

DRAFT

**Traffic Operations & Safety Evaluation
Technical Memorandum**

Zavoral Property Mine and Reclamation Project

AECOM

August 19, 2011

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Executive Summary

The Tiller Corporation, Inc. (Tiller) proposes to operate a sand and gravel mine on the site of a dormant, unreclaimed gravel mine in the City of Scandia, Washington County, Minnesota. The 114-acre site (Zavoral Site or Site) is located along St. Croix Trail North (State Trunk Highway [TH] 95) near its intersection with TH 97 (Figure 1). Tiller proposes to mine and reclaim 64 acres of the 114-acre Site, predominately on portions of the Site that were previously disturbed by mining. An 8-acre area that has not been previously mined is included in the proposed mining area. Tiller is also proposing to restore approximately 4 acres of the previously mined area located within the St. Croix National Scenic Riverway and USA Scenic Easement Area.

This technical memorandum presents the evaluations completed for Task 21 – Traffic. It identifies potential environmental impacts related to the Project alternatives and identifies measures that could avoid, minimize, or mitigate for these potential impacts. This work was conducted as part of the Environmental Impact Statement (EIS) process to be completed under Minn. R. 4410.

The traffic evaluation task includes analysis of existing and alternative traffic operations impacts to the key roadway network serving the existing Scandia Mine and the Zavoral Site. The study area is bounded by Manning Trail, 228th Street, TH 95, and TH 97. The roadway links evaluated in the study area included TH 97, TH 95, Manning Avenue, Lofton Avenue, and Olinda Trail.

The Project scope incorporates the proposed Zavoral Site operation and includes the following EIS alternatives:

- Alternative 1 – Tiller’s Preferred Alternative. Mining and reclamation would occur over a 5 to 10-year period.
- Alternative 2 – No-Build Alternative.
- Alternative 3 – Reduced Timeframe. Mining and reclamation would occur over an up to 5-year period.

The following goals are included under Task 21 – Traffic:

- Data Collection – obtained from Minnesota Department of Transportation (Mn/DOT), City of Scandia, Washington County, and Tiller to provide input into the alternative analysis.
- Traffic Analysis and Evaluation – using Mn/DOT data and the Tiller mining and reclamation plans for the alternatives, evaluate the impacts of trucking operations to TH 97 and the study roadway system.
- Safety Evaluation – using Mn/DOT and Department of Public Safety (DPS) crash data, evaluate the crash reports and make recommendations as needed. This task includes a general roadway operations evaluation.
- Mitigation Measures – the traffic and safety analysis identifies recommendations to be included in the EIS.

The following are key findings from the traffic analysis and operations task efforts:

- The existing roadway network is sufficient to handle the daily traffic volumes in the area. TH 97 and TH 95 are state highways designed to accommodate regional traffic. The peak hour truck volumes are also within the capacity of the roadways.
- A reduction in daily truck traffic volume was calculated under the proposed “build” alternatives (Alternatives 1 and 3). The evaluation included the highest volume that could be hauled to the Scandia Mine under peak conditions.

The following is a list of potential mitigation measures that may be included as part of the EIS process:

- Construct the new driveway access directly across from TH 97. This is a required item by Mn/DOT for safe access.
- Construct a northbound right turn lane on TH 95
- In order to ensure that additional truck traffic would not result from hauling from the Zavoral Site at peak demand concurrently with other sites, the number of trucks hauling add-rock to the Scandia Mine could be limited to the projected maximum level of 280 trucks, or 560 trips per day or below, and documentation could be required.
- Relocate the small trail running along TH 95 and re-establish the trail connection.
- The City of Scandia Trail Plan should be coordinated with Mn/DOT to provide a safe bicycle route and avoid conflicts with vehicle traffic on TH 97 (at the 55 mph speed limit).
- Consider Tiller’s contribution to trail construction and reconnection as mitigation.
- Truck warning signs that are compliant with the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD) are recommended on TH 95 to advise drivers of trucks crossing TH 97 in and out of the proposed Zavoral Site. The installation of warning flashers is another option, but should be discussed with Mn/DOT to evaluate the safety impacts.

1.0 Project Background

AECOM is completing tasks to analyze the potential for environmental impacts, and to identify mitigation measures for potential impacts from the identified alternatives related to the Zavoral Property Mining and Reclamation Project. This is part of the EIS process to be completed under Minn. R. 4410. This technical memorandum presents the analysis and evaluation completed for Task 21 – Traffic.

The alternatives to be addressed in the EIS are summarized below. This Traffic Operations and Safety Evaluation Technical Memorandum addresses the three alternatives (focusing on the “build alternatives”).

1.1. Alternative 1: Applicant’s Preferred Alternative – 5 to 10-Year Operation

1.1.1 Zavoral Site Activities

The mining and reclamation would be conducted in phases, with a Project duration of up to 10 years under this alternative. Proposed site preparation, mining, and reclamation phasing are included in Appendix B.

In general, reclamation of the Site would proceed in increments as areas of mining are completed. The reclamation plan proposes that perimeter areas be sloped and interior areas backfilled and graded to reclamation grades. Topsoil or other organic material would be applied to these areas and vegetation established to reduce erosion. The Environmental Assessment Worksheet (EAW), prepared earlier for the Project, proposed that the previously mined area within the St. Croix Riverway be restored during the final phase of mining operations at the Site. Tiller’s letter to the City (April 7, 2009) proposed revising the reclamation and phasing plan to include reclamation of the area within the St. Croix Riverway and scenic easement areas during the first years of operation. This technical memorandum, therefore, evaluates the Project scenario that includes reclamation of the St. Croix Riverway and scenic easement areas during the first 5 years of mining operations on the Site.

1.1.2 Scandia Mine Activities

Raw aggregate material mined at the Site would primarily be transported to the Scandia Mine. The Scandia Mine currently uses or processes aggregate material from the Scandia Mine and materials that are transported to the Scandia Mine from various locations, most recently Chisago, Minnesota, and Polk counties, Wisconsin. Tiller has indicated that the materials transported from the Zavoral Site would replace materials hauled to the Scandia Mine from Chisago County and Polk County. The following activities would occur at the Scandia Mine:

- Aggregate material brought in from the Zavoral Site (add-rock) would be blended with aggregate material mined at the Scandia Mine for use in the production of hot mix asphalt.
- A portion of the aggregate material transported to the Scandia Mine may be processed as needed through a series of crushers, screens, conveyors, wash decks, and classifiers to produce commercial grade construction aggregates.

- The finished construction aggregate products would be stockpiled at the Scandia Mine until they are hauled off-site by trucks to various construction sites.

The Scandia Mine operates under a Conditional Use Permit (CUP) and an Annual Operating Permit (AOP) approved by the City of Scandia. The processing activities listed above are included in the activities authorized by these permits. No changes in operations at the Scandia Mine are expected.

1.2. Alternative 2: No-Build Alternative

The No-Build alternative is based on the existing use continuing at the Site. It would remain as an unreclaimed open space. Allowable future uses of the Zavoral Site are agricultural and rural residential.

1.3. Alternative 3: Reduced Time Period - Up to 5-Year Operation

This alternative focuses on the impacts of the proposed activities if the overall time frame for mining at the Zavoral Site is up to 5 years rather than up to 10 years, as proposed in the Preferred Alternative. This would result in more mining occurring for more weeks each year and more material being mined per year.

Tiller is proposing the following activities at the Zavoral Site with either of the “build alternatives” (Alternatives 1 and 3):

- Clearing and grubbing the Site of vegetation, as necessary.
- Removing overburden from areas to be mined, and stockpiling the material on the Site for potential future use in reclamation.
- Excavating raw aggregate materials.
- Using water from the existing well for dust suppression.
- Storing fuel and related materials, such as oil, anti-freeze, grease, and hydraulic fluid, on the Site.
- Reclaiming the Site through grading, placing topsoil or other organic material, and seeding.

Mining operations would typically be conducted on a seasonal basis from April through mid-November.

Mined aggregate material (pit-run and/or add-rock) would primarily be hauled to Tiller’s Scandia Mine near Manning Avenue and 225th Street for use in material produced at that Site.

2.0 Traffic Study Goals

The traffic operations and safety evaluation reviews the existing conditions in the study area and determines the impacts to the roadway system of the three EIS alternatives for the Zavoral Site. The tasks and goals are to analyze the following conditions and prepare recommendations/potential

mitigation that may be needed for each alternative. The following tasks and goals are included in the technical evaluation.

- Data Collection – obtained from Mn/DOT, City of Scandia, Washington County, and Tiller to provide input into the alternative analysis.
- Traffic Analysis and Evaluation – using Mn/DOT data and the Tiller mining and reclamation plans for the alternatives, evaluate the impacts of trucking operations to TH 97 and the study roadway system.
- Safety Evaluation – using Mn/DOT and Department of Public Safety (DPS) crash data, evaluate the crash reports and make recommendations as needed. This task includes a general roadway operations evaluation.
- Mitigation Measures – the traffic and safety analysis identifies recommendations to be included in the EIS.

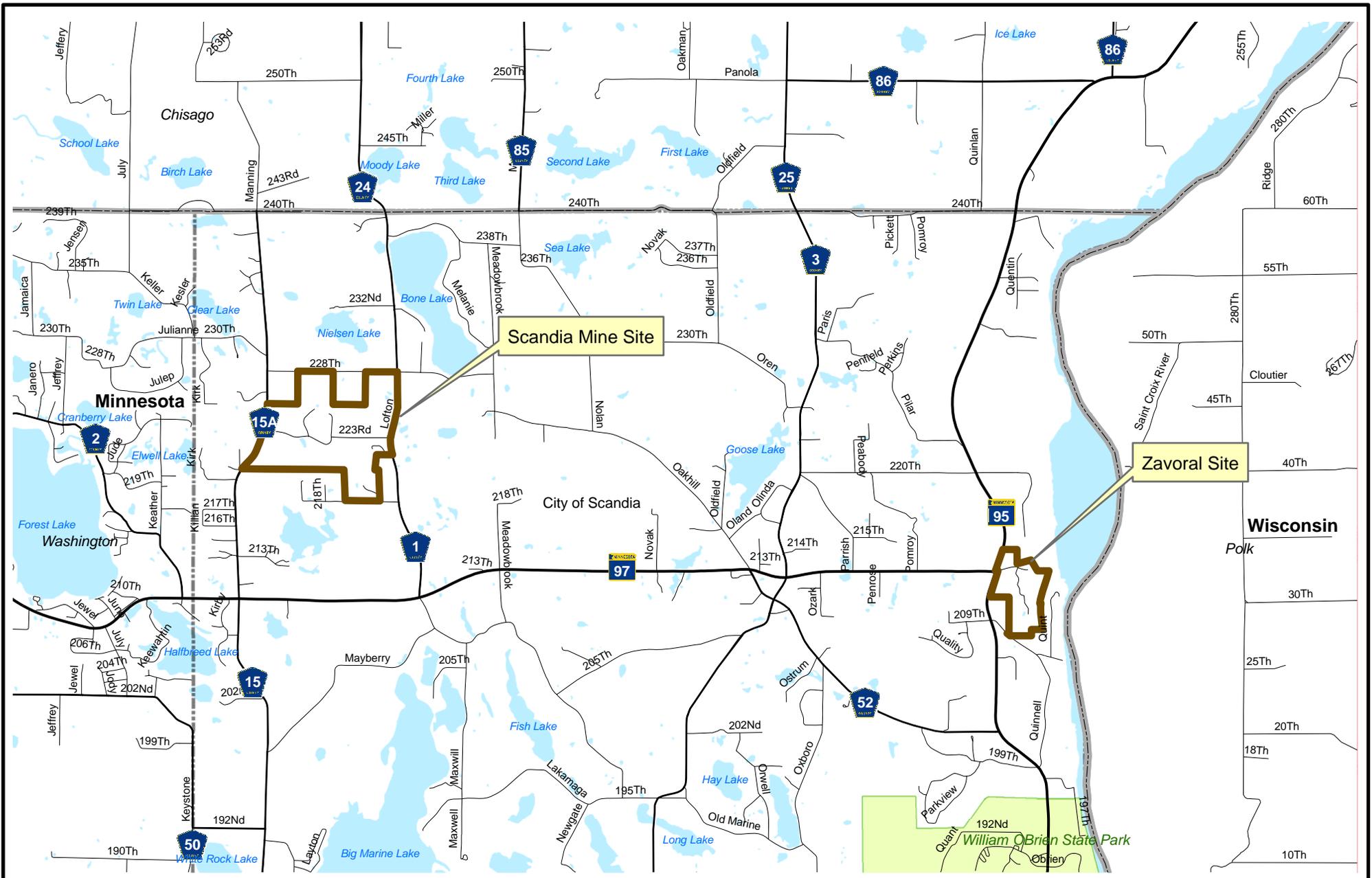
The Project location map, with the main roadway network and existing Scandia Mine and Zavoral Site, is shown in Figure 1.

