Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

City of Savage / Scott County

Final - July 2017

Prepared by WSB & Associates, Inc.

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

Trunk Highway (TH) 13 runs north-south through central Scott County before it heads east at the TH 13/101 intersection in Savage. From there, TH 13 serves as an east-west principal arterial roadway generally following the southern banks of the Minnesota River to St. Paul. As part of the National Highway System (NHS), TH 13 provides a highway connection between two major river crossings in the area: the Bloomington Ferry Bridge (US Highway 169) and Interstate 35W. This is one of few continuous east-west corridors in northern Scott County, making it a primary route for both commuter and business traffic connecting to the rest of the Twin Cities Metropolitan Area. TH 13 provides the only roadway access to the Ports of Savage businesses located along the Minnesota River. See **Figure 1** for the location map.

TH 13 Corridor Roadway Classifications:
- *Principal Arterial (Non-Freeway)*
- *National Highway System (NHS)*
- *National Multimodal Freight Network*
- *State Principal Freight Network (PFN)*

From a Statewide perspective, TH 13 serves a key freight connection between agricultural rich lands in southwestern Minnesota to the Ports of Savage. The Ports of Savage, consisting of five separate private ports off the Minnesota River and two rail corridors served by three railroad companies, serves as an intermodal hub for the shipment of grain and other commodities beyond Minnesota. Approximately two million tons of material is shipped through the Ports of Savage annually from major operators including Cargill, CHS Inc., Bunge, and Superior Minerals. Ninety percent of the grain arrives to the ports by truck via TH 13 (see **Figure 2** for a graphical representation of existing freight flows). Increased efficiency in flow of commercial truck traffic will enhance freight mobility along the TH 13 Corridor.

Major investments have been made in the past decade along TH 13, including interchanges at TH 13/101 and Dakota County Highway 5, as well as intersection and south frontage road improvements at Quentin Avenue. These investments resulted in travel time benefits for through traffic on TH 13. However, recent improvements have not addressed issues associated with the at-grade Dakota Avenue and Yosemite Avenue intersections, which provide access for freight trucks to the Ports of Savage businesses. The 2013 *TH 13 Corridor Study* recommended further consideration of long-term recommendations at Dakota Avenue and Yosemite Avenue. While several options have been explored in the past, existing site conditions and funding constraints limited efforts to develop an effective long-term solution.

The *Trunk Highway (TH) 13 Dakota Ave-Yosemite Ave Design Study* builds upon recent efforts to address safety, access, and mobility issues within the TH 13 corridor. The City of Savage and Scott County initiated this study to identify and evaluate concepts for roadway improvements along TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue. This study evaluates improvements that would directly benefit freight movements to and from the Ports of Savage area for the shipment of grain and other commodities to the rest of the nation, as well as improve overall TH 13 mobility and safety.

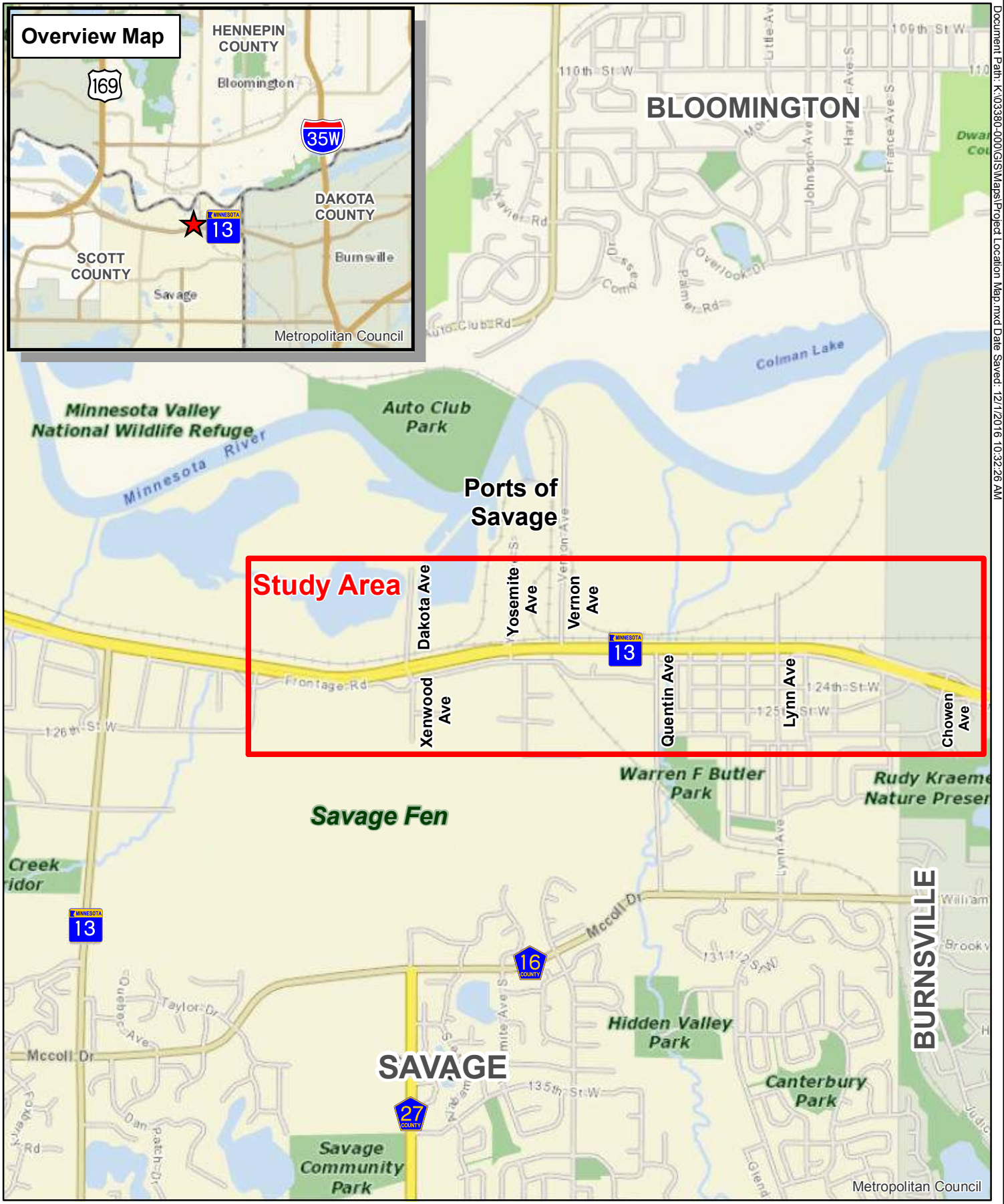

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Figure 1 - Location Map

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

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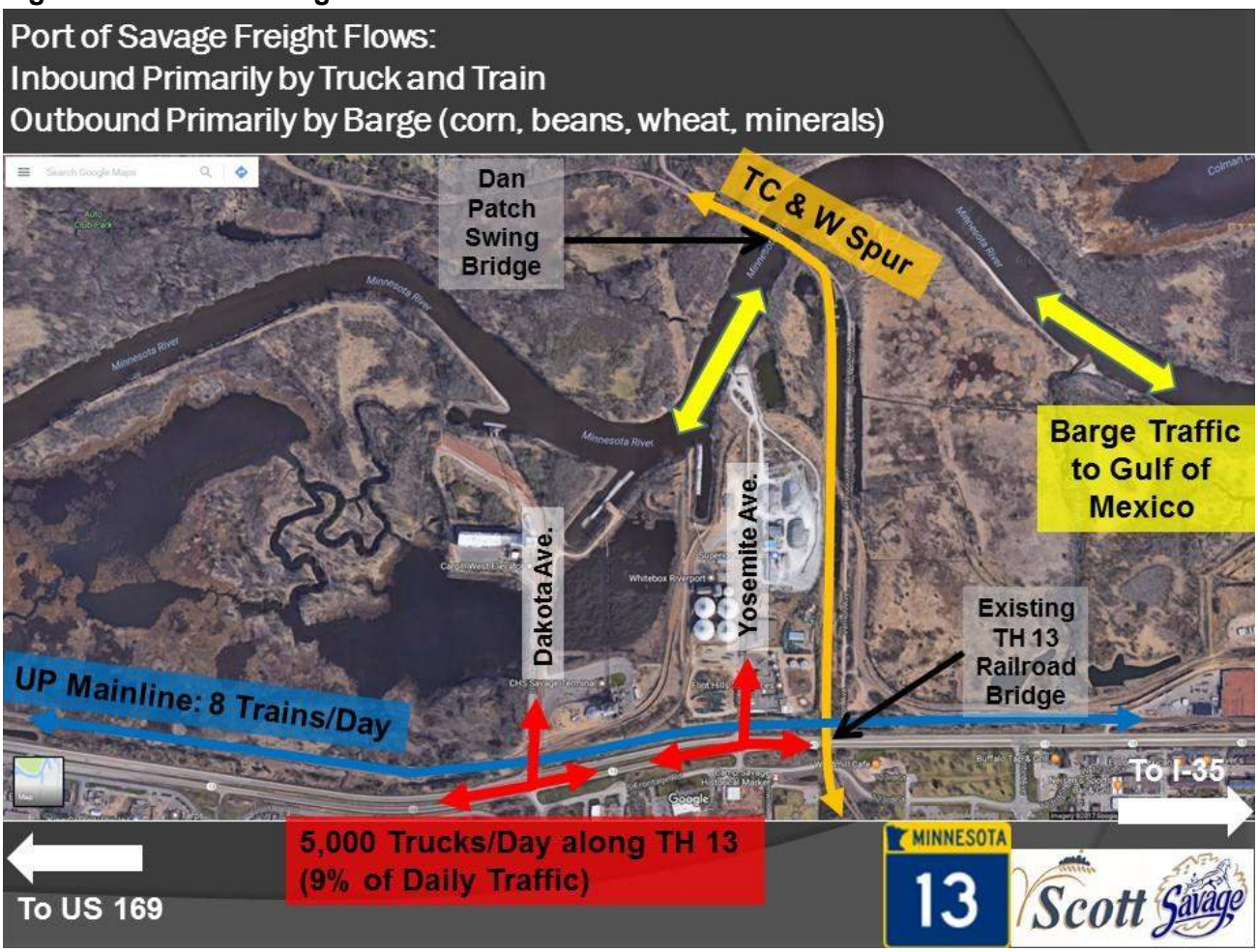
Figure 2 - Flows of Freight



a. STUDY AREA

The project study area includes an approximately two-mile long segment of TH 13 between Louisiana Avenue and Chowen Avenue in the City of Savage. Improvements were evaluated primarily in the approximately one-mile long segment from Dakota Avenue to Lynn Avenue. See **Figure 3** for a map of the study area.

b. STUDY PURPOSE

The purpose of the *Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study* is to:

- Develop a long-term concept for roadway improvements along TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue.
- Continue recent efforts to address safety, access, and mobility issues within the TH 13 corridor.
- Evaluate improvements that benefit freight movements to and from the Ports of Savage area.
- Be ready to compete for state and federal funding opportunities related to freight projects.

Figure 3 - Study Area Map

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

c. STUDY PARTICIPANTS

This study was initiated through a cooperative agreement between the City of Savage and Scott County. The study was funded by the City of Savage, Scott County, and through an Economic Development Incentive – Corridor Readiness Grant from the Scott County Community Development Agency.

A Study Management Team (SMT) was established to guide the overall study process. SMT members consisted of staff from the City of Savage, Scott County, Minnesota Department of Transportation (MnDOT) Metro District South Area, and MnDOT Freight and Rail Office. Study area business representatives from Cargill, Cenex Harvest States (CHS), and Road and Machinery Supplies (RMS) also participated in SMT meetings. The SMT discussed technical analyses, concept alternatives, business outreach, and recommendations. The SMT met five times over the course of the study. SMT meeting summaries are provided in **Appendix D**.

SMT participants:

- Seng Thongvanh, City of Savage, City Engineer
- Brian Tucker, City of Savage, City Planner
- Lisa Freese, Scott County Transportation Planning and Program Director
- Jarrett Hubbard, Scott County Senior Transportation Planner
- Diane Langenbach, MnDOT Metro South Area Engineer
- Jon Solberg, MnDOT Metro South Area Manager
- Jim Weatherhead, MnDOT Office of Rail
- John Tompkins, MnDOT Office of Freight
- Greg Oberle, Cenex Harvest States (CHS)
- Ruben Chong, Cargill
- Troy Johnson, Road Machinery Supplies (RMS) – business south of TH 13
- Jen Lehmann, Minnesota Valley Transit Authority (MVTA)
- Troy Beam, Scott County Transit Manager
- Brian Sorenson, Dakota County Assistant County Engineer
- Steve Albrecht, City of Burnsville Public Works Director

Updates to the Savage City Council and Scott County Board of Commissioners were provided throughout the course of the study. Railroad agency coordination meetings were held with Union Pacific Railroad and Twin Cities and Western Railroad. Canadian Pacific Railroad provided comments on the design concepts.

d. IMPORTANCE OF FREIGHT

Freight transportation is of critical importance in supporting the State and regional economy, ensuring a competitive business climate, and maintaining a high quality of life. According to the Federal Highway Administration, the United States will see freight activity grow by about 50 percent in tonnage between 2012 and 2045 to 17 million. Trucks represent the United States predominant freight carrier mode now and into the future.

The following section provides excerpts from freight studies and plans that highlight the increasing importance of freight system on the regional and State transportation network.

Twin Cities Metropolitan Region Freight Study Summary Report (Met Council, 2013):

Congestion, lack of good connections from major highways to freight warehouses and distribution centers, and deteriorating roads are all factors that affect commercial transportation costs. Businesses struggling with high transportation costs might relocate outside the region or to other states where operating costs may be lower, leading to a negative impact on the regional and State economy. A robust, efficient freight transportation system helps attract and retain businesses, and supports overall economic vitality.

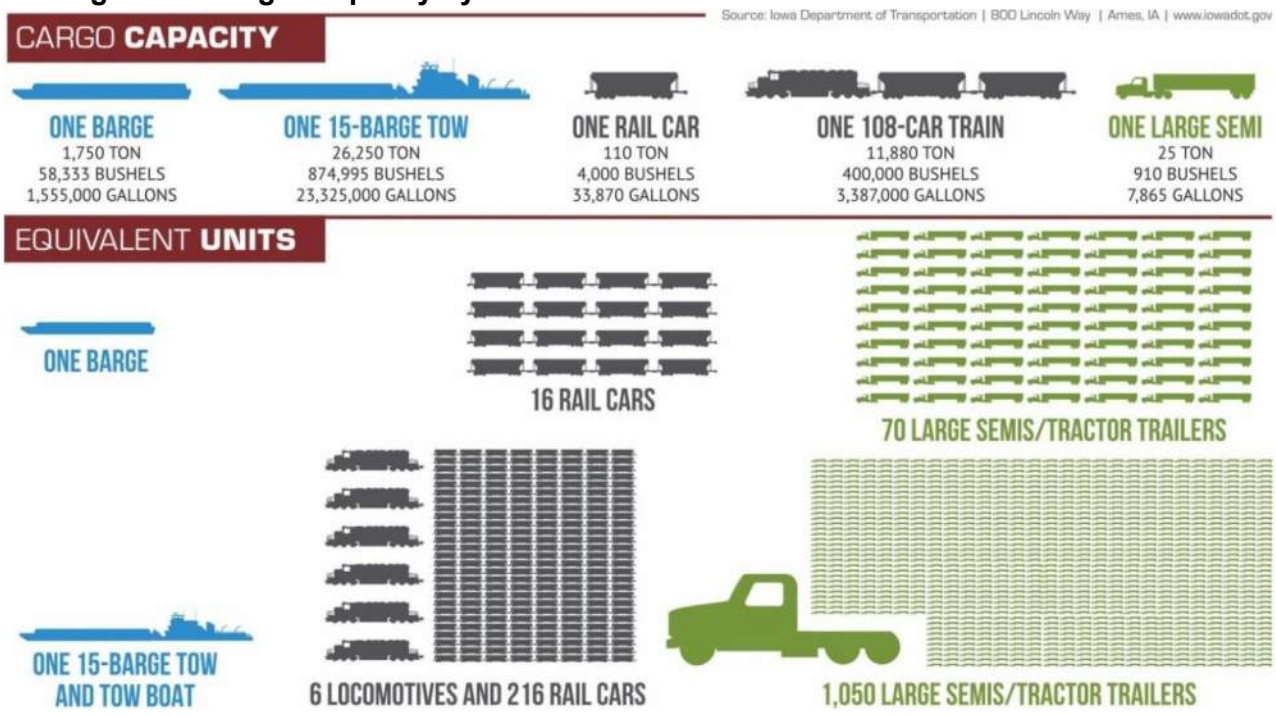
Minnesota Statewide Ports & Waterways Plan (MnDOT, 2014):

Intermodal terminals are key nodes in the regional freight system where freight is transferred between the marine system and other modes such as rail and truck. Trucking of products to ports is generally used for shorter trips – commodities that have less than 400 miles to travel to or from the port – including raw or finished goods such as agricultural products, forest products, scrap metal, pig iron, steel, and twine. Rail-moved products are generally those that must travel 400 miles or more.

Truck and rail freight rates, changing market conditions or locations, and seasonal (winter) shutdowns of lake and river ports cause shippers to change or modify shipping modes. Companies that have sufficient storage terminals often receive additional shipments and store the products on-site during the non-shipping season to avoid the higher transportation costs of comparable rail shipments. Companies that do not have this luxury will divert their traffic to rail from barge or ship during the non-shipping season, and must therefore pay more for their overall freight transportation costs.

Compared to other modes of freight transportation, marine transportation carries the most freight per vessel, is the most fuel efficient, and produces the lowest emissions. In terms of cargo capacity, one typical barge container, carrying 1,750 tons, is equivalent to about 70 truck trips (see **Figure 4**). Diversion of freight from roadways reduces road wear, traffic congestion, and potential roadway safety concerns. Enough freight is moved on the river system in Minnesota each year to equal 464,000 trucks on the highways and local roads in Minnesota.

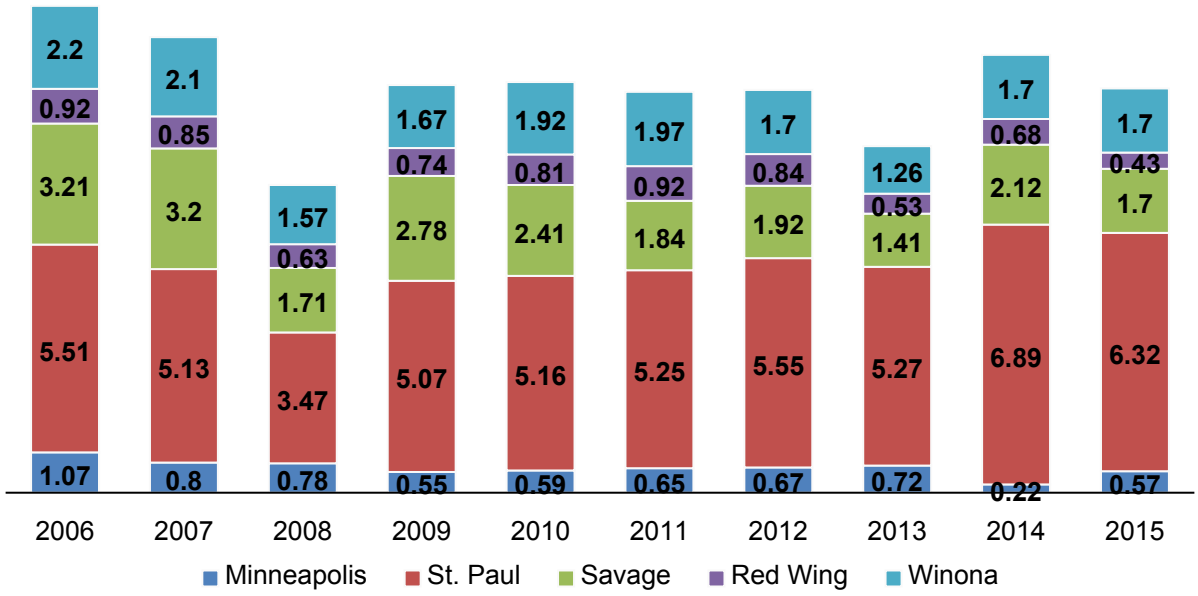
Figure 4 - Freight Capacity by Mode



Source: Iowa DOT

The Mississippi River System (which includes the Minnesota River ports) stretches over 222 miles in Minnesota and supports five port areas whose combined 2015 tonnage was 11 million net tons. These ports account for over 50 percent of Minnesota's agricultural exports. The State's largest river tonnage commodities are agricultural products such as corn, soybeans and wheat. In 2015, Minnesota shipped over 3.4 million tons of grain down the River. River ports also handle other dry commodities such as fertilizer, cement, sand and gravel, salt, coal, steel and scrap metals for recycling.

Figure 5 - Mississippi River System Tonnage by Year (in Millions)



Source: MnDOT

e. TH 13 Corridor Freight Summary

The Ports of Savage consists of five separate private ports off the Minnesota River and two rail corridors served by three railroad companies. Approximately two million tons of material is shipped through the Ports of Savage annually from major operators including Cargill, CHS Inc., Bunge, and Superior Minerals. Grain, corn, and other commodities are transferred from truck to barges and then sent down the Minnesota River and ultimately the Mississippi River. Freight travels 1,811 miles from the region to the Port of New Orleans where it is loaded onto ocean-going vessels to reach global markets. It is anticipated that the recently expanded Panama Canal will increase activity at the Port of New Orleans, resulting in upstream market demands for marine transportation via the Mississippi River.

The Ports of Savage include:

- *Harvest States (grain)*
- *Port Cargill (corn, grain, salt, fertilizer)*
- *Cargill West (grain)*
- *Port Bunge (grain)*
- *Port Richard (aggregates)*

TH 13 is part of a major intermodal corridor connecting US Highway 169 and Interstate 35W to the Ports of Savage. Via these major highway routes, trucks from all over the State of Minnesota utilize TH 13 to access the Ports for exporting goods onto river barges. Commodities that arrive via truck can also transfer to rail cars, providing transportation options and modal competition for commodity shipments. Reducing congestion to the Ports and other employment centers in the area will improve the economic competitiveness of the region as well as enhance freight mobility along the TH 13 Corridor.

2. TH 13 Corridor Background

a. Previous Studies

Several studies and design concepts related to the TH 13 corridor in the Savage and Burnsville area have been prepared since 2000. Studies include the *TH 13 Corridor Study* originally prepared in 2000 and updated in 2013. The 2000 *TH 13 Corridor Study* recommended several major improvements that have since been implemented and are listed in the following section. The 2013 *TH 13 Corridor Study* identified short-term improvements that could be implemented based on constrained transportation funding at the State level. Neither study fully addressed the long-term needs for improvements near Dakota Avenue and Yosemite Avenue.

In 2005 and 2007, a number of alternative designs were evaluated to cost effectively address mobility, safety, and access issues throughout the TH 13 corridor and within the study area. These alternatives evaluated different intersection controls at Dakota Avenue, constructing a north frontage road between Dakota Avenue and Yosemite Avenue, consolidating access points and closing access to Yosemite Avenue. These concepts were pursued but did not advance.

Other recent plans and studies that were evaluated as part of this design study include the *City of Savage 2030 Comprehensive Plan*, *Scott County 2030 Comprehensive Plan*, *Twin Cities Metropolitan Region Freight Study*, *Minnesota Statewide Freight System Plan*, and *Minnesota Statewide Rail Plan*. In addition, two long-term issues considered were the Dan Patch corridor crossing over the Minnesota River (as recently studied by the City of Savage for vehicle or multimodal uses and previously identified as a possible commuter rail route) and the extension of County Highway 27 north to TH 13.

In the Metropolitan Council's *Regional Truck Highway Corridor Study* (completed in 2017), TH 13 was identified as a Tier 1 regional key truck corridor. The purpose of the study was to identify and prioritize the most significant regional truck highway corridors. The study notes that while the interstate highway system is the region's freight backbone, it is supported by a critical network of principal and minor arterials that serve to provide redundancy to the interstate system, as well as providing door-to-door access to manufacturing facilities, distribution centers, intermodal freight hubs, and ultimately, retailers and customers. In the analysis, the TH 13 corridor was ranked second in the top thirty truck delay hotspots on non-interstate Tier 1 corridors, with 60 hours of delay eastbound and 48 hours of delay westbound on average per day.

b. RECENTLY COMPLETED AND PLANNED IMPROVEMENTS

Several major improvements to the TH 13 corridor have been implemented in the last decade. A pavement preservation project is also programmed by MnDOT for 2017. These improvements, shown in **Figure 6**, include:

- South frontage road construction (2007),
- Signal, turn lane and median upgrades at Quentin Avenue and Lynn Avenue (2012),
- TH 13/101 partial interchange (2012),
- Interchange at Dakota County Road 5 (2014), and
- TH 13 mill and overlay, including acceleration and turn lane extensions at Dakota Avenue (2017).

These investments have facilitated improved mobility on TH 13. However, the improved mobility on TH 13 (and overall traffic volumes) has impacted the level of service at the minor-approach stop-controlled intersections of Dakota Avenue and Yosemite Avenue which provide access to the Ports of Savage businesses. Several recent plans and studies have acknowledged the need for additional improvements to address these safety, traffic operations, and connectivity issues along the TH 13 corridor.

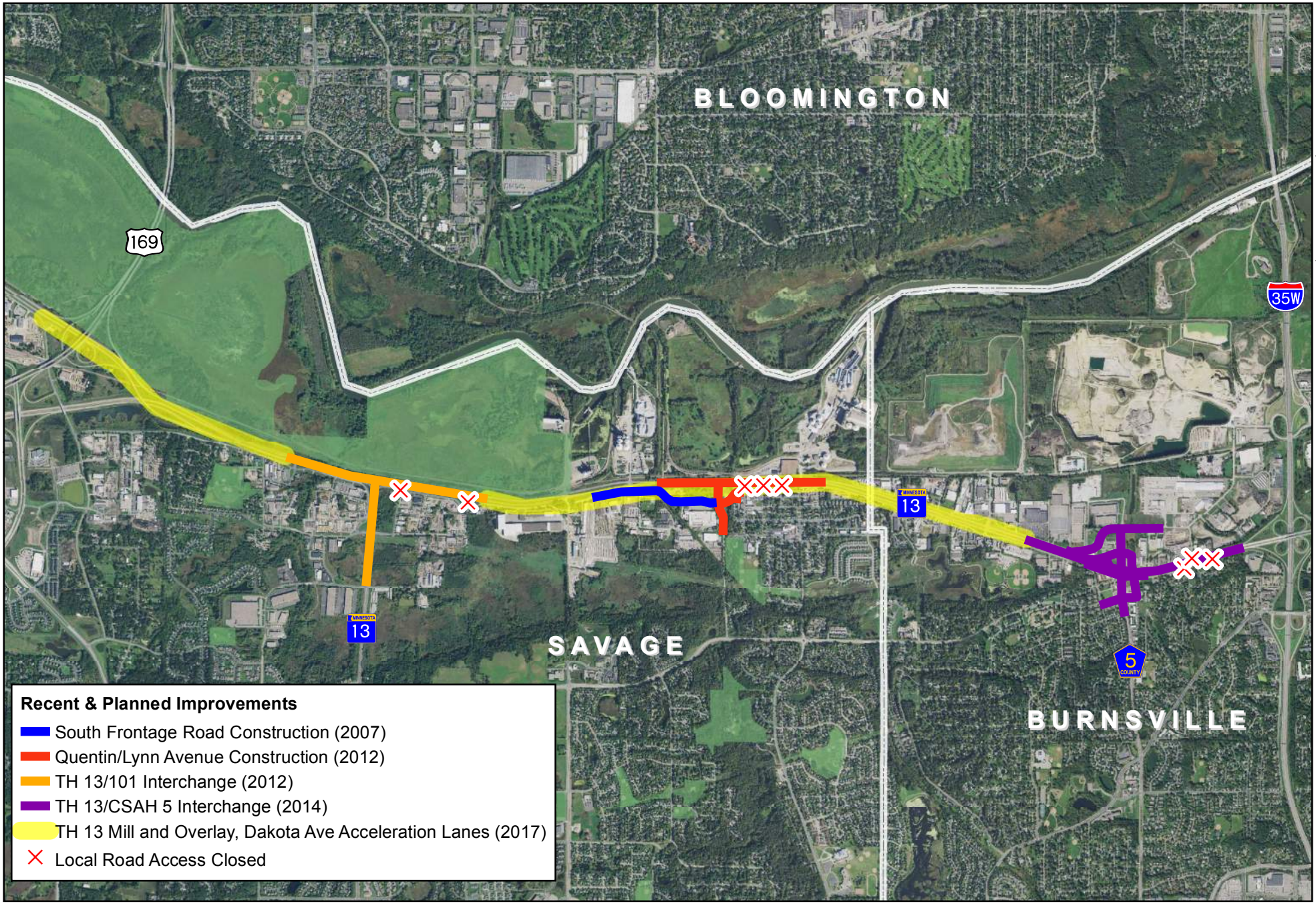


Figure 6 - Roadway Investments

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

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3. Existing and Forecast Conditions

In order to develop recommendations for improvements, the study partners reviewed data on existing and forecast conditions in the TH 13 corridor study area. The sections below document corridor characteristics and analysis to better understand issues in the corridor.

a. Roadway Characteristics

In the study area, TH 13 is currently a four-lane divided at-grade expressway with a speed limit of 45 miles per hour (mph) from Lynn Avenue to Yosemite Avenue and 55 mph east of Lynn Avenue and west of Yosemite Avenue. The road has 12-foot through lanes with a 10-foot paved outside shoulder. The roadway is primarily a rural section with a ditch median, except the section from east of Vernon Avenue to east of Lynn Avenue was converted to an urban section with a raised curbed concrete median as part of the Quentin Avenue/Lynn Avenue improvements in 2012. **Figure 7** and the following text describe the existing geometry and traffic control at the study intersections:

- **TH 13 and Dakota Avenue** - This is a four-legged, minor-approach stop-controlled intersection. The east and west major approaches provide an exclusive left turn lane, two through lanes, and an exclusive right turn lane. The north and south minor approaches are not striped but operate as one shared left/through lane and a right turn lane. This intersection has planned 2017 improvements including the extension of existing turn lanes and construction of acceleration lanes on TH 13.
- **TH 13 and Yosemite Avenue/Xenwood Avenue** – This is a four-legged, minor-approach stop-controlled intersection. The east and west major approaches provide an exclusive left turn lane, two through lanes and an exclusive right turn lane. Yosemite Avenue, the north minor approach is not striped, but operates as one shared left/through lane and one right turn lane. Similarly, Xenwood Avenue, the south minor approach is also not striped, but operates as one shared left/through lane and one right turn lane.
- **TH 13 and Quentin Avenue** – This is a three-legged, traffic signal-controlled intersection. The west major approach provides two through lanes and an exclusive right turn lane. The east major approach provides an exclusive left turn lane and two through lanes. The south minor approach provides two left turn lanes and one right turn lane. The westbound left turn is controlled by a flashing yellow arrow.
- **TH 13 and Lynn Avenue** – This is a four-legged, traffic signal-controlled intersection. The east and west major approaches each provide an exclusive left turn lane, two through lanes and an exclusive right turn lane. The north and south minor approaches each provide one exclusive left turn lane and one shared through/right turn lane. All left turns are controlled by a flashing yellow arrow.
- **TH 13 and Chowen Avenue** – This is a four-legged, minor-approach stop-controlled intersection. The east and west major approaches provide an exclusive left turn lane, two through lanes and an exclusive right turn lane. The north and south minor approaches each provide an exclusive left turn lane, an exclusive through lane, and an exclusive right turn lane. A concrete median exists on each of the minor approaches.

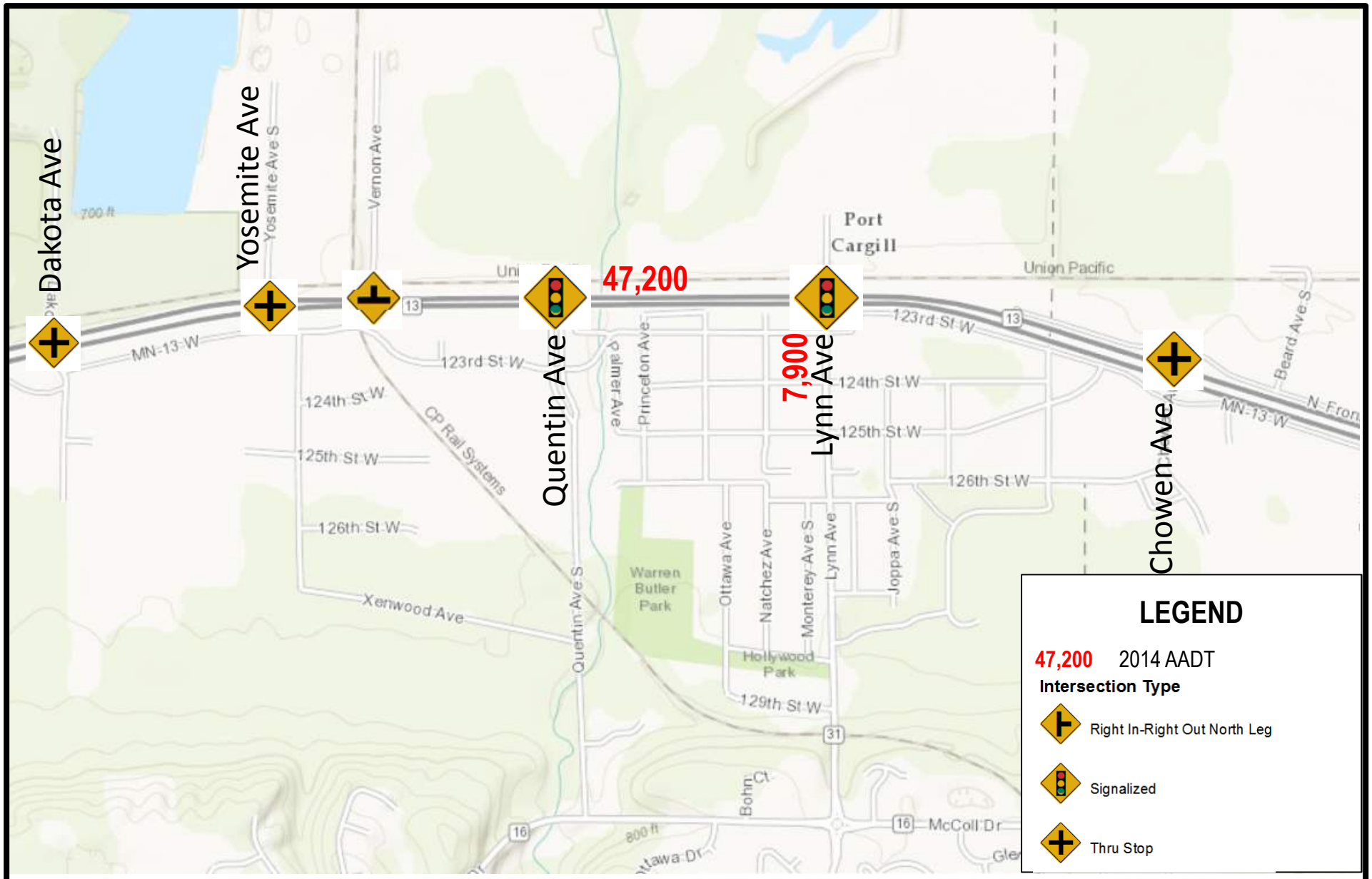

Figure 7 - Existing Conditions

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

b. LAND USE AND ENVIRONMENTAL FEATURES

Most existing industrial land uses in the City of Savage are concentrated along the TH 13/101 corridor. Agri-business and food handling and processing facilities dependent on the Minnesota River Ports are located on the east end of the corridor, north of the highway. Light industry in the form of manufacturing and machinery production is also located on the south side of TH 13. Near Quentin Avenue, downtown Savage includes a mix of commercial and residential uses. The City's comprehensive plan supports continuing these land uses in their current form. In addition, redevelopment opportunities have been identified in the downtown Savage area and at the southeast quadrant of the TH 13/101 intersection.

The subject segment of TH 13 is bound by two significant natural features, the Minnesota River (with corresponding floodplain and wetland complexes) to the north and the Minnesota River Valley bluff line to the south. The Savage Fen Wetland Complex is located north of this bluff between TH 13 and Quentin Avenue. It is the largest calcareous fen in Minnesota, comprising of approximately 640 acres. This type of wetland is a rarity and contains some plant species found in few or no other locations. Its special characteristics are a product of the groundwater flowing through the upgradient aquifer and glacial till in this location. Land uses adjacent to the Savage Fen Wetland Complex include industry and businesses on the north, single-family housing on the east, wooded slope open space on the south, and TH 13 or industry on the west.

Industrial properties south of TH 13 are limited in land area and currently operate near capacity; however, the port businesses to the north have potential for more capacity. Business representatives estimate the Ports of Savage current grain elevator activity to be at about 40-50 percent of available capacity. It was noted that historically, activity has been higher. Demand could increase in the future based on market demands. These businesses typically have an eight-month season, with June-July as the peak period of demand.

A high-level environmental screening and historic resource inventory were performed and are summarized in **Figures 8** and **9**. Floodplain and wetland complexes associated with the Minnesota River are present in the TH 13 corridor. Other environmental considerations include contaminated soils due to the nearby industrial and railroad land uses. Minnesota Valley Wildlife Refuge lands owned by the US Fish and Wildlife Service are also nearby. Utilizing the existing TH 13 right-of-way as much as possible for any proposed roadway improvements will reduce potential environmental impacts and minimize project costs.

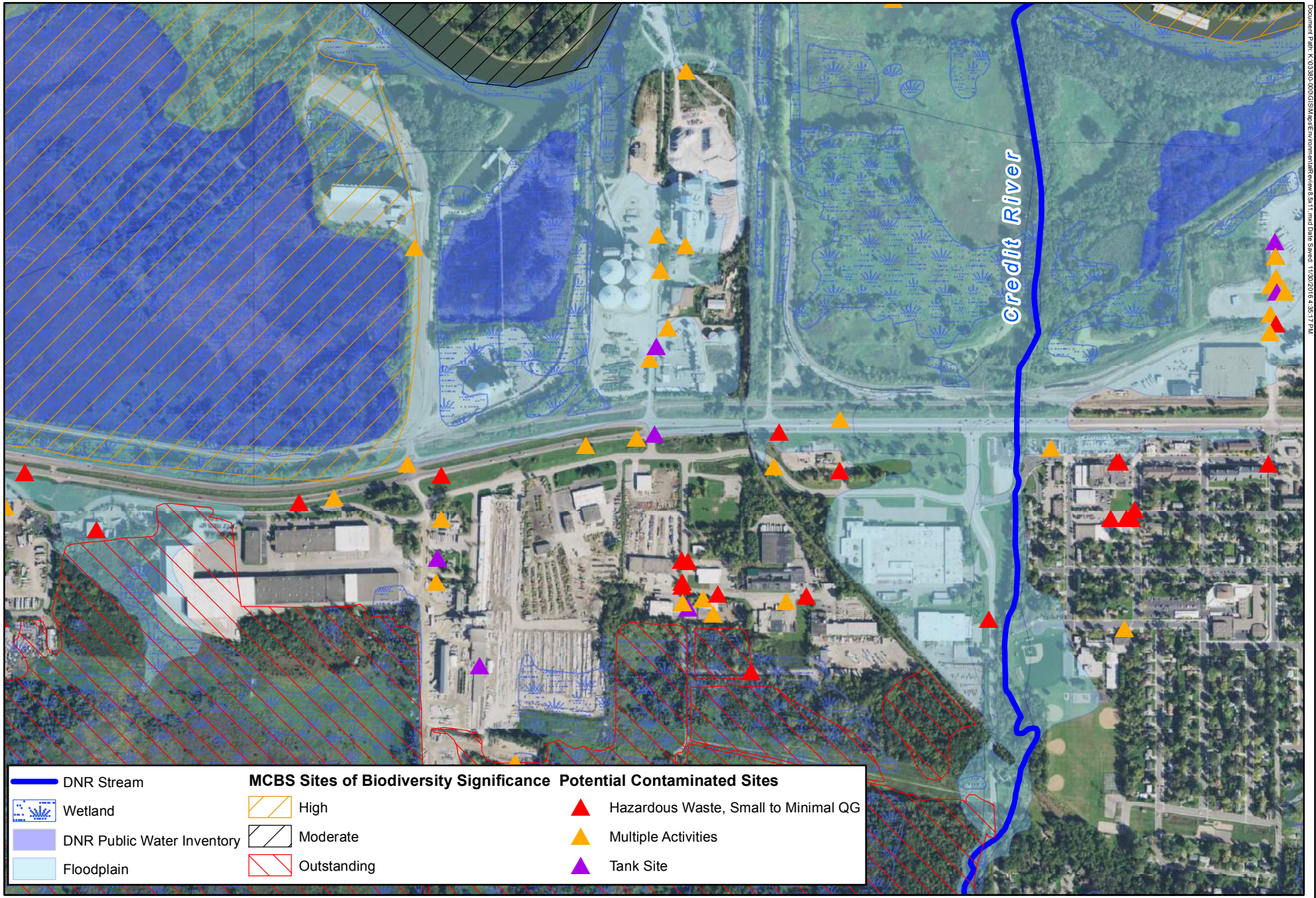

Figure 8 - Environmental Screening

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

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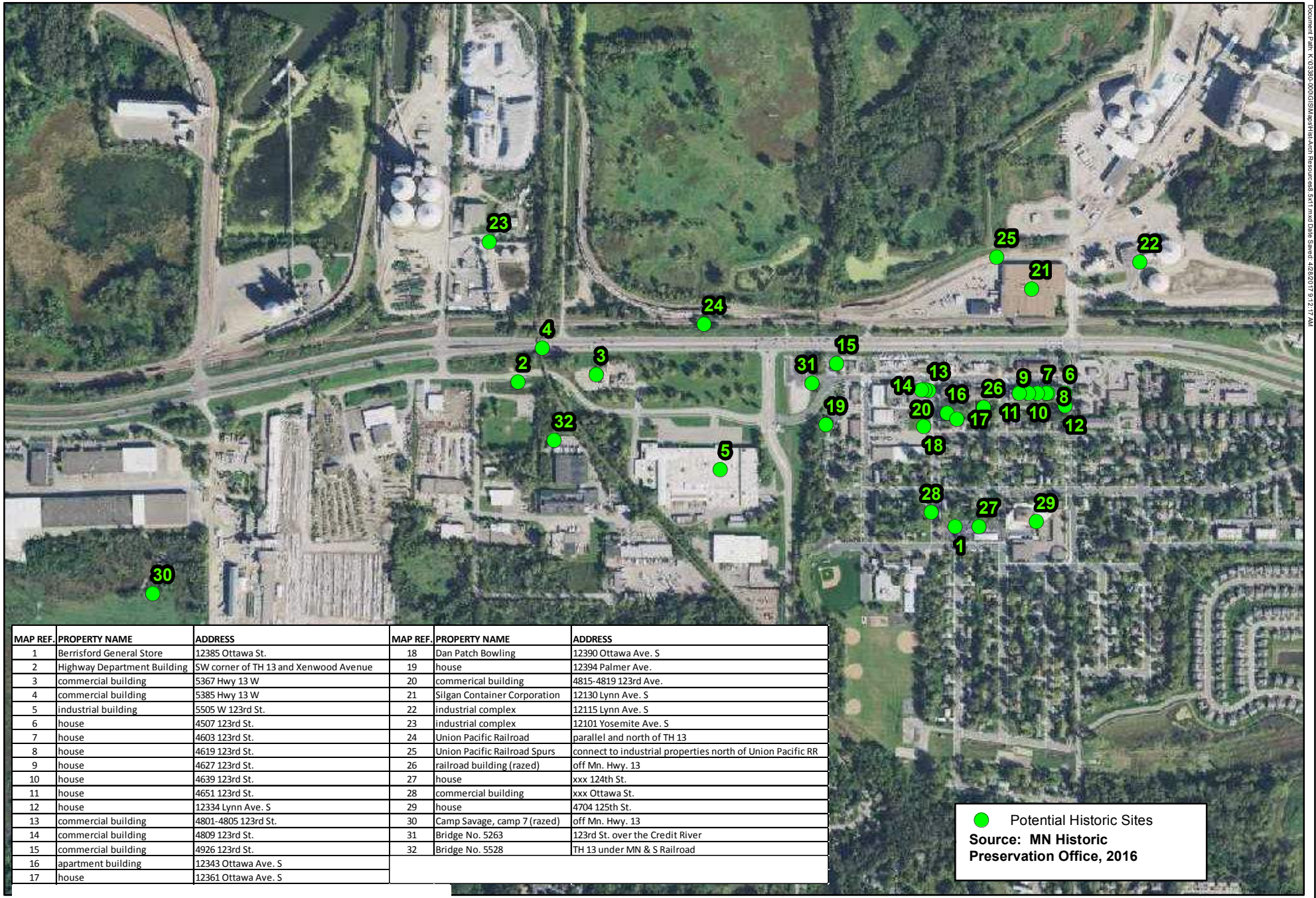

MAP REF.	PROPERTY NAME	ADDRESS	MAP REF.	PROPERTY NAME	ADDRESS
1	Berrisford General Store	12385 Ottawa St.	18	Dan Patch Bowling	12390 Ottawa Ave. S
2	Highway Department Building	SW corner of TH 13 and Xenwood Avenue	19	house	12394 Palmer Ave.
3	commercial building	5367 Hwy 13 W	20	commerical building	4815-4819 123rd Ave.
4	commercial building	5385 Hwy 13 W	21	Silgan Container Corporation	12130 Lynn Ave. S
5	industrial building	5505 W 123rd St.	22	industrial complex	12115 Lynn Ave. S
6	house	4507 123rd St.	23	industrial complex	12101 Yosemite Ave. S
7	house	4603 123rd St.	24	Union Pacific Railroad	parallel and north of TH 13
8	house	4619 123rd St.	25	Union Pacific Railroad Spurs	connect to industrial properties north of Union Pacific RR
9	house	4627 123rd St.	26	railroad building (razed)	off Mn. Hwy. 13
10	house	4639 123rd St.	27	house	xxx 124th St.
11	house	4651 123rd St.	28	commercial building	xxx Ottawa St.
12	house	12334 Lynn Ave. S	29	house	4704 125th St.
13	commercial building	4801-4805 123rd St.	30	Camp Savage, camp 7 (razed)	off Mn. Hwy. 13
14	commercial building	4809 123rd St.	31	Bridge No. 5263	123rd St. over the Credit River
15	commercial building	4926 123rd St.	32	Bridge No. 5528	TH 13 under MN & S Railroad
16	apartment building	12343 Ottawa Ave. S			
17	house	12361 Ottawa Ave. S			

Figure 9 - Historic Resource Inventory

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

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c. RAILROAD OPERATIONS

There are two main railroad corridors within the study area (see **Figure 10**). Union Pacific Railroad operates a regional rail mainline between St. Paul, Mankato, Worthington, and Sioux City, Iowa. This line, known as the Mankato Subdivision, runs east-west adjacent to TH 13. Significant train switching activity can occur in the Ports of Savage area related to operations at the Cargill sites off Dakota Avenue and Lynn Avenue. Public at-grade crossings with active warning systems exist at Dakota Avenue, Yosemite Avenue, Vernon Avenue, and Lynn Avenue. Gates are installed at all public at-grade crossings except Vernon Avenue. Other private at-grade crossings also exist in this segment of the railroad line. There are approximately 6 through trains per day on the rail line within the study area, although past data shows that approximately 11 through trains per day used the line in 2006. It has been suggested by Union Pacific Railroad that train activity may increase in the future, however this is dependent upon market factors.

