Table 3.2 Annual Entering Vehicles (for intersections) and VMT (for grade-separated through traffic) by Facility Type

		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided
No Build Base Year (2015)	Annual ADT	19,074,170	5,265,125	757,375	2,160,800	3,455,820	2,464,115	963,235
2040 No Build	Annual ADT	26,218,315	5,858,250	960,680	2,491,125	3,707,305	3,030,230	1,241,365
Build Base Year (2021)	Annual ADT	19,576,045	6,588,250	1,314,365	2,160,800	4,455,555	2,464,115	963,235
2040 Build Alt. 2A	Annual ADT	26,618,720	8,595,750	638,385	3,370,045	4,751,935	2,971,830	1,241,365

Table 3.3 Annual Crashes for Project Sub-Area by Facility Type

	Crash Type	Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided	Annual Crash Cost
		Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	
No Build Base Year (2015)	Fatal	0.09	0.00	0.00	0.01	0.02	0.01	0.00	$1,424,158
	A	0.11	0.03	0.00	0.01	0.02	0.01	0.01	$116,761
	B	0.65	0.17	0.06	0.09	0.13	0.06	0.02	$201,040
	C	1.04	0.51	0.06	0.13	0.22	0.13	0.05	$180,261
	PDO	2.87	1.39	0.17	0.41	0.67	0.53	0.18	$47,307
	Total	4.77	2.11	0.29	0.66	1.06	0.75	0.25	**$1,969,527**
2040 No Build	Fatal	0.12	0.00	0.00	0.01	0.02	0.01	0.01	$1,850,410
	A	0.16	0.04	0.01	0.01	0.02	0.02	0.01	$148,795
	B	0.90	0.19	0.07	0.11	0.14	0.08	0.03	$255,830
	C	1.43	0.57	0.08	0.15	0.23	0.16	0.06	$225,962
	PDO	3.95	1.55	0.21	0.47	0.72	0.65	0.23	$59,186
	Total	6.55	2.34	0.37	0.76	1.14	0.93	0.33	**$2,540,183**
Build Base Year (2021)	Fatal	0.09	0.00	0.01	0.01	0.02	0.01	0.00	$1,531,774
	A	0.12	0.04	0.01	0.01	0.03	0.01	0.01	$128,326
	B	0.67	0.21	0.10	0.09	0.17	0.06	0.02	$224,438
	C	1.07	0.64	0.10	0.13	0.28	0.13	0.05	202465.2908
	PDO	2.95	1.74	0.29	0.41	0.87	0.53	0.18	$52,955
	Total	4.89	2.64	0.50	0.66	1.37	0.75	0.25	**$2,139,959**
2040 Build Alternative 2A	Fatal	0.12	0.01	0.00	0.02	0.02	0.01	0.01	$1,961,553
	A	0.16	0.05	0.00	0.02	0.03	0.02	0.01	$164,803
	B	0.91	0.27	0.05	0.15	0.18	0.08	0.03	$281,815
	C	1.45	0.84	0.05	0.21	0.30	0.16	0.06	$257,938
	PDO	4.01	2.27	0.14	0.64	0.93	0.64	0.23	$67,319
	Total	6.65	3.44	0.25	1.03	1.46	0.91	0.33	**$2,733,429**

Notes: (a) MnDOT crash data by roadway facility type, Sources: MnDOT section green sheets (2015 Data; 5-Year Average) and crash history

Table 4

Construction Costs & Right of Way

Table 4.1 Construction and Right of Way Costs

Cost Component	Build Alternative	
	2016 $	2020 $
Env. Rev/Eng/Const. Eng. (25%)	**$ 11,350,000**	**$ 12,094,020**
R/W (Land)	**$ 1,300,000**	**$ 1,385,218**
R/W (Buildings)	**$ -**	**$ -**
Construction		
Structures	**$ 3,867,653**	**$ 4,121,188**
Grading & Drainage	**$ 6,185,176**	**$ 6,590,630**
Subbase & Base	**$ 9,678,248**	**$ 10,312,681**
Surface	**$ 2,393,291**	**$ 2,550,178**
Other	**$ 6,775,631**	**$ 7,219,790**
Track Elements	**$ 10,340,000**	**$ 11,017,812**
Rail Systems and Signals	**$ 6,160,000**	**$ 6,563,803**
SubTotal Construction	**$ 45,400,000**	**$ 48,376,081**
Total Cost	**$ 58,050,000**	**$ 61,855,320**

Roadway Elements		**2016 $**		**Rail Elements**		**2016 $**	
Env. Rev/Eng/Const. Eng. (25%)	$	5,850,000		Env. Rev/Eng/Const. Eng. (25%)	$	5,500,000	
R/W (Land)	$	1,300,000		R/W (Land)	(All R/W costs included		
R/W (Buildings)	$	-		R/W (Buildings)	under Roadway Elements)		
Structures	$	3,867,653	17%	Structures	$	-	
Grading & Drainage	$	685,176	3%	Grading & Drainage	$	5,500,000	25%
Subbase & Base	$	9,678,248	41%	Subbase & Base	$	-	
Surface	$	2,393,291	10%	Surface	$	-	
Other	$	6,775,631	29%	Other	$	-	
Track Elements	$	-		Track Elements	$	10,340,000	47%
Rail Systems and Signals	$	-		Rail Systems and Signals	$	6,160,000	28%
SubTotal Construction	$	23,400,000		Subtotal Construction	$	22,000,000	
Total Cost	$	30,550,000		Total Cost	$	27,500,000	

Source: 2016 Preliminary Design Construction Cost Estimate (9/28/16)

Table 4.2 Summary of Maintenance Costs

Maintenance Costs	Costs (Present Value)
Build Present Value	**$ 3,777,059**
No Build Present Value	**$ 3,111,168**
Net Present Value	**$ 665,890**

Per Track Mile Annual Maintenance Costs
First 10 years: $ 10,000
After first 10 years: $ 15,000
Project Track Miles: 5.14
Source: BNSF
Note: assumes no change in maintenance costs for existing track

Per Roadway Lane-Mile Annual Maintenance Costs
No Build: $25,000
Build: $5,000

Maintenance Roadway Lane-Miles
Alt 2A
No Build: 7.8
Build: 11.6

Bridge Annual Maintenance Costs
TH 12 Steel Bridge $ 99,604
TH 40 Pres Concrete Bridge $ 15,900
Source: 2015 Willmar Wye Benefit Cost Analysis
Spreadsheet "05BCA_2015.xlsx"
Inflated to 2016 dollars using GDP Chained Price Index

Table 4.3 Annual Maintenance Costs

Year	No Build Annual Maintenance Costs	No Build Present Worth Maintenance Costs	Build Annual Maintenance Costs	Build Present Worth Maintenance Costs
2021	$ 195,000	$ 180,122	$ 224,904	$ 207,744
2022	$ 195,000	$ 177,285	$ 224,904	$ 204,473
2023	$ 195,000	$ 174,493	$ 224,904	$ 201,252
2024	$ 195,000	$ 171,745	$ 224,904	$ 198,083
2025	$ 195,000	$ 169,041	$ 224,904	$ 194,964
2026	$ 195,000	$ 166,379	$ 224,904	$ 191,893
2027	$ 195,000	$ 163,758	$ 224,904	$ 188,871
2028	$ 195,000	$ 161,180	$ 224,904	$ 185,897
2029	$ 195,000	$ 158,641	$ 224,904	$ 182,970
2030	$ 195,000	$ 156,143	$ 224,904	$ 180,088
2031	$ 195,000	$ 153,684	$ 250,604	$ 197,507
2032	$ 195,000	$ 151,264	$ 250,604	$ 194,397
2033	$ 195,000	$ 148,882	$ 250,604	$ 191,335
2034	$ 195,000	$ 146,537	$ 250,604	$ 188,322
2035	$ 195,000	$ 144,230	$ 250,604	$ 185,356
2036	$ 195,000	$ 141,958	$ 250,604	$ 182,437
2037	$ 195,000	$ 139,723	$ 250,604	$ 179,564
2038	$ 195,000	$ 137,522	$ 250,604	$ 176,737
2039	$ 195,000	$ 135,357	$ 250,604	$ 173,953
2040	$ 195,000	$ 133,225	$ 250,604	$ 171,214

Table 5
Summary Benefit/Cost for Build Alternative Compared to No-Build

Table 5.1 Summary of Analysis Data (From Previous Tables)

	No Build	Build Alt.
Base Year VMT (daily)	31,476	33,488
Base Year VHT (hours/day)	929	941
2040 VMT (daily)	31,327	35,331
2040 VHT (hours/day)	1,009	1,035
Base Year Annual Crash Cost	$2,106,484	$2,139,959
2040 Annual Crash Cost	$2,540,183	$2,733,429
Percent Trucks	6.1%	6.1%
Base Year	2021	2021
Horizon Year	2040	2040
Year of Analysis	2016	
Initial Year	2020	
Days/Year	365	
Benefit Period (years)	20	

Table 5.2 Capital Costs of Build Alternative 2A and Salvage Value

	Project Cost 2020 $	Component Service Life (Years)	Salvage Value 20 Years	Remaining Capital Value Factor
Eng/Const Admin	$ 12,094,020.30	0		
R/W (Land)	$ 1,385,218.18	100	($1,246,696)	0.90
R/W (Buildings)	$ -	0	$0	
Structures	$ 4,121,187.55	60	($3,132,103)	0.76
Grading & Drainage	$ 6,590,629.64	50	($4,547,534)	0.69
Subbase & Base	$ 10,312,680.57	40	($5,981,355)	0.58
Surface	$ 2,550,177.60	25	($586,541)	0.23
Other	$ 7,219,790.44	0	$0	
Track Elements	$ 11,017,812.33	38	($6,045,520)	0.55
Rail Systems and Signals	$ 6,563,803.09	54	($4,755,771)	0.72
	$ 61,855,319.70		($26,295,520)	
	$ 58,050,000	<- PW Project Costs		
	$ (17,965,229)	<- PW Salvage Value		
	$ 665,890	<- PW Net Maintenance Costs		
	$ 40,750,661	<- PW Capital Cost and Remaining Capital Value		

Table 5.3 Annual Crash Cost Savings

Year	No Build Crash Costs	Build Alt. Crash Costs	Crash Benefits	Present Worth Crash Benefits	
2020			$0	$0	
2021	$2,106,484	$2,139,959	($33,475)	($30,921)	
2022	$2,129,311	$2,171,195	($41,884)	($38,079)	
2023	$2,152,137	$2,202,430	($50,293)	($45,004)	
2024	$2,174,963	$2,233,665	($58,702)	($51,702)	
2025	$2,197,789	$2,264,900	($67,111)	($58,177)	
2026	$2,220,616	$2,296,136	($75,520)	($64,435)	
2027	$2,243,442	$2,327,371	($83,929)	($70,482)	
2028	$2,266,268	$2,358,606	($92,338)	($76,323)	
2029	$2,289,094	$2,389,841	($100,747)	($81,962)	
2030	$2,311,921	$2,421,077	($109,156)	($87,405)	
2031	$2,334,747	$2,452,312	($117,565)	($92,656)	
2032	$2,357,573	$2,483,547	($125,974)	($97,720)	
2033	$2,380,399	$2,514,782	($134,383)	($102,601)	
2034	$2,403,226	$2,546,017	($142,792)	($107,304)	
2035	$2,426,052	$2,577,253	($151,201)	($111,834)	
2036	$2,448,878	$2,608,488	($159,610)	($116,195)	
2037	$2,471,704	$2,639,723	($168,019)	($120,390)	
2038	$2,494,530	$2,670,958	($176,428)	($124,424)	
2039	$2,517,357	$2,702,194	($184,837)	($128,302)	
2040	$2,540,183	$2,733,429	($193,246)	($132,027)	
				($1,737,943)	**<- PW Crashes**

Source: Crash cost linearly interpolated between base year and 2040.

Table 5.4 Annual Vehicle Operating Cost Savings

Year	No Build Annual VMT	No Build Operating Costs	Build Alt. Annual VMT	Build Alt. Operating Costs	Annual Operating Benefits	Present Worth Operating Benefits
2020					$0	$0
2021	11,488,740	$3,993,256	12,222,946	$4,248,451	($255,195)	($235,724)
2022	11,485,878	$3,992,261	12,258,360	$4,260,761	($268,499)	($244,107)
2023	11,483,015	$3,991,266	12,293,774	$4,273,070	($281,803)	($252,168)
2024	11,480,153	$3,990,272	12,329,188	$4,285,379	($295,108)	($259,915)
2025	11,477,291	$3,989,277	12,364,602	$4,297,688	($308,412)	($267,355)
2026	11,474,428	$3,988,282	12,400,016	$4,309,998	($321,716)	($274,496)
2027	11,471,566	$3,987,287	12,435,431	$4,322,307	($335,020)	($281,346)
2028	11,468,703	$3,986,292	12,470,845	$4,334,616	($348,324)	($287,912)
2029	11,465,841	$3,985,297	12,506,259	$4,346,926	($361,628)	($294,201)
2030	11,462,979	$3,984,302	12,541,673	$4,359,235	($374,933)	($300,221)
2031	11,460,116	$3,983,307	12,577,087	$4,371,544	($388,237)	($305,979)
2032	11,457,254	$3,982,312	12,612,502	$4,383,853	($401,541)	($311,480)
2033	11,454,392	$3,981,317	12,647,916	$4,396,163	($414,845)	($316,733)
2034	11,451,529	$3,980,323	12,683,330	$4,408,472	($428,149)	($321,743)
2035	11,448,667	$3,979,328	12,718,744	$4,420,781	($441,453)	($326,516)
2036	11,445,804	$3,978,333	12,754,158	$4,433,090	($454,758)	($331,059)
2037	11,442,942	$3,977,338	12,789,572	$4,445,400	($468,062)	($335,379)
2038	11,440,080	$3,976,343	12,824,987	$4,457,709	($481,366)	($339,480)
2039	11,437,217	$3,975,348	12,860,401	$4,470,018	($494,670)	($343,368)
2040	11,434,355	$3,974,353	12,895,815	$4,482,327	($507,974)	($347,051)

Source: Annual VMT linearly interpolated between base year and 2040. **($5,976,231) <- PW Operating**
Vehicle operating costs applied to annual VMT to calculate annual operating costs.

Table 5.5 Annual Travel Time Cost Savings

Year	No Build Annual VHT (hours)	No Build Time Costs	Build Alt. Annual VHT (hours)	Build Alt. Time Costs	Annual Time Benefits	Present Worth Time Benefits
2020					$0	$0
2021	339,085	$7,604,435	343,454	$7,702,411	($97,976)	($90,500)
2022	340,622	$7,638,901	345,260	$7,742,921	($104,021)	($94,571)
2023	342,159	$7,673,366	347,067	$7,783,432	($110,065)	($98,491)
2024	343,696	$7,707,832	348,873	$7,823,942	($116,110)	($102,263)
2025	345,232	$7,742,298	350,679	$7,864,453	($122,155)	($105,893)
2026	346,769	$7,776,764	352,486	$7,904,963	($128,200)	($109,383)
2027	348,306	$7,811,229	354,292	$7,945,474	($134,244)	($112,737)
2028	349,843	$7,845,695	356,098	$7,985,984	($140,289)	($115,958)
2029	351,380	$7,880,161	357,905	$8,026,495	($146,334)	($119,049)
2030	352,917	$7,914,626	359,711	$8,067,005	($152,379)	($122,015)
2031	354,453	$7,949,092	361,518	$8,107,516	($158,423)	($124,857)
2032	355,990	$7,983,558	363,324	$8,148,026	($164,468)	($127,580)
2033	357,527	$8,018,024	365,130	$8,188,536	($170,513)	($130,186)
2034	359,064	$8,052,489	366,937	$8,229,047	($176,558)	($132,678)
2035	360,601	$8,086,955	368,743	$8,269,557	($182,602)	($135,060)
2036	362,138	$8,121,421	370,549	$8,310,068	($188,647)	($137,333)
2037	363,674	$8,155,887	372,356	$8,350,578	($194,692)	($139,502)
2038	365,211	$8,190,352	374,162	$8,391,089	($200,736)	($141,568)
2039	366,748	$8,224,818	375,969	$8,431,599	($206,781)	($143,534)
2040	368,285	$8,259,284	377,775	$8,472,110	($212,826)	($145,404)

Source: Annual VHT linearly interpolated between base year and 2040. **($2,428,561) <- PW Time**
Person value of time costs applied to annual VHT to calculate annual travel time costs.

Table 1. Alternative 2B Benefit - Cost Summary

	Present Worth			
	Cost	Benefit	Net Present Value	B/C Ratio
Construction/Right-of-way	$ 54,750,000			
Salvage Value of Construction	$ (17,577,330)			
Maintenance	$ 665,890			
At-Grade Crossing Crash Reduction Savings		$ 1,458,424		
Other Crash Reduction Savings		$ (4,247,115)		
Auto/Truck Operating Cost Savings		$ (6,823,462)		
Auto/Truck Travel Time Cost Savings		$ (3,344,180)		
Train Operating and Inventory Cost Savings		$ 59,611,644		
Train Emissions Cost Savings		$ 40,524,546		
Total	**$ 37,838,561**	**$ 87,179,858**	**$49,341,297**	**2.30**

Table 1
Daily Network Statistics by Scenario

Table 1.1

Synchro Model Daily Network Statistics by Scenario[a, b]

Scenario		Daily	
		Vehicle Miles Traveled	Vehicle Hours Traveled
Existing	Based on 2016 Counts	27,364	887
No Build	Projected 2040	31,327	1,009
Build Year of Open	Projected 2021	30,974	914
Build Alt. 2B	Projected 2040	35,925	1,045

Table 1.2

Daily Entering Vehicles (for intersections) and VMT (for grade-separated through traffic)

Scenario		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500,4999]	Rural 2-lane: ADT∈[5000,7999]	Rural 4-lane Divided	Rural 4-lane Undivided
Existing	Based on 2016 Counts	52,258	14,425	2,075	5,920	9,468	6,751	2,639
No Build	Projected 2040	71,831	16,050	2,632	6,825	10,157	8,302	3,401
Build Year of Open	Projected 2021	60,133	21,575	3,705	5,920	12,413	6,751	2,639
Build Alt. 2B	Projected 2040	78,478	23,550	1,289	9,233	13,225	8,142	3,401

Table 2

Recommended Economic Values Worksheet[a]

Table 2.1 Recommended standard values for use in B/C analysis in SFY 2017

Discount Rate	Percent [b]
Real	1.6%
Value of Time	**Dollars per person hour [c]**
Auto	$16.80
Truck	$28.30
Variable Operating and Emissions Costs	**Dollars per mile [d, e]**
Auto variable vehicle operating costs	$0.25
Auto climate and health-related emissions costs	$0.05
Auto total operating and emissions costs	$0.30
Truck variable vehicle operating costs	$0.85
Truck climate and health-related emissions costs	$0.23
Truck total operating and emissions costs	$1.08
Mn/DOT Crash Values	**Dollars per crash [f]**
Fatal	$10,700,000
Injury Type A only	$570,000
Injury Type B only	$170,000
Injury Type C only	$84,000
Property damage only	$7,600

Table 2.2 Recommended remaining capital value factors for use in benefit-cost analysis

Expected life (years)	Factor, 20-year analysis
25	0.23
30	0.39
35	0.50
40	0.58
50	0.69
60	0.76
100	0.9

(a) Recommended standard values for use in economic analysis in SFY 2017 Minnesota Department of Transportation, Office of Investment Management, July 2016.
(b) This is based on the five-year average for real interest rates (market rate less inflation) on 30-year Treasury Notes and Bonds.
(c) Adapted from U.S. DOT's "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis" published July 9, 2014, with Minnesota earnings rates.
(d) Variable vehicle operating costs based on updated cost levels from "The Per-Mile Costs of Operating Automobiles and Trucks," G. Barnes, 2003. Variable costs include fuel, maintenance, tires, repair and depreciation.
(e) Emissions and health costs apply U.S. DOT dollars-per-ton monetization factors to average vehicle emission rates modeled by EPA to account for the social cost of carbon (at benefit-cost analysis period midpoint) and health damages from criteria pollutants including volatile organic compounds (ozone precursor), nitrogen oxides, particulate matter (PM2.5), and sulfur dioxide.
(f) Reflects Minnesota's three-year crash history and recommended value of life published by the U.S. Department of Transportation, June 17, 2015

Table 3
Crash Worksheet

Table 3.1 Crash Rates by Facility Type and Severity Type

Crash Type	Rural Thru/Stop		Low Volume/High Speed		Rural 2-lane: ADT∈[0,1499]		Rural 2-lane: ADT∈[1500,4999]		Rural 2-lane: ADT∈[5000,7999]		Rural 4-lane Divided		Rural 4-lane Undivided	
	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MEV	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT	Crashes %	Crash Rate MVMT
Fatal	0.016	0.0045	0.008	0.0006	0.026	0.0045	0.022	0.0045	0.017	0.0045	0.006	0.0045	0.004	0.0045
A	0.026	0.006	0.008	0.006	0.040	0.006	0.029	0.006	0.028	0.006	0.010	0.006	0.022	0.006
B	0.137	0.034	0.080	0.032	0.183	0.073	0.139	0.043	0.121	0.038	0.086	0.026	0.084	0.022
C	0.218	0.055	0.245	0.098	0.198	0.079	0.197	0.061	0.204	0.063	0.179	0.054	0.187	0.049
PDO	0.603	0.151	0.660	0.264	0.552	0.221	0.613	0.190	0.630	0.195	0.719	0.216	0.703	0.183
Total	1.000	0.250	1.000	0.400	1.000	0.400	1.000	0.310	1.000	0.310	1.000	0.300	1.000	0.260
(a) **Crash Rate**	**0.25**		**0.40**		**0.40**		**0.31**		**0.31**		**0.30**		**0.26**	

Table 3.2 Annual Entering Vehicles (for intersections) and VMT (for grade-separated through traffic) by Facility Type

		Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided
No Build Base Year (2015)	Annual ADT	19,074,170	5,265,125	757,375	2,160,800	3,455,820	2,464,115	963,235
2040 No Build	Annual ADT	26,218,315	5,858,250	960,680	2,491,125	3,707,305	3,030,230	1,241,365
Build Base Year (2021)	Annual ADT	21,948,545	7,874,875	1,352,325	2,160,800	4,530,745	2,464,115	963,235
2040 Build Alt. 1	Annual ADT	28,644,470	8,595,750	470,485	3,370,045	4,827,125	2,971,830	1,241,365

Table 3.3 Annual Crashes for Project Sub-Area by Facility Type

	Crash Type	Rural Thru/Stop	Low Volume, High Speed	Rural 2-lane: ADT∈[0,1499]	Rural 2-lane: ADT∈[1500, 4999]	Rural 2-lane: ADT∈[5000, 7999]	Rural 4-lane Divided	Rural 4-lane Undivided	Annual Crash Cost
		Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	Annual Crashes	
No Build Base Year (2015)	Fatal	0.09	0.00	0.00	0.01	0.02	0.01	0.00	$1,424,158
	A	0.11	0.03	0.00	0.01	0.02	0.01	0.01	$116,761
	B	0.65	0.17	0.06	0.09	0.13	0.06	0.02	$201,040
	C	1.04	0.51	0.06	0.13	0.22	0.13	0.05	$180,261
	PDO	2.87	1.39	0.17	0.41	0.67	0.53	0.18	$47,307
	Total	4.77	2.11	0.29	0.66	1.06	0.75	0.25	**$1,969,527**
2040 No Build	Fatal	0.12	0.00	0.00	0.01	0.02	0.01	0.01	$1,850,410
	A	0.16	0.04	0.01	0.01	0.02	0.02	0.01	$148,795
	B	0.90	0.19	0.07	0.11	0.14	0.08	0.03	$255,830
	C	1.43	0.57	0.08	0.15	0.23	0.16	0.06	$225,962
	PDO	3.95	1.55	0.21	0.47	0.72	0.65	0.23	$59,186
	Total	6.55	2.34	0.37	0.76	1.14	0.93	0.33	**$2,540,183**
Build Base Year (2021)	Fatal	0.10	0.00	0.01	0.01	0.02	0.01	0.00	$1,659,718
	A	0.13	0.05	0.01	0.01	0.03	0.01	0.01	$141,228
	B	0.75	0.25	0.10	0.09	0.17	0.06	0.02	$246,133
	C	1.20	0.77	0.11	0.13	0.29	0.13	0.05	224566.4368
	PDO	3.31	2.08	0.30	0.41	0.88	0.53	0.18	$58,430
	Total	5.49	3.15	0.52	0.66	1.39	0.75	0.25	**$2,330,075**
2040 Build Alternative 1	Fatal	0.13	0.01	0.00	0.02	0.02	0.01	0.01	$2,054,629
	A	0.17	0.05	0.00	0.02	0.03	0.02	0.01	$171,414
	B	0.98	0.27	0.03	0.15	0.18	0.08	0.03	$291,973
	C	1.56	0.84	0.04	0.21	0.31	0.16	0.06	$266,507
	PDO	4.32	2.27	0.10	0.64	0.94	0.64	0.23	$69,469
	Total	7.16	3.44	0.18	1.03	1.48	0.91	0.33	**$2,853,992**

Notes: (a) MnDOT crash data by roadway facility type, Sources: MnDOT section green sheets (2015 Data; 5-Year Average) and crash history

Table 4

Construction Costs & Right of Way

Table 4.1 Construction and Right of Way Costs

Cost Component	Build Alternative	
	2016 $	2020 $
Env. Rev/Eng/Const. Eng. (25%)	**$ 10,550,000**	**$ 11,241,578**
R/W (Land)	**$ 2,000,000**	**$ 2,131,105**
R/W (Buildings)	**$ -**	**$ -**
Construction		
Structures	**$ 2,052,073**	**$ 2,186,592**
Grading & Drainage	**$ 6,489,887**	**$ 6,915,315**
Subbase & Base	**$ 10,004,242**	**$ 10,660,044**
Surface	**$ 1,600,586**	**$ 1,705,509**
Other	**$ 5,553,212**	**$ 5,917,238**
Track Elements	**$ 10,340,000**	**$ 11,017,812**
Rail Systems and Signals	**$ 6,160,000**	**$ 6,563,803**
SubTotal Construction	**$ 42,200,000**	**$ 44,966,313**
Total Cost	**$ 54,750,000**	**$ 58,338,997**

Roadway Elements	**2016 $**		**Rail Elements**	**2016 $**	
Env. Rev/Eng/Const. Eng. (25%)	$ 5,050,000		Env. Rev/Eng/Const. Eng. (25%)	$ 5,500,000	
R/W (Land)	$ 2,000,000		R/W (Land)	(All R/W costs included	
R/W (Buildings)	$ -		R/W (Buildings)	under Roadway Elements)	
Structures	$ 2,052,073	10%	Structures	$ -	
Grading & Drainage	$ 989,887	5%	Grading & Drainage	$ 5,500,000	25%
Subbase & Base	$ 10,004,242	50%	Subbase & Base	$ -	
Surface	$ 1,600,586	8%	Surface	$ -	
Other	$ 5,553,212	27%	Other	$ -	
Track Elements	$ -		Track Elements	$ 10,340,000	47%
Rail Systems and Signals	$ -		Rail Systems and Signals	$ 6,160,000	28%
SubTotal Construction	$ 20,200,000		Subtotal Construction	$ 22,000,000	
Total Cost	$ 27,250,000		Total Cost	$ 27,500,000	

Source: 2016 Preliminary Design Construction Cost Estimate (9/28/16)

Table 4.2 Summary of Maintenance Costs

Maintenance Costs	Costs (Present Value)
Build Present Value	**$ 3,777,059**
No Build Present Value	**$ 3,111,168**
Net Present Value	**$ 665,890**

Per Track Mile Annual Maintenance Costs
First 10 years: $ 10,000
After first 10 years: $ 15,000
Project Track Miles: 5.14
Source: BNSF
Note: assumes no change in maintenance costs for existing track

Per Roadway Lane-Mile Annual Maintenance Costs
No Build: $25,000
Build: $5,000

Maintenance Roadway Lane-Miles
Alt 2B
No Build: 7.8
Build: 11.6

Bridge Annual Maintenance Costs
TH 12 Steel Bridge $ 99,604
TH 40 Pres Concrete Bridge $ 15,900
Source: 2015 Willmar Wye Benefit Cost Analysis Spreadsheet "05BCA_2015.xlsx"
Inflated to 2016 dollars using GDP Chained Price Index

Table 4.3 Annual Maintenance Costs

Year	No Build Annual Maintenance Costs	No Build Present Worth Maintenance Costs	Build Annual Maintenance Costs	Build Present Worth Maintenance Costs
2021	$ 195,000	$ 180,122	$ 224,904	$ 207,744
2022	$ 195,000	$ 177,285	$ 224,904	$ 204,473
2023	$ 195,000	$ 174,493	$ 224,904	$ 201,252
2024	$ 195,000	$ 171,745	$ 224,904	$ 198,083
2025	$ 195,000	$ 169,041	$ 224,904	$ 194,964
2026	$ 195,000	$ 166,379	$ 224,904	$ 191,893
2027	$ 195,000	$ 163,758	$ 224,904	$ 188,871
2028	$ 195,000	$ 161,180	$ 224,904	$ 185,897
2029	$ 195,000	$ 158,641	$ 224,904	$ 182,970
2030	$ 195,000	$ 156,143	$ 224,904	$ 180,088
2031	$ 195,000	$ 153,684	$ 250,604	$ 197,507
2032	$ 195,000	$ 151,264	$ 250,604	$ 194,397
2033	$ 195,000	$ 148,882	$ 250,604	$ 191,335
2034	$ 195,000	$ 146,537	$ 250,604	$ 188,322
2035	$ 195,000	$ 144,230	$ 250,604	$ 185,356
2036	$ 195,000	$ 141,958	$ 250,604	$ 182,437
2037	$ 195,000	$ 139,723	$ 250,604	$ 179,564
2038	$ 195,000	$ 137,522	$ 250,604	$ 176,737
2039	$ 195,000	$ 135,357	$ 250,604	$ 173,953
2040	$ 195,000	$ 133,225	$ 250,604	$ 171,214

Table 5
Summary Benefit/Cost for Build Alternative Compared to No-Build

Table 5.1 Summary of Analysis Data (From Previous Tables)

	No Build	Build Alt.
Base Year VMT (daily)	30,974	33,247
Base Year VHT (hours/day)	914	930
2040 VMT (daily)	31,327	35,925
2040 VHT (hours/day)	1,009	1,045
Base Year Annual Crash Cost	$2,106,484	$2,330,075
2040 Annual Crash Cost	$2,540,183	$2,853,992
Percent Trucks	6.1%	6.1%
Base Year	2021	2021
Horizon Year	2040	2040
Year of Analysis	2016	
Initial Year	2020	
Days/Year	365	
Benefit Period (years)	20	

Table 5.2 Capital Costs of Build Alternative 2B and Salvage Value

	Project Cost 2020 $	Component Service Life (Years)	Salvage Value 20 Years	Remaining Capital Value Factor
Eng/Const Admin	$ 11,241,578.34	0		
R/W (Land)	$ 2,131,104.90	100	($1,917,994)	0.90
R/W (Buildings)	$ -	0	$0	
Structures	$ 2,186,591.69	60	($1,661,810)	0.76
Grading & Drainage	$ 6,915,314.90	50	($4,771,567)	0.69
Subbase & Base	$ 10,660,044.26	40	($6,182,826)	0.58
Surface	$ 1,705,508.73	25	($392,267)	0.23
Other	$ 5,917,238.38	0	$0	
Track Elements	$ 11,017,812.33	38	($6,045,520)	0.55
Rail Systems and Signals	$ 6,563,803.09	54	($4,755,771)	0.72
	$ 58,338,996.61		($25,727,755)	
	$ 54,750,000	<- PW Project Costs		
	$ (17,577,330)	<- PW Salvage Value		
	$ 665,890	<- PW Net Maintenance Costs		
	$ 37,838,561	<- PW Capital Cost and Remaining Capital Value		

Table 5.3 Annual Crash Cost Savings

Year	No Build Crash Costs	Build Alt. Crash Costs	Crash Benefits	Present Worth Crash Benefits	
2020			$0	$0	
2021	$2,106,484	$2,330,075	($223,591)	($206,531)	
2022	$2,129,311	$2,357,650	($228,339)	($207,596)	
2023	$2,152,137	$2,385,224	($233,088)	($208,575)	
2024	$2,174,963	$2,412,799	($237,836)	($209,473)	
2025	$2,197,789	$2,440,374	($242,584)	($210,290)	
2026	$2,220,616	$2,467,948	($247,333)	($211,030)	
2027	$2,243,442	$2,495,523	($252,081)	($211,694)	
2028	$2,266,268	$2,523,097	($256,829)	($212,285)	
2029	$2,289,094	$2,550,672	($261,578)	($212,805)	
2030	$2,311,921	$2,578,246	($266,326)	($213,256)	
2031	$2,334,747	$2,605,821	($271,074)	($213,640)	
2032	$2,357,573	$2,633,396	($275,823)	($213,959)	
2033	$2,380,399	$2,660,970	($280,571)	($214,215)	
2034	$2,403,226	$2,688,545	($285,319)	($214,410)	
2035	$2,426,052	$2,716,119	($290,068)	($214,545)	
2036	$2,448,878	$2,743,694	($294,816)	($214,623)	
2037	$2,471,704	$2,771,269	($299,564)	($214,646)	
2038	$2,494,530	$2,798,843	($304,313)	($214,614)	
2039	$2,517,357	$2,826,418	($309,061)	($214,530)	
2040	$2,540,183	$2,853,992	($313,809)	($214,396)	
				($4,247,115)	**<- PW Crashes**

Source: Crash cost linearly interpolated between base year and 2040.

Table 5.4 Annual Vehicle Operating Cost Savings

Year	No Build Annual VMT	No Build Operating Costs	Build Alt. Annual VMT	Build Alt. Operating Costs	Annual Operating Benefits	Present Worth Operating Benefits
2020					$0	$0
2021	11,305,510	$3,929,569	12,135,189	$4,217,949	($288,380)	($266,377)
2022	11,312,291	$3,931,926	12,186,633	$4,235,830	($303,904)	($276,296)
2023	11,319,073	$3,934,283	12,238,077	$4,253,711	($319,428)	($285,836)
2024	11,325,854	$3,936,640	12,289,521	$4,271,592	($334,952)	($295,007)
2025	11,332,635	$3,938,997	12,340,965	$4,289,473	($350,475)	($303,818)
2026	11,339,417	$3,941,354	12,392,409	$4,307,354	($365,999)	($312,279)
2027	11,346,198	$3,943,711	12,443,853	$4,325,235	($381,523)	($320,398)
2028	11,352,979	$3,946,069	12,495,297	$4,343,115	($397,047)	($328,184)
2029	11,359,761	$3,948,426	12,546,741	$4,360,996	($412,571)	($335,645)
2030	11,366,542	$3,950,783	12,598,185	$4,378,877	($428,095)	($342,790)
2031	11,373,323	$3,953,140	12,649,629	$4,396,758	($443,618)	($349,626)
2032	11,380,104	$3,955,497	12,701,073	$4,414,639	($459,142)	($356,162)
2033	11,386,886	$3,957,854	12,752,517	$4,432,520	($474,666)	($362,406)
2034	11,393,667	$3,960,211	12,803,961	$4,450,401	($490,190)	($368,364)
2035	11,400,448	$3,962,568	12,855,405	$4,468,282	($505,714)	($374,045)
2036	11,407,230	$3,964,925	12,906,849	$4,486,163	($521,238)	($379,456)
2037	11,414,011	$3,967,282	12,958,293	$4,504,044	($536,762)	($384,604)
2038	11,420,792	$3,969,639	13,009,737	$4,521,924	($552,285)	($389,495)
2039	11,427,574	$3,971,996	13,061,181	$4,539,805	($567,809)	($394,137)
2040	11,434,355	$3,974,353	13,112,625	$4,557,686	($583,333)	($398,536)

Source: Annual VMT linearly interpolated between base year and 2040. **($6,823,462) <- PW Operating**
Vehicle operating costs applied to annual VMT to calculate annual operating costs.

Table 5.5 Annual Travel Time Cost Savings

Year	No Build Annual VHT (hours)	No Build Time Costs	Build Alt. Annual VHT (hours)	Build Alt. Time Costs	Annual Time Benefits	Present Worth Time Benefits
2020					$0	$0
2021	333,610	$7,481,651	339,561	$7,615,119	($133,468)	($123,285)
2022	335,435	$7,522,579	341,765	$7,664,532	($141,953)	($129,058)
2023	337,260	$7,563,507	343,968	$7,713,945	($150,438)	($134,618)
2024	339,085	$7,604,435	346,171	$7,763,358	($158,923)	($139,971)
2025	340,910	$7,645,363	348,375	$7,812,771	($167,408)	($145,122)
2026	342,735	$7,686,291	350,578	$7,862,184	($175,893)	($150,076)
2027	344,560	$7,727,219	352,781	$7,911,597	($184,378)	($154,838)
2028	346,385	$7,768,147	354,985	$7,961,010	($192,863)	($159,413)
2029	348,210	$7,809,075	357,188	$8,010,423	($201,348)	($163,806)
2030	350,035	$7,850,003	359,392	$8,059,836	($209,833)	($168,020)
2031	351,860	$7,890,931	361,595	$8,109,249	($218,318)	($172,061)
2032	353,685	$7,931,859	363,798	$8,158,662	($226,803)	($175,934)
2033	355,510	$7,972,787	366,002	$8,208,075	($235,288)	($179,641)
2034	357,335	$8,013,715	368,205	$8,257,488	($243,773)	($183,188)
2035	359,160	$8,054,644	370,408	$8,306,901	($252,257)	($186,579)
2036	360,985	$8,095,572	372,612	$8,356,314	($260,742)	($189,818)
2037	362,810	$8,136,500	374,815	$8,405,727	($269,227)	($192,908)
2038	364,635	$8,177,428	377,018	$8,455,140	($277,712)	($195,854)
2039	366,460	$8,218,356	379,222	$8,504,553	($286,197)	($198,660)
2040	368,285	$8,259,284	381,425	$8,553,966	($294,682)	($201,328)

Source: Annual VHT linearly interpolated between base year and 2040. **($3,344,180) <- PW Time**
Person value of time costs applied to annual VHT to calculate annual travel time costs.

Diversions

Because of the wye, trains that are currently going through Willmar will be able to go around Willmar, saving operating time and inventory costs. Some of these operating cost savings to BNSF are passed on to shippers. In order to avoid double counting, shipper savings are not included.

Operating Savings

$ 6,192,861,190 Total freight operating expenses, BNSF ($2016)
9,131,190 train hours in road service, BNSF
$ 678.21 operating expense per train hour
Source:
http://bnsf.com/about-bnsf/financial-information/surface-transportation-board-reports/pdf/15R1.pdf
Expenses: page 49, line 419 "Total Train Operations;" train hours: page 97, line 115 "Train Hours - Road Service"
Inflated to $2016 using GDP Chained Price Index

Annualization Factor 365 (trains run 365 days per year)

Inventory Savings

3,488 US Class 1 tons per train, 2013
Source: https://www.aar.org/StatisticsAndPublications/Documents/AAR-Stats.pdf, p.2

$ 33,161,517,209 Minnesota value of rail freight
125,148,521 Minnesota rail tons
$ 264.98 Minnesota rail value per ton
Source: Freight Analysis Framework, FHWA, escalated to $2015
Shipments Within, From, and To U.S. States - Tonnage by Domestic Mode: 2012
Shipments Within, From, and To U.S. States - Value by Domestic Mode: 2012

Willmar Trains (2013, 2016)

6 trains that are currently going through Willmar will be diverted to new track
2.5 hours saved per train
Source: per TIGER Application

Number of Trains per day	Type of Train	Estimated hours saved per train	Annual Trains Diverted around Willmar	Estimated hourly Operating savings by type of train	Total O&M Savings		
6.0		2.5	2,190	$ 678.21	$ 3,713,198	Annual savings	Up to 6 trains diverted, held constant throughout analysis period

Operating Savings

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total ($M)
Base Scenario																					
Annual Operating Savings	$ 3,713,198	$ 3,713,198	$ 3,713,198	$ 3,713,198	$ 3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	$3,713,198	**$ 74.26**
Operating savings @ 1.6 percent	$ 3,429,885	$ 3,375,871	$ 3,322,708	$ 3,270,382	$ 3,218,879	$3,168,188	$3,118,296	$3,069,189	$3,020,855	$2,973,283	$2,926,459	$2,880,373	$2,835,013	$2,790,367	$2,746,424	$2,703,174	$2,660,604	$2,618,705	$2,577,465	$2,536,875	**$ 59.24**

Note: 6 trains are diverted and held constant throughout the analysis period.

Inventory Savings

The inventory cost associated with the annual carloads and annual hours of delay is based on the commercial discount rate—the opportunity cost associated with holding assets in inventory rather than using them for another purpose. The analysis uses a commercial discount rate of 4.0%.
Assuming 8,760 hours in a year (365 days * 24 hours), this yields an hourly discount rate of 0.00046%. Multiplying this hourly discount rate by value of freight shipped and the hours of delay avoided yields the annual value of inventory savings.

4% Commercial Discount Rate
0.00046% Hourly Commercial Discount Rate

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total ($M)
Inventory Savings	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	$ 23,106	**$ 0.46**
Inventory savings @ 1.6 percent	$ 21,343	$ 21,007	$ 20,676	$ 20,351	$ 20,030	$ 19,715	$ 19,404	$ 19,099	$ 18,798	$ 18,502	$ 18,210	$ 17,924	$ 17,641	$ 17,364	$ 17,090	$ 16,821	$ 16,556	$ 16,295	$ 16,039	$ 15,786	**$ 0.37**

Note: 6 trains are diverted and held constant throughout the analysis period.

Reduction in Train Emissions

Removing the bottleneck so trains are moving faster and polluting less.

INPUTS

Time Savings with Project per Train

	Diversion
Hours	2.5

Source: Per TIGER Application

Annual Train Time Savings with Project (hours)

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Diversions: 6	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0	5475.0

Note: Diversions stay constant at up to 6 trains per year

Emission Rates (grams per brake horsepower hour)

	PM10	NOX	CO	HC
Tier 2 Line-Haul Locomotive	0.18	4.95	1.28	0.26

Note: Tier 2 locomotives used to account for locomotives being replaced/re-manufactured throughout the analysis period and adhering to higher emissions standards.

Source: US EPA, Office of Transportation and Air Quality, Emissions Factors for Locomotives, EPA-420-F-09-025, April 2009, p.2, http://www.epa.gov/nonroad/locomotv/420f09025.pdf

Horsepower of BNSF Locomotives

	Low	High	Use Max	
BNSF Line Haul Locomotives	3,800	4,300	4,300	due to the trains traveling through the mountainous terrain in ND/Montana

Source: http://www.4rail.net/reference_nam_bnsf_locos1.php

Annual Emission Avoided (tons) Diversions: 6

907185 grams per short ton

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
CO	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22	33.22
NOX	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46	128.46
PM10	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
HC	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75

Value of Emissions Reduced

Value of Emissions (2013$) - Adjusted to 2015$ using GDP deflators

Emission Damage Costs	2013$	2016$	Unit	Data Source
Carbon Monoxide	$0	$ -	$/short ton	
VOC	$1,813	$ 1,873	$/short ton	
Nitrogen Oxides	$7,147	$ 7,383	$/short ton	
Particulate Matter	$326,935	$ 337,727	$/short ton	Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light
Sulfur Dioxide	$42,240	$ 43,634	$/short ton	Trucks (August 2012), page 922, Table VIII-16,
Carbon Dioxide	*varies*	varies	$/metric ton	"Economic Values Used for Benefits Computations (2010 dollars)"

Note: Escalated to 2016$ using CPI Calculator www.dot.gov/sites/dot.gov/files/docs/Tiger_Benefit-Cost_Analysis_%28BCA%29_Resource_Guide_1.pdf

Hydrocarbons *$2,071*

Note: assumes HC is in 2015$, from FRA GradeDec analysis; escalated to 2016$ using CPI Calculator

OUTPUTS

Annual Emissions Benefit (2015$ M)

Diversions: 6	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**Total ($M)**
CO	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NOX	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 0.95	$ 18.97
PM10	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 1.58	$ 31.55
HC	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.01	$ 0.28
Total	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 2.54**	**$ 50.80**
Discounted @ 1.6%	**$ 2.35**	**$ 2.31**	**$ 2.27**	**$ 2.24**	**$ 2.20**	**$ 2.17**	**$ 2.13**	**$ 2.10**	**$ 2.07**	**$ 2.03**	**$ 2.00**	**$ 1.97**	**$ 1.94**	**$ 1.91**	**$ 1.88**	**$ 1.85**	**$ 1.82**	**$ 1.79**	**$ 1.76**	**$ 1.74**	**$ 40.52**

TOTAL NET BENEFITS ASSOCIATED WITH EXISTING CROSSINGS (2021-2040)

	Millions of 2016$ Discounted at 1.6%	
Safety	$	1.458
Total Existing Crossing Benefits	**$**	**1.458**

TOTAL DISBENEFITS ASSOCIATED WITH NEW CROSSING (2021-2040)

	Millions of 2016$ Discounted at 1.6%	
Safety	$	0.970
Total New Crossing Disbenefits	**$**	**0.970**

TOTAL NET BENEFITS ASSOCIATED WITH THE PROJECT (2021-2040)

	Millions of 2016$	
Safety	$	0.489
Total	**$**	**0.489**

Cost	000s of 2016$	
Fatal Accident	$ 10,700.0	Injury = average value of Type A, Type B, Type C
Injury Accident	$ 274.7	Source: MNDOT BENEFIT-COST ANALYSIS (BCA) GUIDANCE
PDO Accident	$ 7.6	

Cost of Fatal Accidents (000s of 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s of 2016$	2021-2040
Connector	Kandiyohi County	MN	1	$ 53.1	$ 53.1	$ 53.1	$ 53.2	$ 53.2	$ 53.2	$ 53.3	$ 53.3	$ 53.3	$ 53.4	$ 53.4	$ 53.4	$ 53.4	$ 53.5	$ 53.5	$ 53.5	$ 53.6	$ 53.6	$ 53.6	$ 53.7	$ 53.7	$ 53.7	$ 53.7	$ 53.8	$ 53.8	$ 53.8	$ 1,389.9	$ 1,067.9
Total			**1**	**$53.1**	**$53.1**	**$53.1**	**$53.2**	**$53.2**	**$53.2**	**$53.3**	**$53.3**	**$53.3**	**$53.4**	**$53.4**	**$53.4**	**$53.4**	**$53.5**	**$53.5**	**$53.5**	**$53.6**	**$53.6**	**$53.6**	**$53.7**	**$53.7**	**$53.7**	**$53.7**	**$53.8**	**$53.8**	**$53.8**	**$ 1,389.9**	**$ 1,067.9**

Cost of Injury Accidents (000s of 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s of 2016$	2021-2040
Connector	Kandiyohi County	MN	1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.1	$ 7.2	$ 7.2	$ 7.2	$ 7.2	$ 7.2	$ 7.2	$ 7.2	$ 185.2	$ 142.3
Total			**1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.1**	**$ 7.2**	**$ 7.2**	**$ 7.2**	**$ 7.2**	**$ 7.2**	**$ 7.2**	**$ 7.2**	**$ 185.2**	**$ 142.3**

Cost of PDO Accidents (000s of 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s of 2016$	2021-2040
Connector	Kandiyohi County	MN	1	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 0.3	$ 7.2	$ 5.5
Total			**1**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 0.3**	**$ 7.2**	**$ 5.5**

Cost of Fatal Accidents (000s of Discounted 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s	2021-2040
Connector	Kandiyohi County	MN	1	$ 49.8	$ 49.1	$ 48.3	$ 47.6	$ 46.9	$ 46.1	$ 45.4	$ 44.8	$ 44.1	$ 43.4	$ 42.7	$ 42.1	$ 41.5	$ 40.8	$ 40.2	$ 39.6	$ 39.0	$ 38.4	$ 37.8	$ 37.2	$ 36.7	$ 36.1	$ 35.6	$ 35.0	$ 34.5	$ 34.0	$ 1,076.7	$ 851.7

Cost of Injury Accidents (000s of Discounted 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s	2021-2040
Connector	Kandiyohi County	MN	1	$ 6.6	$ 6.5	$ 6.4	$ 6.3	$ 6.2	$ 6.2	$ 6.1	$ 6.0	$ 5.9	$ 5.8	$ 5.7	$ 5.6	$ 5.5	$ 5.4	$ 5.4	$ 5.3	$ 5.2	$ 5.1	$ 5.0	$ 5.0	$ 4.9	$ 4.8	$ 4.7	$ 4.7	$ 4.6	$ 4.5	$ 143.5	$ 113.5

Cost of PDO Accidents (000s of Discounted 2016$)

Section	County	State	# of Grade Crossings	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	Total in 000s	2021-2040
Connector	Kandiyohi County	MN	1	$ 0.3	$ 0.3	$ 0.3	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 0.2	$ 5.6	$ 4.4

NET SAFETY BENEFITS ASSOCIATED WITH EXISTING CROSSINGS
(in thousands of $2016)

Fatalities

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Marshall	GDCX1 - Trott	$ 11.64	$ 11.64	$ 11.64	$ 11.64	$ 11.64	$ 11.64	$ 11.64	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.63	$ 11.62	$ 11.62	$ 11.62	**$ 232.65**
Marshall	GDCX2 - Willmar	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.46	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.47	$ 10.48	$ 10.48	**$ 209.32**
Marshall	GDCX3 - 30th	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.98	$ 11.99	$ 11.99	$ 11.99	$ 11.99	$ 11.99	$ 11.99	$ 11.99	$ 11.99	**$ 239.66**
Wayzata	GDCX6 - 7th	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.85	$ 1.84	$ 1.84	$ 1.84	$ 1.84	$ 1.84	$ 1.84	$ 1.84	**$ 36.93**
Wayzata	GDCX7 - 10th	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	$ 1.91	**$ 38.13**
Morris	GDCX8 - 19th	$ 9.91	$ 9.91	$ 9.91	$ 9.91	$ 9.92	$ 9.92	$ 9.92	$ 9.92	$ 9.93	$ 9.93	$ 9.93	$ 9.93	$ 9.93	$ 9.94	$ 9.94	$ 9.94	$ 9.94	$ 9.94	$ 9.95	$ 9.95	**$ 198.57**
Morris	GDCX9 - 30th	$ 15.43	$ 15.43	$ 15.42	$ 15.42	$ 15.42	$ 15.41	$ 15.41	$ 15.41	$ 15.41	$ 15.41	$ 15.41	$ 15.40	$ 15.40	$ 15.40	$ 15.40	$ 15.40	$ 15.40	$ 15.39	$ 15.39	$ 15.39	**$ 308.14**
Morris	GDCX10 - CR5spur	$ 15.90	$ 15.89	$ 15.89	$ 15.89	$ 15.88	$ 15.88	$ 15.88	$ 15.87	$ 15.87	$ 15.87	$ 15.86	$ 15.86	$ 15.86	$ 15.86	$ 15.85	$ 15.85	$ 15.85	$ 15.84	$ 15.84	$ 15.84	**$ 317.33**
TOTAL		**$ 79.06**	**$ 79.06**	**$ 79.06**	**$ 79.05**	**$ 79.05**	**$ 79.04**	**$ 79.04**	**$ 79.04**	**$ 79.04**	**$ 79.04**	**$ 79.03**	**$ 79.03**	**$ 79.03**	**$ 79.03**	**$ 79.03**	**$ 79.03**	**$ 79.02**	**$ 79.02**	**$ 79.02**	**$ 79.01**	**$ 1,580.72**
Discounted at 1.6%		$ 73.03	$ 71.88	$ 70.74	$ 69.62	$ 68.52	$ 67.44	$ 66.38	$ 65.33	$ 64.30	$ 63.29	$ 62.29	$ 61.31	$ 60.34	$ 59.39	$ 58.45	$ 57.53	$ 56.62	$ 55.73	$ 54.85	$ 53.98	**$ 1,261.02**

Injuries

Marshall	GDCX1 - Trott	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	$ 1.64	**$ 32.81**
Marshall	GDCX2 - Willmar	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	**$ 29.95**
Marshall	GDCX3 - 30th	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	$ 1.72	**$ 34.48**
Wayzata	GDCX6 - 7th	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	$ 1.09	**$ 21.76**
Wayzata	GDCX7 - 10th	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.13	$ 1.12	**$ 22.52**
Morris	GDCX8 - 19th	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.42	$ 1.43	**$ 28.45**
Morris	GDCX9 - 30th	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	$ 1.71	**$ 34.18**
Morris	GDCX10 - CR5spur	$ 1.77	$ 1.77	$ 1.77	$ 1.77	$ 1.77	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	$ 1.76	**$ 35.25**
TOTAL		**$ 11.98**	**$ 11.98**	**$ 11.98**	**$ 11.98**	**$ 11.98**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.97**	**$ 11.96**	**$ 11.96**	**$ 11.96**	**$ 11.96**	**$ 239.40**
Discounted at 1.6%		$ 11.07	$ 10.89	$ 10.72	$ 10.55	$ 10.38	$ 10.22	$ 10.05	$ 9.90	$ 9.74	$ 9.58	$ 9.43	$ 9.28	$ 9.14	$ 8.99	$ 8.85	$ 8.71	$ 8.57	$ 8.44	$ 8.30	$ 8.17	**$ 190.99**

PDO

Marshall	GDCX1 - Trott	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	**$ 1.11**
Marshall	GDCX2 - Willmar	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	**$ 1.07**
Marshall	GDCX3 - 30th	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	**$ 1.26**
Wayzata	GDCX6 - 7th	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	**$ 0.92**
Wayzata	GDCX7 - 10th	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	**$ 0.97**
Morris	GDCX8 - 19th	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	$ 0.05	**$ 1.02**
Morris	GDCX9 - 30th	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	**$ 0.83**
Morris	GDCX10 - CR5spur	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.04	**$ 0.86**
TOTAL		**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 0.40**	**$ 8.04**
Discounted at 1.6%		$ 0.37	$ 0.37	$ 0.36	$ 0.35	$ 0.35	$ 0.34	$ 0.34	$ 0.33	$ 0.33	$ 0.32	$ 0.32	$ 0.31	$ 0.31	$ 0.30	$ 0.30	$ 0.29	$ 0.29	$ 0.28	$ 0.28	$ 0.27	**$ 6.42**

Appendix F – Floodplain and Risk Assessments

FLOODPLAIN ASSESSMENT

FLOODPLAIN ENCROACHMENT			
Floodplain	**Crossing ID***	**Type of Encroachment**	**Length, ft**
Hawk Creek: 100-Year	B	Transverse (North RR Crossing)	150/190
Hawk Creek: 100-Year	D	Transverse (TH 40 Existing Bridge 91329)	175
County Ditch 46: 100-Year	F	Transverse (South RR Crossing)	150
Unnamed Creek: 100-Year	A	Transverse (TH12, west of 30th Avenue NW)	150
Unnamed Creek: 100-Year	E	Transverse (TH12, between 1st Avenue and CSAH 55)	150
Hawk Creek: 100-year	C	Transverse (CSAH 55 Existing Bridge 94149)	150
Hawk Creek: 100-year	I	Transverse (Existing TH12)	150

**See figure for location*

TRANSVERSE or LONGITUDINAL ENCROACHMENT

1. There is no significant potential for interruption of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route.

   a. Is the roadway grade above the 100 year flood elevation? **YES**

Location of Crossing	Roadway Elevation	100 year flood elevation
BNSF Railroad North sta 104+95	1118.72	1113.9
TH 40 (bridge 91329)	1118.9	1110.28
BNSF Railroad South Sta 18+54	1118.72	1111.2
Proposed TH12, west of 30th Avenue NW	1122.0	1115.72
Proposed TH12, between 1st Avenue and CSAH 55	1121.5	1114.98
CSAH 55 (bridge 94149)	1120.0	1111.67
TH 12 (bridge 8468)	1124.3	1119.93

NO Frequency of overtopping **N/A**

Reason(s) why roadway grade will not be raised: **No overtopping for the design event**
Are there reasonable alternative routes available that are above the 100 year flood elevations? **YES**

b. If the 100 year flood elevation is not known, does roadway have a history of overtopping?
NO Reference and length of record **n/a**
YES Discuss correcting deficiency **n/a**

c. Describe how emergency services will be maintained during construction:
Emergency vehicles will continue to have access via the existing roadways

2. There is no significant impact on natural and beneficial floodplain values.

a. Impacts:

	Beneficial Impacts	**Adverse Impacts**
Fisheries	None	**N**
Wetlands	N	**N**
Plants	N	**N**
Open Space/Aesthetics	N	**N**
Public Access (boat/canoe)	N	**N**
Channel Changes	N	**N**
Boat Passage	N	**N**
Threatened/Endangered Species	N	**N**
Water Quality	N	**N**
Other	N	**N**

b. Minimization/Mitigation Measures: Wetland impacts due to the project will be mitigated. Water quality best management practices will be provided for the project impervious.

Project will be in compliance with all permit requirements, including NPDES, SWPPP, Minnesota DNR, Wetland Conservation Act, and US Army Corps of Engineers.

3. There is no significant increased risk of flooding.

a. Does the project result in any headwater or tailwater elevations that would endanger life or property? **NO**

Stage Increase **0.0**

b. Are there any special hydraulic features? What is their purpose? **N/A**

4. The project will not support and/or result in incompatible floodplain development.

   Reason(s) why project will not cause incompatible floodplain development:

   The project includes modernization of one existing culvert. The two proposed culverts are needed for safe access of the railroad. Two new culverts are needed under proposed Trunk Highway 12.

COORDINATION

Multiple permits will be required for the project, below is a list of the anticipated permits necessary:

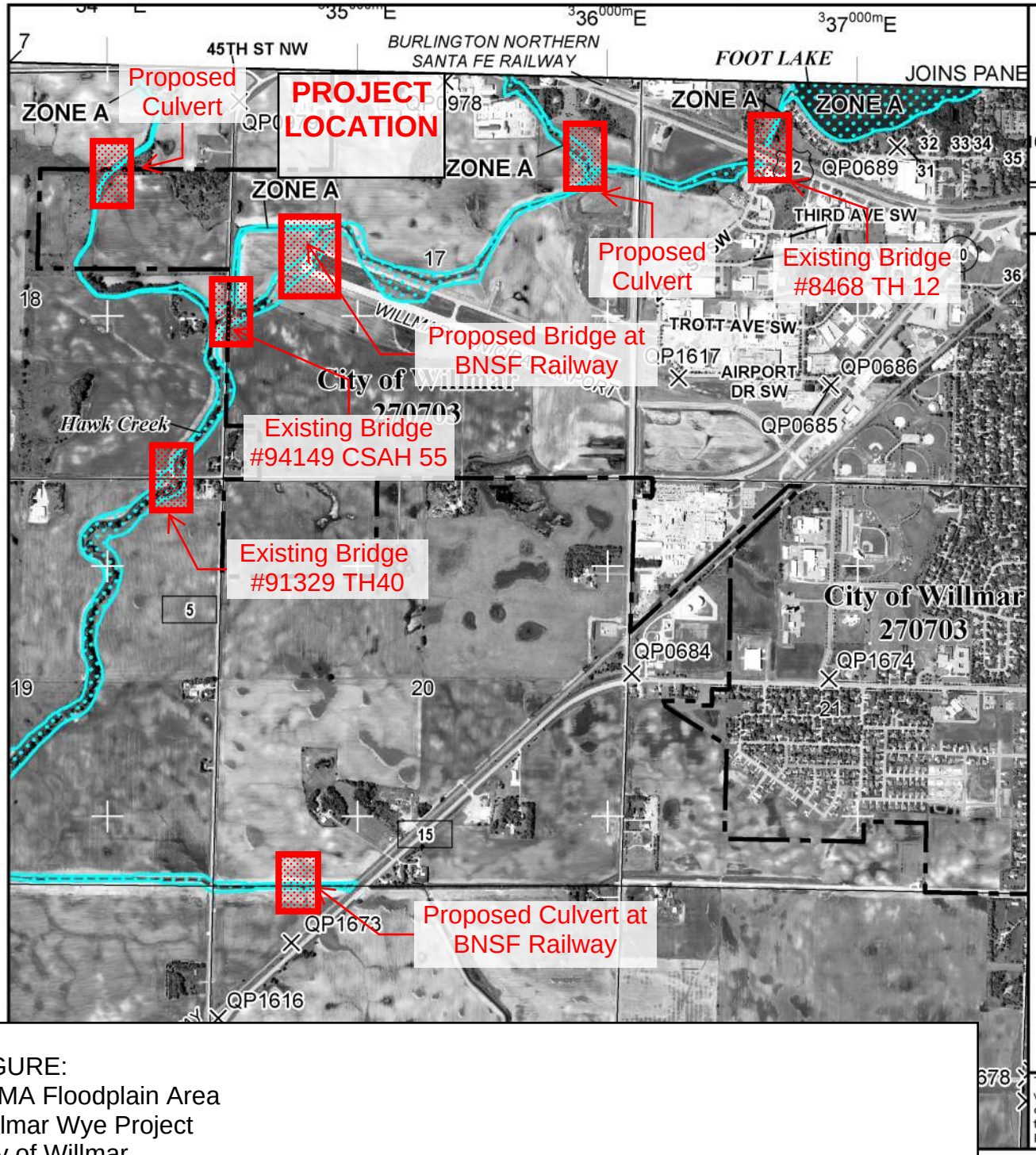
- Minnesota Pollution Control Agency Phase II NPDES CSW permit
- Minnesota Pollution Control Agency Section 401 Certification
- Minnesota Department of Natural Resources License to Cross
- Minnesota Department of Natural Resources Construction Dewatering (if necessary)
- US Army Corps of Engineers Section 404 Permit (Letter of Permission)
- Wetland Conservation Act Replacement Plan
- Kandiyohi County Ditch Drainage and Hydraulic Capacity Design Approval

CONCLUDING STATEMENT

Based on the above assessment, no significant floodplain impacts are expected.

ATTACHMENTS

Effective FEMA FIRMette for project area (September 30, 2015)
Proposed Floodplain Impacts and Crossings Figure
Hydraulic Analysis and Risk Assessments



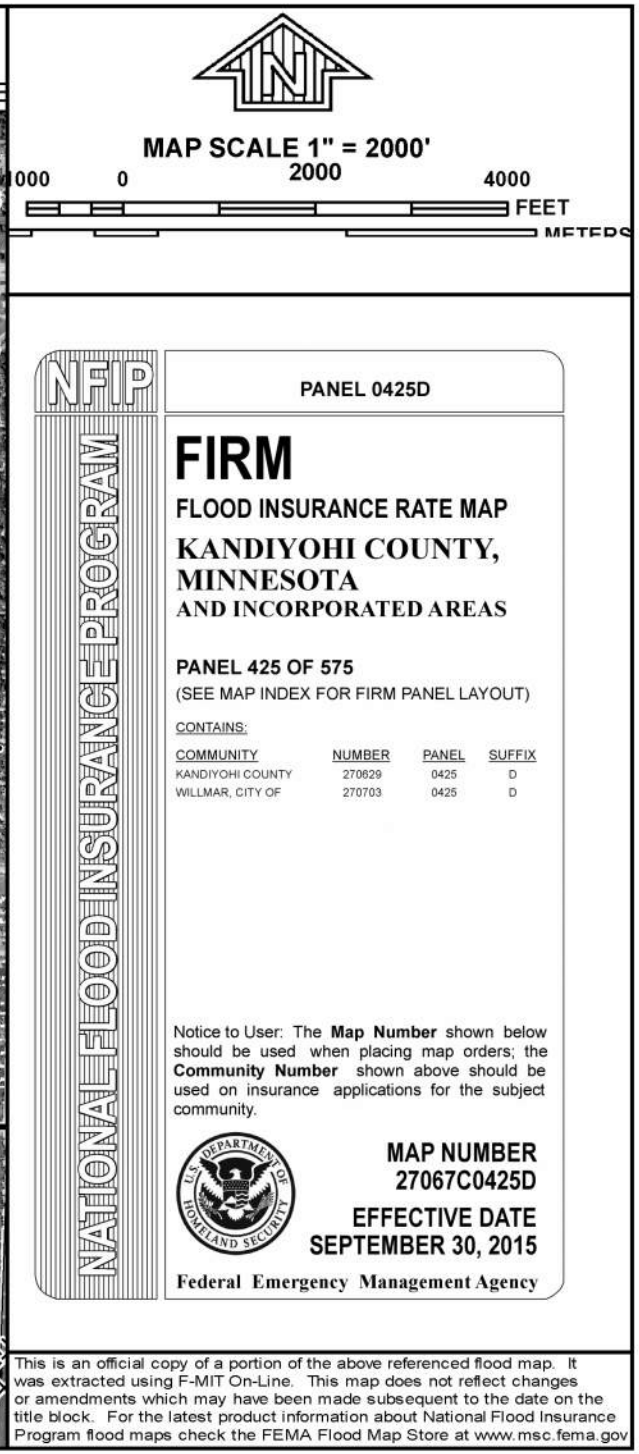
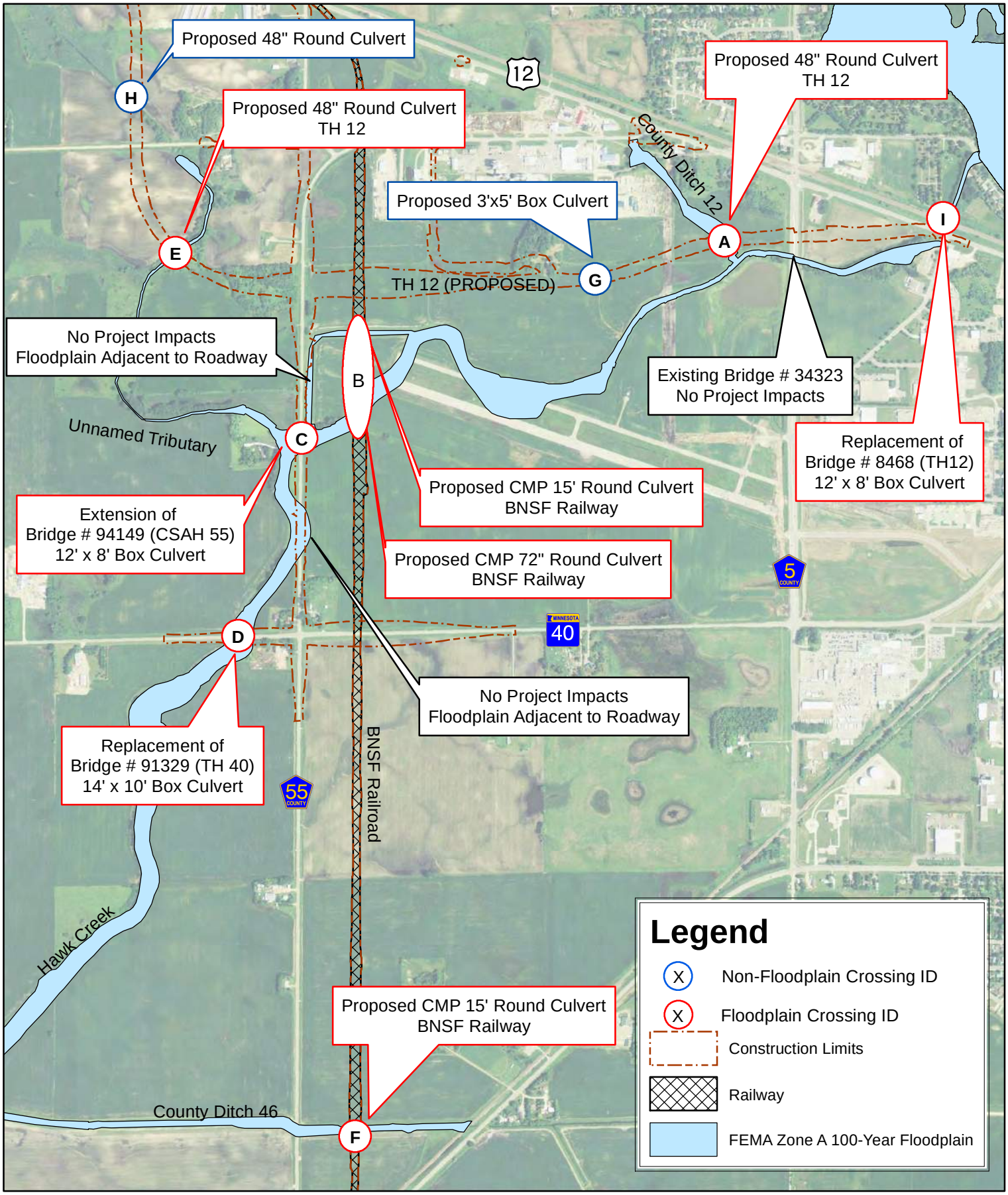


FIGURE:
FEMA Floodplain Area
Willmar Wye Project
City of Willmar
SP 3403-74 September 2016



Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Proposed Floodplain Impacts and Crossings

Willmar, MN

DEPARTMENT OF TRANSPORTATION

N

0 400 800 1,600

Feet

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Approx. 0.4 miles north of TH40 in Willmar, MN

DATA REQUIREMENTS

1. **Location of Crossing:** CSAH 55 **C.S.** _____ **M.P.** _____

   Sec. 17 **T** 119N **R** 35W

2. **Name of Stream:** Hawk Creek **Bridge No. Old:** 94149 **New:** _____

3. **Current ADT:** 730 **Projected ADT:** _____

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain: _____

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =		cfs	HW_{10} Elevation		ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	496	cfs	HW_{50} Elevation	1111.63	ft
Q_{100} =	616	cfs	HW_{100} Elevation	1112.63	ft
Q_{500} =	931	cfs	HW_{500} Elevation	1115.53	ft

Approximate Flowline Elevation: 1105.0 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** N/A - culvert

8. **Minimum roadway overflow elevation if appropriate:** 1119.04 @ station 228.20

9. **Elevation of high risk property, i.e. residences:** N/A

   Other buildings _____

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number 94149 (CSAH 55)

Date September 9, 2016

* Stream name	Hawk Creek
Drainage area	33.41 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (100 - year frequency)	616 cfs
Road sag point elevation	1120
Design stage	1111.67
Total stage increase	1.03 ft
* Headwater elevation	1112.7
Stage increase of the inplace condition	0.96 ft
Min. waterway opening below elevation	165.61 ft2 at el. 1112.7
Low member at or above elevation	N/A
Mean velocity through structure	3.72 fps
Main channel velocity	2.56 fps
Overtopping flood or Greatest flood (500 -year frequency)	931 cfs
Road sag point elevation	1120
Stage	1113.59
Total stage increase	2.03 ft
* Headwater elevation	1115.62
Stage increase of the inplace condition	1.94 ft
Mean velocity through structure	4.22 fps
* Basic flood (100-year frequency)	616 cfs
Stage	1111.67
Total stage increase	1.03 ft
* Headwater elevation	1112.7
Stage increase of the inplace condition	0.96 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	3.72 fps
Approximate flowline elevation	1105
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	5
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Approx. 0.4 miles north of TH40 in Willmar, MN

DATA REQUIREMENTS

1. **Location of Crossing:** TH 12 **C.S.** _____ **M.P.** _____

   Sec. 17 **T** 119N **R** 35W

2. **Name of Stream:** Hawk Creek **Bridge No. Old:** 8468 **New:** _____

3. **Current ADT:** 730 **Projected ADT:** _____

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain: _____

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =		cfs	HW_{10} Elevation		ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	496	cfs	HW_{50} Elevation	1118.98	ft
Q_{100} =	616	cfs	HW_{100} Elevation	1119.93	ft
Q_{500} =	931	cfs	HW_{500} Elevation	1124.2	ft

Approximate Flowline Elevation: 1115 Ft

Design Frequency Event: ☑ 100-yr ☐ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** N/A - culvert

8. **Minimum roadway overflow elevation if appropriate:** 1124.3

9. **Elevation of high risk property, i.e. residences:** N/A

   Other buildings _____

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number 8468 (TH 12)

Date September 23, 2016

* Stream name	Hawk Creek
Drainage area	33.41 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (100 - year frequency)	616 cfs
Road sag point elevation	1124.3
Design stage	1118.74
Total stage increase	1.19 ft
* Headwater elevation	1119.93
Stage increase of the inplace condition	1.19 ft
Min. waterway opening below elevation	160.20 ft2 at el. 11119.93
Low member at or above elevation	N/A
Mean velocity through structure	3.85 fps
Main channel velocity	3.04 fps
Overtopping flood or Greatest flood (500 -year frequency)	931 cfs
Road sag point elevation	1124.3
Stage	1120.5
Total stage increase	3.7 ft
* Headwater elevation	1124.2
Stage increase of the inplace condition	3.47 ft
Mean velocity through structure	2.77 fps
* Basic flood (100-year frequency)	616 cfs
Stage	1118.74
Total stage increase	1.19 ft
* Headwater elevation	1119.93
Stage increase of the inplace condition	1.19 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	3.85 fps
Approximate flowline elevation	N/A
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	N/A
Scour Code	N/A

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Approx. 0.3 miles west of CSAH55 in Willmar, MN

DATA REQUIREMENTS

1. **Location of Crossing:** TH 40 **C.S.** _____ **M.P.** _____

   Sec. 17 **T** 119N **R** 35W

2. **Name of Stream:** Hawk Creek **Bridge No. Old:** 91329 **New:** _____

3. **Current ADT:** 1400 **Projected ADT:** _____

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain: _____

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =		cfs	HW_{10} Elevation		ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	496	cfs	HW_{50} Elevation	1109.78	ft
Q_{100} =	616	cfs	HW_{100} Elevation	1110.62	ft
Q_{500} =	931	cfs	HW_{500} Elevation	1112.67	ft

Approximate Flowline Elevation: 1103.4 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 1113.4

8. **Minimum roadway overflow elevation if appropriate:** 1118.9 at station 406+00

9. **Elevation of high risk property, i.e. residences:** N/A

   Other buildings _____

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number 91329 (TH 40)

Date September 9, 2016

* Stream name	Hawk Creek
Drainage area	33.41 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (100 - year frequency)	616 cfs
Road sag point elevation	1118.9
Design stage	1109.19
Total stage increase	1.43 ft
* Headwater elevation	1110.62
Stage increase of the inplace condition	1.43 ft
Min. waterway opening below elevation	180.47 ft2 at el. 1110.62
Low member at or above elevation	N/A
Mean velocity through structure	3.41 fps
Main channel velocity	2.47 fps
Overtopping flood or Greatest flood (500 -year frequency)	931 cfs
Road sag point elevation	1118.9
Stage	1110.38
Total stage increase	2.29 ft
* Headwater elevation	1112.67
Stage increase of the inplace condition	2.29 ft
Mean velocity through structure	3.86 fps
* Basic flood (100-year frequency)	616 cfs
Stage	1109.19
Total stage increase	1.43 ft
* Headwater elevation	1110.62
Stage increase of the inplace condition	1.43 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	3.41 fps
Approximate flowline elevation	1103.4
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Northeast of intersection of CSAH55 and TH40 in Willmar MN

DATA REQUIREMENTS

1. Location of Crossing: BNSF RR sta 104+95 **C.S.** **M.P.**

Sec. 17 **T** 119N **R** 35W

2. Name of Stream: Hawk Creek **Bridge No. Old:** N/A **New:**

3. Current ADT: N/A **Projected ADT:** N/A

4. Practicable detour available ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. Hydraulic Data: (Fill in as appropriate)

Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =		cfs	HW_{10} Elevation		ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	496	cfs	HW_{50} Elevation	1113.38	ft
Q_{100} =	616	cfs	HW_{100} Elevation	1114.42	ft
Q_{500} =	931	cfs	HW_{500} Elevation	1117.44	ft

Approximate Flowline Elevation: 1106.5 Ft

Design Frequency Event: ☑ 100-yr ☐ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231 - N/A to Railroad

6. Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood: 500-year

7. Low member elevation: 1116.0 (top of culvert)

8. Minimum roadway overflow elevation if appropriate: Railroad sag point elevation is 1118.72 @ station 8+45

9. Elevation of high risk property, i.e. residences: N/A

Other buildings

10. Horizontal location of overflow:

☐ At Structure (See 12) ☑ Not At Structure:

11. Type of proposed structure:

☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number North RR Crossing

Date September 9, 2016

* Stream name	Hawk Creek
Drainage area	33.41 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (100 - year frequency)	616 cfs
Road sag point elevation	1118.72'
Design stage	1113.02
Total stage increase	0.48 ft
* Headwater elevation	1113.5
Stage increase of the inplace condition	0 ft
Min. waterway opening below elevation	503.01 ft2 at el. 1113.5
Low member at or above elevation	N/A
Mean velocity through structure	1.22 fps
Main channel velocity	1.61 fps
Overtopping flood or Greatest flood (500 -year frequency)	931 cfs
Road sag point elevation	1118.72'
Stage	1115.79
Total stage increase	0.66 ft
* Headwater elevation	1116.45
Stage increase of the inplace condition	0 ft
Mean velocity through structure	0.97 fps
* Basic flood (100-year frequency)	616 cfs
Stage	1113.02
Total stage increase	0.48 ft
* Headwater elevation	1113.5
Stage increase of the inplace condition	0 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	1.22 fps
Approximate flowline elevation	1106.5
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0 (north) 30 (south)
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** EAst of CSAH 55 in Willmar MN

DATA REQUIREMENTS

1. **Location of Crossing:** BNSF RR sta 18+54 **C.S.** **M.P.**

   Sec. 17 **T** 119N **R** 35W

2. **Name of Stream:** County Ditch 46 **Bridge No. Old:** N/A **New:**

3. **Current ADT:** N/A **Projected ADT:** N/A

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =		cfs	HW_{10} Elevation		ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	218	cfs	HW_{50} Elevation	1110.53	ft
Q_{100} =	279	cfs	HW_{100} Elevation	1111.37	ft
Q_{500} =	446	cfs	HW_{500} Elevation	1113.3	ft

Approximate Flowline Elevation: 1104.3 Ft

Design Frequency Event: ☑ 100-yr ☐ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231 - N/A to Railroad

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 1114.3 (top of culvert)

8. **Minimum roadway overflow elevation if appropriate:** Railroad sag point is 1118.72 @ station 8+45

9. **Elevation of high risk property, i.e. residences:** N/A
   Other buildings

10. **Horizontal location of overflow:**
    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**
    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS

3a. Is the overtopping flood less than a 100 year frequency flood?

☐ Yes (Go to 3b) ☑ No (Go to 3i)

3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category.

☐ When TW is above the sag point (Go to 4)

☐ TW is between 0 and 0.5' below sag point (Go to 3c)

☐ TW is between 0.5' and 1.0' below sag point (Go to 3d)

☐ When TW is 1.0' and 2.0' below sag point (Go to 3e)

☐ When TW is more than 2.0' below sag point (Go to 3g)

3c. Does the embankment have a good erosion resistant vegetative cover?

☐ Yes (Go to 3i) ☐ No (Go to 3d)

3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3e)

3e. Will the duration of overtopping for the 25-year flood exceed 1 hour?

☐ Yes (Go to 3f) ☐ No (Go to 3i)

3f. Is the embankment constructed from erosion resistant material such as a clay type soil?

☐ Yes (Go to 3i) ☐ No (Go to 3g)

3g. Is the overtopping flood less than a 25-year frequency flood?

☐ Yes (Go to 3h) ☐ No (Go to 3i)

3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity?

☐ No (Go to 3i); ☐ Yes (Go to 3i)

3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood?

☐ Yes (Go to 3j) ☑ No (Go to 4)

3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity?

☐ No (Go to 4); protecting abutments from scour by riprap. ☐ Yes (Go to 4)

4. Will the capital cost of the structure exceed $1,000,000?

☑ No (Go to 5); ☐ Yes (Go to 5)

5. In your opinion, are there any other factors that you feel should require further study through a risk analysis?

☑ No (Go to 6); ☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number South RR Crossing

Date September 2, 2016

* Stream name	County Ditch 46
Drainage area	4.26 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (100 - year frequency)	279 cfs
Road sag point elevation	1118.72'
Design stage	1111.24'
Total stage increase	0.16 ft
* Headwater elevation	1111.4'
Stage increase of the inplace condition	0 ft
Min. waterway opening below elevation	174.95 ft2 at el. 1111.4'
Low member at or above elevation	N/A
Mean velocity through structure	1.59 fps
Main channel velocity	1.44 fps
Overtopping flood or Greatest flood (500 -year frequency)	446 cfs
Road sag point elevation	1118.72'
Stage	1113.01'
Total stage increase	0.34 ft
* Headwater elevation	1113.35'
Stage increase of the inplace condition	0 ft
Mean velocity through structure	1.93 fps
* Basic flood (100-year frequency)	279 cfs
Stage	1111.24'
Total stage increase	0.16 ft
* Headwater elevation	1111.4'
Stage increase of the inplace condition	0 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	1.59 fps
Approximate flowline elevation	1104.3
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Approx 600' west of 30th Avenue NW in Willmar MN11

DATA REQUIREMENTS

1. Location of Crossing: Proposed TH12 **C.S.** **M.P.**

Sec. 17 **T** 119N **R** 35W

2. Name of Stream: Unnamed tributary to Hawk Creek **Bridge No. Old:** N/A **New:**

3. Current ADT: N/A **Projected ADT:** 6400

4. Practicable detour available ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. Hydraulic Data: (Fill in as appropriate)

Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	25	cfs	HW_{10} Elevation	1115.87	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	32	cfs	HW_{50} Elevation	1116.19	ft
Q_{100} =	52	cfs	HW_{100} Elevation	1116.99	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 1113.5 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231

6. Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood: 500-year

7. Low member elevation: 1117.24 (top of culvert)

8. Minimum roadway overflow elevation if appropriate: 1122

9. Elevation of high risk property, i.e. residences: N/A

Other buildings

10. Horizontal location of overflow:

☐ At Structure (See 12) ☑ Not At Structure:

11. Type of proposed structure:

☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number TH12 East

Date September 9, 2016

* Stream name	Tributary to Hawk Creek
Drainage area	0.12 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (50 - year frequency)	32 cfs
Road sag point elevation	1116.0
Design stage	1115.48
Total stage increase	0.71 ft
* Headwater elevation	1116.19
Stage increase of the inplace condition	0 ft
Min. waterway opening below elevation	36.71 ft2 at el. 111619
Low member at or above elevation	N/A
Mean velocity through structure	0.88 fps
Main channel velocity	0.55 fps
Overtopping flood or Greatest flood (500 -year frequency)	52 cfs (100-year)
Road sag point elevation	1122
Stage	1115.72
Total stage increase	1.27 ft
* Headwater elevation	1116.99
Stage increase of the inplace condition	0 ft
Mean velocity through structure	1.06 fps
* Basic flood (100-year frequency)	52 cfs
Stage	1115.72
Total stage increase	1.27 ft
* Headwater elevation	1116.99
Stage increase of the inplace condition	0 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	1.06 fps
Approximate flowline elevation	1113.5
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

RISK ASSESSMENT FOR ENCROACHMENT DESIGN

Date: 9/30/2016

District: 8 **County:** Kandiyohi **Vicinity of:** Approx 1000' west of CSAH 55 in WIllmar MN

DATA REQUIREMENTS

1. **Location of Crossing:** Proposed TH12 **C.S.** **M.P.**

   Sec. 17 **T** 119N **R** 35W

2. **Name of Stream:** Unnamed tributary to HAwk Creek **Bridge No. Old:** N/A **New:**

3. **Current ADT:** N/A **Projected ADT:** 6400

4. **Practicable detour available** ☑ Yes ☐ No

If no is checked, please explain:

If there is no practicable detour available, then the use of the road must be analyzed. Considerations such as emergency vehicle access, emergency supply and evacuation route, and the need for school bus, milk and mail routes should be studied. Factors to consider for this analysis include design frequency, depth, duration, and frequency of inundation if appropriate, and available funding.

5. **Hydraulic Data: (Fill in as appropriate)**

   Elevation Datum: NAVD88

Q_2 =		cfs	HW_2 Elevation		ft
Q_5 =		cfs	HW_5 Elevation		ft
Q_{10} =	39	cfs	HW_{10} Elevation	1115.35	ft
Q_{25} =		cfs	HW_{25} Elevation		ft
Q_{50} =	68	cfs	HW_{50} Elevation	1116.49	ft
Q_{100} =	89	cfs	HW_{100} Elevation	1117.26	ft
Q_{500} =		cfs	HW_{500} Elevation		ft

Approximate Flowline Elevation: 1112.4 Ft

Design Frequency Event: ☐ 100-yr ☑ 50-yr ☐ 25-yr ☐ 10-yr

Reasons for selecting Design Frequency: Minnesota State Statute 6115.0231 -

6. **Magnitude and Frequency of the smaller of "Overtopping" or "500 yr." (Greatest) flood:** 500-year

7. **Low member elevation:** 1116.38 (top of culvert)

8. **Minimum roadway overflow elevation if appropriate:** 1121.5

9. **Elevation of high risk property, i.e. residences:** N/A

   Other buildings

10. **Horizontal location of overflow:**

    ☐ At Structure (See 12) ☑ Not At Structure:

11. **Type of proposed structure:**

    ☐ Bridge (See 12) ☑ Culvert(s)

12	If the proposed structure is a bridge with the sag point located on the bridge and there is ice and debris potential, strong consideration should be given to using Q_{50} as design discharge with 3' of clearance between the 50 year tailwater stage and low member.	
1.	**BACKWATER DAMAGE** - Major flood damage in this context refers to shopping centers, hospitals, chemical plants, power plants, housing developments, etc.	**LTEC Design**
1a.	Is the overtopping flood greater than the 100 yr. flood? ☑ Yes (Go to 1b) ☐ No (Go to 1e)	
1b.	Is the overtopping flood greater than the "greatest" flood (500 yr. Frequency)? ☑ Yes (Go to 1d) ☐ No (Go to 1c)	
1c.	Is there major flood damage potential for the overtopping flood? ☐ No (Go to 1e)	☐ Yes (Go to 1e)
1d.	Is there major flood damage potential for the greatest flood (500 year frequency)? ☑ No (Go to 1e)	☐ Yes (Go to 1e)
1e.	Will there be flood damage potential to residence(s) or other buildings during a 100 yr. flood? ☐ Yes (Go to 1f) ☑ No (Go to 2)	
1f.	Could this flood damage occur even if the roadway crossing wasn't there? ☐ Yes (Go to 1g) ☐ No (Go to 1h)	
1g.	Could this flood damage be significantly increased by the backwater caused by the proposed crossing? ☐ Yes (Go to 1h) ☐ No (Go to 2)	
1h.	Could the stream crossing be designed in such a manner so as to minimize this potential flood damage? ☐ Yes (Go to 1i) ☐ No (Go to 2)	
1i.	Does the value of the building(s) and/or its contents have sufficient value to justify further evaluation of risk and potential flood damage? ☐ No (Go to 2)	☐ Yes (Go to 2)
2.	**TRAFFIC RELATED LOSSES**	
2a.	Is the overtopping flood greater than the "greatest" flood (500 yr. frequency)? ☑ Yes (Go to 3) ☐ No (Go to 2b)	
2b.	Does the ADT exceed 50 vehicles per day? ☐ Yes (Go to 2c) ☐ No (Go to 3)	
2c.	Would the (duration of road closure in days) multiplied by the (length of detour minus the length of normal route in miles) exceed 20? ☐ Yes (Go to 2d) ☐ No (Go to 3)	
2d.	Does the annual risk cost for traffic related costs exceed 10% of the annual capital costs? ☑ No (Go to 3) (See figures A and B – Appendix A(2) - for Assistance)	☐ Yes (Go to 3)

3. ROADWAY AND/OR STRUCTURE REPAIR COSTS	
3a. Is the overtopping flood less than a 100 year frequency flood? ☐ Yes (Go to 3b) ☑ No (Go to 3i)	
3b. Compare the Tailwater (TW) elevation with the roadway sag point elevation for the overtopping flood. Check the appropriate category. ☐ When TW is above the sag point (Go to 4) ☐ TW is between 0 and 0.5' below sag point (Go to 3c) ☐ TW is between 0.5' and 1.0' below sag point (Go to 3d) ☐ When TW is 1.0' and 2.0' below sag point (Go to 3e) ☐ When TW is more than 2.0' below sag point (Go to 3g)	
3c. Does the embankment have a good erosion resistant vegetative cover? ☐ Yes (Go to 3i) ☐ No (Go to 3d)	
3d. Is the shoulder constructed from erosion resistant material such as paved, coarse gravel, or clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3e)	
3e. Will the duration of overtopping for the 25-year flood exceed 1 hour? ☐ Yes (Go to 3f) ☐ No (Go to 3i)	
3f. Is the embankment constructed from erosion resistant material such as a clay type soil? ☐ Yes (Go to 3i) ☐ No (Go to 3g)	
3g. Is the overtopping flood less than a 25-year frequency flood? ☐ Yes (Go to 3h) ☐ No (Go to 3i)	
3h. Will the cost of protecting the roadway and/or embankment from severe damage caused by overtopping exceed the cost of providing additional culvert or bridge capacity? ☐ No (Go to 3i);	☐ Yes (Go to 3i)
3i. Is there damage potential to the structure caused by scour, ice, debris or other means during the lesser of the overtopping flood or the 100 year flood? ☐ Yes (Go to 3j) ☑ No (Go to 4)	
3j. Will the cost of protecting the structure from damage exceed the cost of providing additional culvert or bridge water capacity? ☐ No (Go to 4); protecting abutments from scour by riprap.	☐ Yes (Go to 4)
4. Will the capital cost of the structure exceed $1,000,000? ☑ No (Go to 5);	☐ Yes (Go to 5)
5. In your opinion, are there any other factors that you feel should require further study through a risk analysis? ☑ No (Go to 6);	☐ Yes (Indicate)

6. If there are no ✓'s in the LTEC Design column on the right, proceed with the design, selecting the lowest acceptable grade line and the smallest waterway opening consistent with the constraints imposed on the project. The risk assessment has demonstrated that potential flood damage costs, traffic related costs, roadway and/or structure repair costs are minor and therefore disregarded for this project.

One or more ✓'s in the LTEC Design column indicates further analysis in the category checked may be required utilizing the LTEC design process or justification (below) why it is not required.