3.0 Methodology

3.1. Data Collection

The traffic operations and evaluation included meetings and coordination with the City of Scandia and Tiller to obtain and analyze data and prepare a technical presentation to the Project Advisory Committee (PAC) on July 20, 2010. This presentation included an initial evaluation of the traffic impacts and provided an opportunity for PAC and citizen questions and input. Since that time, there have been subsequent meetings and updates to the alternative plans by Tiller. These updates are included in this memorandum. The following data collection was completed:

- Conducted site reviews of the roadway network in the study area.
- Obtained updated mining plan documentation from Tiller dated April 18, 2011 for Alternatives 1 and 3. This did not change the planned daily traffic or routing to the Site and included.
 - Planned truck volumes from Tiller for Alternatives 1 and 3.
 - Planned employment or service data for the Site (impact of additional vehicles).
- Obtained the most current 3 years of crash data from Mn/DOT (2008-2010). Standard practice is to review the most recent 3 years of data. The initial evaluation included data from 2006 through 2008; updating the data through 2010 (release in June 2011) by Mn/DOT allowed AECOM to review the entire time frame to identify any changed conditions.



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PROJECT AREA ROADWAY NETWORK ZAVORAL MINING EIS SCANDIA, MINNESOTA

Drawn: KLM 06/01/2011

Approved: LK 06/01/2011

Scale: 1" = 1 mile

PROJECT NUMBER 09180095

FIGURE NUMBER 1

- Obtained traffic counts (link volumes) from the following sources:
 - Average Annual Daily Traffic (AADT) data from Mn/DOT.
 - Peak hour volumes (from the Automated Traffic Recorder on TH 97).
 - Existing truck counts from Mn/DOT, Washington County, and Tiller.
- Attended a meeting with Mn/DOT Metro District, City of Scandia, and Tiller representatives on May 26, 2011 to discuss the status of the driveway permit. Mn/DOT listed the following requirements in their letter (included in Appendix B):
 - A northbound TH 95 right turn lane into the Zavoral Site would be required.
 - A westbound acceleration lane would not be feasible to construct exiting the driveway.
 - The driveway must be aligned with TH 97. This would have a minimal change in sight distance.
 - The trail on the southeast side of TH 95 is owned by Mn/DOT (under review by Mn/DOT Metro District staff) and would need to be relocated for the turn lane.
- Collected roadway data, including lane configurations, speed limits, traffic control devices, bicycle and pedestrian facilities, and other features. The City of Scandia has recently published their citywide trail plan. The plan is included in Appendix C.

3.2. Alternative Evaluation for Traffic Operations and Safety

The two “build alternatives” include the same study area, haul facilities, and roadway network. The main difference is the duration of the “haul events” (total years and number of weeks for the add-rock haul). The impacts of the “build alternatives” on traffic operations and safety were evaluated on the following roadways:

- TH 97 from Manning to TH 95
- TH 95 from 220th Street to 209th Street
- Manning & Lofton from TH 97 to the Scandia Mine entrance
- Intersections within the study limits

3.3. Reference Documents

The following standards and reference documents were used for the Traffic Operations and Safety Evaluation:

- Mn/DOT Road Design Manual
- Minnesota Manual on Uniform Traffic Control Devices (MMUTCD)
- Mn/DOT AADT Maps
- Mn/DOT Crash Data GIS mapping for Scandia
- City of Scandia Trail Plan

- Tiller Mining and Reclamation Plans for Zavoral Site

4.0 Findings

4.1. Data Collection

The following are key data collection updates:

- Crash data was updated for the 2008 through 2010 years, which are the most recent data available from Mn/DOT.

Tiller provided data on the existing and planned truck haul volumes for all alternatives. AECOM and the City of Scandia reviewed this data and verified the information presented in this report coincides with the haul volume from Tiller's mining plan dated April 18, 2011.

4.2. Traffic Analysis and Operations

The following are key findings from the traffic analysis and operations task efforts:

- The existing roadway network is sufficient to handle the daily traffic volumes in the area. TH 97 and TH 95 are state highways designed to accommodate regional traffic. The peak hour truck volumes are also within the capacity of the roadways.
- A reduction in daily truck traffic volume was calculated under the proposed "build alternatives." The evaluation included the highest volume that could be hauled under peak conditions.

4.3. Safety Evaluation

The following are key findings from the safety evaluation task efforts:

- The crash data for the 2008 through 2010 years was reviewed, mapped, and evaluated. There were no crashes recorded during this time that involved semi-trailers or haul trucks.
- The TH 97 intersection with Lofton had the highest number of intersection crashes in the study area, but is not considered a hazardous intersection. It would be advised to monitor this intersection for potential increases in crashes during mining operations. The right angle crashes are most likely the result of drivers on Lofton misjudging the speed of vehicles on TH 97 before turning.
- In 2006 there was a fatal crash on TH 95 just north of the intersection of TH 97 and TH 95, where a pedestrian was hit by a large truck. The crash was investigated by the State Patrol and it was determined that the pedestrian made a judgment error and did not get out of the path of the truck. The truck driver was not cited in the crash.

5.0 Impact Analysis

5.1. Traffic Analysis and Evaluation

The traffic evaluation task includes analysis of existing and alternative traffic operations impacts to the key roadway network serving the existing Scandia Mine and Zavoral Site. The study area is bounded by Manning Trail, 228th Street, TH 95, and TH 97. The roadway links to be evaluated in the study area include TH 97, TH 95, Manning Avenue, Lofton Avenue, and Olinda Trail.

The project scope incorporates the proposed Zavoral Site operation and includes the following EIS alternatives:

- Alternative 1 – Preferred Alternative. Aggregate from the Zavoral Site would be transported to the Scandia Mine (mining and reclamation period of 5 to 10 years).
- Alternative 2 – No-Build Alternative
- Alternative 3 – Mining and Reclamation. The mining and reclamation period of up to 5 years.

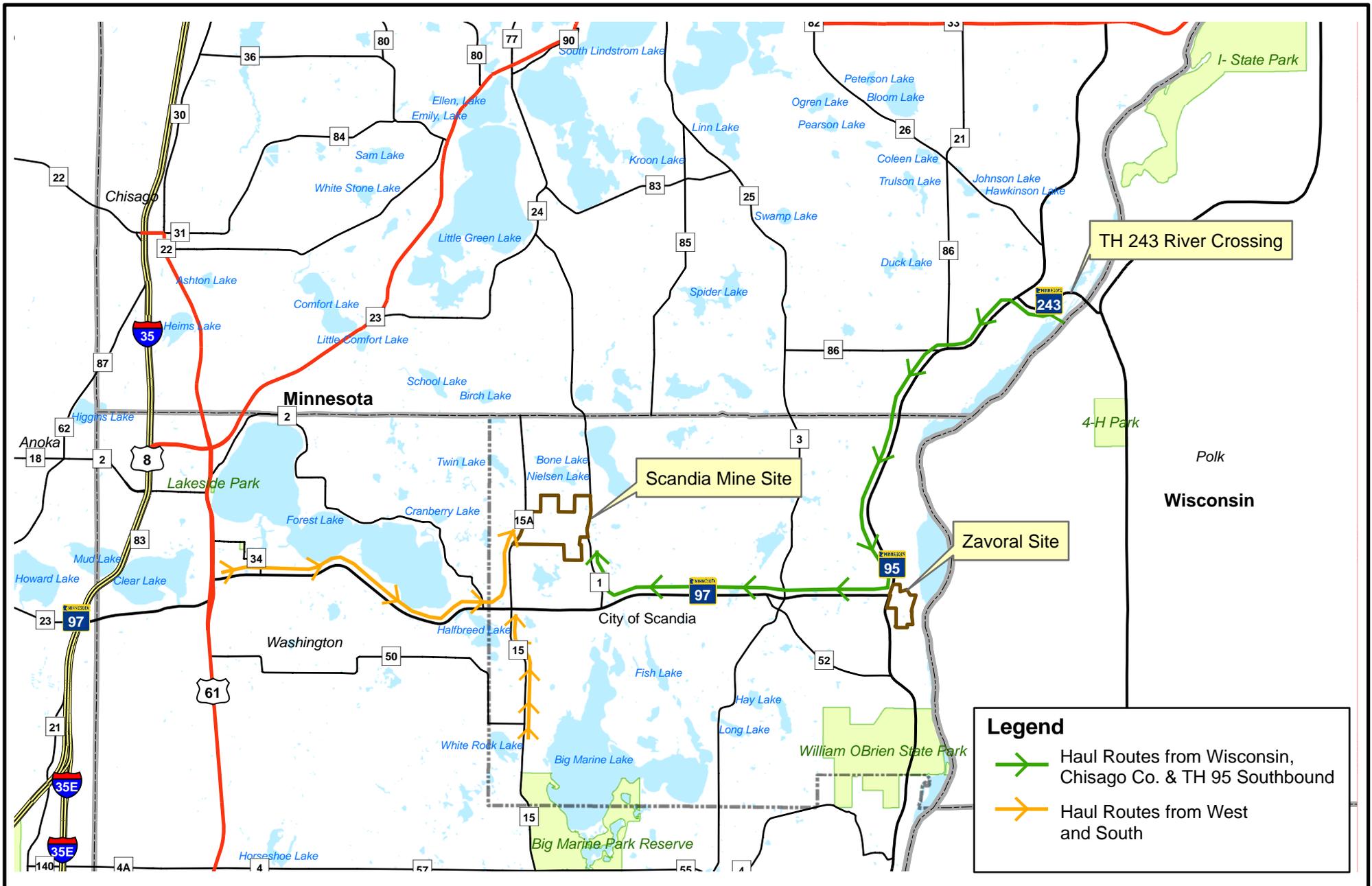
The traffic operations and safety evaluation reviewed the existing conditions in the study area and determined the impacts to the roadway system of the three EIS alternatives for the Zavoral Site. The tasks and goals are to analyze the following conditions and prepare recommendations/potential mitigation that may be needed for each alternative. The following tasks and goals are included in the technical evaluation.