Canadian Pacific owns the north-south railroad line that crosses over TH 13 approximately 650 feet east of Yosemite Avenue. This line is commonly known as the Dan Patch Corridor and runs between Northfield and Minneapolis. The Dan Patch Corridor has been previously discussed as a potential commuter rail corridor and/or vehicle or bicycle trail corridor utilizing its swing bridge crossing location over the Minnesota River (which has been out of service for a decade). The Dan Patch Corridor is currently classified as an inactive rail line south of TH 13. North of TH 13 the line is leased by Twin Cities & Western Railroad and is used for storing and switching train cars in the Ports of Savage Area. Twin Cities and Western Railroad recently began rehabilitating the swing bridge to reconnect rail service north of the Minnesota River.

d. TRANSIT SERVICE

Minnesota Valley Transit Authority (MVTA) is the operator of local and express bus service in northern Scott County and parts of Dakota County. MVTA operates two existing bus routes that utilize this section of TH 13. Route 491 provides reverse commute express service between Minneapolis, Eagan, Shakopee and Prior Lake. Route 495 provides express service between the Marschall Road Transit Station (Shakopee), Burnsville Transit Station, and the Mall of America. Route 421, a local service flex route between Savage and Burnsville, runs nearby with stops in the downtown Savage area.

In addition to MVTA service, dial-a-ride, ADA, and Medical Assistance transit services are provided within the study area through the Metropolitan Council. The business enterprise portion of the Shakopee Mdewakanton Sioux Community also operates employee and guest shuttle services between the Mystic Lake Casino and the metropolitan area. Several of these routes utilize the TH 13 corridor.

MVTA and the City of Savage anticipate discussing potential transit connections to north Savage in the near future. Future transit needs and transit advantages, such as bus-only shoulders, were identified as items that should be considered during concept development. Currently, bus-only shoulders exist on the east-bound direction of TH 13, but not the west-bound direction at this location. MnDOT has identified extending bus only shoulders on TH 13 between the TH 13/101 intersection and east of I-35W in Burnsville (see **Appendix H**).

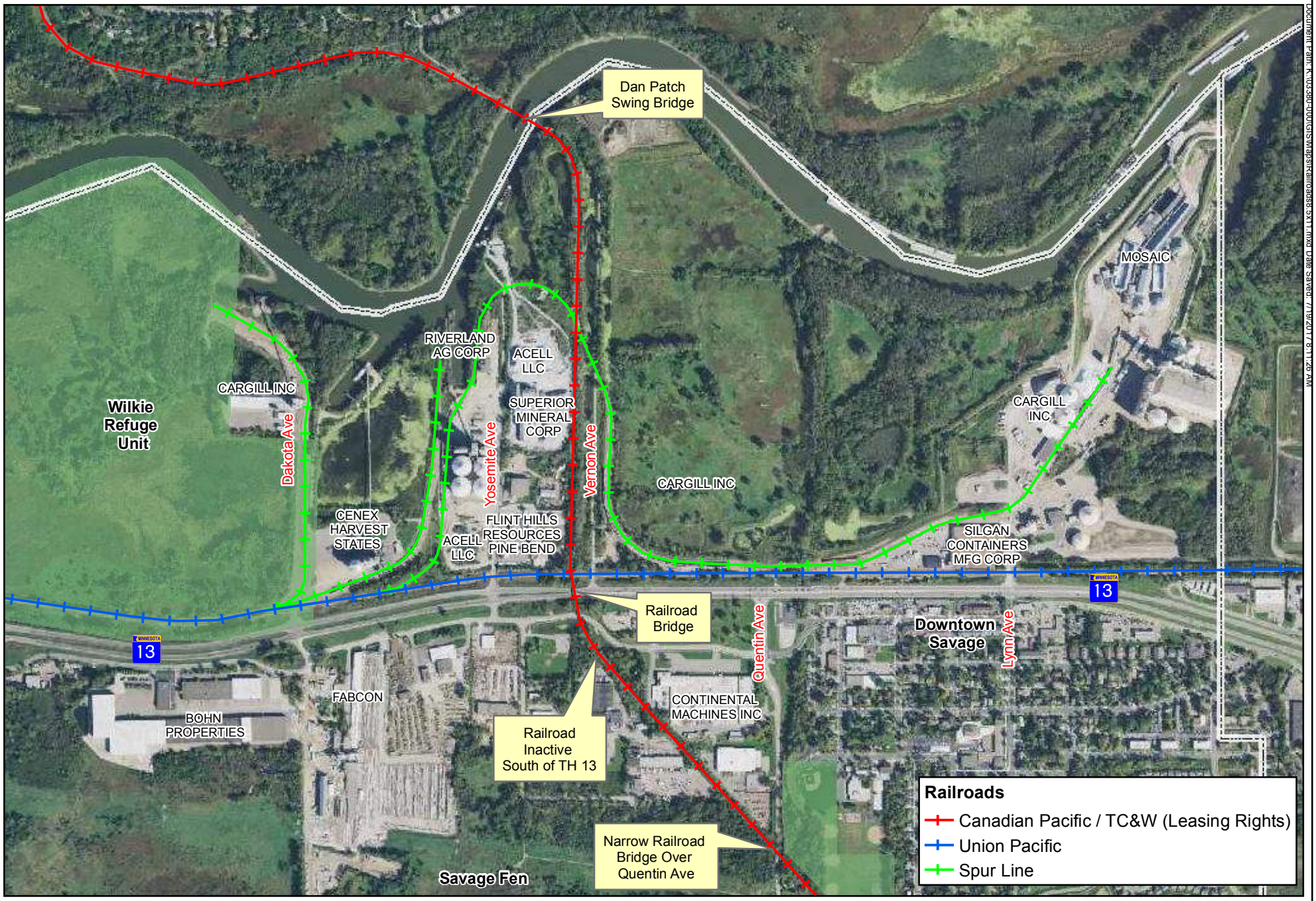

Figure 10 - Railroad Lines

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

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e. EXISTING TRAFFIC VOLUMES AND CONGESTION

The average annual daily traffic volume (AADT) on this segment of TH 13 was 47,200 AADT in 2014 according to MnDOT street series maps. The official MnDOT heavy commercial truck volume (HCAADT) in 2012 was 4,250 HCAADT. Approximately 9 percent of daily traffic is heavy commercial trucks.

Video surveillance of the study area intersections was completed in July 2016 to determine peak hour intersection turning movement volumes. The video also provided a daily traffic count of 54,809 vehicles and a daily heavy commercial volume of 5,073 (see **Table 1**). Heavy commercial trucks accounted for 9 percent of the total daily traffic on this day. Hourly heavy commercial truck volumes exceeded 9 percent in early morning and mid-day periods, reaching up to 18 percent during these times of day. Heavy commercial truck volumes decreased during the afternoon rush hour and evening periods. It has been noted that daily heavy commercial truck traffic to the Ports of Savage businesses is seasonal due to the shipment of agricultural commodities. However, it has also been noted that agricultural shipments to the Ports businesses have extended over longer periods of time in recent years due to farmers storing more commodities on-site until unit prices are more favorable. Approximately 75 percent of trucks destined to CHS come from the west.

From the video surveillance, the AM peak hour was established from 7:15-8:15 and the PM peak hour from 4:30-5:30 along the entire corridor. A traffic operation analysis of existing conditions was completed and was documented in a technical memo (available upon request). The results of the analyses show that although four of the five study intersections are currently operating at an overall level of service (LOS) D or better during the AM peak hour, all but one of them (Quentin Avenue) have one or more movements operating at LOS E or F. The PM peak hour results show that the overall Chowen Avenue and Lynn Avenue intersections LOS is acceptable, however, the three minor approach stop-controlled intersections (Dakota Avenue, Yosemite Avenue, and Chowen Avenue) all have two or more failing movements. Left turning movements on westbound (WB) and eastbound (EB) approaches of TH 13 have extended delays as there are few gaps in through traffic. The northbound (NB) and southbound (SB) approaches also have an unacceptable LOS. See **Figure 11** for existing turning movement volumes and **Figure 12** for existing intersection levels of service.

Freight trucks entering/exiting the Ports businesses via Dakota Avenue and Yosemite Avenue typically start and end their trip from the same direction, requiring trucks to make at least one left turn at TH 13 during their trip. The minor approaches on stop-controlled intersections have the highest delays due to high through traffic volumes during peak hours. The extensive delay for vehicles on the minor approaches creates a safety concern. If a vehicle is waiting too long for a gap, dangerous turning movements are more probable. The surveillance videos showed that when vehicles experienced long delays, some made left turns without a sufficient gap causing oncoming traffic to slow to avoid a collision. Existing volumes and difficulties of entering/exiting Dakota Avenue and Yosemite Avenue lead to traffic being diverted to other roadways and intersections. Demand at these intersections is likely higher, however the diverted traffic is hard to quantify.

Table 1 - Traffic Volume (24-hour Count)
TH 13 East of Quentin Avenue, July 14, 2016

	HOURLY VOLUMES				
TIME	CARS	% CARS	TRUCKS	% TRUCKS	TOTAL
12:00 AM	360	94%	25	6%	385
1:00 AM	225	91%	23	9%	248
2:00 AM	185	88%	25	12%	210
3:00 AM	184	82%	40	18%	224
4:00 AM	474	92%	44	8%	518
5:00 AM	1,520	92%	130	8%	1,650
6:00 AM	2,685	90%	303	10%	2,988
7:00 AM	3,524	91%	361	9%	3,885
8:00 AM	3,208	89%	400	11%	3,608
9:00 AM	2,390	84%	456	16%	2,846
10:00 AM	1,988	82%	431	18%	2,419
11:00 AM	2,155	83%	429	17%	2,584
12:00 PM	2,479	86%	399	14%	2,878
1:00 PM	2,597	85%	452	15%	3,049
2:00 PM	2,854	87%	436	13%	3,290
3:00 PM	3,841	91%	363	9%	4,204
4:00 PM	4,171	95%	228	5%	4,399
5:00 PM	4,174	96%	191	4%	4,365
6:00 PM	3,634	96%	146	4%	3,780
7:00 PM	2,119	97%	64	3%	2,183
8:00 PM	1,660	97%	43	3%	1,703
9:00 PM	1,593	98%	25	2%	1,618
10:00 PM	1,087	98%	25	2%	1,112
11:00 PM	629	95%	34	5%	663
TOTAL	**49,736**	**91%**	**5,073**	**9%**	**54,809**

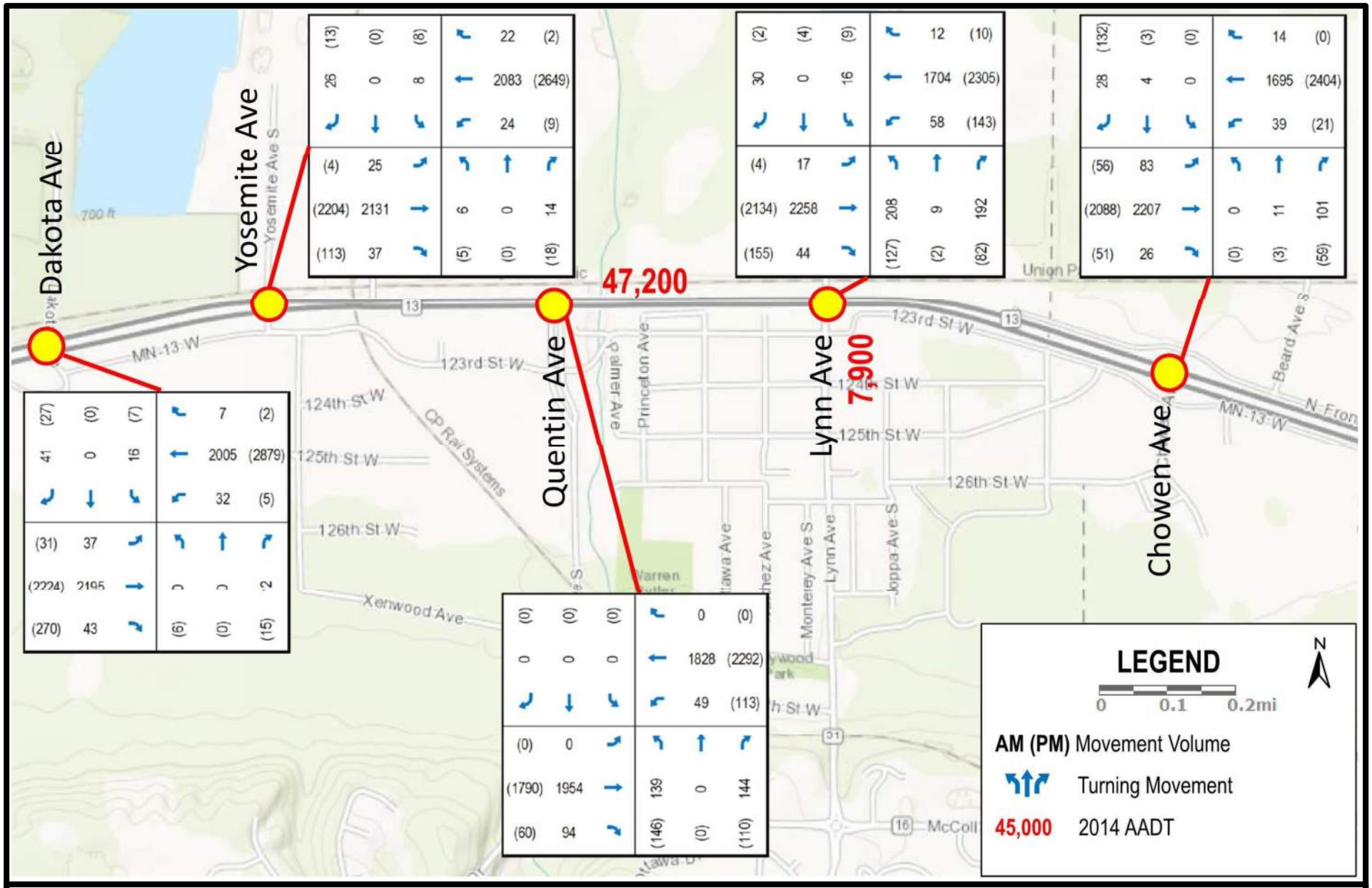


Figure 11 - Existing Turning Movement Volumes

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

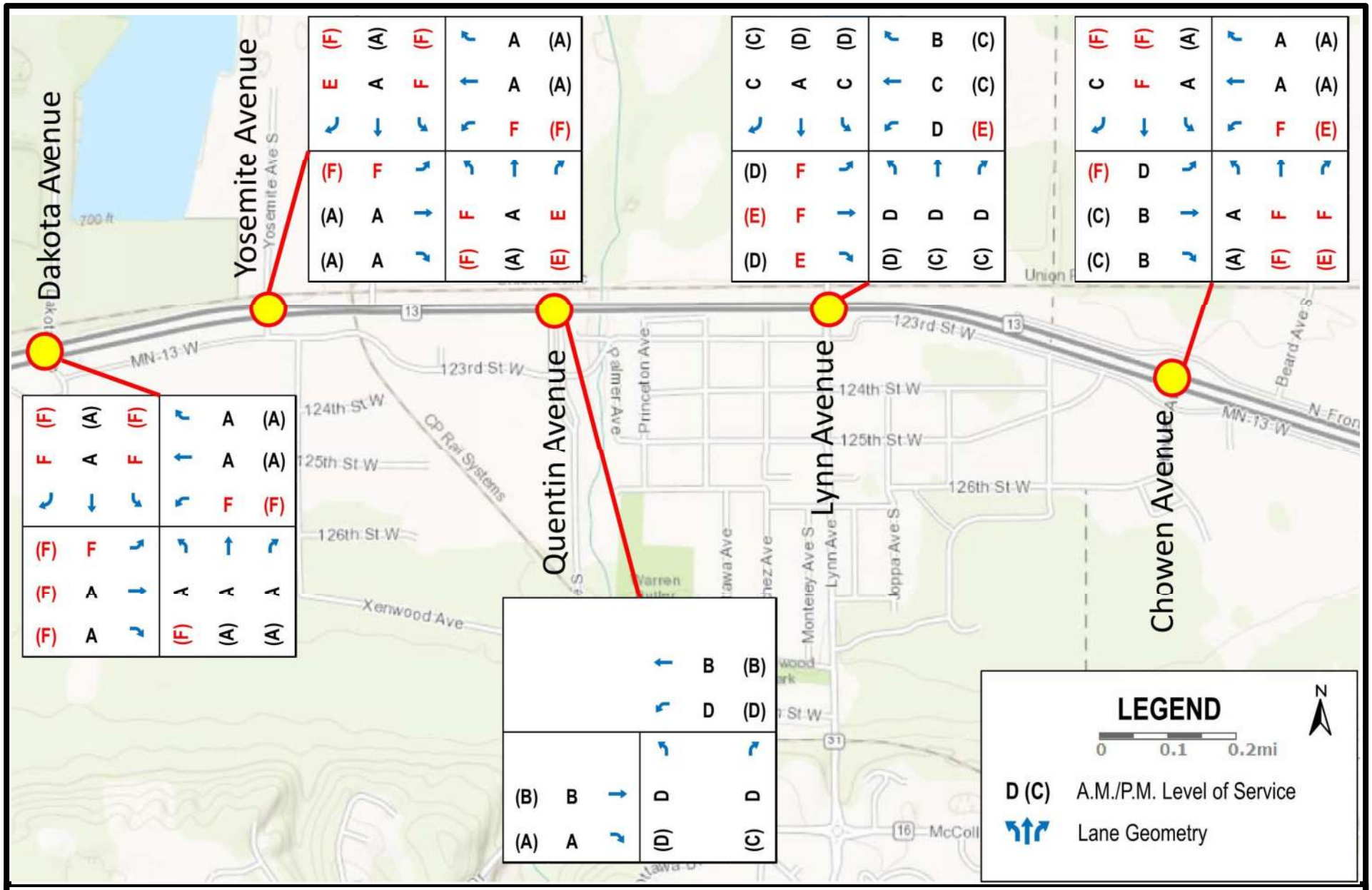


Figure 12 - Existing Levels of Service

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

f. CRASH HISTORY

A three-year and five-year crash analysis was performed for each intersection along the TH 13 study corridor. MnDOT's Crash Mapping Tool (MnCMAT Program) was used to collect the data. The Crash and Severity Rate were calculated to compare with average rates of similar intersections throughout the state. **Figure 13** shows the three-year and five-year crash and severity rates for each studied intersection along the corridor.

Two of the studied intersections have a history of higher-than average crash rates, when compared to similar intersections throughout Minnesota. The two intersections with a higher than average crash rate include:

- **TH 13 & Lynn Avenue** is classified as an urban high volume, high speed signalized intersection. This intersection was measured to have an extremely high crash rate and severity rate for the three-year and five-year analysis. The calculated crash rate was almost twice as high as the critical crash rate for both studies. The three-year crash study has a more significant crash and severity rate when compared to the five-year study.
- **TH 13 & Chowen Avenue** is classified as an urban high volume, high speed through-stop intersection. This intersection was also measured to have a high crash rate and severity rate for the three-year and five-year analysis periods. The three-year study shows no increase or decrease in crash rates in comparison with the five-year study.

The remaining three intersections did not include significant crash or severity rates. The three-year and five-year study results did not show a decrease or increase in rates when in comparison.

The primary types of crashes at all the study intersections are rear end and right angle crashes. Rear end crashes are primarily caused by variation of speed, and vehicles slowing to turn/enter turn bays, or vehicles pulling into traffic and not getting up to speed. Additionally, rear end crashes are more common at signalized intersections, especially on higher speed roads where vehicles are not expecting to stop.

Right angle crashes are most often associated with motorists taking a chance, misjudging a gap, or having limited sight distance. Motorists most often take chances when there are high conflicting volumes and high delay time.

Most of the crashes at the five study intersections along the TH 13 corridor were property damage and possible injury crashes, with Dakota Avenue, Lynn Avenue, and Chowen Avenue having the most severe crashes. Over the last five years, there has been one fatal and two serious injury crashes at Dakota Avenue, three serious injury crashes at Lynn Avenue, and five serious injury crashes at Chowen Avenue. Truck related crashes are summarized in **Appendix G**. Right angle and rear end (congestion related) crashes are common in the truck related crashes, including the fatality at Dakota Avenue.

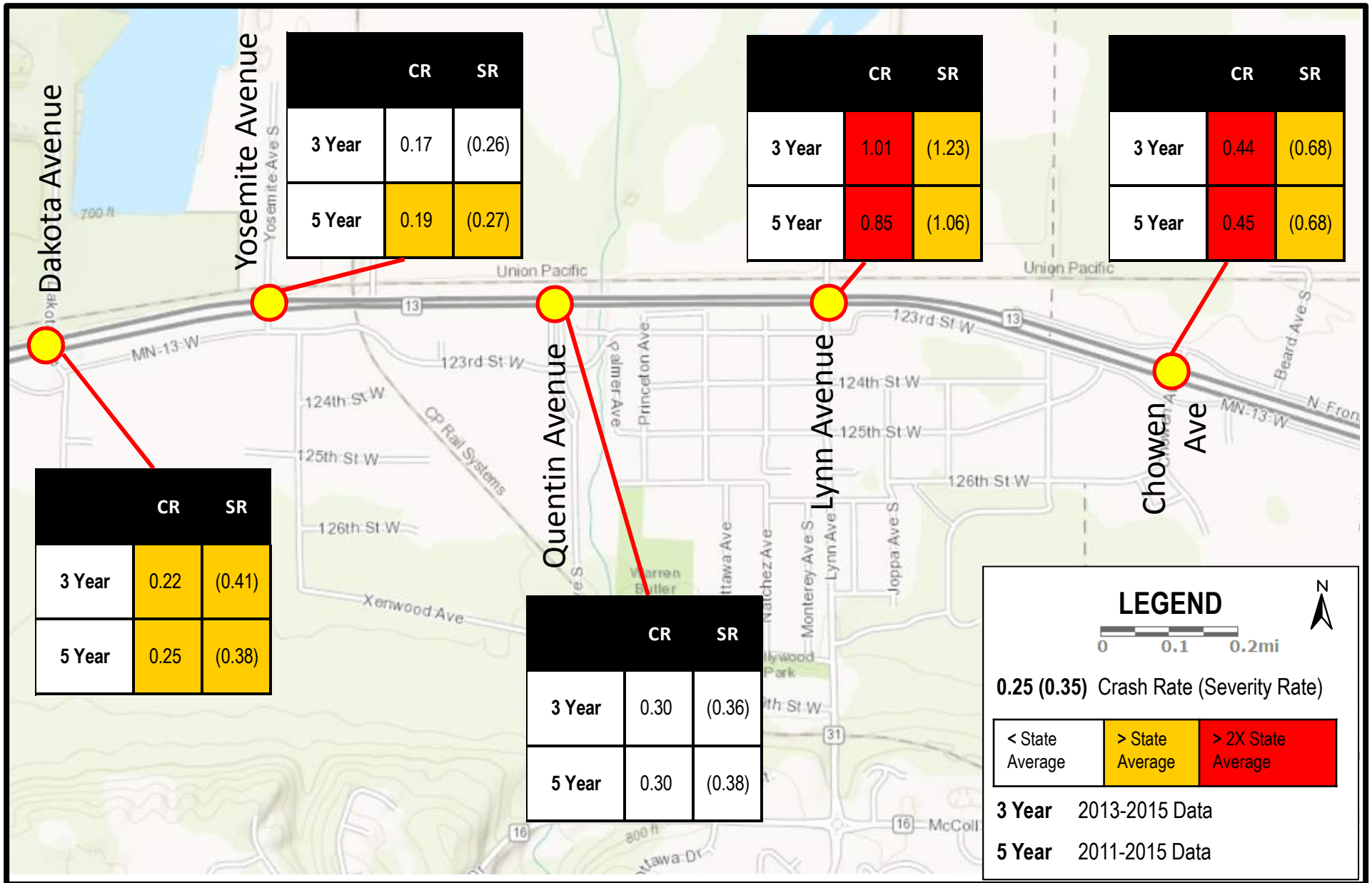


Figure 13 - Three and Five Year Crash Rates

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

Historical Crash Rate Comparison

The *Highway 13 Corridor Study* update completed in June 2013 contains crash data from 2007-2011 and is used for comparison in this study. **Table 2** shows the crash and severity rates from the previous study from 2007-2011 with the 2011-2015 rates for each intersection of interest.

Table 2 - Five Year Crash Rate Comparison

TH 13 INTERSECTION	2007-2011 RATES (2012 STUDY)		2011-2015 RATES		% INCREASE	
	CRASH RATE	SEVERITY RATE	CRASH RATE	SEVERITY RATE	CRASH RATE	SEVERITY RATE
Dakota Avenue	0.18	0.19	0.25	0.38	38.9	100.0
Yosemite Avenue	0.03	0.08	0.19	0.27	533.3	237.5
Quentin Avenue	0.13	0.19	0.3	0.38	130.8	100.0
Lynn Avenue	0.36	0.46	0.85	1.06	136.1	130.4
Chowen Avenue	0.23	0.39	0.45	0.68	95.7	74.4
Notes:			Greater than state averages			
			2+ times greater than state averages			

Crash rates have risen for each of the intersections along the corridor, as shown in **Table 2**. The increases for Lynn Avenue and Chowen Avenue have the biggest safety impact, with each crash rate now at more than double the states average crash rates. The crash rate at Yosemite Avenue is also a concern, which has increased fivefold from the previous five-year study. Although Quentin Avenue remains below the state average for crash and severity rate, it remains a safety concern due to the great increase in crashes from 2011-2015. It is worth noting that TH 13 was reconstructed in 2012 at Quentin Avenue, and the five-year crash rates include this reconstruction season. However, the recent three-year crash rate has a similar rate of 0.3, an increase over the 2012 study results.

Railroad Crash Summary

Railroad related crashes since 2000 reported to the Federal Rail Administration were reviewed. One property damage crash was reported at Lynn Avenue, two personal injury crashes reported at Yosemite Avenue, and one property damage crash was reported at Quentin Avenue. All reported crashes occurred prior to 2010, and involved trucks stopping on tracks or failing to stop at the crossing.

In 2012, MnDOT Rail Office provided a summary of issues related to at-grade crossings along this segment of TH 13. The summary identified a high number of gate arm replacements occurred at Dakota Avenue and Lynn Avenue. In the three years leading up to March of 2010, 42 gates were replaced at Dakota Avenue and 13 gates replaced at Lynn Avenue. Based on the report, commercial vehicles entering the ports would most commonly crash into the gates as they leave TH 13, typically eastbound traffic making a left across the highway. It was also found that at Dakota Avenue a portion of the broken gates were attributed to train switching operations taking place near the crossings with gates dropping on the trailers as the truck moves across the grade crossing. Limited vehicle stacking distance currently exists, ranging from 70 feet at Yosemite Avenue, 85 feet at Lynn Avenue, 90 feet at Vernon Avenue and 110 feet at Dakota

Avenue between the Union Pacific mainline track and TH 13. The MnDOT summary suggested that the addition of right and left lane acceleration lanes may help mitigate the lack of available gaps to enter TH 13 by providing truck refuge, particularly a right lane "escape," should a train approach while parked or queued on the tracks.

g. Forecast Traffic Volumes and Congestion

Figure 14 provides existing and forecasted traffic volumes. Existing MnDOT 2014 traffic counts along the TH 13 corridor in the vicinity of Dakota Avenue and Yosemite Avenue are 47,200 vehicles per day. In comparison, the 2040 travel demand forecast from the Metropolitan Council regional travel demand model, based upon a four-lane expressway capacity constraint, is estimated at 58,200 vehicles per day. This 2040 forecast represents an approximate 23 percent increase over 2014 volumes. Accordingly, a growth factor of 1.23 was applied to July 2016 turning movement data for all study area intersection approaches, except for the south approach to Lynn Avenue where a 1.41 growth rate was used. The 2040 heavy commercial truck percentage of 9 percent was unchanged from the existing conditions, resulting in a 2040 HCADT of 5,200.

The 2040 AM and PM peak hour volumes were used to run the Synchro/SimTraffic Model. Assumed geometric and traffic control changes for the future analyses include extended turn lanes and acceleration lanes on TH 13 at the Dakota Avenue intersection (programmed improvements by MnDOT for 2017), and the installation of a traffic signal at the intersection of Chowen Avenue and TH 13 (unprogrammed improvement) for the 2040 condition.

The results of the analyses show that due to the increase in traffic through the TH 13 corridor, operations generally continue to degrade. In 2040, all intersections analyzed have multiple approaches at LOS E or LOS F in the AM and PM peak hours, and delay increases significantly from existing conditions. The 2040 delay is an average of over 200 seconds per vehicle during the AM and PM peak for vehicles traveling northbound/southbound Dakota Avenue and Yosemite Avenue. The programmed extended turn lanes and acceleration lanes on TH 13 at Dakota Avenue show improvements to the operation at that intersection. Minor approach right turns improve, and the additional storage for left turns from TH 13 keep queueing vehicles from blocking through traffic, improving major approach through traffic LOS. The unprogrammed traffic signal at Chowen Avenue improves the operation for the minor approaches at Chowen Avenue; however, a signal at this location would also significantly reduce the LOS for the TH 13 mainline through approaches. See **Figure 15** for future turning movement volumes and **Figure 16** for future intersection levels of service.

h. Summary

TH 13 is a constrained corridor bound by environmental features, railroad lines, and industrial land uses. As traffic continues to increase on TH 13, the traffic and safety issues outlined above will worsen. With high through traffic volumes on TH 13, access to the Ports area will become more challenging for freight trucks. Eliminating left turn movements from TH 13 by constructing a grade separation and supporting frontage road network is recommended to accommodate forecast traffic volumes and address existing safety concerns on TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue. See **Figure 17** for the Issues Map.

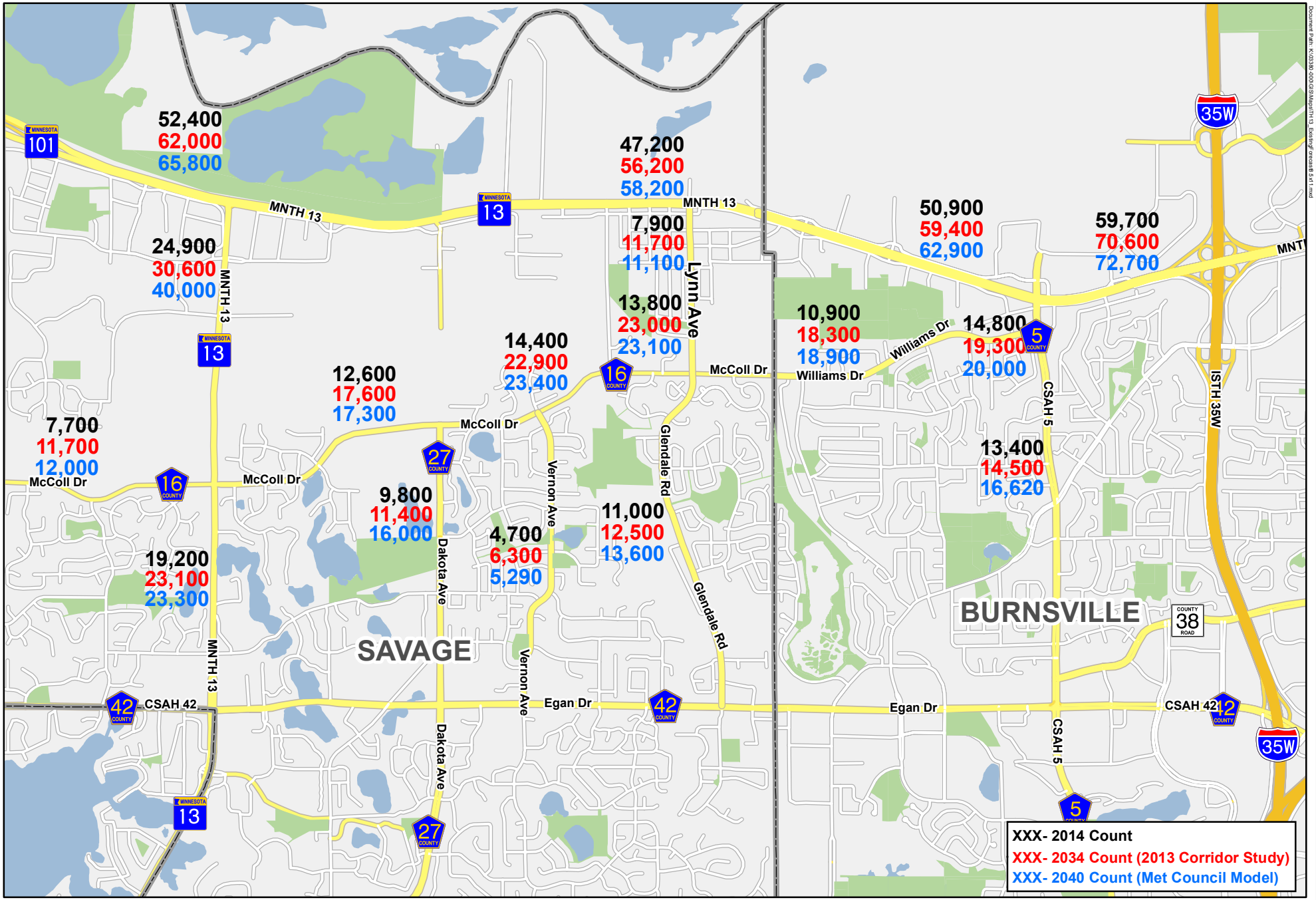


Figure 14 - Existing & Forecasted Traffic Volumes

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

N

0 3,000 Feet

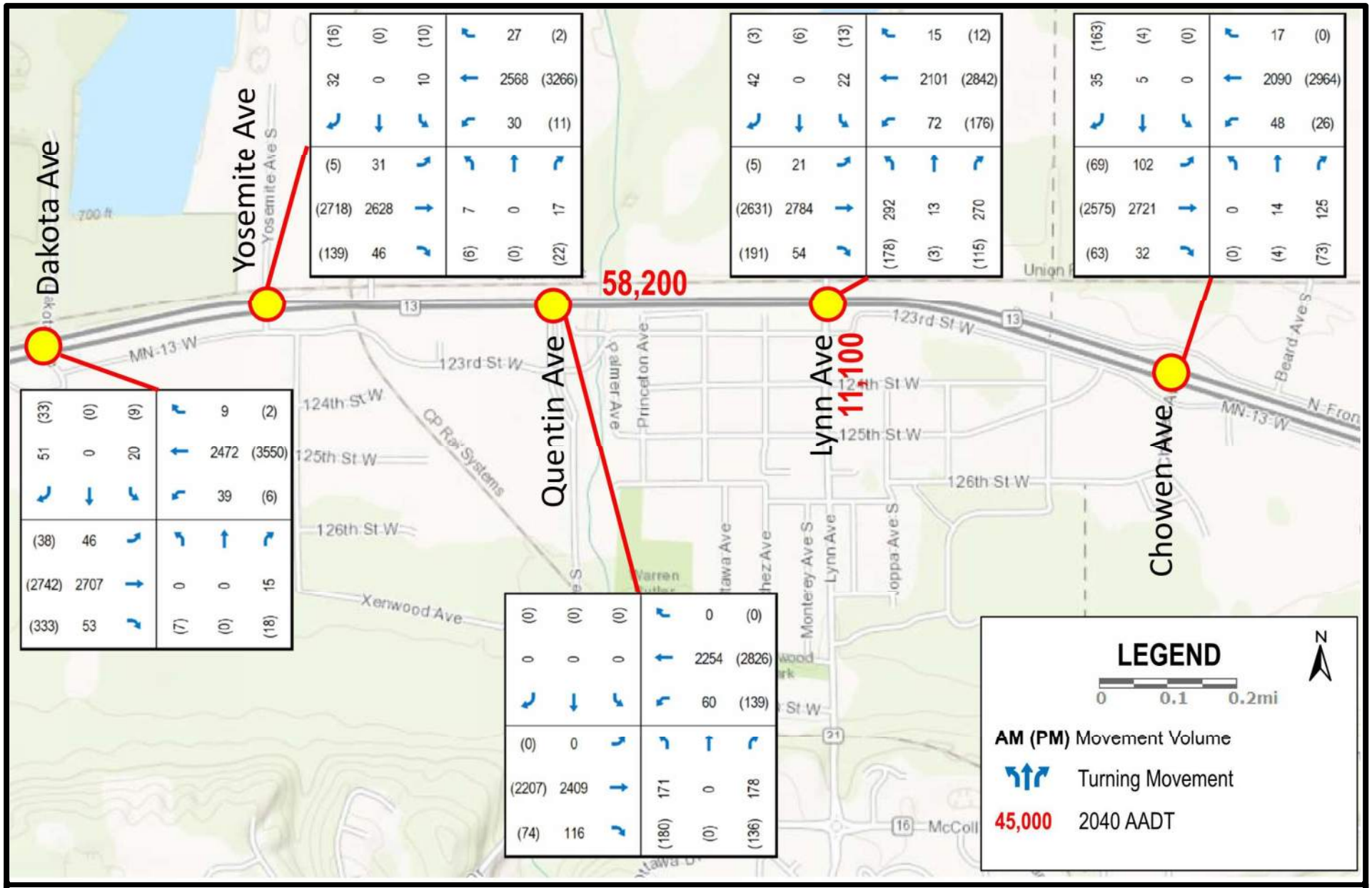


Figure 15 - Future Turning Movement Volumes

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

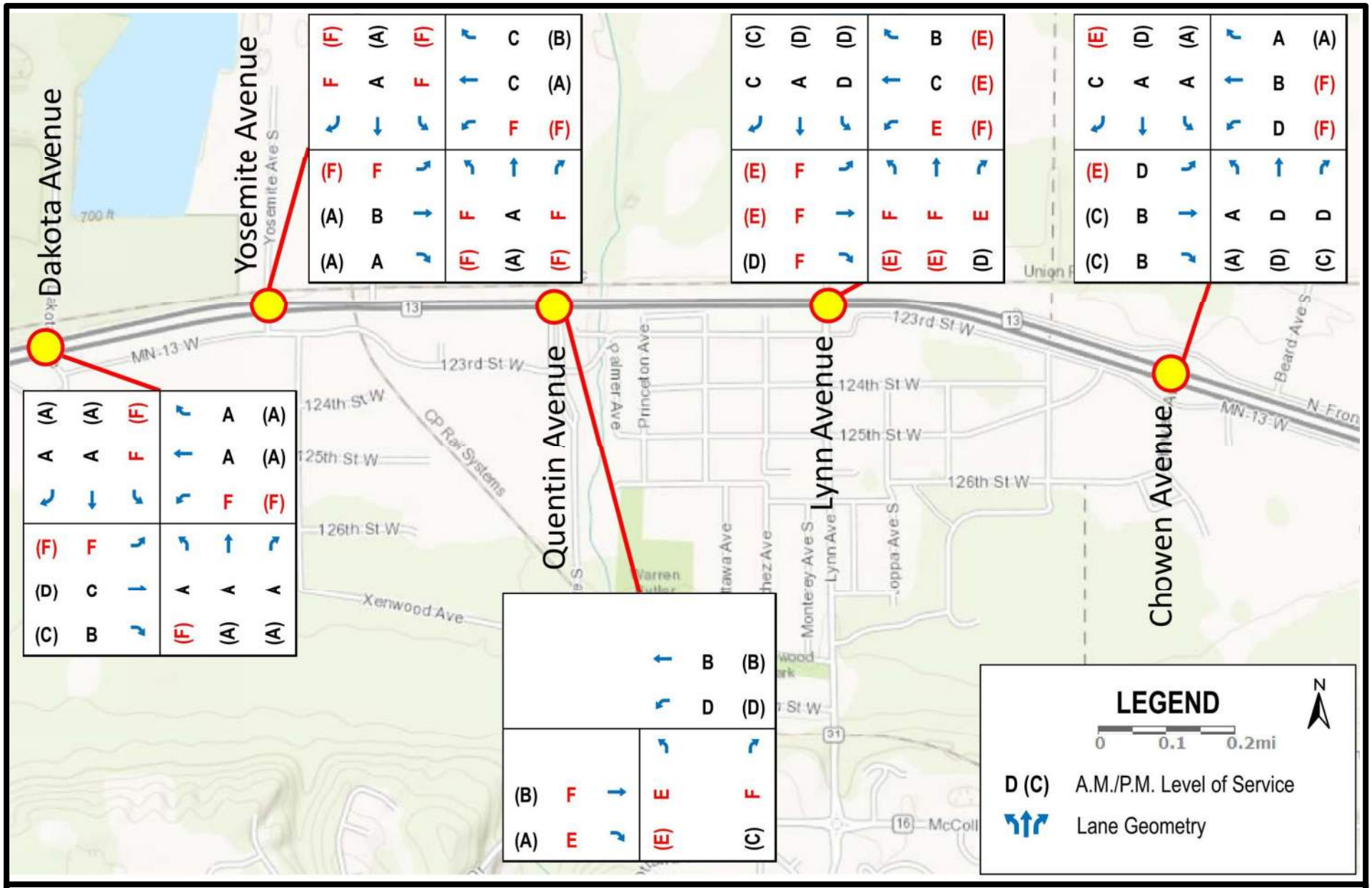


Figure 16 - Future Levels of Service

TH 13 Dakota Ave - Yosemite Ave Design Study

City of Savage / Scott County

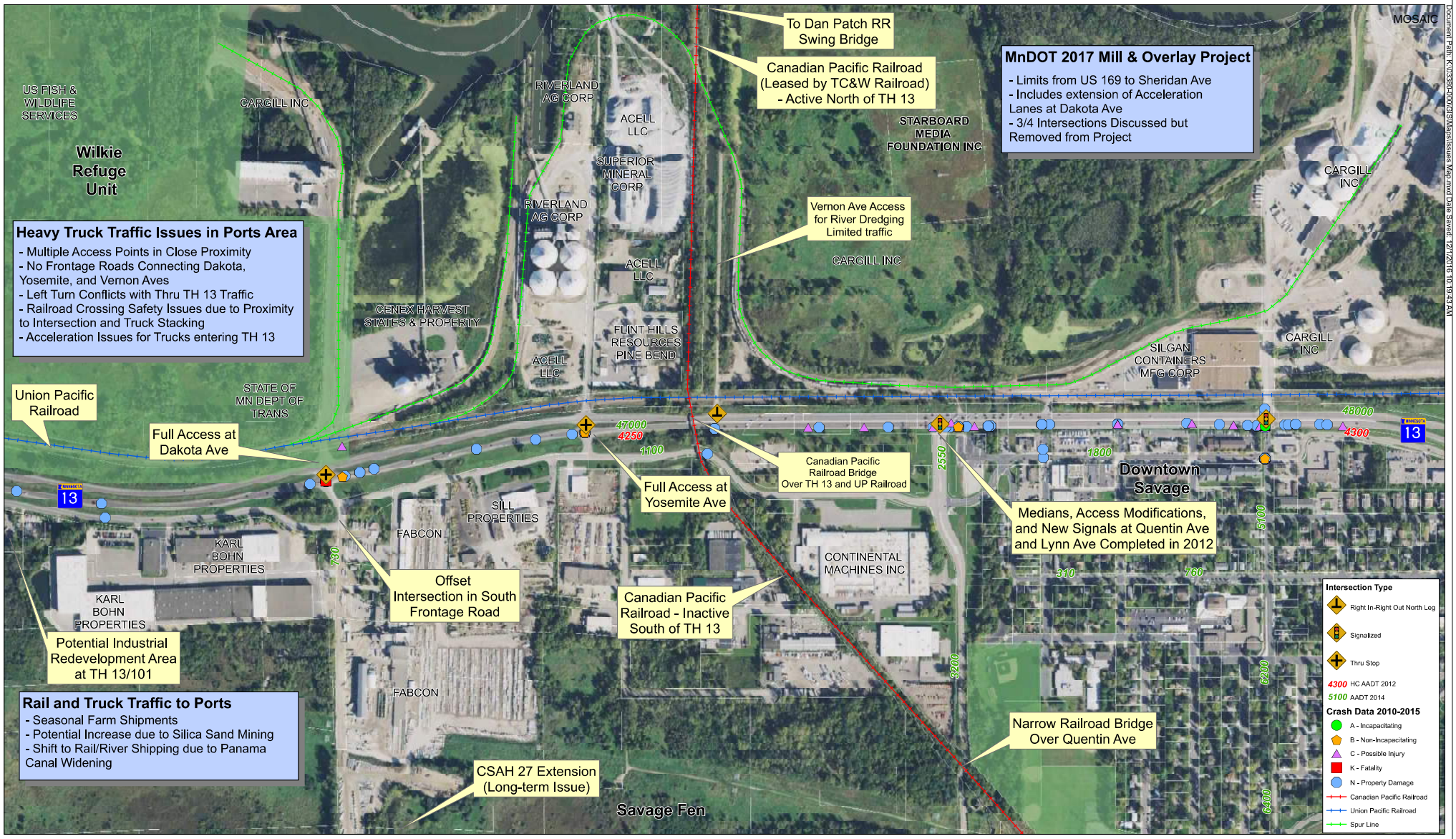


Figure 17 - Issues Map

TH 13 Dakota Ave - Yosemite Ave Design Study
City of Savage / Scott County

4. Concept Development and Evaluation

This section discusses the design concepts developed for Trunk Highway (TH) 13 in the vicinity of Dakota Avenue and Yosemite Avenue, along with the assumptions and methodology used to evaluate these design concepts. It also provides a discussion and rationale for how the concepts were scored relative to each criterion.

a. Concept Development Process

Concept development utilized a two-step process. First, several high-level concepts were prepared during a design charrette. Second, a high-level screening was performed by the participating agencies to select concepts to be carried forward to the concept evaluation phase.