JUSTIFICATION:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota:

Signature: _____

License Number: _____ Date: _____

Bridge Number TH12 WEST

Date September 9, 2016

* Stream name	Tributary to Hawk Creek
Drainage area	2.59 square miles
Flood of record	Unknown
Maximum observed highwater elevation	Unknown
* Design flood (50 - year frequency)	68 cfs
Road sag point elevation	1121.5
Design stage	1114.69
Total stage increase	1.8 ft
* Headwater elevation	1116.49
Stage increase of the inplace condition	0 ft
Min. waterway opening below elevation	50.41 ft2 at el. 1116.49
Low member at or above elevation	N/A
Mean velocity through structure	1.34 fps
Main channel velocity	0.47 fps
Overtopping flood or Greatest flood (500 -year frequency)	89 cfs (100-year)
Road sag point elevation	1121.5
Stage	1114.98
Total stage increase	2.28 ft
* Headwater elevation	1117.26
Stage increase of the inplace condition	0 ft
Mean velocity through structure	1.11 fps
* Basic flood (100-year frequency)	89 cfs
Stage	1114.98
Total stage increase	2.28 ft
* Headwater elevation	1117.26
Stage increase of the inplace condition	0 ft
Min. overflow area above sag point elev.	n/a
Mean overflow velocity	n/a
Mean velocity through structure	1.11 fps
Approximate flowline elevation	1112.4
Estimated pier scour elevation	N/A
Year frequency scour was calculated for	N/A
Skew	0
Scour Code	E

*Items to be shown on Grading Plan

*Elevation datum NAVD88 [adjusted]

Appendix G – Farmland – NRCS Form AD 1006

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 9/6/16
Name Of Project Willmar Rail Connector & Industrial Access Project	Federal Agency Involved Minnesota Dept. of Transportation
Proposed Land Use Highway and Railway	County And State Kandiyohi County, City of Willmar, Minnesota
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 9/6/16

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☑	No ☐	Acres Irrigated N/A	Average Farm Size 317
Major Crop*(s)* corn and soybean	Farmable Land In Govt. Jurisdiction Acres: 461,965 % 84		Amount Of Farmland As Defined in FPPA Acres: 435,352 % 79
Name Of Land Evaluation System Used crop productivity inex	Name Of Local Site Assessment System		Date Land Evaluation Returned By NRCS 8/12/16

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	93.7			
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site	93.7	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	91.0			
B. Total Acres Statewide And Local Important Farmland	1.8			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	49.0			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	88	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	88	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	0	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	88	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

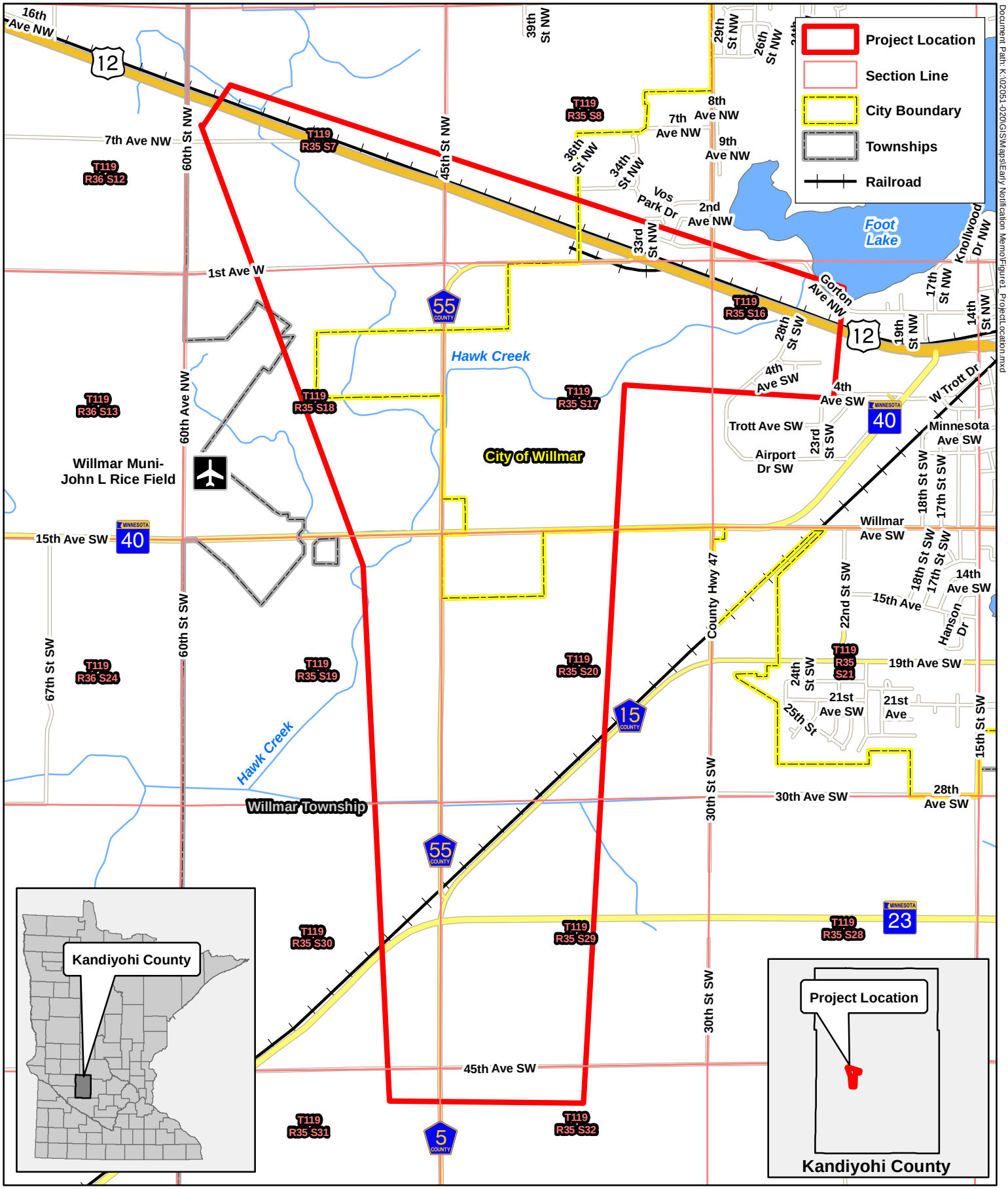
Reason For Selection:

(See Instructions on reverse side)

This form was electronically produced by National Production Services Staff

Clear Form

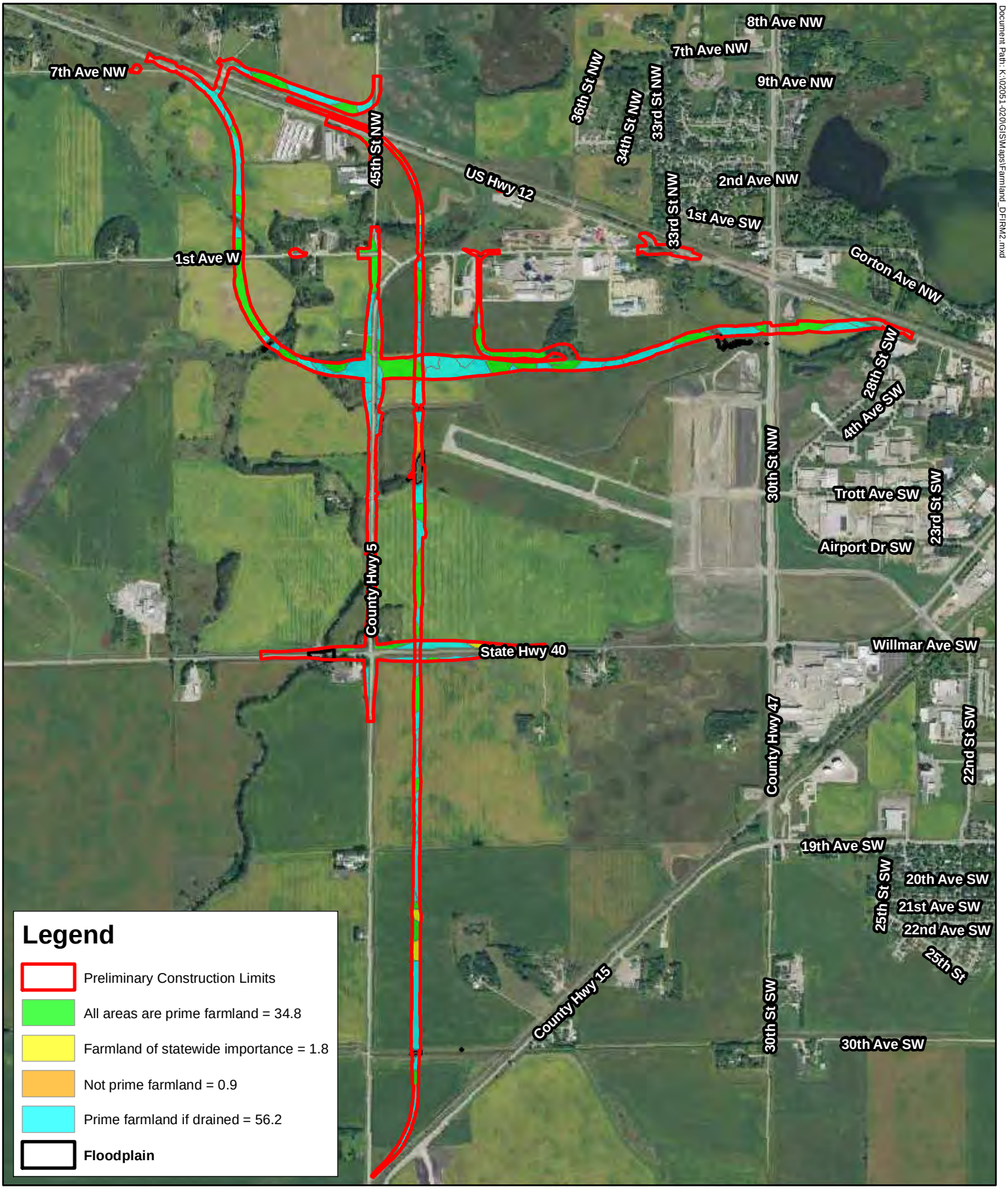
Form AD-1006 (10-83)



Willmar Wye Project Location
S.P. 3403-74
Willmar, MN

N

0 2,500 Feet



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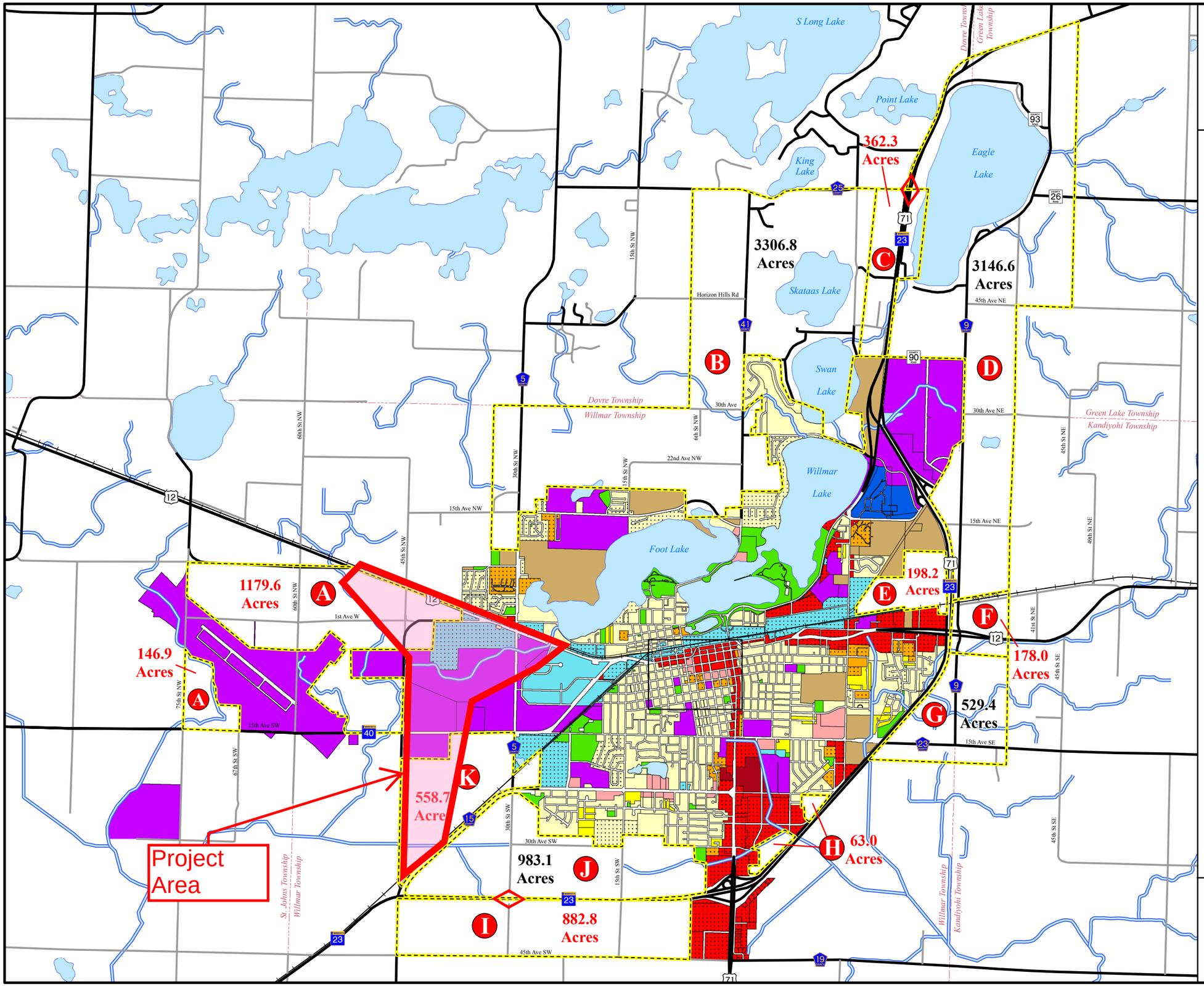
Willmar Wye- Farmland Map
S.P. 3403-74
Willmar, MN

Revised Sept. 6, 2016

N

0 2,000 Feet

Map 6A: City of Willmar: Future Land Use



Legend

- Urban Growth Boundary
- Unpaved Road
- Paved Road
- Railroad
- River, Stream or Ditch
- R-1, One Family Residential
- R-2, One and Two Family Res
- R-3, Low Density Multi Family
- R-4, Medium Density Multi Fam
- R-5, High Density Multi Family
- LB, Limited Business
- GB, General Business
- CBD, Central Business District
- SC, Shopping Center
- I-1, Limited Industry
- I-2, General Industry
- P, Park District
- A, Agriculture
- G, Government/Institution Dist
- T, Technology District
- Lakes
- Townships
- A - K Future Land Use (See text in Comprehensive Plan)
- Future Interchange

Prepared by Mid-Minnesota Development Commission February 2009

0 500 1,000 2,000 3,000 Meters

0 0.4 0.8 1.6 2.4 Miles

Urban Growth Area Descriptions

Map 6A shows the location of each Urban Growth Area described below. It is the City's desire to preserve agricultural land for as long as is feasible and to deter sprawl and/or leap-frog development.

A **AREAS A** The two Urban Growth Areas surrounding the airport should be reserved for airport related business and industry. The land should remain in agricultural use pending the logical expansion of industrial use through annexation, as the City expands to the West and municipal services become available. Areas A contain approximately 1,327 acres of land all impacted by Airport Zoning. It may also be the site of a future railroad bypass.

B **AREA B** Low density residential development with scattered nodes of neighborhood commercial development, including limited retail and service businesses, as municipal services are made available (approximately 3,307 acres).

C **AREA C** Future interchange with expanded highway commercial development when municipal services become available. There will also be some mixed density residential development (approximately 362 acres)

D **AREA D** Area D, containing approximately 3,147 acres, will have low density residential development with scattered nodes of neighborhood commercial development, including limited retail and service businesses.

E **AREA E** This area will continue with agricultural uses until access and services become available. Future conversion of the existing railroad spur line to a trail as a link in the current trail system is anticipated. Development will transition from industrial in the south (where it currently exists) to residential in the north. Area E contains approximately 198 acres.

F **AREA F** Limited commercial development when municipal services become available (approximately 178 acres).

G **AREA G** Residential development when municipal services become available (approximately 529 acres).

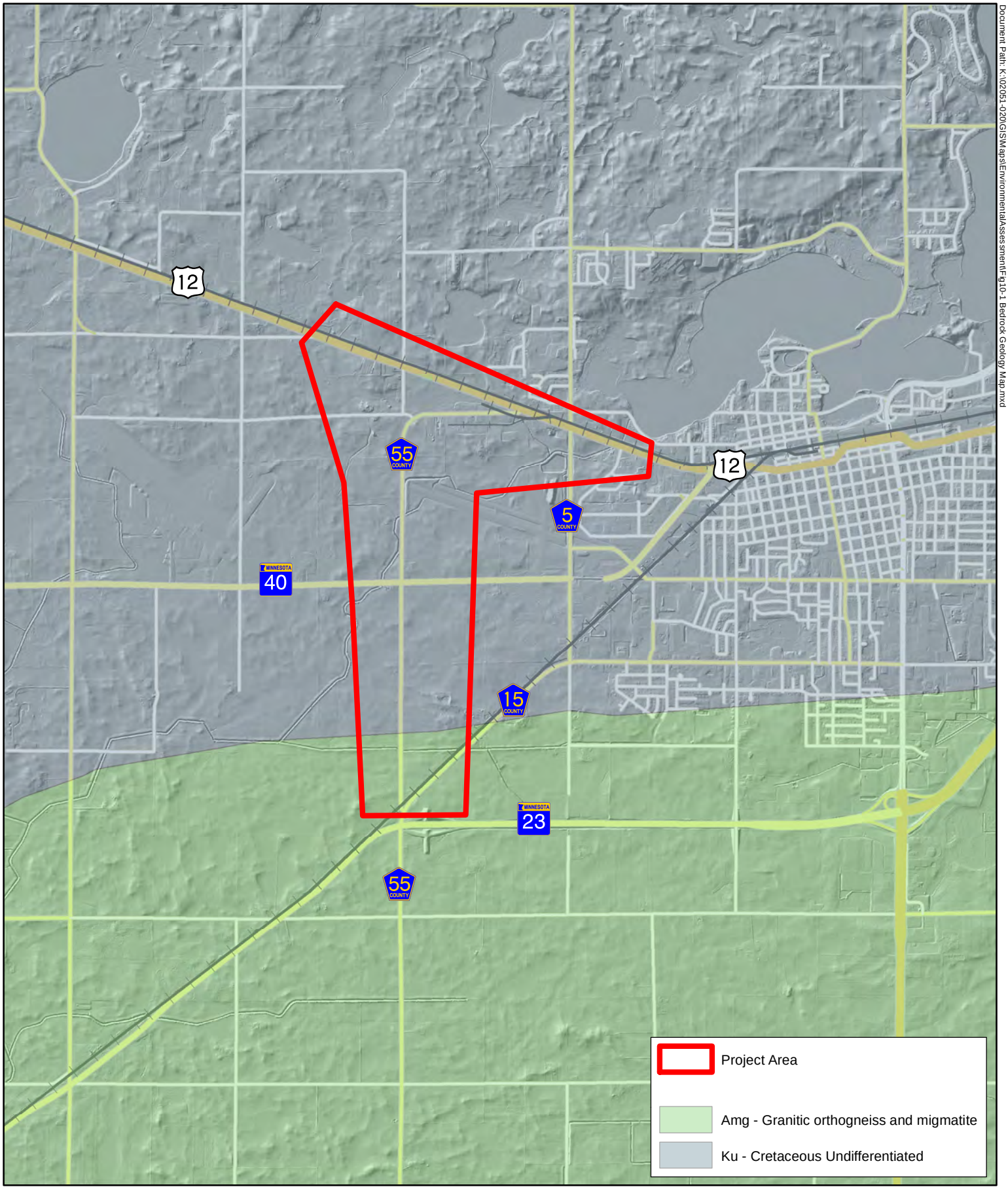
H **AREAS H** Agricultural until annexed. Commercial development when municipal services become available (approximately 63 acres).

I **AREA I** Mixed commercial and light industrial development transitioning to mixed residential development as municipal services become available (approximately 883 acres).

J **AREA J** There will be residential development with limited commercial development adjacent to the interchange planned at CSAH 15 (approximately 983 acres).

K **AREA K** Agricultural uses changing to industrial as municipal services become available (approximately 559 acres).

Appendix H – Geology Figures



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Fig10-1 Bedrock Geology Map.mxd

FIGURE H-1 Bedrock Geology Map

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 4,000 Feet

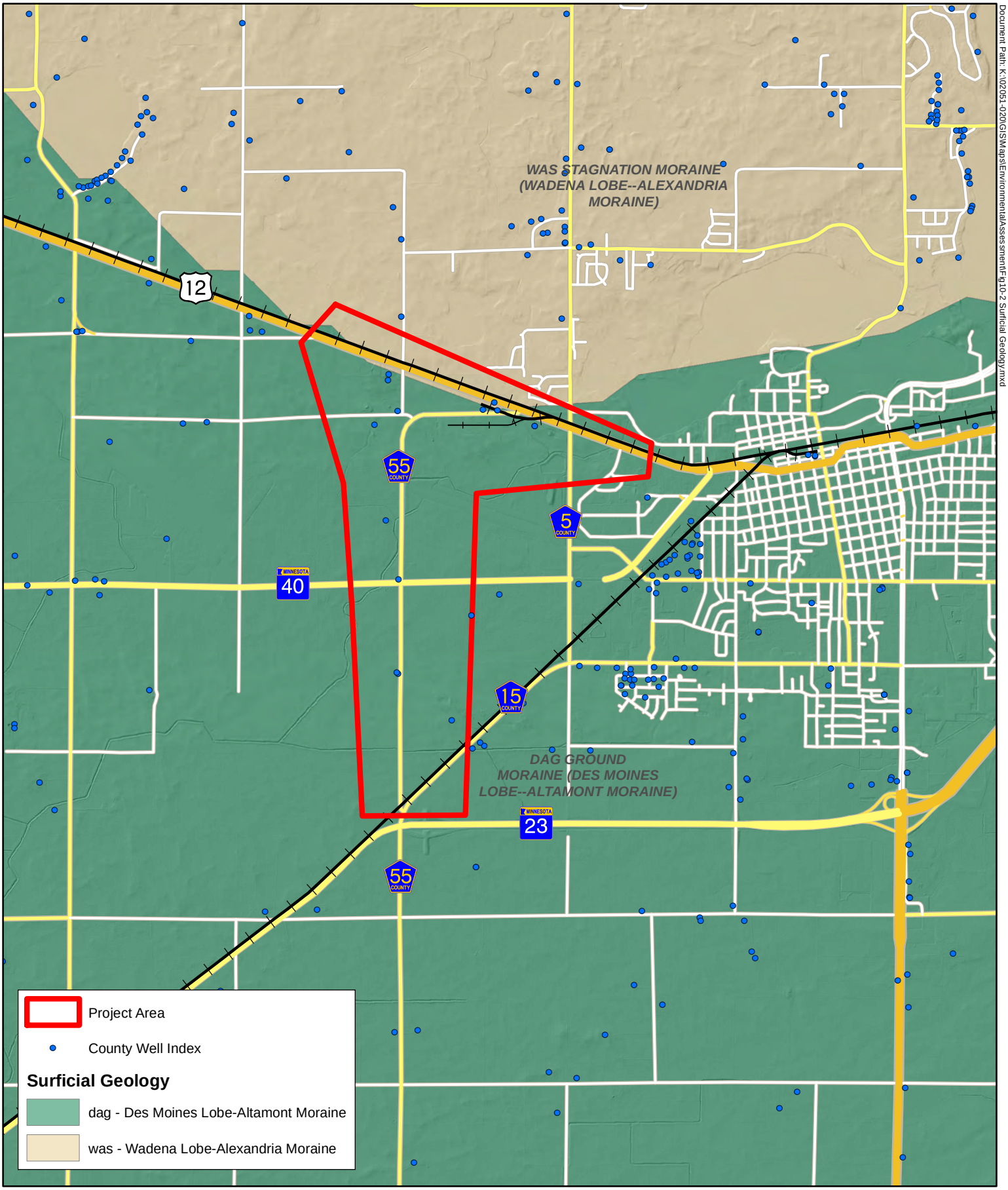


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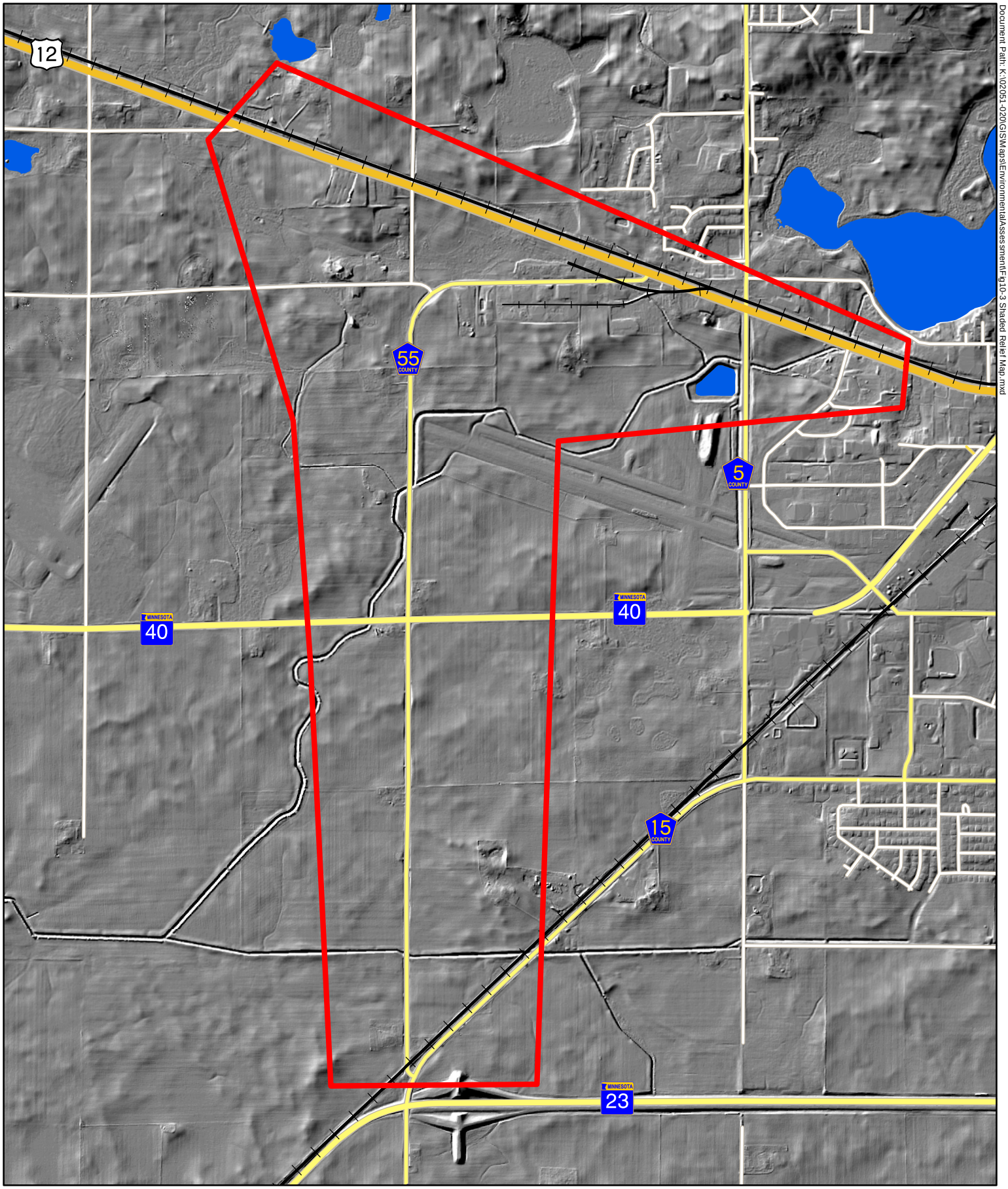
FIGURE H-2 Surficial Geology & CWI Map

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 4,000 Feet



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MINNESOTA DEPARTMENT OF TRANSPORTATION

FIGURE H-3 Hillshade Map

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 2,000 Feet

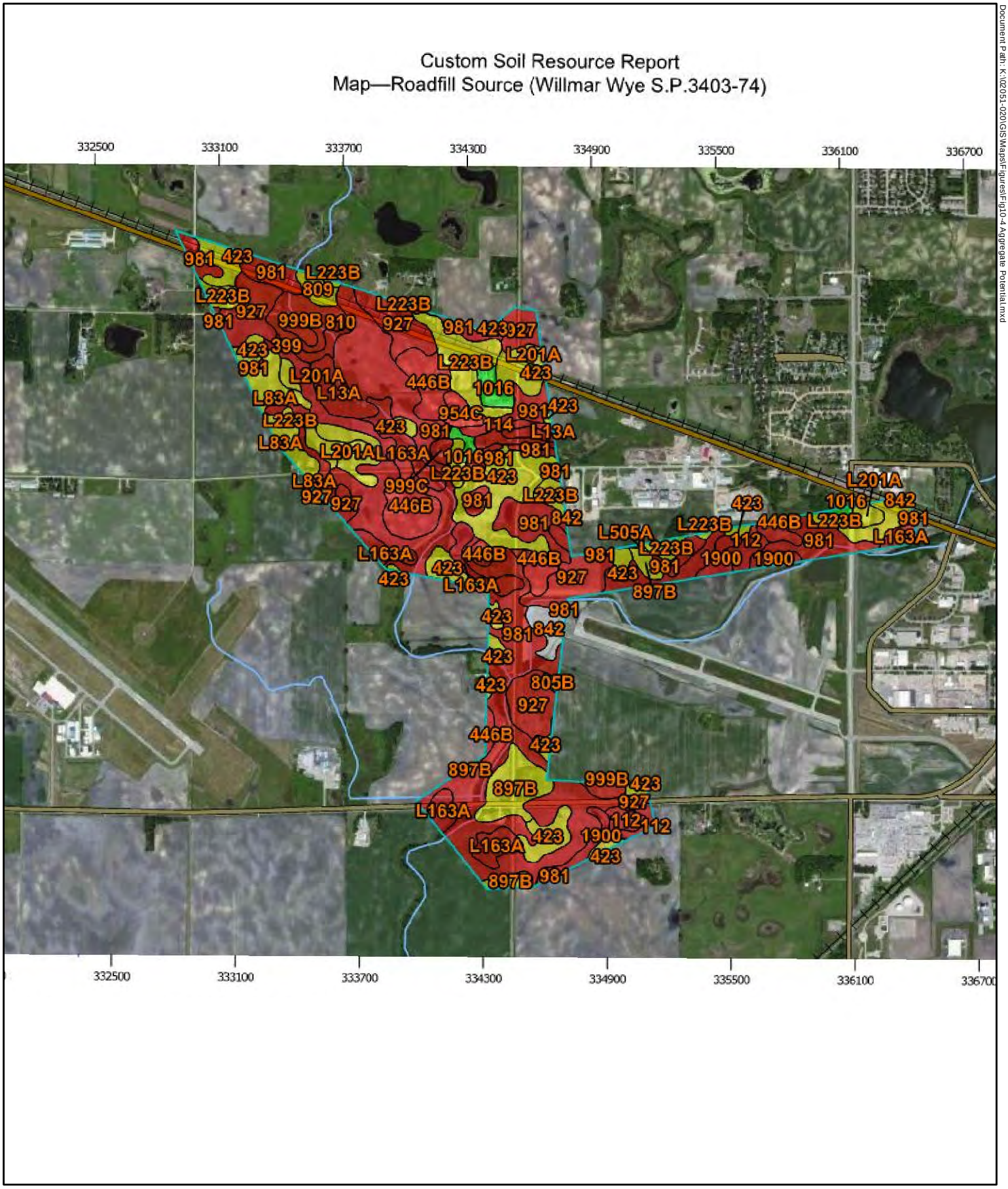

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FIGURE H-4a Aggregate Potential North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 2,000 Feet

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Poor

Fair

Good

Not rated or not available

Soil Rating Lines

Poor

Fair

Good

Not rated or not available

Soil Rating Points

Poor

Fair

Good

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-4b Aggregate Potential Legend North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

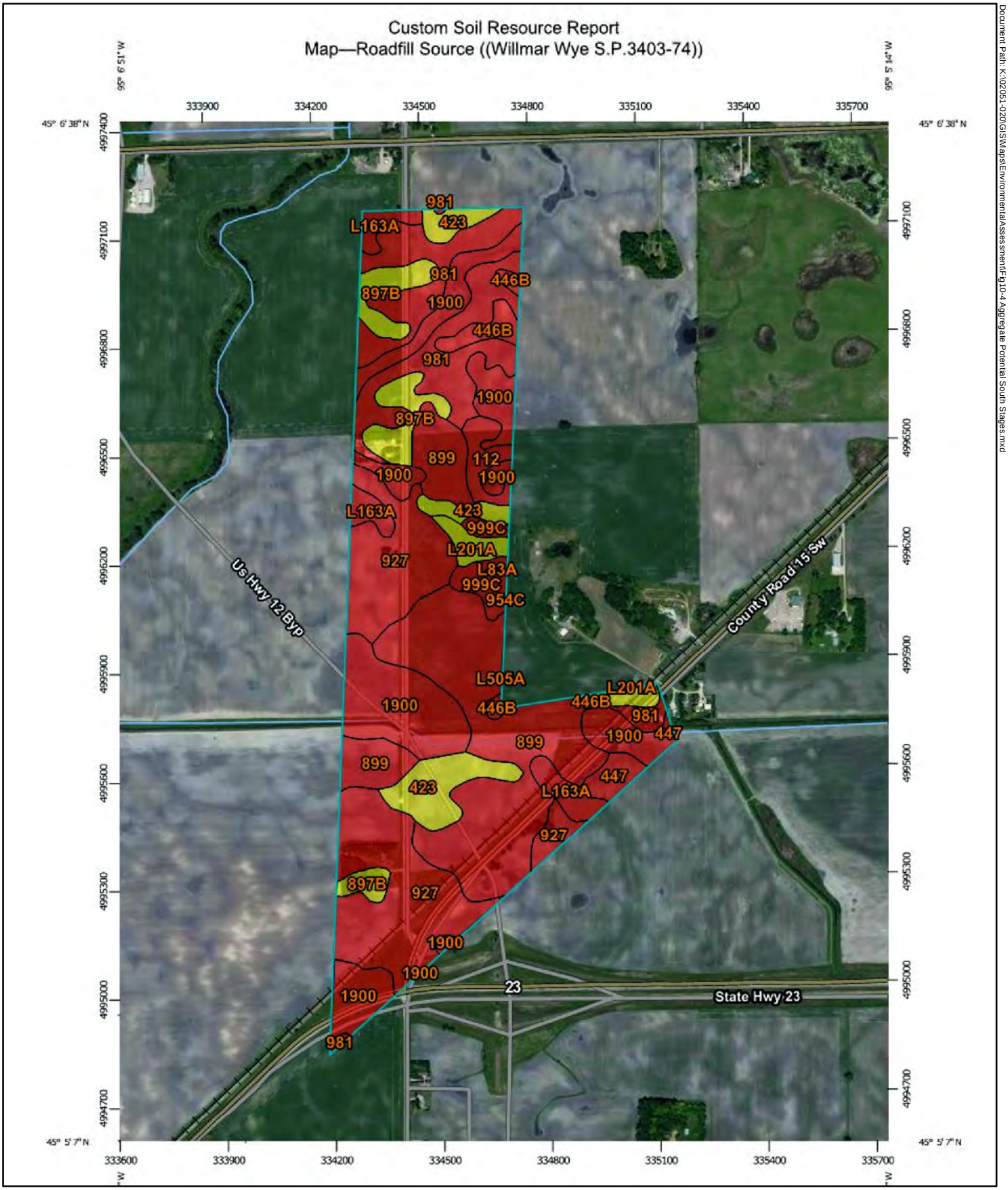

FIGURE H-4c Aggregate Potential South Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 120 Feet

Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Fig10-4 Aggregate Potential South Stages.mxd

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Poor

Fair

Good

Not rated or not available

Soil Rating Lines

Poor

Fair

Good

Not rated or not available

Soil Rating Points

Poor

Fair

Good

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-4d Aggregate Potential Legend South Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

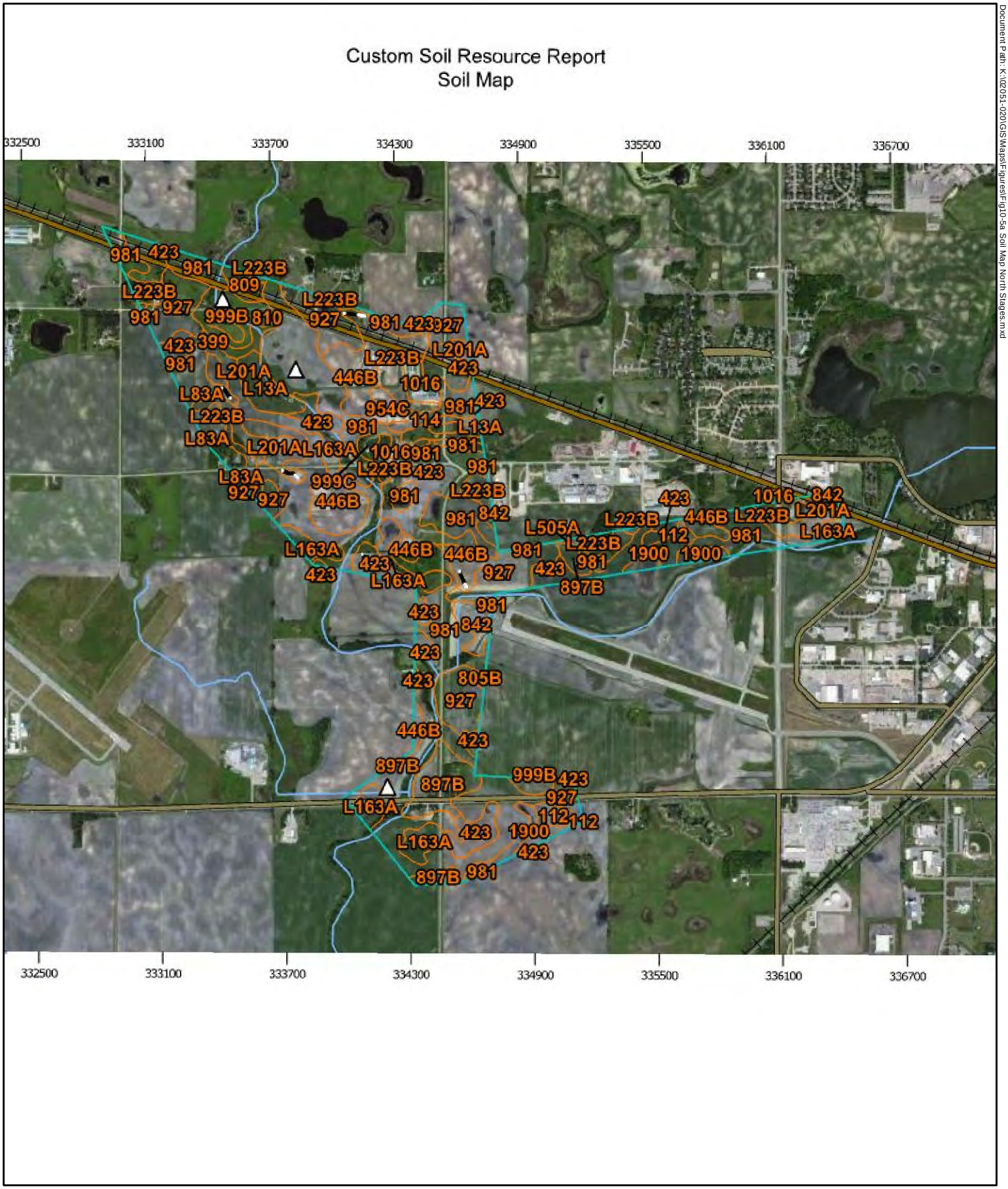

FIGURE H-5a Soil Map North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 2,000 Feet

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-5b Soil Map North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

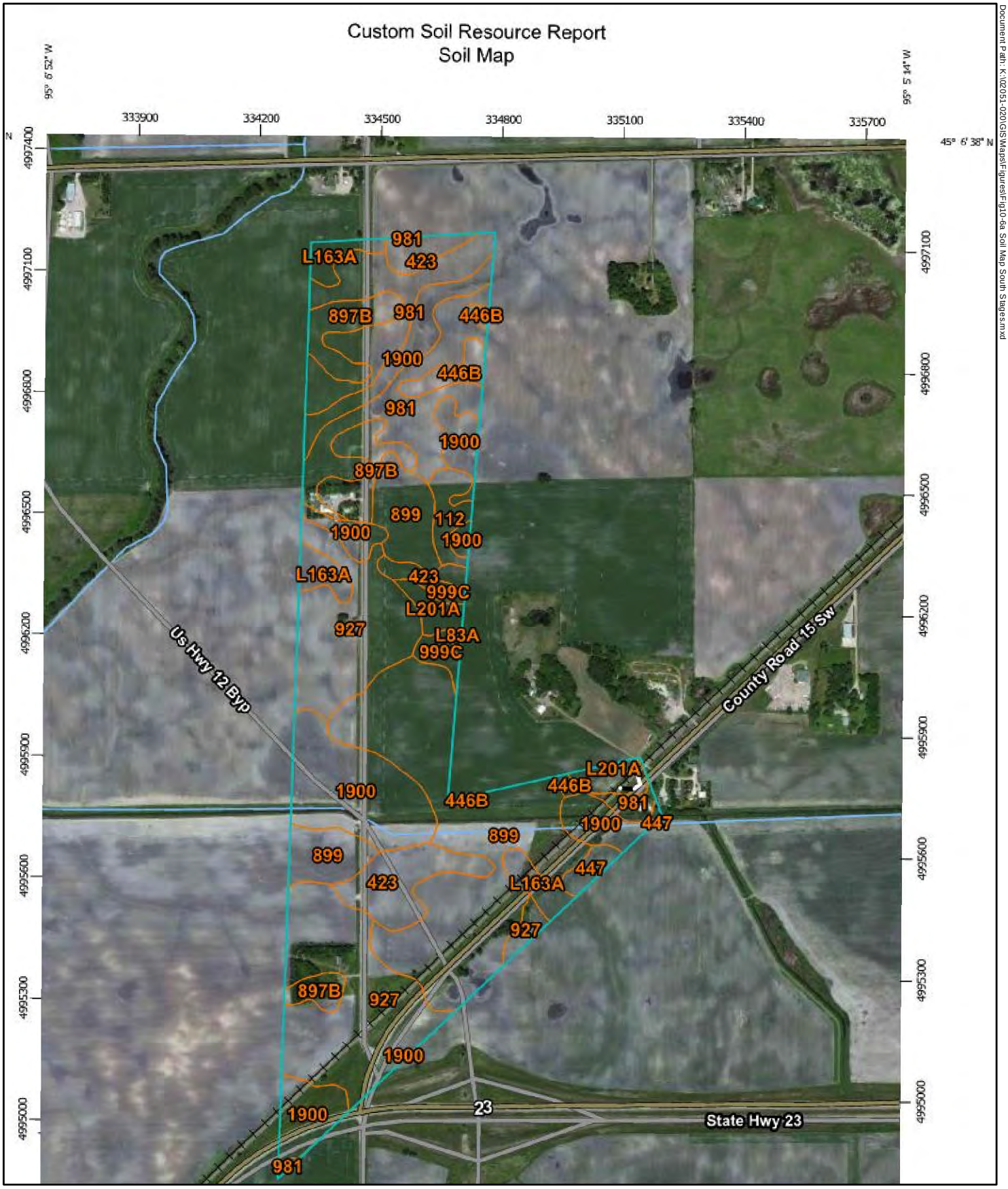

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FIGURE H-6a Soil Map South Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 1,000 Feet

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

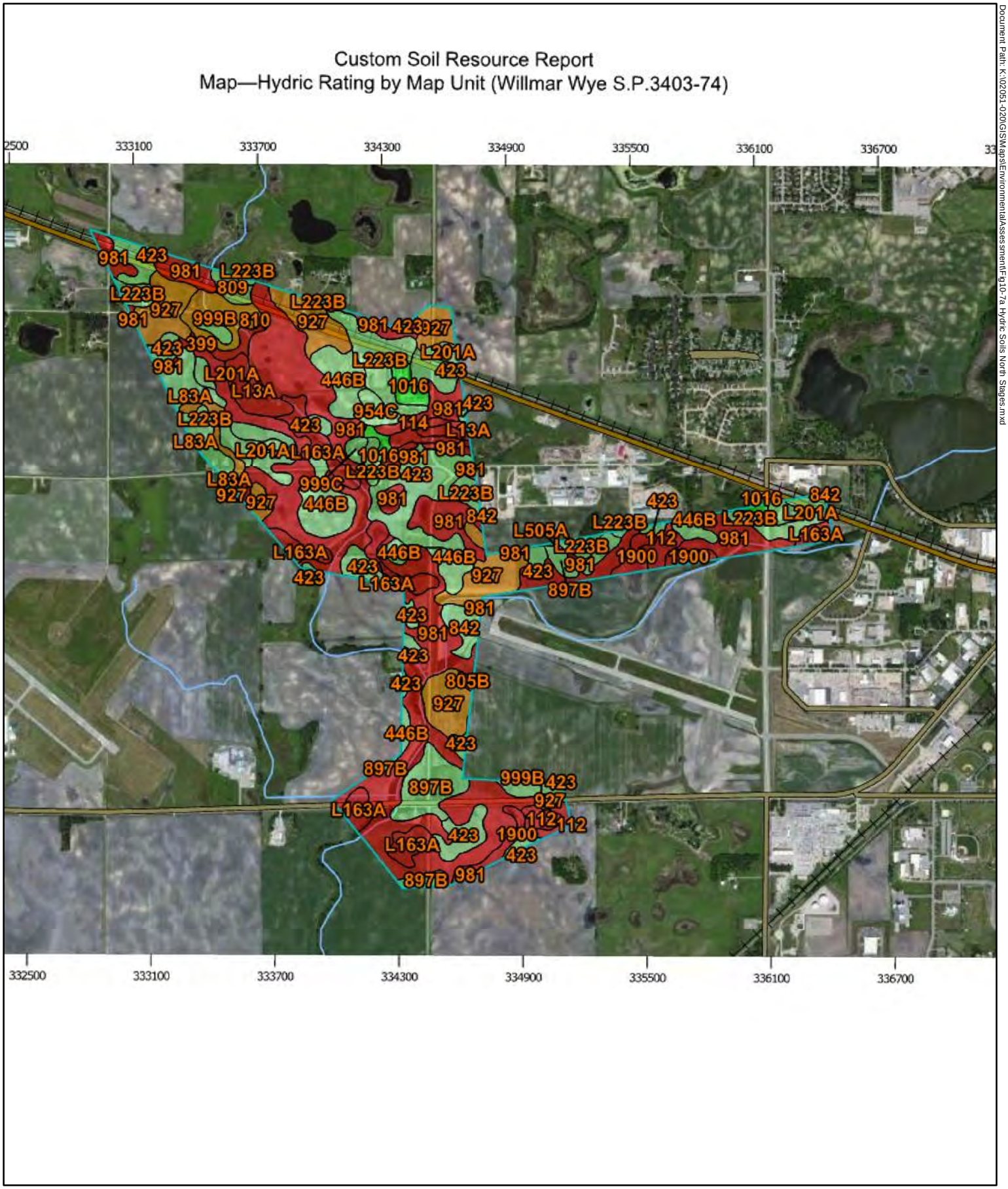
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-6b Soil Map South Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Fig10-7a Hydric Soils North Stages.mxd

FIGURE H-7a Hydric Soil Map North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 2,000 Feet

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

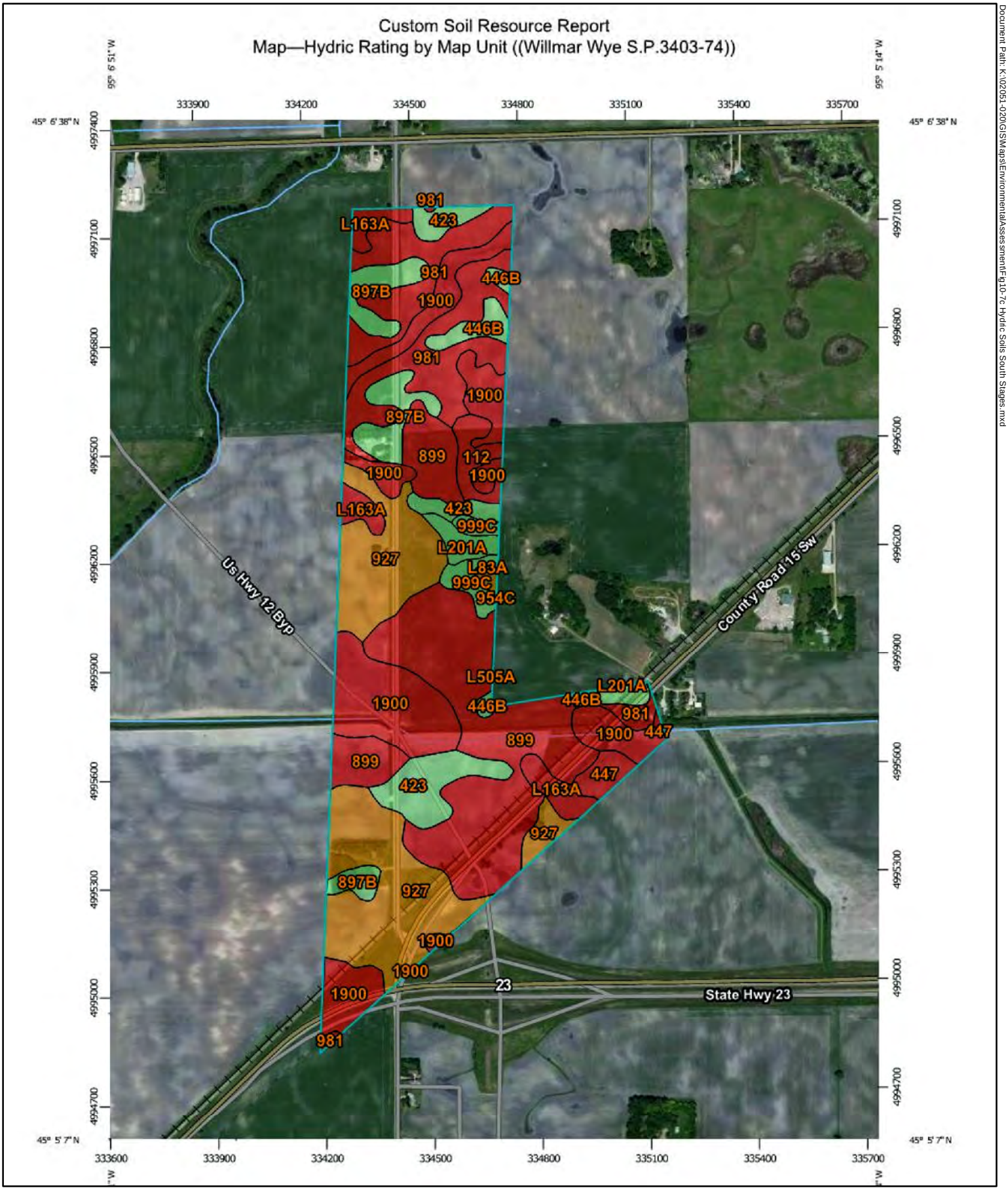
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-7b Hydric Soil Map North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Fig10-7c Hydric Soils South Stages.mxd

FIGURE H-7c Hydric Soil Map South Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 120 Feet

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Soil Rating Lines

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Soil Rating Points

Hydric (100%)

Hydric (66 to 99%)

Hydric (33 to 65%)

Hydric (1 to 32%)

Not Hydric (0%)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-7d Hydric Soil Map South Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

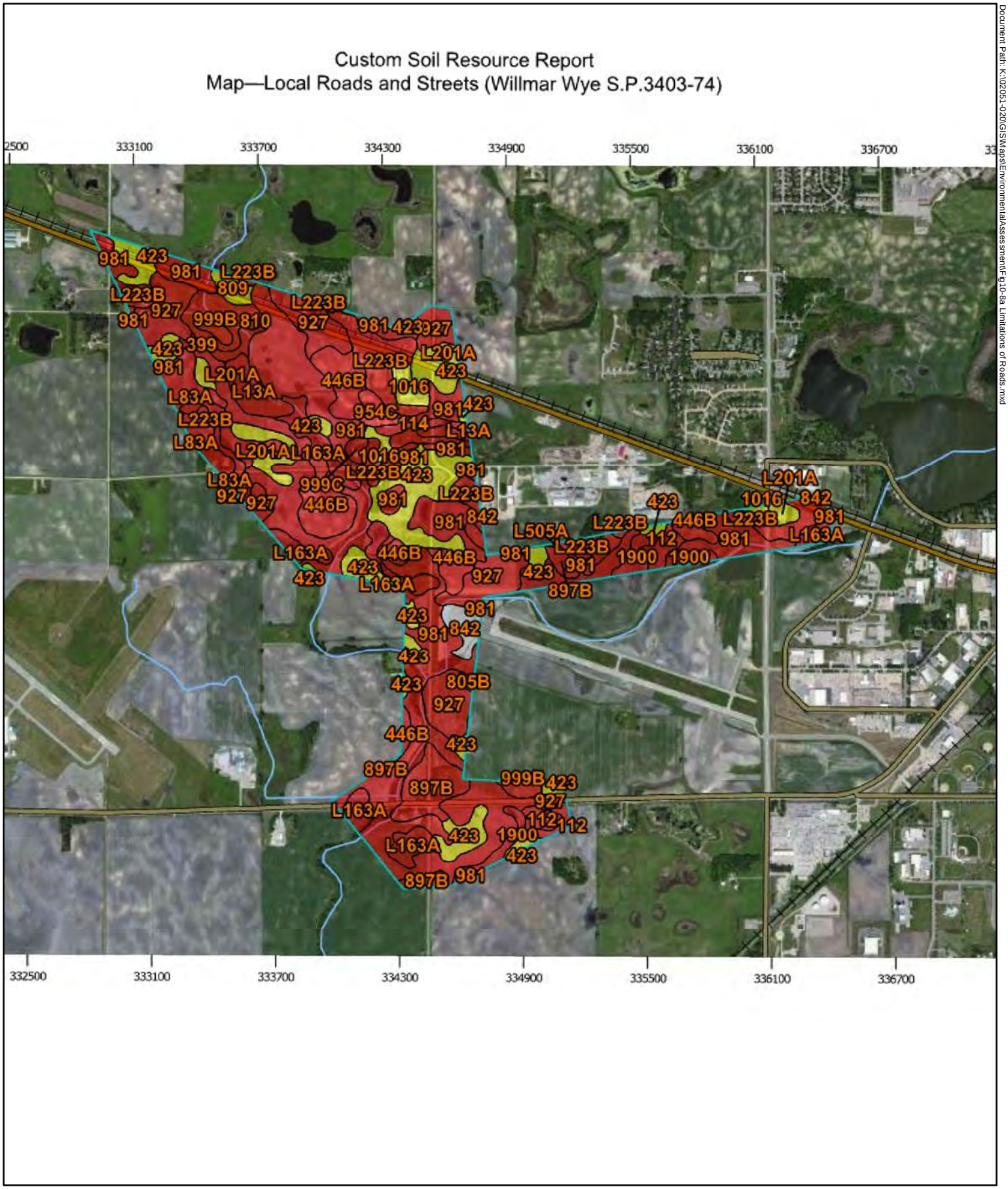


FIGURE H-8a Limitations of Roads Map North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 2,000 Feet

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Very limited

Somewhat limited

Not limited

Not rated or not available

Soil Rating Lines

Very limited

Somewhat limited

Not limited

Not rated or not available

Soil Rating Points

Very limited

Somewhat limited

Not limited

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-8b Limitations of Roads Map Legend North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Tables—Local Roads and Streets (Willmar Wye S.P.3403-74)

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
112	Harps clay loam, 0 to 2 percent slopes	Very limited	Harps (85%)	Depth to saturated zone (1.00)	9.9	1.3%
				Frost action (1.00)		
				Low strength (1.00)		
			Glencoe (10%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Okoboji (3%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
114	Glencoe clay loam, 0 to 1 percent slopes	Very limited	Glencoe (80%)	Ponding (1.00)	6.4	0.9%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Okoboji (10%)	Ponding (1.00)		

FIGURE H-8c Limitations of Roads Map Table North Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Webster (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
			Canisteo (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
399	Biscay clay loam, depressional, 0 to 1 percent slopes	Very limited	Biscay, depressional (85%)	Ponding (1.00)	4.7	0.6%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
			Biscay (10%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
			Mayer (3%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
			Klossner, drained (2%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Subsidence (1.00)		
				Frost action (1.00)		

FIGURE H-8d Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Low strength (1.00)		
423	Seaforth loam, 1 to 3 percent slopes	Somewhat limited	Seaforth (80%)	Frost action (0.50)	82.6	11.2%
				Low strength (0.34)		
				Depth to saturated zone (0.02)		
446B	Normania loam, 2 to 5 percent slopes	Very limited	Normania (90%)	Low strength (1.00)	51.2	7.0%
				Frost action (0.50)		
				Shrink-swell (0.50)		
805B	Wadenill-Sunburg loams, 2 to 6 percent slopes	Somewhat limited	Wadenill (60%)	Frost action (0.50)	1.1	0.1%
			Sunburg (25%)	Frost action (0.50)		
809	Lowlein-Estherville sandy loams	Somewhat limited	Lowlein (65%)	Frost action (0.50)	5.4	0.7%
810	Coriff-Fieldon complex	Very limited	Coriff (45%)	Depth to saturated zone (1.00)	14.5	2.0%
				Frost action (1.00)		
			Fieldon (45%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
842	Urban land-Udorthents complex	Not rated	Urban land (50%)		7.9	1.1%
			Webster (5%)			
			Glencoe (5%)			
897B	Seaforth-Swanlake loams, 2 to 6 percent slopes	Very limited	Seaforth (60%)	Frost action (1.00)	26.2	3.6%
				Low strength (0.99)		
927	Harps-Glencoe-Seaforth complex, 0 to 3 percent slopes	Very limited	Harps (35%)	Depth to saturated zone (1.00)	75.6	10.3%
				Frost action (1.00)		
				Low strength (1.00)		
			Glencoe (25%)	Ponding (1.00)		

FIGURE H-8e Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Amiret (10%)	Low strength (1.00)		
				Frost action (0.50)		
			Canisteo (7%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Webster (3%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
954C	Swanlake-Ves loams, 6 to 12 percent slopes	Very limited	Swanlake (50%)	Low strength (1.00)	5.8	0.8%
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Ves (40%)	Low strength (1.00)		
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
981	Canisteo-Harps loams	Very limited	Canisteo (45%)	Depth to saturated zone (1.00)	253.5	34.5%
				Frost action (1.00)		

FIGURE H-8f Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Low strength (1.00)		
			Harps (40%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.03)		
999B	Ves-Swanlake-Hawick complex, 2 to 6 percent slopes	Very limited	Ves (40%)	Low strength (1.00)	6.3	0.9%
				Frost action (0.50)		
				Shrink-swell (0.50)		
999C	Swanlake-Ves-Hawick complex, 6 to 12 percent slopes	Very limited	Swanlake (40%)	Low strength (1.00)	2.5	0.3%
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Ves (25%)	Low strength (1.00)		
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Hawick (20%)	Low strength (1.00)		
				Slope (0.04)		
1016	Udorthents, loamy	Somewhat limited	Udorthents, loamy (100%)	Frost action (0.50)	10.1	1.4%
1900	Okoboji-Canisteo depressional complex, 0 to 1 percent slopes	Very limited	Okoboji (60%)	Ponding (1.00)	18.0	2.4%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		

FIGURE H-8g Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
			Canisteo, depressional (30%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Klossner, drained (5%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Subsidence (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Harps (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
L13A	Klossner muck, 0 to 1 percent slopes	Very limited	Klossner, drained (90%)	Ponding (1.00)	15.0	2.0%
				Depth to saturated zone (1.00)		
				Subsidence (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Canisteo (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Okoboji (5%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		

FIGURE H-8h Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Low strength (1.00)		
				Shrink-swell (0.96)		
L83A	Webster clay loam, 0 to 2 percent slopes	Very limited	Webster (85%)	Depth to saturated zone (1.00)	6.1	0.8%
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
			Nicollet (5%)	Low strength (1.00)		
				Depth to saturated zone (0.78)		
				Frost action (0.50)		
				Shrink-swell (0.14)		
			Okoboji (5%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Glencoe (3%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		

FIGURE H-8i Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
L163A	Okoboji silty clay loam, 0 to 1 percent slopes	Very limited	Okoboji (85%)	Ponding (1.00)	40.1	5.4%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo (10%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Harps (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
L201A	Normania loam, 1 to 3 percent slopes	Somewhat limited	Normania (85%)	Low strength (0.69)	18.1	2.5%
				Frost action (0.50)		
				Depth to saturated zone (0.02)		
			Seaforth (3%)	Frost action (0.50)		
				Low strength (0.34)		
L223B	Amiret-Swanlake loams, 2 to 6 percent slopes	Very limited	Amiret (45%)	Low strength (1.00)	74.4	10.1%
				Frost action (0.50)		
			Webster (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
			Glencoe (4%)	Ponding (1.00)		

FIGURE H-8j Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
L505A	Delft clay loam, 0 to 2 percent slopes	Very limited	Delft (85%)	Depth to saturated zone (1.00)	0.2	0.0%
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.68)		
			Glencoe (8%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Nicollet (5%)	Low strength (1.00)		
				Depth to saturated zone (0.78)		
				Frost action (0.50)		
				Shrink-swell (0.14)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
Totals for Area of Interest					**735.5**	**100.0%**

FIGURE H-8k Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

Local Roads and Streets— Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Very limited	610.3	83.0%
Somewhat limited	117.3	15.9%
Null or Not Rated	7.9	1.1%
Totals for Area of Interest	**735.5**	**100.0%**

FIGURE H-8l Limitations of Roads Map Table North Stages

Willmar Rail Connector & Industrial Access Project
Willmar, MN

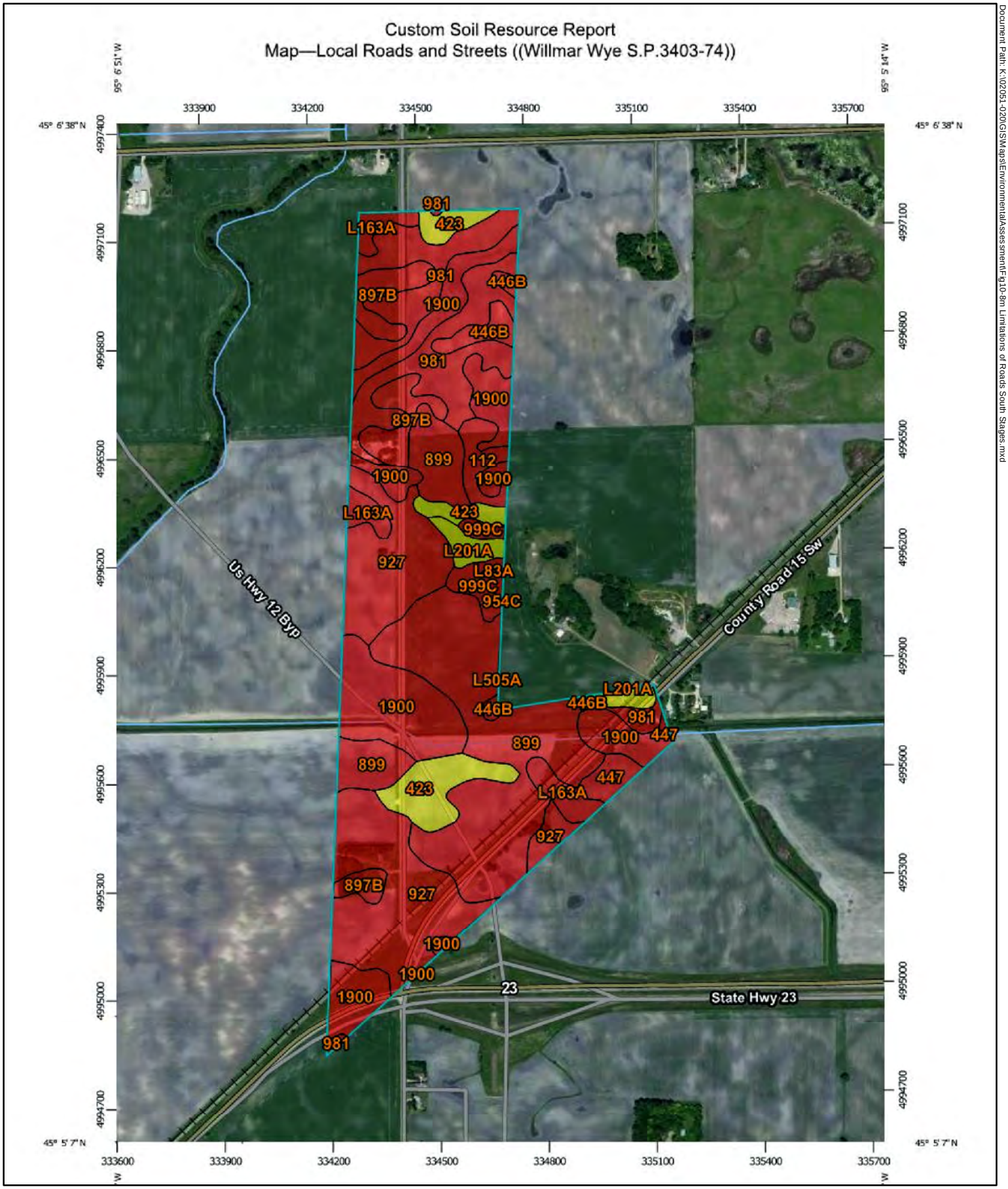


FIGURE H-8m Limitations of Roads Map South Stages

Willmar Rail Connector & Industrial Access Project

Willmar, MN

N

0 120 Feet

Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Fig10-8m Limitations of Roads South Stages.mxd

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Very limited

Somewhat limited

Not limited

Not rated or not available

Soil Rating Lines

Very limited

Somewhat limited

Not limited

Not rated or not available

Soil Rating Points

Very limited

Somewhat limited

Not limited

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kandiyohi County, Minnesota
Survey Area Data: Version 14, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 6, 2011—Aug 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

FIGURE H-8n Limitations of Roads Map Legend South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Tables—Local Roads and Streets ((Willmar Wye S.P.3403-74))

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
112	Harps clay loam, 0 to 2 percent slopes	Very limited	Harps (85%)	Depth to saturated zone (1.00)	5.0	1.8%
				Frost action (1.00)		
				Low strength (1.00)		
			Glencoe (10%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Okoboji (3%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
423	Seaforth loam, 1 to 3 percent slopes	Somewhat limited	Seaforth (80%)	Frost action (0.50)	15.8	5.7%
				Low strength (0.34)		
				Depth to saturated zone (0.02)		
446B	Normania loam, 2 to 5 percent slopes	Very limited	Normania (90%)	Low strength (1.00)	5.3	1.9%
				Frost action (0.50)		

FIGURE H-8o Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Shrink-swell (0.50)		
447	Harpster silty clay loam	Very limited	Harpster (90%)	Depth to saturated zone (1.00)	3.6	1.3%
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.50)		
897B	Seaforth-Swanlake loams, 2 to 6 percent slopes	Very limited	Seaforth (60%)	Frost action (1.00)	14.7	5.3%
				Low strength (0.99)		
899	Harps-Okoboji complex, 0 to 2 percent slopes	Very limited	Harps (55%)	Depth to saturated zone (1.00)	69.2	25.1%
				Frost action (1.00)		
				Low strength (1.00)		
			Okoboji (35%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo (10%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
927	Harps-Glencoe-Seaforth complex, 0 to 3 percent slopes	Very limited	Harps (35%)	Depth to saturated zone (1.00)	56.7	20.6%
				Frost action (1.00)		
				Low strength (1.00)		
			Glencoe (25%)	Ponding (1.00)		

FIGURE H-8p Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Amiret (10%)	Low strength (1.00)		
				Frost action (0.50)		
			Canisteo (7%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Webster (3%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
954C	Swanlake-Ves loams, 6 to 12 percent slopes	Very limited	Swanlake (50%)	Low strength (1.00)	0.0	0.0%
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Ves (40%)	Low strength (1.00)		
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
981	Canisteo-Harps loams	Very limited	Canisteo (45%)	Depth to saturated zone (1.00)	36.7	13.3%
				Frost action (1.00)		

FIGURE H-8q Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Low strength (1.00)		
			Harps (40%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.03)		
999C	Swanlake-Ves-Hawick complex, 6 to 12 percent slopes	Very limited	Swanlake (40%)	Low strength (1.00)	4.7	1.7%
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Ves (25%)	Low strength (1.00)		
				Frost action (0.50)		
				Shrink-swell (0.50)		
				Slope (0.04)		
			Hawick (20%)	Low strength (1.00)		
				Slope (0.04)		
1900	Okoboji-Canisteo depressional complex, 0 to 1 percent slopes	Very limited	Okoboji (60%)	Ponding (1.00)	48.5	17.6%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo, depressional (30%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Klossner, drained (5%)	Ponding (1.00)		

FIGURE H-8r Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Depth to saturated zone (1.00)		
				Subsidence (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Harps (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
L83A	Webster clay loam, 0 to 2 percent slopes	Very limited	Webster (85%)	Depth to saturated zone (1.00)	0.8	0.3%
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.26)		
			Nicollet (5%)	Low strength (1.00)		
				Depth to saturated zone (0.78)		
				Frost action (0.50)		
				Shrink-swell (0.14)		
			Okoboji (5%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Glencoe (3%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		

FIGURE H-8s Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
L163A	Okoboji silty clay loam, 0 to 1 percent slopes	Very limited	Okoboji (85%)	Ponding (1.00)	9.0	3.3%
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.96)		
			Canisteo (10%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
			Harps (5%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
L201A	Normania loam, 1 to 3 percent slopes	Somewhat limited	Normania (85%)	Low strength (0.69)	5.3	1.9%
				Frost action (0.50)		
				Depth to saturated zone (0.02)		
			Seaforth (3%)	Frost action (0.50)		
				Low strength (0.34)		

FIGURE H-8t Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Local Roads and Streets— Summary by Map Unit — Kandiyohi County, Minnesota (MN067)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
L505A	Delft clay loam, 0 to 2 percent slopes	Very limited	Delft (85%)	Depth to saturated zone (1.00)	0.1	0.0%
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.68)		
			Glencoe (8%)	Ponding (1.00)		
				Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
				Shrink-swell (0.02)		
			Nicollet (5%)	Low strength (1.00)		
				Depth to saturated zone (0.78)		
				Frost action (0.50)		
				Shrink-swell (0.14)		
			Canisteo (2%)	Depth to saturated zone (1.00)		
				Frost action (1.00)		
				Low strength (1.00)		
Totals for Area of Interest					**275.5**	**100.0%**

Local Roads and Streets— Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Very limited	254.4	92.3%
Somewhat limited	21.2	7.7%
Totals for Area of Interest	**275.5**	**100.0%**

FIGURE H-8u Limitations of Roads Map Table South Stages
Willmar Rail Connector & Industrial Access Project
Willmar, MN

Appendix I – Well Logs

Minnesota Unique Well Number

122613

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/24/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
PETERSON,	119	35	W	29	CADDBC

Elevation 1130 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W RR WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	2	BLACK	
CLAY	2	12	YELLOW	
CLAY	12	66	BLUE	
SAND & GRAVEL	66	78		

Remarks

SAMPLE NO. 602428.

Well Depth 78 ft. **Depth Completed** 78 ft. **Date Well Completed** 06/25/1976

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**

5 in. To 74 ft. 15 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	20	4 ft.	74 ft.	78 ft.

Static Water Level

11 ft. land surface Measure 06/25/1976

Pumping Level (below land surface)

15 ft. 3 hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination

75 feet North Direction Septic tank/drain field Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - Mad83, Zone 15, Meters X 335130 Y 4994586

Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS, S.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

130237

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BOIKE, BILL	119	35	W	19	DAAADB

Elevation 1117 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	2	BLACK	
CLAY	2	15	YELLOW	
CLAY	15	36	BLUE	
MUCKY SAND	36	42		
SAND & GRAVEL	42	47		
CLAY	47	67	BLUE	
SAND	67	78		
GRAVEL	78	86		

Remarks

Well Depth 86 ft. **Depth Completed** 86 ft. **Date Well Completed** 04/21/1977

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**
5 in. To 82 ft. 15 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	25	4 ft.	82 ft.	86 ft.

Static Water Level
14 ft. land surface Measure 04/21/1977

Pumping Level (below land surface)
16.5 ft. 3 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
75 feet Southwes Direction Sewer Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 334412 Y 4996482
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS, S.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

137046

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
CONKLIN,	119	35	W	20	CDBCAB

Elevation 1133 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W RR WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	2	BLACK	
CLAY	2	26	YELLOW	
CLAY	26	55	BLUE	
SAND	55	58		
CLAY	58	97	BLUE	
GRAVEL	97	109		

Remarks

Well Depth 109 ft. **Depth Completed** 109 ft. **Date Well Completed** 09/23/1977

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
5 in. To	104 ft.	15 lbs./ft.		5 in. To	103 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	25	5 ft.	99 ft.	104 ft.

Static Water Level

34 ft. land surface Measure 09/23/1977

Pumping Level (below land surface)

35 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/30/1977

Manufacturer's name MYERS

Model Number HP 0.75 Volt 230

Length of drop pipe 50 ft Capacity 15 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat gravel (+larger) Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - Mad83, Zone 15, Meters X 334923 Y 4996013

Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Well Co.	34071	MARCUS, S.

Minnesota Unique Well Number

194381

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/11/1992
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MW-1	119	35	W	17	BAAACD

Elevation 1127 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 369 CR 5 SW HWY 12 W LM MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SOIL FILL	0	1	BLACK	
SILTY CLAY	1	10	YELLOW	
SANDY CLAY	10	17	YELLOW	

Remarks

WELL SEALED 09-03-1996 BY 75330
ORIGINAL USE MW - MONITOR WELL
WELL TO CHECK THE SPREAD OF GASOLINE IN THE GROUND WATER

Well Depth 17 ft. **Depth Completed** 17 ft. **Date Well Completed** 06/13/1990

Drill Method Power Auger **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below** 2.52 ft.

Casing Diameter		Weight			Hole Diameter			
4	in. To	2	ft.	lbs./ft.	4.5	in. To	17	ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter		Slot/Gauze	Length		Set		
2	in.	10	10	ft.	ft.		ft.

Static Water Level
8.5 ft. land surface Measure 07/10/1990

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		ft.	ft.

Nearest Known Source of Contamination
50 feet East Direction Volatile organic compounds Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat clay+sand-yellow Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 335272 Y 4998896
Unique Number Verification Site Plan Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Valnes Well Co.	75330	VALNES, T.

Minnesota Unique Well Number

194382

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/11/1992
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MW-2	119	35	W	17	BAADAA

Elevation 1125 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 369 CR 5 SW HWY 12 W LM WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
BLACK SOIL	0	1	BLACK	
SILTY CLAY	1	10	YELLOW	
SILTY CLAY	10	13	YELLOW	
SAND - SILT - CLAY	13	18	YELLOW	
CLAY	18	18	BLUE	

Remarks

WELL SEALED 09-03-1996 BY 75330
ORIGINAL USE MW - MONITOR WELL
WELL USED TO CHECK THE SPREAD OF GASOLINE IN THE GROUND WATER

Well Depth 18 ft. **Depth Completed** 17 ft. **Date Well Completed** 06/14/1990

Drill Method Power Auger **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below** 2 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To	2 ft.	lbs./ft.		4.5 in. To	17 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	10 ft.	7 ft.	17 ft.

Static Water Level
9.6 ft. land surface Measure 06/14/1990

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		5 ft.	6 ft.
neat cement		ft.	5 ft.

Nearest Known Source of Contamination
100 feet Northwes Direction Volatile organic compounds Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat clay-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 335315 Y 4998860
Unique Number Verification Site Plan Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Valnes Well Co.	75330	VALNES, T.

Minnesota Unique Well Number

194383

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/11/1992
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MW-3	119	35	W	17	BAAAAA

Elevation 1125 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 369 CR 5 & HWY 12 W LM WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SOIL FILL	0	1	BLACK	
FILL GRAVEL	1	3	BROWN	
CLAY SOIL	3	7	BLACK	
SILTY CLAY	7	10	YELLOW	
SILTY CLAY	10	15	YELLOW	
SAND	15	16		
CLAY	16	21	BLUE	

Remarks

WELL SEALED 09-03-1996 BY 75330
ORIGINAL USE MW - MONITOR WELL
WELL TO CHECK THE SPREAD OF GASOLINE IN THE GROUND WATER

Well Depth 21 ft. **Depth Completed** 20 ft. **Date Well Completed** 06/14/1990

Drill Method Power Auger **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below** 2 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To	2 ft.	lbs./ft.		4.5 in. To	20 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	10 ft.	10 ft.	20 ft.

Static Water Level
9.6 ft. land surface Measure 07/10/1990

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		6 ft.	7 ft.
neat cement		ft.	6 ft.

Nearest Known Source of Contamination
100 feet South Direction Volatile organic compounds Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat clay-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 335304 Y 4998963
Unique Number Verification Site Plan Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Valnes Well Co.	75330	VALNES, T.

Minnesota Unique Well Number

194384

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/11/1992
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MW-4	119	35	W	17	BAADBB

Elevation 1126 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 369 CR 5 SW & HWY 12 W LM WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SOIL FILL	0	1	BLACK	
SILTY CLAY	1	10	YELLOW	
SILTY CLAY	10	13	YELLOW	
SANDY CLAY	13	17	YELLOW	
SAND	17	21	YEL/BRN	
BLUE CLAY	21	21	BLUE	

Remarks

WELL SEALED 09-03-1996 BY 75330

ORIGINAL USE MW - MONITOR WELL

WELL USED FOR MONTORING THE SPREAD OF GASOLINE CONTAMINATION IN THE GROUND WATER

Well Depth 21 ft. **Depth Completed** 20 ft. **Date Well Completed** 06/14/1990

Drill Method Power Auger **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 2 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To	2 ft.	lbs./ft.		4.5 in. To	20 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	10 ft.	10 ft.	20 ft.

Static Water Level

14 ft. land surface Measure 07/10/1990

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		7 ft.	8 ft.
neat cement		ft.	7 ft.

Nearest Known Source of Contamination

150 feet Northeas Direction Volatile organic compounds Type

Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. Water

Last Strat clay-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 335232 Y 4998868

Unique Number Verification Site Plan Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Valnes Well Co.	75330	VALNES T.

Minnesota Unique Well Number

194601

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HELLENBRAND,	119	35	W	18	DDDDDB

Elevation 1125 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	1	BLACK	
CLAY	1	20	YELLOW	
CLAY	20	36	BLUE	
SAND	36	46	GRAY	
MUCK	46	46		

Remarks

Well Depth 46 ft. **Depth Completed** 46 ft. **Date Well Completed** 05/26/1983

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 41.5 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	20	4 ft.	41.5 ft.	45.5 ft.

Static Water Level
19 ft. land surface Measure 05/26/1983

Pumping Level (below land surface)
23 ft. hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		ft.	ft.

Nearest Known Source of Contamination
75 feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat clay/sand/silt-no peb. Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 334435 Y 4997390
Unique Number Verification Plat Book Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Well Co.	34071	MARCUS, D.

Minnesota Unique Well Number

210694

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HAMAAN,	119	35	W	17	AABBCD

Elevation 1132 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W W. OF WILLMAR WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	20	YELLOW	
CLAY	20	26	BLUE	
GRAVEL	26	36		

Remarks

Well Depth 36 ft. **Depth Completed** 36 ft. **Date Well Completed** 08/00/1966

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 30 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**
Diameter Slot/Gauze Length Set
3 in. 10 5 ft. 30 ft. 35 ft.

Static Water Level
18 ft. land surface Measure 08/00/1966

Pumping Level (below land surface)
25 ft. 4 hrs. Pumping at 15 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 335789 Y 4998849
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Marcus Well Co. 34071
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

210698

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HAMAAN,	119	35	W	17	AABBCD

Elevation 1132 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W W. OF WILLMAR WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	2		
CLAY	2	25	YELLOW	
CLAY	25	89	BLUE	
GRAVEL	89	128		

Remarks

Well Depth 128 ft. **Depth Completed** 128 ft. **Date Well Completed** 07/00/1966

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 128 ft. lbs./ft.

Open Hole From 128 ft. To 128 ft.

Screen? ☐ **Type** **Make**
Diameter Slot/Gauze Length Set
0 in. 0 ft. 0 ft. ft.

Static Water Level
15 ft. land surface Measure 07/00/1966

Pumping Level (below land surface)
22 ft. 8 hrs. Pumping at 18 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0.5 Volt
Length of drop pipe ft Capacity g.p. Typ Jet

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 335789 Y 4998849
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Marcus Well Co. 34071
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report **210698**

Printed on 09/01/2016
HE-01205-15

Minnesota Unique Well Number

210735

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/24/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HOLMGREN	119	35	W	29	CADDBC

Elevation 1130 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SUBSOIL	0	2		
CLAY	2	35	YELLOW	
CLAY	35	118	BLUE	
SAND	118	121		

Remarks

Well Depth 121 ft. **Depth Completed** 121 ft. **Date Well Completed** 06/00/1968

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 118 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**
Diameter Slot/Gauze Length Set
2 in. 12 3 ft. 118 ft. 121 ft.

Static Water Level
12 ft. land surface Measure 06/00/1968

Pumping Level (below land surface)
64 ft. 3 hrs. Pumping at 9 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 335130 Y 4994586
Unique Number Verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS & CO.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

401827

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BOIKE, BILL	119	35	W	19	DAAAAC

Elevation 1117 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact RR 1 WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	1	BLACK	
CLAY	1	14	YELLOW	
CLAY	14	35	BLUE	
SAND	35	40	BLUE	
CLAY	40	70	BLUE	
CLAY	70	75	BLUE	SOFT
SAND AND GRAVEL	75	89	BLUE	

Remarks

Well Depth 89 ft. **Depth Completed** 89 ft. **Date Well Completed** 07/20/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
5 in. To 85 ft.	lbs./ft.	5 in. To 89 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
5 in.	25	4 ft.	85 ft. 89 ft.

Static Water Level
10 ft. land surface Measure 07/20/1984

Pumping Level (below land surface)
15 ft. 1 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		ft.	ft.

Nearest Known Source of Contamination
100 feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/20/1984
Manufacturer's name MEYERS
Model Number 52J52-J511 HP 0.5 Volt 230
Length of drop pipe 28 ft Capacity 15 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand +larger-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334400 Y 4996493
Unique Number Verification Name on mailbox Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Well Co.	34071	MARCUS, D.

Minnesota Unique Well Number

407471

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
VAN BUREN,	119	35	W	19	AAAABD

Elevation 1119 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	1	BLACK	
CLAY	1	15	YELLOW	
CLAY	15	34	BLUE	
GRAVEL	34	49	GRAY	
CLAY	49	81	BLUE	
SAND AND GRAVEL	81	95		

Remarks

Well Depth 95 ft. **Depth Completed** 95 ft. **Date Well Completed** 04/02/1985

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 91 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
5 in.	20	4 ft.	91 ft. 95 ft.

Static Water Level
13 ft. land surface Measure 04/02/1985

Pumping Level (below land surface)
17 ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		ft.	ft.

Nearest Known Source of Contamination
75 feet Direction Barnyard Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand +larger Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334410 Y 4997322
Unique Number Verification Information from Inpute Date 12/02/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Well Co.	34071	MARCUS, D.

Minnesota Unique Well Number

424373

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/11/1988
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
PEHLING, LYDIA	119	35	W	17	CCCCAB

Elevation 1125 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W RR 1 BOX 22 WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	1	BLACK	
CLAY	1	18	YELLOW	
CLAY	18	37	BLUE	
MUDDY SAND	37	40	GRAY	
CLAY	40	43	BLUE	
FINE SAND	43	54	GRAY	
CLAY	54	91	BLUE	
FINE SAND	91	100	GRAY	
COARSER SAND	100	106	GRAY	

Remarks

Well Depth 106 ft. **Depth Completed** 106 ft. **Date Well Completed** 12/30/1986

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 102 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	15	4 ft.	102 ft.	106 ft.

Static Water Level
18 ft. land surface Measure 12/30/1986

Pumping Level (below land surface)
23 ft. hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		ft.	ft.

Nearest Known Source of Contamination
75 feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 334524 Y 4997436
Unique Number Verification Plat Book Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

455090

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/07/1991
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
QUAM, JOHN	119	35	W	18	AADCAB

Elevation 1122 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 4747 1ST AV W WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
LOAM	0	2	BLACK	SOFT
CLAY	2	16	YELLOW	SOFT
CLAY	16	37	BLUE	SOFT
SANDY CLAY	37	39	BLUE	SOFT
CLAY	39	45	BLUE	SOFT
CLAY	45	53	BLUE	
ROCK	53	55	BLK/WHT	
CLAY	55	80	BLUE	SOFT
SAND (SHARP)	80	120	BLUE	

Remarks

Well Depth 120 ft. **Depth Completed** 120 ft. **Date Well Completed** 11/10/1988

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight	Hole Diameter		
5 in. To	115 ft.	lbs./ft.	9 in. To	120 ft.	

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** HOWARD SMITH

Diameter	Slot/Gauze	Length	Set	
4 in.	18	5 ft.	115 ft.	120 ft.

Static Water Level
30 ft. land surface Measure 11/10/1988

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
well grouted, type unknown		ft.	ft.

Nearest Known Source of Contamination
75 feet North Direction Sewer Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/14/1988
Manufacturer's name AERMOTOR
Model Number HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334370 Y 4998657
Unique Number Verification Information from Inpute Date 12/02/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Steffl M.j. Well Co	34480	STEFFL, M.

Minnesota Unique Well Number

489971

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/12/1992
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MW-5	119	35	W	17	ABBCBA

Elevation 1125 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 369 5 CR SW WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SILTY CLAY	0	2	BLACK	
SILT W/ SAND	2	5	BROWN	
SILTY SAND W/ TRACE	5	10	BROWN	
SILTY SAND W/ CLAY	10	13	BROWN	
SILTY CLAY W/ SILT	13	15	GRN/GRY	

Remarks

WELL SEALED 09-03-1996 BY 75330
ORIGINAL USE MW - MONITOR WELL

Well Depth 15 ft. **Depth Completed** 15 ft. **Date Well Completed** 10/21/1991

Drill Method Power Auger **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below** 2 ft.

Hole Diameter
6 in. To 15 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** HOWARD SMITH

Diameter	Slot/Gauze	Length	Set
2 in.	10	10 ft.	5 ft. 15 ft.

Static Water Level
7 ft. land surface Measure 10/21/1991

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		2 ft.	3 ft.
neat cement		ft.	2 ft.

Nearest Known Source of Contamination
180 feet West Direction Volatile organic compounds Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat silt+clay Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 335365 Y 4998865
Unique Number Verification Site Plan Inpute Date 06/21/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Valnes Well Co.	75330	VALNES/EVINK

Minnesota Unique Well Number

505709

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/07/1991
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WILLMAR	119	35	W	17	BBADCA

Elevation 1125 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	14	YELLOW	
CLAY	14	25	BLUE	
SAND	25	34	GRAY	
CLAY	34	58	BLUE	
SAND	58	60	GRAY	
CLAY	60	65	BLUE	
FINE SAND	65	95	GRAY	
COARSE SAND	95	109	GRAY	

Remarks

Well Depth 109 ft. **Depth Completed** 109 ft. **Date Well Completed** 07/05/1989

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use industrial **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 95 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	20	ft.	ft.	109 ft.
5 in.	15	14 ft.	95 ft.	ft.

Static Water Level
29 ft. land surface Measure 07/05/1989

Pumping Level (below land surface)
30 ft. 1 hrs. Pumping at 35 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		0 ft.	30 ft.
bentonite		30 ft.	70 ft.

Nearest Known Source of Contamination
60 feet North Direction Septic tank/drain field Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334862 Y 4998816
Unique Number Verification Information from Inpute Date 12/02/2015

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS, C.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

511576

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/07/1991
Update Date 06/16/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SURPLUS	119	35	W	8	DCCDCB

Elevation 1124 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 3701 12 HY W WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	2	BLACK	
CLAY	2	4	BLUE	
SAND	4	9	GRAY	
CLAY	9	15	BLUE	
MUDDY SAND	15	25	GRAY	
CLAY	25	77	BLUE	
FINE SAND	77	86	GRAY	

Remarks

WELL SEALED 06-12-1990 BY 34071
ORIGINAL USE DO - DOMESTIC

Well Depth 86 ft. **Depth Completed** 86 ft. **Date Well Completed** 06/08/1990

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter		Weight	
5 in. To	81 ft.	lbs./ft.	

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** WERES

Diameter	Slot/Gauze	Length	Set	
5 in.	10	5 ft.	81 ft.	86 ft.

Static Water Level
26 ft. land surface Measure 06/08/1990

Pumping Level (below land surface)
63 ft. 1 hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		6 ft.	30 ft.
bentonite		30 ft.	75 ft.

Nearest Known Source of Contamination
85 feet Northwes Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☒ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 335430 Y 4999011
Unique Number Verification Information from Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Marcus Well Co.	34071	MARCUS, C.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

511591

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/18/1991
Update Date 06/16/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SURPLUS	119	35	W	8	DCCBDD

Elevation 1124 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 3701 12 HY W WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	1	BLACK	
CLAY	1	16	YELLOW	
CLAY	16	18	BLUE	
SAND	18	29	GRAY	
CLAY	29	40	BLUE	
SAND	40	51	GRAY	

Remarks

WELL WAS SEALED.

Well Depth 51 ft. **Depth Completed** 51 ft. **Date Well Completed** 06/10/1990

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 47 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
5 in.	20	4 ft.	47 ft. 51 ft.

Static Water Level
29 ft. land surface Measure 06/10/1990

Pumping Level (below land surface)
36 ft. 1 hrs. Pumping at 15 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		6 ft.	30 ft.
bentonite		30 ft.	40 ft.

Nearest Known Source of Contamination
100 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 335406 Y 4999086
Unique Number Verification Information from Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Well Co.	34071	MARCUS, C.

Minnesota Unique Well Number

588831

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 03/25/1997
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
AARVIG, DEAN	119	35	W	20	BADCAB

Elevation 1125 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 3843 15TH AV SW WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	2	BLACK	SOFT
CLAY	2	23	YELLOW	SOFT
CLAY (FIRM)	23	48	BLUE	
SAND	48	62	GRAY	SOFT

Remarks

Well Depth 62 ft. **Depth Completed** 62 ft. **Date Well Completed** 11/25/1996

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter		Weight	
5 in. To 58 ft.		2.9	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** COOK

Diameter	Slot/Gauze	Length	Set	
5 in.	10	4 ft.	58 ft.	62 ft.

Static Water Level
23 ft. land surface Measure 11/25/1996

Pumping Level (below land surface)
35 ft. 1 hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model BULLDOG
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		0 ft.	48 ft.

Nearest Known Source of Contamination
53 feet North Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name STA RITE
Model Number HP 0.5 Volt 220
Length of drop pipe 45 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 335136 Y 4997030
Unique Number Verification Address verification Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Water Well Co	34644	MARCUS, C.

Minnesota Unique Well Number

651134

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/01/2002
Update Date 06/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
QUAM, JOHN	119	35	W	18	AABACC

Elevation 1124 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 4747 1ST AV W WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	1	BLACK	MEDIUM
CLAY	1	6	YELLOW	MEDIUM
SAND 12-20SLT	6	16	YELLOW	
CLAY	16	24	BLUE	MEDIUM
SAND/GRAVEL	24	48	YELLOW	
CLAY	48	71	BLUE	MEDIUM
SAND 10SLT	71	73	BLUE	
CLAY	73	133	BLUE	MEDIUM
SAND 12SLT	133	135	BLUE	
CLAY	135	140	BLUE	MEDIUM
SAND	140	141	BLUE	
CLAY	141	174	GRAY	HARD
SAND 18SLT	174	176	BLUE	
CLAY	176	208	BLUE	HARD
SAND 10SLT	208	212	BLUE	
CLAY	212	225		HARD
SAND 12SLT	225	229	RED	
CLAY	229	245	BLUE	HARD
SAND 12SLT	245	250	RED	
SAND 12SLT	250	263	BLUE	

Remarks

Well Depth 263 ft. **Depth Completed** 263 ft. **Date Well Completed** 07/11/2001

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Unknown
Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
5 in. To 253 ft.	lbs./ft.	8 in. To 263 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** telescoping **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
4 in.	12	10 ft.	253 ft.	263 ft.

Static Water Level

Pumping Level (below land surface)

160 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MERRILL Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
high solids bentonite	3	Sacks	0 ft.	30 ft.
cuttings			30 ft.	253 ft.