- Data Collection – obtained from Mn/DOT, City of Scandia, Washington County, and Tiller to provide input into the alternative analysis.
- Traffic Analysis and Evaluation – using Mn/DOT data and the Tiller mining and reclamation plans for the alternatives, evaluate the impacts of trucking operations to TH 97 and the study roadway system.
- Safety Evaluation – using Mn/DOT and Department of Public Safety (DPS) crash data, evaluate the crash reports and make recommendations as needed. This task includes a general roadway operations evaluation.

The Project area, with the main roadway network and existing Scandia Mine and proposed Zavoral Site, is shown in Figure 1.

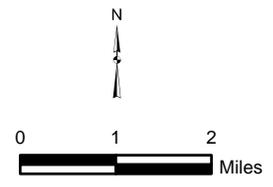
5.1.1 Existing Conditions

Under the existing conditions, trucks haul to the Scandia Mine from various locations in Minnesota and Western Wisconsin. The current haul routes (Figure 2) are concentrated on both TH 95 (north), County Road 1 (from the south), and TH 97. The Wisconsin trucks typically cross the river at TH 243 from Polk County, which is the closest river crossing. Truck also use TH 61 and Interstate (I)-35E as routes from the west.



Legend

-  Haul Routes from Wisconsin, Chisago Co. & TH 95 Southbound
-  Haul Routes from West and South



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**CURRENT HAULING ROUTES
 TO SCANDIA MINE SITE
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

Drawn:	KLM	06/01/2011
Approved:	LK	06/01/2011
Scale:	1" = 2 miles	
PROJECT NUMBER	09180095	
FIGURE NUMBER	2	

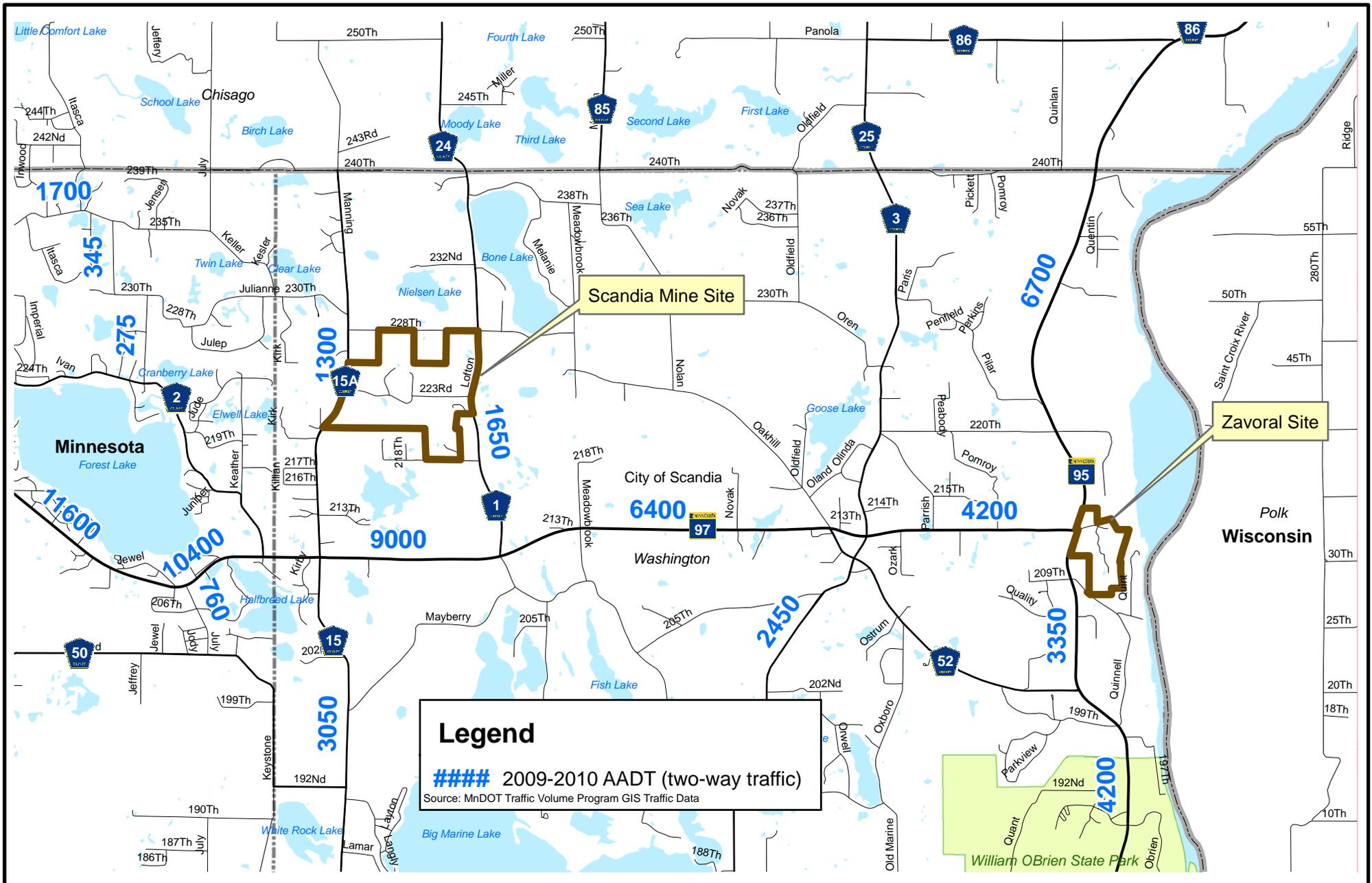
AADT volumes (Figure 3) have remained fairly constant in the past several years on the main roadways. TH 95 and TH 97 are two-lane state highways that are designed for higher speed traffic (55 mph speed limit) and regional travel. They include bypass lanes in some areas and turn lanes at some intersections. Appendix A includes data for the existing intersections in the study area. The intersections at TH 97 at Manning and Olinda are four-way stop intersections. TH 97 has stop sign control at TH 95. None of the intersections in the study area carry sufficient traffic volume to warrant a traffic signal.

The proposed haul route is shown in Figure 4. This route is proposed for all access to the Zavoral Site under the two “build alternatives.” The proposed route would haul add-rock directly from the Zavoral Site to the Scandia Mine on TH 97, instead of using several routes along TH 97, TH 95, TH 243, and County Road 15. This would change the travel pattern by replacing the current routes with the direct routes between the two sites. Under the two “build alternatives,” truck traffic currently traveling to and from the Scandia Mine would be replaced by the new route. This would reduce truck volumes on TH 95, TH 243, and TH 97 (west of Manning). Trucks with other regional and local destinations would continue to operate on these roadways; however, the overall daily volumes would be reduced significantly during the mining season with the haul trucks now providing direct access from Zavoral to Scandia on TH 97.

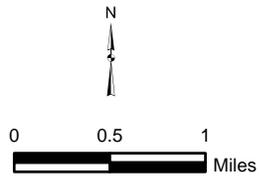
Mn/DOT completed roadway construction improvement projects on sections of TH 97 in 2007 and TH 95 in 2009, which are important for mobility and safety on the Trunk Highways. These were primarily pavement rehabilitation, drainage, and associated improvements for safety and maintenance. Washington County does not have improvements planned in their 5-Year Capital Improvement Plan.

The proposed City of Scandia Trail Plan presents near and long-term improvement plans for trails in the area and connections to regional trails. The trails are planned for both pedestrian and bicycle users. Safety for pedestrian and bicycle users is an important component in the trail planning process.

- The proposed trail on TH 97 is planned as an off-road trail to be constructed in the long-term plan. The off-road trail is recommended as a safer option, with the 55 mph speed limit and large trucks.
- The proposed trail on TH 95 is also an off-road trail. This is also recommended as a safer option, with the 55 mph speed limit and large trucks.
- The trail crossing at TH 97 and TH 95 is in the long-term plan and should be reviewed in coordination with traffic and intersection operations. Advanced signing for the trail crossing should be added.
- A trailhead is shown at TH 97 and TH 95. If the Zavoral Site is operational, the location of the trailhead should be reviewed due to the proximity of the hauling vehicles.
- New crossings on TH 97 at Oakhill and Ozark are called out for design with “traffic controls.” This would most likely be some type of warning flashers, not traffic signals. Potential warning striping should also be reviewed.



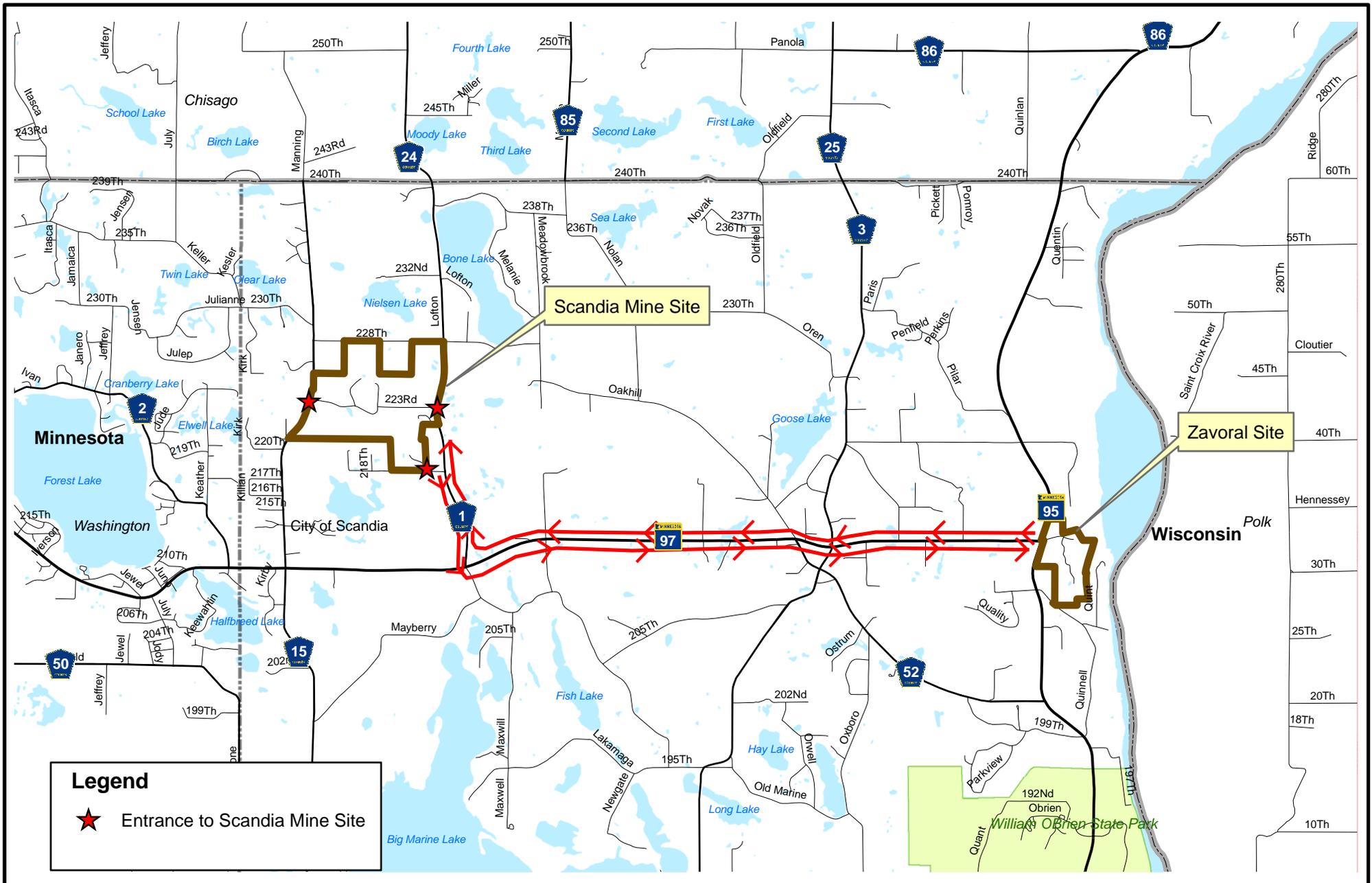
Legend
 ##### 2009-2010 AADT (two-way traffic)
 Source: MnDOT Traffic Volume Program GIS Traffic Data