Step 1: Design Charrette

In October 2016, a design charrette was held at the Savage City Hall. The purpose of the design charrette was to provide a brainstorming session to identify different high-level concepts for road improvements along the TH 13 corridor in the Dakota Avenue and Yosemite Avenue area. A total of 19 people participated in the charrette. Representatives included MnDOT, Scott County, and City of Savage staff, business representatives, and the consulting team. Business representatives in attendance were from Road Machinery & Supplies and CHS, Inc.

Participants were divided into three groups. Each group was asked to develop three concepts for improvements along TH 13. Participants were asked to consider and evaluate intersection modifications to Dakota and Yosemite Avenues, frontage roads, grade separations, and road and railroad realignments. Low- and high-cost solutions were explored. The groups presented their concepts with the entire group for discussion.

Design charrette concepts explored several options, including access consolidation of Dakota and Yosemite Avenues, frontage road extension along the north side of TH 13, grade separation alternatives at Dakota and Lynn Avenues, shifting of the Union Pacific railroad, and alternative designs to TH 13. A meeting summary of the design charrette is provided in **Appendix D4**.

Step 2: High-Level Screening

Following the design charrette, the City of Savage, Scott County, and MnDOT staff conducted an independent review of the concepts and agreed that four concepts should be carried forward for more detailed concept development, traffic analysis and screening. Some of the evaluation considerations involved in this initial high-level screening included: consistency with the TH 13 design vison, ability to address heavy left turning movements, interaction with railroad infrastructure and operations, consistency with land use plans, and consistency with MnDOT design standards. A fifth concept was added during the evaluation analysis. All the evaluated designs provide grade separation for left turns from the TH 13 mainline and include bus only shoulders.

b. DESCRIPTION OF CONCEPTS

A summary of the five concepts that advanced to the concept evaluation phase is provided below. Preliminary layouts for the evaluated concepts are provided in **Appendix A**.

Design Concept A: Dakota Avenue Diamond Interchange and Railroad Grade Separation

- Grade separation over TH 13 at Dakota Avenue and grade separation of Union Pacific Railroad and spur lines at Dakota Avenue; north frontage road connecting Dakota Avenue and Yosemite Avenue
- No TH 13 access at Yosemite Avenue; ingress and egress at Yosemite Avenue must use Dakota Avenue grade separation and north frontage road
- Realignment of Union Pacific Railroad main line shifting closer to TH 13; frontage road north of railroad main line
- At-grade crossings of the mainline track and the Ports of Savage spur track at Dakota Avenue and Yosemite Avenue are eliminated
- Four lanes maintained on TH 13
- Transit Advantages: bus only shoulder added in both directions on TH 13

Design Concept B: Dakota Avenue Grade Separation; Access via Yosemite Avenue

- Grade separation under TH 13 at Dakota Avenue with at-grade crossing of Union Pacific Railroad; north frontage road connecting Dakota Avenue and Yosemite Avenue between TH 13 and Union Pacific Railroad mainline
- Right-in only westbound at Yosemite Avenue
- Right-in right-out only eastbound at Yosemite Avenue
- Eastbound TH 13 traffic destined for Ports must turn right at Yosemite Avenue, use south frontage road, and then cross under Dakota Avenue grade separation and use north frontage road
- Yosemite Avenue traffic wishing to continue east on TH 13 must use north frontage road, cross under the Dakota Avenue TH 13 grade separation, and then use south frontage road and enter TH 13 at Yosemite Avenue
- Existing at-grade railroad crossing conditions at Dakota Avenue and Yosemite remain
- Four lanes maintained on TH 13
- Transit Advantages: bus only shoulder added in both directions on TH 13

Design Concept B1: Dakota Avenue Grade Separation; Access via Yosemite Avenue

- Design Concept B1 includes the same components as Design Concept B plus the following modifications
- Westbound Yosemite Avenue right-in, right-out access is closed and a westbound off ramp is added east of Vernon Avenue, east of the Canadian Pacific Railroad Bridge over TH 13
- The north frontage road is extended between Yosemite Avenue and Vernon Avenue under the Canadian Pacific Railroad Bridge
- An acceleration lane is added to the eastbound right-in, right-out access at Yosemite Avenue, extending under the Canadian Pacific Railroad Bridge
- Additional analysis regarding Design Concept B1 and the existing Canadian Pacific Railroad Bridge was completed, as summarized in a technical memo (**Appendix C**)

Design Concept C: Dakota Avenue Tight Diamond Interchange

- Grade separation under TH 13 at Dakota Avenue with at-grade crossing of Union Pacific Railroad; north frontage road connecting Dakota Avenue and Yosemite Avenue and tight diamond interchange at Dakota Avenue with coordinated signals at eastbound and westbound ramp terminals
- Right-in only westbound at Yosemite Avenue
- Eastbound access to Yosemite Avenue closed
- Eastbound TH 13 traffic destined for Yosemite Avenue exits at Dakota Avenue interchange and utilizes the north frontage road
- Eastbound or westbound traffic leaving Yosemite Avenue uses north frontage road and Dakota Avenue interchange
- Existing at-grade railroad crossing conditions at Dakota Avenue and Yosemite Avenue remain
- Four lanes maintained on TH 13
- Transit Advantages: bus only shoulder added in both directions on TH 13

Design Concept D: Grade Separation between Dakota Avenue and Yosemite Avenue

- Grade separation over TH 13 located in between Dakota Avenue and Yosemite Avenue with at-grade crossing of Union Pacific Railroad; north frontage road connecting Dakota Avenue and Yosemite Avenue and realigned frontage road south of TH 13 between Dakota Avenue and Yosemite Avenue
- No left turns allowed at Dakota Avenue or Yosemite Avenue; these movements must use frontage roads and new bridge between Dakota Avenue and Yosemite Avenue
- Right-in only westbound at Yosemite Avenue
- Eastbound access to Yosemite Avenue closed
- Right-in right-out access only eastbound and westbound at Dakota Avenue
- Acceleration lanes eastbound and westbound at Dakota Avenue
- Existing at-grade railroad crossing conditions at Dakota Avenue and Yosemite Avenue remain
- Four lanes maintained on TH 13
- Transit Advantages: bus only shoulder added in both directions on TH 13

C. CONCEPT EVALUATION

Nine criteria were identified to evaluate overall performance and effectiveness of each design concept in addressing project benefits both today and in a 2040 forecasted condition. Evaluation of the five design concepts against the described criteria is summarized in the paragraphs that follow and in two evaluation tables found in **Appendix B**.

The first table in **Appendix B** provides a preliminary score for each design concept based upon a subjective evaluation of how well that alternative performs regarding the stated criterion compared to other design concepts. Performance measures are identified for each criterion as a means of evaluating effectiveness of a design concept for the identified criterion.

The second table in **Appendix B** provides notes and observations related to the scoring. Ratings range from low to high with intermediate ratings of low-medium, medium, and medium-high. A score of 1 is assigned to a low rating (alternative performs the poorest compared to other design concepts with regard to the stated criterion) and 5 is assigned to a high rating

(design concept performs the best compared to other design concepts with regard to the stated criterion).

Evaluation Criterion: Overall TH 13 Regional Mobility
Performance Measures: TH 13 2040 LOS and Railroad Grade Separation
This criterion measures the ability to provide an acceptable Level of Service (LOS) for existing and forecasted 2040 traffic volumes, and overall design consistency with the function of TH 13 as a principal arterial and regional mobility corridor. The design concepts are scored based upon the LOS they provide along the TH 13 mainline and their provision of railroad grade separation along the Union Pacific mainline.

Design Concept A was given a high rating for this criterion because of its grade separated diamond interchange at Dakota Avenue and grade separated bridge crossing of the Union Pacific Railroad. Design Concepts B/B1, C, and D also provide a high LOS along TH 13, but do not provide grade separation of the Union Pacific Railroad mainline, and therefore, were given a moderate-high rating for this criterion.

Evaluation Criterion: Local Travel Time
Performance Measure: Average Minutes/Vehicle AM/PM Peak, Including Train Delay
This criterion measures travel time to/from three local destinations along TH 13 in the study area (CHS/Cargill via Dakota Avenue, Port Richard via Yosemite Avenue, and along Dakota Avenue approximately 350 feet south of the existing south frontage road) to/from TH 13 near Vernon Avenue (eastern study area limits) and TH 13 near Louisiana Avenue (western study area limits). Time is measured in average minutes per vehicle and totaled for the AM/PM peak. Only vehicles with origin/destinations at one of the three locations were included in the analysis; TH 13 through traffic was not included. A total of twelve travel times were measured and totaled for each design concept. An average train delay was also calculated and incorporated for Design Concepts B/B1, C, and D. For Design Concept A, train delay was eliminated with the grade separation of the railroad line.

Existing condition modeled travel time for the designated routes was 17.1 minutes, with nearly all the travel time related to turning movement delays to/from TH 13 (i.e., high TH 13 volumes heavily restrict truck turning movements when modeled). All five design concepts significantly reduce travel time compared to this existing condition by eliminating the need to cross TH 13 traffic and improving the ability to merge with TH 13 traffic. Design Concepts A, C, and D were all given high ratings for this criterion with average travel time reductions greater than 13 minutes per vehicle compared to the existing condition. Design Concept B/B1 was given a moderate-high rating for this criterion with an average travel time reduction of greater than 12 minutes per vehicle compared to the existing condition.

Evaluation Criterion: Safety/Crash Reduction
Performance Measures: Reduction of At-Grade Access and Conflict
This criterion measures the degree to which a design concept reduces intersection related crashes and conflict along TH 13 and the existing Union Pacific Railroad mainline and Ports of Savage spur lines.

Design Concept A was given a rating of high for this criterion because it removes all at-grade access from TH 13, grade-separates left turns from TH 13, and removes at-grade access of the Union Pacific Railroad mainline and Ports of Savage spur lines. Design Concepts B/B1, C, and D all grade-separate left turns from TH 13, however, these concepts were rated lower than Concept A because they include at-grade crossings of the Union Pacific Railroad and maintain varying levels of at-grade TH 13 access.

Design Concepts B/B1 and C were given a moderate-high rating for this criterion, with no major TH 13 crash or conflict concerns. Concept B1 is slightly preferable to Concept B for this criterion due to the addition of a westbound off ramp and extended north frontage road under the Canadian Pacific Railroad Bridge and the addition of an eastbound acceleration lane at Yosemite Avenue.

Design Concept D allows the most at-grade access to TH 13 with an eastbound and westbound right-in right-out at Dakota Avenue and eastbound right-in only at Yosemite Avenue. Of particular concern with Design Concept D is the at-grade right-in right-out only intersection at Dakota Avenue, which includes poor sight lines and a potential intersection breakdown with the presence of a train. Accordingly, Concept D was given a low-moderate rating with regard to the criterion.

Evaluation Criterion: Construction & Right-of-Way Costs
Performance Measure: Planning Level Order of Magnitude Costs

This criterion assigns generalized planning level unit costs for interchanges, bridges, ramps, frontage roads, and other improvements based on other similar projects to arrive at an “order of magnitude” comparison of overall construction and right-of-way costs. This approach is intended to provide enough detail to determine which design concept is the most expensive, in the middle, and least expensive in today’s dollars. Costs include three years of inflation and a contingency.

Design Concept A was given a rating of low for this criterion because it would likely have the most significant costs ($45-$53 million) due to the full diamond interchange at Dakota Avenue over TH 13, grade separation of the Union Pacific Railroad mainline and Ports of Savage spur lines, railroad realignment, and relocation of a major overhead transmission line north of TH 13. Design Concept B was given a rating of high for this criterion because it would likely have the lowest costs ($25-$30 million) due to just a westbound on-ramp at Dakota Avenue and TH 13 and the existing south frontage road can be used as part of the design. Design Concept B1 is the second lowest cost; approximately $1.5 million more than Design Concept B ($26.5-$31.5 million). Design Concept C ($30-$35 million) and Design Concept D ($32-$37 million) would both likely have costs somewhere in-between A and B/B1, so they were given ratings of moderate for this criterion.

Evaluation Criterion: Freight Mobility
Performance Measure: Directness of travel to the Ports of Savage and businesses south of TH 13, including required turns and associated acceleration/deceleration
This criterion assesses the ability of eastbound and westbound truck traffic to travel directly from TH 13 to the Ports of Savage over the Union Pacific Railroad and to businesses south of TH 13. Design concepts are evaluated based upon the directness of travel, including required turns and associated acceleration/deceleration.

Design Concept A received a high rating for this criterion because it has the most direct routing with a grade separated diamond interchange at Dakota Avenue and grade separated railroad. This results in the lowest amount of potential turns and acceleration/deceleration of all the design concepts. Design Concept C was given a moderate-high rating for this criterion because it also has a grade separated diamond interchange at Dakota Avenue, but no grade separated railroad. This results in the second lowest amount of potential turns and acceleration/deceleration of all the design concepts. Design Concepts B and D both have some circuitous routing that requires more turning and acceleration/deceleration than Design Concepts A or C. Accordingly, Design Concepts B and D were both given a rating of low-moderate for this criterion. Design Concept B1 is slightly preferable to Design Concept B for this criterion due to the added westbound off ramp at Vernon Avenue.

Evaluation Criterion: Railroad Crossing Benefits
Performance Measures: Rail Crossing Safety and Traffic Benefits
This criterion evaluates the presence of railroad grade-separation and the overall design of each alternative with respect to traffic performance and safety.

Design Concept A provides grade separation from the Union Pacific mainline track, and therefore performs best with respect to this criterion. Of particular concern with Design Concept D is the at-grade right-in right-out only intersection at Dakota Avenue, which includes poor sight lines and a potential intersection breakdown with the presence of a train. Accordingly, Concept D was given a low rating with regard to the criterion. Design Concept B/B1 and Design Concept C perform similar with regard to this criterion; less desirable than Concept A, but measurably better than Concept D. Accordingly, Design Concepts B/B1 and C were each given a rating of moderate for overall railroad crossing performance.

Evaluation Criterion: Environmental/Historical/Drainage Impacts
Performance Measure: Degree to Which Impacts are Minimized
This criterion evaluates the ability of each design concept to minimize impacts to environmental and historical features. It also evaluates the amount of surface water runoff and associated drainage that is required.

Design Concept A has the largest amount of impervious surface and largest potential for impacts to environmental features due to its large footprint beyond existing right-of-way, such as wetlands (DNR public waters) northwest of the Dakota Avenue intersection. The existing surface parking lot south of Dakota Avenue is also impacted under Concept A. Accordingly, Concept A was given a rating of low for this criterion. Design Concept B has the smallest footprint and least amount of new construction and impervious surface. Accordingly, Concept B

was given a rating of high for this criterion. Design Concept B1 has a slightly larger footprint than Concept B, but still had a rating of high for this criterion. Design Concepts C and D were both given ratings of moderate-high for this criterion, both having similar amounts of impervious surface and some impacts to the existing surface parking lot south of TH 13.

Evaluation Criterion: Transit Benefits
Performance Measure: Mobility of Transit Only Bus Shoulder
This criterion evaluates the ability of each design concept to allow for the uninhibited flow of transit only bus mobility along the eastbound and westbound shoulders of TH 13.

Design Concept A was given a high rating for this criterion, with no at-grade access to TH 13 and no potential for truck queuing along the eastbound or westbound shoulders of TH 13. Design Concepts C and B1 were both given a moderate to high rating for this criterion, each having one right-in, right-out that could result in some shoulder queuing, with remaining access via on/off ramps or acceleration lanes. Design Concept B was given a low to moderate rating for this criterion due to an at-grade right-in right-out westbound access at Yosemite Avenue and an at-grade right-in only westbound access at Yosemite Avenue that could occasionally conflict with bus traffic. Design Concept D was given a low rating for this criterion, with the highest potential for conflicts along the transit only bus shoulder. Concept D allows for at-grade right-in right-out westbound and eastbound access at Dakota Avenue as well as at-grade right-in only access westbound at Yosemite Avenue.

Evaluation Criterion: Freight Funding Potential
Performance Measure: Overall Level of Freight Improvements
This criterion evaluates the ability of each design concept to meet anticipated freight funding program (both dedicated and competitive) goals through Metropolitan Council, MnDOT or the US Department of Transportation (US DOT).

Design Concept A was given a high rating for this criterion because of its ability to address both rail and truck freight benefits due to the grade separation of TH 13, the Union Pacific Railroad mainline and the Ports of Savage spur lines. Design Concepts B/B1, C and D were all given a rating of moderate-high for this criterion because they all provide truck freight benefits with the grade separation from TH 13, but do not provide additional railroad benefits (crossing removals).

d. EVALUATION SUMMARY

Based on the above evaluation of the concepts using the evaluation matrix criteria in **Appendix B**, the following observations were made:

1. By eliminating left turning movements and improving merging operations for trucks to/from TH 13, all the design concepts would significantly improve safety, access, and mobility and reduce delay for freight in the Ports of Savage area.
2. Design Concepts A, B1, C, and B all performed well with regard to the identified criteria, with scores of 37, 36, 35 and 33 respectively out of a total possible score of 45.
3. Design Concept D was the least effective in addressing the identified criteria, with an overall score of 26 out of a total possible score of 45.

4. Design Concept B/B1 likely have the lowest project construction costs ($25-$31.5 million) since it requires only one on-ramp (westbound) and would utilize TH 13 and the existing south frontage road.

As stated previously, it is important to emphasize that although this evaluation was based on technical analysis, there are also subjective judgements that were made to arrive at the identified conclusions. Additionally, if one were to weigh certain criteria with higher importance than others, or if criteria were to be added to or removed from this analysis, a variety of different conclusions could potentially be drawn. Accordingly, this analysis was intended to be a conversation starter only and should not be used to draw absolute conclusions.

5. Public and Agency Input

a. Business and Landowner Meetings

In September 2016, businesses and landowners in the study area were invited to participate in a group meeting. The purpose of the meeting was to introduce the study and provide an opportunity to identify issues and concerns to consider during concept development. Thirteen people were in attendance, with five representing businesses including Fabcon, Turner Excavating, and Road Machinery & Supplies. Common themes emerged that trucks avoid using Dakota Avenue and Yosemite Avenue throughout the day due to the difficulty in entering/exiting TH 13. Alternate routes used for businesses south of TH 13 are 126th Street and Quentin Avenue (both signalized). They agreed that short-term fixes to the existing intersections will not work; a long-term solution is needed.

An open house was held in May 2017 to present the findings of the study and collect additional input on the design concepts. The use of Highway 13 and the Ports of Savage to transport oversized loads was identified as an issue that may require further design consideration. Comments received at the open house are provided in **Appendix D**. In particular, representatives from Chart Industries provided information related to the use of TH 13 and the Ports of Savage to transfer oversized freight via barges. The size of these overweight shipments and ability to maneuver them at intersections and near bridge structures should be considered when evaluating the design concepts further.

b. Railroad Agency Coordination

Railroad agency coordination meetings were held with Union Pacific Railroad and Twin Cities and Western Railroad during the initial stages of the study. A follow-up meeting with Twin Cities and Western Railroad was held in April 2017 near the end of the study. The railroad agencies were also provided the design concepts for review and comment. Railroad agency coordination materials are provided in **Appendix E** and summarized below.

In April 2017, Canadian Pacific provided review of the evaluated concepts and noted that Concept B1 with the proposed acceleration lane under the Canadian Pacific railroad bridge structure would require detailed review and comments by Canadian Pacific. The existing pier and back wall footings in this area would have to be reviewed accordingly to make sure they would accommodate the proposed traffic lane and retaining wall structure.

Union Pacific Railroad provided comments on the design concepts in May 2017. Union Pacific noted that they support the closing of the Dakota Avenue and Yosemite Avenue railroad crossings and may provide monetary contributions to assist with the closures. For Concept A, the grade separation of the Dakota Avenue and Yosemite Avenue crossings is supported, however adding a curve to the mainline track as part of the railroad realignment is not supported. Railroad right of way property impacts are also a concern. For Concepts B, B1, C, and D, Union Pacific noted that the potential increase in traffic and potential for vehicles to queue over the railroad should be considered when deciding whether to signalize the modified Dakota Avenue and Yosemite Avenue intersections. Advanced preemption (interconnection with the crossing signals) would likely be required if any new traffic signals are installed.

Additional review and comments will be required by Union Pacific should the project advance into a more detailed design.

c. City Council and County Board

Updates to the Savage City Council and Scott County Board of Commissioners were provided throughout the course of the study. In July 2017, the Savage City Council discussed the final report and concepts in a worksession. The City Council indicated a strong preference for design Concept B1. The Scott County Board of Commissioners had not identified a preferred concept as of the completion of this report.

6. Next Steps

a. Incorporating Other Freight Benefits

In addition to the roadway components identified in the evaluated design concepts, the following is a list of other elements to be considered during detailed design and project implementation to enhance freight movements and provide benefits to the statewide freight network:

- Incorporate Intelligent Transportation System (ITS) components to improve travel time reliability for freight drivers
- Private sector contributions, especially with port businesses (multi-modal)
- Evaluate the need for an off-site truck parking/waiting area
- Transit Advantages elements on TH 13
- Railroad crossing safety improvements
- First/last mile roadway improvements between TH 13 and the ports and other area businesses
- System preservation, safety, operations, and freight mobility improvements

b. Implementation/Funding Opportunities

There are currently no funds that have been programmed for improvements outlined in this study. However, outcomes of the study provide design concepts that can be used to pursue funding opportunities, including new freight programs in the FAST Act. Improvements in this area were also identified in the Scott County Transportation Tax Implementation Plan. The City of Savage, Scott County, and MnDOT will continue to work together to establish the TH 13 corridor as a critical component of the state's freight system and identify opportunities to advance potential design solutions.

In recent years, the transportation funding climate has changed at the state level and priorities have shifted toward maintenance of existing facilities. Strategic capacity improvements have been focused on low-cost/high-benefit solutions. Thus, the ability to fund larger projects has been limited. However, funding for transportation projects that benefit the nation's freight network is a new priority in the federal FAST Act that was signed into law in 2015. Two new freight focused programs, the National Highway Freight Program and the Nationally Significant Freight and Highway Projects Program, will provide new opportunities to fund transportation projects that benefit the freight system. The State is in the process of developing a FAST Act-

compliant state freight plan, which includes an investment plan for distributing some of these newly allocated freight funds.

Table 3 provides a list of potential transportation funding programs that could be pursued to advance potential improvements.

Table 3 - Potential Transportation Funding Sources

PROGRAM (AGENCY)	DESCRIPTION (PROGRAM CYCLE)	AWARD LEVELS
TIGER Discretionary Grant (US DOT)	Highly competitive national program that funds innovative projects, including multi-modal and multi-jurisdictional projects (typically annual program, dependent upon available funding)	$5 million minimum
FASTLANE / Nationally Significant Freight and Highway Projects Discretionary Grant (US DOT)	Highly competitive national program that funds critical freight and highway projects on the National Highway Freight Network, National Highway System, or intermodal facilities (typically annual program, dependent upon available funding)	$25 million minimum award large projects $5 million minimum award small projects
Regional Solicitation (Met Council/TAB)	Federal STP funding distributed in the metropolitan area for the non-freeway principal arterial and A-minor arterial systems (typically awarded every two years)	Up to $7 million
Minnesota Highway Freight Program (MnDOT)	New four-year, formula-based federally distributed fund for projects that contribute to the efficient movement of freight on the National Highway Freight Network and other critical urban freight corridors	Est. Minnesota funding is $93.4 million for FY 2019-2022 $500,000 minimum
Corridors of Commerce (MnDOT)	Legislatively directed program intended to provide additional highway capacity on segments where there are currently bottlenecks in the system and improve or preserve the movement of freight and reduce barriers to commerce (annual or every two years, dependent upon available funding)	Dependent upon available funding
Transportation Economic Development (MnDOT, DEED)	Provides state funding to close financing gaps for transportation improvements that will enhance the statewide transportation network while promoting economic growth through the preservation or expansion of an existing business or development of a new business (annual or every two years, dependent upon available funding)	Up to $10 million
Corridor Investment Management Strategy (MnDOT)	Corridor-based initiative that focuses on trunk highway projects that improve quality of life, environmental health or economic competitiveness consistent with the Minnesota GO vision (annual or every two years, dependent upon available funding)	$200,000 to $10 million
State General Obligation Bonds (MN Legislature)	Legislatively issued general obligation bonds for capital improvements (capital bonding typically every two years following legislative sessions)	Dependent upon available funding
Transportation Tax Program (Scott County)	Proceeds from Scott County generated sales tax implemented to fund regionally significant transportation projects (seven-year program)	Dependent upon available funding

C. USEFUL FACTS AND INFORMATION

The following includes useful information related to freight activity along TH 13, at the Ports of Savage area as summarized in this study. It also includes new information revealed during conversations and research as part of this study. This information may be useful as part of future funding application packages.

- Approximately two million tons of material is shipped through the Ports of Savage businesses annually.
- Approximately ninety percent of the material is shipped into the Ports of Savage businesses via truck, primarily from points west of the City of Savage. Union Pacific Railroad and Twin Cities and Western Railroad also transport material into the Ports of Savage businesses for shipping.
- Most material brought into the Ports of Savage businesses is shipped out via barge down the Minnesota River and Mississippi River to New Orleans, where the material is transferred on to ocean vessels and shipped through the Gulf of Mexico and Panama Canal.
- It is estimated that, based on historic activity, the Ports of Savage businesses currently operate at approximately fifty percent capacity with the potential for expanded activity in the future. The peak period for shipping through the Ports of Savage businesses is June/July, however, harvest season during September/October is also busy.
- Union Pacific currently operates six trains per day along the mainline segment adjacent to TH 13. In recent years, the number of trains was higher but the industry is currently experiencing lower demands. It can be assumed that the number of trains per day will remain at six or higher in future years. There are also a few local trains plus switching operations that may use the tracks daily.
- Twin Cities and Western Railroad currently uses the bridge over TH 13 for storage and switching. The swing bridge over the Minnesota River has been rehabilitated to provide service north of the river.
- The 2014 Average Annual Daily Traffic (AADT) along TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue was 47,200. A non-adjusted July 16, 2016 count in this same area was 54,809. Metropolitan Council's regional travel demand model has a 2040 forecast of 58,200 AADT for the Dakota Avenue and Yosemite Avenue area.
- The current roadway section in the vicinity of Dakota Avenue and Yosemite Avenue is an at-grade four-lane expressway, with a theoretical planning level capacity of 60,000 AADT. When volumes exceed 60,000 AADT, typically this is when a four-lane freeway design is considered.
- Total heavy trucks along TH 13 east of Quentin Avenue for a 24-hour period were 5,073 of the 54,809 July 16, 2016 count, or approximately nine percent of the total.
- A heavy left turn demand for trucks coming from the west entering into the Ports of Savage businesses at Dakota Avenue and Yosemite Avenue combined with the significant amount of through traffic along TH 13 and lack of grade separation has been a significant contributor to congestion, crash problems and a significant queuing problem of left turning trucks along TH 13.

- Specifically at Dakota Avenue, as of July 16, 2016, during the peak periods of 6 a.m. to 9 a.m. and 3 p.m. to 6 p.m. there were a total of 65 left turning trucks from the west turning into the Ports of Savage businesses at Yosemite Avenue and 184 left turning trucks turning into the Ports from the west at Dakota Avenue. A full breakdown of all truck movements recorded as of July 2016 at the intersections of Dakota Avenue, Yosemite Avenue, Quentin Avenue and Chowen Avenue can be found in **Appendix F**.
- Additionally, with the Union Pacific mainline tracks in close proximity to TH 13 to the north, trucks attempting to turn left into the Ports of Savage businesses have had to stop on the tracks at times, and as a result, there has been a problem of railroad crossing arms breaking off over the semi-truck trailers.
- Overall crash rates at Dakota Avenue and Yosemite Avenue from 2011 to 2015 have been greater than statewide averages. Specifically, seven truck related crashes at Dakota Avenue and five truck related crashes Yosemite Avenue occurred during this same time period (one involving a fatality). A detailed summary of truck related crashes and truck crash types at these two intersections can be found in to **Appendix G**.
- All of the proposed designs (A, B, B1, C and D) provide grade separation of left turns into the Ports of Savage businesses at Dakota Avenue and Yosemite Avenue, significantly improving safety, capacity and overall traffic flow into and out of the Ports of Savage businesses at these locations.
- Chart Industries (located in New Prague) uses TH 13 and the Ports of Savage CHS terminal to transfer oversized freight via barges. The size of these overweight shipments and ability to maneuver them at intersections and near bridge structures should be considered when evaluating the design concepts further.

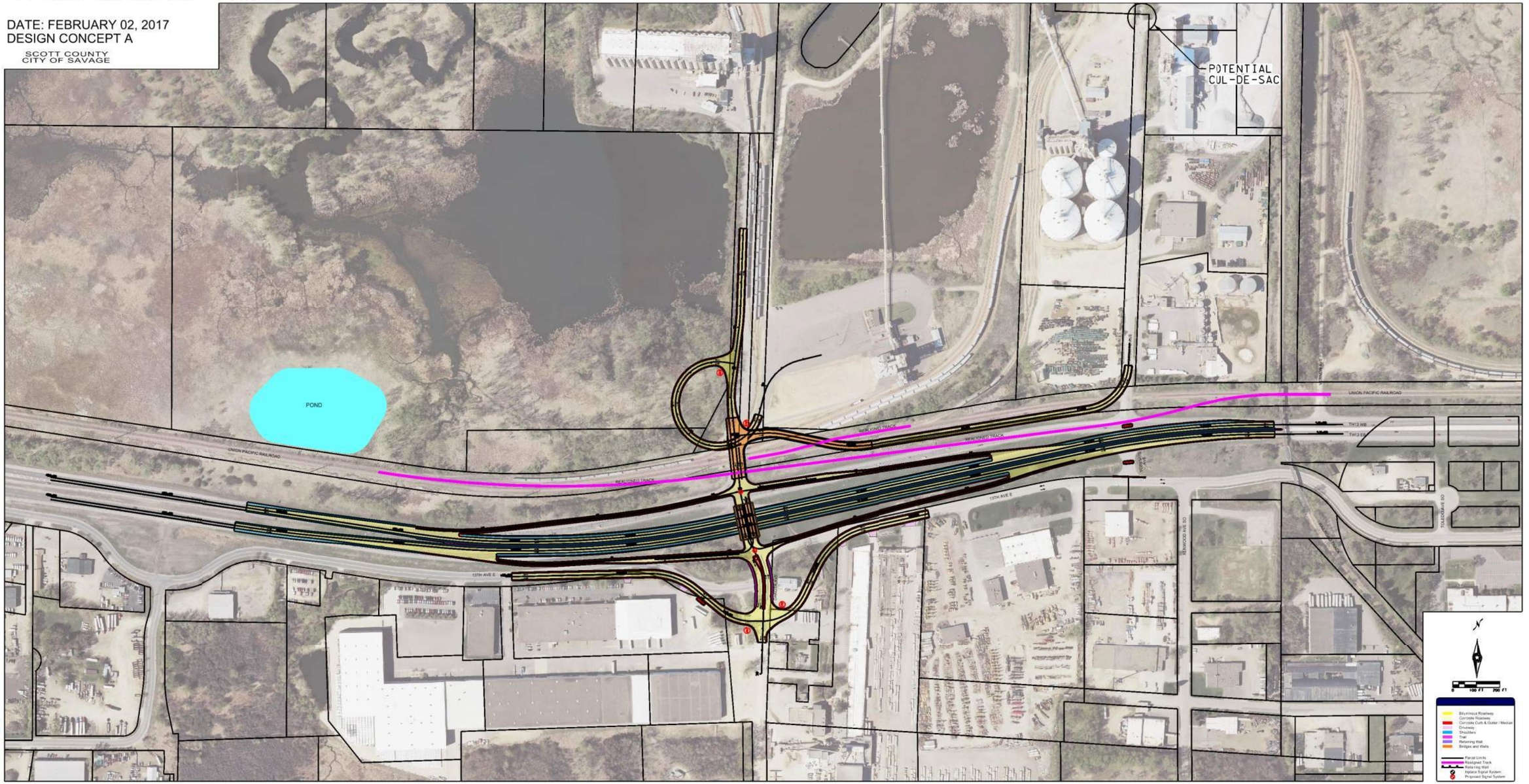
Appendix A

Design Concept Layouts

TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: FEBRUARY 02, 2017
DESIGN CONCEPT A

SCOTT COUNTY
CITY OF SAVAGE



Scott

Savage

DISCLAIMER

Disclaimer:
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WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
www.wsbeng.com

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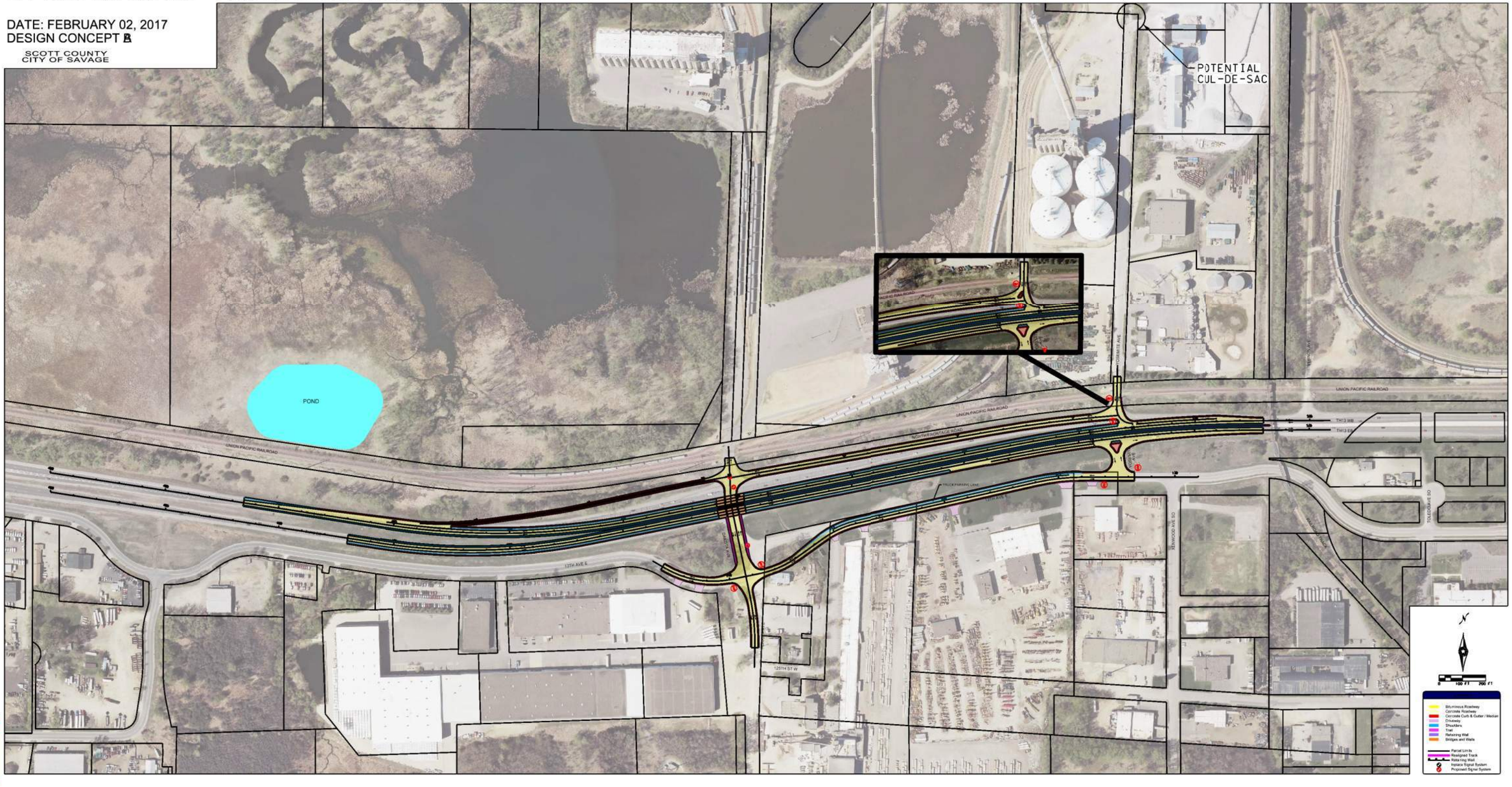
TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: FEBRUARY 02, 2017
DESIGN CONCEPT B

SCOTT COUNTY
CITY OF SAVAGE



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Savage

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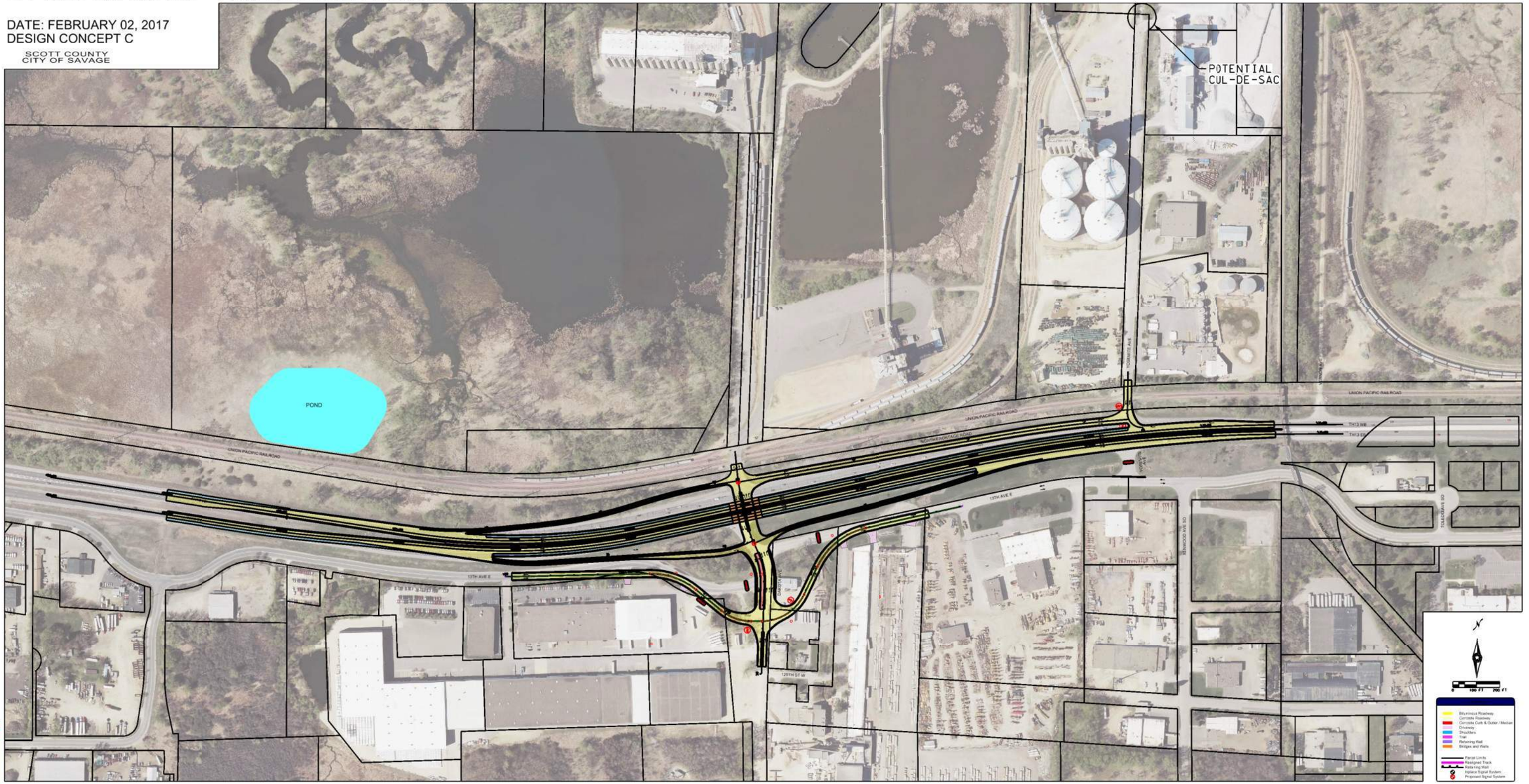
TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: FEBRUARY 02, 2017
DESIGN CONCEPT C