Nearest Known Source of Contamination

100 feet North Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/12/2001

Manufacturer's name STARITE

Model Number 10SP4D025-140 HP 0.75 Volt 230

Length of drop pipe 140 ft Capacity 15 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 334238 Y 4998895

Unique Number Verification Address verification Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Steffl M.j. Well Co	34480	GJERDE, M

Minnesota Unique Well Number

664260

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/18/2001
Update Date 06/16/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WILLMAR	119	35	W	7	DDABDB

Elevation 1136 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 360 45TH ST NW WILLMAR MN
Contact BOX 753 WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	13	YELLOW	SOFT
CLAY	13	81	BLUE	SOFT
CLAY	81	83	GRAY	SOFT
CLAY (FIRM)	83	86	BLUE	
SAND	86	87	GRAY	SOFT
CLAY (FIRM)	87	111	BLUE	
MUDDY SAND	111	114	GRAY	SOFT
CLAY	114	188	BLUE	HARD
SAND	188	192	GRAY	SOFT
CLAY	192	220	BLUE	HARD
CLAY	220	240	BLACK	HARD
SANDY CLAY	240	266	BLUE	SOFT
SAND	266	271	GRAY	SOFT

Remarks

Well Depth 271 ft. **Depth Completed** 271 ft. **Date Well Completed** 07/04/2001

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 251 ft. 2.9 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	7	20 ft.	251 ft.	271 ft.

Static Water Level
34 ft. land surface Measure 07/04/2001

Pumping Level (below land surface)
50 ft. 2 hrs. Pumping at 80 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		0 ft.	200 ft.

Nearest Known Source of Contamination
150 feet Southeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name STA RITE
Model Number HP 2 Volt 220
Length of drop pipe ft Capacity 40 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 334377 Y 4999324
Unique Number Verification Info/GPS from data Inpute Date 07/31/2001

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Water Well Co	34644	MARCUS, C.

Minnesota Unique Well Number

689886

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date
Update Date 06/16/2016
Received Date 03/26/2004

Well Name	Township	Range	Dir	Section	Subsection
WILLMAR	119	35	W	7	DADCDC

Elevation 1139 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well CRNR HWY 12 & 45TH ST NW WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	30	YELLOW	SOFT
CLAY-FIRM	30	142	BLUE	
SANDY CLAY	142	144	BLUE	SOFT
CLAY-FIRM	144	222	BLUE	
SAND	222	224	GRAY	SOFT
CLAY	224	250	BLUE	HARD
SAND	250	257	GRAY	SOFT

Remarks

Well Depth 257 ft. **Depth Completed** 257 ft. **Date Well Completed** 08/04/2003

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 252 ft. 2.9 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	7	5 ft.	252 ft.	257 ft.

Static Water Level
33 ft. land surface Measure 08/04/2003

Pumping Level (below land surface)
50 ft. 1 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model BULLDOG
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft. 100	ft.

Nearest Known Source of Contamination
70 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name STA RITE
Model Number HP 0.75 Volt 220
Length of drop pipe ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334388 Y 4999381
Unique Number Verification Information from Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Marcus Water Well Co	34644	MARCUS, C.

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HE-01205-15

Minnesota Unique Well Number

752252

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/25/2008
Update Date 06/16/2016
Received Date 09/13/2007

Well Name	Township	Range	Dir	Section	Subsection
MW-1	119	35	W	8	DDDDAB

Elevation 1126 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 3001 1ST AV NW WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FINE SILTY SAND	0	9	BROWN	MEDIUM
SILTY CLAY	9	11	BROWN	MEDIUM
SILTY CLAY	11	13	GRY/BRN	MEDIUM
CLAY & SAND MED	13	15	GRAY	
SAND & SILT	15	17	BROWN	MEDIUM
SILT CLAY SAND	17	19	GRY/BRN	MEDIUM
FINE SILTY SAND	19	21	GRAY	MEDIUM

Remarks

SEALED 11-14-2011 BY 1337; PREVIOUS USE: MW

Well Depth 21 ft. **Depth Completed** 20 ft. **Date Well Completed** 07/12/2007

Drill Method Auger (non-specified) **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below**

Casing Diameter 2 in. To 10 ft. **Weight** 0.69 lbs./ft. **Hole Diameter** 8.2 in. To 21 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** TIMCO

Diameter	Slot/Gauze	Length	Set
2 in.	10	10 ft.	10 ft. 20 ft.

Static Water Level

16 ft. land surface Measure 07/12/2007

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☒ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	1	Sacks	6 ft.	8 ft.
neat cement	2	Sacks	ft.	6 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. Water

Last Strat sand+silt-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 336103 Y 4999046

Unique Number Verification Site Plan Inpute Date 06/16/2016

Angled Drill Hole

Well Contractor

Thein Well Co., Inc.	1337	WIEBER, A.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

752253

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/25/2008
Update Date 06/16/2016
Received Date 09/13/2007

Well Name	Township	Range	Dir	Section	Subsection
MW-2	119	35	W	8	DDDDBD

Elevation 1128 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 3001 1ST AV NW WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SILTY CLAY	0	9	BLK/BRN	MEDIUM
SILTY CLAY	9	11	BROWN	MEDIUM
FINE SAND	11	15	BROWN	HARD
SAND & GRAVEL MED	15	17	BROWN	
FINE SAND	17	19	BROWN	MEDIUM
FINE SANDY CLAY	19	21	GRY/BRN	MEDIUM

Remarks

SEALED 11-14-2011 BY 1337; PREVIOUS USE: MW

Well Depth 21 ft. **Depth Completed** 21 ft. **Date Well Completed** 07/12/2007

Drill Method Auger (non-specified) **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
2 in. To	10.5 ft.	0.69 lbs./ft.		8.2 in. To	21 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** TIMCO

Diameter	Slot/Gauze	Length	Set	
2 in.	10	10 ft.	10.5 ft.	20.5 ft.

Static Water Level

17 ft. land surface Measure 07/12/2007

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☒ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	1	Sacks	6 ft.	8.5 ft.
neat cement	2	Sacks	ft.	6.5 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. Water

Last Strat clay+sand Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 336082 Y 4999017

Unique Number Verification Site Plan Inpute Date 06/16/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Thein Well Co., Inc.	1337	WIEBER, A.

Minnesota Unique Well Number

752254

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/25/2008
Update Date 06/16/2016
Received Date 09/13/2007

Well Name	Township	Range	Dir	Section	Subsection
MW-3	119	35	W	8	DDDDAC

Elevation 1130 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 3001 1ST AV NW WILLMAR MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND SILT CLAY	0	8	BROWN	MEDIUM
SILTY CLAY	8	10	BROWN	MEDIUM
FINE SILTY SAND	10	12	BROWN	MEDIUM
SILT & SAND	12	14	BROWN	MEDIUM
SILT SAND CLAY	14	16	GRY/BRN	MEDIUM
SILT SAND CLAY	16	18	GRY/BRN	SOFT
SILTY CLAY	18	20	GRAY	SOFT

Remarks

MW-3 SUMMIT

SEALED 11-14-2011 BY 1337; PREVIOUS USE: MW

Well Depth 20 ft. **Depth Completed** 18 ft. **Date Well Completed** 07/12/2007

Drill Method Auger (non-specified) **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
2 in. To 8 ft.		0.69 lbs./ft.		8.2 in. To 20 ft.	

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** TIMCO

Diameter	Slot/Gauze	Length	Set
2 in.	10	10 ft.	8 ft. 18 ft.

Static Water Level

12 ft. land surface Measure 07/12/2007

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☒ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	1	Sacks	4 ft.	6 ft.
neat cement	2	Sacks	ft.	4 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. Water

Last Strat silt+clay-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 336114 Y 4999015

Unique Number Verification Site Plan Inpute Date 06/16/2016

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Thein Well Co., Inc.	1337	WIEBER, A.

Minnesota Unique Well Number

755798

County Kandiyohi
Quad Willmar
Quad ID 127D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/23/2008
Update Date 06/21/2016
Received Date 09/02/2008

Well Name	Township	Range	Dir	Section	Subsection
FUSSY, JASON	119	35	W	18	DAACCD

Elevation 1121 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 980 5 CR SW WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	15	YELLOW	SOFT
CLAY FIRM	15	45	BLUE	
SAND	45	50	GRAY	SOFT
CLAY FIRM	50	230	BLUE	
CLAY	230	235	BLACK	HARD
SAND & GRAVEL	235	250	GRAY	SOFT

Remarks

FITTINGS 6'- 2'

Well Depth 250 ft. **Depth Completed** 250 ft. **Date Well Completed** 04/23/2008

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**

5 in. To 245 ft. 2.9 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	15	5 ft.	245 ft.	250 ft.

Static Water Level

21 ft. land surface Measure 04/23/2008

Pumping Level (below land surface)

35 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model BULLDOG

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	100 ft.

Nearest Known Source of Contamination

100 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name SCHAEFER

Model Number HP 0.5 Volt 220

Length of drop pipe ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger-gray Depth to Bedrock ft

Located by Minnesota Department of Health

Locate Method Digitization (Screen) - Map (1:24,000)

System UTM - Mad83, Zone 15, Meters X 334328 Y 4997969

Unique Number Verification Info/GPS from data Inpute Date 09/16/2008

Angled Drill Hole

Well Contractor

Marcus Water Well Co., Inc.	1437	MARCUS, C.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

764040

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/23/2008
Update Date 06/16/2016
Received Date 10/23/2008

Well Name	Township	Range	Dir	Section	Subsection
PHILLIPS	119	35	W	8	CDDDDB

Elevation 1120 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 400 5 CR SW WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	15	YELLOW	MEDIUM
CLAY	15	28	BLUE	MEDIUM
GRAVEL, COARSE	28	32	BROWN	
CLAY	32	82	BLUE	MEDIUM
GRAVEL, COARSE	82	89	WHITE	

Remarks

Well Depth 89 ft. **Depth Completed** 89 ft. **Date Well Completed** 08/07/2008

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use industrial **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter		Weight	Hole Diameter	
4 in. To	82 ft.	lbs./ft.	8 in. To	89 ft.
			0 in. To	ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** EAGLE

Diameter	Slot/Gauze	Length	Set	
4 in.	16	7 ft.	82 ft.	89 ft.

Static Water Level
20 ft. land surface Measure 08/07/2008

Pumping Level (below land surface)
75 ft. 2 hrs. Pumping at 17.5 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MERRIL Model SPK
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	50 ft.

Nearest Known Source of Contamination
22 feet West Direction Sewer Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/10/2008
Manufacturer's name GRUNDFOS
Model Number HP 0.5 Volt 230
Length of drop pipe 60 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger)-white Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 335293 Y 4999023
Unique Number Verification Info/GPS from data Inpute Date 09/16/2008

Angled Drill Hole

Well Contractor
Dons Pump and Well Service 1451 MEULEBROECK,
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

771198

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/27/2013
Update Date 06/16/2016
Received Date 04/21/2010

Well Name	Township	Range	Dir	Section	Subsection
MW-4 CITY OF	119	35	W	8	DDDACC

Elevation 1123 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 1ST AV NW WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	2	BLACK	MEDIUM
TOPSOIL CLAY	2	4	BLACK	MEDIUM
CLAY & SILT	4	6	BLK/BRN	SOFT
CLAY SILT FINE SAND	6	8	BROWN	SOFT
WET FINE SANDY CLAY	8	10	BRN/GRY	SOFT
WET SAND SILT	10	16	GRAY	SOFT
SAND & SILT	16	18	GRAY	SOFT

Remarks

CASING PROTECTION: PROTOP W/ POSTS
SEALED 11-14-2011 BY 1337; PREVIOUS USE: MW

Well Depth 18 ft. **Depth Completed** 14.5 ft. **Date Well Completed** 04/02/2010

Drill Method Auger (non-specified) **Drill Fluid**

Use monitor well **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☒ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
2 in. To	4.5 ft.	0.69 lbs./ft.		8.2 in. To	14.5 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** TIMCO

Diameter	Slot/Gauze	Length	Set	
2 in.	10	10 ft.	4.5 ft.	14.5 ft.

Static Water Level
5 ft. land surface Measure 04/02/2010

Pumping Level (below land surface)
ft. hrs. Pumping at g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☒ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	0.5	Sacks	3 ft.	3.5 ft.
neat cement	1	Sacks	ft.	3 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat sand+silt-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 336046 Y 4999071
Unique Number Verification Site Plan Inpute Date 06/16/2016

Angled Drill Hole

Well Contractor

Thein Well Co., Inc.	1337	HILBRANDS, B.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

778923

County Kandiyohi
Quad Solomon
Quad ID 127A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/06/2011
Update Date 06/16/2016
Received Date 12/27/2010

Well Name	Township	Range	Dir	Section	Subsection
QUAM, DAVID	119	35	W	7	DDDDCA

Elevation 1126 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 4578 1ST AV W WILLMAR MN 56201

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	12	YELLOW	SOFT
CLAY	12	206	BLUE	SOFT
CLAY	206	240	BLACK	HARD
SAND	240	260	GRAY	SOFT

Remarks

Well Depth 260 ft. **Depth Completed** 260 ft. **Date Well Completed** 09/30/2010

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
5 in. To 255 ft. 2.9 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
5 in.	10	5 ft.	255 ft.	260 ft.

Static Water Level
15 ft. land surface Measure 09/30/2010

Pumping Level (below land surface)
40 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model BULLDOG
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Material	Amount	From	To
bentonite		0 ft.	100 ft.

Nearest Known Source of Contamination
90 feet Northeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name SCHAEFER
Model Number HP 0.5 Volt 115
Length of drop pipe ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 334465 Y 4999028
Unique Number Verification Address verification Inpute Date 09/11/2015

Angled Drill Hole

Well Contractor
Marcus Water Well Co., Inc. 1437 MARCUS, C.
Licensee Business Lic. or Reg. No. Name of Driller

Appendix J – Wetland Assessment and Two-Part Finding

WETLAND ASSESSMENT & TWO PART FINDING

County: Kandiyohi
Watershed: Minnesota River - Granite Falls (No. 25)

WETLAND ASSESSMENT
The Wetland Assessment is attached (**Table 1**).

AVOIDANCE ALTERNATIVES
Several alternatives, including the No Build, were analyzed for the BNSF railway and the TH 12 realignment. These alternatives had varying levels of wetland impacts, which are summarized in the attached **Table 2**. Due to the size of the various project alternative locations, a wetland delineation was not conducted for each one. The National Wetlands Inventory was used to assist in estimating wetland impacts where field delineation data were not available. Each alternative that was reviewed is summarized below. Detailed descriptions of each alternative are available in Section III of the main document.

No Build Alternative:

Under the No Build Alternative, the proposed Willmar rail connection and industrial access connection would not be constructed and there would be no modifications to the local, regional and state transportation network. Instead, BNSF would continue to switch trains between the Morris and Marshall Subdivisions within the downtown Willmar Terminal. This would continue to perpetuate delays in regional and local railway service and limit opportunities to park trains for longer durations. Trains switching between the subdivisions would continue to occupy existing at-grade railway crossings within and approaching the Willmar Terminal resulting in continued delay and detouring of travel routes for motorized and non-motorized users, including emergency responders and school buses, which have time-sensitive travel. Unpredictability of train delays (not knowing if it is a switching train or a through train) would also be perpetuated.

Quality of life beyond transportation delays would continue to decrease within downtown Willmar. Due to the idling of trains and motorized vehicles, emissions would continue and likely increase in the future when train traffic increases. Additionally, opportunities to serve the new industrial park with rail service which is a key component of the city's planned economic development would be impractical and cost prohibitive.

Other Alternatives

Alternative 1 (RR1): Connection West of CSAH 55 on Existing MnDOT Right of Way

Alternative 1 involved the use of some MnDOT Right of Way that was no longer needed by MnDOT to construct the new BNSF rail line. This alternative would have kept switching trains out of the Willmar Terminal and would reduce the number of trains at at-grade crossings. The total amount of wetland impact that would have resulted

from this alternative was approximately 13.77 acres. In addition to the amount of wetland impact, the disadvantage of this alternative was that its proximity to the industrial park was not ideal and would have resulted in the need for additional railway service to that area. In addition, the transportation network between key local and regional destinations would be broken. For these reasons, Alternative 1 was rejected.

Alternative 2 (RR2): Loop Track East of Willmar Terminal

Alternative 2 created a loop track east of the Willmar Terminal. It would have been created on agricultural land west of US Highway 71 and north of the Wayzata Subdivision. This alternative would have resulted in 0.47 acre of wetland impact. The disadvantages of this alternative were that it would not provide access to the industrial park and would not reduce the train trips into downtown Willmar that ultimately delay traffic. Because Alternative 2 did not address all of the defined project needs, it was rejected.

Alternative 3 (TH12-1, RR3): Bridge on Existing TH 12 alignment, Railroad Connection East of CSAH 55

The Alternative 3 roadway alignment would have involved reconstruction of the existing TH 12 to accommodate a railway grade separation and would have included the following elements:

- reconstruction of TH 12 from 7th Ave West to approximately 1 mile to the east,
- raising TH 12 in the reconstructed area up on retaining walls to accommodate the new railway connection (maximum wall height would be 40 feet),
- construction of a skewed steel bridge on TH 12 over the new railway line,
- raising and reconstructing the TH 40 and CSAH 55 intersection to provide a grade-separated crossing for TH 40 over the proposed railway,
- realignment of CSAH 55 from south of the western leg of 1st Ave West to US 12,
- reconfiguration of the CSAH 55 and 1st Ave West intersection,
- disconnection of 45th Street NW south of TH 12 and construction of a cul-de-sac,
- construction of a new driveway off of CSAH 55 to the mini storage site,
- disconnection of 45th Street NW north of TH 12 and realigned with the new CSAH 55 intersection south of TH 12, and
- crossing of Hawk Creek (County Ditch 10).

Alternative 3 would have resulted in 10.72 acres of wetland impacts. Alternative 3 was rejected for various reasons, which are summarized below:

- wetland impacts associated with Alternative 3 were higher than other potential alternatives,
- the height of the raised TH 12 alignment and bridge raised safety concerns, particularly during winter when strong winds could cause visibility and ice issues, and
- the skewed bridge and retaining walls would increase maintenance and operations costs.

Alternative 4 (TH12-2, RR-3, CSAH 55/1st Ave-1): 1st Avenue At-Grade Railroad Crossing and TH 12/CSAH 55 Quadrant Interchange

Alternative 4 was very similar in design to the preferred alternative, but included an at-grade crossing of 1st Avenue at the proposed railway, raised TH 12 over CSAH 55, and created a quadrant interchange at TH12 and CSAH 55. This alternative would have resulted in 9.40 acres of wetland impact. The disadvantages of this alternative were that it would have involved an at-grade crossing of the proposed railroad at 1st Avenue. Because of the safety concerns related to at-grade railroad crossings, this alternative was rejected.

Alternative 5 (TH12-2, RR-3, CSAH 55/1st Ave-2) – 1st Avenue At-Grade Railroad Crossing and TH 12/CSAH 55 At-Grade Intersection

Alternative 5 was very similar in design to the preferred alternative, but included an at-grade crossing of the proposed railroad at 1st Avenue and an at-grade crossing at the intersection of TH 12 and CSAH 55. This alternative would have resulted in 10.34 acres of wetland impact. The disadvantages of this alternative were that it would have involved an at-grade crossing of the proposed railroad at 1st Avenue. Because of the safety concerns related to at-grade railroad crossings, this alternative was rejected.

Various sub-options were evaluated for each alternative (e.g., crossing alternatives and industrial park access routes), but none would have significantly affected the overall wetland impacts, so are not discussed in detail here.

MINIMIZATION MEASURES

In order to minimize impacts to wetlands, the northwest portion of the preferred TH 12 roadway realignment was shifted to the east approximately 1,000 feet in order to avoid crossing the largest spans of wetland in that area. This shift in alignment reduced the wetland impacts from the preferred alternative by approximately 3 acres. In addition to this alignment shift, the BNSF rail line cross sections include 2:1 side slopes in order to minimize impacts to wetlands.

WETLAND IMPACTS

The preferred alternative includes a new BNSF rail line east of CSAH 55 and the realignment of TH 12 from approximately the intersection of TH 12 with 7th Avenue West south to a new intersection with CSAH 55 about 1,400 feet south of 1st Avenue West and reconnecting with the existing TH 12 at Airport Drive West. The existing 1st Avenue West and CSAH 55 intersection will be closed and 1st Avenue West will be removed between CSAH 55 and the new railway. A new roadway located east of the proposed railway will provide access into the industrial park from 1st Avenue West. Grade-separated crossings will be constructed over the new BNSF rail line at TH 12 and TH 40. A full description of the preferred alternative is available in the main document, in **Section III.B.2**.

Various project elements contribute to the wetland impacts that result from this alternative, which are shown on the attached **Table 3**. These project elements are

caused by construction associated with MnDOT, BNSF, and Kandiyohi County projects. Wetland impacts caused by the preferred alternative total 10.67 acres.

COMPENSATION (REPLACEMENT/ENHANCEMENTS)

It is anticipated that wetland impacts resulting from this project will be replaced at a 2:1 ratio, for a total of approximately 21.34 acres of replacement. This replacement will be achieved through the use of the MnDOT Road Bank for impacts that are associated with the TH 12 realignment and improvements along TH 40, and through the purchase of wetland credits from a US Army Corps-Approved wetland bank for impacts resulting from both the BNSF rail line.

The specific siting of the wetland banks will be determined during permitting, but will be required to follow the Wetland Conservation Act siting requirements. These requirements call for wetland replacement to be provided in the following priority order:

(1) onsite, or within the same minor watershed as the impacted wetlands;
(2) in the same watershed as the impacted wetlands;
(3) in the same county or wetland bank service area (BSA) as the impacted wetland; and
(4) in another wetland bank service area.

Based on current bank data from the Board of Water and Soil Resources, there are no banks available within the same minor or major watershed as the project. There is one bank available within Kandiyohi County, but it has minimal credits available. Several banks are available within the same bank service area as the project (BSA 9). Therefore, it is anticipated that mitigation will come from banks that meet siting criteria (3). If at the time the permit application is submitted no banks are available that meet siting criteria (3) and a bank in another service area must be used, the replacement ratio will increase to 2.5:1.

The proposed wetland replacement options are described below.

WETLAND REPLACEMENT OPTIONS	
	All Wetlands
Location	TBD
onsite, offsite	Offsite
Classification	TBD
Approx. Size, acres	21.34
Topographic setting	TBD
Method of construction	N/A
Timetable	In-advance

CONCLUSION

Based upon the above factors and considerations, it is determined that there is no practicable alternative to the proposed construction in the identified wetlands, and the proposed action includes all practicable measures to minimize harm to the wetlands.

ATTACHMENTS

Table 1a – Preferred Alternative Wetland Assessment
Table 1b –Preferred Alternative Wetland Assessment
Table 2 – Wetland Avoidance Alternatives
Table 3 – Preferred Alternative Wetland Impacts
Figure A-E – Preferred Alternative Impact Figures

Table 1a: Willmar Preferred Alternative Wetland Assessment

WETLAND ASSESSMENT											
	ID # 3	ID # 4	ID # 5	ID # 6	ID # 7	ID # 9	ID # 10	ID # 15	ID # 16	ID # 18	ID # 19
Classification (Type of wetland)	Type 3	Type 3	Type 3	Type 3	Type 2	Type 1	Type 1	Type 1/2/6	Type 2	Type 2	Type 1
Approx. Basin Size, acres	1.80	0.49	31.70	0.38	0.52	0.39	0.35	26.43	4.80	0.66	2.13
Anticipated Encroachment Size, acres	1.235	0.003	2.089	0.099	0.058	0.275	0.010	1.128	0.250	0.033	0.837
Type of Impact: fill, excavation, drain	Fill	Fill	Fill	Fill	Fill	Cut	Fill	Fill, Cut	Fill	Fill	Fill
% Encroachment to Basin Size	68.61	0.61	6.59	26.05	11.15	70.51	2.86	4.27	5.21	5.00	3.93
Protected wetland? Y/N	N	N	N	N	N	N	N	N	N	N	N
Connection to other wetlands? Y/N	N	N	Y	Y	Y	Y	Y	N	N	N	N
Impacts to public water supply? Y/N	N	N	N	N	N	N	N	N	N	N	N
Water Quality impacts? ----recharge/discharge ----water pollution ----flooding ----sedimentation ----erosion	N	N	N	N	N	N	N	N	N	N	N
Impacts to fish/wildlife & habitat?	N	N	N	N	N	N	N	N	N	N	N
Impacts to recreational, cultural, or scientific uses?	N	N	N	N	N	N	N	N	N	N	N

Table 1b: Willmar Preferred Alternative Wetland Assessment

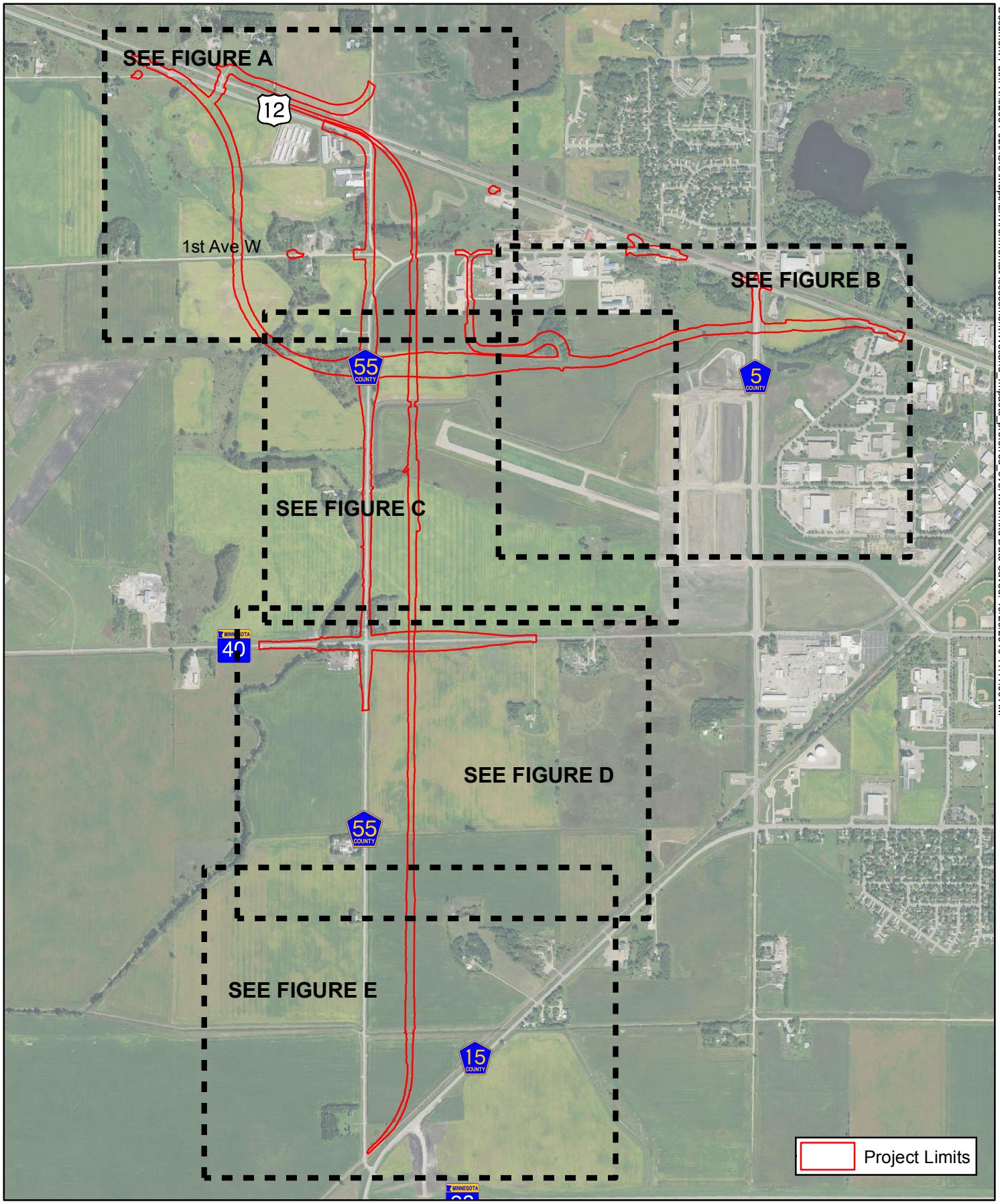
WETLAND ASSESSMENT – Preferred Alternative											
	ID # 20	ID # 21	ID # 22	ID # 24	ID # 32	ID # 33	ID # 34	ID # 35	ID # 36	ID # 38	ID # 39
Classification (Type of wetland)	Type 1	Type 2	Type 1/6	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 1	Type 2
Approx. Basin Size, acres	3.10	0.37	0.36	0.07	7.60	1.13	0.38	17.15	0.90	0.48	0.52
Anticipated Encroachment Size, acres	0.370	0.364	0.251	0.023	1.099	0.018	0.189	1.951	0.008	0.356	0.030
Type of Impact: fill, excavation, drain	Fill	Fill, Cut	Cut	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
% Encroachment to Basin Size	11.94	98.38	69.72	32.86	14.46	1.59	49.74	11.38	0.89	74.17	5.77
Protected wetland? Y/N	N	N	N	N	N	N	N	N	N	N	N
Connection to other wetlands? Y/N	N	N	N	N	N	N	N	N	N	N	N
Impacts to public water supply? Y/N	N	N	N	N	N	N	N	N	N	N	N
Water Quality impacts? ----recharge/discharge ----water pollution ----flooding ----sedimentation ----erosion	N	N	N	N	N	N	N	N	N	N	N
Impacts to fish/wildlife & habitat?	N	N	N	N	N	N	N	N	N	N	N
Impacts to recreational, cultural, or scientific uses?	N	N	N	N	N	N	N	N	N	N	N

Table 2: Willmar Wetland Avoidance Alternatives

AVOIDANCE ALTERNATIVES – Anticipated Encroachment per Alternative, acres						
	No Build Alternative	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5
Wetland ID # 1	0	0	0	0	0	0
Wetland ID # 3	0	0	0	0.644	1.240	1.240
Wetland ID # 4	0	0	0	0	0.003	0.003
Wetland ID # 5	0	6.086	0	1.703	2.012	2.078
Wetland ID # 6	0	0.109	0	0	0.099	0.099
Wetland ID # 7	0	0.056	0	0	0.059	0.066
Wetland ID # 9	0	0	0	0.097	0.275	0.275
Wetland ID # 10	0	0	0	0.034	0.066	0.010
Wetland ID # 15	0	0	0	1.498	1.129	1.162
Wetland ID # 16	0	0	0	1.325	0.082	0.087
Wetland ID # 19	0	0	0	0.105	0.422	0.731
Wetland ID # 20	0	0	0	0.911	0.006	0.293
Wetland ID # 21	0	0	0	0.102	0.083	0.381
Wetland ID # 22	0	0	0	0	0.250	0.252
Wetland ID # 24	0	0	0	0	0	0.023
Wetland ID # 32	0	0	0	1.057	1.102	1.099
Wetland ID # 33	0	0	0	0	0.018	0.018
Wetland ID # 34	0	0	0	0.387	0.212	0.189
Wetland ID # 35	0	0	0	1.853	1.961	1.950
Wetland ID # 36	0	0	0	0.001	0.004	0.006
Wetland ID # 38	0	0	0	0.278	0.343	0.346
Wetland ID # 39	0	0	0	0.030	0.030	0.030
Wetland ID # 40	0	0.087	0	0	0	0
Wetland ID # 41	0	0.145	0	0	0	0
NWI Wetland # 1	0	5.043	0	0	0	0
NWI Wetland # 2	0	1.480	0	0	0	0
NWI Wetland # 3	0	0.398	0	0	0	0
NWI Wetland # 4	0	0.362	0	0	0	0
NWI Wetland # 5	0	0	0.473	0	0	0
Total, acres	**0**	**13.770**	**0.473**	**10.718**	**9.395**	**10.34**

Table 3: Willmar Preferred Alternative Wetland Impacts

WETLAND IMPACTS - Preferred Alternative										
	Anticipated Encroachment per Type of Wetland, acres									Total
	1	1L	2	3	4	5	6	7	8	
Wetland ID # 3				1.235						1.235
Wetland ID # 4			0.003							0.003
Wetland ID # 5			2.089							2.089
Wetland ID # 6	0.099									0.099
Wetland ID # 7	0.058									0.058
Wetland ID # 9	0.275									0.275
Wetland ID # 10	0.010									0.010
Wetland ID # 15							1.128			1.128
Wetland ID # 16			0.250							0.250
Wetland ID # 18			0.033							0.033
Wetland ID # 19	0.837									0.837
Wetland ID # 20	0.370									0.370
Wetland ID # 21			0.364							0.364
Wetland ID # 22							0.251			0.251
Wetland ID # 24	0.023									0.023
Wetland ID # 32	1.099									1.099
Wetland ID # 33	0.018									0.018
Wetland ID # 34	0.189									0.189
Wetland ID # 35	1.951									1.951
Wetland ID # 36	0.008									0.008
Wetland ID # 38	0.356									0.356
Wetland ID # 39	0.030									0.030
Total	**5.323**	**0.000**	**2.739**	**1.235**	**0.000**	**0.000**	**1.379**	**0.000**	**0.000**	**10.674**



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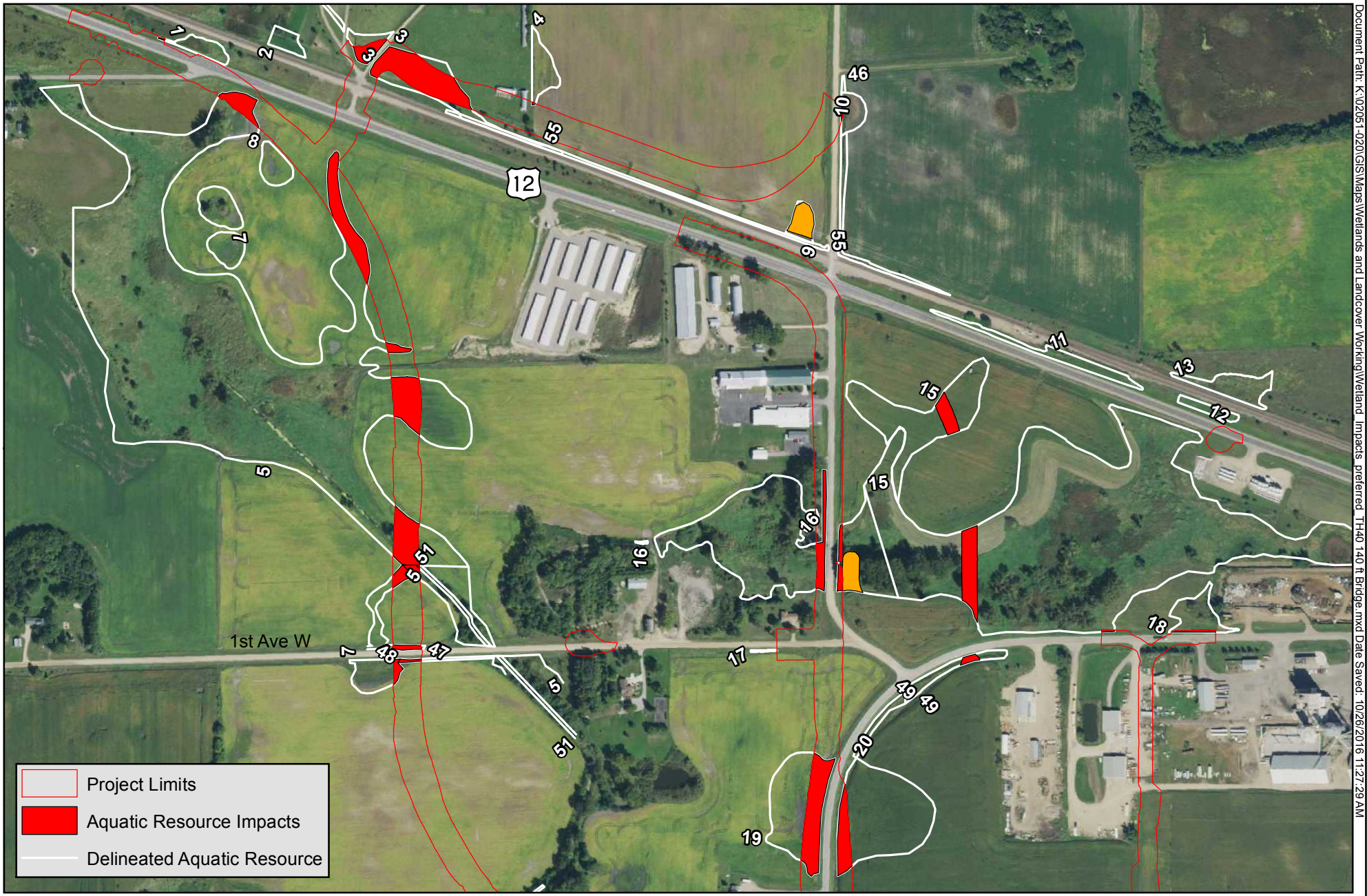
MINNESOTA DEPARTMENT OF TRANSPORTATION

Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure A-E Overview: Aquatic Resource Impacts
Willmar, MN

N

0 1,000 Feet



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Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure A: Aquatic Resource Impacts
Willmar, MN

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Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure B: Aquatic Resource Impacts
Willmar, MN

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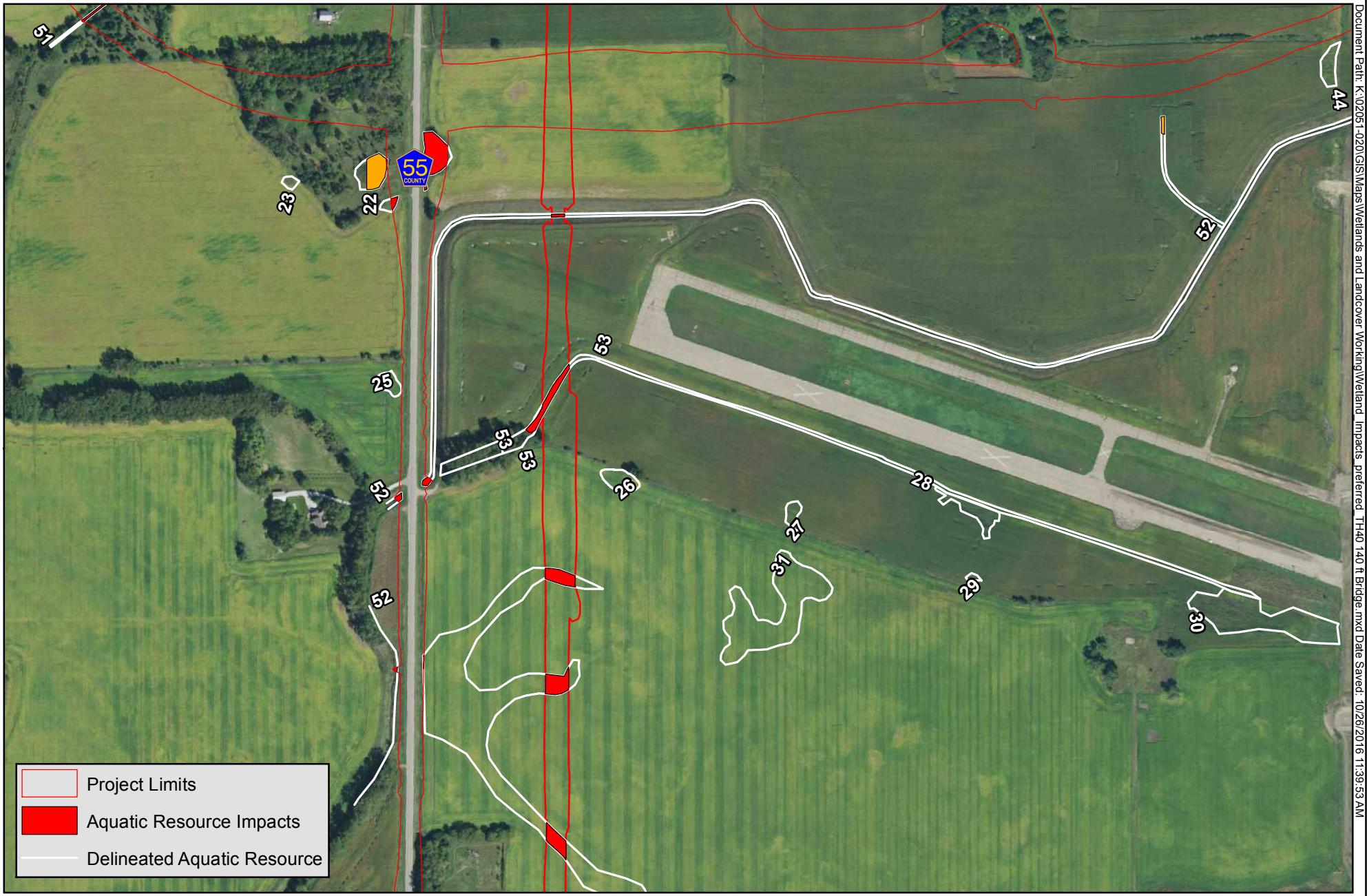
0 500 Feet



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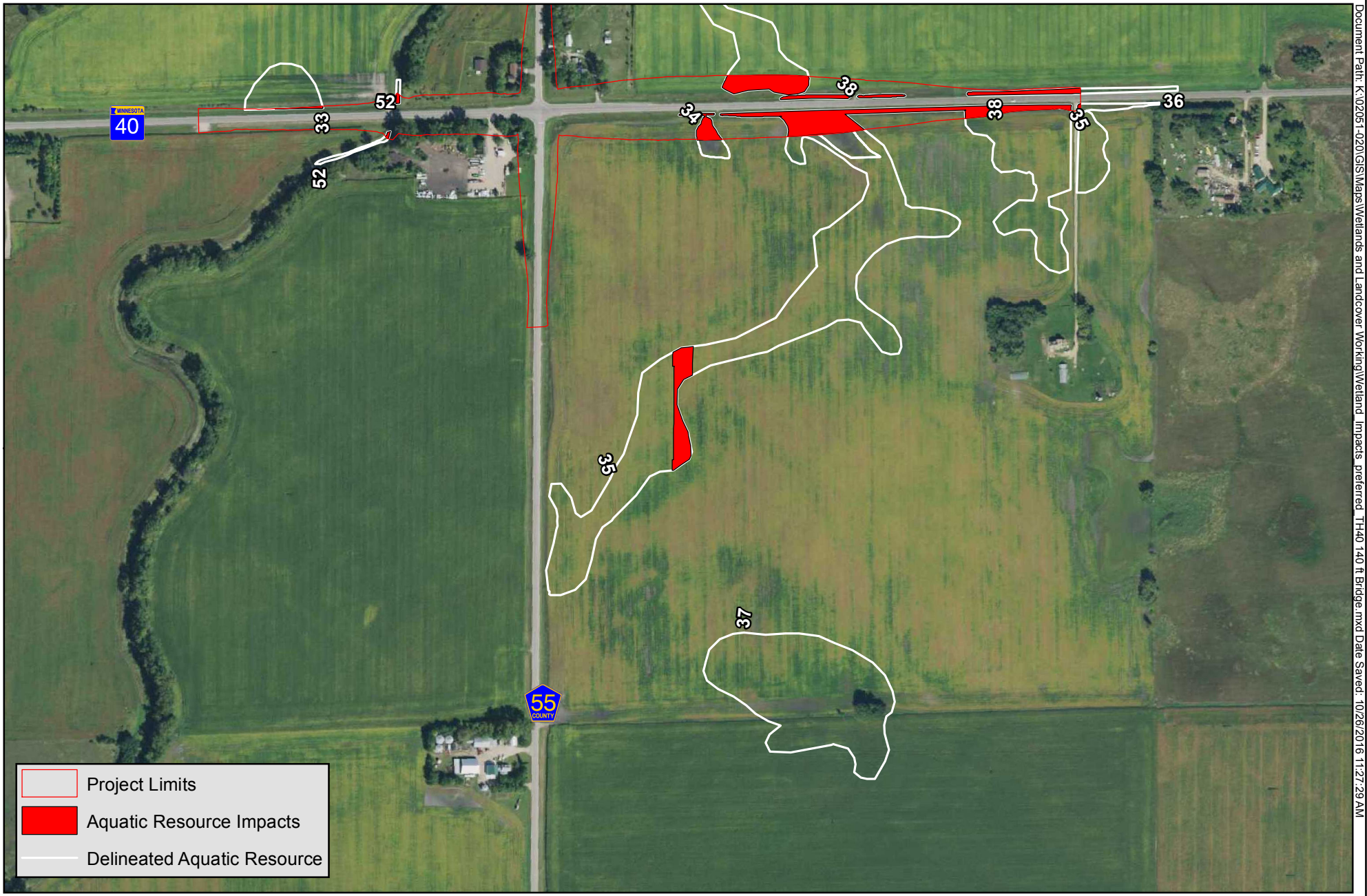
Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure C: Aquatic Resource Impacts
Willmar, MN

N

0 500 Feet



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Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure D: Aquatic Resource Impacts
Willmar, MN

N

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Willmar Rail Connector & Industrial Access Project
S.P. 3403-74
Figure E: Aquatic Resource Impacts
Willmar, MN

N

0 500 Feet

Appendix K – DNR Correspondence

Andy Hingeveld

From: Jack Corkle
Sent: Monday, April 25, 2016 3:02 PM
To: Andy Hingeveld
Subject: FW: DNR Comments on MnDOT Early Notification Memo, TH12 to TH23 'Willmar Wye' project (SP3403-74) Kandiyohi Co
Attachments: Original BNSF Concept Layout.pdf; Project Location Map.pdf; Early Notification Memo_Original BNSF Concept.doc; VE Alternative Layout.pdf; Early Notification Memo_VE Alternative.doc; April 2014 NHIS review.pdf; posk FactSheet(USFWSOct2014).pdf; AES.pdf; DNRbasemap.pdf; Transplanting (from Chapter 1).pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Jack
763-231-4871

From: Leete, Peter (DOT) [mailto:peter.leete@state.mn.us]
Sent: Monday, April 25, 2016 12:36 PM
To: Rasmussen, Paul (DOT)
Cc: Smith, Christopher E (DOT); Graeve, Kenneth M (DOT); Joyal, Lisa (DNR); Mixon, Kevin (DNR); Gelvin-Innvaer, Lisa A (DNR); Sarah.E.wingert@usace.army.mil; Straumanis, Sarma (DOT); Moynihan, Debra (DOT); Jenzen, Ethan (DNR); Coahran, Dave A (DNR); Jack Corkle; Pederson, Nathan A (DOT); Netland, Cory (DNR)
Subject: DNR Comments on MnDOT Early Notification Memo, TH12 to TH23 'Willmar Wye' project (SP3403-74) Kandiyohi Co

Paul,
This email is the DNR response for your project records. The following comments are based on information provided in the submitted documents regarding the proposed reconstruction of the connection between TH12 and TH23 on the west side of the City of Willmar. The project was also reviewed separately as a BNSF railroad connection project and is known as the 'Willmar Wye Project'. Previous comments on the railroad portion of the project are still valid (see April 2004 NHIS review), though are expanded here to include the associated highway work. Please consider the following comments as final designs and special provisions are developed:

1. The project crosses Hawk Creek. This stream is an altered natural watercourse that appears on Public Waters maps, though is also under the jurisdiction of the local ditch authority. This is identified as a dashed line on Public Waters Inventory maps and on the attached DNRbasemap.pdf. The local ditch authority is the primary regulatory authority for design requirements. However the DNR does keep an eye on these crossings and may have design suggestions since full authority would revert to the DNR should the ditch authority abandon the watercourse. If changes to the course current or cross-section of the river are proposed, please let me know.

2. Please remind contractors that a separate water use permit is required for withdrawal of more than 10,000 gallons of water per day or 1 million gallons per year from surface water or ground water. GP1997-0005 (temporary water appropriations) covers a variety of activities associated with road construction and should be applied of if applicable. An individual appropriations permit may be required for projects lasting longer than

one year or exceeding 50 million gallons. Information is located at: http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/permits.html

3. The Minnesota Natural Heritage Information System (NHIS) has been queried to determine if any rare plant or animal species, native plant communities, or other significant natural features are known to occur within an approximate one-mile radius of the project area. There were seven rare features identified in this query. In order to prevent the inadvertent release of the location of specific listed or rare species contained in the NHIS, I have not identified the species or their location on the attached 'DNRbasemap.pdf'. If these details are needed for documentation, please contact me. Please note that the following rare features were identified in the query and *may* be impacted by the proposed project. Suggested avoidance and/or protection measures are also identified:

   a. The butterfly Powesheik Skippering (Oarisma poweshiek) was sighted in 1981 between TH23 and the railroad a few hundred yards near the south end of project limits. Today this species is listed as 'Endangered' on both State and Federal Threatened and Endangered Species. USFWS does not list this area as a critical habitat area. However, re-vegetation of the project area should include native vegetation beneficial to their use (in the remote chance they are still in the area).

      From the attached USFWS infosheet: Adult butterflies feed on nectar from prairie flowers such as purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*) and palespike lobelia (*Lobelia spicata)*. Because limited research has been done on the Poweshiek skipperling, we are not certain which plant species are necessary for the larvae to develop, although we know they select native, fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseeed (*Sporobolus heterolepis*).

      More info is in the DNR Rare Speices guide: http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEP57010

   b. Another rare butterfly was identified as being in the same area as the Powesheik Skippering. The Regal Fritillary (Speyeria idalia), is listed as a species of Special Concern. What little is known about the life cycle of this species is located on the DNR rare species guide; http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPJ6040. Though it is known that Larvae feed only on violets (*Viola* spp.). Seeds mix composition should include Prairie Violet (*Viola palmata var.pedatifida*).

   c. Small White Lady's-slipper (Cypripedium candidum) has also been observed in area to the west of the junction of CR55 and TH23. This is listed as a species of Special Concern. It is not known if any populations are in the project area. Though as part of any vegetative review, this species should be noted if present. When known orchid populations are in areas to be disturbed, we encourage they be transplanted to other public lands. It may be possible to move any known plant to the nearby Wildlife Management Areas at the north end of the project. Guidelines for this are attached.

   d. At the north and south ends of the project area, there are segments of remnant native prairie in the railroad right of way. This is adjacent to MnDOT right of way. The quality of this area is considered to be 'Fair' (see attached DNRbasemap.pdf). It is possible that the adjacent MnDOT right of way also contains similar quality prairie remnants. The concern along these segments is that soil disturbance, incidental herbicide exposure, hydrologic alterations, competition from non-native, sod forming grasses, or shading by encroaching shrubs can all lead to degradation of the site. These areas should be identified as 'Area of Environmental Sensitivity' on plans. See the attached AES best practices guidance. The concern along this segment is that soil disturbance, incidental herbicide exposure, hydrologic alterations, tree disturbance, competition from non-native, sod-forming grasses, introduction of weed seeds, or shading by encroaching shrubs can all lead

to degradation of these sites. The attached guidance is based on your spec 2572.3, and includes protection measures of areas such as these.

- Design the project to avoid impacts to any identified Area of Environmental Sensitivity.
- Protect and preserve vegetation from damage in accordance with MnDOT Spec 2572.3
- Prohibit vehicle and construction activities, including the location of field offices, storage of equipment and other supplies at least 25 feet outside the Area of Environmental Sensitivity to be preserved, also in accordance with MnDOT spec 2572.3
- Redundant sediment/erosion control Best Management Practices (BMP's) may be required for protection of areas of environmental sensitivity.
- Revegetation of disturbed soils should include native mixes in areas that are not proposed for mowed turf grass. Please utilize the native recommendations developed by BWSR (http://www.bwsr.state.mn.us/native_vegetation/) or MnDOT' in the 'Vegetation Establishment Recommendations' – dated November 13, 2015 (http://www.dot.state.mn.us/environment/erosion/seedmixes.html). Please contact your Districts representatives for the Erosion Control & Stormwater Management Unit, Roadside Vegetation Management Unit, and the Districts Maintenance staff to help determine appropriate permanent revegetation plans.
- Additionally, the use of erosion control blanket should be limited to 'bio-netting' or 'naturalnetting' types (category 3N or 4N), and specifically not allow plastic mesh netting.

e. The northern long-eared bat (*Myotis septentrionalis*), federally listed as threatened and state-listed as special concern, can be found throughout Minnesota. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark, in cavities, or in crevices of both live and dead trees. Pup rearing is during June and July. Activities that may impact this species include, but are not limited to, any disturbance to hibernacula and destruction/degradation of habitat (including tree removal).

The U.S. Fish and Wildlife Service (USFWS) has published a final 4(d) rule that identifies prohibited take. To determine whether you need to contact the USFWS, please refer to the USFWS Key to the Northern Long-Eared Bat 4(d) Rule (see links below). Please note that the NHIS does not contain any known occurrences of northern long-eared bat roosts or hibernacula within an approximate one-mile radius of the proposed project.

Links: USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Non-Federal Activities
http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEB.html
USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions
http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html
USFWS Northern Long-eared Bat Website
http://www.fws.gov/midwest/endangered/mammals/nleb/index.html
USFWS Northern Long-eared Bat Fact Sheet
http://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

The NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. If information becomes available indicating additional listed species or other rare features, further review may be necessary.

4. Two wildlife management areas (Rau Prairie Pothole WMA and Gopher Ridge WMA) are located along TH12 (see the attached DNRbasemap for locations). Typically the concern when working adjacent to these areas is that invasive species not be introduced with any fill or seed mixes. If there is soil disturbance in areas adjacent to the WMA, revegetate disturbed soils with native species suitable to the local habitat. For recommended seed mixes see the MnDOT vegetation establishment recommendations for native mixes dated November 13,

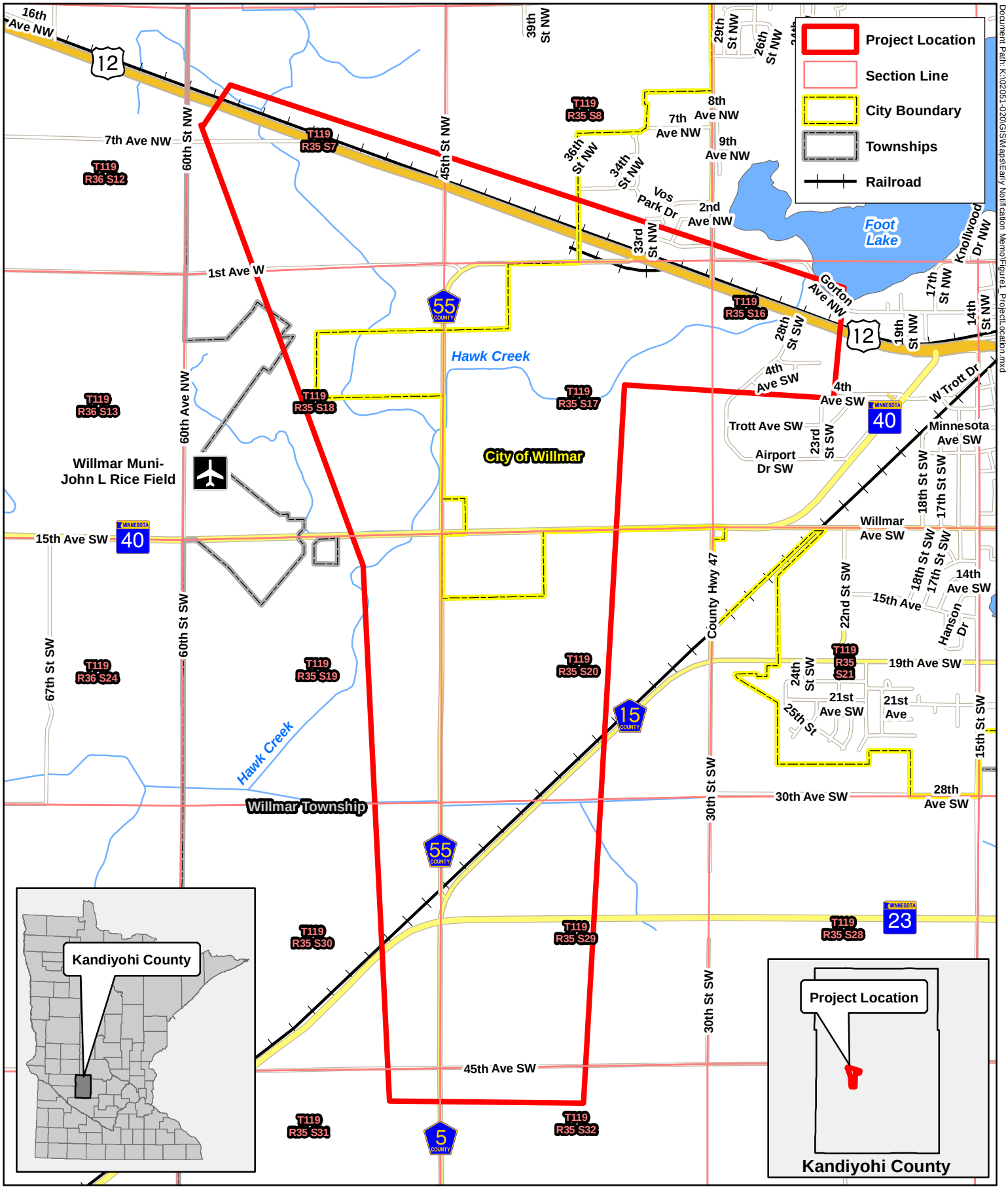
2015. http://www.dot.state.mn.us/environment/erosion/pdf/d4seed.pdf. For folks not familiar with these mixes, they are the same as the BWSR mixes : http://www.bwsr.state.mn.us/native_vegetation/state_seed_mixes.pdf

5. Due to the vegetation concerns listed in #3 and #4 above, we recommend the entire project include native seed mix in order to connect the north and south railroad right of way prairie remnants for the reasons stated above.

Please include a copy of this email in any DNR license or permit application.

Contact me if you have questions

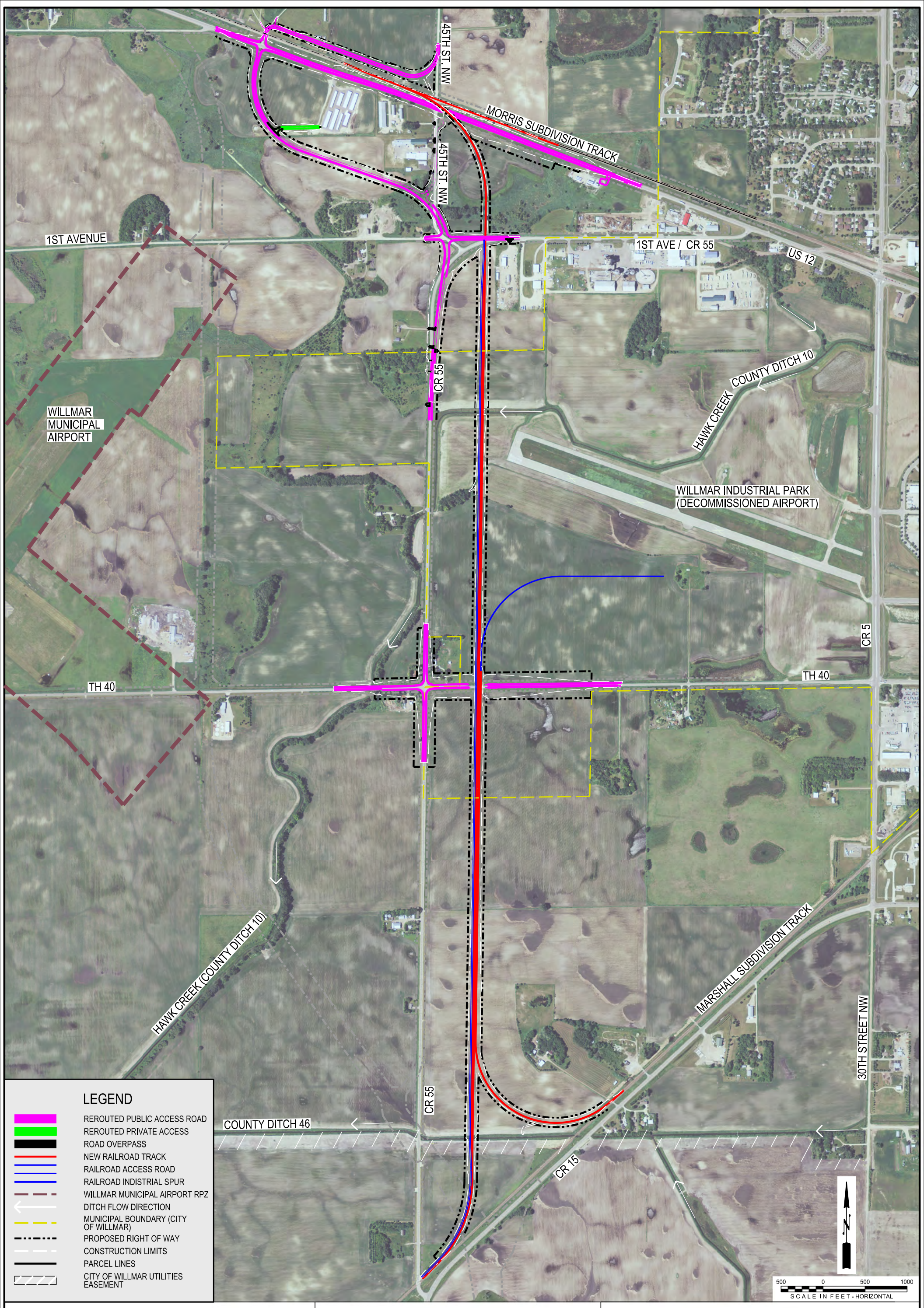
Peter Leete
Transportation Hydrologist (DNR-MnDOT Liaison)
DNR Ecological & Water Resources
Ph: 651-366-3634



Willmar Wye Project Location
S.P. 3403-74
Willmar, MN

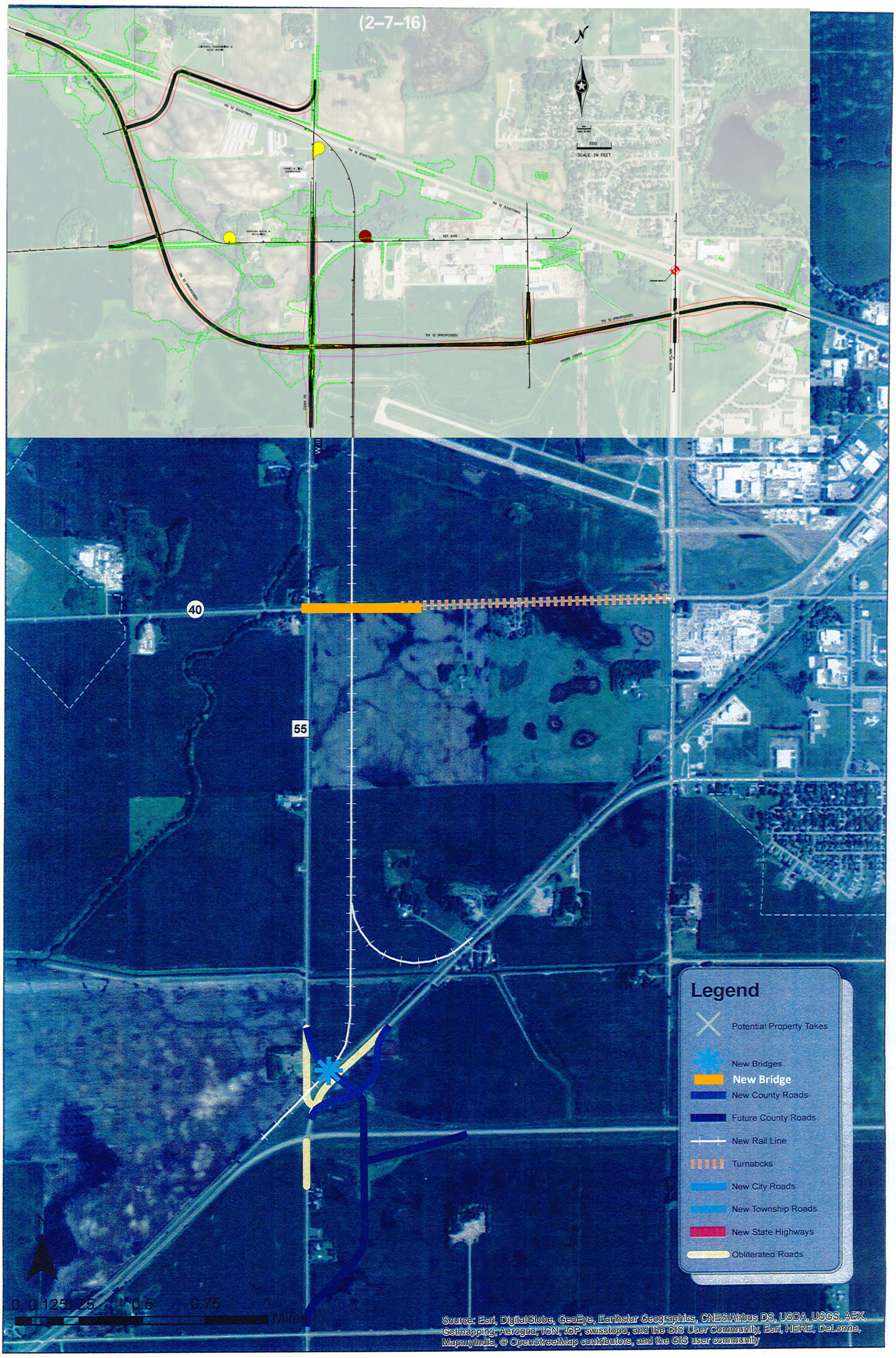
N

0 2,500 Feet



CATEGORICAL EXCLUSION WORKSHEET FOR TIGER APPLICATION - 2015	BNSF RAILWAY WILLMAR CONNECTION	FIGURE 4 KEY MAP

Willmar Wye VE Study Concept - DRAFT



Minnesota Department of Natural Resources
Division of Ecological and Water Resources, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-4025
Phone: (651) 259-5109 E-mail: lisa.joyal@state.mn.us

April 4, 2014 **Correspondence # ERDB 20140246**

Ms. Carole Peter
AECOM Technical Services
161 Cheshire Lane N, Ste. 500
Minneapolis, MN 55441

RE: Natural Heritage Review of the proposed BNSF Willmar Wye Connector, Kandiyohi County

Township (N)	Range (W)	Section(s)
119	35	7,8,17-20,29,30
119	36	12,13

Dear Ms. Peter,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, see the enclosed database reports; please visit the Rare Species Guide at http://www.dnr.state.mn.us/rsg/index.html for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following **rare features *may* be adversely affected** by the proposed project:

- The Minnesota Biological Survey (MBS) has identified native prairie remnants in the railroad right-of-way in T119N R36W Section 12 and in T119N R35W Section 30 (please see the enclosed map). The 1997 Minnesota State Legislature directed the DNR to conduct a field review of active railroad rights-of-way (ROW) to identify native prairie. The DNR surveyed 3240 miles of railroad ROW, of which 487 discontinuous miles of native prairie were identified. The prairie fragments were ranked *very good*, *good*, or *fair* based on the coverage of native prairie plant species, abundance of woody shrubs, and level of disturbance (such as herbicide use or equipment storage). Although the prairie remnants in the vicinity of the project area were only considered to be in fair condition, state-listed species have been documented within these remnants. Given that more than 99% of the prairie that was present in the state before settlement has been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem, we feel that all prairie remnants merit protection. Recognizing that the prairie remnants are outside of the proposed project area, we offer the following recommendations:

    - Avoid ground disturbance within the native prairie remnants,
    - Do not park equipment or stockpile supplies within the native prairie remnants,
    - Divert runoff away from the native prairie remnants
    - Revegetate disturbed soil with native prairie species immediately following construction, and
    - Use only weed-free mulches, topsoils, and seed mixes.

- Please include a copy of this letter in any DNR license or permit application.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. **If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.**

The enclosed results include an Index Report and a Detailed Report of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location information, which might result in the destruction of a rare feature, both reports are copyrighted.

The Index Report provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index report for any other purpose, please contact me to request written permission. **The Detailed Report is for your personal use only as it may include specific location information that is considered nonpublic data under *Minnesota Statutes*, section 84.0872, subd. 2. If you wish to reprint or publish the Detailed Report for any purpose, please contact me to request written permission.**

For environmental review purposes, the Natural Heritage letter and database reports are valid for one year; they are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

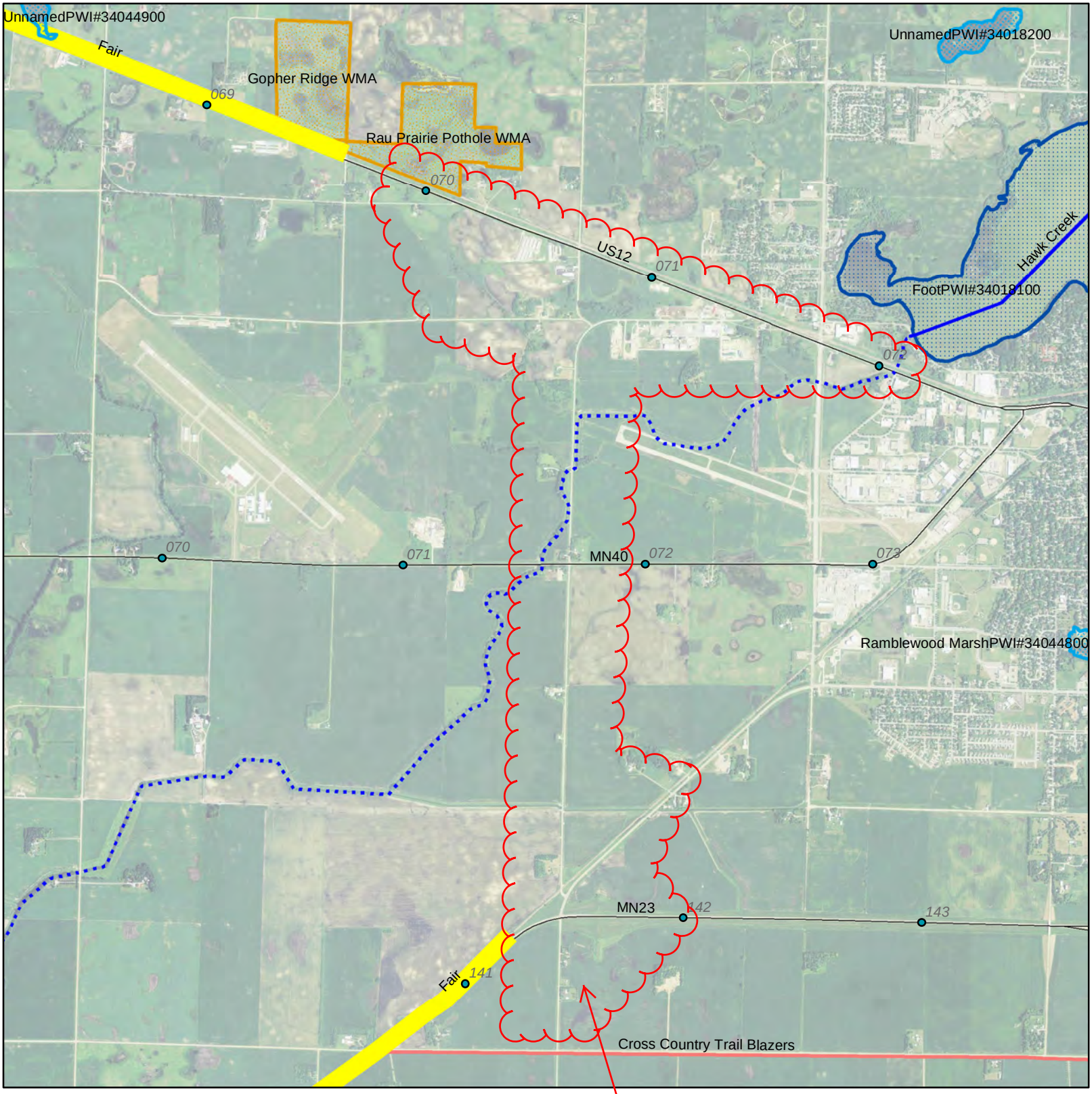
Sincerely,

Lisa Joyal

Lisa Joyal
Endangered Species Review Coordinator

enc. Rare Features Database: Index Report
Rare Features Database: Detailed Report
Rare Features Database Reports: An Explanation of Fields
Map

cc: Kevin Mixon



0 0.5 1 2 Miles

N

Approximate project study area

TH12 to TH23 Willmar Wye project (SP3403-74)

- RefPosts
- DNR Public Water - Watercourse
- DNR Public Water - Public Ditch/Altered Natural Watercourse
- DNR Public Water Lake (P)
- DNR Public Water Wetland (W)
- Railroad Right-of-Way Native Prairie Remnant (Fair)
- DNR Wildlife Management Area
- local Snowmobile Trail

Peter Leete, Transportation Hydrologist
(MnDNR-MnDOT Liaison)
Date: 4/25/2016

Poweshiek Skipperling

Oarisma poweshiek

The Poweshiek skipperling is listed as endangered under the Endangered Species Act. Endangered species are animals and plants that are in danger of becoming extinct. Identifying, protecting and restoring endangered species is a primary objective of the U.S. Fish and Wildlife Service's endangered species program.

Photo Courtesy of the Minnesota Zoo/Erik Runquist

The future of the Poweshiek skipperling may depend on captive propagation combined with reintroductions. This skipperling was reared at the Minnesota zoo.

What is the Poweshiek skipperling?

Appearance: The Poweshiek skipperling is a small butterfly with a wing-span of about 1 inch. It is dark brown above with some light orange along the wing margins and a lighter orange head. The underside of the wings, which can be seen when it's at rest, are dark to light brown with very prominent white veins that may make the wing look striped.

Habitat: Poweshiek skipperlings live in high quality tallgrass prairie in both upland, dry areas as well as low, moist areas. In Michigan they are found mainly in prairie fens, a type of wet prairie.

Reproduction: Poweshiek skipperling larvae (caterpillars) hibernate on the ground during winter; they resume activity in spring and continue developing until they pupate and emerge as adult butterflies between mid-June and mid-July. Adults have a short lifespan of only one to two weeks and during this time they mate and lay eggs. Larvae hatch during late summer; they feed and develop through early fall and then overwinter to continue development the following spring.

Feeding Habits: Adult butterflies feed on nectar from prairie flowers such as purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*) and palespike lobelia (*Lobelia spicata)*. Because limited research has been done on the Poweshiek skipperling, we are not certain which plant species are necessary for the larvae to develop, although we know they select native, fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseeed (*Sporobolus heterolepis*).

Range: Historically, Poweshiek skipperlings were found in tallgrass prairie and prairie fens from Manitoba to Iowa, with populations also found in Michigan and Wisconsin. Unfortunately, the range is now much less and has been declining for some time. The Poweshiek skipperling may have been extirpated from the Dakotas, Minnesota and Iowa within the last 10 years – an area that, until recently, contained the vast majority of the surviving populations. It is now known only from Wisconsin, Michigan and Manitoba. During surveys in 2014, the species could be found only at a few sites in a single Michigan county, in very limited numbers at one site in Wisconsin, and in Canada at the single Manitoba site.

Why is the Poweshiek skipperling an endangered species?

Habitat Loss and Fragmentation: Only about 4 percent of the original tallgrass native prairie in the United States remains. Much of what is left is in small, isolated sites, so the butterfly generally cannot move from site to site. If the Poweshiek skipperling is lost at a site, there are often no nearby populations to recolonize.

Habitat Management: In addition to the loss of large blocks of contiguous prairie, the native grasslands that remain are often not managed in ways that can support Poweshiek skipperlings. Historically, wildfire helped maintain the treeless nature of prairies. Today, grazing, haying and prescribed burns may replicate that effect. However, grazing or burning that is too intense, too frequent or conducted during the wrong time of the year may not create conditions suitable for the Poweshiek or may kill too many of the butterflies to sustain the population.

What is being done to conserve the Poweshiek skipperling?

Listing: Listing the Poweshiek skipperling as endangered under the Endangered Species Act will help focus attention and funds on the butterfly and the habitat that it needs to survive.

Research: We have limited information on the Poweshiek skipperling's life history and exact habitat requirements. Research is needed to determine land management regimes that will help this butterfly survive and provide information that may allow us to reintroduce it into formerly occupied habitats. A study is ongoing to understand the genetic diversity of surviving populations. This information will help us determine if management is needed to increase diversity of remaining populations and will help ensure any captive propagation will result in genetically robust populations. In addition, researchers are looking into potential causes for the sharp and widespread decline of the species that has occurred during the past 10 to 20 years.

Habitat Protection and Management: Where possible, high quality prairie and prairie fens need to be protected and appropriately managed. These may be publicly owned lands or they may be protected through easements and financial incentives on private lands. In light of the species' highly endangered status, its conservation in the wild may only be secured by placing a high priority on conserving remaining populations. Attempts are being made to develop methods to propagate the species in captivity, but it will be unusually difficult to keep in captivity. Therefore, conservation of the few remaining wild populations is extremely important. The Service will cooperate with conservation partners to control and remove invasive species, such as glossy buckthorn (*Frangula alnus*), and to undertake other actions that will alleviate threats to remaining populations and improve their viability.

What can I do to help prevent extinction of the species?

Spread the Word: Learn more about the Poweshiek skipperling and other rare and declining species. Understand how the destruction of habitat leads to loss our nation's plant and animal diversity. Tell others what you have learned.

Join: Join a conservation group; many have local chapters, or volunteer at a local nature center, zoo or National Wildlife Refuge.

Native plants: Provide habitat for butterflies by planting native vegetation in your yard. Avoid using invasive non-native plants like purple loosestrife and dame's rocket and remove invasive non-natives, like buckthorn and honeysuckle if they invade your yard.

Minimize: Use as little herbicide, insecticide and fertilizer as possible or avoid pesticides and insecticides entirely. Pesticides may harm butterflies and other pollinators and, along with fertilizers, can harm water quality.

www.fws.gov/midwest/endangered
October 2014

Transplanting Wildflowers and Other Plants
(Plants Protected by Minnesota Statutes 2003, Chapter 18H.18)

(Prepared by Janet Boe, DNR NW Regional Plant Ecologist; Larry Puchalski and Bob Jacobson, DOT Botanists; and Mark Schreiber, MDA Nursery Inspection & Export Certification Unit Supervisor 5/30/2001. Updated 16 April 2004 by Mark Schreiber, Bob Jacobson, and Janet Boe)

Staff of the Minnesota Department of Agriculture, the Minnesota Department of Transportation, and the Minnesota Department of Natural Resources receive numerous calls each summer requesting information about transplanting orchids from locations threatened by construction or road-building. This information sheet was prepared to answer some of the frequently asked questions and direct inquiries to the appropriate agency.

Collection and sale of native orchids, trilliums, gentians, lilies, lotus (Nelumbo lutea), coneflowers, bloodroot, mayapple, and trailing arbutus are regulated by Minnesota Statutes 2003, Chapter 18H.18, Conservation of certain wildflowers. Although this section of Chapter 18H covers other species, most transplant requests and inquiries concern orchids, most commonly the showy lady's-slipper, Minnesota's state flower.

Minnesota Department of Agriculture

The Minnesota Department of Agriculture (MDA) has responsibility for administering the statutes and granting permits for the sale of wildflower species listed in Chapter 18H.18.

Wildflower collection by individuals for personal use (that is, transplanted to their own property and not offered for sale) is an issue between the property owner (whether public or private property) and the individual wishing to collect plants from that property. The collector needs the written permission of the landowner to enter the property and collect the plant species listed in the statute. The MDA requires a permit only if the plants are sold. Landowners may transplant species protected by Chapter 18H.18 within their own property without an MDA permit.

Wildflowers listed in 18H.18 cannot be collected or dug and immediately sold unless the plants are sold specifically for scientific or herbarium purposes. The individual selling the plants must own the land on which the plants are growing or have written permission of the landowner, and have a permit from the MDA. As part of the permit application, the MDA requires 1) written documentation that plants offered for sale grew naturally on the applicant's property or that the applicant had permission to collect them from property of another, and 2) the name and address of the organization receiving the plants.

If wildflowers are to be sold for purposes other than scientific and herbarium use, they must have been either A) growing naturally on the collectors property, then collected and cultivated by the collector on the collector's property, or B) collected with written permission from the property of another, then transplanted to the private property of the collector and cultivated on the collector's property. In either case, one or more permits and inspection by MDA are required prior to sale of the plants. Inspections must take place after the plant emerges from dormancy under cultivation and can be identified to species. As part of the permit application, MDA requires 1) written documentation that plants offered for sale grew naturally on the applicant's property or that the applicant had permission to collect them from the property of another, 2) a record of the dates they were collected and transplanted, 3) the cultivation techniques used by the applicant, and 4) the intended date of sale. Persons considering sale of these species collected from the wild should contact MDA staff listed below for further information.

Mark Schreiber (mark.schreiber@state.mn.us; 651-296-8388) and Steven Shimek (steven.shimek@state.mn.us; 651-296-8619), of the Agronomy and Plant Protection Division of the MDA, are the persons to contact for more information about MDA nursery certification requirements and to apply for permits. Their mailing address is Minnesota Department of Agriculture, Agronomy and Plant Protection Division, 90 West Plato Boulevard, St. Paul, MN 55107. They can also be reached by fax at 651-296-7386.

Minnesota Department of Transportation

The Minnesota Department of Transportation (MnDOT) is the landowner with jurisdiction over all state highways, interstates, and their rights-of-way. Collectors should contact the MnDOT District Permits Office serving their area to discuss collection of statute-listed plants from MnDOT-managed land. For plants adjacent to County State Aid Highways, the county engineer in the county in question is the contact person. Other roads may be under the jurisdiction of townships or cities, and township supervisors or city administrators would be the initial contacts for these ownerships.

MnDOT considers lady's-slippers a state asset and makes an effort to transplant those that are likely to be damaged by roadwork. They prefer to use their own crews, because of the dangerous nature of the activity, and to transplant them onto public land. Showy lady's-slippers are given first priority, followed by the two varieties of yellow lady's-slipper. If the road project allows, MnDOT prefers to mark the plants ahead of time, then dig them in the fall after they've faded and are dormant. Crews replant them the same day or the next day, keeping the plants wet in boxes or packed in the back of a pick-up truck until they can be placed in the ground.

Removal of orchids by private citizens from MnDOT rights-of-way in which they are threatened by roadwork may be possible but requires a permit from the local MnDOT District Office. MnDOT may require that the plants be transplanted to public land rather than to private property. Interested persons should contact either the MnDOT District Environmental Coordinator in their area directly (see the MnDOT website at www.dot.state.mn.us for contact information for the district offices), or they may contact the MnDOT Botanist in the MnDOT Office of Environmental Stewardship in St Paul. Transplanting orchids and then offering them for sale requires both permission of the landowner (in this case, MnDOT) and one or more permits from the Minnesota Department of Agriculture.

For more information about MnDOT's wildflower program and policies, see the MnDOT Office of Environmental Stewardship website at: www.dot.state.mn.us/environment

Minnesota Department of Natural Resources

If a citizen becomes aware that lady's-slipper orchids or other statute-listed plants are threatened by construction on public lands, the concerned citizen should contact the agency managing the land. In the case of the Minnesota Department of Natural Resources (DNR), lands are usually managed by either the Division of Forestry or the Division of Fish and Wildlife. Contact your local DNR forester or DNR wildlife manager with questions about orchids or other plants threatened by road construction on these lands. However, neither MnDOT nor DNR has a list of volunteer orchid rescuers.

Showy lady's-slippers and yellow lady's-slippers are not listed as rare species in Minnesota. However, some plants listed in Chapter 18H.18 are also covered by Minnesota's Endangered Species Act (Minnesota Statute 84.0895), including several species of lady's-slipper and other orchids. These plants are protected from collection or harvest by the state Endangered Species Act. Copies of Statute 84.0895 and associated rules can be found on the Minnesota legislature's web site at https://www.revisor.mn.gov/pubs/. The current state list of endangered, threatened, and special concern plants and animals is available from the DNR Natural Heritage and Nongame Research Program, 500 Lafayette Road, Box 25, St. Paul, MN 55155, or from the DNR's web site at http://www.dnr.state.mn.us/rsg/index.html

Most Minnesota orchids are also included in Appendix II of CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). Species in Appendix II are not under immediate threat of extinction but require control of trade in order to avoid a level of use incompatible with their survival. An export permit from the U.S. Fish and Wildlife Service is required to export from the U.S. species that are listed under Appendix II. See the CITES website (http://www.cites.org/) for more information.

Persons interested in learning more about orchids should consult Orchids of Minnesota, a book written by Welby Smith, DNR Botanist, and published by the University of Minnesota Press. This book contains line drawings, color photographs, and descriptions of orchid species that are found in Minnesota.

Protection Measures for Areas of Environmental Sensitivity (AES)

An Area of Environmental Sensitivity (AES) is a generic term to be utilized on plans to identify an area as containing unique characteristics that needs specific protection during construction. These areas may be any area that is identified for added protection due to habitat, wildlife, cultural resources/properties, ecological significance, geological features, visual quality, or its sensitivity to disturbance.

Areas identified on plans as an AES shall not be disturbed during construction. Commonly the actual area to be protected is adjacent to the right of way corridor and the AES identifier is utilized as a buffer. The concern is that soil disturbance, incidental herbicide exposure, hydrologic alterations, tree disturbance, competition from non-native, sod-forming grasses, introduction of weed seeds, or shading by encroaching shrubs can all lead to degradation of these sites.

MnDOT projects must adhere to processes and application of measures consistent with, but limited to, the MnDOT Highway Project Development Process Handbook (HPDP), 2014 Standard Specifications For Construction; Section 2572 (Protection and Restoration of Vegetation), and Section 2101 (Clearing and Grubbing), of which key aspects are listed below:

Examples of an Area of Environmental Sensitivity:
Not all Areas of Environmental Sensitivity (AES) are equal. Many may have stringent levels of regulatory protection on their own, such as Threatened and Endangered Species. However, identifying a site as an AES is to be considered as a generic "stay out of this area" for construction purposes and does not have to reveal the reason for the designation. Typical examples are:

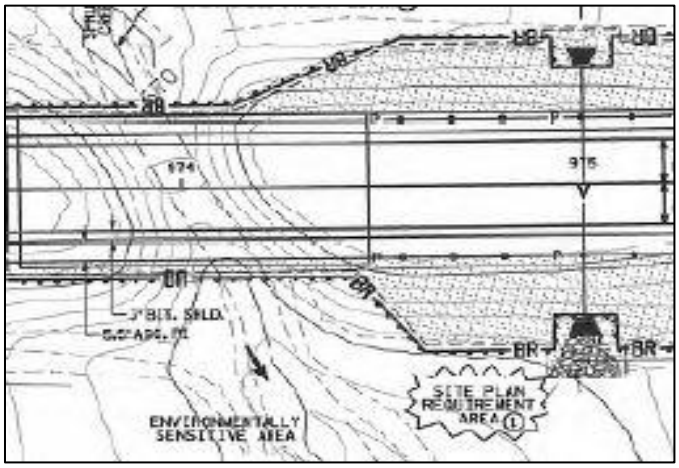
- Wetlands that are not permitted for construction activities.
- Open Water (such as DNR Public Waters, and other perennial streams and waterbodies)
- Trout Lakes and Streams along with their source springs.
- Calcareous Fens. These are identified in 'native plant communities' though due to their unique relationship with groundwater. Impacts to groundwater may also require separate analysis and protection.
- Impaired waters, Special Waters, and/or Outstanding Resource Value Waters (ORVW) as designated by the MPCA. http://pca-gis02.pca.state.mn.us/CSW/index.html.
- Wooded areas with Specimen Trees, or other permanent vegetation designated for preservation.
- Prairie remnants, including but not limited to areas adjacent to Railroad Rights-of-way Prairies.
- 'Sites of Biodiversity Significance' areas designated by the DNR Biological Survey. These sites contain varying levels of native biodiversity such as high quality 'Native Plant Communities', rare plants, rare animals, and/or animal aggregations. http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html.
- 'Native Plant Community' areas designated by the DNR Biological Survey. Native plant communities are classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes. http://www.dnr.state.mn.us/npc/index.html.
- Federal or State listed species, and their habitat.
- Historical sites
- Any natural scenic elements, such as geological features not to be disturbed as designated by project planners, project managers, or project inspectors

Best Practices:
1. Design the project to avoid impacts to identified Area of Environmental Sensitivity.
2. Design and construction should incorporate protection and/or enhancement of adjacent AES features.
3. Label identified Areas of Environmental Sensitivity on all plans.
4. Drainage into Areas of Environmental Sensitivity may also have limitations on impacts.

In situations where work in or adjacent to an AES is authorized:
1. Prior to in-water work in an AES, check to see if a Mussel Survey is required.
2. Protect and preserve vegetation from damage in accordance with MnDOT Spec 2572.3
3. Prohibit vehicle and construction activities, including the location of field offices, storage of equipment and other supplies at least 25 feet outside the dripline of trees or other identified Area of Environmental Sensitivity to be preserved, also in accordance with MnDOT spec 2572.3
4. In areas where there are large or numerous separate of areas to protect, it may be preferred to identify those areas that are OK to be utilized, and have all other areas designated off limits for parking, staging, and/or stockpiling of materials.

5. Walk the perimeter of a sensitive area with the grading foreman so that all personnel understand and agree on the hard edge of the sensitive area.
6. Redundant sediment/erosion control Best Management Practices (BMP's) may be required for protection of areas of environmental sensitivity.
7. Revegetate disturbed soils with native species suitable to the local habitat. Revegetation plans may include woody vegetation (trees and shrubs) in addition to grasses and/or forbs.
8. Coordinate with MnDOT Office of Environmental Stewardship and/or the DNR if an Area of Environmental sensitivity is accidentally disturbed or damaged.
9. Relocate plants if harm is unavoidable (see Information on Transplanting Wildflowers and Other Plants).

For more information:
MnDOT Highway Project Development Process (HPDP): http://www.dot.state.mn.us/planning/hpdp/environment.html
MnDOT 2014 Standard specifications: http://www.dot.state.mn.us/pre-letting/spec/
DNR Sites of Biodiversity Significance: http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html
DNR Rare Species Guide: http://www.dnr.state.mn.us/rsg/index.html



Andy Hingeveld

From: Jack Corkle
Sent: Tuesday, March 22, 2016 4:25 PM
To: Andy Hingeveld
Subject: FW: DRAFT language for DNR comments on MnDOT 'Winona [Willmar] Wye' project (SP3403-74)

More information on species…

Jack
763-231-4871

From: Gelvin-Innvaer, Lisa A (DNR) [mailto:lisa.gelvin-innvaer@state.mn.us]
Sent: Tuesday, March 22, 2016 3:23 PM
To: Leete, Peter (DOT)
Cc: Moynihan, Debra (DOT); Jack Corkle; Rasmussen, Paul (DOT); Baker, Richard (DNR); Jenzen, Ethan (DNR); Smith, Christopher E (DOT); Benage, Megan (DNR); Worland, Michael (DNR); Graeve, Kenneth M (DOT); Joyal, Lisa (DNR); Mixon, Kevin (DNR)
Subject: RE: DRAFT language for DNR comments on MnDOT 'Winona [Willmar] Wye' project (SP3403-74)

[*The email subject line below has a typo--- the attachments indicate this is in Kandiyohi Co--- should be* ***Willmar Wye****]*

Peter,
It wasn't clear to me whether EWR R4 was submitting coordinated, compiled comments or if we should submit them separately to you, Peter. I inquired but hadn't heard back
I'm including both Mike Worland & Megan Benage in the loop. I defer to Megan &/or Kevin Mixon re: rare plants. Mike Worland is our other Nongame Specialist in DNR Southern Region and is stationed out of Hutchinson.