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**AVERAGE DAILY TRAFFIC VOLUMES
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

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 Scale: 1" = 1 mile
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 FIGURE NUMBER 3



Legend

★ Entrance to Scandia Mine Site



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**PROPOSED ADD ROCK HAUL ROUTE
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

Drawn: KLM 06/01/2011

Approved: LK 06/01/2011

Scale: 1" = 1 mile

PROJECT NUMBER 09180095

FIGURE NUMBER 4

5.1.2 Alternative 1 – Tiller’s Preferred Alternative

- Aggregate from the Zavoral Site would be transported to the Scandia Mine as shown in Figure 4. Tiller plans to use material from the Zavoral Site to replace material transported to Scandia from other locations north and east.
- The Site would be operating from 5 to 10 years. Tiller provided the projected daily and peak hour truck volumes under this mining plan. These volumes were reviewed and determined to be representative of the maximum capacity the Scandia Mine could handle.
- The base traffic volumes for Alternative 1 are shown in Figure 5.

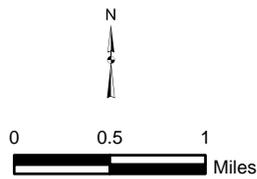
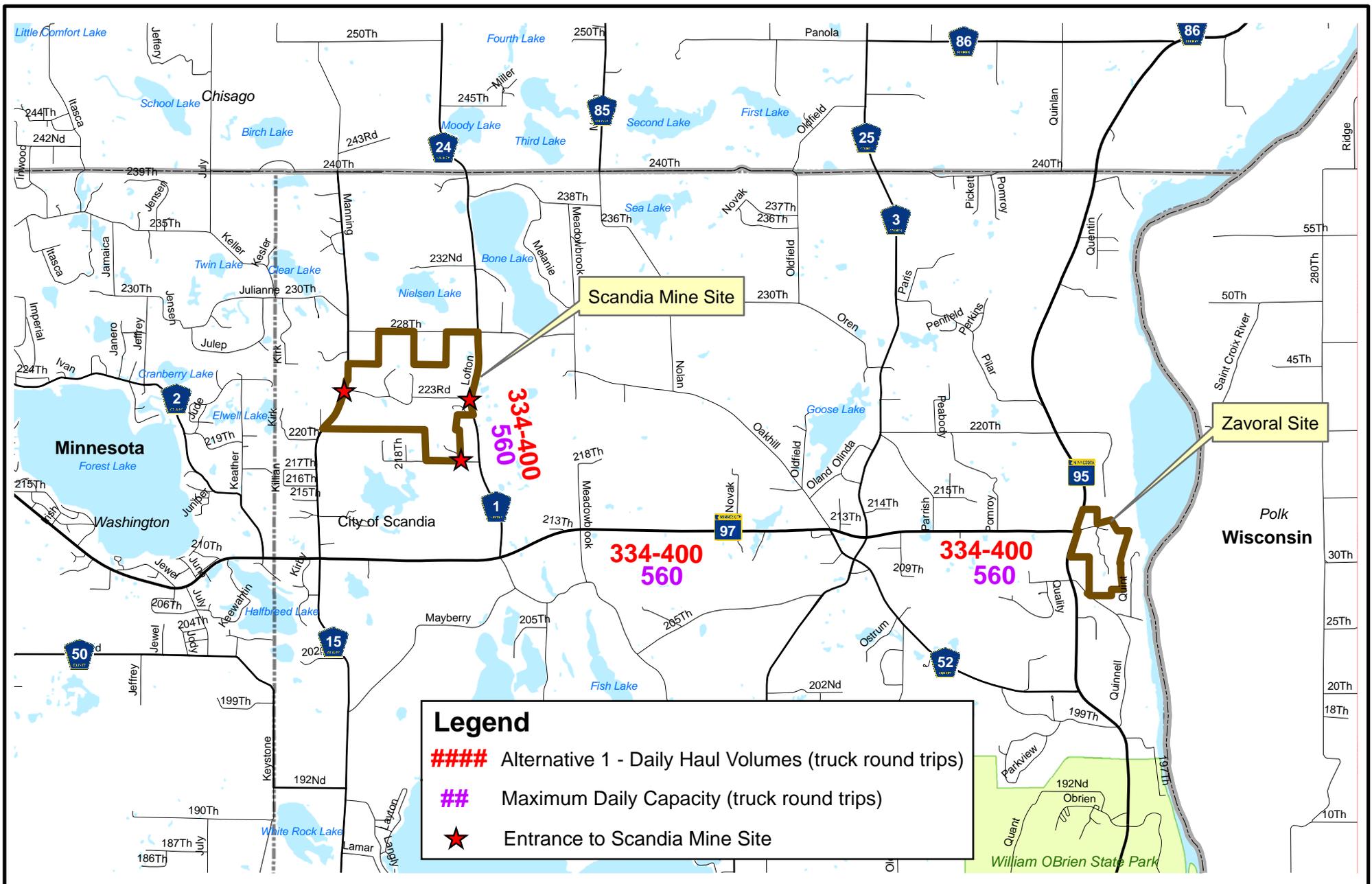
The base traffic volumes for Alternative 1 were developed based on the proposed mining plan for Tiller. The projected daily truck volumes were calculated using the following data:

- Number of weeks scheduled for mining operations each year (6 to 12).
- Total projected aggregate mined each year for transport from the Zavoral Site to the Scandia Mine (120,000 to 240,000 tons).
- The number of loads per year is calculated based on the haul weight and typical weight transferred in one truckload (20 to 24 tons per truckload). The number of loads per year is then converted to “projected loads per day” based on the typical range of truckloads that can be transported during a working day. This calculates to 167 to 200 truckloads on a typical working day (334 to 400 round truck trips).
- Tiller has noted that production can vary and be lower than the 167 truckloads. Our team determined it appropriate to analyze a higher level of traffic volume to evaluate the potential impacts to the roadway system.
- The absolute maximum number of trucks in one working day has been defined at 280 trucks (560 round trips). This scenario is unlikely because trucks would need to run at full hourly capacity (28 loads per hour) for 10 consecutive hours to reach this level. However, it is analyzed in the memorandum because a major demand for gravel has the potential to reach this level.

5.1.3 Alternative 2 – No-Build Alternative (existing land uses)

- This is the No-Build alternative.
- The base traffic volumes for Alternative 2 are shown in Figure 6.

The base traffic volumes for Alternative 2 were developed based on Tiller’s plan to continue operations at the Scandia Mine under a No-Build scenario. The range of projected loads is shown based on Tiller’s records over the past 7 years of operation for the Scandia Mine.



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**BASE TRAFFIC VOLUMES
 ALTERNATIVE 1 (5 TO 10 YEARS)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

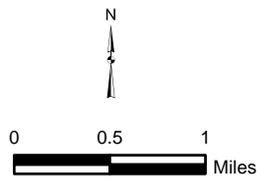
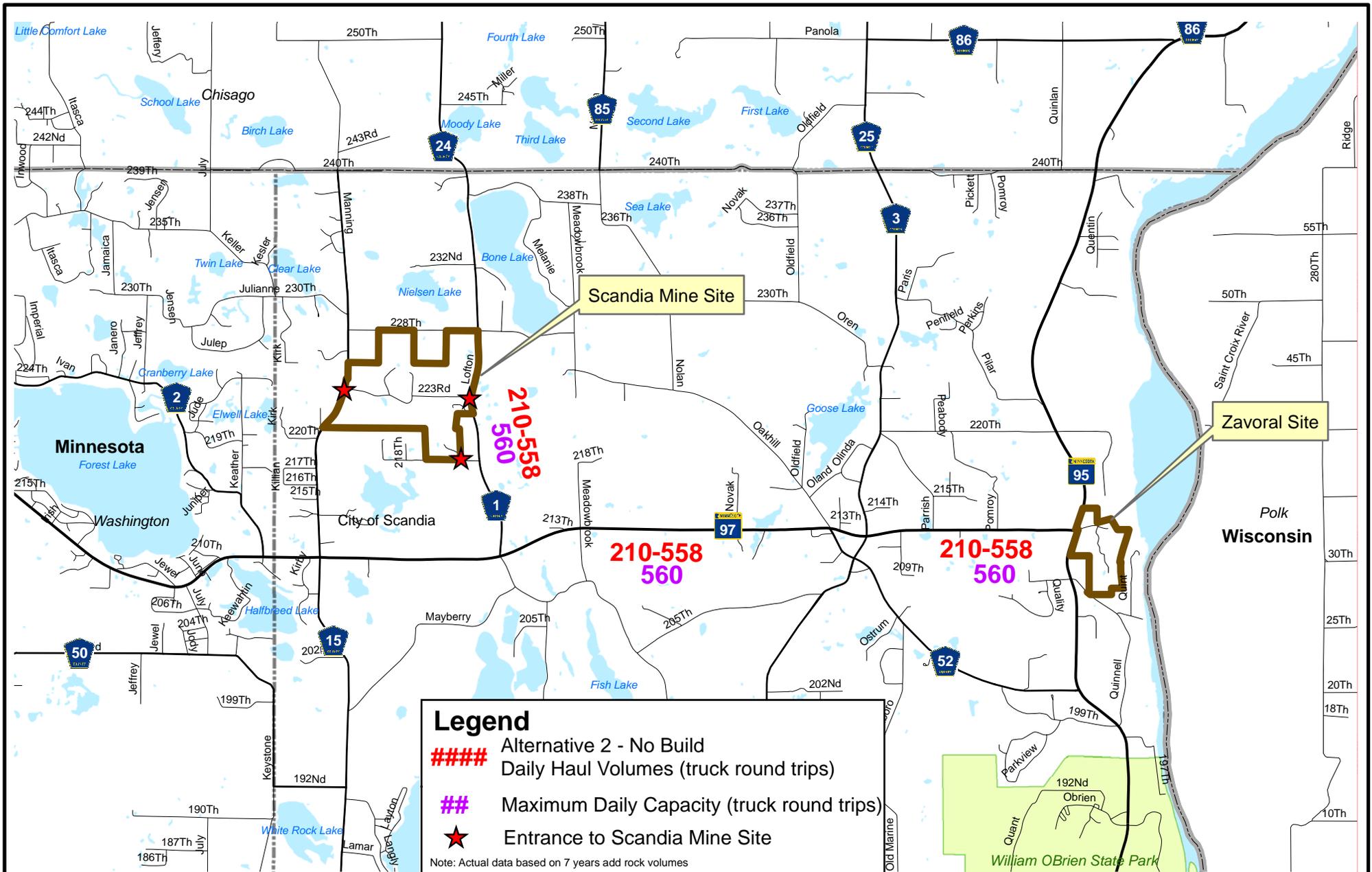
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Scale: 1" = 1 mile

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FIGURE NUMBER 5



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**BASE TRAFFIC VOLUMES
 ALTERNATIVE 2 (NO BUILD)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

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Approved: LK 06/01/2011

Scale: 1" = 1 mile

PROJECT NUMBER 09180095

FIGURE NUMBER 6

5.1.4 Alternative 3 – Reduced Time Frame

- Aggregate from the Zavoral Site would be transported to the Scandia Mine as shown in Figure 4.
- The Site would be operating up to 5 years. Tiller provided the projected daily and peak hour truck volumes under this mining plan. These volumes were reviewed and determined to be representative of the proposed Project based on the maximum capacity the Scandia Mine could handle.
- Tiller plans to use material from the Zavoral Site to replace material transported to the Scandia Mine from other locations north and east. The number of trucks and general location would be requested from Tiller to evaluate these impacts.
- The base traffic volumes for Alternative 3 are shown in Figure 7.