SCOTT COUNTY
CITY OF SAVAGE



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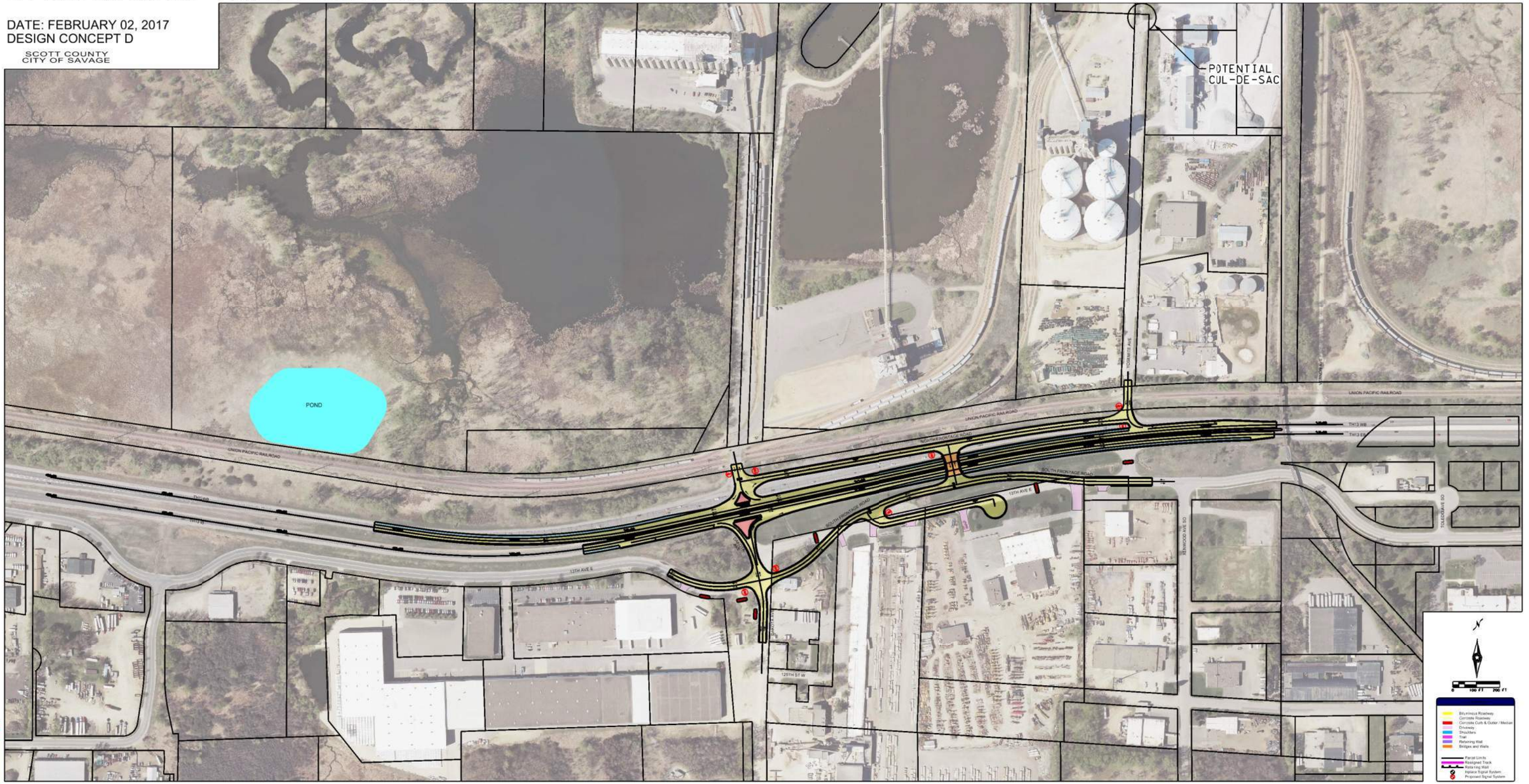
TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: FEBRUARY 02, 2017
DESIGN CONCEPT D

SCOTT COUNTY
CITY OF SAVAGE



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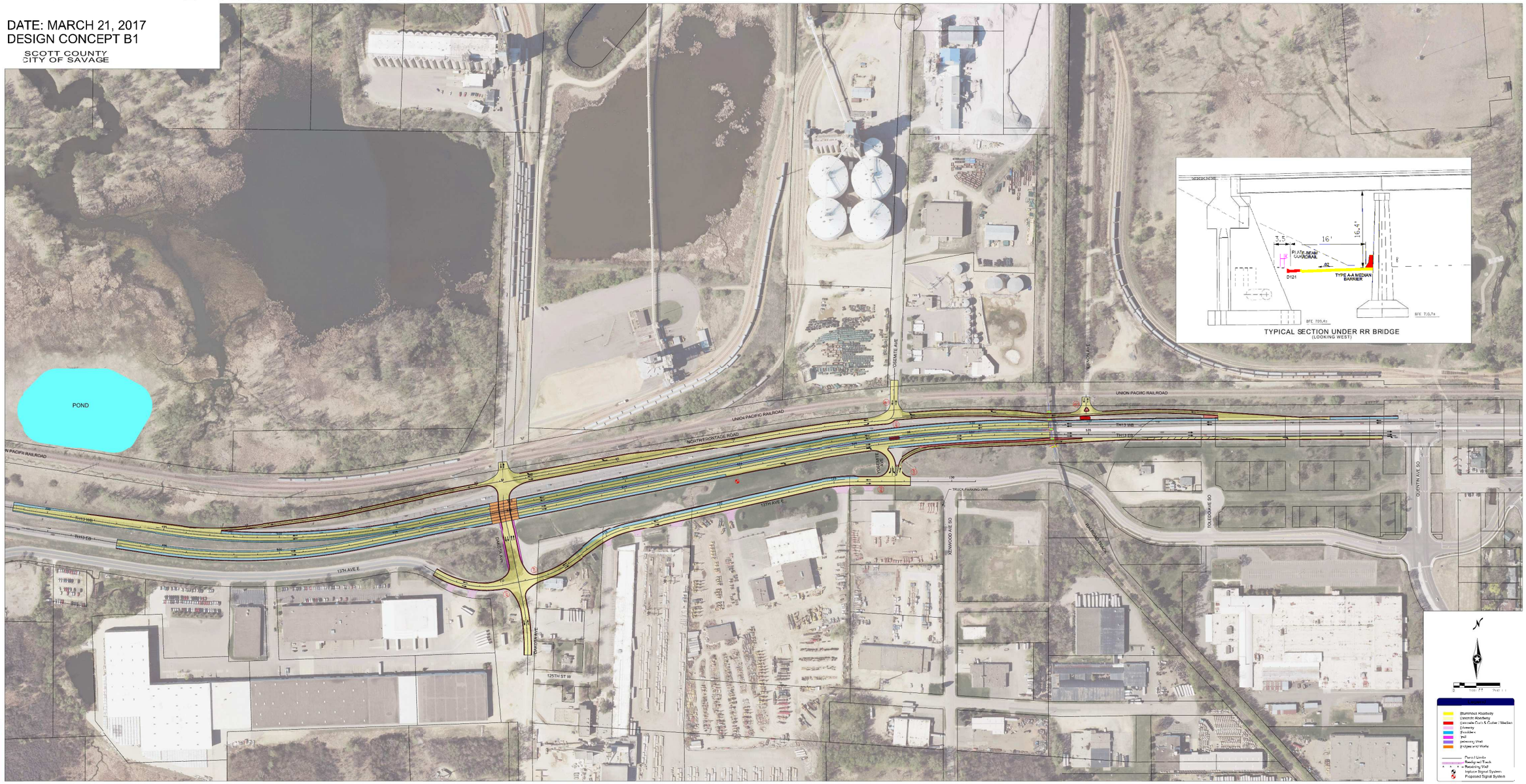
TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: MARCH 21, 2017
DESIGN CONCEPT B1

SCOTT COUNTY
CITY OF SAVAGE



Scott

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Appendix B

Evaluation Matrix

Evaluation of TH 13 Dakota Avenue - Yosemite Avenue Build Design Concepts (Notes Related to Scoring)

April 26, 2017

Evaluation Criterion**	Performance Measure	Build Design Concepts				
		Concept A - Dakota Avenue Diamond Interchange and Railroad Grade Separation (Design Charrette Layout 1)	**Concept B - Dakota Avenue Grade Separation; Access Via Yosemite Avenue (Design Charrette Layout 4)**	**Concept B1 - Same as Concept B Except Westbound Off Ramp and Eastbound Acceleration Lane Added under TH 13 Railroad Bridge**	**Concept C - Dakota Avenue Tight Diamond Interchange (Design Charrette Layout 5)**	**Concept D - Grade Separation Between Dakota Avenue and Yosemite Avenue (Design Charrette Layout 8)**
Overall TH 13 Regional Mobility	Forecasted TH 13 LOS and Railroad Grade Separation	**Highest level of overall TH 13 regional mobility.** High level of mobility along TH 13 mainline and grade separated railroad.	**Moderate-High level of overall TH 13 regional mobility.** High level of mobility along TH 13 mainline, but no grade separated railroad.	**Moderate-High level of overall TH 13 regional mobility.** High level of mobility along TH 13 mainline, but no grade separated railroad.	**Moderate-High level of overall TH 13 regional mobility.** High level of mobility along TH 13 mainline, but no grade separated railroad.	**Moderate-High level of overall TH 13 regional mobility.** High level of mobility along TH 13 mainline, but no grade separated railroad.
Local Travel Time	Average minutes/vehicle compared to existing condition (17.1 minutes total travel time existing condition)	**High overall travel time reduction.** 3.7 Minutes Total Travel Time/13.4 Minute Reduction from Existing Condition.	**Moderate-High overall travel time reduction.** 4.8 Minutes Total Travel Time/12.3 Minute Reduction from Existing Condition.	**Moderate-High overall travel time reduction.** Similar to Concept B.	**High overall travel time reduction.** 4 Minute Total Travel Time/13.1 Minute Reduction from Existing Condition.	**High overall travel time reduction.** 3.6 Minutes Total Travel Time/13.5 Minute Reduction from Existing Condition.
Safety/Crash Reduction	Reduction of at-grade access	**Highest safety/crash reduction. All at-grade access removed from TH 13 and railroad.**	**Moderate-High safety/crash reduction**. Eastbound right-in, right out and westbound right-in at Yosemite Avenue. **At-grade UP mainline and Ports spurs remain.**	**Moderate-High safety/crash reduction**. Eastbound right-in, right-out and acceleration lane at Yosemite Avenue and westbound off ramp at Vernon Avenue. **At-grade UP mainline and Ports spurs remain.**	**Moderate-High safety/crash reduction**. Right-in only access at Yosemite Avenue. **At-grade UP mainline and Ports spurs remain.**	**Low-Moderate safety/crash reduction**. Dakota Avenue eastbound and westbound right-in, right-out, as well as westbound right-in only at Yosemite Avenue. **At-grade UP mainline and Ports spurs remain.**
Construction and Right-of-Way Costs	Planning level order of magnitude costs	**Highest overall cost ($45-$53 Million)** due to grade separation of TH 13, UP mainline and Ports spurs. Requires UP mainline realignment and relocation of overhead transmission line. **Construction: $40 to $45 Million** **Right-of-Way: $5 to $7.5 Million**	**Lowest overall cost ($25-$30 Million)**. Least amount of bridge structure, retaining wall and new frontage road. **Construction: $24 to 28 Million** **Right-of-Way: $750,000 to $1.5 Million**	**Second lowest overall cost ($26.5-$31.5 Million)**. Requires approximately $1.5 million of additional cost to extend Alternative B design under TH 13 Railroad Bridge. **Construction: $25.5 to 29.5 Million** **Right-of-Way: $750,000 to $1.5 Million**	**Moderate overall costs ($30-$35 Million)**. Tight diamond interchange at Dakota Avenue, but no grade separation of railroad. **Construction: $28 to $32 Million** **Right-of-Way: $1.5 to $2.5 Million**	**Moderate overall cost ($32-$37 Million).** Significant retaining wall required to address grade issues for south frontage road. **Construction: $31 to $35 Million** **Right-of-Way: $1 to $2 Million**
Freight Mobility	Truck route directness, turns, acceleration/deceleration	**Best truck access and truck routing.** Lowest amount of potential turns and acceleration/deceleration. Diamond interchange at Dakota Avenue provides **full EB/WB access to Port of Savage and south TH 13 businesses and grade separated railroad crossing.**	**Some circuitous truck access and truck routing.** Highest amount of potential turns and acceleration/deceleration. Both Dakota Avenue and Yosemite Avenue have eastbound and/or westbound movement restrictions. A**t-grade railroad crossing remains.**	**Some circuitous truck access and truck routing, but improved ingress and egress at Yosemite Avenue/Vernon Avenue compared to Concept B.**	**Good truck access and truck routing.** Second lowest amount of potential turns and acceleration/deceleration. Tight diamond interchange at Dakota Avenue provides full EB/WB access to Port of Savage and south TH 13 businesses. **At-grade railroad crossing remains.**	**Some circuitous truck access and truck routing.** Highest amount of potential turns and acceleration/deceleration. Both Dakota Avenue and Yosemite Avenue have eastbound and westbound movement restrictions. **At-grade railroad crossing remains.**
Railroad Crossing Benefits	Railroad crossing safety and traffic benefits	**Highest railroad crossing benefit.** Eliminates all at-grade rail crossings.	**Less desirable than Alternative A, but significantly better than Alternative D.**	**Less desirable than Alternative A, but significantly better than Alternative D.**	**Less desirable than Alternative A, but significantly better than Alternative D.**	**Least desirable**, as train blocking Dakota Avenue could gridlock this entire intersection for all movements.
Environmental/Historical/Drainage	Degree to which impacts are minimized	**Most environmental and drainage impacts. Potential impacts to DNR public water** NW of Dakota Avenue intersection. **Impacts to existing parking lot** south of Dakota Avenue.	**Lowest environmental and drainage impacts**. Least amount of new construction of all alternatives.	**Lowest environmental and drainage impacts**. Least amount of new construction of all alternatives.	**Some environmental and drainage impacts**. Some impact to parking lot south of Dakota Avenue.	**Some environmental and drainage impacts**. Some impacts to property south of TH 13 between Dakota Avenue and Yosemite Avenue.
Transit Benefits	Mobility of transit only bus shoulder	**Highest transit mobility.** No direct TH 13 access or potential truck queuing on TH 13 shoulder.	**Low-moderate transit mobility.** Right-in right-out access eastbound at Yosemite Avenue and right-in only access westbound at Yosemite Avenue. Truck queuing could occur along shoulder at this location.	**Moderate-High transit mobility.** Off ramp at westbound Vernon Avenue improves transit shoulder mobility compared to Concept B.	**Moderate-High transit mobility.** One right-in only access off of TH 13 westbound at Yosemite Avenue. Truck queuing could occur along shoulder at this location.	**Lowest transit mobility** due to right-in-right-out access eastbound and westbound at Dakota Avenue and westbound right-in only access at Yosemite Avenue. Truck queuing could occur eastbound along shoulder at Yosemite Avenue and Dakota Avenue.
Freight Funding Potential	Overall level of freight improvements	**Highest freight funding potential of all alternatives** due to grade separation of TH 13 and UP mainline and Ports spurs.	**Moderate-High freight funding potential**. Some truck benefits with grade separation under TH 13 at Dakota Avenue. However, **eastbound trucks must exit/enter TH 13 at-grade at Yosemite Avenue and at-grade railroad crossings remain**.	**Moderate-High freight funding potential**. Some truck benefits with grade separation under TH 13 at Dakota Avenue. **Improved ingress and egress of truck traffic** at Yosemite Avenue/Vernon Avenue **compared to Concept B**. **At-grade railroad crossings remain.**	**Moderate-High freight funding potential**. Some truck benefits with tight diamond interchange at Dakota Avenue. However, **at-grade railroad crossings remain**.	**Moderate-High freight funding potential**. Some truck benefits from left turns using bridge between Dakota Avenue and Yosemite Avenue. However, **at-grade railroad crossings remain**.

Evaluation Criteria Scale					
Color Scale	**Low**	**Low-Moderate**	**Moderate**	**Moderate -High**	**High**
Score	1	2	3	4	5

**Alternatives are rated from low to high with a low rating meaning it performs poorest relative to the criterion and high meaning it performs best relative to the criterion compared to the other alternatives.

Evaluation of TH 13 Dakota Avenue - Yosemite Avenue Build Design Concepts

April 26, 2017

Evaluation Criterion**	Performance Measure	Build Design Concepts				
		Concept A - Dakota Avenue Diamond Interchange and Railroad Grade Separation (Design Charrette Layout 1)	Concept B - Dakota Avenue Grade Separation; Access Via Yosemite Avenue (Design Charrette Layout 4)	Concept B1 - Same as Concept B Except Westbound Off Ramp and Eastbound Acceleration Lane Added under TH 13 Railroad Bridge	Concept C - Dakota Avenue Tight Diamond Interchange (Design Charrette Layout 5)	Concept D - Grade Separation Between Dakota Avenue and Yosemite Avenue (Design Charrette Layout 8)
Overall TH 13 Regional Mobility	Forecasted TH 13 LOS and Railroad Grade Separation	High	Moderate-High	Moderate-High	Moderate-High	Moderate-High
Local Travel Time	Average minutes/vehicle compared to existing condition	High	Moderate-High	Moderate-High	High	High
Safety/Crash Reduction	Reduction of at-grade access	High	Moderate-High	Moderate-High	Moderate-High	Low-Moderate
Construction & Right-of-Way Cost	Planning level order of magnitude costs	Low	High	High	Moderate	Moderate
Freight Mobility	Truck route directness, turns, acceleration/deceleration	High	Low-Moderate	Moderate	Moderate-High	Low-Moderate
Railroad Crossing Benefits	Railroad crossing safety and traffic benefits	High	Moderate	Moderate	Moderate	Low
Environmental/Historical/Drainage	Degree to which impacts are minimized	Low	High	High	Moderate-High	Moderate-High
Transit Benefits	Mobility of transit only bus shoulder	High	Low-Moderate	Moderate-High	Moderate-High	Low
Freight Funding Potential	Overall level of freight improvements	High	Moderate-High	Moderate-High	Moderate-High	Moderate-High
Total Score		**37**	**33**	**36**	**35**	**26**

Evaluation Criteria Scale					
Color Scale	**Low**	**Low-Moderate**	**Moderate**	**Moderate -High**	**High**
Score	1	2	3	4	5

Appendix C

Design Concept B1
TH 13 Railroad Bridge Analysis

701 Xenia Avenue South | Suite 300 | Minneapolis, MN 55416 | (763) 541-4800

Memorandum

To: ***TH 13 Study Management Team (SMT)***

From: ***Scott Mareck, WSB & Associates***
Derek Schmidt, WSB & Associates
Dan Flittie, WSB & Associates
Carl Osberg, WSB & Associates

Date: ***March 30th, 2017***

Re: ***TH 13 Bridge 5528 – Design Options***
WSB Project No.: 03380-000

Background

The preferred preliminary design concept for the TH 13 Dakota Avenue-Yosemite Avenue Design Study in the City of Savage, Scott County has been identified as Alternative B (see Appendix A). At the east end of the Alternative B design layout, there are three existing railroad bridges which lie on an approximate north/south alignment (see Appendix B, Sheets 2-4). The first bridge (no bridge number) crosses the Union Pacific Railroad mainline track and its right of way (R/W); this seven-span, multi-type bridge shares a pier with the next bridge (Br. 5528) which crosses TH 13 and its R/W. About 60' to the south of the southern end of Br. 5528 is Br. 70541 which spans West 123rd Street and its R/W. To-date, Br. 5528 and its associated pier locations have been identified as a design constraint to developing a longer eastbound acceleration lane from Yosemite Avenue; developing a longer westbound right turn lane into Yosemite Avenue; and extending a north frontage road between Dakota Avenue and Yosemite Avenue further east of Br. 5528 to Vernon Avenue.

Twin Cities and Western Railroad (TC & W) leases this rail line from Canadian Pacific Railway. It is essential for TC & W to use these three railroad bridges to position their rail cars as they enter the Port of Savage from the north across the Minnesota River bridge (see Appendix B, Sheet 1), known as the "Dan Patch Line Bridge".

WSB has been asked by Scott County and the City of Savage to outline design options for extending the eastbound acceleration lane, extending the westbound right turn lane, and extending the north frontage under the TH 13 Railroad Bridge to improve the functionality of the Alternative B design concept. The remainder of this memorandum design options accomplish this along with a high level assessment of design considerations and planning level cost estimates. The design options that have been evaluated include:

1. Tear down the existing TH 13 Railroad Bridge (Br. 5528) and replace it with a new TH 13 Railroad Bridge on the same alignment tying in directly to the recently constructed 123rd Street Railroad Bridge (Br. 70541).

2. Remove the concrete pier north of TH 13, and replacing the existing rolled shape steel beams with much deeper welded plate girders which are adequate in size to resist the much larger loads of newly lengthened span.

3. Extend the Alternative B design under the existing TH 13 Railroad Bridge (Br. 5528) between the existing piers and South Abutment.

Option 1: Full Bridge Replacement

With the proximity of recently constructed Br. 70541 to the immediate south of existing Br. 5528 (see Appendix B, Sheets 2-3), full replacement of Br. 5528 would require maintaining the existing track profile (+/-) of Br. 5528 and the adjoining railroad bridge (no bridge number) to the immediate north. Raising the railroad's profile grade within such close proximity from a required elevation (north end of Br. 70541) will amount to very little, if any, given the very long distances required to raise/lower a railroad's profile grade. Also, the construction type of the railroad cross ties and steel beams of Br. 70541 would be very prohibitive of any grade raise in this area, as the timber cross ties are fastened directly to the bridge's steel beams (no ballast under the ties), so raising the grade, even a small amount, at Br. 70541 would likely not be feasible without a significant design alteration.

If the existing track profile over Br. 70541 is to be maintained, then a near in-kind replacement (same span arrangement +/-, same profile +/-) would be needed for a new TH 13 Railroad Bridge unless significant profile reductions are allowed in order to revise the pier layout (existing spans 33'-41'-41'-33'). Since existing Br. 5528 has vertical clearances less than 16'-4" and has been hit by oversized vehicles in the past, it is anticipated that an in-kind replacement bridge would require a small amount (say 0.5') of profile lowering of TH 13 within the vicinity of the bridge.

Replacing only the existing 148'+/- Br. 5528 would leave the northernmost 170' spans over the Union Pacific Railroad (see Appendix B, Sheet 3) as-is. It is unknown what year these spans were constructed, and as such the design load of these spans are unknown as well. Br. 5528 (built 1939) was designed with a Cooper E65 live load; Br. 70541 was designed under with a Cooper E80 live load. The remaining bridge to the north would be the governing structure then of these three, unable to carry the same loads as this new replacement bridge and Br. 70541 to the immediate south.

To provide a **high level cost estimate** for the bridge replacement, the 2006 bid tabulations for the construction of Br. 70541 were used, which yielded a 2017 construction cost of about $9,000/ft for a similar steel beam (4 members) bridge. Replacing only the 148' existing Br. 5528 would cost about **$1.3M (bridge cost only)**; replacing Br. 5528 and the remaining spans to the north (total about 320') would cost about **$3M (bridge costs only)**. Construction timeline's for these options would likely be a few months, given that this type of bridge is fairly simple with relatively straightforward construction methods.

Notably absent from these estimates are the costs of either a) temporary shoofly bridge(s) and alignments which would enable the railroad to have uninterrupted service while new bridges are being built, or b) payment to TC & W for interruption to their rail service to the Port of Savage. This interruption could potentially be avoided if construction could be scheduled during the winter months (would need MnDOT authorization for construction activities primarily in the winter, not normally done) when Port activity is low. However, there is no guarantee that this could be negotiated with the Railroad. If damages needed to be paid to the Railroad, these costs would likely be very significant and could potentially be cost prohibitive. It is also possible that the Railroad would not agree to any service interruption regardless of compensation, making this option completely infeasible.

Appendix B, Sheet 7 shows an alternate alignment (possible shoofly or permanent) with new bridges, where pier placement could be located around any required lane configurations. Construction costs for this option would be about **$6M-$10M (bridge costs only, same bridge type)** and provides for new bridges to be built without interruption to the in-service railroad bridges. If longer or different span types are required (e.g., steel thru-girder), these costs would be significantly higher (say $20,000/ft) vs. the previously discussed construction costs of $9,000/ft.

Implementing the Option 1 bridge option would allow the construction of a traditional EB acceleration lane from Yosemite Ave for a maximum possible length of 1000'. The minimum length required for a 45mph design speed from a stop condition is 560'. The current speed limit change from 55mph to 45mph happens immediately west of Yosemite Ave. Given the high volume of trucks and the proximity of the speed limit change, applying a 55mph design to the acceleration lane is warranted. The minimum required acceleration length for a 55mph design speed is 960' and would be achievable under this option.

With bridge Option 1, the WB deceleration lane can be designed as a traditional deceleration lane adjacent to TH 13 or separated from the mainline by a barrier to allow for truck storage and increased safety due to speed differentials. The deceleration lane can be design to meet all standards under this option.

Option 2: Remove the Pier 4 from Br. 5528

Removal of existing Br. 5528's Pier 4 (north of westbound traffic) would increase the span from about 41' to about 74' (see Appendix B, Sheet 6), allowing for extension of the TH 13 westbound turn lane and north frontage road to the east to Vernon Avenue. Increasing the span by this large amount would require a significantly deeper welded steel plate girder bridge to resist the much higher loads of the longer span. Similar to Option 1; it is assumed that the track profile in this area would be kept as-is, requiring substantial lowering of TH 13 in order to provide the required 16'-4" vertical clearance.

At a minimum, the caps of the concrete wall piers either side of the removed pier would also need to be removed in order to accommodate the larger bearings required to support the deeper beams and longer span. Temporary shoring of existing Span 2 of Br 5528 and Span 1 of the railroad bridge to the north would also be required to during the concrete cap removal in order to support these beams during concrete pier cap removal operations. The temporary shoring at the north end of Span 2 (Br. 5528) could prove to be problematic for two reasons. The temporary shoring is assumed to be located as far away (towards the north) from existing eastbound traffic, the location of this shoring may be in conflict with the existing pier's spread footing depending on its foundation requirements. The temporary shoring itself would then need to be protected (say temporary/portable concrete Jersey barriers) during construction activities. The combination of the location of the shoring itself and the required protection would mean a substantial reduction in total available lane width for eastbound traffic.

The adjacent piers (and foundations) would need structural evaluation due to the much higher loads due of the increased span. It is quite possible that these piers/foundations will need to be totally replaced due to much higher loads of the longer span. Significant structural steel detailing/retrofitting is anticipated to make the existing beams/bearings tie into the revised pier cap elevations now required due to the much deeper beam used on the adjacent span.

As with Option 1, Option 2 would leave a portion of Br 5528 designed under Cooper E80 Live Load, whereas the new span would be designed with Cooper E80 live load.

A high level planning cost estimate for this option is estimated at about **$1M-$2M (bridge costs only, and no temporary bridge costs included)**, with an estimated construction period of a few months. As is the case with Option 1, due to the proximity of the Br. 70541 to TH 13, further study would be necessary to determine if a temporary shoofly bridge would be feasible; this would need to be explored further in the final design process.

If a shoofly or parallel temporary bridge structure of some type is not feasible during construction, then TC & W Railroad would likely require compensation for interruption to their rail service to the Port of Savage. This interruption could potentially be avoided if construction could be scheduled during the winter months (would need MnDOT authorization for construction activities primarily in the winter, not normally done) when Port activity is low. However, there is no guarantee that this could be negotiated with the Railroad. If damages needed to be paid to the Railroad, these costs would likely be very significant and could potentially be cost prohibitive. It is also possible that the Railroad would not agree to any service interruption regardless of compensation, also making this option completely infeasible.

Implementing the Option 2 bridge option would allow the construction of a traditional EB acceleration lane from Yosemite Ave for a maximum possible length of 1000'. The minimum length required for a 45mph design speed from a stop condition is 560'. The current speed limit change from 55mph to 45mph happens immediately west of Yosemite Ave. Given the high volume of trucks and the proximity of the speed limit change, applying a 55mph design to the acceleration lane is warranted. The minimum required acceleration length for a 55mph design speed is 960' and would be achievable under this option.

With bridge Option 2, the WB deceleration lane would be the same as shown in Bridge Option 3 and the Concept B1 drawing. The WB turning traffic destined for Vernon Ave, Yosemite Ave, or Dakota Ave would exit WB TH 13 1750' east of Yosemite Ave via a traditional exit ramp and continue onto a frontage road that separates from TH 13 and travels though span 4 of the existing railroad bridge. All access to Vernon Ave, Yosemite Ave and Dakota will be facilitated by the frontage rd. This option allows more than adequate deceleration lengths and truck/vehicle storage when trains are blocking the access points without impacting the mainline traffic.

Option 3: Extend Alternative B Design Under Br 5528's Between Existing Abutments & Piers

Option 3 (Appendix C) appears to be the most viable of the three options; notably with the very least disruption of active railroad traffic. This option would be very similar to what was done under existing Br. 5371 during the Light Rail work along University Avenue in St. Paul (see Figure 1).

Figure 1: Br. 5371, University Avenue, St. Paul (Google Maps)

The area under existing Span 4 has about 28'-10" clearance between the pier face, with over 17' vertical clearance. The area under existing Span 1 has much less existing clearances (15'-11" near the south face of Pier 2) and has a typical 2:1 toe slope in front of the South Abutment. Notably different at the South Abutment is the use of two 'reverse counterfort legs' which protrude from the abutment's front face at a fairly steep angle down to the spread footings (one spread footing under each leg).

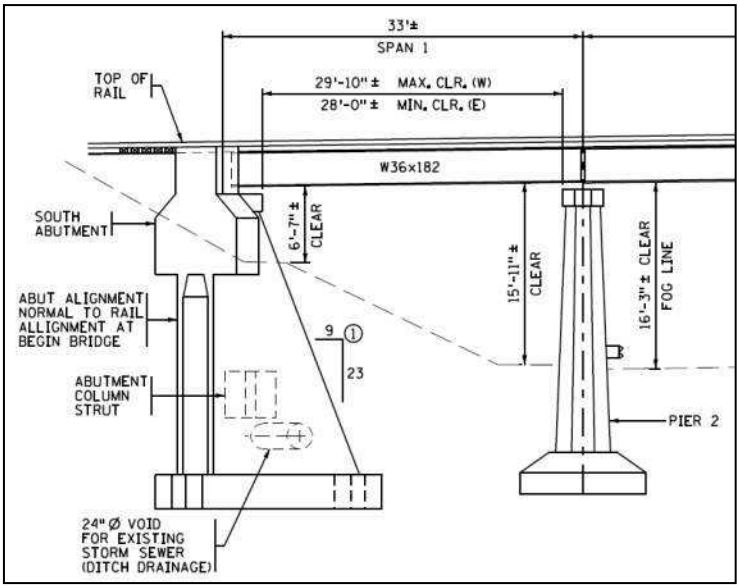
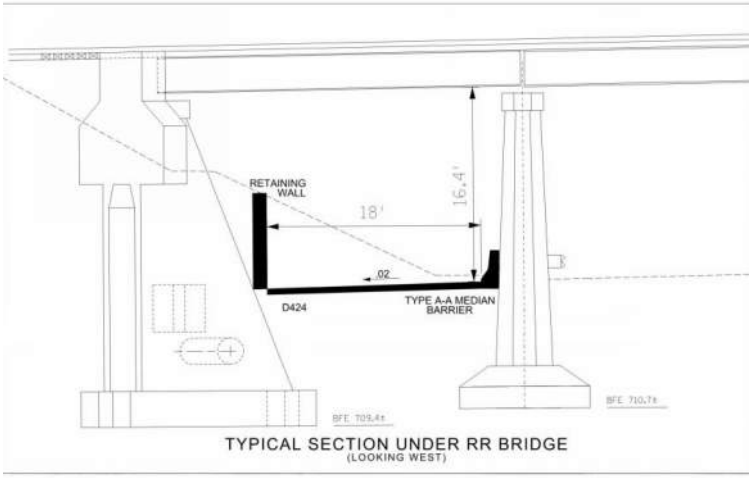


Figure 2: Br. 5528, Span 1

Fill removal under this span is anticipated to require retaining walls encompassing the front half of the entire South Abutment as the fill will be removed much lower than the bottom of the abutment's flared wingwalls. These retaining walls could also serve as crash protection from the acceleration lane that will be placed under this span from the west. Excavation of the toe slopes and construction of retaining walls could be coordinated with the railroad, working around their schedule requiring minimal disruption to TC & W service to the Port of Savage. Based on the field measurements and analysis of the as-builts, an 18' wide lane can be constructed through span 1 to accommodate the acceleration lane. The inside edge would consist of a concrete traffic barrier and the outside would a concrete retaining wall with guardrail on the approach.



Implementing the Option 3 bridge option would allow the construction of a hybrid EB entrance ramp/acceleration lane from Yosemite Ave to EB TH 13 for a maximum possible length of 1000'. The minimum length required for a 45mph design speed from a stop condition is 560'. The current speed limit change from 55mph to 45mph happens immediately west of Yosemite Ave. Given the high volume of trucks and the proximity of the speed limit change, applying a 55mph design to the acceleration lane is warranted. The minimum required acceleration length for a 55mph design speed is 960' and would be achievable under this option. This option shown in the appendix as design alternative B1, does introduce a sight distance concern with the remaining pier between the mainline and the acceleration lane. The

mainline traffic will have an obscured view of the traffic on the acceleration lane and vice versa. This obstruction will reduce the available time for gap acceptance of the entering traffic. This situation will need to be studied further if this option advances.

With bridge Option 2, The WB turning traffic destined for Vernon Ave, Yosemite Ave, or Dakota Ave would exit WB TH 13 1750' east of Yosemite Ave via a traditional exit ramp and continue onto a frontage road that separates from TH 13 and travels though span 4 of the existing railroad bridge. All access to Vernon Ave, Yosemite Ave and Dakota will be facilitated by the frontage rd. This option allows more than adequate deceleration lengths and truck/vehicle storage when trains are blocking the access points without impacting the mainline traffic.

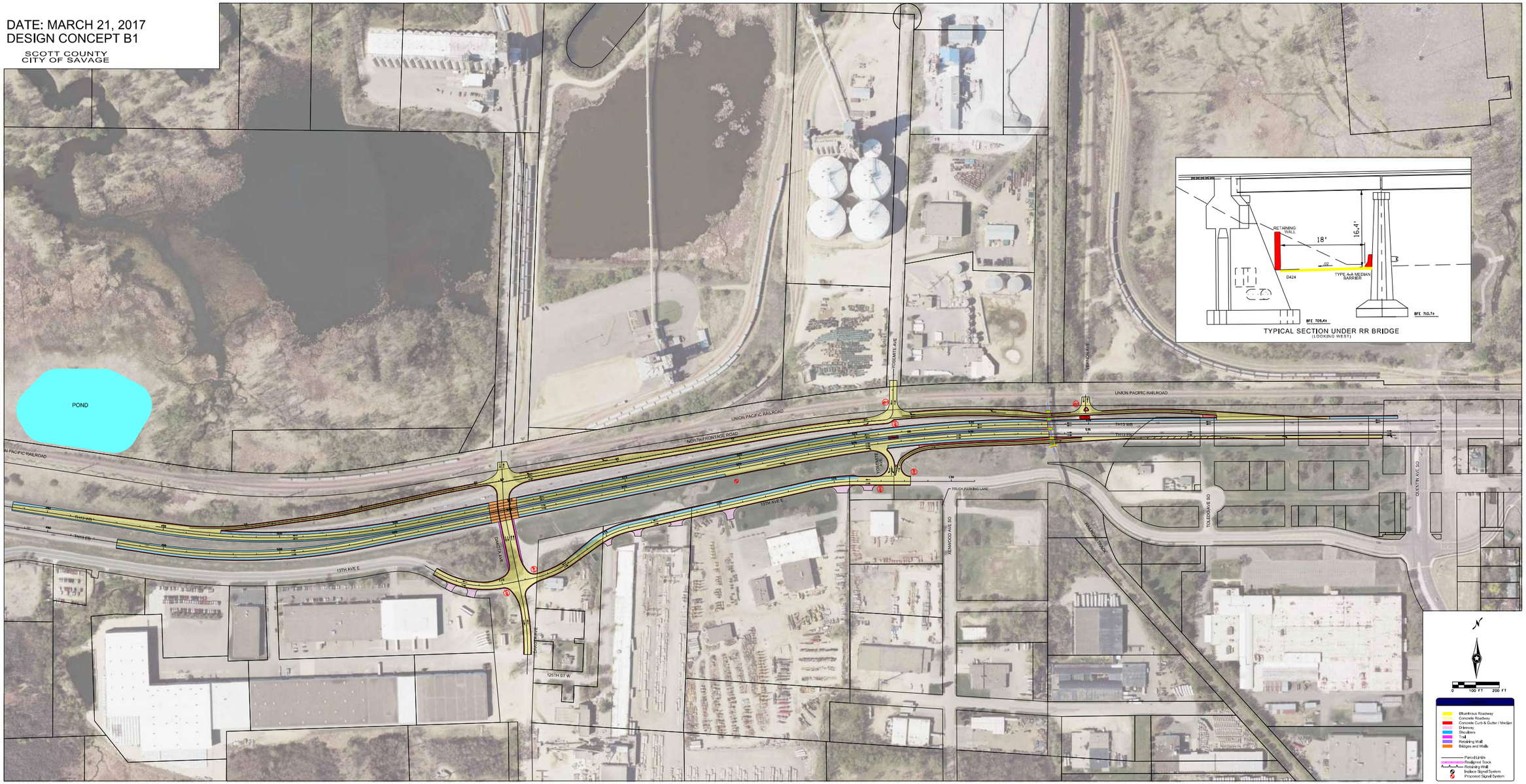
This option has limited impacts to the existing bridge. Bridge costs associated with the changes would be limited to the construction of the retaining wall along the EB acceleration lane and associated wingwall work. A planning level cost estimate for this option is estimated at $150,000.