*A couple comments
-re: Poweshiek Skipperling/Regal Fritillary occurrences- the 2013 aerial photo indicates that the area is in cropland (unless there is a little remaining prairie along MN23? Although that didn't show up in NHIS rare features or NPC Native Prairie layers). It is not part of the federally designated Critical Habitat.
-re: Northern grasshopper mouse-- the last observation was from 1963. From the aerial photo, the habitat appears largely converted to cropland

If we lack updated information re: the current condition these sites (i.e. if remnant habitat does remain; if the species still occur there), then I defer to what Lisa Joyal recommended.

Lisa
……
Lisa Gelvin-Innvaer
Reg. Nongame Wildlife Specialist, CWB ®
MN DNR Southern Region (R4)
Div. of Ecological & Water Resources
21371 State Hwy 15
New Ulm MN 56073-5228
phone: (507) 359-6033
fax: (507) 359-6018
e-mail: lisa.gelvin-innvaer@state.mn.us

From: Smith, Christopher E (DOT)
Sent: Monday, March 21, 2016 2:40 PM
To: Leete, Peter (DOT); Graeve, Kenneth M (DOT); Joyal, Lisa (DNR); Mixon, Kevin (DNR); Gelvin-Innvaer, Lisa A (DNR)
Cc: Moynihan, Debra (DOT); Jack Corkle; Rasmussen, Paul (DOT); Baker, Richard (DNR); Jenzen, Ethan (DNR)
Subject: RE: DRAFT language for DNR comments on MnDOT 'Winona Wye' project (SP3403-74)

Hi Peter,

For 1. B, change violet common name to Prairie Violet (*Viola palmata var.pedatifida*). Prairie Birds-foot Violet (*Viola pedata)* is restricted to SE MN, and should not be planted at this site (but is used by Regals). I doubt Regals use *V. nephrophylla* (it is a wide-leaf violet).

-Chris

--
Christopher E. Smith, M.Sc., AWB®
Wildlife Ecologist | Office of Environmental Stewardship
Minnesota Department of Transportation
395 John Ireland Blvd., MS 620
Saint Paul, MN 55155

E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605

From: Leete, Peter (DOT)
Sent: Saturday, March 19, 2016 3:27 PM
To: Smith, Christopher E (DOT); Graeve, Kenneth M (DOT); Joyal, Lisa (DNR); Mixon, Kevin (DNR); Gelvin-Innvaer, Lisa A (DNR)
Cc: Moynihan, Debra (DOT); Jack Corkle; Rasmussen, Paul (DOT); Baker, Richard (DNR); Jenzen, Ethan (DNR)
Subject: DRAFT language for DNR comments on MnDOT 'Winona Wye' project (SP3403-74)

Hi folks…
This project is/was primarily a railroad project creating a bypass of the two mainlines entering the City of Winona. Review for that project occurred a couple years ago. An NHIS review was conducted at that time (April 1014). Since that time,two things have occurred.

- MnDOT has developed alternatives for re-alignment of TH12, TH40 & TH23 for the construction of bridges to allow unimpeded train and vehicle flow.. It's this MnDOT connection that brings me in to the review process.
- The Poweshiek skipperling was federally listed as endangered in Oct 2014. Its on the state list as endangered too (as of August 2013). Regardless, the NHIS has a record of its presence along the TH23 railroad right of way just outside the project boundaries. Though this area is not in the USFWS critical habitat areas.

For these reasons, I want to be sure my comments are not in conflict what has been said in prior review, plus not be in conflict with USFWS concerns for the poweshiek skipperling. Ideally all our reviews would be woven of the same cloth. What I am proposing below was said previously by me at a meeting a couple weeks ago with MnDOT folks regarding identifying preliminary concerns. It builds on what has been said already. You will quickly see that I think it is important that the project incorporate native seed mixes to aid in expansion of habitat by connecting the two remnants. However, in order for this to succeed, there will need to be a local management plan to ensure the success of new plantings…. Below is a formal version:

1. The Minnesota Natural Heritage Information System (NHIS) has been queried to determine if any rare plant or animal species, native plant communities, or other significant natural features are known to occur within an approximate one-mile radius of the project area. There were seven rare features identified in this query. In order to prevent the inadvertent release of the location of specific listed or rare species contained in the NHIS, I have not identified the species or their location on the attached 'DNRbasemap.pdf'. If these details are needed for documentation, please contact me. Please note that the following rare features were identified in the query and *may* be impacted by the proposed project. Suggested avoidance and/or protection measures are also identified:

   A. The butterfly Powesheik Skippering (Oarisma poweshiek) was sited in 1981 between TH23 and the railroad a few hundred yards outside the project limits. Today this species is listed as 'Endangered' on both State and Federal Threatened and Endangered Species. It is unknown a small colony of this butterfly remains. However, re-vegetation of the project areas should include native vegetation beneficial to their use.

      From attached USFWS infosheet: Adult butterflies feed on nectar from prairie flowers such as purple coneflower (*Echinacea angustifolia*), blackeyed susan (*Rudbeckia hirta*) and palespike lobelia (*Lobelia spicata)*. Because limited research has been done on the Poweshiek skipperling, we are not certain which plant species are necessary for the larvae to develop, although we know they select native, fine-stemmed grasses and sedges such as little bluestem (*Schizachyrium scoparium*) and prairie dropseeed (*Sporobolus heterolepis*).

      More info is in the DNR Rare Speices guide:
      http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEP57010

   B. Another rare butterfly was identified as being in the same area as the Powesheik Skippering. The Regal Fritillary (Speyeria idalia), is listed as a species of Special Concern. What little is known about the life cycle of this species is located on the DNR rare species guide; http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPJ6040. Though it is known that Larvae feed only on violets (*Viola* spp.). Seeds mix composition should include native violet species such as prairie bird's-foot violet (*Viola palmata* var. *pedatifida*), bird's-foot violet (*V. pedata*), and stemless blue violets (primarily *V. nephrophylla*).

   C. Small White Lady's-slipper (Cypripedium candidum) has also been observed in area to the west of the junction of CR55 and TH23. This is listed as a species of Special Concern. It is not known if any populations are in the project area. Though as part of any vegetative review, this species should be noted if present. When known orchid populations are in areas to be disturbed, we encourage they be transplanted to other public lands. It may be possible to move any known plant to the nearby Wildlife Mangement Areas at the north end of the project. Guidelines for this are attached.

   D. Just outside the north and south ends of the project areas at, there are segments of remnant prairie in the railroad right of way, which is adjacent to MnDOT right of way. The quality of this area is considered to be 'Good' (see attached DNRbasemap.pdf). It is possible that the adjacent MnDOT right of way also contains similar quality prairie remnants. The concern along these segments is that soil disturbance, incidental herbicide exposure, hydrologic alterations, competition from non-native, sod forming grasses, or shading by encroaching shrubs can all lead to degradation of the site. The area should be labeled as an Area of Environmental Sensitivity (AES). A copy of AES protection guidance is attached (From the Collection of Best Practices for Meeting DNR Public Waters Permit GP2004-0001). The entire collection of best practices may be found
      at: http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html.

The NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. If information becomes available indicating additional listed species or other rare features, further review may be necessary.

2. TH23 through the region is designated as a national 'Prairie Passage Route'. Along this route, all revegetation of disturbed soils should be a native mix in those areas that are not proposed for mowed turf grass. Typically I've recommended use of the native recommendations in the 'Vegetation Establishment Recommendations – November 13, 2015' for your district as found on the MnDOT website: http://www.dot.state.mn.us/environment/erosion/seedmixes.html. However the recommended mix should be evaluated for composition beneficial for the butterflies listed in 1.A and 1. B.

In fact, we recommend the entire project include native seed mix in order to connect the north and south railroad right of way prairie remnants. This would benefit the rare species that are known to reside there. I realize getting the seed in the ground would only be the first step, as long term vegetation management plans would also need to be developed and followed for such an endeavor to be successful. That said, not putting native mixes in now, would make such an endeavor in the future virtually impossible.

How's that? Any suggestions? I intend to send the full formal email later this week. So pease provide any comments or concerns by Thursday. I will be out of the office until Wednesday (23rd). though I will be checking emails periodically and am available by phone if you want to discuss this (651-442-9890)

Peter Leete
Transportation Hydrologist (DNR-MnDOT Liaison)
DNR Ecological & Water Resources
Ph: 651-366-3634

Appendix L – MnDOT Office of Environmental Stewardship Section 7 Correspondence

Minnesota Department of Transportation
395 John Ireland Boulevard
Saint Paul, MN 55155

July 20, 2016

Andrew Horton
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Twin Cities ES Field Office
4101 American Blvd East
Bloomington, MN 55425-1665

Notice of Determination – May affect, but will not cause prohibited incidental take – Northern Long-eared Bat (NLEB; *Myotis septentrionalis*)

S.P. 3403-74, Trunk Highway 12
Willmar, Kandiyohi County, Minnesota

Project Description

This project includes the construction of a new railroad connection by BNSF Railway between two of its main tracks on the western end of the City of Willmar. The new rail line will be constructed from its existing location near the intersection of TH 12 and 45th Street to the south, running parallel to CSAH 55 and connecting to the existing railroad that runs along CSAH 15, forming a new wye (two legs in a "Y"-shaped configuration). Several new railroad crossing will be constructed. Project crosses Hawk Creek.

TH 12 will be realigned as part of this project. Two alignment scenarios (Base Alternative and VE Alternative) have been proposed for TH 12. Both alignments are considered in this review. Both alignments include tree removal, with the Base Alternative removing up to 5 acres and the VE Alternative removing up to 10 acres.

A portion of TH 55 will also be realigned to remove a skewed intersection and provide a new intersection with TH 55, and other road segments will be constructed to maintain property access to TH 12. The TH 40/CSAH 55 intersection will be raised to meet the TH 40 overpass grade as it descends westward.

It is expected that three residential structures will be removed as part of the TH 40 and CSAH 55 intersection modifications. Additional acquisition of temporary easements and permanent right of way will also be required to accommodate the new rail line, roadway, and bridge locations. The project crosses natural gas lines. Utility services will be relocated or accommodated in order to construct the project without disrupting utility functions.

As an optional element Kandiyohi County is interested in pursuing a grade separation of the southern railroad connection. This would include a slight realignment of CSAH 55 and would relocate the existing intersection of TH 23 and CSAH 5. Please see the Value Engineering Concept for this option. It should be included in both the Value Engineering Concept and this Concept.

The project is a joint Federal Railroad Administration (FRA) and Federal Highway Administration (FHWA) undertaking, with FHWA taking the lead on environmental documentation. FRA is the overall project lead.

Maps attached below.

Conservation Measures

- Winter tree removal – November 1 to March 31, inclusive.
- Revegetation using native seed mixes per MNDNR, MnDOT, and USFWS guidance.
- Use of bio-netting or natural netting for erosion control per MNDNR guidance.

Species List for the Project County

According to the official County Distribution of Minnesota Federally-Listed Threatened, Endangered, Proposed, and Candidate Species list (revised in April 2016), maintained by the Service, the project county is within the distribution range of the following:

Revised April 2016

County	Species	Status	Habitat
Kandiyohi	Northern long-eared bat *Myotis septentrionalis*	Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.

Information to Determine NLEB 4(d) Rule Compliance:	**YES**	**NO**
1. Does the project occur wholly outside of the WNS Zone?	☐	☒
2. Have you contacted the appropriate agency to determine if your project is near known hibernacula or maternity roost trees?	☒	☐
3. Could the project disturb hibernating NLEBs in a known hibernaculum?	☐	☒
4. Could the project alter the entrance or interior environment of a known hibernaculum?	☐	☒
5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year?	☐	☒
6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31.	☐	☒

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the Biological Opinion.

Streamlined NLEB Consultation Table - General Project Information	**YES**	**NO**
Does the project occur within 0.25 miles of a known hibernaculum?	☐	☒
Does the project occur within 150 feet of a known maternity roost tree?	☐	☒
Does the project include forest conversion[1]? (if yes, report acreage below)	☒	☐
Estimated total acres of forest conversion (including winter)	10	
If known, estimated acres[2] of forest conversion from April 1 to October 31	0	
If known, estimated acres of forest conversion from June 1 to July 31[3]	0	
Does the project include timber harvest? (if yes, report acreage below)	☐	☒
Estimated total acres of timber harvest		
If known, estimated acres of timber harvest from April 1 to October 31		
If known, estimated acres of timber harvest from June 1 to July 31		
Does the project include prescribed fire? (if yes, report acreage below)	☐	☒
Estimated total acres of prescribed fire		
If known, estimated acres of prescribed fire from April 1 to October 31		
If known, estimated acres of prescribed fire from June 1 to July 31		
Does the project install new wind turbines? (if yes, report capacity in MW below)	☐	☒
Estimated wind capacity (MW)		

[1] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the Biological Opinion).
[2] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[3] If the activity includes tree clearing in June and July, also include that acreage in April to October.

Notice of Determination

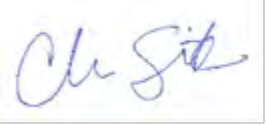
Northern Long-eared Bat— May affect, but will not cause prohibited incidental take.

According to the information provided, this project will include bridge work and tree removal. There are no known locations of NLEB roost trees or hibernacula in the vicinity of this project (MNDNR 2016). By signing this form, MnDOT on behalf of the FHWA, determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, MnDOT may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic Biological Opinion. MnDOT will update this determination annually for multi-year activities.

MnDOT, on behalf of the FHWA, understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. MnDOT will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. **Involved parties will promptly notify the appropriate USFWS Field Office, and MnDOT Office of Environmental Stewardship, upon finding a dead, injured, or sick NLEB.**

Please contact me if there are any questions or concerns.



Christopher E. Smith, M.Sc., AWB®
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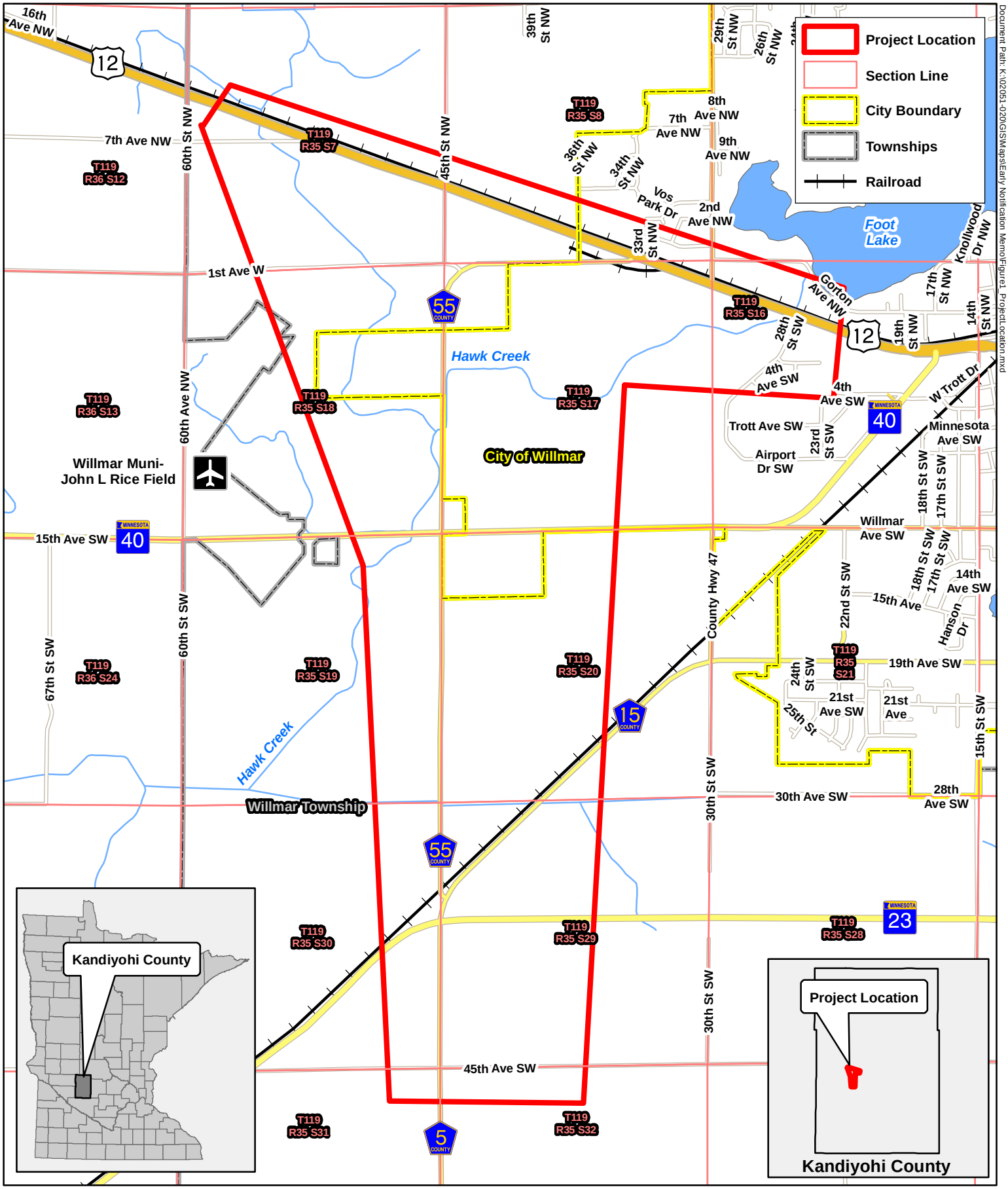
E-mail: Christopher.E.Smith@state.mn.us
Phone: 651-366-3605



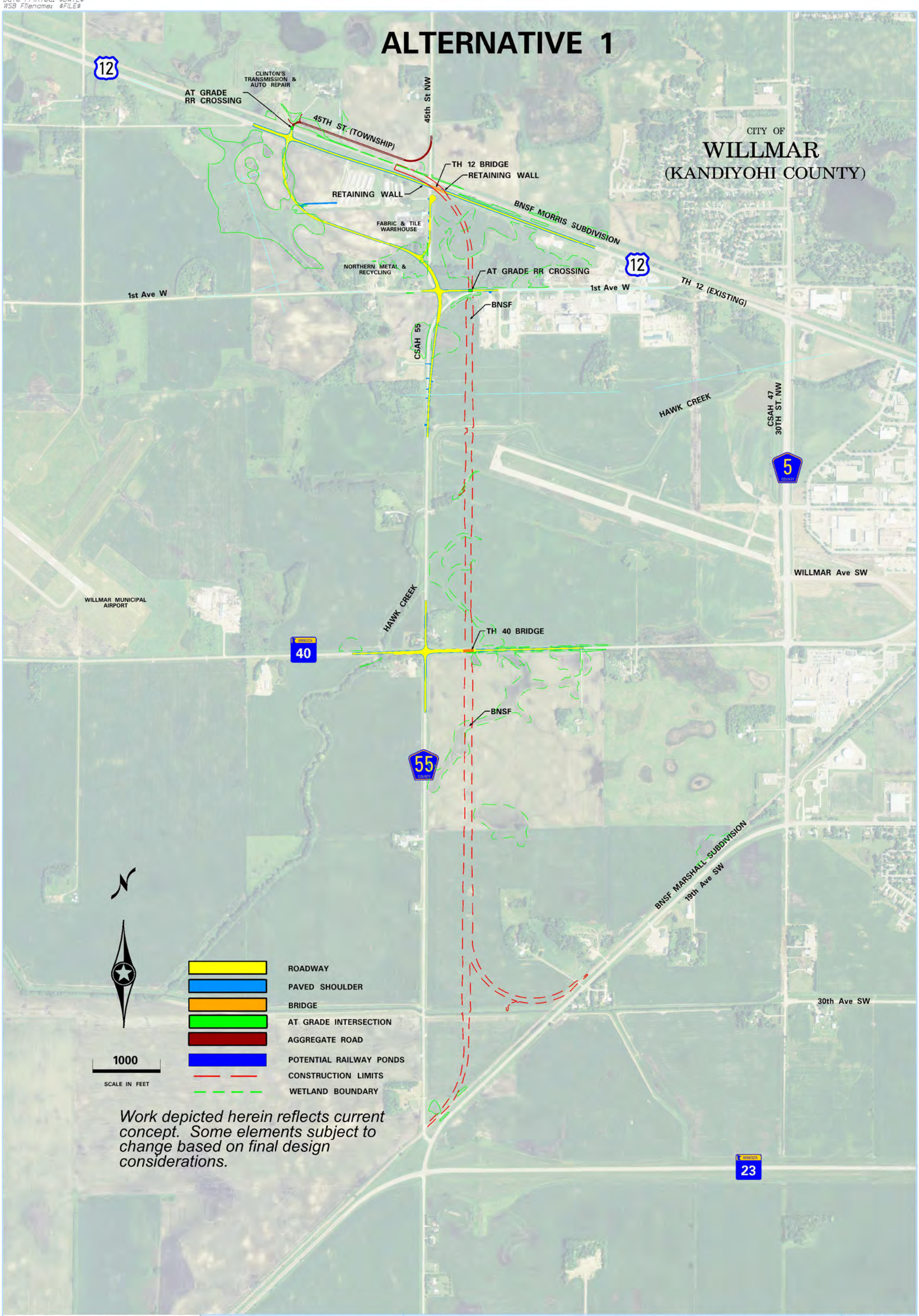
Willmar Wye Project Location
S.P. 3403-74
Willmar, MN

N

0 2,500 Feet

Date Printed: $DATE$
WSB Filename: $FILE$

ALTERNATIVE 1



Work depicted herein reflects current concept. Some elements subject to change based on final design considerations.

WSB

701 Xenia Avenue South, Suite 300
Minneapolis, MN 55146
Tel: (763)541-4800 · Fax: (763)541 1700
wsbeng.com

CITY OF WILLMAR, MINNESOTA

WILLMAR WYE
ALTERNATIVE 1

Date Printed: $DATE$
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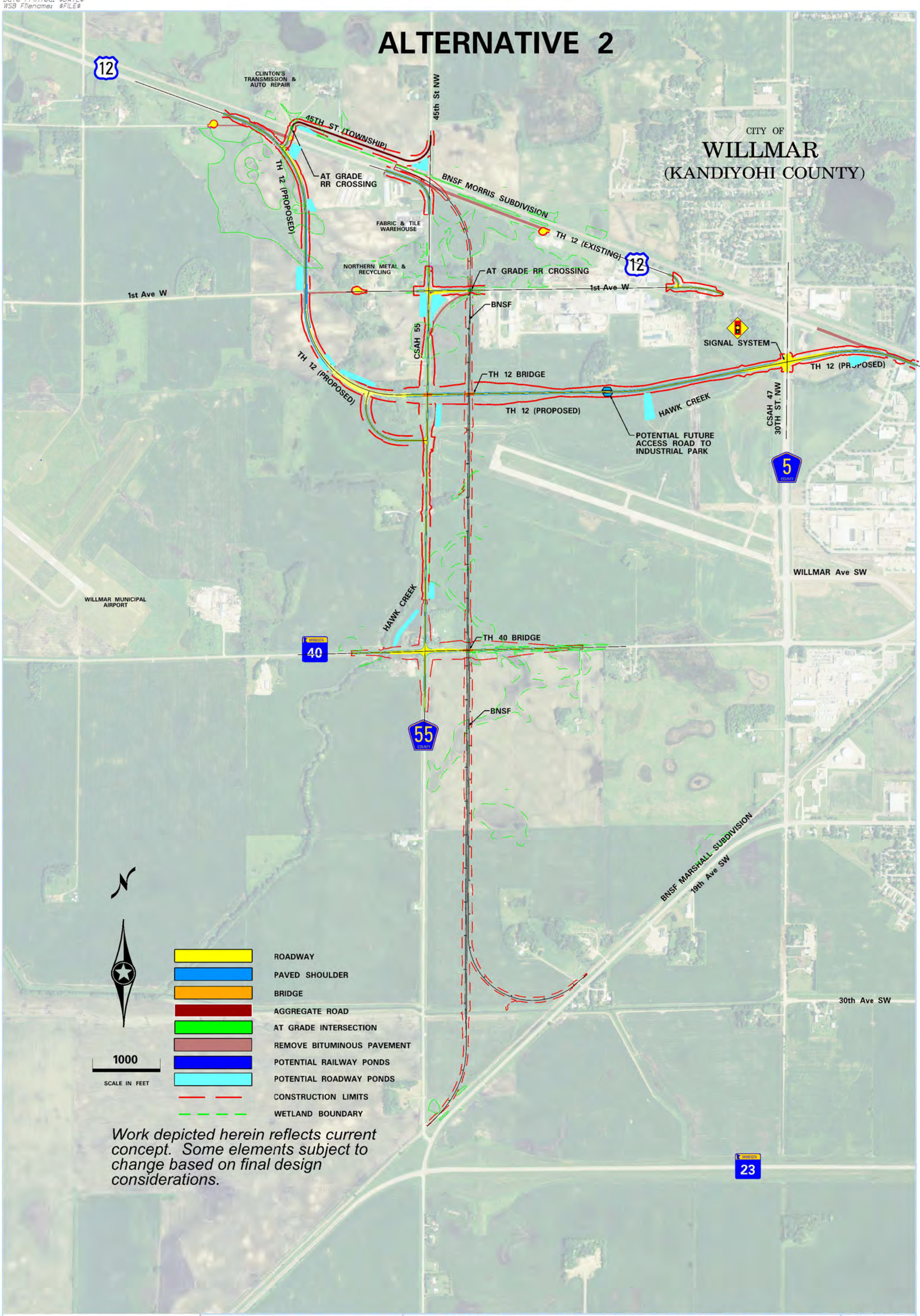
ALTERNATIVE 2



Work depicted herein reflects current concept. Some elements subject to change based on final design considerations.

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CITY OF WILLMAR, MINNESOTA

WILLMAR WYE
ALTERNATIVE 2

SHEET 1 OF 1 SHEETS

Appendix M – Phase I & II Architectural History Investigation Report

Phase I and II Architectural History Investigations for the Willmar Connection and Industrial Access Project, City of Willmar and Willmar Township, Kandiyohi County, Minnesota

Submitted to:
Minnesota Department of Transportation
395 John Ireland Boulevard
St. Paul, MN 55155

Prepared by:

Cultural Services LLC

207 4th Avenue North
South St. Paul, MN 55075

Report Author:
Andrea C. Pizza, Ph.D.

July 2016

MANAGEMENT SUMMARY

A public-private partnership including the city of Willmar, Kandiyohi County, the Kandiyohi County and City of Willmar Development Commission, the Minnesota Department of Transportation (MnDOT), and the BNSF Railway Company is proposing a new rail connection between two existing railroad main lines in Willmar, Kandiyohi County, Minnesota, which will require the construction of new crossings at County Road 55, Trunk Highway 12, and Trunk Highway 40. The crossings at the trunk highways will involve vertical and/or horizontal road realignment. This project, the Willmar Connection and Industrial Access Project (Willmar Wye Project), is receiving Department of Transportation funds through the Transportation Investment Generating Economic Recovery (TIGER) competitive grant program, and is therefore subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended. The Federal Railroad Authority (FRA) is the lead federal agency for delivery of physical construction, and the Federal Highway Administration (FHWA) is the lead federal agency for completing the project environmental document, including Section 106 review. FHWA delegates authority for compliance with Section 106 to the MnDOT Cultural Resources Unit (CRU). To assist with their review, the MnDOT CRU contracted with Deco Cultural Services LLC (Deco) to conduct Phase I and II architectural history investigations of the project area of potential effects (APE). The APE was determined by the MnDOT CRU Project Manager, and it comprises approximately 2,712 acres located in Sections 7, 8, 16-20, 29, and 30 of T119N, R35W. The objective of the Phase I investigation, which included literature review and field survey components, was to identify known historic properties and any properties that are potentially eligible for listing in the National Register of Historic Places (National Register) within the APE.

The Phase I architectural history investigation was performed in January to March of 2016, and it identified one property previously determined eligible for listing in the National Register: the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387). One property, County Ditch No. 10 (KH-DTC-002), was identified as potentially eligible by the MnDOT CRU Project Manager prior to the Phase I survey. Beyond County Ditch No. 10, a total of 25 properties 45 years in age or older were surveyed, 24 of which were recommended as not eligible for listing in the National Register. The remaining property, the Willmar and Sioux Falls Railway Company main line (XX-RRD-038), was recommended as being potentially eligible for listing in the National Register. Deco therefore conducted Phase II evaluations of County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line to determine their National Register eligibility. The Phase II evaluations were completed in the spring of 2016. Andrea Pizza served as Principal Investigator for both phases.

Based on the Phase II evaluations, County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line are recommended as not eligible for listing in the National Register due to a lack of significance; therefore, with the exception of the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District, no further architectural history work is recommended prior to or during construction for the Willmar Wye project. The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District is eligible for listing in the National Register; therefore any further work is pending MnDOT's determination of the effects of the project, if any, on this property.

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INTRODUCTION

A public-private partnership including the city of Willmar, Kandiyohi County, the Kandiyohi County and City of Willmar Development Commission, the Minnesota Department of Transportation (MnDOT), and the BNSF Railway Company is proposing a new rail connection between two existing railroad main lines in Willmar, Kandiyohi County, Minnesota, which will require the construction of new crossings at County Road 55, Trunk Highway 12, and Trunk Highway 40. The crossings at the trunk highways will involve vertical and/or horizontal road realignment. This project, the Willmar Connection and Industrial Access Project (Willmar Wye Project), is receiving Department of Transportation funds through the Transportation Investment Generating Economic Recovery (TIGER) competitive grant program, and is therefore subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended. The Federal Railroad Authority (FRA) is the lead federal agency for delivery of physical construction, and the Federal Highway Administration (FHWA) is the lead federal agency for completing the project environmental document, including Section 106 review. FHWA delegates authority for compliance with Section 106 to the MnDOT Cultural Resources Unit (CRU). To assist with their review, the MnDOT CRU contracted with Deco Cultural Services LLC (Deco) to conduct Phase I and II architectural history investigations of the project area of potential effects (APE).

1.1 PROJECT DESCRIPTION

The proposed project is to construct a rail connection between two existing BNSF main track subdivisions, the Morris Subdivision, which parallels Trunk Highway (TH) 12, and the Marshall Subdivision, which parallels County Road (CR) 55/County State Aid Highway (CSAH) 15 (Figure 1). The rail connection will consist of approximately 2.7 miles of new main track, and its configuration will include a single leg on the north, a north-south connection track, and a wye on the south. It is anticipated that the east leg of the wye will provide rail access to the city's industrial park once it is further developed.

A rail siding consisting of approximately 10,000 linear feet of new track will be constructed parallel to the proposed connection on the west to allow trains to pass one another, and an approximately 14-foot-wide access road paralleling and west of the siding will be built to allow BNSF crews to perform train inspections on the connection, to provide access for track and signal maintenance, and to accommodate replacing train crews.

The connection will result in new road crossings at 1st Avenue West/CR 55, TH 40, and TH 12. The road crossing at 1st Avenue West will be an at-grade crossing with active warning devices for crossing protection. The crossing at TH 40 will be a bridge over the new track, and the TH 40/CR 55 intersection located west of the rail line will be raised to meet the TH 40 overpass grade as it descends westward; three properties at this intersection may need to be acquired to allow for the bridge and grade raise. Two alternatives are currently under consideration for the TH 12 crossing, each of which will involve constructing a bridge over the rail line. The first is to follow the current alignment. The second involves re-routing TH 12 to the south

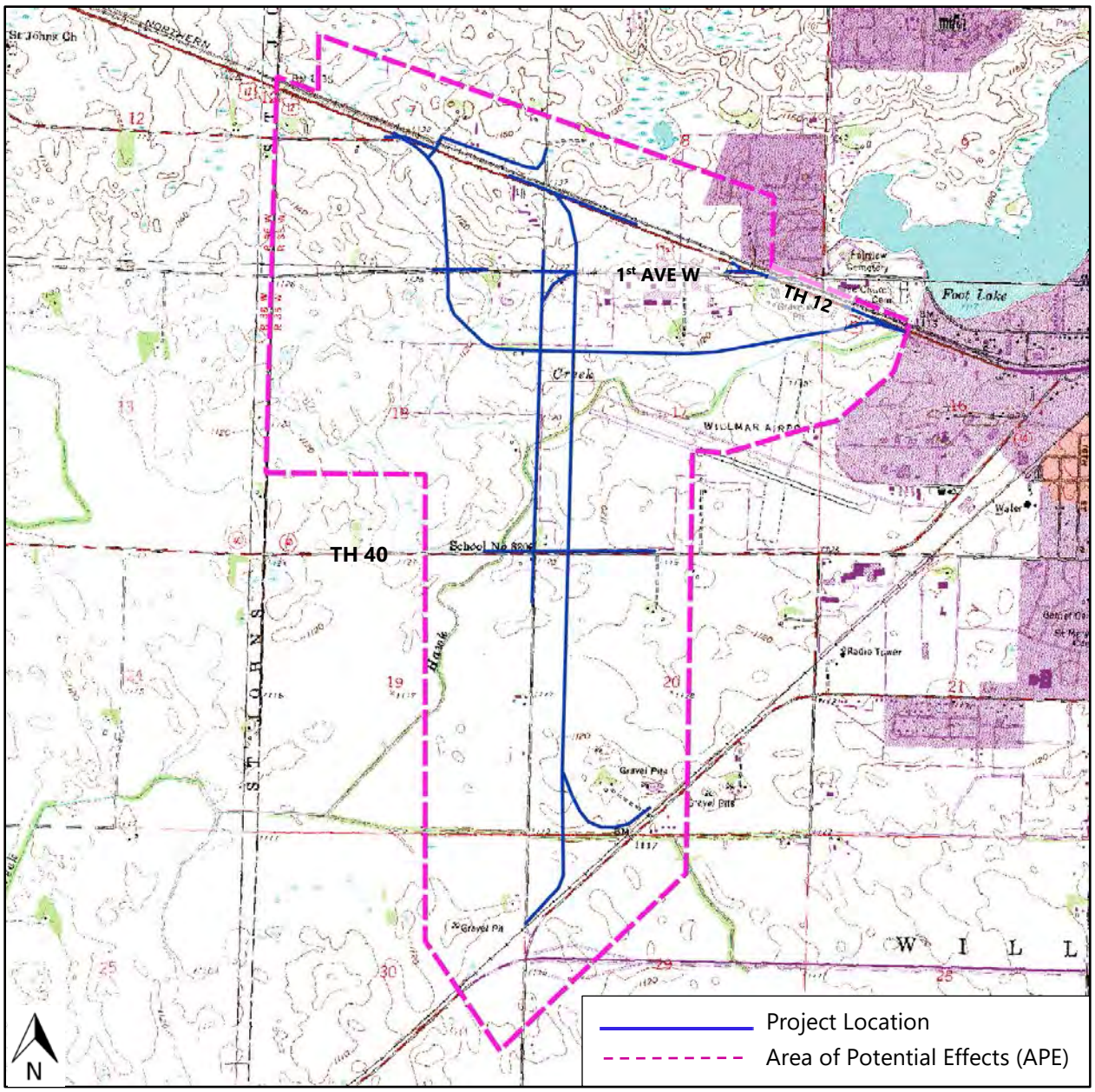

FIGURE 1. PROJECT LOCATION AND AREA OF POTENTIAL EFFECTS (APE)

0 2000 4000 6000 ft

(Portions of Pennock, Raymond, Solomon Lake, and Willmar 7.5' USGS Quadrangles, obtained through MnGeo's Geospatial Image Service)

to circumnavigate the northern rail-connection point. In addition to road crossings, railway bridges or culverts will be constructed to cross Hawk Creek/County Ditch No. 10, an unnamed tributary to Hawk Creek, and County Ditch No. 46.

1.2 AREA OF POTENTIAL EFFECTS

The APE for architectural history was determined by the MnDOT CRU Project Manager to be an irregularly shaped area which accommodates potential effects for either project alternative (see Figure 1). Legal locations are provided in Table 1. The UTM (NAD 83, Zone 15) coordinates are northernmost point: E 333243 N 5000271, westernmost point: E 332979 N 5000107, easternmost point: E 336640 N 4998689, and southernmost point: E 334183 N 4994493. Coordinates were generated electronically using ACME Mapper 2.1 (http://mapper.acme. com).

1.3 STRUCTURE OF THE REPORT

The next chapter describes the methods used in the investigation and is followed by two chapters detailing the results of the Phase I literature review and the field survey. The subsequent two chapters are devoted to the Phase II investigations. The final chapter summarizes the cultural resources management recommendations for the project.

TABLE 1. LEGAL LOCATIONS OF THE APE

Township	Range	Section	Quarter Sections
119	35	7	E-NW-NW, S-NE-NW, S-NW, S-NE, SW, SE
		8	S-SW-NW, SW, NW-NW-SE, S-NW-SE, SW-NE-SE, SW-SE, W-SE-SE
		16	NW-NW, N-SW-NW, SW-SW-NW
		17	NW, NE, SW, W-W-SE, E-NW-SE, N-NE-SE
		18	N-NW, NE, E-SW, SE
		19	NE, SE
		20	NW, W-W-NE, SW, W-W-SE
		29	N-NW, SW-NW, N-SE-NW, SW-SE-NW, W-NW-NE, N-NW-SW, SW-NW-SW
		30	N-NE, N-SW-NE, SE-SW-NW, SE-NE, NE-NW-SE, NE-SE, N-SE-SE

METHODS

The objective of the Phase I architectural history investigation was to identify known historic properties and any properties that are potentially eligible for listing in the National Register of Historic Places (National Register) within the APE. The objective of the Phase II investigation was to determine whether County Ditch No. 10 (KH-DTC-002) and the Willmar and Sioux Falls Railway Company main line (XX-RRD-038) are eligible for listing in the National Register. National Register eligibility is based on the significance criteria outlined below:

- Criterion A – association with events that have made a significant contribution in our past;
- Criterion B – association with the lives of persons significant in our past;
- Criterion C – embodiment of the distinctive characteristics of a type, period, or method of construction; or representation of the work of a master; possession of high artistic values; or representation of a significant and distinguishable entity whose components may lack individual distinction; and
- Criterion D – potential to yield information important to prehistory or history (National Park Service 2002)

In the cases of farm-related properties and railroad-related properties, the application of these criteria was guided, respectively, by the requirements established in *Historic Context of Minnesota Farms, 1820-1960* (Farms Context) (Granger and Kelly 2005) and the National Register Multiple Property Documentation Form titled "Railroads in Minnesota, 1862-1956" (Railroads MPDF) (Schmidt et al. 2007).

All work was conducted per *MnDOT's Cultural Resources Unit Project Requirements* (MnDOT 2011), *Guidelines for History/Architecture Projects in Minnesota*, (Minnesota State Historic Preservation Office [SHPO] 2010), and *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (National Park Service 1983).

2.1 LITERATURE REVIEW

2.1.1 Phase I

A database query request was submitted to the SHPO on January 4, 2016. Once the results were received, relevant files held at the SHPO were reviewed to obtain information on architectural history properties previously inventoried and architectural history surveys previously conducted within the APE. Subsequently, historical fire insurance maps, plat maps, and aerial photographs were consulted to obtain baseline data on construction dates for properties within the APE as available. All of these resources were reviewed to obtain historic contextual information that could be used to frame the potential significance of properties identified during the field survey.

Additional historic contextual information was obtained from other sources held at the Minnesota Historical Society (MNHS) library, the University of Minnesota libraries, and online, primarily histories of Kandiyohi County and the city of Willmar.

2.1.2 Phase II

Following the identification of County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line as potentially eligible for listing in the National Register, an intensive literature search was conducted to obtain in-depth property histories and information used to develop detailed, relevant historic contexts specific to County Ditch No. 10; such contexts pertaining to the Willmar and Sioux Falls Railway Company main line are contained in the Railroads MPDF. To these ends, Deco reviewed sources such as *The Illustrated History of Kandiyohi County* (Lawson 1905), *The Centennial History of Kandiyohi County* (Kandiyohi County Historical Society [KCHS] 1970), issues of *The Willmar Tribune*, the county and judicial ditch files of the Minnesota Division of Waters, records of the Minnesota State Drainage Commission, *The Great Northern in Minnesota* (Luecke 1997), and the corporate records of the Willmar and Sioux Falls Railway Company. Using the information obtained during the literature review, the Principal Investigator evaluated whether each property met one or more of the four National Register significance criteria.

2.2 FIELD SURVEY

2.2.1 Phase I

A Phase I architectural history survey was performed on March 8-10, 2016. Andrea Pizza served as Principal Investigator and conducted the fieldwork. During the field survey, the Principal Investigator documented all properties 45 years in age or older through field notes and digital photography. Construction dates were estimated based on the literature review and the professional judgment of the Principal Investigator. The potential National Register eligibility of all properties surveyed was assessed under the framework of relevant historic contexts with reference to National Register criteria for significance and integrity.

2.2.2 Phase II

County Ditch No. 10 and the Willmar and Sioux Falls Railroad Company main line were sufficiently examined and documented during the Phase I survey for the purposes of evaluating their National Register eligibility. No additional fieldwork was therefore conducted as part of the Phase II investigation.

PHASE I LITERATURE REVIEW RESULTS

3.1 PREVIOUSLY INVENTORIED PROPERTIES

Two previously inventoried architectural history properties are located partially or entirely within the APE: the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387), which has been determined eligible for listing in the National Register, and the Willmar Brick Yard (KH-WLC-072), which has not been evaluated for its National Register eligibility. As recorded in 1985, the Willmar Brick Yard included two kilns, smokestacks, a farmhouse, and outbuildings, all constructed of brick (Minnesota Historic Properties Inventory Form, KH-WLC-072).

3.2 PREVIOUS SURVEYS

No architectural history surveys have been conducted previously within the APE.

3.3 HISTORIC CONTEXTS

The brief historic context that follows is included based on the property types surveyed during the Phase I investigation and provides a framework for the assessment of their potential historical significance. This context is associated with the SHPO statewide historic contexts *Railroads and Agricultural Development, 1870-1940,* and *Railroad Development in Minnesota, 1862-1956* (SHPO 1993; Schmidt et al. 2007). Detailed historic contexts developed to assist in the evaluation of properties during the Phase II investigations are presented with the results of those investigations in subsequent chapters.

3.3.1 Railroads and Agricultural Development of Willmar, 1869-1960s

Although the first Euroamerican settlers arrived in the Willmar area during the late 1850s, any notions they had of permanent habitation were disrupted by the U.S.-Dakota War of 1862; those who survived fled, and the next attempt at putting down roots was not made until the fall of 1866, with the arrival of a Norwegian immigrant named Erick Nelson. Others followed over the course of the next two years, but it was with the platting of the townsite of Willmar by the St. Paul and Pacific Railroad and the quickly ensuing construction of their main line into it in 1869 that a nascent city began to form. The first store was built in that year, and soon other commercial buildings and houses were locating on the blocks proximate to the rail line. In 1871, Willmar was designated as the Kandiyohi County seat, by which time it boasted among its businesses a wide variety of stores and services, a billiard parlor, and three hotels. In 1874, with approximately 1,000 residents to its name, Willmar was incorporated as a village (KCHS 1970:211, 214).

With a St. Paul and Pacific grain elevator constructed there in the summer of 1870, constituting the only one in the vicinity for several years, Willmar became a regional hub for wheat marketing (Lawson 1905:392). After the railroad's monopoly in this regard was ended in the mid 1870s, private interests immediately built more of these structures along the line in Willmar, just as wheat monoculture was shifting from southeastern to western Minnesota, and new flour milling technologies were catalyzing the state's flour manufacturing industry, particularly in Minneapolis, creating a massive demand for the grain (Lawson 1905:401; Granger and Kelly 2005:3.17, 3.19). An 1880 article in Willmar's *Republican Gazette* noted:

> We have four elevators and one mil, viz., the Elevator Company's building, capacity 100,000 bushels, J. Lamoine inspector; West End Elevator, E. Locke proprietor, capacity 80,000 bushels; Central Elevator, R. Korthe proprietor, capacity 35,000 bushels; Scandinavian Elevator Company, Bunker & Jacobson, capacity 45,000 bushels. The Meridian Mill, established in 1876, the only one in the immediate vicinity, is 24x42 feet, three stories high, has four rows of burrs, and does a large business. The shipment of wheat from Willmar during the season of 1879 up to [January 29, 1880] was over 400,000 bushels" [quoted in Lawson 1905:401].

With demand for wheat came farmers looking to profit from it, settling on the lands of Willmar and other surrounding townships. Of the 77 heads of household in Willmar Township recorded in the 1880 U.S. Census, 75 were listed as farmers (United States Department of Commerce, Bureau of the Census 1880). Businesses serving both these farmers when they made runs to town and the residents of Willmar proliferated, and the buildings housing them began to be of masonry construction, with a commercial core forming along Pacific and Benson avenues, south of the railroad track (Sanborn-Perris Map Company 1893).

Although a shift from wheat monoculture began to occur circa 1885, wheat remained a major focus of Minnesota farmers, particularly in the western part of the state, and therefore cause for competition among railroads. By this time, the St. Paul Minneapolis and Manitoba Railway Company (Manitoba), under the management of James J. Hill, had purchased the St. Paul and Pacific. Willmar, with a railroad yard and grain processing facilities already in place, became a logical location through which the Manitoba would run as Hill looked to win this competition in southwestern Minnesota. It came to pass, therefore, that in 1885-1886, the Manitoba-backed St. Cloud Mankato and Austin Railroad Company constructed a line from St. Cloud to Willmar, and then in 1887, construction began in Willmar on the Manitoba-backed Willmar and Sioux Falls Railway Company line. The combination not only provided access to southwestern wheat, but at nearly the time that the Willmar and Sioux Falls line reached Sioux Falls in November of 1888, a through-route was created from Sioux Falls, South Dakota, to Lake Superior, via a line of the Eastern Railway Company of Minnesota, another Hill road, which was completed in the same month (Luecke 1997:72, 116-117, 120, 129). Willmar had the enviable position of being a division point for the Manitoba and later, the Great Northern Railway Company (Great Northern), with direct connections to Lake Superior, the Twin Cities, the Red River Valley, Sioux Falls, and intervening agricultural lands. Perhaps not coincidentally, the first three of Kandiyohi County's ditches were established in Willmar Township in 1885 and 1886, as farmers sought to improve the productivity of their lands (Lawson 1905:387-388).

The railroads would support a wide variety of industrial endeavors in Willmar, not all of which were related to agriculture. The first brickyard was established just a few blocks south of the railroad in 1888, and the company, under the ownership of John Dehlbom and others, would locate along the Manitoba/Great Northern main line three years later. Best known as the Willmar Brick Company, this company would successfully operate in Willmar until 1950. Non-agricultural industries in Willmar between 1905 and 1940 included a gasoline works, cuspidor plant, a foundry, boiler companies, a strawboard manufacturer, a glove factory, a wheel and tire company, cigar factories, bottling works, cement-related industries, sand and gravel

companies, sash and door companies, a paint factory, a mattress works, and a wood working operation (KCHS 1970:285). On the agricultural side were operations such as the grist mill built in 1896 by William Peterson, and in the next few decades, those of companies such as the Willmar Creamery Company, Willmar Tractor Manufacturing Company, Minnesota Spreader Company, Central Dairy Products Company, International Milling Company, and Allstate Hatchery (KCHS 1970:285, 268-269). Allstate, who introduced turkeys into their operations in 1930, was the forerunner in what would become the most important component of Willmar's post-World War II agricultural economy, the turkey industry, including both breeding and processing (KCHS 1970:268).

Two major interests engaged in the turkey industry emerged in the post-war era: the Willmar Poultry Company and the Farmers Produce Company. The Willmar Poultry Company was formed by H. I. Nelson, Albert Huisinga, Fred and Albin Norling, and Charles Bischoff in 1945, the latter exiting the venture the following year. Initially engaged only in turkey processing, the company added hatchery operations within just a few years, and then in 1953 eliminated processing to focus on the hatcheries. The company subsequently established additional hatcheries in Redwood Falls (1954), Litchfield (1960), and other locations in Minnesota. Beginning in the late 1950s, the company established farms to handle overages in the poult population stemming from order cancellations at the hatcheries. Thirteen such farms existed by 1970, by which time the Willmar Poultry Company was the "largest turkey hatchery in the world" (KCHS 1970:268), having an egg capacity of 1.75 million per month. As such, it contributed to Kandiyohi County's status as the top turkey producer in the nation.

On the processing end, beginning in 1949, was the Farmers Produce Company. What started in that year under the ownership of Earl B. Olson as a single turkey processing plant with 60 employees became within two decades a large-scale enterprise with more than 1,000 employees processing five million turkeys a year in Willmar, Litchfield, and Melrose. In Willmar, operations were augmented between 1963 and 1969 with "twenty farms raising over two million head of turkey; three feed mills, a research farm, and a feather processing plant" (KCHS 1970:267). The Farmers Produce Company supplied an international market for the bird and was the corporation behind the brands Jennie-O, named after Olson's daughter, and Festive. Its Further Processing Division "developed . . . fourteen major products, such as turkey pan roasts, oven roasted breasts, [and] cooked turkey rolls . . . sold to over-the-counter trade and to institutional operations" (KCHS 1970:267).

The turkey industry remains a significant part of the Willmar economy, with both Jennie-O, now known as Jennie-O Turkey Store and owned by Hormel Foods Corporation, and the Willmar Poultry Company, now "the key division of a privately held turkey industry empire in Willmar called Life-Science Innovations" (Hughlett 2015), maintaining headquarters and large-scale operations there (Jennie-O Turkey Store 2016). The transportation needs of these and other industries continue to be serviced in no small part by the railroads that run through the city, which are now part of the BNSF system.

PHASE I FIELD SURVEY RESULTS

The Phase I architectural history investigation for the Willmar Wye Project identified 27 architectural history properties within the APE. Of these, one property, the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387), previously was determined eligible for listing in the National Register (Table 1). The properties surveyed include 15 current or former farmsteads, 6 houses, 2 current or former industrial facilities, 2 county ditches, and 1 railroad, (Figure 2), two of which are potentially eligible for listing in the National Register: County Ditch No. 10 (KH-DTC-002) and the Willmar and Sioux Falls Railway Company main line (XX-RRD-038).

TABLE 2. SUMMARY OF PHASE I RESULTS

Inventory No.	Property Name	Property Address	Recommendation
HE-MPC-16387	St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District		Previously found eligible
KH-WLC-072	Willmar Brick Yard	South of Highway 12, west of 30th Street NW	Not eligible
KH-WLT-001	Farmstead	5090 Highway 12 NW	Not eligible
KH-WLT-002	Farmstead	790 45th Street NW	Not eligible
KH-WLT-003	Farmstead	699 45th Street NW	Not eligible
KH-WLT-004	Farmstead	5840 7th Avenue NW	Not eligible
KH-WLT-005	Farmstead	5812 7th Avenue NW	Not eligible
KH-WLT-006	Farmstead	5591 7th Avenue NW	Not eligible
KH-WLT-007	Diamond Farm	4611 Highway 12 NW	Not eligible
KH-WLT-008	Farmstead	5550 1st Avenue W	Not eligible
KH-WLT-009	Farmstead	4746/4747 1st Avenue W	Not eligible
KH-WLT-010	Farmstead	1399 45th Street SW	Not eligible
KH-WLT-011	Farmstead	1560 45th Street SW	Not eligible
KH-WLT-012	Farmstead	2280 45th Street SW	Not eligible
KH-WLT-013	House	2460 45th Street SW	Not eligible
KH-WLT-014	Barn	45th Street SW, north of BNSF line	Not eligible
KH-WLT-015	Farmstead	3830 County Road 15 SW	Not eligible
KH-WLT-016	Farmstead	3843 15th Avenue SW	Not eligible
KH-WLT-017		3631/3637 15th Avenue SW	Not eligible
KH-WLC-135	House	3055 Highway 12 W	Not eligible
KH-WLC-136	House	101 33rd Street NW	Not eligible
KH-WLC-137	House	103 33rd Street NW	Not eligible
KH-WLC-138	House	105 33rd Street NW	Not eligible
KH-WLC-139	House	107 33rd Street NW	Not eligible
KH-DTC-001	County Ditch No. 46		Not eligible
KH-DTC-002	County Ditch No. 10		Potentially eligible
XX-RRD-038	Willmar and Sioux Falls Railway Company main line		Potentially eligible

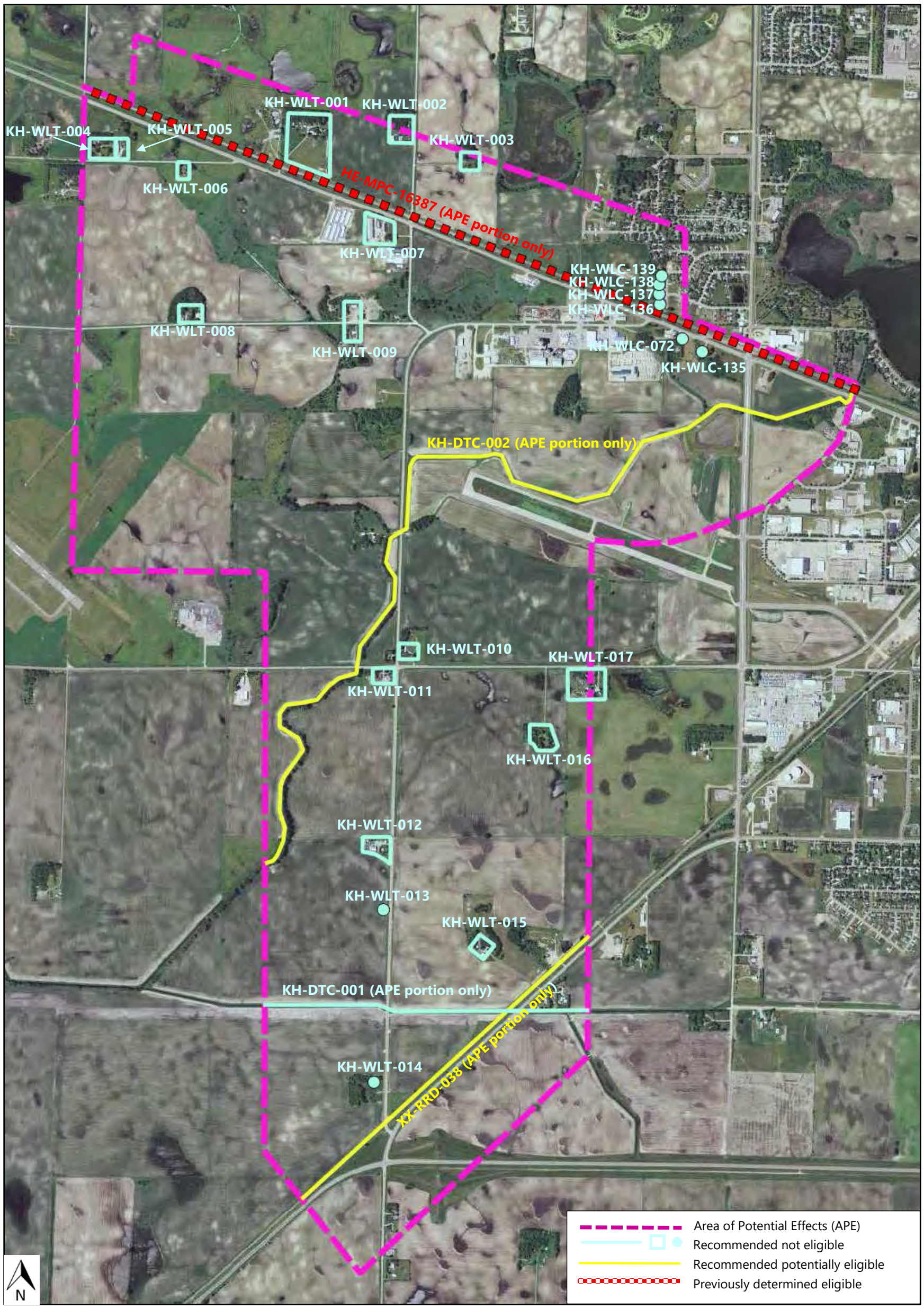

FIGURE 2. PHASE I SURVEY RESULTS

The property histories provided for the farmsteads in the following sections are based on available plat maps, which date to 1886 (North West Publishing Company), 1915 (Webb Publishing Company), 1925 (W. W. Hixson & Company), 1932 (Webb Publishing Company), 1954 (Thomas O. Nelson Company), 1957 (Farm Plat Book Publishing Company), and 1961 (Thomas O. Nelson Company), as well as aerial photographs dating to 1938, 1955, 1963, 1970, and the modern era.

4.1 HE-MPC-16387

St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District Adjacent/Parallel to TH 12

This railroad was constructed in 1862 and 1867 to 1871 by the St. Paul and Pacific Railroad as its main line from St. Paul to Breckenridge, reaching Willmar in 1869. The St. Paul and Pacific Railroad was purchased by the St. Paul Minneapolis and Manitoba Railway Company in 1879, whose properties were in turn leased and then acquired in 1890 and 1907, respectively, by the Great Northern. Under the auspices of the Great Northern, the main line reached Seattle in 1893, becoming the country's fifth and northernmost transcontinental railroad line.

In the project APE, the railroad corridor consists of a railroad roadway, which begins on the east as a double track incorporating wood ties and steel rails supported by a slightly raised rail bed before merging into a single track of the same materials approximately 0.2 mile east of 45th Street NW (Figure 3). The railroad line remains active as part of the BNSF system.

FIGURE 3. ST. PAUL AND PACIFIC RAILROAD MAINLINE AT 45TH STREET NW, LOOKING SE

4.1.1 Recommendations

This railroad corridor historic district was previously determined to be eligible for listing in the National Register.

4.2 KH-WLC-072

Willmar Brick Yard
South of TH 12, west of 30th Street NW

In 1892, the Willmar Brick Company began operations in the area south of TH 12 and west of 30th Street NW as Dehlbom, Johnson & Co., who had moved there after exhausting their supply of clay in another Willmar location. Dehlbom, Johnson & Co. was renamed the Willmar Brick Company in 1899 after Nels Flykt bought out the shares of part-owner John Dehlbom (Lawson 1905:388). Bricks, along with the later addition of clay tile, were manufactured at the site under various company names under Nels Flykt and then his son, Clarence, until 1950 (KCHS 1970:285).

When the Willmar Brick Yard was inventoried in 1985, two kilns, brick smokestacks, a brick farmhouse, and other outbuildings associated with the operations of the Willmar Brick Company were present on the site (Minnesota Historic Properties Inventory Form, KH-WLC-072, on file at the SHPO). Since that time, nearly all of the structures and buildings associated with the Willmar Brick Company have been removed, leaving a single brick smokestack (Figure 4).

FIGURE 4. WILLMAR BRICK YARD SMOKESTACK, LOOKING SE

4.2.1 Recommendations

As an appurtenance to a former kiln, the smokestack does not meet the definition of and therefore would not be evaluated as a masonry ruin under the National Register Multiple Property Documentation Form titled "Minnesota's Nineteenth-Century Masonry Ruins" (Pizza 2015:F2). Although the Willmar Brick Yard may hold significance under Criterion A within the context of Railroads and Agricultural Development in Willmar, 1869-1960s, it does not have the integrity to convey any potential significance in this regard, due to the loss of the all but one of its buildings and structures. No evidence could be located to suggest that any of the owners of the Willmar Brick Company were historically important in the brickmaking industry, but if they were, the smokestack alone would not be sufficient to convey the significance of any of these individuals under Criterion B. The smokestack, which is basic in its construction and does not incorporate any innovation in its design, does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components may lack individual distinction. It therefore does not individually meet Criterion C. The Willmar Brick Yard is therefore recommended as not eligible for listing in the National Register.

4.3 KH-WLT-001

Farmstead
5090 Highway 12 NW

Based on plat maps and historical aerial photographs, this farmstead was established sometime between 1932 and 1938. A plat map dating to the former year lists the owner as Frank R. Zwemke. In 1954, the property was owned by Wallace and Beryl Zwemke, who retained it through at least 1957.

The farmstead includes two houses, a garage, two granaries, a chicken coop, a barn, a silo, a machine shed, a Quonset building, several grain bins, and five additional outbuildings. One of the houses is a large, modern house (Figure 5). The second is a circa-1935, one-story, side-gabled house with a concrete-block foundation. It has been altered with a flat-roofed addition on the north end, fiberboard siding, and replacement windows and doors (Figure 6). Three other buildings and structures along the north edge of the farmstead appear to have been constructed around the same time as this earlier house: a garage, a granary, and a chicken coop (Figures 7 to 9). The single-bay garage has a gabled roof, covered in asphalt shingles, with exposed rafter tails. The walls are wood drop siding, and an original four-light fixed-sash window is located on the rear of the building. The superstructure is raised on wood supports, which either were placed as a measure against deterioration or may indicate that this building was moved from another location.

The granary is elevated on concrete skids. It has a gabled roof clad in wood shakes, and a four-light, fixed-sash window is located in the west gable end. Shed wings are located on the east end and the north side, both of which are accessed by sliding doors, the door to the north shed wing located on the west side of the building, and the door to the east shed wing located on the south side of the building. To the west of

FIGURE 5. 5090 HIGHWAY 12 NW, MODERN HOUSE, LOOKING NE

FIGURE 6. 5090 HIGHWAY 12 NW, CIRCA-1935 HOUSE, LOOKING NE

FIGURE 7. 5090 HIGHWAY 12 NW, GARAGE, LOOKING NW

FIGURE 8. 5090 HIGHWAY 12 NW, GRANARY, LOOKING NW

FIGURE 9. 5090 HIGHWAY 12 NW, CHICKEN COOP, LOOKING NW

the latter sliding door is a pedestrian door that provides entry to the main portion of the granary, and to the west of the pedestrian door is a small hatch door. The entirety of the building is clad in wood drop siding. The chicken coop, which is west of the granary, has a shed roof with exposed rafter tails, and the roof is covered in corrugated metal. The walls are wood lap siding. Four window openings are located on the south side, all of which have been infilled with plywood. A pedestrian door is on the east end.

Later additions to the farmstead are interspersed with these buildings along the north edge of the farmstead. To the east of the garage is a circa-1950 Quonset building on a concrete-block foundation (Figure 10). Its original wood drop siding is evident on the south (front) and north ends of the building, but the arched portion has been covered with roll roofing. Fenestration includes both original four-light, fixed-sash windows and replacement windows in the north and south walls. Rough cuts indicate these walls have been altered to create larger openings for non-original doors that allow for drive-through capacity.

On the west side of the garage is a machine shed covered in corrugated metal sheeting (Figure 11). Aerial photos show a building was placed in this location circa 1960, but any original details of the machine shed are obscured by its cladding. The obscuring of details similarly applies to a later granary with portable elevator located west of the chicken coop (Figure 12). This gable-roofed building is almost entirely covered in sheet metal panels, but original wood drop siding is visible on the north (rear) gable. Exposed rafter tails are visible on both ends of the building. One original six-light, fixed-sash window is present in the south gable, but a second window opening in the same gable is infilled with sheet metal. These visible similarities

FIGURE 10. 5090 HIGHWAY 12 NW, QUONSET BUILDING, LOOKING NW

FIGURE 11. 5090 HIGHWAY 12 NW, MACHINE SHED, LOOKING NW

FIGURE 12. 5090 HIGHWAY 12 NW, GRANARY WITH PORTABLE ELEVATOR, LOOKING NW

to the circa-1935 buildings suggest that this building may have been constructed around the same time, but if so, a 1938 aerial photograph indicates that it was moved to this location at a later date. The granary is raised on concrete skids, and it features a sliding door of vertical wood planking on both ends.

West of the granary are two heavily altered outbuildings that were put into place sometime between 1938 and 1955. The first incorporates original concrete-block walls or portions thereof (Figure 13). A gable evident over the concrete-block portion appears to constitute a later superstructure, and still later was an expansion of the building to the east, nearly doubling its size. The expanded portion and the gables above the concrete-block portion have been covered with wood drop siding, into which cuts were made to create or re-create loft doors. Original fenestration appears to be limited to the six-light fixed sash in the concrete-block portion. The roof has been covered with corrugated metal. The second outbuilding, a barn, has had vertical wood planking added to the north and south ends, which was roughly cut to create doorways (Figure 14). The west side and the roof have been clad in corrugated metal, and the east side has a slatted ventilating wall of horizontal wood planks. A pulley extends from an opening in the mow. To the northwest of the barn is a simple post and beam loafing shed (Figure 15), and to the south is a cement-stave silo (Figure 16). A third outbuilding put up during the period between 1938 and 1955 is located south of the chicken coop (Figure 17). Beyond a small exposure of horizontal wood plank siding, no original architectural details are visible on this gable-roofed building because it has been clad entirely in corrugated metal, except where openings exhibit replacement or added window and doors.

FIGURE 13. 5090 HIGHWAY 12 NW, OUTBUILDING, LOOKING S-SE

FIGURE 14. 5090 HIGHWAY 12 NW, BARN, LOOKING NE

FIGURE 15. 5090 HIGHWAY 12 NW, LOAFING SHED, LOOKING NW

FIGURE 16. 5090 HIGHWAY 12 NW, SILO, LOOKING SE

FIGURE 17. 5090 HIGHWAY 12 NW, OUTBUILDING, LOOKING NW

Aerial photographs indicate that additional outbuildings and structures present on the farmstead post-date the period of significance for Minnesota farmsteads. These include several steel grain bins (Figure 18) and a large livestock building (Figure 19) put up on the property during the mid to late 1960s, and two other livestock buildings constructed after 1970 (Figures 20 to 21). The grain bins are located to the north of the circa-1935 house, while the livestock buildings are concentrated in the southeast portion of the farmstead.

4.3.1 Recommendations

Based on the extensive, and in some cases severe, alterations to the buildings and structures on this property, combined with the conspicuous presence of the modern house, this farmstead would not have the integrity to convey any potential historical significance under National Register Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 18. 5090 HIGHWAY 12 NW, GRAIN BINS, LOOKING N

FIGURE 19. 5090 HIGHWAY 12 NW, LIVESTOCK BUILDING, LOOKING SE

FIGURE 20. 5090 HIGHWAY 12 NW, LIVESTOCK BUILDING, LOOKING SW

FIGURE 21. 5090 HIGHWAY 12 NW, LIVESTOCK BUILDING, LOOKING SE

4.4 KH-WLT-002

Farmstead

790 45th Street NW

A farmstead was established at this location sometime prior to 1886, at which time it was owned by Ole Thorson. The property remained in the Thorson family until at least 1957, during which year it was owned by Oscar Thorson.

This farmstead includes a house, a barn, a silo, and four additional outbuildings/structures. The house, which appears to have been built as a one-and-a-half-story house with gabled roof has been extensively modified through several additions, including an attached garage and adjoining extension of the house on the south, addition on the east with added bay window, and a sunporch inset in the resultant ell; the installation of vinyl siding and soffits; and the replacement of windows and doors, such that a construction date cannot be discerned (Figure 22).

Set somewhat behind the house to the west-southwest is a small, one-story storage building having a low-pitched roof, with walls and roof clad in corrugated metal (Figure 23). Its foundation is not visible. Fenestration appears original, with paired 1/1 double-hung sash windows on the east and two nine-light, fixed-sash windows on the west. What appears to be original wood framing with crown molding surrounds the windows, as well as the single-panel wood pedestrian door on the south end.

To the south of the storage building and house is a driveway that divides them from the remaining outbuildings and structures. The barn, or former barn, is banked on the north, where an original concrete-faced, mortared fieldstone foundation incorporated into the current building is evident (Figure 24). Beyond this exposure on the north edge, what is assuredly a replacement superstructure is clad in corrugated metal, as is the roof. A larger, post-1963 addition to the building extends in a perpendicular fashion from its south side. Sliding doors are present on the east and west sides of this extension, and a pedestrian door is located on the east side of the extension as well. No windows are present on the building. North of and adjacent to the banked edge is a remnant cement-stave silo (Figure 25).

A circa-1960 corrugated metal-clad Quonset building with sliding doors is located northwest of the barn (Figure 26), and a circa-1965 outbuilding, which was subsequently expanded, is to its west (Figure 27). The latter outbuilding also is clad in corrugated metal, with cuts made to accommodate an overhead door and a pedestrian door on the north side, which additionally features a sliding door. A second sliding door is located on the south side.

FIGURE 22. 790 45TH STREET NW, HOUSE, LOOKING NE

FIGURE 23. 790 45TH STREET NW, STORAGE BUILDING, LOOKING NW

FIGURE 24. 790 45TH STREET NW, BARN WITH ADDITION IN FOREFRONT, LOOKING NE

FIGURE 25. 790 45TH STREET NW, SILO, LOOKING SE

FIGURE 26. 790 45TH STREET NW, QUONSET BUILDING, LOOKING SW

FIGURE 27. 790 45TH STREET NW, OUTBUILDING, LOOKING SE

4.4.1 Recommendations

Based on the extensive alterations to nearly all of the buildings and structures on this property, this farmstead would not have the integrity to convey any potential historical significance under National Register Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.5 KH-WLT-003

Farmstead
699 45th Street SW

A farmstead was established on this property sometime prior to 1886, in which year it was owned by John Rasmusson. The Rasmusson family retained the property through at least 1932, when it was owned by Benhardt Rasmusson. A property owner is not noted for 1954, but from 1957 through at least 1961, the farmstead was owned by Harry and Thelma Solberg.

This former farmstead includes a house, barn, remnant silo, possible milk house, machine shed, granary, privy, and one other outbuilding. The circa-1880, one-and-a-half-story, front-gable-and-wing house has a poured-concrete foundation (Figure 28). With the exception of a small shed-roofed addition, the walls are clad in wood lap siding. All gables contain a decorative sunray motif underlined by the crown molding that is over the upper windows. Extending down the corners of the house from the ends of each gable are wood pilasters that mimic columns (Figure 29). A deck-roof enclosed porch is in the ell on the north side of the house; from its west side extends the previously mentioned small shed-roofed addition, which is clad in vertical wood-plank siding and contains a newer door on the west. The deck-roofed enclosed porch either is contemporaneous with the house or was enclosed not too long after its construction and represents a conscientious effort to create consistency in its appearance. It features the same wood lap siding, pilasters, and window style. Windows on the main house and the porch are largely original 1/1 double-hung sash with newer storm windows surrounded by wood frames with crown molding. The window, however, on the lower story of the west end of the house has been altered and contains a 1/1 fixed sash over an inset row of five glass blocks. It exhibits a simple, narrow wood frame with no crown molding. An original wood door is located on the south side of the wing. The roof is covered in asphalt shingles, and original wood soffits and fascia remain intact. An interior brick chimney projects above the peak of the wing.

The barn is located on the south edge of the farmstead just above a field edge. It is a circa-1920, gothic-arch, bank barn flanked on both sides by attached wings (Figure 30). The east wing was constructed circa 1965 and has a concrete-block foundation that supports a side-gabled superstructure clad in wood drop siding on the south and in horizontal wood planking on the south and east (Figure 31). Within the foundation on the south side is a central machine-door opening, to the west of which is a wood pedestrian door. These are flanked on both sides by a single glass-block window. In the upper level are regularly

FIGURE 28. 699 45TH STREET NW, HOUSE, LOOKING N-NW

FIGURE 29. 699 45TH STREET NW, HOUSE, LOOKING SW

FIGURE 30. 699 45TH STREET NW, BARN, LOOKING N

FIGURE 31. 699 45TH STREET NW, EAST WING OF BARN, LOOKING N

spaced 1/1, fixed-sash windows. A pedestrian door opening is present on the east end, while the north side contains two window similar to those on the south. The roof is clad in asphalt shingles. The west wing was constructed at an unknown date (Figure 32). Although a west wing appears on a 1938 aerial photograph of the property, the current truncation of a stone wall near the junction of the barn and wing by a poured-concrete foundation and a superstructure of horizontal wood-plank siding suggest the construction currently present dates to a later period. This wing, which has a flat roof, features regularly spaced openings for four-light, fixed-sash windows, some of which are missing, and a vertical wood-plank pedestrian door on the south side. The rear of this wing is built into the hillside.

The original, main portion of the barn is clad in wood drop siding (Figure 33). The south end faces out toward agricultural fields and features a hay hood over the mow door. The mow door is flanked on each side by a small window opening, beneath which are larger window openings, none of which contain windows. These openings are mirrored on the north side of the barn, where the larger window openings contain paired six-light fixed-sash windows. Beneath the larger window openings on the south side at ground level are two sliding doors, the eastern one of which has deteriorated. Between these doors are three window openings, one of which no longer contains a window, and the other two of which hold original four-light, fixed-sash windows. On the east side of the main barn, a pedestrian door is located at the level of the bank. The barn roof is covered in asphalt shingles.

FIGURE 32. 699 45TH STREET NW, WEST WING OF BARN, LOOKING NW

FIGURE 33. 699 45TH STREET NW, ORIGINAL BARN, LOOKING N

Near the northeast end of the gothic-arch portion of the barn is the base of a cement-stave silo (Figure 34). The small area between the barn and silo was not accessible and was therefore not visible as it is enclosed on the east side by a horizontal wood-plank wall containing a vertical wood-plank pedestrian door and on the west side by a small, concrete-block structure built into the hillside and having a pedestrian door on the north side, possibly a milk house (Figure 35). Lying on the east side of the silo is the overturned superstructure of a small, frame outbuilding with wood drop siding (Figure 36).

To the east-northeast of the barn is an outbuilding, possibly an earlier granary, in a highly deteriorated state (Figure 37). It is a gabled with a shed wing and sided with horizontal wood planking. Only the west wall was observable during the survey; a door opening and one window opening are located in this wall, but the door and window are no longer present. The roof is covered with asphalt shingles. Just northwest of this outbuilding is a gable-roofed granary, which is raised on concrete skids and blocks (Figure 38). The walls are clad in wood drop siding, and it retains original four-light, fixed-sash windows in the west gable and under the eave on the south side. A deteriorated, vertical wood-plank pedestrian door is located on the north side. The roof is covered in asphalt shingles.

North-northwest of the barn on the north side of the driveway is a side-gabled machine shed with three south-facing bays, each of which holds an overhead door of vertical wood planking (Figure 39). Although this building appears to date to the 1920s or 1930s, aerial photographs indicate that it was not in its current location until sometime after 1963, so it was likely moved from elsewhere on the farmstead. A pedestrian

FIGURE 34. 699 45TH STREET NW, SILO, LOOKING S-SW

FIGURE 35. 699 45TH STREET NW, POSSIBLE MILK HOUSE, LOOKING E

FIGURE 36. 699 45TH STREET NW, COLLAPSED OUTBUILDING, LOOKING SW

FIGURE 37. 699 45TH STREET NW, POSSIBLE EARLIER GRANARY, LOOKING NE

FIGURE 38. 699 45TH STREET NW, GRANARY, LOOKING SE

FIGURE 39. 699 45TH STREET NW, MACHINE SHED, LOOKING N

door is located on the south end of the east end of the building. Centered on the east end is a bank of three four-light, fixed-sash windows underneath a loft door, suggesting that this building has been repurposed. Two of the same type of window are on the west end of the building. The machine shed has a poured-concrete foundation, and the walls of the building are clad in wood drop siding. The roof is covered in asphalt shingles. A gable-roofed privy superstructure clad in wood drop siding is located next to the northwest corner of the machine shed (Figure 40). It has been moved and is used for storing equipment.

4.5.1 Recommendations

No evidence could be found to suggest that this farmstead was importantly associated with an event or pattern important to the development of Minnesota farming or agriculture in general and therefore it does not meet National Register Criterion A. No information was found to indicate that anyone in the Rasumusson family was historically significant with regard to agriculture, Willmar Township, or otherwise. The farmstead does not clearly illustrate the pattern of features common to a specific type or period of farming; responses to natural, economic, political, or social forces; or any of the other potential means by which a farmstead would possess the distinctive characteristics of a type, period, or method of construction. It does not represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction. It therefore does not meet Criterion C. None of the individual elements are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 40. 699 45TH STREET NW, PRIVY, LOOKING S

4.6 KH-WLT-004

Farmstead

5840 7th Avenue NW

This property, along with the one to the east at 5812 7th Avenue NW, used to constitute a single farmstead, established sometime between 1886 and 1915. In the latter year, it was owned by Christian J. Hanson, who held the property through at least 1932. In 1954, the property was owned by Johnathan Johnson, who retained it until at least 1961. The current property owner at 5812 7th Avenue NW stated that the original parcel was split the last time it was sold. Buildings located on this parcel include two houses and a barn.

The main house was built circa 1890 (Figure 41). It is one and a half stories in height with a cross-gable roof, and it exhibits a T-plan. What appears to be original wood lap siding is evident, in part, in the north and south gables. Large additions have been made on the north and west sides, the latter a two-bay attached garage, and the front (south) porch has been enclosed. Replacement siding occurs variably as fiberboard, vinyl, and a sheeting that resembles vertical wood planks in the south gable. The roof is covered in asphalt shingles and exhibits vinyl fascia and soffits. All windows and doors are replacement or have been added.

What appears to be a second house, with attached garage, is a side-gabled, converted outbuilding (Figure 42). A sliding machinery door is evident on the east end, where the wall is clad in wood lap siding and a

FIGURE 41. 5840 7TH AVENUE NW, HOUSE, LOOKING NW

FIGURE 42. 5840 7TH AVENUE NW, APPARENT SECOND HOUSE, LOOKING NE

concrete-block foundation is visible, as it is on the west. The front (south) of the house has been covered with board and batten siding and a decorative stone treatment between the garage and front door, the latter of which is flanked by added sliding windows. A second pedestrian door is located on the west side of the garage, while a shed-roofed addition is located on the rear of the garage. The roof is clad in asphalt shingles and exhibits vinyl fascia and soffits, which are falling off.

The circa-1945, gothic-arch barn has a poured-concrete foundation (Figure 43). Its lower walls are structural tile, and the walls in the arches are wood siding, the south arch containing drop siding, which is original and deteriorating, and the north arch containing replacement lap siding, which is intact. The roof is covered in wood shakes and features a hay hood over the mow door. Fenestration, where intact, consists largely of original four-light and six-light fixed sash. Some of the windows are no longer present in the south arch, although the openings remain. Dutch doors are located on the east and west sides of the barn, and a pedestrian door is located in the center of the south end. Another pedestrian door opening at the east end of the south end has been infilled with plywood. A sliding door of vertical wood planking is present on the rear of the building.

4.6.1 Recommendations

Extensive alterations have been made to the house and an outbuilding on this property and to the Quonset barn on the neighboring property, and a modern house has been constructed on the neighboring property (see next section). The combination of these occurrences has resulted in a substantial loss of integrity to

FIGURE 43. 5840 7TH AVENUE NW, BARN, LOOKING NE

the farmstead that once comprised both properties, such that it would not be able to convey any potential significance under Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.7 KH-WLT-005

Farmstead
5812 7th Avenue NW

This property, along with the one to the west at 5840 7th Avenue NW, used to constitute a single farmstead, the history of which is provided in Section 4.6. The current property owner at 5812 7th Avenue NW indicated that the original parcel was split the last time it was sold. Buildings located on this parcel include a modern house (Figure 44) and a Quonset barn.

The circa-1945 Quonset building is clad in corrugated metal and has a concrete-block foundation (Figure 45). Fenestration largely consists of original six-light, fixed sash. Skylights on the west and east sides of the building have been covered with corrugated metal. A wood, apparently original, pedestrian door is located on the rear (north) end of the barn, as is a central overhead door. This door replaces a sliding door, for which the rail support is still present. A sliding door sheathed in corrugated metal is present on the front of the barn, underneath a hinged, vertical wood-plank mow door.

FIGURE 44. 5812 7TH AVENUE NW, MODERN HOUSE, LOOKING NE

FIGURE 45. 5812 7TH AVENUE NW, BARN, LOOKING NE

4.7.1 Recommendations

A modern house has been constructed on this property, which was formerly one with that at 5840 7th Avenue NW. Alterations have been made to the Quonset barn on this property and to the house and an outbuilding on the neighboring property (see previous section). The combination of these occurrences has resulted in a substantial loss of integrity to the farmstead that once comprised both properties, such that it would not be able to convey any potential significance under Criterion A, B, or C. The Quonset barn is not an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.8 KH-WLT-006

Farmstead
5591 7th Avenue NW

Aerial photographs and plat maps indicate that a farmstead was established on this property between 1938 and 1954. Plat maps dating to the latter year and 1957 indicate that it was located on 112 acres owned by George F. Dunlavy, upon which were also located the farmstead described in section 4.10, below.

This former farmstead contains a house, machine shed, and a large modern metal building, which replaces the original barn (Figure 46). The circa-1945, one-and-a-half-story, Minimal Traditional house with attached garage has a concrete-block foundation and is clad in masonite siding (Figure 47). Poured-concrete stairs lead up to an original wood door, sheltered by a metal awning with decorative iron brackets. The cross-gabled roof is covered in asphalt shingles, and a brick interior chimney projects from its south side. Fenestration includes both original and replacement 1/1 double-hung sash windows. The attached single-bay garage has the original wood overhead door and adjacent wood pedestrian door.

The machine shed is a gable-roofed, wood lap-sided building with a poured-concrete foundation (Figure 48). What was once a sliding door of vertical wood planking on the front (north) of the building is now detached from the rail and is propped up by metal poles, as is the pedestrian door on the west side of the building. Fenestration consists of original four-light, fixed sash on the west and east sides of the building. The roof features exposed rafter tails and is covered in asphalt shingles.

4.8.1 Recommendations

The removal of the original barn and its replacement with a large modern metal building leaves only the house and machine shed from the period of significance for Minnesota farms. Although these buildings are generally intact, without other elements of the farmstead they would be unable to convey any potential significance of the farmstead under Criterion A, B, or C, and neither is an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 46. 5591 7TH AVENUE NW, MODERN METAL BUILDING, LOOKING S

FIGURE 47. 5591 7TH AVENUE NW, HOUSE, LOOKING SE

FIGURE 48. 5591 7TH AVENUE NW, MACHINE SHED, LOOKING SE

4.9 KH-WLT-007

Diamond Farm
4611 Highway 12 NW

Access to this property was not permitted by the landowner, requiring the survey to be conducted from publicly accessible points. The property is primarily occupied by a poultry processing facility of the Willmar Poultry Company known as the Diamond Farm, the functions for which are housed in two Quonset buildings, a large rectangular-plan, gable-roofed building, and a small, gable-roofed office building, all of which are located inside a chain-link fence, and all of which have are clad in corrugated metal (Figures 49 to 52). Additionally located on the property, outside of the fence, are a house and a garage.

A 1955 aerial photograph shows the property as having been recently graded and a Quonset building present. By 1963, two much longer Quonset buildings flanked it, one each on the east and west, and the house and garage had been built. Sometime between 1970 and 1991, the two longer Quonset buildings were replaced by one of similar size to the first on the east, and the large gable-roofed building on the west. Because the two existing Quonset buildings are identical, it is likely that the circa-1955 Quonset building was replaced with one of similar size, or at least re-clad during the 1970-1991 period. The one-and-a-half-story, L-plan house and gable-roofed, single-bay garage both appear to have recently received replacement siding, windows, and doors, and asphalt-shingle roof with vinyl soffits and fascia (Figures 53 to 54).

FIGURE 49. DIAMOND FARM, QUONSET BUILDING 1, LOOKING NW

FIGURE 50. DIAMOND FARM, QUONSET BUILDING 2, LOOKING NW

FIGURE 51. DIAMOND FARM, LARGE FACILITY, LOOKING SW

FIGURE 52. DIAMOND FARM, OFFICE, LOOKING W-NW

FIGURE 53. DIAMOND FARM, HOUSE, LOOKING W

FIGURE 54. DIAMOND FARM, GARAGE, LOOKING SE

4.9.1 Recommendations

It is possible that this facility is the outgrowth of an earlier one of the farms established by the Willmar Poultry Company beginning during the late 1950s to handle overages in the poult population (see p. 8). No information, however, could be found to substantiate an association between the owner of the property during the late 1950s and early 1960s, Harold Ditmarson, and the Willmar Poultry Company. Even if such a connection could be made, however, only one of the industrial buildings remaining on this property may date prior to 1970, and if it does, it was likely re-clad after that year. The exterior of the house and the garage have been substantially updated in cladding, fenestration, and roofing. For these reasons, the Diamond Farm would not have the integrity to convey any potential significance under Criterion A, B, or C. This property is therefore recommended as not eligible for listing in the National Register.

4.10 KH-WLT-008

Farmstead

5550 1st Avenue W

A farmstead was established on this property sometime prior to 1886, in which year it was owned by Austin Corbin. By 1915, the property had been transferred to John Anderson, who continued to own the property through at least 1925. In 1932, it was owned by Nels Njus, and in 1954, by Geo. F. Dunlavy, who retained it through at least 1961.

The former farmstead comprises a house, silo, and former granary. The original, circa-1880, T-plan house with cross-gabled roof is two stories in height, but it has been substantially modified through enclosure of the front porch and one-story additions to the east and west ends, the additions on the latter end consisting of an enclosed breezeway and an attached garage (Figure 55). The original construction visible above the additions is clad in wood lap siding, while the newer construction is covered in vinyl siding. Windows are in a multitude of styles and configurations, including a picture window with side casements on the façade; replacement, 1/1 double-hung sash; a bay window on the east end of the east addition; a nine-light fixed-sash window in the breezeway; and a fixed octagonal window in the garage. A newer door is within the front entry. The roof is entirely clad in asphalt shingles, but varying color and condition indicates that portions have been redone more recently than others.

A cement-stave silo is present to the southeast of the house, but the associated barn has been razed (Figure 56). To the southwest of the house is a gable-roofed former granary with shed wing, which is raised on boulders (Figure 57). The gable-roofed portion is clad in wood lap siding on the south and east, and wood drop siding on the north. The shed wing is covered in corrugated metal, as is the roof of the gable-roofed portion. All openings have been infilled with wood planks, except for a 6/6 double-hung sash window on the rear of the building, which appears to have been added, and the pedestrian door on the east side. A dog door has been added to the east side, and this building currently serves as a doghouse. Sliding doors are located on both ends of the shed wing.

FIGURE 55. 5550 1ST AVENUE W, HOUSE, LOOKING N

FIGURE 56. 5550 1ST AVENUE W, SILO, LOOKING E-SE

FIGURE 57. 5550 1ST AVENUE W, GRANARY, LOOKING NW

4.10.1 Recommendations

Based on the alterations to the house and granary, combined with the removal of the barn and any other historically present outbuildings, this farmstead would not have the integrity to convey any potential historical significance under National Register Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.11 KH-WLT-009

Farmstead

4746/4747 1st Avenue W

The ownership of this property on both sides of 1st Avenue West by a single owner began sometime between 1886 and 1915. In the latter year, it was owned by the Anderson Land Company, perhaps affiliated with John Anderson, who owned the property to the west (see Section 4.10). The Anderson Land Company held the property through at least 1925. Between that year and 1932, a house was built on the south side of 1st Avenue West, but in 1932, the property was owned by the State Bank of New London. By 1954, the property, still incorporating both sides of the road, was owned by Harold and Elsie Ditmarson, as was the case through at least 1961.

This former farmstead includes a modern house located on the south side of 1st Avenue W (Figure 58), and a barn, root cellar, and post-1970 machine shed (Figure 59) on the north side of the road. The root cellar, of unknown date, is constructed of poured concrete built into an artificially created hill (Figure 60). A deteriorating plywood pedestrian door provides access to it.

The circa-1930, gothic-arch barn has a concrete-block foundation and lower walls, while the upper walls within the arch are clad in wood drop siding (Figure 61). It incorporates an attached, concrete-block milk house on the north end (Figure 62). Fenestration consists primarily of replacement four-light, fixed-sash windows, two symmetrically placed in each of the north and south arches; regularly spaced along the lower walls on the east and west sides; and one in the north lower wall. One single-light, fixed-sash window has been added to each the lower wall of the south end and the west side of the milk house. A glass-block window is present in the north end of the milk house. The front (south) end of the barn has a pent roof, underneath of which is a central replacement overhead door and a new pedestrian door to its west. A second pedestrian door is located in the east side of the milk house. A larger livestock/machinery door opening on the north end of the barn has been sealed off. The barn roof is clad in asphalt shingles, and a shed-roof dormer that once contained the hay-loft door projects from the west side, the opening now infilled.

FIGURE 58. 4747 1ST AVENUE W, MODERN HOUSE, LOOKING SW

FIGURE 59. 4746 1ST AVENUE W, MACHINE SHED, LOOKING NW

FIGURE 60. 4746 1ST AVENUE W, ROOT CELLAR, LOOKING W

FIGURE 61. 4746 1ST AVENUE W, BARN, LOOKING NE

FIGURE 62. 4746 1ST AVENUE W, BARN AND MILK HOUSE, LOOKING SW

4.11.1 Recommendations

Only the barn, which has been altered, and possibly the root cellar remain standing from the period of significance for Minnesota farms; without any other elements of the farmstead present, they would be unable to convey any potential significance of the farmstead under Criterion A, B, or C. Neither is an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.12 KH-WLT-010

Farmstead
1399 45th Street SW

A farmstead was established in this location sometime prior to 1886, as indicated by the house pictured on the plat map of that year, but the 40 acres within which the house was located, along with the adjacent 120 acres to its northeast, were by that time owned by the St. Paul Minneapolis and Manitoba Railway Company. Between 1886 and 1915, the parcels were reconfigured, and in the latter year, the house and its 40 acres, along with the adjacent 40 acres on the north and east, were owned by Minnie Weber et al., which continued to be the case through at least 1925. In 1932, the 120 acres were owned by the Universalist General Convention, a religious organization, although map symbology indicates that at least the house was owned by the property owner who held the 160 acres to the south, Berthal K. Arvig. As of 1954, the 120 acres and house were owned by Herman and Lydia Pehling, who remained the property owners through at least 1961.

This farmstead property includes a house, garage, two chicken coops, and seven outbuildings. Aerial photographs indicate that the garage, chicken coops, and one of the outbuildings, a modern metal building, were all constructed after 1991, during which period a barn with silo in the vicinity of the metal building was torn down (Figures 63 to 65).

The cross-gabled house is a variable one and a half stories in height, as the gable on the west section of the house does not extend to the height of the others (Figure 66). The upper levels of the higher-gabled sections are incongruous, but original wood window trim around the windows under and near the north-side gable suggests this exterior wall is of the original configuration; the remainder of the upper north wall and the upper walls on the south and east sides either lack fenestration or have newer windows and trim, which along with the incongruity suggests that the upper levels were built up and out from the original configuration on these sides (Figures 67 and 68). The windows on the lower level also have been replaced, with the exception of a stained-glass window located on the east side of the house, which remains above a newer picture window surrounded by the original wood trim. Similarly, the replacement door to its north is within the original wood door frame. This side of the house features an open porch, the roof supported by spindlework posts and situated under a newer balcony. A deck has been built to extend off of the porch. An open porch with similar posts and also extended by a deck is located on the south side of the west

FIGURE 63. 1399 45TH STREET SW, MODERN GARAGE, LOOKING SE

FIGURE 64. 1399 45TH STREET SW, CHICKEN COOPS, LOOKING NE

FIGURE 65. 1399 45TH STREET SW, MODERN METAL OUTBUILDING, LOOKING NW

FIGURE 66. 1399 45TH STREET SW, HOUSE, LOOKING NE

FIGURE 67. 1399 45TH STREET SW, HOUSE, LOOKING S

FIGURE 68. 1399 45TH STREET SW, HOUSE, LOOKING W-NW

section, and the wall here contains a replacement window and door. Replacement windows are located on the remaining walls of this section, although those on the north side are surrounded by original wood trim. The walls of the house are wood lap siding and are supported on a stone foundation. The roof is covered in asphalt shingles, and an interior brick chimney projects from its peak above the west section.

Approximately 150 feet northeast of the house is a front-gabled outbuilding on a concrete foundation (Figure 69). It is clad in a variety of materials due to any number of alterations. Wood drop siding is present on the west wall, which also features sliding, vertical wood-plank doors. The north wall and the roof are covered in corrugated metal, while the south side features board-and-batten siding. This side contains the only window opening, which is framed for a fixed four-light window, but the glass has broken out and the opening covered over from the interior.