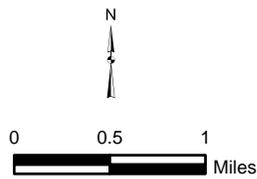
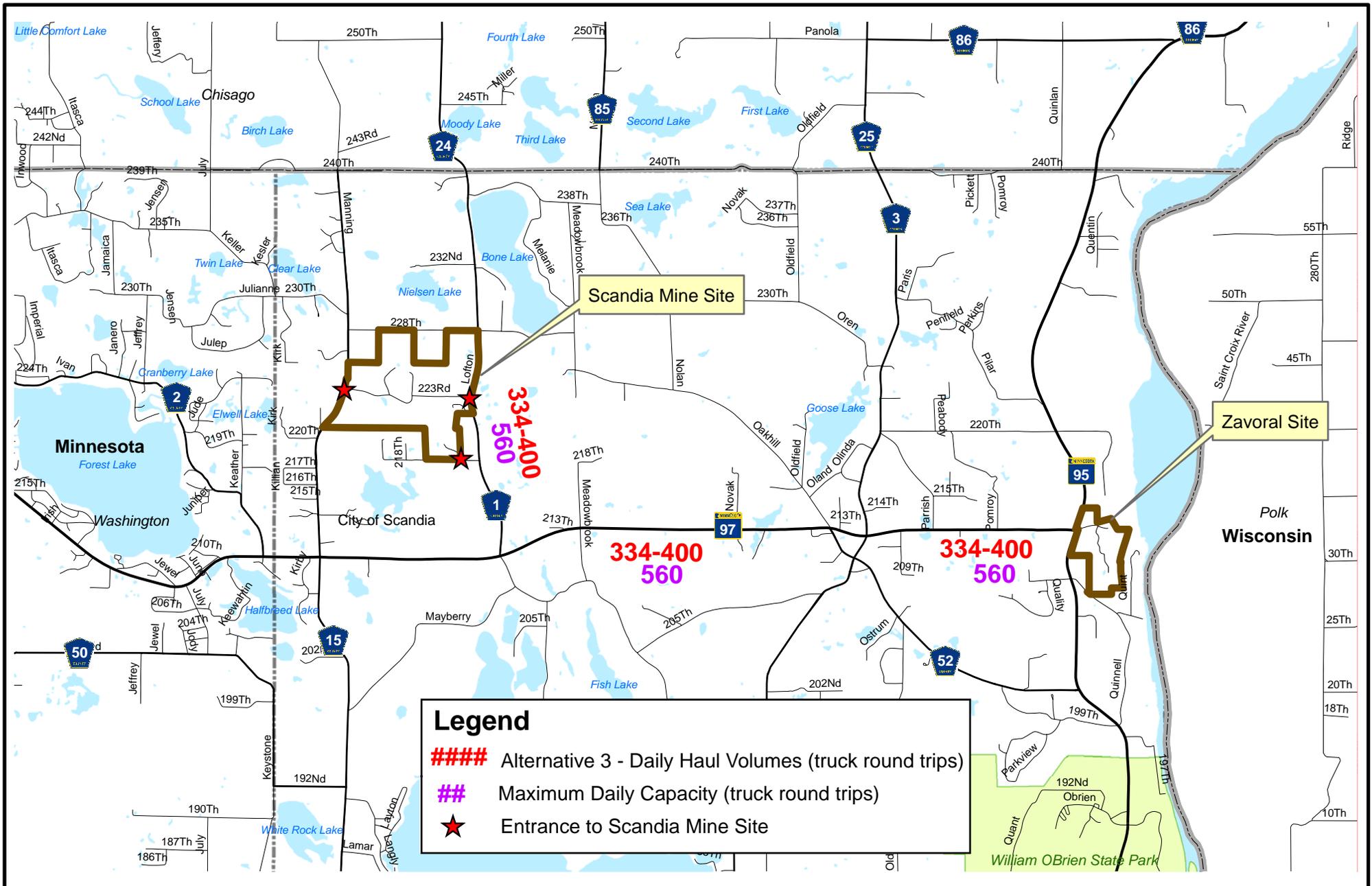
The based traffic volumes for Alternative 3 were developed based on the proposed mining plan for Tiller. The projected daily truck volumes were calculated using the following data:

- Number of weeks scheduled for mining operations each year (12 to 18).
- Total projected aggregate mined each year for transport from the Zavoral Site to the Scandia Mine (240,000 to 360,000 tons).
- The number of loads per year and “projected loads per day” are the same as Alternative 1.
- The maximum number of trucks in one working day is the same as Alternative 1.

The proposed haul traffic operations for the alternatives include a range in the mining activity and the duration. A summary of the alternatives and the associated activity data is shown in Table 1. Hauling traffic for the No-Build alternative represents hauling levels from current add-rock sources to the Scandia Mine. Alternatives 1 and 3 present two options for operating the Zavoral Site, with transport of add-rock to the Scandia Mine via TH 97.

The daily truck volume calculations were defined in the previous section and summarized in Figures 5, 6, and 7. The descriptions below highlight the process for data shown in Table 1.

- Mining activity – planned life of the Zavoral Site (under Alternatives 1 and 3).
- Tons per year mined – planned range of total aggregate weight that would be hauled each year. This is calculated for the number of years of mining activity and the typical haul weight per truck.



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**BASE TRAFFIC VOLUMES
 ALTERNATIVE 3 (5 YEARS OR LESS)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

Drawn: KLM 06/01/2011
 Approved: LK 06/01/2011
 Scale: 1" = 1 mile
 PROJECT NUMBER 09180095
 FIGURE NUMBER 7

- Projected weeks operating per year – data provided by Tiller for their projected length of “haul season” each year. This is based on a 5-day week with a maximum of 10 working hours in one workday.
- Projected loads per year – calculated based on the range of “tons per year mined” and typical haul weight.
- Typical tons per truckload – weight of aggregate hauled by one truck (range provided).
- Projected loads per day – calculated truckloads hauled in a single day. This is based on the planned number of weeks of mining, tons mined in one year, and typical truck load. The loads are also shown as round trips (truck runs from the Zavoral Site to the Scandia Mine, and back).
- Maximum capacity loads per day – calculated based on an absolute peak capacity to run trucks between sites. This would require running 28 trucks every hour for 10 hours per day (the maximum haul rate).
- Maximum capacity loads per hour – the maximum number of trucks that could be hauled in one hour is 28.

Table 1. Add-Rock Haul Traffic for Each Alternative

Task	Alternative		
	Alternative 1 (5 to 10 Years)	Alternative 2 No-Build (Hauling from current add-rock sources)	Alternative 3 (5 Years or Less)
Mining activity	5 to 10 years	20 to 30+ Years	3 to 5 years
Tons per year mined	120,000 to 240,000	120,000 to 400,000	240,000 to 360,000
Projected weeks operating per year	6 to 12	6 to 20	12 to 18
Projected loads per year	5,000 to 12,000	5,000 to 20,000	10,000 to 18,000
Typical tons per truckload	20 to 24	20 to 24	20 to 24
Projected loads per day (range)	167-200 trucks 334-400 trips	105-279 trucks 210-558 trips	167-200 trucks 334-400 trips
Maximum capacity loads per day	280 trucks 560 trips	280 trucks 560 trips	280 trucks 560 trips
Maximum capacity loads per hour	28 trucks 56 trips	28 trucks 56 trips	28 trucks 56 trips

5.2. Safety Evaluation

Crash data for the key roadways in the study area was collected for the years 2008, 2009, and 2010. Mn/DOT provided updated crash data for the Scandia area for roadway segments and intersections. The data is mapped and details included in the tables shown on Figures 8, 9, and 10.

The roadway segments in the study area for crash data included:

- TH 97 from Manning to Lofton
- TH 97 from Lofton to Olinda
- TH 97 from Olinda to TH 95
- Lofton from TH 97 to 228th Street

The intersections in the study area for crash data included:

- TH 97 & Manning
- TH 97 & Lofton
- TH 97 & Meadowbrook
- TH 97 & Oakhill
- TH 97 & Olinda
- TH 97 & TH 95

The segment crashes are relatively small in number and include run off road and deer collision crashes. Segment crashes are defined as crashes that occur on a section of roadway between intersections (but not including the intersection). These are typical for rural areas. There appears to be no major contributing factors in terms of roadway geometry and operations. Mn/DOT has reviewed the sight distance at the TH 97 and TH 95 intersection and found no deficiencies. TH 97 was rehabilitated in 2007 and the sight distances met Mn/DOT standard requirements at the 55 mph speed limit. TH 95 was rehabilitated in 2009 and the sight distances met Mn/DOT standard requirements at the 55 mph speed limit.