Appendix A Design Alternative B1

TH 13 DAKOTA AVE - YOSEMITE AVE DESIGN STUDY

DATE: MARCH 21, 2017
DESIGN CONCEPT B1

SCOTT COUNTY
CITY OF SAVAGE



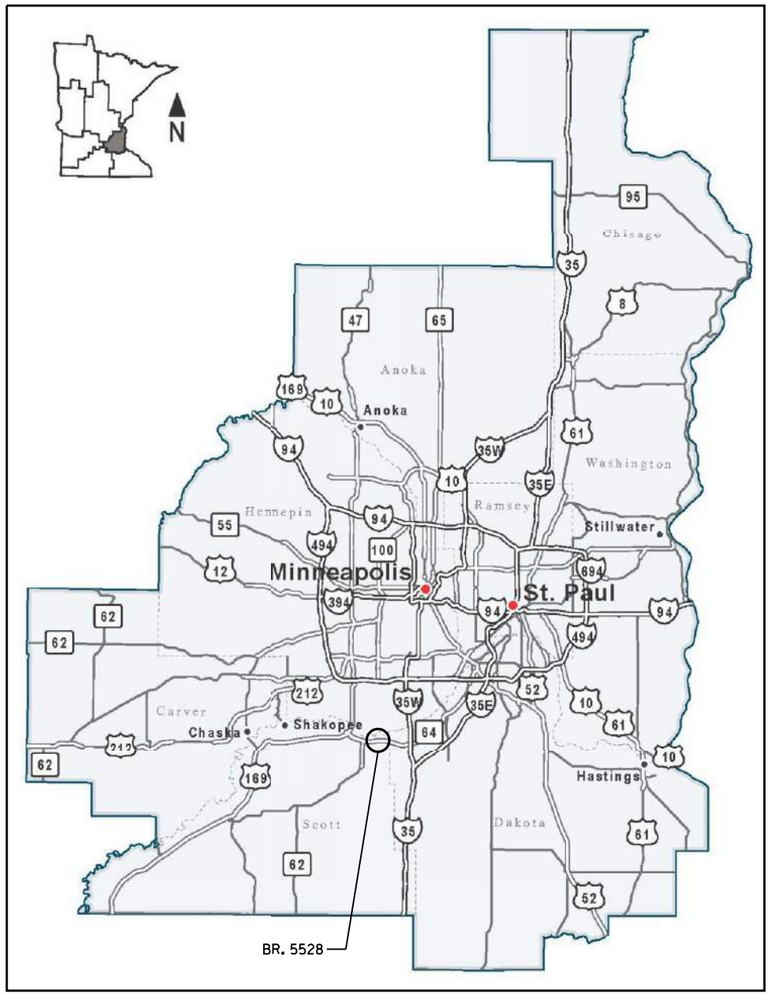
DISCLAIMER

Disclaimer:
This Plan Will Change Prior To Construction. Any Plans For Development Adjacent To The Roadway Should Be Confirmed By Contacting:

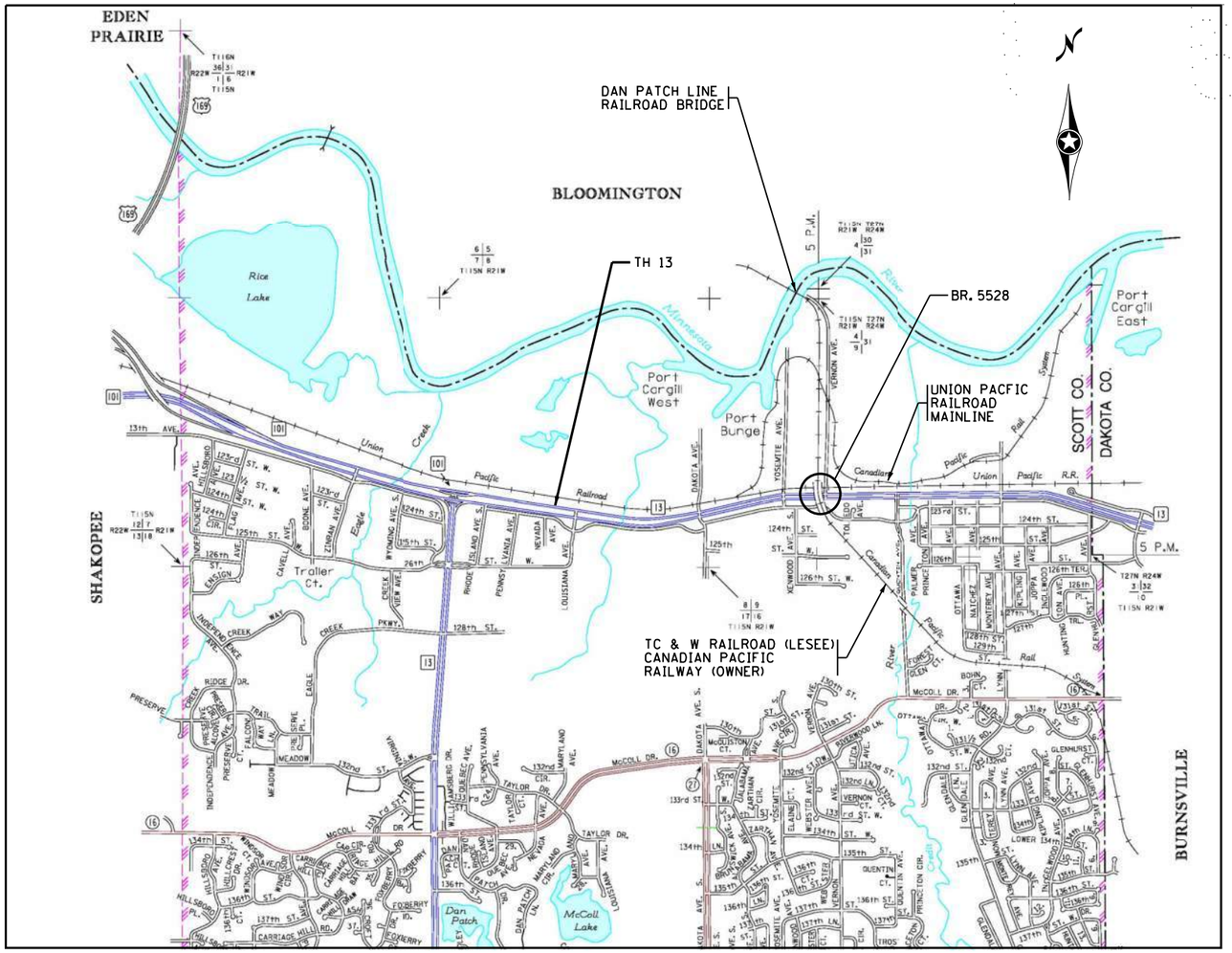
WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
www.wsbeng.com
763-541-4800 Fax 763-541-1700
INFRASTRUCTURE ENGINEERING PLANNING CONSTRUCTION

No Responsibility Is Assumed For Plans Developed Based On This Layout

Appendix B Background Information

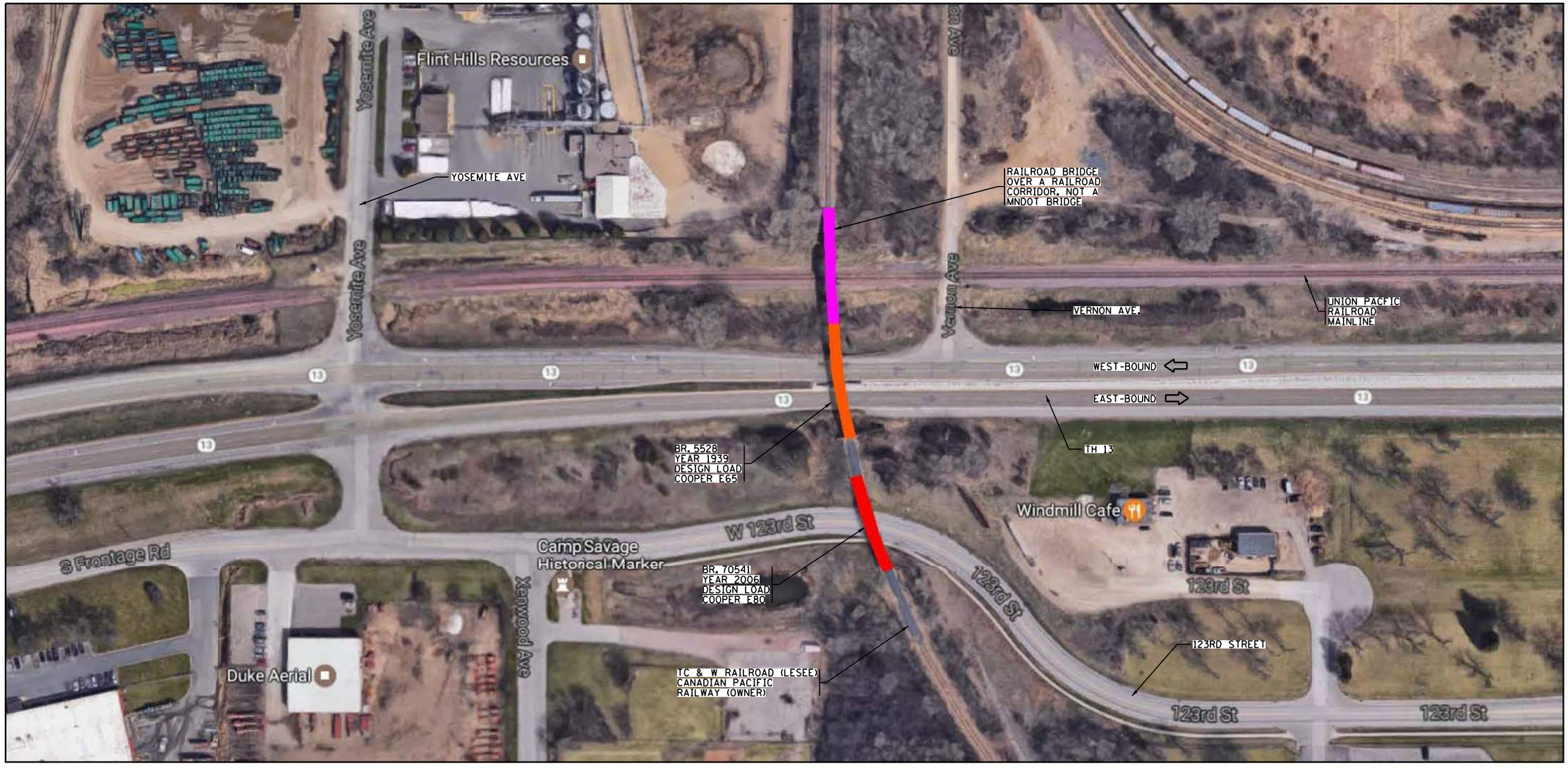


MnDOT METRO DISTRICT - SCOTT COUNTY



CITY OF SAVAGE - BR 5528

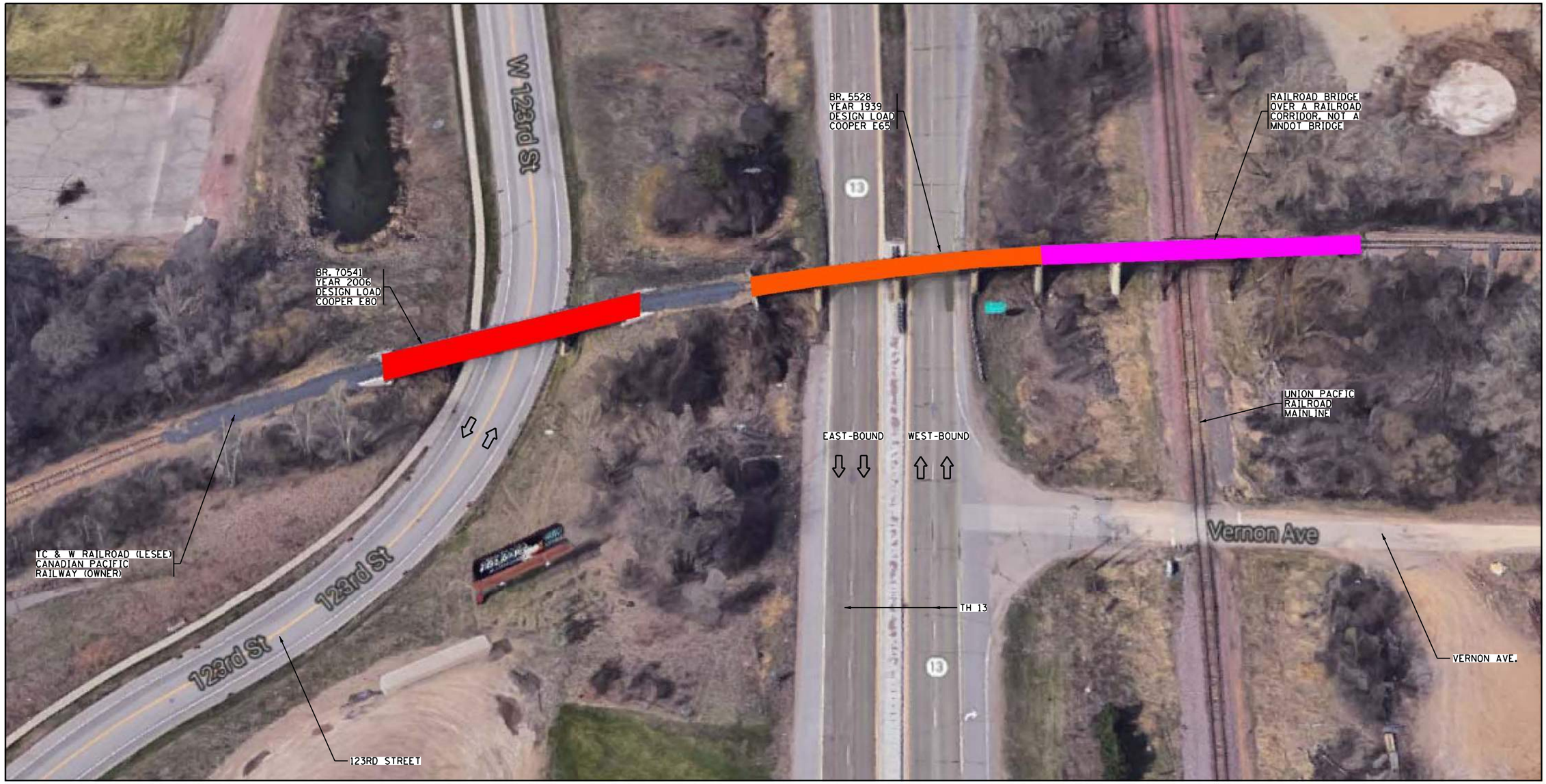
	WSB	701 Xenia Avenue South, Suite 300 Minneapolis, MN 55146 Tel: (763)541-4800 · Fax: (763)541 1700 wsbeng.com	APPENDIX B	TH 13 DESIGN OPTIONS	CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	SHEET 1 OF 10



GENERAL AREA

(GOOGLE MAPS)

	WSB	701 Xenia Avenue South, Suite 300 Minneapolis, MN 55146 Tel: (763)541-4800 · Fax: (763)541 1700 wsbeng.com	APPENDIX B	TH 13 DESIGN OPTIONS	CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	SHEET 2 OF 10



BRIDGES 70541 & 5528

(GOOGLE MAPS)

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BRIDGE 5528

(GOOGLE EARTH)

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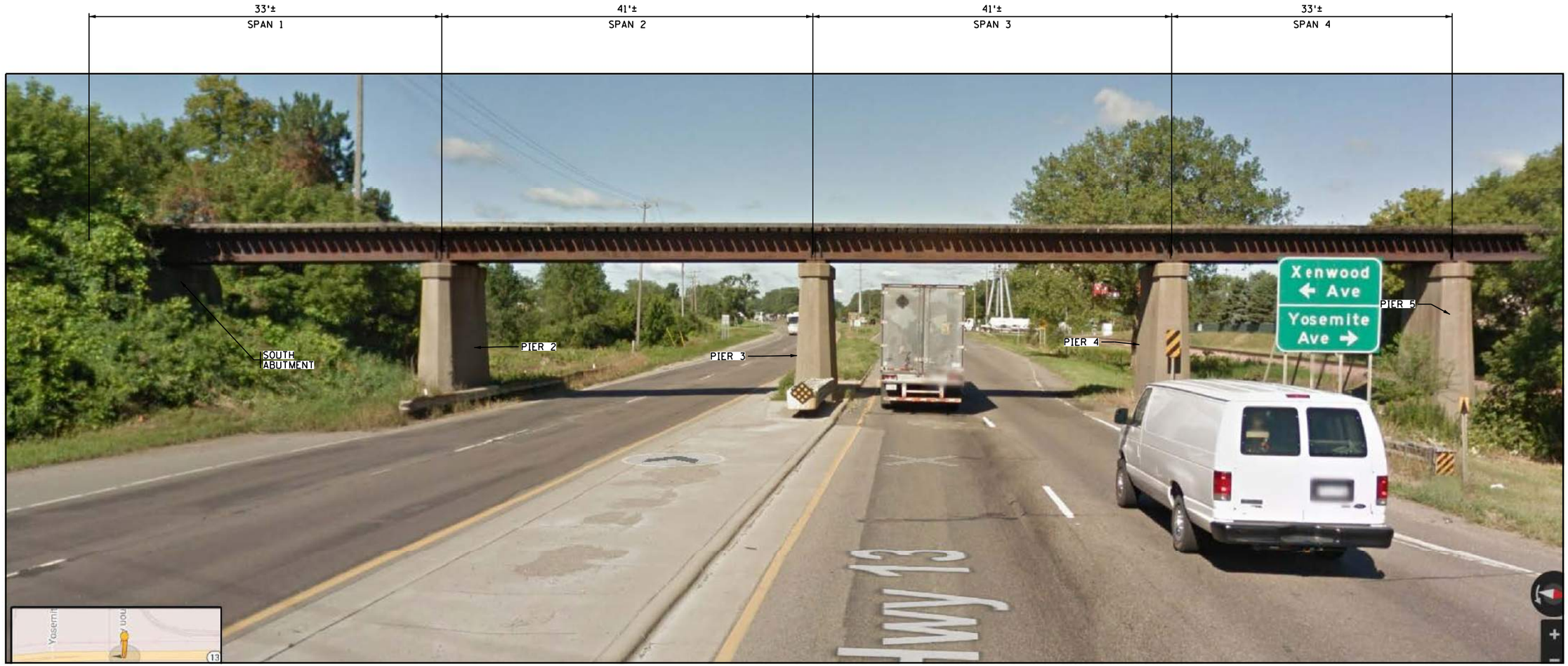
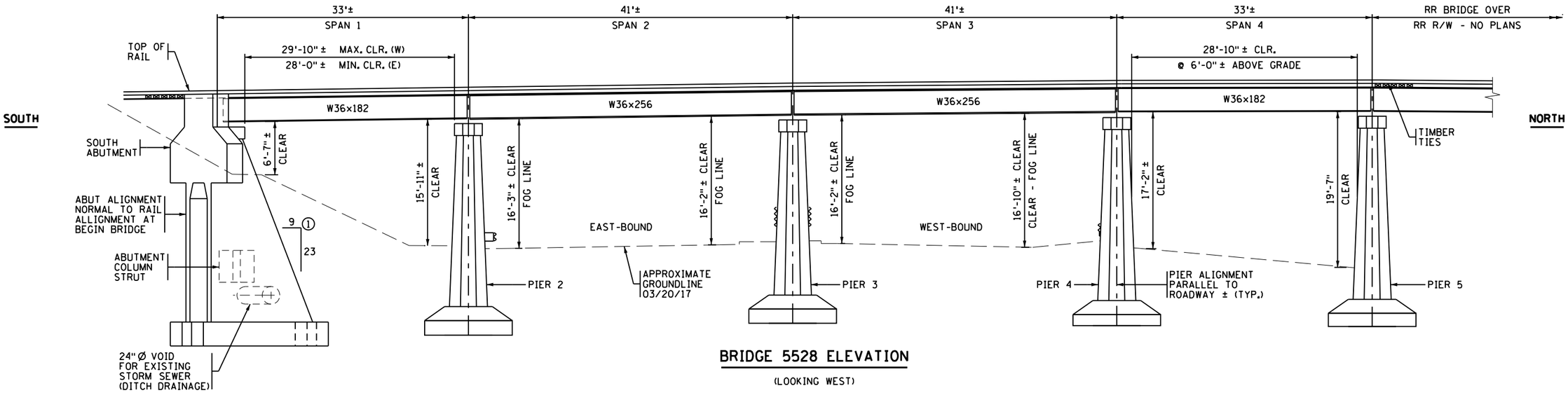
APPENDIX B	
TH 13 DESIGN OPTIONS	
CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	
SHEET 4 OF 10	



BRIDGE 5528 ELEVATION - LOOKING WEST

(GOOGLE MAPS)

	WSB	701 Xenia Avenue South, Suite 300 Minneapolis, MN 55146 Tel: (763)541-4800 · Fax: (763)541 1700 wsbeng.com	APPENDIX B	TH 13 DESIGN OPTIONS	CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	SHEET 5 OF 10

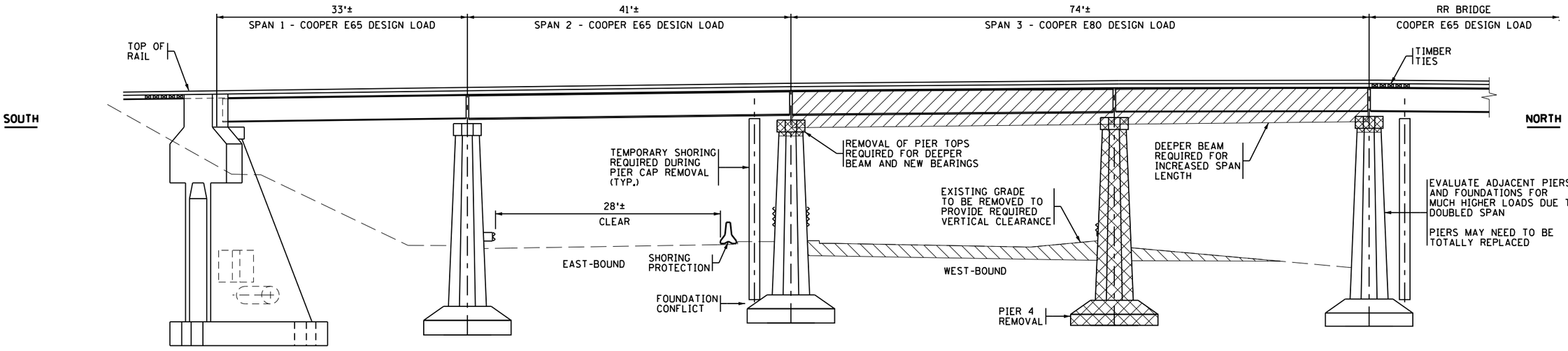


BRIDGE 5528 ELEVATION

(LOOKING WEST)

NOTES:

1. MEASURED LONGITUDINAL TO ABUTMENT LAYOUT.



OPTION 2 - PIER REMOVAL, SPAN REPLACEMENT

(LOOKING WEST)

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701 Xenia Avenue South, Suite 300
Minneapolis, MN 55146
Tel: (763)541-4800 · Fax: (763)541 1700
wsbeng.com

APPENDIX B	TH 13 DESIGN OPTIONS	CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	SHEET 6 OF 10

PROPOSED RAILROAD ALIGNMENT

(GOOGLE MAPS)

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BRIDGE 27236 - BNSF RR OVER TH 65

(GOOGLE MAPS)

STATE PROJECT: 2710-2736A

(1) SINGLE SPAN THRU-GIRDER BRIDGE
SPAN ARRANGEMENT: 120'-4"
TWO TRACKS
LETTING DATE 02/28/14
BRIDGE ONLY

$ 16.4k / LFT / TRACK

WSB
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55146
Tel: (763)541-4800 · Fax: (763)541 1700
wsbeng.com

BRIDGE 27303 - CP RAILWAY OVER TH 100

(GOOGLE MAPS)

STATE PROJECT: 2734-33

(2) SINGLE SPAN THRU-GIRDER BRIDGE
SPAN ARRANGMENT: 106'-0" - 106'-0"
ONE TRACK
LETTING DATE 05/16/14

$ 17.4k / LFT / TRACK

WSB
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55146
Tel: (763)541-4800 · Fax: (763)541 1700
wsbeng.com

BRIDGE 70541 - CP RAIL OVER S FRONTAGE ROAD

(GOOGLE MAPS)

STATE PROJECT: 211-010-05 & 7001-96

(1) SIMPLE SPAN MULTI-STRINGER BRIDGE
SPAN ARRANGMENT: 28'-62'-32'
ONE TRACK
LETTING DATE 06/01/06

$ 8.5k / LFT / TRACK

WSB
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55146
Tel: (763)541-4800 · Fax: (763)541 1700
wsbeng.com

APPENDIX B	TH 13 DESIGN OPTIONS	CITY OF SAVAGE SCOTT COUNTY BRIDGE NO. 5528	SHEET 10 OF 10

Appendix C Estimated Costs

TH 13 - Br 5528 Replacement

PROJECT: CONTRACT LOCATION: LOCATED ON T.H. 65 FROM 14TH AVE. TO 18TH AVE.

GRADING, CONC PAVING, BIT MILL & OVERLAY, & BRIDGE #27236.

STATE PROJECT 2710-42

LOCATION: CITY OF MINNEAPOLIS Date: 02/28/14 9:30 A.M.

GOOGLE MAP: https://goo.gl/maps/LDn3ycm6NMS2

Low Bid	2nd	3rd	4th
$1,608,891.90	$1,877,004.06	$1,803,134.90	$2,026,792.36

Average Bid	Early Bridge Steel
$1,828,955.81	$2,113,969.26

Total
$3,942,925.07

OTO Bridge Length (ft)	Number of Tracks --	2014 Cost per Foot per Track ($ / ft)
123.43	2	$15,972.69

Inflation				
CPI in 2017 / CPI in 2014	=	243.603 / 236.736	=	1.029

Consumer Price Index (CPI)

2017 Cost per Foot per Track ($ / ft)
$16,436.01

Cost Alternative Foot ($ / ft)
$17,000.00

Bridge Costs Only
Thru-Girder, Ballasted Deck

PROJECT: LOCATED ON T.H. 100 FROM 100' NORTH OF 36TH STREET WEST TO 80' NORTH OF 26TH STREET WEST IN ST. LOUIS PARK.

GRADING, ALTERNATE BIT OR CONC SURFACING, MULTI BRIDGES ETC

STATE PROJECT 2734-33

LOCATION: SLP Date: 05/16/14 9:30 A.M.

GOOGLE MAP: https://goo.gl/maps/3eJUHcjb9vJ2

Low Bid	2nd	3rd	4th
$3,250,112.75	$3,530,672.73	$3,482,472.73	$4,706,509.80

Average Bid
$3,742,442.00

OTO Bridge Length (ft)	Number of Tracks --	2014 Cost per Foot per Track ($ / ft)
221.35	1	$16,907.03

Inflation				
CPI in 2017 / CPI in 2014	=	243.603 / 236.736	=	1.029

Consumer Price Index (CPI)

2017 Cost per Foot per Track ($ / ft)
$17,397.45

Cost Alternative Foot ($ / ft)
$18,000.00

Bridge Costs Only
Thru-Girder, Ballasted Deck

PROJECT: TH 13 SOUTH FRONTAGE ROAD

PHASE 1: DAKOTA AVENUE TO QUENTIN AVENUE STREET, STORM SEWER, RAILROAD BRIDGE, AND APPURTENANT WORK

STATE PROJECT S.P. 211-010-05 & S.P. 7001-96

LOCATION: CITY OF SAVAGE Date: 6/1/2006

BASE BID: TOTAL SCHEDULE B - BRIDGE CONSTRUCTION

GOOGLE MAP: https://goo.gl/maps/YrZxRpodJRA2

Low Bid	2nd	3rd	4th
$832,666.43	$868,586.91	$865,687.55	$882,460.35

Average Bid
$862,350.31

OTO Bridge Spans (ft)	2006 Cost per Foot ($ / ft)
122.00	$7,068.45

Inflation				
CPI in 2017 / CPI in 2006	=	243.603 / 201.60	=	1.208348

Consumer Price Index (CPI)

2017 Cost per Foot ($ / ft)
$8,541.14

Cost Alternative Foot ($ / ft)
$9,000.00

Bridge Costs Only
Multi-Stringer (4) non-ballasted deck

	Bridge Replacement Length (ft)	Cost Estimate (2017 USD)	
Option 1A	148	$1,332,000	Same bridge type
Option 1B	320	$2,880,000	" "
Option 1C	600	$5,400,000	" "
Option 2	74	$666,000	" "

Appendix D

Study Management Team (SMT) and Public

Meeting Summaries

Appendix D1 - SMT Kick Off Meeting 7/8/16

Appendix D2 - SMT Meeting 8/17/16

Appendix D3 - Property and Business Owner Meeting - Comments and Sign In Sheet 9/22/16

Appendix D4 - Design Charrette Summary 10/5/16

Appendix D5 - SMT Meeting 11/9/16

Appendix D6 - SMT Meeting 1/11/17

Appendix D7 - Public Open House - Comments and Sign In Sheet 5/22/17

Appendix D1 - SMT Kick Off Meeting 7/8/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Kick-Off Meeting Notes

Friday, July 8, 2016
1:00 to 2:30 pm
Savage City Hall

In Attendance:

City of Savage: John Powell, Bryan Tucker, Sydney Schaff
Scott County: Lisa Freese, Jarrett Hubbard
MnDOT: Diane Langenbach, Jon Solberg
WSB: Scott Marek, Derek Schmidt, Andy Hingeveld

1. Introductions.
   - *The group went around the table and introduced themselves.*

2. Overview of study scope, timeline and deliverables (Scott Mareck, All – Attachment A).
   - *Scott gave an overview of the study scope, tasks, and deliverables.*
     - *The purpose of the study is to identify and evaluate concepts for roadway improvements along Trunk Highway (TH) 13 in the vicinity of Dakota Avenue and Yosemite Avenue. The study will continue recent efforts to address safety, access, and mobility issues within the TH 13 corridor. This study will examine improvements that benefit freight movements to and from the Ports of Savage area.*
   - *The study is a partnership effort by the City of Savage and Scott County, and is expected to last until April 2017.*
   - *John Powell reiterated that the partners will be invited to participate in all meetings throughout the course of the study.*

3. Discussion of SMT composition and public involvement (Scott Mareck, All – Attachment B).
   - *Scott presented the Outline of Public Involvement and upcoming meetings.*
   - *There was a question if businesses in the study area should be invited to participate in the design charrette. The group agreed that businesses should be invited to participate.*
   - *John Powell stated that there were three railroad coordination meetings identified in the scope of work, but there are two railroad companies and they will likely not meet together. Thus there will likely be two individual railroad meetings, and the third meeting may be a follow-up for one of the railroads with more issues/concerns to discuss.*
   - *The group discussed the importance of building interest and support in the study from the adjacent businesses in the ports area. At least one business representative will be invited to participate in the study group meetings. Bryan Tucker has a list of business representatives to serve as contacts for*

upcoming group business meetings. Group meetings should include businesses from both the north and south sides of TH 13.

- *The group agreed that a representative from the MnDOT Freight Office should be invited to participate. Diane will reach out to them to determine who will participate.*
- *Greg Oberly from CHS was identified as a potential business representative for the Study Management Team (SMT) meetings.*
- *It was agreed that the next SMT meeting will be held on Wednesday, August 17, 1:00PM at Savage City Hall.*

4. Overview of 2000, 2005 and 2013 studies (Scott Mareck, All – Attachment C).
    - *Scott provided a recap of previous studies and concepts that have been prepared in the study area. In 2000, MnDOT prepared a TH 13 Corridor Study that evaluated improvements along a larger corridor area. In 2005, WSB prepared multiple concepts for MnDOT in the Dakota-Yosemite area. These concepts included closing Yosemite and Dakota Avenues, frontage roads, and grade separation options. A final recommendation from the 2005 concepts was not provided. In 2013, MnDOT updated the TH 13 Corridor Study. The update recommended future long-term improvements be evaluated at Dakota and Yosemite, but the study did not identify what these improvements should include.*
    - *John Powell suggested that Savage's recent Dan Patch river crossing study should be considered during new concept development. The study discussed options for using the river crossing for vehicle or pedestrian purposes. This is a long-term issue to consider.*
    - *John Powell also suggested that the extension of CH 27 north from CH 16 to TH 13 should be considered during concept development. This is also a long-term issue to consider due to the impact to the Savage Fen.*
    - *Lisa Freese stated that river crossings are a choke point on the highway system in the southwest metro. There is a need for more capacity on river crossings that serve Scott County (TH 169, I-35W, CSAH 101, TH 41).*
    - *Lisa Freese also mentioned that in 2005, there was not an appetite for high-cost solutions in the study area due to other improvements that were in process (TH 13/CSAH 101 intersection).*
    - *Lisa Freese stated that Scott County wants to see TH 13 as a mobility corridor, and the County adopted the Transportation Sales Tax to invest in mobility improvement projects that benefit regional corridors, including TH 13.*
    - *Jon Solberg stated that freight projects may have more priority now due to the funding focus on freight at the state and federal levels.*
    - *Scott asked the group what the vision of TH 13 is. John Powell responded that a six-lane expressway was likely ruled out – need to think about best long-term solution, even if it is expensive. The group agreed with this statement.*
    - *Jon Solberg stated that farm commodity shipments have changed in recent years. Grain hauls may occur over an extended period of time, and may occur during different seasons due to farmers storing more commodities on-site until unit prices are more favorable. Thus fall 2015 counts collected by MnDOT may be helpful, but may not fully represent peak trucking periods. Jon stated that business engagement is key to understand trucking demands. Business involvement and support is important to MnDOT.*

- *Bryan Tucker stated that approximately 200 truckloads occurred at the Cargill site on a recent day.*
- *Lisa Freese said that railroad use is also important in the ports area, and railroad activity may be up due to recent trends and the opening of the Panama Canal expansion.*
- *The Met Council is leading a Metro Freight Study. Steve Elmer is the contact for the study.*

5. Overview of current issues and round robin discussion (Andy Hingeveld, All – Attachment D).
   - *Andy gave an overview on the issues map that was prepared for the study. It was discussed that MnDOT has an overlay project in 2017 programmed on TH 13 in the study area. As part of the overlay project, MnDOT initially discussed converting Dakota and Yosemite Avenue accesses to 3/4 intersections, but removed them after discussions with the city and due to the start of this study. Instead, acceleration lane extensions at Dakota Avenue are included as part of the overlay project.*
   - *John Powell suggested Jim Weatherhead (MnDOT Rail Office) be contacted to discuss railroad safety improvements that he has provided to the City in the past.*
   - *The City said that Union Pacific Railroad is exploring an additional spur track in the vicinity of Dakota Avenue, but the project is on hold. There is a city sewer line in the area where the spur would go.*
   - *It was noted that there have been a high number broken railroad crossing stop gate arms at these intersections. In addition to recorded crashes, there are a lot of close calls that occur.*
   - *The issues map will be updated to note the long-term Dan Patch River Crossing Study and the CH 27 extension. Crash symbols will also be updated to make more legible.*

6. Discussion of existing and forecasted traffic (Scott Mareck, All – Attachment E).
   - *Scott noted that traffic counts at five intersections and six segments will be completed the week of July 11th. It was agreed that it will be helpful to have these counts to augment the data collected by MnDOT in fall 2015.*

7. Discussion of approach for design concept development (Derek Schmidt, All).
   - *Derek gave an overview of the design and charrette process to evaluate previous concepts and develop new concepts for the study area. The main issue is how to deal with current left turns, which will likely lead to the need for an over/underpass.*
   - *Derek asked whether internal circulation at business sites contributes to back-ups on TH 13. Lisa Freese stated that Cargill has updated its circulation recently, and that Cenex may have capacity on-site.*
   - *Jon Solberg suggested that haulers/truckers should be invited to participate in the business meetings to hear how they use the roads.*

8. Next steps.
   - *WSB will collect traffic counts the week of July 11th.*
   - *WSB will perform existing conditions traffic operations and safety analysis for the next SMT meeting.*
   - *WSB will reach out to Jim Weatherhead at MnDOT Rail Office.*
   - *MnDOT will reach out to MnDOT Freight Office.*
   - *Next Meeting: Wednesday, August 17th, 1:00PM at Savage City Hall*

Appendix D2 - SMT Meeting 8/17/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Study Management Team (SMT) #2 Meeting Notes

Wednesday, August 17, 2016
1:00 to 2:30 pm
Savage City Hall

In Attendance:

City of Savage: Seng Thongvanh, Bryan Tucker
Scott County: Jarrett Hubbard
MnDOT: John Tompkins
WSB: Scott Mareck, Derek Schmidt, Eric Seiberlich

1. Introductions.
   - *The group went around the table and introduced themselves.*

2. Review of meeting notes from July 8, 2016 Kick-Off Meeting (Attachment A).
   - *Scott Mareck overviewed meeting notes from the July 8th Kick-Off Meeting.*
   - *Highlights included discussion of the previous MnDOT corridor studies in 2000 and 2012, previous grade-separated designs evaluated, heavy truck traffic entering and existing the Savage Port Area, railroad issues, business and property owner issues, heavy traffic volumes along TH 13, recent signals installed at Quentin and Lynn Avenues in 2012 and upcoming turn lanes and acceleration lanes programmed at Dakota Avenue for FY 2017.*
   - *Scott explained that the purpose of the current study is to update the 2012 study and develop a long term design for TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue.*
   - *The current study update is being completed to position the City of Savage and Scott County to potentially receive federal and/or State freight funding assistance.*
   - *John Tompkins, from the MnDOT Office of Freight, added that MnDOT will be conducting a Freight Investment Plan Study beginning sometime this fall. The purpose of the Study will be to identify a Statewide freight network and a listing of eligible freight projects for $20 million of annual freight funding available to Minnesota through the Federal "FAST Act".*
   - *John noted that freight projects that are along the identified statewide freight network that demonstrate a need for system preservation, safety, operations or freight mobility improvements will be considered for FAST Act funding through a project selection process to be determined during the Study. Partial FAST Act funding will be available for selected projects.*
   - *John indicated that he is very interested in the TH 13 project and will be participating in the TH 13 SMT for the duration of the study process.*
   - *Jarret Hubbard emphasized that Scott County is looking for a long-term solution for this project.*

3. Review of crash analysis and existing/forecasted level of service analysis (Attachment B).
    - **Base Traffic Assumptions and Background**
    - *TH 13 2014 traffic counts near Dakota and Yosemite Avenues are approximately 47,200 AADT.*
    - *TH 13 2034 traffic counts near Dakota and Yosemite Avenues are approximately 56,200 AADT.*
    - *TH 13 2040 traffic counts near Dakota and Yosemite Avenues are approximately 58,200 AADT.*
    - *TH 13 overall traffic growth rate from 2014 to 2040 is approximately 23%.*
    - *WSB completed traffic counts at Dakota Avenue, Yosemite Avenue, Quentin Avenue, Lynn Avenue and Chowen Avenue the week of July 11th.*
    - *Results of these counts show an increase from October, 2015 counts taken by MnDOT.*
    - *Synchro/Sim Traffic Model was used for the Level of Service (LOS) traffic analysis.*
    - ***Dakota and TH 13** is a four-legged, minor approach stop controlled intersection.*
    - ***Yosemite and TH 13** is a four-legged, minor approach stop controlled intersection.*
    - ***Quentin and TH 13** is a three-legged, minor approach signal controlled intersection.*
    - ***Lynn and TH 13** is a four-legged, minor approach signal controlled intersection.*
    - ***Chowen and TH 13** is a four-legged, minor approach stop controlled intersection.*
    - **2016 Traffic Conditions**
    - *Based on existing traffic, all existing intersections except Quentin have 1 or more approaches at LOS E or LOS F in the peak hour.*
    - *Delay in the PM peak hour is an average of over 200 seconds per vehicle for vehicles traveling NB/SB on Dakota, Yosemite and Chowen.*
    - *Left turns and stop controlled minor approach stop controlled intersections attempting to access TH 13 have the most delay.*
    - *A 3 and 5 year crash analysis was conducted.*
    - *Crashes at all intersections analyzed increased significantly since the previous 2012 study.*
    - *Only Quentin has a crash rate below the statewide average.*
    - *Lynn and Chowen have crash rates twice the statewide average.*
    - *Both Lynn and Chowen have experienced significant crash rate increases since the 2012 study.*
    - *Yosemite's crash rate has increased 5 times since the 2012 study.*
    - **Forecasted 2040 Traffic Conditions**
    - *A growth factor of 1.23 was applied to existing turning movements to develop forecasted 2040 turning movements for Dakota, Yosemite, Quentin, Lynn and Chowen.*
    - *For the Lynn south approach to TH 13, a factor of 1.41 was used, based available data.*
    - *Acceleration lanes and turns lanes were added to the model at Dakota, based on FY 2017 improvements planned for this intersection.*
    - *A signal was added to the model at Chowen for analysis purposes.*
    - *In 2040, all intersections analyzed have multiple approaches at LOS E or LOS F, and delay increases significantly from existing conditions.*
    - *2040 delay is an average of over 200 seconds per vehicle during the AM and PM peak for vehicles traveling NB/SB on Dakota and Yosemite.*
    - *Adding a signal at Chowen improves the LOS for minor approaches, but significantly decreases the LOS for east and west approaches along TH 13.*
    - ***Overall, the crash and LOS analysis shows worsening conditions since the 2012 study.***

- *Cheng Thongvanh asked if consideration had ever been given to closing Lynn to the north of TH 13 and consolidating this approach with the north Quentin Avenue approach to TH 13?*
- *It was explained by Derek Schmidt, WSB Design Engineer, that consolidating Lynn with Quentin had been considered in previous studies, however, this idea was not liked by the Railroad.*
- *Closing and/or consolidating existing intersections in combination with an improved frontage road system will be considered as part of an at-grade solution, in addition to grade-separated solutions, during the upcoming preliminary design process. Integrating the existing railroad and large truck movements into design alternatives will be critical elements of the design development process.*

4. Discuss timing of project mailings and City website material (Attachment C).
    - *It was decided to wait on posting website material or doing an informational project mailing until after the first property owner/business owner meeting is held.*
    - *Brian Tucker is preparing a contact list of people who will be invited to attend the 1st property owner/business owner meeting.*
    - *Brian has also lined up a business representative to serve on the SMT.*
    - *Scott Mareck will coordinate with Jim Weatherhead, MnDOT Office of Rail, to arrange face-to-face meetings with Union Pacific and Canadian Pacific Railroads in the next 30 days.*
    - *The first business/property owner meeting will be held Thursday, September 22nd from 4 to 5 pm at the Savage City Hall. A PowerPoint presentation, poster boards and handout will be prepared.*
    - *Scott Mareck will coordinate City of Savage Council and Scott County Board project updates with City and County staff.*
    - *A Design Charrette (SMT meeting #3) will be held Tuesday, October 4th from 3 to 5 pm at the Savage City Hall.*
    - *SMT meeting #4 will be held Wednesday, November 9th from 1 to 2:30 pm at the Savage City Hall.*
    - *SMT meeting #5 will be held Wednesday, January 11th from 1 to 2:30 pm at the Savage City Hall.*
    - *Subsequent SMT meetings will be held on the 2nd Wednesday of the month, as necessary, from 1 to 2:30 pm.*

5. Other business.
    - *There being no further business, the meeting was adjourned.*

Appendix D3 - Property and Business Owner Meeting - Comments and Sign In Sheet 9/22/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Property and Business Owner Meeting

Thursday, September 22, 2016
4:00 to 5:00 pm
Savage City Hall

Meeting Summary

- Ten people signed in, and thirteen people were in attendance. Of the thirteen, five represented businesses and properties in the study area. The remaining eight represented the City, County, MnDOT, and consulting team.
- Business representatives in attendance were from businesses on the south side of TH 13 including Fabcon, Turner Excavating, and Road Machinery & Supplies.
- There was some discussion regarding previous studies and proposals along TH 13, and that issues still haven't been addressed for Dakota Ave and Yosemite Ave.
- MnDOT and Scott County stated that past studies looked at low-cost high-benefit solutions, which have been difficult to identify and implement at this location. However, there is new interest and potential funding sources that have led to exploring this area again to identify a long-term solution.
- The business representatives stated that other TH 13 highway improvements (13/101, County Road 5) have made it harder to get business traffic on and off TH 13 since traffic is now going faster on TH 13.
- The business representatives stated that a traffic signal and extended acceleration lanes at Dakota Avenue are needed in order to get on and off of TH 13. An additional signal would also slow down traffic on TH 13 allowing cars wanting to go to TH 169 to be able to move over from the 13/101 intersection.
- Shifting the Dakota Avenue access west could also help to allow more room for truck movements.

- Most trucks that access their sites (on south side of TH 13) use either Quentin Avenue or 126th Street (even though Dakota Ave is the closest access point) because traffic on TH 13 is so high that trucks cannot turn at Dakota Ave.
- Fabcon can have up to 100 trucks per day at their peak. Traffic is seasonal. Most trucks will avoid Dakota and use Quentin or 126th Street since they have traffic signals.
- There is a business need for trucks to cross TH 13 between the ports businesses on the north and the businesses south of TH 13.
- During afternoon hours, TH 13 traffic will spill into south frontage road and back-ups can occur. The frontage road can back up from Quentin Ave to Fabcon.
- The business representatives agreed that they would rather see one good intersection improvement than two bad ones. (ie, fix it right, no short-term solution).
- They do not want to see a freeway and loss of access to TH 13. Mobility and business/local access needs to be balanced.
- The business representatives stated that the adjacent businesses and its truck traffic were here before all of the car and commuter traffic, yet none of the road improvements have benefited trucks.
- The SW corner of Dakota Avenue has some visibility issues due to trees/vegetation.
- Yosemite Avenue also has its issues in getting in and out of from TH 13.

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study
Property Owner Meeting #1: September 22, 2016

Please Sign-In:

Name & Business/Organization	Address	Email	Telephone
1. Matt Hagen Fabcon	6111 hwy 13	matthew.hagen@fabcon-usa.com	(952) 707-9921
2. Sara Thorgrud City of Savage		sthorgrud@ci.savage.mn.us	952-224-3419
3. Bryan Tucker city of Savage		btucker@ci.savage.mn.us	952.882-2692
4. Jarrett Hubbard Scott County		jhubbard@scott.mn.us	
5. John Tompkins MnDOT	395 John Ireland St. Paul	John.tompkins@state.mn.us	651-366-5724
6. Diane Langenbach MnDOT		diane.langenbach@state.mn.us	(651)234-7721
7. KEVIN TURNER	12540 NEVADA AVE SO	KTURNER454@AOL.com	612-759-6564
8. JOHN TURNER		JTURNER@TURNERKAPTI.COM	952-890-1645

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study
Property Owner Meeting #1: September 22, 2016

Please Sign-In:

Name & Business/Organization	Address	Email	Telephone
1. Dave Leitchman	7225 W Hwy 13		952-894-4405
2. TROY JOHNSON	ROAD MACHINERY & SUPPLIES	tjohnsone rsmeq.com	952 895 7048
3.			
4.			
5.			
6.			
7.			
8.			

Appendix D4 - Design Charrette Summary 10/5/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Design Charrette

Tuesday, October 4, 2016
3:00 to 5:00 pm
Savage City Hall

Design Charrette Summary

Overview:

- The purpose of the design charrette was to provide a brainstorming session for improvements along the TH 13 corridor in the Dakota Avenue and Yosemite Avenue area.
- The ideas generated from the charrette will be used to develop concepts that will be further refined during the concept development phase of the study.
- 19 people participated in the charrette. Representatives included MnDOT, County, and City staff, two business representatives, and consulting team. Business representatives in attendance were from Road Machinery & Supplies and CHS, Inc.
- Scott Marek gave an overview of the study purpose and Derek Schmidt provided a framework for the meeting.
- Participants were divided into three tables. Each table was asked to develop three concepts: 1) low-cost high benefit solution, 2) mid-range cost solution, and 3) high-cost long-term solution.
- Participants were asked to consider and evaluate intersection modifications to Dakota and Yosemite Avenues, frontage roads, grade separations, and road and railroad realignments.

Concepts:

- The following pages provide a summary of the concepts that were developed at each table.

- **Table 1:**
  - Low Cost Concept: turn lane and acceleration lane extensions at Dakota Avenue. This is option is being implemented as part of the MnDOT 2017 overlay project.

  - Mid Cost Concept: raise TH 13 over Dakota Avenue and add ramps under to Dakota Avenue (see following image for concept)

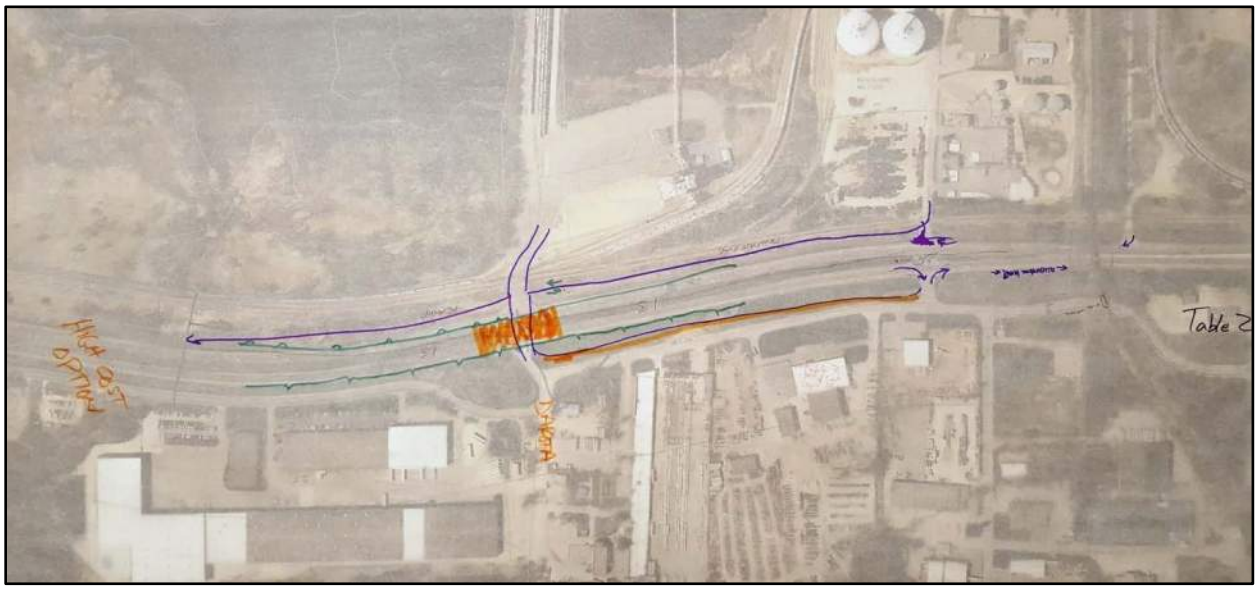
  - High Cost Concept #1: move railroad spurs used for switching/loading/transfers away from TH 13. This option would separate switching operations and the UP rail thru traffic, reducing the number of delays at the at-grade RR crossings at Dakota and Yosemite Avenues.

- <u>High Cost Concept #2</u>: tight-diamond interchange at Dakota Avenue, shift the railroad south towards TH 13 and run a frontage road (near current UP RR alignment) between Dakota and Lynn Avenues. (see Mid Cost Option image on page 2 and the following images for concept)

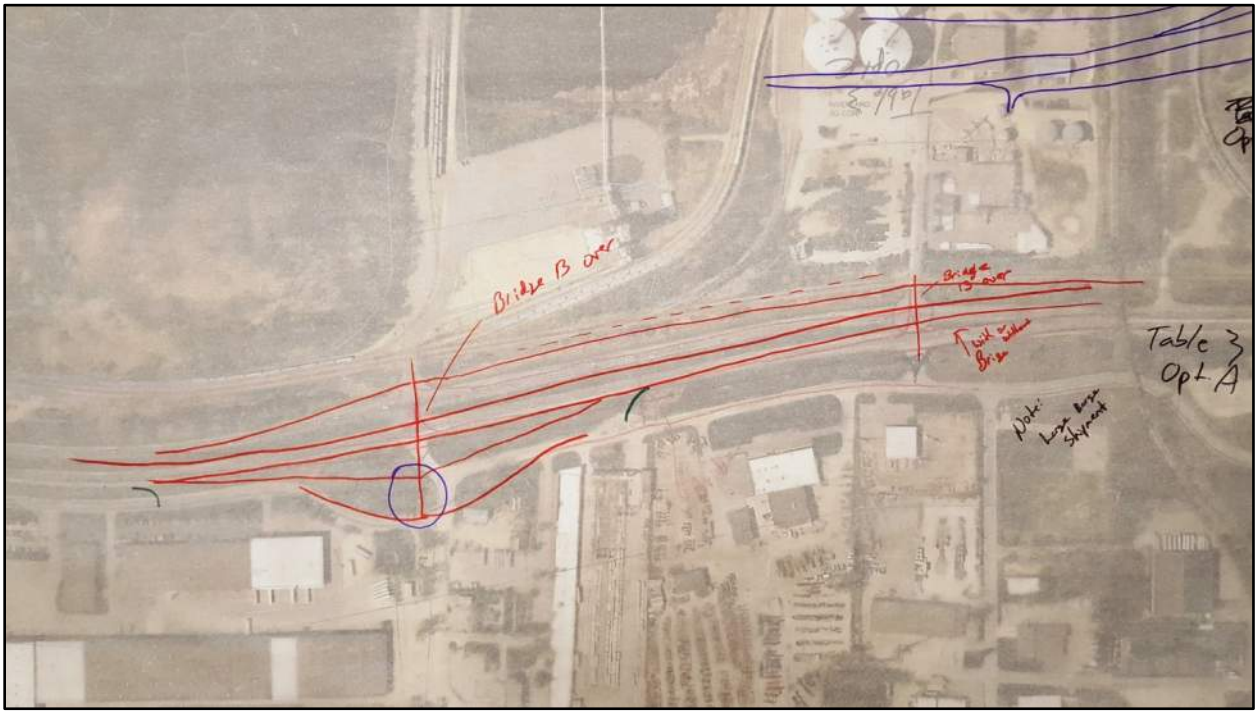
- **Table 2:**
  - Low Cost Concept: build frontage road on north (either adjacent to TH 13 or further north if it could fit within business operations) between Dakota and Yosemite Avenues, close Yosemite Avenue south leg, and build a loon (u-turn) on TH 13 at Dakota Avenue (see following image for concept)

  - Mid Cost Concept: superstreet design – 3/4 intersection at Yosemite Avenue and offset 2-phased signal system at Dakota Avenue. The superstreet design would maintain all directional movements at Dakota Avenue, however left turns onto TH 13 would be converted to a right turn followed by U-turn at signalized intersection. Signals would be coordinated, and are very efficient in moving traffic. The superstreet design could be implemented corridor-wide, and could also be designed for future added capacity on TH 13. (see following image for concept)

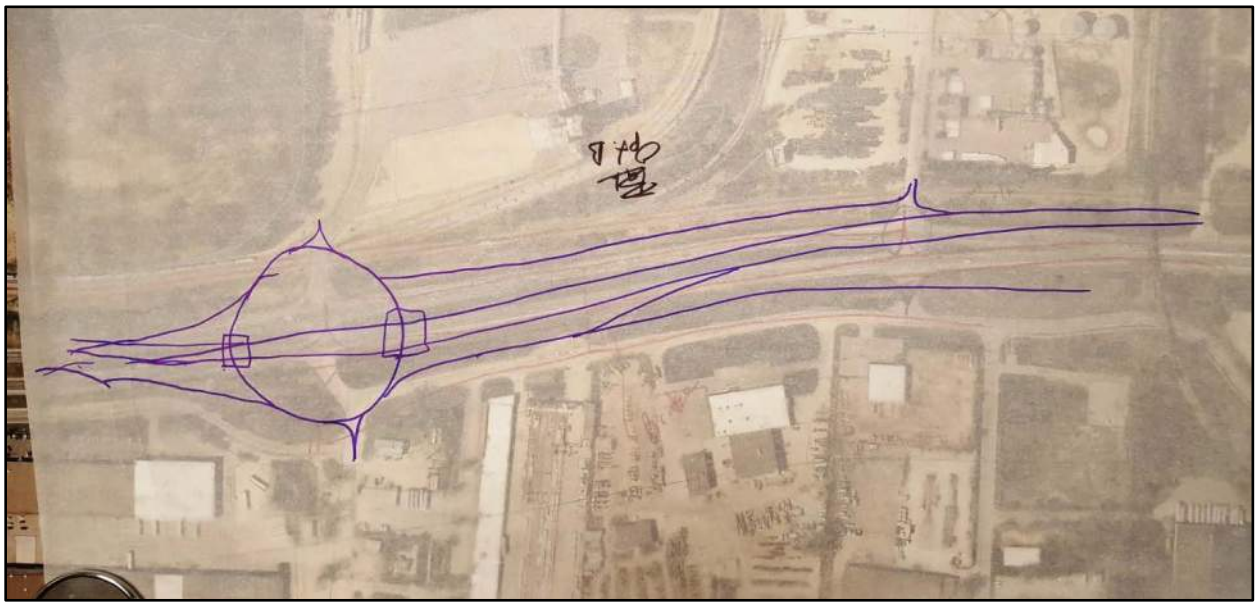
- <u>High Cost Concept</u>: tighten up EB and WB TH 13 to build interchange at Dakota Avenue with TH 13 over Dakota (see following image for concept)



- **Table 3:**
  (Table 3 participants stated all options are likely in the high cost range)
  - <u>Concept A</u>: realign TH 13 to the south and add frontage road to the north of TH 13. Tight diamond or roundabout interchange at Dakota Avenue. Could also grade-separate Yosemite Avenue (see following image for concept)



- Concept B: two-bridge roundabout design – TH 13 over Dakota Avenue with a large roundabout underneath connecting frontage roads (see following image for concept)



- Concept C: frontage roads on both sides of TH 13 with an overpass connecting the frontage roads in the middle between Dakota and Yosemite Avenues. Convert Dakota and Yosemite Avenue intersections to right-in/right-out. Design could also become a single-point interchange. (see following image for concept)

- **Other Concepts:**
  - Derek Schmidt showed two more concepts developed by the consulting team:
  - Concept #1: tight diamond interchange at Dakota Avenue with frontage road to the north and closure of Yosemite Avenue (see following image for concept)

  - Concept #2: grade separation of Yosemite Avenue, frontage road to the north, and reconfiguration of Dakota Avenue to right-in/right-out only. Existing left turns would be accommodated via right-in/right-out at Dakota Avenue and use of overpass/underpass at Yosemite Avenue to cross TH 13 (see following image for concept)

Discussion:

- Following the presentation of each concept, some additional comments were provided.
- General consensus was that any improvements should address the long-term need; quick fixes won't do.
- It was discussed that existing volumes and difficulties of entering/exiting Dakota and Yosemite Avenues leads to traffic being diverted to other roadways and intersections. Thus, demand at these intersections is likely higher, however the diverted traffic is hard to quantify.
- Properties south of TH 13 may not have much capacity to expand, however the port businesses to the north may have more capacity. Grain elevator activity was estimated to be about 40-50% capacity today. Historically, activity was higher, and demand could increase in the future as well. The port businesses can handle additional activity to react to market demands. These businesses typically have an eight-month season, with June-July as the peak period of demand. 75% of trucks destined to CHS come from the west.
- It would be helpful to get trucking activity from businesses to identify actual needs and compare with the traffic counts collected in July.
- Transit advantages was not discussed during the charrette, but should be considered during concept development. Existing routes, including the new MVTA Route 495, utilize TH 13. And a bus stop in the downtown Savage area has been discussed by the city.

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study
Design Charrette: October 4, 2016

Please Sign-In:

Name & Business/Organization	Email	Telephone
1. Greg Oberle / CHS INC	greg.oberle@chsinc.com	651-355-6572
2. Diane Langenbach - MnDOT	diane.langenbach@state.mn.us	651-234-7721
3. Jim Weatherhead - MnDOT	jim.weatherhead@state.mn.us	651-366-3671
4. Ted Gregory - MnDOT	theodore.gregory@state.mn.us	651-366-3696
5. Jesse Larson - MnDOT Traffic	jesse.larson@state.mn.us	651-234-7824
6. Douglas Carter - MnDOT	DOUGLAS.CARTER@STATE.MN.US	651-366-4623
7. Jamal Love - MnDOT	Jamal.Love@state.mn.us	651-366-4681
8. Anthony Sellner - Scott County	asellner@co.scott.mn.us	507-766-2526
9. Jarrott Hubbard Scott County	JHubbard@co.scott.mn.us	
10. CRAIG JENSON	CJENSON@co.scott.mn.us	
11. Seng Thayanal	sthayanal@ci.savage.mn.us	952-224-3419
12. CURT KOBILARCSIK	CKobilarcsik@co.scott.mn.us	

Name & Business/Organization	Email	Telephone
13. Kate Miner - ScottCo	Kminer@co.scott.mn.us	952.496.8367
14. Bryon Tucker - Savage	btucker@ci.savage.mn.us	952 882 2697
15. TROY JOHNSON	tjohnson@rmseg.com	952 855 7048
16. Lisa Freese - Scott County		
17. Scott Marek - WSB		
18. Derek Schmidt - WSB		
19. Andy Hingeveld - WSB		
20.		
21.		
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25.		

Appendix D5 - SMT Meeting 11/9/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Study Management Team (SMT) #4 Meeting Notes

Wednesday, November 9, 2016
1:00 to 2:30 pm
Savage City Hall

In Attendance:

City of Savage: Seng Thongvanh
Scott County: Jarrett Hubbard, John Swanson (SmartLink)
MnDOT: John Tompkins, Diane Langenbach, Jon Solberg, Jim Weatherhead
MVTA: Jen Lehmann
City of Burnsville: Brian Connolly
Road Machinery & Supplies: Troy Johnson
WSB: Scott Mareck, Derek Schmidt, Andy Hingeveld

1. Introductions.
   - *The group went around the table and introduced themselves.*

2. Overview of study timeline and work completed to-date (Scott Mareck, All).
   - *Scott Mareck provided a study overview and gave an update on the project status.*
   - *Some potential considerations were identified that may require further group discussion during evaluation of alternatives. These considerations included:*
     - *whether rebuilding the CP railroad bridge over TH 13 (Dan Patch Line) would be considered to allow more flexibility in concept designs*
     - *need to incorporate possible extension of CSAH 27 to TH 13*
     - *considerations related to long-term transportation uses of the Dan Patch Corridor*
     - *transit considerations along TH 13*
   - *John Tompkins questioned whether a frontage road could be located north of the UP rail line. Derek Schmidt stated that the frontage road could be placed north of the railroad if the railroad is shifted south. The concepts prepared during the design charrette mainly explored a frontage in-between the railroad and TH 13 by shifting the TH 13 alignment to the south. Eliminating the existing at-grade crossings is difficult because of the elevations required to go over the tracks and being able to tie back in to existing grades would require extending into the business properties.*

3. Discuss project purpose and need and design evaluation criteria (Scott Mareck, All).
    - *In order to assist the group in evaluating design concepts, Scott Mareck presented a draft purpose statement and evaluation criteria.*
    - *The group noted that the purpose and need should address safety and freight mobility/access.*
    - *Jen Lehmann stated that MVTA and the city of Savage will be discussing potential transit connections to north Savage. Transit service currently on TH 13 is thru service. Jen asked about redevelopment opportunities along the corridor. Seng Thongvanh replied that some redevelopment south of TH 13 could occur. Jarrett Hubbard replied that the ports businesses will remain due to their transportation connections to the River, railroad and TH 13.*
    - *It was suggested that for level of service (LOS), freight benefits should be separated out to demonstrate to FHWA the difference between freight and auto mobility on TH 13.*
    - *Economic benefits for freight are also of importance.*
    - *Railroad operations, freight safety and railroad safety should also be considered.*
    - *Continuity with the freight system on TH 13 is also of importance. There is a need to balance access and mobility for freight without further impacting the role that TH 13 currently plays in the freight system.*

4. Review and preliminary screening of design charrette alternatives (Derek Schmidt, All).
    - *Derek Schmidt presented nine concepts that have been developed to-date. The majority of concepts were based upon the results of the design charrette along with a couple other options and considerations from past design efforts.*
    - *There are a number of similarities/design variations between the concepts that could be applied across multiple concepts. Of the nine concepts, three general themes emerged:*
        - *at-grade access remains (although reduced) at Dakota Avenue and/or Yosemite Avenue*
        - *grade separation with the crossing of TH 13 and direct access at Dakota Avenue*
        - *grade separation with the crossing of TH 13 located between Dakota Avenue and Yosemite Avenue*
    - *All grade separation options look at raising TH 13 over cross streets due to the difficulty of tying Dakota and Yosemite Avenues back into existing grades, especially with the proximity of the railroad to the north.*
    - *Jen Lehmann mentioned that bus-only shoulders could be considered for all concepts, and currently exists on EB TH 13 only.*
    - *For the at-grade R-cut concepts (#2 & #9), it was discussed that truck stacking issues that exist today for trucks turning onto Dakota and Yosemite Avenues would remain.*
    - *The superstreet design (#3) was discussed in detail. While the design would add signals to TH 13, it was discussed that the three signals would operate in unison and are considered to be highly efficient in moving traffic. It was asked whether the eastern U-turn could be consolidated with Yosemite Avenue, which was discussed that it could be considered but may result in access issues for Yosemite Avenue. Maintenance and public acceptance were also mentioned as possible concerns. It was mentioned that the signal timing could be adjusted during peak freight seasons, which would provide a great benefit.*
    - *Concept #4 includes an underpass of Dakota Avenue with right-in right-out access at Yosemite Avenue and a west bound ramp at Dakota Avenue. This option adds truck storage capacity on the*

local frontage roads. It would likely require improvements to the south frontage road. It was discussed that the concept could provide mobility and safety benefits. The weaving of traffic from the Dakota Avenue WB ramp to SB TH 13 would need to be evaluated.

- *Concept #5 is a variation of #4. Items discussed included stacking issues near the railroad if the CHS and Cargill sites are full. Truck counts and turning movements to the businesses would need to be considered.*
- *Concept #1 includes a grade separation of the railroad crossing at Dakota Avenue. This would require extending limits well into CHS site to meet grades. It was discussed that the railroad could be shifted south closer to TH 13 and the frontage road could be located on the current railroad alignment in order to reduce vertical clearance issues.*
- *John Tompkins stated there are a couple of items that should be considered in order to increase the freight attractiveness of the project:*
    - *incorporate ITS components into the project. This improves reliability for freight drivers*
    - *private sector contributions*

5. Discuss next steps (Scott Mareck, All).
    - *The group discussed the next steps for determining the four alternatives to be analyzed. WSB will send out the initial concepts for the group to review and the agencies will identify their top four concepts to be evaluated.*

6. Other business.
    - *No other business was discussed.*

7. Adjournment.

Appendix D6 - SMT Meeting 1/11/17

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Study Management Team (SMT) #5 Meeting Notes

Wednesday, January 11, 2017
1:00 to 3:00 pm
Savage City Hall

In Attendance:

City of Savage: Seng Thongvanh, Brian Tucker
Scott County: Jarrett Hubbard, Kate Miner, John Swanson (SmartLink)
MnDOT: Diane Langenbach, Jon Solberg, Tiffany Kautz
Cargill: Allan Haas, Ruben Chong
CHS: Greg Oberle
WSB: Scott Mareck, Derek Schmidt, Erik Seiberlich

1. Introductions.
   - *The group went around the table and introduced themselves.*

2. Overview of study timeline and work completed to date (Scott Mareck, All).
   - *Scott Mareck overviewed the study timeline, including meetings completed to date and upcoming milestones in the study process. After completing the alternatives evaluation, study updates will be provided to the Savage City Council and the Scott County Board. Following the Savage and Scott County updates, 8 one-on-one meetings will be arranged with a variety of key stakeholders to get input on the design concepts.*

3. Review of meeting notes from November 9, 2016 (Scott Mareck, All).
   - *Meeting notes from November 9, 2016 were briefly reviewed.*

4. Overview of preliminary Build Concepts A, B, C and D (Derek Schmidt, All)
   - *It was explained that MnDOT, Scott County and the City of Savage selected concepts 1, 4, 5 and 8 from the 9 concept layouts developed at the October 4th design charrette. These concepts will be referred to as A, B, C and D moving forward.*
   - *Derek Schmidt discussed how each of the concepts functioned and provided a high-level summary of pros and cons from a design perspective.*
   - ***Concept A** provides a full diamond interchange at Dakota Avenue over TH 13 with railroad grade separation of the Union Pacific Railroad and spurs for vehicles destined to Dakota Avenue or Yosemite Avenue Port businesses. No access is allowed at Yosemite Avenue eastbound or westbound along TH 13. TH 13 is realigned to the south and the Union Pacific Railroad mainline is also*

realigned. Grade is a significant challenge with this concept. The bridge structure is 26 feet above the railroad at its highest point. There are major transmission lines that would need to be moved north of TH 13. Due to grade, a significant portion of the new structure would be located in the existing Port. Cargill has recently installed a truck scale north of Dakota Avenue that would need to be moved. This is the most expensive of the 4 concepts, at approximately $45 to $50 million for right-of-way and construction, but also is the only concept that provides full grade separation of both TH 13 and the railroad.

- ***Concept B*** *provides grade separation at Dakota Avenue under TH 13. All TH 13 access is via Yosemite Avenue except for a westbound TH 13 on ramp at Dakota Avenue. Westbound TH 13 traffic can only turn right-in at Yosemite Avenue. Eastbound TH 13 traffic destined for Dakota Avenue must use the right-in-right-out at Yosemite Avenue. TH 13 is realigned to the south so a north frontage road can be constructed south of the Union Pacific mainline. Westbound traffic exiting Yosemite Avenue must use the north frontage road and the westbound TH 13 on ramp at Dakota Avenue. The existing south frontage road could remain in-place. Both the north and south frontage roads could be designed to include truck parking lanes. Westbound trucks exiting at Yosemite Avenue may back-up onto TH 13 during peak periods; this is undesirable from MnDOT's perspective. Most turns are right; little conflicting traffic. The existing at-grade railroad crossings at Yosemite Avenue and Dakota Avenue remain. Concept B is the least expensive of the 4 design concepts, estimated at approximately $25-$30 million for right-of-way and construction.*
- ***Concept C*** *provides a full movement tight diamond signalized interchange at Dakota Avenue with grade separation under TH 13. The at-grade railroad crossings remain in-place at Dakota Avenue and Yosemite Avenue. Interchange ramp terminal signals could be coordinated with railroad crossing arms and train activity at Dakota Avenue. TH 13 is realigned to the south to allow for a north frontage road south of the existing Union Pacific mainline. There is no eastbound access at Yosemite Avenue. Westbound traffic at Yosemite Avenue can only turn right-in. The existing frontage road south of TH 13 in the vicinity of Dakota Avenue would need to be realigned further to the south, which would impact some properties in this area. Right-of-way and construction costs for Concept C are estimated at approximately $30 to $35 million. A concern was raised about adequate ramp length for Concept C.*
- ***Concept D*** *provides grade separation at the midpoint between Dakota Avenue and Yosemite Avenue with a bridge over TH 13. TH 13 is realigned to the south to accommodate a north frontage road south of the existing Union Pacific mainline. In order to accommodate the grade separated bridge over TH 13, frontage roads on the north and south side of TH 13 are elevated and supported with a significant amount of retaining wall. Due to grade changes, a secondary access road is required south of the new south frontage road to maintain access to Road Machinery and Supplies. Right-in right-out only access is allowed both eastbound and westbound at Dakota Avenue. Westbound right-in only access is allowed at Yosemite Avenue. Eastbound access at Yosemite Avenue is removed. The westbound right-in right-out movement at Dakota Avenue would likely create a problem when trains are present and cause traffic to back up onto TH 13. This could be alleviated by closing the Dakota Avenue westbound access and only allowing westbound traffic to only enter the Ports at Yosemite Avenue. However, if this design change was made, there, may also be TH 13 backup problems at Yosemite Avenue. Right-of-way and construction costs for Concept D are estimated at approximately $32 to $37 million.*

- *It was noted that with concepts B, C and D, vehicles could potentially head east on the north frontage road from Dakota Avenue toward Yosemite Avenue without understanding there is no outlet back onto TH 13 at Yosemite Avenue. To remedy this situation, a cul-de-sac could be added to the design at Yosemite Avenue and a "No-Outlet" sign could be posted along the north frontage road for eastbound traffic.*
- *It was noted that design efforts should be made to ensure adequate ramp lengths are in-place for Concepts A and C to ensure that semi-trucks are not backed up along the TH 13 mainline waiting to enter the Port area. Modeling of forecasted traffic indicates that current ramp lengths, which are minimum length, are adequate to accommodate anticipated queuing.*

5. Overview of preliminary Build Concepts Evaluation for A, B, C and D (Scott Mareck, All).
   - *Scott Mareck and other WSB staff overviewed the design criterion and preliminary scoring of each design concept. It was explained that the evaluation includes both technical analysis and subjective judgements, so definitive conclusions should not be drawn from the information presented. The analysis is intended to only be the starting point of a dialogue of overall pros and cons.*
   - *Eight criterion were established for the initial evaluation: 1. Overall TH 13 mobility; 2. Local travel time; 3. Safety/crash reduction; 4. Construction and right-of-way costs; 5. Freight mobility; 6. Railroad crossing; 7. Environmental/historical/drainage; and 8. Freight funding potential.*
   - *Discussion:*
     - *<u>Transit:</u> It was recommended to add a transit criterion.*
     - *<u>Overall TH 13 Regional Mobility:</u> It was recommended to reduce the scoring of concepts of B, C and D to "moderate-high" and to leave concept A at "high" due to concept A providing railroad grade-separation.*
     - *<u>Local Travel Time:</u> It was recommended to create an exhibit to visually show local travel time distances that were measured. Also, existing travel times should be subtracted from forecasted travel times to arrive at a net travel time reduction attributed to each design concept. A delay factor for trains related to Concepts B, C and D will also be included in an updated local travel time analysis to fully account for the railroad grade separation provided with Concept A. CHS commented that railroad grade separation is a nice design benefit, but is secondary to the importance of providing grade separation of TH 13 for left turns in and out of the Port. Other comments noted the importance of travel time predictability for drivers and the importance of focusing on Port benefits.*
     - *<u>Safety/Crash Reduction:</u> Concept A scored the highest due to both TH 13 and railroad grade separation and no direct at-grade access to TH 13. Concept D scored the lowest because it allows the most at-grade direct access to TH 13 and also has an operational issue with westbound TH 13 right-in traffic at Dakota Avenue backing up onto TH 13 when trains are present.*
     - *<u>Construction and ROW Costs:</u> It was recommended to break construction and right-of-way costs into separate estimates.*
     - *<u>Freight Mobility:</u> It was recommended to quantify freight mobility and ease of access into the ports by comparing required turns, acceleration, deceleration or other similar measures.*
     - *<u>Railroad Crossing:</u> Concept A scored the highest, due to the railroad grade separation. Concept D scored the lowest due to the at-grade right in-right out near the railroad tracks at Dakota Avenue.*

- *<u>Environmental/Historical/Drainage:</u> A comment was made that a high level analysis of drainage and storm water ponding location/size needs should be included.*
- *<u>Freight Funding Potential:</u> Concept A scored "High" due to the railroad grade separation. Concepts B, C and D also scored "High-Moderate" because of their ability to all grade separate left turns in and out of the Port.*

6. General Discussion and Next Steps.
    - *CHS commented that if it were feasible to route access into and out of the Port at Yosemite Avenue instead of Dakota Avenue, this would be preferable for train spotting and switching activities that currently take place at Dakota Avenue.*
    - *There is no formal project implementation schedule established at this time. MnDOT has access to $20 million annually of new freight funding available through the federal "FAST Act", however, the first several years of this funding are already spoken for to implement other projects. Scott County local option sales tax funds may also be available; however, County funding assistance would not be possible until sometime beyond 2022.*
    - *MnDOT would like to highlight this project during an upcoming freight meeting they are hosting February 3rd. Jarrett Hubbard will be making a presentation at this event.*
    - *The Savage City Council will be provided an update on the TH 13 project by Seng Thongvanh at an upcoming meeting in early February.*
    - *The Scott County Board will also be provided an update on the TH 13 project by Jarrett Hubbard at an upcoming meeting sometime in the next month.*
    - *Following the Savage City Council and Scott County Board project updates, one-on-one meetings will be scheduled with key project stakeholders to get input on the preliminary design concepts and concept evaluation completed to date.*

Appendix D7 - Public Open House - Comments and Sign In Sheet 5/22/17

From: Lyman, Bruce [mailto:Bruce.Lyman@chartindustries.com]
Sent: Tuesday, May 23, 2017 12:18 PM
To: Seng Thongvanh (sthongvanh@ci.savage.mn.us) <sthongvanh@ci.savage.mn.us>; Scott Mareck <SMareck@wsbeng.com>; Jarrett Hubbard (jhubbard@co.scott.mn.us) <jhubbard@co.scott.mn.us>
Cc: Hetzel, Anthony <Anthony.Hetzel@chartindustries.com>; Brinkman, Joe <Joe.Brinkman@chartindustries.com>
Subject: TH 13 Dakota-Yosemite Design Concept Study

Gentlemen,

Thanks for holding the public input session at the Savage City Hall on May 22nd. It was good to meet all of you there and to review the plan options for this subject project.

Anthony Hetzel (Export Traffic Manager) and myself (Vice President – Facilities and Business Development) attended on behalf of Chart Industries. Chart employs about 500 people at their factory in New Prague MN building a wide variety of cryogenic tanks. Chart completed a significant factory expansion in 2013 that provides capabilities to build some extremely large cryogenic tanks. In the fall of 2015, two such cryogenic vessels were shipped from Chart's New Prague factory (see pics attached). Due to the extreme dimensions and weight (165' long, 26' high on trailer, and 600,000 lbs) it is not possible to ship these tanks by rail or road to their end destination. The only mode of transportation out of MN for this size vessel is by water.

Chart worked cooperatively with CHS at their Savage grain terminal to develop a way to load these vessels onto a deck barge (see pic) for shipment down river. Since Savage is the closest point of river access to Chart's New Prague factory (22 miles) and the road route from New Prague to the CHS Savage terminal is free of fixed barriers (bridges) Chart considers this route a strategic transportation corridor for future Chart business.

Chart is planning to ship 8 more tanks via this same route in the fall of 2017. Planning/engineering is in process to make investment/improvements at the CHS site to enhance the barge loading capabilities there. Our hope is that these improvements will help facilitate future business for Chart in New Prague.

Chart is very interested in protecting the transportation corridor between New Prague and CHS Savage terminal – and in fact is planning some additional investments (utility line raise or removal) in this corridor.

The subject project represents some potential barriers that might block the movement of a large Chart tank to the CHS site.

Specifically Concept A appears to likely be a total barrier to Chart tank movement to the CHS site. Chart's feedback on this concept is negative.

Concepts B, B1 and C all appear to be able to accommodate Chart tank movement to the CHS site if a small design accommodation is made to cross over the median (at the extreme west end of the project area).

Concept D appears to be able to accommodate Chart tank movement, although some of the turn radii might cause some hindrances.

In summary, Chart is most supportive of concepts B, B1 and C and is negative toward concept A as not workable for Chart tank movement.

If you have any questions about this feedback, please feel free to reach out to me for clarification.

Thanks for the opportunity for this feedback.

Bruce Lyman | Vice President – Facilities and Business Development
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Attached Images:

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study
Open House – May 22, 2017
Please Sign-In:

Name/Business/Organization	Address	Email	Telephone
1. ANTHONY HETZEL / CHART INC.	407 7TH STREET NW NEW PRAGUE, MN 56071	ANTHONY.HETZEL @ CHARTINDUSTRIES.COM	952-758 8246
2. Steve Albracht	100 Civic Center Parkway Burnsville, MN	Steve.albracht@burnsvillemn.gov	952-895-4544
3. Jim Weatherhead	395 John Ireland Blvd St Paul MN 55155	jim.weatherhead@state.mn.us	651-366-3671
4. Bruce Lymon Chart Inc	407 7th St NW New Prague MN 56071 ~~56067~~	bruce.lymon@chartindustries.com	612-328-6949
5. Karl Bohn	7006 McColl Drive P.O. Box 380 Savage MN 55378		612-839-3880
6. Randy Williams	7329 W. Hwy 13	Randy W13@Gmail.Com	952-212-5796
7.			
8.			

Appendix E

Railroad Agency Coordination

Appendix E1 - MnDOT Railroad Issues Memo 2012

Appendix E2 - UP RR Meeting Summary 9/14/16

Appendix E3 - TC&W RR Meeting Summary 10/20/16

Appendix E4 - TC&W RR Meeting Summary 4/6/17

Appendix E5 - Canadian Pacific Email Correspondence 4/28/17

Appendix E6 - Union Pacific Email Correspondence 5/5/17

Appendix E1 - MnDOT Railroad Issues Memo 2012

Minnesota Department of Transportation
Office of Freight and Commercial Vehicle Operations
Mail Stop 470
395 John Ireland Blvd.
St. Paul, MN 55155-1899
Tel: 651/366-3671
Fax: 651/366-3720

The Metro staff asked for a report of the known railroad issues pertaining to Union Pacific Railroad operations in the City's of Savage and Burnsville, Scott and Dakota Counties in the vicinity of MN TH 13.

DESCRIPTION OF RAILROAD COORIDOR

The Union Pacific mainline track essentially parallels MN TH 13 along the north is known as the Mankato Sub-division. This is a regional rail line that runs between St. Paul, Mankato, Worthington and Sioux City Iowa. The train volume shown in the Mn/DOT Railroad crossing data base is 11 trains per day (2006 data) with a timetable train speed of 49 MPH in the Savage/Burnsville area. Significant train switching activity takes place in the Savage area related to Port Cargill and Port of Savage, this activity takes place between (just east of) Lynn Ave and (just west of) Dakota Ave.

Between Cliff Road in Burnsville and Dakota Ave in Savage 11 at grade RR crossings and one highway overpass (I-35W) cross the Mankato sub-division track. Of the eleven grade crossings 7 are on public roads with 4 private grade crossings, 1 private grade crossing has been recently closed within these limits.

GENERAL OBSERVATIONS

The 4 private at grade crossings included in this report are all passively warned with cross-bucks and possibly supplemental stop signs based on the RR and property owners desires, details of actual signing information is not available from the Mn/DOT data base. Mn/DOT does not have jurisdiction or typically has involvement with private grade crossings.

Of the 7 public grade crossings all have active warning systems with up-to-date constant motion circuitry (installed between 2000 & 2006). Gates are used at all grade crossings except the Vernon Avenue crossing in Savage, Vernon Ave is equipped flashing lights only. The warning system at Lynn Ave is also interconnected with the MN TH 13 highway traffic signal using advanced pre-emption to allow the roadway signal system to clear traffic from the RR grade crossing in the event of a train present at the Lynn Avenue grade crossing.

ACCIDENT HISTORY

In reviewing our records of reported crashes we show 43 total accidents dating back to 1972, when looked at from year 2000 forward we have 8 recorded crashes with 4 being property damage only, 3 being personal injury, 1 fatal crash in 2001. All crashes since 2000 have been in the City of Savage.

The crashes histories from 2000 disperse as follows: At public crossings - Lynn Ave, 1 property damage; Yosemite Ave, 2 personal injuries; At private crossings Quinton Ave extension, 1 property damage; Washburn Ave – this grade crossing is by definition a private crossing, the public street ends just prior to the grade crossing at the Union Pacific right of way and is considered a private road over the tracks, 2 property damage, 1 personal injury, and 1 fatal crash

Of the above listed crashes the 4 at Washburn all involved trucks, two tractor-trailers and two heavy single units, the fatality was a tractor-trailer. All Washburn Ave crashes where listed as failure to stop. The Quinton Ave ext. was an auto stopped on tracks. The Yosemite Ave crashes both involved tractor-trailers prior to the gates being installed, one failed to stop, one was stopped on tracks. Stop signs were in place at all of the prior listed crossings. The Lynn Ave crash was a tractor – trailer backing onto a "spur track near the crossing", but according to DPS this is considered a grade crossing incident and the reporting officer described it as vehicle traveling, and then backing over the twin tracks at the Lynn Avenue crossing, one of which is a spur. Lynn Avenue was equipped with an active warning system with gates and a highway signal interconnect at the time of this crash in 2002.

GENERAL CONCERNS ~ UP RR REPORTED

In the September of 2010 Union Pacific Railroad undertook a pro-active "Safety Blitz" to evaluate and mitigate, to the extent possible, known issues on the Union Pacific trackage in Minnesota. The Mankato Sub-division was part of the "Safety Blitz"; the Mn/DOT Railroad Administration Office was included in the study.

In the Savage area the primary concerns involved the multiple crashes at Washburn (private crossing), unsafe motorist reports which are generated by the train crews, and the high numbers of broken gates at the Dakota Ave and Lynn Ave grade crossings as reported by the signal maintence crews.

At Lynn Ave UP trains crews have reported 4 incidents of unsafe motorists recently; this is typically a "near" miss incident in which a vehicle drove around the lowered or lowering gates. Yosemite had 2 such incidents. It is unclear as to the date range of the 6 unsafe motorist's reports, it is likely within the last year, however I could not confirm actual dates prior to the submittal of this report.

Of great concern is the high number of broken gates that have been reported at Dakota Avenue. In the three years leading up to March of 2010 there have been 42 gates replaced at Dakota Avenue and 13 gates replaced at Lynn Avenue. This office has worked with Mn/DOT Commercial enforcement officers to try and educate and use enforcement to address the incidents. It appears that commercial vehicles entering the Ports crash the gates as they leave TH 13, typically east bound traffic making a left across the highway. It is also been found that at Dakota Avenue a portion of the broken gates can be attributed to train switching operations taking place near the crossings with gates dropping on the trailers as the truck moves across the grade crossing.

CONCLUSION ~ POSSIBLE STRATIGIES

Stacking Distance

Due to the heavy seasonal truck traffic associated with the Port of Cargill and Port of Savage and the limited vehicle stacking distance, ranging from 70' at Yosemite Avenue, 85' at Lynn, 90' at Vernon and 110' at Dakota Avenue between the Union Pacific mainline track and MN TH 13 is of significant concern. Recently stacking distance signs have been added at each crossing with regulatory "Do Not Stop On Track" signing; however the likely hood of a semi-trucks trailer getting trapped on the tracks due to gap acceptance limitations on MN TH 13 is a concern.

Truck Acceleration Lanes
One highway modification that could potentially be beneficial is the addition of truck acceleration lanes for ALL turn movements out of the Port public roads; Dakota, Yosemite, Vernon and Dakota. The addition of right and left lane acceleration lanes may help mitigate the lack of available gaps to enter TH 13 by providing truck refuge, particularly a right lane "escape", should a train approach while parked or queued on the tracks.

Additional HWY signal(s)
Warrant 9 traffic signal/RR warning system interconnects (see 2009 MUTCD section 4C.10 Warrant 9) merit investigation.

Closures and Consolidations
Grade crossing closures and consolidations would be a preferred method to address the known issues, however given the constraints associated with the highway and railroad alignment this would likely prove to be prohibitive due to land use and cost factors.

Industry track train switching operations in this area will significantly limit placement of any new grade crossings, whenever a grade crossing is proposed an operational study of the train switching would be done as part of the railroad evaluation, should the crossing hamper train operations the railroad will strongly oppose the new crossing. The concern stems from the statutory limit of 10 minutes to block a grade crossing; switching and "train building" potentially will block a nearby grade crossing for much longer than the 10 minutes available by state statue.

A comprehensive study looking at Port operations and traffic patterns, land use, soil conditions, and to define the vision for the TH 13 corridor could perhaps uncover some traffic recirculation options within the Port(s), MN TH 13 realignment options, that combined would allow the reroute and consolidation of grade crossings resulting in improvements in public safety and a higher level of service of MN TH 13.

Report compiled by:
Jim Weatherhead, Metro Area Project Manager
Mn/DOT Rail Administration, MS 470
395 John Ireland Blvd, St. Paul MN 55155-1800
jim.weatherhead@state.mn.us
Office 651-366-3671

ADDENDUM: Aug 29th, 2012 -- Since this report was done two crossing have changes to report:

Lynn Ave will have a new signal system installed as part of a roadway modification to add turn lanes to Lynn Ave.

Washburn Ave (private crossing) was closed. The City of Burnsville is currently working to reestablish Washburn Ave as a City street with a new active RR warning system w/gates to be installed as part of the agreement with UP RR. A Commissioners Order was completed in the summer of 2012, it is expected that the new roadway will be completed by fall of 2012 – this connection enables the City to access property for development north of the UP tracks.

Appendix E2 - UP RR Meeting Summary 9/14/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Union Pacific Railroad Coordination Meeting Notes

Wednesday, September 14, 2016
10:00 to 11:30 am
Savage City Hall

In Attendance:

City of Savage: Seng Thongvanh, Bryan Tucker
Scott County: Jarrett Hubbard
MnDOT: John Tompkins, Jesse Larson, Diane Langenbach, Jim Weatherhead
Union Pacific Railroad: Kyle Nodgaard
CHS: Greg Oberle
WSB: Scott Mareck, Andy Hingeveld, Derek Schmidt (via phone)

1. Introductions.
   - *The group went around the table and introduced themselves.*

2. Overview of project history, updated traffic analysis and project schedule (Scott Mareck, All).
   - *Scott Mareck provided an overview of the project, schedule, and traffic analysis.*
   - *A long-term solution for improvements in the Dakota Ave/Yosemite Ave area is being explored. Options to consider include grade separation of local roads and TH 13, consolidating accesses, frontage roads, shifting roads, etc. Railroad track work (relocation, shifting, etc.) could also be evaluated.*
   - *A previous concept discussed extending Quentin Ave to the north, which would require changes to the spur line.*
   - *A couple of ideas discussed by the group included utilizing new technology to better manage traffic and improve truck staging. An off-site truck staging area could also be part of the solution.*
   - *Staging and switching operations were mentioned as other issues that may need to be evaluated to improve existing conditions.*
   - *The stacking distance between the railroad lines and TH 13 is limited, which contributes to safety and mobility issues. Increasing the stacking distance by shifting the highway and railway to the south would be beneficial for vehicle stacking purposes.*
   - *Due to the short stacking distance between TH 13 and the railroad, many railroad crossing arms are currently coming down and breaking on trucks stopped on the railroad while entering the port area.*
   - *Jesse Larson stated that that safety on TH 13 is a concern for MnDOT. This corridor has experienced an increase in crashes and the heavy mixture of commuter and freight traffic, along with the number*

of access points, contributes to the issues. This corridor is one of the highest State Highway crash corridors in the South Metro Area.

- *Greg Oberle mentioned that trucks come from both the west (TH 169) and east (I-35). The majority of traffic is from the west. However, issues with turning trucks both eastbound and westbound exist.*
- *John Tompkins stated that for eligibility of the new federal FAST Act funding, freight projects must demonstrate a connection to the interstate system.*
- *CHS – May, June, and July (deliveries from previous harvest seasons) are generally the busiest months for the CHS plant. They receive 500-600 truckloads per day. Activity picks up again in the fall during harvest time.*
- *CHS – Some product arrives via rail, but the majority is via trucks – primarily corn and beans.*
- *CHS – has a truck staging area on their property.*
- *CHS – Farmers hold onto crops on-site until the market prices are more favorable.*
- *CHS – Overall production has been down since the 1990 peak, but this year will be the highest in 8-9 years. Cargill West follows similar industry trends.*
- *Jim Weatherhead provided a concept idea to consider during this study – two tight-diamond interchanges at each end of the project (near Dakota and Lynn Aves), and shift the railroad south towards TH 13 to build a new frontage road connecting the two tight-diamonds. The TH10/CSAH 83 (Armstrong) project in Anoka County is an example of a recent project that provided grade separation in a narrow footprint.*
- *Diane Langenbach indicated that MnDOT considered a reduced conflict intersection for the 2017 intersection improvement project scheduled at Dakota Avenue, however, it was ultimately ruled out as not feasible.*

3. Comments from Union Pacific Railroad (UP Railroad Manager, Kyle Nodgaard, All).
    - *From the railroad's perspective, the best railroad crossing is no crossing.*
    - *UP currently operates 6 trains per day along this segment of their railroad line. In recent years, the number of trains was higher but the industry is currently experiencing lower demands. It can be assumed that the number of trains per day will remain at 6 or higher in future years.*
    - *There are also a few local trains plus switching operations that may use the tracks on a daily basis.*
    - *UP generally does not own tracks beyond the clear zone connection to the mainline. Its customers usually own spur tracks beyond this point.*
    - *The current State Statute prohibiting trains from blocking an at-grade crossing for more than 10 minutes was mentioned as a concern of the railroad, and should be taken into account during the design process.*
    - *Grade separation of any railroad crossing is preferred over at-grade crossings.*

4. Next steps.
    - *The property owner meeting is scheduled for Thursday, September 22, at the Savage City Hall. Mailing notifications were sent out to the surrounding property owners.*
    - *Design charrette (brainstorming session) will be held in October. Everyone present was encouraged to attend the charrette, if they are available, or share any design ideas, if they cannot attend.*

5. Adjournment.

Appendix E3 - TC&W RR Meeting Summary 10/20/16

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Twin Cities & Western Railroad Coordination Meeting Notes

Thursday, October 20, 2016
9:00 to 10:00 a.m.
Savage City Hall

In Attendance:

City of Savage: Bryan Tucker
Scott County: Lisa Freese, Jarrett Hubbard
MnDOT: Diane Langenbach, Jim Weatherhead
Twin Cities & Western Railroad: Tim Jeske
WSB: Scott Mareck, Derek Schmidt

1. Introductions.

2. Overview of project history, updated traffic analysis and project schedule (Scott Mareck, All).
   - *TH 13 has been studied through the City of Savage dating back to 2000, with the most recent study completed in 2013. The current study initiated in July and will be finished in the spring of 2017.*
   - *Some recent improvements have been constructed in the corridor, including new interchanges at CSAH 5 and CSAH 101/TH 13 to the east and west of the current study area.*
   - *A south frontage road has also been constructed and Quentin Avenue and Lynn Avenue have both had intersection improvements and new signals installed.*
   - *A mill and overlay project is also planned for the corridor next year along with acceleration lane and turn lane improvements at Dakota Avenue.*
   - *The City of Savage and Scott County are updating the traffic analysis and design for the Dakota Avenue and Yosemite Avenue area of TH 13 at this time because of new federal freight funding that will soon be available through MnDOT and Met Council.*
   - *TH 13 has been identified as a top freight corridor in the Twin Cities and may soon be added to Minnesota's federal freight network. Scott County ½ cent sales tax funding may also be available for future TH 13 improvements because of its regional significance.*
   - *Existing traffic volumes along TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue are approximately 47,000 ADT and forecasted Met Council 2040 traffic is approximately 58,000 ADT.*
   - *Both existing and forecasted traffic volumes exceed the capacity of TH 13 in the vicinity of Dakota Avenue and Yosemite Avenue.*
   - *As a result, TH 13 mainline segments and intersections have significant congestion today and this congestion is expected to get measurably worse by 2040.*

- *There is also a significant crash problem along TH 13 between Dakota Avenue and Chowen Avenue. Intersections in this area have Critical Crash Rates in excess of statewide averages; some as high as twice the statewide average for similar intersections.*
- *Rear end and tee-bone crashes are most frequent along TH 13 through Savage, due to the significant amount of traffic and congestion, the heavy percentage of truck traffic and vehicles entering TH 13 from side streets when there are not adequate gaps in traffic.*
- *The stacking distance between the Union Pacific Railroad and TH 13 is inadequate, which also contributes to safety and mobility issues.*
- *Many railroad crossing arms are currently coming down and breaking on semi-trucks stopped on the railroad while entering the port area.*
- *The biggest design problem that needs to be addressed with existing TH 13 is heavy left turns crossing TH 13 into the Port of Savage.*
- *Long and medium term design solutions in the Dakota Avenue/Yosemite Avenue area are being explored at this time.*
- *Design options that will be explored include grade separation of TH 13 and potentially the Union Pacific mainline at Dakota Avenue and/or Yosemite Avenue. At grade improvements will also be explored including consolidating accesses, frontage roads, shifting roads, signal upgrades and shifting railroad track alignments.*

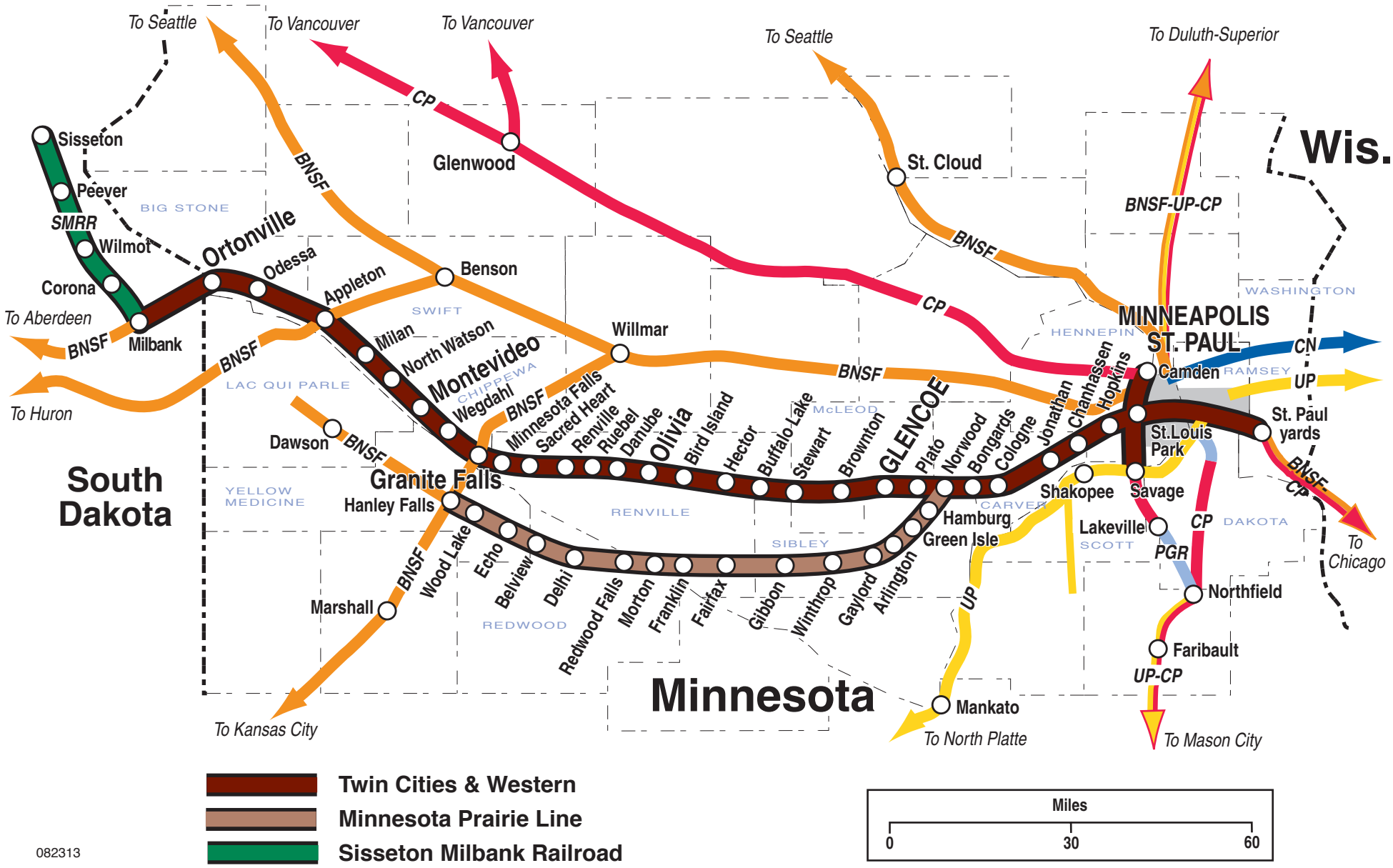
3. Comments from Twin Cities and Western Railroad (Tim Jeske, All)
   - *A question was asked about the status of the Dan Patch Minnesota River Crossing Study? It was explained that this study is on hold right now, but may be considered for pedestrian traffic at some point. The City of Bloomington would likely need to express interest in this issue for a roadway bridge study to be reinitiated.*
   - *TC & W Railroad has recently rehabilitated the Swing Bridge over the Minnesota River.*
   - *TC & W leases its rail rights from Canadian Pacific Railroad.*
   - *TC & W is currently offloading freight onto Class 1 railroads in Minneapolis. The Class 1 railroads are currently transporting TC & W Railroad freight to the Port of Savage. By 2017, TC & W Railroad hopes to be transporting its own freight directly into the Port of Savage.*
   - *TC & W trains originate out of Hopkins.*
   - *TC & W is spending significant time right now coordinating with the Southwest Light Rail project.*
   - *TC & W currently serves Riverland Ag Corporation and Cenex Harvest States in the Port of Savage; they do not currently service Cargill, but would like to at some point in the future.*
   - *TC & W needs the TH 13 railroad bridge to position railroad train cars for access into Riverland and Cenex Harvest States.*
   - *Long-term, TC & W would like to provide service to customers south of TH 13 to Northfield.*
   - *A question was asked if Progressive Railroad may have an interest at some point in servicing the Port of Savage via the TH 13 Railroad Bridge? Scott Mareck will attempt to contact Progressive to research their long-term plans.*
   - *Some Canadian Pacific(CP) Railroad lines are paved-over south of TH 13, however, the CP line south of TH 13 is not formally abandoned.*
   - *It was noted by MnDOT that the CP line south of TH 13 will likely not be formally abandoned anytime in the foreseeable future as long as there are potential future rail clients in the vicinity of this rail line.*
   - *TC & W's client base is primarily agriculture from South Dakota and western Minnesota; they also operate Minnesota Prairie Line, which extends from Norwood Young America to Hanley Falls, MN.*

- *TC & W's primary commodities brought into the Port of Savage are corn and wheat.*
- *It is expected that expansion of the Panama Canal will increase Mississippi River and Gulf of Mexico barge and ship traffic, consequently, making the Port of Savage a more important intermodal facility in the future. The other major competing shipping market to the Gulf of Mexico is the Pacific Rim and ports in Seattle, WA.*
- *Most commodities come into the Port of Savage via train or truck and go out via barge.*
- *TC & W will provide Scott Mareck with a map of TC & W Railroad (and affiliated railroad lines) in Minnesota.*
- *It was recommended to show the Union Pacific Railroad line north of TH 13 as a "mainline" railroad, in a different color from other rail lines on the TH 13 issues map.*

4. Next steps.
   - *The next TH 13 Study Management Team (SMT) meeting will be held on Wednesday, November 9th, at which time, detailed discussion of feasible design alternatives will begin.*
   - *Design alternatives will be studied over the winter, with the goal of selecting a preferred alternative by spring, 2017.*
   - *The SMT will reach out to TC &W, UP and CP railroads in early 2017 to obtain further input and comments on design alternatives that are being formally developed.*

5. Adjournment.

Twin Cities & Western Railroad Company and Affiliates



Appendix E4 - TC&W RR Meeting Summary 4/6/17

Trunk Highway 13 Dakota Ave-Yosemite Ave Design Study

Twin Cities & Western Railroad Coordination Meeting Notes

Thursday, April 6, 2017
1:00 p.m.
Savage City Hall

In Attendance:

City of Savage: Seng Thongvanh, Bryan Tucker
Scott County: Lisa Freese, Jarrett Hubbard, Anthony Sellner
MnDOT: Diane Langenbach
Twin Cities & Western Railroad: Tim Jeske
WSB: Scott Mareck, Derek Schmidt

1. Introductions.

2. Overview of October 20, 2016 TC & W Railroad meeting and update on TH 13 Design Study progress (Scott Mareck, All).

   Scott Mareck overviewed the October 20th meeting notes and it indicated that 5 design concepts have been developed since last fall to grade separate TH 13 left turning traffic.

3. Overview of Design Concepts A, B, B1, C and D (Derek Schmidt, All).

   Derek Schmidt reviewed the 5 design concepts developed to-date:

   - ***Design Concept A*** *– full grade separation of TH 13 and the UP Mainline at Dakota Avenue (most expensive)*
   - ***Design Concept B*** *– TH 13 grade separation at Dakota Avenue and at-grade UP Mainline remains (least expensive)*
   - ***Design Concept B1*** *– same as Design Concept B, with design extended east of the TH 13 Railroad Bridge*
   - ***Design Concept C*** *– same as Design Concept B, with eastbound on/off ramps added at Dakota Avenue*
   - ***Design Concept D*** *– TH 13 grade separation between Dakota Avenue and Yosemite Avenue and at-grade UP Mainline remains*

Miscellaneous Discussion:

- *A preliminary engineering analysis shows that it is feasible to extend the north frontage road and an eastbound acceleration lane for Design Concept B under the existing TH 13 Railroad Bridge and between the existing piers without any changes to the existing Railroad Bridge. This is Design Concept B1.*
- *Design Concept B1 would require further study in the final design process to evaluate traffic and design details and make further potential modifications.*
- *There is a potential sight distance issue under Design Concept B1 for eastbound traffic merging onto TH 13 under the Railroad Bridge due to the existing bridge piers blocking the view of drivers looking west as they merge onto TH 13.*
- *The acceleration lane for Design Concept B1 is also very close to the eastbound right turn lane at Quentin Avenue, which may create a weaving situation.*
- *Both the sight distance issue under the Railroad Bridge and the Quentin Avenue right turn lane issue under could potentially be addressed by moving the Yosemite Avenue eastbound right-in-right-out access further west. This would keep the acceleration lane taper west of the Railroad Bridge and further away from the Quentin Avenue right turn lane.*
- *TC & W asked if the existing Railroad Bridge's structural integrity would remain intact under Design Concept B1? It was noted that structural integrity of the existing TH 13 Railroad Bridge could be preserved with the appropriate crash barriers protecting the existing Railroad Bridge piers.*
- *TC & W asked if there would be room for truck stacking with Design Concepts B and B1? It was explained that both B and B1 offered truck stacking capabilities along the north and south frontage roads.*
- *Scott County plans to submit a federal freight application to MnDOT for the preferred design concept selected from this study. The application will be submitted later this year for potential funding in approximately 5 years; in the early 2020's.*
- *If the federal application is successful, a formal environmental study and a much more rigorous and detailed final design evaluation process would begin.*
- *A meeting is scheduled April 21st with Port of Savage Area businesses.*
- *Efforts will also be made to meet with Canadian Pacific Railroad and Union Pacific Railroad later this spring.*
- *A final open house for the project is planned for later this spring.*
- *Scott County asked TC & W Railroad for their thoughts regarding the Design Concept A option; full grade separation of TH 13 and the Union Pacific Mainline. TC & W indicated that, if pursued, this option would likely be supported by Union Pacific Railroad due to removal of 2 existing at-grade mainline crossings.*

Appendix E5 - Canadian Pacific Email Correspondence 4/28/17

From: Jim Krieger [mailto:Jim_Krieger@cpr.ca]
Sent: Friday, April 28, 2017 2:58 PM
To: SThongvanh@ci.savage.mn.us
Cc: SMareck@wsbeng.com; Tim_Havlicek@cpr.ca
Subject: RE: TH 13/Dakota/Yosemite Concepts

Seng - after review of the concept drawings appears only Concept B1 for the proposed acceleration lane under the CP railroad bridge structure would involve any detail CP review and comments. The existing pier and back wall footings in this area would have to be review accordingly to make sure they would accommodate the proposed traffic lane and retaining wall structure, etc.
No other issues or concerns were noted by CP for the Concepts drawings.

Jim H. Krieger
Manager Public Works – US East Region
O 612-330-4555
C 612-581-0119
Canadian Pacific Plaza 120 South 6th Street., Suite 700, Minneapolis, MN 55402

Appendix E6 - Union Pacific Email Correspondence 5/5/17

-------- Original message --------
From: "Kyle D. Nodgaard" <kdnodgaa@up.com>
Date: 5/5/17 9:49 AM (GMT-06:00)
To: Seng Thongvanh <SThongvanh@ci.savage.mn.us>
Cc: Scott Mareck <SMareck@wsbeng.com>
Subject: Re: FW: TH 13/Dakota/Yosemite Concepts

Seng,

To preface my comments, two of my department's primary goals at UP are to protect the UP ROW and safety (close crossings).

It appears that concepts B, B1, C, and D are all the same in regards to the railroad, so I will lump my comments to those comments all together. My concept specific comments are below.

Concept A:

- We like the idea of Dakota Ave and Yosemite Ave crossings being permanently closed (we would ask that the grade separation over the tracks clear span the UP ROW). We do contribute monetarily to grade separations involving crossing closures. The more at-grade crossing closures involved, the more we are willing to contribute. No matter the funding source (federal, state, county, etc.), this is negotiable.
- Realigning the track is costly and adding a relatively tight reverse curve on the mainline is not something we are in favor of.
- Since the track is proposed to be shifted south of the current UP ROW, we at UP would need to be made whole in regards to our property, and we would not want to have a parallel road running on our ROW.

Concepts B, B1, C, D:

- We would like to see crossings closed with any concept even if there is no grade separation over the tracks. We do make monetary contributions to crossing closures not tied to grade separations as well.
- Advanced preemption (interconnection with our crossing signals) would likely be required at the Yosemite and Dakota intersections if signalized.
- The potential increase in traffic and potential for vehicles to queue over the tracks should be considered when deciding whether or not to signalize these intersections.
-

These are comments only from myself and what we look for in my department. If we get further on down the line and you need a more definitive direction from UP, I can pass this around internally. It will take a lot more time to round up comments internally from all affected parties so that is why am only giving you my comments at this point and I would say that none of the concepts presented is an absolute non-starter for UP.

Thank you,

Kyle Nodgaard
Manager - Industry and Public Projects
Union Pacific Railroad
Omaha, NE
kdnodgaa@up.com
402-544-2029 (Office)
402-271-5656 (Fax)

Appendix F

Heavy Commercial Peak Period

Turning Movement Counts July 2016

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Dakota Ave Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & yosemite ave
Site Code : 00000001
Start Date : 7/14/2016
Page No : 1

Groups Printed- trucks

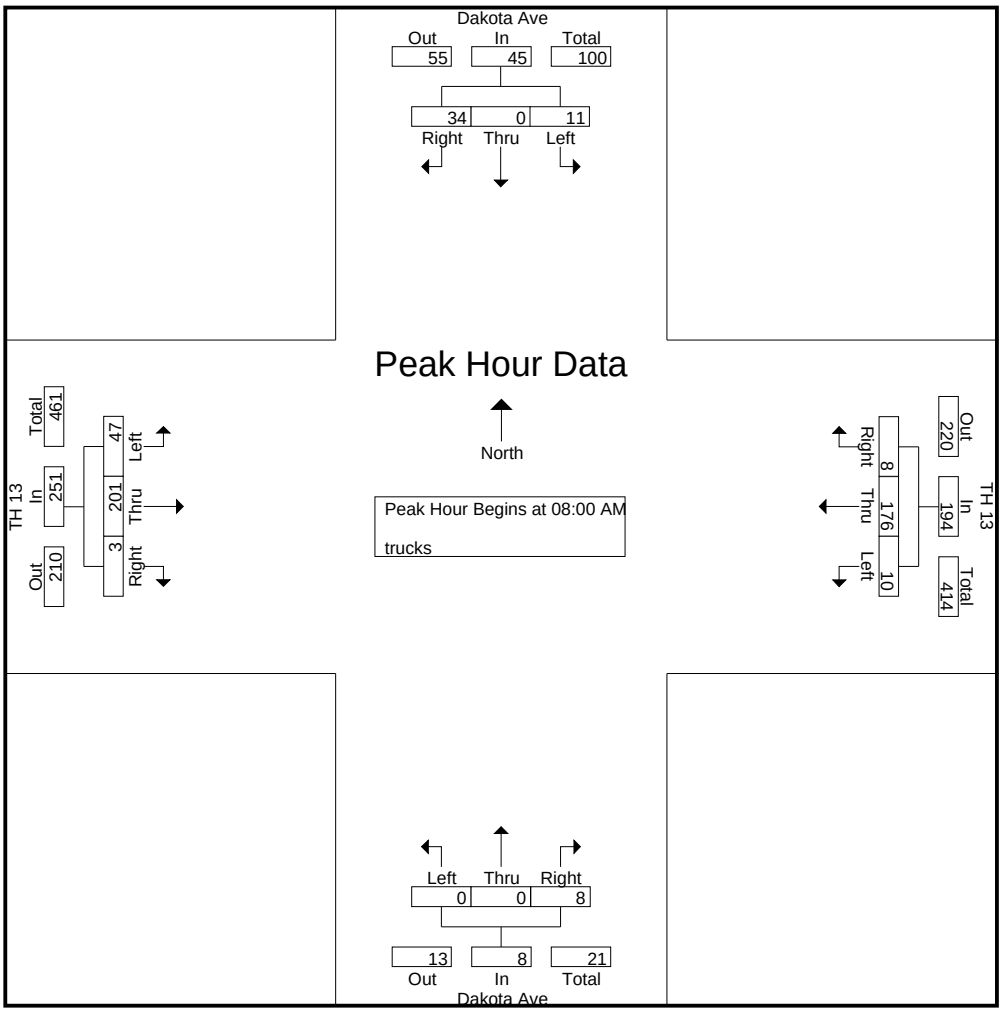
	Dakota Ave From North				TH 13 From East				Dakota Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	5	0	0	5	2	15	1	18	1	0	1	2	2	29	7	38	63
06:15 AM	11	0	3	14	2	24	2	28	1	0	0	1	1	48	11	60	103
06:30 AM	13	0	2	15	2	44	1	47	2	0	0	2	0	43	14	57	121
06:45 AM	14	0	4	18	3	34	2	39	1	0	0	1	2	42	12	56	114
Total	43	0	9	52	9	117	6	132	5	0	1	6	5	162	44	211	401
07:00 AM	9	0	3	12	3	39	3	45	1	0	0	1	2	31	5	38	96
07:15 AM	8	0	4	12	1	34	1	36	4	0	0	4	0	33	4	37	89
07:30 AM	15	0	5	20	1	53	0	54	1	0	0	1	0	45	7	52	127
07:45 AM	8	0	1	9	1	48	3	52	1	0	0	1	3	60	9	72	134
Total	40	0	13	53	6	174	7	187	7	0	0	7	5	169	25	199	446
08:00 AM	10	0	1	11	3	34	5	42	1	0	0	1	0	49	13	62	116
08:15 AM	7	0	5	12	3	44	1	48	4	0	0	4	0	48	6	54	118
08:30 AM	5	0	3	8	1	38	4	43	3	0	0	3	2	50	16	68	122
08:45 AM	12	0	2	14	1	60	0	61	0	0	0	0	1	54	12	67	142
Total	34	0	11	45	8	176	10	194	8	0	0	8	3	201	47	251	498
*** BREAK ***																	
03:00 PM	6	0	1	7	2	52	3	57	4	0	0	4	2	53	8	63	131
03:15 PM	10	0	1	11	1	41	2	44	3	0	1	4	2	51	5	58	117
03:30 PM	5	0	0	5	0	45	2	47	2	0	0	2	1	40	8	49	103
03:45 PM	11	0	0	11	1	38	1	40	2	0	0	2	2	38	14	54	107
Total	32	0	2	34	4	176	8	188	11	0	1	12	7	182	35	224	458
04:00 PM	8	0	0	8	2	36	0	38	2	0	2	4	1	29	2	32	82
04:15 PM	5	0	0	5	2	34	0	36	0	0	0	0	1	20	2	23	64
04:30 PM	3	0	1	4	1	22	0	23	1	0	0	1	0	26	6	32	60
04:45 PM	8	0	1	9	0	31	1	32	0	0	0	0	0	29	4	33	74
Total	24	0	2	26	5	123	1	129	3	0	2	5	2	104	14	120	280
05:00 PM	5	0	0	5	1	12	0	13	1	0	0	1	0	16	3	19	38
05:15 PM	5	0	0	5	0	29	3	32	0	0	0	0	1	28	9	38	75
05:30 PM	4	0	1	5	0	9	0	9	0	0	0	0	0	16	2	18	32
05:45 PM	6	0	1	7	1	22	0	23	0	0	0	0	0	28	5	33	63
Total	20	0	2	22	2	72	3	77	1	0	0	1	1	88	19	108	208
Grand Total	193	0	39	232	34	838	35	907	35	0	4	39	23	906	184	1113	2291
Apprch %	83.2	0	16.8		3.7	92.4	3.9		89.7	0	10.3		2.1	81.4	16.5		
Total %	8.4	0	1.7	10.1	1.5	36.6	1.5	39.6	1.5	0	0.2	1.7	1	39.5	8	48.6	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Dakota Ave Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & yosemite ave
Site Code : 00000001
Start Date : 7/14/2016
Page No : 2

	Dakota Ave From North				TH 13 From East				Dakota Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	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 08:00 AM																	
08:00 AM	10	0	1	11	**3**	34	**5**	42	1	0	0	1	0	49	13	62	116
08:15 AM	7	0	**5**	12	3	44	1	48	**4**	0	0	**4**	0	48	6	54	118
08:30 AM	5	0	3	8	1	38	4	43	3	0	0	3	**2**	50	**16**	**68**	122
08:45 AM	**12**	0	2	**14**	1	**60**	0	**61**	0	0	0	0	1	**54**	12	67	**142**
Total Volume	34	0	11	45	8	176	10	194	8	0	0	8	3	201	47	251	498
% App. Total	75.6	0	24.4		4.1	90.7	5.2		100	0	0		1.2	80.1	18.7		
PHF	.708	.000	.550	.804	.667	.733	.500	.795	.500	.000	.000	.500	.375	.931	.734	.923	.877



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Minneapolis, MN

TH 13 & Dakota Ave Ave
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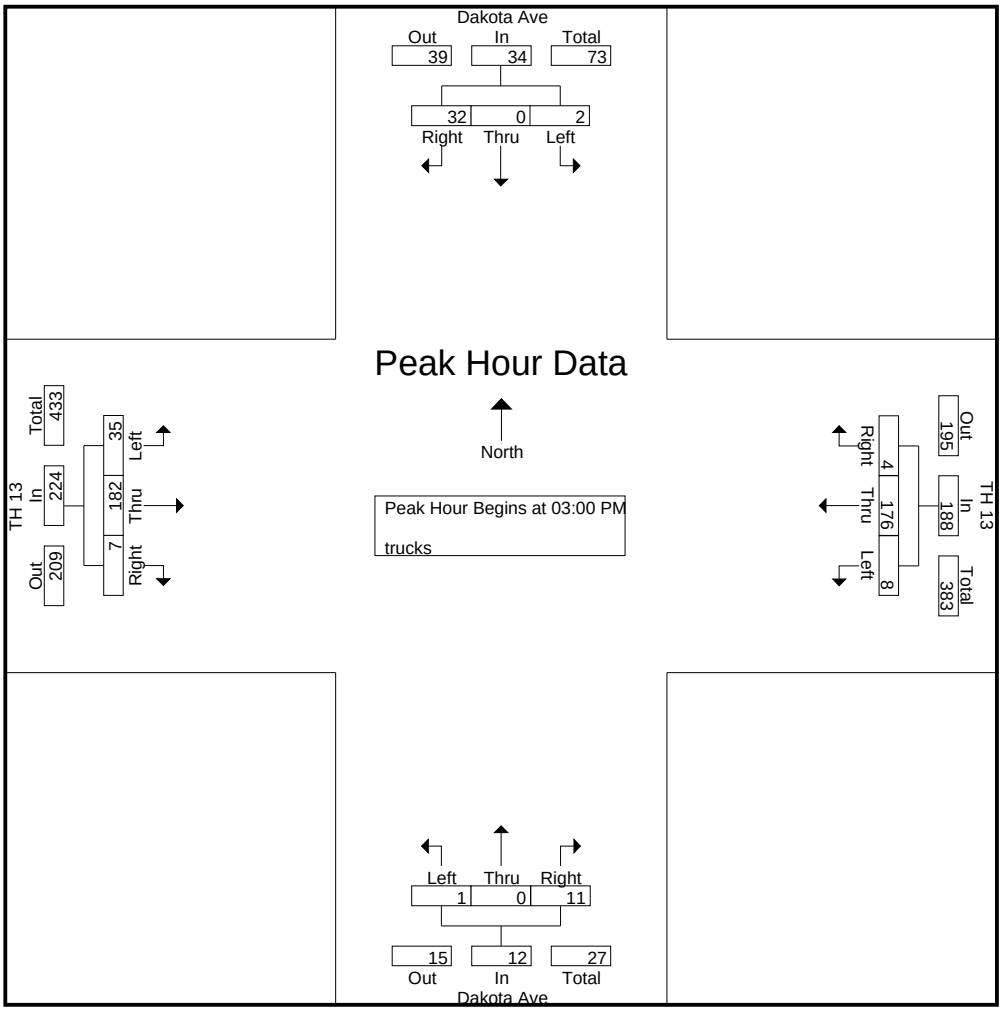
File Name : th 13 & yosemite ave
Site Code : 00000001
Start Date : 7/14/2016
Page No : 3

	Dakota Ave From North				TH 13 From East				Dakota Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	6	0	**1**	7	**2**	**52**	**3**	**57**	**4**	0	0	**4**	**2**	**53**	8	**63**	**131**
03:15 PM	10	0	1	**11**	1	41	2	44	3	0	**1**	4	2	51	5	58	117
03:30 PM	5	0	0	5	0	45	2	47	2	0	0	2	1	40	8	49	103
03:45 PM	**11**	0	0	11	1	38	1	40	2	0	0	2	2	38	**14**	54	107
Total Volume	32	0	2	34	4	176	8	188	11	0	1	12	7	182	35	224	458
% App. Total	94.1	0	5.9		2.1	93.6	4.3		91.7	0	8.3		3.1	81.2	15.6		
PHF	.727	.000	.500	.773	.500	.846	.667	.825	.688	.000	.250	.750	.875	.858	.625	.889	.874



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Minneapolis, MN

TH 13 & Yosemite Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & yosemite ave
Site Code : 00000002
Start Date : 7/14/2016
Page No : 1

Groups Printed- trucks

	Yosemite Ave From North				TH 13 From East				Yosemite Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	1	0	3	4	5	13	1	19	3	0	0	3	1	24	2	27	53
06:15 AM	5	0	2	7	4	24	0	28	1	0	0	1	0	51	3	54	90
06:30 AM	3	0	4	7	4	34	1	39	2	0	0	2	0	44	2	46	94
06:45 AM	5	0	2	7	4	41	3	48	2	0	0	2	1	38	5	44	101
Total	14	0	11	25	17	112	5	134	8	0	0	8	2	157	12	171	338
07:00 AM	7	0	3	10	3	39	5	47	1	0	0	1	1	33	3	37	95
07:15 AM	6	0	0	6	3	38	1	42	2	0	0	2	1	39	3	43	93
07:30 AM	5	0	3	8	1	42	0	43	1	0	0	1	0	45	5	50	102
07:45 AM	4	0	3	7	5	51	0	56	0	0	0	0	0	53	5	58	121
Total	22	0	9	31	12	170	6	188	4	0	0	4	2	170	16	188	411
08:00 AM	6	0	1	7	3	44	1	48	2	0	0	2	1	51	2	54	111
08:15 AM	5	0	1	6	4	47	2	53	0	0	0	0	0	60	0	60	119
08:30 AM	6	0	2	8	1	38	3	42	2	0	0	2	0	53	8	61	113
08:45 AM	4	0	3	7	2	53	1	56	2	0	0	2	2	50	4	56	121
Total	21	0	7	28	10	182	7	199	6	0	0	6	3	214	14	231	464
*** BREAK ***																	
03:00 PM	9	0	1	10	3	49	1	53	2	0	0	2	0	56	5	61	126
03:15 PM	5	0	1	6	1	45	2	48	1	0	0	1	0	47	4	51	106
03:30 PM	5	0	2	7	5	40	1	46	1	0	0	1	1	49	4	54	108
03:45 PM	4	0	2	6	2	38	3	43	2	0	0	2	1	37	4	42	93
Total	23	0	6	29	11	172	7	190	6	0	0	6	2	189	17	208	433
04:00 PM	5	0	1	6	3	35	4	42	0	0	0	0	1	36	2	39	87
04:15 PM	4	0	0	4	0	36	0	36	0	0	0	0	0	17	1	18	58
04:30 PM	2	0	1	3	1	32	0	33	1	0	0	1	0	30	1	31	68
04:45 PM	4	0	1	5	1	26	1	28	1	0	0	1	0	31	0	31	65
Total	15	0	3	18	5	129	5	139	2	0	0	2	1	114	4	119	278
05:00 PM	0	0	0	0	0	20	1	21	0	0	0	0	1	19	0	20	41
05:15 PM	1	0	0	1	0	27	0	27	0	0	0	0	0	24	1	25	53
05:30 PM	0	0	0	0	0	15	1	16	0	0	0	0	0	21	1	22	38
05:45 PM	1	0	0	1	0	21	0	21	0	0	0	0	2	26	0	28	50
Total	2	0	0	2	0	83	2	85	0	0	0	0	3	90	2	95	182
Grand Total	97	0	36	133	55	848	32	935	26	0	0	26	13	934	65	1012	2106
Apprch %	72.9	0	27.1		5.9	90.7	3.4		100	0	0		1.3	92.3	6.4		
Total %	4.6	0	1.7	6.3	2.6	40.3	1.5	44.4	1.2	0	0	1.2	0.6	44.3	3.1	48.1	

WSB & Associates
701 Xenia Ave S
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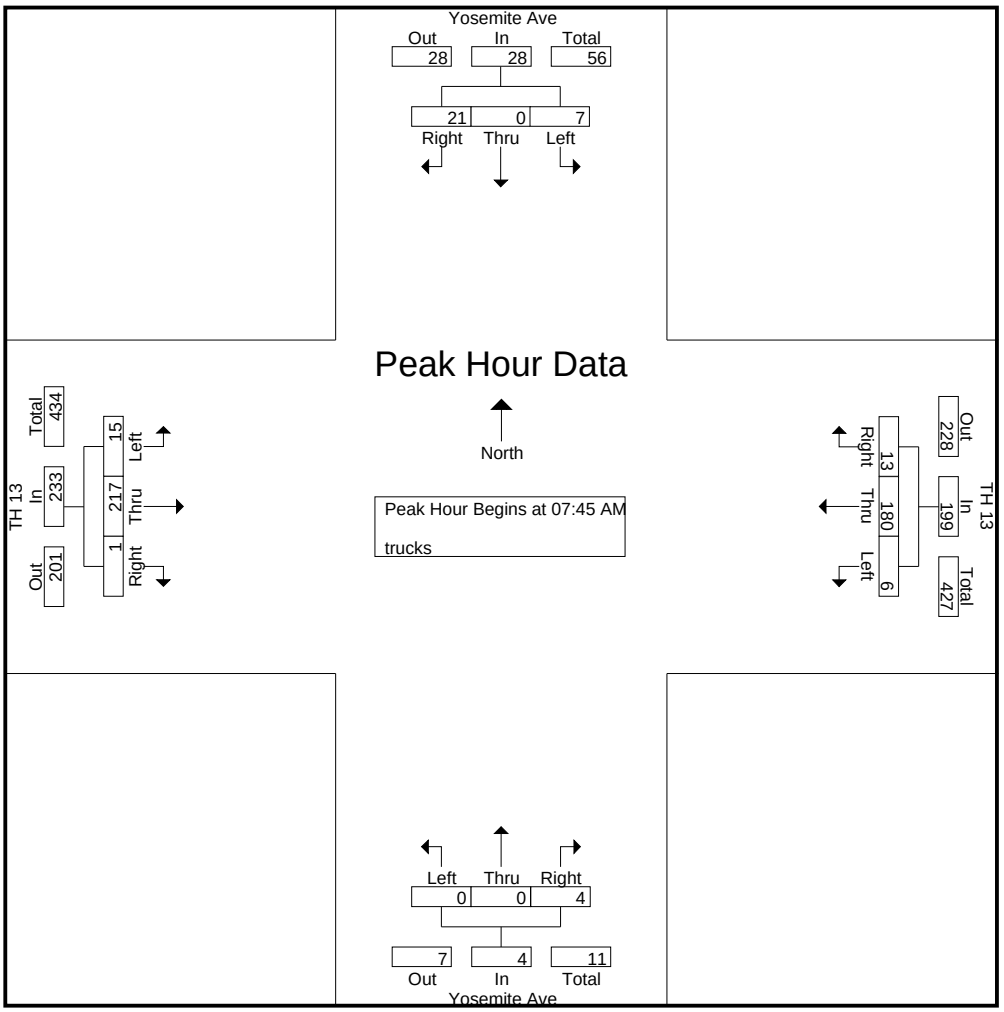
TH 13 & Yosemite Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & yosemite ave
Site Code : 00000002
Start Date : 7/14/2016
Page No : 2

	Yosemite Ave From North				TH 13 From East				Yosemite Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	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 07:45 AM																	
07:45 AM	4	0	**3**	7	**5**	**51**	0	**56**	0	0	0	0	0	53	5	58	**121**
08:00 AM	**6**	0	1	7	3	44	1	48	**2**	0	0	**2**	**1**	51	2	54	111
08:15 AM	5	0	1	6	4	47	2	53	0	0	0	0	0	**60**	0	60	119
08:30 AM	6	0	2	**8**	1	38	**3**	42	2	0	0	2	0	53	**8**	**61**	113
Total Volume	21	0	7	28	13	180	6	199	4	0	0	4	1	217	15	233	464
% App. Total	75	0	25		6.5	90.5	3		100	0	0		0.4	93.1	6.4		
PHF	.875	.000	.583	.875	.650	.882	.500	.888	.500	.000	.000	.500	.250	.904	.469	.955	.959



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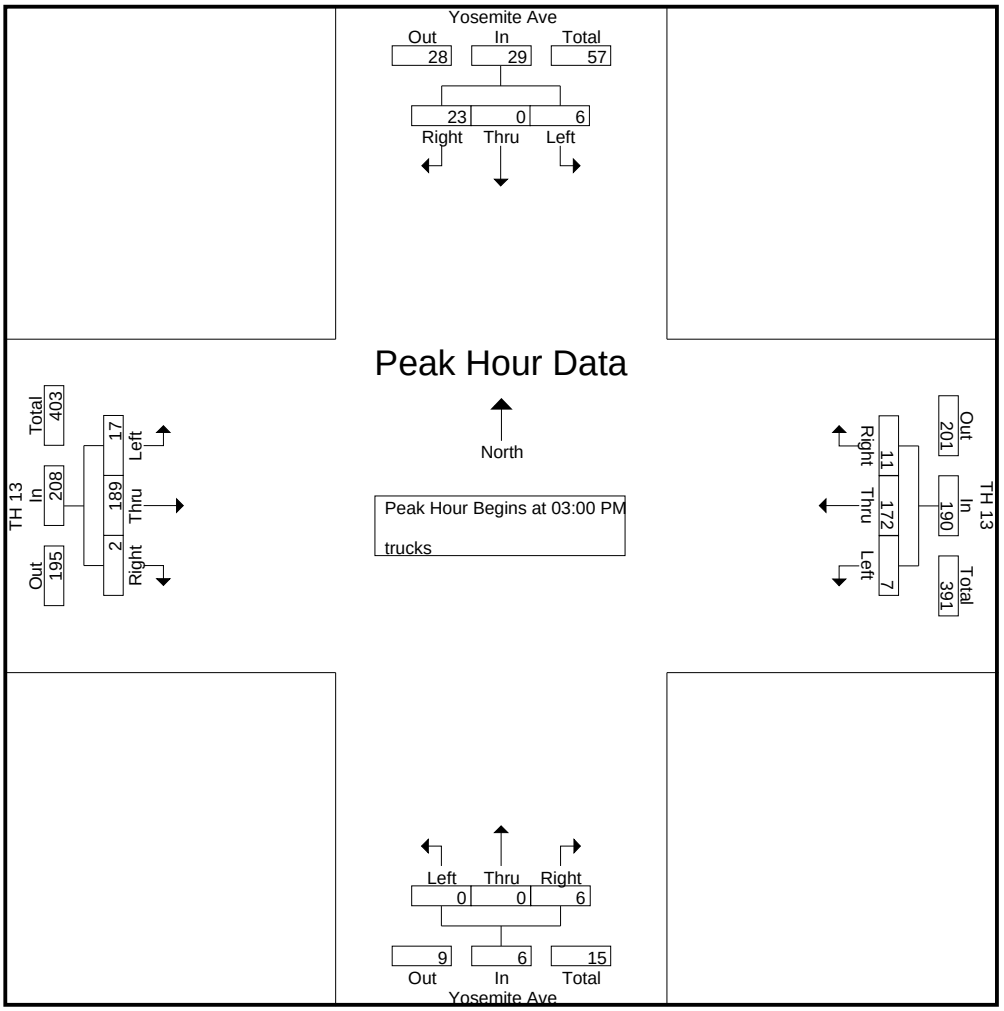
File Name : th 13 & yosemite ave
Site Code : 00000002
Start Date : 7/14/2016
Page No : 3

	Yosemite Ave From North				TH 13 From East				Yosemite Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	**9**	0	1	**10**	3	**49**	1	**53**	**2**	0	0	**2**	0	**56**	**5**	**61**	**126**
03:15 PM	5	0	1	6	1	45	2	48	1	0	0	1	0	47	4	51	106
03:30 PM	5	0	**2**	7	**5**	40	1	46	1	0	0	1	**1**	49	4	54	108
03:45 PM	4	0	2	6	2	38	**3**	43	2	0	0	2	1	37	4	42	93
Total Volume	23	0	6	29	11	172	7	190	6	0	0	6	2	189	17	208	433
% App. Total	79.3	0	20.7		5.8	90.5	3.7		100	0	0		1	90.9	8.2		
PHF	.639	.000	.750	.725	.550	.878	.583	.896	.750	.000	.000	.750	.500	.844	.850	.852	.859



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Quentin Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & quentin ave
Site Code : 00000003
Start Date : 7/14/2016
Page No : 1

Groups Printed- trucks

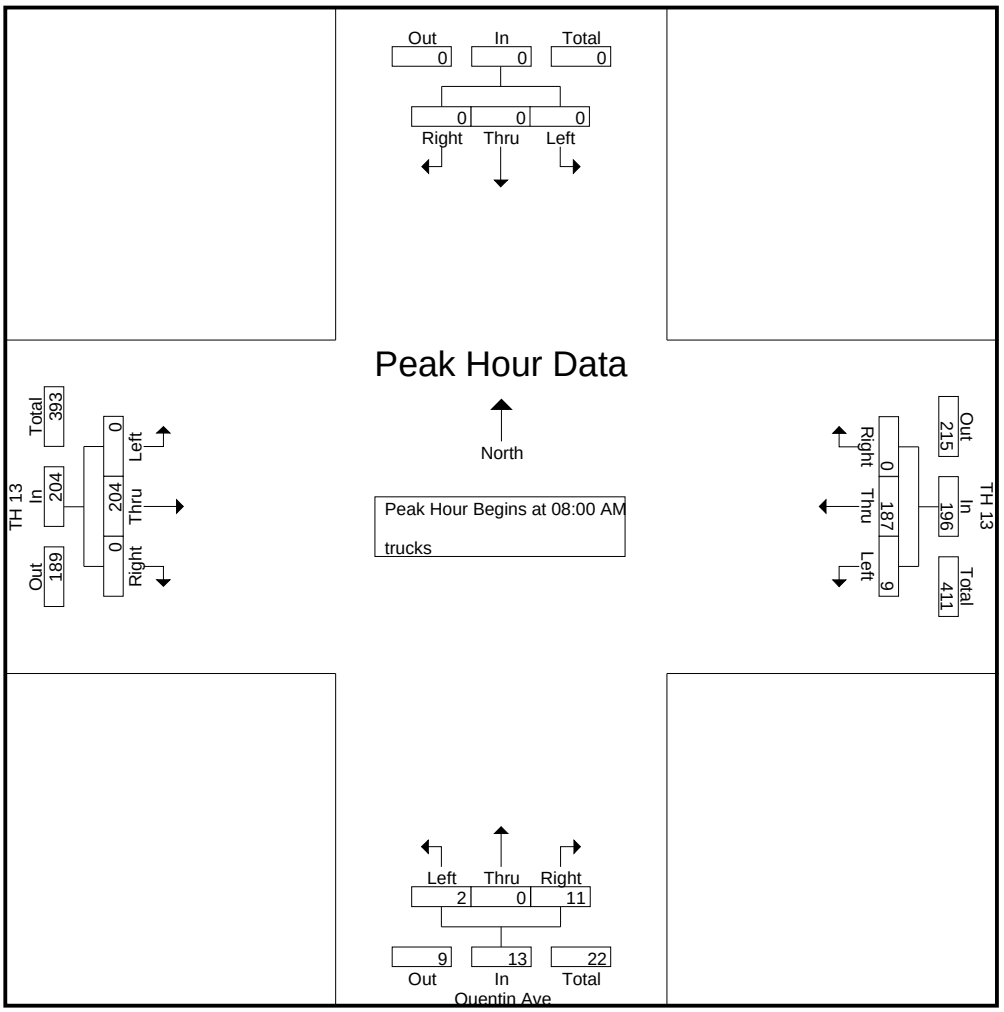
	From North				TH 13 From East				Quentin Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	0	0	0	0	0	26	0	26	4	0	0	4	0	27	0	27	57
06:15 AM	0	0	0	0	0	29	0	29	1	0	0	1	1	48	0	49	79
06:30 AM	0	0	0	0	0	50	1	51	0	0	1	1	1	45	0	46	98
06:45 AM	0	0	0	0	0	35	0	35	2	0	2	4	0	40	0	40	79
Total	0	0	0	0	0	140	1	141	7	0	3	10	2	160	0	162	313
07:00 AM	0	0	0	0	0	44	3	47	1	0	0	1	0	38	0	38	86
07:15 AM	0	0	0	0	0	41	0	41	0	0	0	0	1	41	0	42	83
07:30 AM	0	0	0	0	0	48	3	51	5	0	1	6	0	41	0	41	98
07:45 AM	0	0	0	0	0	44	2	46	1	0	2	3	0	55	0	55	104
Total	0	0	0	0	0	177	8	185	7	0	3	10	1	175	0	176	371
08:00 AM	0	0	0	0	0	40	1	41	2	0	1	3	0	44	0	44	88
08:15 AM	0	0	0	0	0	49	2	51	3	0	0	3	0	55	0	55	109
08:30 AM	0	0	0	0	0	42	2	44	3	0	0	3	0	50	0	50	97
08:45 AM	0	0	0	0	0	56	4	60	3	0	1	4	0	55	0	55	119
Total	0	0	0	0	0	187	9	196	11	0	2	13	0	204	0	204	413
*** BREAK ***																	
03:00 PM	0	0	0	0	0	48	2	50	2	0	2	4	0	48	0	48	102
03:15 PM	0	0	0	0	0	33	2	35	3	0	1	4	2	46	0	48	87
03:30 PM	0	0	0	0	0	49	2	51	2	0	1	3	1	46	0	47	101
03:45 PM	0	0	0	0	0	36	2	38	3	0	0	3	1	37	0	38	79
Total	0	0	0	0	0	166	8	174	10	0	4	14	4	177	0	181	369
04:00 PM	0	0	0	0	0	31	2	33	1	0	1	2	1	30	0	31	66
04:15 PM	0	0	0	0	0	31	0	31	1	0	1	2	1	16	0	17	50
04:30 PM	0	0	0	0	0	23	0	23	0	0	0	0	0	29	0	29	52
04:45 PM	0	0	0	0	0	22	2	24	1	0	0	1	0	36	0	36	61
Total	0	0	0	0	0	107	4	111	3	0	2	5	2	111	0	113	229
05:00 PM	0	0	0	0	0	18	1	19	2	0	0	2	0	21	0	21	42
05:15 PM	0	0	0	0	0	35	0	35	1	0	0	1	0	24	0	24	60
05:30 PM	0	0	0	0	0	15	0	15	0	0	0	0	0	21	0	21	36
05:45 PM	0	0	0	0	0	27	1	28	0	0	0	0	0	26	0	26	54
Total	0	0	0	0	0	95	2	97	3	0	0	3	0	92	0	92	192
Grand Total	0	0	0	0	0	872	32	904	41	0	14	55	9	919	0	928	1887
Apprch %	0	0	0		0	96.5	3.5		74.5	0	25.5		1	99	0		
Total %	0	0	0	0	0	46.2	1.7	47.9	2.2	0	0.7	2.9	0.5	48.7	0	49.2	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Quentin Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & quentin ave
Site Code : 00000003
Start Date : 7/14/2016
Page No : 2

	From North				TH 13 From East				Quentin Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	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 08:00 AM																	
08:00 AM	0	0	0	0	0	40	1	41	2	0	**1**	3	0	44	0	44	88
08:15 AM	0	0	0	0	0	49	2	51	**3**	0	0	3	0	**55**	0	**55**	109
08:30 AM	0	0	0	0	0	42	2	44	3	0	0	3	0	50	0	50	97
08:45 AM	0	0	0	0	0	**56**	**4**	**60**	3	0	1	**4**	0	55	0	55	**119**
Total Volume	0	0	0	0	0	187	9	196	11	0	2	13	0	204	0	204	413
% App. Total	0	0	0		0	95.4	4.6		84.6	0	15.4		0	100	0		
PHF	.000	.000	.000	.000	.000	.835	.563	.817	.917	.000	.500	.813	.000	.927	.000	.927	.868

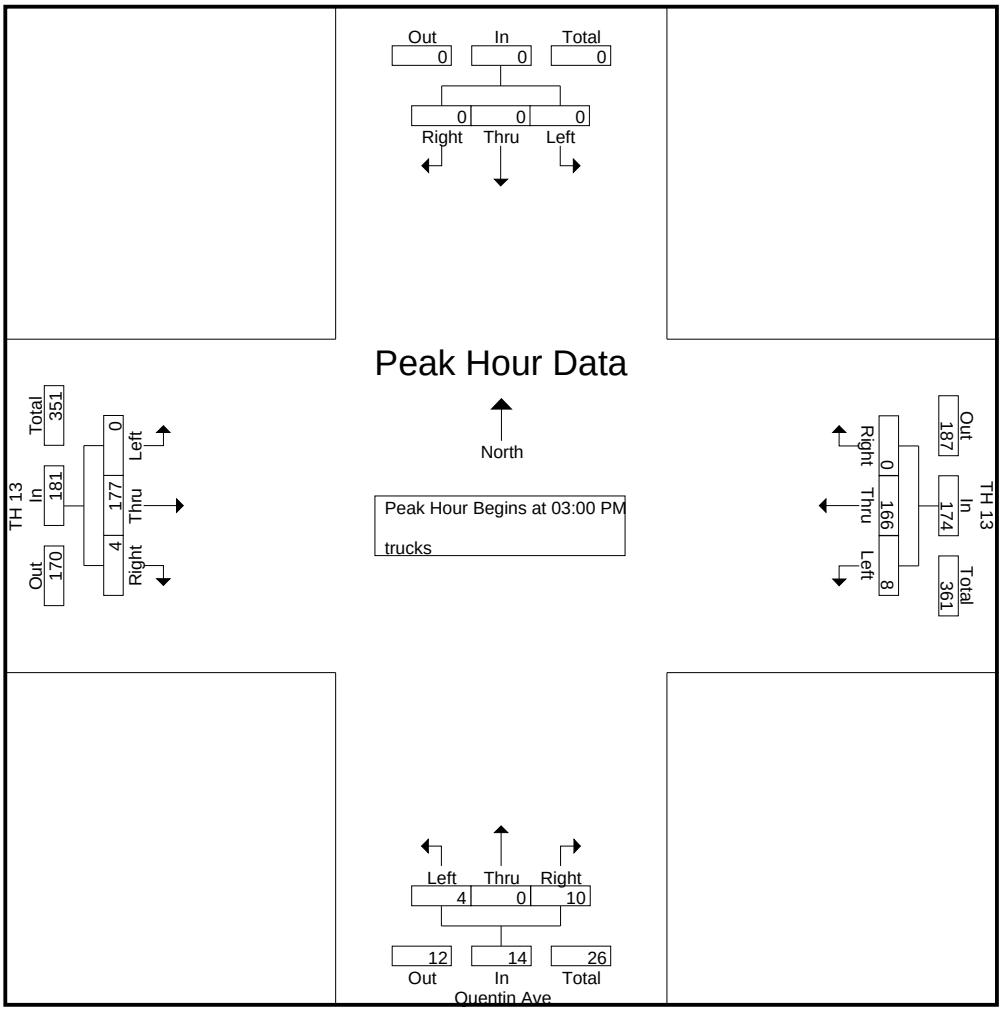


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Quentin Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & quentin ave
Site Code : 00000003
Start Date : 7/14/2016
Page No : 3

	From North				TH 13 From East				Quentin Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	0	0	0	0	0	48	**2**	50	2	0	**2**	**4**	0	**48**	0	**48**	**102**
03:15 PM	0	0	0	0	0	33	2	35	**3**	0	1	4	**2**	46	0	48	87
03:30 PM	0	0	0	0	0	**49**	2	**51**	2	0	1	3	1	46	0	47	101
03:45 PM	0	0	0	0	0	36	2	38	3	0	0	3	1	37	0	38	79
Total Volume	0	0	0	0	0	166	8	174	10	0	4	14	4	177	0	181	369
% App. Total	0	0	0		0	95.4	4.6		71.4	0	28.6		2.2	97.8	0		
PHF	.000	.000	.000	.000	.000	.847	1.00	.853	.833	.000	.500	.875	.500	.922	.000	.943	.904



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Lynn Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & lynn ave
Site Code : 00000004
Start Date : 7/14/2016
Page No : 1

Groups Printed- trucks

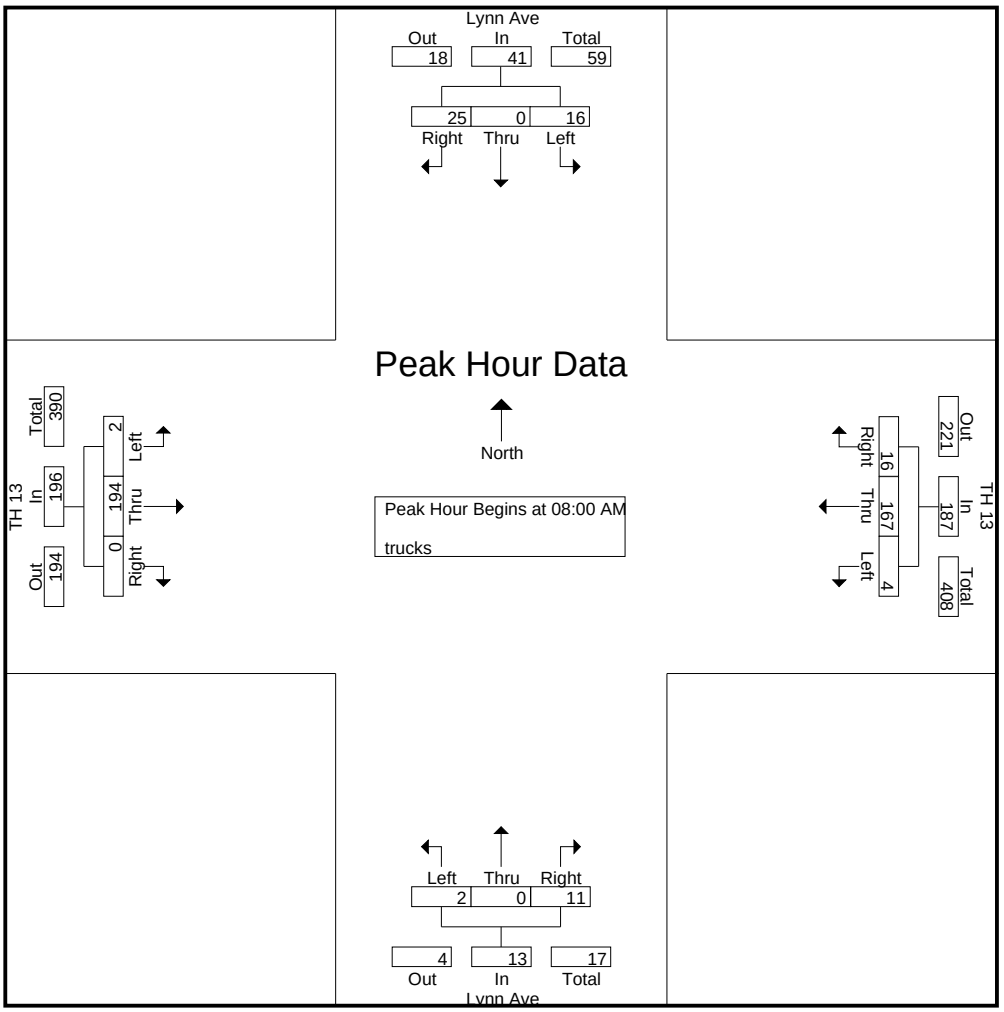
	Lynn Ave From North				TH 13 From East				Lynn Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	0	0	1	1	1	32	0	33	4	0	0	4	0	27	0	27	65
06:15 AM	3	0	4	7	4	24	0	28	1	0	0	1	1	46	0	47	83
06:30 AM	5	0	0	5	0	43	0	43	0	0	1	1	1	45	1	47	96
06:45 AM	1	0	5	6	3	37	1	41	2	0	2	4	0	40	0	40	91
Total	9	0	10	19	8	136	1	145	7	0	3	10	2	158	1	161	335
07:00 AM	7	0	3	10	3	44	1	48	1	0	0	1	0	36	1	37	96
07:15 AM	11	0	2	13	2	36	0	38	0	0	0	0	1	41	0	42	93
07:30 AM	8	0	3	11	0	38	1	39	5	0	1	6	0	41	0	41	97
07:45 AM	8	0	5	13	2	41	0	43	1	0	2	3	0	55	0	55	114
Total	34	0	13	47	7	159	2	168	7	0	3	10	1	173	1	175	400
08:00 AM	3	0	2	5	4	40	3	47	2	0	1	3	0	41	1	42	97
08:15 AM	5	0	2	7	5	44	0	49	3	0	0	3	0	55	0	55	114
08:30 AM	9	0	5	14	2	37	0	39	3	0	0	3	0	50	1	51	107
08:45 AM	8	0	7	15	5	46	1	52	3	0	1	4	0	48	0	48	119
Total	25	0	16	41	16	167	4	187	11	0	2	13	0	194	2	196	437
*** BREAK ***																	
03:00 PM	4	0	1	5	4	42	1	47	2	0	2	4	0	42	0	42	98
03:15 PM	2	0	3	5	2	38	2	42	3	0	1	4	2	46	0	48	99
03:30 PM	3	0	1	4	3	57	0	60	2	0	1	3	1	46	0	47	114
03:45 PM	8	0	5	13	2	34	0	36	3	0	0	3	1	33	0	34	86
Total	17	0	10	27	11	171	3	185	10	0	4	14	4	167	0	171	397
04:00 PM	0	0	0	0	2	31	1	34	1	0	1	2	1	30	0	31	67
04:15 PM	0	0	0	0	3	32	1	36	1	0	1	2	1	16	0	17	55
04:30 PM	0	0	0	0	2	23	0	25	0	0	0	0	0	29	0	29	54
04:45 PM	0	0	0	0	1	24	2	27	1	0	0	1	0	35	0	35	63
Total	0	0	0	0	8	110	4	122	3	0	2	5	2	110	0	112	239
05:00 PM	0	0	0	0	0	16	1	17	2	0	0	2	0	21	0	21	40
05:15 PM	0	0	0	0	1	34	0	35	1	0	0	1	0	24	0	24	60
05:30 PM	0	0	0	0	1	15	0	16	0	0	0	0	0	23	0	23	39
05:45 PM	0	0	0	0	1	27	1	29	0	0	0	0	0	26	0	26	55
Total	0	0	0	0	3	92	2	97	3	0	0	3	0	94	0	94	194
Grand Total	85	0	49	134	53	835	16	904	41	0	14	55	9	896	4	909	2002
Apprch %	63.4	0	36.6		5.9	92.4	1.8		74.5	0	25.5		1	98.6	0.4		
Total %	4.2	0	2.4	6.7	2.6	41.7	0.8	45.2	2	0	0.7	2.7	0.4	44.8	0.2	45.4	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Lynn Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & lynn ave
Site Code : 00000004
Start Date : 7/14/2016
Page No : 2

	Lynn Ave From North				TH 13 From East				Lynn Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	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 08:00 AM																	
08:00 AM	3	0	2	5	4	40	**3**	47	2	0	**1**	3	0	41	**1**	42	97
08:15 AM	5	0	2	7	**5**	44	0	49	**3**	0	0	3	0	**55**	0	**55**	114
08:30 AM	**9**	0	5	14	2	37	0	39	3	0	0	3	0	50	1	51	107
08:45 AM	8	0	**7**	**15**	5	**46**	1	**52**	3	0	1	**4**	0	48	0	48	**119**
Total Volume	25	0	16	41	16	167	4	187	11	0	2	13	0	194	2	196	437
% App. Total	61	0	39		8.6	89.3	2.1		84.6	0	15.4		0	99	1		
PHF	.694	.000	.571	.683	.800	.908	.333	.899	.917	.000	.500	.813	.000	.882	.500	.891	.918

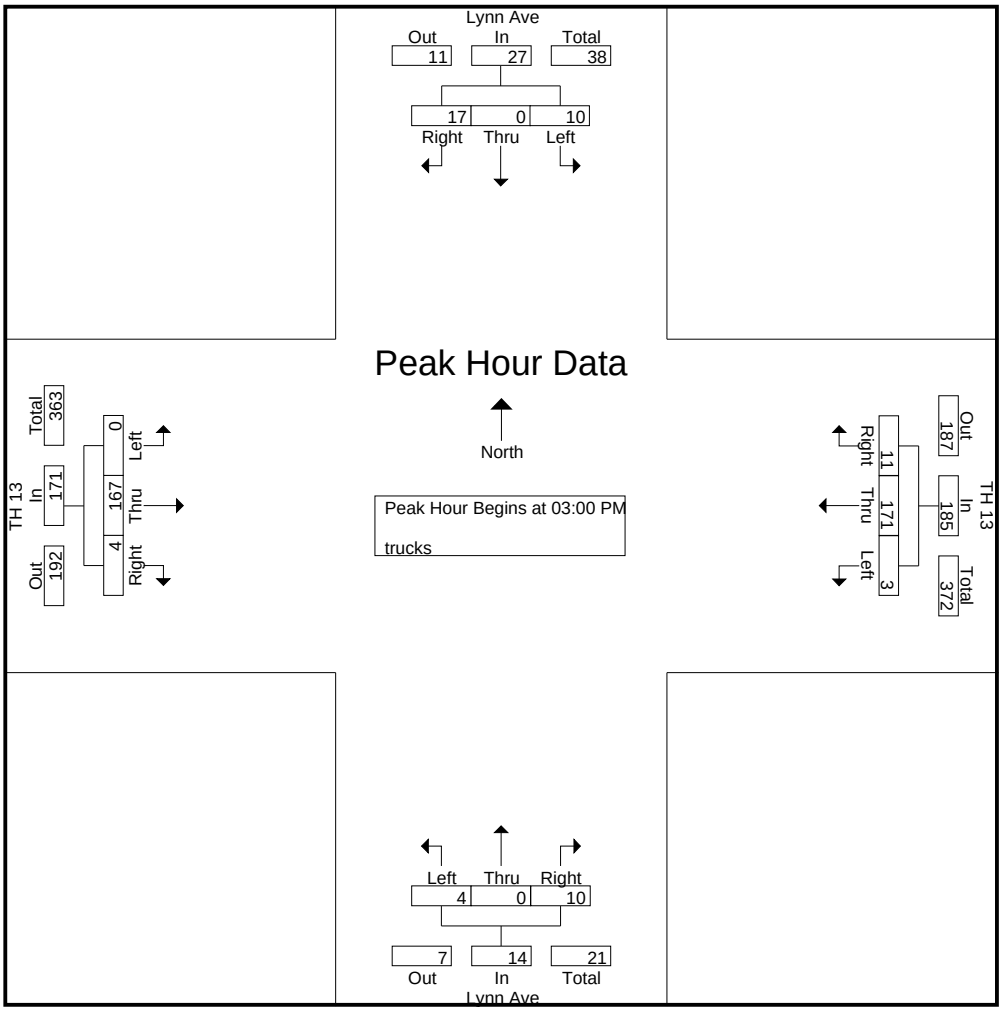


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Lynn Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & lynn ave
Site Code : 00000004
Start Date : 7/14/2016
Page No : 3

	Lynn Ave From North				TH 13 From East				Lynn Ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	4	0	1	5	**4**	42	1	47	2	0	**2**	**4**	0	42	0	42	98
03:15 PM	2	0	3	5	2	38	**2**	42	**3**	0	1	4	**2**	**46**	0	**48**	99
03:30 PM	3	0	1	4	3	**57**	0	**60**	2	0	1	3	1	46	0	47	**114**
03:45 PM	**8**	0	**5**	**13**	2	34	0	36	3	0	0	3	1	33	0	34	86
Total Volume	17	0	10	27	11	171	3	185	10	0	4	14	4	167	0	171	397
% App. Total	63	0	37		5.9	92.4	1.6		71.4	0	28.6		2.3	97.7	0		
PHF	.531	.000	.500	.519	.688	.750	.375	.771	.833	.000	.500	.875	.500	.908	.000	.891	.871



WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Chowen Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & chowen ave
Site Code : 00000005
Start Date : 7/14/2016
Page No : 1

Groups Printed- trucks

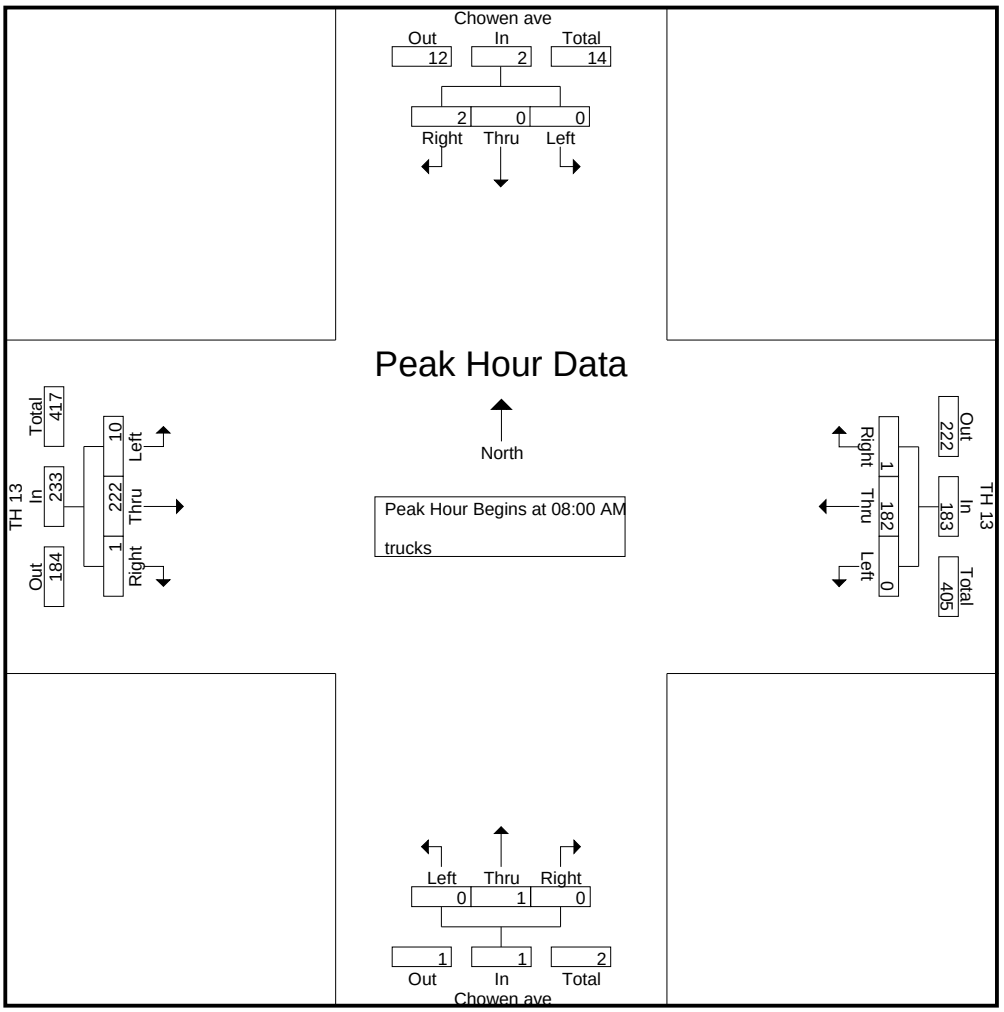
	Chowen ave From North				TH 13 From East				Chowen ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
06:00 AM	0	0	0	0	0	28	0	28	0	1	0	1	0	26	1	27	56
06:15 AM	2	0	0	2	0	28	0	28	1	1	0	2	1	52	0	53	85
06:30 AM	1	0	0	1	0	41	0	41	0	0	0	0	0	43	1	44	86
06:45 AM	1	0	0	1	0	37	0	37	2	0	0	2	1	39	1	41	81
Total	4	0	0	4	0	134	0	134	3	2	0	5	2	160	3	165	308
07:00 AM	1	0	0	1	1	42	1	44	1	0	0	1	0	36	3	39	85
07:15 AM	0	0	0	0	0	33	0	33	0	0	0	0	2	34	1	37	70
07:30 AM	2	0	0	2	0	38	2	40	0	0	0	0	0	49	1	50	92
07:45 AM	1	0	0	1	1	43	0	44	1	0	0	1	1	58	0	59	105
Total	4	0	0	4	2	156	3	161	2	0	0	2	3	177	5	185	352
08:00 AM	0	0	0	0	1	41	0	42	0	0	0	0	0	56	1	57	99
08:15 AM	2	0	0	2	0	50	0	50	0	1	0	1	0	58	2	60	113
08:30 AM	0	0	0	0	0	37	0	37	0	0	0	0	0	50	1	51	88
08:45 AM	0	0	0	0	0	54	0	54	0	0	0	0	1	58	6	65	119
Total	2	0	0	2	1	182	0	183	0	1	0	1	1	222	10	233	419
*** BREAK ***																	
03:00 PM	3	0	0	3	1	44	0	45	0	0	0	0	2	43	9	54	102
03:15 PM	0	0	0	0	1	37	0	38	0	0	0	0	2	46	9	57	95
03:30 PM	2	0	0	2	0	50	0	50	0	0	0	0	0	46	3	49	101
03:45 PM	3	0	0	3	0	26	0	26	0	0	0	0	1	43	1	45	74
Total	8	0	0	8	2	157	0	159	0	0	0	0	5	178	22	205	372
04:00 PM	0	0	0	0	0	33	0	33	1	0	0	1	0	35	1	36	70
04:15 PM	1	0	0	1	0	31	0	31	1	0	0	1	0	18	0	18	51
04:30 PM	0	0	0	0	0	28	1	29	0	0	0	0	0	31	1	32	61
04:45 PM	1	0	0	1	0	25	0	25	1	0	0	1	0	36	3	39	66
Total	2	0	0	2	0	117	1	118	3	0	0	3	0	120	5	125	248
05:00 PM	1	0	0	1	0	17	1	18	0	0	0	0	0	24	2	26	45
05:15 PM	0	0	0	0	0	26	0	26	1	0	0	1	1	20	0	21	48
05:30 PM	0	0	0	0	0	13	0	13	0	0	0	0	1	23	1	25	38
05:45 PM	0	0	0	0	0	24	0	24	0	0	0	0	0	17	4	21	45
Total	1	0	0	1	0	80	1	81	1	0	0	1	2	84	7	93	176
Grand Total	21	0	0	21	5	826	5	836	9	3	0	12	13	941	52	1006	1875
Apprch %	100	0	0		0.6	98.8	0.6		75	25	0		1.3	93.5	5.2		
Total %	1.1	0	0	1.1	0.3	44.1	0.3	44.6	0.5	0.2	0	0.6	0.7	50.2	2.8	53.7	

WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Chowen Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & chowen ave
Site Code : 00000005
Start Date : 7/14/2016
Page No : 2

	Chowen ave From North				TH 13 From East				Chowen ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	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 08:00 AM																	
08:00 AM	0	0	0	0	**1**	41	0	42	0	0	0	0	0	56	1	57	99
08:15 AM	**2**	0	0	**2**	0	50	0	50	0	**1**	0	**1**	0	**58**	2	60	113
08:30 AM	0	0	0	0	0	37	0	37	0	0	0	0	0	50	1	51	88
08:45 AM	0	0	0	0	0	**54**	0	**54**	0	0	0	0	**1**	58	**6**	**65**	**119**
Total Volume	2	0	0	2	1	182	0	183	0	1	0	1	1	222	10	233	419
% App. Total	100	0	0		0.5	99.5	0		0	100	0		0.4	95.3	4.3		
PHF	.250	.000	.000	.250	.250	.843	.000	.847	.000	.250	.000	.250	.250	.957	.417	.896	.880

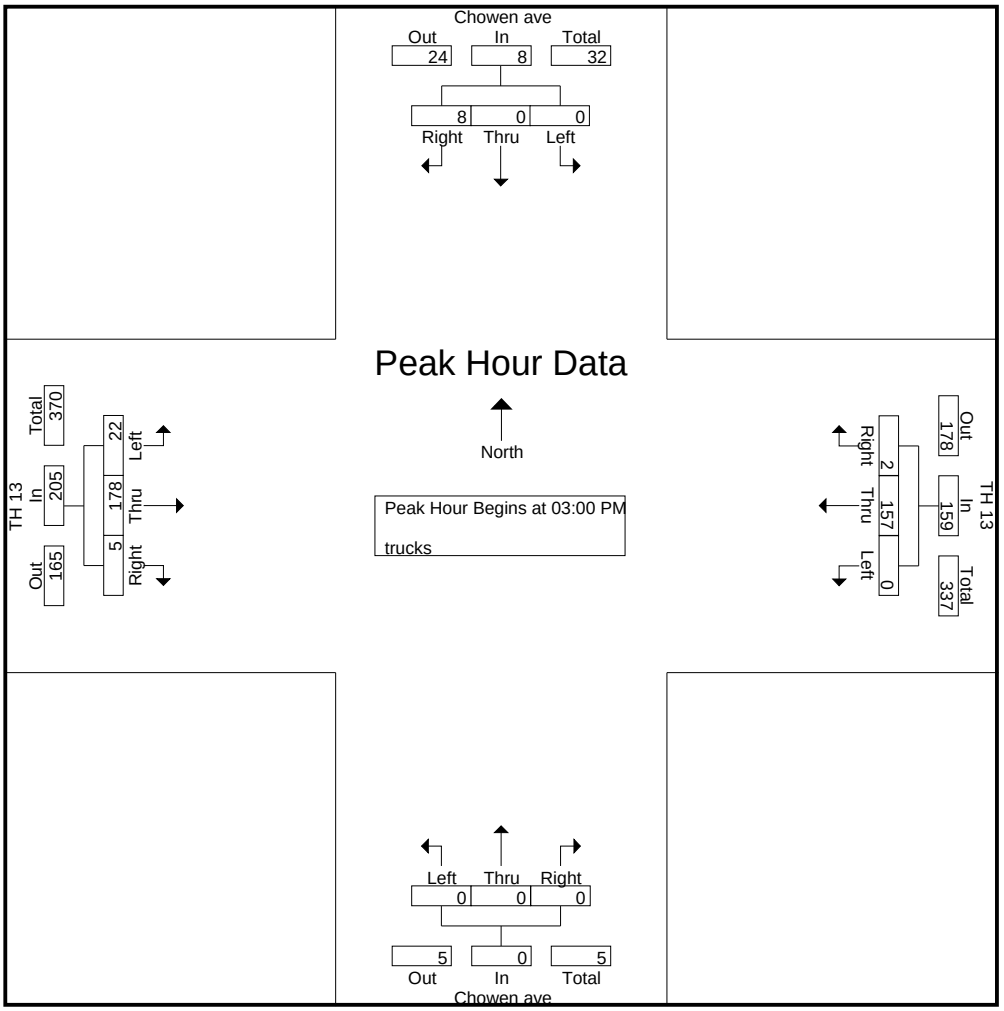


WSB & Associates
701 Xenia Ave S
Minneapolis, MN

TH 13 & Chowen Ave
6-9 AM - 3-6 PM Turning Movement
Savage, MN
80's sunny

File Name : th 13 & chowen ave
Site Code : 00000005
Start Date : 7/14/2016
Page No : 3

	Chowen ave From North				TH 13 From East				Chowen ave From South				TH 13 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	**3**	0	0	**3**	**1**	44	0	45	0	0	0	0	**2**	43	**9**	54	**102**
03:15 PM	0	0	0	0	1	37	0	38	0	0	0	0	2	**46**	9	**57**	95
03:30 PM	2	0	0	2	0	**50**	0	**50**	0	0	0	0	0	46	3	49	101
03:45 PM	3	0	0	3	0	26	0	26	0	0	0	0	1	43	1	45	74
Total Volume	8	0	0	8	2	157	0	159	0	0	0	0	5	178	22	205	372
% App. Total	100	0	0		1.3	98.7	0		0	0	0		2.4	86.8	10.7		
PHF	.667	.000	.000	.667	.500	.785	.000	.795	.000	.000	.000	.000	.625	.967	.611	.899	.912



Appendix G

Truck Related Crashes

by Intersection 2011-2015

Chowen Avenue

Chowen Avenue 5-Year Crash Data (2011-2015)					
		Car	Truck	Total Each	Total
Severity	Fatal	0	0	0	**41**
	Injury	15	1	16	
	Property Damage	22	3	25	
Type	Right Angle	15	0	15	**41**
	Left Turn	3	0	3	
	Rear End	11	2	13	
	Head On	1	0	1	
	Other	7	2	9	
	Unknown	0	0	0	

Source: MnCMAT

Comments:

1. One 3+ Axle-1 unit truck involved in a Rear End crash with a passenger car, both vehicles traveling eastbound. Truck driver distraction. Possible injury.
2. One truck tractor Semi-trailer involved in a Sideswipe crash with a passenger car, both vehicles traveling southbound. Passenger car unsafe lane use. Property damage only.
3. One heavy truck involved in a Sideswipe crash with a passenger car, both vehicles traveling westbound. Passenger car unsafe lane use. Property damage only.
4. One truck tractor Semi-trailer involved in a Rear End crash with a pickup, both vehicles traveling southbound. Pickup following too closely at an unsafe speed. Property damage only.

Dakota Avenue

Dakota Avenue **5-Year Crash Data (2011-2015)**					
		Car	Truck	Total Each	Total
Severity	Fatal	0	1	1	**22**
	Injury	2	3	5	
	Property Damage	13	3	16	
Type	Right Angle	0	4	4	**22**
	Left Turn	0	0	0	
	Rear End	6	1	7	
	Head On	2	0	2	
	Other	7	2	9	
	Unknown	0	0	0	

Source: MnCMAT

Comments:

1. One 2 axle-6 tire-1 unit truck traveling southbound involved in a Right-Angle crash with a passenger car traveling eastbound. Truck failed to yield right of way making a southbound left turn. 1 person killed.
2. One truck tractor Semi-trailer traveling northeast involved in a crash with sign structure or post after making a wrong way turn into opposing traffic. Property Damage only.
3. One truck tractor Semi-trailer involved in a Sideswipe crash with a passenger car, both vehicles traveling eastbound. Truck unsafe lane use. Property damage only.
4. One truck tractor Semi-trailer involved in a Rear End crash with a passenger car, both vehicles traveling eastbound. Passenger car unsafe lane use. Possible injury.
5. One truck tractor Semi-trailer traveling northbound involved in a Right-Angle crash with a passenger car traveling eastbound. Both vehicles failed to yield right of way. Property damage only.
6. One truck tractor Semi-trailer traveling southbound involved in a Right-Angle crash with a passenger car traveling westbound. Truck failed to yield right of way; car driver had chemical impairment. Possible injury.
7. One 2 axle-6 tire-1 unit truck traveling westbound involved in a Right-Angle crash with a van or minivan traveling southbound. Van unsafe lane use. Possible injury.

Lynn Avenue

Lynn Avenue **5-Year Crash Data (2011-2015)**					
		Car	Truck	Total Each	Total
Severity	Fatal	0	0	0	**83**
	Injury	15	1	16	
	Property Damage	62	5	67	
Type	Right Angle	26	1	27	**83**
	Left Turn	5	1	6	
	Rear End	34	3	37	
	Head On	1	0	1	
	Other	11	1	12	
	Unknown	0	0	0	

Source: MnCMAT

Comments:

1. One heavy truck traveling eastbound involved in a Right-Angle crash with sport utility vehicle traveling northbound. Truck failed to yield right of way. Property damage only.
2. One truck tractor Semi-trailer involved in a Rear End crash with a pickup, both traveling westbound. Truck following too closely. Property damage only.
3. Two 2 axle-6 tire-1 unit trucks involved to in a Left-turn crash, one vehicle traveling westbound and the other traveling southeast. The westbound truck was driving distracted. Property damage only.
4. One truck tractor Semi-trailer involved in a Rear End crash with a pickup, both vehicles traveling eastbound. No clear contributing factor for both. Possible injury.
5. One 3+ Axle-1 unit truck involved in a Sideswipe crash with a passenger car, both vehicles traveling southbound. Car driver was improper passing and distracted. Property damage only.
6. One 2 axle-6 tire-1 unit truck involved in a Rear End crash with a passenger car, both vehicles traveling westbound. Truck driver was distracted. Property damage only.

Quentin Avenue

Quentin Avenue 5-Year Crash Data (2011-2015)					
		Car	Truck	Total	Total
Severity	Fatal	0	0	0	**27**
	Injury	6	0	6	
	Property Damage	21	0	21	
Type	Right Angle	2	0	2	**27**
	Left Turn	0	0	0	
	Rear End	20	0	20	
	Head On	0	0	0	
	Other	5	0	5	
	Unknown	0	0	0	

Source: MnCMAT

Comments:

No truck crashes involvement.

Yosemite Avenue

Yosemite Avenue 5-Year Crash Data (2011-2015)					
		Car	Truck	Total Each	Total
Severity	Fatal	0	0	0	**17**
	Injury	2	3	5	
	Property Damage	10	2	12	
Type	Right Angle	2	1	3	**17**
	Left Turn	0	0	0	
	Rear End	8	1	9	
	Head On	0	0	0	
	Other	2	3	5	
	Unknown	0	0	0	

Source: MnCMAT

Comments:

1. One truck tractor Semi-trailer traveling eastbound involved in a Right-Angle crash with a sport utility vehicle traveling northbound. Sport utility vehicle failed to yield right of way and was distracted. Possible injury.

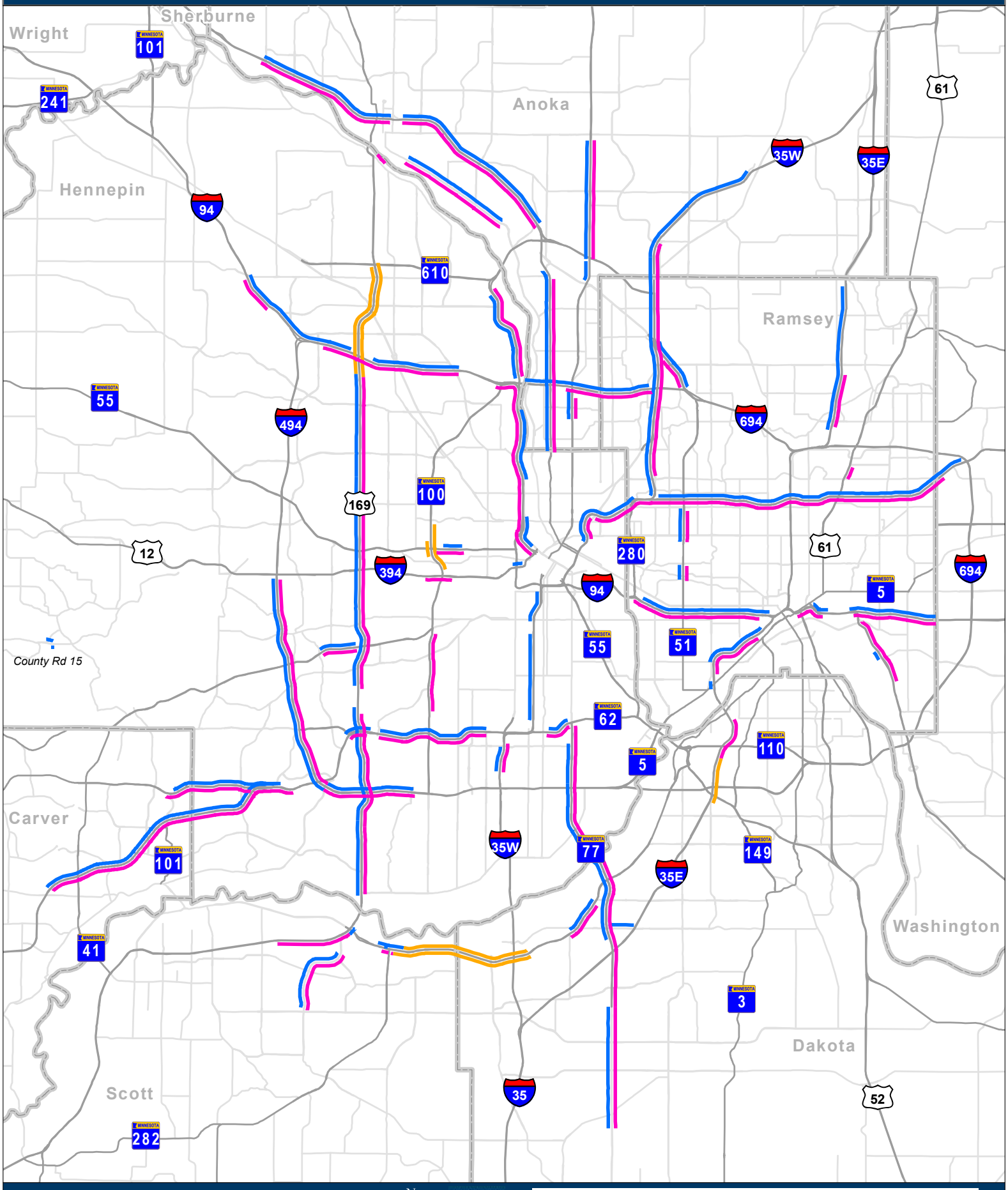
2. One 2 axle-6 tire-1 unit truck traveling westbound ran off the right side of the road to avoid an object or pedestrian. Possible injury.
3. One 3+ Axle-1 unit truck involved in a Sideswipe crash with a passenger car, both vehicles traveling eastbound. Truck unsafe lane use. Property damage only.
4. One 2 axle-6 tire-1 unit truck involved in a Rear End crash with a passenger car, both vehicles traveling eastbound. Car driving at unsafe speed and distracted. Property damage only.
5. One truck tractor Semi-trailer involved in a Sideswipe crash with a passenger car, both vehicles traveling eastbound. Car driver unsafe lane use. Non-incapacitating injury.

Appendix H

Current and Planned Bus-Only Shoulders Map

March 2017

Current and Planned Bus-Only Shoulders



0 2.5 5 10 Miles

N

Current Bus-Only Shoulders
- Southbound or Westbound
- Northbound or Eastbound

Planned Bus-Only Shoulders
- Planned Shoulders

Date: 3/31/2017