To the west of the house is a semicircle of four outbuildings, all of which have had overhead doors added to them and now resemble garages. From south to north, the first of these outbuildings is a front-gabled, two-bay garage clad in board-and-batten siding (Figure 70). It has no foundation but is raised on wood blocks. The roof is covered in asphalt shingles and has plywood soffits. Two single-light, fixed windows on the south wall constitute the only fenestration on this building. The next, front-gabled outbuilding is one and a half stories high, features a poured-concrete foundation, and appears to be a former poultry house (Figure 71). Fenestration consists of six six-light, fixed-sash windows on the south side and one of the same type on the west end. On the east end, a loft door is situated over the added metal overhead door. A vertical wood-plank pedestrian door is present on the north side. This building is clad in wood lap siding and has an asphalt-shingle roof. The third in this group of outbuildings is also front gabled (Figure 72). It is raised on boulders. Original wood lap siding is evident on the north end; the remainder has been clad in vinyl siding. The roof is covered in corrugated metal. This building has no windows, but a wood, single-panel pedestrian door containing a six-light window is located on the south side. The final building in this group features a substantial poured-concrete foundation, which appears would have supported a superstructure more substantial than the front-gabled, half-story one clad in wood drop siding which is currently present (Figure 73). Two windows are present on the building, a four-light, fixed-sash window on the south end, and a single-light replacement window on the west side. The edge of a pedestrian door is visible on the east side, but its details were obscured by a tall fence. The roof features exposed rafter ends and is clad in asphalt shingles.

Nearly adjacent to and north of the modern metal building is a granary, which aerial photographs indicate was moved to its current location after 1991 (Figure 74). The circa-1920, gable-roofed granary is raised on wood skids and clad in wood drop siding. A single window opening is present in the south gable, but the window is no longer present. A pedestrian door has been fashioned by making cuts in the siding on the east side. The roof is clad in asphalt shingles and features exposed rafter tails.

FIGURE 69. 1399 45TH STREET SW, OUTBUILDING, LOOKING SE

FIGURE 70. 1399 45TH STREET SW, GARAGE-LIKE BUILDING 1, LOOKING SW

FIGURE 71. 1399 45TH STREET SW, GARAGE-LIKE BUILDING 2, LOOKING NW

FIGURE 72. 1399 45TH STREET SW, GARAGE-LIKE BUILDING 3, LOOKING NW

FIGURE 73. 1399 45TH STREET SW, GARAGE-LIKE BUILDING 4, LOOKING NE

FIGURE 74. 1399 45TH STREET SW, GRANARY, LOOKING SW

4.12.1 Recommendations

Extensive alterations have been made to the house and the majority of the outbuildings on this farmstead. Due to these alterations, the loss of the barn and silo, and the addition of the modern metal building and garage, this farmstead would not have the integrity to convey any potential significance under Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.13 KH-WLT-011

Farmstead
1560 45th Street SW

Historical plat maps and aerial photographs indicate that a farmstead was established in this location between 1932 and 1938. The property owner as of 1954 was Thomas Erickson, and he remained so through at least 1961.

The former farmstead is now a tree service yard, but a house, barn, and poultry house are present on the property, along with a modern metal building that serves as the office for the tree service company (Figure 75). Whatever the original appearance of the house, it is now obscured by vinyl siding, new windows and doors, a new asphalt shingle-covered roof with vinyl soffits, and expansion horizontally and perhaps vertically as well (Figure 76).

FIGURE 75. 1560 45TH STREET SW, MODERN METAL BUILDING, LOOKING SW

FIGURE 76. 1560 45TH STREET SW, HOUSE, LOOKING NE

The barn has not been maintained and is in a state of deterioration (Figure 77). It features a poured-concrete foundation and wood drop siding. The gambrel roof is clad in wood shakes and exhibits exposed rafter tails. On the north end, a hay hood extends over the mow door, which is flanked by window openings containing broken six-light, fixed-sash windows. Similarly placed windows have broken out of the south end. What remains of the windows, either broken or infilled, on the lower level of the building indicates that these were also six-light fixed sash. A sliding door at the west end of the north end of the barn has come off the rails and is propped against the wall. At the east end of the north end is a Dutch door. Pedestrian door openings are at both ends of the south wall, the western one of which contains a vertical wood-plank door, and the eastern one of which is empty. A central pedestrian opening is empty and blocked by debris. The remnant of an attached gable and discoloration indicates that this central opening provided a connection between the main barn and a small, gable-roofed extension on its south end.

Aerial photographs demonstrate that the poultry house, although likely original to the farmstead, was moved to its current location sometime between 1970 and 1991 (Figure 78). The gabled roof is covered in asphalt shingles and features exposed rafter tails. The building has a poured-concrete foundation and is clad in wood drop siding. Regularly spaced, original six-light, fixed-sash windows are present on the east side of the building, and a single four-light, fixed-sash window is located on the south end. No window openings are present on the north or west side. A sliding door, sheathed in corrugated metal, is located on the north end of the building and a narrow pedestrian door of vertical wood planking is on the east side.

FIGURE 77. 1560 45TH STREET SW, BARN, LOOKING SW

FIGURE 78. 1560 45TH STREET SW, POULTRY HOUSE, LOOKING W

The south end features a Dutch door, also of vertical wood planking. Loft doors are present in the north and south gables.

4.13.1 Recommendations

Extensive alterations have been made to the house on this property, and the poultry house was moved after the period of significance for Minnesota farms. These occurrences, combined with the removal of other outbuildings and the conversion of the property to a tree service yard have resulted in a substantial loss of integrity to the farmstead, such that it would not be able to convey any potential significance under Criterion A, B, or C. Although the barn and poultry house are generally intact, neither constitutes an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.14 KH-WLT-012

Farmstead
2280 45th Street SW

Historical plat maps and aerial photographs indicate that this farmstead was established between 1925 and 1932, and in the latter year, it was owned by Rose Herman. By 1954, ownership had transferred to J. W. and Seina Boog, who retained the property until at least 1961.

The farmstead includes a complement of buildings, about half of which are modern, and several corrugated-metal grain bins (Figure 79). The modern buildings, some of which date to the twenty-first century, are all large metal buildings (Figures 80 to 84). The remaining buildings are the house, a likely milk house, a granary, a small barn, and a Quonset outbuilding. Although the current property owner indicated a construction date of circa 1945 for the one-and-a-half-story, gable-roofed house, a circa-1930 date is supported by a 1932 plat map and 1938 aerial photograph. In either case, it has been substantially altered through the addition of an enclosed front porch, the construction of one-story additions on the south side and rear (west) end, the cladding of its entirety in vinyl siding, the installation of replacement windows and doors, and the installation of vinyl soffits and fascia (Figure 85). The foundation of the house is concrete block, and the roof is covered with asphalt shingles. Shed dormers project from each side of the roof, and a brick interior chimney rises above the peak.

An outbuilding that the current owner's children used as a playhouse, perhaps originally a milk house, is located near the eastern end of the farmstead (Figure 86). It has a low-pitched, gabled roof, wood lap siding, and a single pedestrian door of vertical wood planks. The roof is covered in asphalt shingles.

Beyond the modern metal buildings to the west of the possible milk house is a granary, which similarly has a gabled roof, wood lap siding, and a roof covered in asphalt shingles (Figure 87). The roof, however, has a higher pitch and features exposed rafter tails. A sliding door of vertical wood planks is located on the south side of the building, and the superstructure rests on concrete skids.

FIGURE 79. 2280 45TH STREET SW, GRAIN BINS, LOOKING NW

FIGURE 80. 2280 45TH STREET SW, MODERN METAL BUILDING 1, LOOKING SW

FIGURE 81. 2280 45TH STREET SW, MODERN METAL BUILDING 2, LOOKING NW

FIGURE 82. 2280 45TH STREET SW, MODERN METAL BUILDING 3, LOOKING SW

FIGURE 83. 2280 45TH STREET SW, MODERN METAL BUILDING 4, LOOKING NE

FIGURE 84. 2280 45TH STREET SW, MODERN METAL BUILDING 5, LOOKING SE

FIGURE 85. 2280 45TH STREET SW, HOUSE, LOOKING NW

FIGURE 86. 2280 45TH STREET SW, "PLAYHOUSE," LOOKING NE

FIGURE 87. 2280 45TH STREET SW, GRANARY, LOOKING NE

A bit farther west is the small barn, which has a poured-concrete foundation (Figure 88). Its gable roof is clad in asphalt shingles and has exposed rafter tails, and the walls are clad in wood drop siding. Original four-light, fixed-sash windows are present on the sides and in the south gable, though some of the panes have been broken out. The window in the gable is centered over a loft door, which in turn is over a Dutch door, both doors made of vertical wood planks. Crude openings have been cut into the base of the superstructure on the east side, at least one of which is boarded in.

The Quonset building, which dates to circa 1960, has a poured-concrete foundation and corrugated-metal siding (Figure 89). Sliding doors are located on the south end, above which are two original four-light, fixed-sash windows.

4.14.1 Recommendations

Extensive alterations have been made to the house, and several massive, modern outbuildings have been constructed on and dominate the visual aspect of this property. The farmstead would therefore be unable to convey any potential significance under Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 88. 2280 45TH STREET SW, SMALL BARN, LOOKING NE

FIGURE 89. 2280 45TH STREET SW, QUONSET, LOOKING NW

4.15 KH-WLT-013

House

2460 45th Street SW

This one-story, Ranch-style house with concrete-block foundation and attached two-bay garage was built circa 1965 (Figure 90). The walls are clad in masonite siding and the side-gabled roof in asphalt shingles; the roofing is newer, and the soffits and fascia are vinyl. A brick interior chimney extends above the roof. At the front of the house, poured-concrete steps lead up to a centrally placed door. Fenestration consists primarily of original casement windows, quadrupled to create a picture window on the façade and paired otherwise. Single-pane, fixed-sash windows are located in the garage and at the basement level on the north and west sides of the house. The garage has two replacement overhead doors, next to which on the north is a pedestrian door.

4.15.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript house that alludes to but does not exhibit any notable architectural hallmarks of the Ranch style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 90. 2460 45TH STREET SW, HOUSE, LOOKING SW

4.16 KH-WLT-014

Barn

45th Street SW, north of BNSF line

A farmstead was established in this location between 1886 and 1915 and was owned by Andrew Larson in the latter year through at least 1925, according to historical plat maps. In 1932, the property was owned by Clara Tallman, and then in 1954 by Horace and Alice Hartjen. By 1957, ownership had transferred to E. T. Krumweide.

Access to this property was not permitted by the landowner, requiring the survey to be conducted from 45th Street SW. This former farmstead has been reduced by the removal of all other buildings to a single, abandoned barn (Figure 91), which aerial photographs indicate was built in this location sometime between 1938 and 1955. The barn, gable-roofed with a shed wing, has a poured-concrete foundation (Figure 92). The walls are clad in wood lap siding. Window openings have all been infilled, except in two cases on the south side, in which the infill has been broken out. A pedestrian doorway on the east side of the barn also has been infilled. A partially intact Dutch door and a pedestrian door are present on the north side of the building, while a sliding door is located on the south. Two loft doors are located on each end of the barn in positions that mirror each other, near the junction of the main massing and the shed wing, although one on the north end is broken out. The roof of the barn is clad in wood shakes, and it features exposed rafter tails and a hay hood over the mow doors on the south.

FIGURE 91. BARN, 45TH STREET SW, LOOKING NW

FIGURE 92. BARN 45TH STREET SW, LOOKING SW

4.16.1 Recommendations

With only a barn present, this property would not have the integrity to convey any potential significance of the former farmstead under Criterion A, B, or C. The barn is not an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

4.17 KH-WLT-015

Farmstead

3830 County Road 15 SW

Although a house undoubtedly associated with a farmstead was present on the 80 acres within which this property is located in 1886, maps dating to 1915 and 1925 do not show a house here. The property owner in 1915 and 1925 was Harold B. Handy, as was the case in 1932, the next year in which a plat map shows a house at this location. In 1954, the farmstead was owned by Gilbert and Bertha Marzuardt, and then in 1957 by E. and E. Levik.

This former farmstead comprises a house, garage, a machine shed, a loafing shed, and two outbuildings. The one-and-a-half-story house with attached garage, if not constructed in the modern era, has been substantially expanded and updated such that any original construction is completely obscured (Figure 93).

FIGURE 93. 3830 COUNTY ROAD 15 SW, HOUSE, LOOKING E

It has a side-gabled roof with four front-facing and one rear-facing gabled dormers, an open front porch in front of a recessed front entry, and a small perpendicular wing off the back (northeast) side of the house, at the end of which is a wide, brick exterior chimney. It is clad in vinyl siding, has newer windows and doors throughout, and has vinyl soffits and fascia. The foundation is concrete block.

A gable-roofed building with overhead door that appears as a detached garage is located to the east of the house; however, no driveway leads to it, suggesting that it currently serves some other function (Figure 94). The walls are wood lap siding, except in the gable, which may constitute an addition to the original building. The gable contains replacement siding underlined by wood shakes, which angle down and out from the base of the gable to the edges of the eaves, which have vinyl soffits. Within the gable is a nine-light casement window. The gabled roof has vinyl fascia and soffits, and is clad in asphalt shingles.

Across the driveway from the house to the southwest is a large, gable-roofed outbuilding clad in metal siding (Figure 95). It features a large central overhead door, flanked on either side by newer pedestrian doors and beyond those, new windows. Historical aerial photographs show a large barn in this location, but it is oriented on the opposite axis. This building therefore either represents a post-1963 reconfiguration or post-1963 construction.

FIGURE 94. 3830 COUNTY ROAD 15 SW, GARAGE-LIKE BUILDING, LOOKING SE

FIGURE 95. 3830 COUNTY ROAD 15 SW, METAL OUTBUILDING, LOOKING SW

The remaining outbuildings and structures are to the northwest: a circa-1945, side-arched Quonset machine shed clad in corrugated metal with a poured-concrete foundation (Figure 96); a shed-roofed loafing shed clad in corrugated metal (Figure 97); and a side-gabled outbuilding with wood drop siding and a poured-concrete foundation (Figure 98). The latter may contain original four-light windows in the southeast end, but several other windows and the loft door have been infilled with plywood. Two doors are located on the southwest side of the building, a pedestrian door of vertical wood planking and a wider hinged door of the same. A small, informal shade has been made by extending a corrugated-metal sheet in a shed-roofed fashion from the northwest end of the southwest face of the building to connect to wooden fencing a few feet to its southwest.

4.17.1 Recommendations

Based on the extensive alterations to or replacement of the house and the main barn, alterations to the side-gabled outbuilding, and the loss of other outbuildings that are evident in historical aerial photographs, this property would not have the integrity to convey any potential significance of the former farmstead under Criterion A, B, or C. None of the individual elements of the farmstead are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 96. 3830 COUNTY ROAD 15 SW, MACHINE SHED, LOOKING N

FIGURE 97. 3830 COUNTY ROAD 15 SW, LOAFING SHED, LOOKING SE

FIGURE 98. 3830 COUNTY ROAD 15 SW, OUTBUILDING, LOOKING E

4.18 KH-WLT-016

Farmstead

3843 15th Avenue SW

The 1886 plat map depicting this property shows a house in the same location as on plat maps dating to 1932 and later, although no house is shown on maps dating to 1915 and 1925. The property owner in 1886 was Christen Arneson. In the year 1915 through at least 1932, it was Berthal K. Arvig. The property remained in the Arvig family through at least 1961, with Jesse and Isabel Arvig indicated as the owners on maps dating between 1954 and 1961.

Access restrictions were placed on the survey of this former farmstead, preventing the obtainment of details on each of the buildings and structures. Comparison, however, of recent aerial photography shows that the house currently present is of very recent construction (Figures 99 and 100), as is a greenhouse to its southwest (Figure 101), all but one outbuilding has been removed, and nearly all trees have been cleared. The only remnants of the farmstead are a partial cement-stave silo (Figure 102) and a corrugated-metal machine shed (Figure 103).

4.18.1 Recommendations

Based on the extensive alterations to this property, it would not have the integrity to convey any potential significance of the former farmstead under Criterion A, B, or C. Neither the silo nor the machine shed is an especially distinctive example of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 99. 3843 15TH AVENUE SW, RECENT BIRDS' EYE VIEW (LEFT) AND 2016 AERIAL (RIGHT) (NORTH IS TO THE RIGHT)

FIGURE 100. 3843 15TH AVENUE SW, HOUSE, LOOKING SW

FIGURE 101. 3843 15TH AVENUE SW, GREENHOUSE, LOOKING SW

FIGURE 102. 3843 15TH AVENUE SW, SILO, LOOKING SE

FIGURE 103. 3843 15TH AVENUE SW, MACHINE SHED, LOOKING SW

4.19 KH-WLT-017

3631/3637 15th Avenue SW

No buildings are shown at this location on plat maps dating through 1932. A house and single outbuilding can be seen on the 1938 aerial photograph of the property, and what appears to be a farmstead is visible in this location on a 1955 aerial photograph. In 1954, the earliest plat map to show a house at this location, it was within a five-acre parcel owned by Theda Klosterboer, with the remainder of the quarter-section owned by Harvey and Della Wibbels, which was also the case in 1961.

A response regarding access to this property was not provided by the landowner. For this reason, and for safety reasons given the condition of and materials on this property, the survey was conducted from the driveway. This former farmstead currently includes two houses, a garage, and an outbuilding, and it currently functions as a junkyard. The house farthest from the road is nearer to the outbuilding, and was likely built circa 1938, as only the house and outbuilding appear on the aerial photograph of that year (Figure 104). This side-gabled, one-and-a-half-story house, which has a concrete-block foundation, has been covered with vinyl siding and has replacement windows and doors. The roof, which features a shed dormer on each side, is clad in asphalt shingles and has vinyl fascia and soffits.

The front-gabled outbuilding is constructed of concrete block, and the gable is clad in replacement siding, likely metal (Figure 105). The gable contains metal-sheathed loft doors, which are the only indicator that this building may once have served an agricultural function. It now appears to be a storage/office building, with a newer garage door on the east end and a newer pedestrian door on the north side. The window openings on this north side have been infilled. An addition off the west end of the building was put on sometime between 1970 and 1991.

A second one-and-a-half-story house, this one cross-gabled, is located nearer to the road, and aerial photographs show it was put in place circa 1960 (Figure 106). Based, however, on its appearance, which does not reflect architecture of that era, it was moved from another location. This house similarly is on a concrete-block foundation, has been clad in vinyl siding, and has replacement doors and windows; an asphalt-shingle roof, and vinyl fascia and soffits. The detached two-bay garage off of its southwest corner was built sometime after 1991 (Figure 107).

4.19.1 Recommendations

Given the extensive alterations to this property, both to the buildings and as a whole, it would not have the integrity to convey any potential significance of the former farmstead under Criterion A, B, or C. None of the individual elements are especially distinctive examples of architecture or design as required by the Farms Context for significance under Criterion C (Granger and Kelly 2005:7.20). This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 104. 3637 15TH AVENUE SW, HOUSE, LOOKING SW

FIGURE 105. 3637 15TH AVENUE SW, MAINTENANCE BUILDING, LOOKING SW

FIGURE 106. 3631 15TH AVENUE SW, HOUSE, LOOKING NW

FIGURE 107. 3631 15TH AVENUE SW, GARAGE, LOOKING W

4.20 KH-WLC-135

House

3055 Highway 12 W

Based on a conversation with its current owner, this house was constructed for his parents in 1965. It is a one-story, L-plan house with an attached three-bay garage, and it has a concrete-block foundation (Figure 108). The property owner indicated that upon his parents' passing, the third, easternmost bay of the garage was added on, the entirety of the house and garage was clad in vinyl siding, and the vinyl soffits were added. The house retains several original 1/1 double-hung sash windows and Chicago-style picture windows, the latter located on the back (north) side of the house. Windows on the front (north) of the east ell of the house appear to be added or replacement sliding windows. Insets containing a row of five glass blocks are located in the basement level on the north end of the house, while fixed, single-light windows are in the same level on the west side. The cross-gabled roof is clad in asphalt shingles, and an interior brick chimney extends above the peak of the ell.

4.20.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript, and modified house that does not exemplify a specific architectural style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 108. 3055 HIGHWAY 12 W, HOUSE, LOOKING SW

4.21 KH-WLC-136

House

101 33rd Street NW

This one-and-a-half-story, side-gabled house with concrete-block foundation was built in 1957 (Figure 109). The house has been altered with the addition of a shed-wing, open front porch; vinyl siding, soffits, and fascia; and replacement doors and windows. The middle section of the house, which connects to the garage, extends in an incongruous fashion off the rear of the house, suggesting it was expanded or added between the original house and garage prior to the re-siding. The roof is covered in asphalt shingles, and an interior brick chimney rises above the peak. A modern, detached garage/workshop is located to the southeast of the house (Figure 110).

4.21.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript, and modified house that does not exemplify a specific architectural style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 109. 101 33RD STREET NW, HOUSE, LOOKING SW

FIGURE 110. 101 33RD STREET NW, GARAGE, LOOKING SW

4.22 KH-WLC-137

House

103 33rd Street NW

This circa-1965 house with concrete-block foundation appears to have been converted to a two-story house through a dormer addition on the south side of a gable-roofed house (Figure 111). In all likelihood, it was a side-gabled house that was, like its two neighbors to the north, not oriented toward the road. It has been additionally altered through the installation of vinyl siding, soffits, and fascia, replacement windows and doors, and decks on the east and west ends. A new, side-gabled entrance has been constructed below the dormer addition. Just to its south is a detached garage (Figure 112).

4.22.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript, and modified house that does not exemplify a specific architectural style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 111. 103 33RD STREET NW, HOUSE, LOOKING NW

FIGURE 112. 103 33RD STREET NW, GARAGE, LOOKING W

4.23 KH-WLC-138

House

105 33rd Street NW

This circa-1960, one-and-half-story, side-gabled house has a concrete-block foundation. It is not oriented toward the road (Figure 113). It has been clad in vinyl replacement siding, and also has vinyl soffits and fascia. A deck has been added at the front of the house. Fenestration includes a Chicago-style picture window, 1/1 double-hung sash windows, and a newer basement egress window on the west end of the house. Opposite the egress window on the east end of the house is an inset containing a row of four glass blocks. The roof is clad in asphalt shingles. A large, modern garage is located east of the house (Figure 114).

4.23.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript, and modified house that does not exemplify a specific architectural style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 113. 105 33RD STREET NW, HOUSE, LOOKING NW

FIGURE 114. 105 33RD STREET NW, GARAGE, LOOKING NE

4.24 KH-WLC-139

House

107 33rd Street NW

This circa-1930, front-gabled bungalow with concrete-block foundation is all that remains of a farmstead formerly at this location (Figure 115). It is not oriented toward the road. The house has been altered by the enclosure of the front porch, the addition of shed dormers on both sides of the roof, a shed-roof addition to the back of the house, and the installation of vinyl siding and soffits, replacement windows and doors, and a deck off the west side. A later, vinyl-sided, two-car garage is located north of the house (Figure 116).

4.24.1 Recommendations

This house has no important associations with historically significant events, patterns, or persons, and it therefore does not meet National Register Criterion A or B. It is a modest, fairly non-descript, and modified house that does not exemplify a specific architectural style; therefore it does not meet Criterion C. This property is therefore recommended as not eligible for listing in the National Register.

FIGURE 115. 107 33RD STREET NW, HOUSE, LOOKING SW

FIGURE 116. 105 33RD STREET NW, GARAGE, LOOKING NW

4.25 KH-DTC-001

County Ditch No. 46

The petition for County Ditch No. 46 was submitted by Andrew Larson and others on February 13, 1919, and an order established by the Kandiyohi County Board on March 13, 1919, for an engineer to conduct a preliminary survey of potentially affected lands (*The Willmar Tribune* 1919a). Following the completion of the remaining procedures required by Minnesota law (see Section 5.1, below), an order establishing the ditch was made on August 29, 1919 (*The Willmar Tribune* 1919b). Bids for construction were received on July 15, 1920, and construction of the ditch was completed circa 1922 (*The Willmar Tribune* 1920, 1921).

County Ditch No. 46 is an open ditch constructed to be eight feet deep with a one-to-one slope ("General Specifications for the Construction of County Ditch Number 46. Kandiyohi County, Minnesota," Minnesota Division of Waters, County and Judicial Ditch Files, held at the Minnesota Historical Society, St. Paul) (Figure 117). It begins approximately ½ mile east of 30th Street SW, adjacent to the north side of 30th Avenue SW, on the southern edge of Section 21 of T119N, R35W, then extends west for approximately 2-1/4 miles, where it meets County Ditch No. 10 in Section 19 of T119N, R35W, placing approximately one mile of the ditch within the APE. Concrete box culverts carry 19th Avenue SW and CR 55 over the ditch within the APE (Figures 118 to 119).

FIGURE 117. COUNTY DITCH NO. 46 AT 19TH AVENUE SW, LOOKING SE

FIGURE 118. COUNTY DITCH NO. 46 AT 19TH AVENUE SW, LOOKING NW

FIGURE 119. COUNTY DITCH NO. 46 AT COUNTY ROAD 55, LOOKING SE

4.25.1 Recommendations

County Ditch No. 46, while associated with the pattern of artificial drainage that expanded farming and opened up previously unviable areas for Euroamerican settlement in Minnesota, is not associated with this pattern in an important way. It was not one of the earliest, did not have an important impact on the development of farming in Kandiyohi County or the Willmar area, and did not open up any new areas of the state for settlement. It therefore does not meet Criterion A. It is not strongly associated with any particular individual and therefore could not meet Criterion B. As a standard, open ditch, it does not incorporate outstanding design or engineering or exhibit any distinctive characteristics, and it therefore does not meet Criterion C. County Ditch No. 46 is therefore recommended as not eligible for listing in the National Register.

4.26 KH-DTC-002

County Ditch No. 10

This property was determined to be potentially eligible for listing in the National Register by MnDOT prior to the Phase I survey, and it is addressed in the following chapter.

4.27 XX-RRD-038

Willmar and Sioux Falls Railway Main Line

The Willmar and Sioux Falls Railway main line was built between 1887 and late 1888 and has not previously been evaluated. It is recommended as potentially eligible for listing in the National Register because it is a railroad corridor built between 1862 and 1956, a property type defined in and subject to the registration requirements provided by the Railroads MPDF. It is further addressed in the chapter following the one on County Ditch No. 10.

PHASE II RESULTS – KANDIYOHI COUNTY DITCH NO. 10 (KH-DTC-002)

Kandiyohi County Ditch No. 10 was evaluated for its National Register eligibility. Based on the evaluation, it is recommended as not eligible for listing in the National Register. The property was evaluated with reference to the historic contexts provided below.

5.1 THE DEVELOPMENT OF ARTIFICIAL DRAINAGE IN MINNESOTA, 1860-1920

When, in his 1861 address to the legislature, Governor Alexander Ramsey (1861:20) estimated 5,000,000 acres of "swamp lands" that could be easily reclaimed in Minnesota, these state-owned acres constituted less than half of the total "unfit for cultivation" (Palmer 1915:88) at that time due to water content, occupying approximately 20 percent of the land area in the state (Marsden 1922:539). In 1860, as had occurred with other states admitted to the union, Minnesota was legally conveyed the acreage to which Ramsey referred by the federal government under an extension of the Swamp Land Act, with the express condition that proceeds garnered from their sale or direct appropriation in kind would be applied to constructing levees and drainages to reclaim them, "as far as necessary" (Palmer 1915:18, 88).

The necessity of artificial drainage was, in the main, the creation of viable agricultural land or the improvement of existing agricultural land. A 1916 bulletin published by the United States Department of Agriculture summarized the improvements that could be achieved, which were likely to result in increased yields and, by extension, profits (Smith 1916:23-24). These included the formation of more granulated, porous, and friable soil, which improved growing conditions and decreased erosion and flooding; warming of the soil, which extended the growing season, lessened the potential for frost damage in the spring and fall, and promoted germination; and the facilitation of cultivation: "Land can be plowed earlier in the spring and is better pulverized. Crops can be cultivated sooner after a rain, and by closing small ditches with tile drains more improved machinery can be used and the cost of cultivation decreased."

Although creating and improving agricultural land was the expressed intention for constructing artificial drainages, couched within it was the need to accommodate the growing numbers of arrivals to Minnesota from the east and overseas by supplying some with the means of a livelihood and supplying others with sustenance via that livelihood. Further, when drainage allowed for more prospective farmers to settle in the state, particularly the western part, it had the effects of proliferating markets, creating railroad traffic, and increasing the tax base, promoting the state's economic well-being (Prince 1997:242). Artificial drainages additionally provided health benefits by decreasing mosquito habitats, resulting in significant reduction in incidences of malaria (Palmer 1915:2-3; McCorvie and Lant 1993:25-26). From a practical perspective, public drainage construction facilitated road building, providing land for and subsequently preventing flooding of roads; further, the spoils from ditch construction were used for road-building material (Beauchamp 1987:17; State Drainage Commission 1909:27).

Prior to 1860, the only legislative action pertaining to artificial drainage in Minnesota was the 1858 passage of a state law allowing for the formation of corporations to drain presumably non-federally owned lands

and establishing the conditions under which they would be permitted to construct ditches (Palmer 1915:59). As people began to settle into workaday life following the Civil War, however, many of whom turned to agriculture, and as railroads began to extend to the western, wetter part of the state, encouraging new settlement there, a series of laws were enacted to address artificial drainage. These became increasingly broader over time with regard to jurisdictional responsibility and spatial extents involved, so that the first law, enacted in 1866, allowed for a justice of the peace to hear cases in which a property owner was refused permission by another property owner to ditch their lands as he found necessary to drain his own; laws enacted in the 1870s shifted this responsibility from the justice of the peace to town supervisors (1877), allowed the latter to open ditches to drain public highways (1874), and established the procedures they should follow when proposed ditches or drains were to cross town boundaries (1879); and a law enacted in 1883 removed the responsibility of oversight of proposed ditches or drains over town boundaries from the town supervisors to the county commissioners (Palmer 1915:62). In all cases, the burden of payment for the construction of the ditches was borne by those private landowners whose lands were determined to benefit from said construction, through subsequently levied taxes or assessments.

The 1883 legislation largely set the procedures by which drainage construction was to be proposed and approved for at least the next four decades. Interested landowners were required to create, sign, and file with the county auditor a petition for construction of a ditch, which would describe its proposed general route. Three uninterested viewers would then be appointed to survey a specific route with a civil engineer, estimate construction costs, identify landowners who were to benefit from the ditch and determine the division of responsibility among them for the cost of construction, develop a general plan for its construction, assess whether the ditch would be of public good, assess property damage that might result from construction, and file a report with the county auditor. If the viewers reported that the ditch would be of public good, after a period of public notification and, if applicable, addressing any filed protests, the commission would hold a public hearing to make an official determination that the ditch would be "of public utility or conducive to public health, or of public benefit or convenience" (General Laws of Minnesota for 1883, Chapter 108, Section 10) and order construction, subject to a 30-day period for appeals (Palmer 1915:62).

At the time this law was passed, Minnesota had long since granted roughly two million acres of its swamp lands to railroads, and legislated that the proceeds of whatever swamp lands that were or would be owned by the state would be used to help finance state institutions and the common school fund, with no regard for the federal directive to use those proceeds for reclamation (Palmer 1915:94). The resultant absence of revenue for reclamation efforts is a major reason that "up to 1893 no public drainage work of any magnitude had been done in the state" (State Drainage Commission 1909:26). A lack of any other designated funding, organized effort for ditch construction, or dedicated authority to direct and oversee such an effort kept drainage construction at a minimum through the end of the nineteenth century (Palmer 1915:95).

The first notable attempt at remedying these problems came in 1886 through conventions in the Red River Valley instigated by the St. Paul Minneapolis and Manitoba Railway Company and attended by representatives and residents of Marshall, Polk, Norman, Clay, and Wilkin counties. These resulted in a

valley-wide topographic survey to determine drainage needs and the locations that would meet them; the drafting of a comprehensive general drainage law, which among other elements allowed for the "organization of drainage districts as municipal corporations" (*Crookston Times* 1886) and the creation of a "state drainage commission . . . to approve and supervise . . . the work of the districts"; and a resolution calling on the governor to advise the legislature of the need for state funding to construct drainages in the Red River Valley. Although such funding did not gain approval in 1887, important revisions were made to general drainage laws that year, including allowance for any county to be organized as a drainage district with a permanent board of drainage commissioners having oversight of all drainage-related activities (Palmer 1915:68).

More progress was made in 1893, when the legislature made its first appropriation for drainage construction, $100,000 divided equally over four years to be used in constructing drainages in the Red River Valley, and established a precursor to the State Drainage Commission to oversee the work. This precursor, the Red River Board of Audit, included the governor, the secretary of state, the Great Northern's chief engineer, and a representative of the counties. The Board of Audit continued to supervise construction and financial matters for another seven years, but the supervision of annual inspections, repairs, and the like was taken over in 1897 by an entity called the Board of State Drainage Commissioners, although at that time it was concerned only with the Red River Valley (Palmer 1915:69).

The first decade of the twentieth century marks the beginning of the first systematic activity in public drainage, bolstered by a multitude of legislative actions that effected the much-needed authority, effort, and funding necessary to developing a full-scale drainage system. In 1901, for example, the Minnesota State Drainage Commission was established to identify, locate, and construct drainages in state-owned wetlands throughout the state, with an initial appropriation of $25,000 a year in 1901 and 1902 (General Laws of Minnesota for 1901, Chapter 90). The year 1905 witnessed the consolidation and revision of all existing laws pertaining to the procedures for constructing county and judicial ditches to create a comprehensive drainage law for the state (Palmer 1915:70-71). Between 1907 and 1911, over $500,000 was allocated to the State Drainage Commission, and another $686,350 was obtained by them through assessments against private lands, allowing for drainage construction, various surveys, and improvements to existing drainages (Palmer 1915:96-97). The Volstead Act of 1908 provided for government-owned lands to be assessed in the same way as those privately owned, providing additional funds for reclamation and creating less resistance to drainage construction by private property owners who, as a result of the act, would be less financially burdened by it. In 1909, the State Drainage Commission reported that the work done throughout the state in 1907 and 1908 in creating drainage systems equaled all of the work completed in the 50 years prior (State Drainage Commission 1909:26-27).

By 1915, it was reported that over seven million of Minnesota's original ten million acres of swamp lands had been reclaimed by county, judicial, and state ditches (Palmer 1915:98). Between 1915 and 1920, another approximately two million acres were added to the total by the same (Marsden 1922:543). Of the 9,232,709 acres in Minnesota for which public ditches had been completed or were under construction, according to the U.S. Census of 1920, 66,279 were located in Kandiyohi County (Marsden 1922:551).

5.2 COUNTY DITCH CONSTRUCTION IN KANDIYOHI COUNTY

In September of 1898, *The Willmar Tribune* reported "The people of the county seem now to be thoroughly aroused to the importance of draining the rich lands which heretofore have been useless on account of surplus water. Never before have so many petitions for public drains been filed with the county auditor. The county board is loaded down with ditch business . . . " (*The Willmar Tribune* 1898a).

The "ditch business," as it were, of Kandiyohi County began with the July 29, 1885, order to establish a ditch in Willmar and Kandiyohi townships, which would be designated County Ditch No. 1 (Lawson 1905:387). After the establishment of two additional ditches in 1886, County Ditch No. 2 in Willmar and County Ditch No. 3, which augmented County Ditch No. 1, public drainage activity was slow and sporadic, with County Ditch Nos. 4 through 7 established, respectively, in the townships of Whitefield and Falun, Irving, Whitefield, and St. Johns between 1888 and 1895. Following, the most intensive period of county drainage activity led to the establishment of an additional 43 county ditches between 1898 and 1921. The County and Judicial Ditch files of the Minnesota Division of Waters do not contain a file for County Ditch No. 51. The remaining 14 Kandiyohi County ditches were constructed between the late 1940s and 1986 (Minnesota Division of Waters, County and Judicial Ditch Files, held at the Minnesota Historical Society, St. Paul; Kandiyohi County 2016).

5.3 KANDIYOHI COUNTY DITCH NO. 10

The petition for County Ditch No. 10 was filed by L. O. Thorpe and others in April of 1898 (Lawson 1905:388; Chamberlain 1977). It was presented at a meeting of the board of county commissioners on May 16, 1898, where it was determined that the ditch would be of public benefit and the petition was accepted. The appointed viewers were H. B. Eddy of Whitefield Township, S. A. Syverson of Arctander Township, and John G. Flann of Lake Lillian Township (*The Willmar Tribune* 1898b). The viewers' report was accepted by the board and the ditch designated as Public Ditch No. 10 by the same in September of 1898 (*The Willmar Tribune* 1898c). The sale of ditching jobs for County Ditch No. 10 was held on November 12, 1898, and it was constructed between 1898 and 1901 (*The Willmar Tribune* 1898d; Chamberlain 1977). Once completed, County Ditch No. 10 consisted of 9.9 linear miles of open ditch beginning at Foot Lake in the northwest quarter of Section 16, Willmar Township and ending at Hawk Creek in Section 10 of Edwards Township (Lawson 1905:388).

In 1915, a petition was filed to repair the ditch by making 9.8 miles of the ditch wider and deeper, which was approved in 1916 and carried out in 1917 and 1918 (Chamberlain 1977). In 1974, a petition was made to improve the ditch through re-sloping several sections and removing a number of trees, citing that "the ditch as now constructed does not afford proper adequate drainage of the lands adjacent thereto" (Petition to Kandiyohi County Board of Commissioners, May 1, 1974, contained in Minnesota Division of Waters, County and Judicial Ditch Files, held at the Minnesota Historical Society, St. Paul). These improvements were carried out sometime between 1979 and 1983 ("Plans, Improvement C, County Ditch No. 10, Kandiyohi County, Minnesota," available online at http://www.co.kandiyohi.mn.us/departments/drainage/ditch_construction_plans_and_maps.php).

5.3.1 Description

County Ditch No. 10 is an open ditch. Based on the most recent improvement plans, it ranges from 8 to 12 feet deep at the bottom and has a two-to-one slope ("Plans, Improvement C, County Ditch No. 10, Kandiyohi County, Minnesota," available online at http://www.co.kandiyohi.mn.us/departments/drainage/ditch_construction_plans_and_maps.php) (Figure 120). It begins at Foot Lake, then runs west and south, ending at Judicial Ditch 7 in Edwards Township. Comparison of aerial photographs indicates that the ditch follows its originally constructed route, with the exception of a small alteration in Section 17, T119N, R35W, where it was rerouted to accommodate a runway for the first Willmar Airport. Within the APE, concrete box culverts carry TH 12, CSAH 5 (30th Street NW), and CR 55 over the ditch, and the ditch runs under CR 40 (15th Avenue SW) via a corrugated metal pipe culvert (Figures 121 to 123).

5.3.2 Significance

County Ditch No. 10 was established in 1898, 13 years after the first county ditch was established in Kandiyohi County; therefore it was not among the earliest ditches constructed. By that time, west-central Minnesota had long been open to Euroamerican settlement and farming, so the ditch did not open any new areas of the state for such. County Ditch No. 10 was one of many constructed in succession to improve farmlands, and its establishment came easily through the standard legal process without any marked public involvement or political complications that might impact Minnesota drainage law. While it certainly would

FIGURE 120. COUNTY DITCH NO. 10 AT COUNTY ROAD 55, LOOKING W

FIGURE 121. COUNTY DITCH NO. 10 AT 30TH STREET NW, LOOKING E-SE

FIGURE 122. COUNTY DITCH NO. 10 AT COUNTY ROAD 55, LOOKING E-SE

FIGURE 123. COUNTY DITCH NO. 10 AT COUNTY ROAD 40, LOOKING S-SW

have improved surrounding farmland as had intended, no evidence suggests that its impact had a significant effect on the agricultural economy of Willmar. For these reasons, County Ditch No. 10 does not meet Criterion A. The individuals involved in petitioning for County Ditch No. 10 were not significant with regard to agriculture or public drainage history; therefore, the ditch does not meet Criterion B. The ditch, as a basic, open ditch does not employ innovative design, construction, or engineering, and it therefore does not meet Criterion C.

5.3.3 Recommendations

Because it does not meet National Register significance criteria, County Ditch No. 10 is recommended as not eligible for listing in the National Register.

PHASE II RESULTS – WILLMAR AND SIOUX FALLS RAILWAY COMPANY MAIN LINE (XX-RRD-038)

The Willmar and Sioux Falls Railway Company main line was evaluated for its National Register eligibility. Based on the evaluation, it is recommended as not eligible for listing in the National Register. The property was evaluated with reference to the historic contexts and registration requirements provided in the Railroads MPDF.

6.1 THE WILLMAR AND SIOUX FALLS RAILWAY

The history of the Willmar and Sioux Falls Railway is provided in the Railroads MPDF (Schmidt et al. 2007:E-97) as follows:

> In 1886, the Willmar and Sioux Falls Railway Company was formed by James J. Hill "to build and operate a railroad and telegraph line from Willmar through Granite Falls, Marshall, and Pipestone to Sioux Falls by a feasible route" (Prosser 1966:169). The formation of the company was prompted by the movements of the Minneapolis and Pacific [Railway Company], which sought to tap into the [St. Paul Minneapolis and] Manitoba's wheat market west of Minneapolis, "thereby securing ample raw materials and reasonable rates for the growing flour milling industry at Minneapolis" (Luecke 1997:116).
>
> When it became clear that the Minneapolis and Pacific would become more than a paper road, a line was built in 1885 from St. Cloud to Willmar by the Manitoba-backed St. Cloud Mankato and Austin [Railroad Company] (see above). Subsequently, between 1887 and 1888, the recently formed Willmar and Sioux Falls built a line from Willmar to Sioux Falls, running in Minnesota from Willmar to Jasper and then extending southwest to Sherman, South Dakota, on its way to Sioux Falls. The line, completed in late 1888, provided a connection between Sioux Falls and Lake Superior via the Willmar to St. Cloud line of the former St. Cloud Mankato and Austin, the Manitoba line from St. Cloud to Hinckley, and the soon-to-be-completed Eastern [Railway Company] line from Hinckley to Superior. The Willmar and Sioux Falls, along with the rest of these connections, was subsumed by the Great Northern in 1907 (Hidy et al. 1988:63; Luecke 1997:115-131).

6.1.1 Description

Within the project APE, the railroad line consists of a single track incorporating wood ties and steel rails supported by a slightly raised rail bed (Figure 124). The railroad line remains active as part of the BNSF system.

6.1.2 Significance

The Willmar and Sioux Falls Railway line was built beginning in 1887, well after the southern half of western Minnesota had been opened to Euroamerican settlement by the previous construction of other railroad

FIGURE 124. WILLMAR AND SIOUX FALLS RAILWAY AT COUNTY ROAD 55, LOOKING SW

lines, including the St. Paul Minneapolis and Manitoba main line, which ran through Willmar. Although the Willmar and Sioux Falls ultimately allowed for transportation between Lake Superior and both western Minnesota wheat and Sioux Falls, South Dakota, it did so via the previously built East St. Cloud to Hinckley (1882) and East St. Cloud to Willmar (1885-1886) lines and the concurrently/subsequently built Eastern Railway Company line from Hinckley to Lake Superior (1888-1889), thus it did not on its own connect wheat or Sioux Falls to Lake Superior. The Willmar and Sioux Falls Railway line was not influential within the state's railroad network in any regard, and as a line built from Willmar west beginning in 1887, it did not make important early connections within the network. It additionally did not provide a critical link or junction between important corridors, because at the time that the Willmar and Sioux Falls line was built, Sioux Falls was the western terminus, i.e., no Manitoba-associated corridors with which to link were present at the west end (Hufstetler and Bedeau 2007:97). For these reasons, the Willmar and Sioux Falls Railway main line does not meet registration requirements for significance under Criterion A.

The registration requirements dictate that railroad corridors will not be eligible under Criterion B or C, and are unlikely to be eligible under Criterion D. With regard to the latter criterion, no evidence is present to suggest that "further analysis of the [Willmar and Sioux Falls Railway] corridor [would] be likely to yield important information about significant aspects of the evolution or development of railroad corridor design, operations, or the inter-relationships between railroads and the industrial and commercial operations they served" (Schmidt et al. 2007:197), as would be necessary for the corridor to be eligible.

6.1.3 Recommendations

Because the Willmar and Sioux Falls Railway main line does not meet the registration requirements for significance established by the Railroads MPDF, it is recommended as not eligible for listing in the National Register.

SUMMARY OF RECOMMENDATIONS

In addition to identifying one property that previously was determined eligible for listing in the National Register, the Phase I architectural history survey for the Willmar Wye Project identified 26 architectural history properties within the APE. Of these, 24 properties were recommended as not eligible for listing in the National Register. The remaining two properties, County Ditch No. 10 (KH-DTC-002) and the Willmar and Sioux Falls Railway main line (XX-RRD-038) were subject to a Phase II evaluation. Both were found to be not eligible due to a lack of significance.

7.1 PROJECT RECOMMENDATIONS

No further architectural history work is recommended in relation to the surveyed properties prior to or during construction for the Willmar Wye project. The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District is eligible for listing in the National Register; therefore any further work is pending MnDOT's determination of the effects of the project, if any, on this property.

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1921 Commissioners' Proceedings. 21 December.

Appendix N – Phase I Archaeological Survey Report

Phase I Archaeological Resources Survey for the Value Engineering Roadway Alternative 2

Willmar Wye Project

Kandiyohi County, Minnesota
Township 119 North, Range 35 West, Sections 7, 16, 17, 18, 19 and 20

State Project Number (SP): 3403-74
Federal Project Number: SPR CR16(001)
OSA License Number: 16-032
MnDOT Contract No. 1002991

AUTHORIZED AND SPONSORED BY:

Minnesota Department of Transportation
and the Federal Highway Administration

PREPARED BY:

HDR Engineering, Inc.
701 Xenia Avenue South, Suite 600
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PRINCIPLE INVESTIGATOR:

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July 2016

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Management Summary

A public-private partnership including the city of Willmar, Kandiyohi County, the Kandiyohi County and City of Willmar Development Commission, the Minnesota Department of Transportation (MnDOT), and the BNSF Railway Company is proposing a new rail connection between two existing railroad main lines in Willmar, Kandiyohi County, Minnesota, which will require the construction of new crossings at County Road 55, Trunk Highway 12, and Trunk Highway 40. The crossings at the trunk highways will involve vertical and/or horizontal road realignment. This project, the Willmar Connection and Industrial Access Project (Willmar Wye Project), is receiving Federal Railroad Administration (FRA) funds and is therefore subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended. After discussions between the FRA and the Federal Highway Administration (FHWA), with consideration given to project delivery schedule and staffing availability, the decision was made that the FRA would be the lead federal agency for delivery of physical construction, while the FHWA would be the lead federal agency for completing the project environmental document, including Section 106 review. The FHWA delegates authority for compliance with Section 106 to the MnDOT Cultural Resources Unit (CRU). To assist with their review, the MnDOT CRU contracted with HDR Engineering, Inc. (HDR) to conduct Phase I and II archaeological investigations of the project area of potential effects (APE).

The roadway modifications are part of the Value Engineering Roadway Alternative (Alternative 2) of the Willmar Wye railway project (Project) near the city of Willmar in Kandiyohi County, Minnesota in sections 7, 16, 17, 18, 19 and 20 of Township 119N, Range 35W. Alternative 2 is needed to address roadway impacts associated with the Project's proposed new railroad connection to the south and west of the city of Willmar. Alternative 2 includes a proposed Trunk Highway (TH) 12 realignment consisting of an approximately 2.5-mile long, 200-foot-wide corridor located south of the current TH 12 route, as well as proposed modifications to several roadway components along TH 12, County State Aid Highway (CSAH) 55, TH 40, 1st Avenue West and 45th Street Northwest.

In April 2016, HDR Engineering, Inc. (HDR) conducted an archaeological resources survey for Alternative 2 and to document previous archaeological work completed for the Project's Original Roadway Alternative (Alternative 1) by AECOM in December 2015. The Willmar Wye project is located in the Prairie Lakes North (2n) Archaeological Sub-Region of Minnesota. The Alternative 2 Area of Potential Effects (APE) includes a 200-foot-wide corridor along the proposed 2.5-mile TH 12 realignment where grading or other surface disturbances will occur, as well as proposed modifications to several roadway components along TH 12, CSAH 55, TH 40, 1st Avenue West and 45th Street Northwest. The Alternative 2 APE encompasses approximately 130 acres. The Alternative 1 project area surveyed by AECOM encompassed approximately 374 acres in sections 7, 8, 17, 18, 19, 20, 29 and 30 of Township 119N, Range 35W.

Phase I investigations were carried out in May 2016 under the direction of Michael Justin, Principal Investigator for the Project, under an Annual Archaeological Reconnaissance Survey License (No. 16-032) issued by the Office of the State Archaeologist (OSA). The Phase I investigations conducted by HDR included an assessment of the previous archaeological investigations conducted by AECOM in the portions of the Alternative 2 APE that overlap with the Alternative 1 project area, background research for the Alternative 2 APE, and archaeological field survey of the TH 12 realignment segment of the Alternative 2 APE. At the request of MnDOT, HDR also documented all previous archaeological work completed in the Alternative 1 project area by AECOM.

The Phase I survey identified one new Post-Contact Period archaeological site. Site 21KH0157 is an abandoned and razed farmstead traversed by the APE. HDR recommends this site as not eligible for listing on the National Register of Historic Places (NRHP). HDR reviewed field maps and survey forms produced for the AECOM investigations of the Alternative 1 project area and recommend that the survey methodology employed by AECOM is adequate and complete. As such, HDR recommends no further work for the Alternative 1 project area.

HDR recommends that a no historic properties finding be made for the purposes of Section 106 compliance for Alternatives 1 and 2 of the Willmar Wye Project.

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Appendices

Appendix A. AECOM Alternative 1 Project Area Survey Forms A-1

Appendix B. 2016 OSA Annual Archaeological Reconnaissance Survey License B-1

1 Introduction

A public-private partnership including the city of Willmar, Kandiyohi County, the Kandiyohi County and City of Willmar Development Commission, MnDOT, and the BNSF Railway Company is proposing a new rail connection between two existing railroad main lines in Willmar, Kandiyohi County, Minnesota, which will require the construction of new crossings at County Road 55, Trunk Highway 12, and Trunk Highway 40. The crossings at the trunk highways will involve vertical and/or horizontal road realignment. This project, the Willmar Connection and Industrial Access Project (Willmar Wye Project), is receiving Department of Transportation funds through the Transportation Investment Generating Economic Recovery (TIGER) competitive grant program, and is therefore subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended. FRA is the lead federal agency for delivery of physical construction, and FHWA is the lead federal agency for completing the project environmental document, including Section 106 review. FHWA delegates authority for compliance with Section 106 to the MnDOT CRU. To assist with their review, the MnDOT CRU contracted with HDR to conduct a Phase I and II archaeological investigations of the project APE. The Project will grade and/or construct a new mainline railway connection, siding, spur line, access roads and mainline extension between the Morris and Marshall subdivisions within Kandiyohi County in the western limits of the city of Willmar. The connection on the southern end (Marshall subdivision) would be in a “wye” configuration with western and eastern tie-in to the mainline. MnDOT proposes roadway modifications as part of the Value Engineering Roadway Alternative (Alternative 2) of the Willmar Wye railway project (Project) near the city of Willmar in Kandiyohi County, Minnesota in sections 7, 16, 17, 18, 19 and 20 of Township 119N, Range 35W. Alternative 2 is needed to address roadway impacts associated with the Project’s proposed new railroad connection to the south and west of the city of Willmar. Alternative 2 includes a proposed Trunk Highway (TH) 12 realignment as well as proposed modifications to related roadway components. The Area of Potential Effects (APE) for Alternative 2 has been identified by the MnDOT Cultural Resources Unit (CRU) as encompassing a 200-foot-wide corridor along the proposed 2.5-mile TH 12 realignment where grading or other surface disturbances will occur, as well as proposed modifications to several roadway components along TH 12, County State Aid Highway (CSAH) 55, TH 40, 1st Avenue West and 45th Street Northwest (Figure 1-1). The Alternative 2 APE encompasses approximately 130 acres based on review of shapefiles provided by WSB & Associates, Inc.

In order to comply with applicable regulations pertaining to cultural resources, MnDOT contracted HDR to complete a Phase I archaeological resources survey of the proposed Alternative 2 APE and to document previous archaeological work completed for the Project’s Original Roadway Alternative (Alternative 1) by AECOM in December 2015 as AECOM did not produce a report of their investigations. The Alternative 1 project area surveyed by AECOM encompassed approximately 374 acres in sections 7, 8, 17, 18, 19, 20, 29 and 30 of Township 119N, Range 35W, and overlaps with much of the Alternative 2 APE, with the exception of the majority of the TH 12 realignment (Figure 1-2). HDR reviewed the results of the previous archaeological investigations completed within the components of the Alternative 2 APE that overlap with the Alternative 1 project area and found them to be adequate and complete. As such, HDR focused the Phase I survey on the TH 12 realignment segment of Alternative 2. After obtaining background information on previously surveyed areas and previously recorded archaeological sites within a one-mile radius of the TH 12 realignment, HDR

conducted Phase I archaeological field work May 24-25, 2016, using a combination of pedestrian reconnaissance and subsurface shovel testing. Michael Justin acted as Principal Investigator for the project under Office of the State Archaeologist (OSA) License 16-032 (Appendix B).The UTM coordinates for the Alternative 2 APE are not given due to the irregular size and discontinuous nature of the APE. .

In addition to the Phase I survey of the Alternative 2 APE, HDR reviewed field maps and survey forms produced for the AECOM investigations of the Alternative 1 project area to determine if the survey methodology employed by AECOM was adequate. A summary of the results of the AECOM investigations is provided in this report.

The environmental and historic contexts, background research, objectives, methods, fieldwork results, and management recommendations for the Phase I archaeological resources survey completed for this Project are presented in the following sections.

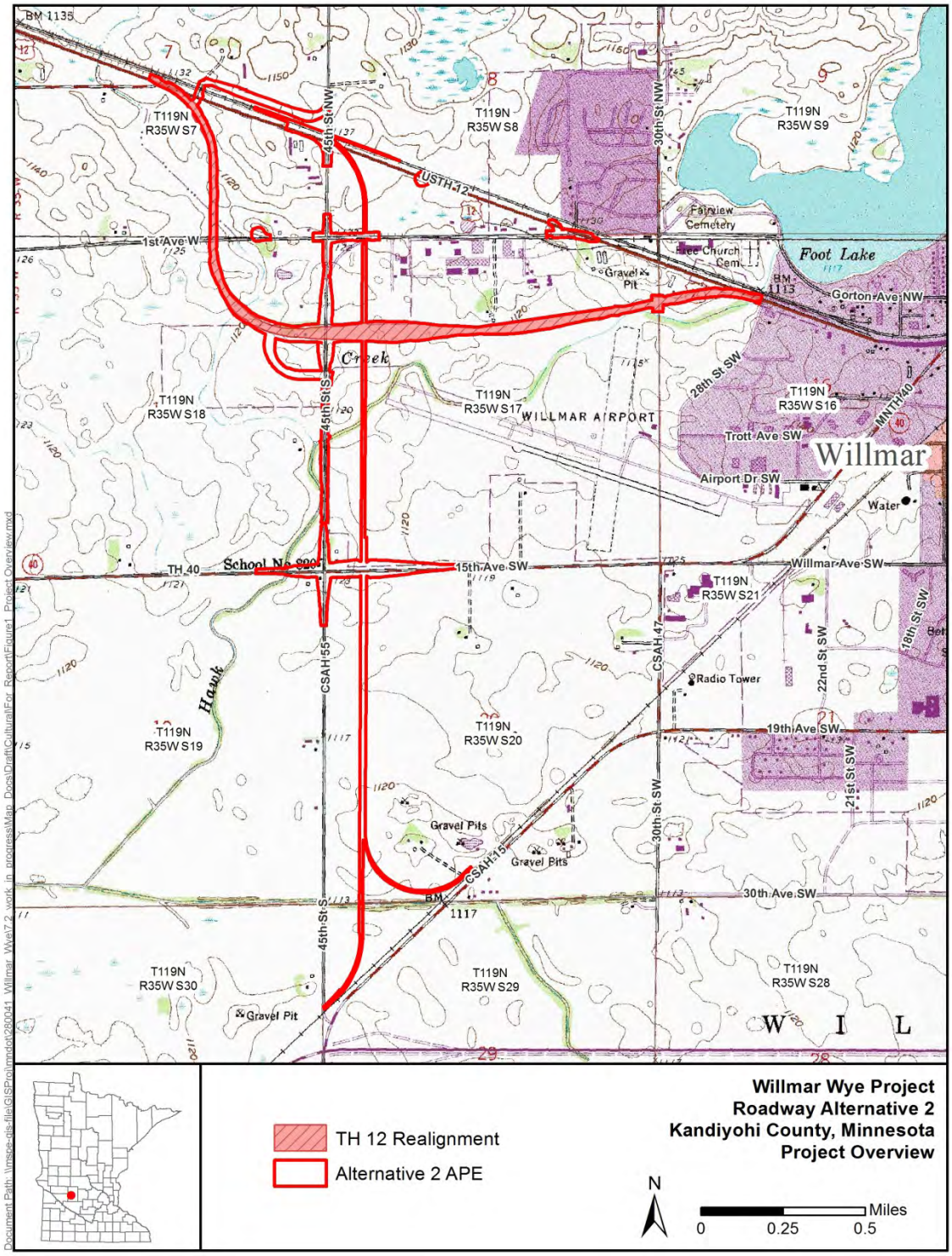

Figure 1-1: Project Location

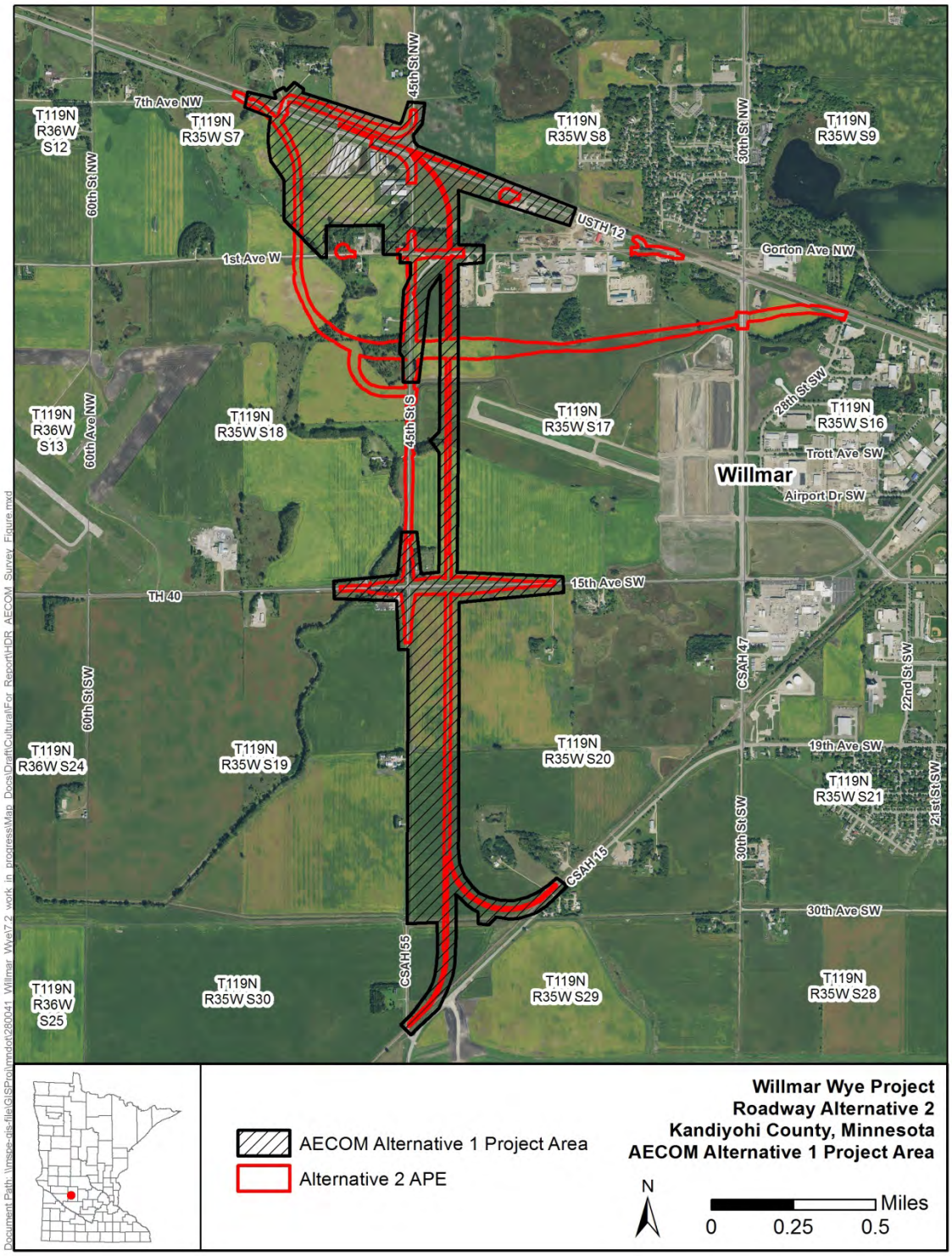

Figure 1-2. AECOM Alternative 1 Project Area in Relation to Alternative 2 APE

2 Methods and Research Design

2.1 Objectives

The Phase I archaeological survey was performed to identify any new or previously recorded archaeological resources that may be present within the APE. HDR's work complies with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 Federal Register [FR] 44716 44740) (National Park Service 1983) and the Minnesota's State Historic Preservation Office (SHPO) *Manual for Archaeological Projects in Minnesota* (Anfinson 2005).

2.2 Methods

The Phase I archaeological resources survey began with a cultural resources file review of the APE. Fieldwork conducted for the Project concentrated on the proposed TH 12 realignment of the APE, an approximately 2.5-mile-long, 200-foot-wide corridor where grading or other subsurface disturbances will occur. The following sections provide a detailed overview of the methods used for the Phase I cultural resources investigation for the Project.

2.2.1 File Review

Background research was conducted for the Project prior to field survey to understand the types of historic properties that may be present in the APE. HDR sent a request to SHPO in April 2016 for information on identified archaeological sites and previously conducted archaeological surveys within one mile of the TH 12 realignment portion of the APE. In April 2016, HDR archaeologist Andrew Kurth conducted background research at SHPO and the OSA. HDR also reviewed Official General Land Office (GLO) records, historic aerial photographs, and historic plat maps relevant to the APE to identify areas with potential for containing historic era cultural resources. The results of the background research for the Project are presented in Section 3.3 of this report. HDR also reviewed the field maps and field survey forms provided by AECOM to assess the adequacy of the previous archaeological investigations conducted in the Alternative 1 project area. The results of the AECOM investigations are presented in Section 3.4 of this report.

2.2.2 Field Review

The fieldwork conducted for this project concentrated on the TH 12 realignment portion of the APE. The archaeological survey began with a visual inspection of the TH 12 realignment portion of the APE via a walkover survey. Areas of the TH 12 realignment that exhibited obvious disturbance by earth-moving or development (for example, road/highway rights-of-way (ROWs), landscaped residential yards, modern residential or industrial developments) were documented with photographs. Previous investigations completed in components of the Alternative 2 APE that overlap with the Alternative 1 project area were found to be adequate and complete so no survey was conducted in those areas.

Systematic pedestrian survey was conducted within the TH 12 realignment portion of the APE along transects spaced at 15-meter intervals in areas that exhibited a minimum of 25 percent ground surface visibility (GSV) and did not exhibit obvious disturbance. Shovel tests were excavated in areas where disturbance was not immediately obvious and that exhibited less than 25 percent GSV.

Shovel tests were spaced at 15-meter intervals or judgmentally based on the Principal Investigator's assessment of the area's archaeological potential. Shovel tests were 30 to 40 centimeters (cm) in diameter and excavated to a depth of 1 meter (m) or until cultural sterile or disturbed soils were sufficiently documented. All excavated soils were screened through a 0.25-inch hardware cloth mesh. Shovel test data was recorded on standard forms and in the field notebook, which included the survey area locations, shovel test locations, shovel test depth, soil profile, soil texture and inclusions, and Munsell color. A Trimble® Global Positioning System (GPS) unit was used to record each shovel test location. A digital camera was used to photo-document each survey area. Aboveground historic resources at site 21KH0157 were documented with photographs, their dimensions noted, and their locations recorded with a Trimble® GPS unit with sub-meter accuracy.

2.2.3 Artifact Processing

Laboratory analysis and artifact curation were not required as no cultural materials were recovered during the Phase I survey.

3 Literature Search

This section presents a discussion of the regional physiography along with the current conditions of the area. A brief overview of past cultural patterns in the region is also presented.

3.1 Environmental Context

The Willmar Wye project is located in the Prairie Lakes Archaeological Region of Minnesota. The following environmental history of this region is summarized from information contained in *Minnesota's Environment and Native American Culture History* by Gibbon, Johnson, and Hobbs (2002).

The topography of the Prairie Lakes archaeological region consists mainly of undulating ground moraines. Lake basins are numerous in the region and vary greatly in size. The major topographic feature of the area is the Minnesota River trench. Soil types in this region consist of medium- to fine-textured prairie soils. Average annual precipitation ranges from 22 to 28 inches. The average January high temperature is 24 degrees Fahrenheit and the average July high temperature is 85 degrees Fahrenheit. The frost-free season lasts from 140 to 160 days. Lakes freeze over by early December, and the ice is off the lakes by early April. At the time of Euro-American settlement, the vegetation in the region consisted of tall grass prairie, with narrow forests located along river bottoms and small wooded groves located in fire-protected areas at major lakes. A principal source of wood in the eastern part of the region that developed around the time of Euro-American contact was the Big Woods vegetation zone, represented by oak, elm, maple and basswood trees. Subsistence resources at the time of Euro-American contact would have included bison, white-tailed deer, and elk, with plentiful aquatic mammals, waterfowl, and fish in the many shallow lakes. The lakes also provided an assemblage of edible plants, including cattails and water lilies. The uplands provided edible plants, including acorns in the oak woods, the ground plum, and the prairie turnip.

3.2 Cultural Context

The following summaries of cultural contexts relevant to the Willmar Wye project are based partially on information contained in a series of statewide historic contexts developed by the Minnesota SHPO (Dobbs 1990a; Dobbs 1990b; SHPO 1993), and an overview entitled *Minnesota's Environment and Native American Culture History* by Gibbon, Johnson, and Hobbs (2002).

3.2.1 Paleoindian Tradition (9500–6000 BC)

The earliest human inhabitants of Minnesota entered the area about 11,000 years ago as the glacial front receded from northern Minnesota. These peoples, comprising the Paleoindian Tradition, were migratory groups of mobile hunter-gatherers who followed herds of large game animals such as bison, woodland caribou, and mastodon into the tundra and open pine and oak forests that characterized Minnesota as the glaciers retreated. There is little archaeological evidence of Paleoindian inhabitants in Minnesota because they did not generate large artifact deposits. Cultural materials left by these people are often deeply buried underneath more recent sediment. Archaeological finds from this period consist mainly of isolated discoveries of large and distinct projectile points that are characteristic of this tradition. These points are divided into the Fluted Point Pattern (Clovis and Folsom points) and the non-fluted Lanceolate Point Pattern (Plano points). Other

tool types associated with the Paleoindian Tradition include bifacially flaked knives, simple choppers, and large scrapers for processing kills.

3.2.2 Archaic Tradition (6000–500 BC)

As Minnesota became warmer and drier, expanses of prairie began to displace the previously forested land. The melting ice exposed new land surfaces with extensive lakes and large, swift rivers quite unlike any in present-day Minnesota. The landscape was interspersed with large lakes and swiftly flowing rivers fed by the glacial runoff.

The Pleistocene megafauna died out, and the human inhabitants had to adapt to the altered landscape. As a result, new tool types and means of subsistence associated with the Archaic Tradition were developed. The Archaic Tradition is distinguished from the Paleoindian Tradition by an increased diversity in tool types, a broader range of raw materials from which they were made, and increased exploitation of a larger variety of animal and plant communities. This diversity has been attributed to the adaptation of Archaic Tradition peoples to local resources and a relative abundance of animal and plant resources. The archaeological record of the Archaic Tradition displays evidence of the beginnings of cultural variation. Notched and stemmed projectile points, along with groundstone tools and chipped-stone scrapers, knives, punches, and drills, are found in the Archaic Tradition toolkit. Copper implements appear in archaeological assemblages from about 7,000 years ago and continued until about 3,500 years ago.

Four distinct Archaic Tradition contexts have been identified in Minnesota: the Shield Archaic, Lake-Forest Archaic, Prairie Archaic, and Eastern Archaic. Site locations during this period are generally tied to locations near water. These sites appear to have been occupied for longer periods and produce larger amounts of artifacts than small encampments, which can be found scattered throughout the environment. Small encampments often represent specific resource extraction or use of a location that takes advantage of a seasonal event, such as a bison kill site, a floral resource gathering site, or a waterfowl breeding site. Artifact deposition at these locations is generally very minimal.

3.2.3 Woodland Tradition (500 BC–AD 1650)

Beginning about 3,000 years ago, Minnesota’s climate began to stabilize and resembled the climate that exists today. Expanses of prairie were found in the western portion of the state. A swath of oak savanna, stretching from the northwest to the southeast, separated the prairie from the pine forests of the arrowhead region.

Woodland Tradition cultures exhibit evidence of an increasingly more sedentary lifestyle. Domestication of plants, ceramic technology, long-term recurring occupation of seasonal village sites, and mound construction emerged in the Woodland Tradition. These innovations were not adopted in all areas of the state at the same time or necessarily together. Because they are not as deeply buried, Woodland Tradition sites are encountered more often than Paleoindian Tradition or Archaic Tradition sites. Woodland Tradition sites can also be more definitively attributed to a tradition based on ceramics and distinct tool types. Known ceramic traditions resulted in division of the Woodland Tradition into an Early, Middle, and Late chronological framework. In Minnesota, the Woodland Tradition is also divided into an earlier Initial Woodland period (including the Early and Middle periods, ca. 500 BC–AD 500) and a later Terminal Woodland period (including the Late period, ca. AD 500–1650).

Regional differences in the Woodland Tradition resulted in the identification of distinct regional complexes, including the Fox Lake phase and Lake Benton phase. The Prairie Lakes region is associated with pottery types such as Havanoid, St. Croix, Onamia, Kathio, and Sandy Lake. In southern Minnesota, contact with Europeans centered on the Minnesota River because this represented the major transportation corridor of the area during contact.

3.2.4 Mississippian/Plains Village Tradition (AD 1000–1500)

About 1,000 years ago, a new tradition developed in southern Minnesota. In the western part of the state, this tradition is known as the Plains Village Tradition. In the eastern part of the state, it is known as the Mississippian Tradition. These traditions are distinguished from Woodland traditions by an intensification of agriculture, including cultivation of corn, and larger, more complex societies. These influences spread into southwestern Minnesota from the Missouri River and into southeastern Minnesota from the Mississippi River and have possible ties to cultures of the southern U.S. and possibly Mexico. Mississippian/Plains Village Tradition sites are distinguished by distinct ceramic styles, large village complexes, a greater density of artifacts, and community vegetable storage pits. Effigy mounds in the shape of animals such as birds and snakes, as well as flat-topped mounds and villages encircled by protective palisades, were constructed during this period.

3.2.5 Fur Trade/Contact (1630s–1858)

By the 1620s, the first European goods may have reached the Upper Midwest through trade with the Ottawa and Huron. The first fur trade contact in this area occurred between 1659 and 1660, when two French explorers named Sieur des Groseilliers and Sieur de Radisson entered present-day Minnesota in search of natural resources, including furs. Increasing numbers of explorers and fur tradesmen would reach the area in the years following first contact. This time period is recognized by the establishment, operation, and adaptation of gathering fur-bearing mammal hides in exchange for other goods and materials. This exchange linked the Northern Plains to a worldwide economic and political system. By the late 1670s, a trade agreement had been established between the Dakota and merchants in Quebec and Montreal. This relationship initiated the French period of exploration and occupation in Minnesota, which lasted into the early 1760s. During this period of French influence, much of the state and the surrounding region were occupied with an extensive network of forts and fur trading posts.

The 1760s (after the Treaty of Paris) brought a half-century of British activity in Minnesota. This time period brought further development of the fur trade industry, with more trading posts and consequently major changes in the distribution of Native American people in the region. By 1800, the Ojibwa took control of the lakes and forests of northern Minnesota, and the Dakota moved south along the Minnesota River Valley.

After a peace treaty with the British in 1763, the U.S. gained legal possession of the state. The U.S. exerted control of Minnesota after Zebulon Pike's 1805 to 1807 expedition as well as later with the establishment of Fort Snelling at the junction of the Minnesota and Mississippi rivers in 1819. The changes in Native American life brought about by the French and British presence in Minnesota included migrations of Native American populations from the east, depopulation of native peoples in certain areas because of introduced diseases and warfare, and gradual movement of the Ojibwa into northern Minnesota and of the Dakota into southern Minnesota. The Native American populations in Minnesota also began to switch from hunting for subsistence to hunting for trade, and Native American manufacturing materials began to be replaced by European materials.

Travel and settlement of the state were mostly restricted to corridors along larger bodies of water. In 1837, the Dakota, Winnebago, and Ojibwa signed treaties that opened up east-central Minnesota to logging and settlement, and by 1849 Minnesota had become organized as a Territory. When Minnesota gained statehood in 1858, Euro-American settlement increased, bringing a wave of new towns, cities, and non-fur trade-related enterprises.

3.2.6 Early Minnesota Military Activity (1800–1890)

Beginning in the mid-nineteenth century, Minnesota Territory representatives appealed to the U.S. Congress to appropriate funds to build and maintain a series of five military roads in the state. The territorial representatives of the state argued that these roads were justified on the grounds of frontier defense and would also aid in territorial settlement and commercial development. In July 1850, the territorial representatives secured funding for the development of these roads. Over the next decade, territorial representatives and the War Department's United States Army Corps of Topographical Engineers would oversee the creation of the five original roads and two additional roads. Not all of the roads were completed, but the segments that were completed were used heavily by the local population.

Around 1862, growing tension between the Dakota and the U.S. government escalated into violence. The U.S. government's failure to keep its promise of annuities, along with poor dealings with fur traders and crop failure, led the Dakota to violence in southern Minnesota. Over a 6-week period, many lives were lost on both sides, and the violent action prompted a large-scale evacuation of settlement areas in southern Minnesota. Eventually, hostilities ceased, but on December 26, 1862, the government rescinded all treaties signed with the Dakota of Minnesota and forcibly removed them from the state.

The eruption of violence in Minnesota in 1862 led to major military expeditions by the U.S. government in 1863, 1864, and 1865 within the region. Battles within the state of Minnesota and in nearby North Dakota and South Dakota diminished Dakota resistance in the region. While hostilities between the U.S. government and the Dakota trailed off over the next decade, a strained relationship between the two existed well into the 1890s and, to some extent, still exists today.

3.2.7 Early Agriculture and River Settlement (1840–1870)

Some of the earliest agricultural farming practices in the state occurred in southern Minnesota. Treaties with the Ojibwa and Dakota in the early and mid-nineteenth century allowed for European settlement in certain areas west of the Mississippi River. Acts passed in the state in the mid-nineteenth century fostered an influx of settlers from the eastern states and Europe. These initial settlers came by steamboat and followed the major rivers and tributaries into the interior of the state. Town sites focused on rivers as a source of transportation and power. Town sites often developed according to resource need, company/industry need, or via social/ethnic boundaries. Many towns developed into agricultural processing and distribution centers. Industries such as milling and brewing became widespread throughout southern Minnesota. The initial farming practice of the time was subsistence, but farmers in the state were at the cusp of large-scale farming, and began to grow wheat as a cash crop.

3.2.8 Railroads and Agricultural Development (1870–1940)

After 1870, railroads were the single most important factor in the rapid growth of agriculture in southern Minnesota because their expansion onto the Great Plains expanded the market for cash

crops. New railroads in Minnesota opened tillable land to farmers, reduced dependence on risky water transportation, and allowed for the transportation of goods and services away from major river transportation corridors. Railroads had become the primary mover of crops by the late nineteenth century. After 1870, an agricultural land boom began as railroads, chambers of commerce, land colonization companies, real estate companies, the State Bureau of Immigration, and other private and public agencies encouraged settlement of the large expanses of land in southern Minnesota. Good soil, a favorable climate, and the low cost of cultivating land made farming profitable. This solidified agriculture as the dominant industry in southern Minnesota. Two of the most important industrial centers for this time became the milling district in St. Anthony Falls and the meat packing operation in South St. Paul. Railroads were paramount in supplying unrefined resources from southern Minnesota to these locations.

3.3 Background Research

In April 2016, HDR staff conducted background research at the SHPO and the OSA. Background research for the Project focused on previously identified archaeological sites and archaeological surveys within the APE and within a one-mile radius of the TH 12 realignment segment of the APE. HDR staff also reviewed historical plat maps and aerial photographs using online sources including the University of Minnesota John R. Borchert Map Library, Historic Map Works, the State of Minnesota GLO Historic Plat Map Retrieval System, and the State of Minnesota Aerial Photography database.

3.3.1 Previous Archaeological Surveys within One Mile of the TH 12 Realignment Segment of the APE

Background research for the Project revealed that no previous archaeological surveys have been recorded and documented at SHPO within the APE; however, one previous archaeological survey has been conducted within a one-mile radius of the APE (Table 3-1; Figure 3-1). This survey was a cultural resources assessment completed for the release of the Willmar Municipal Airport (John Rice Memorial Field) property from airport activities. Information on a survey of Alternative 1, which has overlapping boundaries with the current project, was provided by MnDOT CRU. Details are provided in Section 3.4, below.

Table 3-1. Previous archaeological surveys within one mile of the TH 12 Realignment Segment of the APE

SHPO Number	Title	Author(s)	Year
KH-07-04	Survey of Cultural Resources, Section 106 Review, Land Release Request, Willmar Municipal Airport, Willmar, Minnesota, Kandiyohi County. BMI Project Number T41.22255	Maul, Dale E.	2007
None	Untitled notes and field maps	AECOM	2015

3.3.2 Previously Recorded Archaeological Sites within One Mile of the TH 12 Realignment Segment of the APE

Background research revealed no previously identified archaeological sites within the TH 12 realignment segment of the APE or within a one-mile radius.

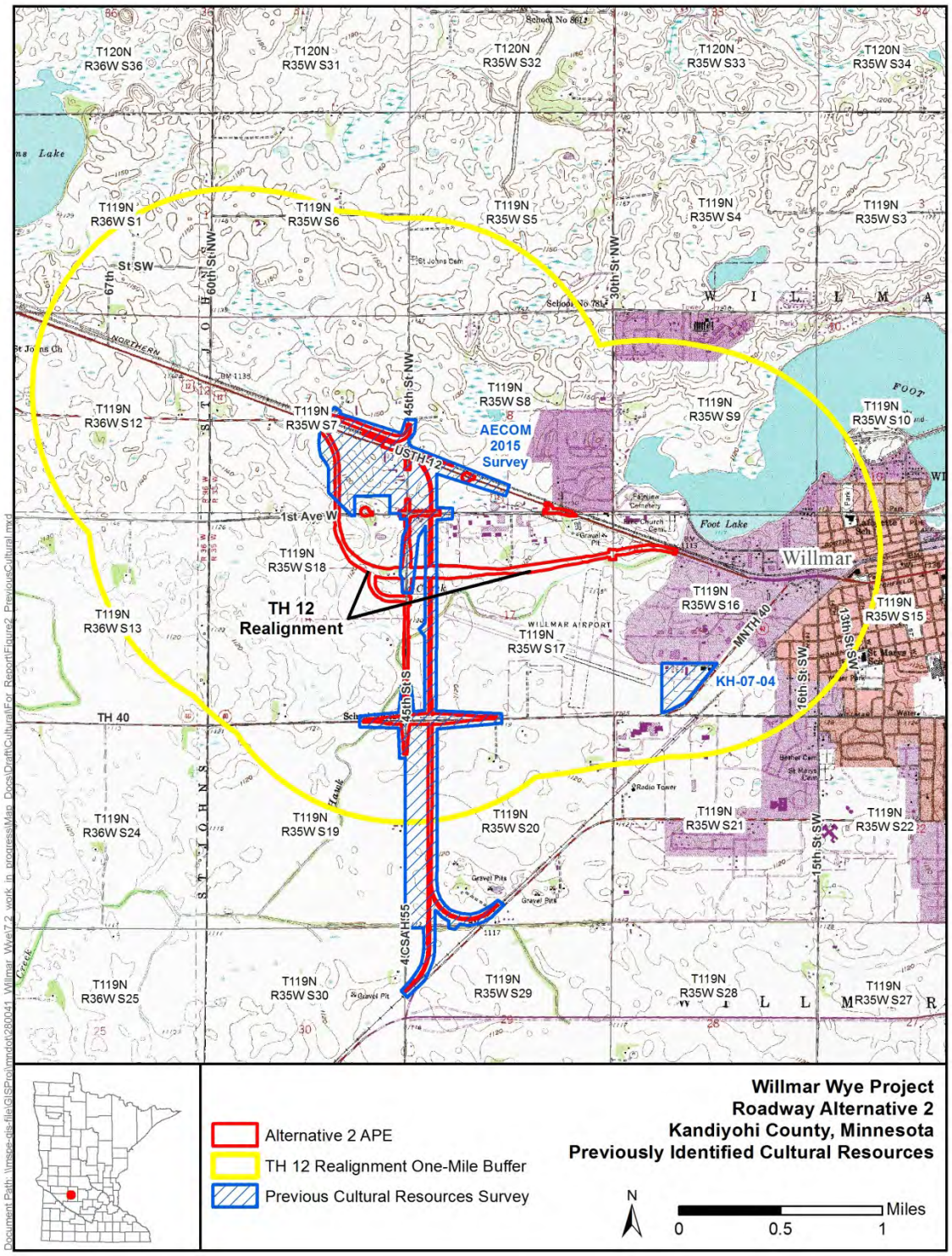

Figure 3-1: Previously Identified Cultural Resources within One Mile of the TH 12 Realignment Segment of the APE

3.3.3 Historic Maps and Aerial Photograph Review

GLO maps, historic plat maps and historic aerial photographs were examined to identify areas with potential for containing historic era cultural resources located within the TH 12 realignment segment of the APE. Archaeological sites may be present in locations where historic resources have been documented on historic maps.

A review of a GLO map dating to 1857 revealed no features related to Euro-American settlement within or near the TH 12 realignment (United States Surveyor General 1857). The 1874 Andreas Atlas shows the village of Willmar approximately 1 mile to the east of the TH 12 realignment in Section 15, Township 119N, Range 35W. The 1874 atlas also shows the St. Paul and Pacific Railroad and a parallel unnamed road just to the north of the TH 12 realignment in Section 7 as they run southeast to northwest from Willmar to St. John. The 1874 atlas also reveals an unnamed road running north to south through the TH 12 realignment along what is now CSAH 55; however, no other features are located within the TH 12 realignment (Andreas 1874).

By 1886 Willmar had expanded to include all of Section 15, Township 119N, Range 35W, as well as portions of neighboring sections. The railroad and roads in the vicinity of the TH 12 realignment as seen on the 1874 plat remain relatively unchanged. Numerous farmstead are present throughout the area; however, none are located within the TH 12 realignment (North West Publishing Co. 1886). A 1905 plat map shows Willmar expanding to the further to the west into Section 16, Township 119N, Range 35W. The railroad and roads in the vicinity of the TH 12 realignment as seen on the 1886 plat remain relatively unchanged. Numerous farmsteads are still present throughout the area, and a structure associated with property owner Ole Rasmussen is present in the TH 12 realignment in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W. No other farmsteads are located within the TH 12 realignment on the 1905 map (Lawson and Nelson 1905) (Figure 3-2). A 1915 plat map shows the vicinity of the TH 12 realignment remaining much the same as it was in 1905, however the structure in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W that was attributed to Ole Rasmussen is now associated with A.C. Skoog. In addition, a stream that runs roughly southwest to northeast through Section 17, Township 119N, Range 35W has been channelized and named County Ditch No. 10. Also, the St. Paul and Pacific Railroad is now referred to as the Great Northern Railway (Webb Publishing Co. 1915) (Figure 3-3). A plat map from 1932 shows the vicinity of the APE remaining much the same as it was in 1905, however the structure in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W that was associated with A.C. Skoog is now associated with Jens Anderson (Webb Publishing Co. 1932) (Figure 3-4).

An aerial photograph from 1938 shows the APE consisting mainly of agricultural fields. The farmstead in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W is present and several buildings are visible. The APE also crosses the southern edge of a farmstead in the SE ¼ of the NE ¼, of the NW ¼ of Section 17, Township 119N, Range 35W (Figure 3-5). A 1958 plat mat shows that the farmstead in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W is still associated with property owner Jens Anderson. This map also reveals a new alignment of TH 12 as it runs just south of and parallels the Great Northern Railway (Farm Plat Book Publishing Co. 1958) (Figure 3-6). A 1963 aerial photograph shows conditions in the APE remaining much the same as they were in the 1938 aerial, with the exception of TH 12 now being present south of and parallel to the Great Northern Railway. Modifications to the number and arrangement of outbuildings can also be seen at the two farmsteads located within or near the APE (Figure 3-7). An aerial photograph from 1991 shows the conditions in the APE similar to what they were in the 1963 aerial, with the main exception being that the structures associated with the

farmstead in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W have all been removed. Section 4.4.1 of this report discusses the changes to the farmstead in more detail.

Current land use in the APE remains agricultural, as it has been throughout the twentieth and early twenty-first centuries. The only major change since the 1991 aerial photograph is the presence of 30th Street SW, and the adjacent bike path, which run north to south along the section line between Sections 16 and 17, Township 119N, Range 35W.