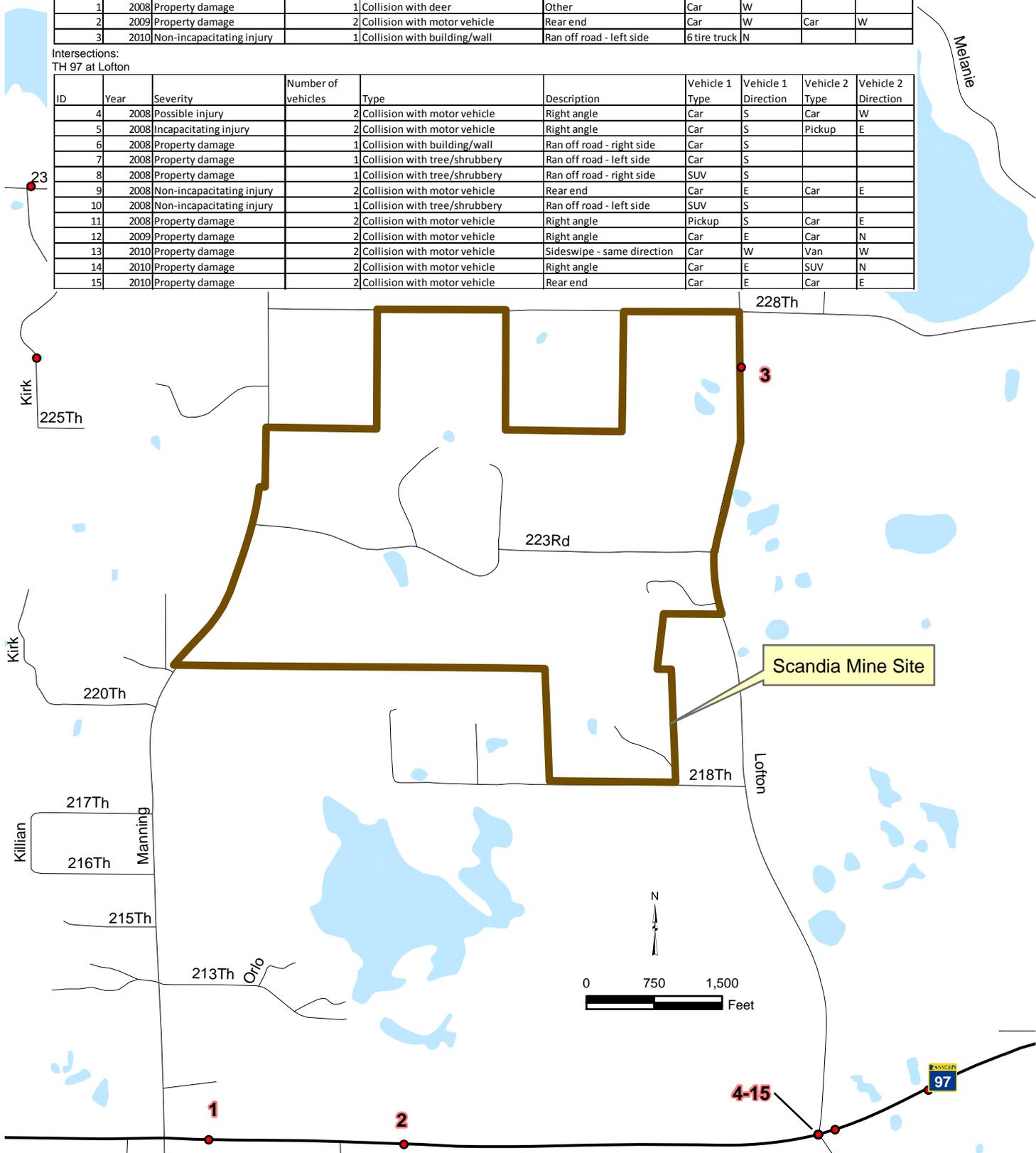
The intersection crash data is generally low at most intersections. The TH 97 and Lofton intersection had the highest number of crashes during the 3-year period (12 crashes), including five right angle crashes. The TH 97 and Lofton intersection was part of Mn/DOT's resurfacing project. The cause of the crashes is likely due to driver error by turning in front of vehicles on TH 97. If there are concerns about speeding on TH 97, this is an enforcement issue that requires the attention of the State Patrol.

Segments:
 TH 97 from Manning to Lofton
 Lofton from TH 97 to 228th St

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
1	2008	Property damage	1	Collision with deer	Other	Car	W		
2	2009	Property damage	2	Collision with motor vehicle	Rear end	Car	W	Car	W
3	2010	Non-incapacitating injury	1	Collision with building/wall	Ran off road - left side	6 tire truck	N		

Intersections:
 TH 97 at Lofton

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
4	2008	Possible injury	2	Collision with motor vehicle	Right angle	Car	S	Car	W
5	2008	Incapacitating injury	2	Collision with motor vehicle	Right angle	Car	S	Pickup	E
6	2008	Property damage	1	Collision with building/wall	Ran off road - right side	Car	S		
7	2008	Property damage	1	Collision with tree/shrubbery	Ran off road - left side	Car	S		
8	2008	Property damage	1	Collision with tree/shrubbery	Ran off road - right side	SUV	S		
9	2008	Non-incapacitating injury	2	Collision with motor vehicle	Rear end	Car	E	Car	E
10	2008	Non-incapacitating injury	1	Collision with tree/shrubbery	Ran off road - left side	SUV	S		
11	2008	Property damage	2	Collision with motor vehicle	Right angle	Pickup	S	Car	E
12	2009	Property damage	2	Collision with motor vehicle	Right angle	Car	E	Car	N
13	2010	Property damage	2	Collision with motor vehicle	Sideswipe - same direction	Car	W	Van	W
14	2010	Property damage	2	Collision with motor vehicle	Right angle	Car	E	SUV	N
15	2010	Property damage	2	Collision with motor vehicle	Rear end	Car	E	Car	E



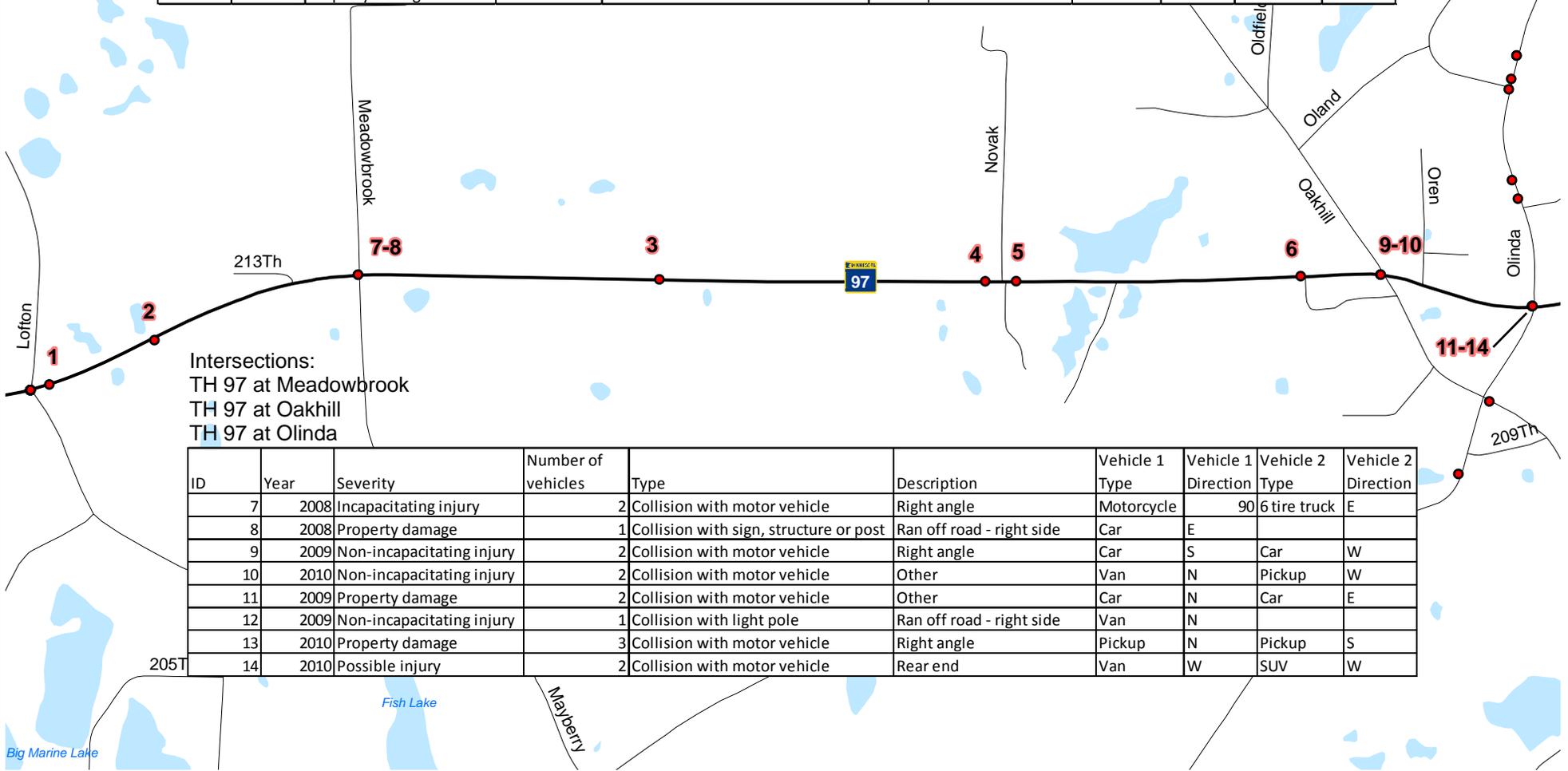
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CRASH DATA ZAVORAL MINING EIS SCANDIA, MINNESOTA

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 Approved: LK 06/01/2011
 Scale: 1" = 1,500 feet
 PROJECT NUMBER 09180095
 FIGURE NUMBER 8

Segments:
TH 97 from Lofton to Olinda

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
1	2009	Property damage	1	Overturn / rollover	Ran off road - right side	SUV	E		
2	2008	Property damage	1	Collision with sign, structure or post	Ran off road - right side	Car	E		
3	2009	Property damage	1	Collision with deer	Other	Car	W		
4	2009	Incapacitating injury	2	Collision with motor vehicle	Head on	Car	E	Car	W
5	2009	Property damage	1	Collision with deer	Head on	Car	W		
6	2009	Property damage	2	Collision with motor vehicle	Sideswipe - same direction	Car	E	Car	E



Intersections:
TH 97 at Meadowbrook
TH 97 at Oakhill
TH 97 at Olinda

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
7	2008	Incapacitating injury	2	Collision with motor vehicle	Right angle	Motorcycle	90	6 tire truck	E
8	2008	Property damage	1	Collision with sign, structure or post	Ran off road - right side	Car	E		
9	2009	Non-incapacitating injury	2	Collision with motor vehicle	Right angle	Car	S	Car	W
10	2010	Non-incapacitating injury	2	Collision with motor vehicle	Other	Van	N	Pickup	W
11	2009	Property damage	2	Collision with motor vehicle	Other	Car	N	Car	E
12	2009	Non-incapacitating injury	1	Collision with light pole	Ran off road - right side	Van	N		
13	2010	Property damage	3	Collision with motor vehicle	Right angle	Pickup	N	Pickup	S
14	2010	Possible injury	2	Collision with motor vehicle	Rear end	Van	W	SUV	W