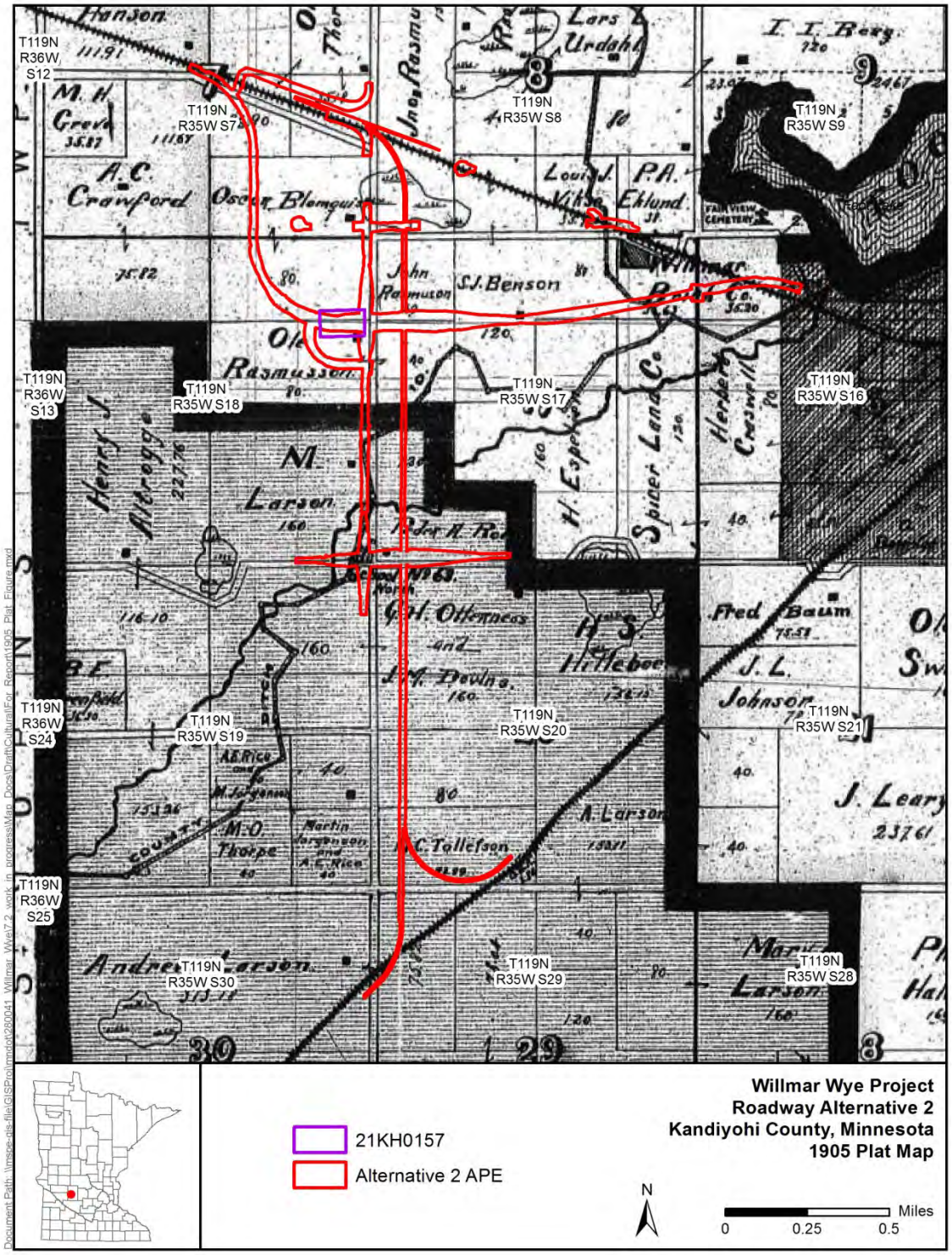

Figure 3-2: 1905 Plat Map of Willmar Township showing APE (Lawson and Nelson 1905)

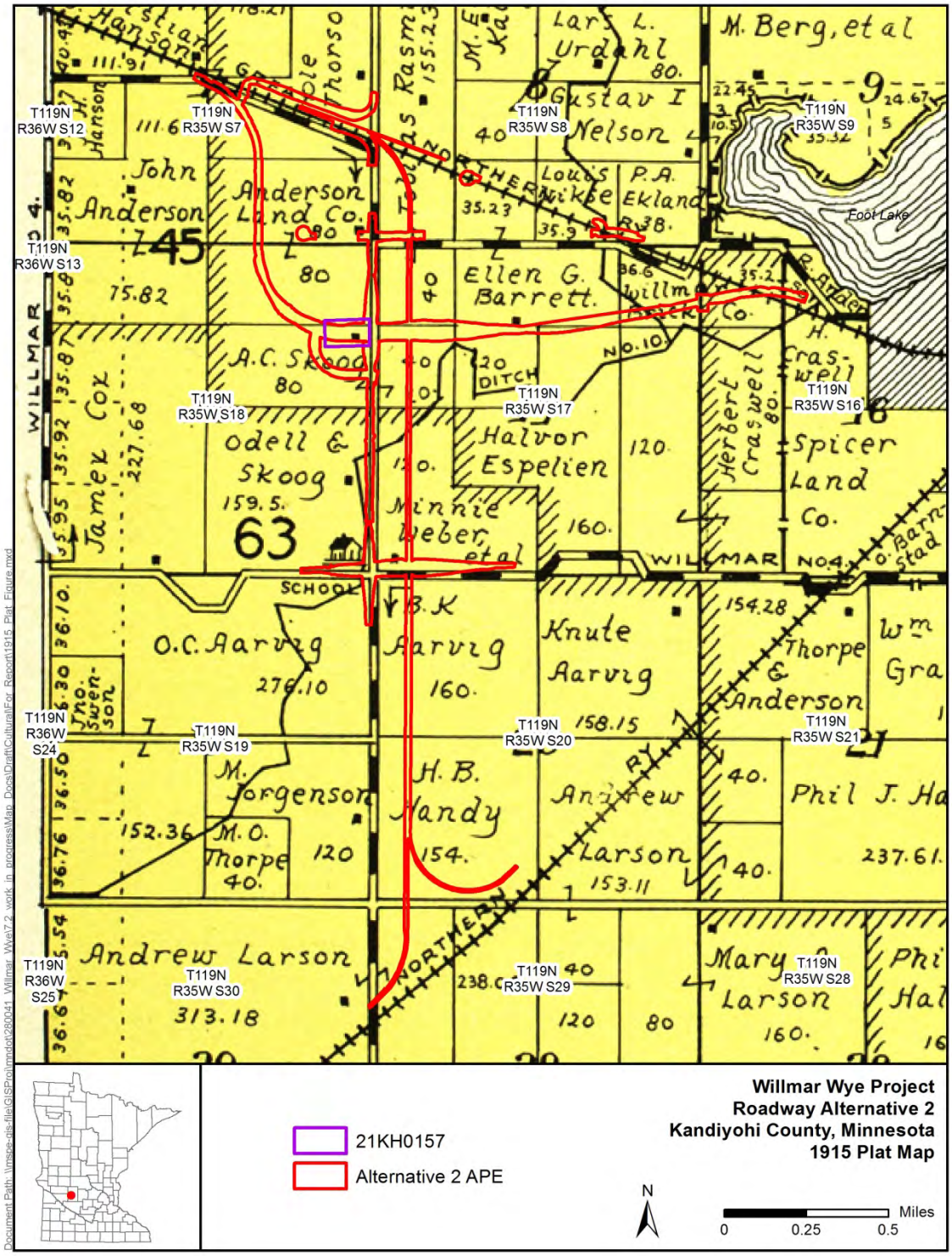

Figure 3-3. 1915 Plat Map of Willmar Township Showing APE (Webb Publishing Co. 1915)

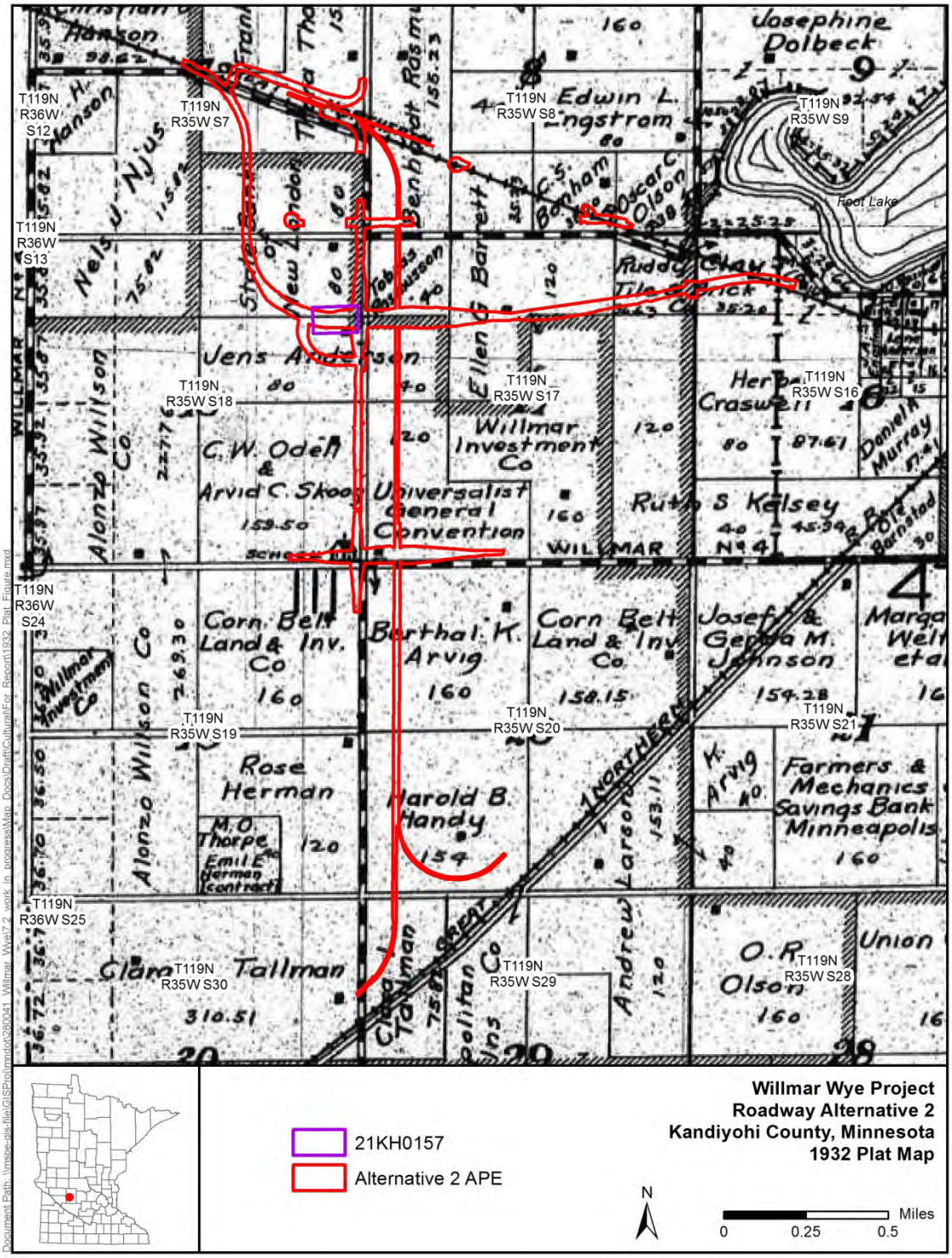

Figure 3-4. 1932 Plat Map of Willmar Township showing APE (Webb Publishing Co. 1932)

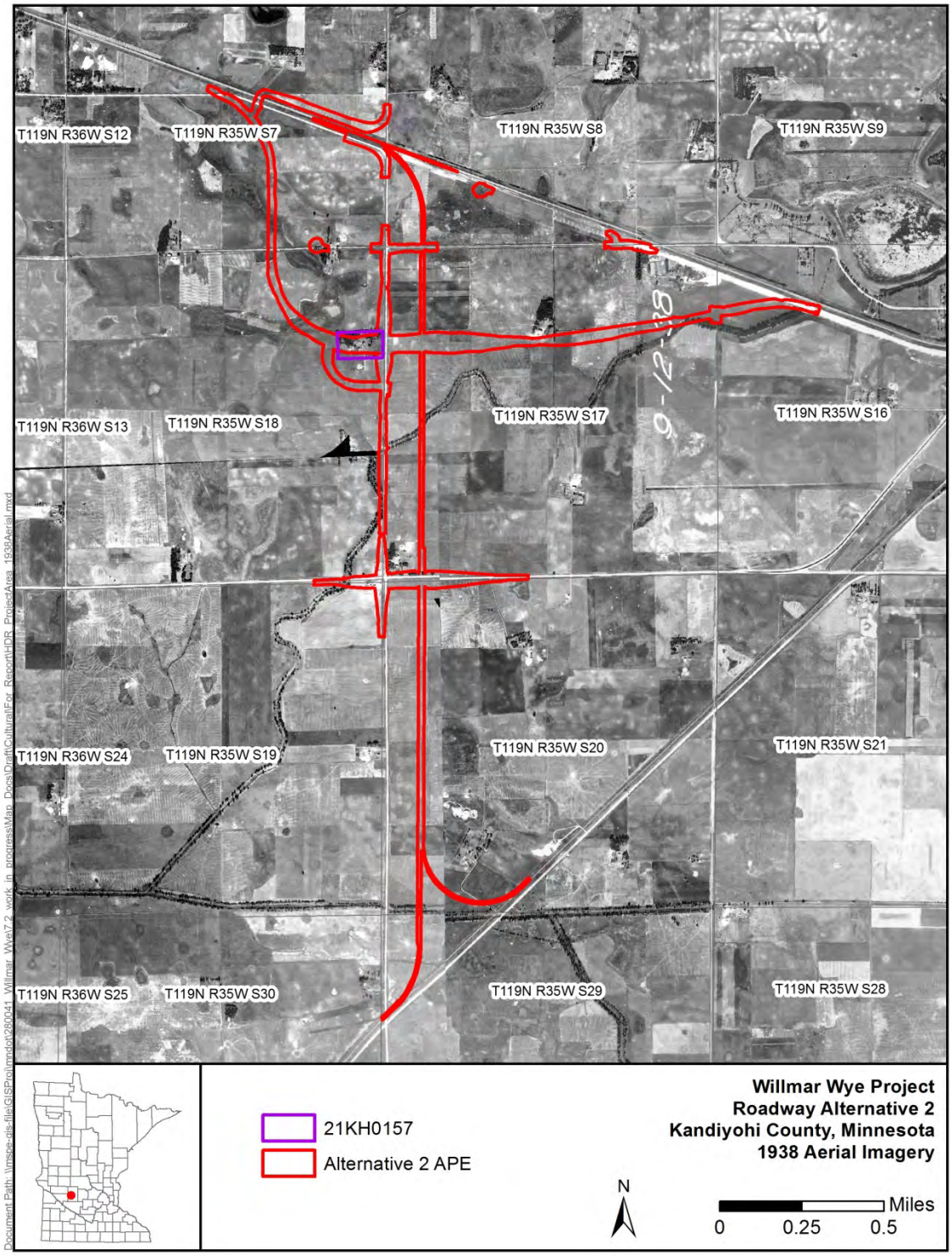

Figure 3-5. 1938 Aerial Photograph showing APE

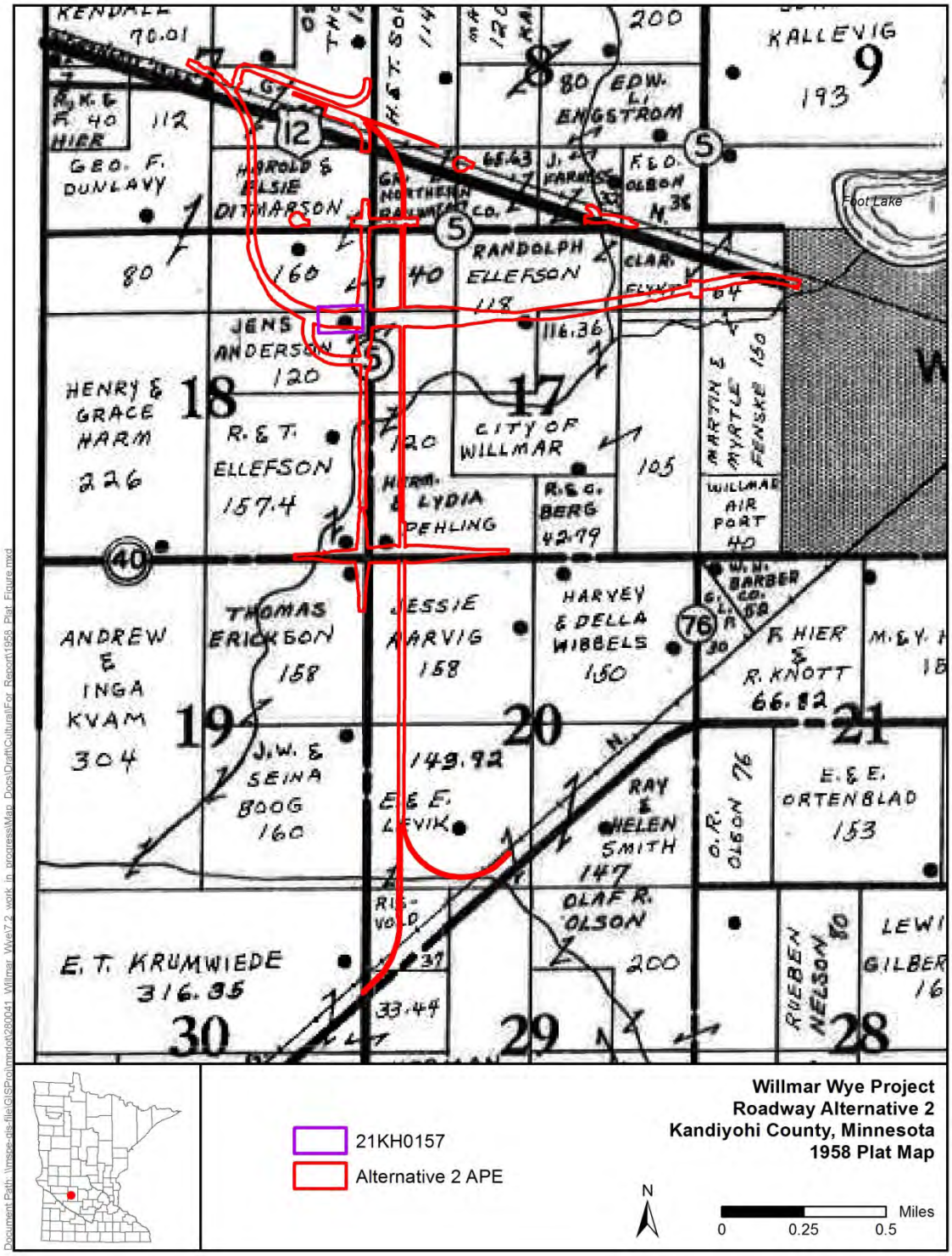

Figure 3-6. 1958 Plat Map of Willmar Township showing APE (Farm Plat Book Publishing Co. 1958)

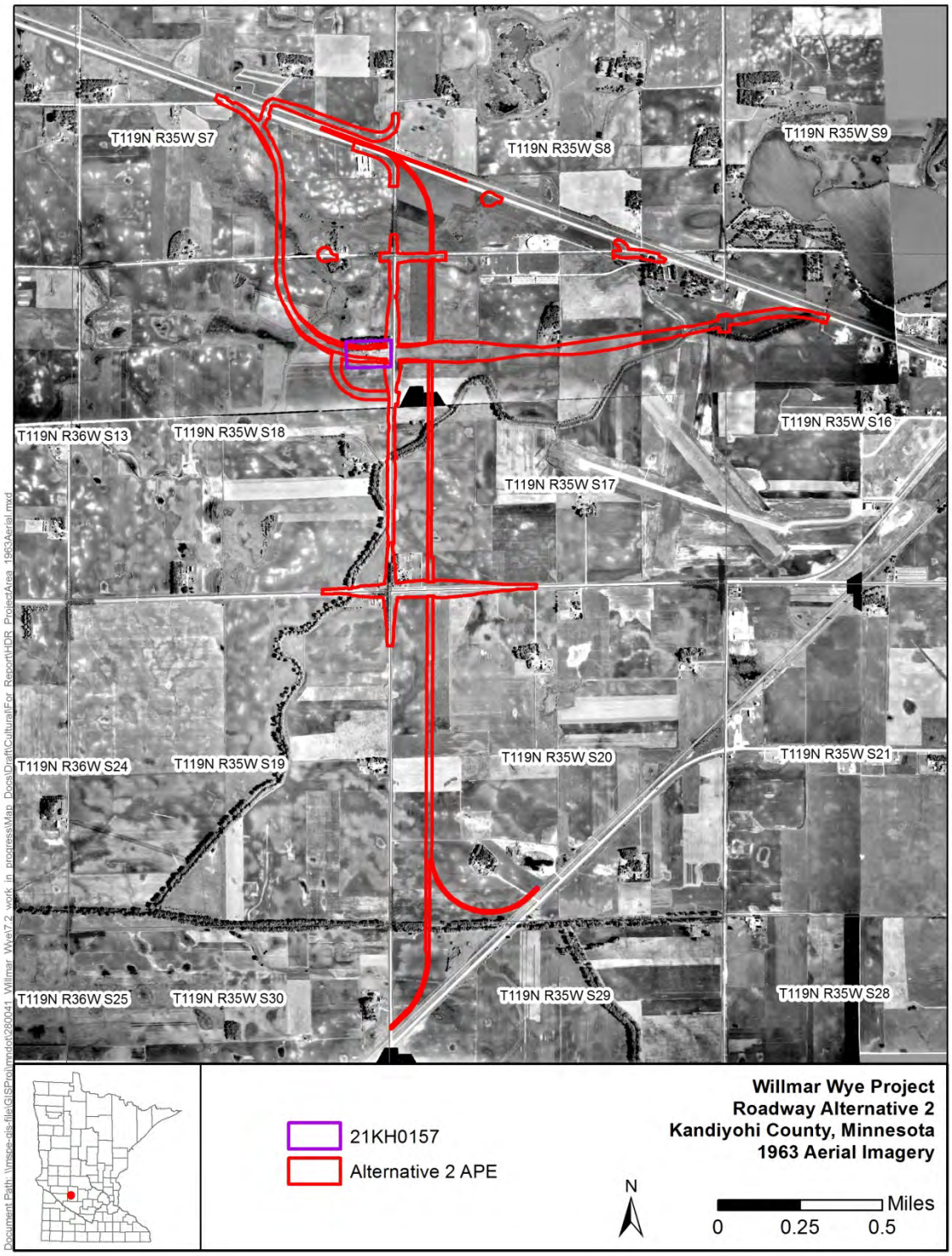

Figure 3-7. 1963 Aerial Photograph showing APE

3.4 2015 AECOM Investigations

AECOM performed an archaeological investigation of the Alternative 1 project area of the Willmar Wye Project from December 9–13 and December 19, 2015. The Alternative 1 project area consists of an approximately 374-acre irregularly-shaped area that extends south from TH 12 near the intersection with 45th Street NW, includes the intersection of CSAH 55 and 15th Avenue SW, and ends near the intersection of CSAH 55 with CSAH 15 (Figure 1-2).

Information from the AECOM investigation was limited to field maps and field survey forms that were provided to HDR by MnDOT CRU. AECOM divided the Alternative 1 project area into 45 individual survey segments labeled numerically and alphabetically. Figures 3-8 and 3-9 present the ground surface conditions and survey methodology employed by AECOM in the Alternative 1 project area at the time of the 2015 survey. Details regarding the survey methodology, which included pedestrian survey and subsurface testing, and results in the 45 survey segments can be found on AECOM's field survey forms, included as Appendix A. There were no archaeological sites recorded in the AECOM forms or notes, although two historic barns were noted. HDR reviewed the AECOM field maps and survey forms and recommends that the survey methodology employed by AECOM is adequate and complete. As such, HDR recommends no further work for the Alternative 1 APE.

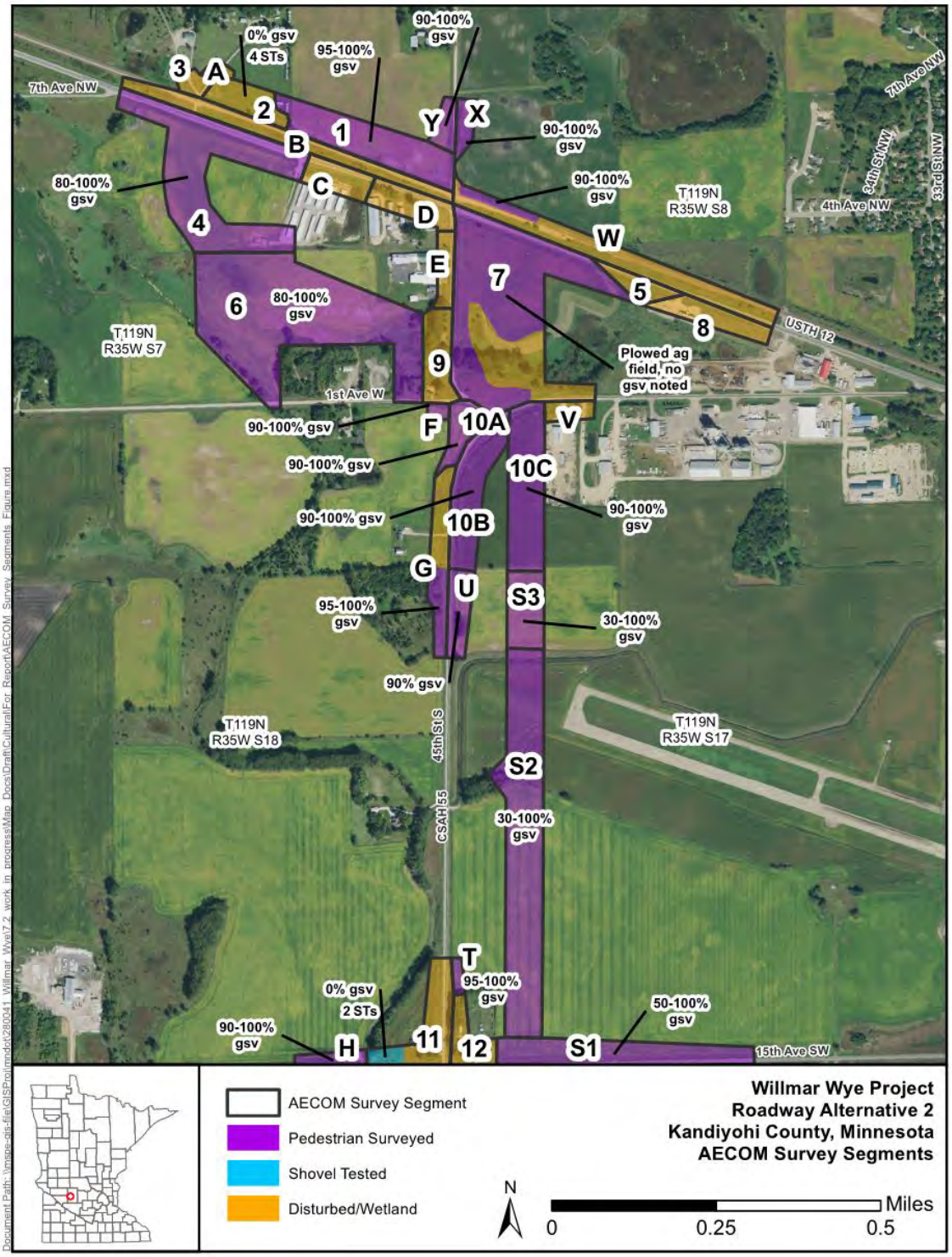

Figure 3-8. AECOM Survey Coverage of Alternative 1 Project Area (North Half)

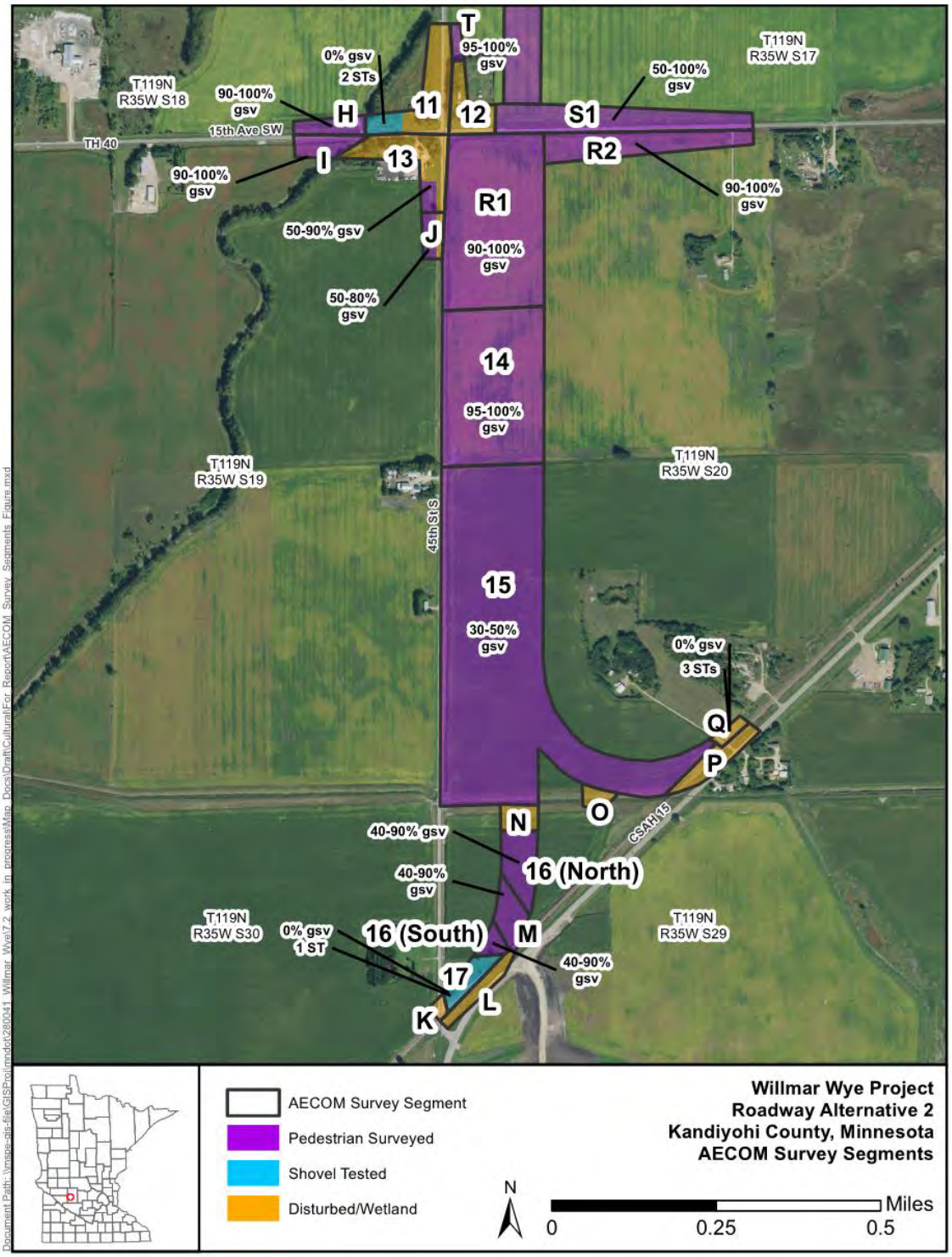

Figure 3-9. AECOM Survey Coverage of Alternative 1 Project Area (South Half)

4 Results

From May 24–25, 2016, HDR performed a Phase I archaeological resources survey for the Project. The archaeological survey focused on the TH 12 realignment segment of the APE (Figure 4-1). HDR archaeologist Michael Justin served as the Principle Investigator and conducted the survey with HDR archaeologist Dylan Eigenberger. Both Justin and Eigenberger meet the Secretary of the Interior's Professional Qualification Standards for Archaeology as published in 36 CFR 61. For documentation purposes the APE where survey was performed (TH 12 realignment) is separated by township, range, and section.

Areas of the APE that overlap with the Alignment 1 project area surveyed by AECOM were not surveyed as part of this effort with the exception of an approximately 0.5-mile stretch of the TH 12 realignment just south of TH 12 in Section 7, Township 119N, Range 35W, and where the TH 12 realignment crosses CSAH 55.

Three components of the APE that were not previously surveyed were located in areas of obvious disturbance and not considered for survey. These areas include a proposed cul-de-sac on 1st Avenue West to the west of CSAH 55 on the grounds of an operating farm complex in the SE ¼ of Section 7, Township 119N, Range 35W, improvements to the intersection of 1st Avenue West/CSAH 55 and TH 12, and shoulder widening along CSAH 55 south of the proposed TH 12 realignment (Figure 1-1 and 1-2).

Subsequent to the field survey, the APE was revised to include a new connecting roadway that branches off from the TH 12 realignment in the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35 and runs north to south then east to west around a former farmstead area until it reaches CSAH 55 (Figure 1-1 and 1-2). The new roadway component traverses an agricultural field, a portion of which was examined during survey of the TH 12 realignment just west of the former farmstead area. At the time of the TH 12 realignment survey, the field where the connecting roadway is located was planted in corn. Based on the negative results of the previous archaeological surveys conducted in adjacent agricultural fields, the new roadway component was considered to have low potential for containing significant archaeological resources and no survey was conducted.

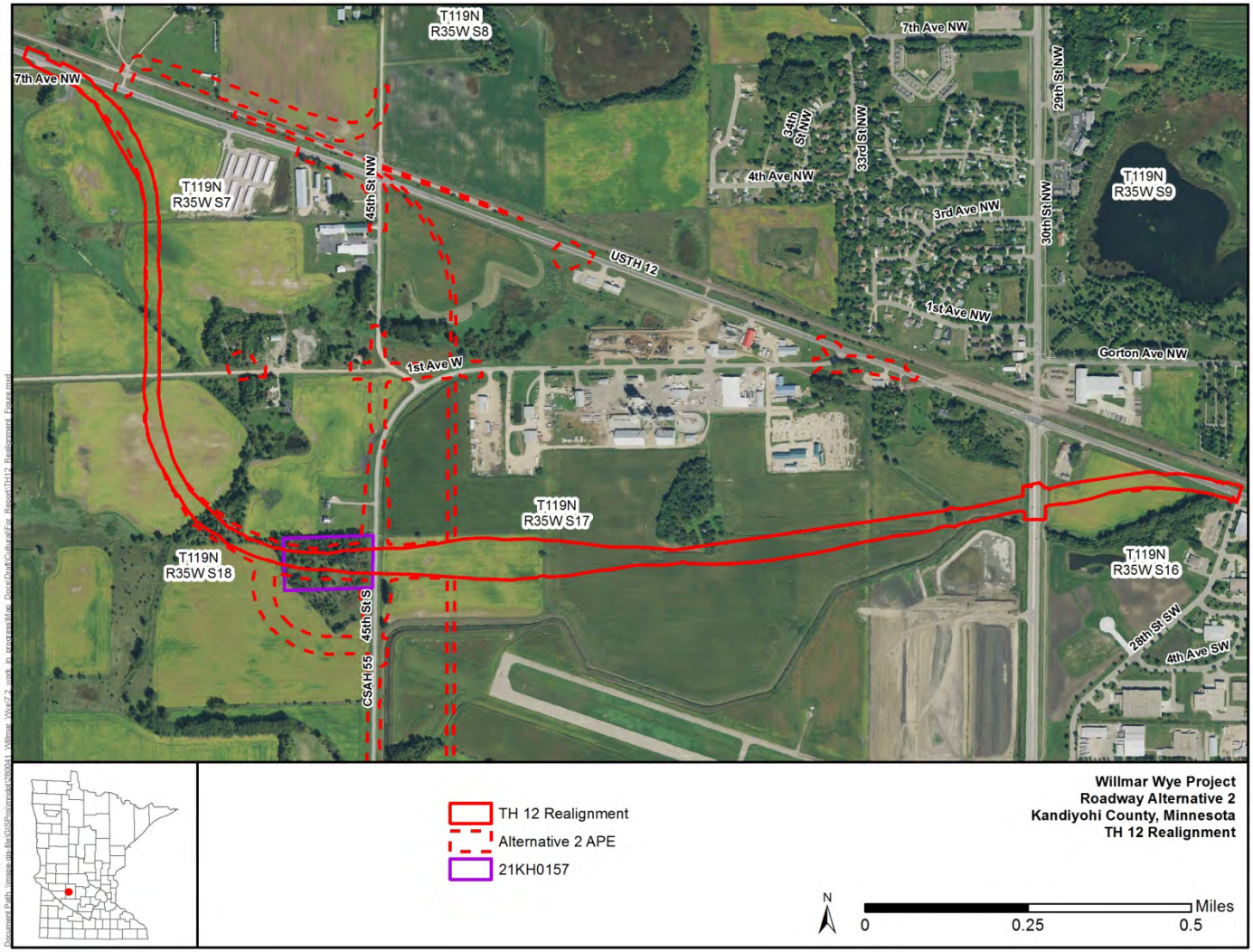

Figure 4-1. TH 12 Realignment Segment of the APE Overview

4.1 Section 7, Township119N, Range 35W

The TH 12 realignment runs roughly north to south through the SE ¼ of the section over generally flat terrain from the intersection of TH 12 and 7th Avenue NW to 1st Avenue W (see Figure 4-1). At the time of survey, from north to south the APE traversed the ditched and disturbed ROW of the intersection of TH 12 and 7th Avenue NW intersection, a planted corn field with 90 percent GSV, a planted soybean field with 90 percent GSV, a ditched stream, and another planted soybean field with 90 percent GSV (see Figures 4-2 and 4-3). Pedestrian survey of the APE in this section revealed no cultural material. No further work is recommended for this portion of the APE.

Figure 4-2. TH 12 Realignment from Intersection of 7th Avenue NW and TH 12. View to Southeast

Figure 4-3. Typical Field Conditions within TH 12 Realignment in Section 7, View to South

4.2 Section 16, Township119N, Range 35W

The TH 12 realignment runs roughly east to west through the NW ¼ of the section over flat to gently rolling terrain from TH 12 to 30th Street SW (see Figure 4-1). At the time of survey, from east to west, the APE traversed the ditched and disturbed ROW of TH 12, a planted corn field with 90 percent GSV, and the ditched and disturbed ROW of 30th Street SW, which includes a paved bike path that runs north to south along the east side of the street (see Figures 4-4, 4-5 and 4-6). Pedestrian survey of the APE in this section revealed no cultural material. No further work is recommended for this portion of the APE.

Figure 4-4. Typical Field Conditions within TH 12 Realignment in Section 16, View to Northeast

Figure 4-5. TH 12 Realignment in Section 16 at Intersection with TH 12, View to Northeast

Figure 4-6. TH 12 Realignment at intersection with 30th Street NW and Bicycle Path, View to West

4.3 Section 17, Township119N, Range 35W

The TH 12 realignment runs roughly east to west through the N ½ of the section over flat to gently rolling terrain from 30th Street SW to CSAH 55 (see Figure 4-1). At the time of survey, from east to west the APE traversed the ditched and disturbed ROW of 30th Street SW, a planted soybean field with 80 percent GSV, a ditched stream, a planted soybean field with 80 percent GSV, a planted corn field with 90 percent GSV, and the ditched and disturbed ROW of CSAH 55 (see Figures 4-7 and 4-8). Pedestrian survey of the APE in this section revealed no cultural material. No further work is recommended for this portion of the APE.

Figure 4-7. TH 12 Realignment in Section 17 from CSAH 55, View to East

Figure 4-8. Typical Field Conditions within TH 12 Realignment in Section 17, View to East

4.4 Section 18, Township119N, Range 35W

The TH 12 realignment runs east to west then curves and runs north to south through the NE ¼ of section over flat to gently rolling terrain from CSAH 55 to 1st Avenue W (see Figure 4-1). At the time of survey, from east to west, the APE traversed a former farmstead area covered with a mix of tall grass and heavily wooded areas. This former farmstead area was recorded as site 21KH0157 and is described in more detail in Section 4.4.1 below. West of the former farmstead area the APE traversed a planted corn field with 90 percent GSV then curved to the northwest and traversed an area covered by tall grass and scattered trees that was bordered to the northwest and east by stands of mature trees (see Figure 4-9). A channelized stream that runs southwest to northeast was located within the northwest stand of trees. A review of historic plat maps and aerial photographs revealed that no buildings or farmsteads had been located in this area, and it had been cultivated as recently as recently as 1963 (see Figures 3-2 through 3-7). The presence of an unnaturally undulating ground surface and an old push-pile further indicate prior disturbance in this area. Pedestrian survey of this area revealed no features or cultural materials. Northwest of this grassy area, the APE traversed another planted corn field with 90 percent GSV (see Figure 4-10). Pedestrian survey of the portion of the APE that contains the two cornfields and grassy area northwest of the former farmstead area revealed no cultural material. No further work is recommended for these portions of the APE.

Figure 4-9. Grass and Tree-Covered Parcel along TH 12 Realignment in Section 18, View to Northwest

Figure 4-10. TH 12 Realignment in Section 18 from 1st Avenue West, View to Southeast

4.4.1 Site 21KH0157

Site 21KH0157 is an abandoned farmstead located in the NE ¼ of the SE ¼ of the NE ¼ of Section 18, Township 119N, Range 35W in Kandiyohi County, Minnesota (see Figure 4-1). The site was defined based on the farmstead area as represented on historical aerial photographs (see Figures 3-5, 3-7, and 4-12). The farmstead area consists of a mix of tall grass and heavily wooded areas. Grassy openings with scattered groves of young trees are located throughout the southern portion of the farmstead area while the northern portion of the farmstead is a heavily wooded overgrown shelterbelt. The north half of the APE traverses the heavily wooded area and the south half of the APE traverses the grassy openings with scattered trees (see Figure 4-14).

Historic Map/Aerial Photograph Review

Historical maps reveal the presence of a structure belonging to Ole Rasmussen at this location as early as 1905 (Lawson and Nelson 1905) (see Figure 3-2). A 1915 plat map shows a structure in the same location with the property now owned by A.C. Skoog (Webb Publishing Co. 1915) (see Figure 3-3). A farmstead is first visible at this location on an aerial photograph from 1938, which shows a residence, a barn, two smaller outbuildings, and an irregular-shaped, indistinguishable feature west of the barn that may be an animal enclosure or pen (see Figure 4-11). Plat maps from 1932 (Webb Publishing Co. 1932) and 1958 (Farm Plat Book Publishing Co. 1958) reveal the property was owned by Jens Anderson (see Figures 3-4 and 3-6). By 1961 the property had changed hands and was now owned by Art Sordahl (Directory Service Co. 1961).

An aerial photograph from 1963 reveals that the farmstead had undergone extensive modifications since 1938 (see Figure 4-12). Based on the 1963 aerial photograph, the barn appears to have been altered as is seems shorter along its north-south axis, and a silo is clearly visible along the east wall that was not present in 1938. The small outbuilding just to the east of the house in the 1938 aerial

has been removed, and the irregular-shaped, indistinguishable feature west of the barn is no longer present. A new outbuilding is present to the southeast of the barn where in the 1938 aerial there appeared to be a patch of removed soil, possibly a borrow area. The driveway has also been modified. The 1938 aerial shows the driveway running southwest from the near northeast corner of the farmstead and curving around south of the residence, whereas the 1963 aerial shows the driveway running almost due west south of the residence. Overall, the farmstead area appears more orderly and better kept than it appeared in 1938. Property ownership was not available from plat maps subsequent to 1961, and by 1982 the entire S ½ of the NE ¼ of Section 18, including the farmstead, was annexed by the city of Willmar. The property is currently owned by the city of Willmar. Aerial photographs reveal that the buildings within the farmstead had been razed by 1991 (see Figure 4-13).

Survey Results

Pedestrian survey of the APE within the former farmstead revealed the presence of two sets of foundations, one along the southern edge of the APE (Feature 1) and one along the northern edge of the APE (Feature 2).

Feature 1 consists of poured concrete foundations measuring approximately 50 feet north to south by 26 feet east to west, as well as a poured concrete silo foundation with an approximately 10-foot diameter along the east foundation wall (see Figure 4-12 and Figures 4-15 through 4-19). Large metal anchor bolts are spaced evenly along the foundation walls. Two interior wall foundations, oriented east to west, created separate bays within the structure. A concrete slab floor was present within the foundations. A poured-concrete ramp measuring approximately 4 feet north to south by 8 feet east to west was found along the west foundation wall. The entire structure was overgrown with trees and scrub brush. A mix of mid-twentieth-century and modern household and architectural debris, including miscellaneous pieces of metal, a variety of glass food and beverage vessels, and a tire, were scattered throughout the foundations.

Feature 2 consists of poured concrete foundation measuring approximately 16.5 feet north to south by 24 feet east to west (see Figures 4-12 and Figures 4-20 through 4-23). Large metal anchor bolts are spaced evenly along the foundation walls. A concrete slab floor was present within the foundations, and a concrete slab measuring approximately 8 feet north to south by 6.5 feet east to west found off of the southeast corner of the foundations. The entire structure was overgrown with trees and scrub brush. A scatter of mostly modern debris was found within and around the foundations. This debris scatter included metal ductwork, metal buckets, metal fuel barrels, wire mesh, asphalt shingles, pieces of Styrofoam, miscellaneous glass food vessels, 1960s to 1970s era pop-top aluminum cans, an enamel wash basin, an upholstered reclining chair, a 1980s era Huffy bicycle, and a metal rabbit hutch. No structures are evident in the vicinity of Feature 2 on the 1938 or 1963 aerial photographs; however, the 1963 aerial shows what appears to be a square patch of cleared earth at that location.

In addition to the debris scattered within and near features 1 and 2, a mix of modern and mid-twentieth-century household and architectural debris was observed scattered throughout the grassy and wooded areas within the site. This debris included multiple metal fuel containers, miscellaneous pieces of sheet metal, metal can fragments, wire, galvanized metal ductwork, a 1970s–1980s era television set, and a box-spring mattress.

Four shovel tests were excavated along the centerline of the APE in the vicinity of the residence, and two outbuildings west of the residence, as portrayed on the 1938 aerial photograph (see Figure 4-24). Shovel tests 1 and 2 were excavated in the vicinity of the residence. This area exhibited an

unnaturally undulating ground surface that appeared to be disturbed. Shovel test 1 was placed in the vicinity of the southeast corner of the former residence just to the east of the disturbed ground surface and exhibited an intact profile consisting of 15 cm of very dark brown (10YR 2/2) silt loam over very dark grayish brown (10YR 3/2) silt loam with some gravel that continued to a depth of 55 centimeters below surface (cmbs) before transitioning to a mottled very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) silt loam with some gravel. A grayish brown (10YR 5/2) silt loam with some gravel subsoil was reached at 70 cmbs and the shovel test was terminated at 85 cmbs. No artifacts were recovered from this test. Shovel test 2 was placed 15 m north/northwest of shovel test 1 in vicinity of the west elevation of the former residence. Shovel test 2 revealed a disturbed profile consisting of 15 cm of very dark brown (10YR 2/2) silt loam topsoil over brown (10YR 5/3) sand and gravel fill. This fill layer contained numerous pieces of architectural debris of indeterminate age including pieces of miscellaneous metal and metal wire, and fragments of concrete, red brick, ceramic drain pipe, and marble slab. At 40 cmbs the test transitioned to very dark brown (10YR 2/2) silt loam mixed with the sand and gravel fill material. Small fragments of charcoal and slag, and numerous pieces of burned and melted linoleum were found throughout this layer along with charred pieces of concrete, wire nails, and miscellaneous pieces of metal. This stratum was interpreted as a burn layer and continued until an obstruction impeded further excavation of the shovel test at 62 cmbs. The presence of fill mixed with architectural debris overlying a burn layer as seen in shovel test 2, which was placed within an area of disturbed ground surface in the vicinity of the former residence, indicate that the residence was razed, the structural debris burned (at least partially), and the entire area buried over with soil.

Shovel test 3 was placed 15 m west/southwest of shovel test 2 in the vicinity of an outbuilding west of the residence that was portrayed on the 1938 aerial photograph. The 1963 aerial photograph revealed that this outbuilding had been removed in the intervening years and a portion of the driveway now occupying that location. Shovel test 3 revealed 15 cm of very dark grayish brown (10YR 3/2) silt loam topsoil over a pale brown (10YR 6/3) sandy silt fill layer that was present to 25 cmbs. This fill layer contained mostly architectural debris of indeterminate age consisting of less than ten window glass fragments, less than 10 red brick fragments, and less than 5 fragments of colorless container glass. At 25 cmbs a stratum consisting of very dark brown (10YR 2/2) silt loam with some gravel was encountered and continued to a depth of 75 cmbs. No artifacts were recovered from this stratum. At 75 cmbs gray (10YR 5/1) silt loam subsoil was reached and was present until excavation ceased at 100 cmbs.

Shovel test 4 was placed 15 west of shovel test 3 in the vicinity of the small, westernmost outbuilding that was portrayed on the 1938 aerial photograph. The 1963 aerial photograph revealed that this outbuilding had been removed in the intervening years and also shows a larger outbuilding having been constructed to the west of the old outbuilding. Shovel test 4 revealed 65 cm of black (10YR 2/1) silty clay loam over gray silty clay loam subsoil that was present until excavation ceased at 80 cmbs. The upper stratum contained mostly architectural debris of indeterminate age consisting of less than 10 fragments of window glass, a square-cut nail. A terra cotta pot rim sherd, a triangular-shaped metal plate, and a metal window latch. A single wire nail was recovered from the subsoil.

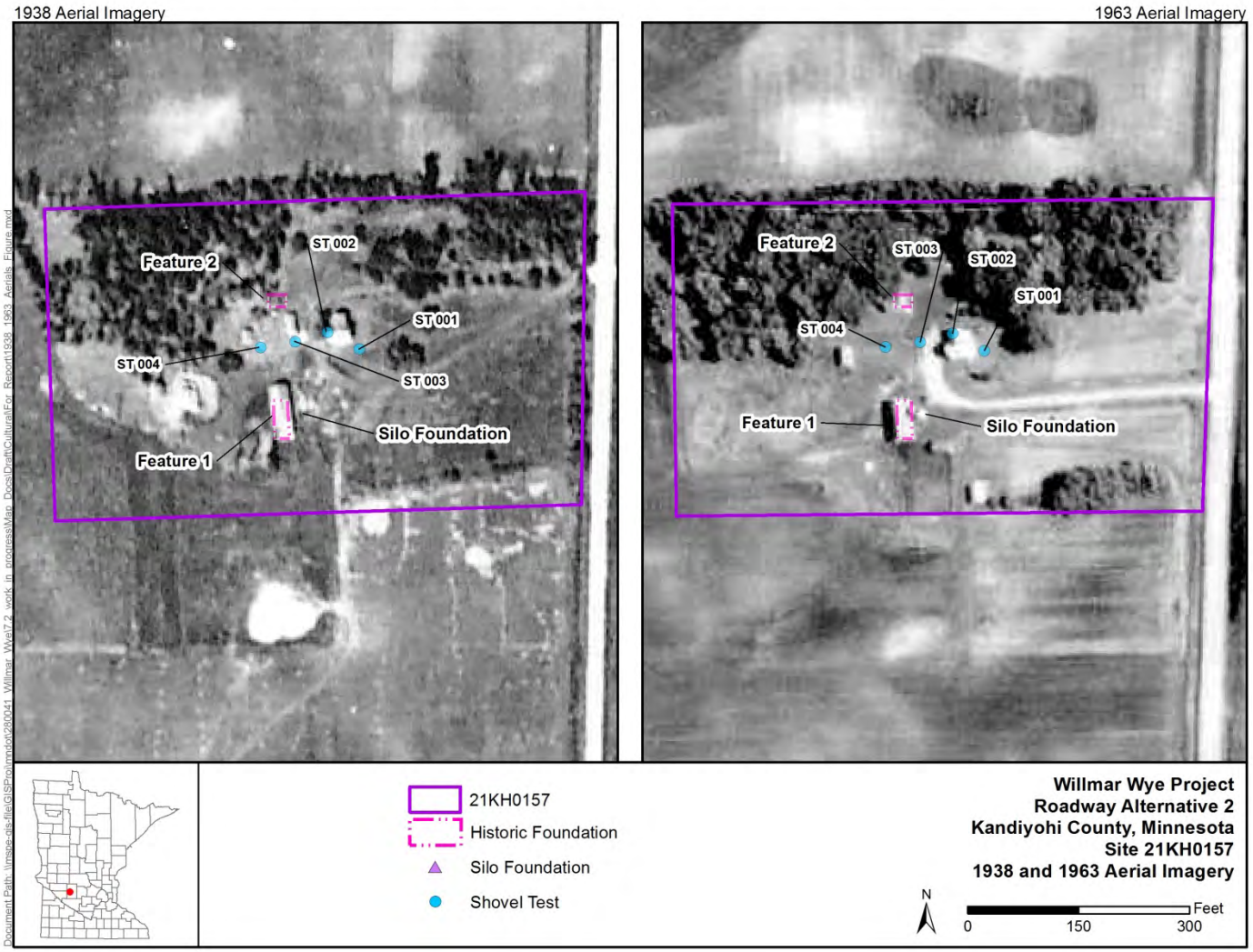

Figure 4-11. 1938 and 1963 Aerial Photographs Showing Farmstead with Results of Current Investigation

Figure 4-12. 1991 and 2015 Aerial Photographs Showing Farmstead with Results of Current Investigation

Figure 4-13. Site 21KH0157 Overview, View to East

Figure 4-14. Site 21KH0157, Feature 1 Overview, View to Southeast

Figure 4-15. Site 21KH0157, Feature 1, North Wall, View to East

Figure 4-16. Site 21KH0157, Feature 1, East Wall, View to South

Figure 4-17. Site 21KH0157, Feature 1 Interior, View to West

Figure 4-18. Site 21KH0157, Feature 1, Silo Foundation, View to Southwest

Figure 4-19. Site 21KH0157, Feature 2 Overview, View to Northwest

Figure 4-20. Site 21KH0157, Feature 2, South Wall, View to East

Figure 4-21. Site 21KH0157, Debris in Vicinity of Feature 2, View to Southeast

Figure 4-22. Site 21KH0157 Debris in Vicinity of Feature 2, View to Northeast

Figure 4-23. Site 21KH0157, Shovel Test Transect from Shovel Test 3, View to East

Summary

Minnesota historic farmsteads are primarily eligible to the National Register under Criterion D, although on rare occasions they could be considered under Criteria A, B, or C (Terrell 2006). Site 21KH0157 is an historic farmstead dating to at least 1905 and was present until at least 1963. According to the *Historic Context Study of Minnesota Farms, 1820-1960* (Granger and Kelly 2005), site 21KH0157 is located in the West Central Livestock and Cash Grain farming region. Based on the results of the Phase I investigations at this site, and its apparent dates of occupation, this farmstead may be associated with four farming developmental periods as identified in the *Historic Context Study of Minnesota Farms, 1820-1960* (Granger and Kelly 2005) and *Historical Archaeology of Minnesota Farmsteads* (Terrell 2006):

- Period 4: Industrialization and Prosperity, 1900-1920
- Period 6: Development of Livestock Industries, 1900-1940
- Period 7: Depression and Interwar Period, 1920-1940
- Period 8: World War II and the Postwar Period, 1940-1960

However, historic plat maps reveal that the farmstead has been occupied by at least three different family households over the years, making site evaluation under Criterion D problematic. As Terrell (2006) states, farmsteads that were occupied by multiple successive households present particular difficulty in identifying archaeological patterns that could be attributed to a specific household, and therefore are poor candidates for research into behavior of individual households. They could be used to answer questions regarding regional trends, but changes to the composition of farmstead features by successive owners will have a tendency to blur distinctions between contexts. Historic

aerial photographs revealed significant alterations to multiple farmstead buildings between 1938 and 1963, and that all buildings in the farmstead were razed by 1991. Substantial regrading through the center of the farmstead for the repositioned driveway caused significant disturbance through central "courtyard" of the farmstead compromising integrity.

Two sets of poured-concrete foundations, associated with a barn and outbuilding, were the only structural remains present at the site, and these lie mostly outside the APE. Subsurface testing in the vicinity of the former residence indicated that the residence was demolished, burned (at least partially), and buried. Subsurface testing in the vicinity of two former outbuildings west of the residence also revealed disturbed soil profiles. A low quantity of artifacts were recovered from disturbed contexts in the subsurface tests and consisted mainly of undiagnostic architectural debris. A mix of modern with some mid twentieth-century architectural and household debris was found scattered on the surface throughout the farmstead area.

Recommendations

While HDR did not complete a formal NRHP evaluation for site 21KH0157, we found that it is, as indicated above, a poor candidate for additional research and does not retain integrity because of alterations to the farmstead complex by multiple unrelated occupants between 1938 and 1963, the deliberate razing of the buildings by 1991, and the disturbed context of the artifacts recovered from subsurface testing within the APE. HDR also recommends that the low density and lack of diagnostic artifacts recovered from subsurface tests, along with the mostly modern nature of the surficial debris scatter, suggests that the archaeological features in the site are not present in sufficient quantity and quality to answer important research questions related to the farming developmental periods that may be associated with this site, or with the farming region where this site is located. As such, HDR recommends site 21KH0157 as not eligible for listing on the NRHP. No further work is recommended for this location.

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5 Summary and Recommendations

In May 2016, HDR completed a Phase I Archaeological Resources Survey for the Willmar Wye Project's Value Engineering Roadway Alternative 2. Alternative 2 is needed to address roadway impacts associated with the Project's proposed new railroad connection to the south and west of the city of Willmar in Kandiyohi County, Minnesota. Alternative 2 encompasses a proposed TH 12 realignment, as well as proposed modifications to several roadway components along TH 12, CSAH 55, TH 40, 1st Avenue West and 45th Street NW in sections 7, 16, 17, 18, 19 and 20 of Township 119N, Range 35W. The Alternative 2 APE encompasses approximately 130 acres. In addition to the Phase I survey of Alternative 2, HDR documented previous archaeological work completed for the Project's Original Roadway Alternative (Alternative 1) by AECOM in December 2015. The Alternative 1 project area surveyed by AECOM encompasses approximately 374 acres in sections 7, 8, 17, 18, 19, 20, 29, and 30 of Township 119N, Range 35W.

The survey of Alternative 1 conducted by AECOM included pedestrian survey and subsurface testing and resulted in no historic properties recorded. The Phase I archaeological survey conducted by HDR of Alternative 2 consisted of pedestrian reconnaissance and subsurface testing. The survey identified one new Post-Contact Period archaeological site. Site 21KH0157 is an abandoned and razed farmstead traversed by the APE.

Site 21KH0157 lacks research potential and is recommended as not eligible for listing on the NRHP since the farmstead has been occupied by multiple unrelated households over its years of occupation. Changes to the composition of farmstead features, such as the removal and addition of structures and the relocation of the driveway, have substantially compromised the integrity of the farmstead.

HDR reviewed field maps and survey forms produced for the AECOM investigations of the Alternative 1 project area and recommend that the survey methodology employed by AECOM is adequate and complete. As such, HDR recommends no further work for the Alternative 1 project area.

HDR recommends that a no historic properties finding be made for the purposes of Section 106 compliance for Alternatives 1 and 2 of the Willmar Wye Project.

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Appendix A. AECOM Alternative 1 Project Area Survey Forms

AECOM

Survey Segment/Area Record

Segment/Area No. 1
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
Area NW-SE along north side of RR + Hwy 12. and west of 45th St. NW, bordered by Parcel 2 on the west side.

~~Map Name~~: Ped surveyed at 10m transects.
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate~~: No shovel testing required.
Vegetation: plowed ag field
Ground Visibility: Good 95-100 % Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances along south edge from fiber optic + electrical lines + placement of overhead utility line poles.
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 2
Date 12-10-15
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: mmm + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
North of RR in northwest area of APE. Entrance/drive across RR to residence north of A. Two historic barns on east end.

~~Map Name~~: No ped survey - wetlands except eastern 1/4 of parcel which needs shovel testing
Length: _____ Width: _____ Acreage: _____

Topographic Setting: gently rolling hills

* ~~Substrate~~: Shovel testing needed at eastern end. See Below

Vegetation: 70% wetland; short mowed grass

Ground Visibility: Good _____ % Fair _____ % Poor Ø %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: 2 Historic Barns on eastern edge. Disturbances - driveway along western edge, RR + ditch along southern edge.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
	2 historic barns	yes			

4 Shovel tests dug on upper ridge in eastern side of segment. All shovel tests were negative, + all showed signs of heavy disturbance.

AECOM
Survey Segment/Area Record

Segment/Area No. 3
Date 12-10-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
North of Hwy 12 in northwest area of APE. Bordered by RR on south side.

~~Map Name~~: No ped survey - No shovel testing required
Length: Width: Acreage:
Topographic Setting: gently rolling + man-made hill
~~Substrate~~: No shovel testing required
Vegetation: wetland + mowed grass area
Ground Visibility: Good ____ % Fair ____ % Poor Ø %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed - man-made hill @ southwest end, 2 driveways to repair shop + 1 to residence, planted trees, graded lawn

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

Notes: Spoke w/ landowner 12-13-2015 + he explained all the disturbances

AECOM

Survey Segment/Area Record

Segment/Area No. 4
Date 12-13-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MM & LM
Location (describe in terms of roads, prominent geographic features, and so forth):
Parcel 4 is located in the NW area of APE, south of Hwy. 12 and west of storage unit buildings.

~~Map Name~~: Ped surveyed @ 10m transects
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate~~:
Vegetation: Plowed ag field & wetlands
Ground Visibility: Good 80-100% Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances - Road & ditch along northern border, extensive wetlands, & large pile of dirt in APE (@ 15m x 50m long & tall). Buried utilities near ditch. storage building disturbances.
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM
Survey Segment/Area Record

Segment/Area No. 5
Date 12-10-15
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
Small triangular area south of Hwy 12 between Parcels 7 & 8.

~~Map Name~~: No ped survey - all wetland
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Low area surrounded by gently rolling hills.
~~Substrate~~: No shovel testing necessary.
Vegetation: All wetland
Ground Visibility: Good _____ % Fair _____ % Poor Ø %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Wetland

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 6
Date 12-13-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MM + LM
Location (describe in terms of roads, prominent geographic features, and so forth):
Parcel 6 is located towards the NW area of APE, south of Parcel 6 & storage buildings and northwest & west of Parcel 9.

~~Map Name~~: Ped surveyed @ 10 m. transects.
Length: Width: Acreage:
Topographic Setting: Gently rolling hills
~~Substrate~~: No shovel testing necessary.
Vegetation: plowed ag field w/ some wetland areas
Ground Visibility: Good 80-100 % Fair ____ % Poor ____ %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances - Road & ditch at southern end of parcel. Pieces of modern building debris drug into field. Extensive wetlands & chicken creek.
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 7
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Segment 7 is at southeast corner of Hwy 12 & 45th St. W. Large wetland area in southern half of segment. Creek cuts through segment near middle.

~~Map Name~~: Ped surveyed @ 5-10m transects

Length: _____ Width: _____ Acreage: _____

Topographic Setting: Gently rolling hills

~~Substrate~~: No shovel testing needed.

Vegetation: plowed ag fields & wetlands

Ground Visibility: Good _____ % Fair _____ % Poor _____ %

Sites Encountered (list by Number):

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances along western & northern edges of gravels/rock from road construction. Buried fiber optic cable along west side.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM
Survey Segment/Area Record

Segment/Area No. 8
Date 12-10-15
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: mmm + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
long narrow area south of Hwy 12 at eastern end of APE. Dooleys gas tanks on property

~~Map Name~~: No ped survey- disturbed

Length: Width: Acreage:

Topographic Setting:

~~Substrate~~: No shovel testing required.

Vegetation: graveled & mowed grass & wetland areas.

Ground Visibility: Good ____ % Fair ____ % Poor 0 %

Sites Encountered (list by Number):

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbed - Dooley's Tanks, buried pipelines, utilities & wetland areas w/in parcel

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM
Survey Segment/Area Record

Segment/Area No. 9
Date 12-10-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
northwest of intersection of Hwy 55 & . Parcel contains house in SE corner & wetlands in northeast.

~~Map Name~~: No ped survey - disturbances & wetlands
Length: ____ Width: ____ Acreage: ____
Topographic Setting: graded land w/ house
~~Substrate~~:
Vegetation: mowed lawn, wetland, harwood trees
Ground Visibility: Good ____ % Fair ____ % Poor Ø %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed, - buried gas line, private ~~public~~ electrical, house, graded lawn, wetland, driveway. Planted trees

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM
Survey Segment/Area Record

Segment/Area No. 10 A, B, + C completed
Date 12-10-13
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: mmm + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
10A Small section south of 1st Ave W + west of Hwy 55.
10B+C Two lg. narrow sections of Parcel 10 is located south of + east of Hwy 55 (n-s sections). 10C is located adjacent to Quam Construction + partially extends into Quam property on east side.

~~Map Name:~~ Ped Survey 10m intervals.

Length: Width: Acreage:

Topographic Setting: Gently rolling hills
~~Substrate:~~ No shovel testing needed.
Vegetation: plowed ag field
Ground Visibility: Good 90-100% Fair % Poor %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: 10-A disturbances from road construction, ditch, buried utilities. Asphalt chunks in ag field. 10B - road + ditch along west side. 10C - Quam construction property on east side, multiple buried utilities along northern border, + road + ditch on north.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM
Survey Segment/Area Record

Segment/Area No. 11
Date 12-10 & 12-11-15
Recorder K. Jordan

Project: BNSF Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Parcel on NW corner of Hwy 55 & Hwy 40. House & outlying Buildings. Ag field to the north & west of house / lawn area. Property is bordered by creek on west side.

~~Map Name:~~ Documented structures & disturbances

Length: Width: Acreage:

Topographic Setting: Gently rolling ag field & graded residence land

see Below ~~Substrate:~~ Shovel testing required in ag field to west of house.

Vegetation: Harvested cornfield & mowed lawn.

Ground Visibility: Good ____ % Fair ____ % Poor 0 %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - House, out buildings, driveways, buried fiber optic lines. GSV was low due to vegetative debris since field has not been plowed.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments

Shovel Testing Area 3 12-13-2015

Two shovel tests placed 15 m apart in harvested ag field. Both STs were negative.

AECOM
Survey Segment/Area Record

Segment/Area No. 12
Date 12-10-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Historic farmstead @ northwest corner of Hwy 55 & Hwy 40. House & 9 out-buildings.

~~Map Name~~: Documented farmstead w/ photos, etc.
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Graded land
~~Substrate~~: N
Vegetation: mowed lawn w/ some hardwood trees
Ground Visibility: Good _____ % Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - driveway from west side of property curving to south side.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Farmstead		yes			

AECOM
Survey Segment/Area Record

Segment/Area No. 13
Date 12-9 & 10-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
SW corner of intersection of Hwy 55 & Hwy 40

Documented house, barn + outlying buildings
~~Map Name~~: Ped Survey in ag field @ 3-5m transects
Length: _____ Width: _____ Acreage: _____
Topographic Setting: flat to gently rolling
~~Substrate~~: Documented disturbances – No shovel testing required
Vegetation: partial ag field
Ground Visibility: Good 50-90 % in ag field Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed lawn, road & ditch
Buried private electrical line along southern prop grass & ag field. House & out buildings, driveway

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Farmstead		Yes.			

AECOM

Survey Segment/Area Record

Segment/Area No. 14
Date 12-12-15
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MM, KJ + LM
Location (describe in terms of roads, prominent geographic features, and so forth):
Area east of Hwy 55 & south of Hwy 40. and between Area R1 and Parcel 15.

~~Map Name:~~ Ped surveyed at 15m transects
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate~~: No shovel testing needed.
Vegetation: plowed ag field w/minimal vegetative debris
Ground Visibility: Good 95-100% Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - road & ditch along west side of parcels. Drain pipes throughout field.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 15
Date 12-12-2015
Recorder K. Jordan

Project: BNSF

Crew: MMM, KDJ, + LM

Location (describe in terms of roads, prominent geographic features, and so forth):
Area east of Hwy 55 between Parcels 14 + 16. Southern end of Parcel 15 extends to RR to the east.

~~Map Name~~: Ped surveyed at 15m transects

Length: _____ Width: _____ Acreage: _____

Topographic Setting: Gently rolling hills

~~Substrate~~: No shovel testing needed.

Vegetation: Plowed corn field w/ some vegetative debris

Ground Visibility: Good _____ % Fair 30-50 % Poor _____ %

Sites Encountered (list by Number):

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances - ditch along road on west side of segment. Drainage pipes throughout field.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 16
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Parcel 16 is located near the southern end of APE & is divided into 2 sections by Area M. Parcel 16 is east of Hwy 55 & north of Parcel 17. & bordered by canal at north end of parcel.

~~Map Name~~: Ped Surveyed @ 10m transects.

Length: _____ Width: _____ Acreage: _____

Topographic Setting: Gently rolling hills

~~Substrate~~: No shovel testing necessary.

Vegetation: plowed ag field.

Ground Visibility: Good 40-90% Fair _____% Poor _____%

Sites Encountered (list by Number):

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances along western edge include road & ditch & buried utilities.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. 17
Date 12-9-15
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Parcel 17 is located east of Hwy 55 & bordered by RR along SE edge.

~~Map Name~~: Place STs along ridge at north end of parcel

Length: _____ Width: _____ Acreage: _____

Topographic Setting: slightly rolling - flat

~~Substrate~~: documented disturbances & wetlands / Shovel test needed. See Below

Vegetation: med grasses & some wetland vegetation, few scrub trees evergreen

Ground Visibility: Good _____ % Fair _____ % Poor Ø %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: 1/3 of ROW Disturbances - RR & grade along SE; road ditch along west side; wetland covers portion of APE.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

Shovel Test Area 5
1 ST was placed in the northeast area of parcel on a slight bump. NCM recovered.

AECOM

Survey Segment/Area Record

Segment/Area No. A
Date 12-10-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
North of Parcels 2 + 3. Small area

~~Map Name~~: No ped survey - disturbances
Length: _____ Width: _____ Acreage: _____
Topographic Setting: gently rolling hills
~~Substrate~~: No shovel testing required
Vegetation: Mostly none, driveway & small amount of wetland
Ground Visibility: Good _____ % Fair _____ % Poor Ø %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - Driveway + ditch along side drive. and slope.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. B
Date 12-10-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Bordered by RR along NE edge & Hwy 12 on SW edge. South of Parcels 1, 2, & 3.

~~Map Name~~: No ped survey - disturbances & wetland
Length: Width: Acreage:
Topographic Setting: Ditch between RR + Hwy. 12
~~Substrate~~:
Vegetation: Wetland
Ground Visibility: Good ____ % Fair ____ % Poor Ø %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances - entirely roadside ditch & RR grading

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. C
Date 12-10-15
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth): Storage Units— Bordered by Hwy 12 along northern edge, drive on western edge, and poultry farm to the east.

~~Map Name:~~ No ped survey- disturbances documented
Length: Width: Acreage:
Topographic Setting: Graded land
~~Substrate:~~ No shovel testing required.
Vegetation: Roadside ditch has mowed grasses.
Ground Visibility: Good ____ % Fair ____ % Poor Ø %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances - storage buildings, ditch & road along northern boundary, buried utilities?
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. D
Date 12-10-15
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth): Poultry Farm. Bordered by Hwy 12 to the north & 45th St NW to the east. Storage buildings are to the west.

~~Map Name:~~ No pedsurvey - disturbances documented
Length: Width: Acreage:
Topographic Setting: gently rolling hills & graded land.
~~Substrate:~~
Vegetation: mowed lawn on east side
Ground Visibility: Good ___ % Fair ___ % Poor Ø %
Sites Encountered (list by Number): Ø
Isolates Encountered (list by Number): Ø
Comments, Problems, Anomalies: Disturbed - ditch, buried pipeline along northern edge, poultry farm, road construction disturbances. Graded land around chicken coops at western end.
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. E
Date 12-10-15
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Area is south of Area D & runs parallel along the west side of 45th St. NW. This area is in the front of businesses.

~~Map Name~~: No pedestrian survey - disturbances documented
Length: Width: Acreage:
Topographic Setting: Graded land & mowed grass in ditch
~~Substrate~~:
Vegetation: mowed grass in ditch along road and a few hardwood trees at southern end
Ground Visibility: Good % Fair % Poor Ø %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed - Road & ditch along side, parking lots, buried utilities in ditch (multiple) driveways

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. F
Date 12-10-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Small area south of 1st Ave. W and west of upper portion of Parcel 10. (10A)

~~Map Name~~: Ped surveyed @ 10m transects.
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate~~: No shovel testing necessary
Vegetation: _____
Ground Visibility: Good 90-100 % Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - Ditch along road with buried utilities.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. G
Date 12-11-2015
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
N-S area along west side of Hwy 55, beginning @ curve (south of IDA). Wetland north of residential property (4310?). & wooded lot to ag field south of residential lawn.

~~Map Name~~: Ped Surveyed ag field at 5m transects. Disturbances documented in notes & photos, etc.
Length: Width: Acreage:

Topographic Setting: Fairly flat area within gently rolling hills
see note below ~~Substrate~~: Shovel Testing needed in grass & wooded area S of residence prop.
Vegetation: Med grasses, Immature - Mature trees, wetland area
Ground Visibility: Good 95-100 % in ag field Fair ___ % Poor 0 % grass + wooded areas
mowed grass in residential property.

Sites Encountered (list by Number):
Ø - in ag field

Isolates Encountered (list by Number):
Ø - in ag field

Comments, Problems, Anomalies: Disturbances - buried pipeline & electrical line, and ditch along east side of Area G. Portion of segment is wooded w/ immature & a few mature hardwoods, north end of segment is a wetland. Other disturbances at north half include residential drive & two other approaches, Overhead elec. lines.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

ST - Shovel tests not excavated as this area is no longer part of the APE & will not be impacted outside the road ROW for Hwy 55.

AECOM
Survey Segment/Area Record

Segment/Area No. H
Date 12-10-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: mmm + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
E-W area north of Hwy 40. Bordered by creek on eastern edge.

~~Map Name~~: Ped surveyed @ 10m transects
Length: Width: Acreage:
Topographic Setting: Gently rolling hills
~~Substrate~~:
Vegetation: plowed ag field
Ground Visibility: Good 90-100 % Fair % Poor %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances along southern edge - road, ditch & buried utilities.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. I
Date 12-10-2015
Recorder K Jordan

Project: BNSF-Willmar Wye
Crew: MMM + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
South + parallel to Highway 40, at western edge of APE of intersection of Hwy 40 + Hwy. 55. Creek is located to the south & eastern edge of APE.
~~Map Name:~~ Ped surveyed at 10m intervals.
Length: Width: Acreage:
Topographic Setting: gently rolling hills
~~Substrate:~~ No shovel testing required.
Vegetation: plowed ag field & med grasses along creek
Ground Visibility: Good 90-100 % Fair ____ % Poor ____ %
Sites Encountered (list by Number): in ag field.

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances - ditch & road along northern borders of Area I, buried

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. J
Date 12-9-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
Parallel to west side of Hwy 55 and south of Parcel 13.

~~Map Name~~: Ped survey @ 3-5m transects w/ southern portion of Parcel 13
Length: Width: Acreage:
Topographic Setting: gently rolling
~~Substrate~~:
Vegetation: plowed ag field - corn
Ground Visibility: Good 50-80 % Fair ____ % Poor ____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - ditch + road along east side Buried fiber optic in ditch. 10-15m along east edge is disturbed. Buried private electrical line along north edge in NW corner.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. K
Date 12-9-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Southend of project area west of Hwy 55 & north of RR. Small section south of abandoned farmstead.

~~Map Name~~: Ped Survey in ag field @ 5m transects

Length: Width: Acreage:

Topographic Setting: gently rolling near abandoned farmstead & RR

~~Substrate~~: No shovel testing required.

Vegetation: plowed ag field & grass along road

Ground Visibility: Good 50 % in ag field Fair % Poor %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed - slope from road construction, buried electrical lines & fiber optic cable. gravels in ag field from disturbances. More disturbances than ag field

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. L
Date 12-9-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Southern end of project area. South of RR, east side of Hwy 55 to road.
Bordered by Hwy 55 on west, RR to North & Hwy 23/15/5 to South.

~~Map Name~~: No ped survey; documented disturbances

Length: Width: Acreage:

Topographic Setting: RR grade

~~Substrate~~: NO shovel testing required

Vegetation: Med - Tall grasses

Ground Visibility: Good ____ % Fair ____ % Poor 0 %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed from RR grade and road ditch. Wetland area at northeast end of Area L.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. M
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
Area M is between two sections of Parcel 16. East of Highway 55 & north of RR at southern end of APE.

~~Map Name~~: Ped Surveyed 10m transects
Length: Width: Acreage:
Topographic Setting: gently rolling
~~Substrate~~: No shovel testing
Vegetation: plowed Ag field
Ground Visibility: Good 40-90 % Fair % Poor %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances along SE edge, from RR

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. N & O
Date 12-9-2015
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
East of Hwy 55; 2 areas along irrigation canal Area N is west & Area O is to the east. Areas are directly north of northern Parcel 16.

~~Map Name~~: Ped survey ag field @ 5m transects / Area along canal - no ped survey & no ST required
Length: Width: Acreage:
Topographic Setting: gently rolling ag fields (plowed)
~~Substrate~~: Disturbances Documented
Vegetation: Med to tall grasses & area extends into ag field.
Ground Visibility: Good % ag field Fair % Poor 0 % along canal

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed - irrigation canal E-W across northern end of area. Buried sewer line parallel to canal - two older green locate flags observed

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. P
Date 12-9-2015
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Area is bound by RR to the north, Hwy 23 to the south.

~~Map Name~~: No ped survey - Disturbances documented
Length: _____ Width: _____ Acreage: _____
Topographic Setting: road + RR grade
~~Substrate~~: No shovel testing required
Vegetation: Med grasses w/ some cattails in ditch
Ground Visibility: Good _____ % Fair _____ % Poor Ø %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbed from road, RR, ditch, residence drive. Buried electrical line in ditch along road.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. Q
Date 12-9-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Area north of RR, partially extending into residential yard on east side of driveway. Ag field

~~Map Name~~: No ped survey - disturbances documented
Length: Width: Acreage:
Topographic Setting: RR grade & graded residential lawn
~~Substrate~~: Shovel testing needed - See below
Vegetation: ag field west of drive; lawn east of drive
Ground Visibility: Good ___ % Fair ___ % Poor Ø %

Sites Encountered (list by Number): Ø

Isolates Encountered (list by Number): Ø

Comments, Problems, Anomalies: Disturbances - RR grade, manicured lawn, driveway & ditch along side.
All pics from public ROW.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

12-13-2015 Shovel Test Area 4
Shovel Tests @ 15 m intervals
STs - Three shovel tests excavated west of driveway to residence. All shovel tests were negative & highly disturbed.

AECOM

Survey Segment/Area Record

Segment/Area No. R1
Date 12-12-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: mm, kd, cm
Location (describe in terms of roads, prominent geographic features, and so forth):
Area is east of Hwy 55, south of Hwy 40 and north of Parcel 14.

~~Map Name~~: Ped surveyed at 15m transects
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate~~: No shovel testing necessary.
Vegetation: plowed ag field w/minimal vegtative debris
Ground Visibility: Good 90-100% Fair _____% Poor _____%
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances- Road & ditch along western & northern edges. Buried pipelines & fiber optic cables

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. R2
Date 12-10-2015
Recorder K Jordan

Project: BNSF Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Narrow E-W area south of Hwy 40 and east of Hwy 55.

~~Map Name:~~ Ped Surveyed @ 10-15 m transects.

Length: _____ Width: _____ Acreage: _____

Topographic Setting: Gently rolling hills.

~~Substrate~~: No shovel testing necessary

Vegetation: plowed ag field & wetland areas.

Ground Visibility: Good 90-100% Fair _____% Poor _____%

Sites Encountered (list by Number):

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances - ditch along north boundary by road. Buried utilities.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. S1
Date 12-19-2015
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM + KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
narrow area north + parallel to Hwy 40

~~Map Name~~: Ped Survey @ 5-15 m transects
Length: Width: Acreage:
Topographic Setting: Gently rolling, slight rise near middle of area.
~~Substrate~~:
Vegetation: plowed ag field
Ground Visibility: Good 50-100 % Fair ____ % Poor ____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - 2 buried petroleum (perpendicular to area) pipelines; buried fiber optic line directly at edge of ag field; Gravels + light brown sticky clay in area of pipeline corridor.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. S2
Date 12-10-2015 & 12-12-15
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: mmm & KDJ / mm, KJ, + LM
Location (describe in terms of roads, prominent geographic features, and so forth):
Narrow N-S corridor north of Hwy 40. and east of Hwy 55 and runs along east side of Parcel 12. Bordered by irrigation canal on north end of segment. Airport runway is east of segment at northern end.
~~Map Name:~~ Ped surveyed @ 10-15m intervals.
Length: Width: Acreage:
Topographic Setting: gently rolling hills
~~Substrate:~~ No shovel testing necessary.
Vegetation: plowed ag field
Ground Visibility: Good 90-100 % in middle & southern fields Fair 30-50 % in northern ag field Poor Ø %
Sites Encountered (list by Number): Ø
Isolates Encountered (list by Number): Ø
Comments, Problems, Anomalies: Portion of a large natural dry creek bed separates a part of the northern & middle ag field. Large cobbles & boulders along creek edges from field clearing.
Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. S3
Date 12-12-2012
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MM, KJ + LM

Location (describe in terms of roads, prominent geographic features, and so forth):
Area is located south of Hwy 55 and travels N-S with irrigation canal at southern end. Two separate ag fields.

~~Map Name:~~ Ped surveyed 10-15m transects - No shovel tests needed.
Length: Width: Acreage:
Topographic Setting: Gently rolling hills
~~Substrate:~~ S-field plowed ag field w/minimal vegetative debris
Vegetation: N-field plowed corn w/some vegetative debris
Ground Visibility: Good 90-100% Fair 30-50% Poor %
Sites Encountered (list by Number): ag field directly north of canal northern ag field

Ø

Isolates Encountered (list by Number):

Ø

Comments, Problems, Anomalies: Disturbances - eastern edge - Quam business. Irrigation canal at southern end & med grasses along canal.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. T
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Small narrow N-S section on east side of Hwy 55 and north of Parcel 12

Map Name: Ped surveyed @ 10m transects
Length: Width: Acreage:
Topographic Setting: gently rolling hills
~~Substrate~~: No shovel tests needed.
Vegetation: plowed ag field
Ground Visibility: Good 95-100% Fair ____% Poor ____%
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances buried Magellan pipeline across northern end of area. Road & ditch along western side of area. Signs of disturbances at southern end of field w/ gravels & mixed clays (light brown).

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. U
Date 12-11-2015
Recorder K. Jordan

Project: BNSF-Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Located east of Hwy 55 + south of parcel 10, adjacent to row

~~Map Name~~: Ped surveyed at 10m transects

Length: _____ Width: _____ Acreage: _____

Topographic Setting: Gently rolling hills

~~Substrate~~: No shovel testing needed

Vegetation: plowed ag field

Ground Visibility: Good 90 % Fair _____ % Poor _____ %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - ditch along road on west side. Raised field burn across northern end of segment.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. V
Date 12-9-2015
Recorder K Jordan

Project: BNSF - Willmar Wye
Crew: MMM + KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
South of east of curve for Highway 40.
Front lawn of Quam Construction

~~Map Name~~: Documented disturbances w/photos, gps, etc.
Length: Width: Acreage:
Topographic Setting: graded lawn.
~~Substrate~~: No shovel testing required
Vegetation: mowed grass, western end of ditch has some wetland vegetation planted trees
Ground Visibility: Good ___ % Fair ___ % Poor 0 %

Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - buried gas line along road & perpendicular towards Bldg., buried electrical Driveway, gravel parking areas, ditch parallel to road

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. W
Date 12-10-15
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Area is bordered by Hwy 12 on southern side. RR divides area lengthwise.

~~Map Name~~: Ped surveyed ag field @ 15m intervals.

Length: _____ Width: _____ Acreage: _____

Topographic Setting: gently rolling hills

~~Substrate~~: No shovel testing required.

Vegetation: Mostly wetland. Western 1/4 north of RR plowed ag field

Ground Visibility: Good 90-100% in ag field Fair _____ % Poor _____ %

Sites Encountered (list by Number): Ø

Isolates Encountered (list by Number): Ø

Comments, Problems, Anomalies: Disturbances - Construction of overhead lines buried cable, RR utilities, buried fiber optic cable south of RR + buried electrical line. RR at grade.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. X
Date 12-10-2015
Recorder K. Jordan

Project: BNSF - Willmar Wye
Crew: MMM & KDJ

Location (describe in terms of roads, prominent geographic features, and so forth):
Small area located at northern end of APE west of Hwy 55 & north of RR.

~~Map Name:~~ Ped survey @ 10-15m transects
Length: _____ Width: _____ Acreage: _____
Topographic Setting: Gently rolling hills
~~Substrate:~~ No shovel testing necessary.
Vegetation: plowed ag field
Ground Visibility: Good 90-100 % Fair _____ % Poor _____ %
Sites Encountered (list by Number):
Ø

Isolates Encountered (list by Number):
Ø

Comments, Problems, Anomalies: Disturbances - road & ditch along

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

AECOM

Survey Segment/Area Record

Segment/Area No. Y
Date 12-11-2015
Recorder K. Jordan

Project: BNSF- Willmar Wye
Crew: MMM & KDJ
Location (describe in terms of roads, prominent geographic features, and so forth):
Small area north of Parcel 1, west of 45th St. NW north of RR tracks

~~Map Name~~: Ped surveyed at 5 m transects
Length: Width: Acreage:
Topographic Setting: Gently rolling
~~Substrate~~: No shovel testing necessary.
Vegetation: Plowed ag field.
Ground Visibility: Good 90-100 % Fair ____ % Poor ____ %
Sites Encountered (list by Number):
Ø
Isolates Encountered (list by Number):
Ø
Comments, Problems, Anomalies: Disturbances - ditch along road on east side of area.

Previously Recorded Sites and Historic Locations

Site Number	Found	In area of potential effect	Location	Time	Comments
Ø					

Appendix B. 2016 OSA Annual Archaeological Reconnaissance Survey License

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 2015. 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: MICHAEL JUSTIN

Institution/Agency/Company Affiliation: HDR EDC, INC

Title/Position: ARCHAEOLOGY PROJECT MANAGER

Address: 701 XENIA AVE SOUTH, SUITE 600, MINNEAPOLIS, MN 55416-3636

Work Phone: 763 · 591. 5423 E-Mail: MICHAEL.JUSTIN@HDRINC.COM

Name of Advanced Degree Institution: UNIVERSITY OF WISCONSIN-MILWAUKEE Year: 1983

Name of Department: ANTHROPOLOGY Degree: __MA X MS __PhD

Purpose: (check all that may apply)
CRM X Academic Research ___ Institutional Field School ___

Type of Land: (check all that may apply)
State Owned X County Owned X Township/City Owned X
Other non-federal public ___ List: ___

MHS Repository Agreement # 664 Other Approved Curation Facility: ___

Previous License: Year 2014 Type PHASE I Number 14-006

Signed (applicant): [signature] Date: Jan 05, 2015

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: 1-6-15
State Archaeologist Approval: [signature] Date: 1/5/15

License Number: 15-006 Form Date: 11/6/12

Appendix O – Historical and Archaeological Review and Coordination Letters

Minnesota Historical Society

Using the Power of History to Transform Lives
PRESERVING • SHARING • CONNECTING

MINNESOTA HISTORIC PRESERVATION OFFICE

September 23, 2016

Mr. Craig Johnson
Cultural Resources Unit
MN Dept of Transportation
Transportation Building, MS 620
395 John Ireland Blvd
St. Paul, MN 55155-1899

RE: S.P. 3403-74, Willmar Connection and Industrial Access Project
Willmar & Willmar Twp, Kandiyohi County
MnHPO Number: 2016-3404

Dear Mr. Johnson:

Thank you for the opportunity comment on the above project. Information received on 17 August 2016 has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and implementing federal regulations at 36 CFR 800, and per the terms of the 2014 Amended Programmatic Agreement between the Federal Highway Administration and the Minnesota State Historic Preservation Office.

As we understand it, the proposed undertaking is the construction of a rail connection between two existing BNSF Railway main track subdivisions. The rail connection includes 2.7miles of new main track with a single leg on the north, a north-south connection track, and a wye on the south. A rail siding and access road will also be built as part of this project.

We have completed our review of your correspondence dated August 16, 2016 along with the documentation provided in regards to your agency's determination of the area of potential effect (APE) for the Federal undertaking. We agree that this APE determination is generally appropriate to take into account the potential direct and indirect effects of the proposed undertaking as we currently understand it. As the project's scope of work is further defined, or if it is significantly altered from the current scope, additional consultation with our office may be necessary in order to revise the current APE.

We have reviewed the report *Phase I and II Architectural History Investigations for the Willmar Connection and Industrial Access Project, City of Willmar and Willmar Township, Kandiyohi County, Minnesota* (July 2016) prepared by Deco Cultural Services. We agree with your consultant's recommendation that twenty-five (25) of the twenty-six (26) properties identified within the APE for this project are ***not eligible*** for listing in the National Register of Historic Places (NRHP), including County Ditch No. 10 (KH-DTC-002) and the Willmar and Sioux Falls Railway Company Main Line (XX-RRD-038).

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District has previously been determined ***eligible*** for listing in the NRHP.

We have also reviewed the report *Phase I Archaeological Resources Survey for the Value Engineering Roadway Alternative 2, Willmar Wye Project, Kandiyohi County, Minnesota* (July 2016) prepared by HDR Engineering. One archaeological site, 21KH0157, was identified within the APE for this project. We agree with your consultant's recommendation that this site is ***not eligible*** for listing in the NRHP.

Based on information available to us at this time, we concur with your determination that construction of this rail connection and industrial access project will have **no adverse effect** on the National Register –eligible St. Paul and Pacific Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

cc: Phil Forst, FHWA
Dave Scott, FHWA

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155-1899

Office Tel: (651) 366-3614
Fax: (651) 366-3603

August 16, 2016

Sarah Beimers, Government Programs & Compliance Manager
State Historic Preservation Office, Minnesota Historical Society
345 Kellogg Blvd. W., St. Paul, MN 55101

Re: S.P. 3403-74 (Willmar Connection and Industrial Access Project, City of Willmar and Willmar Township, Kandiyohi County, Minnesota), Architectural History & Archaeology Reports

Dear Ms. Beimers,

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the applicable Programmatic Agreements between the FHWA and the Minnesota Historic Preservation Office (MnHPO). This review fulfills MnDOT's responsibilities under Minnesota Statute 138 and 307.08.

The proposed project is to construct a rail connection between two existing BNSF Railway main track subdivisions: the Morris Subdivision, which parallels Trunk Highway (TH) 12, and the Marshall Subdivision, which parallels County Road (CR) 55/County State Aid Highway (CSAH) 15. The rail connection will consist of approximately 2.7 miles of new main track, and its configuration will include a single leg on the north, a north-south connection track, and a wye on the south.

A rail siding consisting of approximately 10,000 linear feet of new track will be constructed parallel to the proposed connection on the west to allow trains to pass one another, and an approximately 14-foot-wide access road paralleling and west of the siding will be built to allow BNSF crews to perform train inspections on the connection, provide access for track and signal maintenance, and accommodate replacing train crews.

The connection will result in new road crossings at 1st Avenue West/CR 55, TH 40, and TH 12. The road crossing at 1st Avenue West will be an at-grade crossing with active warning devices for crossing protection. The crossing at TH 40 will be a bridge over the new track, and the TH 40/CR 55 intersection located west of the rail line will be raised to meet the TH 40 overpass grade as it descends westward; three properties at this intersection may need to be acquired to allow for the bridge and grade raise. Two alternatives are currently under consideration for the TH 12 crossing, each of which will involve constructing a bridge over the rail line. The first is to follow the current alignment. The second involves re-routing TH 12 to the south to circumnavigate the northern rail-connection point. In addition to road crossings, railway bridges or culverts will be constructed to cross Hawk Creek/County Ditch No. 10, an unnamed tributary to Hawk Creek, and County Ditch No. 46.

The area of potential effects (APE) for architectural history is an irregularly shaped area which accommodates potential effects for either project alternative (see the attached report by Deco Cultural Services). The Phase I architectural history investigation identified a segment of one property previously considered eligible for listing in the National Register, the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387). One property, County Ditch No. 10 (KH-DTC-002), was identified as potentially eligible by our office prior to the Phase I survey. Beyond County Ditch No. 10, a total of 25 properties 45 years in age or older were surveyed, 24 of which were

recommended as not eligible for listing in the National Register. The remaining property, the Willmar and Sioux Falls Railway Company main line (XX-RRD-038), was recommended as potentially eligible. As a result of Deco's Phase II evaluations, County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line were recommended as not eligible for listing in the National Register of Historic Places. We agree with the consultant's recommendations, and therefore find the neither property is eligible for the National Register.

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387) is an active rail corridor that has previously been determined eligible.

The construction of the railroad line that will extend off the main line, which would constitute the only direct effect to the historic district, will not alter the existing location/alignment, materials, workmanship, design, feeling and association of the main line. While the presence of the new railroad line constitutes a minor change in setting, it is one that is in keeping with historic character of the main line, from which numerous branch lines, spur tracks, and switch tracks extended between 1862 and 1956, the period of significance for Minnesota railroads.

The crossing at 1st Avenue will be low in profile and at a distance of over ¼-mile from the historic district. The crossing at TH 40 will be over 1.25 miles distant in a fairly level landscape; therefore neither will be visible from the historic district.

Whether TH 12 follows its current alignment and a bridge is built over the main line or is realigned such that a segment approximately 1.5 miles in length no longer runs next to the main line, it would constitute a minor visual change in a district that is hundreds of miles long and in which highway bridges over the tracks are a common feature.

None of the proposed project components will create increases in traffic, noise, or vibrations, or affect air quality in the vicinity of the historic district.

A Phase I archaeological survey of the APE by HDR Engineering identified one historic farmstead site (21KH157) occupied from about 1905 to 1991by at least three different households. Phase I fieldwork indicated the presence of a low density of mostly recent artifacts in disturbed contexts. Because it was occupied by multiple households and lack integrity, this site is not eligible for listing in the National Register of Historic Places.

The finding of this office is that there will be **No Adverse Effects** to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District by the project as currently proposed. If the project scope changes, we will provide your office with the revised information to conduct an additional review.

Sincerely,

Craig Johnson
Cultural Resources Unit

Attachments

cc: MnDOT CRU Project File
Jack Corkle, WSB
Paul Rasmussen, MnDOT D. 8

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155

Office Tel: (651) 366-3614
Fax: (651) 366-3603

July 12, 2016

Re: S.P. 3403-74. Realignment of TH 12 and CSAH 55, Willmar, Kandiyohi County

Dear Tribal Representative:

The Minnesota Department of Transportation is propposing to realign TH 12 and CSAH 55 west of Willmar using Federal Highway Administration (FHWA) funds due to the proposed construction of a railroad link between two branches of the BNSF Railroad. This undertaking is subject to review under Section 106 of the National Historic Preservation Act. The project is not on tribal land. Section 106 requires Federal agencies to take into account the effects of their undertakings on historic properties (i.e., those resources eligible for or listed on the National Register of Historic Places). This process involves efforts to identify historic properties potentially affected by the undertaking, assess project effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. On behalf of the FHWA, which has delegated some of its Section 106 responsibilities to the MnDOT Cultural Resources Unit, we are now initiating review to determine the possible effects of the undertaking on historic properties. In accordance with the Section 106 regulations (36 CFR 800.2[c]) and the agreement between the FHWA and the Tribe, we are contacting you to see if you know of any historic properties of religious or historic significance in the area, and to see if you would like to participate in the Section 106 process for this project.

The area of potential effect (APE) is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties (including archaeological sites). Our office has defined the project APE as the proposed construction limits. Once the APE was established, we examined the State Historic Preservation Office database for previously recorded sites in the area. Based on these queries, there are no previously recorded archaeological resources within the APE, or adjacent to it.

We would appreciate any comments you may have about historic, cultural, and archaeological resources and other concerns regarding this project. Our planning schedule is such that we must initiate work on our environmental and historic preservation studies, so we hope to hear from you within **30 days** of receipt of this letter. If you indicate that you are not aware of any historic properties with religious or cultural significance and that you do not wish to comment on the project, or if our office does not receive a response within 30 days, we will conclude that you do not wish to be a consulting party for this project and no further project information will be forwarded.