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CRASH DATA
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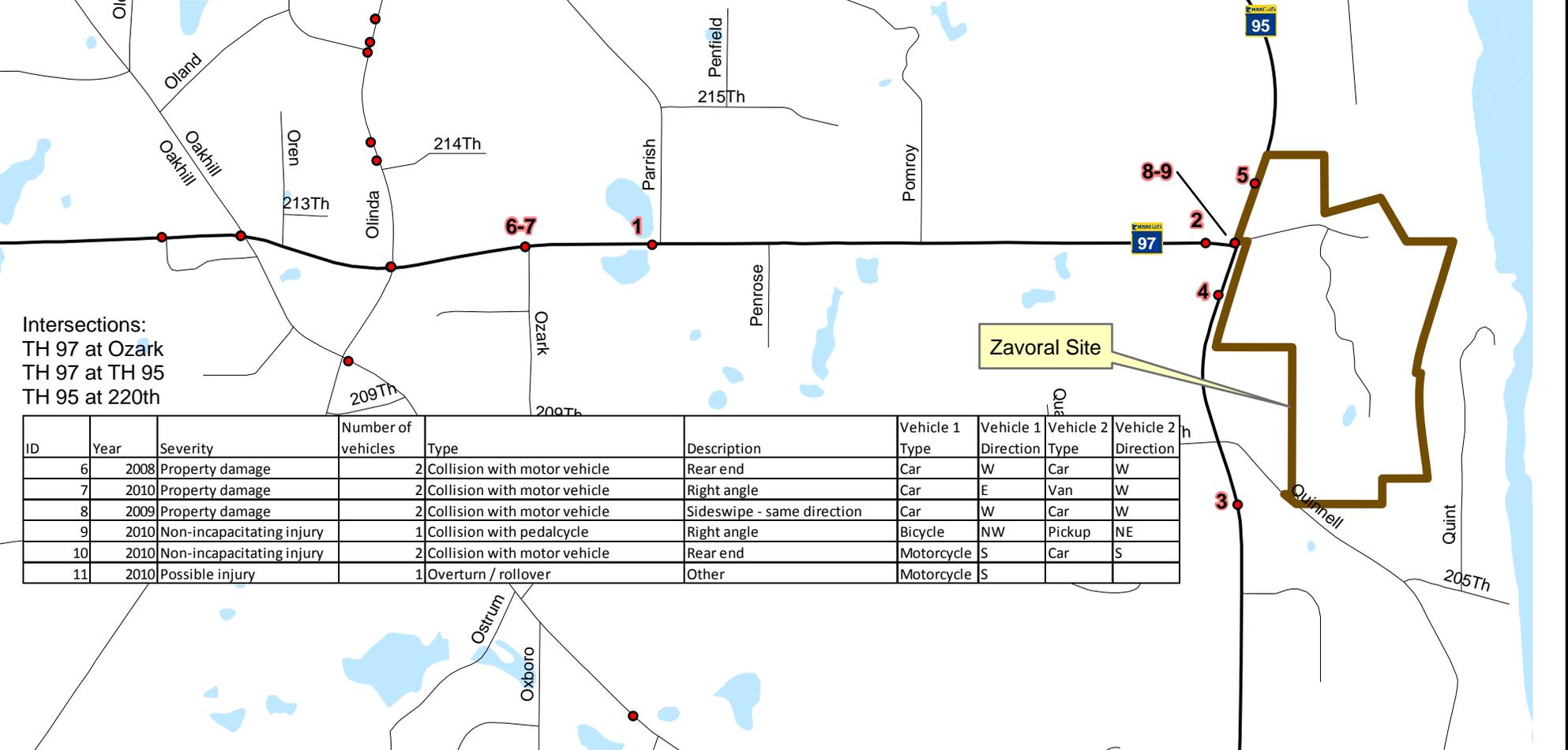
Scale: 1" = 1,500 feet

PROJECT NUMBER 09180095

FIGURE NUMBER 9

Segments:
 TH 97 from Olinda to TH 95
 TH 95 from 220th to Oakhill

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
1	2010	Property damage	2	Collision with motor vehicle	Not applicable	SUV	E	Pickup	E
2	2008	Property damage	1	Other type of collision	Other	Van	E		
3	2009	Possible injury	2	Collision with motor vehicle	Officer left field blank	Pickup		Van	N
4	2010	Property damage	1	Collision with embankment/ditch/curb	Other	Car			
5	2009	Property damage	1	Collision with embankment/ditch/curb	Other	Car	S		



Intersections:
 TH 97 at Ozark
 TH 97 at TH 95
 TH 95 at 220th

ID	Year	Severity	Number of vehicles	Type	Description	Vehicle 1 Type	Vehicle 1 Direction	Vehicle 2 Type	Vehicle 2 Direction
6	2008	Property damage	2	Collision with motor vehicle	Rear end	Car	W	Car	W
7	2010	Property damage	2	Collision with motor vehicle	Right angle	Car	E	Van	W
8	2009	Property damage	2	Collision with motor vehicle	Sideswipe - same direction	Car	W	Car	W
9	2010	Non-incapacitating injury	1	Collision with pedalcycle	Right angle	Bicycle	NW	Pickup	NE
10	2010	Non-incapacitating injury	2	Collision with motor vehicle	Rear end	Motorcycle	S	Car	S
11	2010	Possible injury	1	Overturn / rollover	Other	Motorcycle	S		



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PROJECT NUMBER 09180095

FIGURE NUMBER 10

There was one fatal crash just north of the TH 97 and TH 95 intersection in 2006 that involved a pedestrian. This data was not provided in the initial crash reports and was found after additional research extended the intersection search area. Our team was notified of this crash at the PAC meeting by a resident who was concerned because it was a pedestrian struck by a truck. The State Patrol investigated the crash and found that it was an error by the pedestrian in walking in front of the truck and the driver was unable to stop in time.

A review of the data does not show involvement of semi-trucks in the area crashes. The data captures actual crashes and does not record near miss or other close call data.

6.0 Potential Mitigation

The following is a list of potential mitigation that may be included as part of the Zavoral Site EIS process.

- Construct the new driveway access directly across from TH 97. This is a required item by Mn/DOT for safe access.
- Construct a northbound right turn lane on TH 95. This was listed as a requirement for a driveway permit by Mn/DOT. The turn lane should be consistent with the design of the existing left turn lane. This would also match the design on the southbound approach. (The sight distance requirements were met based on Mn/DOT reviews of the existing TH 97 and TH 95 intersection, and the 2007 and 2009 rehabilitation projects.)
- In order to ensure that additional truck traffic would not result from hauling from the Zavoral Site at peak demand concurrently with other sites (Wisconsin, Washington County, Chisago County, and other Eastern Minnesota locations), the number of trucks hauling add-rock to the Scandia Mine could be limited to the projected maximum level of 280 trucks, or 560 trips per day or below, and documentation could be required.
- Relocate the small trail running along TH 95 and re-establish the trail connection.
- The City of Scandia Trail Plan should be coordinated with Mn/DOT to provide a safe bicycle route and avoid conflicts with vehicle traffic on TH 97 (at the 55 mph speed limit).
- Consider Tiller's contribution to trail construction and reconnection as mitigation.
- Truck warning signs that are MMUTCD compliant are recommended on TH 95 to advise drivers of trucks crossing TH 97 in and out of the proposed Zavoral Site. The installation of warning flashers is another option, but should be discussed with Mn/DOT to evaluate the safety impacts.

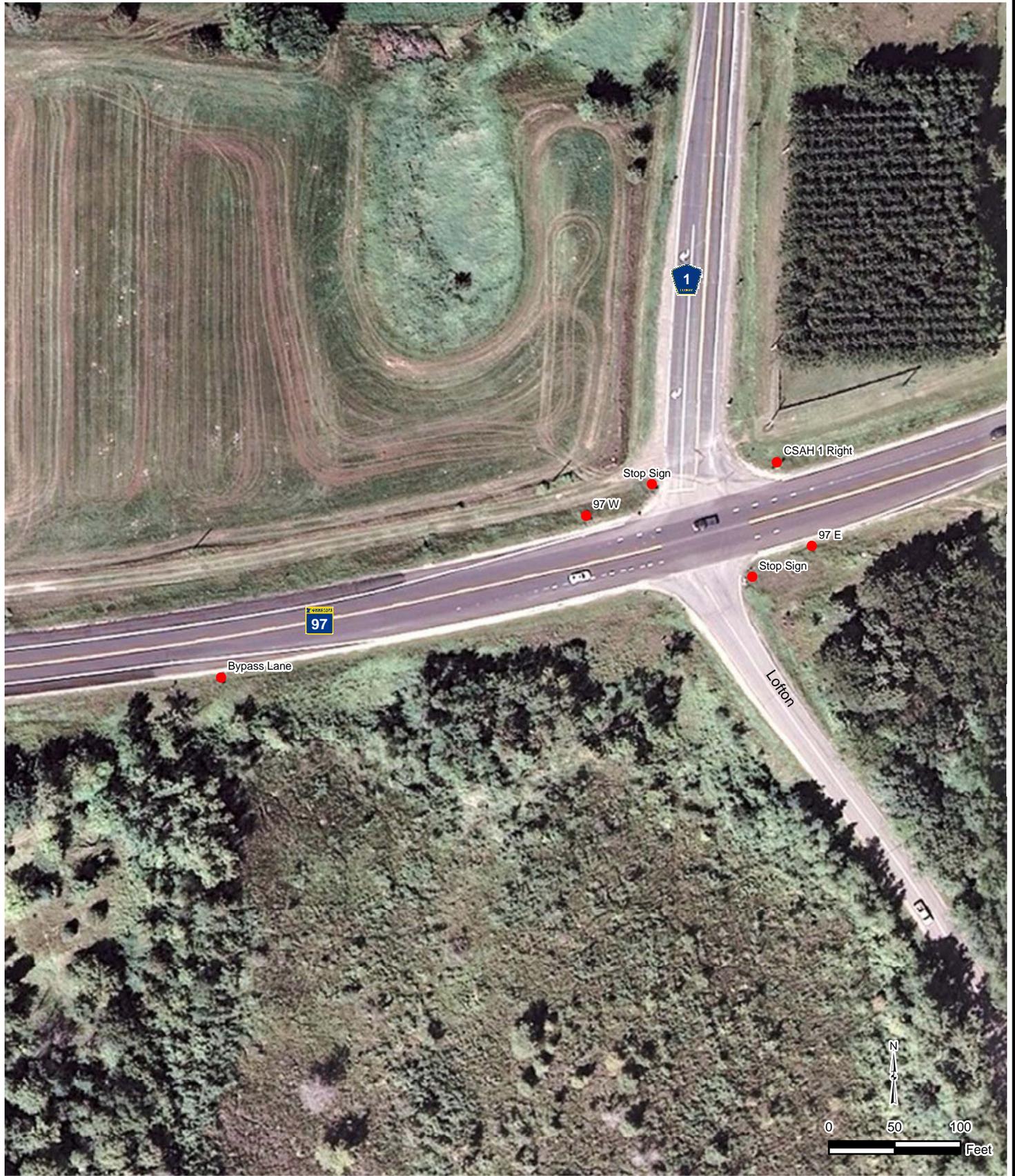
Appendix A
Existing Signing & Striping at Intersections



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SIGNING AT INTERSECTION
 TH 97 & MANNING (CSAH 15)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA

Drawn:	KLM	06/01/2011
Approved:	LK	06/01/2011
Scale:	1" = 100 feet	
PROJECT NUMBER	09180095	
FIGURE NUMBER	A-1	



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**SIGNING AT INTERSECTION
 TH 97 & LOFTON (CSAH 1)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

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FIGURE NUMBER	A-2	



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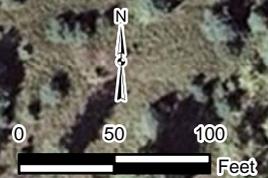
**SIGNING AT INTERSECTION
 TH 97 & OLINDA (CSAH 3)
 ZAVORAL MINING EIS
 SCANDIA, MINNESOTA**

Drawn:	KLM	06/01/2011
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PROJECT NUMBER	09180095	
FIGURE NUMBER	A-3	



Legend

— Proposed Driveway and Turn Lane



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**SIGNING AT INTERSECTION
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 SCANDIA, MINNESOTA**

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Scale:	1" = 100 feet	
PROJECT NUMBER	09180095	
FIGURE NUMBER	A-4	

Appendix B

Minnesota DOT Driveway Review Comments



Minnesota Department of Transportation

Metropolitan District

Waters Edge
1500 West County Road B-2
Roseville, MN 55113-3174

June 29, 2011

Anne Hurlburt
City Administrator
City of Scandia
14727 209th St North
Scandia, MN 55073

SUBJECT: Zavoral Mining, Mn/DOT Review #EAW09-001A – Follow Up Letter
East of TH 95 at TH 97 Intersection
Scandia, Washington County
Control Section: 8210

Dear Ms Hurlburt:

Thank you for meeting with Mn/DOT on Tuesday, June 7th concerning the Zavoral Mining plans. This letter is intended to respond to the questions brought up at this meeting. The questions and answers are as follows:

Mn/DOT though is currently reviewing options concerning the need for the trail as well as the proper ownership of the trail.