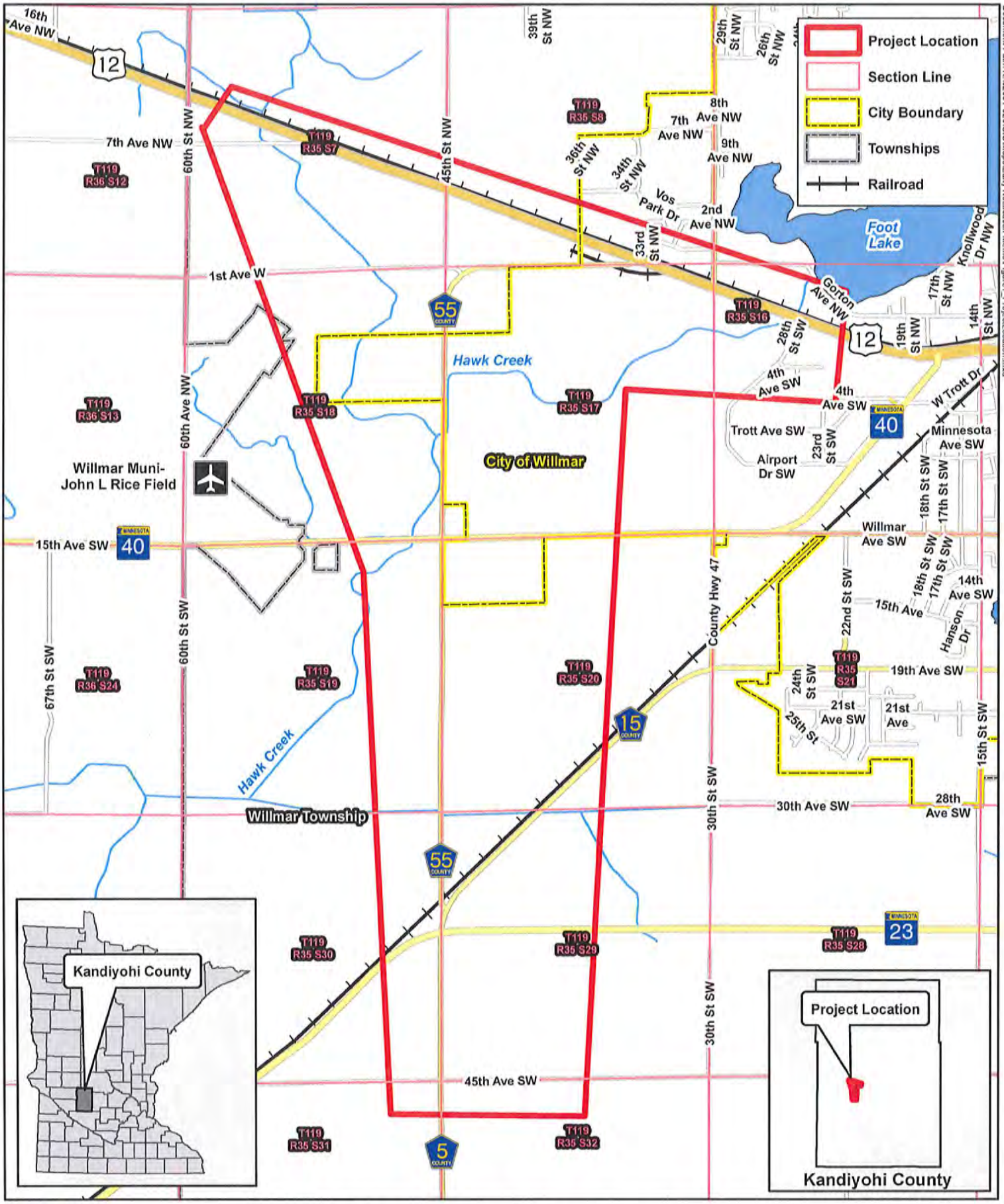
Thank you for your attention to this request. We look forward to working with you on this project.

Sincerely,

Craig Johnson
Archaeologist
Cultural Resources Unit

Attachments

cc: Floyd Azure, Fort Peck Tribes
Roger Trudell, Santee Sioux Nation (email)
Rick Thomas, Santee Sioux Nation (email)
Robert Larsen, Lower Sioux Indian Community
Grace Goldtooth-Campos, Lower Sioux Indian Community (e-mail)
Dianne Desrosiers, Sisseton-Wahpeton Oyate Community (e-mail)
Jim Whitted, Sisseton-Wahpeton Oyate Community (e-mail)
Jack Corkle, WSB



Willmar Wye Project Location
S.P. 3403-74
Willmar, MN

N

0 2,500 Feet

Appendix P – Noise and Vibration Analysis Report

Noise and Vibration Assessment Report
Willmar Rail Connector and Industrial Access Project

(State Project Number: 3403-74)

September 2016

Prepared for:

Minnesota Department of Transportation District 8

Prepared By:

HDR Engineering, Inc.
Minneapolis

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Executive Summary

This noise and vibration assessment evaluated the effect of the proposed State Project 3403-74 Willmar Rail Connector and Industrial Access Project on traffic-generated noise levels and train-generated noise and vibration levels.

Traffic noise was evaluated in accordance with the Federal Highway Administration's (FHWA) Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) and the Minnesota Department of Transportation's (MnDOT) Noise Policy (effective date: June 15, 2015). Under both Build Alternative 1 and Build Alternative 2, Minnesota Pollution Control Agency (MPCA) noise standards are exceeded at modeled receptor locations in the project area; therefore, noise abatement in the form of a noise barrier must be considered. Cost effectiveness of noise barriers was calculated and one barrier was found to be feasible and reasonable and is recommended under Alternative 1. Noise barriers were not found to be feasible and reasonable under Alternative 2 and are not proposed as part of the project.

Train noise and vibration were evaluated in accordance with the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment manual (2006). Five moderate noise impacts were identified at residential receptors due to their proximity to at-grade crossings where locomotive horns would be used. No severe noise impacts were identified. No vibration-sensitive receptors were identified through the vibration screening process, so no further vibration assessments were performed.

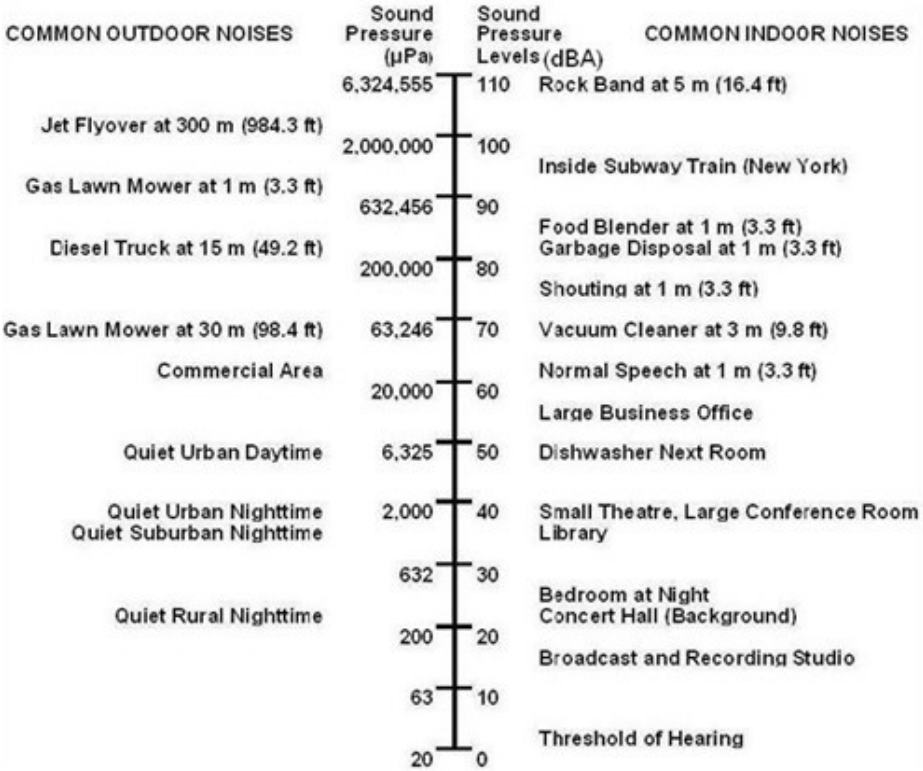
Construction of the proposed project would result in a temporary increase in noise levels relative to existing conditions. Elevated noise levels are, to a degree, unavoidable for this type of project. However, construction should be limited to daytime hours as much as possible. If needed, construction noise may be further mitigated with mindful scheduling and placement of construction equipment.

Project Introduction

The purpose of this noise and vibration assessment is to evaluate and document the effect of the proposed State Project 3403-74 Willmar Rail Connector and Industrial Access Project on traffic-generated noise levels and train-generated noise and vibration levels. The Willmar Rail Connector and Industrial Access Project will provide a direct connection between the Marshall and Morris Subdivisions of the BNSF rail network. Providing this direct connection will decrease the number of trains that need to pull into the rail yard in downtown Willmar. The project also includes a rail spur that will provide access to the city of Willmar's industrial park as well as roadway improvements and realignments to accommodate the proposed rail changes.

Noise is defined as any unwanted sound. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels (dB) represent the logarithm of the ratio of a sound energy relative to a reference sound energy. For environmental noise, an adjustment, or weighting, of the high- and low-pitched sound is often made to approximate the way that an average person hears sound. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). A sound increase of 3 dBA is barely noticeable by the human ear, a 5 dBA increase is clearly noticeable, and a 10 dBA increase is perceived as twice as loud. Table 1, below, provides a rough comparison of the noise levels of some common noise sources.

TABLE 1 – DECIBEL LEVELS OF COMMON NOISE SOURCES



Source: Minnesota Pollution Control Agency, http://www.pca.state.mn.us/index.php/air/air-monitoring-and-reporting/air-emissions-modeling-and-monitoring/noise-program.html

Vibration consists of rapidly fluctuating motions. Ground-borne vibration (GBV) can be a serious concern for residents or at facilities that are vibration-sensitive, such as laboratories or recording studios. In contrast to airborne noise, ground-borne vibration is not an everyday experience for most people. Most perceptible indoor vibration is caused by sources within a building such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads, though in most soils GBV dissipates very rapidly.

Traffic Noise Analysis

Introduction

This analysis evaluates the changes to the roadway network and includes modeled traffic noise levels for existing (2016) and future (2040) No Build and Build conditions.

In Minnesota, traffic noise is evaluated by measuring and/or modeling the traffic noise levels that are expected to be exceeded 10 percent and 50 percent of the time during the hours of the day and/or night that have the loudest traffic noise levels. The noise level descriptors used to characterize traffic noise are the L_{10} and L_{50}. The L_{10} is the noise level that is exceeded for a total of 10 percent, or 6 minutes, of an hour. The L_{50} is the noise level that is exceeded for a total of 50 percent, or 30 minutes, of an hour.

Along with the volume of traffic and other factors (e.g. topography of the area and vehicle speed) that contribute to the loudness of traffic noise, the distance of a receptor from a sound's source is also an important factor. Sound level decreases as distance from a source increases. A rule of thumb regarding sound level decrease due to increasing distance from a line source (roadway) that is commonly used is: beyond approximately 50 feet from the sound source, each doubling of distance from the line source over hard ground (such as pavement or water) will reduce the sound level by 3 dBA, whereas each doubling of distance over soft ground (such as vegetated or grassy ground) results in a sound level decrease of 4.5 dBA.

The Minnesota Pollution Control Agency (MPCA) established noise standards for daytime and nighttime periods. For residential land uses (identified as Noise Area Classification 1 or NAC-1), the MPCA standards for L_{10} are 65 dBA for daytime and 55 dBA for nighttime; the standards for L_{50} are 60 dBA for daytime and 50 dBA for nighttime. The MPCA defines daytime as 7:00 AM to 10:00 PM and nighttime from 10:00 PM to 7:00 AM. State noise standards are depicted in Table 2.

TABLE 2 – MINNESOTA STATE NOISE STANDARDS

MPCA State Noise Standards					
Land Use	**Code**	**Daytime (7 AM – 10 PM) dBA**		**Nighttime (10 PM – 7:00 AM) dBA**	
Residential	**NAC-1**	L_{10} of 65	L_{50} of 60	L_{10} of 55	L_{50} of 50
Commercial	**NAC-2**	L_{10} of 70	L_{50} of 65	L_{10} of 70	L_{50} of 65
Industrial	**NAC-3**	L_{10} of 80	L_{50} of 75	L_{10} of 80	L_{50} of 75

The State noise standards apply to the project section of the Willmar Rail Connector and Industrial Access Project with the proposed roadways changes (see Figures 1 and 2 in Appendix A). Exemptions to State noise standards are found in Minnesota Statutes 2000, Section 116.07

subd. (2a). Minnesota Statutes 2000, Section 116.07 subd. (2a) identifies the conditions and roadway types that are exempt from the State noise standards.

The Federal Highway Administration's (FHWA) Procedures for Abatement of Highway Traffic Noise and Construction Noise is presented in the Code of Federal Regulations, Title 23 Part 772 (23 CFR 772). This regulation establishes the noise abatement criteria (NAC) for various land uses. Noise abatement measures will be considered when the predicted noise levels approach (within 1 dBA) or exceed those values shown for the appropriate activity category in Table 3, or when the predicted traffic noise levels substantially exceed the existing noise levels. MnDOT has defined an increase over existing noise levels of 5 dBA or greater as a substantial noise level increase.

TABLE 3 – FHWA NOISE ABATEMENT CRITERIA

FHWA Noise Abatement Criteria			
Activity Category	**Activity Criteria (1,2) L_{10} dBA**	**Evaluation Location**	**Activity Description**
A	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	70	Exterior	Residential
C	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E(3)	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources water treatment, electrical), and warehousing
G	--	--	Undeveloped lands that are not permitted

[1] L_{10} shall be used for impact assessment

[2] The L_{10} Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

[3] Includes undeveloped lands permitted for this activity category.

Methodology

Affected Environment

The purpose of this noise analysis is to determine the impacts of the proposed project's traffic-generated noise levels on noise-sensitive receptors (residences, businesses, etc.) with frequent outdoor human activity in the vicinity of the proposed project. It is also important to note that the proposed project setting includes other noise sources in the area that may have some effect on ambient noise levels (e.g. trains).

Noise Monitoring

Existing traffic noise levels were measured in the field and then compared against computer modeling results to evaluate the accuracy of the computer model and modeler. If the modeled and measured levels are within + or - 3 dBA of one another, this is an indication that the model and modeler are within the accepted level of accuracy.

Existing noise levels were monitored at three sites within the project area to validate the noise model. Noise monitoring locations are described below and depicted on Figures 1 and 2 in Appendix A.

- Monitoring site A is located along the south side of US 12 just west of CSAH 5 (see Figures 1 and 2 in Appendix A).
- Monitoring site B is located along the north side of TH 40 east of CSAH 55 (see Figures 1 and 2 in Appendix A).
- Monitoring site C is located along the south side of TH 40 east of CSAH 55 (see Figures 1 and 2 in Appendix A).

Noise levels were monitored on June 24, 2016. Traffic noise measurements were conducted in accordance with FHWA-PD-96-046 Measurement of Highway Related Noise (May 1996) and MPCA guidelines.

The measured and modeled noise levels for each of the monitoring sites selected along the project corridor are presented in Table 4. Each set of predicted and measured data was found to be within the acceptable + or - 3 dBA tolerance; therefore, the model and modeler are considered to be validated.

TABLE 4 – MODEL VALIDATION RESULTS

Hourly A-Weighted Sound Level (dBA)				
Existing Monitored Results		*Existing Modeled Results*		*Difference*
Monitoring Location A	**L_{10}** 67.7	**Monitoring Location** A	**L_{10}** 70.1	**L_{10}** 2.3
Monitoring Location B	**L_{10}** 61.4	**Monitoring Location** B	**L_{10}** 62.3	**L_{10}** 0.9
Monitoring Location C	**L_{10}** 58.8	**Monitoring Location** C	**L_{10}** 59.5	**L_{10}** 0.7

Noise Modeling

Traffic noise impacts were assessed by modeling noise levels at receptor sites likely to be affected by construction of the proposed project. Traffic noise levels were modeled at 32 representative receptor locations throughout the project corridor. A majority of these receptor locations represented residential land uses. The locations of the modeled receptor sites are illustrated in Figures 1 and 2 in Appendix A. Land uses (residential, commercial, etc.) are listed with each modeled receptor location in Tables 12-15 in Appendix B.

Noise modeling was done using the noise prediction program "MINNOISEV31," a version of the FHWA "STAMINA" model adapted by MnDOT. This model uses traffic volumes, speed, class of vehicle, and the typical characteristics of the roadway being analyzed (e.g. roadway horizontal and vertical alignment). Noise model input files were developed based on the following assumption:

- Traffic data input into the MINNOISEV31 noise model included existing (year 2016) and future (year 2040) No Build and Build traffic volumes. Year 2040 was identified as the future year for analysis.

In general, higher traffic volumes, vehicles speeds, and numbers of heavy trucks increases the loudness of highway traffic noise. The worst hourly traffic noise impact typically occurs when traffic is flowing more freely and when heavy truck volumes are the greatest. For determining the worst-case traffic noise hour, traffic noise levels for the entire day were modeled at five representative receptor locations along the project corridor under existing conditions, taking into account the appropriate vehicle mix (i.e. cars, medium trucks, heavy trucks), seasonal traffic variations where appropriate, and directional split in traffic volume (i.e. northbound versus southbound).

The daytime L_{10} levels for each of the modeled time periods are summarized in Table 5. Based on this analysis, it was determined that the time period from 4:00 PM to 5:00 PM represents

the worst-case daytime traffic noise hour, and the time period from 6:00 AM to 7:00 AM represents the worst-case nighttime traffic noise hour.

TABLE 5 – LOUDEST NOISE HOUR MODELING RESULTS

Daytime L_{10} (dBA)				
Begin Hour	**REC 10**	**REC 15**	**REC 21**	**REC 31**
7:00 AM	60.8	58.9	58.0	63.3
8:00 AM	60.7	58.8	57.9	63.1
9:00 AM	60.1	58.3	57.4	62.6
10:00 AM	60.6	58.7	57.8	63.0
11:00 AM	60.1	58.2	57.4	62.6
12:00 PM	60.9	59.0	58.1	63.4
1:00 PM	60.5	58.6	57.7	63.0
2:00 PM	61.2	59.2	58.4	63.6
3:00 PM	61.3	59.3	58.4	63.8
4:00 PM	61.9	59.8	59.0	64.3
5:00 PM	60.5	58.5	57.6	63.0
6:00 PM	57.6	55.8	55.0	60.2
7:00 PM	56.3	54.5	53.7	58.7
8:00 PM	57.7	55.9	55.1	60.2
9:00 PM	56.9	55.1	54.3	59.4
Nighttime L_{10} (dBA)				
10:00 PM	55.1	53.4	52.6	57.5
11:00 PM	52.7	51.1	50.3	55.2
12:00 AM	54.1	52.5	51.7	56.5
1:00 AM	52.8	51.2	50.5	55.4
2:00 AM	51.5	50.0	49.3	54.2
3:00 AM	51.7	50.2	49.4	54.2
4:00 AM	53.0	51.4	50.7	55.6
5:00 AM	56.6	54.9	54.1	59.1
6:00 AM	60.2	58.3	57.5	62.7

Noise Model Results

Results of the noise modeling analysis are tabulated in Tables 12-15 in Appendix B. The following describes the results of the traffic noise analysis for existing (2016), future (2040) No Build conditions, and future (2040) Build conditions.

Existing (2016) daytime traffic noise levels range from 47.8/40.9 dBA (L_{10}/L_{50}) to 64.0/56.6 dBA (L_{10}/L_{50}), whereas nighttime noise levels range from 44.3/34.8 dBA (L_{10}/L_{50}) to 59.3/50.0 dBA (L_{10}/L_{50}). Modeled traffic noise levels exceed the MPCA daytime L_{10} standard

at 0 of 32 receptors and the daytime L_{50} standard at 0 of 32 receptors. Modeled noise levels exceed the MPCA nighttime L_{10} standard at 10 of 32 receptors and the nighttime L_{50} standard at 0 of 32 receptors. Modeled traffic noise levels exceed the FHWA criteria at 0 of 32 receptors.

Future (2040) No Build daytime traffic noise levels range from 48.0/41.1 dBA (L_{10}/L_{50}) to 65.1/57.4 dBA (L_{10}/L_{50}), whereas nighttime traffic noise levels range from 44.6/35.1 dBA (L_{10}/L_{50}) to 60.2/51.1 dBA (L_{10}/L_{50}). Under the No Build alternative, modeled traffic noise levels (daytime and nighttime) vary 0.1 dBA to 2.2 dBA over existing conditions. Modeled traffic noise levels exceed the MPCA daytime L_{10} standards at 1 of 32 receptors and the daytime L_{50} standard at 0 of 32 receptors. Modeled traffic noise levels exceed the MPCA nighttime L_{10} standards at 17 of 32 receptors and the nighttime L_{50} standard at 2 of 32 receptors. Modeled traffic noise levels exceed the FHWA criteria at 0 of 32 receptors.

Alternative 1

Under future Build (2040) Alternative 1 daytime traffic noise levels range from 49.0/43.6 dBA (L_{10}/L_{50}) to 65.8/57.2 dBA (L_{10}/L_{50}). Nighttime traffic noise levels range from 45.6/38.4 dBA (L_{10}/L_{50}) to 61.1/51.0 dBA (L_{10}/L_{50}) with future (2040) Build conditions. Modeled noise levels (daytime and nighttime) vary 0.3 dBA to 3.4 dBA from existing (2016) conditions. Modeled traffic noise levels exceed the MPCA daytime L_{10} standard at 1 of 32 receptors and the daytime L_{50} standard at 0 of 32 receptors. Modeled traffic noise levels exceed the MPCA nighttime L_{10} standard at 17 of 32 receptors and the nighttime L_{50} standard at 1 of 32 receptors. Noise levels are predicted to substantially exceed (greater than 5 dBA) existing noise levels at 0 of 32 receptors. Modeled traffic noise levels exceed the FHWA criteria at 0 of 32 receptors.

Alternative 2

Under future Build (2040) Alternative 2 daytime traffic noise levels range from 47.4/43.6 dBA (L_{10}/L_{50}) to 66.4/56.3 dBA (L_{10}/L_{50}). Nighttime traffic noise levels range from 44.6/39.1 dBA (L_{10}/L_{50}) to 61.5/49.8 dBA (L_{10}/L_{50}) with future (2040) Build conditions. Modeled noise levels (daytime and nighttime) vary -14.1 dBA to 9.1 dBA from existing (2016) conditions. Modeled traffic noise levels exceed the MPCA daytime L_{10} standard at 1 of 32 receptors and the daytime L_{50} standard at 0 of 32 receptors. Modeled traffic noise levels exceed the MPCA nighttime L_{10} standard at 4 of 32 receptors and the nighttime L_{50} standard at 0 of 32 receptors. Noise levels are predicted to substantially exceed (greater than 5 dBA) existing noise levels at 2 of 32 receptors. Modeled traffic noise levels exceed the FHWA criteria at 0 of 32 receptors.

Some modeled receptor locations are projected to experience a decrease in traffic noise levels with Alternative 2. These decreases were generally observed at locations where the new alignment will shift traffic volumes to different routes. Table 6 provides of summary of the traffic noise impacts.

TABLE 6 – SUMMARY OF NOISE IMPACTS

ALTERNATIVE	DAYTIME (dBA)			NIGHTTIME (dBA)		
	L_{10}	L_{50}	>5 increase	L_{10}	L_{50}	>5 increase
Existing	0	0	0	10	0	0
No-Build	1	0	0	17	2	0
Alternative 1	1	0	0	17	1	0
Alternative 2	1	0	2	4	0	2

Traffic Noise Abatement Analysis

Under both Build Alternative 1 and Build Alternative 2, MPCA noise standards are exceeded at modeled receptor locations in the project area; therefore, noise abatement in the form of a noise barrier must be considered. However, any of the noise abatement measures listed below shall be considered if a noise barrier is determined not feasible or not reasonable:

- Traffic management measures including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations. (This option may not be practical for most state interstate highways.)
- Alteration of horizontal and vertical alignments (usually considered in the evaluation and comparison of noise impacts of various project build alternatives).
- Acquisition of real property or interests therein (predominately unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.
- Noise insulation of Activity Category D land use facilities listed in Table 3. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

Noise Barrier Evaluation

Noise barrier construction decisions are based on a study of feasibility and reasonableness. Engineering feasibility is determined by physical and /or engineering constraints (i.e. whether a noise barrier could feasibly be constructed on the site) and acoustical feasibility is based on at least one impacted receptor (per proposed barrier) receiving a reduction of 5 dBA or more. There are three reasonableness factors that must be met for a noise abatement measure to be considered reasonable.

1. A noise reduction design goal of at least 7 dBA must be achieved at a minimum of one benefited receptor for each proposed noise abatement measure to be considered reasonable.
2. A cost effectiveness threshold of $43,500 per individual benefited receptor has been established, based on an estimated construction cost of $20/ft^2 for noise walls (additional costs of some items such as guard rail, rub rail, purchased right-of-way, etc.., shall be added to the baseline unit costs cited above for the purpose of cost estimation).
3. The viewpoints of the property owners and residents of all benefited receptors shall be solicited and considered in reaching a decision on the abatement measures to be provided. Please see Section 5.3.3 of the MnDOT Noise Policy (effective date: June 15, 2015) for a detailed explanation of the voting system. If 50% or greater of all possible voting points from benefited receptors for a barrier are received on the first solicitation (typically by mail and/or ballot received at a public meeting), then a simple majority of voting points cast will be used to determine if the proposed barrier will be constructed or not. If less than 50% of all possible points for a barrier are received on the first solicitation, a second solicitation (typically by mail) will be sent to benefited receptors who did not respond to the first solicitation. If after the second solicitation 25% or greater of all possible points for a barrier are received, a simple majority of voting points cast will be used to determine whether the barrier will be constructed or not. However, if fewer than 25% of total possible points for a noise barrier are received after the second solicitation, then the barrier will not be constructed. In the case of a tie (equal number of points for and against a barrier) the barrier will be constructed.

There are several steps to assessing the cost-effectiveness of noise barriers. First, the cost-effective noise barrier height is determined for each segment of the project area. For this study, three heights of potential noise barriers were analyzed: 20 feet (MnDOT's maximum height), 15 feet (if necessary), and 10 feet (if necessary). If a 20-foot tall noise barrier meets the reasonableness criteria and is feasible, it would be proposed for construction. If the 20-foot tall barrier does not meet the criteria, a 15-foot high barrier is evaluated. Likewise, if a 15-foot tall barrier does not meet the criteria, a 10-foot high barrier is studied. If a 10-foot tall noise barrier meets the reasonableness criteria and is feasible, it would then be proposed for construction. All barriers evaluated must meet MnDOT's 7 dBA noise reduction design goal. If a barrier is unable to achieve the 7 dBA noise reduction design goal, further evaluation of shorter barrier heights will not completed.

Noise Barrier Analysis Results

Noise barriers were evaluated at all modeled residential receptor locations where State daytime and/or nighttime noise standards are exceeded with future (2040) Build conditions. The locations with modeled noise barriers are shown in Figures 1 and 2 in Appendix A.

Noise barrier cost-effectiveness results are tabulated in Appendix C. The discussion of noise barrier modeling results presented below includes only daytime results. For reference, nighttime noise barrier cost-effectiveness results are also tabulated and presented at the end of this report along with the daytime noise barrier cost-effectiveness results.

Alternative 1 – Impacted Receptor 7

A single impacted residential receptor is located northwest of the intersection of CSAH 55 with TH 40.

Noise Barrier A
Receptor 7 (see Figure 1)

An approximately 277-foot long, 20-foot high noise barrier was modeled along the west side of CSAH 55 north of TH 40. The approximately 277-foot long, 20-foot high barrier provides a reduction of 1.5 dBA.

The approximately 277-foot long, 20-foot high modeled Barrier A does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the project.

Alternative 1 – Impacted Receptor 8

A single impacted residential receptor is located northeast of the intersection of CSAH 55 with TH 40.

Noise Barrier B
Receptor 8 (see Figure 1)

An approximately 399-foot long, 20-foot high noise barrier was modeled along the east side of CSAH 55 and along the north side of TH 40. The approximately 399-foot long, 20-foot high barrier provides a reduction of 5.4 dBA.

The approximately 399-foot long, 20-foot high modeled Barrier B does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the project.

Alternative 1 – Impacted Receptor 9

A single impacted residential receptor is located southwest of the intersection of CSAH 55 with TH 40.

Noise Barrier C
Receptor 9 (see Figure 1)

An approximately 247-foot long, 20-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 20-foot high

barrier provides a reduction of 8.9 dBA. The cost-effectiveness of the barrier is $98,800 per benefited receptor.

The approximately 247-foot long, 20-foot high modeled Barrier C does not meet MnDOT's cost-effectiveness criteria and is not proposed as part of the project.

An approximately 247-foot long, 15-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 15-foot high barrier provides a reduction of 8.3 dBA. The cost-effectiveness of the barrier is $74,100 per benefited receptor.

The approximately 247-foot long, 15-foot high modeled Barrier C does not meet MnDOT's cost-effectiveness criteria and is not proposed as part of the project.

An approximately 247-foot long, 10-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 10-foot high barrier provides a reduction of 6.3 dBA.

The approximately 247-foot long, 10-foot high modeled Barrier C does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the project.

Alternative 1 – Impacted Receptors 10-21, 25

Noise impacts are predicted at Receptors 10-21 and Receptor 25 north of Highway 12 and west of 30th Street NW.

Noise Barrier D
Receptors 10-21, 25 (see Figure 1)

An approximately 2,232-foot long, 20-foot high noise barrier was modeled along the north side of Highway 12 west of 30th Street NW. The approximately 2,232-foot long, 20-foot high barrier provides a reduction of 6.1 dBA to 10.7 dBA. The cost-effectiveness of the barrier is $42,514 per benefited receptor.

The approximately 2,232-foot long, 20-foot high modeled Barrier D meets both MnDOT's 7 dBA noise reduction design goal as well as MnDOT's cost-effectiveness criteria and is proposed as part of the project.

Alternative 1 – Impacted Receptor 31

A single impacted residential receptor is located south of Highway 12 west of 30th Street NW.

Noise Barrier E

Receptor 31 (see Figure 1)

An approximately 633-foot long, 20-foot high noise barrier was modeled along the south side of Highway 12, west of 30th Street NW. The approximately 633-foot long, 20-foot high barrier provides a reduction of 3.4 dBA.

The approximately 633-foot long, 20-foot high modeled Barrier E does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the project.

Alternative 2 – Impacted Receptors 3 & 5

Noise impacts are predicted at Receptor 3 and Receptor 5 east of Highway 12/Alternative 2.

Noise Barrier F

Receptors 3 & 5 (see Figure 2)

An approximately 4,168-foot long, 20-foot high noise barrier was modeled along the east side of Highway 12/Alternative 2. The approximately 4,168-foot long, 20-foot high barrier provides a reduction of 2.9 dBA to 4.5 dBA.

The approximately 4,168-foot long, 20-foot high modeled Barrier F does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the project.

Alternative 2 – Impacted Receptor 7

A single impacted residential receptor is located northwest of the intersection of CSAH 55 with TH 40.

Noise Barrier G

Receptor 7 (see Figure 2)

An approximately 277-foot long, 20-foot high noise barrier was modeled along the west side of CSAH 55 north of TH 40. The approximately 277-foot long, 20-foot high barrier provides a reduction of 1.6 dBA.

The approximately 277-foot long, 20-foot high modeled Barrier G does not meet MnDOT's feasibility criteria (at least one impacted receptor per proposed barrier must receive the

minimum reduction of 5 dBA to achieve acoustic feasibility) and is not proposed as part of the project.

Alternative 2 – Impacted Receptor 8

A single impacted residential receptor is located northeast of the intersection of CSAH 55 with TH 40.

Noise Barrier H
Receptor 8 (see Figure 2)

An approximately 399-foot long, 20-foot high noise barrier was modeled along the east side of CSAH 55 and along the north side of TH 40. The approximately 399-foot long, 20-foot high barrier provides a reduction of 5.2 dBA.

The approximately 399-foot long, 20-foot high modeled Barrier H does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the project.

Alternative 2 – Impacted Receptor 9

A single impacted residential receptor is located southwest of the intersection of CSAH 55 with TH 40.

Noise Barrier I
Receptor 9 (see Figure 2)

An approximately 247-foot long, 20-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 20-foot high barrier provides a reduction of 8.7 dBA. The cost-effectiveness of the barrier is $98,800 per benefited receptor.

The approximately 247-foot long, 20-foot high modeled Barrier I does not meet MnDOT's cost-effectiveness criteria and is not proposed as part of the project.

An approximately 247-foot long, 15-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 15-foot high barrier provides a reduction of 8.1 dBA. The cost-effectiveness of the barrier is $74,100 per benefited receptor.

The approximately 247-foot long, 15-foot high modeled Barrier I does not meet MnDOT's cost-effectiveness criteria and is not proposed as part of the project.

An approximately 247-foot long, 10-foot high noise barrier was modeled along the west side of CSAH 55 and along the south side of TH 40. The approximately 247-foot long, 10-foot high barrier provides a reduction of 6.3 dBA.

The approximately 247-foot long, 10-foot high modeled Barrier I does not meet MnDOT's 7 dBA noise reduction design goal and is not proposed as part of the project.

Construction Noise

The construction activities associated with implementation of the proposed project will result in increased noise levels relative to existing conditions. These impacts will primarily be associated with construction equipment and pile driving.

The following table (Table 7) shows peak noise levels monitored at 50 feet from various types of construction equipment. This equipment is primarily associated with site grading/site preparation, which is generally the roadway construction phase associated with the greatest noise levels.

TABLE 7 – TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS AT 50 FEET

Equipment Type	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

Source: United States Environmental Protection Agency and Federal Highway Administration

Elevated noise levels are, to a degree, unavoidable for this type of project construction. MnDOT will require that construction equipment be properly muffled and in proper working order. While MnDOT and its contractor(s) are exempt from local noise ordinances, it is the practice to require contractor(s) to comply with applicable local noise restrictions and ordinances to the extent that is reasonable. Advanced notice will be provided to affected communities of any planned abnormally loud construction activities. It is anticipated that night construction may sometimes be required to minimize traffic impacts and to improve safety. However, construction will be limited to daytime hours as much as possible. If necessary, a detailed nighttime construction mitigation plan will be developed during the project final design stage.

Any associated high-impact equipment noise, such as pile driving, pavement sawing, or jack hammering, will be unavoidable with construction of the proposed project. Pile-driving noise is associated with any bridge construction, and sheet piling is necessary for retaining wall construction. While pile-driving equipment results in the highest peak noise level, as shown in Table 7, it is limited in duration to the activities noted above (i.e. bridge construction). The use

of pile drivers, jack hammers, and pavement sawing equipment will be prohibited during nighttime hours to the extent possible.

Conclusions

In general, construction of the project will result in increases in traffic noise levels compared to existing conditions. Changes in daytime traffic noise levels (L_{10}) for Alternative 1 are projected to vary from 0.3 dBA to 3.4 dBA from existing to future (2040) Build conditions. Changes in daytime traffic noise levels (L_{10}) for Alternative 2 are projected to vary from -14.1 dBA to 9.1 dBA from existing to future (2040) Build conditions.

Cost effectiveness of noise barriers was calculated and one barrier (Table 8) was found to be feasible and reasonable and is recommended under Alternative 1. Noise barriers were not found to be feasible and reasonable under Alternative 2 and are not proposed as part of the project.

Final mitigation decisions will be subject to input from affected property owners and final design considerations.

TABLE 8 – PROPOSED FEASIBLE AND REASONABLE NOISE BARRIERS

Alternative	Noise Barrier	Length (feet)	Height (feet)	Cost/ Benefited Receptor
1	D	2,232	20	$42,514

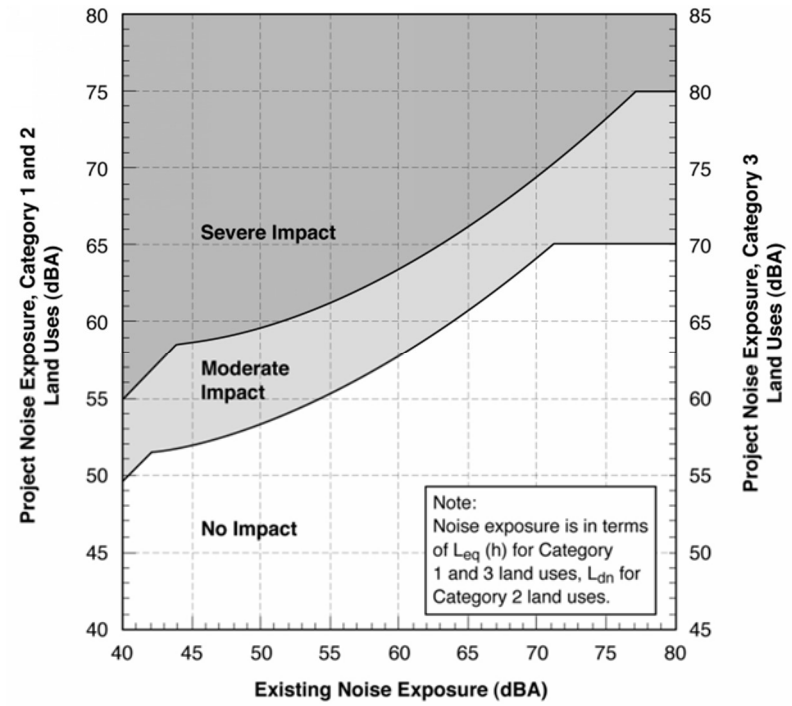
Train Noise and Vibration Analysis

Introduction

This analysis evaluates the effect of the proposed project on train-generated noise and vibration levels in the area. The train noise and vibration analysis was performed in accordance with the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment manual. FTA screening methods were used to evaluate the need for general assessments. FTA general assessments were performed as appropriate.

Chart 1 from the FTA Transit Noise and Vibration Impact Assessment manual shows the noise impact criteria, which are based on the land use category and the existing noise exposure in the area.

CHART 1 – FTA NOISE IMPACT CRITERIA FOR TRANSIT PROJECTS



Source: Federal Transit Administration, https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/fta-noise-and-vibration-impact-assessment

Noise-sensitive receptors are divided into one of three land use categories:

- Category 1: land where quiet is an essential element (e.g. amphitheaters and concert pavilions)
- Category 2: residences and buildings where people sleep
- Category 3: institutional land uses with primarily daytime and evening use (e.g. schools, libraries, and churches)

Category 1 and category 3 receptors are evaluated using the equivalent-average sound level (L_{eq}) from the noisiest hour of project-related activity during hours of noise sensitivity. The L_{eq} represents a constant sound that, over the hour, has the same acoustic energy as the time-varying signal. Category 2 receptors are evaluated using the day-night sound level (L_{dn}), because category 2 receptors are sensitive to noise during all hours of the 24-hour day. The L_{dn} describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 PM and 7:00 AM increased by 10 decibels to account for greater nighttime sensitivity to noise. Modeled project noise levels are compared to the noise impact criteria to evaluate the potential for noise impacts as defined by the FTA. No impact indicates project noise levels are unlikely to cause annoyance. A moderate impact is a noise level increase that is noticeable to most people, yet generally not sufficient enough to cause adverse reactions to the project. A severe impact is a noise level increase that could cause annoyance to a significant percentage of people.

Methodology

Affected Environment

The affected environment is the area near the proposed railroad tracks and a portion of the existing mainline where an existing private at-grade crossing would be converted to a public at-grade crossing (see Figure 3 in Appendix A). This area includes residential land uses, which fall under category 2 as defined by FTA. No category 1 or category 3 receptors were identified in the affected area.

Existing Noise Exposure Monitoring

HDR measured existing noise levels in the project area from June 22 to 24, 2016. Figure 3 in Appendix A shows the monitoring locations.

- Monitoring Location 1 (ML1) was located south of US 12 off of CSAH 55. ML1 was representative of the existing noise exposure in the northern portion of the project area.
- Monitoring Location 2 (ML2) was located near existing tracks and was east of CSAH 55 and northwest of CR 5 SW. ML2 was representative of the existing noise exposure in the southern portion of the project area.

Twenty-four-hour existing noise measurements were performed at ML1 and ML2; the measured existing L_{dn} were used in the train noise analysis. HDR measured noise levels in accordance with guidelines from FTA.

HDR used digital sound level meters and a handheld calibrator that meet Class 1/Type 1 precision requirements of American National Standards Institute and International Electrotechnical Commission standards. All instrumentation used by HDR to measure noise

levels on this project is calibrated on a regular basis by an independent accredited calibration laboratory using standards traceable to the National Institute of Standards and Technology. Calibration checks were performed in the field prior to and upon completion of each series of measurements.

Table 9 shows the measured equivalent day, night, and day-night average noise levels.

TABLE 9 – TRAIN ANALYSIS NOISE MEASUREMENT RESULTS

Monitoring Location	$L_{eq}D$ (dBA)	$L_{eq}N$ (dBA)	L_{dn} (dBA)
ML1	51.9	50.6	57.3
ML2	51.0	48.3	55.2

Similar noise levels were measured at each location. Measured noise levels at ML1 were slightly louder than at ML2 because ML1 was closer to US 12.

Train Noise and Vibration Analysis

HDR performed noise and vibration analyses in accordance with the FTA Transit Noise and Vibration Impact Assessment manual. The assessments began by determining noise and vibration screening distances. If sensitive receptors were identified within the screening distance, a general assessment was performed.

HDR used the following project data in the noise and vibration analyses.

- 6 trains per day on the project rail alignment (evenly distributed throughout the 24-hour day)
- 10 trains per day on the existing mainline (evenly distributed throughout the 24-hour day)
- 2.5 diesel locomotives per train
- 78.7 rail cars per train (estimated from train length of 5,900 linear feet)
- 30 miles per hour
- Continuously welded rail

These served as the primary inputs for the analyses.

Noise Screening

Noise screening distances can be determined using guidance in the FTA guidance manual or calculated using the FTA spreadsheet model. Using the FTA spreadsheet model results in a screening distance based on project-specific conditions; the appropriate screening distance is where the project noise reaches 50 dBA.

The primary train noise sources throughout the southern portion of the project area are the locomotives and railcars. Based on the project data listed above, total project noise from the locomotives and railcars would reach 50 dBA at a distance of 485 feet. Therefore, a screening distance of 485 feet was applied to the project rail alignment.

The project includes one public at-grade crossing where the locomotive horn would be used on the new rail alignment. The project also includes the addition of locomotive horns on the existing mainline where an existing private at-grade crossing would be converted to a public at-grade crossing. Based on the project data listed above, total project noise from the locomotives, railcars, and locomotive horn would reach 50 dBA at a distance of 2,300 feet from the new track and 3,000 feet from the existing mainline. The FRA requires the train engineer to begin sounding the horn when the train is within 15 to 20 seconds of an at-grade crossing (when speeds are below 60 miles per hour). With a project speed of 30 miles per hour, the locomotive horn could be used within 880 feet of the at-grade crossing. Therefore, the screening distances of 2,300 feet and 3,000 feet were applied to the rail alignment that is within 880 feet of the new and existing mainline at-grade crossings, respectively.

Figure 4 in Appendix A illustrates the noise screening buffers. There are 21 noise-sensitive receptors within the noise screening buffers; therefore, HDR performed general noise assessments at those 21 receptors. For receptors located within the intersection of the noise-screening buffers, locomotive warning horns for both at-grade crossings were included as noise sources in the FTA general noise assessment.

General Noise Assessment

HDR used the FTA spreadsheet model to evaluate the 21 identified noise-sensitive receptors individually. The FTA spreadsheet model inputs included the following.

- Land Use Category: The land use category for all of the receptors within the screening area is category 2 – residential.
- Existing Noise: The existing noise level parameter was taken from the measured day-night average sound levels (L_{dn}) from either ML1 or ML2. The monitoring location used to represent the existing conditions at each receptor was chosen depending on the proximity of each receptor to the monitoring locations. The measured L_{dn} from ML1 was used for receptors R01 – R06 and R13 – R21, and the measured L_{dn} from ML2 was used for receptors R07 – R12. Receptor R07 is located in the middle of the project area; using the existing noise level from ML2 was conservative because the measured existing noise level from ML2 was quieter, which results in a more stringent impact assessment.
- Noise Sources: The following noise sources were modeled, as appropriate for each receptor.

- Diesel electric locomotive
- Rail cars
- Locomotive warning horn
- Crossing signal
- Crossover

- Distance from source to receiver: Distances were determined using GIS software and reflect the nearest distance between the receptor and each individual noise source.
- Adjustments: No adjustments were made for shielding from rows of buildings or noise barriers because of the rural project area.

Table 10 presents the results of the FTA general noise assessment.

TABLE 10 – FTA GENERAL NOISE ASSESSMENT SUMMARY

Receptor	Land Use Category	Distance from Tracks, feet	Distance from New-Build Rail Horn, feet	Distance from Mainline Rail Horn, feet	Distance from Crossing Signals, feet	Distance from Cross-over, feet	L_{dn} (dBA)				Impact?
							Existing Level	Total Project Level	Moderate Impact Thresholds	Severe Impact Thresholds	
R01	2	1325	2300	1500	3159	1325	57	53	57-62	>62	None
R02	2	1364	1795	2175	2648	1614	57	53	57-62	>62	None
R03	2	2221	2221	NA	2526	2634	57	51	57-62	>62	None
R04	2	790	790	2248	797	843	57	58	57-62	>62	Moderate
R05	2	1496	1496	2333	1512	1496	57	54	57-62	>62	None
R06	2	1000	1024	NA	1501	1368	57	55	57-62	>62	None
R07	2	449	NA	NA	NA	NA	55	51	56-61	>61	None
R08	2	282	NA	NA	NA	475	55	54	56-61	>61	None
R09	2	321	NA	NA	NA	419	55	53	56-61	>61	None
R10	2	328	NA	NA	NA	354	55	53	56-61	>61	None
R11	2	430	NA	NA	NA	439	55	51	56-61	>61	None
R12	2	277	NA	NA	NA	277	55	54	56-61	>61	None
R13	2	NA	NA	797	NA	NA	57	59	57-62	>62	Moderate
R14	2	NA	NA	663	NA	NA	57	60	57-62	>62	Moderate
R15	2	NA	NA	656	NA	NA	57	60	57-62	>62	Moderate
R16	2	NA	NA	690	NA	NA	57	60	57-62	>62	Moderate
R17	2	NA	NA	2660	NA	NA	57	51	57-62	>62	None
R18	2	NA	NA	2064	NA	NA	57	53	57-62	>62	None
R19	2	NA	NA	2531	NA	NA	57	51	57-62	>62	None
R20	2	NA	NA	2629	NA	NA	57	51	57-62	>62	None
R21	2	NA	NA	1657	NA	NA	57	54	57-62	>62	None

Note: "NA" indicates the noise source was not modeled at that particular receptor. For example, locomotive horns were not modeled at receptors R07 through R12 because they are located far from the project public at-grade crossings.

Based on the FTA general noise assessment, the project-related noise level (L_{dn}) at receptor R04

is expected to be approximately 58 dBA; this is a moderate noise impact. R04 is the nearest receptor to the new track at-grade crossing where the locomotive horn would be used. Analysis results indicate that project-related noise levels (L_{dn}) are expected to be 59 dBA at receptor R13 and 60 dBA at receptors R14 – R16 due to the horn noise from the mainline at-grade crossing; these are moderate noise impacts. Noise impacts are not projected to occur at the other 16 receptor locations (R01 – R03, R05 – R12, and R17 – R21).

HDR also prepared noise contours to illustrate the distance to the noise impact thresholds, to assist local governments with noise-compatible land use planning. The FTA spreadsheet model and the two loudest noise source types were used to calculate moderate and severe impact contour distances. While there are more than two types of project noise sources, the two loudest noise sources dominated the total project noise levels. For example, the locomotives and locomotive warning horns dominated the total project L_{dn} at receptor R04; the addition of noise contributions from the rail cars, crossing signals, and crossovers had minimal effect on the overall calculated L_{dn}. The noise impact contour distances for the mainline at-grade crossing were determined solely based on the added locomotive warning horns at the mainline at-grade crossing, as existing noise sources (i.e. wheel-rail noise) are not assessed in determining the project effects. Figure 5 in Appendix A presents the modeled train noise impact contours.

Noise Mitigation

The FTA general noise assessment identified moderate impacts at five receptors: R04 and R13 – R16. According to the FTA manual, a moderate impact warrants consideration and adoption of mitigation measures when it is considered feasible. The dominant noise source at receptor R04 was found to be the locomotive warning horn associated with the new track at-grade crossing, while the dominate noise source at receptors R13 – R16 was the locomotive warning horn for the mainline at-grade crossing.

Noise barriers are a common measure for mitigating noise from surface transportation. However, noise barriers are infeasible for mitigating noise at receptors near at-grade crossings (where locomotive warning horns are used) because the roadway creates a large gap in the barriers. This gap greatly diminishes the noise reduction of the barriers. In addition to feasibility concerns, noise mitigation measures for a small number of receptors are not cost effective. Therefore noise mitigation measures are not recommended for this project.

Vibration Screening

Vibration screening distances were determined using information in the FTA guidance manual. The project includes diesel locomotive trains in an area with residential receptors; therefore, a screening distance of 200 feet was identified and applied to the project rail alignment. Figure 4 in Appendix A illustrates the vibration screening buffer. No vibration-sensitive receptors were

identified within the vibration screening buffer, so no further vibration assessments were performed.

Construction Noise

Construction of the proposed rail alignment would likely result in a temporary increase in noise levels. Table 11 presents typical equipment used for track construction with typical noise levels, quantities, and utilizations for each.

TABLE 11 – ESTIMATED CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Number	Hours per day	Utilization	Horsepower	KW	SWL/unit	Total SWL (dBA)	$L_{eq(h)}$ in dBA at distance (feet)			
								100	200	500	1000
Air Compressors	1	6	50%	78	58	117	114	76	70	62	56
Cranes	1	7	58%	226	169	121	119	81	75	67	61
Forklifts	3	8	67%	89	66	117	120	83	77	69	63
Generator Sets	1	8	67%	84	63	117	115	78	72	64	58
Track Laying Machine	1	8	67%	1500	1119	129	128	90	84	76	70
Track Tamper	1	8	67%	200	149	121	119	81	75	67	61
Track Stabilizer	1	8	67%	700	522	126	124	87	81	73	67
Tractors/Loaders/Backhoes	2	8	67%	97	72	118	119	81	75	67	61
Welders	1	8	67%	46	34	114	113	75	69	61	55
TOTAL COMBINED NOISE								**93**	**87**	**79**	**73**

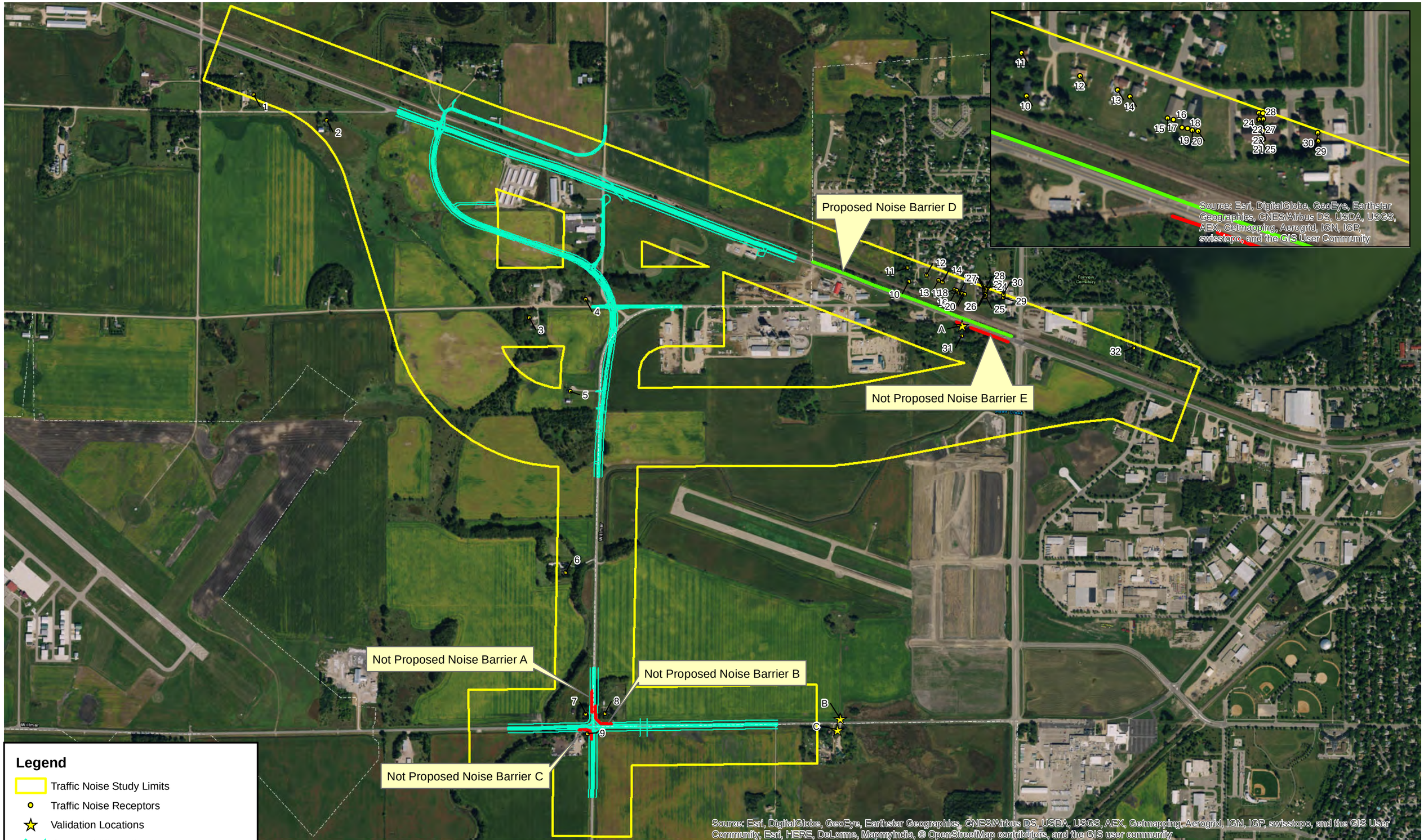
Given the nature of typical railroad projects, construction equipment is generally spread linearly along the construction site rather than concentrated within a small area. Additionally, it is unlikely that all construction equipment identified will be used simultaneously throughout construction. Thus, the given total combined noise levels are conservative approximations that are not likely to be exceeded in actual construction phases of the project.

The FTA does not have standardized criteria for construction, but suggests reasonable criteria that can be used for assessment purposes. The criteria for residential land uses are 1-hour L_{eq}'s of 90 dBA during the day and 80 dBA during the night. The distance between the tracks and the nearest residence is 277 feet, so daytime construction impacts are not projected to occur. However, any nighttime construction could exceed the reasonable criteria of 80 dBA at the nearest residence. Therefore, HDR recommends limiting construction to daytime hours whenever feasible.

Conclusions

Based on assessments performed in accordance with FTA guidelines, moderate noise impacts are projected to occur at receptors R04 and R13 – R16. No vibration-sensitive receptors were identified through the FTA screening process, so no further vibration assessments were performed. Construction noise levels are expected to temporarily increase ambient noise levels in the surrounding area. Analysis results indicate that construction noise levels are unlikely to cause noise impacts during the daytime. HDR recommends limiting construction to daytime hours whenever feasible, particularly when construction occurs near residences.

Appendix A – Figures



Legend

- Traffic Noise Study Limits
- Traffic Noise Receptors
- Validation Locations
- Proposed Alternative 1
- Proposed Noise Barrier Alternative 1
- Not Proposed Noise Barriers Alternative 1

0 500 1,000 Feet

Figure 1 - ALTERNATIVE 1

Traffic Noise Analysis
Willmar Rail Connector and Industrial Access Project

Not Proposed Noise Barrier F

Not Proposed Noise Barrier G

Not Proposed Noise Barrier H

Not Proposed Noise Barrier I

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Legend

- Traffic Noise Study Limits
- Traffic Noise Receptors
- Validation Locations
- Proposed Alternative 2
- Not Proposed Noise Barriers Alternative 2

0 500 1,000 Feet

Figure 2 - ALTERNATIVE 2

Traffic Noise Analysis
Willmar Rail Connector and Industrial Access Project

FIGURE 3 - NOISE MONITORING LOCATIONS

TRAIN NOISE AND VIBRATION ANALYSIS

WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT

PATH: X:\MNDOT\283840_WILLMAR_WYE_NOISE\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\2016.08.19_FIG3_FTA_MONITORING.MXD - USER: ABUCK - DATE: 8/19/2016

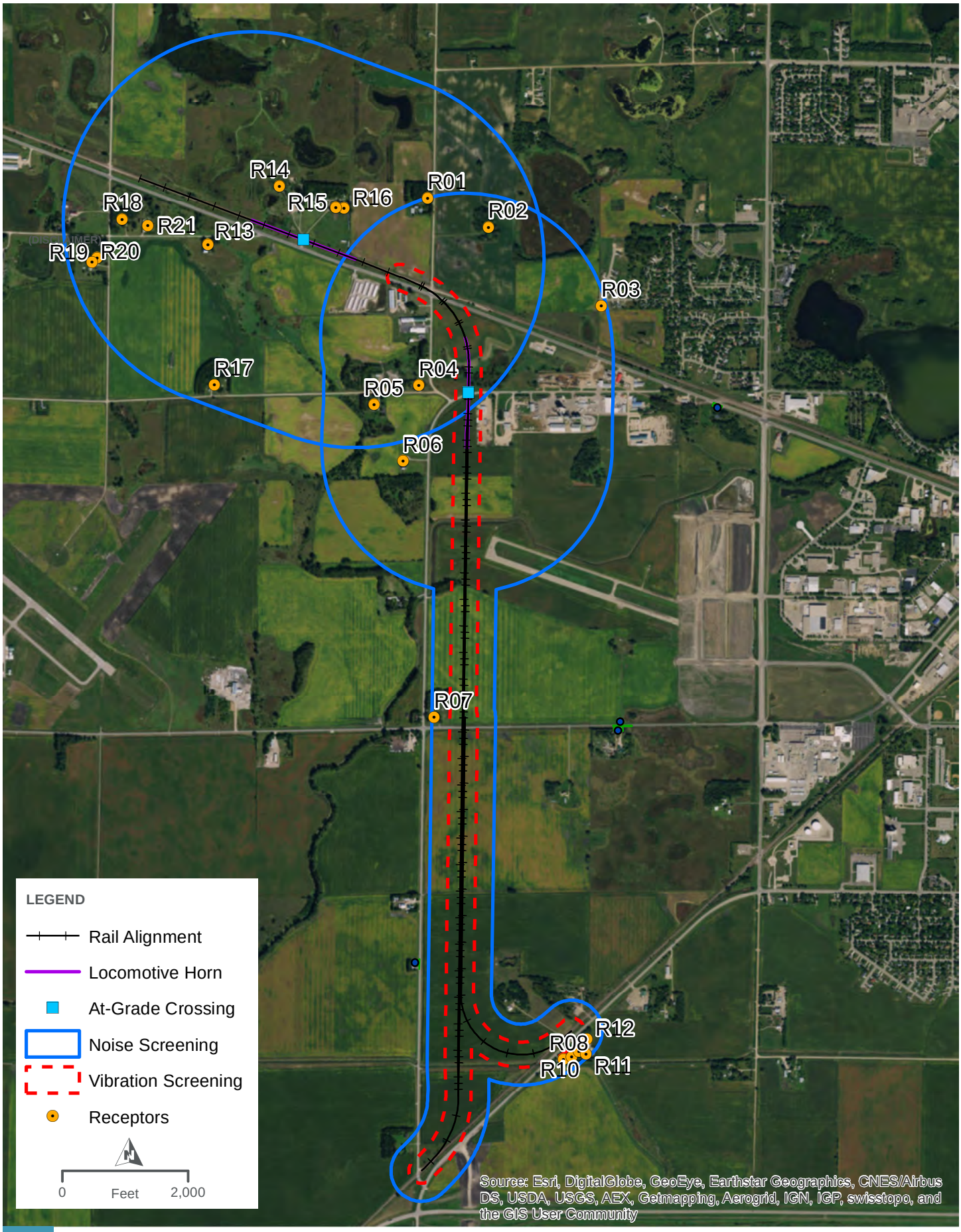


FIGURE 4 - SCREENING DISTANCES

TRAIN NOISE AND VIBRATION ANALYSIS

WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT

PATH: X:\MNDOT\283840_WILLMAR_WYE_NOISE\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\2016.08.19_FIG4_FTA_SCREENING.MXD - USER: ABUCK - DATE: 8/19/2016

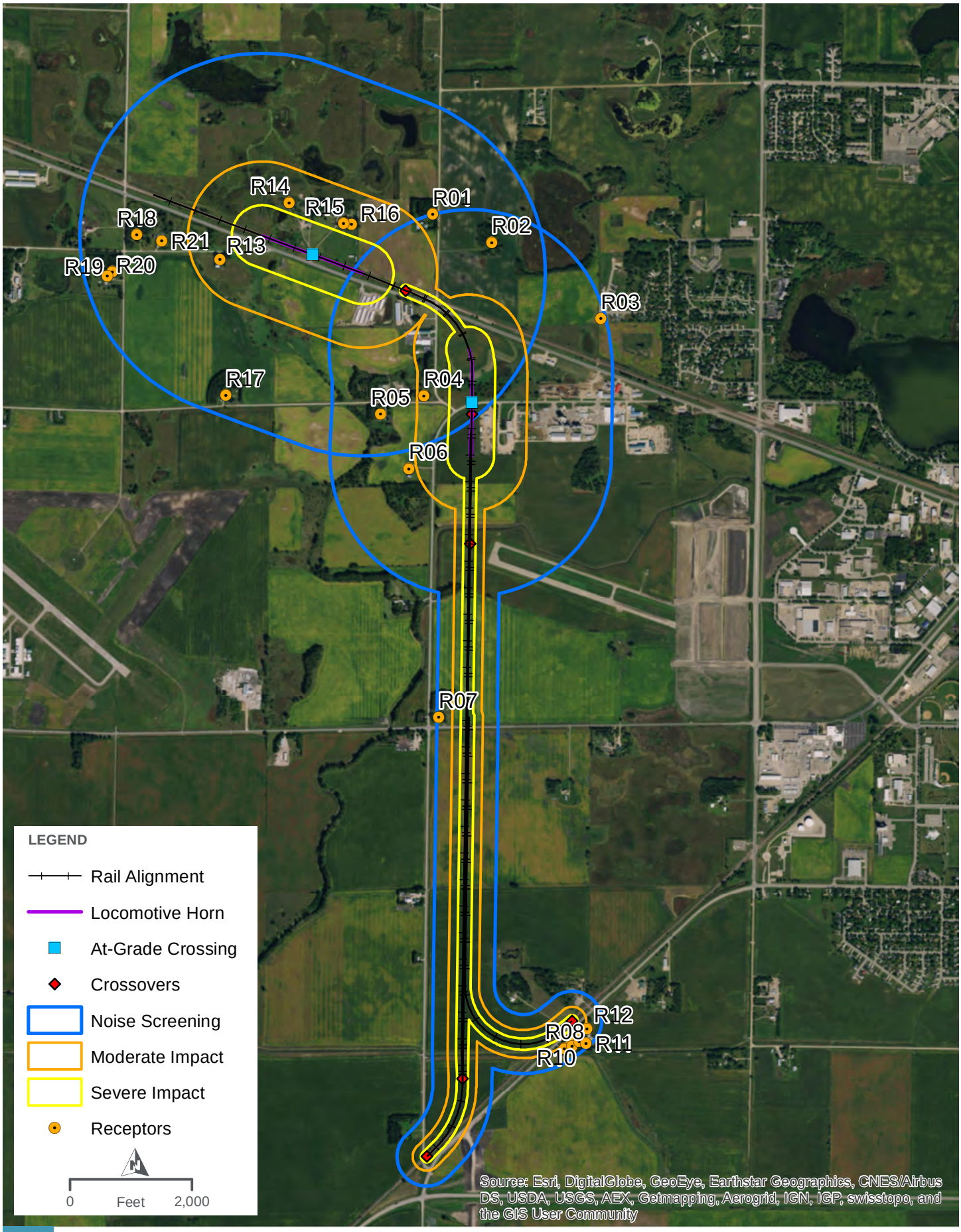


FIGURE 5 - NOISE IMPACT CONTOURS

TRAIN NOISE AND VIBRATION ANALYSIS

WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT

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Appendix B – Traffic Noise Modeling Results

TABLE 12 ALTERNATIVE 1 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: DAYTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Daytime Noise Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**	**--**	**65**	**60**	**--**
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	**--**	**70**	**65**	**--**
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	**--**	**80**	**75**	**--**
1	residential	NAC-1	56.3	49.7	56.6	50.1	0.3	56.6	50.1	0.3
2	residential	NAC-1	56.7	50.0	56.9	50.4	0.2	57.0	50.5	0.3
3	residential	NAC-1	47.8	42.7	48.0	43.1	0.2	49.0	44.2	1.2
4	residential	NAC-1	53.7	44.6	53.8	44.8	0.1	54.6	46.5	0.9
5	residential	NAC-1	50.9	41.6	51.0	41.8	0.1	51.9	43.6	1.0
6	residential	NAC-1	50.4	40.9	50.5	41.1	0.1	52.3	43.6	1.9
7	residential	NAC-1	61.0	50.4	61.7	51.4	0.7	62.8	52.9	1.8
8	residential	NAC-1	60.0	50.5	61.1	52.0	1.1	61.9	53.0	1.9
9	residential	NAC-1	64.0	53.4	**65.1**	54.8	1.1	**65.8**	55.8	1.8
10	residential	NAC-1	62.4	55.4	63.0	56.1	0.6	62.8	55.9	0.4
11	residential	NAC-1	58.6	52.4	59.1	53.1	0.5	58.9	52.8	0.3
12	residential	NAC-1	58.8	52.6	59.4	53.4	0.6	59.2	53.2	0.4
13	residential	NAC-1	58.9	52.7	59.4	53.5	0.5	59.3	53.3	0.4
14	residential	NAC-1	59.0	52.9	59.6	53.6	0.6	59.5	53.4	0.5
15	residential	NAC-1	59.7	53.3	60.3	54.1	0.6	60.1	53.9	0.4
16	residential	NAC-1	59.6	53.3	60.2	54.1	0.6	60.0	53.9	0.4

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TABLE 12 ALTERNATIVE 1 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: DAYTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Daytime Noise Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**	**--**	**65**	**60**	**--**
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	**--**	**70**	**65**	**--**
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	**--**	**80**	**75**	**--**
17	residential	NAC-1	60.0	53.6	60.6	54.4	0.6	60.5	54.2	0.5
18	residential	NAC-1	59.9	53.5	60.5	54.3	0.6	60.4	54.1	0.5
19	residential	NAC-1	59.9	53.5	60.5	54.3	0.6	60.4	54.1	0.5
20	residential	NAC-1	59.8	53.5	60.4	54.3	0.6	60.2	54.0	0.4
21	residential	NAC-1	58.7	52.6	59.3	53.4	0.6	59.1	53.2	0.4
22	residential	NAC-1	58.1	52.1	58.7	52.9	0.6	58.5	52.7	0.4
23	residential	NAC-1	57.4	51.6	58.0	52.4	0.6	57.8	52.2	0.4
24	residential	NAC-1	57.0	51.3	57.6	52.1	0.6	57.4	51.9	0.4
25	residential	NAC-1	58.6	52.5	59.1	53.3	0.5	59.0	53.1	0.4
26	residential	NAC-1	58.0	52.1	58.6	52.9	0.6	58.4	52.7	0.4
27	residential	NAC-1	57.3	51.5	57.9	52.3	0.6	57.7	52.1	0.4
28	residential	NAC-1	56.9	51.2	57.5	52.0	0.6	57.3	51.8	0.4
29	residential	NAC-1	57.4	51.6	58.0	52.4	0.6	57.8	52.2	0.4
30	residential	NAC-1	56.9	51.2	57.5	52.0	0.6	57.3	51.8	0.4
31	residential	NAC-1	63.9	56.6	64.6	57.4	0.7	64.4	57.2	0.5
32	residential	NAC-1	57.6	51.7	58.2	52.5	0.6	58.1	52.3	0.5

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TABLE 13 ALTERNATIVE 1 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: NIGHTTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Nighttime Noise Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**	--	**55**	**50**	--
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	--	**70**	**65**	--
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	--	**80**	**75**	--
1	residential	NAC-1	53.3	45.3	53.7	45.8	0.4	53.7	45.9	0.4
2	residential	NAC-1	53.7	45.6	54.1	46.2	0.4	54.1	46.2	0.4
3	residential	NAC-1	44.3	37.9	44.6	38.3	0.3	45.6	39.4	1.3
4	residential	NAC-1	48.3	38.0	48.6	38.3	0.3	50.1	40.7	1.8
5	residential	NAC-1	46.4	35.8	46.6	36.0	0.2	48.2	38.5	1.8
6	residential	NAC-1	45.8	34.8	46.0	35.1	0.2	48.5	38.4	2.7
7	residential	NAC-1	**55.5**	43.3	**56.4**	44.6	0.9	**58.2**	46.8	2.7
8	residential	NAC-1	53.7	42.5	**55.9**	45.1	2.2	**57.1**	46.6	3.4
9	residential	NAC-1	**58.6**	46.4	**60.0**	48.0	1.4	**61.1**	49.5	2.5
10	residential	NAC-1	**58.1**	49.2	**58.9**	**50.1**	0.8	**58.8**	50.0	0.7
11	residential	NAC-1	54.7	46.6	**55.3**	47.4	0.6	**55.3**	47.3	0.6
12	residential	NAC-1	54.7	46.6	**55.4**	47.5	0.7	**55.4**	47.4	0.7
13	residential	NAC-1	54.7	46.6	**55.5**	47.6	0.8	**55.4**	47.5	0.7
14	residential	NAC-1	54.8	46.7	**55.6**	47.7	0.8	**55.5**	47.6	0.7
15	residential	NAC-1	**55.4**	47.1	**56.2**	48.1	0.8	**56.1**	48.0	0.7
16	residential	NAC-1	**55.3**	47.0	**56.1**	48.1	0.8	**56.1**	48.0	0.8

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TABLE 13 ALTERNATIVE 1 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: NIGHTTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Nighttime Noise Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**	--	**55**	**50**	--
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	--	**70**	**65**	--
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	--	**80**	**75**	--
17	residential	NAC-1	**55.7**	47.3	**56.5**	48.3	0.8	**56.4**	48.2	0.7
18	residential	NAC-1	**55.6**	47.2	**56.4**	48.3	0.8	**56.4**	48.2	0.8
19	residential	NAC-1	**55.6**	47.2	**56.4**	48.3	0.8	**56.3**	48.2	0.7
20	residential	NAC-1	**55.5**	47.1	**56.3**	48.2	0.8	**56.2**	48.1	0.7
21	residential	NAC-1	54.4	46.3	**55.2**	47.4	0.8	**55.2**	47.3	0.8
22	residential	NAC-1	53.9	45.9	54.7	47.0	0.8	54.6	46.8	0.7
23	residential	NAC-1	53.3	45.4	54.0	46.5	0.7	54.0	46.4	0.7
24	residential	NAC-1	52.9	45.1	53.7	46.2	0.8	53.6	46.1	0.7
25	residential	NAC-1	54.3	46.2	**55.1**	47.3	0.8	**55.1**	47.2	0.8
26	residential	NAC-1	53.8	45.8	54.6	46.9	0.8	54.6	46.8	0.8
27	residential	NAC-1	53.1	45.3	53.9	46.4	0.8	53.9	46.3	0.8
28	residential	NAC-1	52.8	45.1	53.6	46.1	0.8	53.5	46.0	0.7
29	residential	NAC-1	53.2	45.4	54.0	46.5	0.8	54.0	46.3	0.8
30	residential	NAC-1	52.8	45.0	53.6	46.1	0.8	53.5	46.0	0.7
31	residential	NAC-1	**59.3**	50.0	**60.2**	**51.1**	0.9	**60.1**	**51.0**	0.8
32	residential	NAC-1	53.4	45.4	54.2	46.5	0.8	54.2	46.4	0.8

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TABLE 14 ALTERNATIVE 2 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: DAYTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Daytime Noise Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**	**--**	**65**	**60**	**--**
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	**--**	**70**	**65**	**--**
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	**--**	**80**	**75**	**--**
1	residential	NAC-1	56.3	49.7	56.6	50.1	0.3	57.4	50.9	1.1
2	residential	NAC-1	56.7	50.0	56.9	50.4	0.2	57.8	51.4	1.1
3	residential	NAC-1	47.8	42.7	48.0	43.1	0.2	53.9	49.4	6.1
4	residential	NAC-1	53.7	44.6	53.8	44.8	0.1	55.2	45.1	1.5
5	residential	NAC-1	50.9	41.6	51.0	41.8	0.1	58.7	52.8	7.8
6	residential	NAC-1	50.4	40.9	50.5	41.1	0.1	53.9	45.7	3.5
7	residential	NAC-1	61.0	50.4	61.7	51.4	0.7	63.5	53.5	2.5
8	residential	NAC-1	60.0	50.5	61.1	52.0	1.1	62.6	53.7	2.6
9	residential	NAC-1	64.0	53.4	**65.1**	54.8	1.1	**66.4**	56.3	2.4
10	residential	NAC-1	62.4	55.4	63.0	56.1	0.6	48.3	44.3	-14.1
11	residential	NAC-1	58.6	52.4	59.1	53.1	0.5	47.4	43.6	-11.2
12	residential	NAC-1	58.8	52.6	59.4	53.4	0.6	48.1	44.1	-10.7
13	residential	NAC-1	58.9	52.7	59.4	53.5	0.5	48.5	44.5	-10.4
14	residential	NAC-1	59.0	52.9	59.6	53.6	0.6	48.7	44.6	-10.3
15	residential	NAC-1	59.7	53.3	60.3	54.1	0.6	49.3	45.1	-10.4
16	residential	NAC-1	59.6	53.3	60.2	54.1	0.6	49.4	45.2	-10.2
17	residential	NAC-1	60.0	53.6	60.6	54.4	0.6	49.6	45.4	-10.4

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TABLE 14 ALTERNATIVE 2 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: DAYTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Daytime Noise Standards										
Residential	**NAC-1**		**65**	**60**	**65**	**60**	**--**	**65**	**60**	**--**
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	**--**	**70**	**65**	**--**
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	**--**	**80**	**75**	**--**
18	residential	NAC-1	59.9	53.5	60.5	54.3	0.6	49.7	45.4	-10.2
19	residential	NAC-1	59.9	53.5	60.5	54.3	0.6	49.7	45.5	-10.2
20	residential	NAC-1	59.8	53.5	60.4	54.3	0.6	49.8	45.5	-10.0
21	residential	NAC-1	58.7	52.6	59.3	53.4	0.6	50.3	45.9	-8.4
22	residential	NAC-1	58.1	52.1	58.7	52.9	0.6	50.1	45.7	-8.0
23	residential	NAC-1	57.4	51.6	58.0	52.4	0.6	49.8	45.5	-7.6
24	residential	NAC-1	57.0	51.3	57.6	52.1	0.6	49.6	45.4	-7.4
25	residential	NAC-1	58.6	52.5	59.1	53.3	0.5	50.3	45.9	-8.3
26	residential	NAC-1	58.0	52.1	58.6	52.9	0.6	50.1	45.8	-7.9
27	residential	NAC-1	57.3	51.5	57.9	52.3	0.6	49.8	45.5	-7.5
28	residential	NAC-1	56.9	51.2	57.5	52.0	0.6	49.7	45.4	-7.2
29	residential	NAC-1	57.4	51.6	58.0	52.4	0.6	50.7	46.2	-6.7
30	residential	NAC-1	56.9	51.2	57.5	52.0	0.6	50.4	46.0	-6.5
31	residential	NAC-1	63.9	56.6	64.6	57.4	0.7	53.5	48.5	-10.4
32	residential	NAC-1	57.6	51.7	58.2	52.5	0.6	58.0	52.2	0.4

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TABLE 15 ALTERNATIVE 2 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: NIGHTTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Nighttime Noise Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**	--	**55**	**50**	--
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	--	**70**	**65**	--
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	--	**80**	**75**	--
1	residential	NAC-1	53.3	45.3	53.7	45.8	0.4	54.5	46.6	1.2
2	residential	NAC-1	53.7	45.6	54.1	46.2	0.4	54.9	47.0	1.2
3	residential	NAC-1	44.3	37.9	44.6	38.3	0.3	51.1	45.0	6.8
4	residential	NAC-1	48.3	38.0	48.6	38.3	0.3	50.4	39.1	2.1
5	residential	NAC-1	46.4	35.8	46.6	36.0	0.2	**55.5**	48.0	9.1
6	residential	NAC-1	45.8	34.8	46.0	35.1	0.2	50.2	40.6	4.4
7	residential	NAC-1	**55.5**	43.3	**56.4**	44.6	0.9	**58.8**	47.2	3.3
8	residential	NAC-1	53.7	42.5	**55.9**	45.1	2.2	**57.8**	47.2	4.1
9	residential	NAC-1	**58.6**	46.4	**60.0**	48.0	1.4	**61.5**	49.8	2.9
10	residential	NAC-1	**58.1**	49.2	**58.9**	**50.1**	0.8	45.4	39.8	-12.7
11	residential	NAC-1	54.7	46.6	**55.3**	47.4	0.6	44.6	39.1	-10.1
12	residential	NAC-1	54.7	46.6	**55.4**	47.5	0.7	45.2	39.5	-9.5
13	residential	NAC-1	54.7	46.6	**55.5**	47.6	0.8	45.6	39.8	-9.1
14	residential	NAC-1	54.8	46.7	**55.6**	47.7	0.8	45.7	39.9	-9.1
15	residential	NAC-1	**55.4**	47.1	**56.2**	48.1	0.8	46.3	40.4	-9.1
16	residential	NAC-1	**55.3**	47.0	**56.1**	48.1	0.8	46.4	40.4	-8.9

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TABLE 15 ALTERNATIVE 2 WILLMAR RAIL CONNECTOR AND INDUSTRIAL ACCESS PROJECT NOISE MODEL RESULTS: NIGHTTIME

Receptor ID	Type	NAC: Noise Area Classification	Modeled Existing (2016)		Modeled No Build (2040)		Difference between Existing (2016) and No Build (2040)	Modeled Build (2040)		Difference between Existing (2016) and Build (2040)
			L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{10}	L_{50}	L_{10}
BOLD numbers are above state standards. **Underline** refers to L10 values approaching/exceeding Federal noise abatement criteria of 70 dBA for residential receptors and 75 dBA for commercial receptors.										
State Nighttime Noise Standards										
Residential	**NAC-1**		**55**	**50**	**55**	**50**	--	**55**	**50**	--
Commercial	**NAC-2**		**70**	**65**	**70**	**65**	--	**70**	**65**	--
Industrial	**NAC-3**		**80**	**75**	**80**	**75**	--	**80**	**75**	--
17	residential	NAC-1	**55.7**	47.3	**56.5**	48.3	0.8	46.6	40.6	-9.1
18	residential	NAC-1	**55.6**	47.2	**56.4**	48.3	0.8	46.6	40.6	-9.0
19	residential	NAC-1	**55.6**	47.2	**56.4**	48.3	0.8	46.7	40.7	-8.9
20	residential	NAC-1	**55.5**	47.1	**56.3**	48.2	0.8	46.7	40.7	-8.8
21	residential	NAC-1	54.4	46.3	**55.2**	47.4	0.8	47.2	41.0	-7.2
22	residential	NAC-1	53.9	45.9	54.7	47.0	0.8	46.9	40.8	-7.0
23	residential	NAC-1	53.3	45.4	54.0	46.5	0.7	46.7	40.6	-6.6
24	residential	NAC-1	52.9	45.1	53.7	46.2	0.8	46.5	40.5	-6.4
25	residential	NAC-1	54.3	46.2	**55.1**	47.3	0.8	47.2	41.0	-7.1
26	residential	NAC-1	53.8	45.8	54.6	46.9	0.8	47.0	40.8	-6.8
27	residential	NAC-1	53.1	45.3	53.9	46.4	0.8	46.7	40.6	-6.4
28	residential	NAC-1	52.8	45.1	53.6	46.1	0.8	46.5	40.5	-6.3
29	residential	NAC-1	53.2	45.4	54.0	46.5	0.8	47.4	41.2	-5.8
30	residential	NAC-1	52.8	45.0	53.6	46.1	0.8	47.2	41.0	-5.6
31	residential	NAC-1	**59.3**	50.0	**60.2**	**51.1**	0.9	50.4	43.6	-8.9
32	residential	NAC-1	53.4	45.4	54.2	46.5	0.8	54.0	46.2	0.6

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Appendix C – Noise Barrier Cost Effectiveness Results

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NOISE BARRIER COST-EFFECTIVENESS RESULTS

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TABLE 16 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER A (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier A											
7	Residential	NAC-1	62.8	61.3	1.5	1	0	277	5540	$110,800	N/A

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 17 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER A (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier A											
7	Residential	NAC-1	**58.2**	**56.4**	1.8	1	0	277	5540	$110,800	N/A

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 18 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER B (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier B											
8	Residential	NAC-1	61.9	56.5	5.4	1	1	399	7980	$159,600	$159,600

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 19 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER B (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier B											
8	Residential	NAC-1	**57.1**	51.7	5.4	1	1	399	7980	$159,600	$159,600

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 20 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER C (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier C											
9	Residential	NAC-1	**65.8**	56.9	8.9	1	1	247	4940	$98,800	$98,800

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 21 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER C (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier C											
9	Residential	NAC-1	**61.1**	52.5	8.6	1	1	247	4940	$98,800	$98,800

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 22 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER C (15-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
15-foot tall modeled barrier C											
9	Residential	NAC-1	**65.8**	57.5	8.3	1	1	247	3705	$74,100	$74,100

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 23 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER C (15-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
15-foot tall modeled barrier C											
9	Residential	NAC-1	**61.1**	53.1	8.0	1	1	247	3705	$74,100	$74,100

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 24 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER C (10-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
10-foot tall modeled barrier C											
9	Residential	NAC-1	**65.8**	59.5	6.3	1	1	247	2470	$49,400	$49,400

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 25 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER C (10-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
10-foot tall modeled barrier C											
9	Residential	NAC-1	**61.1**	**55.1**	6.0	1	1	247	2470	$49,400	$49,400

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 26 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER D (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier D											
10	Residential	NAC-1	62.8	52.1	10.7	1	1				
11	Residential	NAC-1	58.9	50.5	8.4	1	1				
12	Residential	NAC-1	59.2	49.8	9.4	1	1				
13	Residential	NAC-1	59.3	49.6	9.7	1	1				
14	Residential	NAC-1	59.5	49.7	9.8	1	1				
15	Residential	NAC-1	60.1	50.0	10.1	1	1				
16	Residential	NAC-1	60.0	50.0	10.0	1	1				
17	Residential	NAC-1	60.5	50.3	10.2	1	1				
18	Residential	NAC-1	60.4	50.3	10.1	1	1				
19	Residential	NAC-1	60.4	50.4	10.0	1	1				
20	Residential	NAC-1	60.2	50.4	9.8	1	1	2,232	44,640	$892,800	$42,514
21	Residential	NAC-1	59.1	50.8	8.3	1	1				
22	Residential	NAC-1	58.5	50.4	8.1	1	1				
23	Residential	NAC-1	57.8	50.0	7.8	1	1				
24	Residential	NAC-1	57.4	49.7	7.7	1	1				
25	Residential	NAC-1	59.0	50.8	8.2	1	1				
26	Residential	NAC-1	58.4	50.5	7.9	1	1				
27	Residential	NAC-1	57.7	50.0	7.7	1	1				
28	Residential	NAC-1	57.3	49.8	7.5	1	1				
29	Residential	NAC-1	57.8	51.7	6.1	1	1				
30	Residential	NAC-1	57.3	51.2	6.1	1	1				

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 27 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER D (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier D											
10	Residential	NAC-1	**58.8**	49.1	9.7	1	1				
11	Residential	NAC-1	**55.3**	47.7	7.6	1	1				
12	Residential	NAC-1	**55.4**	47.0	8.4	1	1				
13	Residential	NAC-1	**55.4**	46.8	8.6	1	1				
14	Residential	NAC-1	**55.5**	46.8	8.7	1	1				
15	Residential	NAC-1	**56.1**	47.0	9.1	1	1				
16	Residential	NAC-1	**56.1**	47.0	9.1	1	1				
17	Residential	NAC-1	**56.4**	47.3	9.1	1	1				
18	Residential	NAC-1	**56.4**	47.3	9.1	1	1				
19	Residential	NAC-1	**56.3**	47.3	9.0	1	1				
20	Residential	NAC-1	**56.2**	47.3	8.9	1	1	2,232	44,640	$892,800	$42,514
21	Residential	NAC-1	**55.2**	47.4	7.8	1	1				
22	Residential	NAC-1	54.6	47.0	7.6	1	1				
23	Residential	NAC-1	54.0	46.6	7.4	1	1				
24	Residential	NAC-1	53.6	46.3	7.3	1	1				
25	Residential	NAC-1	**55.1**	47.4	7.7	1	1				
26	Residential	NAC-1	54.6	47.0	7.6	1	1				
27	Residential	NAC-1	53.9	46.6	7.3	1	1				
28	Residential	NAC-1	53.5	46.3	7.2	1	1				
29	Residential	NAC-1	54.0	47.8	6.2	1	1				
30	Residential	NAC-1	53.5	47.4	6.1	1	1				

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 28 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER E (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier E											
31	Residential	NAC-1	64.4	61.0	3.4	1	0	633	12,660	$253,200	N/A

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 29 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER E (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier E											
31	Residential	NAC-1	**60.1**	**56.5**	3.6	1	0	633	12660	$253,200	N/A

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 30 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER F (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier F											
3	Residential	NAC-1	53.9	51.0	2.9	1	0	4,168	83,360	$1,667,200	N/A
5	Residential	NAC-1	58.7	54.2	4.5	1	0				

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 31 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER F (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier F											
3	Residential	NAC-1	51.1	48.2	2.9	1	0	4,168	83,360	$1,667,200	N/A
5	Residential	NAC-1	**55.5**	51.2	4.3	1	0				

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 32 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER G (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier G											
7	Residential	NAC-1	63.5	61.9	1.6	1	0	277	5540	$110,800	N/A

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 33 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER G (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier G											
7	Residential	NAC-1	**58.8**	**56.9**	1.9	1	0	277	5540	$110,800	N/A

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 34 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER H (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier H											
8	Residential	NAC-1	62.6	57.4	5.2	1	1	399	7980	$159,600	$159,600

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 35 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER H (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier H											
8	Residential	NAC-1	**57.8**	52.5	5.3	1	1	399	7980	$159,600	$159,600

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 36 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER I (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier I											
9	Residential	NAC-1	**66.4**	57.7	8.7	1	1	247	4940	$98,800	$98,800

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 37 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER I (20-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
20-foot tall modeled barrier I											
9	Residential	NAC-1	**61.5**	53.1	8.4	1	1	247	4940	$98,800	$98,800

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 38 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER I (15-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
15-foot tall modeled barrier I											
9	Residential	NAC-1	**66.4**	58.3	8.1	1	1	247	3705	$74,100	$74,100

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 39 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER I (15-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
15-foot tall modeled barrier I											
9	Residential	NAC-1	**61.5**	53.7	7.8	1	1	247	3705	$74,100	$74,100

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 40 NOISE MITIGATION COST EFFECTIVENESS RESULTS (DAYTIME) MODELED BARRIER I (10-FOOT)

Receptors	Type	NAC: Noise Area Classification	Daytime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
10-foot tall modeled barrier I											
9	Residential	NAC-1	**66.4**	60.1	6.3	1	1	247	2470	$49,400	$49,400

BOLD numbers are above state daytime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

TABLE 41 NOISE MITIGATION COST EFFECTIVENESS RESULTS (NIGHTTIME) MODELED BARRIER I (10-FOOT)

Receptors	Type	NAC: Noise Area Classification	Nighttime L10 Noise (dBA)		Reduction (in dBA) with Noise Barrier	Number of Receptors	Number of Benefited Receptors	Length of Barrier (feet)	Barrier Area (ft^2)	Total Cost of Barrier $20/$ft^2$	Cost/ Benefited Receptor
			Build year 2040 (no barrier)	Build year 2040 (with barrier)							
10-foot tall modeled barrier I											
9	Residential	NAC-1	**61.5**	**55.7**	5.8	1	1	247	2470	$49,400	$49,400

BOLD numbers are above state nighttime standards (L_{10})
Underline refers to L10 values approaching/exceeding Federal noise abatement criteria

Appendix Q – Section 4(f) Resources Information

Minnesota Department of Transportation
District 8 Headquarters
2505 Transportation Road
Willmar, MN 56201

Office: 320-231-5195
Fax: 320-214-6305
800-657-3792

October 6, 2016

David Scott

Asst. Division Administrator
Federal Highway Administration
380 Jackson Street, Suite 500
St. Paul, Minnesota 55101-2904

In reply refer to:
De Minimis Preliminary Determination Request for
Minn. Proj. No. S.P. 3403-74 (TH 12)
From 7th Avenue NW To 28th Street AND
From Morris Subdivision of BNSF just West of 45th Street NW To BNSF Marshall Subdivision just East of CSAH 55 in Kandiyohi County

Dear Mr. Scott:

MnDOT recommends a de minimis preliminary determination by FHWA for the impacts of the above referenced project on the **St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District (HE-MPC-16387)**. Information supporting this recommendation is presented below.

1. General Project Information

SP: 3403-74
Federal Project No.:
Route: TH 12
From /To: From 7th Avenue NW To 28th Street AND
From Morris Subdivision of BNSF just west of 45th Street NW To BNSF Marshall Subdivision just east of CSAH 55
Description of Proposed Improvement:
Construction of a new 2.8-mile railway between the Marshall and Morris Subdivisions of the BNSF railway and a rail spur for industrial park access. Roadway modifications include a 2.5-mile realignment of Trunk Highway (TH) 12, construction of two bridges over the proposed rail line, and other road modifications.

2. Project Manager

Name: Paul Rasmussen
Title: Project Manager
Agency: MnDOT District 8
Address: 2505 Transportation Road, Willmar, MN 56201-2207
Phone: 320-214-6320
Email: p.rasmussen@state.mn.us

3. Description of the Section 4(f) Property.

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District (HE-MPC-16387) is an active rail corridor that has previously been determined eligible for listing in the National Register of Historic Places. The rail corridor was once part of the Great Northern Railway, and the period of significance for this and other Minnesota railroads was between 1862 and 1956. The property is a 203-mile long linear railroad corridor that extends between Breckenridge, MN, and Minneapolis, MN. The Minnesota Historic Preservation Office (MnHPO) is the official with jurisdiction (OWJ).

The subject railroad corridor is currently owned and operated by the Burlington Northern Santa Fe (BNSF) Railway as part of the Morris Subdivision, which extends between Breckenridge and Willmar. Within the city of Willmar, the railroad line connects to two other subdivisions (Marshall to the south and Wayzata to the east). The subject site is located west of the City of Willmar near the existing intersection of TH 12 and 45th Street NW. At this location, the railroad line runs adjacent to the north side of the TH 12 roadway.

The railroad corridor consists of a railroad line (steel tracks, wooden rail ties) and access road built upon a railroad embankment. Ditches run along each side of the railroad embankment. The railroad corridor runs adjacent to and at a similar elevation to TH 12. One main track exists at 45th Street NW, and extends to the west. Approximately 1,000 feet east of the 45th Street NW at-grade crossing, a second track ties into the main track. The access road ends prior to the second track, where it provides access to track switching mechanical and electrical equipment. Both tracks extend east into Willmar. In the subject area, a public at-grade crossing is located at 45th Street NW, and a private at-grade crossing is located approximately 2,000 feet to the west.

4. Impacts to the Section 4(f) Property.

The proposed project includes tying a new north-south railroad connection between the Marshall Subdivision and the Morris Subdivision–the Section 4(f) property–into the existing main line near the current 45th Street NW at-grade crossing location. Approximately 4,000 feet of existing track would be replaced within the Morris Subdivision as part of the new railroad connection to the south. In addition, 45th Street NW north of the railroad corridor would be redirected to cross the railroad corridor approximately 2,000 feet to the west, eliminating the existing 45th Street NW at-grade crossing and converting an existing private at-grade crossing into a public at-grade crossing. The converted public at-grade crossing would be upgraded with an active warning system.