1. *Since truck traffic will be traveling between the Zavoral site to the site off of Lofton, trucks are not expected to turn right into the site. Is a right turn lane (Per Mn/DOT's letter dated January 22, 2009) still needed? Would a truck acceleration lane on TH 97 be more useful?*

Based on the trips generated by the proposed mining operation, a right turn lane is warranted. To allow for current and future turning movements into the site, the right turn lane is still required. Since it would not be feasible to construct an acceleration lane long enough for trucks to reach highway speed, an acceleration lane is not needed. For questions concerning these comments, please contact Chad Erickson, Mn/DOT Metro Traffic Section, at 651-234-7806.

2. *Since sight distance is better to the north, than the south, will Mn/DOT still require the Zavoral driveway on TH 95 to be moved further south to line up with TH 97?*

Yes, the change in sight distance would be minimal. The driveway must be aligned with TH 97 to improve the operation of traffic at the TH 97/TH 95/Zavoral Mining intersection.

3. *Who owns and maintains the stub trail located along the east side of TH 95, south of TH 97? Will the trail need to be rebuilt?*

Mn/DOT currently owns this trail. In order to accommodate the right turn lane, the trail will need to be relocated. However, Mn/DOT is currently reviewing options concerning the need for the trail as well as the proper ownership of the trail.

If you have any additional questions regarding this follow up letter, please call me at (651) 234-7794.

Sincerely,



Tod Sherman,
Planning Supervisor

Copy send via Groupwise:

Marc Briese, Area Engineer

Chad Erickson, Traffic

Adam Josephson, Area Manager

Michael Caron, Tiller Corporation (Mikec@tillercorp.com)

Christina Morrison, Tiller Corporation (Christinam@tillercorp.com)

Kirsten Pauly, Sunde Engineering (kapuly@sundecivil.com)

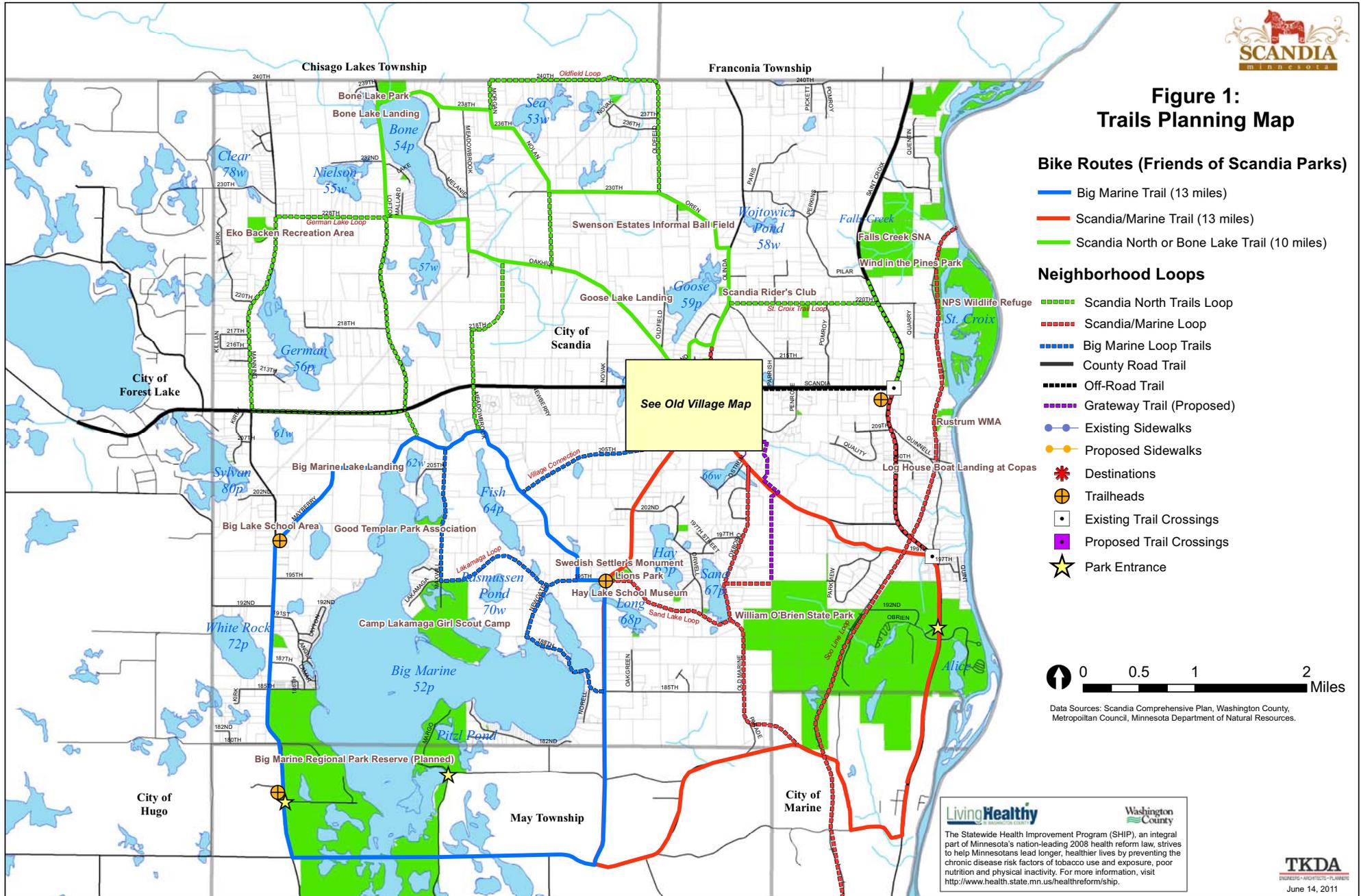
Mark Rothfork, AECOM (mark.rothfork@aecom.com)

Angie Christo, AECOM (angela.christo@aecom.com)

Ann Braden / Metropolitan Council

Appendix C
City of Scandia Trail Plan

**Figure 1:
Trails Planning Map**

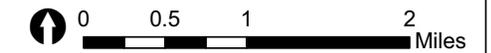


Bike Routes (Friends of Scandia Parks)

- Big Marine Trail (13 miles)
- Scandia/Marine Trail (13 miles)
- Scandia North or Bone Lake Trail (10 miles)

Neighborhood Loops

- - - - Scandia North Trails Loop
- - - - Scandia/Marine Loop
- - - - Big Marine Loop Trails
- County Road Trail
- - - - Off-Road Trail
- - - - Gateway Trail (Proposed)
- Existing Sidewalks
- Proposed Sidewalks
- ✳ Destinations
- ⊕ Trailheads
- ◻ Existing Trail Crossings
- ◻ Proposed Trail Crossings
- ★ Park Entrance



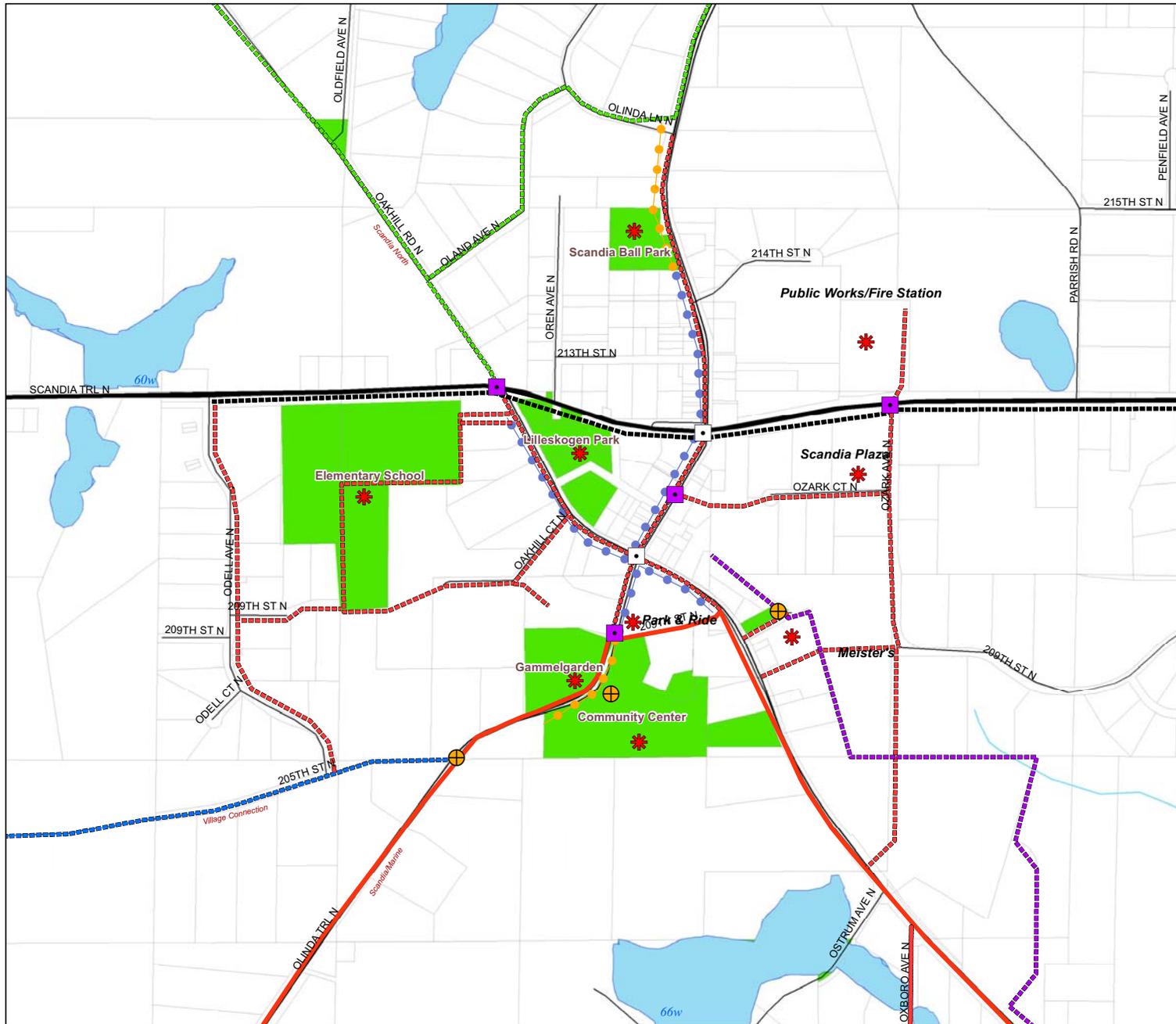
Data Sources: Scandia Comprehensive Plan, Washington County, Metropolitan Council, Minnesota Department of Natural Resources.

LivingHealthy
Washington County

The Statewide Health Improvement Program (SHIP), an integral part of Minnesota's nation-leading 2008 health reform law, strives to help Minnesotans lead longer, healthier lives by preventing the chronic disease risk factors of tobacco use and exposure, poor nutrition and physical inactivity. For more information, visit <http://www.health.state.mn.us/healthreform/ship>.



**Figure 2:
Trails Planning Map - Old Village**

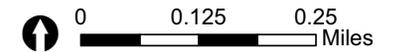


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- - - Gateway Trail (Proposed)
- Existing Sidewalks
- Proposed Sidewalks
- * Destinations
- ⊕ Trailheads
- ◻ Existing Trail Crossings
- ◻ Proposed Trail Crossings
- ★ Park Entrance



Data Sources: Scandia Comprehensive Plan, Washington County, Metropolitan Council, Minnesota Department of Natural Resources.

LivingHealthy
in Minnesota County

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Washington
County