MnDOT's Cultural Resource Unit (CRU) has reviewed the proposed project and determined that there would be "no adverse effects" to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District as currently proposed. According to CRU's determination, the construction of the railroad line that will extend off the main line, which would constitute the only direct effect to the historic district, will not alter the existing location/alignment, materials, workmanship, design, feeling and association of the main line. While the presence of the new railroad line constitutes a minor change in setting, it is one that is in keeping with historic character of the main line, from which numerous branch lines, spur tracks, and switch tracks extended between 1862 and 1956, the period of significance for Minnesota railroads.

Other project components, including the crossing at TH 40, will be over 1.25 miles distant in a fairly level landscape; therefore will not be visible from the historic district. The realignment of TH 12 would result in the road no longer running next to the main line, which constitutes a minor visual change in a district that is hundreds of miles long. None of the propose project components will create increases in traffic, noise or vibrations, or affect air quality in the vicinity of the historic district.

5. **Coordination with Responsible Official with Jurisdiction (OWJ) Over the Section 4(f) Property:**

MnHPO, the official with jurisdiction, has provided a letter stating that the proposed railroad connection, including consideration of the mitigation, will not adversely affect the activities, features and attributes that are important to the resource. See attached letter.

If FHWA agrees with the recommendation for a de minimis preliminary determination, please indicate by signature below. MnDOT understands that the de minimis preliminary determination is conditioned upon consideration of any comments received from the OWJ during the required comment period.

Sincerely,

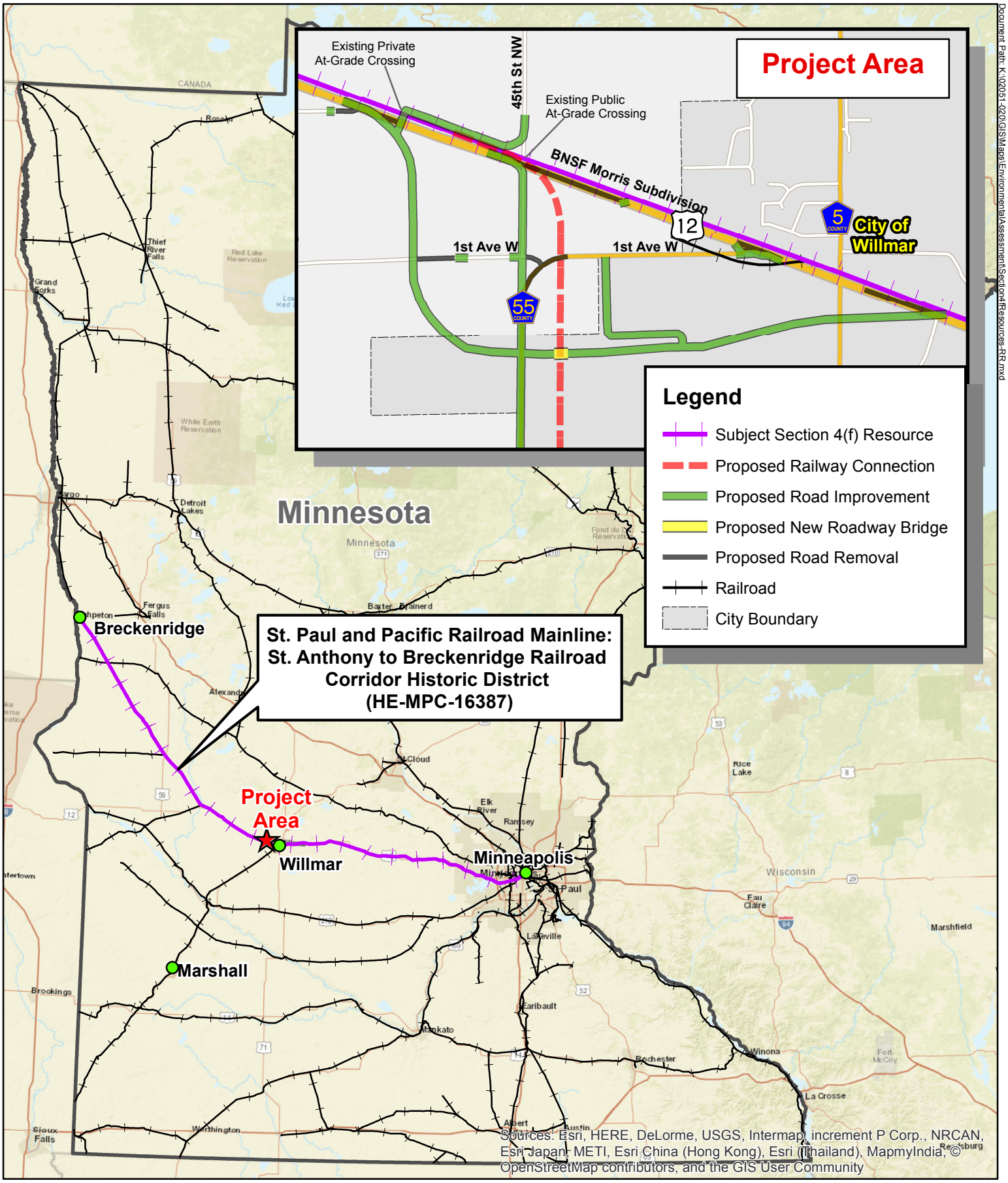
Paul Rasmussen

Project Manager

MnDOT District 8

De Minimis Preliminary Determination conditioned on results of note to OWJ and subsequent comment period:

FHWA Engineer _____ **Date** 10/17/2016



Document Path: K:\02051-020\GIS\Maps\Environmental\Assessment\Section4\Resources-RR.mxd

Willmar Rail Connector & Industrial Access Project

S.P. 3403-74

Section 4(f) Resource: Historic Site

Willmar, MN

N

Minnesota Department of Transportation

Office of Environmental Stewardship
Mail Stop 620
395 John Ireland Boulevard
St. Paul, MN 55155-1899

Office Tel: (651) 366-3614
Fax: (651) 366-3603

August 16, 2016

Sarah Beimers, Government Programs & Compliance Manager
State Historic Preservation Office, Minnesota Historical Society
345 Kellogg Blvd. W., St. Paul, MN 55101

Re: S.P. 3403-74 (Willmar Connection and Industrial Access Project, City of Willmar and Willmar Township, Kandiyohi County, Minnesota), Architectural History & Archaeology Reports

Dear Ms. Beimers,

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the applicable Programmatic Agreements between the FHWA and the Minnesota Historic Preservation Office (MnHPO). This review fulfills MnDOT's responsibilities under Minnesota Statute 138 and 307.08.

The proposed project is to construct a rail connection between two existing BNSF Railway main track subdivisions: the Morris Subdivision, which parallels Trunk Highway (TH) 12, and the Marshall Subdivision, which parallels County Road (CR) 55/County State Aid Highway (CSAH) 15. The rail connection will consist of approximately 2.7 miles of new main track, and its configuration will include a single leg on the north, a north-south connection track, and a wye on the south.

A rail siding consisting of approximately 10,000 linear feet of new track will be constructed parallel to the proposed connection on the west to allow trains to pass one another, and an approximately 14-foot-wide access road paralleling and west of the siding will be built to allow BNSF crews to perform train inspections on the connection, provide access for track and signal maintenance, and accommodate replacing train crews.

The connection will result in new road crossings at 1st Avenue West/CR 55, TH 40, and TH 12. The road crossing at 1st Avenue West will be an at-grade crossing with active warning devices for crossing protection. The crossing at TH 40 will be a bridge over the new track, and the TH 40/CR 55 intersection located west of the rail line will be raised to meet the TH 40 overpass grade as it descends westward; three properties at this intersection may need to be acquired to allow for the bridge and grade raise. Two alternatives are currently under consideration for the TH 12 crossing, each of which will involve constructing a bridge over the rail line. The first is to follow the current alignment. The second involves re-routing TH 12 to the south to circumnavigate the northern rail-connection point. In addition to road crossings, railway bridges or culverts will be constructed to cross Hawk Creek/County Ditch No. 10, an unnamed tributary to Hawk Creek, and County Ditch No. 46.

The area of potential effects (APE) for architectural history is an irregularly shaped area which accommodates potential effects for either project alternative (see the attached report by Deco Cultural Services). The Phase I architectural history investigation identified a segment of one property previously considered eligible for listing in the National Register, the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387). One property, County Ditch No. 10 (KH-DTC-002), was identified as potentially eligible by our office prior to the Phase I survey. Beyond County Ditch No. 10, a total of 25 properties 45 years in age or older were surveyed, 24 of which were

recommended as not eligible for listing in the National Register. The remaining property, the Willmar and Sioux Falls Railway Company main line (XX-RRD-038), was recommended as potentially eligible. As a result of Deco's Phase II evaluations, County Ditch No. 10 and the Willmar and Sioux Falls Railway Company main line were recommended as not eligible for listing in the National Register of Historic Places. We agree with the consultant's recommendations, and therefore find the neither property is eligible for the National Register.

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District (HE-MPC-16387) is an active rail corridor that has previously been determined eligible.

The construction of the railroad line that will extend off the main line, which would constitute the only direct effect to the historic district, will not alter the existing location/alignment, materials, workmanship, design, feeling and association of the main line. While the presence of the new railroad line constitutes a minor change in setting, it is one that is in keeping with historic character of the main line, from which numerous branch lines, spur tracks, and switch tracks extended between 1862 and 1956, the period of significance for Minnesota railroads.

The crossing at 1st Avenue will be low in profile and at a distance of over ¼-mile from the historic district. The crossing at TH 40 will be over 1.25 miles distant in a fairly level landscape; therefore neither will be visible from the historic district.

Whether TH 12 follows its current alignment and a bridge is built over the main line or is realigned such that a segment approximately 1.5 miles in length no longer runs next to the main line, it would constitute a minor visual change in a district that is hundreds of miles long and in which highway bridges over the tracks are a common feature.

None of the proposed project components will create increases in traffic, noise, or vibrations, or affect air quality in the vicinity of the historic district.

A Phase I archaeological survey of the APE by HDR Engineering identified one historic farmstead site (21KH157) occupied from about 1905 to 1991by at least three different households. Phase I fieldwork indicated the presence of a low density of mostly recent artifacts in disturbed contexts. Because it was occupied by multiple households and lack integrity, this site is not eligible for listing in the National Register of Historic Places.

The finding of this office is that there will be **No Adverse Effects** to the St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge RR Corridor Historic District by the project as currently proposed. If the project scope changes, we will provide your office with the revised information to conduct an additional review.

Sincerely,

Craig Johnson
Cultural Resources Unit

Attachments

cc: MnDOT CRU Project File
Jack Corkle, WSB
Paul Rasmussen, MnDOT D. 8

Minnesota Historical Society

Using the Power of History to Transform Lives
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MINNESOTA HISTORIC PRESERVATION OFFICE

September 23, 2016

Mr. Craig Johnson
Cultural Resources Unit
MN Dept of Transportation
Transportation Building, MS 620
395 John Ireland Blvd
St. Paul, MN 55155-1899

RE: S.P. 3403-74, Willmar Connection and Industrial Access Project
Willmar & Willmar Twp, Kandiyohi County
MnHPO Number: 2016-3404

Dear Mr. Johnson:

Thank you for the opportunity comment on the above project. Information received on 17 August 2016 has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and implementing federal regulations at 36 CFR 800, and per the terms of the 2014 Amended Programmatic Agreement between the Federal Highway Administration and the Minnesota State Historic Preservation Office.

As we understand it, the proposed undertaking is the construction of a rail connection between two existing BNSF Railway main track subdivisions. The rail connection includes 2.7miles of new main track with a single leg on the north, a north-south connection track, and a wye on the south. A rail siding and access road will also be built as part of this project.

We have completed our review of your correspondence dated August 16, 2016 along with the documentation provided in regards to your agency's determination of the area of potential effect (APE) for the Federal undertaking. We agree that this APE determination is generally appropriate to take into account the potential direct and indirect effects of the proposed undertaking as we currently understand it. As the project's scope of work is further defined, or if it is significantly altered from the current scope, additional consultation with our office may be necessary in order to revise the current APE.

We have reviewed the report *Phase I and II Architectural History Investigations for the Willmar Connection and Industrial Access Project, City of Willmar and Willmar Township, Kandiyohi County, Minnesota* (July 2016) prepared by Deco Cultural Services. We agree with your consultant's recommendation that twenty-five (25) of the twenty-six (26) properties identified within the APE for this project are ***not eligible*** for listing in the National Register of Historic Places (NRHP), including County Ditch No. 10 (KH-DTC-002) and the Willmar and Sioux Falls Railway Company Main Line (XX-RRD-038).

The St. Paul and Pacific Railroad Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District has previously been determined ***eligible*** for listing in the NRHP.

We have also reviewed the report *Phase I Archaeological Resources Survey for the Value Engineering Roadway Alternative 2, Willmar Wye Project, Kandiyohi County, Minnesota* (July 2016) prepared by HDR Engineering. One archaeological site, 21KH0157, was identified within the APE for this project. We agree with your consultant's recommendation that this site is ***not eligible*** for listing in the NRHP.

Based on information available to us at this time, we concur with your determination that construction of this rail connection and industrial access project will have **no adverse effect** on the National Register –eligible St. Paul and Pacific Mainline: St. Anthony to Breckenridge Railroad Corridor Historic District.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

cc: Phil Forst, FHWA
Dave Scott, FHWA

KANDIYOHI COUNTY
PUBLIC WORKS DEPARTMENT

1801 E Highway 12 • Willmar, MN 56201
• Phone 320-235-3266 • Fax 320-235-0055 • E-mail: Highway@co.kandiyohi.mn.us

Melvin W. Odens, P.E., Public Works Director

July 21, 2016

Paul Rasmussen, PE
Project Manager
Minnesota Dept. of Transportation
2505 Transportation Road
Willmar, MN 56201

Re: Willmar Rail Connector & Industrial Access Project (Willmar Wye)
CSAH 5 Trail Section 4(f) Evaluation
State Project Number 3403-74

Dear Mr. Rasmussen,

This letter is in reference to the Willmar Wye project that is proposed along the western edge of the City of Willmar and the Section 4(f) process. Kandiyohi County is aware that the Willmar Wye Project – being proposed would realign a portion of Trunk Highway (TH) 12 to the south, creating a new location for the intersection of TH 12 and County State Aid Highway (CSAH) 5. This construction work would impact a portion of the existing multiuse trail along CSAH 5 at the new intersection location.

The CSAH 5 trail, owned and maintained by Kandiyohi County, is approximately 0.9 miles long and connects between existing TH 12 and TH 40. As a recreational resource, the CSAH 5 trail is subject to Section 4(f) of the Department of Transportation Act of 1966. The Section 4(f) process addresses temporary and permanent impacts to Section 4(f) resources.

Kandiyohi County understands that the proposed project will require a temporary closure and/or detour of the CSAH 5 trail during construction at the new TH 12/CSAH 5 intersection. The County understands that the CSAH 5 trail will not be closed or detoured during the entire duration of the Willmar Wye project construction. No change in land ownership for the trail will occur.

The County believes that the project should not adversely affect the activities, feature or attributes of the CSAH 5 trail. The Willmar Wye project allows the CSAH 5 trail to continue in the future. We understand that the trail will be returned to an equal or better condition upon completion of the project.

Kandiyohi County determines that the Willmar Wye project will provide a negligible temporary occupancy to the CSAH 5 trail, a Section 4(f) resource. If you have any questions regarding this matter, please contact me at 320-235-3266, extension 4105.

Sincerely,

Melvin Odens

Melvin Odens, PE
County Engineer/Public Works Director
Kandiyohi County

Appendix R – Motor Vehicle Crash Data for 7th Street, 10th Street and Lakeland Drive

Crash Detail Report

7th Street - Crashes 2006-2015

Report Version 1.0 March 2010

Crash ID: 061630108 **Date:** 05/03/2006 **Time:** 2037
County: KANDIYOHI **City:** WILLMAR
Sys: 04-CSAH
Route: 34000041 001+00.420

Severity: PROPERTY DAMAGE
Road Type: NOT SPECIFIED
Road Char: NOT SPECIFIED
Crash Type: OTHER
Surf Cond: DRY
Light Cond: DARK - STREET LIGHTS ON
Weather 1: CLEAR
Weather 2: NOT SPECIFIED
First Event: NOT SPECIFIED
To Junction: NOT SPECIFIED
Traffic Device: RR XING - GATES
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	33	18	
Gender:	F	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 070550018 **Date:** 02/23/2007 **Time:** 2308
County: KANDIYOHI **City:** WILLMAR
Sys: 04-CSAH
Route: 34000041 001+00.360

Severity: POSSIBLE INJURY
Road Type: 2 LANES UNDIV 2_WAY
Road Char: STRAIGHT AND LEVEL
Crash Type: COLL W/MV IN TRANSPORT
Surf Cond: WET
Light Cond: DARK - STREET LIGHTS ON
Weather 1: RAIN
Weather 2: NOT SPECIFIED
First Event: ON ROADWAY
To Junction: INTERSECTION-RELATED
Traffic Device: RR XING - GATES
Speed Limit: 30
Diagram: REAR END
Officer:
Reliability: CONFIDENT
# of Vehicles: 2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	SLOWING TRAFFIC	00	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	54	895	
Gender:	F	NULL	
Cond:	NORMAL	NOT SPECIFIED	
Cont Fact 1	NO IMPROPER DRIVING	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 090390077	**Date:** 02/07/2009	**Time:** 2102	**Sys:** 04-CSAH
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041 001+00.360

Severity:	INCAPACITATING INJURY	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	LESS CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STRAIGHT AHEAD	SLOWING TRAFFIC	
Veh Type:	PICKUP TRUCK	VAN OR MINIVAN	
Age:	21	37	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	DISTRACTION	NO IMPROPER DRIVING	
Cont Fact 2	ILLEGAL SPEED	NO IMPROPER DRIVING	

Crash ID: 103060183	**Date:** 09/30/2010	**Time:** 9998	**Sys:** 04-CSAH
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041 001+00.274

Severity:	NON-INCAPACITATING INJURY	**First Event:**	NOT SPECIFIED
Road Type:	NOT SPECIFIED	**To Junction:**	NOT SPECIFIED
Road Char:	NOT SPECIFIED	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	NE	
Veh Act:	STRAIGHT AHEAD	LEFT TURN	
Veh Type:	MOTORCYCLE	VAN OR MINIVAN	
Age:	30	34	
Gender:	M	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 113190010	**Date:** 11/14/2011	**Time:** 2051	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.280	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	INTERSECTION-RELATED
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	W	
Veh Act:	STRAIGHT AHEAD	PED. FAIL TO YIELD R/W TO TR	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	41	16	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 121730142	**Date:** 06/21/2012	**Time:** 2008	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.320	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	19	46	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	DISTRACTION	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 121930024	**Date:** 07/10/2012	**Time:** 1439	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.277	

Severity:	NON-INCAPACITATING INJURY	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/PEDALCYCLE	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	OTHER
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	MC	
Veh Act:	STRAIGHT AHEAD	LEFT TURN	
Veh Type:	PASSENGER CAR	BICYCLE	
Age:	26	23	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	PEDESTRIAN ERROR	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 123430104	**Date:** 12/07/2012	**Time:** 1711	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.280	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	ICE/PACKED SNOW	**Diagram:**	REAR END
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	SNOW	**Reliability:**	CONFIDENT
Weather 2:	SLEET/HAIL/FREEZE-RAIN	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	SPORT UNTILITY VEHICLE	
Age:	31	28	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	WEATHER	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 130050105	**Date:** 01/05/2013	**Time:** 1655	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.320	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	SUNSET	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	MC	MC	
Veh Act:	BIKE SLOWING/STOPPING/START	BIKE SLOWING/STOPPING/STARTI	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	32	25	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 132060078	**Date:** 07/25/2013	**Time:** 0959	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.324	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	LESS CONFIDENT
Weather 2:	CLEAR	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STOPPED TRAFFIC	STRAIGHT AHEAD	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	23	18	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FOLLOWING TOO CLOSELY	
Cont Fact 2	NO IMPROPER DRIVING	FAIL TO YIELD ROW	

Crash ID: 132880208	**Date:** 10/15/2013	**Time:** 1649	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.320	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	WET	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	RAIN	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PASSENGER CAR	
Age:	51	56	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	FOLLOWING TOO CLOSELY	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 141880022	**Date:** 07/07/2014	**Time:** 0303	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.420	

Severity:	PROPERTY DAMAGE	**First Event:**	OFF ROADWAY ON ROADSIDE
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	T-INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/LIGHT POLE	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	UNKNOWN
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	0.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	MC		
Veh Act:	00		
Veh Type:	99		
Age:	902		
Gender:	NULL		
Cond:	NOT APPLICABLE		
Cont Fact 1	NOT SPECIFIED		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 142480138	**Date:** 09/05/2014	**Time:** 1748	**Sys:** 04-CSAH
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041 001+00.324

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	OTHER
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	OTHER
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	N	
Veh Act:	BACKING	STOPPED TRAFFIC	
Veh Type:	VAN OR MINIVAN	PASSENGER CAR	
Age:	25	31	
Gender:	F	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	UNSAFE BACKING	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 142700130	**Date:** 09/27/2014	**Time:** 1923	**Sys:** 04-CSAH
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041 001+00.280

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	S	
Veh Act:	PED. DARTING INTO TRAFFIC	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	VAN OR MINIVAN	
Age:	47	58	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 151400023	**Date:** 05/19/2015	**Time:** 1920	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.355	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	ALLEY-DRIVEWAY ACCESS
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	SIDESWIPE PASSING
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	SE	S	
Veh Act:	LEFT TURN	OVERTAKING/PASSING	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	42	903	
Gender:	M	NULL	
Cond:	NORMAL	UNKNOWN	
Cont Fact 1	NO IMPROPER DRIVING	IMPROPER PASSING	
Cont Fact 2	NOT SPECIFIED	OTHER HUMAN FACTOR	

Crash ID: 152270141	**Date:** 08/15/2015	**Time:** 2115	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.280	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	S	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	68	27	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 153170154	**Date:** 11/13/2015	**Time:** 1502	**Sys:** 04-CSAH		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 34000041	001+00.279	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	24	51	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Selection Filter:

WORK AREA: COUNTY_CODE('34') - FILTER: CRASH_YEAR('2006','2007','2008','2009','2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst: Andy Hingeveld

Notes: 7th Street - Crashes 2006-2015

Crash Detail Report

10th Street - Crashes 2006-2015

Report Version 1.0 March 2010

Crash ID:	072280216	**Date:** 08/16/2007	**Time:** 1623	**Sys:** 05-MSAS	
County:	KANDIYOHI	**City:** WILLMAR		**Route:** 41100113	000+00.120

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND GRADE	**Traffic Device:**	RR XING - GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	STOPPED TRAFFIC	BACKING	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	24	16	
Gender:	F	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	UNSAFE BACKING	
Cont Fact 2	NOT SPECIFIED	DISTRACTION	

Crash ID:	081200099	**Date:** 04/29/2008	**Time:** 0957	**Sys:** 05-MSAS	
County:	KANDIYOHI	**City:** WILLMAR		**Route:** 41100113	000+00.070

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	SW	E	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PICKUP TRUCK	
Age:	50	32	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	DISTRACTION	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 100410029	**Date:** 02/09/2010	**Time:** 1641	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100113	000+00.130	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/PARKED MV	**Speed Limit:**	30
Surf Cond:	ICE/PACKED SNOW	**Diagram:**	UNKNOWN
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	SNOW	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:			
Veh Act:			
Veh Type:			
Age:			
Gender:			
Cond:			
Cont Fact 1			
Cont Fact 2			

Crash ID: 101250077	**Date:** 04/03/2010	**Time:** 0610	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100113	000+00.070	

Severity:	PROPERTY DAMAGE	**First Event:**	NOT SPECIFIED
Road Type:	NOT SPECIFIED	**To Junction:**	NOT SPECIFIED
Road Char:	NOT SPECIFIED	**Traffic Device:**	NOT SPECIFIED
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	
Surf Cond:	NOT SPECIFIED	**Diagram:**	NOT CODED
Light Cond:	NOT SPECIFIED	**Officer:**	
Weather 1:	NOT SPECIFIED	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	MC	MC	
Veh Act:	BACKING	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PASSENGER CAR	
Age:	63	19	
Gender:	M	F	
Cond:	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 1	NOT SPECIFIED	NOT SPECIFIED	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Selection Filter:

WORK AREA: COUNTY_CODE('34') - FILTER: CRASH_YEAR('2006','2007','2008','2009','2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Andy Hingeveld

Notes:

10th Street - Crashes 2006-2015

Crash Detail Report

Lakeland Drive - Crashes 2006-2015

Report Version 1.0 March 2010

Crash ID: 060040020	**Date:** 01/03/2006	**Time:** 1607	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.140	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/PARKED MV	**Speed Limit:**	30
Surf Cond:	ICE/PACKED SNOW	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	W	
Veh Act:	STOPPED TRAFFIC	PEDESTRIAN NO CROSSWALK	
Veh Type:	PASSENGER CAR	SNOWMOBILE	
Age:	39	20	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	DISTRACTION	
Cont Fact 2	NOT SPECIFIED	INEXPERIENCE	

Crash ID: 070410013	**Date:** 02/10/2007	**Time:** 0014	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.196	

Severity:	PROPERTY DAMAGE	**First Event:**	PARKING LOT
Road Type:	OTHER	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/PARKED MV	**Speed Limit:**	< 30
Surf Cond:	DRY	**Diagram:**	UNKNOWN
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	MC		
Veh Act:	UNKNOWN		
Veh Type:	99		
Age:	895		
Gender:	NULL		
Cond:	UNKNOWN		
Cont Fact 1	UNKNOWN		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 072090088	**Date:** 07/27/2007	**Time:** 2336	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	000+00.990	

Severity:	PROPERTY DAMAGE	**First Event:**	OTHER
Road Type:	OTHER	**To Junction:**	OTHER
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	OTHER	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	OTHER
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	3.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	MC	
Veh Act:	STOPPED TRAFFIC	UNKNOWN	
Veh Type:	SPORT UNTILITY VEHICLE	PASSENGER CAR	
Age:	38	19	
Gender:	F	M	
Cond:	NORMAL	OTHER	
Cont Fact 1	NO IMPROPER DRIVING	CHEMICAL IMPAIRMENT	
Cont Fact 2	NOT SPECIFIED	ILLEGAL SPEED	

Crash ID: 073180207	**Date:** 11/14/2007	**Time:** 1213	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100134	000+00.528	

Severity:	PROPERTY DAMAGE	**First Event:**	PRIVATE PROPERTY
Road Type:	OTHER	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND GRADE	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/NONFIXED UNKNOWN	**Speed Limit:**	< 30
Surf Cond:	DRY	**Diagram:**	NOT APPLICABLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	EAST		
Veh Act:	RIGHT TURN		
Veh Type:	TRUCK W/ SEMI TRAILER		
Age:	68		
Gender:	M		
Cond:	NORMAL		
Cont Fact 1	OTHER		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 073320206	**Date:** 11/28/2007	**Time:** 1826	**Sys:** 05-MSAS
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152 001+00.143

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	LESS CONFIDENT
Weather 2:	CLEAR	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	BIKE U TURN	BACKING	
Veh Type:	PASSENGER CAR	PICKUP TRUCK	
Age:	24	21	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	UNSAFE BACKING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 081800072	**Date:** 06/28/2008	**Time:** 1426	**Sys:** 05-MSAS
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152 000+00.971

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	ALLEY-DRIVEWAY ACCESS
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	WET	**Diagram:**	SIDESWIPE PASSING
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	RAIN	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	RIGHT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	53	63	
Gender:	M	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	IMPROPER TURN	IMPROPER PASSING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 090910131	**Date:** 04/01/2009	**Time:** 0520	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.111	

Severity:	PROPERTY DAMAGE	**First Event:**	OFF ROADWAY ON ROADSIDE
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	CURVE AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/OTHER FIXED OBJECT	**Speed Limit:**	40
Surf Cond:	SNOW	**Diagram:**	RAN OFF ROAD - LEFT SIDE
Light Cond:	DARK - UNKNOWN LIGHTING	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	BEST GUESS
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N		
Veh Act:	STRAIGHT AHEAD		
Veh Type:	SPORT UNTILITY VEHICLE		
Age:	66		
Gender:	M		
Cond:	NORMAL		
Cont Fact 1	OVER-CORRECTING		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 093490234	**Date:** 12/15/2009	**Time:** 1503	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.126	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND GRADE	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	45
Surf Cond:	ICE/PACKED SNOW	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	LESS CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S	S	
Veh Act:	SLOWING TRAFFIC	SLOWING TRAFFIC	
Veh Type:	PASSENGER CAR	SPORT UNTILITY VEHICLE	
Age:	18	17	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FOLLOWING TOO CLOSELY	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 113080115	**Date:** 11/04/2011	**Time:** 1258	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.100	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	SLOWING TRAFFIC	STRAIGHT AHEAD	
Veh Type:	PICKUP TRUCK	PASSENGER CAR	
Age:	16	17	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	IMPROPERLY PARKED	
Cont Fact 2	NOT SPECIFIED	FAIL TO YIELD ROW	

Crash ID: 121200014	**Date:** 04/29/2012	**Time:** 0103	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.200	

Severity:	NON-INCAPACITATING INJURY	**First Event:**	PRIVATE PROPERTY
Road Type:	ALLEY OR DRIVEWAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/PARKED MV	**Speed Limit:**	40
Surf Cond:	DRY	**Diagram:**	RAN OFF ROAD - LEFT SIDE
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	3.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N		
Veh Act:	STRAIGHT AHEAD		
Veh Type:	PASSENGER CAR		
Age:	43		
Gender:	M		
Cond:	USING DRUGS		
Cont Fact 1	CHEMICAL IMPAIRMENT		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 122620099	**Date:** 09/18/2012	**Time:** 1131	**Sys:** 05-MSAS
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152 001+00.200

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	RAILROAD CROSSING
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	40
Surf Cond:	DRY	**Diagram:**	REAR END
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	3.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	N
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	STRAIGHT AHEAD
Veh Type:	PASSENGER CAR	PASSENGER CAR	SPORT UNTILITY VEHICLE
Age:	26	65	65
Gender:	F	F	F
Cond:	NORMAL	NORMAL	NORMAL
Cont Fact 1	FOLLOWING TOO CLOSELY	NO IMPROPER DRIVING	NO IMPROPER DRIVING
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	NOT SPECIFIED

Crash ID: 122790067	**Date:** 10/05/2012	**Time:** 0826	**Sys:** 05-MSAS
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152 001+00.140

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	NON-JUNCTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	RR XING - OVHD AND GATES
Crash Type:	COLL W/RR CROSSING DEVICE	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	OTHER
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	1.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	S		
Veh Act:	STRAIGHT AHEAD		
Veh Type:	PICKUP TRUCK		
Age:	87		
Gender:	M		
Cond:	NORMAL		
Cont Fact 1	DISTRACTION		
Cont Fact 2	NOT SPECIFIED		

Crash ID: 123660166	**Date:** 12/31/2012	**Time:** 1753	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	001+00.200	

Severity:	POSSIBLE INJURY	**First Event:**	ON ROADWAY
Road Type:	4_6 LANES UNDIV 2_WAY	**To Junction:**	INTERSECTION-RELATED
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	NOT APPLICABLE
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	WET	**Diagram:**	REAR END
Light Cond:	DARK - STREET LIGHTS ON	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	CLOUDY	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	N	N	
Veh Act:	LEFT TURN	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	VAN OR MINIVAN	
Age:	39	54	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	DISTRACTION	
Cont Fact 2	NO IMPROPER DRIVING	DISTRACTION	

Crash ID: 132400108	**Date:** 08/28/2013	**Time:** 1140	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	000+00.990	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLOUDY	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	S	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	PASSENGER CAR	PASSENGER CAR	
Age:	79	25	
Gender:	M	F	
Cond:	NORMAL	NORMAL	
Cont Fact 1	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Crash ID: 151420040	**Date:** 05/22/2015	**Time:** 0759	**Sys:** 05-MSAS		
County: KANDIYOHI	**City:** WILLMAR		**Route:** 41100152	000+00.990	

Severity:	PROPERTY DAMAGE	**First Event:**	ON ROADWAY
Road Type:	2 LANES UNDIV 2_WAY	**To Junction:**	4-LEGGED INTERSECTION
Road Char:	STRAIGHT AND LEVEL	**Traffic Device:**	STOP SIGN OTHER
Crash Type:	COLL W/MV IN TRANSPORT	**Speed Limit:**	30
Surf Cond:	DRY	**Diagram:**	RIGHT ANGLE
Light Cond:	DAYLIGHT	**Officer:**	
Weather 1:	CLEAR	**Reliability:**	CONFIDENT
Weather 2:	NOT SPECIFIED	**# of Vehicles:**	2.00

	Unit 1	Unit 2	Unit 3
Trav Dir:	W	N	
Veh Act:	STRAIGHT AHEAD	STRAIGHT AHEAD	
Veh Type:	VAN OR MINIVAN	VAN OR MINIVAN	
Age:	32	40	
Gender:	F	M	
Cond:	NORMAL	NORMAL	
Cont Fact 1	NO IMPROPER DRIVING	NO IMPROPER DRIVING	
Cont Fact 2	NOT SPECIFIED	NOT SPECIFIED	

Selection Filter:

WORK AREA: COUNTY_CODE('34') - FILTER: CRASH_YEAR('2006','2007','2008','2009','2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

Analyst:

Andy Hingeveld

Notes:

Lakeland Drive - Crashes 2006-2015

Appendix S – Wetland Delineation Approvals Documentation

Minnesota Wetland Conservation Act

Notice of Decision

Local Government Unit (LGU)	400 SW Benson Ave.
Kandiyohi County	Willmar, MN 56201

1. PROJECT INFORMATION

Applicant: MINNESOTA Department of Transportation (Paul Rasmussen)	Address: 2505 Transportation Rd. Willmar, MN 56201	Date of Application 9/7/16	Application Number

Type of Decision:

Wetland Boundary or Type X	Delineation X	Exemption	No Loss	
Sequencing	Replacement Plan	Banking Plan		

Technical Evaluation Panel Findings and Recommendation (if any):

The project area consists of proposing to costruct a new alignment and industrial park access on the west side of Willmar, realign approximately 2.5 miles of TH 12, construct two new bridges on TH 12 and TH 40 over the proposed rail line and related road modifications.

A total of 20 wetlands were identified and delineated within the project area. All potential wetland areas were viewed on-site and either delineated or determined to be upland.

TEP meeting 8/10/16 members present were Jeff Bredberg (LGU) and Kane Radel (BWSR), also present were Pat Jaegar (DOT), Ben Orne (ACOE) and Shawn Williamson (WSB Consultant). Drove site and verified delineation plan.

Minor comments were made by TEP and wetland delineation plan was amended to incorporate those comments.

No Comments were made.

2. LOCAL GOVERNMENT UNIT DECISION

Date of Decision: 10/3/16

Approved X Approved with conditions: TEP recommendation: Deny:

For Replacement Plans using credits from the State Wetland Bank:

Bank Account #	Bank Service Area	County:	Credits Approved for Withdrawal (sq. ft. or nearest .01 acre)

Replacement Plan **Approval Conditions.** In addition to any conditions specified by the LGU, the approval of a Wetland Replacement Plan is conditional upon the following:

Financial Assurance: For project-specific replacement that is not in-advance, a financial assurance specified by the LGU must be submitted to the LGU in accordance with MN Rule 8420.0522, Subp. 9 (List amount and type in LGU Findings).

Deed Recording: For project-specific replacement, evidence must be provided to the LGU that the BWSR "Declaration of Restrictions and Covenants" and "Consent to Replacement Wetland" forms have been filed with the county recorder's office in which the replacement wetland is located.

Credit Withdrawal: For replacement consisting of wetland bank credits, confirmation that BWSR has withdrawn the credits from the state wetland bank as specifie in the approved replacement plan.

Wetlands may not be impacted until all applicable conditions have been met!

LGU Authorized Signature:

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 5 provides notice that a decision was made by the LGU under the Wetland Conservation Act as specified above. If additional details on the decision exist, they have been provided to the landowner and are available from the LGU upon request.		
Name **Jeff Bredberg**	Title: Director of Env. Services	
Signature	Date **10/3/16**	Phone Number and E-mail **320.231-6229 X5258**

THIS DECISION ONLY APPLIES TO THE MINNESOTA WETLAND CONSERVATION ACT. Additional approvals or permits from local, state, and federal agencies may be required. Check with all appropriate authorities before commencing work in or near wetlands.

Applicants proceed at their own risk if work authorized by this decision is started before the time period for appeal (30 days) has expired. If this decision is reversed or revised under appeal, the applicant may be responsible for restoring or replacing all wetland impacts.

This decision is valid for three years from the date of decision unless a longer period is advised by the TEP and specified in this notice of decision.

3. APPEAL OF THIS DECISION

Pursuant to MN Rule 8420.0905, any appeal of this decision can only be commenced by mailing a petition for appeal, including applicable fee, within thirty (30) calendar days of the date of the mailing of this Notice to the following as indicated:

Check one:

Appeal of an LGU staff decision. Send petition and $__ fee (if applicable) to: **Jeff Bredberg** **400 SW Benson Ave.** **Willmar, MN 56201**	☒ Appeal of LGU governing body decision. Send petition and $500 filing fee to: Executive Director Minnesota Board of Water and Soil Resources 520 Lafayette Road North St. Paul, MN 55155

4. LIST OF ADDRESSEES

SWCD TEP member: Rick Reimer, SCWD 1005 High Ave., Willmar, MN 56201
BWSR TEP member: **Kane Rade, BWSR, l400 East Lyon Street, Marshall, MN 56258**
LGU TEP member (if different than LGU Contact):
DNR TEP member: Jeff Miller**, DNR, 398 Sibley Park Road NE, New London, MN 56273-9664**
DNR Regional Office (if different than DNR TEP member)
WD or WMO (if applicable):
Applicant and Landowner (if different)
Members of the public who requested notice:
Bev**erly Meyer, USFWS, 22274 615th Ave., Litchfield, MN 55355**
Corps of Engineers Project Manager: Andrew Beaudet, ACOE, 180 5th St. E., Suite 700, St. Paul, MN, 55101-1678
BWSR Wetland Bank Coordinator (wetland bank plan decisions only)

5. MAILING INFORMATION

- For a list of BWSR TEP representatives: www.bwsr.state.mn.us/aboutbwsr/workareas/WCA_areas.pdf
- For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf
- Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

For a map of DNR Administrative Regions, see: http://files.dnr.state.mn.us/aboutdnr/dnr_regions.pdf

- For a list of Corps of Project Managers: www.mvp.usace.army.mil/regulatory/default.asp?pageid=687 or send to:

  US Army Corps of Engineers
  St. Paul District, ATTN: OP-R
  180 Fifth St. East, Suite 700
  St. Paul, MN 55101-1678

- For Wetland Bank Plan applications, also send a copy of the application to:

  Minnesota Board of Water and Soil Resources
  Wetland Bank Coordinator
  520 Lafayette Road North
  St. Paul, MN 55155

6. ATTACHMENTS

None

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
180 FIFTH STREET EAST, SUITE 700
ST. PAUL MN 55101-1678

REPLY TO
ATTENTION OF

AUG 25 2015

Operations
Regulatory (2013-04581-RMM)

BNSF Railway
c/o Ms. Lynn Leibried
80-44th Avenue NE
Minneapolis, Minnesota 55421

Dear Ms. Leibried:

This letter is in response to your request for an approved jurisdictional determination for a 64-acre property located in Sections 7, 8, 17, 18, 19, 20, 29, and 30, Township 119 N., Range 35 W., Kandiyohi County, Minnesota. The review area for our jurisdictional determination is limited to the boundaries of Wetlands 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 26, 27, 28, 29, 30, 31, 32, 33, and 34, as shown on the attached figures labeled MVP-2013-04581-RMM Page 1 of 12 through Page 12 of 12.

The review area contains no waters of the United States subject to Corps of Engineers jurisdiction. Therefore, you are not required to obtain Department of the Army authorization to discharge dredged or fill material within this area. The rationale for this determination is provided in the attached Approved Jurisdictional Determination form.

This determination is only valid for the review area shown on the attached figures labeled MVP-2013-04581-RMM Page 1 of 12 through Page 12 of 12.

If you object to this approved jurisdictional determination, you may request an administrative appeal under Corps regulations at 33 CFR 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination, you must submit a completed RFA form to the Mississippi Valley Division Office at the address shown on the form.

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR 331.5, and that it has been received by the Division Office within 60 days of the date of the attached NAP.

It is not necessary to submit an RFA form to the division office if you do not object to the determination in this letter

This approved jurisdictional determination may be relied upon for five years from the date of this letter. However, the Corps reserves the right to review and revise the boundary in response to changing site conditions, information that was not considered during our initial review, or off-site activities that could indirectly alter the extent of wetlands and other resources on-site. This determination may be renewed at the end of the five year period provided you

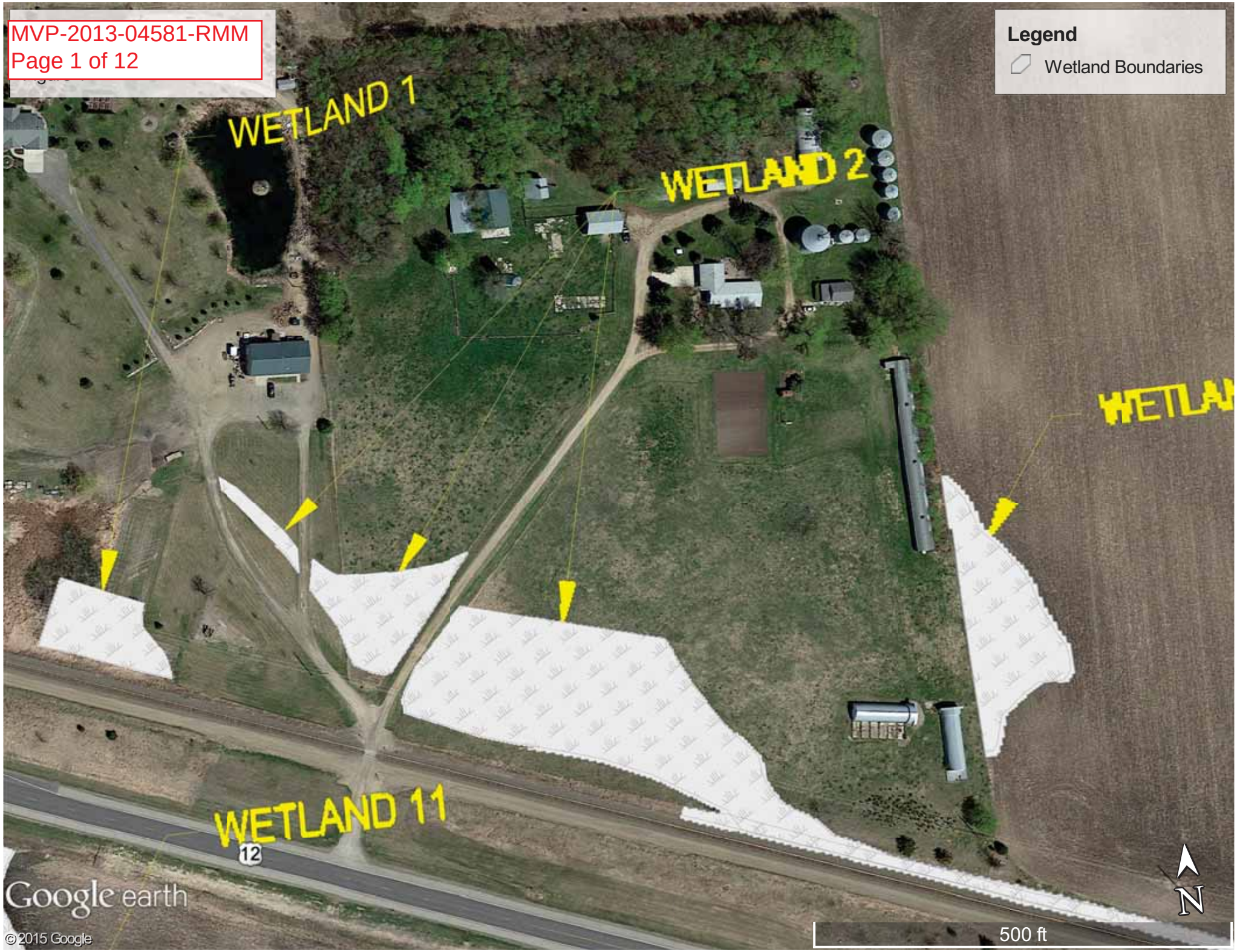
submit a written request and our staff are able to verify that the limits established during the original determination are still accurate.

If you have any questions, please contact me in our St. Paul office at (651) 290-5286. In any correspondence or inquiries, please refer to the Regulatory number shown above.

Sincerely,

Ryan Malterud
Senior Project Manager

cc:
Kane Radel (BWSR)
Jeff Bredberg (LGU)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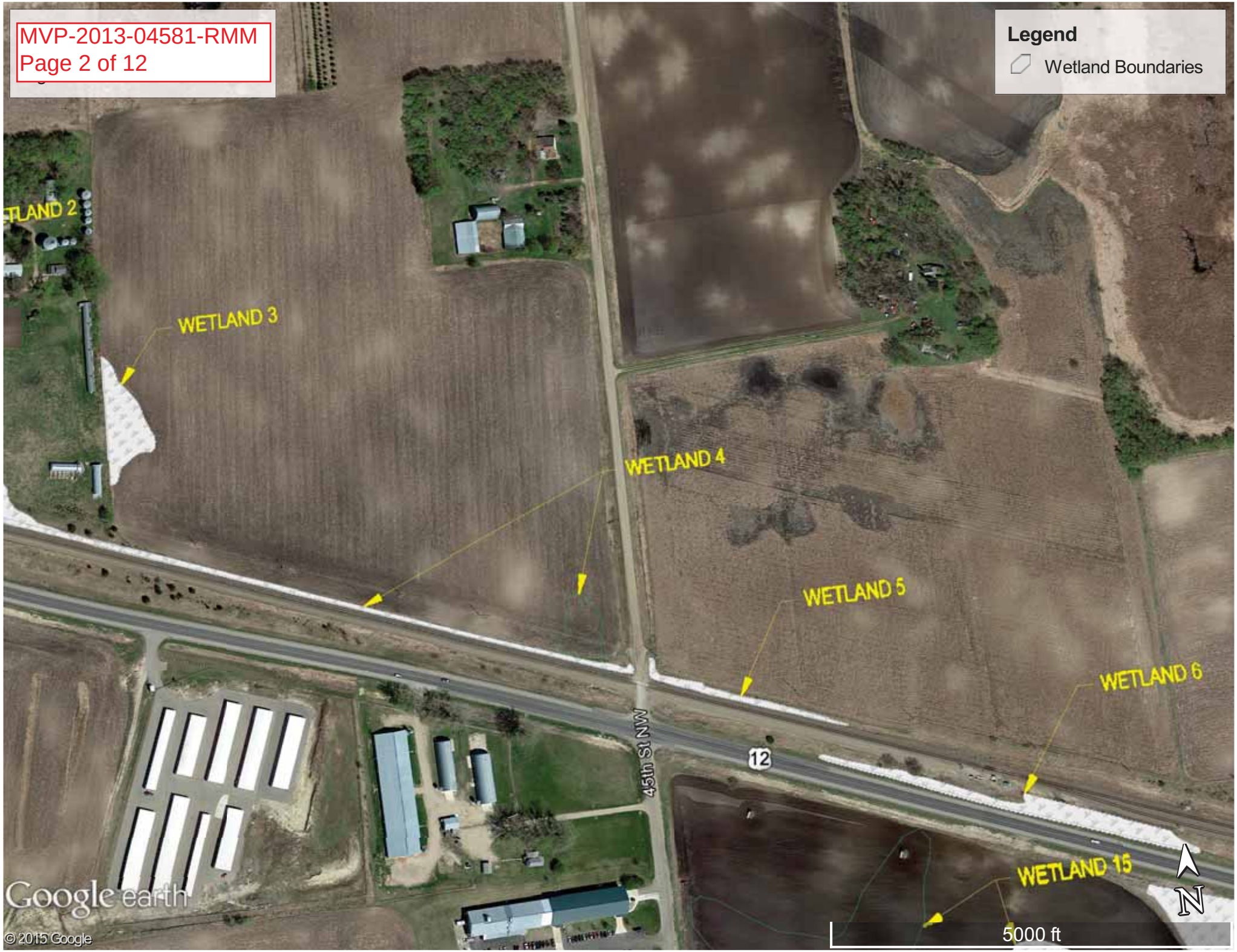
Wetland Boundaries
WETLAND 1
WETLAND 2
WETLAN
WETLAND 11
12
Google earth
© 2015 Google
500 ft
N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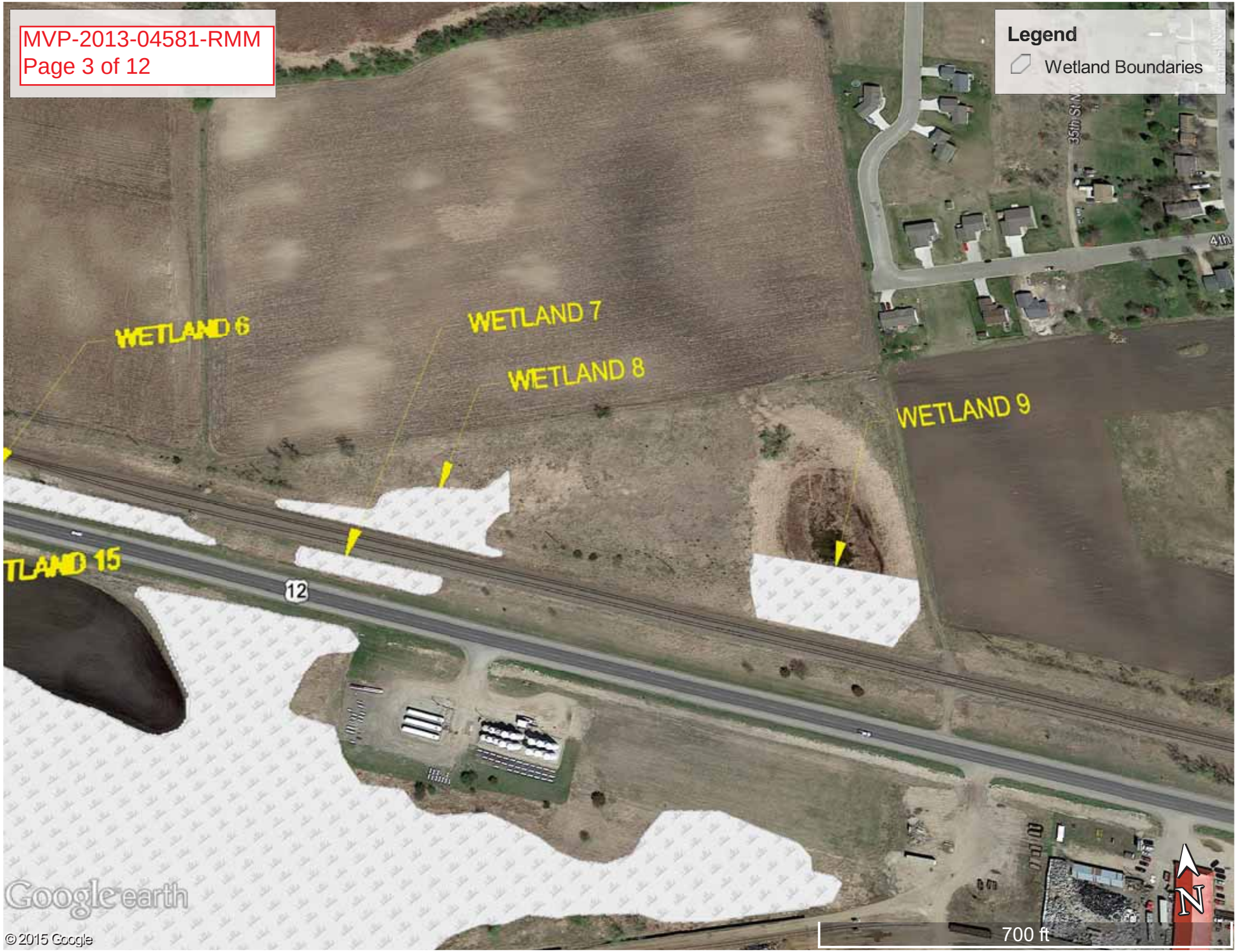
Wetland Boundaries
TLAND 2
WETLAND 3
WETLAND 4
WETLAND 5
WETLAND 6
WETLAND 15
45th St NW
12
N
5000 ft
Google earth
© 2015 Google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Wetland Boundaries
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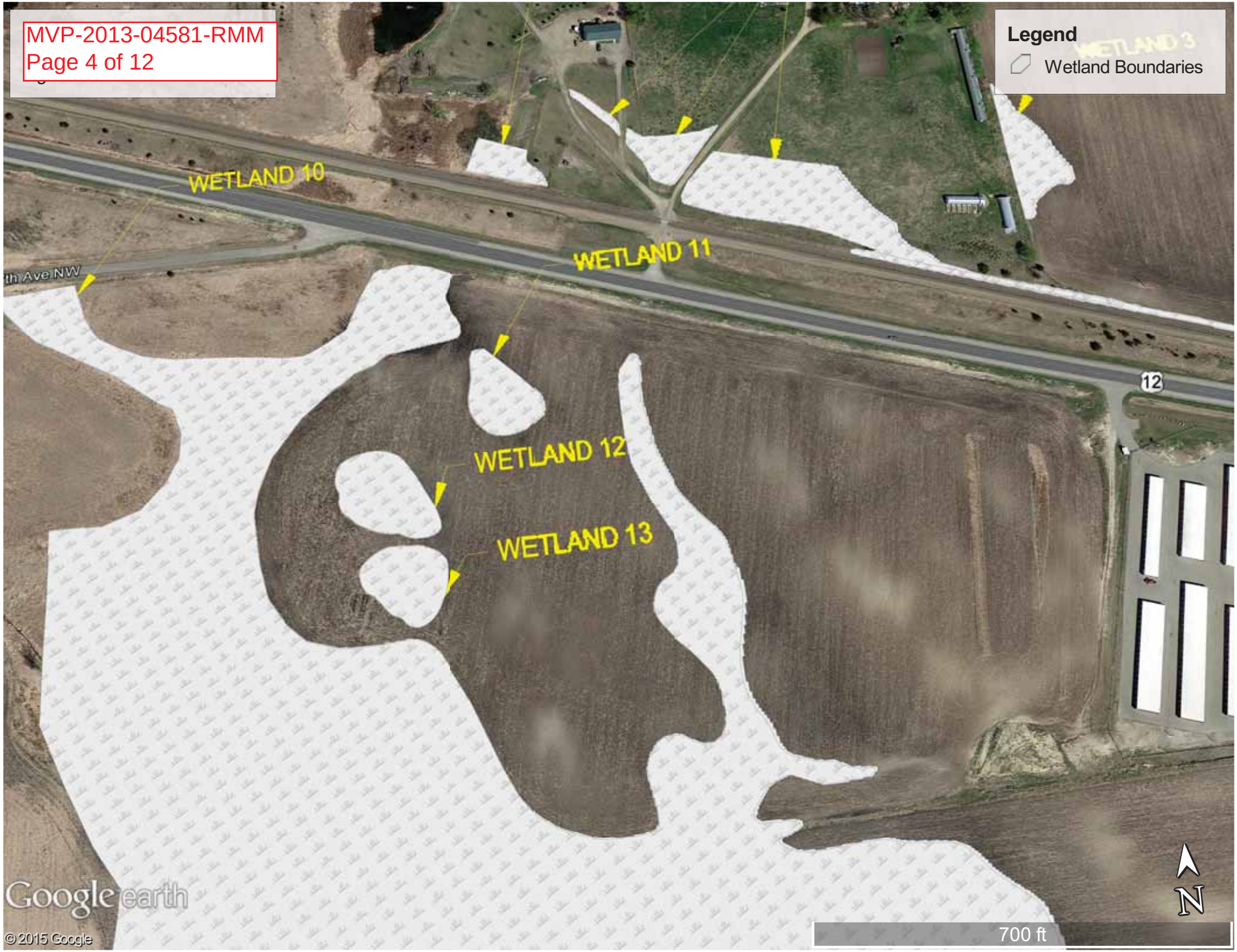
WETLAND 7
WETLAND 8
WETLAND 9
TLAND 15
12
35th St N
4th
700 ft
N
Google earth
© 2015 Google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Wetland Boundaries
WETLAND 3
WETLAND 10
WETLAND 11
WETLAND 12
WETLAND 13
th Ave NW
12
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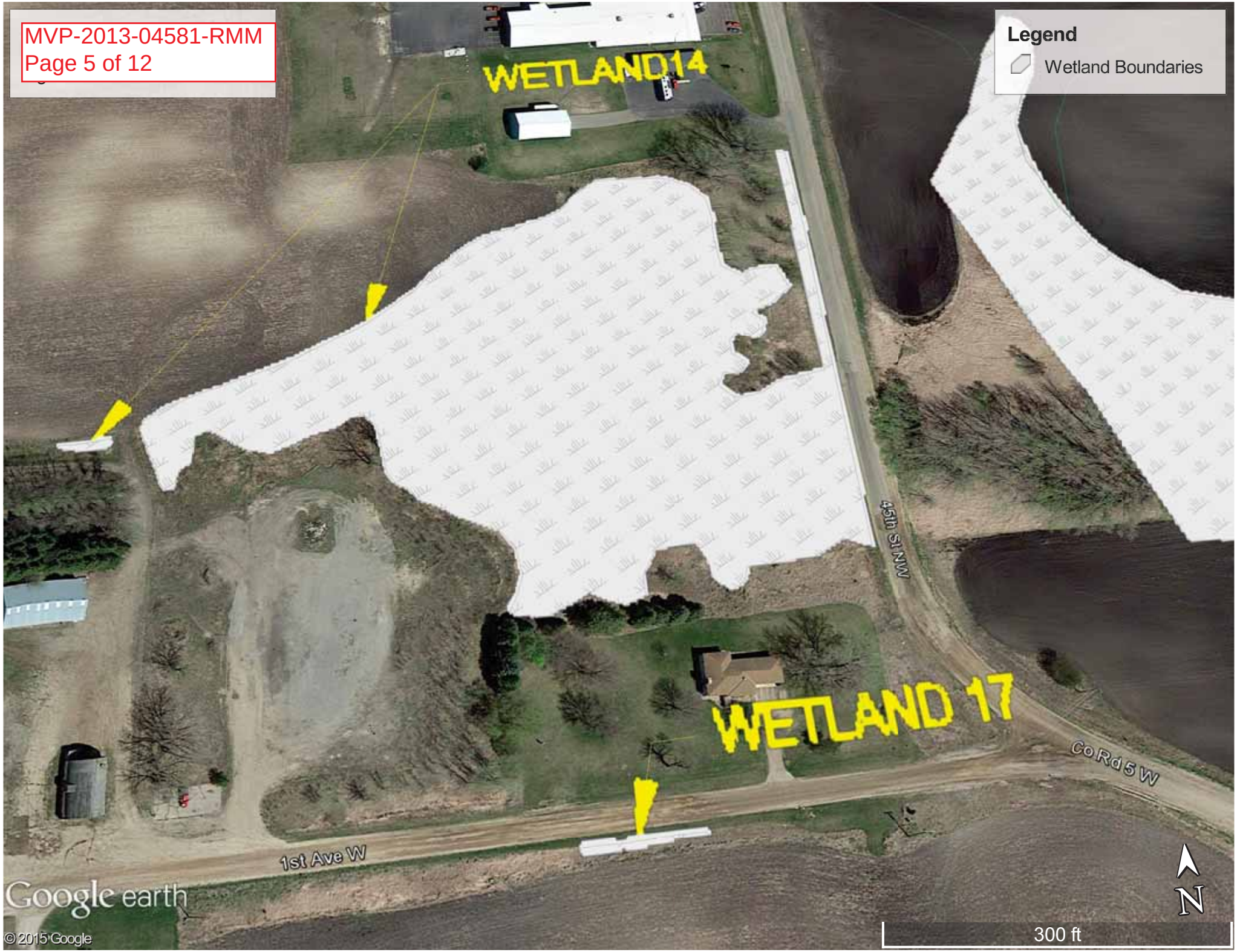
© 2015 Google
700 ft
N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WETLAND14
WETLAND 17
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Co Rd 5 W
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© 2015 Google
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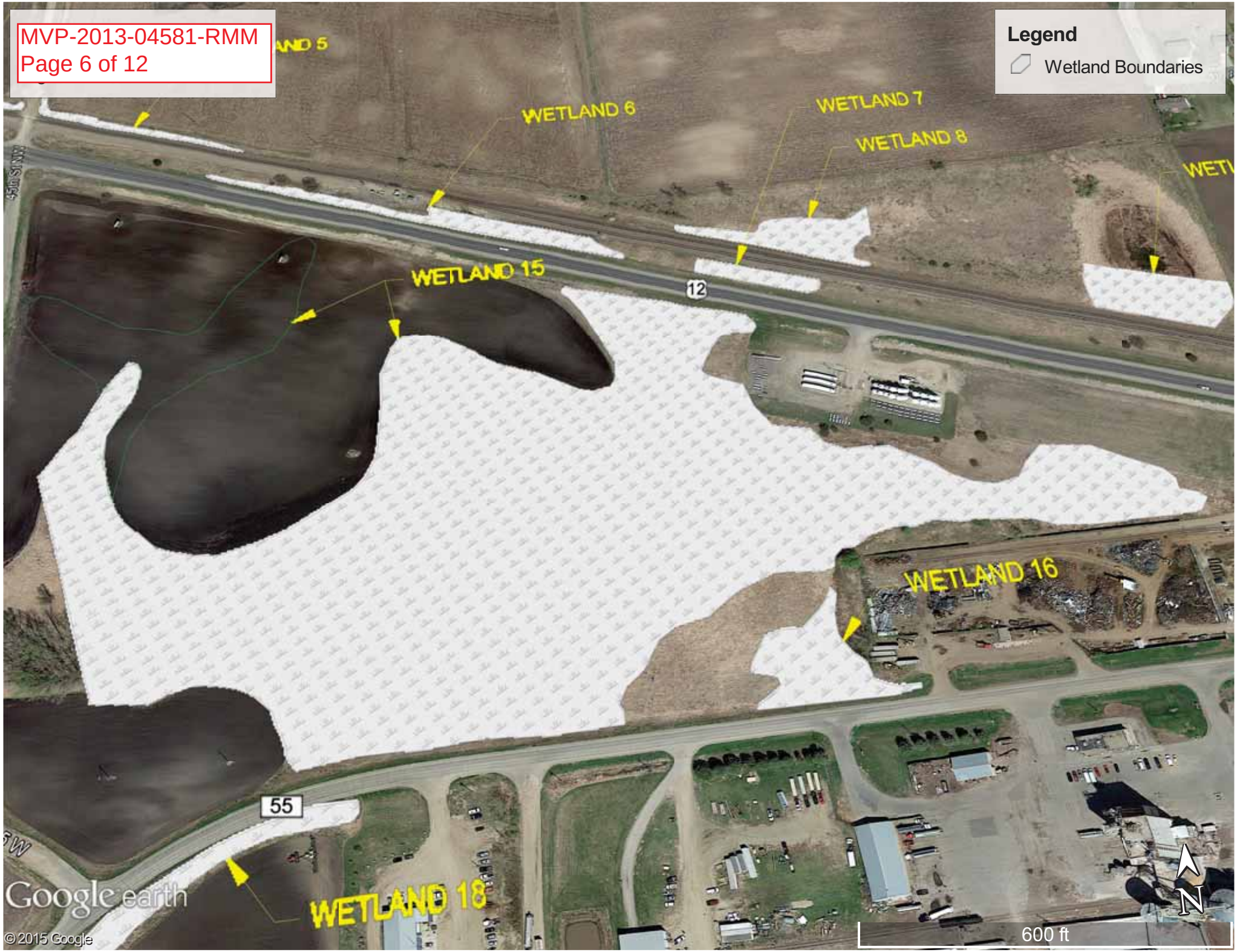
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Wetland Boundaries
WETLAND 5
WETLAND 6
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WETLAND 15
WETLAND 16
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Google earth
© 2015 Google
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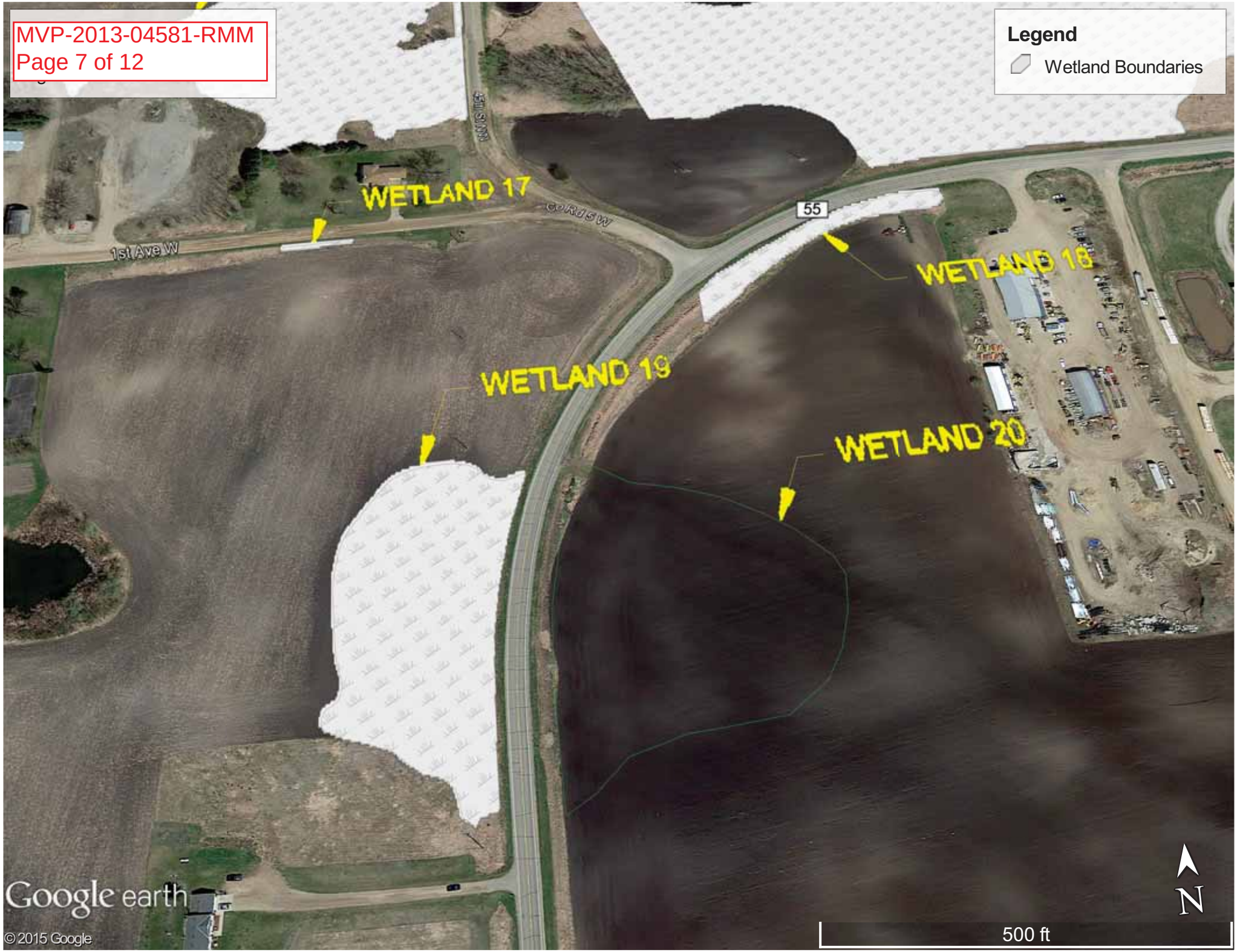
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WETLAND 19
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Co Rd 5 W
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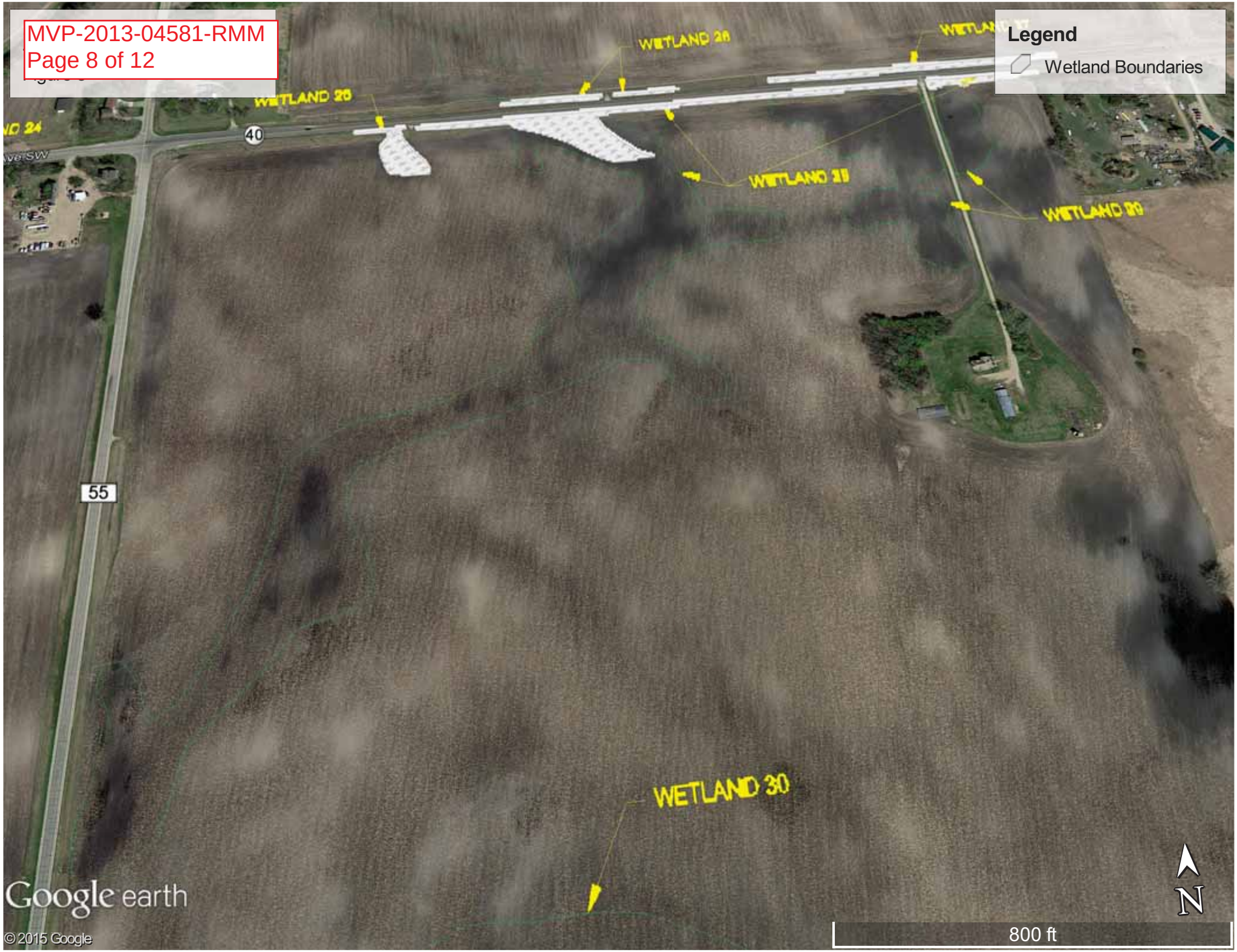
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Wetland Boundaries
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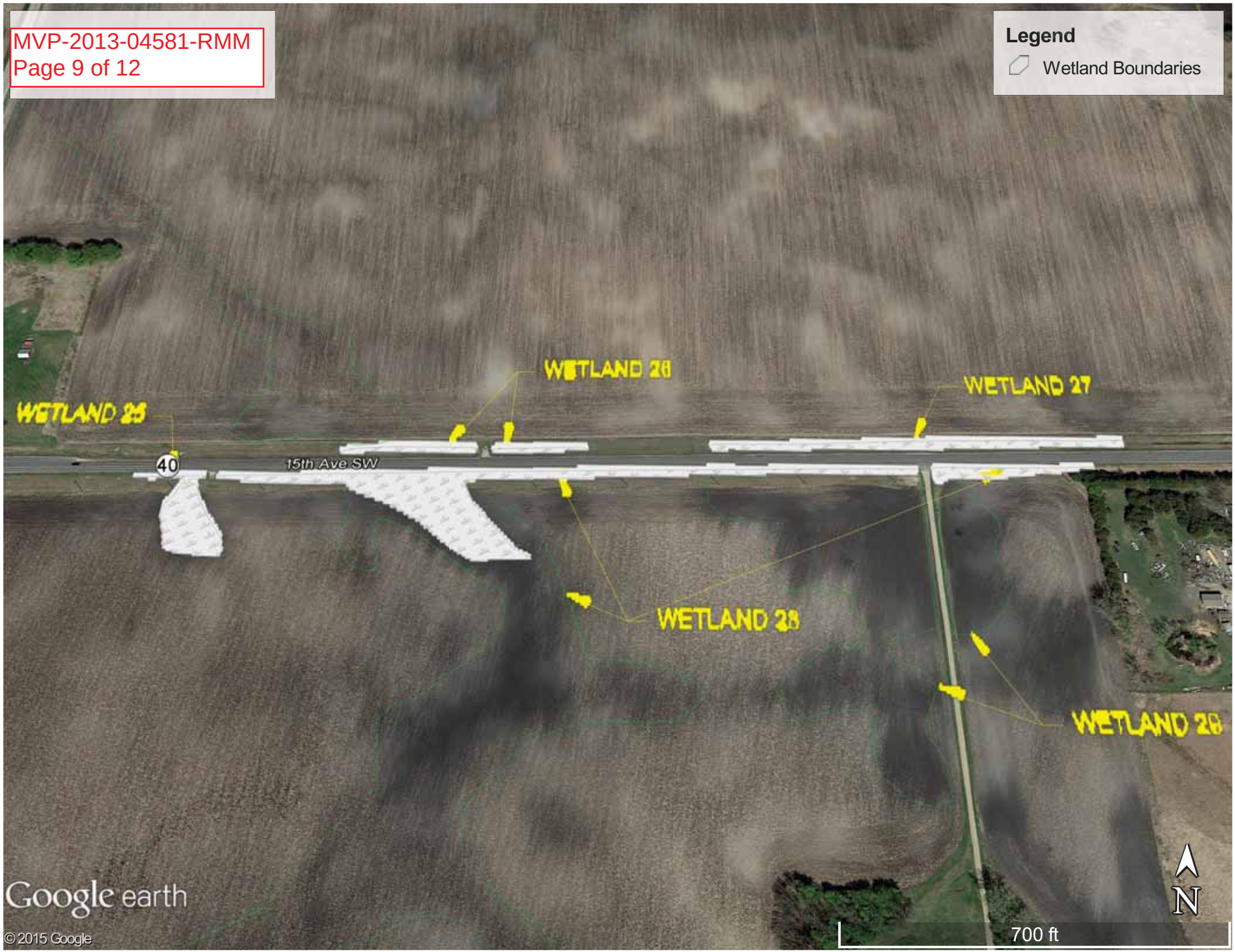
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WETLAND 27
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WETLAND 29
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© 2015 Google
700 ft
N

Legend
WETLAND 10
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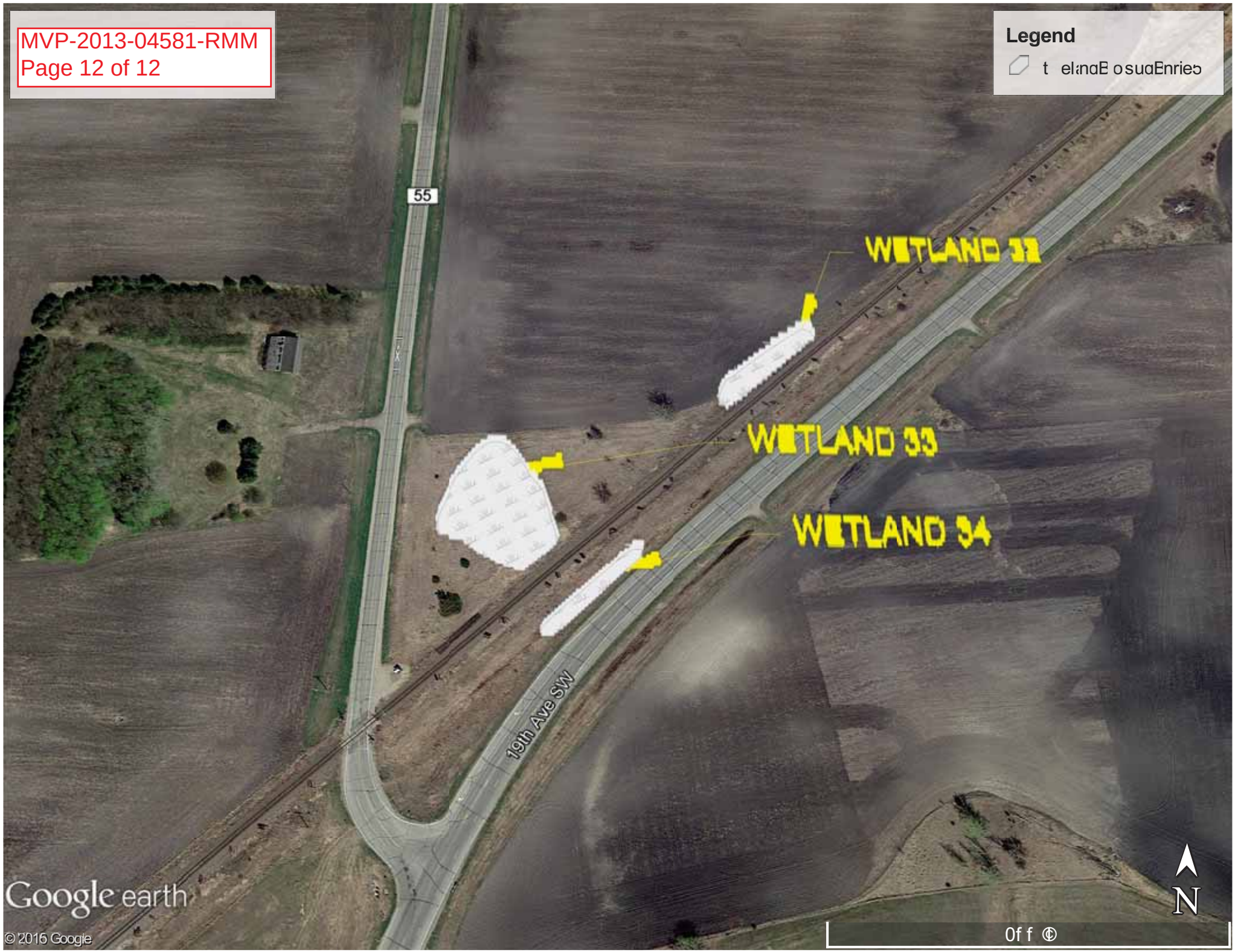
N
Google earth
© 2015 Google

Legend
Wetland Boundaries
WETLAND 01
47
19th Ave SW
Google earth
© 2015 Google
N
500 ft


Legend
55
WETLAND 32
WETLAND 33
WETLAND 34
19th Ave SW
Google earth
© 2016 Google
N

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): AUG 25 2015

B. ST PAUL, MN DISTRICT OFFICE, FILE NAME, AND NUMBER: 2013-04581-RMM

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: MN County/parish/borough: Kandiyohi City: Wilmar

Center coordinates of site (lat/long in degree decimal format): Lat. 45.13189° N, Long. -95.11409° W.

Universal Transverse Mercator:

Name of nearest waterbody:

Name of watershed or Hydrologic Unit Code (HUC): 7020004

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

☒ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: July 20, 2015

☒ Field Determination. Date(s): May 19, 2015

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There are no "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There are no "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area.

1. **Waters of the U.S.:** N/A

2. **Non-regulated waters/wetlands (check if applicable):**[1]

   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **See Attachment 1.**

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs: N/A

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY): N/A

C. SIGNIFICANT NEXUS DETERMINATION: N/A

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY): N/A

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY): N/A

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.

☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.

   ☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).

☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:

☐ Other (explain, if not covered above):

---

[1] Supporting documentation is presented in Section III.F.

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: See Attachment 1 acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps:
- ☐ Corps navigable waters' study:
- ☒ U.S. Geological Survey Hydrologic Atlas:
  - ☒ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name:MN-SOLOMON LAKE
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation:Kandiyohi County
- ☒ National wetlands inventory map(s). Cite name:NWI
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date):FSA 2013
  or ☐ Other (Name & Date):
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Applicable/supporting case law:
- ☐ Applicable/supporting scientific literature:
- ☐ Other information (please specify):

B. ADDITIONAL COMMENTS TO SUPPORT JD: See attachment 1.

29 emergent wetlands (see Table 1 for a description of the wetlands) were examined, including a review of aerial photography, topographic maps, National Wetland Inventory maps and observations recorded during a site inspection. The data does not indicate a surface or shallow groundwater connection between these features to waters of the U.S. A site visit on May 19, 2015, confirmed that the waterbodies are geographically isolated. The waterbodies do not support a link to interstate or foreign commerce. The waterbodies are not known to be used by interstate or foreign travelers for recreation or other purposes; do not produce fish or shellfish that could be taken and sold in interstate or foreign commerce; and are not jurisdictional under the Clean Water Act because the aquatic resources lack links to interstate commerce sufficient to serve as a basis for jurisdiction. The 29 wetlands identified in the Table 1 are determined to be geographically isolated and therefore, non-jurisdictional. The waterbodies are described below.

Wetland 1 (0.26 acre) – W1 is an emergent wetland located north of Highway 12 and south of a residence. During the site visit the wetland was observed draining in a NW direction to a larger open water wetland, which was not in the delineation, that has no outlet or surface connection to the adjacent unnamed tributary. Off-site review appeared to show W1 draining to the west; however, the site visit confirmed a rise in elevation to the west and the absence of a roadside ditch or other surface connections to waters of the U.S. Therefore, W1 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 5)

Wetland 2 (1.98 acres) – W2 is an emergent wetland located north of Highway 12 and SE of a residence. The wetland flows to the west through three culverts under residential driveways and outlets into W1. The SE portion of the W2 is adjacent to W4 but does not flow into W4. For the same reason W1 is isolated, W2 is also isolated because it drains into W1. Therefore, W2 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 5)

Wetland 3 (0.50 acre) – W3 is located in an agricultural field and was delineated based on an off-site wetland determination. The boundary was confirmed in the field. W3 did not have any surface connection any tributary or other water of the US. Therefore, W3 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 6)

Wetland 4 (0.76 acre) and Wetland 5 (0.16 acre) – W4 and W5 are located at the toe of the railroad slope in a drainage ditch. The drainage ditch carries surface flows after storm events and drains to the east. In the absence of storm events, the ditch is generally dry but exhibits wetland characteristics. The drainage ditch is not well defined and transitions in and out of a tributary like feature. The feature does not exhibit a defined ordinary high watermark. It does have a bed and banks but that is likely because the ditch was constructed. W4 and W5 may have a surface connection to W8 and W9; however, both W8 and W9 are also isolated (please see description of W8 and W9 below). Therefore, W4 and W5 are geographically isolated, are not tributaries to any waters of the U.S., and are not considered to be jurisdictional waters of the U.S. (See Figure 6)

Wetland 6 (0.58 acre) and Wetland 7 (0.22 acre) – These wetlands are located in between Highway 12 and the railroad bed. The two basins are separated by upland; however, W6 appears to flow overland to W7. There is a culvert located in the south central part of W7 that outlets under Highway 12 and outlets into W15. W15 has been determined to be isolated; therefore, W6 and W7 are geographically isolated, are not a tributary to any other waters of the U.S., and are not considered to be jurisdictional waters of the U.S. (See Figures 6 and 7)

Wetland 8 (0.69 acre) – W8 is similar to W4 and W5 in that it is located at the toe of the railroad slope, but it extends farther north. To the east of the wetland there is a slight upland rise; however, it is possible that during high flow events water leaves the wetland and flows into W9, which is also isolated. Therefore, W8 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 7)

Wetland 9 (0.86 acre) – W9 is located north of the railroad track and is bound by a farm road to the east. The wetland is depressional and does not have an outlet. During the site visit no surface connection or culvert

was observed draining any portion of the wetland. Therefore, W9 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 7)

Wetland 11 (0.43 acre), Wetland 12 (0.58 acre) and Wetland 13 (0.43 acre) – these 3 wetlands are very similar in nature and are all located in an agricultural field. The wetland boundaries were confirmed in the field and were found to be surrounded by non-hydric soils. There is a rise in elevation to the west and south blocking any surface connection to the unnamed tributary to the west and south. Therefore, W11, W12 and W13 are geographically isolated, are not a tributary to any waters of the U.S., and are not considered to be jurisdictional waters of the U.S. (See Figure 8)

Wetland 14 (0.44 acre) – This large wetland originates from runoff from the agricultural field to the north and west. The water enters the wetland and then flows under a field road into the main basin of W14. W14 does have a culvert under 45th Street NW that flows from west to east. W14 has a surface connection with W15; however, W15 is isolated. Therefore, W14 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 9)

Wetland 15 (24.64 acres) – W15 is a large wetland basin confined by Highway 12 to the north, 45th Street to the west, and County Road 55 to the south. The applicant has provided a storm sewer/culvert map identifying all culverts in the area. There are no culverts or storm sewers located in or draining W15, other than the culvert entering W15 from W7. The flow is generally into the south portion of the wetland. I walked the southern boundary and did not locate any pipe or culvert under County Road 55. Therefore, W15 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 10)

Wetland 16 (0.66 acre) – W16 receives runoff from adjacent industrial facilities. The wetland has a connection with W15 via surface flows; however, W15 is isolated. Therefore, W16 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 10)

Wetland 17 (0.02 acre) – W17 is a small wetland located at the toe of slope of 1st Avenue W. This wetland is depressional and has no surface connection to any water of the US. Therefore, W17 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 11)

Wetland 18 (0.39 acre) – W18 is located at the toe of the slope of County Road 55. It flows in a SW direction. The surface water in this wetland flows into W20 during storm events; however, W20 is isolated. Therefore, W18 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 11)

Wetland 19 (2.29 acres) and Wetland 20 (3.20 acres) – W19 and W20 are similar and were likely once parts of one large basin. These two wetlands are connected via a culvert in the northeast corner of W19 and the NW corner of W20. The culvert flows form W19 into W20. During my site visit it was confirmed that W19 flows into W20 and W20 has no outlet. The south end of W20 increases in elevation, prohibiting water from leaving W20. Therefore, W19 and W20 are geographically isolated, are not a tributary to any waters of the U.S., and are not considered to be jurisdictional waters of the U.S. (See Figure 11)

Wetland 25 (0.39 acre), Wetland 26 (0.16 acre), Wetland 28 (13.35 acres), and Wetland (29 4.88 acres) – These wetlands are all connected via culverts. W25 flows east into W28 via a culvert under a farm access road, W26 flows south into W28 via a culvert under County Road 40, and W29 flows into W28. The water from these wetlands flows east through road ditches on the south side of County Road 40. The surface water from W25, W26, W28, and W29 flows into a wetland restoration area where the water settles in a large emergent wetland in the north portion of the property. The Wetland restoration is located south of 30th Street SW, south of County Road 40 and north of 19th Avenue SW. The wetland restoration includes several isolated wetlands in an old agricultural field. Therefore, W25 and W26, W28, and W29 are geographically isolated,

are not a tributary to any waters of the U.S., and are not considered to be jurisdictional waters of the U.S. (See Figures 12 and 13)

Wetland 27 (0.38 acre) – W27 is located north of County Road 40 and does not have a direct connection to W28 or 29; however, surface water from W27 flows east and enters a large wetland complex that drains south under County Road 40 and into the wetland restoration area that is described in the discussion of W25, W26, W28, and W29. Therefore, W27 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 13)

Wetland 30 (7.39 acres) – W30 is located in an agricultural field. The wetland boundary was confirmed in the field and was found to be surrounded by non-hydric soils. The wetland has no surface connection to any water of the US. Therefore, W30 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 14)

Wetland 31 (2.21 acres) – W31 is located adjacent to a rail line at the toe of slope of the rail bed. The wetland has no surface connection to any water of the US. Therefore, W31 is geographically isolated, is not a tributary to any waters of the U.S., and is not considered to be jurisdictional waters of the U.S. (See Figure 15)

Wetland 32 (0.14 acre), Wetland 33 (0.55 acre) and Wetland 34 (0.09acre) – These wetlands are similar in that they are all depressional and are located at the toe of slope of the rail line. The wetlands did not have any surface connections to water of the US. Therefore, W32 and W33, and W34 are geographically isolated, are not a tributary to any waters of the U.S., and are not considered to be jurisdictional waters of the U.S.

Please note that Wetlands 10, 21, 22, 23, and 24 will be addressed in a Preliminary Jurisdictional Determination at the request of the applicant.

Attachment 1; Approved Jurisdictional Determination for Union Pacific Railroad; File No. 2013-04581-RMM

Table 1: Wetland Description

Wetland ID	WETLAND AREA (SF)	(ACRE)
WETLAND 1	11,395.84	0.26
WETLAND 2	86,057.92	1.98
WETLAND 3	21,937.88	0.50
WETLAND 4	33,236.48	0.76
WETLAND 5	7,116.97	0.16
WETLAND 6	25,210.89	0.58
WETLAND 7	9,621.39	0.22
WETLAND 8	29,968.48	0.69
WETLAND 9	37,462.98	0.86
WETLAND 11	18,576.38	0.43
WETLAND 12	25,051.56	0.58
WETLAND 13	18,600.54	0.43
WETLAND 14	19,059.96	0.44
WETLAND 15	1,073,215.69	24.64
WETLAND 16	28,792.14	0.66
WETLAND 17	682.52	0.02
WETLAND 18	17,061.26	0.39
WETLAND 19	99,599.20	2.29
WETLAND 20	139,497.03	3.20
WETLAND 25	16,864.15	0.39
WETLAND 26	6,930.76	0.16
WETLAND 27	16,638.04	0.38
WETLAND 28	581,382.90	13.35
WETLAND 29	212,468.23	4.88
WETLAND 30	322,027.53	7.39
WETLAND 31	96,295.96	2.21
WETLAND 32	6,306.24	0.14
WETLAND 33	24,021.42	0.55
WETLAND 34	3,797.07	0.09

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant:BNSF Railway	File Number: 2013-04581-RMM	Date AUG 25 2015
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of Permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/cecw/pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A. INITIAL PROFFERED PERMIT: You may accept or object to the permit.

• **ACCEPT**: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approve jurisdictional determinations associated with the permit.

• **OBJECT**: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B. .PROFFERED PERMIT: You may accept or appeal the permit.

• **ACCEPT**: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

• **APPEAL**: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C. PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D. APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

• **ACCEPT**: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

• **APPEAL**: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E. PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact:

U. S. Army Corps of Engineers, Regulatory Branch
Attn: Ryan Malterud
180 Fifth Street East, Suite 700

Telephone (651) 290-5286

If you only have questions regarding the appeal process you may also contact:

Mr. Thomas McCabe
Administrative Appeals Review Officer
Mississippi Valley Division
P.O. Box 80 (1400 Walnut Street)
Vicksburg, MS 39181-0080
(601) 634-5820
(601) 634-5816 (fax)

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.	Date:	Telephone number: