TH 41 MINNESOTA RIVER CROSSING:

A Future US 169/US 212 Regional Freeway Connection

MINNESOTA DEPARTMENT OF TRANSPORTATION

State Project Number: S.P. 1008-60
Trunk Highway Number: TH 41

TIER I
DRAFT
ENVIRONMENTAL IMPACT STATEMENT
AND
DRAFT SECTION 4(F)/6(F) EVALUATION
(Page 1 of 2)

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By
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Federal Highway Administration
And
Minnesota Department of Transportation

Cooperating Agencies

U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency

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ABSTRACT: The project proposes future construction of a new Minnesota River crossing connecting TH 169 and New TH 212 in the vicinity of the existing TH 41. The project is located within Scott County and Carver County, Minnesota. The project is being developed in a tiered process. Tier I will identify a corridor for preservation. Tier II will evaluate and select a design for construction.

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June 2007

Signatures of Approval

(Page 2 of 2)

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Date of Approval

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1.0 EXECUTIVE SUMMARY

1.1 PROJECT DESCRIPTION

The proposed action is the future construction of a new Minnesota River crossing connecting US 169 in Scott County and New US 212 (under construction at the time of this DEIS), north of the existing US 212 corridor in Carver County in the vicinity of existing TH 41. Project planning and environmental review are being conducted in conformance with state and federal environmental review requirements. (Note: The proposed project is referred to in earlier documents as *TH 41 Over the Minnesota River*.)

1.2 PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The National Environmental Policy Act (NEPA) of 1969 (Statute 42 USC 4321 et seq.) requires that social, economic and environmental considerations be included in the planning of projects that receive federal funding. Similarly, the Minnesota Environmental Policy Act (MEPA) (Minnesota Rules Chapter 4410) requires review of potential environmental impacts for proposed projects that exceed state regulatory thresholds. The extent of the proposed improvements requires preparation of an Environmental Impact Statement (EIS). The Draft Environmental Impact Statement (DEIS) was prepared to: discuss the purpose of and need for the proposed project; consider alternatives; evaluate environmental effects of alternatives; explore methods for avoiding and minimizing adverse impacts; and obtain public and agency input, to aid in the identification of a preferred alternative for further study in the Final EIS (FEIS). The FEIS will summarize public involvement during the DEIS process; respond to substantive comments received on the DEIS; identify the preferred alternative; and, if necessary, provide more detail on the environmental impacts of the preferred alternative and describe potential mitigation measures to the extent that is appropriate for a "tiered" process as discussed below.

Per Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1508.28), environmental documentation may occur through a "tiered" two-step review process. The tiered EIS process has been determined to be appropriate for the proposed action because, while the construction of the project may not occur for 20 or more years, the project area is rapidly developing and future development will likely encroach on potential corridor locations, resulting in greater potential for social and economic impacts at the time the project is funded if an alignment location is not protected in the near future. The notice of intent to prepare a Tier I EIS was published in the Federal Register January 10, 2003.

The Tier I EIS identifies and evaluates the social, economic and environmental issues associated with alternative corridor locations, as a basis for identifying a preferred alignment corridor that can be preserved for future use. The Tier I EIS is a corridor-level document, with analysis based on an assumed standard corridor width of 300 feet. A Tier II EIS process will be initiated in the future, as the project moves forward for implementation. The Tier II process will focus on preferred alignment design alternatives, updated assessment of environmental impacts to address a higher level of design, and identification of mitigation.

1.3 PROJECT SETTING

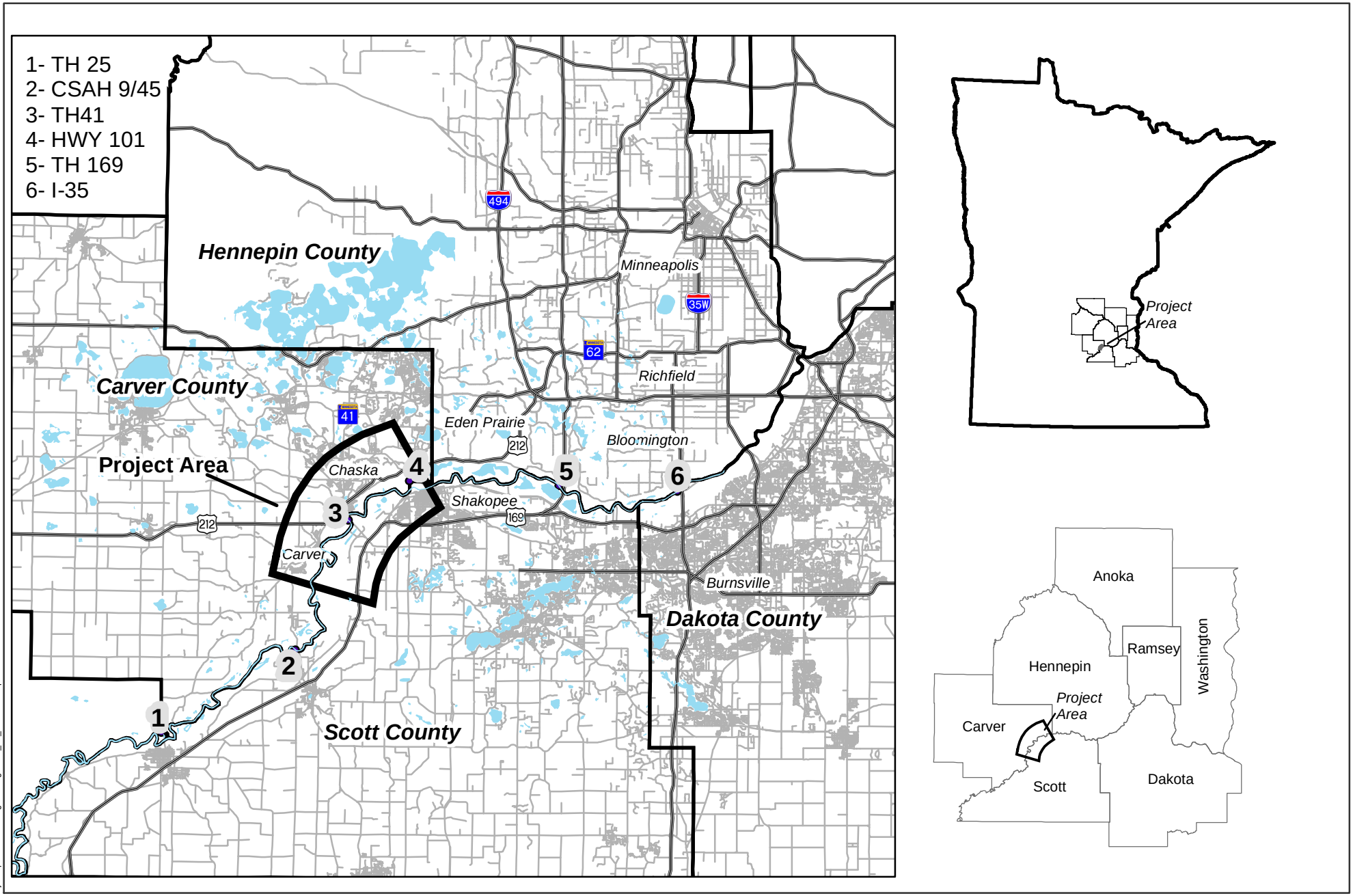
The study area is in the southwest portion of the Twin Cities metropolitan area. The study area is bordered on the south by United States Highway (US) 169; on the north by New US 212; on the west by County State Aid Highway 14 in Scott County and west of the City of Carver, in Carver County; and on the east by Highway 101 (Note that Highway 101 is a state trunk highway in Carver County and a county state aid highway in Scott County.). See Figures 1–1 and 1-2.

United States Highway 169, within the Trunk Highway (TH) 41 study area, is a state principal arterial route running parallel to the south side of the Minnesota River. United States Highway 169 is on the National Highway System (NHS), and is designated as a High Priority Interregional Corridor. Mn/DOT's Interregional Corridor system was developed to connect regional trade centers in Greater Minnesota with the Twin Cities metropolitan area. These connections are considered essential to long-term economic growth and activity within the state, as well as important transportation corridors that promote mobility and safety. The US 169 corridor management plan (CMP) proposes future conversion of US 169 to a freeway facility within the project study area.

United States Highway 212 is a state principal arterial route running parallel to the north side of the Minnesota River. It also is on the National Highway System (NHS) and designated as a High Priority Interregional Corridor. These designations will be assigned to the New US 212 corridor (north of existing US 212) when it is complete (fall 2008). New US 212 will be a freeway facility and will connect to existing US 212 at the west end of the study area.

United States Highway 169 and US 212 are currently connected by two river crossings within the study area, at existing TH 41 and Highway 101. Both of these crossings are located within the 100-year floodplain. Existing TH 41 is a two-lane facility that widens to four lanes through downtown Chaska. Trunk Highway 41 currently connects to US 169 and US 212 at at-grade signalized intersections, however, future construction of an interchange at US 169 is part of the US 169 CMP, and is assumed for purposes of this study. Details of US 169 improvements will be developed under a separate project. Trunk Highway 41 will connect to New US 212 north of Chaska with an interchange. The TH 41 corridor through downtown Chaska bisects a nationally designated historic district.

Highway 101 is a two-lane facility (county highway south of the river; state highway north of the river) that connects downtown Shakopee and US 212. In Shakopee, Highway 101 tees into CSAH 69 at a signalized intersection; CSAH 69 connects to US 169 at an at-grade signalized intersection at the western edge of Shakopee. From its intersection with US 212, Highway 101 continues north on a winding alignment up the river bluff, crossing the New US 212 alignment in the vicinity of CSAH 18 and eventually connects to TH 5 in Chanhassen. Highway 101 will be connected to New US 212 by an interchange. For purposes of this study, it is assumed that the future connection between US 169 and CSAH 69 will be an interchange.



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STATE / COUNTY LOCATION MAP

Figure 1-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
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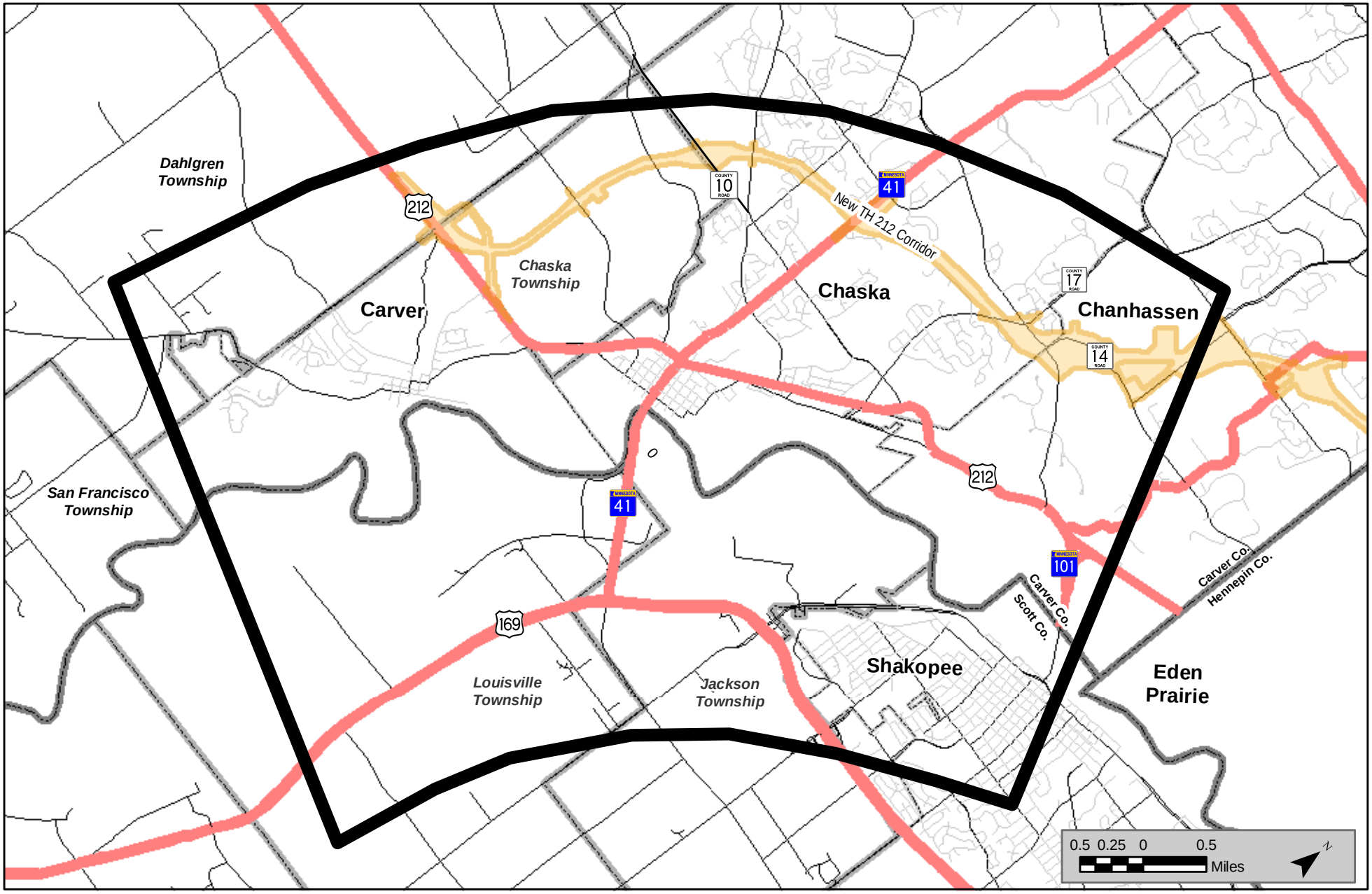
Minnesota Department of Transportation



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STUDY AREA MAP

Figure 1-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Beyond the boundaries of the study area, crossings of the Minnesota River include: TH 25, 14 miles west of TH 41; CSAH 9/45 6 miles west of TH 41; Highway 101, 3.5 miles east of TH 41; US 169 (Bloomington Ferry Bridge), 10 miles east of TH 41; and I-35W, 5 miles east of US 169.

The study area is currently characterized by urban- and suburban-density development, agricultural activities, and natural resource areas most notable being public lands within the Minnesota Valley National Wildlife Refuge (MVNWR) and the Minnesota Valley State Recreation area, the Seminary Fen/Assumption Creek wetland complex, and remaining other tracts of native vegetation within the study area. Figure 1-3 depicts key features in the project area. As discussed in Section 2.2, the population of Scott County grew by 54 percent and the population of Carver County grew by 46 percent during the 1990s. Rapid growth in the southwestern metropolitan area, including the study area, is projected to continue.

1.4 ALTERNATIVES STUDIED IN THE DEIS

The Build alternatives that were studied in the DEIS are depicted in Figure 1-3 and briefly described below. Alternatives for study in the DEIS resulted from a scoping process, described in the Scoping Document (SD), with the final decision documented in the Scoping Decision Document (SDD) (approved February 18, 2005, amended March 17, 2006).

1.4.1 No-Build Alternative

The No-Build alternative is defined as future conditions that include programmed improvements to the regional transportation system. This alternative does not include construction of a new TH 41 river crossing. The regional highway network improvements assumed under No-Build conditions are described in Chapter 4. While the No-Build alternative would not adequately address the need for the project (detailed in Chapter 2), it is analyzed as the basis for comparison of the other DEIS alternatives.

1.4.2 Build Alternatives

Each of the six Build alternatives is a freeway design with an interchange at US 169 and at New US 212.

1.4.2.1 Alternative W-2

Alternative W-2 is located in the western portion of the study area. This alternative intersects with US 169 one mile west of existing TH 41/CSAH 78 and connects with New US 212 at the New US 212/CSAH 11(CR 147)[1] interchange.

[1] When construction of New US 212 is complete (scheduled fall 2008), CR 147 will be redesignated CSAH 11. It is referenced to as CSAH 11 throughout the remainder of the DEIS, including on figures.

1.4.2.2 Alternative C-2

Alternative C-2 is in the central/western portion of the study area. This alternative connects to US 169 at the planned US 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New US 212 at the New US 212/CSAH 11 interchange.

1.4.2.3 Alternative C-2A

Alternative C-2A is located in the central portion of the study area. This alternative connects to US 169 at the planned US 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New US 212 at CSAH 10/Engler Boulevard.

1.4.2.4 Alternative E-1

Alternative E-1 is in the eastern portion of the study area. This alternative connects to US 169 at the planned US 169/CSAH 69 interchange, and connects with New US 212 at CSAH 17/Audubon Road. This alternative assumes that US 169 is realigned south of its existing alignment in the vicinity of CSAH 69.

1.4.2.5 Alternative E-1A

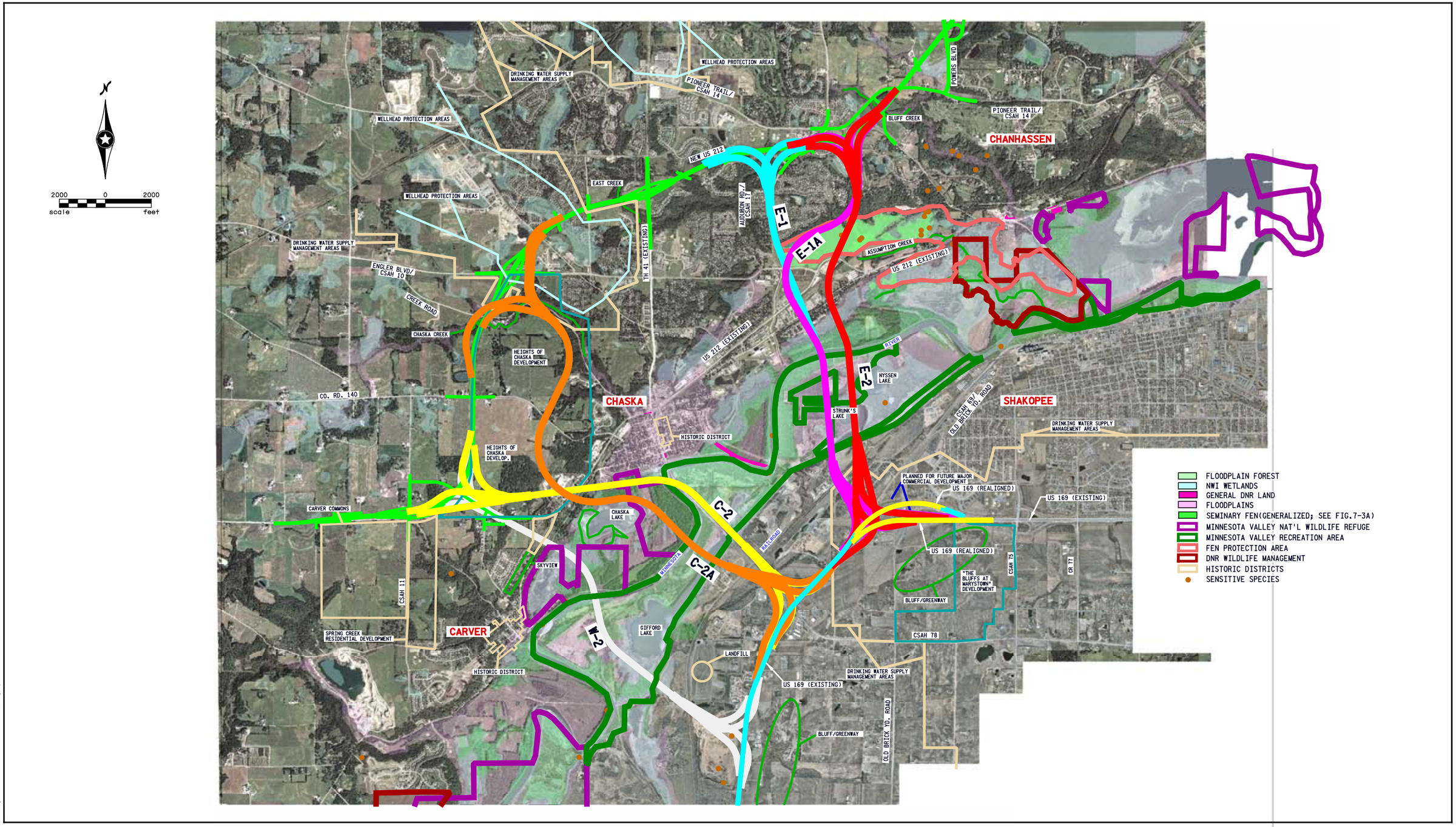
Alternative E-1A is located in the eastern portion of the study area. This alternative is identical to Alternative E-1 south of the Minnesota River, therefore also assumes that US 169 is realigned south of its existing alignment in the vicinity of CSAH 69. North of the river, this alternative follows the bluff line and connects to New US 212 near Bluff Creek Road.

1.4.2.6 Alternative E-2

Alternative E-2 is located in the eastern portion of the study area. It is the easternmost alignment of all the Build alternatives. This alternative connects to US 169 at the planned US 169/CSAH 69 interchange and connects to New US 212 near Bluff Creek Road. This alternative assumes that US 169 is realigned south of its existing alignment in the vicinity of CSAH 69.

1.5 RESPONSIBLE GOVERNMENTAL UNITS

The Minnesota Department of Transportation (Mn/DOT) is the Responsible Governmental Unit (RGU) for the development of the proposed project with respect to state environmental review requirements and the Federal Highway Administration (FHWA) is the lead federal agency.



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BUILD ALTERNATIVES, WITH KEY FEATURES

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
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Minnesota Department of Transportation

Figure 1-3

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1.6 COSTS/FUNDING

Table 1-1 presents estimated construction and right of way costs (in 2005 dollars) for each of the proposed Build alternatives. Note that mitigation costs are not estimated, but that the higher number in the cost range represents an added risk assessment percentage to account for several currently unknown factors, including mitigation.

TABLE 1-1
COST ESTIMATES (2005 DOLLARS)[1]

	Alternative						
Cost	**W-2**	**C-2**	**C-2A**	**E-1**		**E-1A**	**E-2**	
Construction[2]	335-390M	305-355M	345-405M	Low Profile High Profile	375-460M 395-485M	410-490M	Low Profile High Profile	370-440M 375-450M
Right of Way[3]	55-80M	75-105M	65-90M	Low Profile High Profile	100-135M 100-135M	55-75M	Low Profile High Profile	60-80M 60-80M
Total	**390-470M**	**380-460M**	**410-495M**	**Low Profile High Profile**	**475-595M 495-620M**	465-565M	**Low Profile High Profile**	**430-520M 435-530M**

(1) Rounded to nearest $5 million

(2) Range provided with high number representing construction cost with a roadway risk-assessment percentage added following Mn/DOT peer review of cost factors.

(3) Includes right of way acquisition and relocation costs. No right of way differences between low and high profile options. Section 5.2.2.2.2 provides detailed cost estimates.

Funds from a variety of regional, state and federal sources are anticipated for this project. The project is included in the Mn/DOT Metro District's fiscally constrained Transportation System Plan (TSP) for preservation of right of way. The Metropolitan Council's Transportation Policy Plan (TPP) for the Twin Cities Metropolitan Area also includes right of way preservation for this project. It is shown on the 2030 constrained Metropolitan System Plan of Investment Priorities.

Upon determination of a preferred alternative, Mn/DOT will reevaluate needs and timing of right of way and construction funding during future TSP updates, which occur approximately every three years.

1.7 SCHEDULE

The following is the anticipated project schedule for completion of the TH 41 Minnesota River Crossing Tier I EIS and Tier II EIS.

TABLE 1-2
SCHEDULE

Task/Activity	Completion Date
Distribute Tier I DEIS for agency/public comment; start of DEIS comment period	June 2007
Public Hearing on Tier I DEIS	July 2007
Identification of Preferred Alternative by Mn/DOT and Federal Highway Administration (FHWA)	Fall 2007
Distribution of FEIS	Summer 2008
Mn/DOT Adequacy Determination	Summer 2008
FHWA Record of Decision	Summer 2008
Begin implementation of corridor preservation measures	2008
Initiation of Tier II EIS process	Three Years Prior to Construction*

*Construction is not currently in Mn/DOT 20-year plan.

The outcome of the Tier I EIS process will be a selected corridor for right of way preservation. Upon completion of the EIS process Mn/DOT will work with local communities and the affected landowners to identify the best approach to preserve the needed right of way. It will most likely involve official mapping of the selected corridor. "Official Mapping" is a local zoning tool that enables Mn/DOT to work with the local communities to acquire undeveloped properties within the selected corridor where development is imminent as well as open market sales or hardship acquisitions of existing homes or businesses (i.e. the river crossing alignment makes selling the property difficult). Note that early acquisition efforts are limited by law to willing sellers. When the bridge construction is programmed then it will be necessary to complete acquisitions of all the properties and eminent domain actions may be required if negotiated settlements cannot be reached.

In terms of new development, Mn/DOT is encouraging cities to take the river crossing alignments into consideration during the local approval process. When a preferred alternative is selected, Mn/DOT can work with local communities to secure right of way dedication as part of new development.

1.8 MAJOR ENVIRONMENTAL IMPACT SUMMARY

Table 1-4 summarizes the transportation, environmentally social and economic impacts of the Tier I DEIS alternative. Assessment of these impacts is based upon an assumed 300-foot wide corridor, with wider impacts at interchange areas, and to provide for ponding and topographic considerations. The impacts included in the summary table may be able to be further minimized through avoidance and minimization efforts during design that will occur during the Tier II EIS process and during final project design, but represent a reasonable basis for comparison among alternatives for the purpose of identifying a preferred alternative for corridor preservation.

1.9 OTHER MAJOR GOVERNMENTAL ACTIONS IN THE STUDY AREA

As discussed in Section 1.3, the US 169 CMP proposes future conversion of US 169 to a freeway facility within the project study area. For purposes of this DEIS, it is assumed that, under a separate project or projects, interchanges will be built at US 169/CSAH 14, US 169/existing TH 41/CSAH 14, and US 169/CSAH 69. The design of the eastern Build alternatives assumes that, as part of the future US 169 corridor improvements, US 169 will be realigned south of its existing alignment in the vicinity of CSAH 69. These assumed US 169 corridor improvements have not been programmed. The need for these improvements is independent from the need for the proposed New TH 41 project – that is, the projects have independent utility. However, depending upon Build alternative, the proposed new river crossing would influence the design of future US 169 corridor improvements. In addition, the alignment of US 169 in the vicinity of CSAH 69 will influence the design of the eastern Build alternatives. The relationship between the proposed project and planned US 169 corridor improvements is discussed in Chapter 3, and noted in appropriate impact analyses.

In addition, New US 212 is currently under construction, to be completed fall 2008. The design of the proposed project and relevant impact analyses account for its effect on New US 212.

1.10 POTENTIAL AREAS OF CONTROVERSY AND UNRESOLVED ISSUES

Throughout the EIS scoping and DEIS process, Mn/DOT has made extensive efforts at agency, local government and public involvement, in order to identify potentially controversial issues and resolve them during development of the DEIS alternatives. This effort has generally been successful in addressing concerns of stakeholders in the project area, however different agencies and different municipalities affected by the proposed DEIS alternatives have varying priorities and interests they would like to see protected. The chief area of controversy relates to the trade-offs in terms of impacts among all alternatives, in particular trade-offs between impacts to the natural environment (i.e., habitat, vegetation, wetlands, calcareous fen) and impacts to the social/cultural environment (i.e., developed and developing areas, historic properties). However, there are currently no unresolved issues.

The DEIS document attempts to document the positions presented by these various interested parties, to inform the process of assessing benefits and impacts and, ultimately the preferred alternative decision-making process.

1.11 PERMITS AND APPROVALS

Permits, approvals, or completion of other documentation prior to the start of construction of the proposed project are required by the agencies listed in Table 1-3.

TABLE 1-3
AGENCY PERMITS, APPROVALS, AND OTHER REQUIRED DOCUMENTS

FEDERAL	
Advisory Council on Historic Preservation	▪ Section 106 of the National Historic Preservation Act (potential) ▪ Programmatic Agreement
Federal Highway Administration	▪ Tier I EIS (Draft and Final) and Section 4(f) of the Department of Transportation Act of 1966 Evaluations (Draft and Final) ▪ Tier I Section 106 of the National Historic Preservation Act ▪ Tier I EIS Record of Decisions ▪ Tier II EIS (Draft and Final) and Section 4(f) of the Department of Transportation Act of 1966 Evaluations (Draft and Final) ▪ Tier II Section 106 of the National Historic Preservation Act ▪ Tier II EIS Record of Decision ▪ Air Conformity Determination
U.S. Army Corps of Engineers	▪ Section 404 of the Clean Water Act – Permit (fill in U.S. waters) ▪ Section 10 of the Rivers and Harbors Act
U.S. Fish and Wildlife Service	▪ Acquisition or Easement Agreement (if needed)
National Park Service	▪ Coordination regarding potential Wild and Scenic River ▪ Section 6(f) Conversion approval (if needed)
Federal Emergency Management Agency (FEMA)	▪ Conditional Letter of Map Revision (if needed)

TABLE 1-3 continued
AGENCY PERMITS, APPROVALS, AND OTHER REQUIRED DOCUMENTS

STATE	
MN Department of Transportation	▪ Scoping Decision Document ▪ Amended Scoping Decision Document ▪ Tier I EIS (Draft and Final) and Section 4(f) of the Department of Transportation Act of 1966 Evaluations (Draft and Final) ▪ Tier I EIS Adequacy Determination ▪ Tier II EIS (Draft and Final) and Section 4(f) of the Department of Transportation Act of 1966 Evaluations (Draft and Final) ▪ Tier II EIS Adequacy Determination ▪ Noise Standards Exemption ▪ Wetlands Conservation Act (WCA)
MN Department of Natural Resources	▪ ▪ Public Waters Permit (if needed) ▪ Calcareous Fen Management Plan (if needed) ▪ Endangered Species Taking Permit (if needed) ▪ Mussel Relocation Permit (if needed) ▪ Water Appropriation Permit (if needed) ▪ Threatened and Endangered Species Taking Permit ▪ Acquisition or Easement Agreement (if needed)
MN Pollution Control Agency	▪ Noise Standards Exemption ▪ Section 401 of the Clean Water Act – Water Quality Certification ▪ National Pollutant Discharge Elimination System Permit (NPDES) ▪ Tier I Programmatic Agreement (to be determined)
MN State Historic Preservation Office	▪ Tier I Section 106 of the National Historic Preservation Act – Programmatic Tier II Memorandum of Agreement
REGIONAL	
Twin Cities Metropolitan Council	▪ Controlled Access Approval
LOCAL	
City of Shakopee [(1)]	▪ Municipal Consent (if needed)
City of Chaska[(1)]	▪ Municipal Consent (if needed)
City of Carver	▪ Municipal Consent (if needed)
City of Chanhassen	▪ Municipal Consent (if needed)
Local Watershed Districts	▪ Permits/Coordination of Grading and Drainage Plans/Dewatering/ Floodplain Management
Local Watershed Management Organizations	▪ Coordination of Grading and Drainage Plans/Dewatering/ Floodplain Management

[(1)] Assume affected land will be within city limits by time of construction

1.12 IMPACTS

Table 1-4 located at the end of this chapter provides an abbreviated summary of the identified impacts of the No-Build and six Build alternatives.

1.13 MITIGATION SUMMARY

The purpose of the Tier I EIS process is to identify and evaluate the social, economic and environmental issues associated with alternative corridor locations, as a basis for identifying a preferred corridor that can be preserved as right of way for future use. Design details will be developed in the Tier II EIS process which will occur closer to the time of construction. As

corridor-level documents, the Tier I DEIS and FEIS address the potential for mitigation; however mitigation plans will be developed in the Tier II EIS process. This summary presents information regarding current regulatory requirements, project benefits or expected changes in the project area that can be expected to offset project impacts, and general approaches to mitigation that are able to be identified at the Tier I level of environmental documentation.

Right of Way

All Build alternatives would have right of way impacts. All acquisition of property due to the proposed project will be conducted in accordance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987 and 49 Code of Federal Regulations Part 24, and effective April 1989 (revised January 2005)

Business/employees

All Build alternatives would result in impacts to project area businesses and employees. Acquisition of commercial properties will be conducted as described above under Right of Way. In addition, it should be noted that as employment in the study area communities is anticipated to grow substantially over the next decade, it is expected that there will be sufficient accessible job opportunity to replace jobs lost through acquisition of commercial/industrial properties.

Fiscal

All Build alternatives would result in fiscal impacts (annual tax losses for both Scott and Carver Counties) due to property acquisitions. This decrease in property tax base resulting from conversion of private property to public right of way is anticipated to be offset by new development occurring in communities in the study area.

Environmental Justice

Alternatives C-2, C-2A, E-1, E-1A and E-2 each would result in impacts to low income and minority populations (i.e. environmental justice impacts), specifically direct right of way, noise, and visual impacts and potential indirect impacts due to loss of affordable housing stock. Mitigation for the direct impacts would be the same as for impacts to the general populations. With regard to potential indirect impacts on the stock of affordable housing, the advantage of the Tier I process is that it provides communities information about expected future impacts to affordable housing which the communities can take into account as they plan for their future housing needs in their housing plans. Note also that impacts to low income and minority populations are offset by overall improved regional accessibility and alleviation of congestion affecting quality of life.

Neighborhoods, Community Facilities, Access

All Build alternatives would have impacts to community cohesion, traffic patterns and access, community facilities, and services. These impacts are offset by overall improved regional accessibility and alleviation of congestion affecting quality of life, particularly in downtown Chaska.

Cultural Resources

Alternative C-2 has been determined to have an adverse effect on Athletic Field (Chaska Cubs Ballfield), a property found to be eligible for the National Register of Historic Places (NRHP). It is premature to assess the effect of Alternatives W-2, C-2 and C-2A on other identified NRHP eligible cultural resources. Alternatives E-1, E-1A and E-2 have been determined to have no adverse effect on identified NRHP-eligible properties. Specific mitigation for adverse effects on NRHP-eligible properties will be addressed in the Tier II process. During the Tier I FEIS, a Programmatic Agreement will be executed among FHWA, Mn/DOT, the State Historic Preservation Office (SHPO) and other appropriate parties to outline the completion of the federal cultural resources (Section 106) process as planning for this project proceeds.

Parks, Trails, Recreational Areas (Section 4(f)/Section 6(f))

All Build alternatives would have impacts to the MVNWR and MVSRA/MV Trails. Alternative C-2 would have a direct impact to Athletic Park. Alternatives E-1, E-1A, and E-2 would have impacts to Pioneer Park/ Chaska High School/ Pioneer Ridge Freshman Center Complex, Audubon Trails, and City of Chaska Trails. Impacts to Section 4(f) properties will be minimized through roadway or bridge design. Efforts will be made to maintain access to and use of the facilities during construction. Specific mitigation for impacts of the Preferred Alternative will be determined through the Tier II EIS process and Section 4(f) Evaluation prepared at the time of the Tier II EIS.

Threatened and Endangered Species

Alternatives W-2, E-1 and E-2 are located where threatened and endangered species have been reported. Additional field surveys may be needed during the Tier II process to confirm/detail the presence of these species. A mussel study will be completed during the Tier II process. Mitigation measures to avoid, minimize, or alleviate impacts to threatened/endangered or other protected species will be defined during the Tier II process. Mitigation measures may include timing of construction activities to avoid disturbance during bird nesting periods, or endangered mussel relocation when live specimens are identified in the preferred alternative corridor. Continuing involvement with the MnDNR and USFWS will take place through the Tier I FEIS and Tier II processes.

Vegetation/Wildlife/Habitat Communities

All Build alternatives would impact vegetation and native habitats and could result in shading effects, salt spray, debris, and spread of opportunistic invasive species. Additionally, bridge piers as well as the at-grade roadway could act as a barrier to wildlife movement. Design refinements will be made during the Tier II EIS to minimize impacts. Where impacts to wildlife are unavoidable, the effect of the impacts would be minimized through design features such as wildlife crossings where the roadway is at-grade. Mitigation opportunities include timing of construction to avoid nesting and fish spawning seasons or during winter months when soils are frozen; re-vegetation of disturbed areas with native plants; restoration of un-fragmented and close-canopied forest on the Minnesota River bottoms and native grassland; erosion and sedimentation and water quality Best Management Practices (BMPs).

Seminary Fen/Assumption Creek

Alternatives E-1, E-1A, and E-2 would impact the Seminary Fen Wetland Complex (SFWC). In accordance with Wetland Conservation Act (WCA) requirements, the MnDNR would provide technical assistance in development of a management plan for the SFWC. Mitigation techniques to minimize impacts to the entire wetland complex may include the use of coffer dams, swamp mats, dormant season construction, surface water protection, erosion and sedimentation control, relocation of fen vegetation, vegetation management, management of use of road salts, and restoration and management for compensatory mitigation.

Surface Water Quality/Storm Water Runoff

All Build alternatives would result in the creation of impervious surface and increased volume and rate of stormwater runoff that contains contaminants common to roadways. BMPs, such as storm ponds, wet detention basins, filter strips and infiltration areas, would be incorporated as required to meet state and federal water quality regulatory requirements. To the extent possible, stormwater runoff would also be routed through a wet detention basin prior to discharge into the Minnesota River. Mitigation strategies to reduce impacts from winter de-icing materials include carefully monitoring timing, method, and application rates of de-icing materials.

Wild and Scenic River

This section of the Minnesota River is not currently designated as a Wild and Scenic River, but it is on the National River Inventory. All Build alternatives would have the potential to negatively impact the scenic nature of the River. Bridge design will be addressed in the Tier II EIS process. The impact to scenic value of the river will be an important design consideration and will be assessed in the Tier II EIS.

Floodplains

All Build alternatives would have similar minimal effect on the floodplain.

Any adverse impacts can be successfully minimized through careful design and construction considerations. Temporary and permanent erosion control measures would be used where appropriate and would be designed to meet regulatory guidelines.

Groundwater

Alternatives E-1, E-1A and E-2 pose concerns about effects on groundwater due to the sensitivity of the Seminary Fen calcareous plant species on upwelling groundwater conditions. Groundwater monitoring indicates the benefits of using sheet piling and installing a grout seal in the base of the excavations for the bridge piers to reduce drawdown beyond the limits of the excavation and reduce impact to the rate of seepage of groundwater into the fen. Methodologies to minimize the potential for long term disturbances of groundwater flow due to soil compaction during construction could be evaluated. Measures such as vegetated filter strips along road embankments, grassed swales/ditches and detention basins can be implemented to promote infiltration/groundwater recharge of highway runoff.

All Build alternatives are located in the vicinity of wellhead protection areas. If necessary, roads that encroach on wellhead protection areas can be constructed with additional containment features such as clay-lined ditches that would contain spills and prevent contamination to water supply aquifers. The Tier II EIS will need to address special design issues related to wellhead protection.

Wetlands

All Build alternatives would result in direct impacts to wetlands. The sequencing and mitigation procedures required by the Wetland Conservation Act (WCA) will be followed when assessing alternatives and design options.

Noise

Both State and Federal criteria are exceeded at a number of existing receptors for all Build alternatives (as well as under existing and No-Build conditions). Mitigation measures could include noise barriers or other sound attenuation methods, or incorporation of land use controls to limit the number of noise-sensitive receptors located adjacent to or in the vicinity of the project corridor. Evaluation of noise barriers as mitigation to avoid and/or minimize impacts as well as guidance for local governments regarding potential noise mitigation measures (such as recommended set-back distances for proposed developments) will be included in the Tier II EIS.

Air Quality

It is expected that there would be reduced MSAT emissions when compared to No-Build in the immediate area of the project due to the reduced vehicle hours traveled and due to Environmental Protection Agency (EPA) MSAT reduction programs. Detailed air quality analyses will be conducted during the Tier II EIS process.

Contaminated Sites

Contaminated properties are located in or near all Build alternative corridors. Further evaluation of potentially contaminated properties identified in the Phase I ESAs will be completed for the preferred alternative during the Tier II process. The results would be used to determine whether the contaminated materials can be avoided or whether the project's impacts to these properties can be minimized. If necessary, a plan would be developed for properly handling and for treating contaminated soil and/or groundwater during construction. Any soil and groundwater remediation activates would be coordinated with appropriate regulatory agencies.

Visual Quality

All Build alternatives would substantially change the visual quality of the study area with the addition of a long, high bridge across the river valley, grade-separations over existing roadways and the introduction of new highway into developed and undeveloped areas. Design will be addressed in the Tier II process. Consideration can be given to aesthetic treatment of design elements on the bridge and at the interchanges. Other measures that can mitigate negative visual impacts include minimizing the clearing of natural vegetation and replacement of lost or removed vegetation with native species and retention of slope and bottom land vegetation. Mitigation measures would be evaluated further and refined in the Tier II EIS.

Steep Slopes, Erodible Soils

All Build alternatives would cross areas of steep slopes and/or potentially erodible soils. BMPs such as erosion control blankets, fast growing cover crops and silt fencing would be implemented in accordance with the National Pollutant Discharge Elimination System (NPDES) permit that is required for the project. After the construction is complete, disturbed areas would be re-vegetated to control erosion on a permanent basis.

Farmland

All Build alternatives would require acquisition of farmland. Such acquisition would be in conformance with the Uniform Relocation and Real Property Acquisition Act of 1970 as amended by the surface Transportation and Uniform Relocation Assistance Act of 1989 and 49 Code of the Federal Regulations, Part 24. It should be noted that farmland impacts that are actually likely to occur are reduced by the orderly development of land (i.e. conversion of farmland to urban uses) provide for in local comprehensive plans and processes. It is expected that farmland within the selected TH 41 corridor will likely not be acquired until conversion to non-agricultural uses (through development) is imminent. Efforts to minimize impact to remaining farmland will be part of the Tier II process.

Construction Impacts

All Build alternatives would pose impacts during construction. Details of the construction activities, including mitigation measures such as a detailed erosion control plan, a plan for management and disposal of any excess material, a construction staging plan, special construction techniques for river bridge construction, traffic flow management techniques and access maintenance and/or detour plan would be developed during the Tier II EIS process.

Indirect Impacts

All Build alternatives have the potential for indirect impacts due to land development, the effect on the design of planned US 169 corridor improvements, and the broader effects to the natural environment due to ecological relationships.

Land development impacts are subject to land, local land use plans and land use controls, agency permits and approvals. Alternatives C-2, C-2A, E-1, E-1A and E-2 would have the potential for indirect social impacts due to the reduction in affordable housing supply. However, because of the timeframe for construction, communities will have time to plan for future land use and transportation systems to fit physically with the project and for adequate supply of affordable housing. The Tier II EIS will evaluate the potential for more specific indirect effects of the project on area economic conditions and develop mitigation strategies as appropriate. Mn/DOT will be planning and implementing the US 169 improvements and, therefore, will be responsible for mitigation for impacts of any of that project. Any project mitigation that improves the natural environment, (e.g. wetland replacement, habitat restoration, etc.) would have a corresponding beneficial indirect impact on the broader ecosystem.

Mitigation of specifically-identified indirect effects of the proposed project will be addressed in the Tier II EIS process.

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TABLE 1-4
IMPACT SUMMARY

	Alternatives						
	No-Build	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
DESCRIPTION	N/A	Roadway length: 3.1 miles Bridge length: 10,550 feet No. of piers: 86	Roadway length: 3.9 miles Bridge length: 9,550 feet No. of piers: 80	Roadway length: 3.0 miles Bridge length: 9,350 feet No. of piers: 76	Roadway length: 3.1 miles Bridge length: 10,800 feet [low profile] 11,300 feet [high profile] No. of piers: 94	Roadway length: 3.6 miles Bridge length: 13,500 feet No. of piers: 112	Roadway length: 3.2 miles Bridge length: 12,000 feet No. of piers: 98
TRANSPORTATION AND FISCAL IMPACTS							
Capacity Improvement and Relief to Other River Crossings							
New TH 41 Average Daily Traffic (ADT) (2040)	N/A	45,000	48,000	43,000	56,000	56,000	59,000
Other River Crossings ADT (2040)							
▪ CSAH 9/45	▪ 25,100	▪ 19,200	▪ 21,600	▪ 21,300	▪ 20,800	▪ 21,300	▪ 21,300
▪ TH 41	▪ 36,500	▪ 24,700	▪ 22,000	▪ 24,800	▪ 23,800	▪ 25,100	▪ 24,200
▪ Highway 101	▪ 34,000	▪ 30,400	▪ 30,000	▪ 29,900	▪ 24,800	▪ 24,300	▪ 23,300
▪ US 169	▪ 141,000	▪ 135,000	▪ 135,000	▪ 135,000	▪ 131,000	▪ 129,000	▪ 129,000
▪ I-35W	▪ 133,000	▪ 133,000	▪ 133,000	▪ 133,000	▪ 132,000	▪ 132,000	▪ 132,000
Hours of Congestion (2040)							
▪ Existing TH 41 north of existing US 212	▪ 0	▪ 0	▪ 0	▪ 0	▪ 0	▪ 0	▪ 0
▪ Existing TH 41 river crossing	▪ 10	▪ 3	▪ 2	▪ 3	▪ 2	▪ 3	▪ 2
▪ Existing Highway 101 river crossing	▪ 10	▪ 7	▪ 7	▪ 7	▪ 6	▪ 6	▪ 5
Regional Efficiency (2040)							
▪ VMT (difference from No-Build)	▪ N/A	▪ 310,000	▪ 314,000	▪ 354,000	▪ 309,000	▪ 285,000	▪ 292,000
▪ VHT (difference from No-Build)	▪ N/A	▪ -3,900	▪ -3,500	▪ -3,100	▪ -3,600	▪ -4,000	▪ -4,000
Safety							
Crashes (2040)							
▪ Freeway	▪ 996	▪ 1,058	▪ 1,052	▪ 1,058	▪ 1,052	▪ 1,055	▪ 1,053
▪ Non-Freeway	▪ 9,430	▪ 9,433	▪ 9,460	▪ 9,468	▪ 9,435	▪ 9,444	▪ 9,438
▪ Downtown Chaska	▪ 35	▪ 24	▪ 22	▪ 24	▪ 23	▪ 24	▪ 23
Other		▪ Grade-separated rail crossings increase safety and decrease number of stops for transports carrying hazardous/flammable materials. ▪ Substantial improvements in emergency response times, especially during flood conditions. ▪ Reduced potential for vehicle-bicycle or vehicle-pedestrian conflicts.					
Trucks per day (% of ADT) (2040)							
▪ New TH 41	▪ N/A	▪ 2,360 (5)	▪ 2,350 (5)	▪ 2,210 (5)	▪ 3,650 (7)	▪ 4,130 (7)	▪ 4,040 (7)
▪ Existing TH 41	▪ 2,700 (7)	▪ 900 (4)	▪ 700 (3)	▪ 800 (3)	▪ 700 (3)	▪ 700 (3)	▪ 700 (3)
▪ Highway 101	▪ 1,400 (4)	▪ 1,500 (5)	▪ 1,500 (5)	▪ 1,300 (4)	▪ 1,300 (5)	▪ 1,300 (5)	▪ 1,000 (4)
▪ US 169	▪ 8,900 (6)	▪ 8,700 (6)	▪ 8,700 (6)	▪ 9,100 (7)	▪ 8,300 (6)	▪ 8,200 (6)	▪ 8,100 (6)
Fiscal							
Cost (in 2005 dollars) (rounded to $10M)							
▪ Construction (higher figure risk assessed for factors including mitigation)		▪ $335-$390M	▪ $305-$355M	▪ $345-$405M	▪ $375-$460M (Low Profile) ▪ $395-$485M (High Profile)	▪ $410-$490M	▪ $370-$440M (Low Profile) ▪ $375-$450M (High Profile)
▪ Right of way	N/A	▪ $ 55- $80M	▪ $ 75-$105M	▪ $ 65- $90M	▪ $100-$135M	▪ $ 55- $75M	▪ $ 60- $80M
▪ Total		▪ $390-$470M	▪ $380-$460M	▪ $410-$495M	▪ $475-$495M (Low Profile) ▪ $495-$620M (High Profile)	▪ $465-$565M	▪ $430-$520M (Low Profile) ▪ $435-$530M (High Profile)
Benefit/Cost Ratio	N/A	3.43	3.39	3.29	2.33	2.72	2.84
SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS							
Right of way	N/A	▪ 258 acres ▪ 44 affected parcels: – 7 residential – 17 agricultural – 7 industrial/commercial – 9 public – 4 other	▪ 320 acres ▪ 59 affected parcels: – 15 residential – 15 agricultural – 15 industrial/commercial – 11 public – 3 other	▪ 301 acres ▪ 133 affected parcels: – 69 residential – 17 agricultural – 16 industrial/commercial – 16 public – 15 other	▪ 360 acres ▪ 204 affected parcels: – 144 residential – 11 agricultural – 6 industrial/commercial – 39 public – 4 other	▪ 214 acres ▪ 84 affected parcels: – 35 residential – 10 agricultural – 13 industrial/commercial – 25 public – 1 other	▪ 194 acres ▪ 34 affected parcels: – 42 residential – 9 agricultural – 56 industrial/commercial – 24 public – 1 other
Residential Units Needed to be Acquired[1]		▪ 13	▪ 29	▪ 78	▪ 261	▪ 136	▪ 210
Business/employees	N/A	6 businesses 125 employees	11 businesses 114 employees	12 businesses 134 employees	3 businesses 115 employees	7 businesses 264 employees	5 businesses 99 employees
Fiscal							
▪ Annual tax loss (Scott County)		▪ $25,150	▪ $162,200	▪ $166,750	▪ $25,000	▪ $33,700	▪ $44,200
▪ Annual tax loss (Carver County)		▪ $15,350	▪ $ 17,450	▪ $ 45,900	▪ $45,900	▪ $84,350	▪ $32,150

[1] Includes single family homes, townhomes and mobile home units. Does not include farm houses. Note: Agricultural parcels include seven properties that will be classified as residential before the anticipated build-year.

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TABLE 1-4 continued
IMPACT SUMMARY

	Alternatives						
	No-Build	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS							
Environmental Justice	N/A	No disproportionate impacts	18 households – Jackson Heights	38 households – Jackson Heights	▪ Up to 126 households – Mobile Manor, Bonnevista and Riverview Terrace	▪ Up to 113 households – Mobile Manor, Bonnevista and Riverview Terrace	▪ Up to 182 households – Mobile Manor, Bonnevista and Riverview Terrace
Neighborhoods	N/A	▪ River Bluff Estates (Carver) ▪ Separates northeast portion of Carver from remainder of City	▪ Jackson Heights ▪ Separates corner of Heights of Chaska from remainder ▪ Separates Carver and Chaska	▪ Jackson Heights ▪ Divides Heights of Chaska ▪ Separates Carver and Chaska	▪ Mobile Manor, Bonnevista and Riverview Terrace ▪ Separates established Chaska neighborhoods east and west of Audubon Road	▪ Mobile Manor, Bonnevista and Riverview Terrace ▪ Separates Chaska and Chanhassen	▪ Mobile Manor, Bonnevista, and Riverview Terrace ▪ Separates Chaska and Chanhassen
Community Facilities	N/A	▪ Renaissance Festival (private)	▪ No impact	▪ Chaska maintenance facility (minor land acquisition)	▪ Church, church residence ▪ School property	▪ School property	▪ St. John's Cemetery expansion area ▪ School property
Access	N/A	▪ Existing US 212 realigned ▪ Mt. Hope Road extended to realigned existing US 212	▪ Affects design of US 169/ existing TH 41 interchange and US 169/CSAH 69 interchange ▪ Assumes existing TH 41/ CSAH 78 realigned to the west ▪ Local ramps at New US 212/CSAH 11 interchange reconstructed	▪ Affects design of US 169/ existing TH 41 interchange and US 169/CSAH 69 interchange ▪ Assumes existing TH 41/ CSAH 78 realigned to the west ▪ Local ramps at New US 212/CSAH 11 interchange reconstructed	▪ Affects design of US 169/ existing TH 41 interchange and US 169/CSAH 69 interchange ▪ Numerous local roadway alterations needed to restore access to affected parcels	▪ Affects design of US 169/ existing TH 41 interchange and US 169/CSAH 69 interchange	▪ Affects design of US 169/ existing TH 41 interchange and US 169/CSAH 69 interchange
Cultural Resources	Walnut Street Historic District (downtown Chaska)	Effect cannot be determined at this time	▪ Athletic Field (a.k.a. Chaska Cubs Ball Field) ▪ Effect on other resources cannot be determined at this time	Effect cannot be determined at this time	No adverse effect	No adverse effect; assumes alignment will avoid archeological site	No adverse effect; assumes alignment will avoid archeological site
Parks, Trails, Recreational Areas (Section 4[f])	N/A	▪ Temporary construction impacts to Canoe and Boating route ▪ 20.4 acres Minnesota Valley National Wildlife Refuge (MVNWR) ▪ 30.6 acres Minnesota Valley State Recreation Area/ Minnesota Valley (MVSRA/MV) Trails	▪ Temporary construction impacts to Canoe and Boating route ▪ 8.5 acres MVNWR ▪ 22.3 acres MVSRA/MV Trails ▪ 3.5 acres - Athletic Park, Chaska (possibly all 8 acres)	▪ Temporary construction impacts to Canoe and Boating route ▪ 36.1 acres MVNWR ▪ 5.4 acres MVSRA/MV Trails	▪ Temporary construction impacts to Canoe and Boating route ▪ 12.0 acres MVSRA/MV Trails ▪ 10.4 acres Pioneer Park/ Chaska High School/ Pioneer Ridge Freshman Center Complex ▪ 1.4 miles (1.3 acres) Audubon Trail ▪ 4,200 feet (0.8 acres) Chaska Trail Segments	▪ Temporary construction impacts to Canoe and Boating route ▪ 12.0 acres MVSRA/MV Trails ▪ 2.7 acres Pioneer Park/ Chaska High School/ Pioneer Ridge Freshman Center Complex ▪ 1,000 feet (0.2 acres) Audubon Trail ▪ 800 feet (0.2 acres) City of Chaska Trail Segments	▪ Temporary construction impacts to Canoe and Boating route ▪ 4.2 acres MVSRA/MV Trails ▪ 1.1 acres Pioneer Park/ Chaska High School/ Pioneer Ridge Freshman Center Complex ▪ 1,000 feet (0.2 acres) Audubon Trail ▪ 800 feet (0.2 acres) City of Chaska Trail Segments
Threatened and Endangered Species	No adverse impacts to rare species have been observed	▪ (Potential) freshwater mussel concentrations ▪ Kitten Tails (state threatened) ▪ Hills Thistle (state special concern) ▪ Regal Fritillary butterfly (state special concern) ▪ Tier II mussel study recommended	▪ No Threatened and Endangered species listed within ½ mile ▪ Shovelnose sturgeon (state special concern) ▪ Tier II mussel study anticipated	▪ No Threatened and Endangered species listed within ½ mile ▪ Shovelnose sturgeon (state special concern) ▪ Tier II mussel study anticipated	▪ No Threatened and Endangered species listed within ½ mile ▪ Shovelnose sturgeon (state special concern) ▪ Tier II mussel study anticipated	▪ Several species that are part of the Seminary Fen native plant community, including (but not limited to): – sterile sedge (state threatened) – low nutrush (state threatened) – beaked spikerush (state threatened) – white lady's slipper (state special concern) – twig rush (state special concern) ▪ Shovelnose sturgeon (state special concern) ▪ Tier II mussel study anticipated	▪ Several species that are part of the Seminary Fen native plant community, including (but not limited to): – sterile sedge (state threatened) – low nutrush (state threatened) – beaked spikerush (state threatened) – white lady's slipper (state special concern) – twig rush (state special concern) ▪ Shovelnose sturgeon (state special concern) ▪ Tier II mussel study anticipated

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TABLE 1-4 continued
IMPACT SUMMARY

	Alternatives						
	No-Build	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
SOCIAL, ECONOMIC, AND ENVIRONMENTAL IMPACTS							
Vegetation/Habitat	N/A	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds	▪ Shading effects ▪ Salt spray, trash, debris, and opportunistic invasive species ▪ Bridge piers may create obstacles for wildlife; bridge creates flight barrier for birds
▪ Native vegetation ▪ High quality native vegetation (BC rank or better) ▪ State rarity ranking of native vegetation ▪ Outstanding biodiversity area ▪ Forested areas ▪ Impacts to forest interior ▪ Creation of new forest edge		51.7 acres (3)* 33.3 acres (4) 48.8 acres (4) 0.0 acres (0) 33.9 acres (3) 24.9 acres (4) 15.9 acres (4)	54.8 acres (3) 36.3 acres (4) 38.1 acres (2) 0.0 acres (0) 38.6 acres (3) 20.8 acres (1) 13.6 acres (4)	81.6 acres (4) 44.9 acres (4) 61.4 acres (4) 0.0 acres (0) 61.3 acres (4) 33.6 acres (4) 23.3 acres (4)	29.9 acres (2) 2.8 acres (1) 28.9 acres (2) 0.5 acres (1) 22.3 acres (2) 12.2 acres (1) 7.0 acres (2)	48.9 acres (3) 28.1 acres (2) 35.9 acres (2) 30.6 acres (4) 33.0 acres (3) 20.1 acres (2) 11.6 acres (3)	59.3 acres (4) 34.2 acres (4) 48.9 acres (4) 26.0 acres (4) 26.3 acres (2) 21.8 acres (2) 10.2 acres (3)
Seminary Fen/Assumption Creek (3 calcareous fen component (CFC] areas)	N/A	No impact	No impact	No impact	No impact to CFC Areas 1 or 3. Water table drawdown 0.1 ft. to small portion of CFC Area 2	No impacts to CFC Area 1. Potential contamination transport to CFC Area 3. Major impact to CFC Area 2.	No impacts to CFC Area 1. Potential contamination transport to CFC Area 3. Major impact to CFC Area 2.
Surface Water Quality/Storm Water Runoff ▪ Impervious surface ▪ Permanent ponding storage requirement (% in floodplain)	N/A	▪ 44.1 acres ▪ 10.4 acre-ft. (33.6)	▪ 47.7 acres ▪ 13.9 acre-ft. (31.9)	▪ 60.3 acres ▪ 17.2 acre-ft. (24.0)	▪ 48.3 acres ▪ 15.0 acre-ft. (33.2) (High Profile) ▪ 14.7 acre ft. (38) (Low Profile)	▪ 52.9 acres ▪ 14.9 acre-ft. (26) (both profile options)	▪ 47.7 acres ▪ 14.8 acre-ft. (29.6) (both profile options)
Wetland Impacts	N/A	11.7 acres	10.9 acres	16.1 acres	9.0 acres (both profile options)	14.9 acres (High Profile) 14.6 acres (Low Profile)	15.7 acres (both profile options)
Wild and Scenic River	N/A	Impact on scenic value *(Note: this section of the Minnesota River is not currently designated as a Wild and Scenic River, but it is on the National River Inventory and is a candidate for potential National Wild and Scenic River)*					
Floodplain/Waterbodies ▪ Floodplain encroachment ▪ Increase in flood elevation	N/A	▪ 7,920 feet (Minnesota River) ▪ 0.01 foot (Minnesota River)	▪ 7,250 feet (Minnesota River) ▪ 0.02 foot (Minnesota River)	▪ 6,500 feet (Minnesota River) ▪ 1,464 feet (Bluff Creek) ▪ 0.01 foot (Minnesota River)	▪ 5,730 feet (Minnesota River) ▪ 0.02 foot (Minnesota River)	▪ 5,716 feet (Minnesota River) ▪ 163 feet (Bluff Creek) ▪ 0.02 foot (Minnesota River)	▪ 5,934 feet (Minnesota River) ▪ 166 feet (Bluff Creek) ▪ 0.01 foot (Minnesota River)
Groundwater	N/A	Potential dewatering or direct impacts to groundwater, not excessive	Potential dewatering or direct impacts to groundwater, not excessive	Potential dewatering or direct impacts to groundwater, not excessive	▪ Potential construction dewatering or permanent direct impacts to groundwater, limited with assumed pier construction ▪ High profile less potential for impact than Low profile	▪ Potential construction dewatering or permanent direct impacts to groundwater, limited with assumed pier construction ▪ High profile less potential for impact than Low profile	▪ Potential construction dewatering or permanent direct impacts to groundwater, limited with assumed pier construction ▪ High profile less potential for impact than Low profile
Physical							
Noise (daytime) (2040)	▪ 1 dBA over existing conditions ▪ would exceed Federal standards	▪ State standards exceeded by 4 to 16 dBA at 5 receptors ▪ Noise levels near downtown Chaska are 4 dBA lower than No-Build	▪ State standards exceeded by 1 to 6 dBA at 5 receptors ▪ 5 of 13 receptors lower than No-Build ▪ Downtown Chaska 4 dBA lower than No-Build	▪ State standards exceeded by 1 to 8 dBA at 12 receptors ▪ 7 of 15 receptors lower than No-Build ▪ Downtown Chaska 3 dBA lower than No-Build	▪ State standards exceeded by 4 to 12 dBA at five receptors ▪ 5 of 13 receptors lower than No-Build ▪ Downtown Chaska 4 dBA lower than No-Build	▪ State standards exceeded by 1 to 9 dBA at 6 receptors ▪ 4 of 13 receptors lower than No-Build ▪ Downtown Chaska 4 dBA lower than No-Build	▪ State standards exceeded by 4 to 7 dBA at 6 receptors ▪ 4 of 9 receptors lower than No-Build ▪ Downtown Chaska 4 dBA lower than No-Build
Air Quality		Reduced MSAT emissions in the immediate area of the project expected relative to No-Build, due to reduced VHT and EPA's MSAT reduction programs.					
Soil, Water Contamination		3 High risk sites	2 High risk sites 7 High risk sites	2 Medium risk sites 7 High risk sites	5 Medium risk sites 1 High risk sites	5 Medium risk sites 1 High risk sites	2 Medium risk sites 1 High risk sites
Visual Quality	N/A	Substantial permanent impacts, highly visible to neighbors, travelers, and riverway users					
Steep Slopes, Erodible Soils – Length of erodible soil crossing (acres)		550 feet (3.8 acres)	1,950 feet 13.4 acres)	4,980 feet (34.3 acres)	3,000 feet (20.6 acres)	4,700 feet (32.3 acres)	2,610 feet (18.0 acres)
Farmland	N/A	▪ 9 land owners ▪ 17 agricultural parcels ▪ 91 acres	▪ 14 land owners ▪ 15 agricultural parcels ▪ 148 acres	▪ 14 land owners ▪ 17 agricultural parcels ▪ 101 acres	6 land owners 11 agricultural parcels 50 acres	6 land owners 10 agricultural parcels 92 acres	7 land owners 10 agricultural parcels 80 acres
Excess/Borrow	N/A	Preliminary estimates indicate that up to 3.3 million cubic yards of borrow may be required for this project.					

*Number in ( ) indicates ranking of potential for impacts. (0) represents least potential for impacts/no impacts; (4) represents greatest potential for impacts.

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TABLE 1-4 continued
IMPACT SUMMARY

	Alternatives						
	No-Build	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
SOCIAL, ECONOMIC, AND ENVIRONMENTAL IMPACTS							
OTHER							
Construction Impacts	N/A	Local traffic congestion and access impacts; noise near sensitive receptors; temporary channel obstructions; impacts to aquatic species habitat					
Indirect Impacts	N/A	▪ Assumed US 169 south frontage road removes commercial building	▪ Assumed US 169/existing TH 41 interchange removes 3 homes ▪ Reduction in affordable housing may affect businesses, broader low-moderate income families	▪ Assumed US 169/existing TH 41 interchange removes 3 homes ▪ Reduction in affordable housing may affect businesses, broader low-moderate income families	Reduction in affordable housing may affect businesses, broader low-moderate income families	Reduction in affordable housing may affect businesses, broader low-moderate income families	Reduction in affordable housing may affect businesses, broader low-moderate income families
		▪ Increased development intensity near corridor; potential induced development beyond study area ▪ Vegetation/habitat effects					
Cumulative Impacts (greater potential)	N/A	▪ MVNWR – visual, noise, habitat fragmentation, storm water	▪ MVNWR – visual, noise, habitat fragmentation, storm water ▪ Mobile home parks ▪ Athletic Park	▪ MVNWR – visual, noise, habitat fragmentation, storm water ▪ Mobile home parks	▪ Mobile home parks ▪ Seminary Fen health	▪ Mobile home parks ▪ Seminary Fen health	▪ Mobile home parks ▪ Seminary Fen health
		Potential impacts to cultural resources, land development, vegetation, wildlife, threatened and endangered species and wetlands.					

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2.0 PURPOSE OF AND NEED FOR ACTION

2.1 PROJECT HISTORY

In 1970 Mn/DOT commissioned the *Corridor Location Study for Trunk Highways 169, 212 and 41* (the 1970 Study), which examined the long-term need to improve and realign US 169, US 212 and TH 41 in the Chanhassen/Chaska/Shakopee area. (Note: US 169 is also referred to as TH 169 in reports and studies; similarly, US 212 is also referred to as TH 212.) The regional transportation system needs identified during this planning process are discussed in Section 2.2. The 1970 Study identified four corridor system options. Proposed System "D", which connected the realigned US 169 and US 212 highway corridors with a new TH 41 river crossing alignment (with a southern terminus near CSAH 69), was selected as the preferred long-term corridor system. Following completion of the 1970 Study, Mn/DOT conducted individual corridor studies and environmental review/design work for each of the three major roadways addressed in the study. Realignment of US 169 has already been completed and implementation of the realignment of US 212 (hereafter referred to in this document as "New US 212") is under construction. New US 212 is expected to be completed by Fall 2008.

A draft Environmental Impact Statement (DEIS) was completed for TH 41 in 1974 (1974 DEIS). The 1974 DEIS evaluated a No-Build and a Build alternative (construction along a new route, 41-D) (see Figure 3-1 in Chapter 3) after dismissal of alternatives involving upgrades to the existing TH 41 alignment and dependence on other modes of transportation. A Final EIS (FEIS) was not completed.

Since the 1974 DEIS, conditions in the study area, the types and number of relevant issues and concerns, and regulations have changed. As such, Mn/DOT initiated a scoping process in 2002 to identify and evaluate a range of location alternatives for the project based on current considerations and regulations. The scoping effort was intended to be the first step in the NEPA and state environmental review process to fulfill requirements of both 42 USC 4321 et seq. and Minnesota Rule Chapter 4410 for TH 41. In April of 2004, Mn/DOT published a Scoping Document and Draft Scoping Decision Document for TH 41 (2004 SD/DSDD). (Note: During scoping, this project was referred to as *TH 41 Over the Minnesota River*.)

As part of the scoping process, it was determined that a "tiered" environmental process would be used. Per Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1508.28), environmental documentation may occur through a "tiered" two-step review process. The tiered EIS process has been determined to be appropriate for the proposed TH 41 project because, while the construction of the project may not occur for 20 or more years, the study area is rapidly developing. The Tier I EIS is a corridor-level document intended to inform the selection of a corridor to preserve for a future project. For purposes of Tier I analysis, the area of impact of each of the alternatives is assumed to be a standard corridor width of 300 feet, except in the few locations where larger limits were assumed due to topographic considerations. Specific design details will be included in a Tier II EIS, to be prepared closer to the time of construction. Future development will likely encroach on potential corridor locations if an alignment location is not protected in the near future, resulting in greater potential for social and economic impacts at the time the project is funded.

In addition to discussing the "tiered" environmental process, the 2004 SD/DSDD provided a discussion of:

- The purpose of and need for the proposed project;
- Alternatives considered;
- Potential social, economic and environmental impacts and discussion regarding to what extent each issue will need to be addressed in the Tier I EIS and how the issue will likely be addressed in the Tier II process;
- Permits likely to be needed prior to construction of the proposed project; and
- Agencies and other stakeholders consulted during project development and environmental review.

Following completion of the 2004 SD/DSDD, a Scoping Decision Document (2005 SDD) was prepared to present the decisions reached regarding the scope of future environmental studies for TH 41. The 2005 SDD indicated the issues and alternatives that were to be examined in depth in the Tier I DEIS and documented initial expectations for issues that will eventually be examined in the Tier II EIS process. In addition, the 2005 SDD responded to comments received regarding the 2004 SD/DSDD. The SDD was amended in 2006 to expand the limits of one of the corridor alternatives. Notice of the amended SDD was published March 27, 2006.

2.2 NEED FOR THE PROPOSED TH 41 MINNESOTA RIVER CROSSING

As described previously, the need for an improved connection between US 169 and New US 212 for TH 41 was initially established in a comprehensive transportation study completed by Mn/DOT in 1970 and in a Draft EIS in 1974. Since completion of the earlier studies described above, the southwestern portion of the Twin Cities metropolitan area has undergone rapid growth and development. Scott County was the fastest growing county in the state between 1990 and 2000; its population increased by over 54 percent. During that same time period, Carver County's population increased by over 46 percent (third fastest growing county in the state). This growth has put additional stress on a transportation system that was experiencing congestion during peak travel periods by the mid-1990s, and it has magnified the traffic problems and delays resulting from bridge closures due to seasonal flooding.

Construction of the US 169 Bypass and construction of New US 212 (to be completed in Fall 2008) address east-west roadway capacity issues in the study area, but they do not address the issues of:

- Congestion on existing TH 41 and other river crossings for typical weekday conditions due to inadequate capacity;
- Severe area-wide congestion, as well as public safety problems during flood events which frequently close three area river crossings for extended periods; and
- The lack of adequate north-south principal arterial and interregional corridor connections between US 169 and New US 212 to facilitate regional traffic flow, and particularly freight (heavy commercial truck) movement.

Thus, these three basic issues that result in the need for the project identified in earlier studies still exist, and are supported by more recent transportation studies and travel forecasts. Additional transportation objectives related to other transportation and land use issues have also been identified. The sections below compile the findings of previous studies to the present that establish the need for the proposed project.

2.2.1 Inadequate Capacity

One of the three basic deficiencies supporting the need for a new TH 41 crossing over the Minnesota River is lack of capacity to meet projected travel demand for typical weekday conditions (i.e. non-flood conditions). The sections below discuss capacity constraints on existing crossings.

2.2.1.1 Existing and Future River Crossings Travel Demand

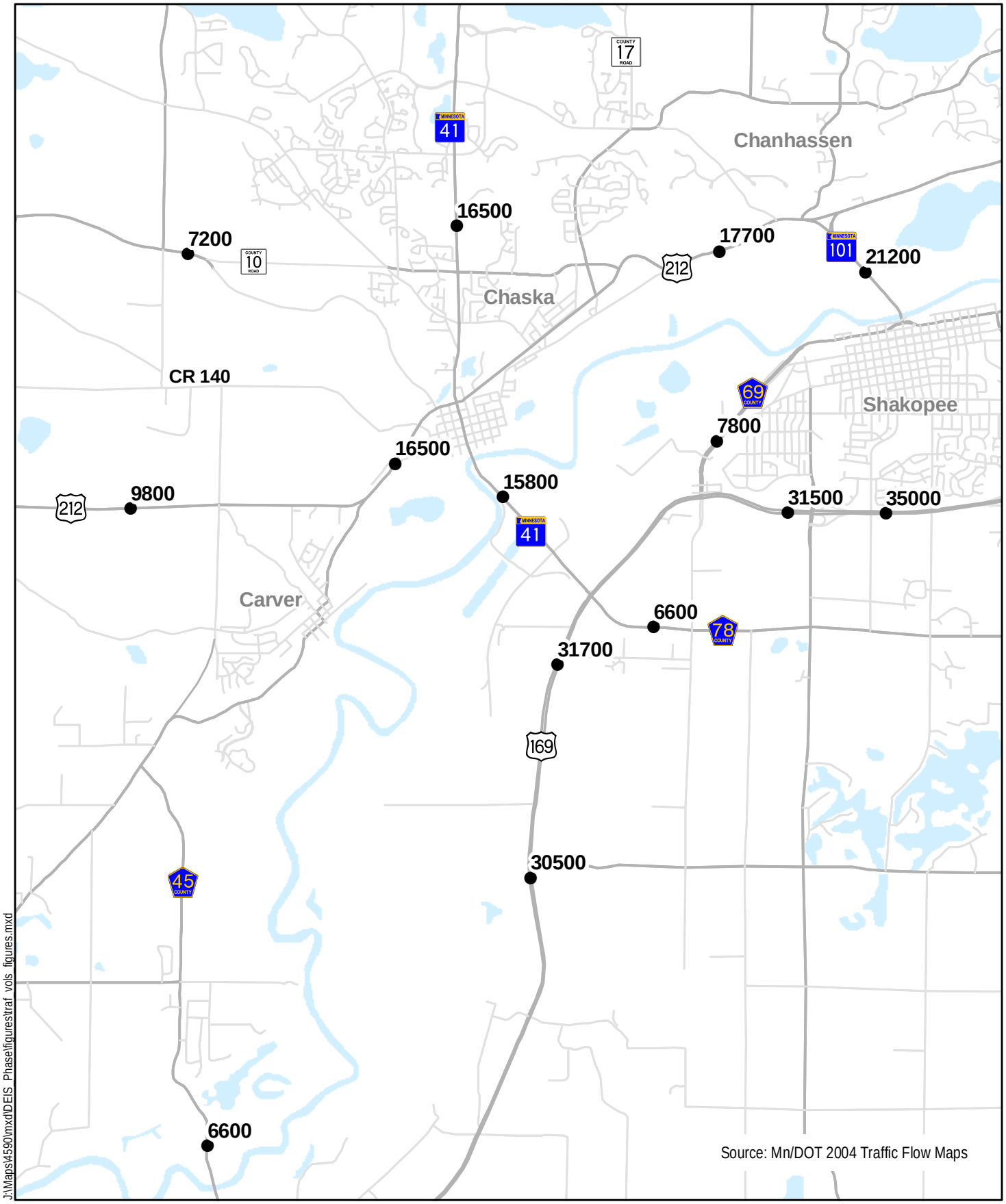
Studies dating back to 1970 have indicated that growth in population and employment will result in capacity deficiencies on major highways within the study area, including TH 41. Traffic on existing roadways parallel to and crossing the Minnesota River has increased substantially as a result of the growth over the past 20 years and is expected to continue to grow over the next 30 years as the area continues to develop. Over 200,000 vehicles per day use five Minnesota River crossings within and near the study area. The most heavily used corridors are I-35W and US 169. The crossings at TH 41, Highway 101, US 169 and I-35W are congested during peak travel periods. See Figure 1-1 in Chapter 1 for location of these crossings. See Figure 2-1 for existing (2004) traffic volumes within the study area.

The Metropolitan Council and local agencies project continued rapid population growth in the TH 41 travelshed (See Table 2-1). The estimated 2040 population of the four cities (Carver, Chanhassen, Chaska and Shakopee) within the study area is expected to triple. This continued growth is expected to exacerbate river crossing capacity deficiencies.

TABLE 2-1
POPULATION, 2000 AND 2040
CITIES AND COUNTIES WITHIN THE TH 41 TRAVELSHED

	Location[3]	2000 Population[1]	2040 Population Estimates[2]	Percent Growth
	Carver County	70,205	184,910	163
	Scott County	89,498	247,378	176
Cities	Eden Prairie	54,901	71,706	31
	Carver	1,266	20,000	1,480
	Chanhassen	20,321	45,900	126
	Chaska	17,449	42,036	139
	Victoria	4,025	9,800	143
	Belle Plaine	3,789	13,500	256
	Jordan	3,833	13,300	247
	Savage	21,115	49,600	135
	Shakopee	20,568	71,185	246

(1) Metropolitan Council
(2) 2040 population estimates were developed with input from local agencies and Metropolitan Council staff.
(3) A number of the cities listed will have annexed portions of surrounding townships by 2040. Anticipated incorporation of township land is accounted for in the 2040 population estimates. Except where orderly annexation agreements are in place, it is not possible to project which portion of townships will be within City limits in 2040. Note that regardless of area, 2000 population within townships is at very low density.



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2004 DAILY TRAFFIC VOLUMES

Figure 2-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING

Draft Environmental Impact Statement
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In addition to population growth, the study area is expected to see large increases in employment (See Table 2-2). Within the past twenty years, the area has attracted a number of industrial and commercial uses. Today, a large portion of Chanhassen's and Chaska's industrial development, and some commercial developments, is located along TH 41 just north of the study area. The City of Chaska, along with private investors, has spent a substantial amount of time and money rehabilitating its historic downtown with intensified commercial and residential uses. The City of Carver anticipates several large industrial and commercial developments within the next 15 to 30 years. South of the Minnesota River in Shakopee, which is home to the state's largest land area of industrial park uses, expansion of "big-box" and other commercial development is expected to continue.

TABLE 2-2
EMPLOYMENT, 2000 AND 2040
CITIES AND COUNTIES WITHIN THE TH 41 TRAVELSHED

	Location[1]	2000 Employment[2]	2040 Employment Estimates[3]	Percent Growth
	Carver County	26,657	63,650	139
	Scott County	32,009	75,006	134
Cities	Eden Prairie	49,392	86,463	75
Cities	Carver	156	2,325	1,390
Cities	Chanhassen	7,571	17,860	136
Cities	Chaska	10,185	20,400	100
Cities	Victoria	836	1,595	91
Cities	Belle Plaine	1,469	3,660	149
Cities	Jordan	1,264	2,565	103
Cities	Savage	4,680	11,170	139
Cities	Shakopee	12,476	30,149	142

(1) A number of the cities listed will have annexed portions of surrounding townships by 2040. Incorporation of township land is accounted for in the 2040 employment estimates.
(2) Metropolitan Council
(3) 2040 employment estimates were developed with input from local agencies and Metropolitan Council staff and from data supplied by the Minnesota Department of Employment and Economic Development.

The anticipated growth in population and employment within the study area was used to help prepare future travel forecasts. Travel forecasts for the five existing river crossing corridors in the vicinity of TH 41 were prepared using the regional travel demand models developed and approved by the Metropolitan Council and Mn/DOT. (Travel forecast methodology and results are documented in the *TH 41 River Crossing EIS: Technical Memorandum on Travel Demand Forecasting* dated May 1, 2006 and contained in: *TH 41 Minnesota River Crossing Draft Environmental Impact Statement Volume II: Technical Memoranda* dated, June 2007 [*Volume II: Technical Memoranda*]). (Note that *Volume II: Technical Memoranda* will be available for review at Mn/DOT Metro Division, on the project website and as announced in public notices.) The location of these crossings is shown in Figure 1-1. Existing and future daily volumes for the five Minnesota River crossings are shown in Table 2-3. As shown, under 2040 No-Build conditions, the total daily volume on the five river crossings is expected to increase by 83 percent. Travel demand on existing TH 41 under No-Build conditions is projected to increase by over 97 percent to 36,500. (For comparison, the TH 61 river crossing in Hastings carries 32,500 Average Daily Traffic [ADT].) Travel demand of this magnitude indicates that the facility will be congested for a significant portion of the day. (See Section 2.2.1.3.)

TABLE 2-3
MINNESOTA RIVER CROSSING: EXISTING AND FUTURE DAILY VOLUMES

Bridge Crossing	2000 ADT[1]	2040 No-Build ADT	Percent Change
CSAH 9/45	6,400	25,100	292
TH 41	18,500	36,500	97
Highway 101	21,400	34,000	59
US 169 (Bloomington Ferry)	54,000	141,000	161
I-35W	102,000	133,000	30
Total	**202,300**	**369,600**	**83**

(1) Average daily traffic (ADT) for the year 2000

The river crossings at existing TH 41, Highway 101, US 169 (Bloomington Ferry) and I-35W are already congested during the peak travel periods. This congestion is expected to worsen in intensity and duration as traffic volumes increase. For example, the 141,000 vehicles that have demand on US 169 in 2040 would result in peak hour traffic demand that exceed the capacity of a six-lane freeway. (The I-35W river crossing carried 141,000 ADT in 2004.) United States Highway 169 is currently a four-lane roadway. The increased travel demand for the other river crossings means that there is no excess capacity available that could be used to relieve congestion on TH 41.

See Figure 4-1 in Chapter 4 for 2040 No-Build volumes on major roads in the study area.

2.2.1.2 Existing TH 41 Level of Service

The previous section described existing and future travel demands for all Minnesota River crossings within the study area. "Existing" for that discussion referred to 2000 since that is the most recent socioeconomic data (i.e. Census) and the travel forecast model is calibrated to 2000 data. This section reviews existing and future No-Build operations on existing TH 41. A level of service (LOS) analysis was performed for key intersections along the corridor to provide insight on the corridor's ability to adequately meet existing traffic demand. "Existing" for this discussion refers to the years of relevant operations analysis (2003 and 2005), as well as current (2006) physical conditions. Figure 2-1 shows 2004 (most recent data) volumes in the study area. (Note that volumes on existing TH 41 were lower in 2004 (15,800) than in 2000 (18,500); this is likely attributable to construction on TH 41.

2.2.1.2.1 Existing (2003-2006)

Within the study area, TH 41 is primarily a two-lane roadway. Between US 169 and the southern end of the existing Minnesota River Bridge in downtown Chaska it is primarily a two-lane rural roadway, with limited access (two traffic signals, no private driveways and a limited number of cross streets). Typical ADT for a two-lane roadway ranges between 8,000 and 12,000; the 2000 ADT on this segment was 18,500. Between the southern end of the existing river crossing bridge in downtown Chaska and existing US 212, TH 41 is an undivided four-lane facility. This four-lane, urban downtown segment has local street access as well as on-street parking. These two factors, along with a high volume of truck traffic and capacity limitations at the existing US 212 intersection cause substantial operational issues (i.e. lengthy queues and delays) and substantially reduce the capacity of TH 41.

In addition to the sheer volume on this primarily two-lane facility, the types of vehicles using existing TH 41 play an important role in its operations. Almost 20 percent of the vehicles using existing TH 41 (at US 169) are classified as heavy commercial vehicles (semi trucks, garbage trucks, aggregate trucks, etc.) (based on truck counts taken in October 2002). Typical truck traffic on similar facilities is 5 to 10 percent. This high percentage of trucks negatively impacts corridor operations, especially at the signalized intersections because trucks at a stop take longer to start up and go through the traffic signal.

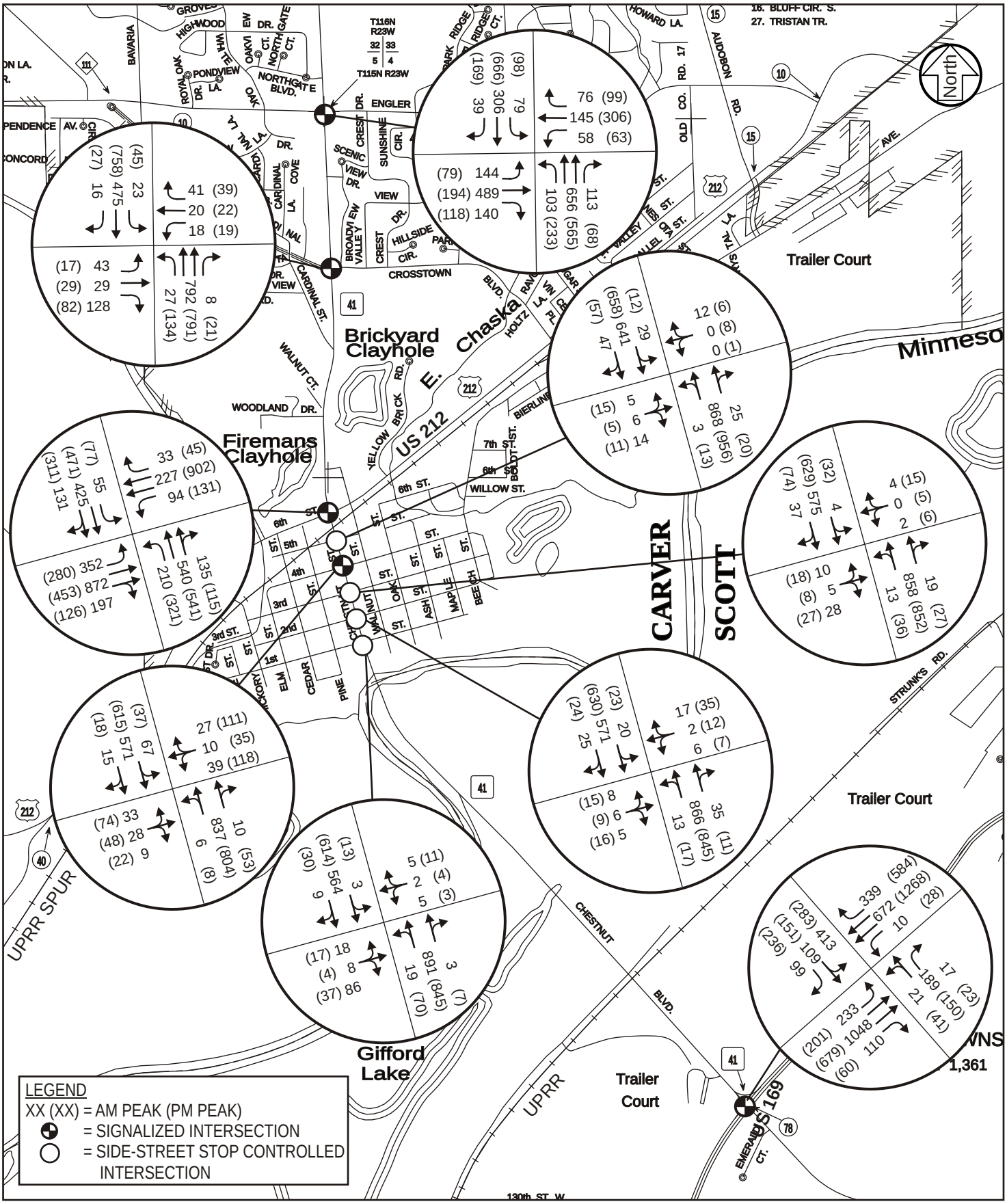
An existing intersection level of service (LOS) analysis was completed for key intersections between US 169 and New US 212. Figure 2-2 shows existing intersection control, lane configurations and turning movement counts for this segment. The analysis identifies how well intersections can accommodate existing and future traffic volumes. Intersections are ranked in terms of delay from LOS "A" to LOS "F" (severely congested with substantial delays). LOS A through D is generally considered acceptable. LOS E indicates that the roadway or intersection is operating at or very near its capacity – drivers can experience substantial delays. Table 2-4 below presents delay threshold values.

TABLE 2-4
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	<10	<10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	80<	50<

Results of the analysis indicate that most of the intersections are operating at unacceptable levels of service during the p.m. peak period, with the worst congestion occurring between 2nd Street and existing US 212 (See Table 2-5). At the existing TH 41/existing US 212 intersection, there is an 85 second delay in the p.m. peak hour. It should be noted that the LOS at the existing TH 41/US 169 intersection has improved to a LOS D (50-second delay in the p.m. peak hour) with the intersection improvements completed in 2005.

Two Union Pacific freight rail lines, mainline and spur, also affect traffic operations along the existing TH 41 corridor. The mainline, which runs parallel to and north of US 169, crosses existing TH 41 south of the Minnesota River. Five trains a day run on the mainline. Often, long queues on existing TH 41 extend from the crossing at TH 41 to US 169. The spur, which runs parallel to existing US 212, crosses TH 41 just south of US 212 in downtown Chaska. Approximately three trains a day run on the spur line. (Note: Train frequencies noted represent Union Pacific's current records, but are subject to change.) These rail lines contribute to operational problems at US 169 and existing US 212 when trains are present.



EXISTING 2005 PEAK HOUR TRAFFIC VOLUMES

Figure 2-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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TABLE 2-5
EXISTING INTERSECTION LEVEL OF SERVICE (LOS)

Intersection with TH 41 and	Existing p.m. Peak Hour LOS
US 169	D
1st Street*	C/F[(1)]
2nd Street*	E/F[(1)]
3rd Street*	F/F[(1)]
4th Street	E[(1)]
5th Street*	F/F[(1)]
Existing US 212	F
Victoria Drive	C
Engler Boulevard	E

* Indicates an unsignalized intersection. Overall LOS is shown followed by the worst approach LOS.

(1) Poor level of service due to queuing from the TH 41/US 212 intersection which extends through downtown Chaska and reduces gaps for vehicles on the side streets.

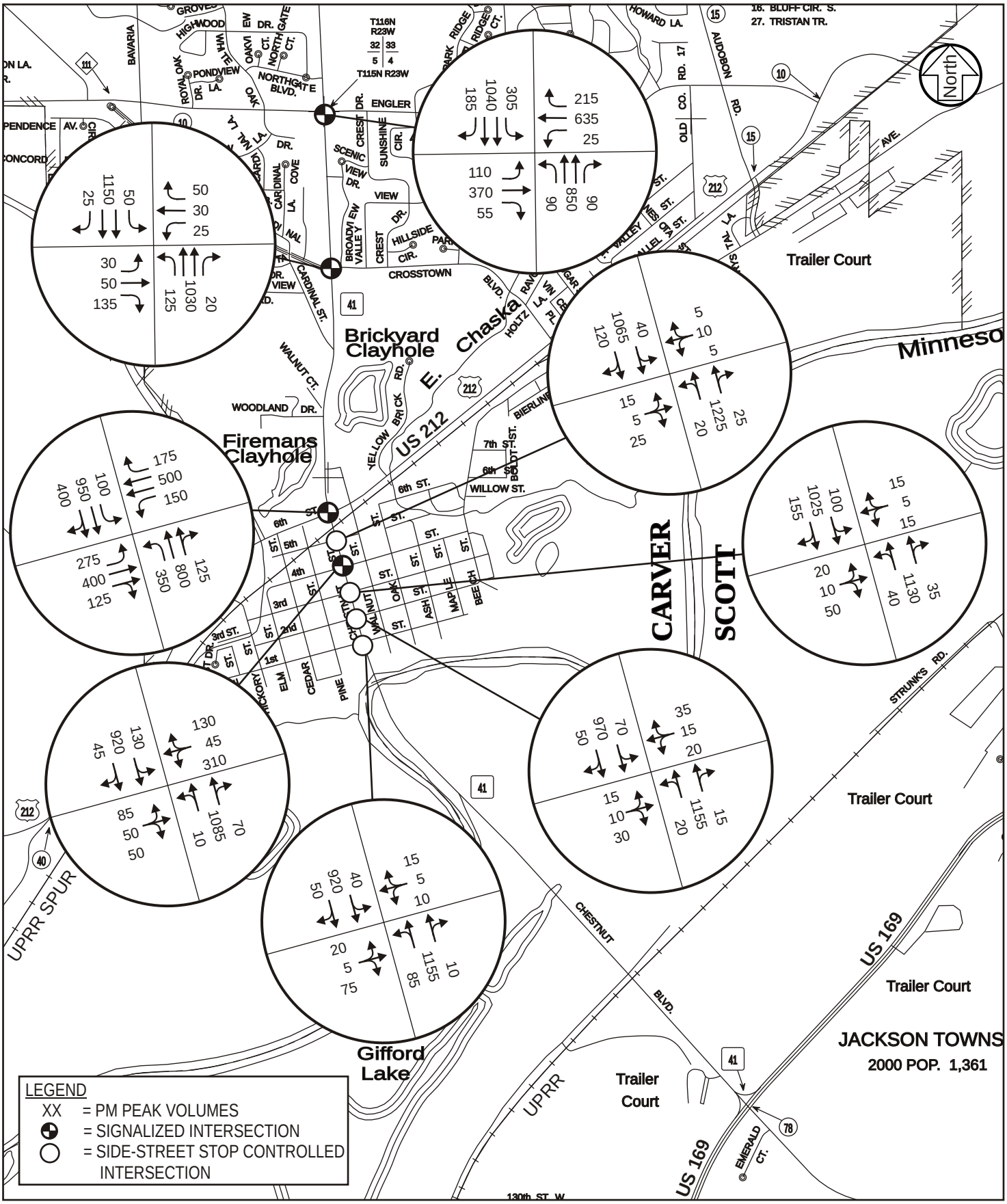
2.2.1.3 Future

A previous *TH 41 Traffic Study*, dated March 12, 2003 and updated April 5, 2006 (and included in *Volume II: Technical Memoranda*), analyzed 2030 No-Build p.m. peak hour intersection volumes (Table 2-6; Figure 2-3) and found that most of the intersections along existing TH 41 would operate at LOS F (the worst LOS). 2040 No-Build traffic volumes will be higher than 2030 No-Build volumes; therefore, under 2040 No-Build conditions, these intersections will also operate at LOS F. Delay at existing TH 41/existing US 212 is predicted to be an average of 140 seconds per vehicle. It should be noted that the delay at the intersection of TH 41 and existing US 212 is worse in the future even though both current and future results are LOS F. In the existing condition, only the northbound approach fails; in 2030 No-Build conditions, all approaches fail. The overall delay affecting all approaches in 2030 is greater than the delay that affects the northbound approach in its existing condition.

Three of the studied intersections (1st, 2nd and 3rd Streets) operate better under 2030 No-Build than under existing conditions. The improved operations at these locations are due to the construction of New US 212 which reduces east- and westbound traffic on existing US 212. This allows for more “green time” (i.e., when the traffic signal shows green permitting traffic flow) for TH 41. This improvement in traffic flow reduces the extent of the northbound queuing on TH 41 and improves operations at the southern-most intersections. However, by 2040 queues from the existing TH 41 existing US 212 intersection are likely to extend south to 1st Street causing these intersections to fail.

A limitation of peak hour operations analysis is that it focuses only on the peak hour of the day. Increasingly, congestion management within the metropolitan area more appropriately considers operations over the duration of the day.

Existing TH 41 is currently congested two hours per day. Additional analysis determined that under 2040 No-Build conditions, both existing TH 41 (south of existing US 212) and Highway 101 river crossings can be expected to be congested 10 hours per day (Note: hours of congestion are based on 48 hours, 24 hours for each direction).



2030 NO-BUILD PM PEAK HOUR TRAFFIC VOLUMES

Figure 2-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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TABLE 2-6
EXISTING AND NO-BUILD FUTURE LEVEL OF SERVICE (LOS)

Intersection with TH 41 and:	Existing P.M. Peak Hour LOS	2030 (Modeled) and 2040 (Projected) P.M. Peak Hour LOS
US 169	D	NA[2]
1st Street*	C/F[1]	A/D (2030) – F/F (2040)[3]
2nd Street*	E/F[1]	C/F[1]
3rd Street*	F/F[1]	C/F[1]
4th Street	E[1]	F[1]
5th Street*	F/F[1]	F/F[1]
US 212	F	F
Victoria Drive	C	C[4]
Engler Boulevard	E	F

*Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.

(1) Poor level of service is due to queuing from the intersection of TH 41/US 212 which extends through downtown Chaska and reduces gaps for vehicles on the side streets.

(2) 2030 analysis does not include the intersection of TH 41/US 169 because it is assumed that this intersection will be improved to an interchange.

(3) It is expected that, by 2040, the queue extending from existing US 212 will extend to 1st Street, causing this intersection to fail.

(4) It is expected that, because traffic is "bottle-necked" at existing TH 41/existing US 212 and at existing TH 41/Engler Boulevard, no additional traffic can get through to Victoria Drive, therefore, operations will not become worse by 2040.

2.2.2 Regional Congestion and Public Safety Concerns During Flooding

The second basic issue supporting the need for the proposed project is the inadequate capacity to handle regional traffic and public safety concerns during flood events that are associated with the existing river crossings within the study area.

2.2.2.1 Inadequate Capacity

The study area is located in the Minnesota River Valley. Currently, there are only two crossings within 14 miles of the study area where both the bridge and the approach roadways to the bridge are above the 100-year flood level. The Bloomington-Ferry Bridge (US 169), between Shakopee and Bloomington/Eden Prairie, is approximately 10 miles to the north and east of existing TH 41. The bridge and its approaches are above the 100-year flood level, as is TH 25 in Belle Plaine, approximately 14 miles to the south and west of existing TH 41. The remaining bridges and approach roadways (TH 41, Highway 101 and CSAH 9/45) have been closed on a regular basis due to flooding of either the bridge or the approach roadway.

Historically, flooding has been a frequent problem during the spring thaw period and occasionally during wet periods with heavy storm events. Existing TH 41, Highway 101 and CSAH 9/45 river crossings can experience closures during flood events. The most recent flood event occurred in 2001. Table 2-7 shows the number of days that the three river crossings have been closed due to flooding since 1993.

TABLE 2-7
MINNESOTA RIVER CROSSINGS
NUMBER OF DAYS OF ROAD CLOSURE DUE TO FLOODING
1993 – 2001

Crossing	1993	1995	1996	1997	1998	1999	2001	Total (1993 – 2001) [1]
TH 41	11	--	--	10	--	--	25	46
Highway 101	27	--	--	18	--	--	29	74
CSAH 9/45 [2]	114	14	6	36	9	4	47	230

[1] No river crossing closures in 1994 and 2000. No flood events since 2001.
[2] CSAH 9/45 was reconstructed in 2002. The improvements made to the bridge and its approaches have reduced its susceptibility to flooding to a 10-year flood frequency, similar to those of TH 41 and Highway 101.

Closure of existing TH 41, Highway 101 and CSAH 9/45 due to flooding creates serious traffic congestion in the southwest metropolitan area. Travel patterns are altered dramatically as transportation users search for the fastest route or route with reduced delays. The data in Table 2-7 indicate that the existing TH 41 crossing has been closed approximately every four years for a minimum of 10 days. The increase in costs to the traveling public that results from flooding (in terms of additional operating expenses for motor vehicles based on extra vehicle miles traveled and lost productivity due to extra travel time for motorists) was calculated as part of the benefit-cost analysis discussed in Chapter 4. Under 2030 No-Build conditions, closure of existing TH 41 due to flooding adds 765,000 vehicle miles traveled (VMT) per day and 30,600 vehicle hours traveled (VHT) per day, or $645,400 in costs to the traveling public for every day the roadway is closed. The diversion cost of a 10-day closure would be $6,454,000 (2006 dollars).

During flood-related closures, the two regional river crossings that do not flood (Bloomington Ferry and TH 25) are forced to carry the traffic that would normally use the other bridges. This leads to some congestion on TH 25 and substantially increases delays on the already congested Bloomington Ferry Bridge (US 169).

2.2.2.2 Public Safety

Disruption of travel patterns due to flooded river crossings affects not only commuters and the flow of freight, but also impacts emergency response vehicles that need to cross the Minnesota River. St. Francis Hospital, the hospital closest to the City of Chaska, is located on the south side of the Minnesota River in the City of Shakopee. According to Chaska staff, when Highway 101 floods, the roads that Emergency Medical Service (EMS) staff must travel to get to the existing TH 41 bridge become congested. (Highway 101 floods before existing TH 41 because it has a lower flood level.) When existing TH 41 also floods, EMS staff needs to use either the TH 25 bridge in Belle Plaine or the Bloomington Ferry Bridge to get to St. Francis Hospital in Shakopee. This diversion can add one and a half to two hours to EMS travel time, especially during peak hours. Because this is unacceptable in life-threatening situations, if TH 41 is closed, a medical emergency victim on the north side of the river will usually need to be transported to the City of Waconia, approximately 14 miles to the northwest. If it is not a life-threatening situation, the victim may be transported the 30+ miles out of the way to get to Shakopee via another river crossing. These delays seriously impact the ability of first responders to get patients to critical care facilities.

2.2.3 Improved Transportation System Connection for Traffic and Freight Movement

Planners and engineers also identify transportation need and purpose based on overall system planning elements such as functionality, system connectivity, and spacing. The sections below discuss existing TH 41 as it relates to these elements, which together make up the third basic element of the need for the project, that of an improved system connection.

2.2.3.1 System Functionality

Existing TH 41 is supposed to serve the role of a regional north-south principal arterial connection between the two east-west principal arterials (US 169 and New US 212); however, the functionality of this route is limited by the frequent stops, turns and interruptions of flow that occur as the corridor runs through downtown Chaska. The need for TH 41 to perform as a principal arterial is defined by its spacing to other north-south principal arterials, the limited number of north-south arterials in the southwestern metropolitan area, its existing and planned role in providing system connectivity and continuity between US 169 and New US 212, and its function as a regional river crossing.

2.2.3.1.1 System Spacing

Roadways are categorized by their function in the overall transportation network. Principal arterial roadways provide high mobility (usually high-speed roadways or freeways) and have limited access. These roadways are intended to serve longer regional and/or statewide trips rather than short trips. Principal arterials should be spaced two to three miles apart in fully developed areas (Minneapolis/St. Paul and first ring suburbs) and three to six miles in developing areas (second ring suburbs and beyond).[1]

Existing spacing of principal arterials within and near the study area suggests that another high-level connection is needed. The closest north-south principal arterials to existing TH 41 are well beyond the three to six miles suggested for this developing area. Trunk Highway 15, the closest north-south principal arterial to the west is approximately 40 miles away. United States Highway 169, which parallels the Minnesota River and crosses the river, is approximately 10 miles to the east of TH 41. See Figure 1-1 in Chapter 1. As the metropolitan area continues to expand to the west, towards the City of Carver and beyond, there will be greater demand for north-south travel, and existing TH 41, with all of its access and its poor spacing with other principal arterials, will not be able to fulfill that role. Without a new connection, adequate capacity will not be provided and service and safety issues and substantial delays will continue to occur at existing river crossings. Additionally, some traffic demand will be diverted to the existing minor arterial roadways, which are also at capacity and not intended to carry additional traffic loads.

2.2.3.1.2 System Connectivity

Principal arterials are intended to provide high mobility and limited access for longer trips. Existing TH 41 serves a larger travelshed, connecting US 169 in Scott County with TH 7, which is the border between Carver and Hennepin Counties. However, there is a substantial amount of

[1] Based on the Metropolitan Council Functional Classification Criteria for the Twin Cities metropolitan area.

access and travel speeds are low on existing TH 41, especially in downtown Chaska. A new high-capacity TH 41, with limited access within the study area would better connect Scott, Carver and Hennepin Counties, as well as provide better connectivity to the two east-west principal arterials (US 169 and New US 212). As the area continues to expand, there will be a greater emphasis on the north-south connections between Scott, Carver and Hennepin Counties within the study area.

This connectivity is important for regional travel efficiency and safety generally, but particularly for freight movements, which is discussed as it relates to the designation of US 169 and US 212 as interregional corridors (IRCs) as noted in Section 2.2.3.2 and detailed in Section 2.2.4.2.2.

2.2.3.2 Interregional Corridor (IRC) Connection

In addition to connecting Scott, Carver and Hennepin Counties, TH 41 plays an important role in connecting US 169 and US 212. Both US 169 and US 212 have been designated as High-Priority Interregional Corridors (IRCs) by Mn/DOT. The IRC system supports statewide economic activity by providing safe, reliable and efficient movement of people and goods between regional trade centers. Because of the important role that these corridors play, Mn/DOT developed Corridor Management Plans (CMPs) to preserve their functionality. Both of the CMPs for these roadways identify the important role TH 41 plays in connecting these two IRC routes. Both plans also acknowledge that a new regional river crossing is needed to improve the connectivity between the two routes in order to serve regional automobile and truck traffic.

One of the important functions that this connection provides is for agricultural traffic between Greater Minnesota (including large areas north of the Minnesota River) and the Ports of Savage (located in Scott County, south of the Minnesota River). Annually, thousands of shipments of grain from Greater Minnesota are sent to the Ports of Savage as well as fertilizer shipped from Savage to farms throughout Minnesota and the Dakotas. Many of the shipments use TH 41 to travel from east-west roadways (US 212, TH 7 and TH 5) to US 169 and then eastward to TH 13 where the Ports of Savage are located. Although there are a number of east-west routes that bring agricultural traffic into the Twin Cities metropolitan area, there are few north-south roadways that connect the east-west roadways to US 169. As a result, the truck trips on TH 41 tend to be more regional or interregional in nature.

2.2.4 Additional Transportation Needs

The three transportation objectives described in the previous sections establish the primary purpose of and need for the proposed project. The proposed project would also meet other transportation needs including improvement of safety, accommodation of a range of travel modes, consistency with adopted transportation plans and enhancement of quality of life. These needs are discussed in the following sections.

2.2.4.1 Traffic Safety Issues on Existing TH 41

Transportation safety issues in the TH 41 corridor, including vehicle crash rates/severity rates and pedestrian and bicycle safety issues are discussed below.

2.2.4.1.1 Crash and Severity Rates

Segment and intersection crash analyses for the years 2001, 2002, and 2004 were conducted for TH 41 from US 169 to existing US 212. Table 2-8 shows a comparison of the calculated crash and severity rates to Mn/DOT's average segment and intersection rates for the state. All calculated crash and severity rates in the TH 41 corridor are higher than statewide average rates. The intersection of TH 41 and US 169 is on the state's list of the Top 200 Crash Intersections (crashes prior to recent geometric improvements). It should be noted that during the study period two fatal crashes occurred within the segment between the Minnesota River Bridge and US 169.

As travel demand along the corridor continues to increase and the corridor becomes even more congested, it is likely that crash rates will increase. At signalized intersections, rear-end crashes become more prevalent. At unsignalized intersections right-angle crashes increase as side-street traffic takes more risks and accepts smaller gaps. The proposed new river crossing would serve a substantial volume on a freeway type facility that typically has a crash rate and severity rate that is much less (two-to four times) than that of at-grade facilities.

TABLE 2-8
TRUNK HIGHWAY 41 CRASH RATE AND CRASH SEVERITY RATE
2001, 2002, 2004[(1)]

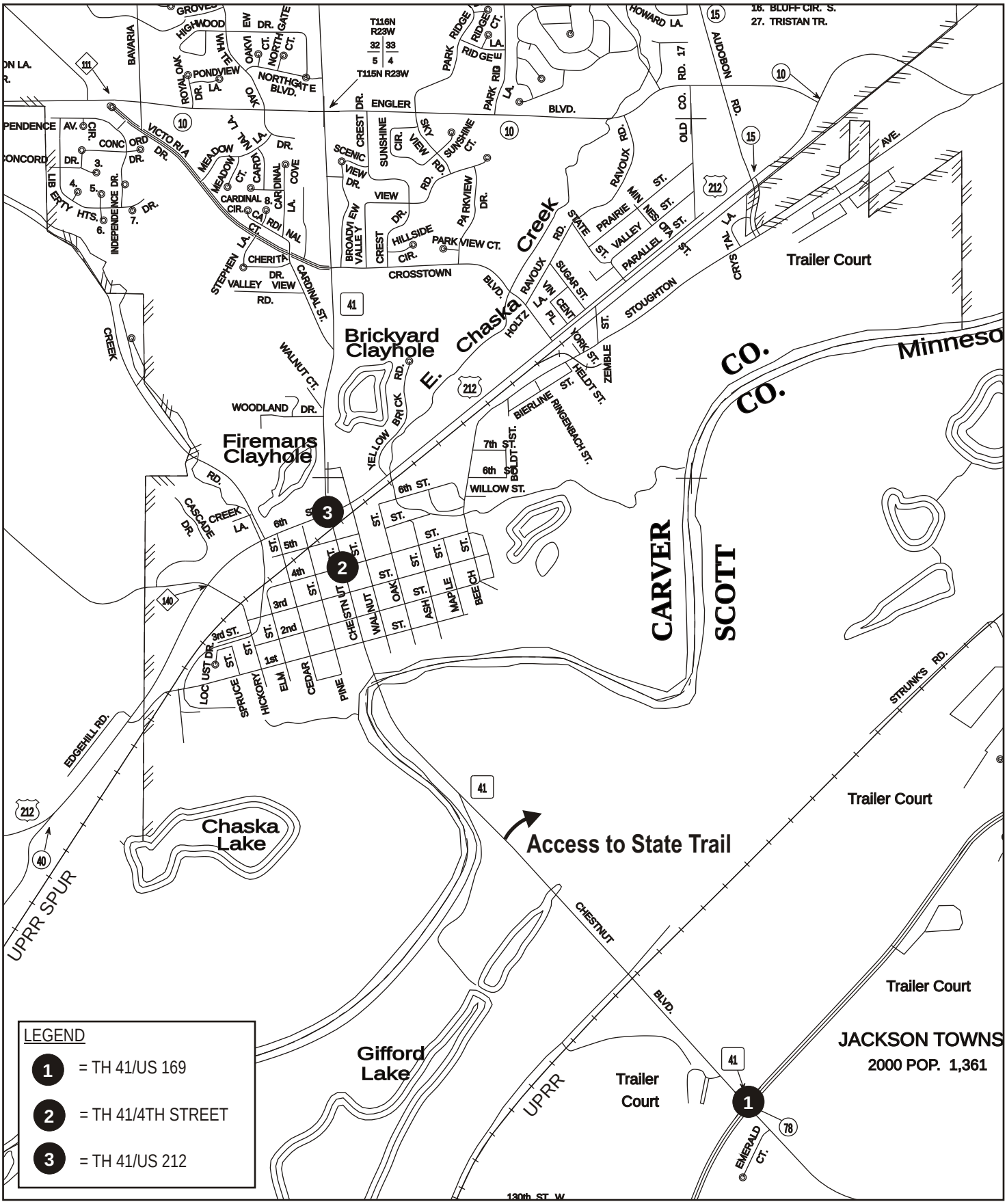
Trunk Highway 41	Crash Rate [(2)]	Severity Rate
Segment Crashes		
TH 41 between the Minnesota River Bridge and US 169 (2-lane)	3.0/**0.9**	4.3/**1.4**
TH 41 between US 212 and the Minnesota River Bridge (4-lane)	5.8/**4.9**	7.7/**6.9**
Intersection Crashes		
TH 41 and US 169	2.0/**0.8**	2.7/**1.2**
TH 41 and US 212	1.1/**0.8**	1.4/**1.1**

[(1)] Crash data from 2003 are not included due to data quality issues.
[(2)] Crash rates are reported per Million Vehicle Miles (MVM) for segments and as per Million Vehicles (MV) for the intersections. Mn/DOT numbers for comparative values for similar roadways statewide are shown in **bold type**.

2.2.4.1.2 Pedestrian-Bicyclist Safety

The Jackson Heights mobile home park is located near the existing TH 41/US 169 intersection; convenience stores are located across both TH 41 and US 169 from this residential community. Existing TH 41 provides bicycle/pedestrian access to the state trail system (Minnesota Valley State Trail). Walking and bicycling are part of the Chaska community quality. Within this environment, pedestrian and bicycle safety along existing TH 41, as well as near the TH 41/ US 169 intersection, is of special concern since the high traffic volumes and conflicting vehicle movements increase the potential for crashes involving pedestrians and bicyclists trying to cross or travel along the corridor. This issue is compounded by the high percent of heavy commercial vehicles (semi trucks, garbage, gravel and other large trucks) on TH 41. Crash data from 2001 to 2004 indicate that there were four crashes involving either pedestrians or bicyclists at the intersection of TH 41 and US 169, 4th Street and other downtown Chaska intersections, and existing US 212 (Figure 2-4).[2]

[2] Crash data from 2003 is not included due to data quality issues.



PEDESTRIAN OR BICYCLE CRASH LOCATIONS

Figure 2-4

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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As traffic volumes increase, it is likely that the conflict between pedestrians/bicyclists and motorists will worsen. Decreasing the overall through traffic (including trucks) in the corridor will help support pedestrian/bicycle movements.

2.2.4.1.3 At-Grade Railroad Crossing Hazard

Two Union Pacific freight rail lines (a mainline and a spur) run through the study area and cross TH 41 at at-grade locations (See Figure 2-2). The mainline, which runs parallel to and north of US 169, has a frequency of five trains per day. The spur, which runs south of existing US 212, has a frequency of three trains per day. (Note: Train frequencies noted represent Union Pacific's current records, but are subject to change.) The mainline crosses TH 41 north of US 169 and south of the Minnesota River; the spur line crosses TH 41 just south of the existing US 212 intersection in downtown Chaska. Long queues on TH 41 extend back from the US 169 intersection through the mainline crossing.

Crash data provided by Mn/DOT indicate that five crashes occurred at the intersection of TH 41 and the railroad's mainline (data is for the years 2001, 2002 and 2004). None of the crashes have actually been with a train, but they have occurred on the railroad crossing. This is a serious concern. A disabled vehicle on the railroad tracks could be struck by a train and result in serious injury. In addition, Mn/DOT has given the mainline crossing at TH 41 a hazard rating. A hazard rating is issued for at-grade rail crossings where there are high-traffic volumes, multiple trains per day and/or there have been crashes involving a train and a motor vehicle within the past five years. In addition, the rating takes into account the type of crossing protection in use. Currently, the mainline has gates, bells and flashing lights to warn motorists of approaching trains. The spur line was not identified as a hazard location; however, its proximity to highly congested intersections causes substantial operational issues when trains cross.

2.2.4.2 Accommodation Needs of a Range of Travel Modes

The transportation network needs to adequately serve the needs of a range of modes in addition to the private automobile. Issues related to truck travel, transit, and pedestrian/bicycle travel are discussed in the following sections.

2.2.4.2.1 Heavy Commercial Vehicle Traffic (Trucks)

As indicated in Section 2.2.1.2, study done in 2002 found that heavy commercial vehicle traffic on TH 41 constitutes almost 20 percent of the current total daily traffic volume. Typical roadways within the Twin Cities carry between five to 10 percent truck traffic; the Highway 101 river crossing carries approximately eight percent truck traffic. An assessment of truck traffic turning movements and origins and destinations on existing TH 41 was conducted in October 2002. The assessment is detailed in the Shipper and Carrier Survey Results report dated July 2003, contained in *Volume II: Technical Memoranda*. Key points include the following:

- Fifteen to 33 percent of truck traffic on TH 41 is related to agriculture and destined to the Ports of Savage. (15% based on single terminal survey; 33% based on modeling)
- The most frequently observed trucks include sand and aggregate haulers, fuel haulers, garbage trucks and general freight.
- The heaviest truck traffic period on TH 41 is between 10:00 a.m. and 11:00 a.m. During this hour, 37 percent of the traffic on TH 41 is composed of trucks.

- During the peak commuting hour (4:00-5:00 p.m.), trucks made up 13 percent of the traffic on TH 41. On Highway 101, trucks made up 7 percent of the peak period traffic.
- Truck volumes on TH 41 turning to and from US 169 are fairly evenly split between US 169 north (18 percent) and US 169 south (22 percent).
- Morning truck turning movements on TH 41 favor trips to and from US 169 north, while afternoon movements favor trips to and from US 169 south.
- Truck movements to and from existing US 212 west to TH 41 south are larger than volumes to and from existing US 212 east to TH 41 south.
- The highest truck movement at the US 212 and TH 41 intersection is the north/south through-movement on TH 41 (36 to 46 percent, depending on time of day).

These turning patterns indicate that industrial and commercial development north of existing US 212 on TH 41 plays a prominent role (i.e., the number and percent of trucks) in generating truck traffic on TH 41. While the Ports of Savage (north and east on US 169 and TH 13) are not the primary destination for truck traffic, this generator is a substantial contributor to truck travel demand on TH 41.

2.2.4.2.2 Transit

Transit services within the study area are currently limited and future increases in local and regional transit services are not part of local and regional transit plans. There are two primary transit operators in the area, with additional services provided for disabled individuals and senior citizens. In Scott County, Scott County Transit provides community bus and dial-a-ride services. In Carver County, SouthWest Metro provides both local community bus services and express bus services to downtown Minneapolis. The New TH 41 river crossing would increase overall river crossing capacity, thereby decreasing overall congestion. This would help facilitate any bus or vanpool service that is provided at this time. SouthWest Metro is in the process of updating its long-term transit plan for the area. The plan includes construction of a transit center development in Chanhassen at the New US 212/Highway 101 intersection which began in fall 2006. Also, plans include the design process for a park-and-ride at the intersection of the New US 212/TH 41 intersection in Chaska. Park-and-ride lots are also being developed in Scott County east of the project area.

Although a rapid transit corridor has been preserved from the City of Hopkins to the eastern edge of Chaska, it is currently being utilized as a pedestrian/bicycle trail corridor. Plans from the Metropolitan Council indicate that portions of this corridor could have light-rail transit type service sometime after 2020. No final alternative or plan for transit operation has been agreed to at this time.

2.2.4.2.3 Bicycle/Pedestrian Facilities

Section 2.2.4.1.2 identifies safety concerns due to conflicts between bicyclists/pedestrians and motor vehicles, primarily in downtown Chaska, and also near the TH 41/US 169 intersection (Jackson Heights mobile home park). In addition to safety concerns, the high volumes of vehicular traffic and high percentage of large trucks in the TH 41 corridor make it uninviting for pedestrians and bicyclists. While there are no designated bicycle lanes or facilities along existing TH 41, there is a state trail system (Minnesota Valley State Trail) that crosses TH 41 just

south of the main Minnesota River channel bridge (south of downtown Chaska). Sidewalks connect downtown Chaska to the bridge; however, bicyclists who do not choose to ride on the sidewalks have to ride with traffic. In downtown Chaska this can be challenging given the fact that there is on-street parking and a large percent (almost 20 percent) of the vehicles in downtown Chaska are large trucks. The already limited ability of the existing TH 41 corridor to provide a safe, inviting route for bicyclists and pedestrians will become more limited as traffic volumes continue to increase.

2.2.4.3 Consistency with Adopted Transportation Plans

State, regional and local plans have recognized the importance of TH 41 in serving the transportation needs of the area and region. These plans have also identified capacity, flooding and development concerns that limit the existing roadway's ability to fulfill its role as a regional principal arterial river crossing for the long-term.

2.2.4.3.1 State Plans

As explained in Section 2.2.3.2, Mn/DOT developed the Interregional Corridor (IRC) system to support statewide economic activity by maintaining safe, reliable and efficient movement of people and goods between Greater Minnesota and the Twin Cities. Two of the roadways identified as part of that system are US 212 and US 169. Because of their role in the IRC System, both of the roadways have had Corridor Management Plans (CMPs) completed to identify improvements needed in order to maintain their mobility and enhance their safety for the long-term. The CMPs for these roadways identified the importance of a new regional river crossing in the vicinity of existing TH 41 to improve mobility on the principal arterial connection between the two corridors. The US 169 CMP confirmed the long identified need for a new river crossing as well as the need to upgrade the existing US 169/TH 41 intersection to an interchange. The US 212 CMP identified the need to improve the connection to US 169 through a new river crossing.

2.2.4.3.2 Regional Plans

Metropolitan Council

In 1989, the Metropolitan Council completed its *Major River Crossings Study Report*. This study evaluated major river crossing needs in the Twin Cities. At the time of the study, TH 41 was identified as the sixth priority out of 20 major crossings that were ranked. Since 1989, four of the five major crossings ranked ahead of TH 41 have been constructed or are under construction. The only crossing ranked ahead of TH 41 that has yet to be constructed is the St. Croix River Crossing at Stillwater.

In addition to the *Major River Crossings Study Report*, the Metropolitan Council's 2001 *Transportation Policy Plan* prioritized major river crossing needs in the Twin Cities. This plan identified the need for a high capacity principal arterial connecting US 169 and New US 212 in the vicinity of TH 41. Capacity was noted as an issue during both the morning and afternoon peak periods. The *Transportation Policy Plan* also identified right of way preservation needs for this new river crossing as a priority for system expansion projects for the years 2001 to 2025.

The 2004 *Transportation Policy Plan* acknowledges the on-going need for a new principal arterial river crossing within the study area. The 2004 *Transportation Policy Plan* noted that a new river crossing was needed for mobility reasons, but that funding was not available at this time. The plan included a recommendation that right of way be preserved for a future corridor. Funding for right of way preservation was included under the constrained funding scenario.

Mn/DOT's Metropolitan District

Mn/DOT's Metropolitan Division identified a new TH 41 regional river crossing as an unmet need in its 1997, 2001 and 2005 *Transportation System Plans* (TSPs). The plans specifically acknowledge congestion and safety issues with the existing river crossing; because the plans were fiscally constrained, at present, only right of way preservation funding is designated for this project within the next 20 years.

2.2.4.3.3 Local Plans

Information contained in this section is from local comprehensive and transportation plans for communities within the study area. These plans were developed between 1998 and 2001. In 2005, the Metropolitan Council developed new policies and planning requirements relating to development within the Twin Cities metropolitan area. Communities within the metropolitan area will be required to update their existing transportation plans before December 2008. New information regarding local plans will become available as agencies update their transportation plans.

Carver County

When Carver County updated its transportation plan in 1999, it conducted a special area study to identify the long-term function of TH 41. As part of the analysis, future traffic volumes were projected to 2020 to determine whether or not the existing corridor could operate at a reasonable level of service. Results from the study indicated that there would be enough traffic demand to warrant a new regional river crossing in addition to the existing TH 41 corridor serving as a local crossing. The study also indicated that even if a new TH 41 corridor crossing was constructed, the existing alignment's connection to US 169 should be upgraded to an interchange in order to improve mobility on both existing TH 41 and US 169. Note, the need for an interchange at this location was confirmed by the US 169 CMP (see Section 2.2.4.3.1).

Scott County

The 2001 Scott County Transportation Plan recognizes the importance of TH 41 in its function as a regional principal arterial river crossing between US 212 and US 169 and expresses support for a new river crossing connecting US 169 and US 212.

City of Chanhassen

The City of Chanhassen has expressed support for a new regional river crossing in transportation planning studies and environmental documentation studies since the 1970s. The city's 1998 comprehensive plan expresses the need for a new regional river crossing as well as the need to improve the existing TH 41 facility.

City of Chaska

The City of Chaska has expressed support for a new connection/regional river crossing in transportation planning studies and environmental documentation studies since the 1970s. Based on these early environmental studies, Chaska has identified the location of a proposed new TH 41 corridor in its comprehensive plan and has preserved right of way for this general corridor based on the 1974 DEIS Build alignment. The City of Chaska's rationale for supporting a new regional river crossing is threefold. First, the volume of vehicles as well as the type of vehicles (heavy commercial vehicles) passing through the downtown is disruptive to local businesses, has a negative impact on historic buildings, hinders pedestrian and bicycle movement, and decreases the overall quality of life in the downtown. Second, the existing roadway has capacity constraints and does not function as a high-level principal arterial. Third, when TH 41 is closed due to flooding, City residents are forced to use alternate roadways to travel to their destinations.

2.2.4.4 Quality of Life

As discussed in previous sections, the high percent of truck traffic on existing TH 41 poses concerns with regard to traffic operations and safety. In addition to these concerns, the traffic mix has a negative impact on the quality of life in downtown Chaska. Portions of downtown Chaska are designated as an historic district. The constant exposure to exhaust and vibrations from heavy commercial vehicles and other traffic has the potential to threaten some of the buildings' structure and facing. During the summer months, the City of Chaska has plastic flowers and nylon banners along the sidewalks in the downtown area. According to staff, these items are washed on a weekly basis to remove the soot and grime from the truck traffic. In addition, the sheer volume of trucks in the TH 41 corridor makes the area uninviting for pedestrians (i.e., shoppers). A new TH 41 river crossing corridor would meet the dual objectives of facilitating truck transport and alleviating negative effects of heavy truck volumes on downtown Chaska. Chapter 4 reports truck volumes under 2040 Build conditions of 700-900 trucks per day compared to 2,700 trucks per day under 2040 No-Build conditions.

2.3 SUMMARY OF PROJECT NEED/PURPOSE

The purpose of the Tier I EIS is to identify and evaluate the social, economic and environmental issues associated with the alternative corridor locations, as a basis for identifying a preferred alignment corridor that can be preserved for future use.

The previous sections describe in more detail the purpose for proposing an improved TH 41 principal arterial river crossing connection to meet state, regional and local area transportation needs as well as to resolve other current and future problems in the existing TH 41 corridor. The primary findings regarding the need for an improved TH 41 connection include:

1. Inadequate Capacity

   Trunk Highway 41 serves as an important river crossing in the southwest metropolitan area that includes two of the three fastest growing counties in the state. Currently, TH 41 functions below the acceptable level of service (LOS) threshold with lengthy queues and delays occurring at the TH 41/US 212 intersection during peak travel periods.

Future traffic volumes within the existing TH 41 corridor are forecast to increase by 97 percent by 2040 (18,500 ADT in year 2000 and 36,500 ADT in 2040) resulting in increasing levels of congestion. Overall, traffic volumes on the five Minnesota River crossing corridors in the vicinity of TH 41 are forecast to increase by over 83 percent by 2040. No-Build LOS on TH 41 is expected to be "F" for a majority of intersections by 2030. By 2040, there will be 10 directional hours of congestion on TH 41 and Highway 101 if a new alignment is not built.

2. Regional Congestion and Public Safety Concerns During Flooding

Regular flooding on the existing TH 41, Highway 101 and CSAH 9/45 river crossings in the vicinity of the study area results in emergency response service concerns plus increased costs to the traveling public due to substantial user delays and diversions. The closest river crossing above the 100-year floodplain (US 169) is 10 miles to the east of TH 41. Existing and projected future traffic demand on the US 169 crossing limits its ability to accommodate additional traffic during flood events.

3. Improved Regional Connection for Traffic and Freight Movement between US 169 and New US 212

A new principal arterial connection between US 169 and New US 212 is needed to provide an important river crossing in the overall transportation system in the southwest metropolitan area. This new connection is consistent with principal arterial functions and IRC objectives that cannot be addressed by the existing TH 41 corridor. It is also consistent with local, regional and state transportation plans.

4. Additional Needs

Additional transportation needs that a new TH 41 freeway facility would address include:

a. Vehicle, pedestrian and bicycle safety needs along existing TH 41.

b. Need to facilitating goods movement by providing an improved capacity principal arterial connection across the Minnesota River.

c. Improving the quality of life in downtown Chaska by reducing the percent of truck traffic through downtown.

3.0 ALTERNATIVES

This chapter of the DEIS presents a summary of the alternative development process, including early alternative locations studied and documented in the 1974 DEIS; this chapter also discusses the refinements of alternative alignments during the present study process, including the consideration of several sub-alternatives; and descriptions of the alternatives that were analyzed in detail for the DEIS. Because the environmental review for the proposed project is being done in a tiered process, as described in Section 2.1, the alternatives were developed at the level for corridor-analysis, rather than for detailed design. A sufficient level of design was done to ensure the physical and operational feasibility of alternatives, and to inform a corridor-level analysis of the alternatives.

3.1 SUMMARY OF ALTERNATIVE DEVELOPMENT PROCESS

Section 2.1 details the history of the project. As noted in these sections, an improved river crossing in the vicinity of Chaska and Shakopee has been discussed since the population in this portion of the Twin Cities began growing in the late 1960s. The 1970 Study discussed in Section 2.1 identified four system alternatives. Proposed System "D" was selected as the preferred long-term system concept for the three roadway corridors (US 169, US 212 and TH 41). The 1974 DEIS for TH 41 considered alternatives that included No-Build; a mass transit option; two alternatives involving the upgrading of the existing route; one alternative upgrading partially along the existing route; and construction along a new corridor alignment (Alternative 41-D) identified in the 1970 Study. Only Alternative 41-D (Figure 3-1), which included two alignment options between US 169 and US 212, and the No-Build alternative were analyzed in detail in the 1974 DEIS. The other 1974 DEIS alternatives were rejected because they were found to be not feasible or to have unacceptable impacts. Due to lack of funding for the project, a final EIS (FEIS) was not completed.

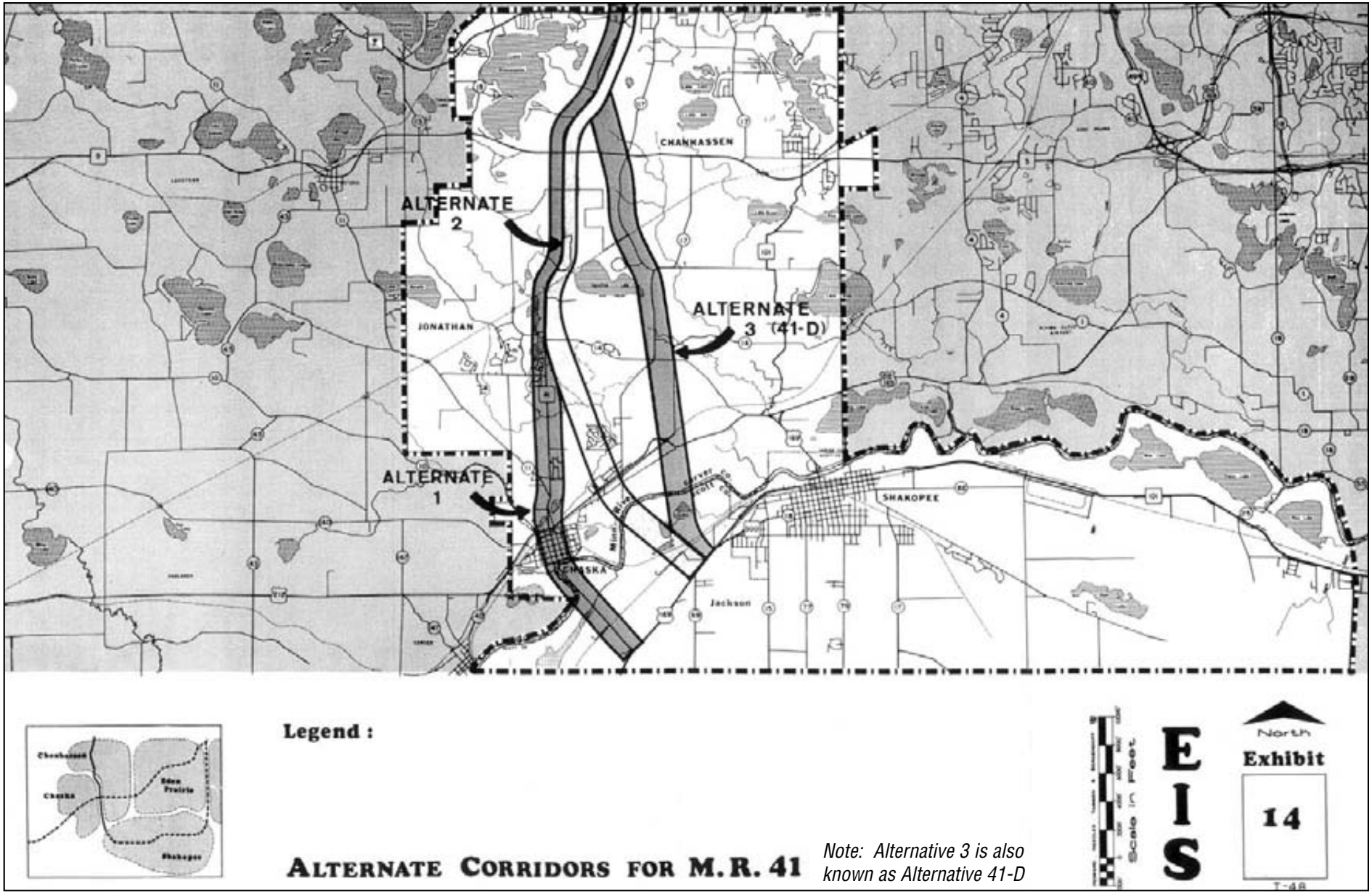
Since a FEIS and federal Record of Decision were not completed for the 1974 EIS process, and since conditions have changed substantially in the study area since the 1970s, a new environmental review (EIS scoping) process for the project was initiated in 2002. Development and evaluation of alternatives in the current scoping process were informed, but not limited, by the studies performed in the 1970s. For example, development of retained study alternatives included alignments representative of the Alternative 41-D corridor from the 1974 DEIS. However, the current scoping process considered a larger study area and broader range of alternatives compared to the 1970s studies.

On January 10, 2003, FHWA issued a notice of intent to prepare a Tier I EIS to improve capacity on TH 41 between TH 169 and proposed TH 212, including a crossing of the Minnesota River. The Notice of Intent was published in the Federal register, Volume 68, Number 7.

3.1.1 Scoping Process and Decision

The process used to develop alternatives for the current Draft EIS is described in detail in the *TH 41 Over the Minnesota River: Scoping Document/Draft Scoping Decision Document* (SD/DSDD), April 2004, and included the following steps:

- Identification of study area limits
- Identification of evaluation criteria



Graphics/Support/4590/DEIS Graphics

ALTERNATIVE "41-D" from 1974 DEIS

Figure 3-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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- Initial definition/screening of alternatives
- Development and evaluation of potential Build alignment alternatives
- Public/agency input in the process

3.1.1.1 Study Area Limits

As discussed in Section 1.2 and in the SD/DSDD, the present study area is bordered on the south by US 169; on the north by New US 212; on the west by CSAH 14 in Scott County and just west of the City of Carver in Carver County; and on the east by Highway 101. (See Figure 1-1.)

These limits were established based on physical limitations and the proximity of US 169 and New US 212 to each other (beyond the defined east-west boundaries, the two roadways diverge dramatically). The scoping process limited exploration of potential alternatives to locations within these boundaries. (The study area was expanded beyond the original 1970 Study area because, compared to the 1970s, development is moving west.)

3.1.1.2 Evaluation Criteria

During the scoping study, two levels of criteria were developed to facilitate the identification and screening of alternatives. These criteria are presented in Table 3-1. Level I criteria define the essential transportation objectives (i.e., purpose and need) for the project (see Chapter 2), i.e., (a) increase river crossing capacity and meet 2040 forecast capacity needs, (b) can be constructed above the 100-year floodplain, and (c) provide a principal arterial roadway connection between US 169 and New US 212. Scoping alternatives that did not meet the Level I criteria, that is, that would not fulfill the basic need for the project, were eliminated from further study during the screening evaluation process.

Level II criteria address social, economic and environmental (SEE) impacts and transportation/design impacts. The Level II SEE and transportation/design issues are those that were identified through scoping as key issues, not only because of the level of concern associated with potential impacts, but also because impacts are measurably different for different Build alternative alignments. Level II criteria were used to provide guidance for comparing alternatives that meet Level I transportation need criteria, but involve trade-offs among impacts on key resources and transportation benefits/design considerations. While the Level I evaluation was absolute in nature (i.e., alternatives either did or did not meet the need criteria), the Level II criteria were developed to provide a comparative framework for discerning which alternatives should be further studied in the DEIS.

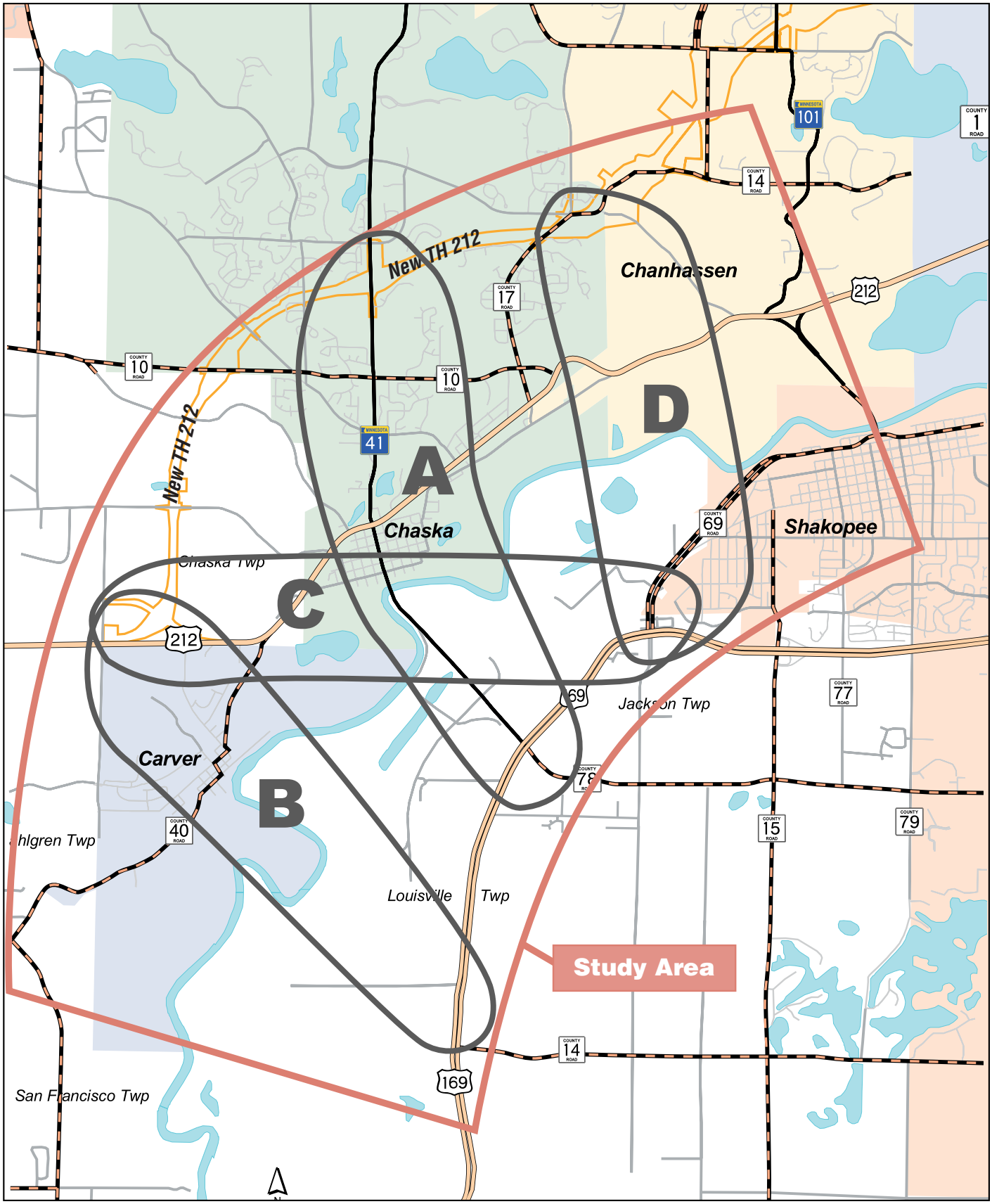
3.1.1.3 Initial Definition and Screening of Alternatives

Initial definition of scoping alternatives included establishing the assumptions for No-Build and Minimum Build alternatives. An initial screening process was also performed for orientations/connections of Build alternative “test links” to provide an assessment of whether any test link alignments should be eliminated from further consideration because they would not serve a beneficial transportation function. (Note that travel forecasts prepared for the Scoping Analysis utilized socioeconomic inputs and the forecast model that were available at the time; DEIS travel forecasts utilized updated inputs and the new forecast model, as described in Chapter 4.)

TABLE 3-1
SCOPING ALTERNATIVES EVALUATION CRITERIA

Evaluation Criteria		
	Level II	
Level I **Transportation Need**	**SEE Impacts: Nature of and potential extent of impact on**	**Transportation and Design Issues**
▪ The alternative increases river crossing capacity and can be designed to meet forecast capacity needs (year 2040) ▪ The alternative can be constructed above the 100-year floodplain. ▪ The alternative connects US 169 to New US 212	▪ Right of way and land use ▪ Environmental justice (low income and/or minority populations) ▪ Cultural resources ▪ Cemetery ▪ Minnesota Valley National Wildlife Refuge ▪ Sensitive biological areas ▪ State Wildlife Management Area	▪ The extent to which the alternative relieves existing congested crossings ▪ The travelshed (market area) served by the alternative ▪ Other design issues identified in concept development, such as topography, access considerations, optimizing interchange spacings, transportation system connection/design standards, etc. ▪ Fiscal issues: relative implementation cost vs. transportation and environmental benefits

Initial scoping alternatives included No-Build, Minimum Build (Transportation System Management/Travel Demand Management (TSM/TDM) alternative, and the four general Build locations shown in Figure 3-2. The Minimum Build alternative was evaluated to determine if minimum improvements to existing roadways such as turn lanes, auxiliary lanes, improved geometrics or improved intersection controls (TSM) plus decreased travel demand due to transit, carpooling or other actions (TDM) could accommodate future travel demands. Evaluation/screening of the Minimum Build alternative was based on the results of a forecast model run where it was assumed that a 10 to 15 percent capacity increase could be achieved on existing TH 41 and Highway 101 through implementation of a broad range of minor improvements to the existing corridors, and a five to 15 percent reduction in work-related trips on the regional system could be achieved through transit and other TDM measures. The percentage assumed at a given location was dependent upon employment density. The result of the forecast model run for this scenario indicated that this alternative would not meet future river crossing travel demand. It was eliminated from further consideration based on Level I evaluation criteria (i.e., it would provide only limited capacity improvement, would perpetuate bridge closures due to flooding, and would provide no supplementary connection between US 169 and new US 212, therefore would not meet the project purpose and need).



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TEST LINKS

Figure 3-2

TRUNK HIGHWAY 41 - MINNESOTA RIVER CROSSING
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The four general Build locations shown in Figure 3-2 were used as “test links" within the study area to test the effect of general locations and orientations for an improved capacity river crossing connection between US 169 and New US 212. The test link analysis assessed the following factors:

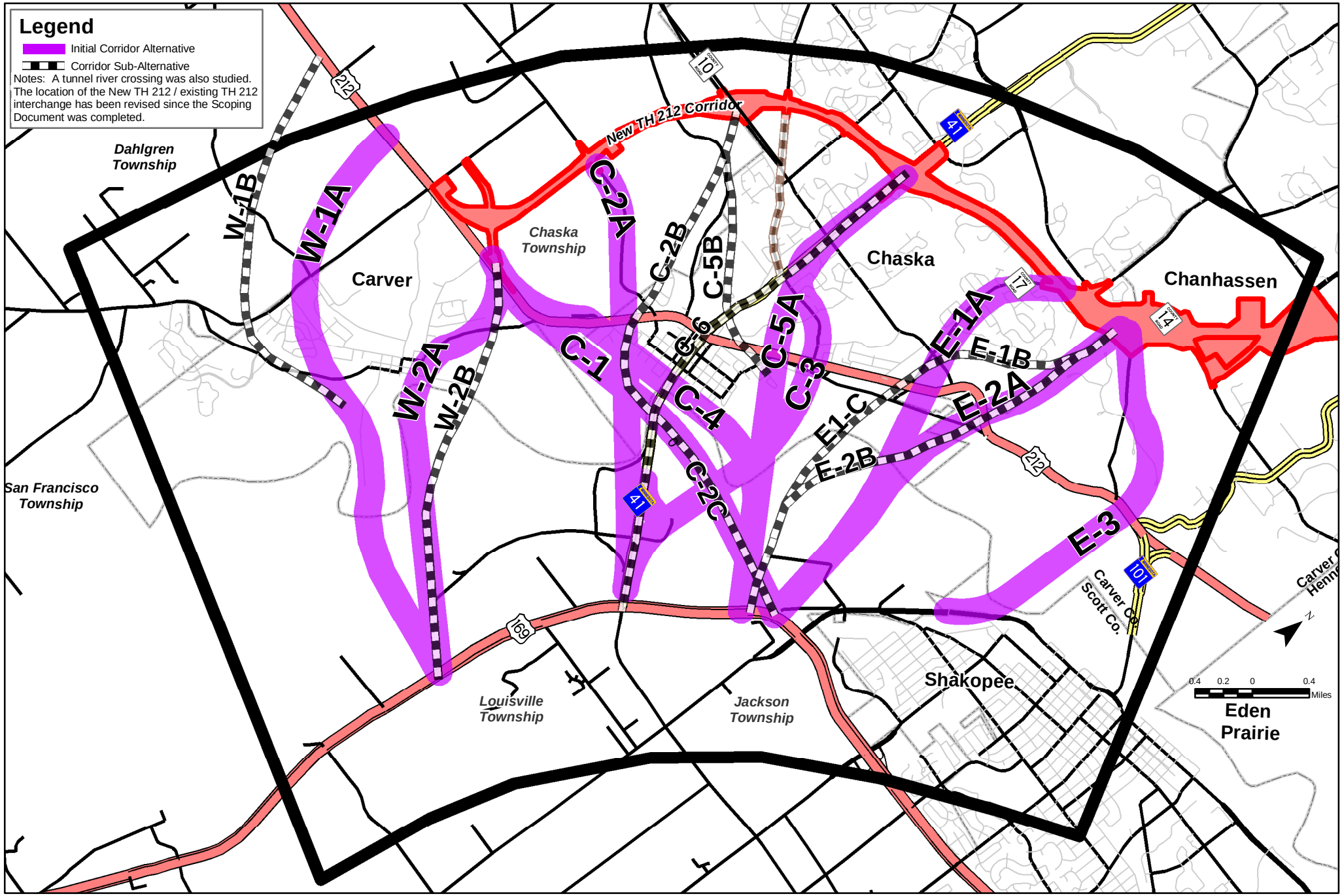
- Forecast volumes (i.e., travel demand) on each test link crossing and for No-Build conditions.
- Number of trips attracted from other crossings under each test link, i.e., trips that would otherwise have crossed the river elsewhere to arrive at the same destination. Other crossings evaluated in the forecasting include TH 25, CSAH 9/CSAH 45, TH 41, Highway 101, US 169 and I-35W.
- The amount of “previously unserved demand” for each test link, i.e., trips that would otherwise have chosen a different destination but that now choose a destination across the river due to the improved accessibility.
- “Demand market area” for each test link (i.e., selected link analysis showing where trips on each link come to/from).

Results of the test link analysis did not support elimination of any of the test link corridor locations/orientations on the basis of serving substantially fewer trips. The test link analysis indicated that a four-lane facility was needed to accommodate the study year (2040) travel demand.

3.1.1.4 Development of Scoping Build Alternative Alignments

Informed by the findings of the test link analysis, the Project Management Team (PMT), with the input of the Study Advisory Committee (SAC) and other stakeholders (described in Chapter 15), developed a wide range of potential Build alternatives within the parameters of the three primary transportation objectives for the project (increases river crossing capacity, alternative would be located above the 100-year floodplain, and connects US 169 and new US 212) and responding to the environmental and design constraints that exist within the study area. The identification and evaluation of this wide range of alternatives was an iterative rather than a purely sequential process, as preliminary evaluation of alternatives often generated ideas for new alternatives or sub-alternatives. Generally, the Build alternatives were grouped into three main categories, based on location within the study area: West (W), Central (C) and East (E). Sub-alternative designations within these general groupings were assigned as the iterative process of revising alternatives proceeded.

The initial set of 11 alternatives comprised variations on the test link corridors as well as a tunnel option that was proposed at the January 2003 SAC meeting. These 11 alternatives were presented to the SAC at its February 2003 meeting and evaluated in additional detail at its March 2003 meeting. Based on continued assessment of constraints and opportunities and consultation with stakeholders, the PMT subsequently identified one additional alternative and eight sub-alternatives, bringing the total number of potential Build alternatives and sub-alternatives for scoping level evaluation to 20. These are depicted in Figure 3-3.



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SCOPING BUILD ALTERNATIVES - Scoping Document

Figure 3-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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The scoping process included an evaluation of each of the 11 alternatives (including sub-alternatives) based on the Level I (purpose and need) and II (SEE impacts and transportation and design issues) evaluation criteria. Based on results from the Level I and II evaluation, the SD/DSDD recommended the further analysis of the No-Build alternative and four Build alternatives. The SD/DSDD was released for public review April 26, 2004. A public scoping meeting was held May 20, 2004; the formal comment period concluded May 26, 2004. Mn/DOT received the comments submitted on the SD/DSDD and conferred with the PMT and SAC prior to issuing a scoping decision.

3.1.1.5 Scoping Decision

Mn/DOT approved a Scoping Decision Document (SDD) for the proposed project February 18, 2005. The SDD included a No-Build alternative and four Build alternatives (W-2, C-2, E-1 and E-2) to be studied in the EIS (See Figure 3-4). Mn/DOT approved an Amended SDD on March 16, 2006, discussed in Section 3.2.1.1.

3.1.2 Alternatives Retained for Detailed Analysis in the Tier I DEIS

3.1.2.1 Alternative Refinement

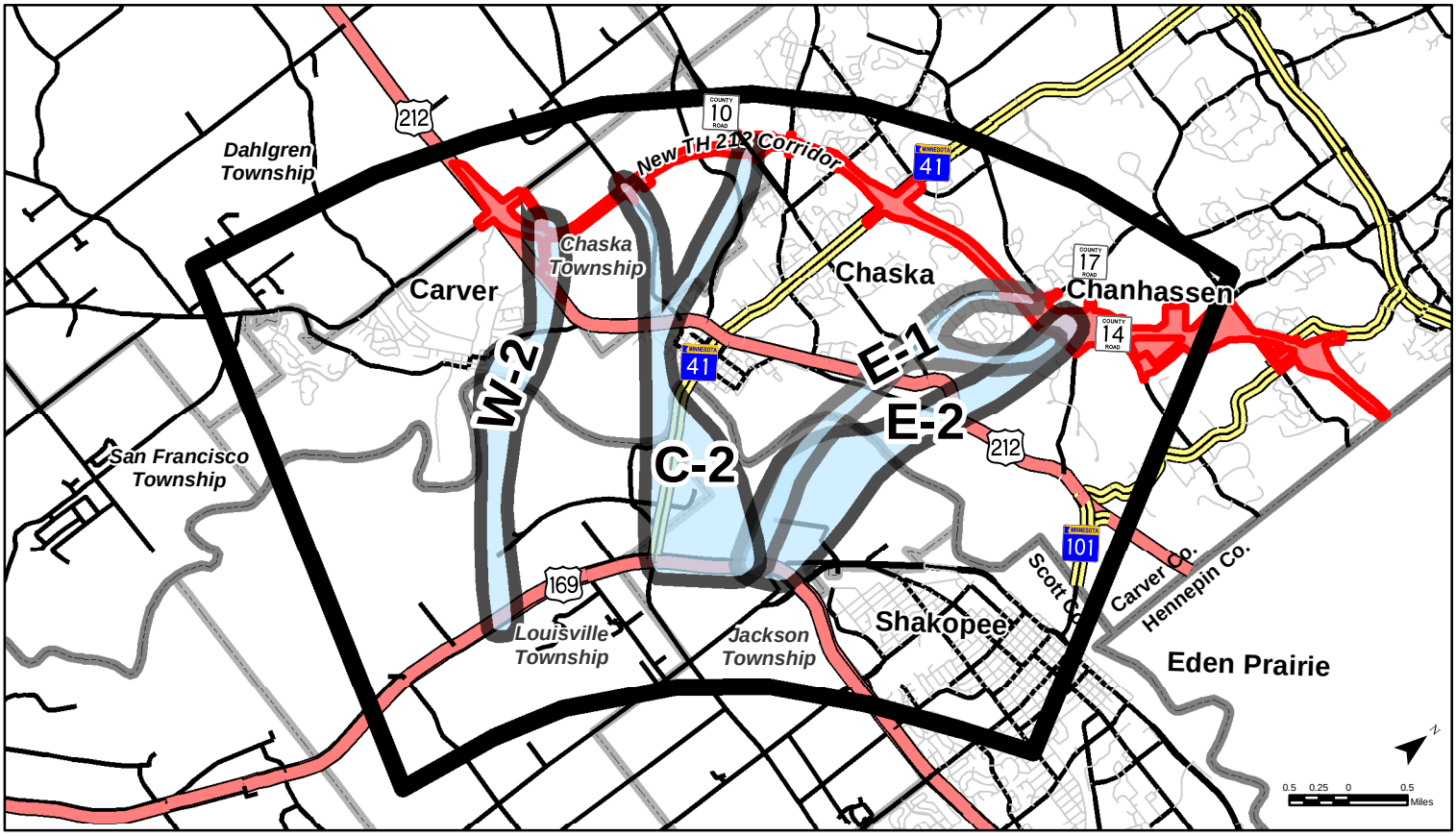
An initial task in the DEIS process was to refine the broad Build corridors identified during the scoping process into feasible alignments that meet engineering design standards, provide for acceptable freeway traffic operations (i.e., within capacity thresholds in 2040, with adequate merge/diverge weave distances), allow for development/maintenance of local transportation networks to meet access and system needs, and minimize socioeconomic and environmental impacts. The four broad scoping Build corridors were refined into six DEIS Build alternatives as follows and as shown on Figure 3-5:

1. Scoping Alternative W-2

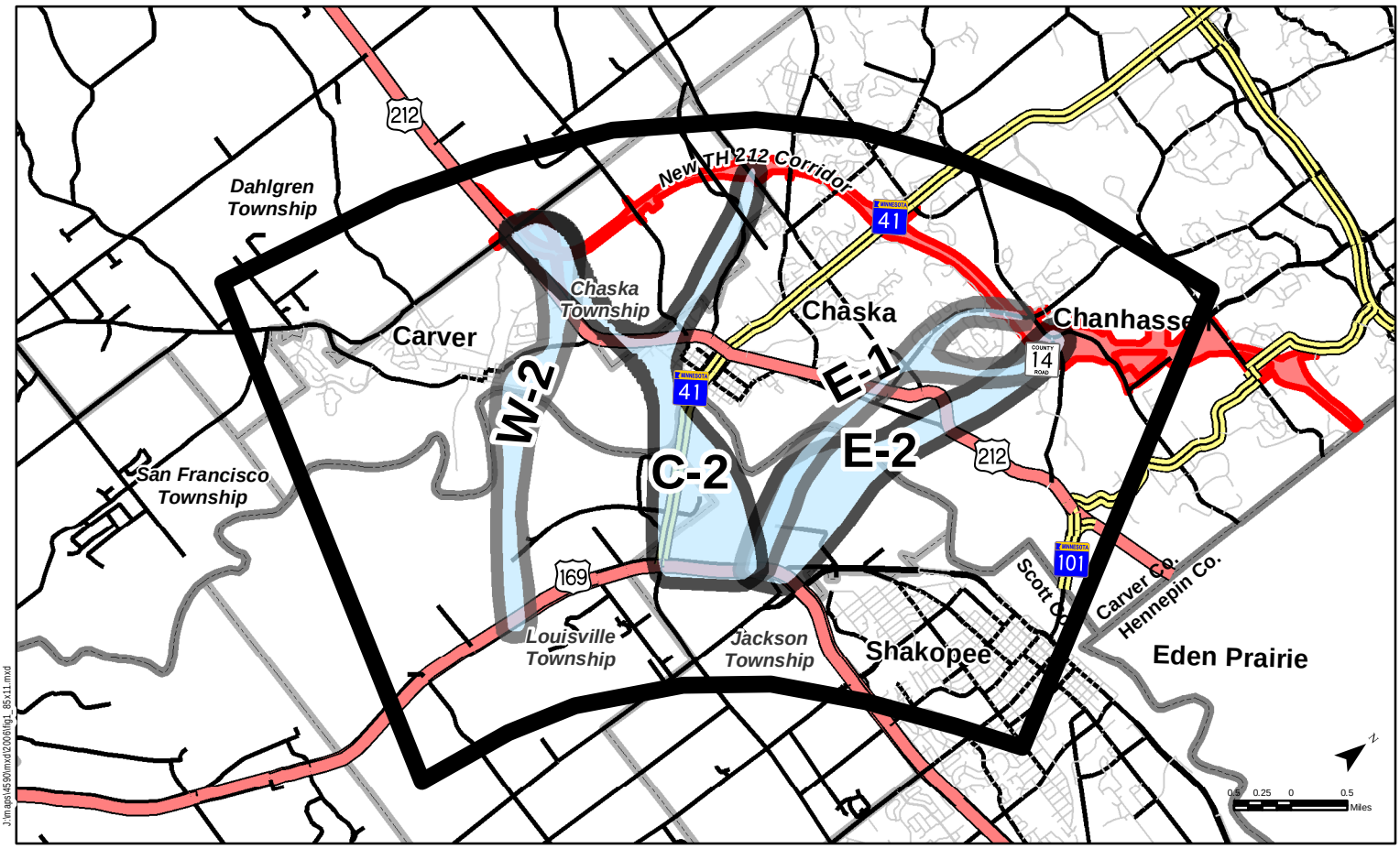
   The scoping corridor for this alternative is broad as it crosses the river. In the DEIS alternative refinement process, an alignment was developed within this corridor.

2. Scoping Alternative C-2

   The scoping corridor for this alternative: (a) is broad at the south end to provide for alternative locations for its intersection with US 169 and to provide for a potentially realigned existing TH 41, and (b) provides for two alternative connections to New US 212: at CR 140 and at Engler Boulevard/CSAH 10 (hereafter referred to as Engler Boulevard). In the DEIS alternative refinement process, this scoping alternative was developed into two separate DEIS alternatives: C-2 and C-2A. The DEIS Alternative C-2 was further refined with a new northern terminus near CSAH 11/ CR 147 (hereafter referred to as CSAH 11); as noted, the SDD was amended in March 2006 to provide for this revision (see Section 3.1.2.2).



Scoping Decision Document - February 2005



Amended Scoping Decision Document - March 2006

BUILD ALTERNATIVES TO BE ANALYZED IN DEIS

Figure 3-4

TRUNK HIGHWAY 41 OVER THE MINNESOTA RIVER
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3. Scoping Alternative E-1

The scoping corridor for this alternative provides for two alternative connections to New US 212: at CSAH 17/Audubon Road (hereafter referred to as Audubon Road) and at Bluff Creek Drive. In the DEIS alternative refinement process, this scoping alternative was developed into two separate DEIS alternatives: E-1 and E-1A.

4. Scoping Alternative E-2

The scoping corridor for this alternative is broad to cover the area identified in the 1974 DEIS Alternative 41-D corridor and allow for further refinement.

The alignment development process occurred in consultation with project stakeholders. Iterative versions of the Build alternatives were reviewed at PMT, SAC, agency, and public meetings. The agency coordination and public review process is detailed in Chapter 15.

During the DEIS process, preferred concepts were identified for each of the six Build alternatives to be retained for detailed study/comparison in the DEIS. Along with the identification of a preferred concept for each Build alternative, other local and regional access considerations were reviewed and concepts addressing these needs were developed.

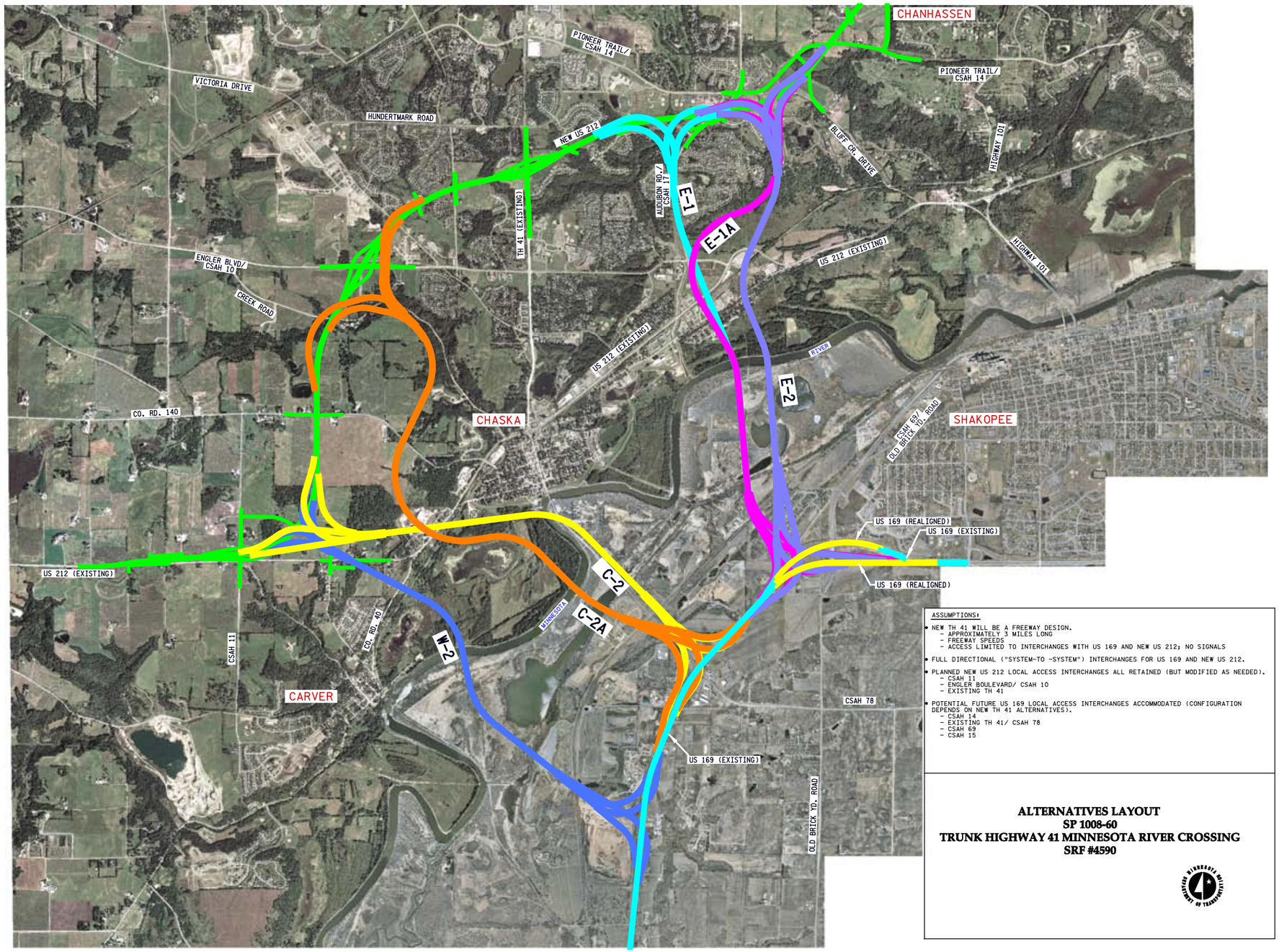
3.1.2.2 Amended Scoping Decision

As described in Section 3.2.2, the development of specific alignments within the identified alternative corridors during the DEIS process which followed the publication of the 2005 SDD, sought to minimize socioeconomic and environmental impacts and included consultation with agency and public stakeholders in that regard. One outcome of this process is that revisions to Alternative C-2 resulted in an alternative that was no longer within the limits of the broad corridor shown in the SDD. The SDD was amended to expand the limits of the corridor to include the revised alternative and provide the rationale for its inclusion in the DEIS. Notice of the Amended SDD was published March 27, 2006. The revised map of SDD Build alternatives is included in Figure 3-4. A public meeting to present the revised Alternative C-2 was held March 16, 2006. Alternative C-2 is described in Section 3.2.4.2.

3.2 DESCRIPTION OF DEIS ALTERNATIVES

3.2.1 No-Build Alternative

The No-Build alternative does not include construction of a new TH 41 river crossing. This alternative would continue to utilize the existing TH 41 corridor as the connection between US 169 and New US 212, including existing at-grade access points, intersection configurations, alignments and geometrics. The No-Build alternative would include needed safety improvements and reconstruction of existing TH 41 (as required by routine maintenance) between US 169 and New US 212 within the study area. The No-Build alternative could also include consolidation of direct access points along TH 41 warranted by safety conditions. Social, economic and environmental impacts of the No-Build alternative are analyzed where relevant and compared to impacts of the Build alternatives in subsequent chapters.



ASSUMPTIONS:

- NEW TH 41 WILL BE A FREEWAY DESIGN.
  - APPROXIMATELY 3 MILES LONG
  - FREEWAY SPEEDS
  - ACCESS LIMITED TO INTERCHANGES WITH US 169 AND NEW US 212; NO SIGNALS
- FULL DIRECTIONAL ("SYSTEM-TO -SYSTEM") INTERCHANGES FOR US 169 AND NEW US 212.
- PLANNED NEW US 212 LOCAL ACCESS INTERCHANGES ALL RETAINED (BUT MODIFIED AS NEEDED).
  - CSAH 11
  - ENGLER BOULEVARD/ CSAH 10
  - EXISTING TH 41
- POTENTIAL FUTURE US 169 LOCAL ACCESS INTERCHANGES ACCOMMODATED (CONFIGURATION DEPENDS ON NEW TH 41 ALTERNATIVES).
  - CSAH 14
  - EXISTING TH 41/ CSAH 78
  - CSAH 69
  - CSAH 15

ALTERNATIVES LAYOUT
SP 1008-60
TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
SRF #4590

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BUILD ALTERNATIVES

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Figure 3-5

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As indicated, the No-Build alternative would include programmed (i.e., included in state or county transportation improvement plans) improvements to the regional transportation system. The No-Build alternative also includes improvements to US 169 that are included in concept in the CMP, but not yet programmed in the fiscally-constrained Mn/DOT Metro District 20-year plan. The programmed improvements are functionally the same under No-Build or Build conditions; the configuration of US 169, certain interchanges of New US 212, and local roadways may vary under Build conditions. Within the study area, the programmed improvements are substantial and include the following:

- United States Highway 169 improvements – Improvements included in the CMP for US 169 and assumed for the No-Build (as well as Build) conditions include completing US 169 as a four-lane freeway facility between CSAH 69 and I-494. For purposes of this study, an interchange at US 169/CSAH 69 is assumed (though as noted above not programmed in the fiscally-contained 20-year Metro District plan). In addition, a frontage road paralleling US 169 on the north and south sides of the roadway will be constructed as development occurs between CSAH 69 and CSAH 14. The intent of this frontage road is to remove local trips from US 169 and to connect to long-term planned interchanges at US 169/CSAH 14 and US 169/existing TH 41. Portions of this frontage road have been constructed near the intersection of US 169 and TH 41.
- Construction of New US 212 – As discussed in Section 1.2, a new alignment for US 212 (New US 212) is under construction north of the existing alignment within the study area. New US 212 is a freeway facility with limited access points. One of the access points is an interchange with existing TH 41. Other interchanges within the study area are programmed for CSAH 11, Engler Boulevard, Powers Boulevard and Highway 101. New US 212 is scheduled for completion fall 2008.
- Construction of local roadways – A number of local roadway improvements to arterial and collector roadways are programmed within the study area. These improvements, which include new routes, major realignments and widening of existing routes, are programmed for both Scott and Carver Counties.

A list of the assumed improvements within the study area and broader travelshed is provided in the *Technical Memorandum on Travel Forecasting* dated May 1, 2006 and contained in *Volume II: Technical Memoranda*.

3.2.2 Build Alternatives

The Tier I DEIS includes six Build alternatives for evaluation and comparison to the No-Build alternative. The objective of the Tier I EIS process is to identify a corridor for right of way preservation. For analysis purposes, a standard 300-foot corridor width, with minor variations for topographic considerations and at interchanges, is assumed. Detailed design will occur during the Tier II EIS process closer to the time of construction.

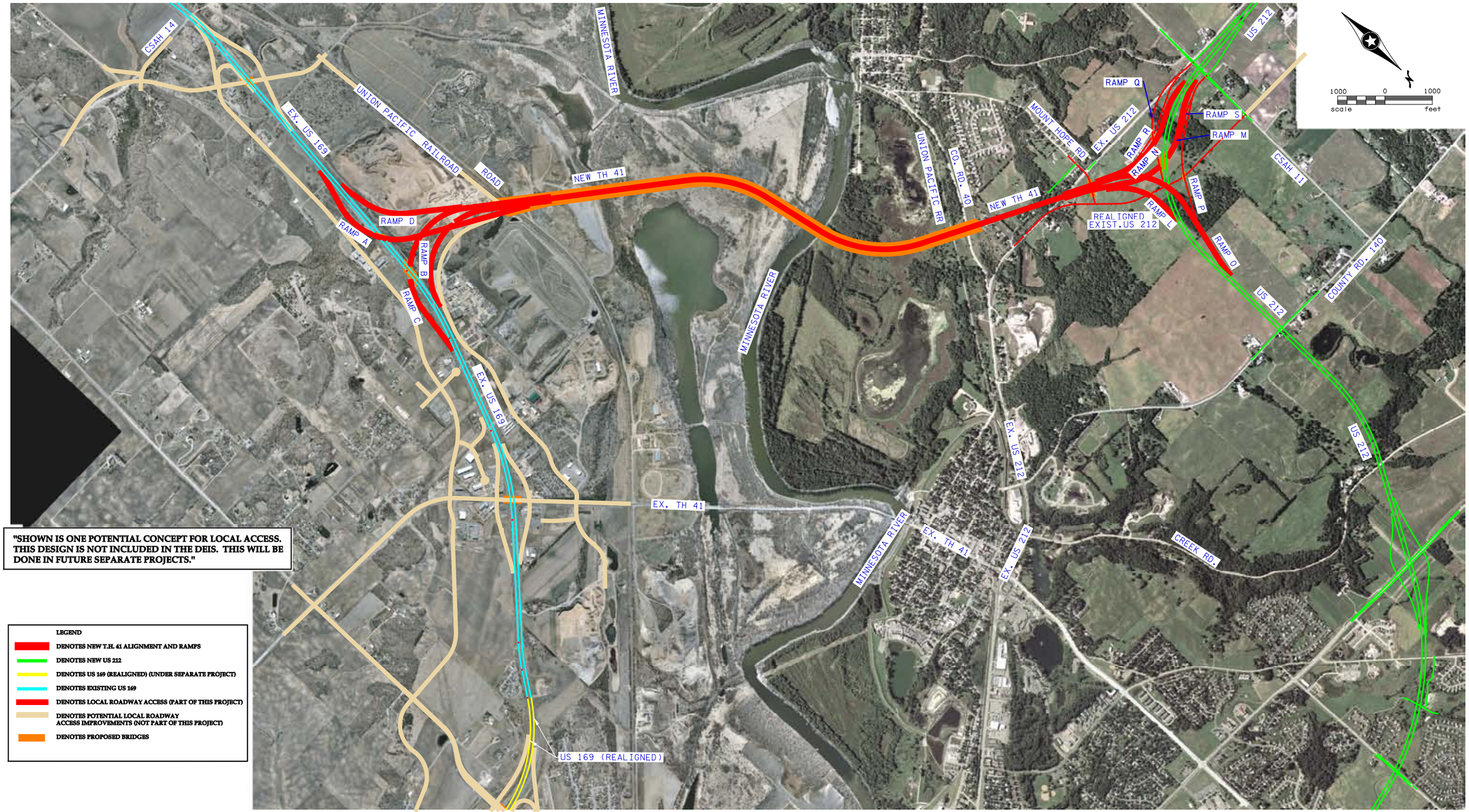
For purposes of the Tier I EIS, the various Build alternatives were designed to a level of detail that demonstrated engineering feasibility, provided for acceptable freeway operations, and allowed reasonable quantification of impacts for comparison purposes.

Figures 3-6 through 3-11 depict the proposed improvements for each Build alternative.

The figures also illustrate potential concepts for other access improvements on US 169 that may have a relationship to the proposed project. Access concepts were developed for all Build alternatives for interchanges at the junction of US 169 and existing TH 41, and also for the existing junction of US 169 and CSAH 69. The access concepts were developed only to show interchanges are feasible at these locations if any of the alternatives for New TH 41 is constructed. They are not intended to be the final concepts, nor are they included as elements of the Build alternatives except where ramps would connect the system and local interchanges. Improvements to US 169 and to local systems that are not part of the proposed TH 41 river crossing project will be developed and assessed for environmental impacts as a separate project(s). For that reason, the interchanges and corresponding local road connections are not detailed in the alternative discussions below and costs or impacts of the TH 41/US 169 and US 169/ CSAH 69 interchanges and local road connections were not evaluated as part of this study except as appropriate for assessing indirect or cumulative impacts.

All of the Build alternatives have the following in common:

- Include construction of a freeway facility, with the planning assumption of four lanes. (As noted in Section 3.1.1.3, travel forecasts conducted during scoping supported the need for a four-lane facility. Updated travel forecasting conducted during preparation of the DEIS and detailed in Chapter 4 confirmed this finding.)
- Connect US 169 to New US 212.
- Construct full-access directional interchanges between the Build alternative and US 169 and New US 212 (to provide for regional system interchange standards for ramps [60 mph design speed]).
- Include auxiliary lanes on US 169, New TH 41 and New US 212 where needed to provide acceptable freeway operations.
- Assume, for corridor analysis purposes, a 300-foot wide corridor, except where wider to respond to topographic considerations, and at interchanges.
- Maintain planned access on New US 212.
- Can accommodate local access for US 169 at CSAH 14, near existing TH 41/CSAH 78, and CSAH 69. The configuration of local access for US 169/existing TH 41 and US 169/ CSAH 69 will vary depending on the Build alternative.
- Include programmed improvements to the regional transportation system within the study area (including improvements on US 169, the construction of New US 212, and the construction of local roadways). As described in Section 3.2.1, these improvements will be made under Build and No-Build conditions. Configurations of the improvements may vary under Build conditions, including the location of US 169 near CSAH 69 (two US 169 alignments near CSAH 69 are under consideration; details will be finalized in the FEIS).



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ALTERNATIVE W-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Figure 3-6

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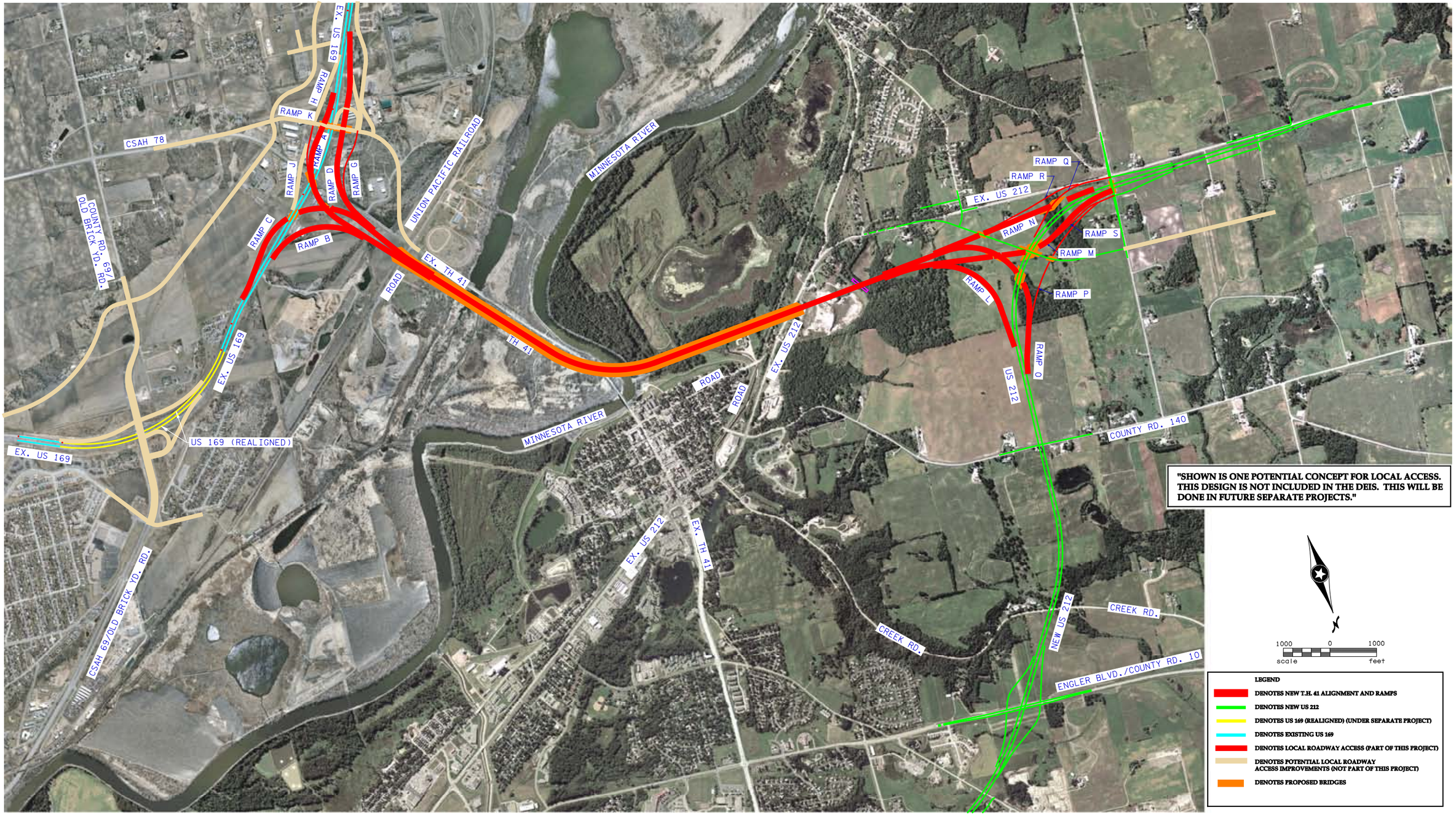

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ALTERNATIVE C-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Figure 3-7

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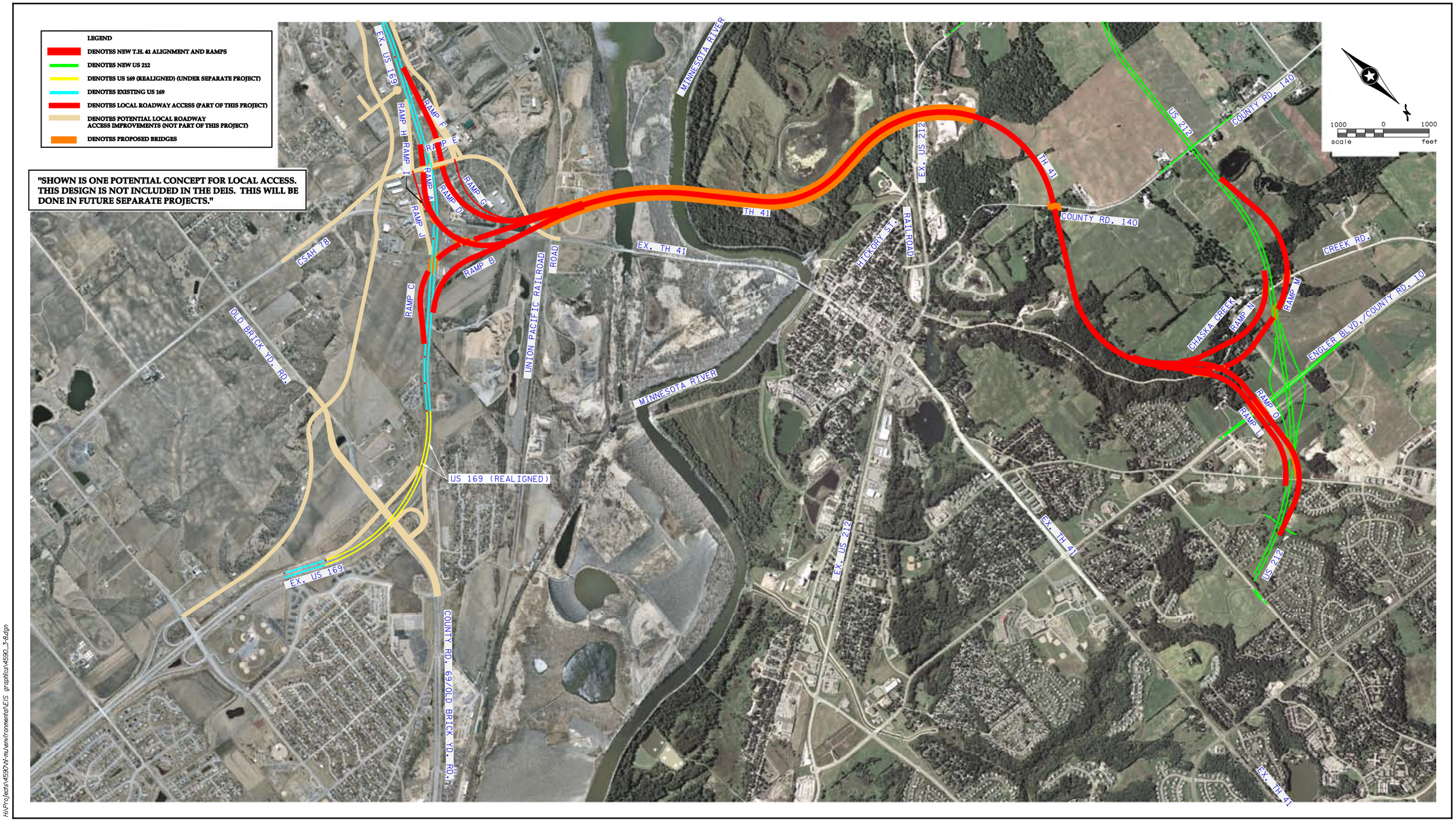

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ALTERNATIVE C-2A

Figure 3-8

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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S.P. #1008-60
Minnesota Department of Transportation

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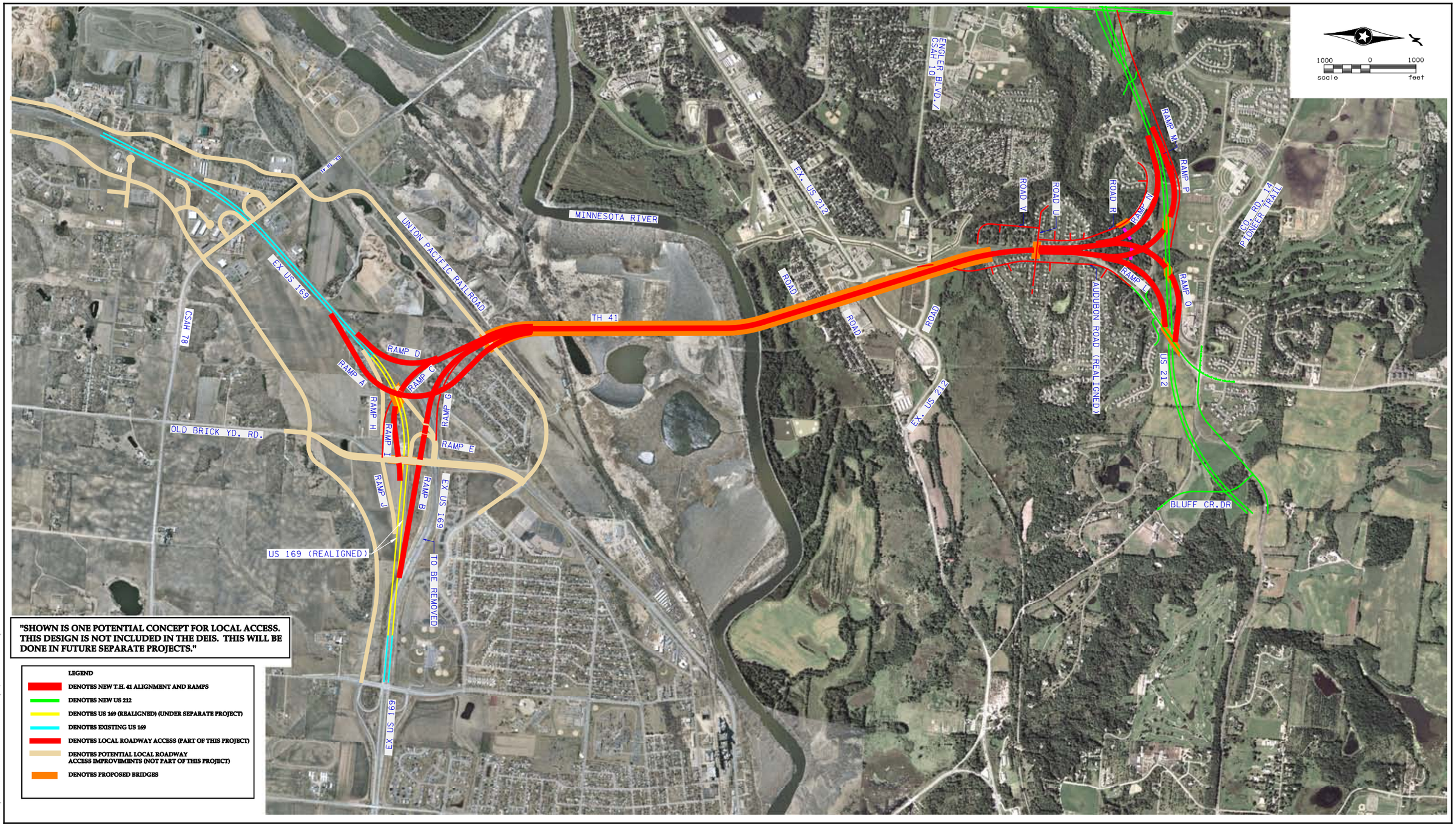

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ALTERNATIVE E-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Minnesota Department of Transportation

Figure 3-9

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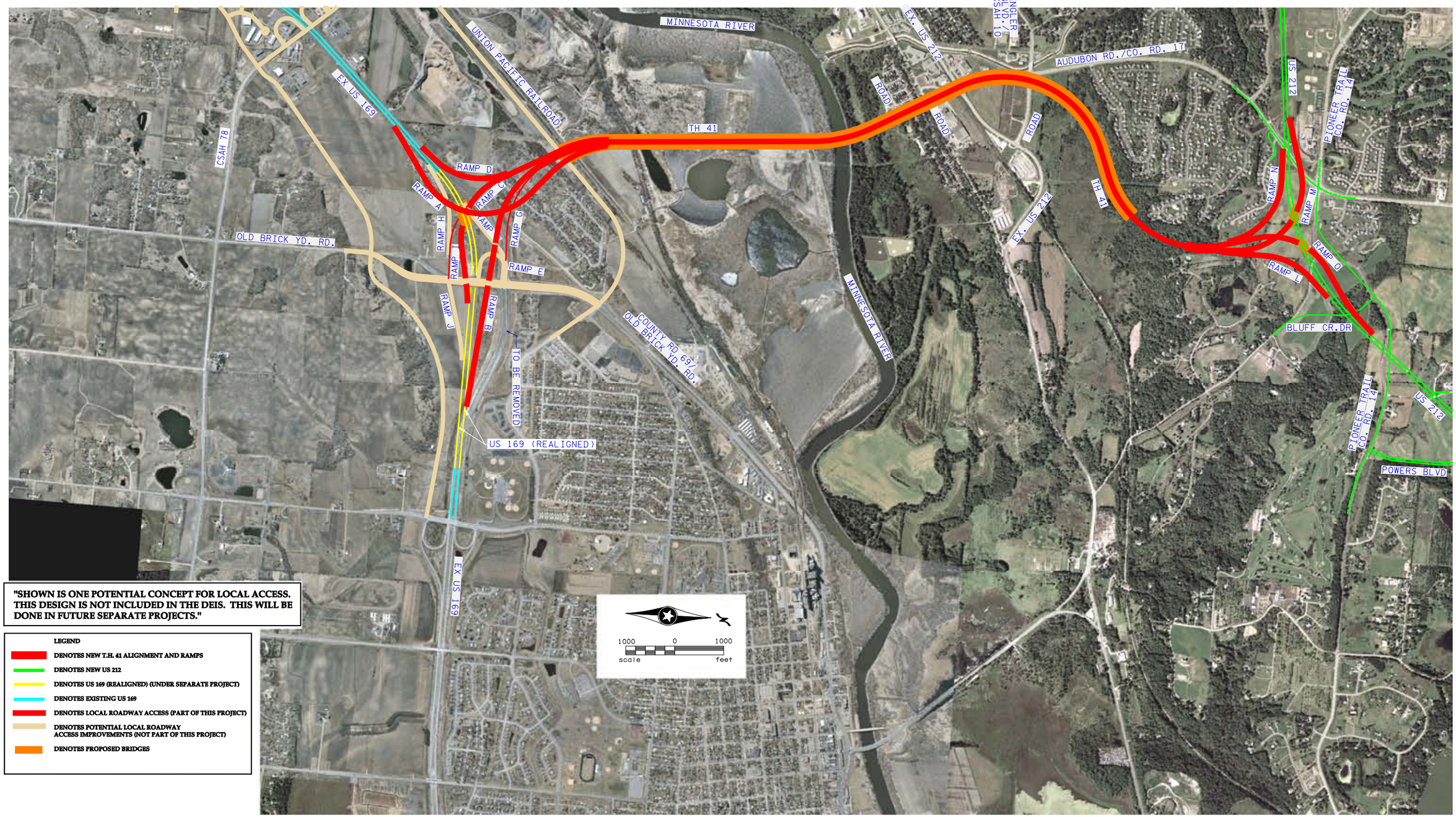

"SHOWN IS ONE POTENTIAL CONCEPT FOR LOCAL ACCESS. THIS DESIGN IS NOT INCLUDED IN THE DEIS. THIS WILL BE DONE IN FUTURE SEPARATE PROJECTS."

LEGEND

- DENOTES NEW T.H. 41 ALIGNMENT AND RAMPS
- DENOTES NEW US 212
- DENOTES US 169 (REALIGNED) (UNDER SEPARATE PROJECT)
- DENOTES EXISTING US 169
- DENOTES LOCAL ROADWAY ACCESS (PART OF THIS PROJECT)
- DENOTES POTENTIAL LOCAL ROADWAY ACCESS IMPROVEMENTS (NOT PART OF THIS PROJECT)
- DENOTES PROPOSED BRIDGES

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ALTERNATIVE E-1A

Figure 3-10

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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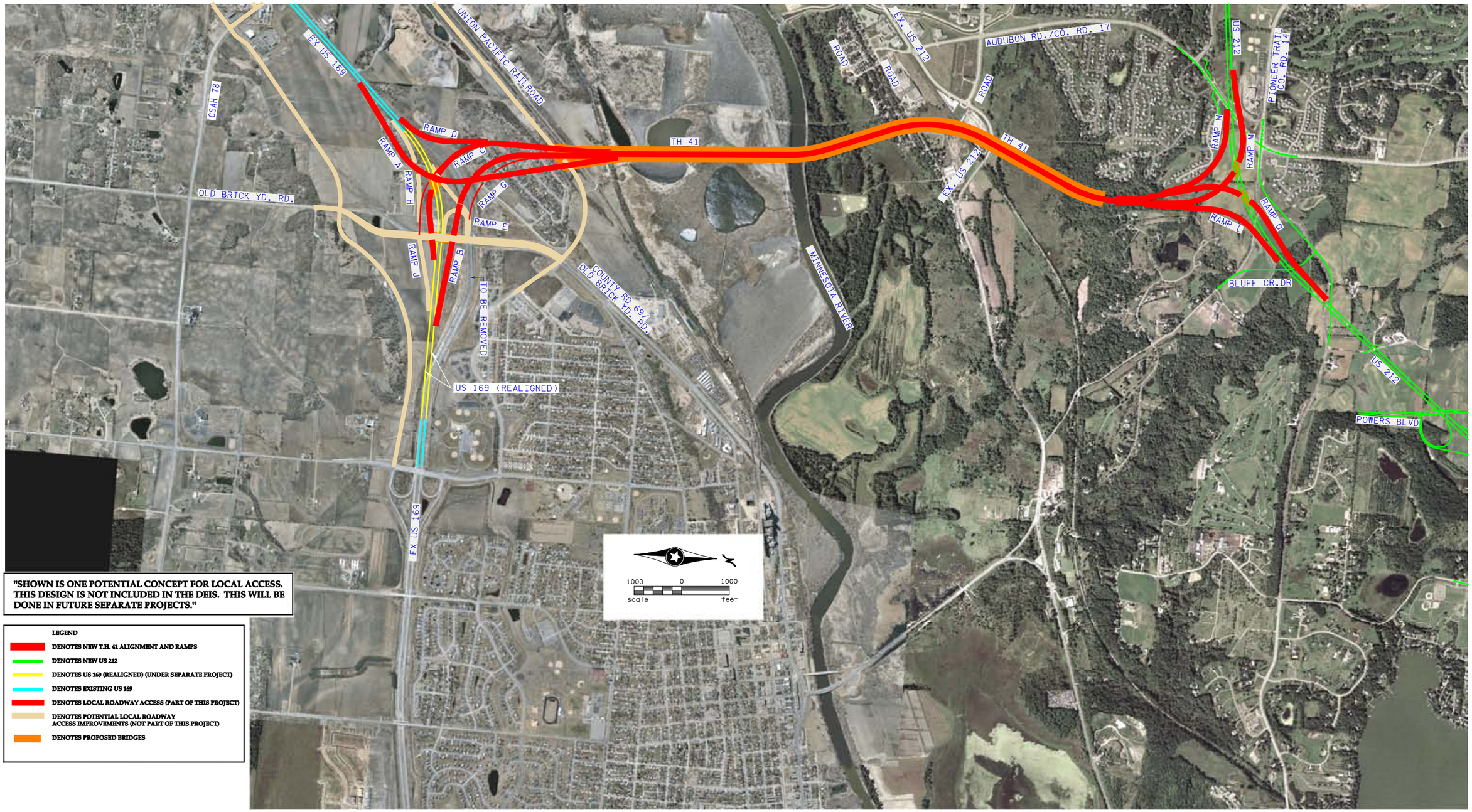

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ALTERNATIVE E-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Figure 3-11

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Full descriptions of the Build alternatives are provided in the following subsections. Physical relationships to resources and developments are provided for locational reference; impacts are discussed in subsequent DEIS chapters.

3.2.2.1 Alternative W-2 [Figure 3-6]

Alternative W-2 involves the construction of a new east-west freeway connection between US 169 and New US 212. Alternative W-2 is the westernmost Build alternative, located in Louisville Township in Scott County and just to the east of the City of Carver in Carver County. Alternative W-2 crosses areas identified as floodplain forest, a large wetland complex, the Minnesota Valley State Recreation Area (MVSRA - Minnesota Department of Natural Resources property), and the Minnesota Valley National Wildlife Refuge (MVNWR - U.S. Fish and Wildlife Service property north of the Minnesota River). Within the MVNWR, Alternative W-2 crosses through the Chaska Unit, most specifically between the Chaska Marsh and Chaska Lake water bodies. Alternative W-2 also crosses areas being developed or planned for development in the City of Carver and near Carver's downtown historic district and crosses the very western edge of a proposed development site—Heights of Chaska—located north of existing US 212 and east of CSAH 11 (See Chapter 5).
Alternative W-2 includes:

- Two new full-access directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the New US 212/CSAH 11 intersection (separate from the system ramps connecting New US 212 and New TH 41);
- A four-lane freeway approximately 3.1 miles in length;
- A new bridge from the Union Pacific Railroad in Scott County to approximately CSAH 40 in Carver County (10,550 feet in length);
- A grade separation connecting existing US 212 to Mt. Hope Road in the City of Carver;
- A realignment of the connection of existing US 212 to CSAH 11 that is being made as part of the New US 212 project, now under construction; and
- Partial reconstruction of ramps that are being constructed as part of the New US 212 project to connect New US 212 to CSAH 11 (impacted by the proposed project).

Alternative W-2 has been designed to accommodate local access to and from both US 169 and New US 212 and the new river crossing alignment via a series of local frontage roads and ramp connections.

It is assumed that the alignment of the US 169 mainline would not change. On US 169, local access can be accommodated at CSAH 14, existing TH 41/CSAH 78, and CSAH 69 as separate projects. On New US 212, local access is accommodated at CSAH 11. It should be noted that ramps and frontage road connections not noted in the bulleted list above are not considered part of this alternative; they are planned as part of implementation of the IRC plan discussed in Section 2.2.3.2, and, therefore, would be separate projects. These improvements are not yet

designed nor are they programmed (i.e., not in Mn/DOT's current 20-plan); however it is assumed that these improvements would be in place by 2040 under No-Build as well as Build conditions. It is also assumed that future improvements to US 169 would be designed to accommodate the proposed project. This differs for New US 212 where improvements are currently under construction and, where impacted by the proposed project, would require reconstruction.

The Alternative W-2/US 169 interchange is located approximately one mile southwest of the existing TH 41/CSAH 78 intersection with US 169. The proposed interchange at this location provides full access between US 169 and the new river crossing alignment. Local access can be accommodated via US 169 at its interchanges with CSAH 14 (located approximately one mile to the southwest of the interchange) and existing TH 41/CSAH 78 and CSAH 69 (respectively located approximately one mile and two miles to the northeast of the interchange). These connections and the complementary series of frontage roads are separate projects and are not included as part of this alternative. They are shown in the figure as a representation that planned US 169 improvements and local connections are feasible if Alternative W-2 is constructed.

The Alternative W-2/New US 212 interchange is located near the proposed diamond interchange at New US 212 and CSAH 11. This interchange provides full access between New US 212 and the new river crossing alignment. Access to and from CSAH 11 and Alternative W-2 can be accommodated at this interchange via additional ramps. Alternative W-2 includes the realignment of existing US 212 and the extension of Mt. Hope Road, as shown.

This alternative, including potential concepts for local access, is shown in Figure 3-6.

3.2.2.2 Alternative C-2 [Figure 3-7]

Alternative C-2 involves the construction of a new east-west freeway connection between US 169 and New US 212. Alternative C-2 is located within the central portion of the study area, along the western edge of downtown Chaska. Section 3.1.2.2 describes the development of this alternative and resulting amendment to the SDD.

Alternative C-2 crosses the site of a mobile home park located just west of existing TH 41 near the intersection of US 169 and TH 41. South of the Minnesota River, Alternative C-2 crosses over areas identified as floodplain and floodplain forest, through wetlands identified as part of the national wetland inventory, and through the Gifford Lake portion of the MVSRA. North of the Minnesota River, the alternative crosses through wetlands identified as part of the national wetland inventory and floodplain forest and floodplain areas. It also crosses the northeastern portion of the MVNWR Chaska Unit south of the levy across the Athletic Park ballpark site and approximately 1,250 feet south of the Chaska downtown historic district. North of existing US 212, Alternative C-2 crosses through the southern portion of the proposed Heights of Chaska development site.

Alternative C-2 includes:

- Two new full-access, directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the planned US 169/TH 41 interchange;

- Ramps for local access at the New US 212/CSAH 11 interchange (separate from the system ramps connecting New US 212 to New TH 41);
- A four-lane freeway approximately 3.9 miles in length;
- A new bridge from just south of the Union Pacific Railroad in Scott County to just north of existing US 212 in Carver County (9,550 feet in length); and
- Partial reconstruction of ramps that are being constructed as part of the New US 212 project to connect New US 212 to CSAH 1 (impacted by the project);
- Several bridges at both the New TH 41/US 169 interchange and the New TH 41/New US 212 interchange

The Alternative C-2/US 169 interchange that is located near the existing at-grade intersection between US 169 and existing TH 41/CSAH 78, which is planned to be converted to an interchange, assumed to occur prior to construction of the proposed project. Alternative C-2 assumes a configuration for the planned US 169/existing TH 41 interchange that can accommodate the proposed US 169/New TH 41 interchange including local access ramps; this configuration realigns existing TH 41 and CSAH 78 slightly to the southwest of their current alignments. As noted in Section 3.2.2.1, the US 169/existing TH 41 interchange and the complementary series of frontage roads are separate projects and are not included as part of this alternative. They are shown in Figure 3-7 as a representation that improvements to US 169 and local connections are feasible if Alternative C-2 is constructed. Alternative C-2 assumes that the alignment of the US 169 mainline would not change.

The Alternative C-2/New US 212 interchange is located near the diamond interchange being constructed as part of the New US 212 project at New US 212 and CSAH 11. Access to and from CSAH 11 and Alternative C-2 can be accommodated at this interchange via additional ramps.

Alternative C-2, including potential concepts for local access to the new river crossing, is shown in Figure 3-7.

3.2.2.3 Alternative C-2A [Figure 3-8]

Alternative C-2A involves the construction of a new freeway connection between US 169 and New US 212. A majority of the new freeway connection runs east-west (segment between US 169 and existing US 212), with a portion of the alignment running north-south north of existing US 212. The broad curve in the alignment is to minimize impacts to sensitive resources including wooded areas, the Chaska downtown historic district and a cemetery while connecting to New US 212 near Engler Boulevard. Alternative C-2A is located within the central portion of the study area, just west of downtown Chaska.

Alternative C-2A crosses the site of a mobile home park located just west of existing TH 41 near the intersection of US 169 and TH 41. This alternative also bisects a number of areas identified as national wetland inventory wetlands and floodplain forest south of the Minnesota River. North of the Minnesota River, Alternative C-2A bisects areas identified as floodplain forest. In

addition, this alternative bisects the MVNWR near the Chaska Unit; this area has been identified as floodplain forest and floodplain. National wetland inventory wetlands are also crossed by the alternative.

North of the Minnesota River and existing US 212, Alternative C-2A crosses through both the eastern and western portions of the proposed Heights of Chaska development site.

Alternative C-2A includes:

- Two new full-access directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the US 169/existing TH 41 interchange
- A four-lane freeway approximately 3.0 miles in length;
- A new bridge from just south of the Union Pacific Railroad in Scott County to just north of existing US 212 in Carver County (9,350 feet in length); and
- A grade separation at CR 140

Alternative C-2A has been designed to accommodate local access to and from existing TH 41/CSAH 78, CSAH 69, the new river crossing alignment and US 169 via a series of local ramps, interchanges and frontage road connections. It should be noted that these connections are not considered part of this alternative; they would be separate projects. They are shown in the figure as a representation that local connections are feasible if Alternative C-2A is constructed.

The Alternative C-2A/US 169 interchange is located near the existing at-grade intersection between US 169 and TH 41/CSAH 78. The proposed interchange at this location provides full access between US 169 and the new river crossing alignment. Alternative C-2A assumes a configuration for the planned US 169/existing TH 41 interchange that realigns existing TH 41 and CSAH 78 alignment slightly to the southwest. As discussed previously, it is assumed that US 169 improvements, including the US 169/existing TH 41 interchange will be constructed prior to the proposed project (but after selection of a preferred alternative corridor) and designed to accommodate the proposed project. Local access to/from New TH 41 can be accommodated at this interchange. This access is provided through a series of frontage roads, local access interchanges and ramps. As noted in Section 3.2.2.1, these connections are separate projects and are not included as part of this alternative. They are shown in the figure as a representation that local connections are feasible. The alignment of the US 169 mainline would not change.

The proposed interchange with New US 212 and Alternative C-2A is located near the planned interchange at Engler Boulevard and New US 212. (The proposed project will not require reconstruction of the New US 212/Engler Boulevard interchange.) This system-to-system interchange provides full access between New US 212 and the new river crossing alignment. Local access at New US 212 is not accommodated at this interchange location. The nearest local CSAH 11 access to New TH 41 under Alternative C-2A would be from the New US 212/ CSAH 11 interchange 1½ miles to the west or the New US 212/existing TH 41 one mile to the east.

Alternative C-2A, including potential concepts for local access to the new river crossing, is shown in Figure 3-8.

3.2.2.4 Alternative E-1 [Figure 3-9]

Alternative E-1 involves the construction of a new north-south freeway connection between US 169 and New US 212. Alternative E-1 is located within the eastern portion of the study area (this is the alternative located farthest to the west in this area); it utilizes portions of existing Audubon Road alignment. In addition to providing a connection between US 169 and New US 212, Alternative E-1 also includes a number of local road realignments between Engler Boulevard and New US 212.

For Alternatives E-1 (as well as for E-1A and E-2), it is assumed that improvements to US 169 include its realignment south of its existing alignment and construction of an interchange at CSAH 69. Note that the realignment of US 169 is assumed in this DEIS for study purposes only, and only for the New TH 41 eastern Build alternatives. The eastern alternatives could be built without this assumed realignment; impacts to the Bonnevista mobile home park would likely be greater. No decisions have been made about US 169 improvements; any such improvements, as well as local roadway improvements in the study area, would be separate projects. It is expected that land use studies of the US 169 corridor planned by the City of Shakopee will further inform planning for the US 169/CSAH 69 interchange. If Alternative E-1, E-1A or E-2 are identified as the Preferred Alternatives, the future alignment options for US 169 and their relationship to the proposed project, including influences on likely project impacts (notably the Bonnevista mobile home park), will be investigated further in the Tier I FEIS. Tier I decisions about the proposed project are not, however, expected to determine the future alignment of US 169 in this area.

South of the Minnesota River, Alternative E-1 crosses the western portion of a mobile home park located just north of US 169. Between the mobile home park and the river, Alternative E-1 crosses through the eastern edge of the MVSRA, Nyssen's Lake Area, through land identified as floodplain, floodplain forest, and wetland according to the national wetland inventory.

North of the Minnesota River, Alternative E-1 crosses through land identified as floodplain forest as well as through wetlands identified as national inventory wetlands. Additionally, Alternative E-1 crosses a mobile home park located between existing US 212 and the Minnesota River. North of Engler Boulevard, Alternative E-1 utilizes the existing Audubon Road right of way, continuing to the north to its connection to New US 212.

Alternative E-1 includes:

- Two new full-access directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the planned US 169/CSAH 69 interchange

- Ramp for local access (northbound) at existing TH 41
- A four-lane freeway approximately 3.1 miles in length;
- A new bridge from just north of existing US 169 to slightly north of Engler Boulevard (length: 10,800 feet [Low Profile]; 11,300 feet [High Profile] – see below);
- A realignment of Audubon Road;
- An overpass connecting two residential developments to realigned Audubon Road;
- Realignment/construction of a series of local roadway connections west of the proposed Alternative E-1 alignment that will connect to the new overpass;
- A revised interchange connection between New US 212 and existing TH 41 that extends the westbound New US 212 off-ramp approximately 4,500 feet east of its location under the configuration now under construction; and
- Two New TH 41 profile options ("High Profile" [i.e., New TH 41 is over New US 212 at their interchange] and "Low Profile" [i.e., New TH 41 is under New US 212 at their interchange]. Two profiles are considered for Alternatives E-1, E-1A and E-2 because of groundwater concerns related to Seminary Fen. Alternatives W-2, C-2 and C-2A do not appear to have groundwater issues that affect profile.)

Alternative E-1 has been designed to accommodate local access to and from the new river crossing alignment and US 169 for local roadways such as existing TH 41/CSAH 78, CSAH 69, and Marystown Road/CSAH 15 via a series of ramps, frontage roads and local interchanges. It should be noted that except for ramps for local access to/from New TH 41 at the planned US 169/CSAH 69 interchange, these ramps, frontage road connections and interchanges are not considered part of this alternative; they would be separate projects. They are shown in the figure as a representation that US 169 improvements and planned local connections are feasible if Alternative E-1 is constructed. Local access is not provided at the northern connection with New US 212. The only access (other than that between Alternative E-1 and New US 212) provided as part of this alternative is an off-ramp for northbound traffic on Alternative E-1 to existing TH 41.

The Alternative E-1/New US 212 interchange is located south of Pioneer Trail near Chaska High School/Pioneer Park complex. This interchange provides full access between New US 212 and Alternative E-1. As mentioned previously, directional ramps provide access to and from New US 212 along with a ramp for northbound traffic on the new river crossing alignment for access to existing TH 41. As part of the construction of this interchange, an off ramp for existing TH 41 for westbound traffic on New US 212 is removed from its to-be-constructed location and is shifted further to the east to allow for better spacing and to eliminate weave movements. No other local access is provided at the connection between Alternative E-1 and New US 212. The nearest local access from the west is ½ mile away at the New US 212/existing TH 41 interchange; the nearest local access to/from the east is 1½ miles away at the New US 212/Powers Boulevard interchange.

This alternative, including potential concepts for local access to the new river crossing, is shown in Figure 3-9.

3.2.2.5 Alternative E-1A [Figure 3-10]

Alternative E-1A involves the construction of a new north-south freeway connection between US 169 and New US 212. Alternative E-1A follows the same alignment as Alternative E-1 from US 169 to approximately Engler Boulevard.

North of Engler Boulevard, the connection of Alternative E-1A to New US 212 is shifted to the east (located east of Audubon Road) to follow the bluff line and to connect to New US 212 near Bluff Creek Drive. South of Engler Boulevard, Alternative E-1A crosses similar natural resources as Alternative E-1. However, north of Engler Boulevard, Alternative E-1A shifts to the northeast of Alternative E-1 and crosses the northwestern edge of the Seminary Fen protection area. Alternative E-1A connects to New US 212 south of Pioneer Trail, just east of the Pioneer Ridge Freshman Center and east of Audubon Road.

Alternative E-1A includes:

- Two new full-access, directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the US 169/CSAH 69 interchange;
- A four-lane freeway approximately 3.6 miles in length;
- A new bridge from just north of existing US 169 to slightly north of Engler Boulevard (length: 13,500 feet [Low and High profiles]); and
- Two New TH 41 profile options ("High Profile" and "Low Profile").

System connections and assumptions for US 169 improvements, including realignment and interchange with CSAH 69 are identical for Alternatives E-1 and E-1A.

The Alternative E-1A/New US 212 interchange is located south of Pioneer Trail and just east of the Pioneer Ridge Freshman Center near Bluff Creek Road. This interchange provides full access between New US 212 and Alternative E-1A. Directional ramps that can go under or over New US 212 have been developed for this alternative. No local access is provided at the connection between Alternative E-1A and New US 212. The nearest local access to/from the west is 1½ miles away at the New US 212/existing TH 41 interchange; the nearest local access to/from the east is one mile away at the New US 212/Powers Boulevard interchange.

This alternative, including potential concepts for local access to the new river crossing, is shown in Figure 3-10.

3.2.2.6 Alternative E-2 [Figure 3-11]

Alternative E-2 involves the construction of a new north-south freeway connection between US 169 and New US 212. Alternative E-2 is the easternmost alternative in the study area.

South of the Minnesota River, Alternative E-2 connects to US 169 just south and west of the existing intersection with US 169 and CSAH 69. One of the directional ramps at the Alternative E-2/US 169 interchange crosses the southeastern portion of the mobile home park located between existing and proposed US 169. North of existing US 169, Alternative E-2 bisects a mobile home park located between the railroad and existing

US 169. From the mobile home park, Alternative E-2 continues northward and crosses through the MVSRA through land identified as floodplain, floodplain forest, and wetland according to the national wetland inventory.

North of the Minnesota River, Alternative E-2 crosses through the northeastern corner of a mobile home park located just south of existing US 212. North of existing US 212, Alternative E-2 crosses reserve land of a local cemetery and continues in a northeasterly direction towards New US 212. Along this portion of the corridor, Alternative E-2 passes through the Seminary Fen protection area.

Alternative E-2 includes:

- Two new full-access, directional interchange connections, one at US 169 and one at New US 212;
- Ramps for local access at the US 169/CSAH 69 interchange;
- A four-lane freeway approximately 3.2 miles in length;
- A new bridge from just north of existing US 169 to approximately one mile north of existing US 212 (length: 12,000 feet [Low and High profiles]); and
- Two New TH 41 profile options ("High Profile" and "Low Profile").

The Alternative E-2/US 169 interchange is located near the existing at-grade intersection of US 169 and CSAH 69. The design of Alternative E-2 assumes that US 169 is shifted slightly to the south of its present alignment in order to accommodate the connection with the new river crossing and to allow for adequate space for local roadway connections. Directional ramps between US 169 and Alternative E-2 provide full access between the two roadways.

Local access on existing TH 41 and CSAH 69 to and from the new river crossing alignment and US 169 can be accommodated as part of this design. Additionally, access between Marystown Road/CSAH 15 and CSAH 69 and existing TH 41 is also accommodated. This access is accommodated through a series of frontage roads, local access interchanges and additional ramps. Except for local ramps to/from New TH 41 at the planned US 169/ CSAH 69 interchange, these connections are separate projects and are not included as part of this alternative. They are shown in the figure as a representation that US 169 improvements and local connections are feasible if Alternative E-2 is constructed.

The Alternative E-2/New US 212 interchange is located south of Pioneer Trail and east of the Pioneer Ridge Freshman Center. This interchange provides full access between New US 212 and Alternative E-2. Directional ramps that can go under or over New US 212 have been developed for this alternative. No local access is provided at the connection between Alternative E-2 and New US 212. The nearest local access to/from the west is 1½ miles away at the New US 212/existing TH 41 interchange; the nearest local access to/from the east is one mile away at the New US 212/Powers Boulevard interchange.

This alternative, including potential concepts for local access to the new river crossing, is shown in Figure 3-11.

3.2.3 Cost Estimates

Table 3-2 summarizes the estimated costs for all of the Tier I DEIS alternatives. Construction costs only include the cost of improvements that are required for the proposed project (as shown in Figures 3-1 through 3-11), including bridge and road segments, interchanges, and realignment of affected existing roadways and trails, and storm ponding. Included are costs for reconstruction of affected portions of the New US 212 project now under construction. Not included are costs that would be part of separate projects, (i.e., interchange at US 169/existing TH 41) even if the configuration of those separate projects would be affected by the selection of a New TH 41 corridor. It is assumed that improvements to the US 169 corridor will occur prior to construction of and designed to accommodate the proposed project.

Note that mitigation costs are not specifically estimated, but that the higher number in the cost range represents an added risk assessment percentage to account for several currently unknown factors, including mitigation.

TABLE 3-2
COST ESTIMATES (2005 DOLLARS)[1]

	Alternative								
Cost	**W-2**	**C-2**	**C-2A**	**E-1**		**E-1A**	**E-2**	
Construction[2]	335-390M	305-355M	345-405M	Low Profile High Profile	375-460M 395-485M	410-490M	Low Profile High Profile	370-440M 375-450M
Right of Way[3]	55-80M	75-105M	65-90M	Low Profile High Profile	100-135M 100-135M	55-75M	Low Profile High Profile	60-80M 60-80M
Total	**390-470M**	**380-460M**	**410-495M**	**Low Profile** **High Profile**	**475-595M** **495-620M**	465-565M	**Low Profile** **High Profile**	**430-520M** **435-530M**

(1) Rounded to nearest $5 million
(2) Range provided with high number representing construction cost with a roadway risk-assessment percentage added following Mn/DOT peer review of cost factors.
(3) Includes right of way acquisition and relocation costs. No differences between low and high profile options. Section 5.2.2.2.2 provides detailed cost estimates.

Funds from a variety of regional, state and federal sources are anticipated for this project. The project is included in the Mn/DOT Metro District's fiscally constrained Transportation System Plan (TSP) for preservation of right of way. The Metropolitan Council's Transportation Policy Plan (TPP) for the Twin Cities Metropolitan Area also includes right of way preservation for this project. It is shown on the 2030 constrained Metropolitan System Plan of Investment Priorities.

Upon determination of a preferred alternative, Mn/DOT will reevaluate needs and timing of right of way and construction funding during future TSP updates, which occur approximately every three years.

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4.0 TRANSPORTATION IMPACTS

Chapter 2.0, Purpose and Need, described the transportation impacts of the No-Build alternative, including increasing congestion, safety issues related to increased risk of crash incidents, increasing vehicle conflicts with rail traffic, and increasing bicycle/pedestrian conflicts as traffic volumes increase. This chapter will focus on how well each of the six Build alternatives addresses transportation issues identified in Chapter 2. The relationship or impact of the alternatives on intermodal relationships, energy use, and local and regional access changes is also discussed.

4.1 FUTURE TRAFFIC OPERATIONS

Assessment of future traffic operations for the DEIS alternatives (Build and No-Build conditions) was performed using two analysis techniques: (1) travel demand forecast model-based volume/capacity comparison of the river crossing corridors in/adjacent to the study area, and (2) traffic operations-model based analysis of the proposed Build alternative crossings and the US 169 and New US 212 segments in the immediate vicinity of each proposed crossing. The operations model analysis was used to identify capacity or operational issues.

The six Build alternatives are similar in that each provides a freeway connection between US 169 and New US 212. From a transportation perspective, the main difference among alternatives is general location and the orientation of the connection between US 169 and New US 212.

For all alternatives (Build and No-Build), highway improvements assumed include the following:

- US 169 conversion to a limited access facility – The conversion would include replacing existing, at-grade US 169 intersections with interchanges at CSAH 14, existing TH 41, and CSAH 69. For the purposes of the DEIS, it is assumed that the conversion would take place on the existing alignment for Alternatives W-2, C-2, and C-2A. For Alternatives E-1, E-1A, and E-2, it is assumed the converted US 169 freeway would be realigned to the south in the vicinity of CSAH 69. Note these improvements are not included in the 20-year plan, however, based on expected travel demand, their inclusion in the Corridor Management Plan (CMP), as described in Section 2.2.3.2, and consultations with affected communities, it is reasonable to assume their implementation by the 2040 forecast year.
- Construction of a New US 212 freeway on a new alignment – The new alignment is located north of the existing US 212 alignment. Construction completion is anticipated by Fall 2008.

Other highway network assumptions are detailed in *TH 41 River Crossing EIS: Technical Memorandum on Travel Demand Forecasting*, dated May 1, 2006 (Travel Forecast Memo), *Volume II: Technical Memoranda*.

4.1.1 Travel Demand Forecast Analysis

The study performed travel demand forecasting for year 2040. Travel forecasts were prepared using a modified version of the travel demand models developed and approved by the Twin

Cities Metropolitan Council and Mn/DOT. These models are computerized procedures for systematically predicting travel demand changes in response to development and transportation facility changes. Inputs to these models were developed in consultation with local communities and the Metropolitan Council.

Daily forecast volume, travelshed analysis, regional traffic effects analysis, and daily truck volume forecast results are summarized below and depicted in Figures 4-1 through 4-9; additional information is available in the May 2006 Travel Forecast Memo.

Table 4-1 shows the results of the 2040 travel demand forecasts for No-Build and the six Build alternatives.

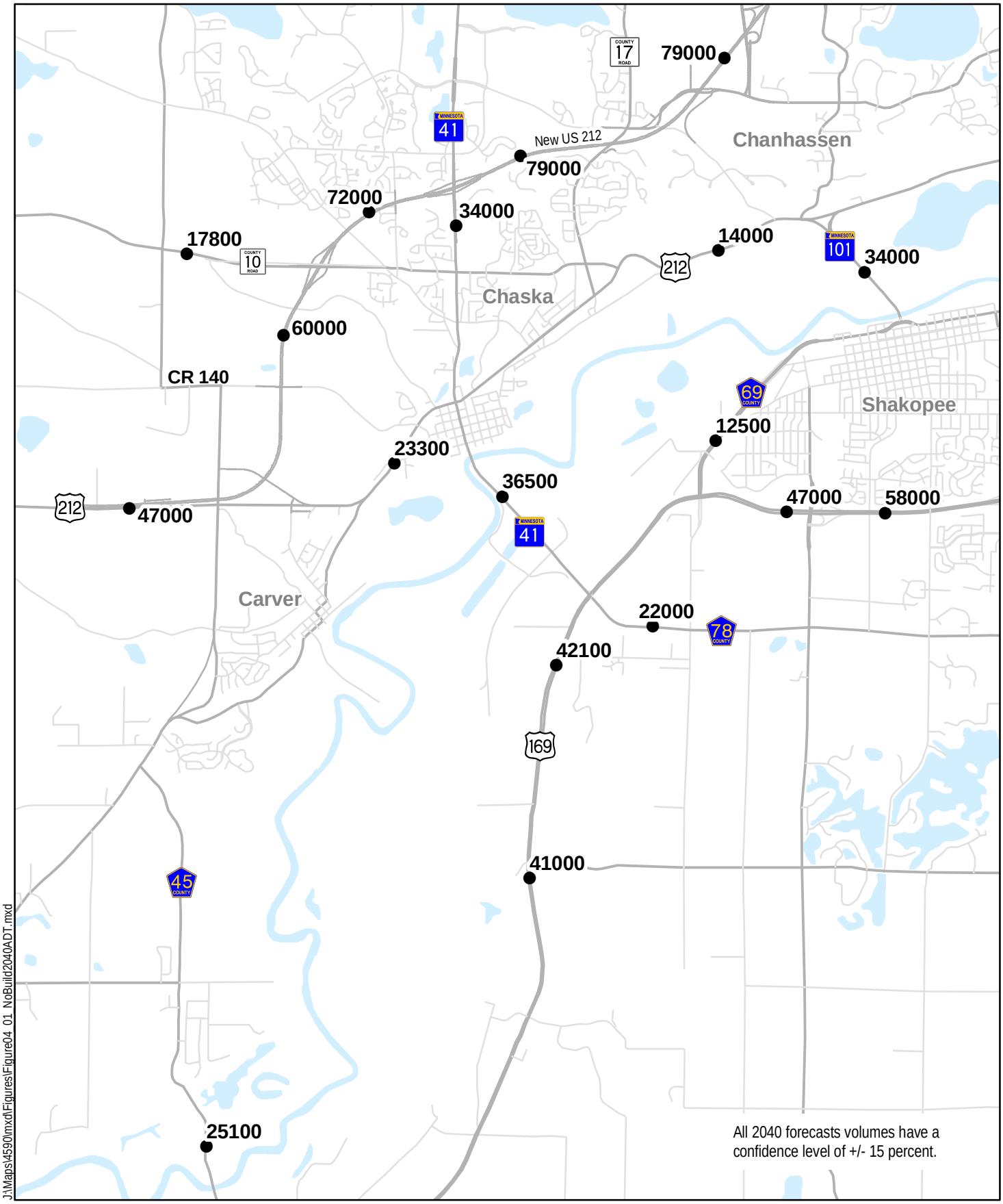
TABLE 4-1
DAILY RIVER CROSSING VOLUMES, 2000, 2040

		2040						
Crossing	***2000***[1]	**No-Build**	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
CSAH 9/45	*6,400*	25,100	19,200	21,600	21,300	20,800	21,300	21,300
TH 41	*18,500*	36,500	24,700	22,000	24,800	23,800	25,100	24,200
New TH 41			45,000	48,000	43,000	56,000	56,000	59,000
Highway 101	*21,400*	34,000	30,400	30,000	29,900	24,800	24,300	23,300
US 169	*54,000*	141,000	135,000	135,000	135,000	131,000	129,000	129,000
I-35W	*102,000*	133,000	133,000	133,000	133,000	132,000	132,000	132,000
Total	***202,300***	**369,600**	**387,300**	**389,600**	**387,000**	**388,400**	**387,700**	**388,800**

[1] Year 2000 volumes are used to calibrate the regional travel forecast model.

Forecast traffic for the New TH 41 river crossing ranges from 45,000 to 59,000 per day, with the eastern Build alternatives generally carrying more traffic than the western and central alternatives. Because all Build alternatives provide capacity exceeding 60,000 vehicles per day (vpd), and daily volumes on these crossings are forecast to be less than 60,000 vpd, the Build alternatives represent largely unconstrained demand on the new river crossings. Trips on the New TH 41 river crossing come largely from five sources:

- Existing TH 41 – Under No-Build conditions, demand to travel on the existing TH 41 river crossing is predicted to exceed capacity (estimated to be ten hours of congestion per day, see Section 4.1.3). All Build alternatives attract a substantial amount of traffic from the existing TH 41 river crossing, reducing its forecast future volume by 11,400 vehicles per day (31 percent, E-1A) to 14,500 vehicles per day (40 percent, C-2).
- CSAH 9/45 – Under the No-Build condition, CSAH 9/45 traffic volumes are predicted to be near capacity in the peak period (estimated to be five hours of congestion per day). The Build alternatives attract 3,500 vehicles per day (14 percent, C-2) or more from this crossing. Alternative W-2 attracts the most traffic, 5,900 vehicles per day (24 percent).



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NO BUILD DAILY TRAFFIC VOLUMES (2040)

Figure 4-1

TH 41 MINNESOTA RIVER CROSSING

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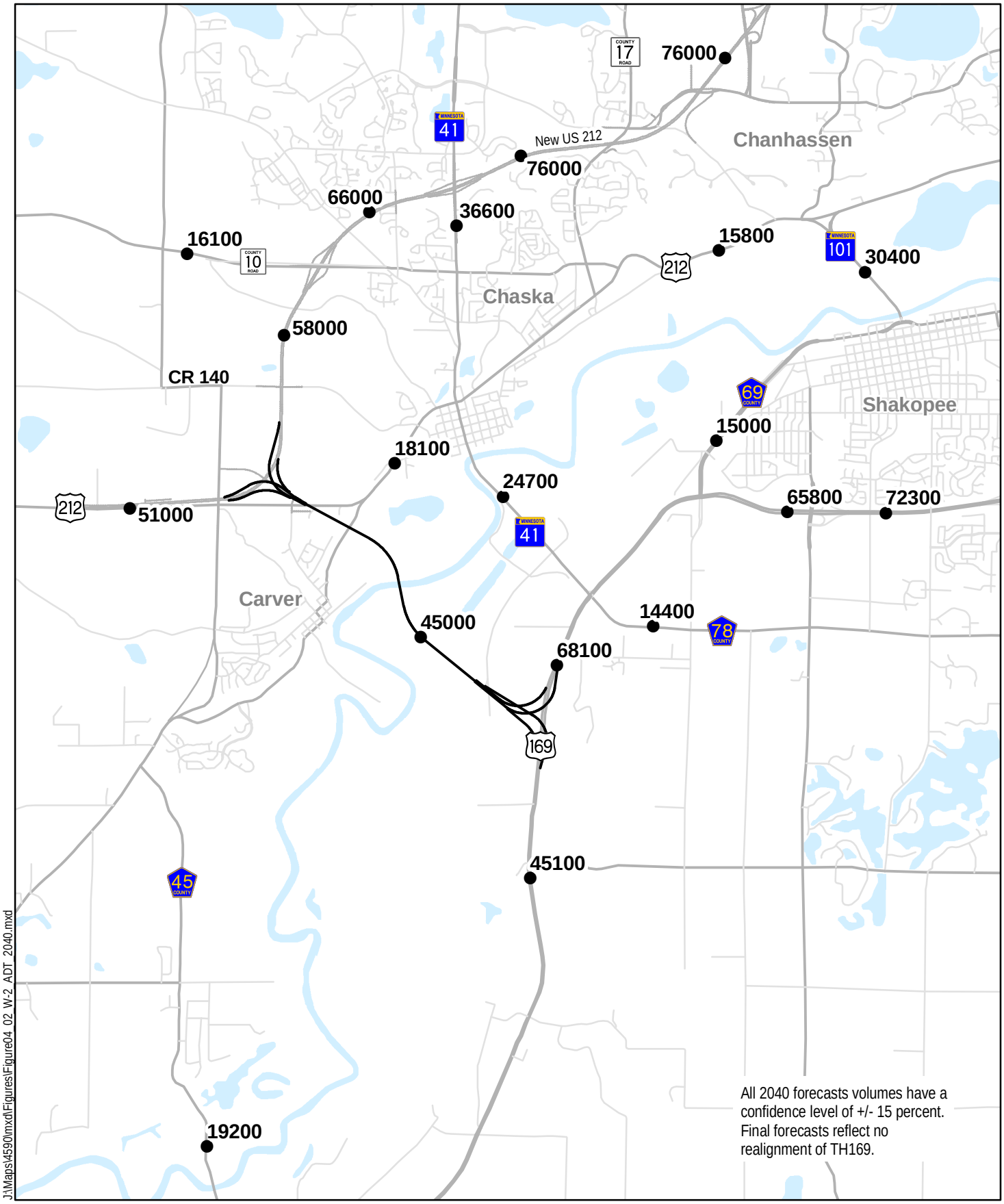

ALTERNATIVE W-2 DAILY TRAFFIC VOLUMES (2040)

Figure 4-2

TH 41 MINNESOTA RIVER CROSSING

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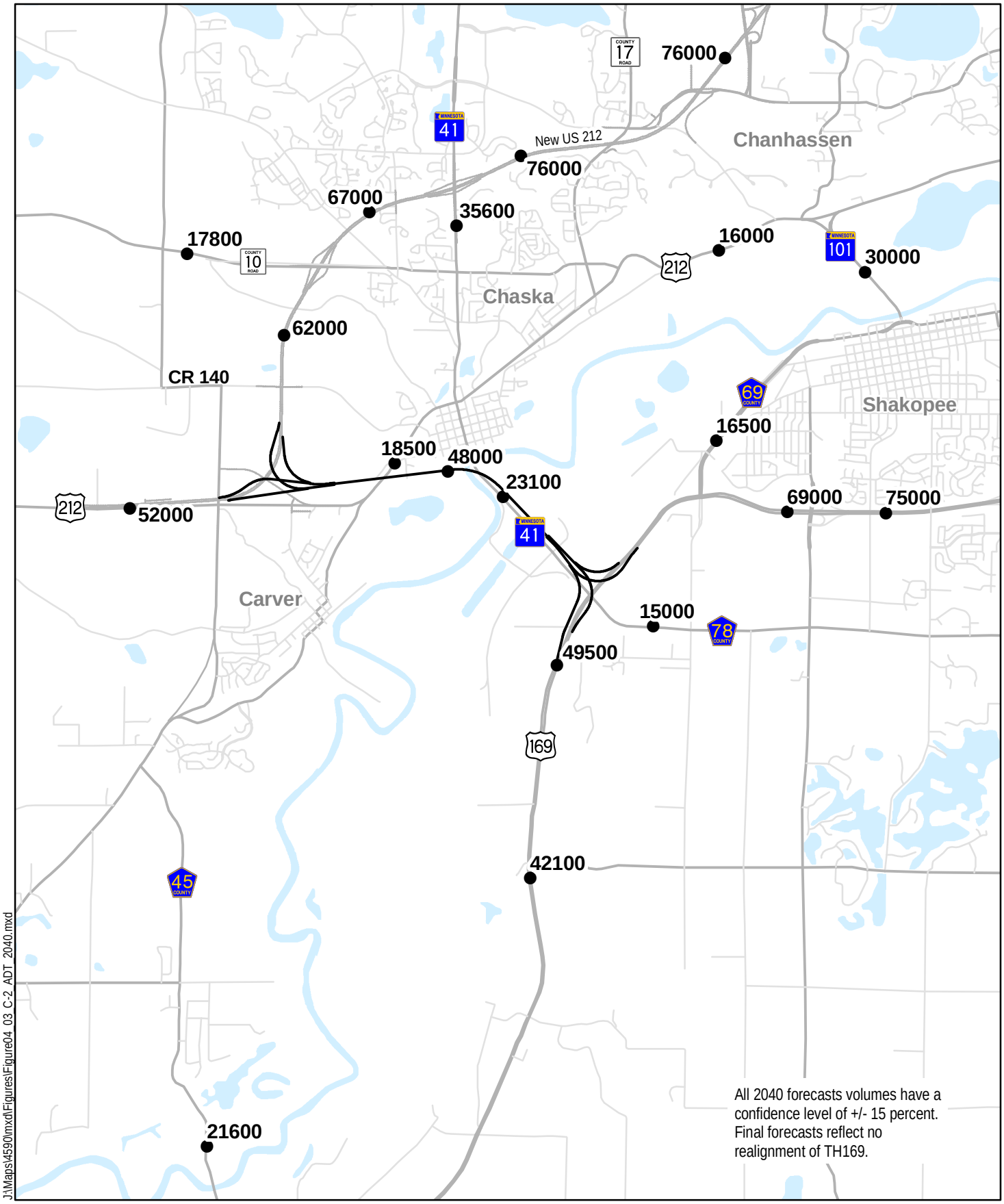

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ALTERNATIVE C-2 DAILY TRAFFIC VOLUMES (2040)

Figure 4-3

TH 41 MINNESOTA RIVER CROSSING

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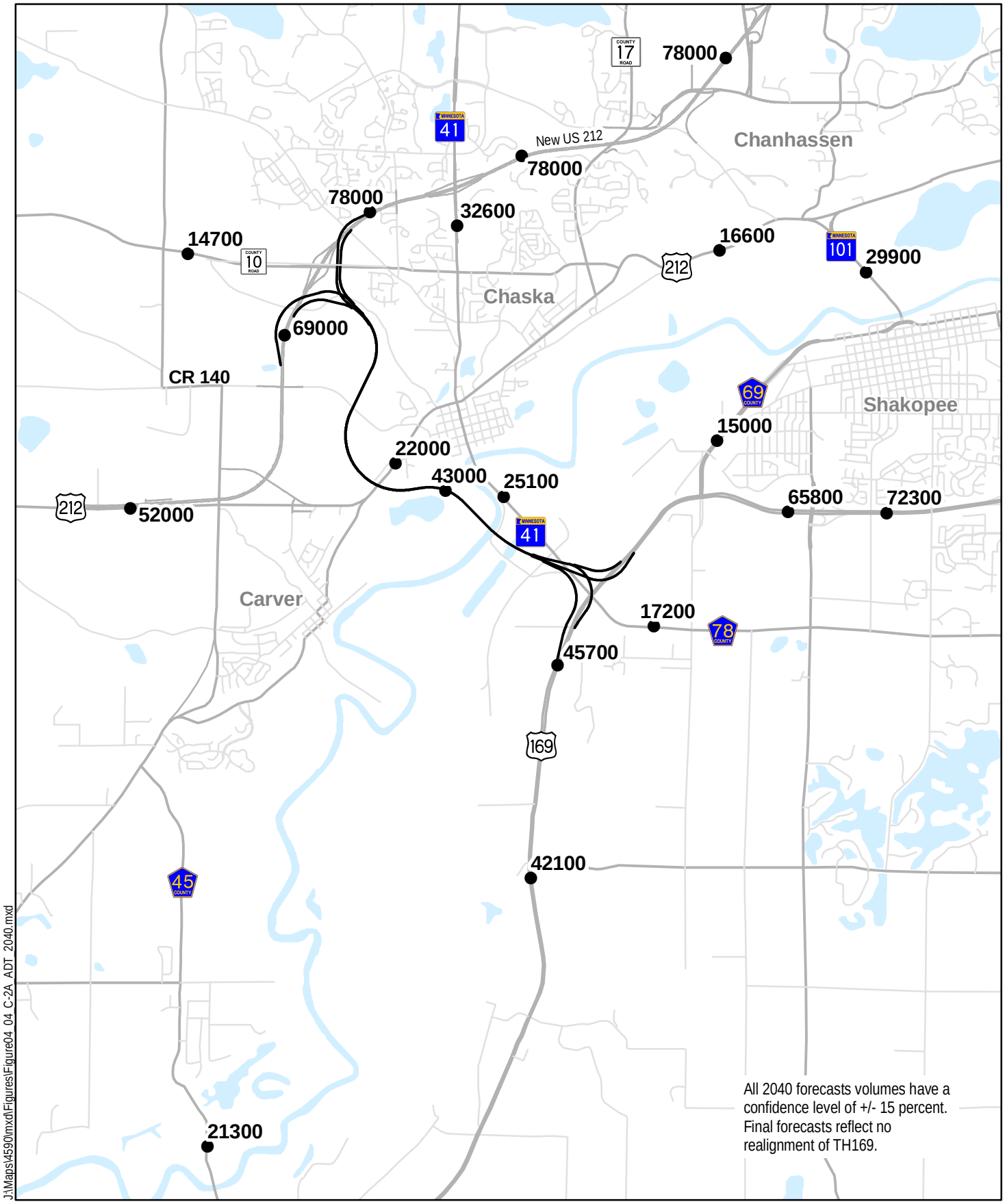

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ALTERNATIVE C-2A DAILY TRAFFIC VOLUMES (2040)

Figure 4-4

TH 41 MINNESOTA RIVER CROSSING

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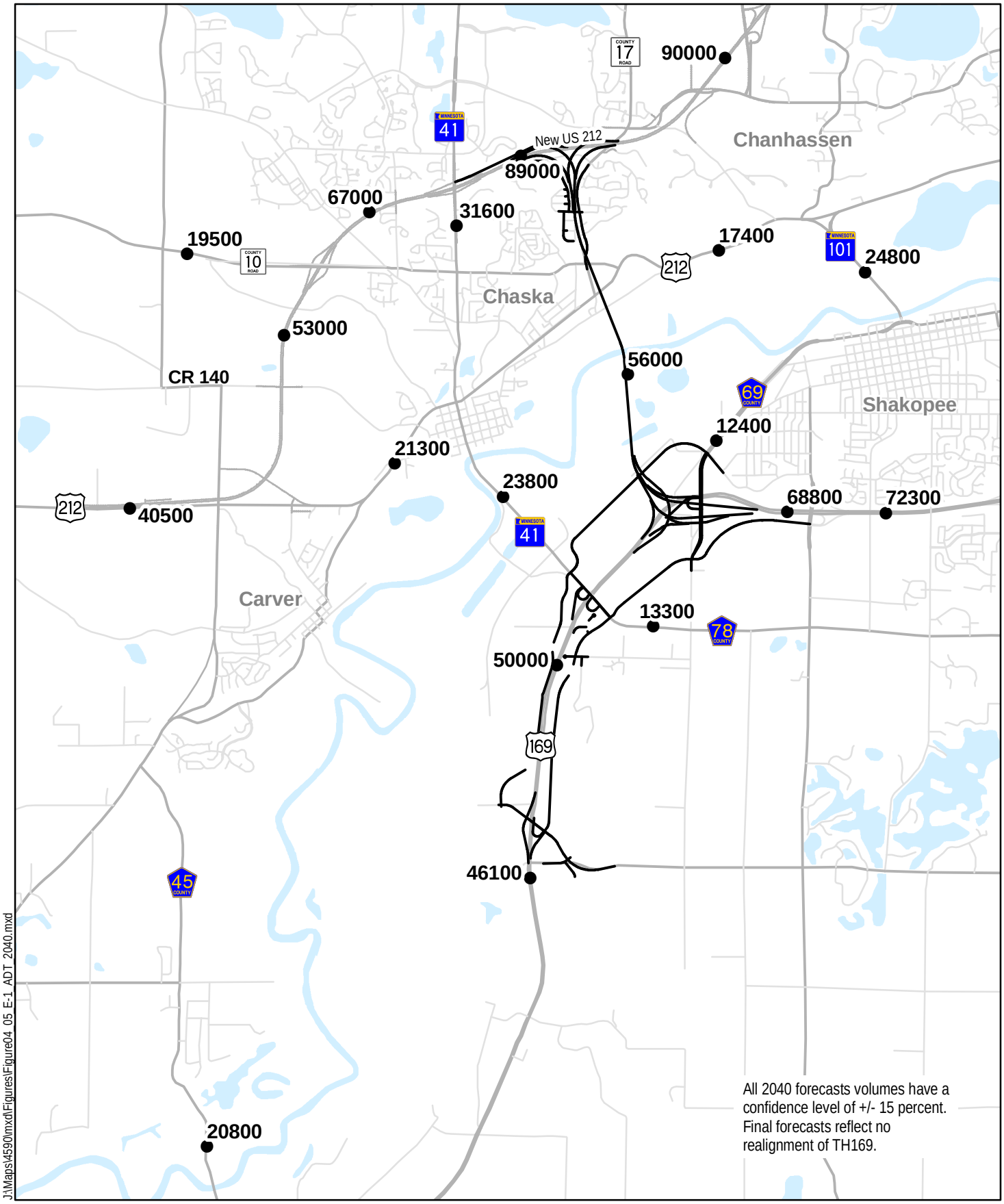

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ALTERNATIVE E-1 DAILY TRAFFIC VOLUMES (2040)

Figure 4-5

TH 41 MINNESOTA RIVER CROSSING

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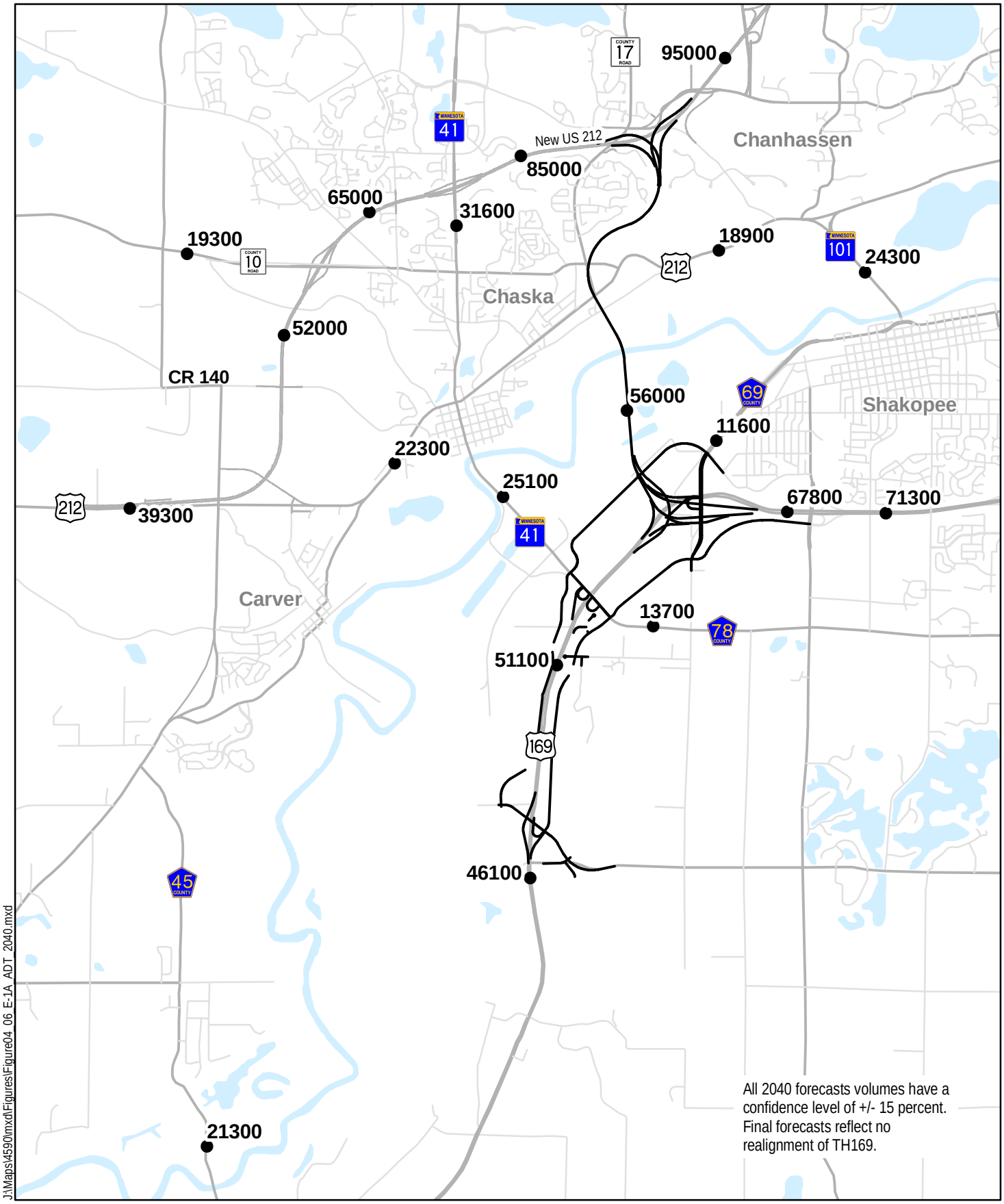

ALTERNATIVE E-1A DAILY TRAFFIC VOLUMES (2040)

Figure 4-6

TH 41 MINNESOTA RIVER CROSSING

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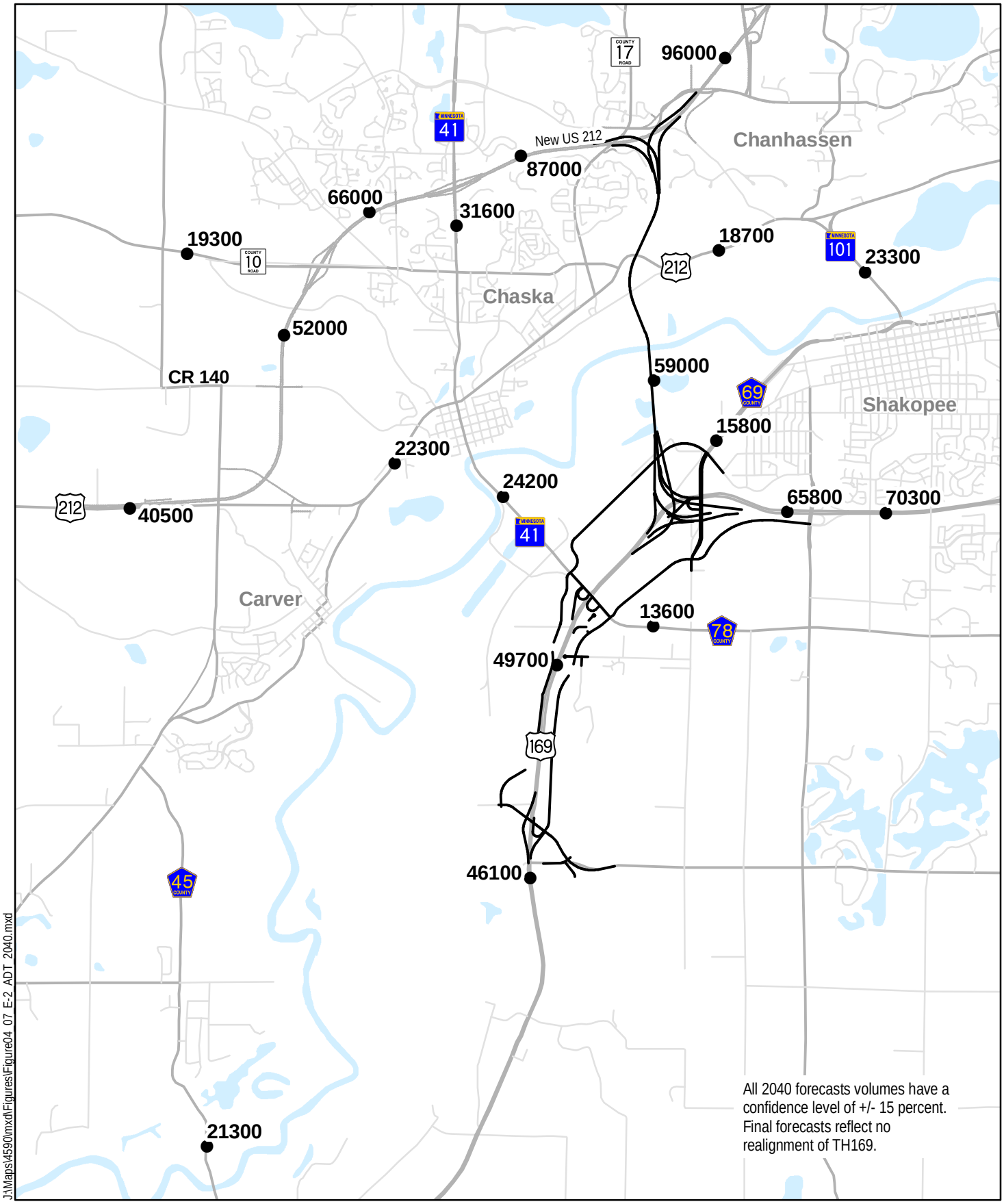

ALTERNATIVE E-2 DAILY TRAFFIC VOLUMES (2040)

Figure 4-7

TH 41 MINNESOTA RIVER CROSSING

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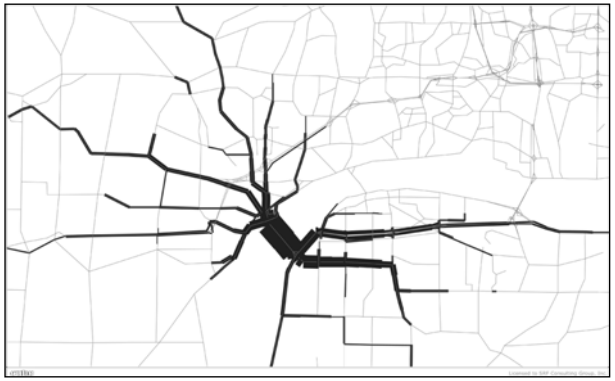
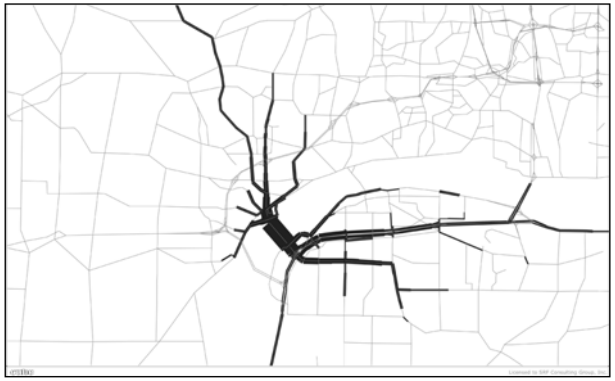
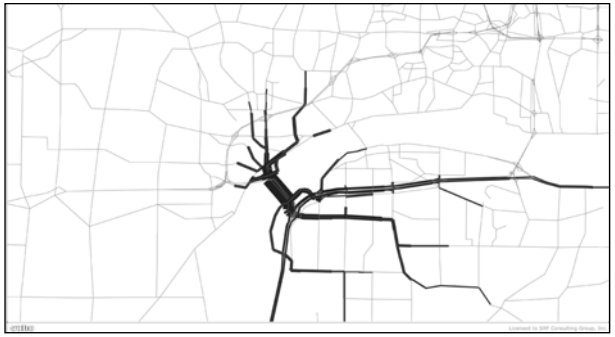
Alternative No Build: Existing TH 41 Travelshed



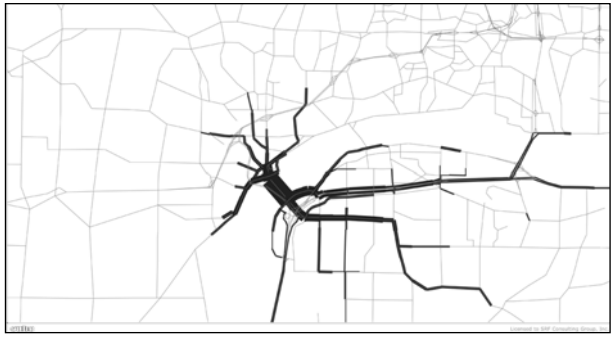
Alternative W2: Existing TH 41 Travelshed



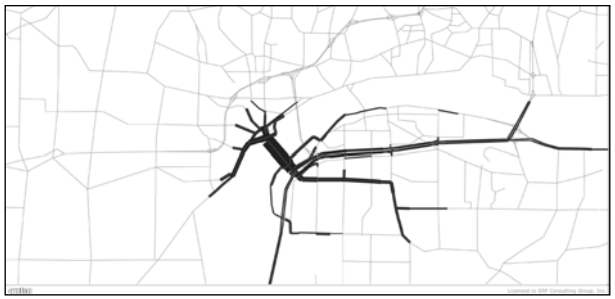
Alternative C2: Existing TH 41 Travelshed



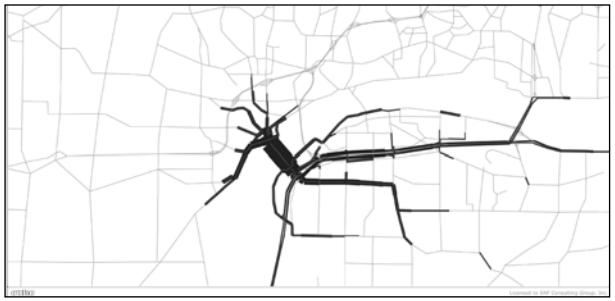
Alternative C2A: Existing TH 41 Travelshed



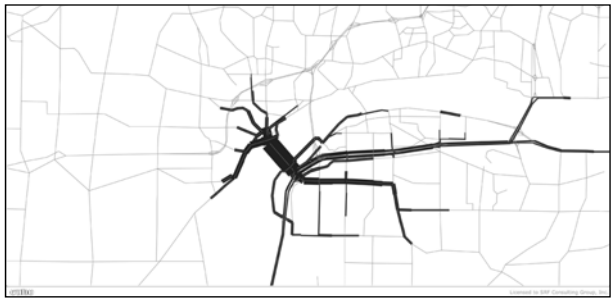
Alternative E1: Existing TH 41 Travelshed



Alternative E1A: Existing TH 41 Travelshed



Alternative E2: Existing TH 41 Travelshed



Graphics/Support/4590/EIS Figures

2040 TRAVELSHED — EXISTING TH 41

Figure 4-8

TH 41 MINNESOTA RIVER CROSSING
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Alternative W2: New TH 41 Travelshed

Alternative C2: New TH 41 Travelshed

Alternative C2A: New TH 41 Travelshed

Alternative E1: New TH 41 Travelshed

Alternative E1A: New TH 41 Travelshed

Alternative E2: New TH 41 Travelshed

Graphics/Support/4590/EIS Figures

2040 TRAVELSHED — NEW TH 41

Figure 4-9

TH 41 MINNESOTA RIVER CROSSING
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- Highway 101 – The eastern Build alternatives attract the largest amounts of traffic from Highway 101, reducing its volume by 10,000 vehicles per day (about 30 percent). Alternatives W-2, C-2, and C-2A attract 4,000 vehicles per day (about 12 percent).
- US 169 – The eastern Build alternatives attract the most traffic from US 169, reducing its volume by 10,000 to 12,000 vehicles per day (7 to 9 percent). Alternatives W-2, C-2, and C-2A reduce US 169 volumes by 6,000 vehicles per day (4 percent).
- Trips which would not cross the river under No-Build conditions – Under Build conditions, 18,000 to 20,000 trips per day would choose to travel to a destination across the river, as compared to staying on one side of the river under No-Build conditions. The additional trips reflect improved travel conditions (reduced congestion and delay) and perceived increased access to employment, shopping, and service industry options under Build conditions. Under No-Build conditions, larger numbers of people would choose to live and work on the same side of the Minnesota River, while with added river crossing capacity, it becomes more attractive to live on one side and work on the other.

Figures 4-1 through 4-7 depict the forecast 2040 No-Build and 2040 Build volumes on the major roads within the study area.

4.1.2 Peak Hour Traffic Operations Analysis

The travel demand forecast analysis summarized above provides a general indication of overall, daily travel demand in the study area. This information is valuable in comparing Build alternative effect on travel demand, but it does not identify specific capacity constraints. The study performed analysis of peak hour traffic operations to provide an indication of key roadway capacity constraints within the study area. The text below summarizes results from the peak hour traffic operations analysis performed for the freeway and local road networks.

Freeway

For each Build alternative, the study performed a planning-level peak hour traffic operations analysis for US 169, the New TH 41 river crossing, and New US 212 using year 2040 a.m. and p.m. peak hour volume forecasts developed using the Twin Cities Metropolitan Regional Forecasting Model. The planning-level analysis identified the basic number of lanes and auxiliary lanes needed to provide acceptable freeway operations (level of service C/D) during peak hours. Additional through lanes and/or auxiliary lanes were considered in areas where projected forecast volumes approached lane volume thresholds (2000 vehicles per hour per lane and 1800 vehicles per hour per lane in weaving sections). Auxiliary lanes were also considered in areas where the physical distance between ramps would necessitate them. In certain merge locations, more detailed analysis was performed using CORSIM software to determine the need for parallel acceleration lanes. Findings are incorporated into the designs for each Build alternative and were used in developing cost estimates. The designs are described in Chapter 3, and illustrated in Figures 3-6 through 3-11. Additional information is available in the technical memorandum, *TH 41 Freeway Alternatives Review*, dated April 26, 2006 and contained in *Volume II: Technical Memoranda*.

Local Traffic Operations

A peak hour traffic operations analysis was completed for intersections on existing TH 41 from Engler Boulevard to the river crossing in the City of Chaska. The analysis identified how the Build alternatives would impact traffic operations at intersections in downtown Chaska. Results of the analysis are summarized below; additional information is available in the technical memorandum, *TH 41 Traffic Study Update*, dated April 5, 2006 and contained in *Volume II: Technical Memoranda*. Figure 4-8 shows the location of the following nine analyzed intersections:

- Existing TH 41 and Engler Boulevard
- Existing TH 41 and Victoria Drive
- Existing TH 41 and existing US 212
- Existing TH 41 and 5th Street
- Existing TH 41 and US 169
- Existing TH 41 and 4th Street
- Existing TH 41 and 3rd Street
- Existing TH 41 and 2nd Street
- Existing TH 41 and 1st Street

A previous *TH 41 Traffic Study*, dated March 12, 2003, and contained in *Volume II: Technical Memoranda*, analyzed p.m. peak hour traffic operations analysis at most of these locations under 2030 No-Build conditions. The previous study found that all intersections operate at Level of Service F (LOS F) during the p.m. peak hour. (This 2003 study did not include analyses of intersections at existing TH 41 and Engler Boulevard or existing TH 41 and Victoria Drive.) The number of peak hour trips forecast for TH 41 in 2040 (Build and No-Build) exceeds the number forecast for 2030. Because of these results, 2040 operations were also assumed to result in LOS F and no additional intersection operations analysis was performed for this area. As noted in Section 2.2.1.3, increasingly in the metropolitan area, operational performance over the duration of the day rather than during peak hour is a more appropriate measure of congestion. Therefore, additional regional modeling analysis was done to evaluate the effect of the alternatives on duration of congestion. Results are presented in Section 4.1.3.

4.1.3 Daily Duration of Congestion

The p.m. peak hour traffic operations analysis pertains to one hour of the day. While this analysis shows peak hour operations would not change substantially (i.e., existing TH 41 would be congested from 4 to 5 p.m. under 2040 No-Build and Build conditions), forecast model-based analysis shows that the duration of congestion on existing TH 41 would be reduced substantially in the Build alternative scenarios. The present study included an analysis of number of hours of congestion on existing TH 41 during a typical week day. Number of congested hours, based on hourly capacities assumed in the travel demand forecast model, is shown in Table 4-2 for the following three locations:

- Existing TH 41 north of existing US 212 (and north of downtown Chaska)
- Existing TH 41 river crossing (south of downtown Chaska)
- Highway 101 river crossing (located adjacent to existing TH 41 river crossing)

TABLE 4-2
RESULTS FROM 2040 DIRECTIONAL HOURS OF CONGESTION ANALYSIS [(1),(2)]

	Location		
	Existing TH 41 North of Existing US 212 (north of downtown Chaska)	**Existing TH 41 River Crossing** (south of downtown Chaska)[(3)]	**Existing Highway 101 River Crossing**
Capacity [(4)]	*750 vplph*	*1200 vplph*	*1200 vplph*
Hours of Congestion			
No-Build	0	10	10
W-2	0	**3**	7
C-2	0	**2**	7
C-2A	0	**3**	7
E-1	0	**2**	6
E-1A	0	**3**	6
E-2	0	**2**	5

Notes:
(1) Directional hours of congestion are based on a total of 48 hours per day, 24 hours for each direction.
(2) **BOLD** numbers indicate locations where the hours of congestion are reduced by 70 percent or more.
(3) Hours are discrete.
(4) vplph = vehicles per lane per hour

The results show Build alternatives would substantially reduce the number of hours of congestion on existing TH 41 and Highway 101. As noted, the high percentage of heavy commercial trucks in traffic using existing TH 41 exacerbates congestion because trucks at a stop take longer than other vehicles to start up and go through a traffic signal. Therefore, it is important to note that with any Build alternative, truck traffic volumes on existing TH 41 through the downtown Chaska area would be reduced by approximately 65 percent as compared to No-Build conditions.

Conclusions for each analyzed location include the following:

<u>TH 41 North of Existing US 212</u>

- Based on hourly lane capacity, this section would not experience congestion in the future. It should be noted that based on traffic operations analysis, the intersection of existing TH 41/Engler Boulevard operates at a LOS F during the p.m. peak hour for 2030 No-Build conditions. Capacity for existing TH 41 is reduced at this intersection due to opposing traffic on Engler Boulevard. While traffic operations analysis shows delay for vehicles on existing TH 41 at this intersection, the delay is not substantial enough to produce congestion in the travel demand forecast model.

<u>Existing TH 41 River Crossing</u>

- Build alternatives reduce the daily hours of congestion by 70 to 80 percent as compared to No-Build.
- A desire to preserve historic buildings and accommodate pedestrian-scale activities limits the ability to add capacity on existing TH 41 through downtown Chaska in the future.

Existing Highway 101 River Crossing

- Alternatives W-2, C-2, and C-2A reduce the daily hours of congestion by 30 percent as compared to No-Build.
- Alternatives E-1, E-1A and E-2 reduce the daily hours of congestion by 40 to 50 percent as compared to No-Build.
- The possibility exists to add capacity to Highway 101 in the future to address local circulation issues.

4.2 VEHICLE MILES TRAVELED (VMT)/VEHICLE HOURS TRAVELED (VHT)

4.2.1 Average Daily Travel

In addition to traffic volumes and hours of congestion, travel demand models also forecast daily vehicle-hours of travel (VHT) and daily vehicle-miles of travel (VMT). These two elements provide indications of the overall efficiency of highway system alternatives. Table 4-3 illustrates how VMT and VHT generally respond differently to varying travel conditions. Under congested conditions, VHT is often higher indicating there is more delay/congestion in the network while VMT is lower (generally, people travel less because it is difficult to travel in congested conditions). Opposite effects occur when congestion is reduced, i.e., VHT decreases (delay is reduced) while VMT increases (people travel farther because it is easier to travel in the improved conditions).

TABLE 4-3
GENERAL RESPONSE TO VARYING TRAVEL CONDITIONS

	Travel Conditions	
	Congested	**Freeflow**
Vehicle-Hours Traveled (VHT)	Higher	Lower
Vehicle-Miles Traveled (VMT)	Lower	Higher

Table 4-4 summarizes VMT and VHT data for the study area.[1] All Build alternatives create a 2 percent increase of daily VMT and a 1 percent decrease in daily VHT as compared to No-Build conditions indicating the new river crossing reduces congestion and improves efficiency within the system as compared to No-Build. This is consistent with a project that creates a fundamental new link in the freeway system, decreasing congestion and travel time, and resulting in wider access to employment, shopping, and service options (the wider access results in VMT increases due to more and longer trips across the Minnesota River).

[1] VMT/VHT results are for the study area, not the entire region covered by the regional model. The study area consists of all of Carver and Scott Counties, and the portion of Hennepin County bounded by the Minnesota River, US 169, and TH 7. This study area was selected to account for the majority of the travelshed of the TH 41 crossing and all river crossings whose volumes are affected by various TH 41 alternatives.

TABLE 4-4
2040 DAILY VEHICLE MILES TRAVELED (VMT) AND VEHICLE HOURS TRAVELED (VHT)

Alternative	VMT	Difference Compared to No-Build miles (percent)	VHT	Difference Compared to No-Build hours (percent)
No-Build	15,688,000		476,600	
W-2	15,998,000	310,000 (2)	472,700	-3,900 (-1)
C-2	16,002,000	314,000 (2)	473,100	-3,500 (-1)
C-2A	16,042,000	354,000 (2)	473,500	-3,100 (-1)
E-1A	15,997,000	309,000 (2)	473,000	-3,600 (-1)
E-1	15,973,000	285,000 (2)	472,600	-4,000 (-1)
E-2	15,980,000	292,000 (2)	472,600	-4,000 (-1)

Among Build alternatives, Alternative C-2A results in the most growth in predicted VMT and the least reduction in predicted VHT. Alternative E-1 results in the least growth in predicted VMT and the most reduction in predicted VHT. However, the differences in VMT and VHT among the Build alternatives are less than one-half percent, and all Build alternatives show substantial benefit (reduced congestion, as shown by lower VHT, making travel easier, as shown by higher VMT) over the No-Build alternative.

4.2.2 Travel During Flood Events

Section 4.2.1 above discusses Build alternative travel characteristics under typical weekday conditions. But as discussed in Section 2.2.2, the existing TH 41 river crossing has been closed due to flooding for 15 days average during a flooding year with a flood having occurred three of seven years between 1993 and 2001. This closure substantially affects travel patterns and levels of congestion on the area's highway network. The study used the travel demand forecast model to analyze VMT and VHT impacts during flood events under No-Build and Build Alternative W-2 and E-2 conditions (these alternatives are located farthest to the east and west and can be used to set a reasonable range for all Build alternatives for the change in daily VMT/VHT under flood conditions).[2] Table 4-5 summarizes VMT and VHT data for the modeled alternatives under normal weekday conditions and flood conditions.

Compared to normal weekday conditions, VMT increases 6 percent and VHT increases 8 percent for the No-Build alternative during a flood event. Travelers are forced to drive farther and longer during a flood under No-Build conditions. For the Build alternatives, VMT increases 2 percent and VHT increases 2 to 3 percent during a flood event as compared to a normal weekday. Floods would continue to effect travel on the highway network under Build conditions, but the effect would be substantially less than under No-Build conditions.

[2] Bridges over the Minnesota River on Highway 101 and existing TH 41, and the approach roadways on CSAH 9/45 were closed in the travel demand model to represent flood conditions.

TABLE 4-5
COMPARISON OF 2040 DAILY VEHICLE MILES AND VEHICLE HOURS TRAVELED DURING NORMAL WEEKDAY AND FLOOD EVENT CONDITIONS

Travel Condition	Alternative	VMT	Difference Compared to Normal Weekday miles (percent)	VHT	Difference Compared to Normal Weekday hours (percent)
Normal Weekday	No-Build	15,688,000	NA	476,600	NA
	W-2	15,998,000	NA	472,700	NA
	E-2	15,980,000	NA	472,600	NA
Flood Event	No-Build	16,633,000	945,000 (6)	516,700	40,100 (8)
	W-2	16,346,600	348,600 (2)	485,400	12,700 (3)
	E-2	16,261,300	281,300 (2)	483,800	11,200 (2)

Notes:
NA = Not Applicable

Among alternatives under flood conditions, Table 4-6 shows the Build alternatives reduce both the vehicle-miles and vehicle-hours traveled as compared to No-Build. This is noteworthy because under normal weekday conditions, the opposite is true for VMT (see Table 4-4, VMT is higher for Build alternatives as compared to No-Build for normal weekdays). In addition, VHT savings for Build alternatives as compared to No-Build are eight times larger for flood conditions as compared to normal weekday conditions. These findings are consistent with a project that provides a new river crossing that remains open during flood events, providing an additional alternative route for public, commercial, and emergency vehicle travel during these events. Differences among Build alternatives under flood conditions are one-half percent or less.

TABLE 4-6
2040 DAILY VEHICLE MILES AND VEHICLE HOURS TRAVELED UNDER FLOOD CONDITIONS

Alternative	VMT	Difference Compared to No-Build miles (percent)	VHT	Difference Compared to No-Build hours (percent)
No-Build	16,633,000	NA	516,700	NA
W-2	16,346,600	-286,400 (-2)	485,400	-31,300 (-6)
E-2	16,261,300	-371,700 (-2)	483,800	-32,900 (-7)

4.3 SAFETY

4.3.1 Highway Network Safety

The study performed a network safety analysis for the study area under Build and No-Build conditions.[3] The analysis used VMT data broken out by facility type along with crash rates for each facility type to predict the number of crashes occurring in 2040. Table 4-7 summarizes the number of crashes predicted, accounting for flood events.

[3] The study area for which results are reported consists of all of Carver and Scott Counties, and the portion of Hennepin County bounded by the Minnesota River, US 169, and TH 7. This study area was selected to account for the majority of the travel shed of the TH 41 crossing and all river crossings whose volumes are affected by differing TH 41 alternatives.

From the highway network perspective, the Build alternatives produce mixed safety results. As noted in Section 4.2.1, VMT is predicted to increase substantially for Build alternatives as compared to No-Build. Because the number of crashes predicted is directly related to exposure (i.e., distance traveled), the number of crashes is also predicted to increase. Compared to the No-Build alternative and due to the increase in VMT, the number of crashes is predicted to increase 1 percent (from a low of 62 additional crashes for Alternative E-1 to a high of 101 additional crashes for Alternative C-2A) under 2040 Build alternative conditions.

Among Build alternatives, more non-freeway crashes are predicted for Alternatives C-2 and C-2A. On non-freeway facilities, more fatal or injury crashes occur per vehicle mile traveled as compared to freeway facilities (based on Mn/DOT 3-year crash severity rates for 2000 to 2002). Based on these results, Alternatives C-2 and C-2A would result in more injury crashes on the non-freeway roadway network as compared to other Build alternatives; however among all Build alternatives, the percentage difference from No-Build is negligible, each predicted to result in less than 1 percent more crashes.

TABLE 4-7
NUMBER OF CRASHES PREDICTED FOR STUDY AREA [(1)(2)]

				CHANGE		
Alternative	**Freeway**	**Non-Freeway**	**TOTAL**	**Freeway**	**Non-Freeway**	**TOTAL CHANGE**
No-Build	996	9,430	10,425			
W-2	1,058	9,433	10,491	62	4	66
C-2	1,052	9,460	10,512	56	30	87
C-2A	1,058	9,468	10,527	63	39	101
E-1	1,052	9,435	10,487	56	5	62
E-1A	1,055	9,444	10,498	59	14	73
E-2	1,053	9,438	10,491	57	9	66

Notes:
(1) Number of crashes was predicted based on VMT produced by the travel demand forecast model and 2000-2002 crash rates for different facility types. Mn/DOT Metro District statistics for rural freeways were used for freeway facilities. A weighted average of Metro District data for rural 4-lane expressways, urban 2-lane roadways with ADTs 5,000 - 8,000, and urban 2-lane roadways with ADTs 1,500 - 5,000 was used for non-freeway facilities. The weighting was based on the proportion of miles driven on each facility type in the forecasting model sub-area.
(2) Calculations for all alternatives include effects of five days of bridge closures per year due to of flooding.

4.3.2 Existing TH 41 Safety

Although there is more travel (VMT increases) in the Build alternatives as compared to No-Build, and as a result safety results are mixed on a network-wide basis, the Build alternatives would provide safety benefits in downtown Chaska. Section 2.2.4.1.1 indicates that existing TH 41 has a crash rate of 5.8 per million vehicle miles of travel in downtown Chaska, well above the statewide average for similar facility types. As discussed in Section 4.1.1, a new river crossing would attract 30 to 40 percent of traffic from existing TH 41. Table 4-8 shows that because a substantial amount of traffic is predicted to shift from existing TH 41, Build alternatives would reduce the number of crashes predicted in downtown Chaska by more than 30 percent. Statistically, the change among Build alternatives is roughly the same; between 11 and 13 fewer crashes than the No-Build are predicted in the year forecast (2040).

TABLE 4-8
RATE-BASED CRASH PREDICTION FOR DOWNTOWN CHASKA IN 2040[(1)]

Alternative	2040 ADT	Number of Crashes Predicted Per Year	Change from No-Build
No-Build	36,500	35	NA
W-2	24,700	24	-11
C-2	23,100	22	-13
C-2A	25,100	24	-11
E-1	23,800	23	-12
E-1A	25,100	24	-11
E-2	24,200	23	-12

(1) All alternatives use a length of 0.45 miles and a crash rate of 5.8 to predict the number of crashes on existing TH 41 in 2040.

4.3.3 Railroad Crossing Safety

As discussed in Section 2.2.4.1.3, existing TH 41 intersects railroad tracks in two at-grade crossing locations. Vehicle crashes have occurred at the at-grade crossing locations. This condition would not change in the No-Build alternative, and more TH 41 traffic would pass through the at-grade railroad crossings. All Build alternatives provide a grade-separated alternative and are predicted to reduce the amount of traffic traveling through the at-grade railroad crossings, reducing the risk of a crash in these locations. The study did not quantify the number of crashes that would likely be avoided under Build alternative conditions. However, Build alternative conditions will reduce the frequency of stops for trucks carrying hazardous/flammable materials (e.g., fuel). These stops can cause operational and safety issues.

4.3.4 Emergency Response

Improvements in emergency response times and route reliability are substantial benefits of the Build alternatives as compared to No-Build. Section 4.2.1 discussed substantial reductions in VHT for Build Alternatives under normal weekday conditions, indicating lower levels of congestion on the highway network. This will also benefit emergency response times. Section 4.2.2 discussed substantial reductions in VMT and VHT for Build alternatives under flood conditions, indicating shorter trips and less delay. This is a key benefit of the Build alternatives as compared to No-Build. Each of the Build alternatives provides a reliable route for emergency response over the Minnesota River that is not affected by flood conditions.

4.4 BENEFIT/COST ANALYSIS

A benefit/cost analysis was completed to compare the six Build alternatives to the No-Build alternative from an overall transportation perspective. The purpose of a benefit-cost analysis is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that transportation benefits accrue over a long period of time while construction costs are incurred primarily in the initial years. The primary elements that can be

monetized are travel time (hours traveled), changes in vehicle operating costs (miles traveled), vehicle crashes, annual and major maintenance costs, initial capital costs, and remaining capital value. Travel time, miles traveled, and crashes were discussed above. Initial capital costs include construction and right of way, which are further broken down for remaining capital value analysis in accordance with service life. Maintenance costs are approximated based on Mn/DOT annual cost per lane-mile estimates.

The benefit-cost analysis can provide an indication of the economic desirability of an alternative, but it is only a broad indicator for decision-making which must be weighed against other considerations, effects, and impacts of the project. A benefit/cost ratio of 1.0 is considered the minimum for justifying an improvement. The larger the ratio number, the greater the benefits per unit cost.

The benefit-cost analysis conducted for the proposed project resulted in benefit/cost ratios as follows:

- Alternative W-2: 3.43
- Alternative C-2: 3.39
- Alternative C-2A: 3.29
- Alternative E-1: 2.33
- Alternative E-1A: 2.72
- Alternative E-2: 2.84

Because all Build alternatives have benefit-cost ratios above 1.0, all are beneficial from an economic perspective.

It should be noted that mitigation costs were not included in the benefit-costs analysis, but that a sensitivity analysis on the highest cost/lowest benefit-cost ratio alternative indicates that mitigation cost would have to nearly double the total project cost for the benefit-cost ratio to drop below 1.0.

Additional detail on the benefit/cost analysis can be found in the memorandum entitled *Trunk Highway 41 (TH 41) River Crossing Benefit-Cost Analysis Assumptions and Results* August 29, 2006 amended November 20, 2006, contained (without attachments) in *Volume II: Technical Memoranda*. (Note: Complete Memorandum with attachments is available from Mn/DOT.)

4.5 LOCAL AND REGIONAL TRANSPORTATION SYSTEM ACCESS CHANGES

4.5.1 Local Access

As noted in Sections 3.23 and 3.24, planned local access to US 169 and New US 212 is assumed under No-Build conditions and accommodated under Build conditions for all alternatives. Local access to the New TH 41 river crossing and changes in local access caused by the proposed project are discussed in Section 5.1.2.3.

4.5.2 Regional Travelshed Analysis

Each Build alternative has a unique location and orientation which means it provides similar, but distinct regional access. The regional access provided can also be described as the travel market

served by the alternative. Travel market served is another defining feature of the alternatives identified through the travel forecasting process. Figures 4-8 and 4-9 illustrate the markets served by each alternative (including No-Build). The market analysis was performed using selected link analysis. Results show the following:

- North of the Minnesota River, Build alternatives substantially reduce long distance trips on existing TH 41. Alternative W-2 results in the smallest reduction; traffic oriented for Chanhassen and northern Chaska remains on existing TH 41 because the new crossing passes far to the west (see Figure 4-8).
- South of the Minnesota River, Build alternatives result in some reduction in long distance traffic on existing TH 41. Some long distance traffic remains because existing TH 41 is the primary access to all of Scott County from downtown Chaska (see Figure 4-8).
- Alternatives E-1, E-1A, and E-2 carry more north-south trips than the western and central alignments (see Figure 4-9) which indicates a stronger use of new US 212 to access the I-494 beltway.
- Alternatives W-2, C-2, and C-2A carry a larger portion of their traffic from western Carver County as compared to the eastern alignments (see Figure 4-9).
- Alternative C-2A carries fewer trips to/from western Chaska and southern Victoria because it provides no access to/from Engler Boulevard (CSAH 10, see Figure 4-9).

4.6 VEHICULAR ENERGY USE

Roadway projects consume energy both directly and indirectly. Direct energy impacts are defined as the fuel that would be used by vehicles traveling the roadway as well as fuel that would be consumed by vehicles using alternate routes during congested periods in lieu of the roadway under study. The primary direct impacts on transportation energy use related to the proposed project would result from changes in traffic volumes and traffic patterns associated with project Build and No-Build alternatives. Indirect impacts are defined as the fuel required to construct and maintain the road, and the fuel used to construct and maintain the vehicles using the roadway.

Energy consumption models commonly used for analysis of energy impacts can typically predict energy impacts within a margin of error of approximately 10 percent. As a result, differences in energy use of less than 10 percent among alternatives are not considered to be substantial. A preliminary assessment of total energy differences among alternatives, based on a comparison of total VMT as a primary indicator of differences in highway user energy consumption, indicated differences of up to two percent among all alternatives. The difference between the No-Build and each of the six Build alternatives' total VMT is one (2030) to two (2040) percent. (A discussion of values for No-Build and Build alternatives' total VMT is provided in Section 4.2.1). The difference in VMT for the six Build alternatives is less than one percent. Therefore, a detailed energy analysis (using modeling) was not performed for this project.

All of the Build alternatives would involve roadway construction and thus would result in construction-related energy use. The No-Build alternative would consume less indirect energy than any other alternative because no initial construction is required; however, periodic roadway maintenance, such as resurfacing, would occur over time.

Operational energy consumed may increase with the Build alternatives because the VMT is greater. This increase may be offset to some degree because all TH 41 traffic would no longer be forced to travel through traffic signals in downtown Chaska. Vehicle speed cycling (slowing at a traffic signal and then accelerating after the light turns green) consumes substantial amounts of fuel, particularly for trucks, which make up a substantial amount of the traffic stream in the existing TH 41 corridor.

4.7 OTHER MODES

4.7.1 Freight (Rail)

As discussed in Section 4.3.3., all Build alternatives provide grade-separated crossings over the two sets of railroad tracks that presently intersect existing TH 41. The Build alternatives also attract substantial amounts of traffic off existing TH 41, reducing the number of opportunities for train-vehicle conflict.

4.7.2 Freight (Highway Truck Traffic)

As noted in Chapter 2, heavy commercial vehicles (trucks) make up about 20 percent of the total daily traffic volume on existing TH 41, compared to 5 to 10 percent for typical roadways within the metropolitan area. The connection between US 169 and existing US 212 is used for truck transport of thousands of shipments of grain and other agricultural products from western and southwestern Minnesota to the Ports of Savage. A large amount of truck traffic is also generated by a number of aggregate mining facilities in and near the study area, as well as by the substantial amount of commercial/industrial development in the area.

Several factors are expected to cause truck percentages to decline in the future for all alternatives. As the metropolitan area's developing fringe moves outward, activities requiring truck transport, such as agricultural transport, gravel mining and residential construction, can be expected to decline in the Chaska area. In addition, commuter trips would be expected to grow faster than truck traffic, making the truck traffic a smaller portion of all traffic.

Truck volume forecasts were prepared using the Metropolitan Council regional freight model to estimate the relative differences between alternatives and the total Minnesota River crossing truck traffic.[*] Results of the truck forecast are shown in Table 4-9; they show the following:

- Truck volumes on existing TH 41 remain stable between 2000 and 2040 under No-Build conditions, but their portion of daily traffic falls from 14 percent to 7 percent.
- Alternatives C-2, E-1, E-1A, and E-2 attract the most truck traffic off existing TH 41 (74 percent, 2000 vehicles, as compared to No-Build). Alternatives W-2 and C-2A attract slightly less at 67 percent and 70 percent (1,800 and 1,900 vehicles per day), respectively.

[*] The primary inputs to the regional freight model include TAZ-level projections of employment by four classifications: (1) Agriculture, Mining, and Construction, (2) Manufacturing, Transportation, Communication, Utilities, and Wholesale Trade, (3) Office and Services, and (4) Retail Trade. These projections were not available for this study; the existing classification of employment was assumed. As a result, the precision associated with these freight forecasts is less than that for auto travel demand forecasts.

- Alternative E-2 attracts the most truck traffic off Highway 101 (29 percent, 400 vehicles per day as compared to No-Build). Alternatives C-2A, E-1, and E-1 still reduce truck volumes on Highway 101 (reduced by 7 percent, 100 vehicles per day, as compared to No-Build). Alternatives W-2 and C-2 increase truck volumes on Highway 101 by 7 percent (100 vehicles per day)

- Alternatives E-1, E-1A, and E-2 attract the most truck traffic off US 169 (7 to 9 percent, 600 to 800 vehicles per day, as compared to No-Build). In Alternative C-2A, more truck traffic travels on US 169 as compared to No-build (2 percent increase, 200 vehicles per day, as compared to No-Build).

- The New TH 41 crossing, with its higher volume, carries 5 percent of total traffic as trucks (a typical percent).

TABLE 4-9
MINNESOTA RIVER CROSSING 2040 TRUCK FORECASTS

	2000	2040						
	Existing	**No-Build**	**W-2**	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Alternative	Number of Trucks per Day (Percent of ADT)							
TH 41	2,500 (14)[2]	2,700 (7)	900 (4)	700 (3)	800 (3)	700 (3)	700 (3)	700 (3)
New TH 41			2,360 (5)	2,350 (5)	2,210 (5)	3,650 (7)	4,130 (7)	4,040 (7)
Highway 101[1]		1,400 (4)	1,500 (5)	1,500 (5)	1,300 (4)	1,300 (5)	1,300 (5)	1,000 (4)
US 169	3,640 (7)	8,900 (6)	8,700 (6)	8,700 (6)	9,100 (7)	8,300 (6)	8,200 (6)	8,100 (6)
Total	**6,000 (6)**	**13,000 (6)**	**13,000 (6)**	**13,000 (6)**	**13,000 (6)**	**14,000 (6)**	**14,000 (6)**	**14,000 (6)**

Notes:
(1) No commercial vehicle counts at the Highway 101 crossing were available for this study; validation was not possible for Highway 101 as a result.
(2) 2000 data; the truck study done in October 2002 reported truck percentages approaching 20 percent.

Truck traffic will benefit substantially by shifting from existing to New TH 41. Although the route may be longer in some cases, the New TH 41 river crossing would provide the following benefits:

- Improved safety – the new river crossing would have a lower crash rate than existing TH 41.

- Reduced energy consumption – the new river crossing would reduce the number of speed cycles (the process of slowing for a traffic signal and then accelerating back to cruising speed) which freight-hauling trucks would encounter. See Section 4.6 for more information.

- Improved travel time – trucks traveling on the new river crossing would travel on an uncongested facility, as compared to traveling through downtown Chaska with its more than 10 hours of congestion per day under No-Build conditions.

4.7.3 Rail Transit

A future Light Rail Transit (LRT) corridor, extending from the eastern edge of Chaska to Hopkins, has been identified and is known as the Southwest Transitway. The transitway follows the Hennepin County Regional Trail Corridor which goes along Highway 5, approximately three miles north of New US 212, through Chanhassen and into Chaska for about one block at which point it terminates. The southwest transitway is one of the alternatives being studied by Hennepin County Regional Railroad Authority. However, rail transit beyond Eden Prairie is not being considered at this time. Plans from the Metropolitan Council indicate that portions of this corridor could have service sometime after 2020. Although no final alternative or plan for rail transit operation has been agreed to at this time, it is likely the LRT line would be located on former rail/existing trail corridors. Build alternatives include grade-separated crossings of all affected rail/trail corridors. Under these conditions, Build alternatives would have no direct impacts on rail transit.

4.7.4 Bicycle and Pedestrian Traffic

Section 2.2.4.1.2 discusses existing and anticipated bicycle/pedestrian issues within the study area under the No-Build condition, particularly in downtown Chaska and at the Minnesota Valley Trail crossing on existing TH 41. Build alternatives will provide a grade-separated crossing of the Minnesota Valley Trail and will also attract substantial amounts of traffic off existing TH 41, providing the following benefits to bicycle and pedestrian travel:

- Improved safety – reduce the potential for vehicle-bicycle or vehicle-pedestrian conflicts.
- Improved enjoyment of bicycle/pedestrian experience – reduced congestion and reduced truck volumes will create a more enjoyable bicycle/pedestrian travel experience.

A trail is located on the existing TH 41 river crossing bridge. Mn/DOT is committed to providing more substantial bicycle/pedestrian facilities on the new river crossing under Build alternative conditions. Specific details have not been discussed; this issue would be addressed in the Tier II EIS. Impacts on trails are discussed in Chapter 8.

4.7.5 Public Transit

Regularly-scheduled transit service crossing the Minnesota River is not currently in the study area, and no plans have been identified to provide such service in the foreseeable future. For this reason, there are no direct impacts of a new river crossing on the transit routes. Indirectly, a new TH 41 river crossing would increase overall river crossing capacity, decreasing congestion and facilitating any bus or vanpool service on the area's highway network. As discussed in Section 4.2.1, VHT (as a measure of congestion in the highway network) among the Build alternatives is not substantially different, and all Build alternatives show substantial benefit (reduced congestion) over the No-Build alternative. As described in Section 2.2.4.2.2, SouthWest Metro Transit is in the process of updating its long-term transit plan for the area. As part of the plan, construction is underway for a transit-centered development at the New US 212/Highway 101 intersection in Chanhassen and the design process is beginning for a park-and-ride at the New US 212/TH 41 intersection.

Existing park-and-ride facilities are located on Market Boulevard in Chanhassen; and Jonathan Boulevard, Bavaria Road/Hundertmark Road, and TH 41/Walnut Street in Chaska. They are used primarily by SouthWest Metro Transit riders, but are also used for ridesharing and carpooling. Congestion is predicted in downtown Chaska during peak hours under both Build and No-Build conditions. Build alternatives may not improve access to the park-and-ride lots by reducing levels of congestion, but they will improve conditions by providing reliable access, uninterrupted by flood conditions, for travelers crossing the Minnesota River. There is little difference among Build alternatives.

Rail transit is discussed in Section 4.7.3 above.

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5.0 SOCIAL, RELOCATION AND ECONOMIC IMPACTS

This chapter describes the social and economic environment of the project area and the potential social, environmental justice, relocation, and economic impacts of the proposed No-Build alternative and Build alternatives. This chapter does not attempt to project future racial and economic characteristics of the population, however, it is acknowledged that changes in ethnic compositions, income, poverty and household composition will occur in the coming decades in the study area.

Social and economic issues were identified using a number of information sources including agency correspondence, literature review, compilation of mapped data and input from project stakeholders. Local governments and public resource regulatory agencies were given opportunities to provide input on potential issues during early project correspondence, public meetings, Political Advisory Committee meetings, Project Management Team meetings, Study Advisory Committee meetings and individual agency contacts. The general public was given the opportunity to identify potential social, economic and environmental impacts related to the project during public open house meetings and public forums several times between April 2003 and June 2006. For more detail about these events refer to Section 15.2.4.

For a full description of the project area and the proposed alternatives, refer to Chapter 3.

5.1 SOCIAL IMPACTS

5.1.1 Affected Environment

5.1.1.1 Project Area and Population

The study area is located in the southwestern portion of the Twin Cities metropolitan area and encompasses portions of southeastern Carver County and northcentral Scott County.

Individual municipalities either partially or fully within the project area include the cities of Carver, Chaska and Chanhassen and Dahlgren Township in Carver County, and the City of Shakopee, Jackson Township and Louisville Township in Scott County. Figure 1-2 in Chapter 1 illustrates the study area and municipal boundaries.

Table 5-1 provides current and projected population data for the municipalities within the project area. According to 2000 Census data, the total population of municipalities located within the project area is 63,931.

Table 5-1 indicates the combined municipalities within the study area are projected to add an additional 115,190 inhabitants by 2040, more than doubling their present combined population.

TABLE 5-1
POPULATION, 2000 AND 2040
STUDY AREA, CITIES, TOWNSHIPS AND COUNTIES

	Location[3]	2000 Population[1]	2040 Population Estimates[2]	Percent Growth
	Seven-County Twin Cities Metropolitan Area	2,646,056	3,573,000	35
	Carver County	70,205	184,910	163
	Scott County	89,498	247,378	176
Cities	Eden Prairie	54,901	71,706	31
Cities	Carver	1,266	20,000	1,480
Cities	Chanhassen	20,321	45,900	126
Cities	Chaska	17,603	42,036	139
Cities	Victoria	4,025	9,800	143
Cities	Belle Plaine	3,789	13,500	256
Cities	Jordan	3,833	13,300	247
Cities	Savage	21,115	49,600	135
Cities	Shakopee	20,568	71,185	246

(1) Metropolitan Council
(2) 2040 population estimates were developed with input from local agencies and Metropolitan Council staff.
(3) A number of the cities listed will have annexed portions of surrounding townships by 2040. Anticipated incorporation of township land is accounted for in the 2040 population estimates. Except where orderly annexation agreements are in place, it is not possible to project which portion of townships will be within City limits in 2040. Note that regardless of area, 2000 population within townships is at very low density.

5.1.1.2 Socio-Economic and Racial Characteristics

Socio-economic and racial characteristics of the population in the study area are summarized in Tables 5-2 and 5-3. Key variables listed for each municipality include population, racial composition, number of households, median household income, and number and percentage of individuals below the poverty level.

Tables 5-2 and 5-3 indicate the population in the study area is predominantly white (all jurisdictions report 85 percent or more of their population as white). With the exception of Jackson Township in Scott County, the median household income is higher and the percent of population under the poverty level is lower within the study area population than for state and the Twin Cities metropolitan area populations.

5.1.1.3 Community Facilities

Community facilities include those serving local residents of the study area communities and those serving visitors and the traveling public. There are, of course, numerous community facilities both in and outside of the study area that serve the population residents in the study area. The proposed project could have some effect on residents' access to the array of these services. Those community facilities that are within the study area itself are noted below and shown in Figure 5-1.

TABLE 5-2
RACIAL AND ETHNIC COMPOSITION
STUDY AREA MUNICIPALITIES, 2000

Location	Race													Hispanic	
		White		Black		American Indian or Alaskan Native		Asian		Hawaiian/ Pacific Island		Other Race			
	Total Population	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
State of Minnesota	4,919,479	4,400,282	89.4	171,731	3.5	54,967	1.1	141,968	2.9	1,979	>0.1	65,810	1.3	143,382	2.9
Metropolitan Area	2,642,062	2,238,117	84.7	156,620	5.9	20,417	0.8	121,053	4.6	1,186	>0.1	45,061	1.7	95,902	3.6
Carver County	70,205	67,361	95.9	417	0.6	129	0.2	1,096	1.6	10	>0.1	613	0.9	1,791	2.6
City of Carver	1,266	1,233	97.4	3	0.2	3	0.2	6	0.5	0	0	12	0.9	21	1.7
City of Chanhassen	20,321	19,284	94.9	152	0.7	31	0.2	576	2.8	1	>0.1	84	0.4	402	2.0
City of Chaska	17,449	16,351	93.7	178	1.0	49	0.3	291	1.7	1	>0.1	381	2.2	1013	5.8
Dahlgren Township	1,453	1,435	98.8	0	0	3	0.2	5	0.3	0	0	2	0.1	3	0.2
Scott County	89,498	83,813	93.6	824	0.9	693	0.8	1,946	2.2	27	>0.1	1,114	1.2	2,381	2.7
City of Shakopee	20,568	18,842	91.6	273	1.3	193	0.9	495	2.4	8	>0.1	440	2.1	906	4.4
Jackson Township	1,361	1,168	85.8	3	0.2	15	1.1	21	1.5	0	0	137	10.1	298	21.9
Louisville Township	1,359	1,178	86.7	10	0.7	4	0.3	15	1.1	0	0	146	10.7	174	12.8

Source: U. S. Census Bureau, Census 2000

TABLE 5-3
HOUSEHOLD, INCOME AND POVERTY CHARACTERISTICS
STUDY AREA MUNICIPALITIES, 2000

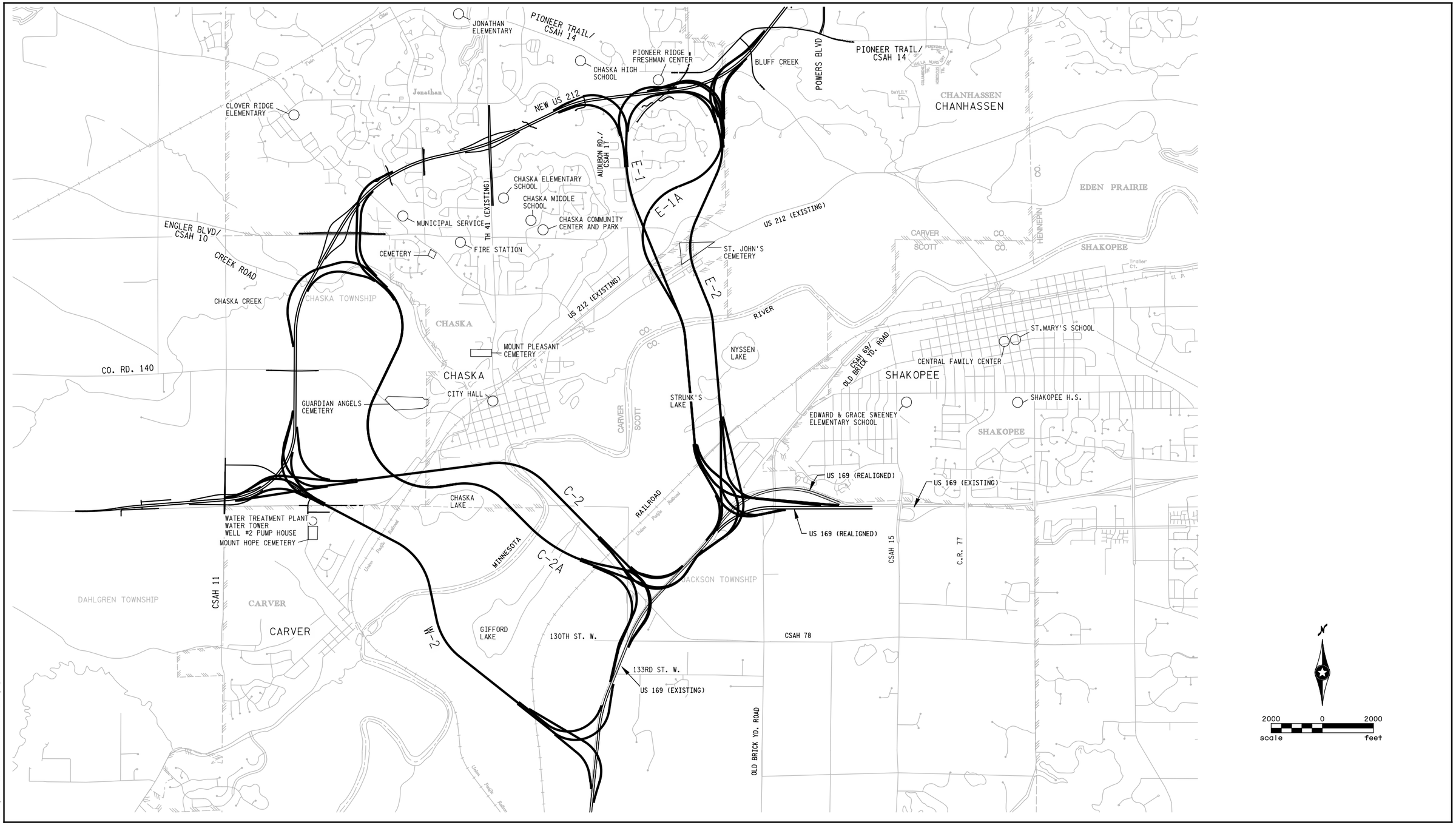
Location	Number of Households	Median Household Income, 1999	Number of Individuals Below the Poverty Level, 1999	Percent of Population Below the Poverty Level
State of Minnesota	1,895,127	$56,874	380,476	7.7
Metropolitan Area	1,021,456	$65,450	195,253	7.4
Carver County	24,356	$73,577	2,391	3.5
City of Carver	458	$70,673	24	1.9
City of Chanhassen	6,914	$93,092	386	1.4
City of Chaska	6,104	$69,612	816	4.7
Dahlgren Township	479	$68,977	38	2.6
Scott County	30,692	$72,212	2,979	3.3
City of Shakopee	7,540	$66,885	695	3.4
Jackson Township	461	$53,611	169	12.4
Louisville Township	410	$82,911	53	3.9

Source: U. S. Census Bureau, Census 2000

SCHOOLS

- **City of Shakopee**
  - Shakopee High School
  - St. Mary's School
  - Edward and Grace Sweeney Elementary School

- **City of Chaska**
  - Chaska High School (545 Pioneer Trail)
  - Pioneer Ridge Freshman Center (1085 Pioneer Trail East)
  - Middle School East (1600 Park Ridge Drive)
  - Middle School West (140 Engler Boulevard East)
  - Elementary School (1800 Chestnut Street North)
  - Guardian Angels School (215 2nd Street West)
  - Saint John's Lutheran Church LCMS School (300 4th Street East)
  - Carver-Scott Educational Cooperative (401 4th Street East)



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COMMUNITY FACILITIES

Figure 5-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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CHURCHES

- **City of Shakopee**
  - Jehovah's Witnesses Shakopee Congregation (13066 Old Brick Yard Road)
- **Chaska**
  - Guardian Angels Church (218 2nd Street West)
  - Valley Evangelical Free Church (150 Engler Boulevard)
  - Crown of Glory Lutheran Church (ELCA) (1141 Cardinal Street)
  - Saint John's Lutheran Church LCMS (300 4th Street East)
  - Discovery United Methodist Church (950 Trumble Street)
  - Moravian Church of Chaska (115 4th Street East)
- **Carver**
  - Trinity Lutheran Church (417 Oak Street North)

CEMETERIES

- **City of Carver**
  - Mount Hope Cemetery
- **Chaska**
  - Mount Pleasant Cemetery
  - St. John's Cemetery
  - Guardian Angels Catholic Cemetery

COMMUNITY CENTERS

- Chaska Community Center (1661 Park Ridge Drive)

LIBRARIES

- **Chaska**
  - Chaska Library, Carver County Library System (City Hall Plaza)

MUSEUMS

- **Chaska**
  - Chaska Historical Society (112 West 4th Street)

SPECIAL EVENT SITE

- **Louisville Township**
  - Renaissance Festival site (private) (north of Union Pacific Railroad, west of existing TH 41)

NURSING HOMES

- **Chaska**
  - Moravian Care Ministries (501 Oak Street North)
  - Carric Cottages (112001 Hidden Creek Place)

GOVERNMENT CENTERS

- **Carver**
  - City Hall (316 Broadway North)
- **Chaska**
  - City Hall (One City Hall Plaza)
  - Carver County Government Center (600 East 4th Street)

EMERGENCY SERVICES

- **Chaska**
  - Chaska Police Department (Two City Hall Plaza)
  - Chaska Fire Department (285 Engler Boulevard)

Parks and public recreation areas are discussed in Chapter 8.

5.1.2 Environmental Consequences

5.1.2.1 Community Cohesion

Community cohesion refers to existing and potential social interaction between or among geographically-defined groups. In particular, community cohesion addresses the spatial connectedness of individual sites both within and among the communities and integrates the concerns of safety, efficiency, environmental sensitivity and aesthetic continuity.

No-Build Alternative

Existing TH 41 is a primary regional traffic link across the Minnesota River connecting Scott and Carver Counties. It is heavily relied upon for local traffic within the City of Chaska; it is the City's "Main Street". The No-Build alternative would not change the physical connectivity of existing roadways. However, forecast increases in traffic volume (discussed in Chapter 2) may

negatively impact community cohesion connectedness between the east and west portions of Chaska by increasing the incidence of auto accidents, lengthening travel times, affecting pedestrian safety and access and increasing traffic congestion.

Build Alternatives

Each of the Build alternatives requires acquisition of business and residential properties. These impacts are detailed in Section 5.2.2.5.[1] This section describes acquisitions that particularly affect community cohesion.

For all Build alternatives, existing or planned local roadway connections that are affected by the proposed project will be functionally restored via grade-separation and/or local roadway realignment. These are discussed in Section 5.1.2.3. Note that as discussed in Chapters 2, 3 and 4, it is assumed that within the study area US 169 will be converted to a freeway facility, including interchanges at CSAH 14, existing TH 41 and CSAH 69, closure of direct access to properties from US 169 and provision of property access and local circulation through a system of frontage/backage roads. Figures 3-6 through 3-11 in Chapter 3 provide potential concepts for these US 169 and local improvements; any such improvements are not part of the proposed project.

Alternative W-2

Alternative W-2 would directly impact several residential and business properties in both Carver and Scott counties, as described in Section 5.2.2.3.

Alternative W-2 crosses the site of and would divide a townhome community (Riverbluff Estates now under construction) and areas planned for lower density residential use in the City of Carver. It would separate a small portion of Carver (east of the Alternative W-2 alignment) from the remainder of the community, though this separated area would be accessible by grade-separated crossings at Mt. Hope Road and CSAH 40.

There are no exclusively designated pedestrian or bicycling routes within or intersected by Alternative W-2. Foot and bicycle traffic in the area occurs on local, county and state roadways where permitted and would be retained.

Alternative C-2

Alternative C-2 would require acquisition of a portion of the Jackson Heights mobile home park (12 of 64 units) in Scott County. As further described in Section 5.1.2.4, Jackson Heights, as well as Mobile Manor, Bonnevista and Riverview Terrace mobile home parks are largely Hispanic, low-income communities.

[1] Note: For purposes of this DEIS, impacts on mobile home communities include the units that are located within the assumed corridor limits. It is recognized that acquisition in mobile home parks differ from other types of residential acquisitions in certain ways, one of which is that acquisition of some of the units in the park could affect the remaining units should the park as a whole be no longer economically viable due to the removal of units affected by the project. Because the proposed project is several years away and the economic impact on the affected mobile home parks is not quantifiable at this time, only the number of directly impacted units is assumed as a direct impact.

Alternative C-2 would impact the planned "Heights of Chaska" development. This proposed mixed-use, primarily single-family residential development includes up to 3,550 new housing units and 70,000 square feet of commercial space. Alternative C-2 passes through the southern portion of the planned development and would require its redesign to accommodate the necessary right of way and local access to the development.

Changes in vehicular access are described in Section 5.1.2.3. There are no exclusively designated pedestrian or bicycling routes within or intersected by Alternative C-2. Foot and bicycle traffic in the area occur on local, county and state roadways where permitted and would be retained.

Alternative C-2 would separate the small area of Chaska that would remain between existing US 212 and New TH 41 from the remainder of the city, as well as making a more prominent division between the cities of Chaska and Carver than currently exists. These areas will still be connected via grade-separated crossing at existing US 212. Alternative C-2A would also permanently change the visual relationship between the City of Chaska—particularly the original townsite—and the Minnesota River.

Alternative C-2A

In Scott County, Alternative C-2A would require acquisition of a portion of the Jackson Heights mobile home park (24 of 64 units) affecting the largely Hispanic, low-income community as well as several businesses and residences along existing US 169.

In Carver County, Alternative C-2A would require acquisition of several residential properties along existing US 212 and County Road 140 for right of way.

Alternative C-2A would impact the planned "Heights of Chaska" development. As noted above, this mixed-use, primarily single-family residential development includes up to 3,550 new housing units and 70,000 square feet of commercial space. Alternative C-2A passes through the southern portion of the planned development and would require its redesign to accommodate the necessary right of way and local access to the development. Alternative C-2 results in a separation of the portion of Chaska west of the alignment (chiefly the Heights of Chaska development) from the remainder of the city including its downtown, although a grade-separated crossing would be provided at CR 140.

Changes in vehicle access are discussed in Section 5.1.2.3. At present there are no exclusively designated pedestrian or bicycling routes intersected by Alternative C-2A. Foot and bicycle traffic in the area occur on local, county and state roadways where permitted and would be retained. CSAH 10/Creek Road is planned for future conversion to a non-motorized route dedicated to pedestrian and cycling use. It would be grade-separated from the new river crossing facility.

Alternative E-1

In Scott County, it is assumed (for Alternatives E-1, E-1A and E-2) that improvements to US 169 (under a separate project) include its realignment south of its existing alignment, as well as construction of an interchange at CSAH 69. These assumed US 169 improvements would

likely require the acquisition of a portion of the 66-unit Mobile Manor mobile home park. Alternative E-1 itself would require the acquisition of any remaining portion of Mobile Manor and a portion of the Bonnevista mobile home park (25 of 200 units), affecting these largely Hispanic, low-income communities. Alternative E-1 would also affect other individual residential and business properties in Scott County.

In Carver County, Alternative E-1 would require the acquisition of a portion of the Riverview Terrace mobile home park (30 of 241 units) affecting and dividing this largely Hispanic community, and would pass directly through several businesses along Stoughton Road and existing US 212 in the cities of Chaska and Chanhassen, directly north of Riverview Terrace.

Alternative E-1 would also require acquisition of numerous parcels in residential developments either side of existing Audubon Road.

Alternative E-1 is designed to run parallel with a realigned Audubon Road in Chaska. The realigned Audubon Road will provide access to the neighborhood east of the Alternative E-1 corridor as well as to the remaining neighborhoods west of the Alternative E-1 corridor via a grade-separation at Woodridge Drive and connection/extension of Brandenburg Drive-August Drive to serve the west end of Weston Ridge. The Alternative E-1 corridor would separate the established neighborhoods east and west of Audubon Road and substantially change the existing relationships within the neighborhoods and their connectivity to the surrounding area. While access to these neighborhoods would be provided as part of the project, connection between the two neighborhoods would be more circuitous, spatial connections would be severed, and opportunities for pedestrian movement between affected neighborhoods would be fewer.

New US 212, as being constructed, will create a separation between Chaska neighborhoods along Audubon Road south of the New US 212 corridor and the complex comprising Chaska High School, Pioneer Park, and the Pioneer Ridge Freshman Center. The Alternative E-1/New US 212 system interchange would exacerbate this separation.

At present, two designated pedestrian/bicycle routes connect the neighborhoods south of New US 212 to the high school complex. One of these paths begins at Weston Ridge Parkway and leads to the football fields and main school building. This connection will be preserved (reconstructed) as part of the New US 212 project. The other trail begins at Wildflower Lane and connects the neighborhood with Pioneer Ridge Freshman Center. Construction of New TH 41 in the Alternative E-1 corridor would impact these paths.

Alternative E-1A

In Scott County, impacts for Alternative E-1A are identical to those presented for Alternative E-1 above.

In Carver County, Alternative E-1A would require the acquisition of a portion of the Riverview Terrace mobile home park (17 of 241 units) affecting and dividing this largely Hispanic, low-income community. Alternative E-1A will also require the acquisition of residences in Chaska and Chanhassen and numerous business properties.

Alternative E-1A would pass directly through several businesses located along Stoughton Road and existing US 212 in the cities of Chaska and Chanhassen directly north of the Riverview Terrace.

While New TH 41 would bridge over Stoughton Road, existing US 212 and Engler Road, it will create a visual separation between the portions of the communities of Chaska and Chanhassen east and west of the corridor.

While access will continue to be provided via a realigned Bluff Creek Road, New US 212, as being constructed, will create a spatial separation between Chanhassen neighborhoods along Bluff Creek Road south of New US 212 and the major portion of Chanhassen north of New US 212. The Alternative E-1A/New US 212 system interchange would exacerbate this separation.

Alternative E-2

In Scott County, the assumed improvements to US 169 (under a separate project) are as described under Alternative E-1, above. As noted, those assumed US 169 improvements are anticipated to require the acquisition of at least a portion of the 66-unit Mobile Manor mobile home park. Alternative E-2 itself would require the acquisition of any remaining portion of Mobile Manor and a substantial portion of Bonnevista mobile home park (85 of 200 units) affecting these largely Hispanic and low-income communities. Alternative E-2 will also require the acquisition of numerous residences and business properties.

In Carver County, impacts to community cohesion are very similar to those noted for Alternative E-1A.

5.1.2.2 Community Facilities and Services

A New TH 41 route through the communities in the project area has the potential to impact the connectivity of existing facilities and services to the population. The following section examines potential impacts on community facilities and services for both the No-Build and Build alternatives. Note that impacts to parks are addressed in Chapter 8.

No-Build Alternative

As described in Chapter 4, existing TH 41 is expected to experience 10 directional hours of congestion a day under 2040 No-Build conditions, which will impede cross-town access within the City of Chaska to community facilities, such as clinics, schools, churches and libraries. Increased traffic loads on the existing transportation network will also slow school bus travel and increase the response time of law enforcement, fire departments and emergency ambulance service. The existing TH 41 bridge is subject to periodic closure due to flooding, which hampers access and response time for emergency personnel. The periodic closure of existing TH 41 interrupts important connections between the north and south sides of the Minnesota River, affecting commuter traffic, local delivery and regional freight traffic.

Build Alternatives

All Build alternatives result in fewer hours of congestion on existing TH 41 as compared to No-Build conditions, thus improving the overall general circulation, and access to community facilities and services. In addition, since the new bridge connection will not be subject to periodic closure due to flooding, it will enable emergency responders in Carver and Scott Counties to assist each other more effectively and efficiently.

Alternative W-2 impacts a private property that is the site of the annual Renaissance Festival and is also used for similar events. The impact is toward the edge of the site.

Alternatives W-2, C-2 and C-2A have no negative impact on existing community facilities or services, except for a minor acquisition of land from a maintenance facility site in Chaska.

Alternative E-1 would require acquisition of a church (Discovery United Methodist Church, Chaska) and church-residence and partial acquisition of school property. Alternative E-1 would require re-configuration of local roadways and pedestrian paths near the Chaska High School campus, creating slightly longer trips and more circuitous routes from residential areas to the school.

Alternative E-1A would require partial acquisition of school property.

Alternative E-2 would require acquisition of a cemetery (St. John's, Stoughton Road, Chaska) and partial acquisition of school property.

Both Alternatives E-1A and E-2 would require re-configuration of local roadways and pedestrian paths through the residential neighborhoods in Chaska and Chanhassen through which it passes.

5.1.2.3 Travel Patterns & Access

Transportation impacts of the No-Build alternative are described in Chapter 2. Transportation impacts of Build alternatives are described in Chapter 4. This section describes these impacts from the socio-economic perspective.

No-Build Alternative

The No-Build alternative would result in no direct impacts to access as existing routes would remain in place. Negative impacts from the No-Build alternative would result from congestion on existing TH 41 and Highway 101, as described in Chapter 2.

Build Alternatives

The proposed project is a limited access freeway connection between US 169 and New US 212 with grade separated interchanges at each end and no other proposed points of access. Each of the Build alternatives would impact the continuity of the local road network resulting in minor impacts on ease of access to community facilities for residents. Overall regional

connectivity would be enhanced by each of the six Build alternatives and Existing TH 41 would remain to carry local traffic. Access impacts are summarized in Table 5-4. For all alternatives, any affected access would be restored as part of the project. The discussion below is focused on implications of the project for design of US 169 and local roadway improvements in Scott County, and for realignment of New US 212-related improvements and local roadways in Carver County.

Alternative W-2

In Scott County, Alternative W-2 has no specific effect on the design of US 169 or local roadway improvements.

In Carver County, Alternative W-2 would require a new realignment of existing US 212 (which is being realigned as part of the New US 212 project). Alternative W-2 would also require the extension of Mt. Hope Road to connect to realigned existing US 212.

Alternative C-2

In Scott County, Alternative C-2 affects the future design of the US 169/existing TH 41 interchange and the US 169/CSAH 69 interchange. Potential concepts for those improvements are shown in Figure 3-7 in Chapter 3. Alternative C-2 would require the realignment of existing TH 41/CSAH 78 to the west.

In Carver County, Alternative C-2 requires the reconstruction of local ramps at the New US 212/CSAH 11 interchange.

Alternative C-2A

In Scott County, Alternative C-2A has very similar effects on design of future roadway improvements as Alternative C-2, discussed above.

In Carver County, Alternative C-2A does not require roadway realignment.

Alternative E-1

In Scott County, Alternative E-1 affects US 169/existing TH 41 and US 169/ CSAH 69 interchange designs; the effect on local roads design will depend on whether the assumed realignment of US 169 occurs.

In Carver County, there would be numerous local roadway alterations (realignments, grade-separations, roadway extensions) needed in order to restore access to affected properties. These include:

- the realignment of Audubon Road east of its existing alignment,
- new connections from realigned Audubon Road to Falls Curve, Wenz Avenue, Bluff Point Drive, Trumble Street, and Hazeltine Bluff Boulevard,

TABLE 5-4
ACCESS IMPACTS

	Alternative					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Local Access to New TH 41 – Scott County	Via US 169 from US 169/CSAH 14 inter-change (2 mile west) and US 169/ existing TH 41 interchange (½ mile east)	At combined system/ local interchange (existing TH 41/ CSAH 78)	At combined system/ local interchange (existing TH 41/ CSAH 78)	At combined system/ local interchange (CSAH 69)	At combined system/ local interchange (CSAH 69)	At combined system/ local interchange (CSAH 69)
Local Access to New TH 41 – Carver County	At combined system/ local interchange (CSAH 11)	At combined system/ local interchange (CSAH 11)	Via New US 212 from US 212/ CSAH 11 interchange (1½ mile west) and US 212/ existing TH 41 interchange (1 mile east)	Via New US 212 from US 212/existing TH 41 interchange (½ mile west) and US 212/ Powers Boulevard interchange (1½ mile east)	Via New US 212 from US 212/ existing TH 41 interchange (1½ mile west) and US 212/ Powers Boulevard interchange (1 mile east)	Via New US 212 from US 212/ existing TH 41 interchange (1½ mile west) and US 212/ Powers Boulevard interchange (1 mile east)
Effect on design of US 169 and other local roadway improvements – Scott County	None	Existing TH 41/ CSAH 78 realigned; affects US 169/ existing TH 41 and US 169/CSAH 69 interchange design	Existing TH 41/ CSAH 78 realigned; affects US 169/ existing TH 41 and US 169/CSAH 69 interchange design	Affects US 169/existing TH 41 and US 169/ CSAH 69 inter-change design; effect on local roads depends on US 169 realignment decision	Affects US 169/ existing TH 41 and US 169/CSAH 69 interchange design; effect on local roads depends on US 169 realignment decision	Affects US 169/ existing TH 41 and US 169/CSAH 69 interchange design; effect on local roads depends on US 169 realignment decision
Required changes to other roadways – Carver County	Existing US 212 realigned; Mt. Hope Road extended	Rebuild US 212 local ramps rebuilt	None	Audubon realigned; new road to serve Weston Ridge Parkway area; Bluff Point realigned to serve Howard Lane area; overpass at Woodridge Drive to connect to realigned Audubon	None	None

- an overpass at Bluff Point Drive connecting the neighborhoods west and east of the corridor,
- extension of a roadway south from Bluff Point Drive to provide access to Howard Lane and Mabel Court,
- extension of a roadway north from Bluff Point Drive to provide access to Weston Ridge Parkway, including a grade-separation of the existing trail.

Alternative E-1A

In Scott County, Alternatives E-1A is identical to Alternative E-1.

In Carver County, Alternative E-1A requires no changes to other roadways.

Alternative E-2

In Scott County, Alternative E-2 has very similar implications for access as Alternatives E-1 and E-1A.

In Carver County, Alternative E-2 requires no changes to other roadways.

5.1.2.4 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", issued in February 1994, requires that the evaluation of environmental justice be addressed (to the greatest extent practicable and permitted by law) in all federal planning and programming activities. The purpose of Executive Order 12898 is to identify, address and avoid disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority and low-income populations. The proposed project has federal permit requirements and will receive federal funding. As such, it is considered a federal project for the purpose of compliance to this Executive Order.

Executive Order 12898 requires that the proposed actions be reviewed to determine if there are 'disproportionately' high or adverse impacts on these populations. 'Disproportionate' is defined in two ways: the impact is 'predominantly borne' by the minority or low-income population group, or the impact is 'more severe' than that experienced by non-minority or non-low income populations. The steps for defining environmental justice impacts includes the following:

1. Identification of the location of low-income population and/or minority population in the project area;

2. Identification of the impacts of the project upon the identified low-income population and/or minority population; and

3. Determination of whether or not the impacts are disproportionately high or adverse.

Modest changes in the population of low-income or minority persons in the affected area can be anticipated beyond the date of publication of this DEIS and the date of the data collected. New data will be collected and reevaluated as part of the Tier II EIS in order to determine impacts to these populations at that time.

Identification of the location of Low-Income or Minority Populations

The first step in the environmental justice determination process is to determine whether any minority and/or low-income persons are present within the study area. For the purposes of environmental justice, a low-income population or minority population is defined as a population of people or households located in close geographic proximity meeting the racial or income criteria set forth in Executive Order 12898.

Information on population characteristics of the study area was obtained primarily from Census 2000 data and discussions with local staff. Table 5-5 presents income and minority data by Census block group. See Figure 5-2 for Census tract, block group and block boundaries.

Minority Populations

Because data concerning racial/ethnic composition are recorded at the Census block level, it is possible to provide further detail regarding minority populations that have been identified in several sites throughout the study area.

Hispanics comprise just over six percent of the study area's total population. They comprise 40 to 80 percent of the population in selected Census blocks in the study area. The largest concentrations of Hispanics coincide with the Census blocks that contain the four mobile home parks in the study area. See Figure 5-3. Table 5-6 illustrates the composition of the Census blocks with the highest minority population concentrations in the study area; these blocks are organized by the mobile home parks that comprise them.

Low-Income

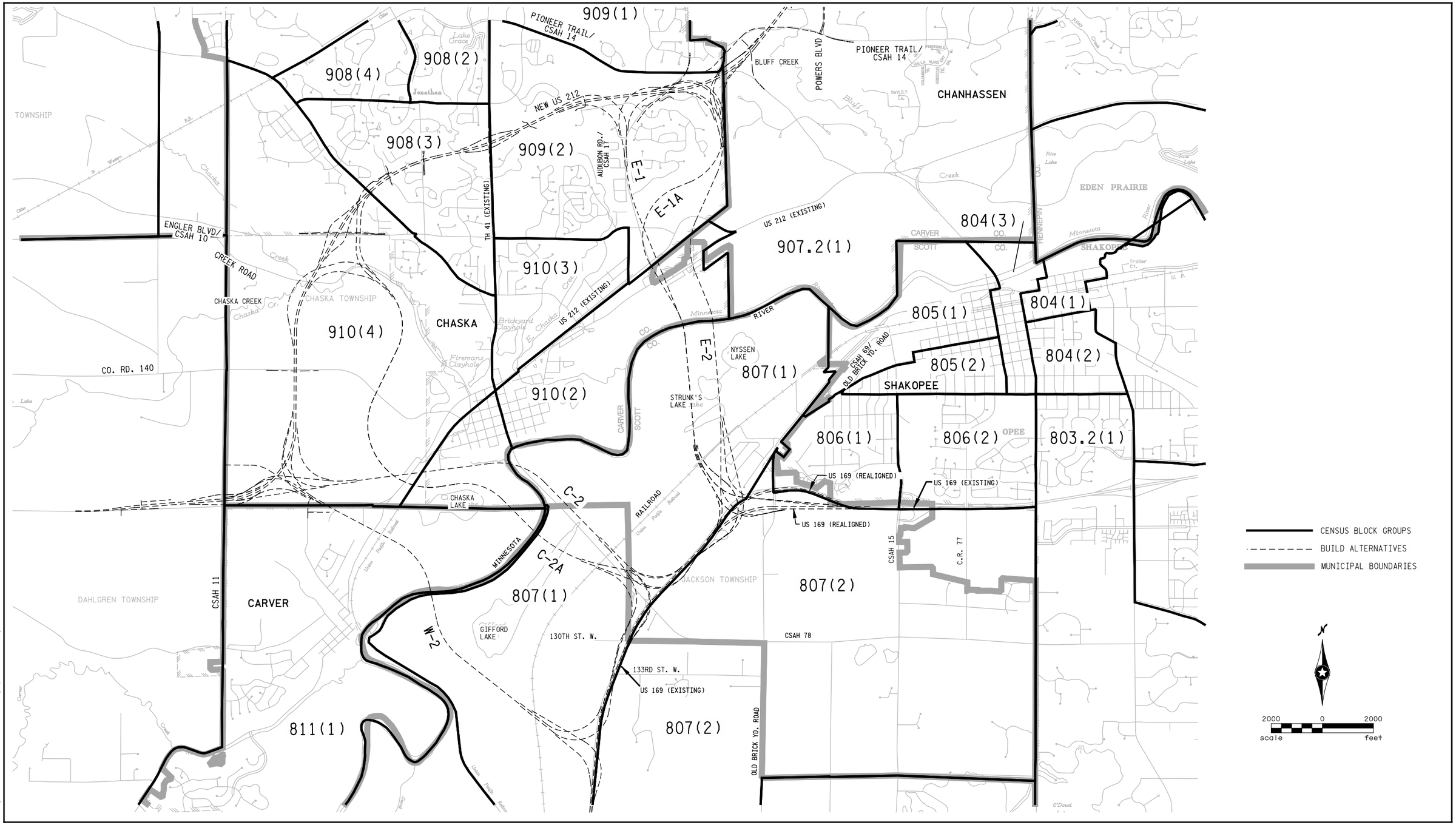
As shown in Table 5-5, Census Blocks Groups containing low-income populations have been identified in several locations throughout the study area, predominantly the older portions of the City of Chaska, the northern portions of Jackson Township and Louisville Township and northwestern areas of the City of Shakopee. The median household income in eight of the nine Census Block Groups (BGs) affected by one or more of the Build alternatives is lower than the median household income for both Scott County or Carver County. All of the Build alternatives pass through Census block groups where median household incomes are below state and metropolitan area levels.

In Scott County, the median household income for the BG in which Mobile Manor is located (807[2]) is $66,806 (note that this block group also covers other residential areas); the median household income for the BG in which Bonnevista and Jackson Heights are located (807[1]) is $40,625. This compares to the median household income for Scott County of $72,212. The percentage of persons with incomes below the poverty level is 14 percent in BG 807(1) and 8 percent in BG 807(2), compared to 3 percent in Scott County.

TABLE 5-5
LOW-INCOME[1] AND MINORITY CHARACTERISTICS, 2000

Tract (Block Group)	Total Population	Total Low-Income Population	Percent Low-Income Population	Total Minority Population	Percent Minority	Total Hispanic	Percent Hispanic	Affected by Alternative(s):
Carver County	70,205	2,391	3	2,844	4	1,791	3	
Scott County	89,498	2,979	3	5,685	6	2,381	3	
907.01(1)	5,784	78	1	407	**7**	195	3	
907.02(1)	1,268	20	2	38	3	16	1	
908 (2)	2,089	150	**7**	122	6	76	4	
908 (3)	3,124	37	1	110	4	48	2	C-2A
908 (4)	1,242	18	1	59	5	24	2	
909 (1)	1,158	18	2	58	5	3	0	
909 (2)	3,921	210	**5**	154	4	88	2	E-1, E-1A, E-2
910 (1)	598	36	**6**	24	4	7	1	C-2, C-2A
910 (2)	2,131	215	**10**	312	**15**	570	**27**	E-1, C-1A, E-2
910 (3)	1,886	104	**6**	213	**11**	164	**9**	E-1, C-1A, E-2
910 (4)	985	31	3	39	4	27	3	W-2, C-2, C-2A
911 (1)	1,896	24	1	41	2	25	1	W-2
911 (2)	1,711	42	2	19	1	8	0	
803.02 (1)	3,520	96	3	174	5	52	1	
804 (1)	605	16	3	67	**11**	90	**15**	
804 (2)	2,431	162	**7**	375	**15**	301	**12**	
804 (3)	874	6	1	65	**7**	70	**8**	
805 (1)	790	73	**9**	48	6	59	**7**	
805 (2)	1,589	158	**10**	198	**12**	72	5	
806 (1)	2,268	58	3	140	6	71	3	
806 (2)	2,014	21	1	188	**9**	49	2	
807 (1)	839	117	**14**	265	**32**	335	**40**	W-2, C-2, C-2A, E-1, E-1A, E-2
807 (2)	1,126	89	**8**	86	**8**	128	**11**	W-2, C-2, C-2A, E-1, E-2A, E-2
808 (1)	2,476	81	3	72	3	41	2	

Source: U. S. Census, 2000
[1] With 1999 incomes below the poverty level.
Note: Percent in **bold** is higher than percent in the highest study area county.



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CENSUS TRACTS AND BLOCK GROUPS

Figure 5-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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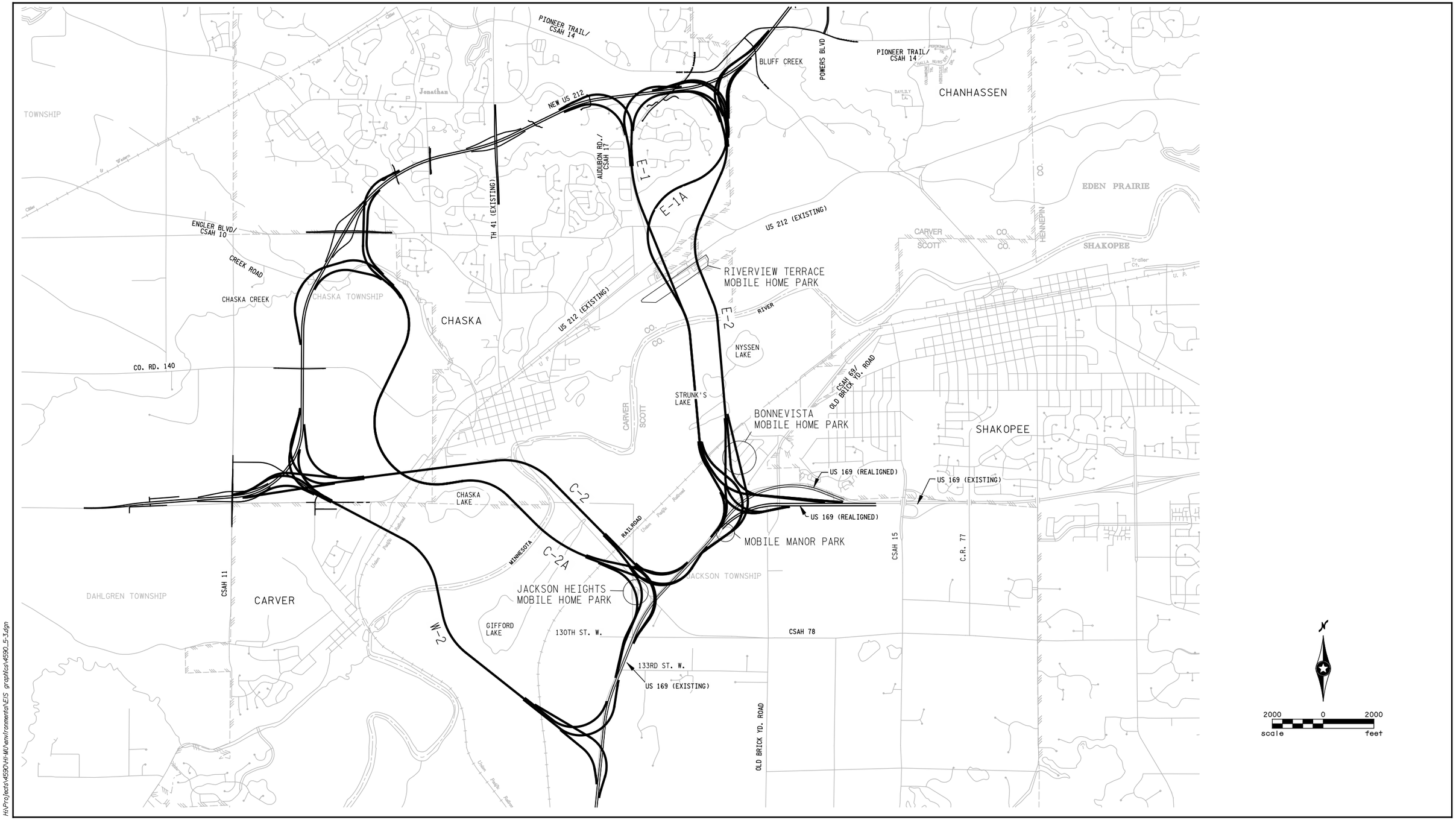
Minnesota Department of Transportation



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MOBILE HOME PARKS

Figure 5-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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TABLE 5-6
ETHNIC COMPOSITION, BY CENSUS BLOCK, 2000
CENSUS BLOCKS WITHIN AFFECTED MOBILE HOME PARKS

Census Block	Total Population	Total White	Percent White	Total Hispanic	Percent Hispanic	Total Households
Mobile Manor (Scott County)						
807.2003	247	191	77	118	48	75
Jackson Heights (Scott County)						
908.1012	197	47	24	165	84	43
908.1014	25	25	100	16	64	5
908.1015	84	39	46	73	87	20
Bonnevista (Scott County)						
908.1005	346	310	90	40	12	139
908.1006	93	78	84	19	20	39
908.1004	72	54	75	22	31	29
Riverview Terrace (Carver County)						
910.2002	433	356	82	185	43	120
910.2011	127	75	59	86	68	31
910.2010	65	54	83	38	58	18
910.2009	31	25	81	23	74	10
910.2012	8	8	100	4	50	3
910.2013	131	99	76	67	51	36
910.2003	54	51	94	25	46	12
910.2004	37	25	68	25	68	11
910.2005	32	28	88	20	62	7

Source: U.S. Census (2000)

In Carver County, the median household income for the BG in which Riverview Terrace is located (910[2]) is $34,306 compared to the median household income for Carver County of $75,577. The percentage of persons with incomes below the poverty level is 10 percent in BG 910(2), compared to 3 percent in Carver County.

Impacts of Alternatives on Low-Income or Minority Populations

Issues that were considered when evaluating the potential for environmental justice impacts included social impacts, right of way, visual quality and noise.

Outreach efforts were made during the preparation of this DEIS to contact and engage the public with particular attention given to reaching minority and low-income communities. General open houses were held April 10, 2003, May 20, 2004, December 7, 2005, March 16, 2006 and June 21, 2006. Four open houses designed and advertised specifically for the residents of the mobile home communities were held on January 23, January 24, and July 19, 2006, (two on the same day) in the Riverview Terrace Community Room, Chaska (January 23 and July 19,2006) and the Scott County Government Center in Shakopee (January 26 and July 19, 2006). A Spanish translator was provided. Comments made and issues raised by attending these open houses focused chiefly on impacts of alternatives, project schedule, process for making decisions, and details of the acquisition and relocation process. More information on all public outreach efforts for the project is provided in Chapter 15.

Alternative W-2

Alternative W-2 has no direct impacts on minority or low-income populations since it does not pass through areas containing concentrations of minority or low-income populations. Alternative W-2 is too distant from the closest identified concentration of minority or low-income populations (Jackson Heights) to result in noise impacts to that population. Alternative W-2 would be visible from the Jackson Heights mobile home park.

Alternative C-2

Alternative C-2 would directly impact identified minority and low-income populations, specifically, requiring the removal of a portion of Jackson Heights (12 of 64 units) in Jackson Township. The population of this mobile home park is over 60 percent Hispanic and falls within Census block groups that exhibit the highest levels of poverty and lowest median household income in the study area.

2040 Build daytime noise levels (L_{10}—see definitions in Section 6.2.1.1 and additional detail in Section 6.2.2.1) at Jackson Heights would not exceed state or federal standards. Jackson Heights would be affected by construction noise.

Alternative C-2 would be visible from Jackson Heights and Mobile Manor.

Alternative C-2A

Alternative C-2A would directly impact identified minority and low-income populations, specifically, requiring the removal of a portion of Jackson Heights (24 of 64 units) in Jackson Township. The population of this mobile home park is over 60 percent Hispanic and falls within Census block groups that exhibit the highest levels of poverty and lowest median household income in the study area.

2040 Build daytime noise levels at Jackson Heights would exceed state standards by 3 decibels; they would not exceed federal standards. Jackson Heights would also be affected by construction noise.

Alternative C-2A would be visible from Jackson Heights Mobile Manor.

Alternative E-1

Alternative E-1 would directly impact identified minority and low-income populations. As previously noted, it is assumed (for Alternatives E-1, E-1A and E-2) that improvements to US 169 (under a separate project) include its realignment south of its existing alignment and construction of an interchange at CSAH 69. These assumed US 169 improvements would likely require the acquisition of a portion of the Mobile Manor mobile home park. Alternative E-1 would require removal of any remaining portion of Mobile Manor and portions of Bonnevista and the Riverview Terrace mobile home parks, a total of up to 121 units.

2040 daytime Build noise levels at Bonnevista would not exceed state or federal standards; levels at Riverview Terrace would exceed state but not federal levels. Bonnevista and Riverview Terrace would be affected by construction noise.

Alternative E-1 would have a major visual impact on the remaining residents of Bonnevista and Riverview Terrace mobile home parks. As discussed in Section 5.1.2.1, the right of way impacts on these communities affect community cohesion by removing a substantial number of units.

Alignment E-1A

Alternative E-1A would directly impact identified minority and low-income populations requiring the removal of any remaining portion of the Mobile Manor, and portions of the Bonnevista and Riverview Terrace mobile home parks, a total of up to 113 units.

2040 Build daytime noise levels at Bonnevista would not exceed state or federal standards; levels at Riverview Terrace would exceed both state and federal standards. Bonnevista and Riverview Terrace would be affected by construction noise.

Alternative E-1A would have a major visual impact on the remaining residents of Bonnevista and Riverview Terrace mobile home parks, and would impact the community cohesion of these communities by removing a substantial number of units.

Alignment E-2

Alternative E-2 would directly impact identified minority and low-income populations requiring the removal of any remaining portion of the Mobile Manor, substantial portions of the Bonnevista and Riverview Terrace mobile home parks, a total of up to 186 units.

2040 Build daytime noise levels at Riverview Terrace would exceed state and federal standards. The receptor representing Bonnevista would be eliminated if Alternative E-2 was constructed and was therefore not modeled; however it is reasonable to assume that any remaining portion of Bonnevista would experience high noise impacts similar to those reported for Alternative E-1A. Bonnevista and Riverview Terrace would be affected by construction noise.

Alternative E2 would have a major visual impact on the remaining residents of Bonnevista and Riverview Terrace mobile home parks, and would impact the community cohesion of these communities by removing a substantial number of units.

Mitigation of Impacts

Mitigation will be addressed in the Tier II EIS process. Right of way impacts would be mitigated in conformance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1989 and 49 Code of Federal Regulations, Part 24, as described in Section 5.2.3. Mitigation for noise impacts could include consideration of use of noise barriers or other sound attenuation methods and/or incorporation of land use controls to limit the number of noise-sensitive receptors located adjacent to or in the vicinity of the preferred Build highway corridor, as described in Chapter 6, Section 6.4.3. Construction noise would be mitigated by adherence as is practicable to local noise ordinances. Mitigation for visual impacts would consider aesthetic design treatments, design elements, and vegetation measures as described in Chapter 6, Section 6.5.4. The identification of a preferred alternative corridor several years in advance of the project implementation will enable local communities to take into consideration the future reduction of affordable housing units due to the proposed project when those communities are planning for their long-term affordable housing needs.

Determination of High or Disproportionate Impacts

Noise impacts to low-income/minority populations are high where they occur for any of the five Build alternatives that affect mobile home areas (Alternatives C-2, C-2A, E-1, E-1A, and E-2) in that they exceed state and, in some cases, federal standards. Noise impacts for

Alternative E-1, E-1A and E-2 are disproportionate because, while similar high impacts accrue to residential receptors in areas with populations that are not low-income or minority, noise impacts to mobile home areas are either higher or accrue to more residences.

Visual impacts are not disproportionate to low-income/minority populations because similar impacts accrue to viewers (neighbors and travelers) that are not low-income or minority.

Table 5-7 presents the number of units that would be acquired in each affected low-income minority neighborhood (mobile home park) for each Build alternative, compared to the total number of residential acquisitions.

TABLE 5-7
MOBILE HOME COMMUNITY (ENVIRONMENTAL JUSTICE) ACQUISITIONS

	Alternatives					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Total Residential Acquisitions [(1)]	13	29	78	261	136	210
Low Income/Minority Neighborhoods						
• Jackson Heights (of 64)	0	18	38	0	0	0
• Mobile Manor (of 66) [(2)]	0	0	0	66	66	66
• Bonnevista (of 200)	0	0	0	30	30	85
• Riverview Terrace (of 240)	0	0	0	30	17	31
Total within low-income/minority neighborhoods	0	18	38	126	113	182
Percent of Total Acquisitions	0%	62%	48%	48%	83%	87%

(1) Includes mobile home units plus other residential parcels with structures.

(2) Note that the number of units acquired from Mobile Manor by the proposed project will likely be lower than shown, since the assumed realignment of TH 169 would likely acquire a portion of this mobile home park prior to implementation of the proposed project.

The discussion below is focused on the social and right of way impacts for Alternatives C-2/C-2A, and E-1, E-1A/E-2. (Alternative W-2 does not affect any mobile home communities.)

Alternatives C-2/C-2A

Social and right of way impacts for Alternatives C-2 and C-2A are disproportionate for low-income minority populations because each requires removal of substantial portions of an entire neighborhood (Jackson Heights) (18 and 38 of 64 units, respectively); impacts of this scale do not accrue to populations that are not low income of minority. The impact to Jackson Heights compares to a total residential unit acquisition of 29 (Alternative C-2) and 78 (Alternative C-2A).

Alternative E-1

The social and neighborhood impacts to mobile home communities that result from Alternative E-1 also accrue to populations that are not low-income or minority. Alternative E-1 divides and removes 141 units from neighborhoods that are not mobile home communities. Despite these impacts, however, the impacts to low-income/minority populations

are still disproportionate because the proportion of impact is higher than the proportion of population. The 126-unit-impact to Mobile Manor, Bonnevista and Riverview Terrace compares to a total residential unit acquisition of 261 for Alternative E-1.

Alternative E-1A/E-2

Social and neighborhood impacts for Alternatives E-1A and E-2 are disproportionate for low income/minority populations because each requires removal of an entire low income/minority neighborhood (Mobile Manor) and a substantial portion of two other low income/minority neighborhoods (Bonnevista and Riverview Terrace); impacts of this scale do not accrue to populations that are not low income or minority. The respective 113-unit (Alternative E-1A) and 182-unit (Alternative E-2) impacts to Mobile Manor, Bonnevista and Riverview Terrace compares to total residential unit acquisitions of 136 (Alternative E-1A) and 210 (Alternative E-2).

Environmental Justice Finding

Based on the available data, low-income and minority populations are located in several portions of the corridor. Noise impacts may be high but not disproportionate and may be able to be mitigated. Social and right of way impacts are disproportionate to low-income/minority communities for Alternatives C-2, C-2A, E-1, E-1A and E-2.

5.1.3 Mitigation of Social and Community Impacts

Impacts to community cohesion, traffic patterns and access, community facilities and services are mitigated by overall improved regional accessibility and alleviation of congestion affecting quality of life, particularly in downtown Chaska. The improved regional accessibility and alleviation of congestion will also be a benefit to low-income and minority populations in the area in terms of access to job opportunities, goods and services, and therefore, provides mitigation for the environmental justice impacts of the proposed project. In addition, those impacts are mitigated in the environmental justice section above.

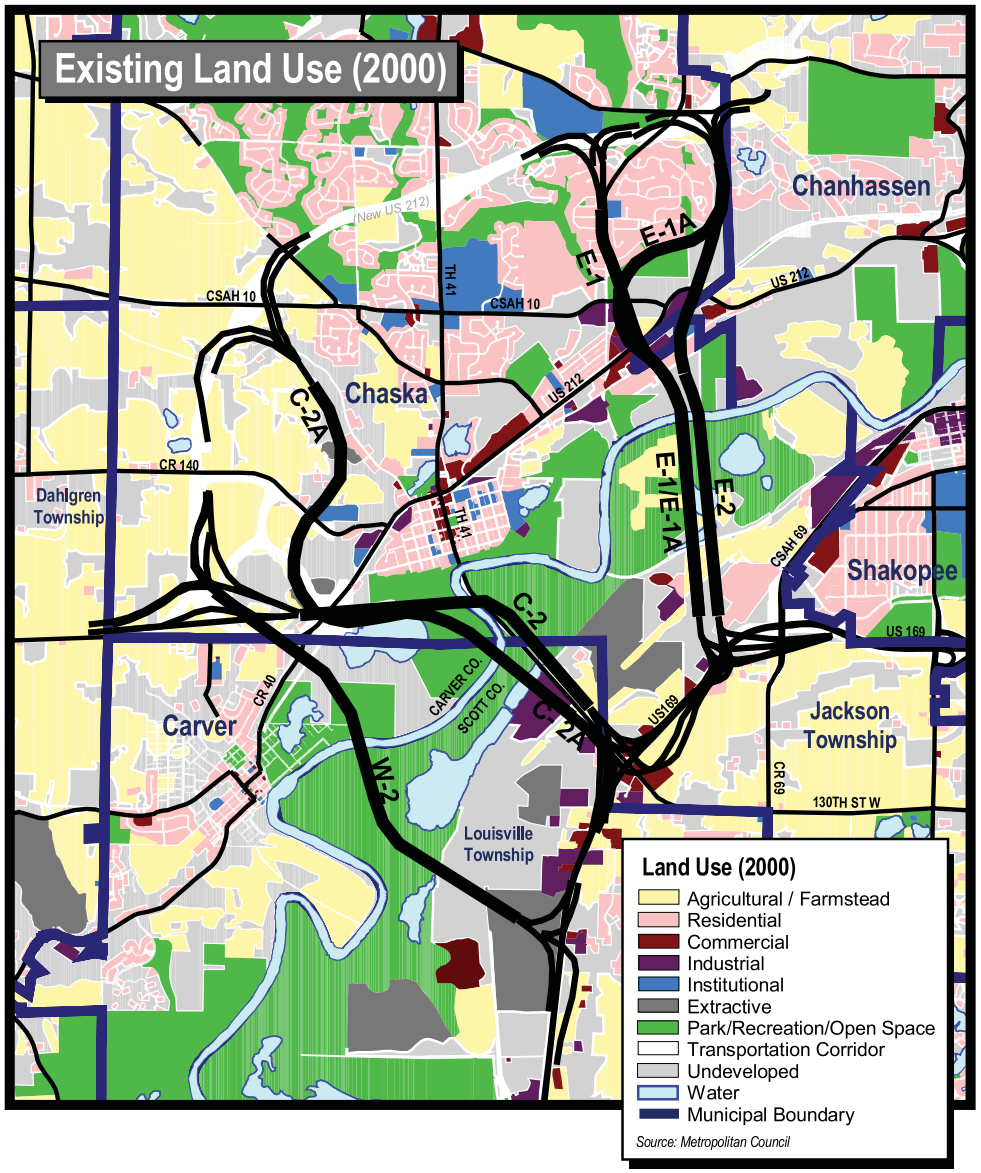
5.2 LAND USE

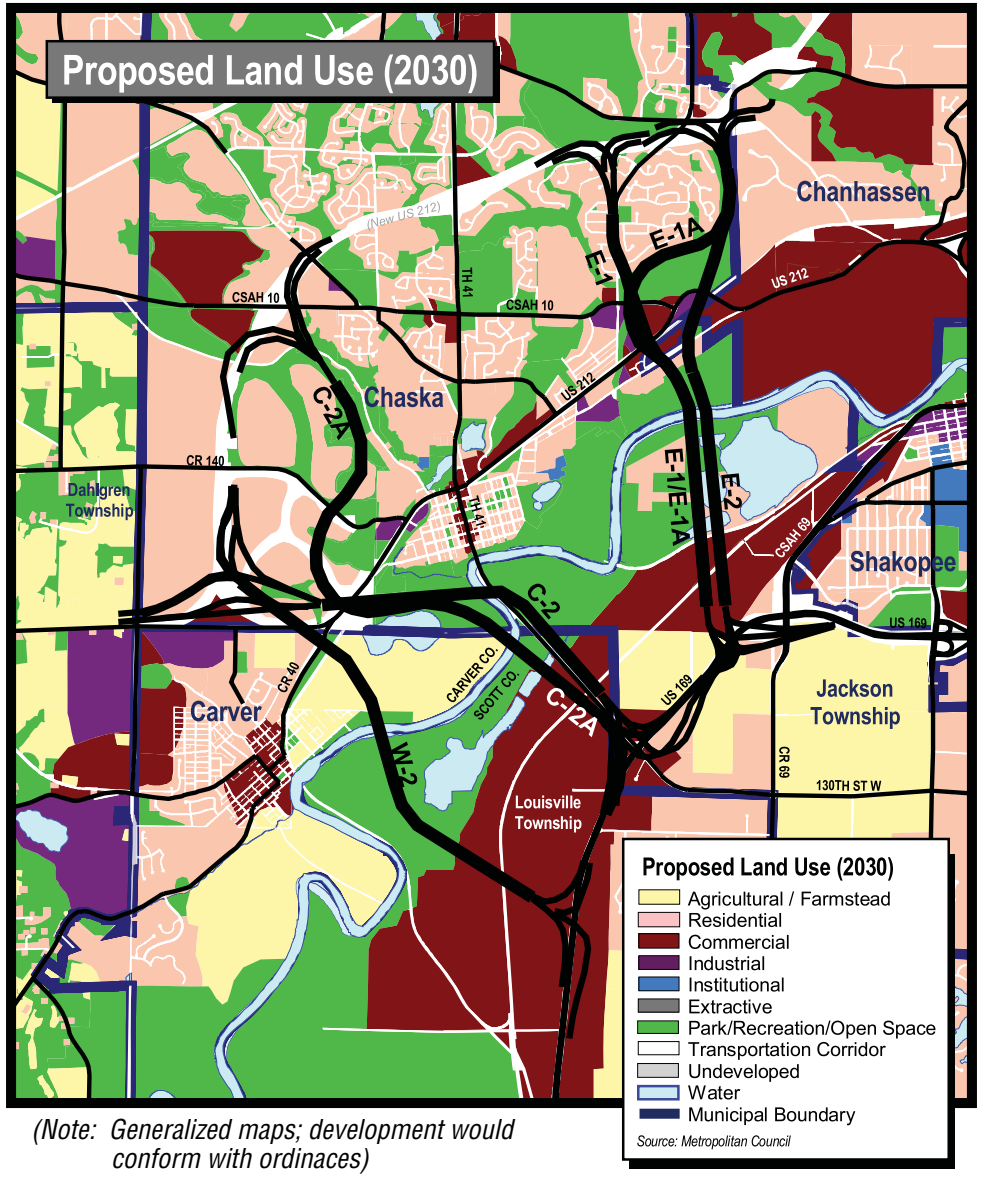
5.2.1 Affected Environment

5.2.1.1 Existing Land Use

The study area encompasses a total of 24,836 acres (38.8 square miles) in an arc of land along the Minnesota River in northcentral Scott County and southeastern Carver County, Minnesota. The study area incorporates portions of the cities of Chanhassen, Chaska, Carver and Shakopee as well as areas of the unincorporated townships of Dahlgren, Louisville and Jackson. The study area is shown in Figure 1-1. Figure 5-4 depicts existing (2000) and proposed (2030) land use.

Table 5-8 shows existing land use in the study area, as well as projected land uses to 2030. (Note: Land use projections for the study year 2040 are not available. Travel forecasts are based on available 2040 population and employment data.) The most prevalent existing land uses include undeveloped land (primarily forested, non-agricultural lands), agriculture, park/recreational/preserve areas, and residential. Substantial changes to existing land use patterns are anticipated over the next 30 years. The biggest changes are expected to be the expansion of residential and commercial land and loss of farmland.





(Note: Generalized maps; development would conform with ordinaces)

EXISTING AND PROPOSED LAND USE: 2000 AND 2030

Figure 5-4

TH 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

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TABLE 5-8
EXISTING (2000) AND PLANNED (2030) LAND USES

Land Use	Existing Land Use[(1)(3)] (Acres)	Planned Land Use, 2030[(2)(3)] (Acres)	% Change
Undeveloped Land	6,222	166	*(-97)*
Agriculture	5,901	1,734	*(-71)*
Park/Open Space	4,209	4,672	11
Residential	3,571	6,131	72
Industrial/Utility	671	1,517	126
Commercial	635	5,696	797
Other	3,625	4,919	36
Total[(4)]	**24,834**	**24,835**	**---**

Source: Extracted from Metropolitan Council approved datasets.
(1) Metropolitan Council Existing Land Use (2000) GIS Dataset
(2) Metropolitan Council Proposed/Planned Land Use (2030) GIS Dataset
(3) Category definitions differ between 2000 data and 2030 projections. Data has been aggregated into uniform categories for clarity.
(4) Difference in totals due to rounding.

5.2.1.2 Planned and Anticipated Land Uses

Extensive amounts of residential and commercial development are planned within and adjacent to the study area in the coming decades. In Scott County, the City of Shakopee's *Comprehensive Plan Update* (as of January 2004 revisions) indicates that over 9,000 acres are designated for future urban expansion and commercial/industrial use along existing US 169 between CSAH 69 and the Louisville Township border. The City of Shakopee is in the process of conducting a land use study. The City's study will be informed by the New TH 41 planning process. Likewise, relevant information from the City's study will be incorporated in future environmental documentation for the New TH 41 project, as appropriate.

In Carver County, the largest planned residential development is the proposed 1,000-acre "Heights of Chaska." This site has been identified by the Metropolitan Council as a "Smart Growth Opportunity Site." Key factors of a Smart Growth Opportunity Site include a cohesive mix of residential, employment, commercial and civic uses, a range of residential densities, a street layout to organize commercially and residentially focused areas, accommodation of pedestrian and bicycle trail systems, management of storm water, consideration of aesthetics and the preservation of existing natural and cultural amenities. Residential development (Carver Commons and Spring Creek) is pending in the City of Carver in the immediate vicinity of existing US 212/New US 212/CSAH 11 interchange. Commercial/industrial use is also provided in this area. The area is currently agricultural.

5.2.2 Environmental Consequences

5.2.2.1 No-Build Alternative

The study area is anticipated to experience continual population growth and subsequent residential and commercial expansion in the coming decades. The No-Build alternative would not change the existing land use patterns, in that, areas planned for development would result in no changes to existing or planned land use. Growth may occur more slowly under No-Build conditions than Build conditions as roadway capacity would remain at present levels.

5.2.2.2 Build Alternatives

5.2.2.2.1 *Land Use Patterns and Plans*

Each of the alternatives will convert land from its existing/planned use to highway right of way. Land conversion by type is summarized in Table 5-9. Right of way acquisition is addressed in Section 5.2.2.2.2. Impacts to farmland are addressed in Chapter 6. Impacts to parks and recreational land are addressed in Chapter 8. Indirect impacts to land use are addressed in Chapter 12.

TABLE 5-9
ACRES OF LAND TO BE CONVERTED TO HIGHWAY RIGHT OF WAY

Land use	Alternatives					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Residential	10	29	58	142	78	86
Commercial	17	53	48	4	9	5
Industrial	41	0	1	5	5	3
Public	54	46	62	69	96	73
Agriculture	132	190	127	29	26	25
Other	5	2	5	5	1	2
Total	**258**	**320**	**301**	**360**	**214**	**194**

5.2.2.2.2 Right of Way Acquisition and Relocation

Each of the Build alternatives would require acquisition of property for right of way. While it is premature to determine in detail the extent of acquisition required for each affected property in each corridor, estimates displayed in Table 5-10 were developed based on an assumed corridor width, based on limits shown in Figures 3-6 through 3-11. Methodology for estimating right of way impacts including costs, is documented in the *TH 41 River Crossing EIS: Technical Memorandum on Travel Demand Forecasting, Volume II: Technical Memoranda.*

TABLE 5-10
RIGHT OF WAY IMPACTS

	Alternatives					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Total Affected Parcels	44	59	133	203	84	81
Parcels requiring total acquisition	16	31	81	124	37	39
Parcels requiring partial acquisition	28	28	52	79	47	42
Affected Parcels by Type						
Residential	7[6]	12	66	138	29	34
Mobile home[1]	0	3	3	6	6	8
Commercial	6	15	15	3	9	3
Industrial	1	0	1	3	4	2
Agricultural	17[6]	15	17	10	10	9
Public[2]	9	11	16	39	25	24
Undeveloped	2	0	10	0	0	0
Other[3]	2	3	5	4	1	1
Parcels with Structures						
Residential	6	11	40	135	23	28
Mobile Home[4]	0	18	38	126	113	182
Commercial	4	9	10	3	8	3
Industrial	1	0	0	1	1	2
Agricultural	5	10	9	5	4	5
Public	0	1	1	4	0	3
Other	0	0	0	2	0	0
Total Structures	16	49	98	276	149	223
Cost Range [5]	$55-80 M	$75-105M	$65-90M	$100-136M	$55-75M	$60-80M

(1) Represents tax parcels, not mobile home units.
(2) Includes recreational, civic, utilities uses.
(3) Includes railroad, exempt miscellaneous.
(4) Note that the number of mobile home units acquired for Alternatives E-1, E-1A and E-2 would likely be somewhat lower than shown, since the assumed realignment of TH 169 would likely acquire a portion of one mobile home park.
(5) Acquisition costs used values based on projected changes in land use (i.e. some agricultural/public lands were priced based on their projected value as a residential property). The high end of the cost ranges are based on Mn/DOT risk assessment.
(6) Agricultural parcels include seven properties that will be classified as residential before the anticipated build-year.

5.2.3 Mitigation

Mitigation of impacts on farmland and on parks and recreation areas is addressed in Chapters 6 and 8, respectively. Mitigation of indirect impacts on land use is addressed in Chapter 12.

Regarding right of way impacts, if one of the Build alternatives is chosen as the preferred alternative, all right of way acquisition and relocation would be in conformance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1989 and 49 Code of Federal Regulations, Part 24. Two booklets entitled *Relocation: Your Rights and Benefits* and the *Guidebook for Property Owners* have been produced by Mn/DOT to provide information to property owners and persons to be displaced on their rights and benefits under the Uniform Act, including the Relocation Assistance Program. These documents are available from the Mn/DOT Office of Land Management.

5.3 ECONOMIC AND FISCAL IMPACTS

5.3.1 Affected Environment

Employment

Table 5-11 presents existing (2000) and projected (2040) employment for the cities and counties in the study area.

TABLE 5-11
EMPLOYMENT – 2000 AND 2040
COUNTIES AND CITIES IN THE STUDY AREA

Location	2000 Employment	Projected 2040 Employment	Employment Change 2000-2040
Carver County	**26,657**	**63,650**	**36,993**
Scott County	**32,009**	**75,006**	**42,997**
City of Chaska	10,185	20,400	10,215
City of Chanhassen	7,571	17,860	10,289
City of Carver	156	2,325	2,169
City of Shakopee	12,476	30,149	17,673
Totals[(1)]	**30,388**	**70,734**	**40,346**

Source: Metropolitan Council
[(1)] Totals are the sum of the four municipalities only.

Tax Base

The total taxes payable for the most current year (2006) is $38,359,060 (Scott County) and $38,828,591 (Carver County).

5.3.2 Environmental Consequences

The traffic forecasts presented in Chapters 2 and 4 assume the same amount and location of employment for No-Build and Build conditions, regardless of Build alternative.

As discussed in Section 5.2.1.2, the City of Shakopee is conducting a land use study that will be informed by the planning for a New TH 41. In addition, City of Carver planning staff have indicated that if either Alternative W-2 or Alternative C-2 is selected as the preferred alternative, the location of land guided for commercial development may be different than if the No-Build or an alternate Build alternative were chosen. While the selected alternative may influence the location of future jobs, it is not expected to result in different total job levels within the study area.

No-Build Alternative

Reliance on the existing roadway infrastructure without expanding capacity will limit local and regional transport and offer less efficient service and shipping for local businesses. Continued use of existing TH 41 through downtown Chaska and increased freight and regional traffic will have a detrimental impact to the downtown character and attractiveness for downtown reinvestment. Potential retail, commercial and service oriented businesses—many ideally suited to a location in a historic 'Main Street' context, may be discouraged from locating there due to the continued increase in traffic and congestion.

The No-Build alternative would result in no loss of taxable property due to direct right of way impacts. If increasing congestion, noise and vibration in downtown Chaska result in disinvestment in local properties, the tax base could be adversely impacted.

Build Alternatives

Table 5-12 reports the businesses affected by right of way acquisition for each of the six alternatives, including estimated number of employees. As shown, all alternatives have business impacts. Alternatives C-2 and C-2A have the greatest total business impacts. Certain business in downtown Chaska that depend on exposure to regional customers may be adversely affected by reduction in regional traffic on existing TH 41.

TABLE 5-12
BUSINESS AND EMPLOYMENT IMPACTS[1]

	Build Alternative					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Commercial						
Businesses	5	11	11	2	5	3
Employees	99	114	96	25	174	3
Industrial						
Businesses	1	0	1	1	2	2
Employees	26	0	38	90	90	96
Total						
Businesses	6	11	12	3	7	5
Employees	125	114	134	115	264	99

[1] Based on businesses located on affected parcels, July 2006.

Acquisition of existing commercial and industrial land and its conversion to highway and highway right of way may have short-term impacts to employment in the study area.

As discussed in Section 5.4.2, the proposed Build alternatives would result in acquisition of between 16 and 272 parcels. Table 5-13 compares the total taxes payable for properties estimated to be acquired for each of the Build alternatives with the total taxes payable for Scott and Carver counties, and for each of the affected municipalities.

As shown, the impact on taxing jurisdictions (i.e., estimated tax loss from total acquisitions as a percent of total taxes payable) range from zero to 10.9 percent.

TABLE 5-13
TAXES PAYABLE: TOTAL ACQUISITION OF PROPERTIES, 2006

Alternative & Jurisdiction	Estimated Tax Loss from Total Acquisitions	Total 2006 County/City Taxes Payable	Estimated Tax Loss as a Percentage of 2006 Total County/City Taxes Payable
W-2			
Louisville Township	$25,150	$1,725,232	1.5
Jackson Township	$0	$1,175,181	0
Scott County Total	$25,150	$38,359,060	0.1
City of Carver	$15,339	$1,125,522	1.4
City of Chaska	$0	$3,533,401	0
City of Chanhassen	$0	$8,232,062	0
Carver County Total	$15,339	$38,828,591	< 0.05
C-2			
Louisville Township	$34,348	$1,725,232	2.0
Jackson Township	$127,810	$1,175,181	10.9
Scott County Total	$162,158	$38,359,060	0.4
City of Carver	$0	$1,125,522	0
City of Chaska	$17,420	$3,533,401	0.5
City of Chanhassen	$0	$8,232,062	0
Carver County Total	$17,420	$38,828,591	< 0.05
C-2A			
Louisville Township	$67,326	$1,725,232	3.9
Jackson Township	$99,392	$1,175,181	8.5
Scott County Total	$166,718	$38,359,060	0.4
City of Carver	$0	$1,125,522	0
City of Chaska	$45,887	$3,533,401	1.3
City of Chanhassen	$0	$8,232,062	0
Carver County Total	$45,887	$38,828,591	0.1
E-1			
Louisville Township	$0	$1,725,232	0
Jackson Township	$24,975	$1,175,181	2.1
Scott County Total	$24,975	$38,359,060	0.1
City of Carver	$0	$1,125,522	0
City of Chaska	$333,735	$3,533,401	9.5
City of Chanhassen	$0	$8,232,062	0
Carver County Total	$333,735	$38,828,591	0.9

TABLE 5-13 continued
TAXES PAYABLE: TOTAL ACQUISITION OF PROPERTIES, 2006

Alternative & Jurisdiction	Estimated Tax Loss from Total Acquisitions	Total 2006 County/City Taxes Payable	Estimated Tax Loss as a Percentage of 2006 Total County/City Taxes Payable
E-1A			
Louisville Township	$0	$1,725,232	0
Jackson Township	$33,706	$1,175,181	2.9
Scott County Total	$33,706	$38,359,060	0.1
City of Carver	$0	$1,125,522	0
City of Chaska	$82,053	$3,533,401	2.3
City of Chanhassen	$2,312	$8,232,062	< 0.05
Carver County Total	$84,365	$38,828,591	0.2
E-2			
Louisville Township	$0	$1,725,232	0
Jackson Township	$40,209	$1,175,181	3.4
Scott County Total	$40,209	$38,359,060	0.1
City of Carver	$0	$1,125,522	0
City of Chaska	$29,834	$3,533,401	0.8
City of Chanhassen	$2,312	$8,232,062	< 0.05
Carver County Total	$32,146	$38,828,591	< 0.05

Source: Estimated Tax Loss: Scott and Carver County property information web pages. No special assessments are included.

Taxes Payable: Scott County Assessor. Total for the whole county is the levy amount, total for municipalities include taxes payable to "all taxing districts" (school districts, county etc.). Carver County web page: http://www.co.carver.mn.us/ElectedOfficials/auditor/PropTax/docs/2006_Levy.pdf

5.3.3 Mitigation

Section 5.2.3 discusses mitigation for right of way impacts. Alleviation of traffic congestion on existing TH 41 will generally improve business conditions in downtown Chaska. While not mitigation, it should be noted that as employment in the study area communities is anticipated to grow substantially over the next decade, it is expected that there will be sufficient accessible job opportunity to replace jobs lost through acquisition of commercial/industrial properties.

In addition, the decrease in property tax base resulting from conversion of private property to public right of way will be offset by new development occurring in communities in the study area.

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6.0 PHYSICAL ENVIRONMENTAL IMPACTS

6.1 AIR QUALITY

6.1.1 Regulatory Overview

The scope and methods of the air quality analysis performed for this project were developed during a meeting with Minnesota Pollution Control Agency (MPCA) air quality staff on March 22, 2005.

Motorized vehicles affect air quality by emitting airborne pollutants. Changes in traffic volumes, traffic patterns, and roadway locations affect air quality by changing the number of vehicles in an area, changing traffic congestion conditions, and changing where vehicles travel. The U.S. Environmental Protection Agency (EPA) uses six "criteria pollutants" as indicators of air quality and has established National Ambient Air Quality Standards (NAAQS) for each of them. The NAAQS represent maximum concentrations above which adverse effects on human health may occur. The criteria pollutants are ozone, particulate matter, nitrogen dioxide, sulfur dioxide, lead, and carbon monoxide. In addition to the criteria air pollutants, the EPA also regulates air toxics.

6.1.2 Affected Environment

The study area is located within the Twin Cities Metropolitan Area, which currently has no areas that are not in attainment of air quality standards. The metropolitan area is classified as a “maintenance area,” for carbon monoxide. The area is subject to the State Implementation Plan (SIP) which contains procedures to monitor, control, maintain and enforce compliance with the NAAQS.

6.1.3 Environmental Consequences

<u>Ozone</u>

Ground-level ozone is a primary constituent of smog and is a pollution problem throughout many areas of the United States. Exposures to ozone can make people more susceptible to respiratory infection, result in lung inflammation, and aggravate preexisting respiratory diseases such as asthma. Ozone is not emitted directly from vehicles but is formed through the reaction of volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the presence of sunlight. Transportation sources emit NO_x and VOCs and can therefore affect ozone concentrations. However, due to the phenomenon of atmospheric formation of ozone from chemical precursors, concentrations are not expected to be elevated where precursors are emitted (i.e. near a particular roadway).

Ozone concentrations in the lower atmosphere are influenced by a complex relationship of precursor concentrations, meteorological conditions and regional influences on background concentrations. The MPCA has determined that the contribution of a single roadway project to ozone concentrations is negligible and difficult to accurately quantify. The EPA has classified the project area as an attainment area in regard to ozone levels. Because of these factors, a quantitative ozone analysis was not conducted for this project.

Particulate Matter

Particulate matter (PM) is categorized by the size of particles being measured. For example, the $PM_{2.5}$ value is the measurement of particles smaller than 2.5 microns (a micron is a millionth of a meter) in a particular volume of air. Fine particles with very small diameters can move like gases and can be transported hundreds of miles from their source. Larger particles do not remain suspended and tend to settle out of the air relatively near their source.

The following summary of potential health impacts is excerpted from the EPA brochure Particle Pollution and Your Health (EPA document 452/F-03-001, September 2003):

> *Particle exposure can lead to a variety of health effects. For example, numerous studies link particle levels to increased hospital admissions and emergency room visits—and even to death from heart or lung diseases. Both long- and short-term particle exposures have been linked to health problems.*

The MPCA states on its web site:

> *Recent data suggests that particles 2.5 microns or smaller may pose the greatest threat to human health because, for the same mass, they absorb more toxic and carcinogenic compounds than larger particles and penetrate more easily deep into the lungs.*

Motor vehicles can influence particulate matter concentrations on a local scale by directly emitting fine particles and from wind turbulence that causes particles to be mixed into the air. On a regional scale, vehicular traffic can influence particle concentrations through emission of precursor compounds (nitrogen oxides, sulfur oxides and VOCs) as well as direct emissions. Vehicle related particulate matter tends to be smaller than 2.5 microns. A recent study, Transportation-Related Air Toxics: Case Study Materials Related to U.S. 95 in Nevada, March 7, 2003, completed by Sonoma Technology states:

> *With the exception of road dust, essentially all of the particulate matter attributed to vehicles (either as direct emissions or compounds which are emitted as gases and condense into particulate matter in the ambient air) is smaller than 2.5 mm in size (pm2.5).*

The concentration of fine particulates in the atmosphere is a complex function of background concentrations, the presence of various precursor compounds, direct emissions of nearby sources and meteorological conditions. Modeling of particulate concentrations is an emerging science and is being done on a regional and nationwide scale. The study referenced above, Transportation-Related Air Toxics: Case Study Materials Related to U.S 95 in Nevada, states:

> *There is currently a lack of guidance available to analysts regarding methodological approaches for analyzing the PM impacts of transportation projects at the micro scale.*

Widespread $PM_{2.5}$ monitoring began in Minnesota in 1999. An article published in the MPCA's Minnesota's Environment magazine, Volume 3, Number 3, Summer 2003, indicates that

particulate concentrations rise to concentrations considered unhealthy for sensitive people only a few times per year. Based on recent $PM_{2.5}$ monitoring, it appears that the State of Minnesota will be in attainment of recently enacted $PM_{2.5}$ standards.

Based on the relatively low ambient concentrations observed in Minnesota and the lack of analysis methodology, no project level modeling for particulate matter was conducted for this project.

Nitrogen dioxide (Nitrogen oxides)

Nitrogen oxides, or NO_x, are the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Nitrogen oxides form when fuel is burned at high temperatures. The primary sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. The MPCA Air and Water Emissions Report, March 2000 indicates that on-road mobile sources account for 31 percent of NO_x emissions in Minnesota. In addition to being a precursor of ozone, NO_x can cause respiratory irritation in sensitive individuals and contribute to acid rain.

Nitrogen dioxide (NO_2) levels in the Twin Cities metropolitan area currently meet state and federal standards. Appendix C of the MPCA's 2001 Legislative Report Air Quality in Minnesota: Problems and Approaches, states:

> *Monitored NO_2 levels are currently about one third of the annual NO_2 standard. Although NO_x emissions have increased and may increase further due to increased vehicle travel and increased fuel combustion, it is unlikely that these increases will pose a threat to the annual NO_2 standard.*

The EPA's regulatory announcement EPA 420-F-99-051 (December 1999) describes the Tier 2 standards for tailpipe emissions and states:

> *The new tailpipe standards are set at an average standard of 0.07 grams per mile for nitrogen oxides for all classes of passenger vehicles beginning in 2004. This includes all light-duty trucks, as well as the largest SUVs. Vehicles weighing less than 6,000 pounds will be phased-in to this standard between 2004 and 2007.*
>
> *As newer, cleaner cars enter the national fleet, the new tailpipe standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent by 2030. The standards also will reduce emissions by more than 2 million tons per year by 2020 and nearly 3 million tons annually by 2030.*

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

Sulfur Dioxide

Sulfur dioxide is a colorless gas that can be detected by taste and odor. High concentrations of sulfur dioxide can affect breathing, cause respiratory illnesses and aggravate existing respiratory and cardiovascular diseases. It is converted in the atmosphere to sulfuric acid, a major component of acid rain.

The Twin Cities Metropolitan Area is classified as an attainment area for sulfur dioxide. A specific analysis of sulfur dioxide was not conducted for this project.

Lead

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

Carbon Monoxide

Carbon monoxide (CO) is the traffic-related pollutant that is most likely to be a concern on a project level scale. The MPCA has established state standards (or maximum permissible concentrations) for CO of 30 parts per million (ppm) for a 1-hour period (average concentration), and 9 ppm for an 8-hour period (average concentration). The MPCA 1-hour standard is more stringent than the federal standard of 35 ppm; the MPCA 8-hour standard is the same as the federal standard.

The project area is currently designated as a maintenance area for CO. The maintenance status in the Twin Cities metropolitan area is contingent upon the implementation of measures to assure that CO concentrations remain below standards. The contingency stipulates that future CO concentrations be modeled for proposed transportation projects. In compliance with this stipulation, detailed intersection-level CO dispersion analysis will be performed in conjunction with a Tier II EIS.

Concentrations of CO are generally highest at at-grade intersections with poor levels of service and, consequently, with more idling vehicles. Because under all Build alternatives, New TH 41 will operate under free-flow conditions, and will be above grade, increasing dispersion distance to locations of human activity, New TH 41 is not expected to generate CO levels approaching state standards. Congestion (measured in hours of congestion) under all Build alternatives is projected to decline on existing TH 41 and on existing Hwy 101 relative to the No-Build alternative; there is not a substantial difference in hours of congestion among Build alternatives. Therefore, it is unlikely that CO levels approaching state standards will occur at at-grade intersections along existing TH 41 or Hwy 101 under any Build alternative.

Improvements in vehicle technology and in motor fuel regulations continue to cause reductions in vehicle emission rates. The EPA Mobile 6.2 emissions model estimates that emission rates will fall by at least 35 to 40 percent from 2006 to 2040. Consequently, 2040 vehicle-related CO concentrations in the study area are likely to be lower than existing concentrations even considering the increase in project-related and background traffic.

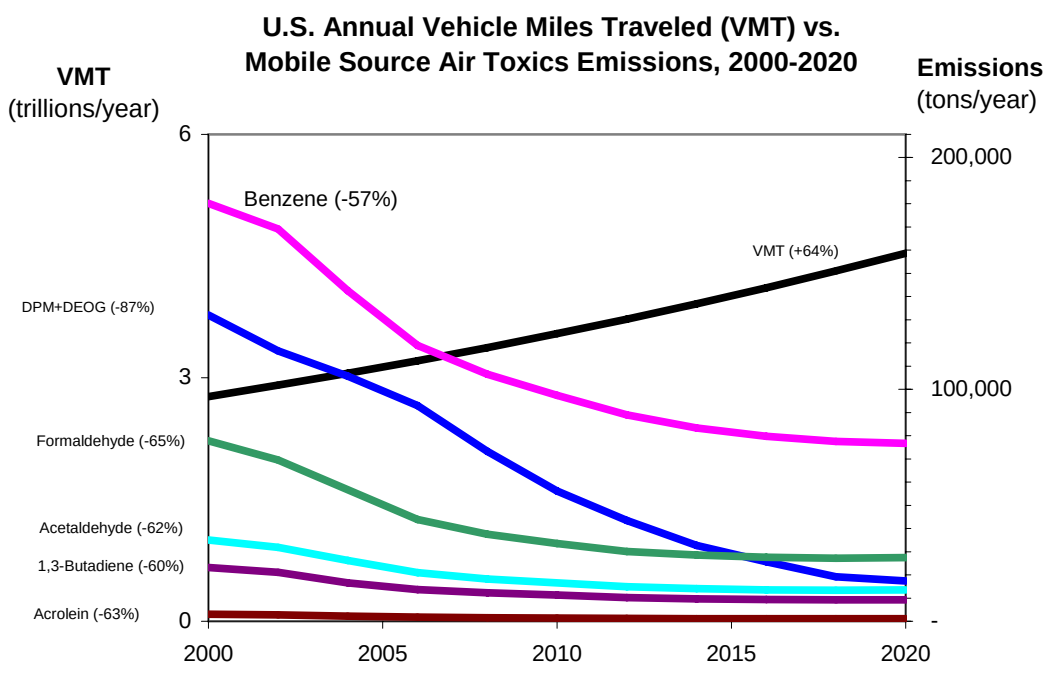
Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act. The MSATs are compounds emitted from highway vehicles and non-road equipment.

Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead Federal Agency for administering the Clean Air Act and has certain responsibilities regarding the health effects of MSATs. The EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources, 66 FR 17229 (March 29, 2001). This rule was issued under the authority in Section 202 of the Clean Air Act. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards and on-highway diesel fuel sulfur control requirements. FHWA projects that, between 2000 and 2020, even with a 64 percent increase in vehicle miles traveled (VMT), these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 percent to 65 percent, and will reduce on-highway diesel PM emissions by 87 percent, as shown in the following graph:



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. Methyl tertiary-butyl ether proportion of market for oxygenates is held constant, at 50%. Gasoline Reid Vapor Pressure and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5%. "Diesel Particulate + Diesel Exhaust Gas" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and SO4 from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

As a result, EPA concluded that no further motor vehicle emissions standards or fuel standards were necessary to further control MSATs. The agency is preparing another rule under authority of CAA Section 202(l) that will address these issues and could make adjustments to the full 21 and the primary six MSATs.

Unavailable Information for Project Specific MSAT Impact Analysis

This DEIS includes a basic analysis of the likely MSAT emission impacts of the proposed project. However, available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this DEIS. Due to these limitations, the following discussion is included in accordance with CEQ regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information. Note that the language and statistics quoted in this section are derived from "*Interim Guidance on Air Toxics Analysis in NEPA Documents*," Cynthia J. Burbank, published by FHWA on February 3, 2006.

Evaluating the environmental and health impacts from MSATs on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSAT health impacts of this project.

1. Emissions: The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While the MOBILE 6.2 emissions model is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE 6.2 is a trip-based model with emission factors that are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and cannot adequately capture emissions effects of smaller projects. For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

   These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

2. Dispersion. The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. The National Cooperative Highway Research Program is conducting research on best practices in applying models and other technical methods in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

3. Exposure Levels and Health Effects. Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude the reaching of meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts.

6.1.3.1 Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is on-going. For different emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries. This information is taken verbatim from EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Formaldehyde** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** (DE) is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases.
- **Diesel exhaust** also presents chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute (a non-profit organization funded by EPA, the FHWA, and industry) has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes, particularly respiratory problems[1]. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and other pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable the performance of a more comprehensive evaluation of the health impacts specific to this project.

[1] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality); NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the alternatives would have "significant adverse impacts on the human environment."

In this document, the FHWA has provided a qualitative analysis of MSAT emissions relative to the various alternatives, and has acknowledged that some of the project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

6.1.3.2 Qualitative Assessment

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable quantitated, absolute estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSATs at the project level, it is possible to qualitatively assess the comparative levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions—if any—from the various alternatives. Application of this qualitative methodology is consistent with FHWA policy. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*, January 2005.

For each of the Build alternatives, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. VMT is discussed in Section 4.2.1. VMT was calculated for an area including all of Carver County, all of Scott County, and portions of Hennepin County. For each of the alternatives, VMT is two percent higher in this study area compared to the No-Build alternative. This suggests that MSAT emissions in the study area will increase slightly under Build conditions compared to No-Build conditions. Vehicle hours traveled (VHT) decrease by one percent under all Build alternatives, representing a higher average speed of traffic. Mobile 6.2 suggests that emissions rates for all MSATs other than DPM decrease as speeds increase. This suggests that the increase in MSATs resulting from higher VMT may be

moderated by higher average speeds. In addition, because the estimated VMT under each of the Build alternatives are nearly the same, varying by less that 0.3 percent, it is expected that there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower in the design year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Because of the specific characteristics of the project alternatives, under each alternative, there will be localized areas where VMT and VHT will increase, and other areas where they will decrease. Therefore, it is possible that localized increases or decreases in MSAT emissions may occur. However, even if those increases do occur, they too will be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In conclusion, under all Build alternatives in the design year it is expected that there would be reduced MSAT emissions in the immediate area of the project, relative to the No-Build alternative, due to the reduced vehicle hours traveled (VHT) associated with more direct routing, and due to EPA's MSAT reduction programs. In comparing various project alternatives, MSAT levels could be higher in some locations than others, but current tools and science are not adequate to quantify them. However, on a regional basis, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause reductions that, in almost all cases, will cause region-wide MSAT levels to be substantially lower than today.

6.1.4 Mitigation

Any necessary mitigation measures will also be addressed as part of that process. Detailed air quality analyses will be conducted during the Tier II EIS process.

6.2. TRAFFIC NOISE

This section provides an analysis of the noise impacts that would result from each of the project alternatives (No-Build and Build Alternatives W-2, C-2, C-2A, E-2, E-1, and E-1A). The noise analysis was completed to assess existing traffic noise levels in the project area and to determine what effect the six potential Build alternatives would have on future noise levels. This noise analysis is also intended to help facilitate the identification of a preferred alternative among the various alternatives under consideration in this DEIS. The noise analysis presented in this section is based on preliminary design information. A more detailed and rigorous analysis will be completed with the Tier II EIS process.

The Build alternatives would create new traffic noise sources in different areas of the study area and could change traffic volumes along existing roadways. Increases in traffic can result in increased noise levels, which can be perceived as an annoyance by adjacent residents and other affected persons.

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6.2.1 Affected Environment

The noise analysis consisted of monitoring existing noise levels at residential receptor sites and predicting future noise levels using computer modeling. As noted in Section 1.2 of this DEIS, the study area is currently characterized by a range of land uses, including urban- and suburban-density development, agricultural activities, and natural resource areas. Residences within the study area are mainly concentrated within the cities of Chanhassen, Chaska, and Carver; however, there are mobile home courts in Jackson Township and scattered residences located throughout the project corridor between New US 212 and US 169.

The study area is also characterized by the Minnesota River Valley. The Minnesota Valley State Recreation Area (MVSRA) is a resource common to the six Build alternatives, and is included within this noise analysis. The Minnesota Valley National Wildlife Refuge (MVNWR) is an urban wildlife refuge located within the project area. The MVNWR consists of eight non-contiguous units that currently stretch 34 miles from Fort Snelling to the City of Jordan. The Chaska Lake Units are located within the study area, (see Chapter 8), and are also included in this noise analysis. There are numerous existing roadways in the study area with traffic volumes high enough to be considered sources of traffic noise, including, but not limited to: TH 41; US 169; US 212 (existing and new); and multiple county highways and city streets. There are also numerous low traffic volume roads throughout the study area that would not substantially contribute to traffic noise.

6.2.1.1. Noise Analysis

Noise is defined as any unwanted sound. Traffic is a common source of noise near high-volume roadways and is regulated in Minnesota by the Minnesota Pollution Control Agency (MPCA) under Minnesota Statute 116.07 Subdivisions 2 and 4. Sound travels in a wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Decibels (dB) represent the logarithmic increase in sound energy relative to a reference energy level. A sound increase of 3 dB is barely perceptible to the human ear, a 5 dB increase is clearly noticeable, and a 10 dB increase is heard as twice as loud. For example, if the sound energy is doubled (e.g., the amount of traffic doubles), there is a 3 dB increase in noise, which is just barely noticeable to most people. On the other hand, if traffic increases to where there is 10 times the sound energy level over a reference level, then there is a 10 dB increase and it is heard as twice as loud. [2]

To approximate the way that an average person hears sound, an adjustment, or weighting, of the high- and low- pitched sounds is made. The adjusted sound levels are stated in units of "A-weighted decibels" (dBA). In Minnesota, traffic noise impacts are evaluated by measuring and/or modeling the traffic noise levels that are exceeded 10 percent and 50 percent of the time during the hours of the day and/or night that have the heaviest traffic for a given hour. These numbers are identified as the L_{10} and L_{50} levels, respectively. For example, an L_{10} value of 65 dBA means that the noise level was at or greater than 65 dBA during 10 percent of the measurement period (i.e., more than 6 minutes per hour). Common noise levels from various indoor and outdoor sources are listed in Table 6-1.

[2] Minnesota Pollution Control Agency. 1999. *A Guide to Noise Control in Minnesota*. http://www.pca.state.mn.us/programs/pubs/noise.pdf

TABLE 6-1
NOISE LEVEL COMPARISONS

Noise Source	Sound Pressure Level (dBA)
Jet Engine (at 75 feet)	140
Jet Aircraft (at 300 feet)	130
Rock and Roll Concert	120
Pneumatic Chipper	110
Jointer/Planer	100
Chainsaw	90
Heavy Truck Traffic	80
Business Office	70
Conversational Speech	60
Library	50
Bedroom	40
Secluded Woods	30
Whisper	20

Source: "A Guide to Noise Control in Minnesota", Minnesota Pollution Control Agency, http://www.pca.state.mn.us/programs/pubs/noise.pdf and "Highway Traffic Noise", Federal Highway Administration, http://www.fhwa.dot.gov/environment/htnoise.htm.

6.2.1.2. Regulatory Framework

The MPCA is the governmental regulatory agency responsible for implementing regulations controlling traffic noise in Minnesota. Minnesota state noise standards have been established for daytime and nighttime periods. For residential land uses (identified as Noise Area Classification 1 or NAC-1), the Minnesota State standards for an hourly L_{10} are 65 dBAs for daytime and 55 dBAs for nighttime; the standards for L_{50} are 60 dBAs for daytime and 50 dBAs for nighttime. Recreation areas and wildlife refuges within the Minnesota River Valley also fall under the state NAC-1 classification. The MPCA defines daytime as 7:00 a.m. to 10:00 p.m. and nighttime from 10:00 p.m. to 7:00 a.m. Traffic noise analyses are conducted for the peak noise hour during both daytime and nighttime. The peak daytime traffic noise hour typically corresponds to the morning or evening rush hour, while the peak nighttime noise hour is almost always from 6:00 a.m. to 7:00 a.m.

Minnesota Statute 116.07, Subd. 2a. states that municipal and county roads, except for roadways for which full control of access has been acquired, are exempt from State noise standards. Within the study area, State standards apply to TH 41, US 212, US 169. Some county roads within the study area may be exempt from State noise standards, depending upon the access control on each individual county road. State standards would apply to any new TH 41 river crossing alternative. State standards are depicted in Table 6-2.

TABLE 6-2
MINNESOTA STATE NOISE STANDARDS

MPCA State Noise Standards					
Land Use	**Code**	**Day (7 a.m. – 10 p.m.) dBA**		**Night (10 p.m. – 7 a.m.) dBA**	
Residential	**NAC-1**	L_{10} of 65	L_{50} of 60	L_{10} of 55	L_{50} of 50
Commercial	**NAC-2**	L_{10} of 70	L_{50} of 65	L_{10} of 70	L_{50} of 65
Industrial	**NAC-3**	L_{10} of 80	L_{50} of 75	L_{10} of 80	L_{50} of 75

For residential and parkland uses (Federal Land Use Category B), the Federal L_{10} noise abatement criterion is 70 dBA for both daytime and nighttime. Locations where noise levels are "approaching" (defined as being within one dBA of the criterion threshold, i.e., 69 dBA) or exceeding the criterion level must be evaluated for noise abatement feasibility. Federal Noise Abatement Criteria (NAC) are shown in Table 6-3.

TABLE 6-3
FEDERAL NOISE ABATEMENT CRITERIA

FHWA Noise Abatement Criteria		
Category	**L_{10} dBA**	**Land Use**
A	**60**	Special areas requiring serenity
B	**70**	Residential and recreational areas
C	**75**	Commercial and industrial areas
D	**NA**	Undeveloped areas
E	**55***	Residential, hospitals, libraries, etc.

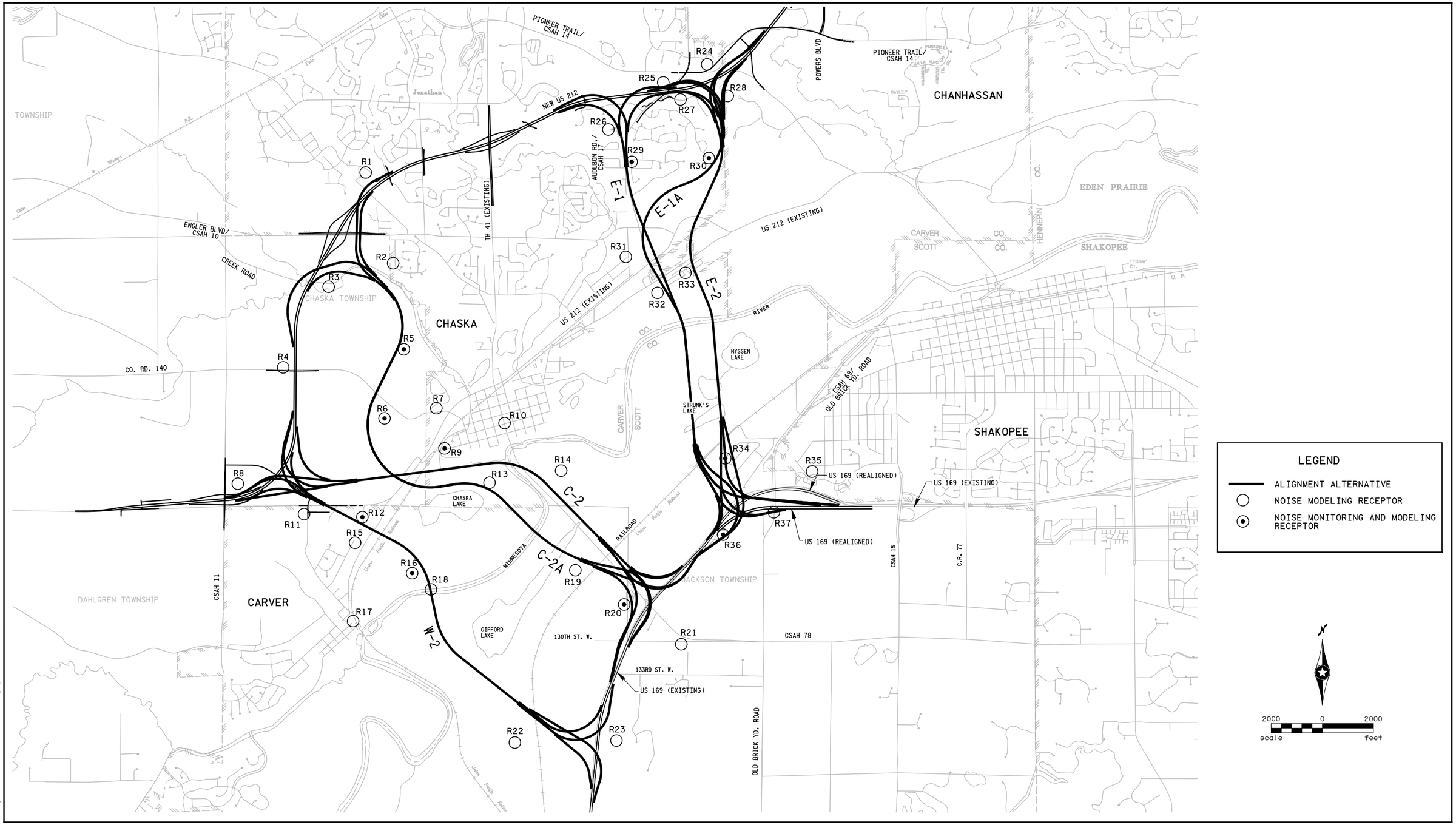
* Applies to interior noise levels. All other land uses are exterior levels.

In addition to the identified noise criteria, the FHWA also defines a noise impact as a "substantial increase" in the future noise levels over the existing noise levels. Mn/DOT considers an increase of five dBA or greater a substantial noise level increase. Because Federal funds are anticipated to be used as part of this project, the Federal noise criteria would apply to all roads associated with each Build Alternative.

6.2.1.4 Monitoring

Noise level monitoring is commonly performed during a noise study to document existing noise levels. Existing noise levels can be used as a "baseline" against which future scenarios are compared. In addition, when studying future noise levels projected with computer models, monitored noise levels for existing conditions are compared to modeled results for existing conditions to validate the computer modeling techniques and results.

Existing noise levels were monitored at nine sites in the project area, chosen to represent areas of outdoor human activity (i.e., residential yards), as well as natural areas within the river valley (see Tables 6-4 through 6-5). Noise monitoring locations are shown in Figure 6-1. Monitoring locations were chosen at residential sites adjacent to existing traffic noise sources and in areas close to the six potential Build alignments. Locations not currently affected by traffic noise are identified in Table 6-4A through Table 6-5F as "A," or ambient.



NOISE RECEPTOR LOCATIONS

Figure 6-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Existing dominant noise at these receptors originates from non-traffic sources. Ambient noise is caused by wind, birds, insects, etc. and varies depending on meteorological conditions and time of day. Ambient noise levels in the study area were measured at levels ranging from 40 to 55 dBA (L_{10}). Ambient noise levels measured in the study area were averaged and used to characterize the background noise levels at receptors located in areas not affected by traffic noise. The average ambient noise levels at these receptors are 50 dBA (L_{10}) and 47 dBA (L_{50}).

Noise levels were monitored during October 2005. Monitoring methods used in this study comply with State and Federal guidelines. A trained noise monitoring technician was present at each session for the entire monitoring session to ensure correct operation of the instrumentation. Noise monitoring results are presented in Tables 6-4A through 6-5F. Monitoring results are presented along with the results of computer modeling for existing daytime and nighttime noise conditions. The monitored L_{10} noise levels are within three dBA of the modeled levels for most all receptors, supporting the validity of the model in predicting future noise levels. Monitored levels are 7 dBA (daytime L_{10}) below modeled levels at Receptor 12, which is located along Lano Lane, adjacent to existing US 212 and County Road 40. The difference in monitored versus existing modeled levels is likely the result of monitoring occurring just prior to the peak p.m. period, when traffic volumes were lower than those used to model daytime traffic noise. The monitoring location for Receptor R12 also occurred at a location within the Alternative W-2 corridor. Therefore, for modeling purposes, the receptor location was moved to the north outside of the Alternative W-2 corridor to represent receptors along Lano Lane. Locating the Receptor R12 modeling location closer to existing US 212 likely contributed to monitoring levels being lower than modeled levels. Monitored levels at Receptor R5 are 5 dBA (daytime L_{10}) greater than modeled levels, which is located adjacent to Creek Road. The monitoring at Receptor R5 occurred closer to Creek Road than the model location, which is closer to the Alternative C-2A corridor. The difference in monitored versus existing modeled levels is likely the result of the monitoring location being closer to traffic noise from Creek Road where higher levels of traffic noise would be observed.

6.2.2 Environmental Consequences

6.2.2.1. Modeled Receptor Sites

Traffic noise impacts were assessed by modeling noise levels at receptor sites likely to be most affected by changes in roadway alignment resulting from construction of the proposed Build alternatives. Figure 6-1 shows the noise modeling locations. The number of residences represented by each receptor is listed in parentheses in Tables 6-4A to 6-5F. This number represents the number of first-row residences or commercial properties immediately adjacent to a Build Alternative alignment. For example, Receptor R1 represents nine first-row residences near the Build Alternative C-2A interchange with New US 212. Conversely, Receptor R8 represents a single residence north of existing US 212. Receptor R10 represents the downtown Chaska area. While both commercial and residential land uses are located in downtown Chaska, for the purposes of this evaluation, Receptor R10 represents eight residential properties in the downtown Chaska area along both sides of existing TH 41 between 5th Street and the Minnesota River.

Receptors R20, R32, R33, R34, and R36 represent mobile home parks within the project area. Only those first-row mobile home structures immediately adjacent (i.e., first row residences) to the Build Alternative corridors were considered.

The average existing ambient noise levels are listed as the modeled existing (year 2004) and No-Build (year 2040) noise levels for those locations where traffic noise is not the dominant noise source. Year 2003 and 2004 average daily traffic (ADT) volumes were used to model daytime and nighttime peak traffic hours. Because ADT represents traffic volumes over a 24-hour period, 10 percent of the ADT was used to model the daytime peak traffic hour, and 8 percent of the ADT was used to model the nighttime peak traffic hour. Forecast year 2040 No-Build traffic volumes were used to model noise for those receptors that are near existing traffic noise sources (e.g., TH 41; US 169; existing and new US 212; County Highways, etc.). Forecast year 2040 Build traffic volumes, which are representative of the worst-case traffic volumes, were used to model traffic noise at all receptors. If the modeled noise for an isolated receptor was equal to or lower than the ambient level, it was assumed that the proposed alternative alignment had no noise impact and the ambient noise level was reported.

The eastern Build alternatives (Alternatives E-1, E-1A, E-2) each included both a low and high roadway profile option. For each of these three Build Alternatives, only the high profile option was included in the noise models as a worst-case scenario.

Noise modeling was done using the noise prediction program "MINNOISE", a version of the FHWA "STAMINA" model adapted by Mn/DOT. This model uses vehicle numbers, speed, class of vehicle, and the typical characteristics of the roadway being analyzed. The vehicle class percentages used for all roads except existing TH 41, new TH 41, US 169, and US 212 (existing and new) mainline were as follows: automobiles and light trucks, 97 percent; medium trucks, 2 percent; and heavy trucks, 1 percent. Vehicle class percentages used for US 212 (existing and new) for all models was as follows: automobiles and light trucks, 95 percent; medium trucks, 1 percent; and heavy trucks, 4 percent. The vehicle class percentage for existing TH 41, new TH 41 (Build condition models), and US 169 varied between models based on travel demand forecast results (see Table 4-9 of this DEIS). Posted and anticipated future speed limits were used to model all roadways.

New US 212, currently under construction and anticipated for completion in year 2008, was programmed into the year 2040 No-Build and year 2040 Build alternative noise models. This included noise barriers (earthen berms and noise walls) that are proposed for construction with new US 212. Under existing conditions (year 2003-2004), there are isolated residences in rural Carver County adjacent to the new US 212 corridor where ambient noise is dominated by non-traffic sources and/or low-volume roadways. These isolated receptors adjacent to the New US 212 corridor will experience a substantial increase in noise under the No-Build (year 2040) conditions with construction of New US 212. For example, Receptor R4 represents residences along County Road 140 west of the proposed New US 212 corridor. As shown in Table 6-4A, existing daytime L_{10} noise levels at Receptor R4 are 55 dBA. However, under future No-Build (year 2040) conditions, daytime L_{10} noise levels were modeled at 72 dBA, an increase of 17 dBA over existing conditions. This increase from existing to No-Build conditions is a result of traffic-generated noise from the New US 212 roadway.

TABLE 6-4A
NOISE MODELING RESULTS (ALTERNATIVE W-2) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative W-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R8 (1)			52	47	65	**63**	13	16	**67**	**65**	15	18	2	2
R11 (6)			60	54	59	57	1	3	**68**	**65**	8	11	9	8
R12 [(1)] (3)	51	47	58	53	62	60	4	7	**72**	**70**	14	17	10	10
R15 (2)			55	49	59	56	4	7	65	**64**	10	15	6	8
R16 (1)			50A	47A	50A	47A	0	0	**68**	**66**	18	19	18	19
R17 (5)			54	47	60	55	6	8	62	58	8	11	2	3
R18 [(2)] (1)			49	46	54	53	5	7	**81**	**77**	32	30	27	24
R21 (5)			59	56	62	59	3	3	61	59	2	3	-1	0
R22 (1)			49	48	50	49	1	1	59	58	10	10	9	9
R23 (5)			62	60	63	**61**	1	1	63	**61**	1	1	0	0
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.
(1) Monitoring for Receptor R12 occurred at a location within the proposed Alternative W-2 corridor. For modeling purposes, the location of Receptor R12 was moved to the north to represent residences along Lano Lane between existing US 212 and the Alternative W-2 corridor. Locating the modeling location for Receptor R12 closer to Existing 212 results in a higher modeled traffic noise level compared to the monitored level.
(2) Receptor R18 is located on the Minnesota River underneath Alternative W-2.

TABLE 6-4B
NOISE MODELING RESULTS (ALTERNATIVE C-2) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative C-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R4 (6)			55	44	**72**	**68**	17	24	**69**	**64**	14	20	-3	-4
R6 (3)			50A	47A	60	57	10	10	58	56	8	9	-2	-1
R7 (5)			59	53	**68**	**64**	9	11	64	59	5	6	-4	-5
R8 (1)			52	47	65	**63**	13	16	**66**	**64**	14	17	1	1
R9 (13)	64	57	61	52	63	55	2	3	**68**	**62**	7	10	5	7
R10 (8)			**73**	**66**	**74**	**68**	1	2	**70**	**64**	3	2	-4	-4
R11 (6)			60	54	59	57	1	3	64	**62**	4	8	5	5
R12 (3)	51	47	58	53	62	60	4	7	63	**61**	5	8	1	1
R13 (1)			54	51	55	53	1	2	65	**63**	11	14	10	10
R14 (1)			57	54	58	56	1	2	64	**62**	13	11	6	6
R19 (4)			56	54	58	56	2	2	59	58	3	4	1	2
R20 (15)	59	56	63	**61**	64	**62**	1	1	65	**63**	2	2	1	1
R21 (5)	59	56	62	59	65	62	3	3	64	61	2	2	-1	-1
R36 (12)			**69**	**65**	**70**	**67**	1	2	**71**	**68**	2	3	1	1
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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TABLE 6-4C
NOISE MODELING RESULTS (ALTERNATIVE C-2A) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative C-2A)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1 (9)			49	42	58	55	9	13	**66**	**64**	17	22	8	9
R2 (15)			50A	47A	56	55	6	8	63	**62**	13	15	7	7
R3 (7)			53	45	65	**62**	12	17	**67**	**65**	14	20	2	3
R4 (6)			55	44	**72**	**68**	17	24	**69**	**64**	14	20	-3	-4
R5 (1)	**66**	53	61	51	**68**	**61**	7	10	**73**	**70**	12	19	5	9
R6 (3)			50A	47A	60	57	10	10	**67**	**65**	17	18	7	8
R7 (5)			59	53	**68**	**64**	9	11	64	60	5	7	-4	-4
R9 (13)	64	57	61	52	63	55	2	3	**66**	60	5	8	3	5
R10 (8)			**73**	**66**	**74**	**68**	1	2	**71**	**65**	2	1	-3	-3
R13 (1)			54	51	55	53	1	2	**73**	**70**	19	19	18	17
R14 (1)			57	54	58	56	1	2	58	57	1	3	0	1
R19 (4)			56	54	58	56	2	2	**67**	**65**	11	11	9	9
R20 (15)	59	56	63	**61**	64	**62**	1	1	**68**	**66**	5	5	4	4
R21 (5)			59	56	62	59	3	3	62	59	3	3	0	0
R 36 (12)			**69**	**65**	**70**	**67**	1	2	**71**	**68**	2	3	1	1
R37 (1)			63	61	**66**	**63**	3	3	**67**	**65**	4	4	1	2
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

TABLE 6-4D
NOISE MODELING RESULTS (ALTERNATIVE E-1) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-1)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			59	55	62	59	3	4	61	58	2	3	-1	-1
R24 (7)			60	55	**67**	**64**	7	9	**69**	**67**	9	12	2	3
R25 (1)			59	55	**68**	**66**	9	11	**73**	**70**	14	15	5	4
R26 (6)			50	47	60	59	10	12	**68**	**66**	18	19	8	7
R27 (17)			54	51	59	57	5	6	61	60	7	9	2	3
R28 (2)			50	47	62	**61**	12	14	63	**62**	13	15	1	1
R29 (11)	57	53	55	50	59	56	4	6	**77**	**73**	22	23	18	17
R30 (9)			50A	47A	50A	47A	0	0	55	54	5	7	5	7
R31 (8)			55	53	55	53	0	0	63	**62**	8	9	8	9
R32 (10)			55	51	56	52	1	1	**69**	**67**	14	16	13	15
R33 (4)			56	50	56	51	0	1	65	**63**	9	13	9	12
R34 (27)			50A	47A	50A	47A	0	0	63	62	13	15	13	15
R35 (15)			61	59	62	60	1	1	60	59	-1	0	-2	-1
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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TABLE 6-4E
NOISE MODELING RESULTS (ALTERNATIVE E-1A) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-1A)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			59	55	62	59	3	4	61	57	2	2	-1	-2
R24 (7)			60	55	**67**	**64**	7	9	**69**	**67**	9	12	2	3
R25 (1)			59	55	**68**	**66**	9	11	**74**	**71**	15	16	6	5
R27 (17)			54	51	59	57	5	6	63	**62**	9	11	4	5
R28 (2)			50	47	62	**61**	12	14	**72**	**69**	22	22	10	8
R29 (11)	57	53	55	50	59	56	4	6	**67**	**61**	12	11	8	5
R30 (9)			50A	47A	50A	47A	0	0	**74**	**71**	24	24	24	24
R31 (8)			55	53	55	53	0	0	63	**61**	8	8	8	8
R32 (10)			55	51	56	52	1	1	**70**	**67**	15	16	14	15
R33 (4)			56	50	56	51	0	1	62	**61**	6	11	6	10
R34 (27)			50A	47A	50A	47A	0	0	63	62	13	15	13	15
R35 (15)			61	59	62	60	1	1	60	58	-1	-1	-2	-2
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

TABLE 6-4F
NOISE MODELING RESULTS (ALTERNATIVE E-2) – DAYTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			59	56	62	59	3	5	61	57	2	1	-1	-2
R24 (7)			60	55	**67**	**64**	7	9	**70**	**68**	10	13	3	4
R25 (1)			59	55	**68**	**66**	9	11	**72**	**69**	13	14	4	3
R27 (17)			54	51	59	57	5	6	**71**	**69**	17	18	12	12
R28 (2)			50	47	62	**61**	12	14	**70**	**68**	20	21	8	7
R30 (9)			50A	47A	50A	47A	0	0	**69**	**67**	19	20	19	20
R32 (10)			55	51	56	52	1	1	60	59	5	8	4	7
R33 (8)			56	50	56	51	0	1	**70**	**68**	14	18	14	17
R35 (15)			61	59	62	60	1	1	59	58	-2	-1	-3	-2
State Standards	65	60	65	60	65	60	-	-	65	60	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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TABLE 6-5A
NOISE MODELING RESULTS (ALTERNATIVE W-2) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative W-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R8 (1)			51	46	**64**	**62**	13	16	**66**	**64**	15	18	2	2
R11 (6)			**59**	**53**	**59**	**56**	0	3	**67**	**64**	8	11	8	8
R12 [1] (3)	**57**	54	**57**	**52**	**62**	**58**	5	6	**71**	**68**	14	16	9	10
R15 (2)			54	48	**59**	**55**	5	7	**64**	**62**	10	14	5	7
R16 (1)			50A	47A	50A	47A	0	0	**67**	**65**	17	18	17	18
R17 (5)			53	45	59	54	6	9	**61**	**56**	8	11	2	2
R18 [2] (1)			50A	47A	50A	47A	0	0	**80**	**75**	30	28	30	28
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**57**	2	3	-1	-1
R22 (1)			50A	47A	50A	47A	0	0	**58**	**56**	8	9	8	9
R23 (5)			**61**	**59**	**62**	**60**	1	1	**62**	**60**	1	1	0	0
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.
(1) Monitoring for Receptor R12 occurred at a location within the proposed Alternative W-2 corridor. For modeling purposes, the location of Receptor R12 was moved to the north to represent residences along Lano Lane between existing US 212 and the Alternative W-2 corridor. Locating the modeling location for Receptor R12 closer to old 212 results in a higher modeled traffic noise level compared to the monitored level.
(2) Receptor R18 is located on the Minnesota River underneath Alternative W-2.

TABLE 6-5B
NOISE MODELING RESULTS (ALTERNATIVE C-2) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative C-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R4 (6)			54	43	**71**	**68**	17	25	**68**	**63**	14	20	-3	-5
R6 (3)			50A	47A	**59**	**56**	9	9	**57**	**55**	7	8	-2	-1
R7 (5)			**58**	**52**	**67**	**62**	9	10	**63**	**58**	5	6	-4	-4
R8 (1)			51	46	**64**	**62**	13	16	**65**	**63**	14	17	1	1
R9 (13)	**58**	**55**	**60**	**51**	**62**	**53**	2	2	**66**	**60**	6	9	4	7
R10 (8)			**69**	**65**	**73**	**67**	4	2	**69**	**63**	0	2	-4	-4
R11 (6)			**59**	**53**	**59**	**56**	0	3	**64**	**61**	5	8	5	5
R12 (3)	**57**	54	**57**	**52**	**62**	**58**	5	6	**62**	**60**	5	8	0	2
R13 (1)			53	50	54	**52**	1	2	**63**	**62**	10	12	9	10
R14 (1)			**56**	**53**	**57**	**55**	1	2	**63**	**61**	7	8	6	6
R19 (4)			55	**53**	**57**	**55**	2	2	**58**	**57**	3	4	1	2
R20 (15)	**60**	**56**	**62**	**60**	**63**	**61**	1	1	**63**	**61**	1	1	0	0
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**57**	2	3	-1	-1
R36 (12)			**68**	**64**	**69**	**66**	1	2	**73**	**69**	5	5	4	3
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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TABLE 6-5C
NOISE MODELING RESULTS (ALTERNATIVE C-2A) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative C-2A)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R1 (9)			48	40	**58**	**54**	10	14	**64**	**62**	16	22	6	8
R2 (15)			48	43	55	**54**	7	11	**62**	**60**	14	17	7	6
R3 (7)			52	44	**64**	**61**	12	17	**66**	**64**	14	20	2	3
R4 (6)			54	43	**71**	**67**	17	24	**68**	**63**	14	20	-3	-4
R5 (1)			**60**	50	**67**	**59**	7	9	**71**	**68**	11	18	4	9
R6 (3)			50A	47A	**59**	**56**	9	9	**65**	**63**	15	16	6	7
R7 (5)			**58**	**52**	**67**	**62**	9	10	**63**	**58**	5	6	-4	-4
R9 (13)	**58**	**55**	**60**	**51**	**62**	**53**	2	2	**65**	**58**	5	7	3	5
R10 (8)			**69**	**65**	**73**	**67**	4	2	**70**	**64**	1	1	-3	-3
R13 (1)			53	50	54	52	1	1	**71**	**68**	18	18	17	16
R14 (1)			**56**	**53**	**57**	**55**	1	2	**57**	**55**	1	2	0	0
R19 (4)			55	**53**	**57**	**55**	2	2	**66**	**64**	11	11	9	9
R20 (15)	**60**	**56**	**62**	**60**	**63**	**61**	1	1	**66**	**63**	4	3	3	2
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**57**	2	3	-1	-1
R36 (12)			**68**	**64**	**69**	**66**	1	2	**70**	**67**	2	3	1	1
R37 (1)			**62**	**60**	**65**	**62**	3	2	**66**	**63**	4	3	1	1
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

TABLE 6-5D
NOISE MODELING RESULTS (ALTERNATIVE E-1) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-1)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**56**	2	2	-1	-2
R24 (7)			**59**	**54**	**66**	**63**	7	9	**67**	**64**	8	10	1	1
R25 (1)			**58**	54	**67**	**65**	9	11	**71**	**69**	13	15	4	4
R26 (6)			49	45	**59**	**58**	10	13	**67**	**65**	18	20	8	7
R27 (17)			53	49	**58**	**56**	5	7	**60**	**59**	7	10	2	3
R28 (2)			49	46	**62**	**60**	13	14	**62**	**61**	13	15	0	1
R29 (11)	**58**	**54**	54	49	**59**	**55**	5	6	**77**	**72**	23	23	18	17
R30 (9)			50A	47A	50A	47A	0	0	54	**53**	4	6	4	6
R31 (5)			54	**52**	55	**52**	1	0	**62**	**60**	8	8	7	8
R32 (10)			54	50	55	**51**	1	1	**68**	**66**	14	16	13	15
R33 (4)			55	49	55	50	0	1	**64**	**62**	9	13	9	12
R34 (27)			50A	47A	50A	47A	0	0	**63**	**61**	13	14	13	14
R35 (15)			**60**	**58**	**61**	**59**	1	1	**59**	**57**	-1	-1	-2	-2
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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TABLE 6-5E
NOISE MODELING RESULTS (ALTERNATIVE E-1A) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-1A)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**56**	2	2	-1	-2
R24 (7)			**59**	**54**	**66**	**63**	7	9	**68**	**66**	9	12	2	3
R25 (1)			**58**	54	**67**	**65**	9	11	**73**	**70**	15	16	6	5
R27 (17)			53	49	**58**	**56**	5	7	**62**	**61**	9	12	4	5
R28 (2)			49	46	**62**	**60**	13	14	**72**	**68**	23	22	10	8
R29 (11)	**58**	**54**	54	49	**59**	**55**	5	6	**66**	**60**	12	11	7	5
R30 (9)			50A	47A	50A	47A	0	0	**75**	**72**	25	25	25	25
R31 (5)			54	**52**	55	**52**	1	0	**64**	**63**	10	11	9	11
R32 (10)			54	50	55	**51**	1	1	**71**	**69**	17	19	16	18
R33 (4)			55	49	55	50	0	1	**63**	**60**	8	11	8	10
R34 (27)			50A	47A	50A	47A	0	0	**63**	**61**	13	14	13	14
R35 (15)			**60**	**58**	**61**	**59**	1	1	**58**	**57**	-2	-1	-3	-2
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

TABLE 6-5F
NOISE MODELING RESULTS (ALTERNATIVE E-2) – NIGHTTIME

Receptor*	Monitored		Modeled Existing (2004)		Year 2040 No-Build		Difference Between Year 2040 No-Build and Existing (2004)		Year 2040 Build (Alternative E-2)		Difference Between Year 2040 Build and Existing (2004)		Difference between Year 2040 Build and Year 2040 No-Build	
	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}	L_{10}	L_{50}
R21 (5)			**58**	**54**	**61**	**58**	3	4	**60**	**56**	2	2	-1	-2
R24 (7)			**59**	**54**	**66**	**63**	7	9	**69**	**66**	10	12	3	3
R25 (1)			**58**	**54**	**67**	**65**	9	11	**71**	**67**	13	13	4	2
R27 (17)			53	49	**58**	**56**	5	7	**70**	**68**	17	19	12	12
R28 (2)			49	46	**62**	**60**	13	14	**70**	**67**	21	21	8	7
R30 (9)			50A	47A	50A	47A	0	0	**68**	**66**	18	19	18	19
R32 (10)			54	50	55	**51**	1	1	**60**	**58**	6	8	5	7
R33 (8)			55	49	55	50	0	1	**69**	**67**	14	18	14	17
R35 (15)			**60**	**58**	**61**	**59**	1	1	**59**	**57**	-1	-1	-2	-2
State Standards	55	50	55	50	55	50	-	-	55	50	-	-	-	-
Federal NAC	70	-	70	-	70	-	-	-	70	-	-	-	-	-

Note: Bold numbers are above state standards.
* - Number in ( ) in this column is the number of residences and/or commercial buildings represented by each receptor.
A = ambient noise levels. Noise at these receptors is dominated by non-traffic sources.

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Noise monitoring and modeling results for existing residential receptors for existing (year 2004) conditions and for the year 2040 are presented in Tables 6-4A through 6-5F. Both daytime and nighttime L_{10} and L_{50} are shown for the existing condition and for year 2040 for both No-Build and Build alternatives. While both L_{10} and L_{50} descriptors are shown on the tables, the discussions of modeling results presented below only reference the L_{10} values, because the L_{10} descriptor is used to define both the state and federal noise level regulatory thresholds. Table 6-6 presents daytime L_{10} noise levels in relation to state noise standards and federal abatement criteria for 2040 No-Build and Build conditions.

Modeling Results

Alternative W-2

Noise monitoring and modeling results for Alternative W-2 are shown in Table 6-4A (daytime) and Table 6-5A (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are not currently exceeded at any receptors along the Alternative W-2 corridor. State nighttime L_{10} standards are currently exceeded by 2 to 6 dBA at four receptors. In general, existing noise levels at residential sites are in the high 50s/low 60s dBA, and ambient noise levels at isolated locations in the river valley are in the mid 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and the New US 212, No-Build 2040 L_{10} noise levels in the vicinity of Alternative W-2 would increase by up to 13 dBA over existing levels, while diversion of traffic to New US 212 would lessen noise increases in some other locations. Under 2040 No-Build conditions, State daytime noise standards would be reached at one receptor location and State nighttime noise standards would be exceeded at seven receptor locations in the vicinity of the W-2 corridor.

Construction of Alternative W-2 (2040 Build) would result in daytime L_{10} standards being exceeded by 4 to 16 dBA at five receptors; nighttime L_{10} standards would be exceeded at all receptors. In general, noise at isolated receptors would increase by approximately 10 to 18 dBA over existing levels; daytime noise at residences close to New US 212 would increase by approximately 8 to 15 dBA over existing levels; noise at residences elsewhere along the corridor would increase by approximately 1 to 14 dBA over existing levels.

Comparing 2040 noise levels under No-Build to those under Alternative W-2 Build conditions finds mixed results, with some receptors experiencing lower noise levels under Build conditions, others experiencing perceptible increases in noise levels under Build conditions, and currently isolated receptors experiencing much higher noise levels.

Alternative C-2

Noise monitoring and modeling results for Alternative C-2 are shown in Table 6-4B (daytime) and Table 6-5B (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are currently exceeded by 4 and 8 dBA at two receptors along the Alternative C-2 corridor. State nighttime L_{10} standards are currently exceeded by up to 17 dBA at 9 receptors. In general, existing noise levels at residential sites are in the range of 50-60s dBA; the ambient noise levels at an isolated location is in the high 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and New US 212, No-Build 2040 daytime L_{10} levels in the vicinity of Alternative C-2 would increase by up to 14 dBA over existing levels. While diversion of traffic to New US 212 would lessen noise increases in some other locations, under 2040 No-Build conditions, State daytime noise standards would be exceeded at three of the receptor locations in the vicinity of the C-2 corridor; nighttime standards would be exceeded at all but one of the receptors.

Construction of Alternative C-2 (2040 Build) would result in State daytime L_{10} standards being exceeded by 1 to 6 dBA at five receptors; nighttime L_{10} standards would be exceeded at all receptors. Noise at the most isolated receptor (R14) in the Minnesota River Valley would increase by approximately 13 dBA over existing levels. Noise at the receptor (R8) near the Alternative C-2 interchange with New US 212 would increase by approximately 14 dBA over existing conditions.

Five of the 13 receptors are predicted to have differences in noise levels that are lower under Alternative C-2 2040 Build conditions than under 2040 No-Build conditions. Noise levels that are 10 to 13 dBA higher under Build conditions occur at receptors west of existing TH 41 in the river valley.

Alternative C-2A

Noise monitoring and modeling results for Alternative C-2A are shown in Table 6-4C (daytime) and Table 6-5C (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are currently exceeded by 4 and 8 dBA at two receptors along the Alternative C-2 corridor. State nighttime L_{10} standards are currently exceeded by up to 13 dBA at 7 receptors. In general, existing noise levels at residential sites are in the high 50s-low/mid 60s dBA and ambient noise levels at isolated locations are in the high 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and New US 212, No-Build 2040 daytime L_{10} levels in the vicinity of Alternative C-2A would increase by up to 17 dBA over existing levels. While diversion of traffic to New US 212 would lessen noise increases in some other locations, under 2040 No-Build conditions, State daytime L_{10} noise standards would be exceeded at six of the receptor locations in the vicinity of the C-2A corridor; nighttime L_{10} standards would be exceeded at all but two of the receptors.

Construction of Alternative C-2A (2040 Build) would result in daytime L_{10} standards being exceeded by 1 to 8 dBA at 12 receptors; nighttime L_{10} standards would be exceeded at all receptors. In general, noise at isolated receptors would increase by approximately 11 dBA (R19)

over existing levels; daytime noise at residences close to New US 212 would increase by approximately 12 to 15 dBA over existing levels; and daytime noise in the river valley increases up to 20 dBA (R13) over existing levels.

Seven of the 15 modeled receptors are predicted to have differences in noise levels that are either imperceptible or lower under Alternative C-2A 2040 Build conditions than under 2040 No-Build conditions. Noise levels that are 9-17 dBA higher under Build conditions occur at receptors west of existing TH 41 in the river valley.

Alternative E-1

Noise monitoring and modeling results for Alternative E-1 are shown in Table 6-4D (daytime) and Table 6-5D (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are not currently exceeded at any receptors along the Alternative E-1 corridor. State nighttime L_{10} standards are currently exceeded by up to 5 dBA at four receptors. In general, existing noise levels at residential sites are in the mid/high 50s dBA and ambient noise levels at isolated locations are in the high 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and New US 212, No-Build 2040 daytime L_{10} levels in the vicinity of Alternative E-1 would increase by up to 13 dBA over existing levels. While diversion of traffic to New US 212 would lessen noise increases in some other locations, under 2040 No-Build conditions, State daytime noise standards would be exceeded at two of the receptor locations in the vicinity of the E-1 corridor; nighttime standards would be exceeded at eight receptors.

Construction of Alternative E-1 (2040 Build) would result in daytime L_{10} standards being exceeded by 4 to 12 dBA at five receptors; nighttime L_{10} standards would be exceeded at all but one receptor location. In general, daytime noise at isolated receptors would increase by approximately 8 to 14 dBA over existing levels; noise at residences close to New US 212 and US 169 would increase by up to 18 dBA over existing levels; and noise at residences elsewhere along the corridor would increase by approximately 1 to 22 dBA over existing levels.

Five of the 13 modeled receptors are predicted to have differences in noise levels that are either imperceptible or lower under Alternative E-1 2040 Build conditions than under 2040 No-Build conditions. Noise levels are notably higher under Build conditions both along existing residential areas and in isolated natural areas.

Alternative E-1A

Noise monitoring and modeling results for Alternative E-1A are shown in Table 6-4E (daytime) and Table 6-5E (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are not currently exceeded at any receptors along the Alternative E-1A corridor. State nighttime L_{10} standards are currently exceeded by up to 4 dBA at four receptors. In general, existing noise levels at residential sites are in the mid/higher 50s dBA and ambient noise levels at isolated locations are in the high 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and New US 212, No-Build 2040 L_{10} levels in the vicinity of Alternative E-1A would increase by up to 12 dBA over existing levels. While diversion of traffic to New US 212 would lessen noise increases in some other locations, under 2040 No-Build conditions, State daytime noise standards would be exceeded at two of the receptor locations in the vicinity of the E-1A corridor; nighttime standards would be exceeded at nine receptors.

Construction of Alternative E-1A (2040 Build) would result in daytime L_{10} standards being exceeded by 1 to 9 dBA at six receptors; nighttime L_{10} standards would be exceeded at all but one receptor. In general, daytime noise at isolated receptors would increase by up to 24 dBA over existing levels (Receptor R30); noise at residences close to New US 212 would increase by up to 21 over existing levels; and noise at residences elsewhere along the corridor would increase by up to 15 dBA over existing levels.

Four of the 13 receptors along the corridor are predicted to have differences in daytime noise levels that are either imperceptible or lower under Alternative E-1A 2040 Build conditions compared to 2040 No-Build conditions. Noise levels are notably higher under Build conditions both along existing residential areas and in isolated natural areas.

Alternative E-2

Noise monitoring and modeling results for Alternative E-2 are shown in Table 6-4F (daytime) and Table 6-5F (nighttime). The following discussion references L_{10} noise levels only.

State daytime L_{10} standards are not currently exceeded at any receptors along the Alternative E-2 corridor. State nighttime L_{10} standards are currently exceeded by up to 5 dBA at four receptors. In general, existing noise levels at residential sites are in the mid 50s-lower 60s dBA and ambient noise levels at isolated locations are in the high 40s to 50 dBA.

Due to projected increases in traffic on existing roadways and New US 212, No-Build 2040 L_{10} levels in the vicinity of Alternative E-2 would increase by up to 12 dBA over existing levels. While diversion of traffic to New US 212 would lessen noise increases in some other locations, under 2040 No-Build conditions, State daytime noise standards would be exceeded at two of the receptor locations in the vicinity of the E-2 corridor; nighttime standards would be exceeded at six receptors.

Construction of Alternative E-2 (2040 Build) would result in daytime L_{10} standards being exceeded by 4 to 7 dBA at six receptors; nighttime L_{10} standards would be exceeded at all

receptors. In general, noise at isolated receptors would increase by approximately 13 to 20 dBA over existing levels. Noise at residences close to New US 212 would increase by approximately 5 to 19 dBA over existing levels.

Four of the nine receptors along the corridor are predicted to have differences in noise levels that are either imperceptible or lower under Alternative E-2 2040 Build conditions than under 2040 No-Build conditions. Noise levels are notably higher (up to 20 dBA) in isolated areas.

Traffic Noise Impact Summary

Table 6-6 summarizes the traffic noise impact (i.e., number of modeled receptors exceeding State and Federal standards) associated with each Build Alternative. At the top of the table is the total number of receptors modeled for each Build Alternative. Within the table, the first number reported is the number of modeled receptors that exceed State daytime noise standards, exceed State nighttime noise standards, approach or exceed Federal noise abatement criteria (69 dBA), and meet Federal noise abatement criteria (increase ≥ 5 dBA). The second number reported in parentheses is the total number of residences represented by the modeled receptors that exceed State noise standards and Federal noise abatement criteria. This data is provided for existing, No-Build (year 2040) and Build (year 2040) conditions for each Build Alternative.

For example, under Alternative W-2, traffic noise was modeled at 10 receptor locations. None of these receptor locations exceed State daytime noise standards under existing and future No-Build conditions. However, 5 of the 10 modeled receptors will exceed State daytime noise standards under Alternative W-2 conditions. These 5 receptors represent a total of 12 first-row residences adjacent to the Alternative W-2.

As shown in Table 6-6, approximately 30 percent (Alternative C-2) to approximately 70 percent (Alternative E-2) of the modeled receptors, representing 12 (Alternative W-2) to 45 (Alternative E-2) residences, exceed State daytime noise standards under year 2040 Build conditions. Nearly all modeled receptors for all Build Alternatives exceed State nighttime noise standards. Approximately 15 percent (Alternative C-2 and Alternative E-1) to 56 percent (Alternative E-2) of the modeled receptor locations will approach (69 dBA) or exceed Federal noise abatement criteria under year 2040 Build conditions. Approximately 85 percent of the modeled receptor locations, representing 102 residences, will experience a noise increase of 5 dBA or greater under Alternatives E-1 and E-1A, as compared to 54 percent of modeled noise receptors representing 30 residences for Alternative C-2.

TABLE 6-6
TRAFFIC NOISE IMPACT SUMMARY TABLE

Type of Impact	Build Alternative Corridor																	
	W-2 10 Receptors Modeled			C-2 13 Receptors Modeled			C-2A 15 Receptors Modeled			E-1 13 Receptors Modeled			E-1A 12 Receptors Modeled			E-2 9 Receptors Modeled		
	Existing (Year 2003-2004)	No-Build (Year 2040)	Build (Year 2040)	Existing (Year 2003-2004)	No-Build (Year 2040)	Build (Year 2040)	Existing (Year 2003-2004)	No-Build (Year 2040)	Build (Year 2040)	Existing (Year 2003-2004)	No-Build (Year 2040)	Build (Year 2040)	Existing (Year 2003-2004)	No Build (Year 2040)	Build (Year 2040)	Existing (Year 2003-2004)	No-Build (Year 2040)	Build (Year 2040)
Receptors Over State Daytime Standards (L_{10})	0	0	5 (12)	2 (20)	4 (31)	5 (40)	2 (20)	6 (33)	12 (78)	0	2 (8)	5 (35)	0	2 (8)	6 (40)	0	2 (8)	6 (45)
Receptors Over State Nighttime Standards (L_{10})	4 (19)	7 (27)	10 (30)	9 (63)	13 (82)	14 (83)	9 (61)	14 (90)	16 (106)	4 (28)	8 (64)	12 (110)	4 (28)	8 (64)	12 (113)	4 (28)	6 (47)	9 (74)
Receptors Approaching/ Exceeding Federal Abatement Criteria (69 dBA)	0	0	2 (4)	2 (20)	3 (26)	3 (26)	2 (20)	3 (26)	5 (28)	0	0	4 (29)	0	0	5 (29)	0	0	6 (44)
Receptors Meeting Federal Abatement Criteria (increase $\geq$5 dBA over existing conditions)	N/A	6 (14)	8 (20)	N/A	4 (15)	8 (33)	N/A	6 (33)	11 (75)	N/A	8 (76)	11 (102)	N/A	8 (72)	10 (96)	N/A	4 (36)	7 (54)

Note: Number in parentheses is the total number of residences and/or commercial properties represented by the modeled receptors that would exceed State noise standards or Federal noise abatement criteria.
N/A = not applicable.

Noise Levels on Existing TH 41

Table 6-7 presents daytime and nighttime L_{10} noise levels on existing TH 41 at Receptor R10 in downtown Chaska under existing, 2040 No-Build and 2040 Build conditions. As shown, under year 2040 No-Build conditions, daytime noise levels are anticipated to increase by 1 dBA (L_{10}) due to increases in traffic volumes. Construction of any of the Build Alternatives (year 2040) is anticipated to result in noise levels lower than existing conditions. For each of the Build Alternatives, daytime and nighttime noise levels are anticipated to be 3-4 dBA lower, respectively, than under 2040 No-Build conditions. Noise levels exceed state standards and approach or exceed federal noise standards for existing, No-Build and Build conditions.

TABLE 6-7
NOISE LEVELS (L_{10}) ON EXISTING TH 41 (RECEPTOR R10)
EXISTING, 2040 NO-BUILD AND 2040 BUILD CONDITIONS

	Existing	2040 No-Build	2040 Build					
			W-2	C-2	C-2A	E-1	E-1A	E-2
Daytime								
R10 noise level (dBA)	73	74	71	70	71	70	70	70
Difference from Existing	–	1	-3	-3	-2	-3	-3	-3
Difference from No-Build	–	–	-4	-4	-3	-4	-4	-4
Nighttime								
R10 noise level (dBA)	69	73	70	69	70	69	69	69
Difference from Existing	–	1	1	0	1	0	0	0
Difference from No-Build	–	–	-3	-4	-3	-4	-4	-4

6.2.2.2. Noise on the River

Construction of a new bridge over the Minnesota River would introduce traffic noise to portions of the river surface that currently do not experience it, and people traveling on the river could be expected to hear this traffic noise as they pass beneath the bridge. Modeling was done for one bridge alignment (Alternative W-2) to document noise impacts experienced by boaters on the river itself. Alternative W-2 crosses the Minnesota Valley Recreation Area and the Minnesota Valley Natural Wildlife Refuge (NWL). Analysis results for daytime L_{10} and L_{50} noise on the river at different distances away from the proposed bridge are shown in Table 6-8. The differences in elevation above the normal water level (NWL) are similar along all six proposed Build alignments, the higher anticipated traffic volumes along the east alternatives (Alternative E-1, E-1A, E-2) may result in slightly higher noise levels on the river immediately adjacent to these alternatives.

Receptors R13 and R14 represent locations within the Minnesota Valley Recreation Area, located adjacent to Build Alternatives C-2 and C-2A. Noise levels at these locations would be up to 71 dBA (daytime L_{10}) for Receptor R13 under Alternative C-2A year 2040 conditions and 64 dBA for both Receptors R13 and R14 under Alternative C-2 year 2040 conditions. This

noise level would be above the daytime L_{10} State noise standards for Alternative C-2A and below the daytime L_{10} State noise standard for Alternative C-2. These daytime noise levels represent a 10-20 dBA increase above existing conditions and a 10-17 dBA increase over year 2040 No-Build conditions.

TABLE 6-8
NOISE MODELING RESULTS ON THE RIVER
(ALTERNATIVE W-2) – DAYTIME

Horizontal Distance from Bridge (feet)	Modeled Build (2040)	
	L_{10}	L_{50}
50	**81**	77
100	**79**	76
200	**77**	74
400	**74**	72
800	70	69
1,600	67	65
State Standards (NAC-1)	**65**	**60**
Federal Criteria (Activity Category B)	**70**	**-**

Bold numbers are above federal noise abatement criteria for activity category B.

Receptor R16 is located within the Minnesota Valley Natural Wildlife Refuge, which is crossed by Alternative W-2. Noise levels at this location would be 68 dBA (L_{10}) and 67 dBA (L_{10}) in the daytime and nighttime, respectively, for the year 2040 Build condition. This noise level would be above the State daytime and nighttime standards and up to 20 dBA above existing conditions.

6.2.3 Mitigation

Since both State and Federal noise criteria are exceeded at a number of existing receptors for all six Build Alternatives, noise impacts would result from construction of any of the Build Alternatives. Mitigation measures to avoid and/or minimize noise impacts could include consideration of use of noise barriers or other sound attenuation methods and/or incorporation of land use controls to limit the number of noise-sensitive receptors located adjacent to or in the vicinity of the preferred Build highway corridor. Evaluation of noise barriers as mitigation to avoid and/or minimize noise impacts will be included in the Tier II EIS. Guidance for local governments regarding potential noise mitigation measures such as recommended set-back distances from the highway corridor for proposed developments will be provided for the preferred alternative as part of the Tier I FEIS process.

6.2.4 Conclusions

Over the next 35 years, increased traffic on many of the roads in the study area, particularly TH 41, US 212, and US 169 will lead to higher traffic noise for the residences adjacent to these roads by the year 2040 regardless of which alternative is selected.

Residences are currently present along each of the proposed alternatives; the densest existing residential development near a proposed Build alternative corridor is found along the Alternative E-1 corridor. Other existing concentrations of residential receptors are in downtown Chaska and the eastern portion of the City of Carver, as well as mobile home communities along US 169 in Jackson Township and in eastern Chaska. A large amount of residential development is planned to occur in Chaska and Carver adjacent to western and central Build alternatives within the study timeframe. Residential development is also pending south of US 169 east of CSAH 69 in Shakopee. The noise analysis completed for this Tier I DEIS only analyzed existing receptors; but further discussion of potential impacts to future development along the identified preferred corridor and recommended avoidance measures based on land use planning strategies will be included in the Tier I FEIS.

Existing A-weighted noise levels vary from the low 40s in isolated areas away from existing traffic noise sources, to 69 dBA along existing TH 41 in Chaska. Increases in traffic volumes by the year 2040 would result in No-Build noise levels increasing by up to 17 dBA over existing noise levels at rural locations within the project area where lower volume roadways contribute to the existing traffic noise; this increase under future No-Build conditions is a result of traffic noise from New US 212. New US 212 is currently under construction and anticipated for completion by year 2008. Construction of any of the Build Alternatives would result in an increase of L_{10} noise levels from 0 to 18 dBA over existing conditions in areas close to existing high volume roadways, and to up to 32 dBA in isolated areas currently not exposed to traffic noise.

6.3. PRIME AND STATEWIDE IMPORTANT FARMLAND

6.3.1 Regulatory Overview

The Federal Farmland Protection and Policy Act (FPPA) of 1981 and the Minnesota Agricultural Land Preservation and Conservation Policy Act (M.S. 17.80-17.84) have been enacted to ensure that impacts on agricultural lands and operations are integrated into the decision-making process, and that impacts upon agricultural land are minimized to a reasonable extent. The project area was evaluated to identify any soils classified by the Natural Resources Conservation Service (NRCS) as being prime and unique farmland or statewide and local important farmland. In addition, the study area was reviewed for land held under state and/or federal easement or protection programs.

6.3.2 Affected Environment

Numerous agricultural properties are located within the study area. They are mostly concentrated in the townships of Chaska, Jackson, and Louisville and the City of Carver. As discussed in Chapter 5, some of this land is planned for development in the near future. Figures 5-4 and 5-5 in Chapter 3 depict agricultural land use (as well as other uses) for existing and 2030 conditions. Scott County and Carver County NRCS offices of the U.S. Department of Agriculture were contacted to obtain information on the location of prime and unique and statewide farmland in each county and to identify whether any lands within the study were held under state and/ or federal easement or protection programs.

Residences are currently present along each of the proposed alternatives; the densest existing residential development near a proposed Build alternative corridor is found along the Alternative E-1 corridor. Other existing concentrations of residential receptors are in downtown Chaska and the eastern portion of the City of Carver, as well as mobile home communities along US 169 in Jackson Township and in eastern Chaska. A large amount of residential development is planned to occur in Chaska and Carver adjacent to western and central Build alternatives within the study timeframe. Residential development is also pending south of US 169 east of CSAH 69 in Shakopee. The noise analysis completed for this Tier I DEIS only analyzed existing receptors; but further discussion of potential impacts to future development along the identified preferred corridor and recommended avoidance measures based on land use planning strategies will be included in the Tier I FEIS.

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6.3.3 Environmental Consequences

No-Build Alternative

No impacts to farmland are anticipated with the No-Build alternative.

Build Alternatives

As identified in Section 6.3.1, the Scott County and Carver County NRCS offices were asked to provide assistance with the completion of the AD 1006 form (the Federal Farmland Conversion Impact Rating form used for proposed conversions of farmland to non-agricultural uses). Table 6-9 provides a summary of the information received from the NRCS (see Appendix A for complete information on the AD 1006 results). The acreages are rounded. There are differences between the number of acres in agricultural use to be converted to highway right of way reported in Chapter 5, Table 5-9, and the number of acres of farmland to be converted reported below in Table 6-9 because the Table 5-9 reflects land classification as assigned for County property assessment and Table 6-9 reflects most recent available MLCCS cropland cover data (mid-1990s). Note also that Table 5-9 provides information about number of affected agricultural land owners. Table 6-10 also provides information about number of affected agricultural landowners and parcels.

TABLE 6-9
FARMLAND CONVERSION IMPACT SUMMARY

	Acres to be Converted Directly[2]			**AD 1006 Score[1]**			**Acres to be Converted as a Percent of Farmland in County with Equal or Higher Relative Value[1][3]**	
Alternative	Scott	Carver	Total	Scott	Carver	Average	Scott	Carver
W-2	4	87	91	137	133	135	0.01	0.05
C-2	38	110	148	145	144	145	0.08	0.06
C-2A	24	77	101	102	144	123	0.05	0.04
E-1	43	7	50	156	124	140	0.09	<0.01
E-1A	43	49	92	156	124	140	0.09	0.03
E-2	27	51	78	141	126	134	0.05	0.03

(1) Data were provided by the NRCS offices of the relevant county as part of the USDA Farmland Conversion Impact Rating process.
(2) Note: Total acres to be directly converted is based on most recent MLCCS cropland cover data.
(3) Percent of farmland in county with equal or higher relative value was calculated by dividing the total acres to be converted by total acres prime and unique farmland in the county.

The results of the U.S. Department of Agriculture Farmland Conversion Impact Rating process as provided by NRCS are summarized in Table 6-9 (see Appendix A for completed forms). Based on most recent MLCCS data, Alternative C-2 would require the greatest total acreage of prime and unique statewide and local farmland; note that Table 5-9 reports that Alternative C-2 also has the greatest impact on property classified as agricultural for property tax purposes. However, much of the affected farmland in the Carver County portion C-2 corridor is

planned for development in the near future. Note that the AD 1006 score does not exceed 160 points for any of the Build Alternatives. None of the farmland impacts posed by any of the Build Alternatives represents a substantial portion of farmland in either of the study area counties, with the greatest proportional impact being 0.09 percent of all farmland in the County (Scott) with equal or higher value. Depending on timing of right of way acquisition, actual farmland impacts will likely be lower than those identified due to planned transition in land use.

TABLE 6-10
AGRICULTURAL PROPERTY IMPACTS

	Alternatives					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Agricultural Landowners	9	14	14	6	6	7
Agricultural Parcels	17	15	17	11	10	10

Note: Several parcels classified as agricultural are owned by development companies.

6.3.4 Mitigation

Acquisition of any farmland would be in conformance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the surface Transportation and Uniform Relocation Assistance Act of 1989 and 49 Code of Federal Regulations, Part 24. See Section 5.2.3 for additional information. It is important to note that the impacts to farmland that are actually likely to occur are reduced by the orderly development of land (i.e., conversion of farmland to urban uses) provided for in local comprehensive plans and processes and by the opportunity for New TH 41 corridor preservation to take place in cooperation with local planning. Through this approach, much of the current farmland affected by any of the Build Alternatives will likely not be acquired until conversion to non-agricultural use (through development) is imminent. Efforts to avoid and minimize impacts to any remaining farmland will be part of the Tier II EIS process.

6.4. CONTAMINATED PROPERTIES

The presence of potentially contaminated properties is a concern in the development of highway projects because of the potential clean up costs and public health concerns associated with encountering unexpected wastes or contaminated soil or groundwater. Potentially contaminated sites are identified early during project development to avoid or minimize impacts.

6.4.1 Affected Environment

Phase I Environmental Site Assessments (ESAs) were conducted to assess the likely presence of potential or known contaminated properties within or directly adjacent to (within 1/8 mile) the alternative corridors (scoping corridors). The Phase I ESAs were completed in February 2006 in general conformance with Article 2, Minnesota Department of Transportation (Mn/DOT) Scope of work, and procedures in the ASTM Practice E 1527-00 (*Phase I ESAs- Proposed TH 41 New River Crossing- Alternatives W-2, C-2, E-1, and E-2 (C-2 included C-2A and E-1 included E-1A), Braun Intertec Corp.).* The Phase I ESA for Alternative C-2 was updated with an

planned for development in the near future. Note that the AD 1006 score does not exceed 160 points for any of the Build Alternatives. None of the farmland impacts posed by any of the Build Alternatives represents a substantial portion of farmland in either of the study area counties, with the greatest proportional impact being 0.09 percent of all farmland in the County (Scott) with equal or higher value. Depending on timing of right of way acquisition, actual farmland impacts will likely be lower than those identified due to planned transition in land use.

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addendum in May 2006, following revision to the Alternative C-2 corridor. The executive summary of each of these ESAs and the Addendum are included in *Volume II: Technical Memoranda*. The Phase I ESAs are available from Mn/DOT.

The Phase I ESAs compiled the following information:

- A review of reasonably ascertainable and practically reviewable regulatory information published by state and federal agencies, health, and /or environmental agencies.
- A review of the history of each corridor, including aerial photographs, fire insurance maps, directories, and other readily available corridor development data.
- A reconnaissance and environmental review of each corridor, including an assessment of the corridor for indicators of hazardous materials, petroleum products, polychlorinated biphenyls (PCBs), wells, storage tanks, solid waste disposal, pits and sumps, and utilities.
- An area reconnaissance, including a brief review of adjacent property uses and any pertinent environmental information noted in the corridor vicinity.
- Interviews with local government officials or agencies having jurisdiction over hazardous waste disposal or other environmental matters in the area of the corridor.

Sites of potential concern identified by a Phase I ESA can be categorized into three risk areas: high, medium, or low potential for environmental risk. Table 6-11 provides definitions for properties considered to have a high, medium or low potential for contamination.

TABLE 6-11
POTENTIAL FOR CONTAMINATION: DEFINITIONS

High Potential for Contamination	Sites where there are one or more of the following: ▪ documented releases to the subsurface, such as a leak or spill ▪ a large amount of chemicals known or inferred to be in use at the facility ▪ stains, odors, stressed vegetation or some other indication that a release has occurred ▪ active or inactive dumps/landfills
Medium Potential for Contamination	Sites where there are one or more of the following: ▪ known or inferred medium or small quantities of chemicals used or stored ▪ underground storage tanks with no documented release ▪ indications of poor housekeeping (poor housekeeping can indicate that any leaks or spills which occur may not be handled correctly) ▪ documented releases that have the potential to migrate to the corridor even though the site is located more than 500 feet from the existing corridor right of way
Low Potential for Contamination	Sites where there are one or more of the following: ▪ known or inferred small or very small quantities of chemicals used or stored on the property ▪ indications of good housekeeping (good housekeeping indicates that any leaks or spills which occur are more likely to be handled correctly)

Source: Mn/DOT Highway Development Process Handbook. Contaminated Properties, Appendix 1.

6.4.2 Environmental Consequences

No-Build Alternative

Because the No-Build Alternative would not involve new construction, it would not have impacts on potentially contaminated sites.

Build Alternatives

The Phase I ESAs identified many known or potentially contaminated properties in the Build alternatives. Each identified property was rated as having high, medium, or low potential for contamination (as defined in Table 6-10). Figure 6-2 depicts the locations of all of the properties in the broad scoping corridors that are rated as high or medium. The Phase I ESA provides detailed information about each of these as well as for the sites that were rated low. Table 6-12 lists those sites that may be in or near the alignment corridor for any of the Build alternatives, their general location and the reason for their assessment as medium or high potential for contamination. Table 6-13 summarizes the number of medium and high risk potential sites identified by Build alternative. As shown, each of the alternatives affects priorities that have high risk of contamination, with Alternatives C-2 and C-2A affecting the most high-risk properties and Alternatives E-1, E-1A and E-2 affecting the fewest high-risk properties.

No sites in the study are appeared on the EPA's National Priorities List (NPL) of uncontrolled or abandoned hazardous waste facilities identified for priority remedial actions under the Superfund Program or the EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) listing of actual and potential hazardous waste facilities. Nor did any sites in the study area appear on the MPCA's Superfund Permanent List of Priorities (SPL).

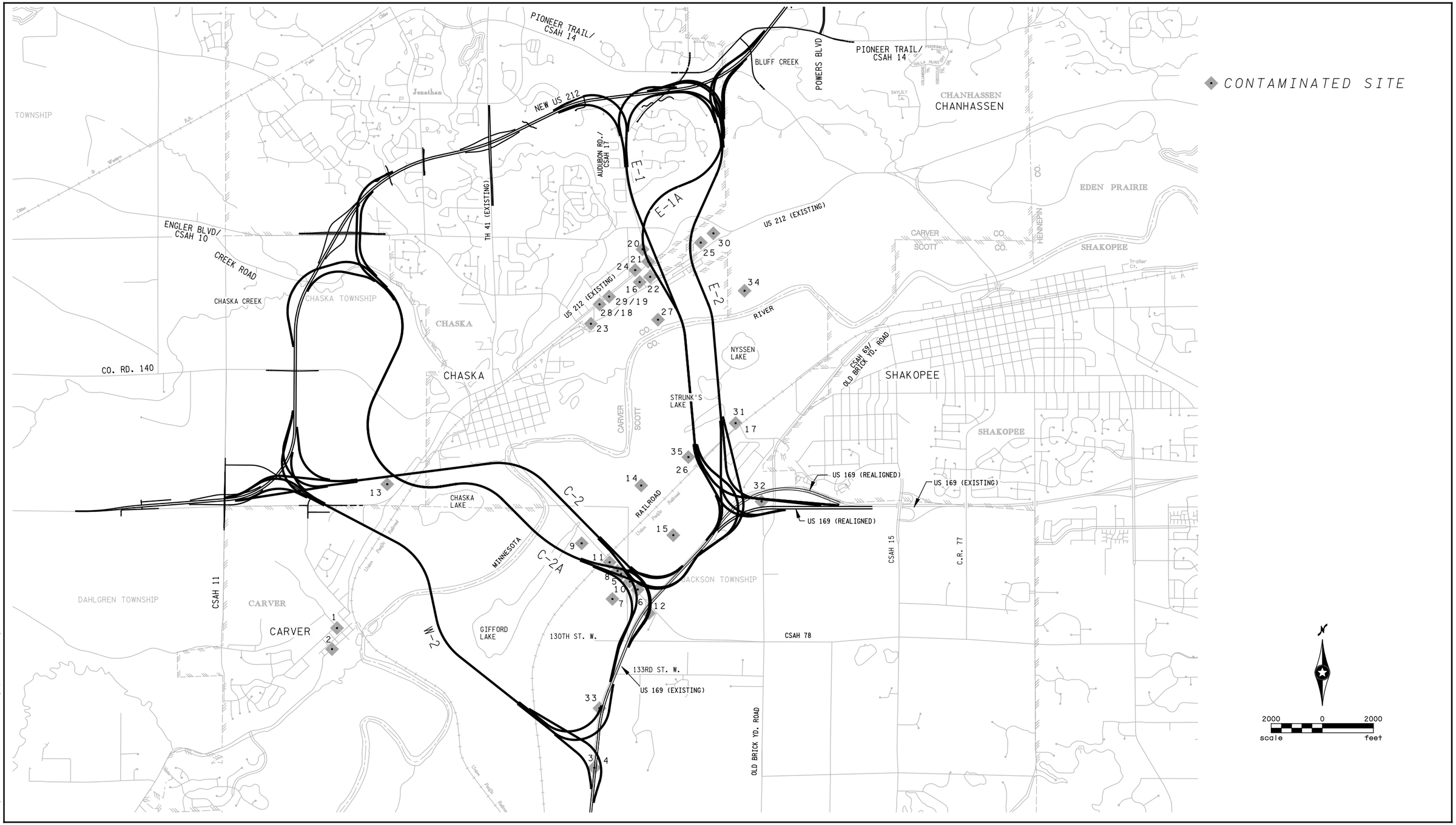
6.4.3 Mitigation

Further evaluation of potentially contaminated properties identified in the Phase I ESAs will be completed for the preferred alternative during the Tier II EIS process. Any properties within the vicinity of the preferred alternative that have the potential to be affected by construction and/or would be acquired as right of way would be investigated, if necessary, to determine the extent and magnitude of contaminated soil and/or groundwater in the areas of concern. The results of this investigation would be used to determine whether the contaminated materials can be avoided or whether the project's impacts to these properties can be minimized. If necessary, a plan would be developed for properly handling and for treating contaminated soil and/or groundwater during construction. Any soil and groundwater remediation activities would be coordinated with appropriate regulatory agencies.

TABLE 6-12
SITES WITH MEDIUM OR HIGH POTENTIAL FOR CONTAMINATION NEAR BUILD ALTERNATIVE CORRIDORS

Alternative	Potential for Contamination	# of properties	Location	Description (Figure 6-2 Reference Number)
W-2	Medium	0	NA	NA
	High	3	New TH 41/US 169 interchange area	Auto salvage yard that operated until mid-1980s; file review indicates that some remaining buried waste is likely. (3) 2 active gravel pits; potential for imported material from unknown sources and for hazardous solid waste materials (4, 33)
C-2	Medium	2	New TH 41/US 169 interchange area	Properties with underground storage tanks (USTs), but no documented releases (5,6)
	High	7	New TH 41/US 169 interchange area	Vehicle-oriented businesses (e.g. sales, gas stations, truck station), all with documented releases from leaking underground storage tanks (LUSTs) (7,8,10,11,12)
			West of New TH 41corridor, south of River, between UPRR and Gifford Lake	Farm with LUST (9)
			New TH 41 and existing US 212	Active gravel pit; potential for imported material from unknown sources and for hazardous solid waste materials (13)
C-2A	Medium	2	New TH 41/US 169 interchange area	Properties with underground storage tanks (USTs), but no documented releases (5,6)
	High	7	New TH 41/US 169 interchange area	Vehicle-oriented businesses (e.g. sales, gas stations, truck station), all with LUSTs (7,8,10,11,12)
			New TH 41/existing US 212	Active gravel pit; potential for imported material from unknown sources and for hazardous solid waste materials (13)
			West of New TH 41corridor, south of River, between UPRR and Gifford Lake	Farm with LUST (9)
E-1	Medium	5	New TH 41/US 169 interchange area	Property with above ground storage tank (AST) (32)
			New TH 41, existing US 212, Audubon Road	Vehicle-oriented businesses (e.g. gas stations, auto/truck service) with USTs, but no documented releases (16, 21, 22) Business with potential for dry-cleaning chemicals to be located previously or currently on site, but no documented releases (20)
	High	1	New TH 41 corridor/north of UPRR	Disturbed soil associated with an adjacent gravel pit; potential for imported material from unknown sources and for hazardous solid waste materials (26)
E-1A*	Medium	5	New TH 41/US 169 interchange area	Business with AST but no documented releases (32)
			New TH 41/ existing US 212/ Audubon Road	Vehicle-oriented businesses (e.g. gas stations, auto/truck service) with USTs, but no documented releases (16, 21, 22) Business with potential for dry-cleaning chemicals to be located previously or currently on site, but no documented releases (20)
	High	1	New TH 41, north of UPRR	Disturbed soil associated with an adjacent gravel pit; potential for imported material from unknown sources and for hazardous solid waste materials (26)
E-2	Medium	2	New TH 41/US 169 interchange area	Business with AST but no documented releases (32)
			New TH 41/UPRR	Farm with AST but no documented releases (31)
	High	1	New TH 41/Stoughton Road	Industrial business with groundwater contamination associated with LUST incidents. (25)

Note: South of existing US 212, E-1 and E-1A are on the same alignment.



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CONTAMINATED SITES

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Figure 6-2

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TABLE 6-13
CONTAMINATED SITES SUMMARY

Number of Sites Near Corridor		Alternatives					
		W-2	C-2	C-2A	E-1	E-1A	E-2
Contamination Potential	Medium	0	2	2	5	5	2
	High	3	7	7	1	1	1

6.5 VISUAL IMPACTS

This section examines the existing visual environment in the project area, what visual impacts would result from the implementation of a No-Build or the Build alternatives, the viewers who would be affected by visual changes, and the possible mitigation measures. The construction of a new bridge crossing the Minnesota River along with the associated roadways and on/off ramps will have a dominant and permanent visual presence in the project area. Of note, this assessment is based on existing land uses, and that future conditions along each of the alternatives are expected to change as development and other land use changes occur prior to project construction.

6.5.1 Affected Environment

6.5.1.1 Visual Elements and Landscapes

This section describes the existing visual elements in the vicinity of each alternative and how they combine to create a landscape.

Figure 6-3 illustrates the portions of the study area comprising each of the landscapes discussed below and the general topography of the area.

6.5.1.1.1 *Visual Elements*

The visual elements of the study area can be divided into two groups: natural and cultural. These groups are defined as follows:

Natural Elements

The study area's natural environment is composed of those visual elements not constructed by humans. The dominant feature of the natural environment in the study area is the Minnesota River; however, other features include the wetlands, forested areas and scenic vistas of the surrounding area. Natural visual elements provide a sense of landscape harmony. Landscape harmony refers to the balance and continuity of water, vegetation and topography with constructed elements of buildings and roadways.

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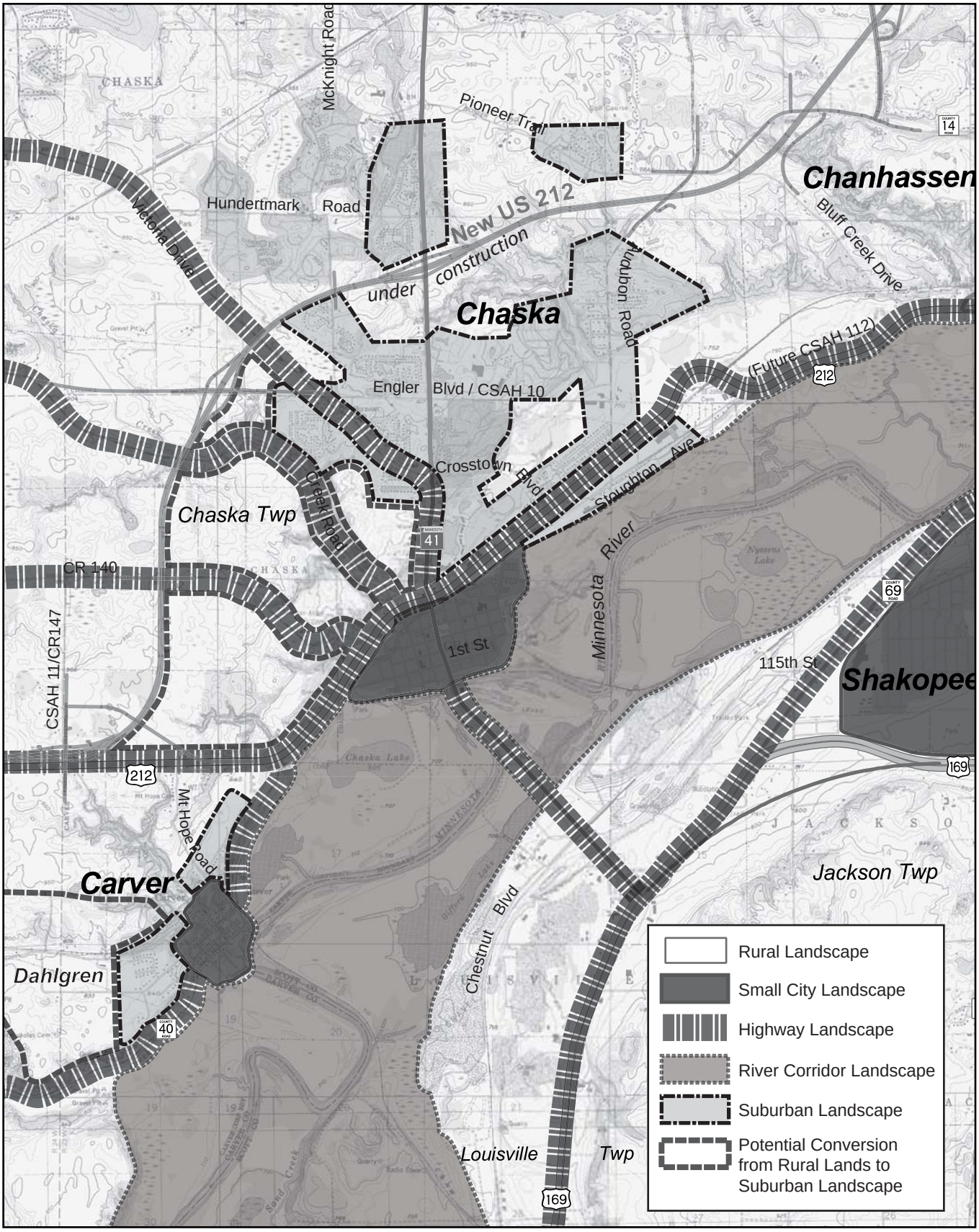


Graphics/Support/4590/EIS Figures

LANDSCAPES

Figure 6-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Cultural Elements

The cultural environment includes those visual elements that are the result of human modification of the natural landscape or construction activities such as land cleared for agriculture and construction of homes, businesses and roadways. Cultural visual elements provide a composite sense of cultural order. Cultural order can be defined by the relationship of the built environment to the natural environment and among the elements within itself; i.e., the relationship and mix of residential and commercial districts or the impact of signage or lighting.

Project visual elements are those internal to the proposed structures of the project that provide a sense of design quality. The geometrics, structures, materials, design, finishes and architectural elements of the structure need to be integrated internally among them within the project and integrated with the surrounding cultural and natural landscape attributes.

Examining and defining visual quality and addressing questions of aesthetics is a subjective exercise. The amenities inventoried below reflect culturally held assumptions about which features compose key visual and aesthetic amenities within the given landscape.

6.5.1.1.2 Landscapes

Together the natural and cultural environments combine to create five general types of landscapes found within the project area. These landscapes are similar in all six Build Alternative corridors and are described below.

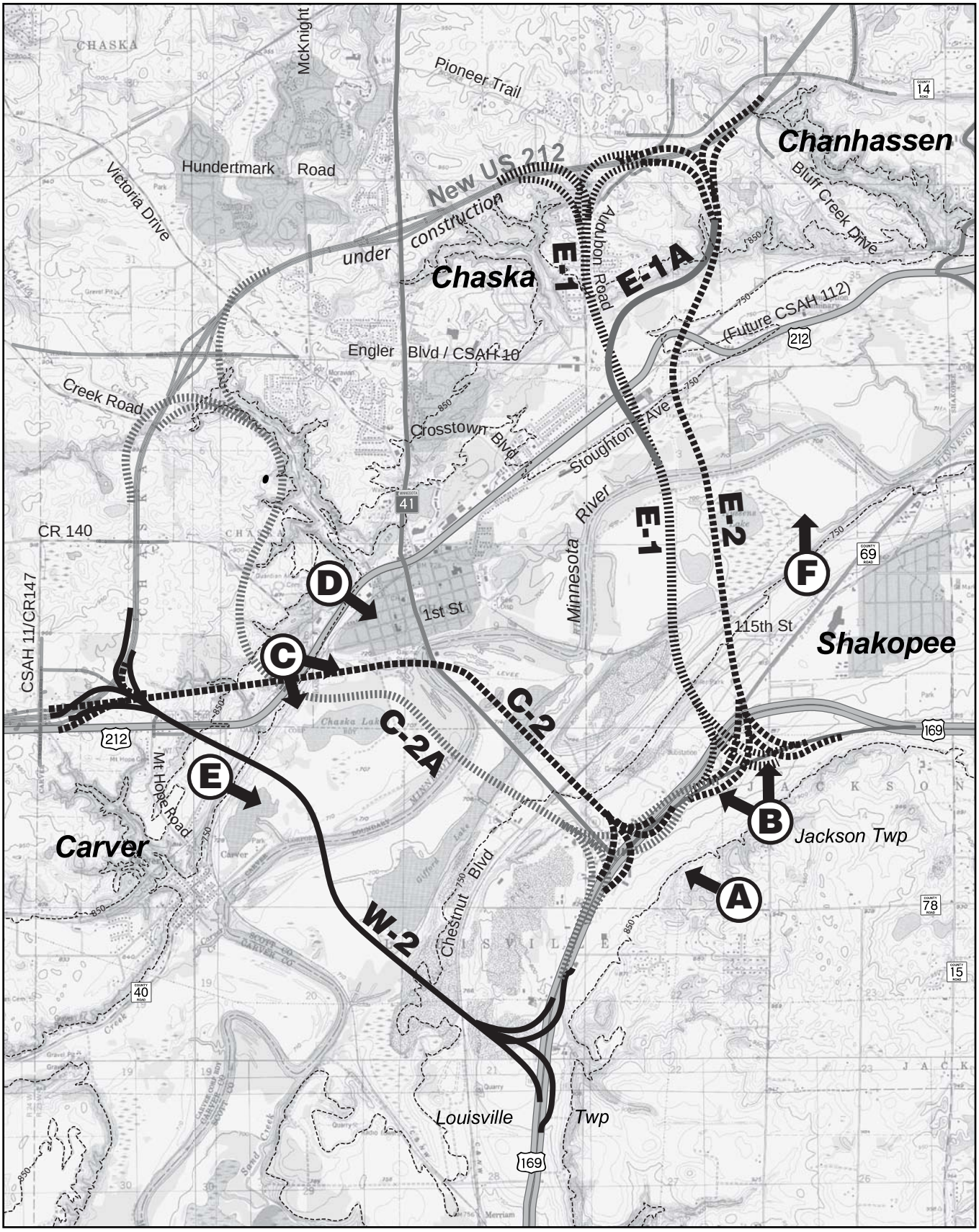
General Rural Landscape

The rural area surrounding the project areas is dominated by agricultural and rural residential cultural elements. The topography of the area is defined by the Minnesota River Valley and surrounding slopes and hillsides. The Minnesota River is at an elevation of just below 700 feet above sea level, with the surrounding lands rising to 900 feet providing views of the river valley and surrounding region. See Figure 6-4 for contour reference points. The fields are cultivated, fallow or pastureland interrupted visually by fencerows, wetlands, small to medium sized forest tracts and a combination of farmsteads and rural residential land uses.

Planned community expansion coupled with anticipated population growth for the study area serves as a prime indicator for land use change in coming years. As shown in Figure 5-4 in Chapter 5, by 2030 most of the agricultural lands in the study area will be converted to residential, commercial and other uses.

Small City Landscape

In Carver County, the study area contains the original townsites of both the cities of Chaska and Carver. These townsites are typical of the small cities that developed in the late 19th Century, exhibiting a compact arrangement of residential and commercial development and a distinct grid street pattern and commercial main streets. Both cities also maintain numerous historic buildings and prominent landmarks to create a unique and cohesive community appearance and sense of place. Views from the top of the valley from both the south and north shores of the Minnesota River include the landmark steeple of Guardian Angels Catholic Church in Chaska along with other prominent buildings.



Graphics/Support/4590/EIS Figures

KEY VIEWS - Location Map

Figure 6-4

TH 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

View A

View B

View C

Graphics/Support/4590/EIS Figures

KEY VIEWS - Photos

Figure 6-4a

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

View D

View E

View F

Graphics/Support/4590/EIS Figures

KEY VIEWS - Photos

Figure 6-4b

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Suburban Landscape

In Scott County, suburban growth from the City of Shakopee is expanding southward into Jackson Township. Residential growth occurring in the rural-agricultural areas of Jackson and Louisville townships is not as dense as that occurring in the municipalities of Carver County, however, upland areas—particularly those with desirable north-facing views of the Minnesota River valley—are experiencing low-density rural-residential development. City of Shakopee plans include preservation of a natural resources corridor along the bluff.

In Carver County, the upland areas surrounding the original townsites of Chaska and Carver, including the western portions of the City of Chanhassen are experiencing suburban-style-residential growth. Residential developments in these areas are predominantly detached, single-family homes on medium to large lots. Commercial development along the main roadway corridors leading to and from the cities of Chaska and Chanhassen is steadily increasing. In Scott County, the intersection of existing TH 41 and US 169 has an expanding commercial and residential (mobile home park) node with commercial expansion occurring along existing US 169 extending out from the City of Shakopee.

The upland portions of the landscape in Carver County are in the process of changing from dominantly rural-agricultural to suburban. On the ridgelands of 850 feet and above the cities of Carver and Chaska are experiencing modest to rapid suburban development with accompanying commercial and institutional expansion. To the north and west of the cities of Chaska and Carver, the landscape remains predominantly rural-agricultural, however, these areas are expected to develop during the planning timeframe. The City of Chanhassen borders the City of Chaska to the east and northeast and is experiencing comparable suburban and commercial growth along and extending from major roadways.

Minnesota River Valley

The dominant feature of the landscape within the study area is the Minnesota River valley. The low-lying bottomlands along the river channel are a mix of forests, open wetland and forested wetlands. The river valley within the study area contains portions of both the Minnesota Valley National Wildlife Refuge (MVNWR) and the Minnesota Valley Recreation Area (MVRA). (These resources are discussed in detail in Chapter 8.) In the eastern portion of the study area, the river valley contains portions of the Seminary Fen/Assumption Creek wetland complex, (Seminary Fen is discussed in Chapter 7). Where these lands rise up out of the river valley, the bluffs and shoreline are predominantly heavily wooded with a mix of deciduous tree species. The cultural elements within the immediate bottomland adjacent to the river include existing TH 41 bridge and roadway, the original townsites of Carver and Chaska, a small network of unimproved roadways, a public boat launch northeast of the Carver townsite and the railway bridge across the Minnesota River at the City of Carver. Additionally, an earthen-levee separates the Minnesota River from the original townsites of Chaska and Carver. All cultural landscape features in the river valley are above the 700-foot contour line. Development in the Minnesota River Valley falling between the 700-foot to 750-foot contours is found in Carver County and includes the Riverview Terrace mobile home park, original townsite of Chaska and residential properties to the northeast of the original townsite.

Highway Landscape

Existing TH 41, US 169, US 212 and County Highways 10, 11, 17, 69 and 140 currently create this landscape with the non-natural elements required of a highway facility, including paved surfaces, bridge structures and lighting. Local roadways are most dense in the urban areas and suburban fringes of Chaska, Carver, Chanhassen, Shakopee and along developing commercial nodes at highway intersections in Louisville and Jackson Townships. Roadways—both paved and unimproved—in the rural-agricultural areas generally follow the mile-section township and range grid; in some cases the roads follow local topography.

6.5.1.2 Potentially Visually-Affected Areas – Build Alternatives

This section describes in more detail the existing conditions for the potentially visually-affected areas that correspond to each of the Build alternative corridors. This narrative acknowledges that this document is a Tier I DEIS being prepared for the purpose of selecting a corridor for right of way preservation. Certain assumptions are made in order to estimate impacts and costs; however, the design detail is limited. Therefore, this visual assessment provides an inventory and discussion of the potential cultural and natural resources to be affected by each alternative in lieu of a comprehensive and detailed description of known visual impacts which would be prepared as part of the Tier II EIS process.

The addition of a bridge, roadway and interchanges to the study area will create dominant visual landscape features visible throughout the area. Under conditions for any of the Build alternatives, the bridge will pass through each of the landscape types identified and will be either partially or fully visible from roadways and developed areas that presently enjoy scenic vistas of the Minnesota River valley. The following narrative summarizes cultural and natural features common to all six alternatives, provides a list of key views that presently exist in the study area and a summary description of the present conditions in each of the six alignments.

Cultural Features

Residential, commercial, industrial and institutional activities take place throughout the study area. Each of the six proposed alternatives will be visible from existing residential neighborhoods, from existing parks, trails and open spaces and from existing commercial areas.

Natural Features

The natural elements of the study area are comprised of the Minnesota River valley and its upland areas. These two broad categories can be broken down into more detailed features such as the river channel proper, marshlands, forested wetlands, bottomland lakes and ponds, upland forest tracts, slopes and hillsides. Each of the six proposed alternatives will cross the valley and affect the views of and from the natural areas listed. For purposes of this analysis, the MVNWR and the MVSRA are considered natural features.

Key Views

The following list indicates the most prominent viewsheds available to neighbors and travelers entering the study area by road (see Figure 6-4; key views referenced below).

- Entering the study area from the east on CSAH 78 provides a panoramic view of the Minnesota River valley and surrounding countryside including the Carver County side of the river. (Key View A)

- Entering the study area from the south on CSAH 69 provides a panoramic view of the Minnesota River valley and eastern portion of the City of Shakopee with the ability to see the far-side of the river in Carver County. (Key View B)

- Entering the study area from the west on Creek Road and CR 140 provides some views of the river valley that are in some places interrupted by forest vegetation. (Key View C)

- Dramatic views of the river valley and the original townsite of Chaska are evident from Guardian Angels Cemetery and the residential neighborhood immediately to the east of it. (Key View D)

- Entering the study area from the west on CR 40 into the City of Chaska provides a view of the river valley. (Key View E)

- Driving along CSAH 69, parallel to the Minnesota River valley from north of its intersection with existing US 169 to its entry point into the City of Shakopee provides views of the river valley that are in some places interrupted by forest vegetation. (Key View F)

In addition, entering the study area on existing TH 41 from the north into the City of Chaska provides views of the city and river valley; while entering the study area on existing US 212 provides some intermittent views of the river valley and original Chaska townsite skyline, that are in some places, interrupted by forest vegetation. Finally, note that views at and above the 850-foot contour in the City of Chaska provide partial and full visibility of the river valley and western horizon.

Present Conditions in Build Alternative Corridors

Alternative W-2

The greatest concentration of cultural features along this alternative corridor is found in Carver County on the ridge above the river and along CR 40 to the northeast of the original City of Carver townsite. A cluster of suburban homes on small- to medium-sized lots in the Skyview neighborhood is situated on a dead-end city street and overlooks the river to the south and southeast. Townhomes are being developed along CR 40. Development is also planned or pending on land immediately east and north of the Skyview neighborhood.

The greatest concentration of natural features along the Alternative W-2 corridor is found in the Minnesota River valley, as the alignment bisects the southern portion of the Minnesota Valley Wildlife Refuge, near Gifford Lake crossing adjacent wetlands and the river, and continues up

the slope toward the Skyview neighborhood in Carver. Beyond the river valley and Skyview neighborhood, Alternative W-2 continues to the northwest terminating at New US 212 in an area that is presently rural-agricultural in character but that is planned for mixed residential.

Alternative W-2 would be visible from the Minnesota River levee in the City of Carver as it would cross the Minnesota River ¾ of a mile to the east of the old townsite. The new bridge would be visible from the upland areas of the City of Carver and Chaska above the 800-foot contour line (see Figure 6-4). Existing vegetation would likely screen most of the new bridge from roadways and residences below the 800-foot contour line except for where viewers are in the immediate vicinity or where there are gaps in vegetation.

In Scott County, Alternative W-2 originates on a segment of existing US 169 containing several businesses and would also pass through the Renaissance Festival event site.

Alternative C-2

Alternative C-2 would cross over the top of existing TH 41 approximately 1/8 of a mile south of where the existing bridge crosses the Minnesota River. In Scott County, the highest concentrations of cultural features in this corridor include businesses and residences near the intersection of existing TH 41 and US 169. While the amount and configuration of development in this area will likely have changed by time of construction, due to natural growth and redevelopment, and also due to expected US 169 improvements, this area will continue to be a concentration of commercial uses.

In Carver County, Alternative C-2 also passes near the original Chaska townsite, crosses the Minnesota River levee and crosses the rural-agricultural areas where it terminates at New US 212. The bridge would be able to be seen from the residences that are located along the ridge of the river valley between Chaska and Carver on existing US 212.

The highest concentration of natural features in the Alternative C-2 corridor are found in the Minnesota River valley. Alternative C-2 crosses the narrow northeastern portion of the Gifford Lake unit of the MVNWR and adjacent wetlands, the river channel, and continues up the slope in Carver County toward the residences along existing US 212. Alternative C-2 continues westward through rural-agricultural and wooded areas, terminating at New US 212.

Alternative C-2A

The largest concentration of cultural features potentially impacted by Alternative C-2A includes businesses and residences in proximity to the junction of existing TH 41 and US 169 in Scott County and, the original Chaska townsite and the residences along the north ridge of the river valley in Carver County. While it does not cross the property, Alternative C-2A is routed along the western side of Guardian Angels Cemetery; the cemetery is a high point that affords a view to the surrounding area and the river valley.

The highest concentration of natural features in the Alternative C-2A corridor includes the Minnesota Valley Wildlife Refuge, northeastern end of Gifford Lake, the river channel, the northern edge of Chaska Lake, the forests and wetlands of the river bottomlands and the top of the western side of the Chaska Creek valley.

As Alternative C-2A emerges up the slope in Carver County from the river bottom, it enters an area that is presently in farm fields but is planned for the Heights of Chaska mixed-use development. Alternative C-2A then runs northward roughly parallel to CSAH 10/Creek Road along the 900-foot contour and cuts through the wooded areas at the top of the western ridge of the Chaska Creek valley before terminating at New US 212.

Alternative E-1

The highest concentration of cultural features impacted by Alternative E-1 would include residential and commercial and commercial clusters in both Scott and Carver counties. In Scott County, these are found along existing US 169, TH 41/CSAH 78, CSAH 69 and local routes. The interchange with US 169 would create a prominent structure that would be visible from the upland areas to the southwest up to the 900-foot contour where deciduous forests along the slopes and bordering the agricultural lands form a solid visual buffer.

In Carver County, Alternative E-1 would be viewable from residential areas along the Audubon Road corridor and commercial and residential clusters along and accessed by existing US 212. The interchange with New US 212 would create a prominent structure viewable from adjacent residential, commercial and institutional properties.

Natural features potentially impacted by the Alternative E-1 corridor include the forested slopes of the river valley found in both counties, the forests and wetlands of the river bottomlands, the river channel, the western limit of the Seminary Fen buffer/protection area, and the woodland areas among the upland residential areas of Chaska.

The Alternative E-1/US 212 interchange would be located between two fully-developed suburban neighborhoods on either side of the Audubon Road corridor and just south of the Pioneer Park Freshman Center. The size of this structure would make it a prominent and highly-visible feature.

Alternative E-1A

Alternative E-1A is identical to Alternative E-1 from its origin at the existing US 169 junction to its crossing of the Minnesota River and contains the same concentration of cultural features. Alternative E-1A will be visible from residential and commercial sites in Scott County along existing US 169, CSAH 69 and local routes unobstructed by forest vegetation. The Alternative E-1A/US 169 interchange would create a prominent structure that would be visible from the upland areas to the southwest up to the 900-foot contour where deciduous forests form a solid visual buffer.

In Carver County, Alternative E-1A will impact residential areas along the southern portion of the Audubon Road corridor from its intersection with existing US 212 to Engler Boulevard, as well as commercial and residential clusters along existing US 212, and residences along the bluff east of Audubon Road and adjacent to the ravine heading north to New US 212.

Natural features to be impacted by the Alternative E-1A corridor include the forested slopes of the river valley in both counties, the forests and wetlands of the river bottomlands, the river channel, the western and northwestern limit of the Seminary Fen buffer/protection area, and the woodland areas among the upland residential areas of Chaska along the municipal boundary of Chaska and Chanhassen.

Alternative E-2

Alternative E-2 will be visible from residential and commercial clusters in Scott County along existing US 169, TH 41/78, CSAH 69 and local routes. The Alternative E-2/US 169 interchange would create a prominent structure that would be visible from the upland areas to the southwest to the 900-foot contour where deciduous forests along the slopes and bordering the agricultural lands form a solid visual buffer.

In Carver County, Alternative E-2 would be visible from residential areas along existing US 212 and between established suburban neighborhoods on both sides of the municipal boundary between Chaska and Chanhassen, including views of the Alternative E-2/New US 212 interchange.

Natural features in the viewshed of the Alternative E-2 corridor include the forested slopes of the river valley found in both counties, the forests and wetlands of the river bottomlands, the river channel, the northwestern portion of the Seminary Fen buffer/protection area, and the woodland areas among the upland residential areas along the boundary between Chaska and Chanhassen.

6.5.1.3 Affected Viewers

Viewers are those persons who experience the natural and cultural visual elements of the study area. Three groups of views have been identified for the project area: neighbors, travelers and users of the Minnesota River and Minnesota Valley Wildlife Refuge.

Neighbors and riverway users can be defined as those people who have views *of* the proposed structure, while travelers would be experiencing views *from* the proposed structure. Further subdivision of these groups provides a clearer understanding of their use and viewing of the landscape's visual elements. Neighbors are defined as individuals or groups who use or own property within view of the proposed project. These include homeowners, land owners, and retail, commercial and industrial interests within view of the proposed project. Riverway users are defined as people who utilize the river corridor, the Minnesota Valley Wildlife Refuge and surrounding areas for recreational use including outdoor wildlife viewing, boating, fishing, hunting or hiking.

Travelers are defined as those who will use the proposed roadway either frequently or infrequently. Travelers are composed of two component groups: commuter travelers and touring travelers. Commuting travelers will view the proposed structure as part of their continuous daily routine, while touring travelers will experience the landscape as part of infrequent, periodic or one-time-only travel through the viewshed.

TABLE 6-14
HEIGHT OF BRIDGE (TOP OF DECK) (IN FEET)

Alternative	At Railroad in Scott County	At Minnesota River Crossing	At CR 40 in Carver County	At Existing US 212 in Carver County	At Audubon Road in Carver County
W-2	32	58	52	--	--
C-2	40	59	--	40	--
C-2A	35	75	--	32	--
E-1					
Low Profile	45	65	--	37	50
High Profile	45	65	--	55	80
E-1A					
Low Profile	45	60	--	32	--
High Profile	45	60	--	32	--
E-2					
Low Profile	50	60	--	53	--
High Profile	50	60	--	70	--

Each of the six alternatives would change the visual setting of the study area for recreational users of the riverway and river bottom as the bridge and supporting pier structures would dominate the riverway landscape. Placement of the bridge may require modification of riverway slope banks resulting in change to the expected landscape and visual appearance of the site to riverway users.

For neighbors throughout the study area, the structures established under any of the six alternatives would be visible from distances up to two miles away. Affected neighbors include established viewers in residential areas, commercial areas, and roadways, in upland areas within the study area. Figures 6-5 through 6-10 provide cross-sections at selected locations for reference.

To travelers using the new structure, the bridge and elevated roadway would provide views of the landscape and riverway not presently available. No negative impacts are anticipated to result for travelers, since the alignments would be an extension of the existing roadway system and the panoramic views of the valley afforded by the high structure would be generally considered aesthetically pleasing.

6.5.2 Visual Consequences and Impacts

Impacts to cultural and natural features specific to each alignment are discussed below.

Alternative W-2

In Scott County, cultural features that would be visually impacted by Alternative W-2 include the commercial businesses in Louisville Township along existing US 169 and the Renaissance Festival event site (a private enterprise). With its designed height of 58 feet at the Minnesota River crossing, Alternative W-2 would potentially be visible from areas in Scott County at or above the 850-foot contour that are without vegetative screening.

In Carver County, Alternative W-2 would be visible from sites in the City of Carver including Riverside Park, the city's levee which borders the Minnesota River, the historic water tower and its surrounding grounds and the residential neighborhoods in the upland areas, notably the Skyview neighborhood which presently enjoys a wide, relatively uninterrupted southern view of the Minnesota River valley. With its designed height of 52 feet at its crossing of existing US 212, Alternative W-2 would be highly visible from the adjacent residential areas in Carver and Chaska. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

Natural features that would be visually impacted by construction of Alternative W-2 include the forests, marshes, bottomlands and slopes associated with the Minnesota River valley that fall within the W-2 corridor. Specifically, the Alternative W-2 passes to the south of Gifford Lake and would be visible from the lake as well as the river channel itself. The Alternative W-2 would also pass through, interrupt and divide numerous forest parcels in both Carver and Chaska.

Alternative C-2

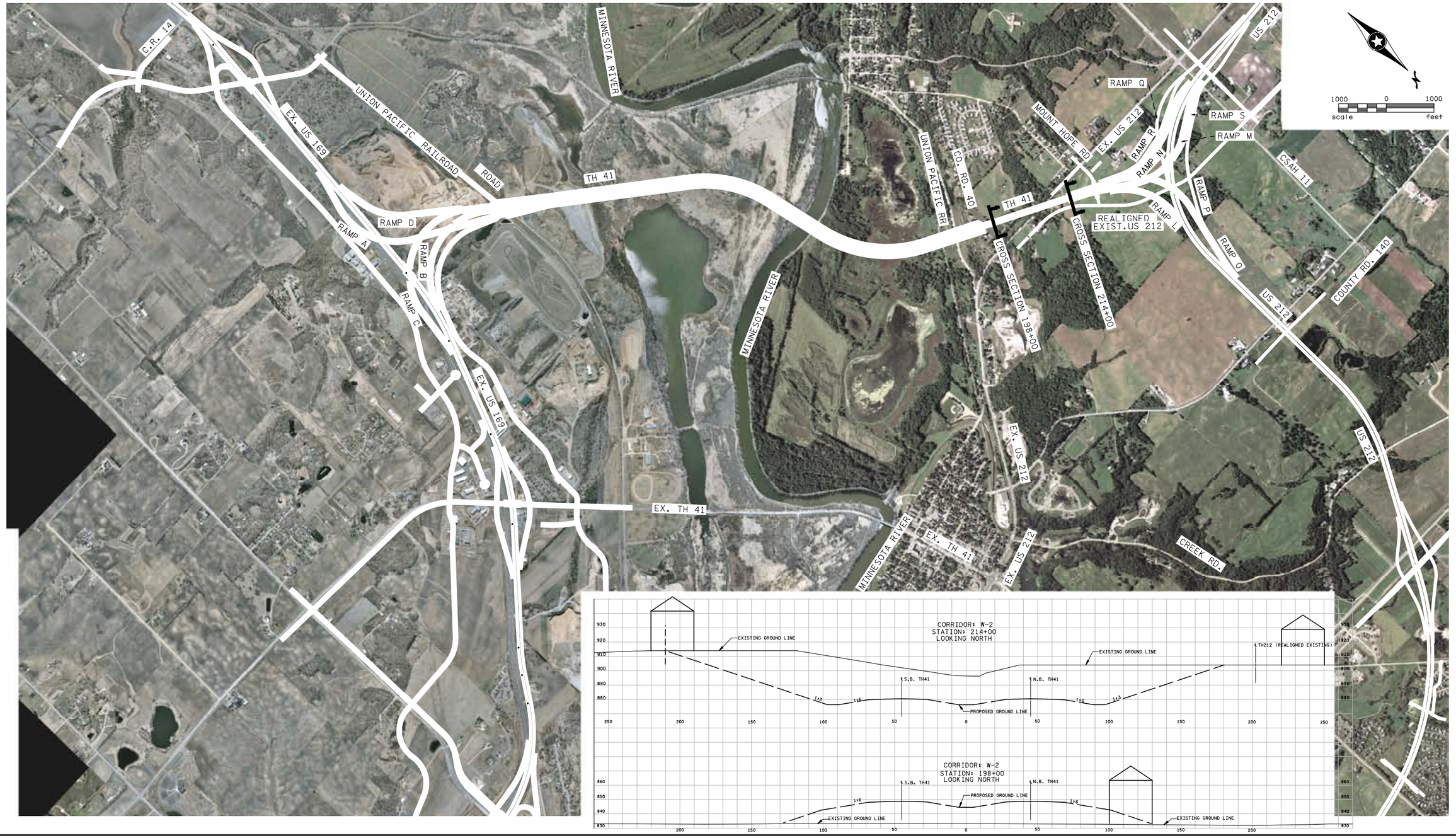
In Scott County, cultural features that would be visually impacted by Alternative C-2 include any remaining portions of the Jackson Heights Mobile Home Park that were not removed to make way for the alternative, include commercial properties along the existing US 169 corridor in proximity to the intersection with existing TH 41 and commercial and agriculture properties (including Malkerson Stables [a private equestrian enterprise]) in the river valley. Alternative C-2 would be visible from existing TH 41 (which is to remain in operation during and after the completion of the proposed project). With its designed height of 59 feet at the Minnesota River crossing, Alternative C-2 would be highly visible throughout the study area.

In Carver County, Alternative C-2 would be visible from the old townsite of Chaska (including Winkel and Hickory Park) looking to the south and southwest. The alternative would be visible from numerous upland residential neighborhoods which presently have unobstructed views of the Minnesota River valley. The alternative would also be visible from the Guardian Angels Cemetery in Chaska and its surrounding hillsides and residential neighborhoods. Alternative C-2 would be highly visible to the Heights of Chaska development. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

Natural features that would be visually impacted by the Alternative C-2 include the extreme northeastern tip of Gifford Lake, the Minnesota River channel and associated slopes, wetland and marshland areas that fall within the C-2 corridor and several forested parcels in the cities of Carver and Chaska.

Alternative C-2A

In Scott County, cultural features that would be visually impacted by Alternative C-2A include commercial properties along the existing US 169 corridor in proximity to the intersection with existing TH 41, and commercial and agricultural properties (including Malkerson Stables [a



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ALTERNATIVE W-2- SELECTED CROSS SECTIONS

Figure 6-5

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
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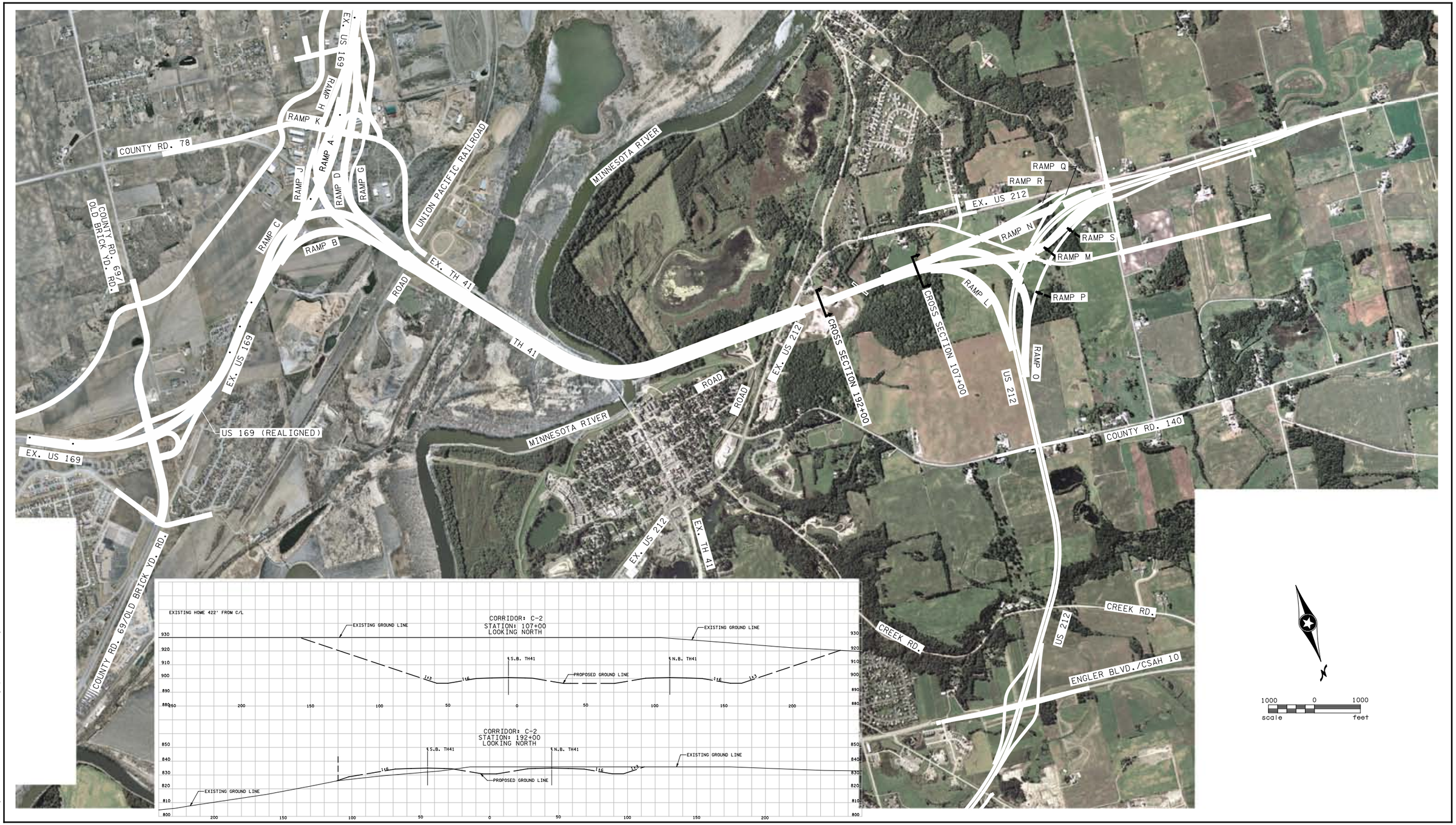

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ALTERNATIVE C-2-SELECTED CROSS SECTIONS

Figure 6-6

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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S.P. #1008-60
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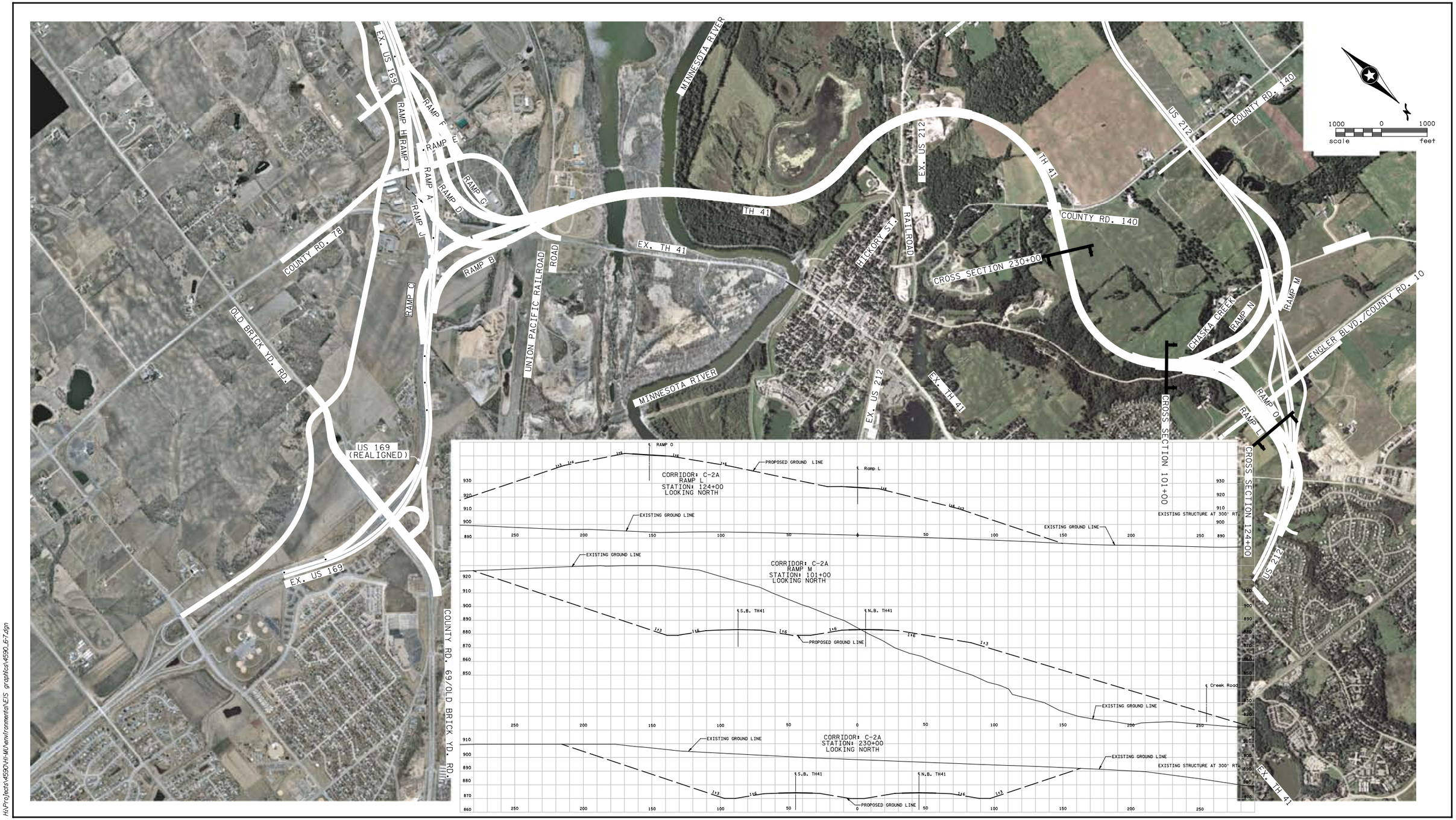

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ALTERNATIVE C-2A-SELECTED CROSS SECTIONS

Figure 6-7

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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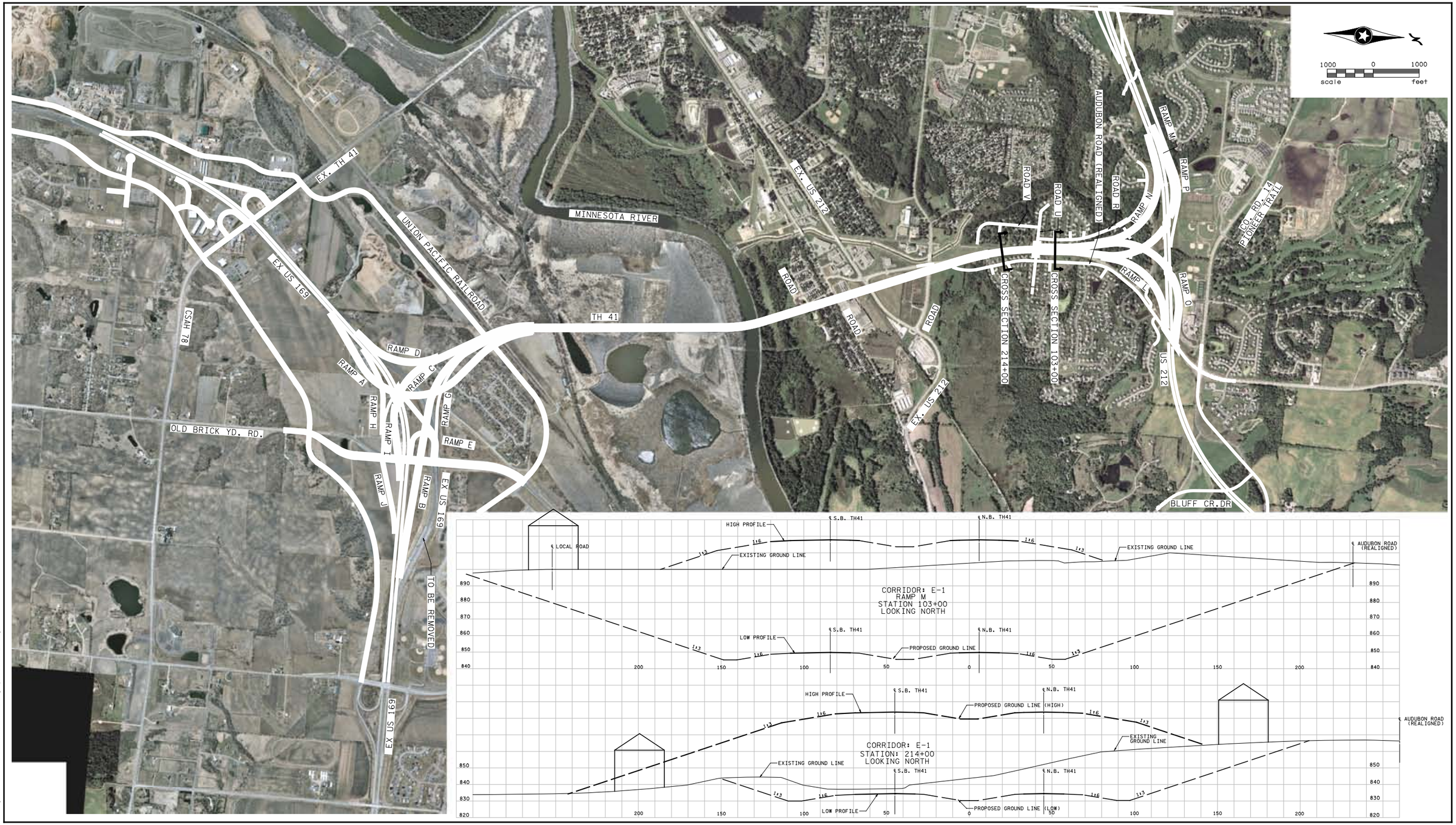

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ALTERNATIVE E-1-SELECTED CROSS SECTIONS

Figure 6-8

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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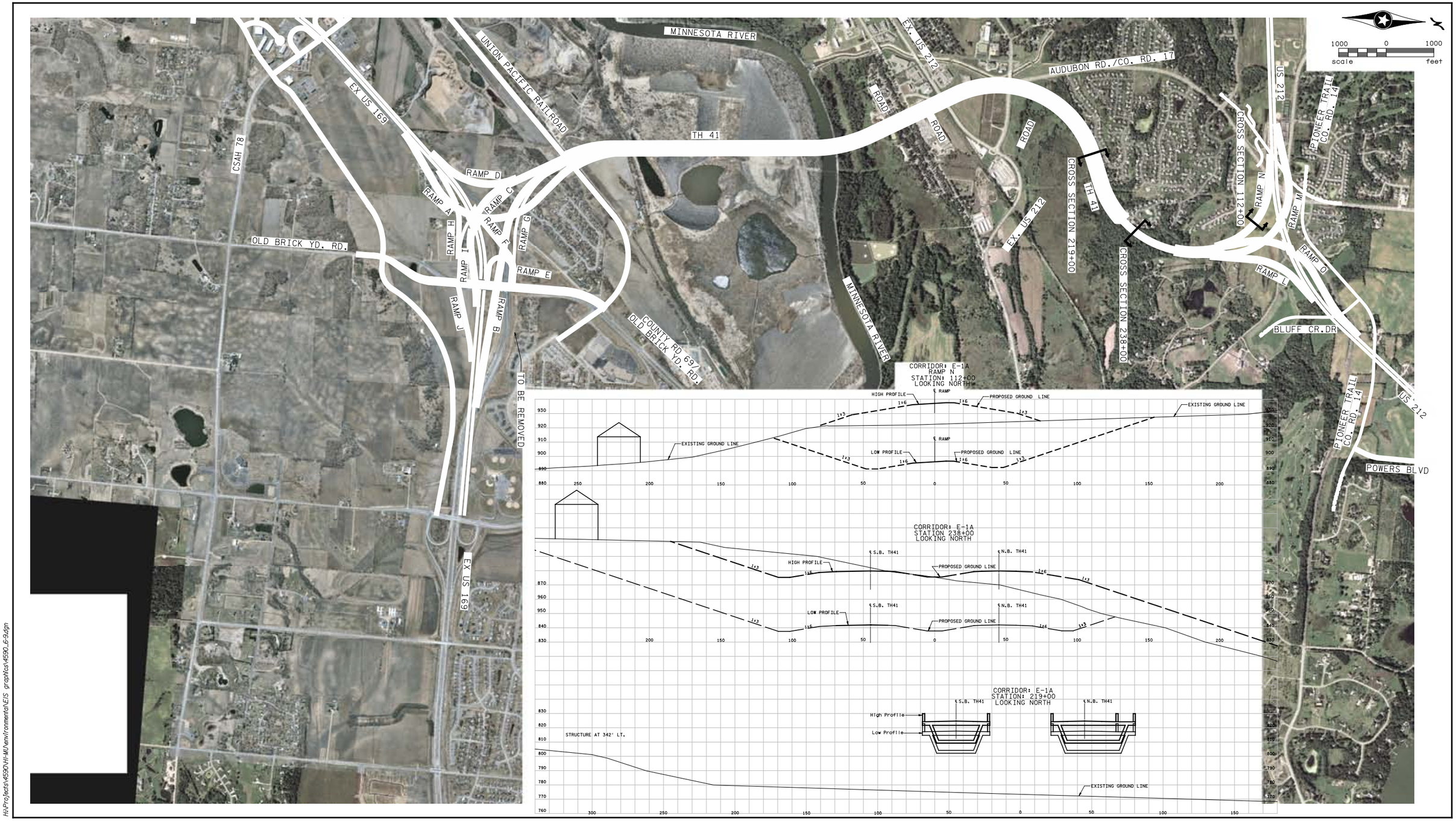

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ALTERNATIVE E-1A-SELECTED CROSS SECTIONS

Figure 6-9

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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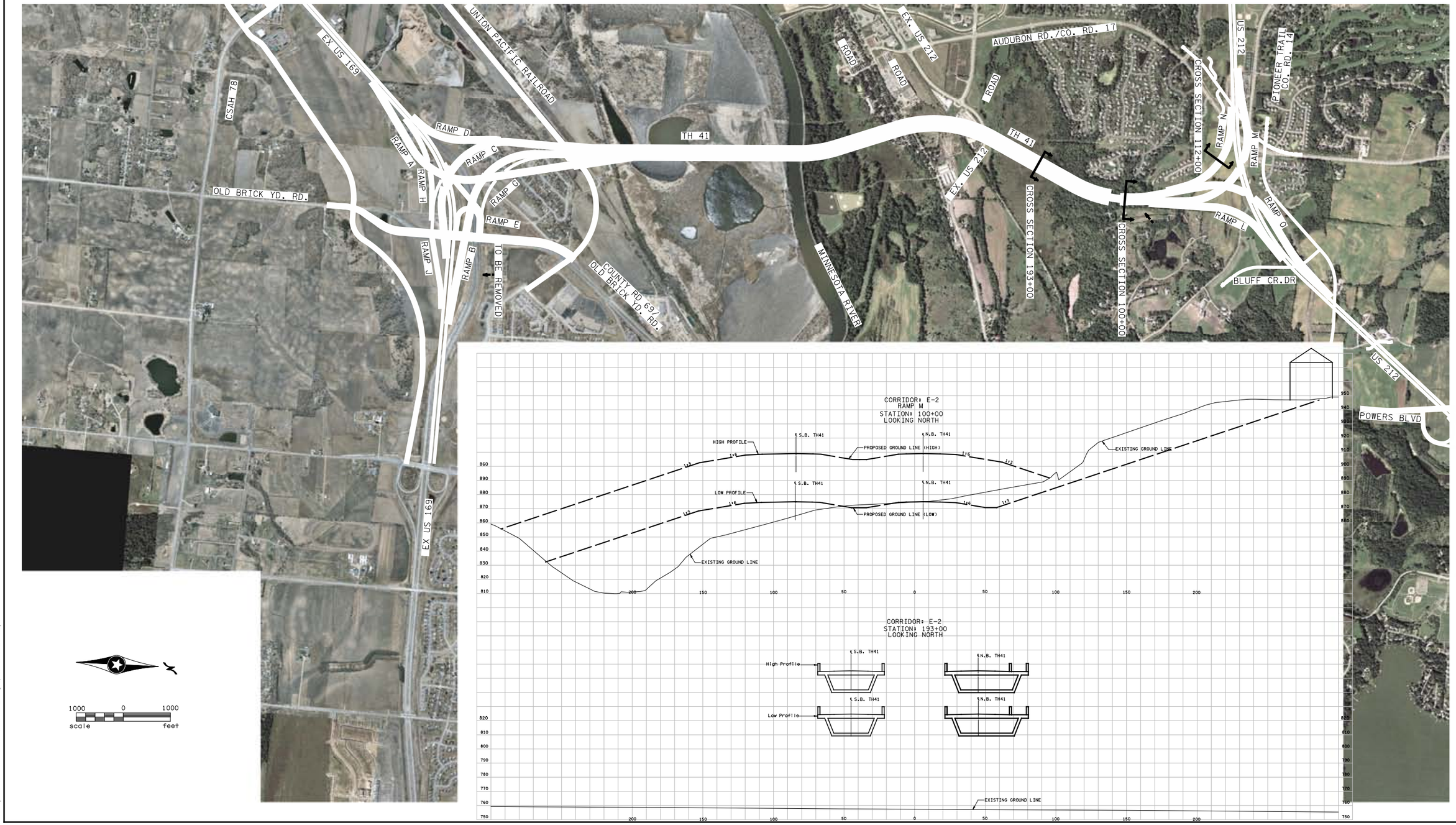

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ALTERNATIVE E-2-SELECTED CROSS SECTIONS

Figure 6-10

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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private equestrian enterprise]) in the river valley. Portions of Alternative C-2A —from its origin at existing US 169 to where it turns to the west after crossing the Minnesota River— would be visible from existing TH 41.

Of the six alternatives, C-2A is the highest, with a designed height of 75 feet at its crossing of the Minnesota River. At this height, the alternative would be the most dominant human-built structure in the study area.

In Carver County, Alternative C-2A would be visible from the old townsite of Chaska looking to the southwest, potentially being visible from both Winkel and Hickory Parks and Athletic Field looking to the west. The alternative would be visible from numerous upland residential neighborhoods which presently have unobstructed views of the Minnesota River valley. The alternative would also be visible from the Guardian Angels Cemetery in the City of Chaska and its surrounding hillsides and residential neighborhoods. Alternative C-2A would be highly visible to the Heights of Chaska development. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

Natural features that would be visually impacted by Alternative C-2A include the extreme northeastern tip of Gifford Lake, the Minnesota River channel and associated slopes, wetland and marshland areas, the northern shore of Chaska Lake, and several forested parcels in the cities of Carver and Chaska. Alternative C-2A would be visible on the western upland ridge of the CSAH 10/Creek Road route.

Alternative E-1

In Scott County, cultural features that would be visually impacted by Alternative E-1 include remaining portion of the Bonnevista mobile home park that would not be acquired for right of way. Alternative E-1 would be visible from commercial and residential properties on the western edge of the City of Shakopee and those found on CSAH 69 and existing US 169 routes in the vicinity.

In Carver County, Alternative E-1 would be visible from residential (including remaining portions of Riverview Terrace) and commercial areas along the existing US 212 corridor and the residential neighborhoods found in the upland areas of the City of Chaska. The alternative would potentially be visible from Riverview Park, Audubon Trail, Woodridge Park, Pioneer Park and the various buildings of the Chaska High School. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

Two profile options are under consideration for Alternative E-1. Both the high and low options situate the bridge at a height of 65 feet at its crossing of the Minnesota River, making it a highly visible landscape feature throughout the area. The low profile results in New TH 41 ramps at the New US 212 interchange going under New US 212. The high profile results in New TH 41 ramps at the New US 212 interchange going over New US 212. The low Alternative E-1 crosses 37 feet above existing US 212 in Chaska and 50 feet above Audubon Road. The high Alternative E-1 crosses 55 feet above existing US 212 and 80 feet above Audubon Road.

Under the high Alternative E-1 option, the structures would be higher and therefore of greater visibility to neighbors, travelers and river users than the low Alternative E-1 option. However, both of these options would result in creating a prominent and highly visible structure landscape feature to all viewer groups. Figure 6-5 presents cross-sections for the low and high alternatives relating the roadway to adjacent residential property at an illustrative location.

Natural features that would be visually impacted by Alternative E-1 include several small, unnamed lakes in the Minnesota River valley bottomlands, the western shore of Strunk Lake, the various features of the river valley (listed above), numerous undeveloped woodland parcels in the City of Chaska and the western tip of the Seminary Fen buffer protection area.

Alternative E-1A

Alternative E-1A is identical to Alternative E-1 for its length in Scott County, and as such, impacts the same cultural and natural features along that length.

In Carver County, Alternative E-1A would be visible from residential and commercial areas along the existing US 212 corridor and the residential neighborhoods found in the upland areas of the cities of Chaska and Chanhassen. The alternative would potentially be visible from Riverview Park, Pioneer Park and the buildings of the Chaska High School. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

Two profile options are under consideration for Alternative E-1A. Both the high and low options place the bridge at 60 feet above the Minnesota River and at 32 feet above existing US 212. The low profile results in New TH 41 ramps at the New US 212 interchange going under New US 212. The high profile results in New TH 41 ramps at the New US 212 interchange going over New US 212. The two profiles do not differ in height at the existing US 212. Figure 6-5 presents cross-sections for the low and high alternatives relating the roadway to adjacent residential property at an illustrative location.

Natural features that would be visually impacted by Alternative E-1A include several small, unnamed lakes in the Minnesota River valley bottomlands, Strunk Lake, the various features of the river valley (listed above), numerous undeveloped woodland parcels in the City of Chaska and the northwestern tip of the Seminary Fen buffer protection area.

Alternative E-2

In Scott County, Alternative E-2 is similar to Alternative E-1 and E-1A for its length lying parallel and to the east of these alternatives. As such Alternative E-2 impacts many of the same cultural and natural features along that length.

Cultural features that would be visually impacted by Alternative E-2 include commercial and residential properties on the western edge of the City of Shakopee and along the CSAH 69 and existing US 169 routes in the vicinity.

In Carver County, Alternative E-2 would be visible from residential and commercial areas along the existing US 212 corridor and the residential neighborhoods found in the upland areas of the cities of Chaska and Chanhassen. The alternative would be visible from Riverview Park, Pioneer Park and the buildings of the Chaska High School. Figure 6-5 presents cross-sections relating the roadway to adjacent property at an illustrative location.

As with Alternative E-1 and E-1A, Alternative E-2 has low and high profile options. Both the high and low options place the bridge at 60 feet above the Minnesota River. Under the high Alternative E-2, the crossing over existing US 212 is at 70 feet, while the low option places the existing US 212 crossing at 53 feet. Figure 6-4 presents cross-sections for the high and low profiles, which relate the road to adjacent residences at an illustrative location. While the high option for Alternative E-2 would be incrementally more visible than the low option, both structures would be prominent and visually dominating landscape features.

Natural features that would be visually impacted by Alternative E-2 include several small, unnamed lakes in the Minnesota River valley bottomlands, Strunk Lake, the various features of the river valley (listed above), numerous undeveloped woodland parcels in the City of Chaska and the northwestern portion of the Seminary Fen buffer protection area.

Summary of Environmental Consequences

Each Build Alternative would affect the visual quality for neighbors, travelers and Minnesota riverway users by adding highway, bridge and interchange structures to predominantly rural-agricultural areas (which are presently being converted to suburban areas), small town landscapes, suburban landscapes and the natural riverway landscape.

Neighbors in the river corridor landscape would experience the greatest change in visual quality as implementation of the proposed project would convert the existing landscape to a highway landscape.

Neighbors in the small city landscapes and suburban landscapes would experience substantial changes in their visual landscape. The original townsites of Chaska and Carver would be most impacted by the implementation of Alternatives W-2, C-2 and C-2A. Section 4(f) (i.e., park) resources are addressed in Chapter 8 and impacts to cultural resources are addressed in Chapter 10. Each of the six alignments would visually impact the suburban landscapes found throughout the study area.

In addition to the adverse impacts that may result for neighbors along the river corridor, users of the riverway and bottomlands may also experience adverse impacts to their river experience with the addition of river crossings, bridge piers and bluff cuts.

No adverse impacts to visual quality are anticipated to result for travelers in the study area. Travelers would either continue to experience additional structural elements consistent with the existing highway landscape or experience the benefit of rural and river corridor views not previously available. The highway facilities in the area would also be less congested, offering a better and more efficient driving experience.

6.5.3 Mitigation

This section of this DEIS lists possible measures that could be considered to mitigate for visual impacts within the different landscape types along the Build alternative corridors. Mitigation measures would be evaluated further and refined in the Tier II EIS process.

This DEIS does not address bridge type or design decisions, other than to assume a 250-foot pier spacing. The bridge type evaluation during the Tier II process will consider visual impact. For the bridge (including the underside) and for the interchanges associated with the proposed alternatives, consideration can be given to the aesthetic treatments and design elements such as structure materials, color and landscaping to minimize negative visual impacts. These design elements can also be used to minimize impacts to the rural-agricultural and small town landscapes present in the study area, as well as to riverway users.

Minimizing the clearing of natural vegetation and replacement of lost or removed vegetation with native species is another mitigation technique to retain visual quality. The vegetation present on the slopes of the Minnesota River valley provides a substantial measure of visual screening of the potential roadway alternatives. From most vantage points along the slopes of the valley, residences situated between the river level (at 700 feet above sea level) amount to the 800-foot contour would have a substantial amount of vegetative screening—with or without foliage—of any of the proposed alternatives. Sites above the 800-foot contour, however, have the potential of having the roadway alternatives present in their viewshed. In the winter and spring months, when the deciduous trees are without foliage, the density of the vegetation still provides a high level of visual screening.

The three predominant tree species found in the river valley and on the adjoining slopes which form the natural screening include Silver Maple (*Acer saccharinum*), Box Elder (*Acer negundo*) and Eastern Cottonwood (*Populus deltoides*). Mature heights of these trees range between 50 to 80 feet. Retention of slope and bottomland vegetation will ensure a level of natural screening is maintained.

The landscape of the river bottom can be differentiated from the surrounding visual environment by its dense trees and a minimal cultural impact, due to its lack of suitable development sites and legal protection from alteration. The bridge has the potential to be screened from view at sites at or below the 750-foot contour throughout the study area.

7.0 NATURAL ENVIRONMENTAL IMPACTS

This chapter describes the natural resources of the project area, set in the Minnesota River valley, and potential impacts on those resources that could result from the No-Build and Build Alternatives. Where relevant, potential measures to mitigate identified impacts are also discussed. Topics addressed in this chapter include: vegetation, wildlife and fisheries; state/federal threatened and endangered species; Seminary Fen and Assumption Creek; geology and soils; and Wild and Scenic Rivers. Wetland resources are discussed in Section 9.6 of the Water Resources chapter.

7.1 VEGETATION/INVASIVE VEGETATION, WILDLIFE AND FISHERIES

Biological surveys have been completed for much of the study area since 2000. In 2004, the U.S. Fish and Wildlife Service (USFWS) published its Comprehensive Conservation Plan and Environmental Assessment for the Minnesota Valley National Wildlife Refuge (MVNWR) and Wetland Management District. This included a survey of existing conditions for the Chaska Unit, the Refuge river unit within the study area. The Gifford Lake Wayside and Nyssen's Lake Units of the Minnesota Valley State Recreational Area (MVSRA) fall entirely within the study area. In 2002, a survey of the biological features in the MVSRA was completed by the Minnesota County Biological Survey (MCBS). In 2006, field survey was conducted to verify Minnesota Land Cover Classification System (MLCCS) and MCBS cover. The methodology and detailed findings of this study are presented in the *Seminary Fen Wetland Complex Phase 2 Study and Hydrologic and Ecological Assessment of Alternative Corridors* (Phase 2 Study) which is also discussed in Section 7.3.

7.1.1 Affected Environment

The study area is located within the transition zone between the Eastern Broadleaf Forest and the Prairie Parkland ecoregions as defined by the nationwide ecological classification system developed by the USDA Forest Service. The six proposed alternatives occur in a landscape of development, agriculture, gravel mining and fragmented natural communities. Natural plant communities within this transition zone contain a mixture of hardwood forest, oak savanna, and mesic prairie. Many of the lakes, wetlands, streams, and springs of these ecoregions exhibit diverse emergent and submergent aquatic vegetation. The discussion in this section is meant to address all native communities, some of which are wetlands. Refer to Chapter 9, Section 9.5 for analysis of specific direct impacts to wetlands.

Identification of native plant communities for the Phase 2 Study was accomplished using the MLCCS maps of Carver and Scott Counties that are available from the MnDNR. Although the alignment corridors are 300 feet wide, final highway alignments will not occupy that entire width. Therefore, the acreages of impact to native vegetation that are reported in this section represent worst case impact scenarios. In addition, if changes in land use and destruction of native vegetation independent of the proposed project occur between now and project construction, the actual impacts from the project will likely be less than stated here. However, it is not expected that the relative actual impact among alternatives would change.

Nearly the entire study area, including the six Build alternative corridors and surrounding lands, have been mapped and assigned MLCCS codes. A smaller portion of the area has been surveyed by MCBS. Areas identified as native plant communities in the MLCCS and MCBS were visited in the summer of 2006 to verify the classification and to assess the quality of the native plant community. Areas not mapped by MLCCS were visited to document the presence of native plant communities. A query of the MnDNR Natural Heritage and Non-game Research Program (NHNRP) Program database also produced records of natural features including native plant communities and protected species.

Several methods of classifying the vegetation in the alternative corridors were used in the Phase 2 Study. While related, the various approaches provide slightly different, but complementary, ways of describing vegetation and interpreting potential direct, indirect, and cumulative impacts:

- Cover type: A land cover classification based on MLCCS Level 1 categories (MnDNR 2004) that includes native plant communities, non-native plant communities, artificial surfaces and managed lands.
- Native Vegetation or Natural Communities: A classification of individual plant communities that are dominated by native species and appear to be of natural origin. Categories generally correspond to Level 4 and 5 MLCCS floristic groups (MnDNR 2004) and MnDNR Natural Heritage Program community types (MN Natural Heritage Program 1993; MnDNR 2005).
- Natural Community State Rarity Rankings: A classification of natural areas according to the relative rarity or abundance within the state or within regions of the state. Categories are defined in MN Natural Heritage Program (1993).
- Natural Community Element-Occurrence Rankings: A classification of natural areas based on ecological integrity and quality reflecting the presence or absence of human-caused disturbance such as grazing, plowing, logging, or invasive species. Categories are defined by the MnDNR Natural Heritage Program guidelines (MnDNR undated; 2004).
- Biodiversity Area: A classification of aggregated natural areas that may reflect the presence of multiple types of native plant communities, rare species, the size of plant communities, and the landscape context. Unlike the categories described above, the boundaries and classification of biodiversity areas were not verified or modified as part of this study. Biodiversity areas were defined by the MCBS. The extent of each category in the alternative corridors was determined during this study.
- Edge and Interior Habitats: A classification to reflect the effect of fragmentation on the quality of natural areas. Edge areas are generally of lower ecological quality compared to interior areas, but this difference is not captured by the element-occurrence ranking described above. Edge and interior areas were determined for two general categories of plant communities: forest (including woodland) and shrub/herbaceous communities.

This information is used in alternative comparisons below and presented in relation to impacts in Section 7.1.2.

7.1.1.1 Native Plant Communities

Native plant communities are groups of native plants that interact with each other and the surrounding environment in ways not greatly altered by humans or introduced plant or animal species. These groups form recognizable units, such as a mesic prairie or oak forest, that tend to repeat across landscape and over time. They may be classified and described by considering vegetation, successional status, topography, hydrology, landforms, substrates, soils, and natural disturbance regimes (including wildfires, normal flood cycles, and the effects of native pathogens, insects and microorganisms). While there are numerous types of native plant communities throughout the study area impacted by one or more Build alternative as discussed in Section 7.1.2, the most common native vegetation types found within the study area include floodplain forest, maple-basswood forest and mixed-emergent marsh. Notable areas of these communities, as well as a lowland hardwood forest, are discussed below. The native plant communities within each of the 300-foot Build alternative corridors are depicted in Figure 7-1.

Floodplain Forest

Floodplain forests historically dominated much of the floodplain along the Minnesota River and its tributaries. Today, segmented strips of disturbed floodplain forest remain within the study area. Floodplain forests provide an important function during flooding events, as forest cover and other woody stems increase surface roughness resulting in an increased detention of high flows. The cumulative effect is reduced peak flows downstream. In addition, floodplain forests along the Minnesota River support several forest wildlife species, including those less tolerant of fragmented forests.

Silver maple (*Acer saccharinum*), in association with peach-leaved willow (*Salix amygdaloides*), dominates the old river channels, whereas a combination of cottonwood (*Populus deltoides*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*), and black ash (*Fraxinus nigra*) dominate the better-drained ridges. Scattered stumps are present throughout much of the forest, indicating significant selective logging. Many of the larger trees are knobby-trunked trees that were undesirable for logging. The subcanopy and seedling layers contain a diverse assemblage of typical floodplain forest tree species, most of which are also represented in the canopy. A fairly diverse community of forest herbs occurs on the better-drained portions of the forest. Wood nettle (*Laportea canadensis*) and several vine species, particularly moonseed (*Menispermum canadense*), river grape (*Vitis riparia*) and bur cucumber (*Sycios angulatus*), are especially abundant. Other typical ground layer species include Ontario aster (*Aster ontarionis*), white grass (*Leersia virginica*), Virginia waterleaf (*Hydrophyllum virginianum*), clearweed (*Pilea spp.*), and mad-dog skullcap (*Scutellaria lateriflora*). Old sand bars along the river are being invaded by sand bar willow (*Salix exigua*) and cottonwoods and are succeeding to forest.

As in every other floodplain forest along the Minnesota River, these areas in the project area have experienced an extraordinary flooding regime in recent years with numerous episodes of prolonged flooding, heavy silt and sand deposition, accumulation of large debris dams, and much reworking of the ground surface by flood waters. Many of the areas of floodplain forest are regenerated from croplands or colonized from changes in the river bottoms due to flooding. USFWS staff consulted for this DEIS advise that noted old growth floodplain forest, unchanged in more than a century, is present along the eastern boundary of the Chaska Unit of the

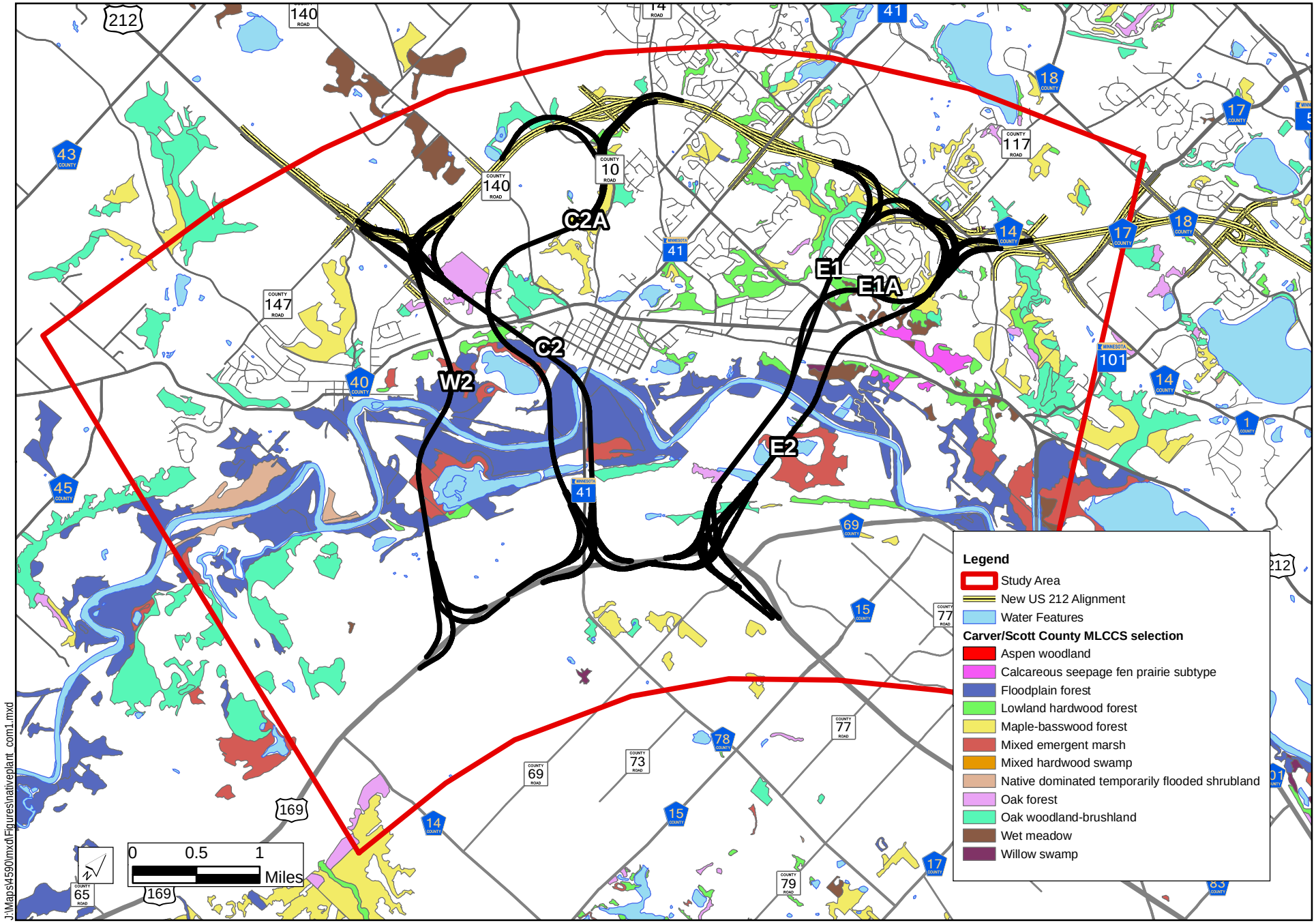
MVNWR. In addition, within the MVNWR and MVSRA, former croplands that were historical floodplain forest have been and are planned to be replanted with species typical of this community. Over the next 20 years, former cropland and turf grass communities can be expected to be in various stages of succession.

Several exotic plant species are present in some of the floodplain forests. Reed canary grass (*Phalaris arundinacea*) is prevalent in a few open areas of recent silt deposition along the edge of the Minnesota River. Common buckthorn (*Rhamnus cathartica*) is scattered throughout the better-drained part of the forests. Other exotic plants present in low numbers include moneywort (*Lysimachia nummularia*), burdock (*Arctium minus*), velvet weed (*Abutilon theophrasti*), creeping charley (*Glechoma hederacea*), and large-leaved plantain (*Plantago major*).

Maple-Basswood Forest

One of the native plant communities recognized as maintaining higher quality is maple-basswood forest found along the bluffs on the Carver County side of the Minnesota River. The value of the maple-basswood forest in the study area is enhanced by its adjacency to other forests and relatively low density of development in the immediate area. These areas are remnants of the "Big Woods", an area of dense forest characterized by maple-basswood forests. Minnesota had extensive stands of this woodland community at the time of European settlement. Today only a tiny fraction remains. Common tree species include sugar maple (*Acer saccharum*), basswood (*Tilia americana*), various oak types (*Quercus sp*.), ironwood (*Carpinus caroliniana*), elm (*Ulmus sp*.), hickory (*Carya sp*.), birch (*Betula sp*.), and aspen (*Populus sp*.). These forest communities have developed on the cool slopes of the bluffs, where rich soils formed from glacial till and loess, with the fertile leaf litter of the maple-basswood forest. Adequate soil moisture and protection from fire by wetlands, rivers, and topography have promoted development of this fire-sensitive community.

Within the study area, two areas of maple-basswood forest exist along the bluffs that would be affected by some of the alternative corridors. Between Audubon Road and Bluff Creek Drive, a 29.2-acre tract of maple-basswood forest covers the bluffs above the SFWC, and another tract is found west of Audubon Road, all near the eastern alternative corridors. A 45.8-acre tract of maple-basswood forest surrounds Chaska Creek, within the Alternative C-2A corridor. The total area of contiguous forest including portions outside of the study area that is bisected by Creek Road is 113.3 acres. Although approximately 30 acres of the forest is mapped as altered/non-native woodland, the relatively large area of contiguous forest is unusual in this part of the growing metropolitan region. These forests were observed to have an uneven-aged distribution of trees, including many that are between 20 and 36 inches diameter at breast height (dbh). Snags are present as well as coarse woody debris on the ground. No evidence of logging or grazing was noted, although the possibility that such anthropogenic disturbance has occurred cannot be discounted. Seedlings and saplings of shade tolerant species such as sugar maple, basswood, and hop hornbeam (*Ostrya virginiana*) are abundant in the forest. Invasive species such as buckthorn or garlic mustard (*Alliaria petoliata*) are either absent or present only at the margins of the forest. The herbaceous ground cover is species rich and includes langstalk sedge (*Carex pedundulata*), wild leek (*Allum tricoccum*), Virginia waterleaf, bloodroot (*Sanguinaria canadensis*), wild ginger (*Asarum canadense*), nodding trillium (*Trillium cernuum*), maidenhair fern (*Adiantum pedutam*), dutchman's breeches (*Dicentra cucullaria*), wood anemone (*Anemone quinquefolia*), and large-flower bellwort (*Uvularia grandiflora*).



NATIVE PLANT COMMUNITIES

Figure 7-1

TH 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
SP 1008-60
Minnesota Department of Transportation

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Lowland Hardwood Forest

A few areas of lowland hardwood forest of varying quality exist within the study area. An area of particular note is a 6.1-acre stand located in Carver County north of existing US 212 near where it will intersect with New US 212 (W-2 and C-2 corridors) and is determined to have a good quality native community. Canopy species include basswood, red oak (*Quercus rubra*), white oak (*Q. alba*), burr oak (*Q. macrocarpa*), American elm (*Ulmus americana*), and green ash (*Fraxinus pennsylvanica*). Most of the individual trees that dominate the canopy, in particular oaks and basswood, have dbh of 30 to 36 inches. A rich assemblage of herbaceous species are present including Virginia waterleaf, bloodroot, wild ginger, nodding trillium, dutchman's breeches, wood anemone, jack-in-the-pulpit (*Arisaema triphyllum*), marsh fern (*Thelypteris palustris*), wood nettle (*Laportea canadensis*), and red baneberry (*Actaea rubra*). This lowland forest is contiguous with a larger tract of upland oak forest that is outside of the alternative corridors. These two forest communities are surrounded by roads and agricultural land, isolating them from other native plant communities. It should also be noted that the New US 212 corridor will remove approximately two acres of this forest.

Mixed-Emergent Marsh

A large area of emergent marsh occurs on the south and east sides of Nyssen's Lake (W-T, refer to Section 9.6, Wetlands) (E-1, E-1A and E-2 corridors). River bulrush (*Scirpus fluviatilis*) uniformly dominates a broad zone around the edges of the lake where there is deep standing water during the growing season. Outside this zone, in shallower water, is a more diverse assemblage of marsh plants dominated by a mosaic of patches of rice cut grass (*Leersia oryzoides*), lake sedge (*Carex lacustris*), hard stem bulrush (*Scirpus acutus*), bur reed (*Sparganium eurycarpum*), sweet flag (*Acorus calamus*), and common reed grass (*Phragmites australis*). A high diversity of typical marsh plants occurs here, including water plantain (*Alisma subcordatum*), broad-leaved arrowhead (*Sagittaria latifolia*), wild mint (*Mentha arvensis)*, water parsnip (*Sium suave*), swamp milkweed (*Asclepias incarnata*), American water horehound (L*ycopus americanus*), and giant water dock (*Rumex orbiculatus*). This marsh is in fine condition and is devoid of exotic species, except for reed canary grass growing in a narrow belt on the outermost edges of the marsh where the ground surface was disturbed by past land use or where sediment from upslope erosion has accumulated.

In July 2005, biologists from the USFWS evaluated the overall health of Carver Marsh (W-B, refer to Section 9.6, Wetlands) using the Wetland Health Evaluation Program (WHEP). In this protocol, both the plant and macroinvertebrate communities are surveyed to provide biological indicators to the overall health of the wetland. Vegetation observed includes River bulrush, Joe-pye weed (*Eupatorium maculatum*), and Climbing false buckwheat (*Polygonum scandens*), as well as a number of floating and submergent species. Woody vegetation included typical species found in floodplain forests, cottonwood, willow, silver maple, and box elder. The vegetation scored in the "Moderate" range. Numerous macroinvertebrates were observed, and the overall score was "Excellent." The diversity found at this site helped determine the site to be of moderate to excellent quality.

As noted, wetlands are more specifically addressed in Chapter 9.

7.1.1.2 Invasive Vegetation

Native plant communities within the study area threatened with invasion by exotic species which often change a diverse native plant community to a monotypic stand of the undesirable invasive. Species that have been introduced, or moved, by human activities to a location where they do not naturally occur are termed "exotic," "nonnative," "alien," and "nonindigenous." When nonnative species cause ecological or economic problems, they are termed "invasive" or "harmful exotic species." Natural resources within the study area are threatened by invasive species such as purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), common and glossy buckthorn (*Rhamnus cathartica, Frangula alnus*), garlic mustard *(Alliaria petiolata)* and leafy spurge (*Euphorbia esula*).

Purple loosestrife invades marshes and lakeshores, replacing cattails and other wetland plants. The plant can form dense, impenetrable stands which are unsuitable as cover, food, or nesting sites for a wide range of native wetland animals including ducks, geese, rails, bitterns, muskrats, frogs, toads, and turtles. Many rare and endangered wetland plants and animals are also at risk.

Reed canary is a major threat to natural wetlands because it out competes most native species by forming large, single-species stands, with which other species cannot compete. Invasion is associated with disturbances, such as ditch building, stream channeling sedimentation and intentional planting. This Eurasian species has been planted throughout the U.S. since the 1800s for forage and erosion control and is still being planted.

Common and glossy buckthorn out-competes native plants for nutrients, light, and moisture by forming an impenetrable layer of vegetation. Buckthorn leafs out early in spring and retains leaves until late in the fall, creating dense shade and contributing to erosion by shading out other plants that grow on the forest floor. The aggressive growth habit of buckthorn degrades wildlife habitat and threatens the future of forests, wetlands, prairies, and other natural habitats. This is because it also serves as host to other pests, such as crown rust fungus and soybean aphid and lacks "natural controls" like insects or disease that would curb its growth.

Garlic mustard spreads into high quality upland woodlands and floodplain forests, not just into disturbed areas. Invaded sites undergo a decline on native herbaceous cover within 10 years, altering habitat suitability for native insects and thereby birds and mammals.

Leafy spurge is a problem for the moist and dry native prairies and savannas in the study area, quickly displacing native plants. Tolerant of a wide range of habitats, from dry to moist, and sunny to semi-shade, leafy spurge is most aggressive in dry soil conditions where there is less competition from native plants. MVNWR and MVSRA staff advises that it is creating a substantial management issue for their native prairie restoration efforts.

7.1.1.3 Fish and Wildlife Communities

The habitats described above support an array of wildlife species that are common to east central Minnesota. The floodplain and upland forest habitats provide cover for wildlife movement as most species do not prefer to move in the open fields where they are more subject to predation and easy detection by their prey. A rich diversity of birds, mammals, fish, reptiles, and amphibians inhabit lands within the study area.

Over 260 species of birds are attracted to the diverse habitats within the study area each year. Of these, over 120 are known to nest in the area. Common waterfowl of the area include Canada Goose, Mallard, Wood Duck, Blue-winged Teal, Gadwall, and American Widgeon. Waterfowl concentrate on the wetlands during spring and fall.

Marsh and water birds frequently observed in the valley and surrounding areas include Great Egret, Double-crested Cormorant, Great Blue Heron, Green Heron, and Black-crowned Night-Heron. Exposed mudflats on the river bottoms attract shorebirds including Greater and Lesser Yellowlegs and Spotted Sandpiper. Both Common Snipe and American Woodcock are commonly found on these lands as well.

Neo-tropical migrants attracted to forested habitats include thrushes, vireos and warblers. Year-round residents include Downy, Hairy, Pileated and Red-bellied Woodpeckers, Wild Turkey, and Ring-necked Pheasant. Birds of prey inhabiting the area include Red-tailed Hawk, American Kestrel, Sharp-shinned Hawk, Cooper's Hawk and Bald Eagle.

At least 50 mammals occur within the area as year-round residents and the most visible of these is the Whitetail Deer. Other mammals attracted to the river bottom aquatic habitats include mink, muskrat, raccoon and beaver. River otter, once nearly eliminated in this area, are now occasionally seen utilizing the Minnesota River wetlands and river banks. Small mammals typical of this area include short-tail shrew, white-footed mouse, thirteen-lined ground squirrel, and plains pocket gopher. Eastern chipmunks plus eastern gray, eastern fox, and red squirrels are commonly found in forested habitats. Both big and little brown bats use the area. Red fox are the most common carnivores of the area, followed by coyote and gray fox.

The Minnesota River is inhabited by an array of fish including game species such as northern pike, large mouth bass, walleye, bluegill, and crappie. Other species include shovel nose sturgeon, catfish, and red horse. Like most other fresh water systems in the United States, high populations of carp inhabit the Minnesota River. Due to regular spring flooding, many of the bottomland wetlands contain a diversity of fish that originate in the river. For some species, these wetlands offer spawning and nursery habitat.

Also within the study area, a designated trout stream exists, known as Assumption Creek, which flows through the area known as the Seminary Fen Wetland Complex discussed in Section 7.3. (See Figure 7-3.) However, information gathered for the Phase 1 Fen Study (see Section 7.3.1.) suggests that Assumption Creek would not likely support trout populations until it has passed through most of the fen because as it flows through the SFWC, it becomes intermittent and loses flow to the groundwater, and therefore would not support any fish population. However, from the east edge of the Seminary Fen down to the Minnesota River, it appears that Assumption Creek could provide a cold-water fishery sufficient to support trout.

Thirty species of reptiles and amphibians have been reported within the river valley. Many of these, such as the snapping and painted turtles, are associated with marsh and open waters while others, such as the common garter snake and the hognosed snake, occur in oak savanna and prairie. A chorus of spring peepers is common through the Minnesota River Valley during spring.

7.1.2 Environmental Consequences

Documentation of native plant communities within each alternative corridor provides a direct measure of the impact of alternative selection. Fragmentation of native plant communities was also considered and quantified in the Phase 2 Study. For this study, native plant communities within 100 feet of a boundary with a non-native community or artificial surface were defined as "edge" areas. Native plant communities that are beyond 100 feet of such a boundary were defined as "interior" areas. By this definition edge areas do not occur at the boundary of different types of natural area (e.g., oak forest and wet meadow or floodplain forest and river). Edge was only quantified if it represented a boundary between native vegetation and an artificial environment (e.g., a highway corridor).

Edges can have detrimental impacts on biodiversity due to alteration of microclimate and increased encroachment of alien or parasitic species. The most detrimental edge impact occurs when a mature forest is fragmented because of the difference between the microclimate of the intact forest and the open area. Changes in light, air and soil temperature, relative humidity, and wind alter plant succession at the edge of the mature forest. Predatory and parasitic animals can gain access to the forest habitat and may be particularly devastating for nesting success of forest birds. The distance into a forest of altered habitat (also termed depth of edge influence, DEI) varies widely among organisms and site conditions. For this analysis, the depth of edge influence (DEI) was defined to be 100 feet in which the most degraded ecological conditions might be expected.

The amount of edge and interior area within each alternative corridor were quantified as a direct measure of potential impact to natural areas differing in relative quality. If a highway corridor bisects a native plant community, the remaining vegetation *outside* the corridor exists in smaller, more isolated patches, and the amount of edge habitat increases. This indirect impact from fragmentation was measured by assessing the amount of *current* interior area that will *become* edge area outside of each alternative corridor.

In addition, observations of conditions beneath bridges elsewhere in the Minnesota River Valley were made to inform the assessment of potential environmental consequences of the proposed project.

In addition, note that some communities discussed in this section are wetlands. Complete analyses of direct fill impacts to wetlands is provided in Section 9.5.

<u>No-Build Alternative</u>

The No-Build Alternative would result in no new direct impacts to native plant communities or fish and wildlife habitat. However, increased congestion from existing TH 41 has the potential to result in impacts on water quality from runoff collecting contaminants from the increased vehicle usage, and noise pollution. The corridor-effect of the river valley can limit the dissipation of vehicle emissions, and the lower topography means that water-borne contaminants drain down into the valley.

Build Alternatives

All of the Build Alternatives would have a similar, though potentially minimal, impact upon fish habitat within the river valley. Any bridge piers placed within the river channel may create an obstacle within the fish habitat, though the fish could adjust to the placement by swimming around any pier and amphibians and reptiles, likewise, could maneuver around piers. However, current design efforts include spanning the entire river channel, with no placement of piers within the channel itself.

The Phase 2 Study also analyzed potential effects on existing vegetation from bridge construction based on visits to existing bridges over the Minnesota River. Qualitative assessments of possible ecological impacts of existing large-bridge crossings of the Minnesota River were conducted during visits in June through August, 2006. Anecdotal observations were made of the general environmental setting of each bridge and used to infer possible impacts from the proposed TH 41 river crossing. Bridges were selected that are similar to the proposed project, in that they cross a large portion of the Minnesota River floodplain and are relatively high bridges. The bridges that were visited for this purpose include TH 169 (Bloomington Ferry Bridge), I-35W, TH 77 (Cedar Avenue), I-494, TH 55 (Mendota Bridge), and I-35E. Because nearly the entire length of the Minnesota River Valley crossing will be made on bridges, rather than on filled embankments or at grades, the assessment focused on impacts under and surrounding existing elevated bridges. The following observations and conclusions are pertinent to all Build alternatives:

- Higher bridges have more vegetation, more native vegetation and less bare area beneath them. Lower bridges have more bare soil and more invasive species, especially reed canary grass, beneath them.
- Wider bridge decks have lower vegetation cover, lower-quality vegetation and more bare soil. These effects may be attenuated by spacing of bridge decks. For example, the total width of two bridge decks of the TH 77 (Cedar Avenue) bridge is 120 feet, which is similar to approximately 110 feet deck widths of I-35W and I-35E. However, the decks of TH 77 are set 45 feet apart, allowing for greater penetration of sunlight beneath the decks, and higher vegetation coverage and quality beneath.
- Forest communities are absent underneath bridges, with the exception of an early successional community of box elder trees under the Mendota Bridge, which is a relatively high bridge. There is no direct evidence of floodplain forests recovering or reestablishing under bridges.
- Herbaceous wetlands beneath the higher bridges, and in more open sites (i.e. not forested), tend to have more native vegetation, in terms of abundance and species richness than those beneath lower bridges.
- Permanently or semi-permanently flooded wetlands beneath the bridges tend to have more native vegetation, in terms of abundances and species richness than seasonally or temporarily flooded wetlands.

- White crystalline deposits were observed beneath lower bridges and in upland and seasonally-flooded wetlands. These deposits may be accumulated road salts, and while no laboratory analyses were conducted to confirm, circumstantial evidence seems to support this finding.
- Floodplain forests can grow very close to the edges of the bridges. Where mature forest vegetation is close to the bridges, the forest edge is not thickly populated by shrubs, saplings or invasive species. It appears that the shade of the bridges ameliorates the microclimate impacts of forest fragmentation to some extent.

Tables 7-1, 7-2, 7-3, 7-4, and 7-5 present impacts on vegetation. Table-7-6 summarizes these impacts. Note that these impacts are based on a 300-foot wide corridor. Actual construction limits would be more narrow. The impacts should be considered as relative comparison among alternatives. Note also that wetland impacts are addressed in Section 9.5, but that the impacts attributed to piers are more narrowly defined; i.e. not based on a 300-foot corridor.

Alternative W-2

In Scott County, Alternative W-2 crosses areas of aggregate mining before dropping down into the river valley.

In the river valley, approximately 86 bridge piers, 43 for each direction of travel, will need to be placed assuming 250 foot intervals for the current design.

In Carver County, Alternative W-2 crosses the Chaska Unit of the MVNWR, just north of Carver Marsh, where there is a relatively narrow strip of floodplain forest. The current alignment crosses between Chaska Lake and Carver Marsh in this unit of the MVNWR. Temporary impacts from construction in this area would be in the form of compaction for construction access, as well as dewatering for placement of the bridge piers. Assuming bridge piers approximately every 250 feet, 14 piers, seven for each direction of travel, would be placed through this portion of the Chaska Unit. This would result in 4.1 acres of direct wetland impact, including the native plant communities of Carver Marsh and Chaska Lake. MnDNR and USFWS staff advised that placement of the bridge between these two water bodies also creates a flight barrier for birds migrating between them.

The Alternative W-2 corridor covers 2.9 acres of the 6.1 acre lowland hardwood forest described Section 7.1.1. Alternative W-2 would also impact 25 acres of floodplain forest. Finally, 4.6 acres of oak forest at the interchange with New US 212 would be impacted. The total new forest edge created by this alternative would be approximately 15.9 acres.

Alternative C-2

In Scott County, Alternative C-2 would minimize the impacts to natural resources in the area by closely paralleling the alignment of existing TH 41 from US 169 nearly to the existing crossing.

This alternative would require a total of 80 bridge piers, 40 in each direction of travel, assuming 250 foot intervals for the current design.

TABLE 7-1
NATURAL COMMUNITY BY ALTERNATIVE CORRIDOR AND STATE RARITY RANKING

Vegetation [rarity ranking][1] (acres)	Alternative Corridor					
	W-2	C-2	C-2A	E-1	E-1A	E-2
Aspen Woodland [5]	0.0	0.9	0.0	0.0	0.0	0.0
Wetland Complex containing Calcareous Seepage Fen [1]	0.0	0.0	0.0	0.0	10.0	12.1
Floodplain Forest [3]	25.0	15.9	20.9	7.1	7.2	9.3
Lowland Hardwood Forest [4]	2.9	5.6	11.6	0.7	8.2	2.3
Maple-Basswood Forest [2]	0.0	11.2	22.4	10.4	10.7	13.4
Mixed Emergent Marsh [2]	19.3	3.6	16.2	1.0	1.0	8.7
Mixed Hardwood Swamp [3]	0.0	0.0	0.0	0.7	0.7	0.0
Native Dominated Temporarily Flooded Shrubland [4]	0.0	7.8	0.0	0.0	0.0	0.0
Oak Forest [2]	4.6	3.9	1.9	3.5	6.2	1.1
Oak Woodland-Brushland [4]	0.0	0.0	8.6	0.0	4.9	7.6
Wet Meadow [3]	0.0	3.5	0.0	6.4	0.04	4.3
Willow Swamp [4]	0.0	2.6	0.0	0.0	0.0	0.6
Total Natural Area	51.7	54.8	81.6	29.6	48.9	59.3

[1] Ranks of natural communities are defined in Minnesota Natural Heritage Program (1993). The numerical ranks range from 1 to 5 and "*…are intended to reflect the extent and condition of the natural communities in Minnesota…those ranked '1' are considered critically endangered in Minnesota, while communities ranked '5' are considered secure under present conditions.*" Where subtypes were possible, the ranking for the "Big Woods Section" subtype was used.

TABLE 7-2
NATURAL COMMUNITY STATE RARITY RANKINGS BY ALTERNATIVE CORRIDOR

State Rarity Ranking[1] (acres)	Alternative Corridor					
	W-2	C-2	C-2A	E-1	E-1A	E-2
1	0.0	0.0	0.0	0.0	10.0	12.1
2	23.8	18.7	40.5	14.8	17.9	23.2
3	25.0	19.4	20.9	14.1	8.0	13.6
4	2.9	15.9	20.2	0.7	13.1	10.4
5	0.0	0.9	0.0	0.0	0.0	0.0
Total	51.7	54.8	81.6	29.6	48.9	59.3

[1] Rarity ranks reflect the scarcity of different types of native plant communities within the state and within regions of the state. Ranks of natural communities are defined in Minnesota Natural Heritage Program (1993). The numerical ranks range from 1 to 5 and "*…are intended to reflect the extent and condition of the natural communities in Minnesota…those ranked '1' are considered critically endangered in Minnesota, while communities ranked '5' are considered secure under present conditions.*" The ranks of individual plant communities in the study area is given in Table 7.1.

TABLE 7-3
NATURAL COMMUNITY ELEMENT-OCCURRENCE RANKINGS BY ALTERNATIVE CORRIDOR

E-O Rank[1] (acres)	Alternative Corridor					
	W-2	C-2	C-2A	E-1	E-1A	E-2
A	0.0	0.0	0.0	0.0	0.0	0.0
B	33.3	36.3	44.9	2.8	8.1	8.7
BC	0.0	0.0	0.0	0.0	20.0	25.5
C	16.0	18.5	36.0	11.0	18.9	23.7
D	2.4	0.0	0.7	15.8	2.0	1.5

[1] The MnDNR Natural Heritage Program guidelines (MnDNR undated; 2004) were used for assessing and ranking the integrity of natural communities:
A –"*Highest quality natural community, no disturbances, and natural processes intact.*"
B –"*Good quality natural community. Has its natural processes intact, but shows signs of past human impacts. Low levels of exotics.*"
C –"*Moderate condition natural community with obvious past disturbance but is still clearly recognizable as a native community. Not dominated by weedy species in any layer.*"
D –"*Poor condition natural community. Includes some natives, but is dominated by non-natives and/or is widely disturbed and altered.*"

TABLE 7-4
BIODIVERSITY AREA RANKINGS BY CORRIDOR

Biodiversity Ranking[1] (acres)	Alternative Corridor					
	W-2	C-2	C-2A	E-1	E-1A	E-2
Outstanding	0.0	0.0	0.0	0.5	30.6	26.0
High	0.0	0.0	0.0	0.0	0.0	0.0
Moderate	0.0	0.0	0.0	13.6	14.0	10.8
Below Minimum Threshold	61.2	36.4	47.7	39.8	40.8	41.8
Total	62.1	36.4	47.7	53.9	85.4	78.5

[1] Biodiversity areas are defined and classified by the Minnesota County Biological Survey of the MnDNR. Categories are defined as follows: Outstanding – "*Sites containing the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most intact functional landscapes present*;" High – "*Sites containing the 'best of the rest,' such as sites with very good quality occurrences of the rarest species, high quality examples of the rarest native plant communities, and/or important functional landscapes*;" Moderate – "*Sites containing significant occurrences of rare species, and/or moderately disturbed native plant communities and landscapes that have a strong potential for recovery*;" Below minimum threshold – "*sites lacking occurrences of rare species and/or natural features that meet MCBS standards for an Outstanding, High, or Moderate rank. These include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, and open spaces.*"

TABLE 7-5
ESTIMATES OF HABITAT FRAGMENTATION IMPACTS BY ALTERNATIVE CORRIDOR

Type of Impact (acres or percent)	Alternative Corridor					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Impact to Forest Edge	9.1	18.8	31.9	16.2	14.2	11.6
Impact to Forest Interior	24.9	20.8	33.6	12.2	20.0	21.8
Percent of Forest Impact that is Interior Habitat	73.2%	52.5%	51.3%	42.9%	58.4%	65.2%
Impact to Shrub/herbaceous Edge	6.5	5.1	0.00	0.9	6.0	8.0
Impact to Shrub/herbaceous Interior	14.7	12.2	16.2	<0.1	3.5	16.6
Percent of Shrub/herbaceous Impact that is Interior Habitat	69.2%	70.3%	100.0%	1.5%	37.1%	67.5%
Creation of Forest Edge (outside corridor)	15.9	13.6	23.3	7.0	11.6	10.2
Creation of Shrub/herbaceous edge (outside corridor)	10.0	6.8	6.8	0.0	3.2	9.5

TABLE 7-6
SUMMARY OF POTENTIAL VEGETATION IMPACTS

Parameter (acres)	Alternative Corridor					
	W-2	C-2	C-2A	E-1	E-1A	E-2
Native Vegetation	51.7	54.8	81.6	29.9	48.9	59.3
High Quality Native Vegetation (BC rank or better)	33.3	36.3	44.9	2.8	28.1	34.2
State Rarity Ranking of Native Vegetation (Rank 1-3)	48.8	38.1	61.4	28.9	35.9	48.9
Outstanding Biodiversity Area	0.0	0.0	0.0	0.5	30.6	26.0
Forested Areas	33.9	38.6	61.3	22.3	33.0	26.3
Impact to Forest Interior	24.9	20.8	33.6	12.2	20.0	21.8
Creation of New Forest Edge	15.9	13.6	23.3	7.0	11.6	10.2

In Carver County, Alternative C-2 crosses a narrow band of old growth floodplain forest at the northernmost edge of the Chaska Unit of the MVNWR. In response to extensive discussions with natural resource agency staff and consultation with local stakeholders, the alignment was configured to minimize the crossing of this forest, and therefore, minimize the fragmentation of the resource. Total floodplain forest impacts amount to 15.9 acres with this alternative. Alternative C-2 would also impact 5.6 acres of lowland hardwood forest as it approaches the interchange with New US 212. Once the alignment reaches the top of the bluff in Carver County, it would impact 11.2 acres of maple-basswood forest and 3.9 acres of oak forest surrounded by agricultural fields. Total new forest edge resulting from this alternative would be approximately 13.6 acres.

Alternative C-2A

Alternative C-2A drops down from the Scott County bluffs into the river valley fairly quickly. Once in the valley Alternative C-2A assumes placement of 76 bridge piers, 38 in each direction of travel, at 250-foot intervals.

In Carver County, Alternative C-2A skirts the southern edge of a 100-plus acre old growth floodplain forest at the northernmost edge of the Chaska Unit of the MVNWR, and would result in the loss of 20.9 acres of this resource. It then winds to the west around the north end of Chaska Lake in the Chaska Unit of the MVNWR. By following along the edge of the forested area, fragmentation of the resource is minimized. However, 20 bridge piers, 10 in each direction of travel, at 250 foot intervals for the current bridge design would be required across the Chaska Unit of the MVNWR with this alternative. This results in 5.8 acres of direct wetland impacts for construction of bridge piers. Alternative C-2A takes the longest route through the river valley and the MVNWR.

Once the roadway reaches the top of the bluff, the alignment crosses mainly through agricultural fields, currently planned for development, as it heads north. Once the alignment reaches the top of the bluff in Carver County, it would impact 11.6 acres of lowland hardwood forest and 1.9 acres of oak forest as it approaches the interchange with New US 212. For the interchange with New US 212, it would impact 22.4 acres of maple-basswood forest surrounding Chaska Creek. As previously mentioned, most animal species prefer to move under forest cover, and Chaska Creek flows within forested buffer. Construction of the interchange could interrupt free movement within this corridor. This alternative would also impact 8.6 acres of native oak woodland-brushland area. Total new forest edge created by this alternative would be 23.3 acres.

Alternative E-1

Across the Minnesota Valley, Alternative E-1 would require a total of 94 bridge piers, 47 in each direction of travel, assuming 250-foot intervals for the current design.

Alternative E-1 crosses aggregate mining activities in Scott County before heading down into the river valley.

At the banks of the Minnesota River, on the Scott County and Carver County sides, the bridge would be crossing 7.1 acres of floodplain forest and 0.7 acres of lowland hardwood forest. It then crosses mainly through developed area up to the interchange with New US 212. Approximately 10.4 acres of maple-basswood forest and 3.5 acres of oak forest would be impacted as this alternative approaches the interchange with New US 212. Minimal new impacts would be expected to vegetative communities and wildlife habitat along Audubon Road. Total edge effect for this alternative is 7.0 acres.

Alternative E-1A

Across the Minnesota Valley, this alternative requires a total of 112 bridge piers, 56 in each direction of travel, assuming 250 foot intervals for the current design.

In Scott County and through the river valley, Alternative E-1A is identical to Alternative E-1. At the banks of the Minnesota River, the bridge would be crossing 7.2 acres of floodplain forest and 8.2 acres of lowland hardwood forest.

In Carver County, Alternative E-1A crosses mainly through developed area to the base of the bluff. At the base of the bluff, it turns to the east and hugs the toe of the bluff. The impacts to the toe of the bluff are discussed in Section 7.3.2, as this is the Seminary Fen Wetland Complex (SFWC). The alternative turns north following the coulee up the bluff to the interchange with New US 212. Construction of this alternative would result in the loss of 10.7 acres of the native maple-basswood forest in the coulee, eliminating the central portion of forest in this gulley, as well as creating a barrier to wildlife movement. Alternative E-1A would also impact 6.2 acres of oak forest and 4.9 acres of oak woodland-brushland with the interchange to New US 212. Total new forest edge created by this alternative would be 11.6 acres.

Alternative E-2

Across the Minnesota Valley, Alternative E-2 would require 98 bridge piers, 49 in each direction of travel.

In Scott County, Alternative E-2 crosses aggregate mining activities before heading down into the river valley. The alignment crosses floodplain agricultural fields prior to starting across the river. A native plant community of special note is located within the river bottom in Nyssen's Lake below the proposed bridge of Alternative E-2, as described in Section 7.1.1.2. A total of 4 bridge piers, 2 in each direction of travel, at 250-foot intervals are assumed across this resource, and those located within this plant community would result in a direct impact of 1.2 acres. As noted in the discussion above, the shading, debris and salt spray from a bridge structure also create the opportunity for invasive, exotic species to out-compete the native species, thereby compromising the integrity of the existing vegetative community even without direct fill impacts.

In Carver County, Alternative E-2 crosses 9.3 acres of floodplain forest along both banks of the Minnesota River. North of existing New US 212, Alternative E-2 crosses directly through the western portion of the SFWC, the impacts to which are discussed in Section 7.3.2. Alternative E-2 also impacts 2.3 acres of lowland hardwood forest. Across the SFWC, Alternative E-2 follows the coulee up the bluff to the interchange with

New US 212. Construction of this alternative would result in the loss of 13.4 acres of the native maple-basswood forest in the coulee, eliminating the central portion of forest in this gulley, as well as creating a barrier to wildlife movement. This alternative would also impact 1.1 acres of oak forest and 7.6 acres of oak woodland-brushland toward the interchange to New US 212. Total new forest edge created by this alternative would be 10.2 acres.

7.1.3 Mitigation

Refinement of the scoping alternatives into DEIS alternatives incorporated efforts to avoid impacts to crucial wildlife habitat where possible.

Where impacts to wildlife are unavoidable, the effect of the impacts would be minimized through design features such as provision of wildlife crossing areas where the roadway is at-grade. At this time, Alternatives C-2 and C-2A (wooded areas in Carver County) appear to have the most opportunity for such crossing areas. Timing construction to avoid nesting seasons, or to work during winter months when soils are frozen, are other practices to consider in minimizing impacts to wildlife. Disturbed areas would be re-vegetated with native plants and land in the right of way would be managed to have diverse grassy vegetation with trees and shrubs outside the required roadway clear zone. Restoration of unfragmented and closed-canopied forest on the Minnesota River bottoms is a mitigation opportunity that greatly increases the potential for the valley to sustain breeding populations of bald eagles, red-shouldered hawks, cerulean warblers and other forest bird species that were once much more abundant in the valley. In addition, the formerly-cultivated bottomlands within the river valley could be restored by planting cottonwoods and silver maple trees. This will help to accelerate the process of succession to forest communities. Cultivated or formerly-cultivated lands within the floodplain can be restored to floodplain forest where feasible.

Native grassland restoration can also occur as a part of the overall mitigation scheme. Former croplands can be planted to native grass mixtures consisting of big bluestem, little bluestem, switch grass, side oats grama, and Canada wild rye. A mixture of forbs could also be planted to enhance the biological diversity of many of these sites.

During construction, best management practices will be implemented to control erosion and sediment discharge to water bodies. Impacts to fisheries can also be minimized by constraining the timing of construction activities to minimize impacts to spawning fish. Bridge piers would be designed to avoid changes to river flow patterns. Permanent storm water treatment would be included in project design for any of the Build Alternatives, to avoid long-term impacts to water quality. As outlined in Section 9.6, impacts to wetlands would be mitigated through the creation of new wetlands.

7.2 STATE/FEDERAL THREATENED AND ENDANGERED SPECIES

7.2.1 Regulatory Overview

This section provides a summary of the presence of threatened and endangered species of plants, animals and aquatic species and their habitat in the study area and regulatory protection of these resources.

7.2.1.1 The Federal Endangered Species Act

The Federal Endangered Species Act was passed into law in 1973. The Act provides broad protection for species of animals and plants that are listed as threatened or endangered in the U. S. or elsewhere. Provisions include granting the Secretary of the Interior authorization to develop and implement recovery plans and the designation of critical habitat for each listed species. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions.

7.2.1.2 State Endangered Species Act of 1974

Efforts by the federal government to recognize and protect endangered species through legislation were followed in many cases by supportive legislation at the state level. In Minnesota, the state legislature passed the State Endangered Species Act of 1974 (Minnesota Statute 84.0895). The Act states that a species' range in Minnesota should be a factor in determining its status. This statement legally guarantees that a list be developed and maintained specifically for species experiencing problems in Minnesota regardless of their national status. The Minnesota Department of Natural Resources (MnDNR), in conjunction with other plant and animal experts, developed the state list of endangered, threatened and special concern species.

7.2.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 is the domestic law that implements the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. The MBTA was originally framed to put an end to commercial trade in birds and their feathers. The MBTA regulates hunting, killing, taking or commerce in any part, next, or egg of selected birds unless permitted by license or regulations. The MBTA includes a list of protected species as well as provisions for fines/penalties for illegal takes. The MBTA regulations would apply if, at the time of construction, the preferred alternative corridor is used for nesting by any species protected under this act.

7.2.1.4 Implementation

The USFWS is the agency responsible for review and consultation regarding actions that could potentially impact federally-listed threatened and endangered species. The local USFWS area manager will be consulted throughout the process. Through this coordination, the USFWS issues guidance and thresholds for determining avoidance and minimization strategies for particular species (e.g., bald eagle nest protection zones).

The Minnesota Endangered Species Statute (Minnesota Statutes, Section 84.0895) is coordinated and enforced through the MnDNR. Initial project coordination is typically accomplished through a review of the Natural Heritage Information System database. If needed, follow-up coordination with MnDNR or other agency staff is performed. If a state-listed threatened or endangered species will be destroyed during the construction of the proposed project, a Threatened and Endangered Species Taking Permit would be required from the DNR.

7.2.2 Affected Environment

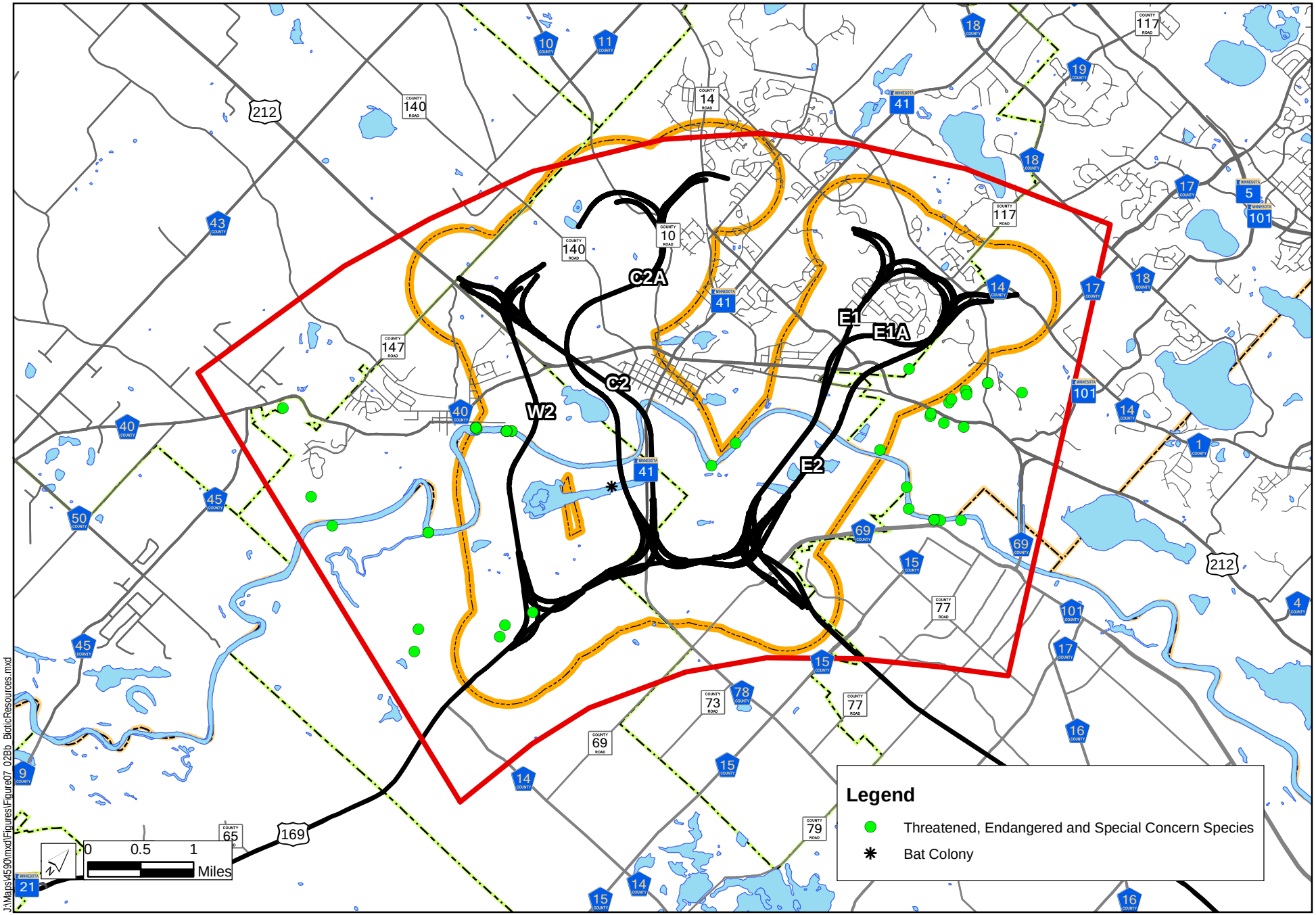
To evaluate whether rare or endangered species are present in the study area, a request was made to the MnDNR Natural Heritage Program (NHP) in June 2005. Upon review, 119 known occurrences of rare species or native plant communities were identified as existing within a one mile radius of the study area (see letter dated June 14, 2005 in Appendix A). Species that fall within a half-mile buffer of the alignments are represented in Table **7-7** and on Figure 7-2; all other species within the study area but outside the half-mile buffer are in Table 7-8 and shown on Figure 7-2. Discussion of a few of the species of note follows the tables.

In addition to review of the NHP information, the MnDNR MCBS conducted biological surveys of Scott and Carver Counties within the study area during the field seasons of 1995 through 1998, with follow-up surveys conducted in 2000. For these particular surveys, more intensive review was conducted within lands designated as part of the MVSRA, and Gifford Lake Wayside and Nyssen's Lake Units are both within the study area. Surveys of rare plants and animals for these surveys were more intensive than the scope of work generally pursued as part of a county-level survey.

The Minnesota River supports a relatively diverse population of freshwater mussel (unionid) species. Of the mussel shell specimens found in recent surveys, two (Higgins eye and Winged mapleleaf) are on the Federal list of Endangered and Threatened Species, and several others are on the Minnesota state list of Endangered and Threatened species. Mussels are sedentary filter feeders that depend on a stable substrate for burrowing, and good water quality and flow for feeding, respiration, and reproduction. They also require an intermediate host (usually a fish species) to complete their life cycle. Changes in substrate characteristics, water quality, flow patterns, or host fish habitat can be detrimental to unionid species. None of the rare shells found in 1990 and 1999 collections were from live specimens. The extremely rare mussels require harder, more stable river bottom substrates and relatively good water quality, and appear to be eliminated from the Minnesota River due to heavy siltation and water pollution. Some of the shells found could be as old as 100 years.

The study area includes habitat for the Bald Eagle (*Haliaeetus leucocephalus*), which, during the breeding season, is typically in forests near rivers where large trees are available for nesting. According to the MnDNR, studies show that Bald Eagles are vulnerable to human intrusion, though this depends upon the particular eagle, as some have become accustomed to human activity near their nests. Wintering areas are also critical for use by Bald Eagles. In general, within certain defined areas from nesting or roosting/feeding sites, eagles need to be protected from human disturbance, physical alterations of their habitat (including clearing of vegetation), environmental contaminants, and loss of food sources.

Shovelnosed sturgeon has recently been of some concern because of apparent population reductions through much of its range in Minnesota, including the Minnesota River. While it apparently had once been relatively abundant, recent MnDNR surveys did not report it and other authorities believe the sturgeon to be scarce or absent altogether. The typical habitat of the shovelnosed sturgeon is the deep main channels of the free-flowing river. Loss of habitat and numbers of sturgeon place this species in the Special Concern category.



THREATENED, ENDANGERED AND SPECIAL CONCERN SPECIES

Figure 7-2

TH 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
SP 1008-60
Minnesota Department of Transportation

TABLE 7-7
THREATENED, ENDANGERED, SPECIAL CONCERN SPECIES WITHIN ½ MILE BUFFER OF BUILD ALTERNATIVES

Species (*Scientific name*)	Federal Status	State Status	Number of Observations	Last Observation
Animals				
Higgins Eye – mussel (*Lampsilis higginsi*)	Endangered	Endangered	1 (dead)	08/16/89
Fluted-shell – mussel (*Lasmigona costata*)		Special Concern	1 (dead)	09/29/99
Monkey Face – mussel (*Quadrula metanevra*)		Threatened	3 (dead)	09/29/99
Ebony shell – mussel (*Fusconaia ebena*)		Endangered	2 (dead)	09/29/99
Mucket – mussel (*Actinonaias ligamentina*)		Threatened	2 (dead)	09/29/99
Wartyback – mussel (*Quadrula modulata*)		Endangered	1 (dead)	09/20/00
Pistolgrip – mussel (*Tritogonia verrucosa*)		Threatened	3 (dead)	08/17/89
Black Sandshell – mussel (*Ligumia recta*)		Special Concern	1 (dead)	08/17/89
Yellow Sandshell – mussel (*Lampsilis teres*)		Endangered	1 (dead)	09/29/99
Rock Pocketbook – mussel (*Arcidens confragosus*)		Endangered	2 (dead)	09/29/99
Winged Mapleleaf – mussel (*Quadrula fragosa*)	Endangered	Endangered	1 (dead)	**9/29/99**
Hickorynut – mussel (*Obovaria olivaria*)		Special Concern	1 (dead)	09/29/99
Elktoe – mussel (*Alasmidonta marginata*)		Threatened	1 (dead)	08/16/89
Round Pigtoe – mussel (*Pleurobema coccineum*)		Threatened	1 (dead)	08/16/89
Bald Eagle – bird (*Haliaeetus leucocephalus*)	Threatened	Special Concern	2	2003
Shovelnose Sturgeon – fish (*Scaphirhynchus platorynchus*)		Special Concern	3	09/30/99
Regal Fritillary – butterfly (*Speyeria idalia*)		Special Concern	1	07/06/75
Plants				
Kitten-tails (*Besseya bullii*)		Threatened	1	05/05/79
Hill's Thistle (*Cirsium hillii*)		Special Concern	1	07/12/79
Sterile Sedge (*Carex sterilis*)		Threatened	1	06/15/95

TABLE 7-8
THREATENED, ENDANGERED, SPECIAL CONCERN SPECIES WITHIN STUDY AREA, BUT OUTSIDE ½ MILE BUFFER OF BUILD ALTERNATIVES

Species (*Scientific name*)	Federal Status	State Status	Number of Observations	Last Observation
Animals				
Mucket – mussel		Threatened	2	09/29/99
Wartyback – mussel		Endangered	1	09/20/00
Yellow Sandshell – mussel		Endangered	2	**9/29/99**
Shovelnose Sturgeon – fish		Special Concern	2	08/14/98
Round Pigtoe – mussel		Threatened	1	**9/29/99**
Bald Eagle – bird	Threatened	Special Concern	2	2003
Rock Pocketbook – mussel		Endangered	2	**9/29/99**
American Brook Lamprey – fish (*Lampetra appendix*)		No legal status, but special note of first siting since 1940's	1	10/20/00
Plants				
Small White Lady's-slipper (*Cypripedium candidum*)		Special Concern	1	06/15/95
Kitten-tails		Threatened	3	06/23/01
Sterile Sedge		Threatened	3	07/06/95
American Ginseng (*Panax quinquefolius*)		Special Concern	1	06/06/95
Marsh Arrow-grass (*Triglochin palustris*)		Non	1	08/21/95
Hair-like Beak-rush (*Rhynchospora capillacea*)		Threatened	1	08/20/90
Whorled Nut-rush (*Scleria verticillata*)		Threatened	1	08/28/90
Valerian (*Valeriana edulis var. ciliata*)		Threatened	1	09/11/92
Twig-rush (*Cladium mariscoides*)		Special Concern	1	09/11/92
Beaked Spike-rush (*Eleocharis rostellata*)		Threatened	1	09/11/92

Many of the threatened/endangered plant species are located in the wetlands of the SFWC and are discussed in detail in the Phase 1 Fen Study and Phase 2 Study (Section 7.3.1). These species are unique in their ability to tolerate calcareous groundwater flows and low nutrient conditions found in the calcareous environment.

7.2.3 Environmental Consequences

No-Build Alternative

No federal or state listed species have been observed in the vicinity of the existing bridge. Therefore, no adverse impacts to rare species are anticipated from this alternative.

Build Alternatives

Alternative W-2

At the south end of Alternative W-2, near the interchange with US 169, plant communities with Kitten Tails (state threatened) and Hills Thistle (state-listed special concern) were reported as last observed in 1979. In addition, the Regal Fritillary butterfly was observed in this location in 1975. This alternative would result in the interchange construction impacting the immediate area of these observations. However, based on 2003 aerial photos, habitat of Kitten Tails, Hills Thistle, and the Regal Fritillary butterfly has likely been destroyed. Should this alternative be selected, a botanical survey will be required to determine if these species are still present in this location.

Freshwater mussel concentrations, including the monkey face mussel, were observed in the Minnesota River in the area of the W-2 bridge crossing. While all of the latest observations of the threatened or endangered species have involved dead specimens, a mussel study should be conducted for the Tier II FEIS to establish the existing species of mussels in the concentration. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

Alternative C-2

No federal or state listed species have been identified within a half mile of the Alternative C-2 corridor. However, a mussel study should be conducted for the Tier II FEIS to establish the existence of any mussel concentration in the area. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

Alternative C-2A

No federal or state listed species have been identified within a half mile of the Alternative C-2A corridor, though a bat colony has been reported in this area. However, a mussel study should be conducted for the Tier II FEIS to establish the existence of any mussel concentration in the area. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

Alternative E-1

No federal or state listed species have been identified within a half mile of the Alternative E-1 corridor. However, a mussel study should be conducted for the Tier II FEIS to establish the existence of any mussel concentration in the area. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

Alternative E-1A

Threatened and endangered species, including sterile sedge and other plant species, are found at the north end of Alternative E-1A. The alignment is located directly within native plant communities and sites of biodiversity significance of the Seminary Fen, where many of these threatened and endangered species have been observed. Refer to Section 7.3 for more information about these impacts. In addition, a mussel study should be conducted for the Tier II FEIS to establish the existence of any mussel concentration in the area. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

Alternative E-2

Threatened and endangered species, including sterile sedge and other plant species, are found at the north end of Alternative E-2. The alignment is located directly within native plant communities and sites of biodiversity significance of the Seminary Fen, where many of these threatened and endangered species have been observed. Refer to Section 7.3 for more information about these impacts. In addition, a mussel study should be conducted for the Tier II FEIS to establish the existence of any mussel concentration in the area. Any bridge piers placed directly within the river channel would have an impact upon a mussel concentration.

7.2.4 Mitigation

Due to the sensitive nature of the area and the presence of threatened and endangered species, continuing involvement with the MnDNR and USFWS will take place. Mitigation measures to avoid, minimize, or alleviate impacts to threatened/endangered or other protected species and sites of biodiversity significance will be defined during the Tier II process after the preferred alternative is selected. Additional field surveys may be needed to confirm the presence of rare and protected species, such as mussels and Kitten Tails, in the preferred alternative corridor or at the time that project final design is implemented. Avoidance measures such as minor alignment shifts will be considered during final design to minimize impacts on identified species. Other mitigation measures may need to include timing of construction activities to avoid disturbance during bird nesting periods, or endangered mussel relocation when live specimens are identified in the preferred alternative corridor. Regulatory protections for these resources are discussed in Section 7.2.1.

7.3 SEMINARY FEN/ASSUMPTION CREEK

This section discusses the Seminary Fen that is located on the north side of the Minnesota River, at the toe of the bluff, and is formally listed as a calcareous fen under Minnesota Rule 7050.0180 Subp. 6b, B Carver County, Seminary Fen and listed on the DNR Identification of Known Calcareous Fens Order (No. 05-001). Seminary Fen is a calcareous seepage fen, a rare and threatened type of wetland that is sensitive to changes in water chemistry and groundwater flow. Calcareous fens are peat-accumulating wetlands dominated by distinct groundwater inflows and having specific chemical characteristics. Discharging groundwater is characterized as circum-neutral to alkaline with high concentrations of calcium and low dissolved oxygen content. The chemistry provides environments for specific and often rare

hydrophytic plants, which include several plants on the state special concern and threatened species lists. Calcareous fens have special protection under state law, and are formally defined and delineated based on the presence of specific hydrology, water chemistry, soils, and vegetation indicator criteria.

Many of the plants specific to calcareous fens are state-listed as threatened or endangered because they are rarely found outside of the calcareous fen environment. The specific reason for the adapted nature of calciphiles has not been investigated in detail. However, their specific adaptation to calcareous environments is thought to result from their ability to withstand continuously saturated, nutrient-poor anaerobic environments that other plants cannot tolerate.

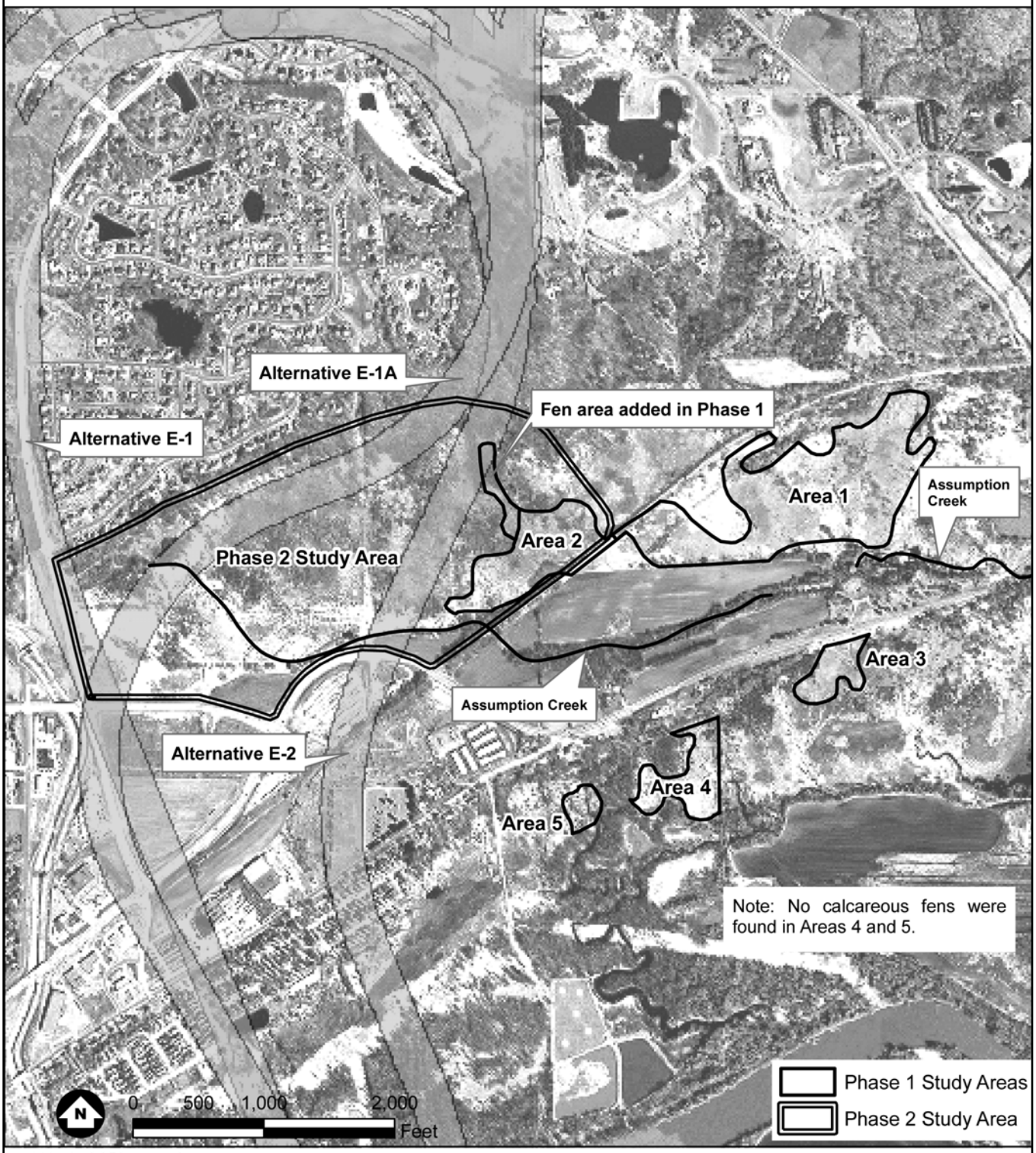
The Seminary Fen is located within a larger wetland complex, referred to as the Seminary Fen Wetland Complex (SFWC). The SFWC, along with associated bluffs, is a site of Outstanding Biodiversity Significance, per the Minnesota County Biological Survey (MCBS) and an Outstanding Resource Water protected under Minnesota Statutes 103G.223 and Rules 8420.1010 to 8420.1070 and MPCA Rule 7050. Five previously identified calcareous fen components (CFC) of the SFWC (CFC-SFWC), Areas 1 through 5, are discussed below individually and within the context of the SFWC as a whole (see Figure 7-3). (Note: The term "Seminary Fen" generally comprises all of the CFCs, for which detailed information is provided below.)

7.3.1 Affected Environment

During 2005 and 2006, an extensive study of the vegetative communities, soils, hydrology, and hydrogeology of the Seminary Fen was undertaken. The study is documented in two reports, *Phase 1 Characterization Seminary Fen Wetland Complex – TH 41 Over the Minnesota River Highway Project, Carver County, Minnesota*, dated March 2006 (Phase 1 Fen Study) and *Seminary Fen Wetland Complex Phase 2 Study*, dated January 2007 (Phase 2 Study), both of which are available from Mn/DOT (and are posted on the project website http://projects.dot.state.mn.us/srf/041/). Executive Summaries are included in *Volume II: Technical Memoranda*.

The Phase 1 Fen Study characterization:

- Provides essential background information on calcareous fen regulation in Minnesota and on the hydrology, soil, water chemistry, and vegetation criteria used to identify calcareous fens in Minnesota;
- Discusses impacts known to adversely affect calcareous fens in general, focusing on those impacts associated with bridge construction;
- Places the Seminary Fen in a local and regional hydrogeological context necessary to understand calcareous fen function and characteristics;
- Assesses historic land use impacts to the Seminary Fen; and
- Quantifies the hydrologic, soil, water chemistry, and vegetation criteria found in the mapped CFC-SFWC.



Graphics/Support/4590/EIS Figures

Source: BARR Engineering

SEMINARY FEN

Figure 7-3

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The Phase 2 Study focused on describing additional calcareous fen areas and assessing the potential hydrologic and ecological impacts to the SFWC that are posed by the three eastern alignment alternatives (E-1, E-1A, and E-2). The Phase 2 Study also assesses the potential hydrologic and ecological impacts to other natural communities near the three other alignment alternatives (W-2, C-2, and C-2A) which are not proximal to the SFWC. The results and implications based on this latter portion of the Phase 2 Study are discussed in Sections 7.1 and 7.2 of this document.

As noted above, the Seminary Fen is located in a large wetland complex in the eastern portion of the study area. It is currently listed as the only calcareous fen in Carver County. The SFWC exists as a large North Unit adjacent to the north bluff of the Minnesota River and a South Unit that lies south of existing US 212. (See Figure 1-3 for the general boundaries of the entire SFWC.) The two units are separated by an upland terrace consisting of coarse-textured glacial outwash sediments. The large peatland system has a gradual slope to the south from the toe-of-slope positions at the bluff edge to the terrace feature that separates the North Unit of the SFWC from the South Unit of the SFWC. Similarly, peatlands to the south of the terrace feature also present a gradual slope from the south of the terrace to the active floodplain of the Minnesota River.

Historic impacts to the SFWC were noted on aerial photos dating back to 1937. While the SFWC is considered to be relatively pristine, the immediate area of the wetland and the adjacent bluffs have been impacted by fragmentation, municipal well withdrawals, bluff top urbanization and storm water management, ditch and tile drainage, hydrologic alteration and surface water diversions, possible mining of peat and/or underlying sediments, and limited industrial development. The Seminary Fen may, in fact, be maintained in the face of existing and historic disturbance by the sheer size of the wetland complex within which it is embedded, combined with the calcareous nature of the underlying sediments. Drainage impacts especially have affected the hydrology and plant community associated with a large, historic, calcareous fen peat mound in CFC Area 1.

CFC Areas 1 and 2 in the North Unit of the SFWC are associated with groundwater discharge focused at the base of the bluff, originating from groundwater recharge of wetlands north of the SFWC on top of the bluff and bedrock aquifers, as documented in the Phase 2 Study. Areas 3, 4 and 5 in the South Unit of the SFWC are approximately 15 to 20 feet lower in elevation than the southern portions of the North Unit. Observed conditions suggest that the source of the discharging groundwater to the South Unit originates as recharge from a portion of Assumption Creek that flows on the terrace and groundwater recharge occurring at the northern edge of the terrace feature.

Field observations and interpretations of the results of groundwater monitoring for the Phase 1 Fen Study suggest a complex hydrology where groundwater discharges at and near the bottom of the bluff, becomes channeled surface flow in spring runs, diffuse surface flows and subsurface throughflow across and within the sloping peat in the North Unit of the SFWC, recharges the groundwater system underlying the coarse textured terrace feature, and then discharges again as spring heads and spring runs in the South Unit of the SFWC. Virtually all of the SFWC, both within and outside of the CFC-SFWC, meets the hydrology criterion for calcareous fens that requires evidence of stable, upward groundwater flow and the presence of peat soils (Histosols) or mineral soils with peat surfaces.

Assumption Creek, which flows through the SFWC and is designated as a trout stream, has very complex hydrology and has been substantially affected by historic diversions and channelization. In its current configuration, Assumption Creek headwaters lie within the North Unit of the SFWC, where it has two main tributaries originating to the west and to the east of CFC Area 2, respectively. North of the railroad embankment, the tributaries were observed to be perennial throughout the field season. However, once the tributaries join and flow under the railroad embankment, the stream becomes intermittent and loses water to the groundwater system. The data and field observations suggest that most of the water recharged on and flowing through the terrace feature resurfaces as groundwater seeps and spring heads at the toe-of-slope positions at the terrace's southern edge, including CFC Areas 3, 4 and 5.

Phase 1 Fen Study chemical analysis data suggest that the discharging groundwater and surface flows originating as seeps, spring heads, and spring runs are saturated with respect to calcium carbonate, and remain so as the water flows south through the system to the Minnesota River. As a result, the groundwater and surface water flows within all CFC Areas of the SFWC fulfill the water chemistry criteria for calcareous fens, and facilitate the presence of diverse, calciphile-dominated plant communities.

Similarly, field investigation of the soils within the SFWC found that all of the wetland soils examined would meet the calcareous fen soil criteria. All of the soils are Histosols (organic soils layer that is greater than 16" thick) or have histic epipedons (organic soil layer that is 8"-16" thick). However, soils in CFC Areas 4 and 5 exhibited alluvial (river sediments) strata and high mineral content in the peat that represent periodic inundation by Minnesota River floodwater. Both areas are well within the 100-year floodplain of the Minnesota River. Periodic flooding retards or prevents calcareous fen development and maintenance by disturbance, sediment burial, and the introduction of elevated nutrient levels in the sediments that favor plant species adapted to disturbance and high nutrient levels. These areas were dominated by rank, high stature vegetation and lacked sufficient quantities of calciphiles to meet the calcareous fen vegetation criteria. Therefore, Areas 4 and 5, while being high quality wetlands, are not calcareous fens.

Vegetation provides the main criteria by which calcareous fens are formally defined, as the documented presence of enough certain indicator species is required. Several rare and protected plant species and species with a high affinity for calcareous fens were observed in the SFWC, such as sterile sedge (*Carex sterilis*), American grass-of-Parnassus (*Parnassia glauca*), smooth sawgrass (*Cladium mariscoides*), white lady's slipper (*Cypripedium candidum*), beaked spikerush (*Eleocharis rostellata*), low nutrush (*Scleria verticillata*), and marsh arrowgrass (*Triglochin palustris*). Numerous locations of calcareous fen were found in Area 1, which supports a diversity of different plant communities representative of the variation possible in calcareous fen vegetation. Despite the presence of calcareous fen plant communities, the area has suffered extensive ecological disturbance in the form of ditch and tile drainage and excavation of peat. Invasive species such as reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), and buckthorn (*Rhamnus cathartica* and *Frangula alnus*) all pose biotic threats to the fen communities.

CFC Areas 2 and 3 also meet the calcareous fen criteria for vegetation, but do not display the same level of quality and diversity as found in CFC Area 1. Invasive species mentioned above also pose a threat in these Areas. During the Phase 1 Fen Study field investigation, an additional

area of calcareous fen community was identified along the northwest edge of Area 2. This information led to the Phase 2 Study of the entire western portion of the SFWC to determine the presence of calcareous fen community not previously identified. (See Figure 7-3). The field analysis for the Phase 2 Study resulted in a detailed characterization, which includes additional calcareous fen communities. The characterization of the additional portions of Area 2 include areas that meet calcareous fen criteria, areas that likely met calcareous fen criteria historically and are restorable, areas that likely met calcareous fen criteria historically but are severely degraded and not likely restorable to calcareous fen, and upland or non-fen wetlands. See Figure 7-3A. The severely degraded areas are those that have been extensively ditched and drained to the extent that restoration of hydrology is not probable. Invasive vegetation such as reed canary grass and buckthorn pose immediate biotic threats to existing and restorable fen communities.

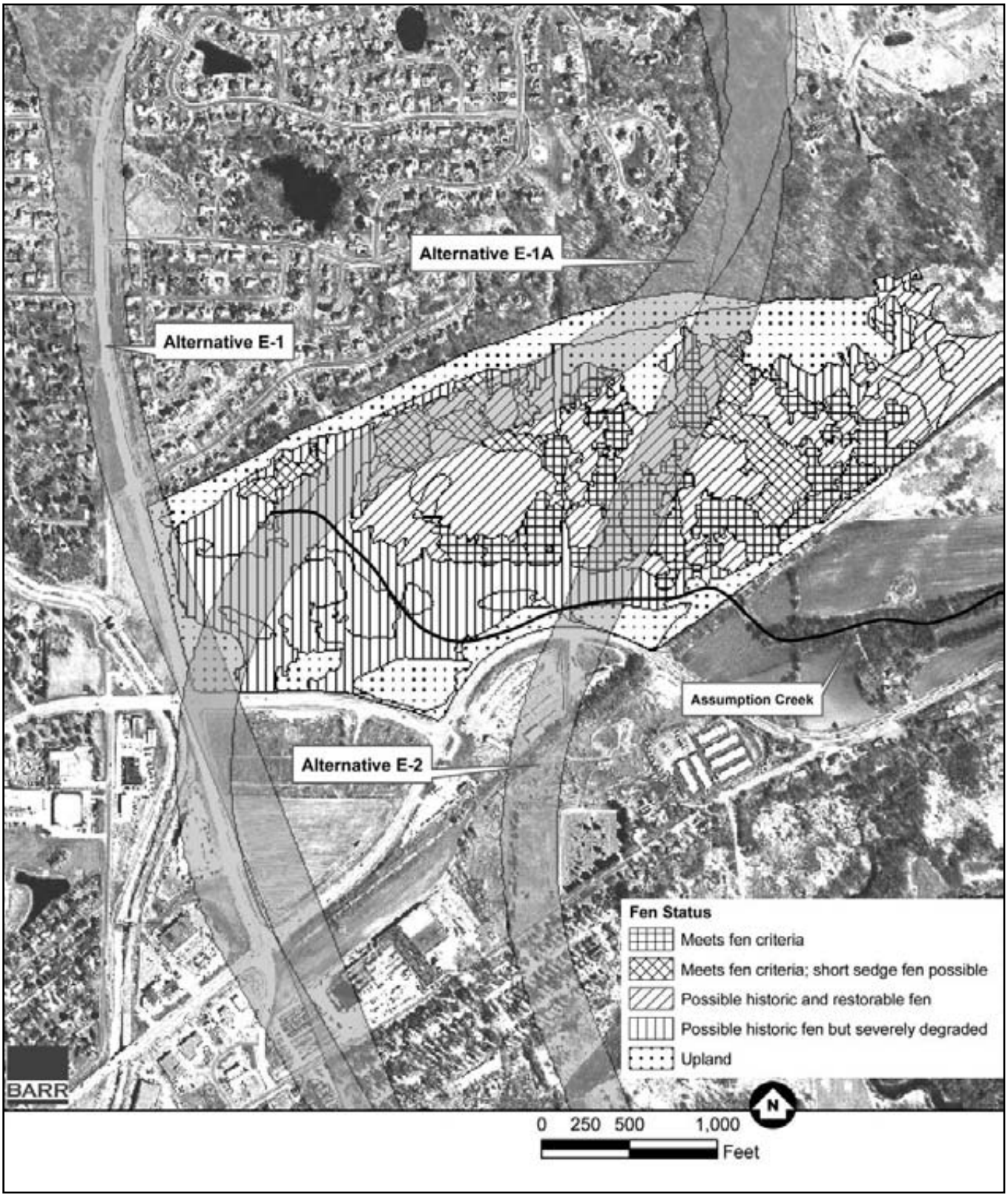
CFC Areas 4 and 5 failed to meet the full vegetation criteria for calcareous fens. The plant communities resembled riparian forest and emergent marsh ecosystems more than calcareous fens. The sites are apparently subject to periodic flooding from the Minnesota River, as noted with the soils findings, and deposition of sediments and nutrients may prevent development of calcareous fen characteristics.

7.3.2 Environmental Consequences

The long-term viability of the Seminary Fen is very much dependent upon land uses. Any significant reduction in the amount of upstream permeable soils and related groundwater recharge can threaten this rare plant community. Furthermore, the SFWC is ecologically degraded in many locations in different ways, and this deterioration will continue without active management, with or without the proposed project.

Construction assumptions were developed in consultation with Mn/DOT staff for the Phase 2 Study impact assessment efforts. As noted elsewhere in this DEIS, bridge piers for each direction of travel were assumed at 250 foot spacing. Bridge pier footprints are approximately 110 feet by 130 feet, or 14,300 square feet. Typical bridge pier construction and dewatering is generally used where high organic, marly or peaty soils are not expected. The use of a sheet-piling coffer dam with a concrete bottom seal is the method used by Mn/DOT where organic, marly, or peaty soils are expected. The coffer dam/sheet piling approach is assumed to be used for bridge pilings within the SFWC. The stage of the drain for dewatering within the coffer dam/sheet pile was assumed at five feet below the ground surface. In other words, water table above five feet would be drawn-down for the construction of the bridge pier footing.

Assumptions were also made for reviewing post-construction impacts to groundwater flow in and near the SFWC. It was assumed that the shallow soils would undergo compaction during construction. In the groundwater model, recharge was set to zero over the entire footprint of the proposed alignment west and north of the Minnesota River. The purpose of this modeling was to determine the influence of the construction and operation of the highway. In particular, road spray containing de-icing agents and other contaminants would infiltrate along the right of way of the highway. Particle tracing with results from the groundwater flow modeling was used to predict where these infiltrating contaminants would flow and where they may impact surface water.



Graphics/Support/4590/EIS Figures

Source: BARR Engineering

CALCAREOUS FEN STATUS - PHASE 2 STUDY AREA

Figure 7-3A

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No-Build Alternative

The No-Build Alternative would result in no direct impacts to the SFWC or to Assumption Creek.

Build Alternatives

Alternatives W-2, C-2 and C-2A

Construction of the W-2, C-2 and C-2A alternatives would result in no direct or indirect impacts to the SFWC or Assumption Creek, because they are located well to the west and out of the SFWC sphere of influence. According to the groundwater modeling results in the Phase 2 Study, no impacts would be expected to the groundwater recharge areas to the SFWC with the construction of any of these alternatives.

Alternatives E-1, E-1A and E-2 (Considerations)

The Phase 2 Study reports that impacts of highway construction in the vicinity of the SFWC can result from many factors, among the most important being alterations to wetland hydrology and direct loss of native vegetation. The impacts of altered hydrology can be qualitatively predicted from scientific literature and observations of the SFWC itself. Ecological impacts can be reasonably inferred, but the magnitude and rate of impacts are difficult to predict. Empirical studies demonstrate the importance of the many factors that are associated with highway construction and development that negatively impact native wetland vegetation, including calcareous fen vegetation, but do not provide a means to easily quantify predictions. Interactions among factors may create novel and untested conditions, which will likely hasten the rate and severity of detrimental impacts.

Impact considerations that were investigated for all eastern alternatives are based on the Phase 2 Study. None of the alternatives are anticipated to pose a direct threat to the highest quality fen areas in Area 1 or lower quality fen communities in Area 3. Indirect impacts may occur from Corridors E-1, E-1A, and E-2 through factors such as increased abundance of invasive species and migration of road salt into groundwater and subsequent discharge. However, the complexity of interacting factors prevents an unequivocal prediction of the likelihood or severity of these potential impacts. As detailed in subsections below, Alternative E-1 poses little potential for impact to the SWFC, with the exception of limited groundwater drawdown and very limited change to existing groundwater flow paths. The impact considerations are of direct relevance to Alternatives E-1A and E-2. Groundwater modeling predicted that dewatering associated with bridge pier construction would result in lowered water tables in or near portions of the SFWC. Drawdown in SFWC-CFC Areas 1 and 3 would be less than 0.1 foot during construction for all alternative corridors. Therefore, it is not expected that this drawdown would have a negative impact on plant communities in Areas 1 and 3, especially if drawdown occurs during the dormant season. Area 2, on the other hand, may be impacted by groundwater drawdown. Table 7-9 summarizes the direct and hydrologic impacts from bridge pier construction to SFWC for each of the eastern alternatives. Table 7-10 summarizes the amount of impact (assuming a 300-foot wide corridor) by calcareous fen status.

TABLE 7-9
SUMMARY OF IMPACTS TO SEMINARY FEN WETLAND COMPLEX

Alternative	Total bridge piers within SFWC	Direct Impact from bridge piers (ac)	Temporary dewatering rate for pier construction (cfs)	Modeled change in seepage, post-construction (cfs)
E-1	4	1.2	0.12	-0.012
E-1A High/Low	22	6.4	0.43	+0.076
E-2	14	4.1	0.49	-0.0025

TABLE 7-10
ALTERNATIVE CORRIDOR IMPACT BY CALCAREOUS FEN STATUS (ACRES)*

Alternative Corridor	Calcareous Fen Status		
	Current Fen	Possible Historic and Restorable Fen	Possible Historic and Severely Degraded Fen
E-1	0.0 ac	0.0 ac.	1.0 ac
E-1A High/Low	4.0 ac.	3.6 ac.	11.9 ac
E-2	5.8 ac.	3.9 ac	2.0 ac.

*Fen impacts based on acreage within the 300-foot width corridor.

Soil compaction from construction traffic would probably be worse in dewatered conditions than in saturated conditions because the normal buoyancy of saturated organic soil would be lost. Generally, saturated organic soils resist compaction. Soils are displaced, rather than compacted, when pressure is applied. The use of swamp mats under equipment spreads the weight and prevents displacement and creation of ruts. However, even the use of mats on dewatered organic soil could cause irreversible compaction. This compaction would lower the soil surface and alter the flow of groundwater through the peat. After the completion of dewatering, restoration of water tables would probably yield water levels that are substantially higher than the soil surface, due to compaction, depression and subsidence. Modeling suggests that groundwater flows will be altered from soil compaction after construction on a peat-substrate wetland.

The net result of hydrologic alterations means that some areas of the SFWC may experience more groundwater discharge, and some areas may experience less. Soil compaction or subsidence may occur in some areas; groundwater flow paths may be altered. These impacts may result in new areas of inundation, areas of seasonally variable water tables, areas with soils not saturated to the surface for long portions of the growing season, and areas in which precipitation and surface water assume greater importance. Any of these changes can alter plant community composition and succession away from calcareous fen plant communities. Although many wetland plants are adapted to fluctuating water tables and soils that are not saturated for

extended portions of the growing season, fen species are found in environments that are, essentially permanently saturated to the surface. Lowered water tables could stress or kill fen vegetation, depending on the timing and duration of the drawdown. Competitive interactions would be altered, favoring species that aggressively exploit hydrologically altered environments.

While conducting dewatering activities when the plants are dormant could reduce stress, mortality and altered succession, it should be recognized that a dormant-season water table drawdown may actually have detrimental impacts on wetland vegetation, including fen species. Most wetland plant species in the SFWC are perennials with long-lived underground organs such as rhizomes, tubers and bulbs. Normally, when these tissues are dormant, the soil is saturated. During the winter, the pores in the soil are filled with ice rather than air. A water table drawdown during the dormant season could produce a dry frozen soil, and subject the plant tissues to a freeze-drying effect. This atypical stress may reduce the viability of wetland plants, setting up another opportunity for exotic and invasive species to take over.

In the SFWC, areas that become drier or exhibit a more seasonally-variable water table would be expected to become dominated by reed canary grass or buckthorn. Areas that become wetter, or even inundated or ponded, would be expected to become dominated by cattails and common reed. Development of any of the eastern alternative would increase the amount of altered edge within the Area 2 of SFWC. Even if loss of calcareous fen and wetland vegetation is initially limited to within the corridor footprint, the altered habitat in the corridor will likely provide opportunities for encroachment of invasive species. This process can be seen in the SFWC currently, where reed canary grass is encroaching along a ditch within a transmission line corridor through the Phase 2 Study area. Encroachment of reed canary grass is common underneath many of the large highway bridges in the Minnesota River Valley and along highways that cross wetlands. The presence of reed canary grass through the length of the corridor in the SFWC would provide an abundant seed source as well as creeping plant roots that expand out of the corridor and into remnant wetlands, including fen communities. While the highway project is not responsible for the presence of the invasive species in the SFWC, without intensive and ongoing vegetation management, the project could substantially increase invasive species distribution.

Salt spray may create an additional stress. Any addition of salts, particularly those containing chloride or sodium ions, would exacerbate an already stressed SFWC. Note that compounds such as potassium acetate, which show promise as effective deicing agents with fewer negative environmental side effects, have unknown implications at this time. For example, acetate is a component of many metabolic pathways, and introduction into a wetland complex may create unforeseen biological chain reactions. Salt deposition is known to favor invasive species to the detriment of native vegetation in various types of wetlands, including calcareous fens. Though the Phase 2 Study did not model or estimate amounts of salt runoff or deposition patterns, it is understood from available literature that runoff concentrations can be several orders of magnitude greater than background concentrations or than those necessary to alter vegetation. It is assumed that salt addition to the SFWC would have a potential negative impact (although the extent and severity of impact has not been quantitatively estimated) because of the specific water chemistry required to sustain the fen plant communities. The amount of salt necessary to cause a

detrimental impact on fen vegetation may be relatively low although higher values are more commonly cited in the literature. Most salt spray is expected to fall in the immediate vicinity of the highway, although the possibility of longer distance dispersal cannot be excluded.

An additional hazard of salt spray in the SFWC is the possibility of the salt migrating away from the initial deposition site through ground and surface water. Surface water is present in the Phase 2 Study area as a result of groundwater discharge. The surface water in the SFWC coalesces to create the origin of Assumption Creek, which passes through a region of apparent strong groundwater recharge. The SFWC water apparently reappears as groundwater discharge south of existing US 212, where extensive wetlands are located, including calcareous fen in Area 3. Highway salts could flow into the ground and be discharged in fen and wetland areas down gradient, including the western portions of Area 1, as well as Areas 3, 4 and 5. These groundwater patterns suggest that road salt could migrate away from the highway corridor in ground and surface water and be discharged in additional wetlands. The net result could be detrimental for native wetland vegetation including fen species, even if they are not adjacent to any of the proposed highway corridors. As with hydrological alterations, road salt and other contaminants could likely affect wetland succession toward communities with lower richness and diversity of native species and increased abundance of exotic and invasive species.

General construction impacts through uplands adjacent to the SFWC have the potential for erosion, which leads to the deposition of sediment in wetlands. Such sedimentation would bury vegetation and increase nutrient availability. Surface water runoff would alter the chemical environment of the fen communities. Both would shift wetland succession towards invasive or exotic species.

The following discussion addresses impacts specifically for each eastern alternative. As noted, findings are detailed in the Phase 2 study.

Alternative E-1

Alternative E-1 is located just to the west of the SFWC along Audubon Road. Because there is an existing road in the location of this proposed alternative, there would be no direct impacts to calcareous fen communities in the SFWC due to the construction of this alternative. However, four bridge piers, two in each direction of travel, are proposed at the very western edge of the SFWC, not within any calcareous fen areas. This would result in a total direct wetland impact within SFWC of 1.2 acres. According to the groundwater modeling in the Phase 2 Study, bridge pier construction dewatering would result in a total of 0.12 cubic feet per second (cfs) of drawdown. This translates to a water table drawdown during construction of 0.1 to 0.6 feet. Drawdown of 0.1 foot (1.2 inches) would extend up to 800 feet to the east of the corridor alignment. This effect is predicted to reach a small portion of calcareous fen area identified in the Phase 2 Study.

Post construction analysis predicts a small net decrease (-0.012 cfs) in the rate of seepage in the SFWC, due to decreases in recharge that would result from increases in impervious area within the footprint of the alignment. In addition, ground water flow paths for post-construction conditions were compared to pre-construction conditions. The flow paths originating toward the

west of the alignment discharge to the unnamed drainage west of the alternative corridor or to the Minnesota River. Many of the flow paths originating toward the east discharge in the vicinity of Areas 4 and 5 in the western portion of the SFWC. Very limited changes to the existing flow paths are predicted with the construction of Alternative E-1. Transport of contaminants, as discussed above, would be through these groundwater flow paths.

Alternative E-1A

Alternative E-1A is located at the western edge of the SFWC, following Audubon Road north to approximately Engler Boulevard, where it turns to the east at the base of the bluff along the northern boundary of the SFWC. Current bridge design assumptions require piers approximately every 250 feet, requiring 22 piers along the toe of the bluff, 11 for each direction of travel, within the SFWC. Within the SFWC, (6.4 acres) of direct wetland impacts, including calcareous fen wetland, would result from pier construction. Additional calcareous fen area would be lost within and around the highway corridor due to temporary dewatering, construction traffic, soil compaction and shading by the bridges. Alternative E-1A intersects calcareous fen at the toe of the bluff, which is the site of what the data suggest is some of the highest-quality original fen in the Phase 2 Study area. In addition, this alternative is up-gradient of additional calcareous fen and passes through areas of strong groundwater discharge critical for the hydrology of the large peatland that is the Phase 2 Study area. The net result is that large areas of calcareous fen will be directly lost from construction and operation of Alternative E-1A, and non-fen wetland areas will likely be further degraded. That degradation may be so severe as to eliminate calcareous fen from large areas outside of the actual corridor. As noted, however, past and ongoing ecological degradation, not associated with the proposed project, may eliminate fen vegetation from the site.

Direct impacts to the groundwater system in this area can be expected with this alternative due to dewatering for placement of the bridge piers. As noted in the Phase 1 Fen Study, groundwater is discharged to the SFWC at the toe of the bluff in the proposed location of Alternative E-1A. A hydraulic head of approximately three feet was noted along the base of the bluff in this location, indicating a very active upwelling of groundwater. According to the groundwater modeling in the Phase 2 Study, bridge pier construction dewatering would result in a total of 0.43 cfs of drawdown. The drawdown in SFWC wetland from the construction of the bridge piers is predicted to be between 0.1 and 4 feet. The deepest area of drawdown is in the immediate vicinity of the bridge pier construction, while drawdown of 0.1 foot (1.2 inches) would extend 2,000 feet to the south of the corridor alignment over a large area of the SFWC.

Post construction analysis predicts that Alternative E-1A will result in a small net increase in the seepage in the SFWC of less than 0.1 cfs. The increase is attributed to changes in permeability of soils that have undergone compaction during construction, which slightly alter groundwater flow paths. In addition, groundwater flow paths for post-construction conditions were compared to pre-construction conditions. The flow paths reviewed around Alternative E-1A indicate that only those at the western extreme of the corridor discharge directly to the Minnesota River. The majority of flow paths in Alternative E-1A discharge to Areas 3, 4 and 5 of the SFWC, south of existing US 212. Limited changes to the existing flow paths are predicted with the construction of Alternative E-1A, apart from the noted increase in seepage. Transport of contaminants, as discussed above, would be through these groundwater flow paths.

Construction of Alternative E-1A would result in an increase in the amount of altered edge within the Area 2 portion of the SFWC. Construction of this alternative would exacerbate the encroachment of reed canary grass and other exotic or invasive species into the SFWC.

Alternative E-2

Alternative E-2 is located directly within the SFWC. Current bridge design assumptions require piers approximately every 250 feet, requiring 14 piers, 7 for each direction of travel, within the SFWC, including calcareous fen areas. Within Area 2 of the SFWC, 4.1 acres of direct wetland impacts, including calcareous fen wetland, would result from pier construction. Alternative E-2 has a more perpendicular orientation to the bluff than Alternative E-1A, and, therefore, directly impacts less of the toe-of-bluff calcareous fen. This alternative is up-gradient of additional calcareous fen and passes through areas of strong groundwater discharge critical for the hydrology of the large peatland that is the Phase 2 Study area. The net result is that similar to Alternative E-1A, large areas of calcareous fen will be directly lost from construction and operation of Alternative E-2, and non-fen wetland areas will likely be further degraded, with that degradation possibly being so severe as to eliminate calcareous fen from large areas outside of the actual corridor. (Again, note the ongoing degradation of Area 2, regardless of the proposed project.)

Direct impacts to the groundwater system in this area can be expected with this alternative from dewatering for placement of the bridge piers. According to the groundwater modeling in the Phase 2 Study, bridge pier construction dewatering would result in a total of 0.49 cfs of drawdown. The drawdown in SFWC wetland from the construction of the bridge piers would be between 0.1 and 4 feet. The deepest area of drawdown is in the immediate vicinity of the bridge pier construction, while drawdown of 0.1 foot (1.2 inches) would extend up to 1,750 feet beyond the corridor alignment, over a large area of the SFWC.

Post construction analysis predicts a small net decrease (-0.0025 cfs) in the seepage in the SFWC from Alternative E-2, due to decreases in recharge that would result from increases in impervious area within the footprint of the alignment. In addition, groundwater flow paths for post-construction conditions were compared to pre-construction conditions. The flow paths reviewed around Alternative E-2 indicate that only a few at the western extreme of the corridor discharge directly to the Minnesota River. The vast majority of flow paths in Alternative E-2 discharge to Areas 3, 4 and 5 of the SFWC, south of existing US 212. Limited changes to the existing flow paths are predicted with the construction of Alternative E-2. Transport of contaminants, as discussed above, would be through these groundwater flow paths.

Construction of Alternative E-2 will result in an increase in the amount of altered edge within the Area 2 portion of the SFWC, thereby exacerbating the encroachment of reed canary grass into the SFWC.

7.3.3 Mitigation

The Minnesota Wetland Conservation Act (WCA) states that calcareous fens may not be drained or filled or otherwise altered or degraded except as provided for in a management plan approved

by the MnDNR. The MnDNR would provide technical assistance in the development of a management plan for the SFWC, if an alternative that impacts it is chosen. According to correspondence with the Mn//DNR, a fen management plan includes:

- a detailed description of the fen including soils, hydrology, chemistry, vegetation, and endangered, threatened or special concern species,
- description of project impacts,
- avoidance, minimization and mitigative measures ("sequencing" as described below), and
- monitoring efforts.

If an E alternative is chosen for further development, Mn/DOT would be responsible for preparing the fen management plan with coordination with DNR and other stakeholders. Mn/DOT would not proceed with preparing this management plan without further consultation with MnDNR staff, including a secure understanding of MnDNR qualifying criteria for a fen impact.

In addition, federal and state wetland regulations require the use of a sequenced approach when projects have the potential to impact wetlands. Sequencing requires first avoiding wetland impacts if possible, and, if impacts are not avoidable, they must be minimized to the greatest extent practicable. Sequencing also includes rectification of temporary impacts and reduction or elimination of impacts over time. After all options for avoidance, minimization, rectification and long term reduction of impacts have been considered and implemented, compensation that will replace lost wetland functions is required for those impacts that are not avoidable. Mitigation of impacts to wetlands other than the SFWC is discussed in detail in Section 9.5.4.

Many wetlands within the SFWC that are not characterized as calcareous fen have been found to be high quality sedge meadows and shrub carrs. Careful mitigation of the losses of these wetland types, with closely monitored establishment of similar vegetative communities, would be conducted. Any mitigation with a dissimilar type of wetland may also be permitted at a higher mitigation ratio. In order to minimize the temporary impacts to the wetlands, construction in these areas may be completed during the winter when the surface is frozen or using swamp mats, thus minimizing compaction. Seeps and spring heads, however, often remain unfrozen except in the coldest of winters, so compaction could remain as a potential impact.

Several techniques are available for minimizing and mitigating for adverse impacts to the SFWC. Complete avoidance of impacts to the SFWC is only possible by excluding Alternatives E-1A and E-2. Without active management and restoration, there may be very little ecologically-intact calcareous fen when construction of proposed project occurs (currently assumed to be many years in the future). However, the site will still be a large, groundwater-supported wetland complex. The techniques described below pertain to impact minimization to the SFWC, regardless of the presence of fen vegetation. It should be noted that these techniques may not prevent all detrimental impacts to the wetlands.

Coffer Dams

The use of coffer dams and a bottom grout seal is considered essential for any bridge pier construction in or near wetlands and is standard Mn/DOT practice. Coffer dams and bottom grout seals will limit the portion of the SFWC that is affected by groundwater drawdown.

Swamp Mats

Using swamp mats under construction traffic to the extent possible will help reduce compaction of organic soils by distributing vehicle weight. However, as stated earlier, organic soil may be compacted under dewatered conditions, even with the use of swamp mats. This compaction may be severe enough to alter groundwater flow, surface elevation, plant growth, and competition. All of these changes can alter the composition of plant communities. Altering groundwater flow may affect vegetation down gradient of the compaction, thus creating impacts well beyond the construction footprint.

Dormant Season Construction

Dewatering and construction of bridge piers during the dormant season will likely reduce, but not eliminate, detrimental impacts on native vegetation. However, compared to dewatering during the growing season, dormant season dewatering is preferred.

Surface Water Protection

Because inputs of surface water and transported nutrients and sediments are detrimental to fen vegetation, measures will be taken to minimize discharges of surface water from the highway and from surrounding uplands to the SFWC.

Erosion and Sedimentation Control

Sedimentation from uplands will be controlled, both during and after construction. The SFWC should be protected during the removal of existing vegetation and earthwork on adjacent uplands to avoid detrimental sedimentation, should any of the eastern alternatives be selected.

Relocation of Fen Vegetation

It is possible under certain circumstances to collect soil and/or plants from wetlands to be impacted and relocate them to new sites for establishment. Relocation has the advantage of preserving the existing species and local genotypes that are present in the SFWC, providing potentially species-rich vegetation in restoration sites and possibly saving protected plant species populations. Possible restoration sites are available in Area 1 of the SFWC. Details outlining methods of increasing the success of restoration sites are provided in the Phase 2 Study.

Transplantation may preserve some fen vegetation from direct impact areas, but the proposed highway corridors still have risks of soil degradation, altered hydrology, and introduction on

invasive species into fen areas outside of the highway right of way. If transplantation will be necessary, the opportunity to conduct small-scale trials in the years prior to highway construction to perfect techniques would be investigated. Mn/DOT is aware of the challenges surrounding transplantation and successful establishment of these protected species. Note that any transplantation of protected species would be coordinated with MnDNR.

Vegetation Management

Disturbed areas area routinely revegetated following construction. However, disturbance and habitat edges create opportunities for the spread of invasive and undesirable species. Not only should appropriate native species be planted and invasive species controlled in disturbed areas, areas surrounding construction should be actively managed to control invasive species. Such control may be necessary for at least 10 years following the cessation of all construction activity. Propagules of invasive species such as reed canary grass, common reed and common buckthorn are abundant in and around the SFWC. Soil disturbance and habitat fragmentation associated with highway construction will provide fresh sites for colonization and spread of invasive species. While the highway project is not responsible for the presence of the invasive species in the SFWC, without intensive and ongoing vegetation management, the project could substantially increase invasive species distribution.

Management of the Use of Road Salts

Mn/DOT's comprehensive maintenance program includes ongoing research in the use of road salts and other emerging technologies for deicing. Mn/DOT will continue to research and evaluate technologies for minimizing or preventing salt spray and runoff from any highway corridor. Certain compounds, such as potassium acetate, show promise as effective deicing agents with fewer negative environmental side effects than traditional deicers such as sodium chloride or magnesium chloride. However, the full environmental implications of alternative deicing compounds have not been investigated. The movement of water through this wetland ecosystem means that any deicing compound used should be expected to migrate well beyond the limits of the highway right of way. By the time bridge design and construction occurs, new technologies may be available, and environmental effects of relatively new deicing agents will be better understood. Options for preventing salt release would be thoroughly evaluated. If one of the eastern alternatives is selected, a monitoring plan would be developed and implemented to document baseline conditions and the spread of deicing agents in the SFWC after the highway opens.

Restoration and Management for Compensatory Mitigation

Several opportunities exist for management and restoration within the SFWC to provide compensatory mitigation for the proposed project or for fen restoration activities in general. Even if none of the eastern alternatives are selected, wetland impacts are expected with any of the build alternatives for which compensatory mitigation will be required. Activities, including active management in the present, conducted prior to or concurrent with any construction may be considered for this compensatory mitigation. Given the difficulties of fen restoration and management, it should not be assumed that an impacted fen can simply be recreated at another

site. However, the SFWC is ecologically degraded in many locations in different ways, and this deterioration will continue without active management. Therefore, restoration and management throughout the SFWC could potentially offset impacts from the proposed project.

Fen restoration has been attempted less often than other types of wetland restoration. The characteristic environmental conditions of a fen make such restoration challenging. Therefore, some restoration efforts may have a low probability of success, at least without detailed background studies, careful design and rigorous management. For some restoration activities, a trial-and-error approach is recommended, whereby small-scale restoration projects can be attempted, replicated, and monitored before attempting larger scale projects. Compensatory mitigation for the proposed project could begin years, or even decades, before any impacts occur. Whereas advance mitigation is generally preferred to after-the-fact mitigation, the challenges of fen restoration and mitigation make advance mitigation even more important.

The highest priorities for restoration and management of the SFWC should be to preserve the remaining high-quality fen areas and prevent further degradation through erosion-control measures. The next priority should be to maintain and enhance the overall viability of fen vegetation through shrub removal, invasive species removal, and prescribed burning. Finally, numerous opportunities are present to reverse historic impacts from excavation, ditching, tiling, impoundment, railroad and transmission line construction, and fire suppression. These opportunities may require hydrological restoration, soil manipulation, and revegetation. Methods for hydrological restoration include blocking or filling drainage ditches, breaking drain tiles within the fen, and regrading or removing soil to intercept the water table. Soil removal from upper soil profiles of potential restoration areas may be necessary to eliminate highly-degraded organic soil that may not be optimal for fen plants. Revegetation may involve seeding, growing plants in greenhouses or collecting in the field for transplantation, or collection and spread of topsoil to relocate seedbanks and living rhizomes. Plugs of soil and plants could be collected throughout the SFWC for use in restoration. Additionally, soil in future impact areas could be collected and used for restoration. Impact areas could be managed through shrub removal and prescribed burning for years before construction to increase the viability of plant populations and seedbanks before relocation.

In any wetland restoration project, assuring appropriate hydrology and control of invasive and undesirable species are critical. For fen restoration to be successful, a continuous supply of groundwater must be present that will saturate the soil to the surface for most of the year. Once the hydrology has been restored, the likelihood of fen vegetation restoration is greatly increased. Long-term well studies should be conducted before, during and after hydrological restoration to ensure that appropriate hydrology is present and to assist in troubleshooting and developing corrective actions. Effective hydrologic restoration would saturate soil to the surface without causing inundation. The well studies would provide information on the optimal ground surface elevation within the hydrologically degraded portions of the fen. It may be necessary to regrade or remove soil so that the saturation will occur. An on-site case study outlined in the Phase 2 Study and published reports of fen restoration demonstrate the potential for restoration within the SFWC.

Much of the SFWC could be restored to tall sedge fen communities with appropriate management. In Area 1, a sizeable area of short sedge fen exists which would be considered a priority. With hydrological restoration and vegetation management, microsites of short sedge fen may reestablish (such as certain locations near the toe of the bluff in the Phase 2 Study area). The Phase 2 Study provides detailed discussion regarding restoration and management methods for specific areas of the SFWC.

7.4 GEOLOGY/SOILS

7.4.1 Affected Environment

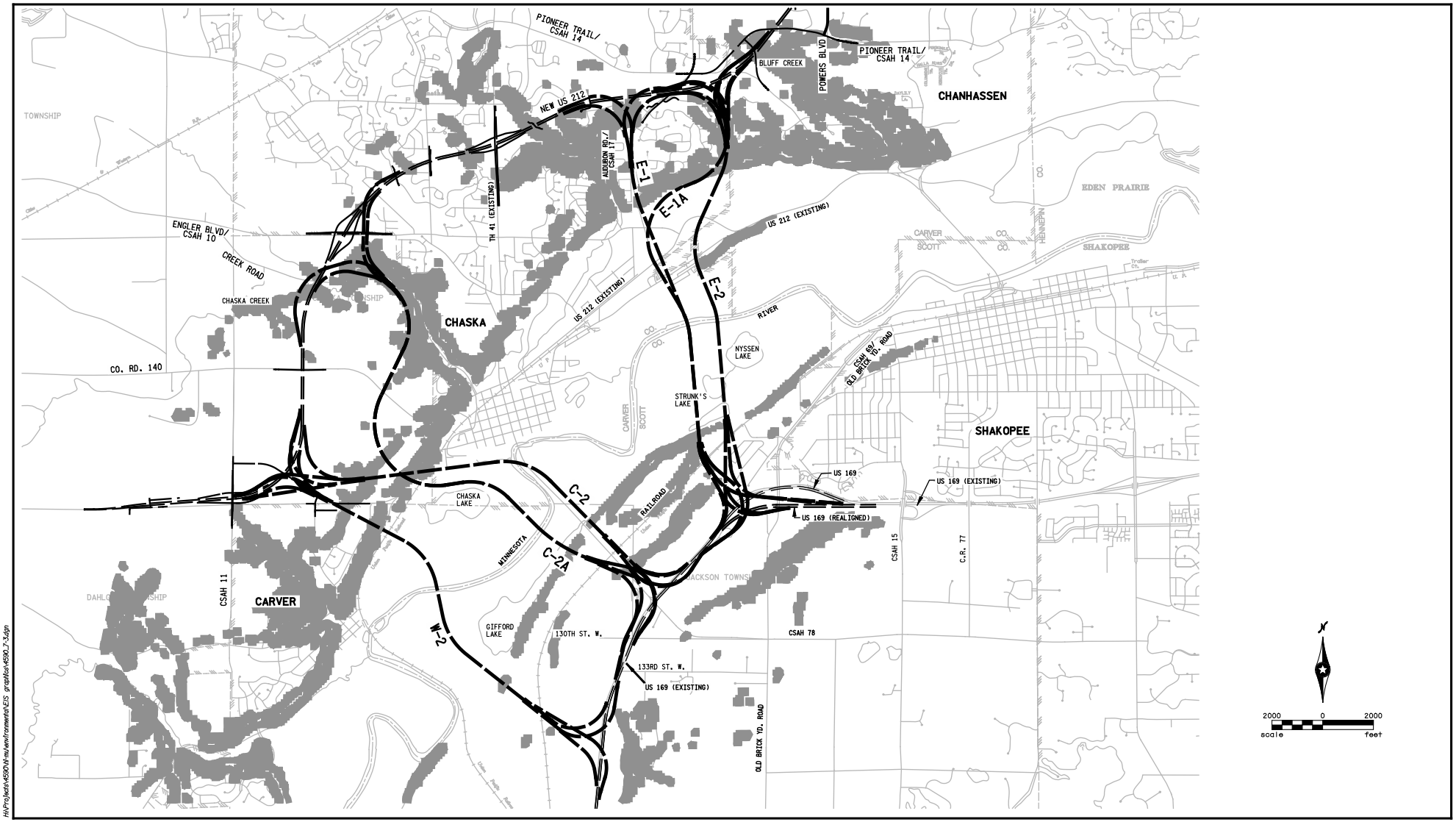
Information provided in the Phase I Environmental Site Assessment, completed by Braun Intertec, dated February 2006 and available from Mn/DOT (Phase I ESA), documents the geologic conditions of the study area and is summarized in this section. Two of the main concerns in the study area are locations that have steep slopes and locations that have highly erodible soils. Information for erodible soils was gathered from the Scott and Carver County soil surveys from the Natural Resource Conservation Service (NRCS). Slope information was obtained from the Metropolitan Council. Refer to Figure 7-4 for details.

Scott County Geology

The unconsolidated sedimentary deposits in the vicinity of the study area in Scott County starting from the Minnesota River and extending to the southeast are Holocene alluvium deposits, Holocene and Pleistocene lower-terrace deposits and Holocene and Pleistocene middle-terrace deposits. The Holocene alluvium deposits consist of gray to yellowish brown floodplain deposits. The deposits are three feet to more than 10 feet thick with variable texture, sorting and bedding. Clay and silt can be interbedded with sand and gravel. The deposits include small areas of lake, marsh and older stream sediment.

The Holocene and Pleistocene lower-terrace deposits consist of undulated erosional and depositional surfaces covered by at least 1½ feet of fine, wind-deposited sand and silt and locally by stream-deposited sandy, silty clay. The Holocene and Pleistocene middle-terrace deposits consist of undulating erosional and depositional surfaces covered by at least 1½ feet of fine, wind-deposited sand and silt and locally by stream-deposited sandy, silty clay, though at a surface of 75 to 115 feet above the present floodplain.

The uppermost bedrock units in the vicinity of the study area in Scott County are the Upper Cambrian, Franconia Formation and the Upper Cambrian, St. Lawrence Formation. The Franconia Formation is described as very fine-grained, glauconitic quartzose sandstone and shale. The St. Lawrence Formation is described as silty dolomite interbedded with siltstone, soft shale, and very fine-grained quartzose sandstone. The depth to bedrock in the vicinity of the study area is approximately 200 feet to 250 feet below land surface.



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STEEP SLOPES WITH HIGHLY ERODIBLE SOILS

Figure 7-4

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Scott County Soils

Soil types located within in the study area south of the Minnesota River (Scott County) include:

1. Loamy and sandy soils on gently sloping topography, including Hubbard, Estherville, Waukegan, and Zimmerman soil types found on terraces;

2. Rocky shallow soils, including the soil subtypes Copas, and Faxton that are on terraces; and

3. Nearly level soils, including Dorchester, Oshawa, and Mixed Alluvial association that are on floodplains.

Carver County Geology

The unconsolidated sedimentary deposits in the vicinity of the study area starting from the Minnesota River and extending to the northwest are Holocene floodplain alluvium; Holocene fan deposits, Pleistocene till, low-relief deposits, and Holocene colluvial deposits. The Holocene floodplain alluvium deposits consist of river-channel, overbank, and slackwater sediments consisting of dark-brown to gray silt loam to silty clay loam, and layers of fine sand and gravel. Organic debris is both disseminated in the sediments and forms discrete peat beds in places. The amount of sand and gravel increases adjacent to the river channel and in areas of channel migration.

The Holocene fan deposits consist of slopewash sediments of loam to loamy fine sand, beds of silt loam to silty clay loam, fine sand, and gravel, and disseminated organic debris deposited in the floodplain at the base of steep slopes. The Pleistocene till, low-relief deposits consist of pebbly loam to clay loam and pockets of silt, sand, and gravel in places. Average composition of very coarse sand fraction includes crystalline rocks (45 percent), carbonate rocks (26 percent), and shale fragments (30 percent). Different units are distinguished on the basis of geomorphic expression. The surface topography is level to rolling with overall relief of about 10 feet. There are also steep gullies as deep as 180 feet. The till is underlain in many places by thick deposits of sand and gravel. The Holocene colluvial deposits consist of reworked sediments of a friable mixture of sand, silt, clay and pebbles. These deposits resemble the till and buried sand and gravel from which they are derived and may contain disseminated organic debris.

The uppermost bedrock units in the vicinity of the study area in Carver County include the Upper Cambrian, St. Lawrence and Franconia Formations. The St. Lawrence Formation consists of silty, very finely crystalline, generally thick-bedded, tan to pink dolostone interlayered with thin intervals of siltstone or, rarely, beds of very fine-grained glauconitic sandstone or maroon to green shale. The fine-grained, glauconitic sandstone and shale of the Franconia becomes dolomitic in central and eastern Carver County, where the two units are distinguishable only by the higher glauconite content of the Franconia. Fine-to medium-grained quartzose sandstone with minor amounts of white or light-colored shale forms the upper part of the Franconia in parts of the north and west. The depth to bedrock in the vicinity of the study area is approximately 200 feet to 250 feet below land surface.

Carver County Soils

Soil types located within the study area north of the river (Carver County) include:

1. Medium-textured to moderately fine textured deep soils on rolling topography, including the Lester-Hayden-Peat association in the uplands;

2. Deep, medium-textured to moderately fine textured soils on strong rolling to hilly topography, including the Hayden-Lester-Peat association in the uplands;

3. Moderately deep to shallow medium-textured soils over sand and gravel on nearly level to strongly rolling topography, including the Fairhaven-Kasota-Estherville association found on outwash terraces above the Minnesota River;

4. Coarse-textured to medium-textured soils on very steep slopes, including the Salida-Haden association found on hills and bluffs; and

5. Chiefly medium-textured to moderately fine textured soils, including the Alluvial land-Chaska-Oshawa association found on the floodplains along the Minnesota River.

7.4.2 Environmental Consequences

No Build Alternative

No impacts to the soils and geology of the study area would be expected from the No-Build Alternative as land disturbing activities would not result in disturbance of steep slopes or highly erodible soils.

Build Alternatives

Each of the Build Alternatives would require excavation in the vicinity of and /or disturbance to steep river bluffs. Disturbances to the vegetative cover that occur during construction could result in erosion of temporarily bare soils. Erosion of the river bluffs is of special concern because eroded sediment could be washed into the Minnesota River, or other surrounding water bodies.

All alternatives intersect the Hubbard-Estherville-Dakota-Waukegan-Zimmerman association and Dorchester-Oshawa-Mixed alluvium association.

All the alternatives cross the alluvial land-Chaska-Oshawa association found along the Minnesota River. All the alternatives also cross the Salida-Haden association, which is known for very steep soils on hills and bluffs. All the alternatives cross the Lester-Hayden-Peat and Hayden-Lester-Peat soil associations.

The main concern when dealing with erodible soils and steep slopes in the study area are areas where highly erodible soils and steep slopes join to create conditions that can cause erosion

issues if vegetation is removed. Table 7-11 summarizes the impacts on erodible soils. Impacts are presented in lengths for a 300-foot corridor width for each Build alternative. As noted elsewhere in this document, this is a worst-case planning level width. The discussion by alternative below provides additional detail.

TABLE 7-11
POTENTIAL EROSION IMPACTS

Alternative	Scott County[1]	Carver County[1]	Total Length of Crossing[1]
W-2	430 ft. (3.0 acres.) – PHEL[2]	120 ft. (0.8 acres) – steep HEL	550 ft. (3.8 acres) [3]
C-2	250 ft. (1.7 acres.) – steep HEL	1,700 ft. (11.7 acres) – steep HEL	1,950 ft. (13.4 acres)
C-2A	350 ft. (2.4 acres) – PHEL	4,630 ft. (31.9 acres) – steep HEL	5,430 ft. (34.3 acres)
E-1	700 ft. (4.8 acres) – steep HEL	2,300 ft. (15.8 acres) – steep HEL	3,000 ft. (20.6 acres)
E-1A	700 ft. (4.8 acres) – steep HEL	4,000 ft. (27.5 acres) – steep HEL	4,700 ft. (32.3 acres)
E-2	0 ft. (0 acres)	2,610 ft. (18.0 acres) – steep HEL	2,700 ft. (18.0 acres)

(1) See discussion below for assumptions about where steep slopes/erodible soils would likely be bridged and are therefore not included in total.
(2) Abbreviations – (potentially) Highly Erodible Soil ([P] HEL).
(3) Plus impacts from two bridge piers.

Alternative W-2

In Scott County, Alternative W-2 the bridge would be elevated over a narrow stretch of steep slopes and highly erodible soils at the river's edge, where it appears possible to span the area with no placement of bridge piers. As the bridge intersects with the land along the higher bluffs, with the approaches to the US 169 interchange, a 430-foot length of potentially highly erodible soils is crossed. This poses the potential for soil erosion with construction in this area.

In Carver County, Alternative W-2 crosses approximately 475 feet of steep slopes (up to 18%) and highly erodible and potentially highly erodible soils where the river valley rises. In this location, however, the bridge may still be elevated, thereby minimizing disturbance of the slopes and soils with placement of two bridge piers. Further up the bluffs, where the bridge would make landfall and begin the approaches to the New US 212 interchange, it crosses 120 feet of steep slopes (up to 18%) and highly erodible soils. Construction in this location poses a severe risk of soil erosion.

Alternative C-2

In Scott County, as the river valley starts to rise, Alternative C-2 passes over a narrow stretch of the steepest slopes, classified in the 12-18 percent range, and the most highly erodible soil. At this location, however, the bridge would still be elevated, and only one bridge pier may be placed in this location. Where the river valley rises once again up to the location with the US 169 interchange, the bridge and ramps would intersect a length of 250 feet of steep (up to 18%) slopes and highly erodible soils. Construction in this location poses a severe risk of soil erosion.

In Carver County, as the bluffs rise out of the river valley, Alternative C-2 cuts into the bluff across a length of 1,700 feet of highly erodible soil and steep slopes (up to 18%). Construction of the bridge in this location, making landfall in the highly erodible soils, poses a severe risk of soil erosion.

Alternative C-2A

In Scott County, Alternative C-2A crosses a very narrow strip of steep slopes and highly erodible soils at the river's edge. The bridge would be elevated in this location, and bridge piers could span erodible slopes in this location. Closer to the US 169 interchange, the bridge makes landfall and splits for the approaches to the interchange across approximately 350 feet of potentially highly erodible soils. The potential for soil erosion exists with construction in this location.

In Carver County, Alternative C-2A crosses over 450 feet of steep slopes (up to 18%) and potentially highly erodible soils, posing a high risk for soil erosion. Once the bridge makes landfall, and turns to the north, it would cross over moderate slopes and potentially highly erodible soils, posing some risk for soil erosion. However, once the alignment reaches the Chaska Creek ravine, it cuts through 4,630 feet of steep slopes (up to 18%) and highly erodible soils along the entire ravine. This poses a severe risk of soil erosion and slope failure.

Alternative E-1

In Scott County, Alternative E-1 is elevated over a narrow strip of steep slopes (up to 18%) and highly erodible soils, where bridge piers can span this stretch. As the bridge makes landfall and begins the approach to the US 169 interchange, it crosses 700 feet of steep slopes and highly erodible soils. Construction in this location poses a severe risk of soil erosion.

In Carver County, Alternative E-1 remains elevated over potentially erodible soils. However, at the intersection with the bluffs above the river valley, the approaches to the New US 212 cut through 2,300 feet of steep slopes (up to 18%) and highly erodible soils. Construction in this area poses a severe risk of soil erosion.

Alternative E-1A

In Scott County, Alternative E-1A is elevated over a 780-foot length of steep slopes (up to 18%) and highly erodible soils. Bridge piers will not be located within these areas. As the bridge makes landfall and begins the approach to the US 169 interchange, it crosses 700 feet of steep slopes and highly erodible soils. Construction in this location poses a severe risk of soil erosion.

In Carver County, once Alternative E-1A turns into the bluffs above the Minnesota River, it cuts through approximately 4,000 feet of steep slopes (up to 18%) within highly erodible soils. Potential for soil erosion and slope failure is severe with construction in this location.

Alternative E-2

In Scott County, Alternative E-2 is elevated over a 150-foot width of steep slopes (up to 18%) and highly erodible soils. Bridge piers can be spaced so none are located within these areas. As

the bridge makes landfall and begins the approach to the US 169 interchange, it crosses only potentially highly erodible soils. Construction in this location poses the potential for soil erosion.

In Carver County, once Alternative E-2 cuts into the bluffs above the Minnesota River through 2,000 feet of steep slopes (up to 18%) and highly erodible soils. In addition, the easternmost interchange with New US 212 would cut across 610 feet of highly erodible soils on steep slopes adjacent to Bluff Creek. Potential for soil erosion and slope failure is severe with construction in these locations.

7.4.3 Mitigation

The proposed road profiles have been designed to minimize disturbances to steep bluffs. As the design of a Preferred Alternative is carried forward, it will be further refined to avoid and minimize impacts to steep slopes and organic soils.

Best management practices (BMPs) such as erosion control blankets, fast growing cover crops and silt fencing (similar to those outlined in the MPCA's manual "Protecting Water Quality in Urban Areas") would be implemented in accordance with the National Pollutant Discharge Elimination System (NPDES) permit which is required for this project. After construction is complete, disturbed areas would be re-vegetated to control erosion on a permanent basis.

Correction of organic soils is minimized by avoiding wetland areas as described in Section 9.6. If organic soil correction is needed, methods such as compaction (surcharging) and the use of lightweight fill would be elevated to minimize disturbance to the soil and surrounding wetlands. Timing of construction during winter, when soils are frozen, may also help to minimize impacts to the wetlands.

7.5 WILD AND SCENIC RIVERS

7.5.1 Regulatory Overview

7.5.1.1 Federal

The Wild and Scenic Rivers Act, (Pub. L. 90-542 as amended; 16 U.S.C. 1271-1287) established a method for providing Federal protection for certain of our country's remaining free-flowing rivers, preserving them and their immediate environments for the use and enjoyment of present and future generations. Rivers are included in the system so that they may benefit from the protective management and control of development for which the Act provides. The National Park Service (NPS) is the agency responsible for implementation of this Act. In October of 1968, the Wild and Scenic Rivers Act pronounced,

> *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values, shall be*

preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dams and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

At this time, the Minnesota River is not listed as a National Wild and Scenic River, but rather is listed as a candidate for potential Wild and Scenic River designation.

According to the Regional Wild and Scenic Rivers Specialist with the NPS, Midwest Region, the entire segment of the Minnesota River in the study area is listed on the Nationwide Rivers Inventory (NRI) prepared by the NPS. The NRI is a register of rivers that may be eligible for inclusion in the National Wild and Scenic River System. These rivers were included on the NRI based on the degree to which they are free-flowing, the degree to which the rivers and their corridors are undeveloped, and the outstanding natural and cultural characteristics of the rivers and their immediate environments. The Minnesota River was listed on the NRI because of its free-flowing condition and outstanding scenic, recreational, wildlife and historic values.

The intent of the NRI is to provide information to assist in making balanced decisions regarding use of the nation's river resources. A Presidential directive and subsequent instructions issued by the Council on Environmental Quality required that each Federal agency, as part of its normal planning and environmental review processes, take care to avoid or mitigate adverse effects on rivers identified in the NRI. Further, all agencies are required to consult with NPS prior to taking actions that could effectively foreclose wild, scenic, or recreational status for rivers on the inventory.

The Wild and Scenic Rivers Act provides that a river may be added to the National Wild and Scenic Rivers System or through the authority granted to the Secretary of the Interior. To be eligible for inclusion in the system through either method, rivers must meet certain criteria set forth in the Act.

7.5.1.2 State

Procedures for proposing State-administered rivers for designation have also been issued by the Department of the Interior. Minnesota Statutes 103F.301-103F.345 (the Minnesota State Wild and Scenic Rivers Act) designates the MnDNR as the agency responsible for state-designated Wild and Scenic Rivers. Upstream of Chaska, the Minnesota River from Lac Qui Parle to Franklin, is listed as a state Wild and Scenic River. However, the segment of the river within the study area is not. As described in Section 8.1.1, this segment of the Minnesota River is a State-designated Canoe and Boating Route.

7.5.2 Affected Environment

This section of the Minnesota River is not impacted or restricted by dams and provides a relatively natural setting through which it flows. As stated above, the Minnesota River was

listed on the NRI because of its free-flowing condition and outstanding scenic, recreational, wildlife and historic values. Also as noted, the Minnesota River is not designated as a National Wild and Scenic River but is a candidate for potential Wild and Scenic River designation. Finally, as noted, it is a state-designated Canoe and Boating route.

7.5.3 Environmental Consequences

The NPS was consulted with regard to NRI and potential Wild and Scenic River designation for the proposed project. The NPS did not comment specifically about potential impacts but rather advised on considerations as the project proceeds.

No-Build

The No-Build alternative would have no impact upon the Minnesota River's candidacy as a potential Wild and Scenic River or its function as a Canoe and Boating route.

Build Alternatives

All of the Build Alternatives would have a similar impact upon the setting of this stretch of the Minnesota River. While no structures, aside from bridge piers if placed within the river channel, would change the free-flowing condition of the river, the construction of a bridge would have an impact upon the scenic value of this section of the river. Additional impacts upon the wildlife and historic values of the river are discussed in Sections 7.1 and 10 respectively, and if any of these impacts are considered adverse, they must be mitigated. Impacts upon the recreational value of this stretch of the river are varied depending upon the recreational use in consideration. Canoeing and fishing activities would not be directly impacted, as the free-flowing condition of the river would not be changed. However, wildlife viewing and similar nature-based activities may be impacted with the introduction of a bridge span across the river.

Alternative W-2

In addition to the general comments above, Alternative W-2 would specifically affect the recreational uses of the river at the MVNWR Chaska Unit with the introduction of a bridge span overhead.

Alternative C-2

Alternative C-2 would have a very minimal impact upon the scenic, recreational, wildlife and historic values of this stretch of the river, because it is very close to the existing TH 41 bridge span and the development of nearby downtown Chaska.

Alternative C-2A

Alternative C-2A would specifically affect the recreational uses of the river at the MVNWR Chaska Unit with the introduction of a bridge span overhead.

Alternatives E-1 and E-1A

Both Alternative E-1 and Alternative E-1A cross the Minnesota River at the same location, so their impacts would be identical. These alternatives would specifically affect the recreational uses of the river this location of a crossing because of the introduction of a bridge span overhead.

Alternative E-2

Alternative E-2 would specifically affect the recreational uses of the river at this location because of the introduction of a bridge span overhead.

The NPS will review project plans for the preferred alternative to provide guidance in reducing impacts to the river and its candidacy for listing as a Wild and Scenic River. Generally, NPS recommends measures to avoid and minimize impacts to the values provided by this river in accordance with the Wild and Scenic Rivers Act.

7.5.4 Mitigation

Mitigation of impacts to a river listed on the NRI includes incorporating features into the design of the preferred alternative to further minimize visual impacts to riverway users. Some of these design features could include:

- Minimizing scale of the bridge;
- Minimizing vegetation disruption;
- Minimizing bluff cuts and other erosion/sedimentation sources; and
- Incorporation of aesthetic features in bridge design to make it more visually pleasing.

8.0 PARKS, TRAILS, RECREATIONAL AREAS AND NATURAL AREAS/SECTION 4(F)/SECTION 6(F)

This Chapter provides information about public recreational and natural resource areas, trails, and parks within the study area as designated by Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303, 23 USC 138) and Section 6(f) of the Land and Water Conservation Fund Act of 1965 (16 USC 2509) (LAWCON). Draft Section 4(f) and 6(f) Evaluations for specific resources are provided in Appendix B and referenced where appropriate in this chapter.

With each of the six Build alternatives and the No-Build alternative, the primary recreational resource affected is the Minnesota River. The Minnesota River is not designated as a Wild and Scenic River. The segment of the river within the study area is listed on the Nationwide Rivers Inventory, prepared by the National Park Service, which is a register of rivers that may be eligible for inclusion in the National Wild and Scenic River System. The Minnesota River was listed because of its free-flowing condition and outstanding scenic, recreational, wildlife and historic values. In addition to the river, there are several other recreational facilities within the corridors. Following is a description of these resources and potential impacts that may result from the Build alternatives as well as potential mitigation measures to minimize impacts.

8.1 AFFECTED ENVIRONMENT

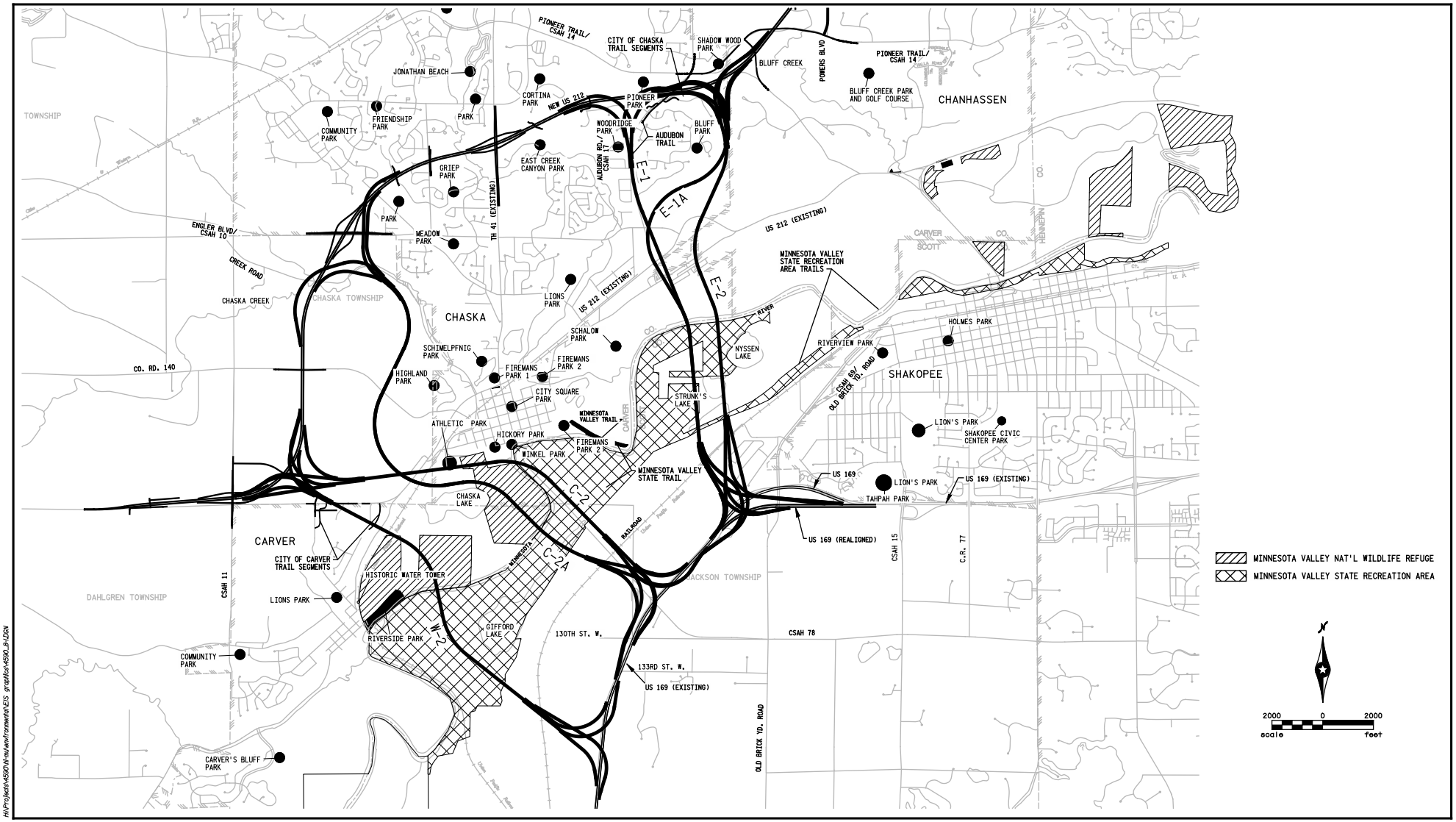
Resources will be presented as they relate to Section 4(f) and Section 6(f) classifications for the No-Build and six Build alternatives. A total of 36 parks, public recreational facilities and wildlife refuge were considered in the evaluation; Figure 8-1 shows the location of these resources. Information about park facility usage and plans was provided by City, County and State agency staff.

8.1.1 Resources in the Vicinity of the Existing TH 41 (No-Build) Corridor

Minnesota Valley National Wildlife Refuge

According to its website, the Minnesota Valley National Wildlife Refuge (MVNWR) is one of four urban wildlife refuges in the nation. It was established in 1976 and is managed by the U.S. Fish and Wildlife Service (USFWS). Its objective is to preserve and protect wildlife and wildlife habitat and to provide opportunities for wildlife-oriented recreation and education. The Refuge is home to many animals such as the bald eagle and is a crucial corridor for migrating birds. The MVNWR consists of eight non-contiguous units that stretch 34 miles from Fort Snelling to the City of Jordan. The Chaska Unit is within the study area and is located in the northeastern part of the City of Carver and the extreme southwest part of the City of Chaska. This 600-acre unit consists of marsh-edged lake surrounded by farmland and floodplain forest.

A hiking and biking trail runs through the Refuge, with a trailhead in Riverside Park in the City of Carver. According to City of Carver staff, the trail receives moderate use. According to City of Chaska staff, a trailhead is planned at Athletic Park in the City of Chaska in the next few years. The MVNWR has received (LAWCON) funding and is therefore subject to Section 6(f) requirements.



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PUBLIC RECREATIONAL FACILITIES

Figure 8-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

Minnesota River

The Minnesota River is a tributary of the Mississippi River, approximately 332 miles long. The Minnesota River drains a watershed of nearly 17,000 square miles in Minnesota and about 2,000 square miles in South Dakota and Iowa. It flows through the study area Cities of Carver, Chaska, Shakopee, and Chanhassen. It joins the Mississippi River south of the Twin Cities near historic Fort Snelling. The river is used recreationally for boating, canoeing, and fishing.

This segment of the Minnesota River is designated by the Minnesota Department of Natural Resources (MnDNR) as a "Canoe and Boating Route." This is a recreational designation. The river itself is the route; therefore no route is shown on a map. There are no restrictions associated with this designation, however the MnDNR staff would review construction plans to ensure that there is an adequate channel for boat passage both during and after construction. If such a passage cannot be preserved, provisions for a portage would likely be created. Whenever a new bridge is constructed with federal or state funds the MnDNR requests that there be consideration given to providing additional access (watercraft and off-street parking) if no such access is already available in the area. Note that Section 4(f) only applies to rivers on the National Wild and Scenic River system; as described in Section 7.5, this segment of the Minnesota River is not on the National Wild and Scenic River system.

Minnesota Valley State Recreation Area

The portion of the Minnesota Valley State Recreation Area (MVSRA) in the study area runs from the City of Carver on the south end through the City of Chanhassen on the north end. Set in the Minnesota River Valley, it is an important resource to residents of the Twin Cites metropolitan area and is known for its rich environmental qualities including many different plant and animal communities ranging from fens and wetlands to floodplain forest and blufftop oak savanna. The Nyssen's Lake Area offers trail access for snowmobiling, horseback riding, mountain biking, and hiking. The Gifford Lake Area offers fishing and trail access. Three boat ramp facilities and parking are within the affected area. More than 170,000 people visit the MVSRA annually. The MVSRA has received LAWCON funding and is therefore subject to Section 6(f) requirements.

Minnesota Valley State Trail

The Minnesota Valley State Trail (MV Trail) in the MVSRA runs through the study area and offers recreational opportunities for biking, hiking, snowmobiling, and horseback riding. The five-mile paved trail, referred to as the Chaska/Shakopee Bike Trail, runs from the former Milwaukee Railroad right of way near the Carver County Courthouse area in Chaska to Murphy's Landing in Shakopee. When reconstruction of the existing TH 41 river bridge is complete in 2007 it will restore the MV Trail connection between the City of Chaska and Murphy's Landing in the City of Shakopee. This trail river crossing is being restored after a deteriorated bridge crossing was removed by the MnDNR in 1997.

The north end of the MnDNR Carver Rapids Wayside recreation area is located directly south of Chaska across the Minnesota River. The MnDNR has developed a horse, mountain bike, and snowmobile trail from Chaska upriver to Belle Plaine. The northerly trailhead is located on the east side of existing TH 41 about one-half mile south of the Minnesota River/Chaska city limits.

The MV Trail has received LAWCON funding and is therefore subject to Section 6(f) requirements.

Winkel Park

Winkel Park, 220 Pine Street in Chaska, is located on the north shore of the Minnesota River just west of northbound TH 41 at the entrance into downtown Chaska. This 4-acre neighborhood park is owned and managed by the City of Chaska. It is a trailhead and provides boat launching facilities and off-street parking. It receives moderate use. No restrooms, play or picnic facilities are present. Winkel Park has received LAWCON funding and is therefore subject to Section 6(f) requirements.

Hickory Park

Hickory Park, 120 Hickory Street in Chaska, is located just west of Winkel Park. This half-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

City Square Park

City Square Park, 300 Chestnut Street in Chaska, is located in downtown Chaska on the east side of existing TH 41 and south of existing US 212. This 2-acre community park is owned and managed by the City of Chaska. It provides a gazebo and picnic tables and is used primarily as a gathering place for concerts, weddings and picnics. No off-street parking or restroom facilities are present.

Firemen's Park I

Firemen's Park I, 260 Highway 212 in Chaska, is located at the northwest corner of existing TH 41 and existing US 212. This 6-acre community park is owned and managed by the City of Chaska. It is a trailhead and offers open space, picnic areas, access to a swimming beach, off-street parking and restrooms. It receives moderate use. Fireman's Park I has received LAWCON funding and is therefore subject to Section 6(f) requirements.

Schimelpfnig Park

Schimelpfnig Park, 419 Creek Road in Chaska, is located northwest of the existing TH 41 and existing US 212 intersection. This 2-acre neighborhood park is owned and managed by the City of Chaska and offers open space, picnic areas, off-street parking and restrooms. It receives moderate use.

Chaska Elementary School and Chaska Middle School

Chaska Elementary School, 1800 Chestnut Street, Chaska Middle School East, 1600 Park Ridge Drive, and Chaska Middle School West, 140 Engler Boulevard in Chaska, are located on a combined campus at the intersection of Engler Boulevard/CSAH 10 and TH 41. Outdoor recreational facilities open to the public include five ball fields, eight multi-purpose fields and a playground structure. The fields are in high demand after school hours and are fully scheduled, April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

Chaska Community Park and Chaska Community Center

Chaska Community Park and Community Center, 1441 Park Ridge Drive in Chaska, are located on the north side of Engler Boulevard/CSAH 10 east of the intersection of Engler Boulevard and TH 41. This 31-acre neighborhood park and community center is owned and managed by the City of Chaska and provides a play structure and picnic tables. The Community Center features a performing arts theater and two hockey rinks; it serves as a community gathering place.

8.1.2 Resources Common to the Six Build Alternatives

Previously-Described Resources

- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.

8.1.3 Resources in the Alternative W-2 Area

Previously-Described Resources

- Minnesota River as identified in 8.1.1
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- Minnesota Valley National Wildlife Refuge (MVNWR) as identified in 8.1.3.

Riverside Park

Riverside Park, 300 Main Street in Carver, is located on the northern shore of the Minnesota River, east of the Historic Water Tower (discussed in Chapter 10). This 18-acre park is owned by the City of Carver and managed by the USFWS. Its primary use is for boat launching; it provides a trailhead for the MVNWR trail system. The City is considering offering primitive camping. No potable water, picnic or restroom facilities are present. According to City of Carver staff, the park hosts a horseshoe tournament once a year. Riverside Park has received LAWCON funding and is therefore subject to Section 6(f) requirements.

Depot Park

Depot Park, 308 County Road East in Carver, is located at the site of the Historic Water Tower. This half-acre park is owned and managed by the City of Carver. Facilities include a picnic shelter and off-street parking. A caboose on site is planned to be used as a future visitor center.

Lions Park – Carver

Lions Park, 700 Lime Street in Carver, is located west of the Historic Water Tower. This 4-acre park is owned and managed by the City of Carver. Facilities include a pavilion, athletic field, playground equipment and restrooms. It is used primarily for picnics and play.

Trails in the City of Carver

The City of Carver owns and manages a system of trails and intends to connect them to the MVNWR trails where appropriate. Within the project area, there is an existing trail that extends south from existing US 212 approximately 1,000 feet, and a trail that is being constructed that extends south from existing New US 212 along Spring Creek Drive. The City plans include a future trail along the UPRR rail corridor from the river to existing US 212 and a future trail along existing US 212 between the UPRR rail corridor trail and the existing City trail at Spring Creek Drive.

8.1.4 Resources in the Alternative C-2 Area

Previously-Described Resources

- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- Minnesota Valley National Wildlife Refuge (MVNWR) as identified in 8.1.3.
- Winkel Park as identified in 8.1.1.
- Hickory Park as identified in 8.1.1.
- City of Carver Trail along Spring Creek Drive.

Athletic Park

Athletic Park, 725 West First Street in Chaska, is located north of Chaska Lake and west of the MVNWR. This 8-acre community park is owned and managed by the City of Chaska. Facilities include a ball field, grandstand with a capacity of 1,000, concession stand, lights, restrooms and off-street parking. This park is used heavily by high school ball teams and adult municipal ball teams. The site is subject to periodic flooding in the spring.

Trails in the City of Chaska

The City of Chaska owns and manages a network of trails. The network consists of greenway trails (leisure and recreation trails which primarily parallel the watershed system of East Chaska Creek leading to the University of Minnesota Arboretum) and roadway trails (destination trails that interconnect most of Chaska's major public facilities and service centers).

Creek Road in Chaska is scheduled to be converted to a City-owned trail in conjunction with the Heights of Chaska development (described in Chapter 5). The Metropolitan Council has plans to connect this trail with a proposed Victoria-to-Chaska Regional Trail (Carver Regional Park to Minnesota Valley State Trail – generally located on existing CR 11). Conversion is planned to occur when CR 11 is upgraded, sometime in the next five to ten years, according to City of Chaska staff.

8.1.5 Resources in the Alternative C-2A Area

Previously-Described Resources

- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- Minnesota Valley National Wildlife Refuge (MVNWR) as identified in 8.1.3.
- Athletic Park as identified in 8.1.4.
- Trails in the City of Chaska as identified in 8.1.4

Highland Park

Highland Park, 421 Tupelo Way in Chaska, is located about one-half mile northwest of Chaska City Hall. This 1-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

Meadow Park

Meadow Park, 305 Engler Boulevard in Chaska, is located on the south side of Engler Boulevard just west of TH 41. This 3-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

Municipal Services Building Open Space Area

Municipal Services Building Open Space Area, located northwest of the Municipal Services building in Chaska, is owned by the City of Chaska. This open space will be developed into a park once construction of New US 212 is complete. A sports facility is planned, with ball fields, off-street parking, restrooms and lights. Anticipated future use is heavy.

Griep Park

Griep Park, 317 Groves Drive in Chaska, is located about one-quarter mile northwest of the intersection of TH 41 and Engler Boulevard/CSAH 10. This City of Chaska property is currently maintained as open space. The future 1-acre neighborhood park planned for the site will be developed as nearby residential development occurs. A play structure and picnic tables are planned. Future anticipated use is light. No off-street parking or restroom facilities are planned.

8.1.6 Resources in the Alternative E-1 Area

Previously-Described Resources

- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- Trails in the City of Chaska as identified in 8.1.4.

Tahpah Park

Tahpah Park, 1490 Adams Street in Shakopee, is located at the northwest corner of US 169 and CSAH 15. This 50-acre park is owned and operated by the City of Shakopee and provides a sports field, baseball stadium, concession stand and trails. Tahpah Park received LAWCON funding and is therefore subject to Section 6(f) requirements.

Lions Park – Shakopee

Lions Park, 1099 Adams Street in Shakopee, is located on CSAH 15, about one-quarter mile north of US 169. This 50-acre park is owned and managed by the City of Shakopee and provides a youth building, aquatic park, warming house, picnic shelters, trails and restrooms.

Tahpah-Lions trail runs through the park. The trail received LAWCON funding and is therefore subject to Section 6(f) requirements.

East Creek Trail in the City of Chaska

The East Creek Trail follows the East Creek flood channel in the City of Chaska from the river northward past existing US 212 near Audubon Road. The trail received LAWCON funding and is therefore subject to Section 6(f) requirements.

The Hennepin County Southwest Regional Light Rail Transit Trail

The Hennepin County Southwest Regional Light Rail Transit Trail is a 27-mile trail that follows abandoned railroad beds, and consists of two corridors between Hopkins and Victoria and between Hopkins and Chanhassen. The corridor between Hopkins and Chanhassen is in the study area. The trail is owned by the Hennepin County Regional Rail Authority (HCRRA) and

is designed for non-motorized uses, such as bicycling, hiking, jogging, walking and cross-country skiing. The corridors were acquired by the HCRRA for future light rail transit use. A cooperative agreement between HCRRA and Three Rivers Park District allows the corridors to be used for interim recreational purposes.

The trail extends into Carver County and runs somewhat parallel to existing US 212. The City of Chanhassen manages the stretch from the trailhead near Bluff Creek Road westerly to its border with Chaska a distance of approximately two miles. The trail continues into the City of Chaska about one block to existing US 212 where it terminates. The City of Chaska has plans to extend the trail into downtown Chaska, according to City staff. According to City of Chanhassen staff, the trail is very popular and receives extensive use, although the lack of a connection to Chaska's trails creates limited use of the segment west of Bluff Creek Road.

Schalow Park

Schalow Park, 865 Mallory Lane in Chaska, is located about one-quarter mile northeast of downtown Chaska. This 3-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

Lions Park – Chaska

Lions Park, 1300 Crosstown Boulevard in Chaska, is located in a residential area east of TH 41 and south of Engler Boulevard/CSAH 10. This 26-acre community park and sports facility provides three ball fields, play structure, concession stand, restrooms, lights and off-street parking. Lions Park has received LAWCON funding and is therefore subject to Section 6(f) requirements.

City of Chaska Trails – Audubon Trail

The City of Chaska owns and operates a trail, known as Audubon Trail that is parallel to Audubon Road, running south-north near the border with the City of Chanhassen between Engler Boulevard/CSAH 10 on the south and Lyman Boulevard/CSAH 18 on the north. The trail is about 2.5 miles in length.

Wood Ridge Park

Wood Ridge Park, 685 August Drive in Chaska, is located in a residential neighborhood west of Audubon Road and south of Pioneer Trail/CSAH 14. This 1-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

Bluff Park

Bluff Park, 1140 Ridge Bluff Drive in Chaska, is located in a residential neighborhood east of Audubon Road and south of Pioneer Trail/CSAH 14. This 8-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

Pioneer Park/Chaska Senor High School/Pioneer Ridge Freshman Center Complex

Pioneer Park, 545 Pioneer Trail in Chaska, is located on the south side of Pioneer Trail/ CSAH 14 between Chaska Senior High School and Pioneer Ridge Freshman Center. This community park is used primarily for outdoor sporting activities by students at the adjacent schools and by municipal athletic groups in the evenings and on weekends. Park facilities include six tennis courts, six multi-purpose/ball fields, a picnic shelter, and play structure. Portable restroom facilities are present. The majority of what is called "Pioneer Park" is owned and maintained by School District 112. About 10 acres of the park are owned by the City of Chaska – two acres west of the high school building and eight acres west of Pioneer Ridge Freshman Center. The fields are in high demand after school hours and are fully scheduled, April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

Chaska Senior High School, 545 Pioneer Trail, is located on the south side of Pioneer Trail/CSAH 14 east of TH 41. The property is owned and maintained by School District 112. Outdoor recreational facilities open to the public include ball fields, multi-purpose fields and tennis courts. The track and football field are not open to the public for recreational purposes. The fields are in high demand after school hours and are fully scheduled, April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

Pioneer Ridge Freshman Center, 1085 Pioneer Trail, is located on the south side of Pioneer Trail/ CSAH 14 east of TH 41. The property is owned and maintained by School District 112. Outdoor recreational facilities open to the public include ball fields, multi-purpose fields and tennis courts. The fields are in high demand after school hours and are fully scheduled, April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

City of Chanhassen Trails

The City of Chanhassen has proposed two trails in the vicinity of Alternatives E-1A and E-2: one running west-east beginning at the City's western border with Chaska at Pioneer Trail/ CSAH 14; the second running along Battle Creek Drive. These proposed trails will be constructed in conjunction with future road and/or subdivision improvements.

8.1.7 Resources in the Alternative E-1A Area

Previously-Described Resources

- Tahpah Park as identified in 8.1.6.
- Lions Park – Shakopee as identified in 8.1.6.
- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.

- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- East Creek Trail in the City of Chaska as identified in 8.1.6.
- Hennepin County Southwest Regional LRT Trail as identified in 8.1.6.
- Schalow Park as identified in 8.1.6.
- Lions Park – Shakopee as identified in 8.1.6.
- Bluff Park as identified in 8.1.6.
- Audubon Trail as identified in 8.1.6.
- Trails in the City of Chaska as identified in 8.1.4.
- Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex as identified in 8.1.6.
- City of Chanhassen Trails as identified in 8.1.6.

Shadow Wood Park

Shadow Wood Park, 2666 Shadow Wood Drive in Chaska, is located just east of the Audubon Road and Pioneer Trail/CSAH 14 intersection. This 2-acre neighborhood park is owned and managed by the City of Chaska. It provides a play structure and picnic tables. It receives light use. No off-street parking or restroom facilities are present.

8.1.8 Resources in the Alternative E-2 Area

Previously-Described Resources

- Tahpah Park as identified in 8.1.6.
- Lions Park – Shakopee as identified in 8.1.6.
- Minnesota River as identified in 8.1.1.
- Minnesota Valley State Recreation Area (MVSRA) as identified in 8.1.1.
- Minnesota Valley State Trail (MV Trail) as identified in 8.1.1.
- East Creek Trail in the City of Chaska as identified in 8.1.6.
- Hennepin County Southwest Regional LRT Trail as identified in 8.1.6.
- Bluff Park as identified in 8.1.6.
- Audubon Trail as identified in 8.1.6.
- Trails in the City of Chaska as identified in 8.1.4.
- Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex as identified in 8.1.6.
- Shadow Wood Park as identified in 8.1.6.
- City of Chanhassen Trails as identified in 8.1.6.

8.2 ENVIRONMENTAL CONSEQUENCES

As shown on Figure 8-1, a number of parks, recreation areas and refuge are located in the study area. Of these, the following would be affected by one or more of the proposed Build alternatives: Minnesota Valley State Recreation Area, Minnesota Valley State Trail, Minnesota Valley National Wildlife Refuge, Athletic Park, Audubon Trail, and Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center complex and trail segments in the City of Chaska system of trails. Potential for acquisition or other "use" of these resources for any of the proposed alternatives is described in the Draft Section 4(f) Evaluation that has been completed for each of the Section 4(f) resources listed (See Appendix B. The Draft Section 4(f) Evaluation also addresses historic sites, which are discussed in Chapter 10.). This chapter summarizes information on "use" as the term is applied to Section 4(f), as well as potential for other impacts on these resources. Impacts to the Minnesota Valley State Trail (MV Trail) are combined with those of the Minnesota Valley State Recreation Area (MVSRA) because the MV Trail is located within the MVSRA.

8.2.1 No-Build Alternative

The No-Build alternative would result in increased daily traffic volumes and congestion on TH 41 as compared to Build conditions, particularly in downtown Chaska where noise and vibration pose serious quality of life concerns that could affect the use and enjoyment of Winkel Park, City Square Park, and Fireman's Park I.

8.2.2 Build Alternatives

Each of the six Build alternatives would impact the Minnesota River, which is a Canoe and Boating route, the MVSRA and the MV Trail as land would need to be acquired or easements granted to cross the river, recreation area, and trails. The MVSRA and MV Trail have received LAWCON funding and are subject to provisions of Section 6(f). New TH 41, as it crosses the river, MVSRA, and MV Trail, would be a bridge and its supporting piers. The amount of land required for each of the six Build alternatives is discussed in the appropriate sections below. In all cases, noise would be substantially higher under Build conditions as compared to No-Build conditions. These resources would also be affected by visual impacts discussed in Chapter 6, impacts to vegetation discussed in Chapter 7, and water resource impacts discussed in Chapter 9.

8.2.2.1 Alternative W-2

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 51.0 acres, as follows:

- MVNWR – 20.4 acres
- MVSRA/MV Trail – 30.6 acres (Section 6[f])

It is assumed that refinements in the design of Alternative W-2 will allow for grade-separation from the existing City of Carver trail that extends from US 212 (along Lano Lane) south to Skyview Drive, as well as complete avoidance of the other existing and future City of Carver trails in the study area.

The bridge crossing would be approximately 60 feet above the river and would be visible from the river, MVSRA, MV Trail and MVNWR as well as from Riverside, Lions, and Depot parks in the City of Carver.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptors in the Refuge (R16), and along the river (R18). The change in decibel level in the Refuge is 21 dBA (from 47 to 68) and 27 dBA (from 54 to 81) along the river.

8.2.2.2 Alternative C-2

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 34.3 acres, as follows:

- MVNWR – 8.5 acres
- MVSRA/MV Trail – 22.3 acres (Section 6[f])
- Athletic Park – 3.5 acres (It is possible that the entire 8-acre site would need to be acquired if the remaining portion would not be useable as a ballfield or other recreational use such as a soccer field.)

The bridge crossing would be approximately 60 feet above the river and would be visible from the river, MVSRA, MV Trail and MVNWR as well as from Athletic, Winkel and Hickory parks in the City of Chaska. Access to MVSRA from existing TH 41 may experience temporary impacts during construction, but access would be maintained.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptor in the MVSRA (R14). The change in decibel level is 6 dBA (from 58 to 64).

8.2.2.3 Alternative C-2A

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 41.5 acres, as follows:

- MVNWR – 36.1 acres
- MVSRA/MV Trail – 5.4 acres (Section 6[f])

The bridge crossing would be approximately 75 feet above the river and would be visible from the river, MVSRA, MV Trail and MVNWR as well as from Winkel, Hickory and Athletic parks in the City of Chaska. The planned park near the connection with New US 212 would likely be impacted by noise and views.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptors in the Refuge (R13), and the MVSRA (R19). The change in decibel level in the Refuge is 18 dBA (from 55 to 73) and 9 dBA (from 58 to 67) in the MVSRA.

8.2.2.4 Alternative E-1

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 22.4 acres (does not include impact to Audubon Trail or City of Chaska trail segments), as follows:

- MVSRA/MV TRAIL – 12.0 acres (Section 6[f])
- Audubon Trail – approximately 7,200 linear feet (1.4 miles; 1.32 acres) (would be reconstructed as part of Audubon Road realignment)
- Pioneer Park/Chaska High School/ Pioneer Ridge Freshman Center complex – 10.4 acres
- City of Chaska Trail Segments south of New US 212 (near the Pioneer Park/ Chaska High School/Pioneer Ridge Freshman Center complex – approximately 3,000 linear feet (0.55 acre) of easterly segment; approximately 1,200 linear feet (0.22 acre) of westerly segment

The bridge crossing would be approximately 65 feet above the river and would be visible from the river, MVSRA and MV Trail. The New TH 41/US 169 interchange area may be visible from the easternmost area of Tahpah Park in the City of Shakopee.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptors near the MVSRA (R32), along Audubon Road (R29), and near the school complex (R25). The change in decibel level near the MVSRA is 13 dBA (from 56 to 69), 18 dBA (from 59 to 77) along Audubon Road and 5 dBA (from 68 to 73) near the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center complex.

8.2.2.5 Alternative E-1A

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 14.7 acres (does not include impact to Audubon Trail or City of Chaska Trail segments), as follows:

- MVSRA/MV Trail – 12.0 acres (Section 6[f])
- Pioneer Park/Chaska High School/ Pioneer Ridge Freshman Center complex – 2.7 acres
- Audubon trail – approximately 1,000 linear feet (0.18 acre)
- City of Chaska Trail segments south of New US 212 near the Pioneer Park/ Chaska High School/Pioneer Ridge Freshman Center complex – approximately 800 linear feet (0.15 acre)

The bridge crossing would be approximately 60 feet above the river and would be visible from the river, MVSRA and MV Trail. The proposed interchange at US 212 would be visible from Shadow Wood Park in the City of Chaska. The New TH 41/US 169 interchange may be visible from the easternmost area of Tahpah Park in the City of Shakopee.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptors near the MVSRA (R32) and the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center School complex (R25). The change in decibel level near the MVSRA is 14 dBA (from 56 to 70) and 6 dBA (from 68 to 74) near the park and school complex.

8.2.2.6 Alternative E-2

Impacts on Section 4(f) resources in this corridor, through direct acquisition or easements would total 5.3 acres (does not include impact to Audubon Trail or City of Chaska trail segments), as follows:

- MVSRA/MV Trail – 4.2 acres (Section 6[f])
- Pioneer Park/Chaska High School/ Pioneer Ridge Freshman Center Complex – 1.1 acres
- Audubon Trail – approximately 1,000 linear feet (0.18 acre)
- City of Chaska Trail segments south of New US 212 near the Pioneer Park/ Chaska High School/Pioneer Ridge Freshman Center complex – approximately 800 linear feet (0.15 acre)

The bridge crossing would be approximately 60 feet above the river and would be visible from the river, MVSRA and MV Trail. The New TH 41/US 169 interchange area may be visible from the easternmost area of Tahpah Park in the City of Shakopee. The proposed interchange at US 212 would be visible from Shadow Wood Park in the City of Chaska.

Noise levels would be discernibly higher under 2040 Build conditions than 2040 No-Build conditions (daytime L_{10}) at the receptors near the MVSRA (R33) and the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center complex (R25). The change in decibel level near the MVSRA is 14 dBA (from 56 to 70) and 4 dBA (from 68 to 72) near the park and school complex.

8.3 CONCLUSIONS/SECTION 4(F)/SECTION 6(F) IMPACTS

The project has been reviewed for applicability of Section 4(f) (see Appendix B). Each of the six Build alternatives would result in impacts to publicly owned parks, recreation areas, trails, and wildlife refuge. Three of the alternatives would impact outdoor recreation areas at joint publicly owned schools/city-owned park complex.

The project has also been reviewed for potential Section 6(f) involvement. All six of the Build alternatives would cause the conversion of land acquired, planned or developed with funds from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is applicable to this project.

Section 4(f) and Section 6(f) Impacts

The Section 4(f) legislation as established under the Department of Transportation Act of 1966 (49 USC 303, 23 USC 138) provides protection for publicly owned parks, recreation areas, historic sites (regardless of ownership), wildlife and/or waterfowl refuges from conversion to a transportation use. The Federal Highway Administration (FHWA) may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that:

- There is no feasible and prudent alternative to the use of the land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 771.135).

Additional protection is provided for outdoor recreational lands under the Section 6(f) legislation (16 USC 4602-8(f)(3)) where Land and Water Conservation (LAWCON) funds were used for the planning, acquisition or development of the property. These properties may be converted to a non-outdoor recreational use only if replacement land of at least the same fair market values and reasonable equivalent usefulness and location is assured.

8.4 MITIGATION

Due to the extensive amount of public land within the study area, impacts to public recreational and wildlife management properties are unavoidable. Each of the Build alternatives would affect one or more of these Section 4(f) resources: Minnesota Valley National Wildlife Refuge; Minnesota Valley State Recreation Area; Minnesota Valley State Trail; Athletic Park; Audubon Trail; the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center complex and trail segments in the City of Chaska system trails. In addition, each of the Build alternatives would use land that has received LAWCON funds. Therefore, development and evaluation of alternatives will be performed consistent with the requirements of federal Section 4(f) and Section 6(f) regarding conversion of these types of properties to transportation use (see Appendix B).

9.0 WATER RESOURCES

This chapter describes the surface water and groundwater resources of the project area and the potential impacts on those resources that could result from the six Build Alternatives and the No-Build Alternative. Where relevant, measures that could mitigate possible impacts are also discussed.

9.1 SURFACE WATER QUALITY

This section presents background information regarding the waterborne pollutants of most concern with respect to highway storm water runoff and a comparison of the DEIS alternatives with respect to opportunities for avoiding or mitigating water quality impacts. Storm water can carry a variety of pollutants, which can affect downstream areas as well as groundwater through infiltration. Storm water runoff is a concern with the roadway project both during and after construction. Construction sites have the potential to contribute substantial amounts of sediment, carrying pollutants and affecting waterways if appropriate controls are not implemented. After construction, impervious surfaces do not allow storm water runoff to soak into the ground and contribute a variety of pollutants to waterways directly or through municipal storm drains.

9.1.1 Regulatory Overview

At the federal level, the Environmental Protection Agency (EPA) regulates storm water as part of the National Pollutant Discharge Elimination System (NPDES) permit program under the Clean Water Act. The EPA delegated permitting authority for Minnesota's NPDES program to the Minnesota Pollution Control Agency (MPCA) in 1974. The MPCA issues combined State Disposal System (SDS) and NPDES storm water permits. Under the NPDES program, all regulated parties must develop storm water pollution prevention plans to address storm water discharges, both during and after construction.

Section 303(d) of the federal Clean Water Act and EPA's Water Quality Planning and Management Regulations require states to develop Total Maximum Daily Loads (TMDLs) for water bodies not meeting water quality standards. The TMDL process establishes the allowable loading of pollutants for a water body based on the relationship between pollutant sources and in-stream water quality conditions. The development of a TMDL Report provides a basis for determining the pollutant reductions necessary from point and nonpoint sources to restore and maintain the quality of the water resources. Components of a TMDL Report include a waste load allocation for point sources, a load allocation for nonpoint sources, a margin of safety included in the modeling assumptions, and reserve capacity to allow for growth. Currently, there are no TMDLs established for this section of the Minnesota River. It is not known when these will be established.

At the local level, Carver and Scott Counties have adopted comprehensive water resource management plans. Policies within both plans establish that each development or land-disturbing activity shall be responsible for managing its storm water effectively, either on- or off-site. The preference is for on-site management, with post-construction runoff rates equal to or less than, and water quality equal to or better than, pre-construction rates. Regional off-site management for linear improvements, such as the proposed project, may also be considered. Potential water quality treatment ponds were developed for each of the alternatives to meet current standards.

9.1.2 Affected Environment

The Minnesota River is the dominant water body in the study area. Figure 9-1 depicts the sub-watershed boundaries within the study area, along with the dominant flow patterns within each boundary. The drainage area of the Minnesota River located upstream from the study area is relatively large. Therefore, water quality of the Minnesota River within and downstream from the study area is influenced by land uses and water quality improvement practices upstream from the study area. Upstream of the study area, the vast majority of land uses within the Minnesota River Basin are agricultural. Within the study area, land uses are a mix of agriculture, aggregate mining, and suburban and urban development.

Carver Creek, in Carver County, and Sand Creek, in Scott County, are both at the western edge of the study area. Land uses in both of these watersheds are mainly agricultural, with aggregate mining operations and some new development.

Chaska Creek is a tributary stream to the Minnesota River within the central portion of the study area. The watershed of Chaska Creek is mainly agricultural, though a steady change to development is taking place from the eastern edge of this watershed.

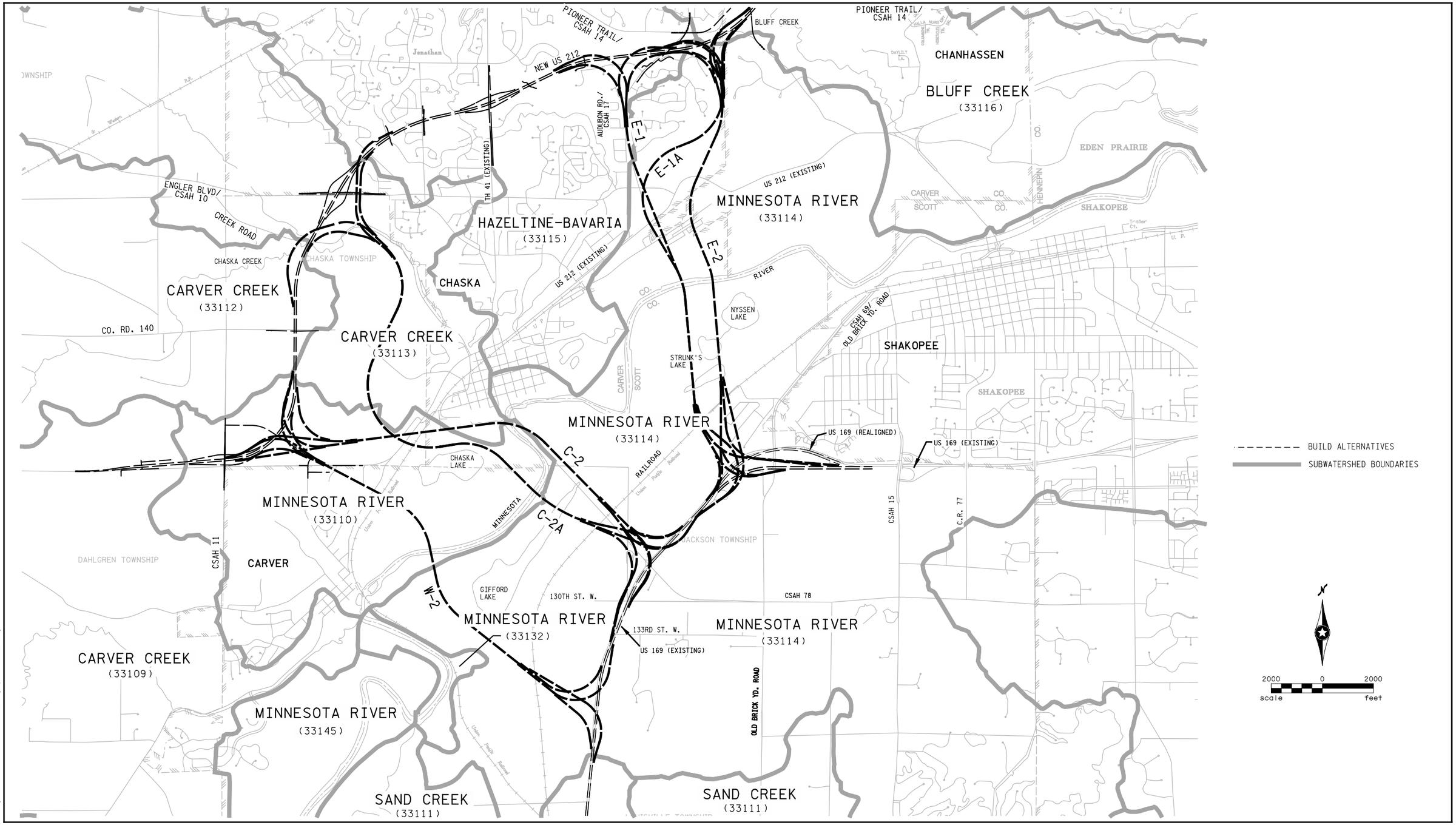
Assumption Creek is also a tributary to the Minnesota River located within the eastern portion of the study area. Assumption Creek is on the MPCA Special Waters list (waters of special designation that require specific management practices to preserve their level of use) as a trout stream and tributary. Refer to Section 7.3.1 for further information from the Phase 1 Fen Study of the Seminary Fen/Assumption Creek complex.

Impaired waters are defined by Minnesota law as polluted waters that do not meet water quality standards because they contain various pollutants above acceptable limits. Much of the Minnesota River is designated by the MPCA as an impaired water for various pollutants. Within the study area the following water bodies are impaired: the Minnesota River (mercury in water column, mercury and polychlorinated biphenyls [PCBs] in fish tissue, turidity, fecal coliform), Chaska Creek (fecal coliform), Carver Creek (fecal coliform, turbidity) and Sand Creek (fish index of biotic integrity [IBI]). These pollutants impair the waters for use as aquatic recreation areas and for supporting aquatic life. Fish Consumption Advisories (FCAs) limit the consumption by humans of aquatic life; therefore, fishing is limited to a recreational catch-and-release activity only, and not for subsistence.

Within the next 20 years (prior to construction of a New TH 41 crossing), the study area will likely become fully developed with residential, commercial and industrial development. Storm water management requirements for developments should result in treatment of nearly all runoff prior to discharge into receiving waters.

9.1.3 Environmental Consequences

Pollutants commonly found in roadway runoff include materials from a variety of sources: atmospheric fallout, vehicle exhaust, lubrication system losses, tire and brake wear, transportation load losses, deicing agents and paint from infrastructure. These sources can produce pollutants including: particulates, nitrogen, phosphorous, lead, zinc, iron, copper, cadmium, chromium, nickel, manganese, cyanide, sodium/calcium/chloride, sulfate and



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SUBWATERSHED BOUNDARIES

Figure 9-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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petroleum compounds. The extent to which these pollutants would affect water quality within the proposed alternative corridors is dependent upon the level of treatment provided for surface water runoff from the roadways and bridges prior to discharge to a receiving water body.

Roadway de-icing compounds used on roadways and river crossing bridges (and other developed areas) can present special water quality concerns if their use is not monitored. Chloride and sodium, common components of de-icing salt, are not effectively removed in many detention ponds because they do not bind as readily to other compounds or to soil particles and, therefore, tend to stay in solution where they can be discharged with outflow water. In addition, a mixture of melted snow and de-icing agents can be sprayed from bridge decks over bridge railings and directly into the river and other natural resources below. Higher traffic speeds result in increased spray distances. The spray impacts plus the 'spring flush' of chloride/sodium from treatment ponds can combine to create relatively high levels of de-icing-related pollutants in early spring. The extent of these impacts varies with the winter and spring weather, which affects how much de-icing is needed in the winter and how much spring melt water and spring precipitation are produced to dilute the effects of the de-icing compounds. All of the alternatives have some potential impacts on water quality because they all result in the production of pollutants described above.

In addition, the negative effect of non-roadway generated pollutants (such as those for which the waters within the study area are impaired) can be exacerbated to the degree that impervious surface resulting from the project increases the rate of runoff for storm water that may carry these pollutants.

9.1.3.1. No-Build Alternative

The No-Build Alternative would have the least increase in pollutant loading, since it would not result in construction of additional impervious pavement surface area. However, the increasing traffic volumes on existing TH 41 and Highway 101 would continue to generate pollutant levels in the future, especially as congestion levels result in increasing vehicle idling. The existing TH 41 corridor in the vicinity of Chaska and the existing TH 41 bridge also provide limited opportunities for storm water detention/treatment prior to discharge to the Minnesota River. The reconstructed existing TH 41 bridge drains over half of the runoff north to the city's storm sewer system and the remainder to the eastern floodplain. The city storm sewer system is part of the levee system. Although runoff from the reconstructed existing TH 41 bridge does not drain directly to the river, it is not routed through conventional BMPs either.

9.1.3.2. Build Alternatives

All of the alternatives involve relatively long bridges across the river (1.8 to 2.5 miles, depending on alternative). Conveyance systems would likely be required to take bridge runoff to water quality ponds located at the low points. The conveyance system design would likely need some type of energy dissipation as well as wet detention basins to prevent erosion, remove roadway pollutants and contain contaminated spills. Potential ponding locations were analyzed for each of the alternatives for water quality treatment. The Build alternatives vary with respect to availability of ponding locations in the vicinity of the river to provide treatment of bridge runoff. Since wet detention basins near the proposed bridge may be located partially or completely within the 100-year floodplain, design and construction of these features may require special considerations to prevent 100-year flood events from impacting the effectiveness of these ponds.

The differences among alternatives with respect to potential water quality impacts relate to: 1) the amount of additional pollutants that will be produced due to traffic volumes and length of roadway surface; and 2) the ability to provide design features to remove pollutants prior to discharge to a water body. The primary differences among alternatives relate to opportunities for providing effective pollutant removal. Preliminary assessment of treatment options for the Build alternatives indicate that the primary factors that differ between alternatives are: 1) rural vs. urban location, and; 2) ponding location availability in the vicinity of the Minnesota River.

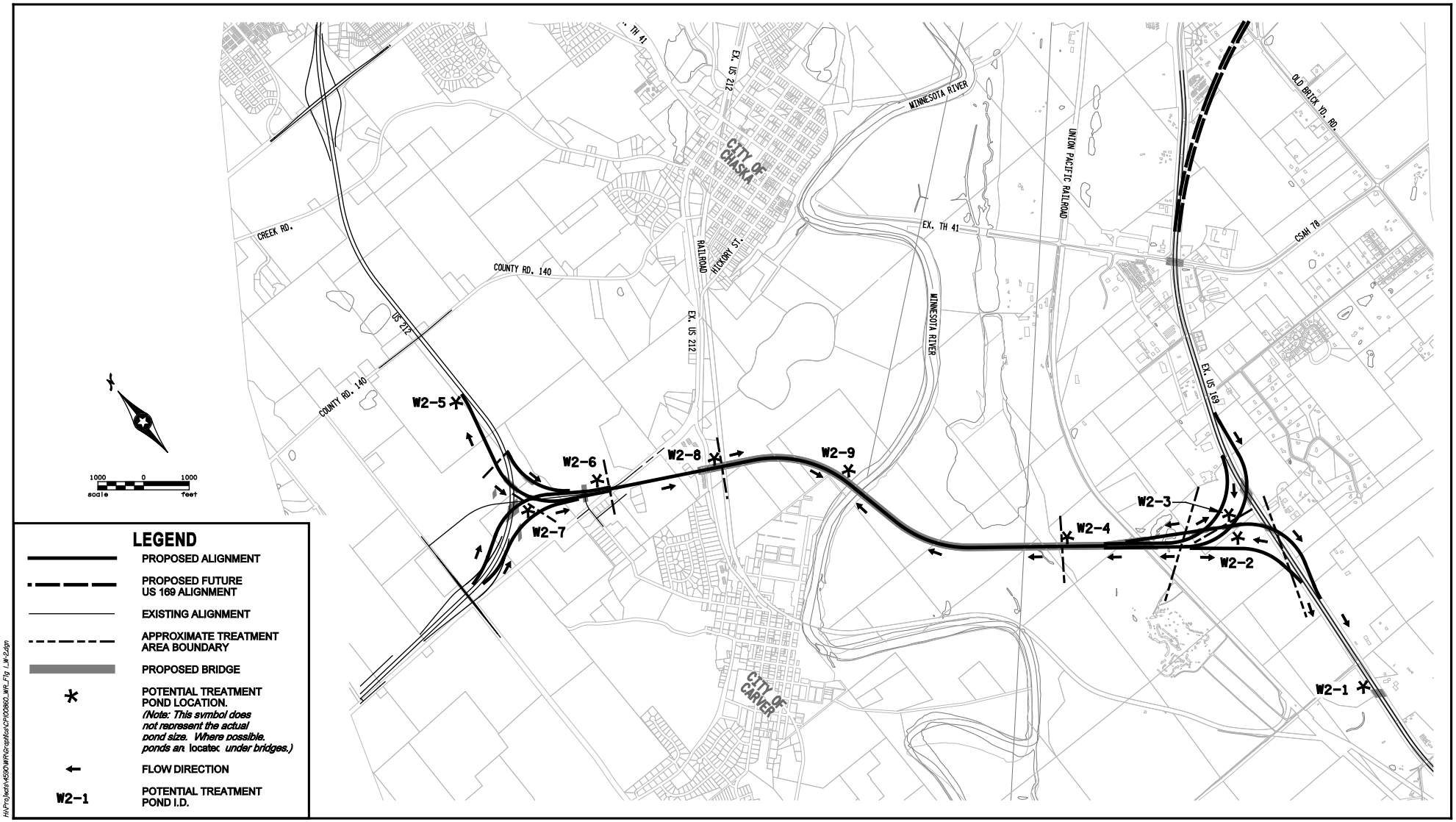
For review under this section, and for this Tier I DEIS, ponds were analyzed for dead storage, providing treatment for water quality purposes, and not designed in detail to account for detention of excess runoff for water quantity control, as that is a level of design detail appropriate for the Tier II EIS process. For purposes of right of way impact estimation, (see Chapter 5) total pond sizes were estimated based upon basic assumptions for rate control, the active storage needed to achieve desired discharge rates, pond depth, sideslopes and berm width. Resulting estimated pond sizes range from 0.5 to 2.4 acres (measured to the toe of the berm). (Methodology for pond sizing and location is detailed in the *TH 41 Water Resources Technical Memorandum*, dated August 30, 2006 and included in *Volume II: Technical Memoranda*.)

As discussed previously in this document, the assumed corridor for Tier I EIS analysis purpose is 300 feet, adjusted for topographic, potential storm water ponds and at interchanges. Note that most of the potential pond areas fall within the 300-foot corridor (including many that fit totally under the bridge structure), or within ramp areas of the system interchanges. Of the 15 (of 90 identified) ponds that are not in interchange areas and that require right of way beyond the 300-foot corridor, one would require approximately two acres of additional right of way; the remainder would require less than an acre of additional right of way. These right of way requirements are accounted for in the right of way costs and areas reported included in Section 5.2.2.

Figures 9-2 through 9-10 depict flow direction and potential storm water treatment pond locations for each of the proposed Build alternatives, (including High and Low Profile options for the three eastern alternatives.) Table 9-1 summarizes permanent treatment storage volume data for all Build alternatives. As noted, more specific pond design will occur during the Tier II EIS process.

TABLE 9-1
STORM WATER PERMANENT TREATMENT STORAGE VOLUME SUMMARY

Alternatives	Total Area Treated (acres)	Permanent Storage				
		Total	In Floodplain		Out of Floodplain	
		Ac-Ft	Ac-Ft	Percent	Ac-ft	Percent
W-2	105.3	10.4	3.5	33.6	6.9	66.4
C-2	107.0	13.9	4.4	31.9	9.4	68.1
C-2A	149.0	17.2	4.1	24.0	13.1	76.0
E-1 (High Profile)	122.0	15.0	5.0	33.2	10.0	66.8
E-1 (Low Profile)	120.0	14.7	5.0	33.8	9.7	66.2
E-1A (High Profile)	118.4	14.9	3.9	26.0	11.1	74.0
E-1A (Low Profile)	118.4	14.9	3.9	26.0	11.1	74.0
E-2 (High Profile)	115.9	14.8	4.4	29.5	10.5	70.5
E-2 (Low Profile)	115.9	14.8	4.4	29.6	10.4	70.4



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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE W-2

Figure 9-2

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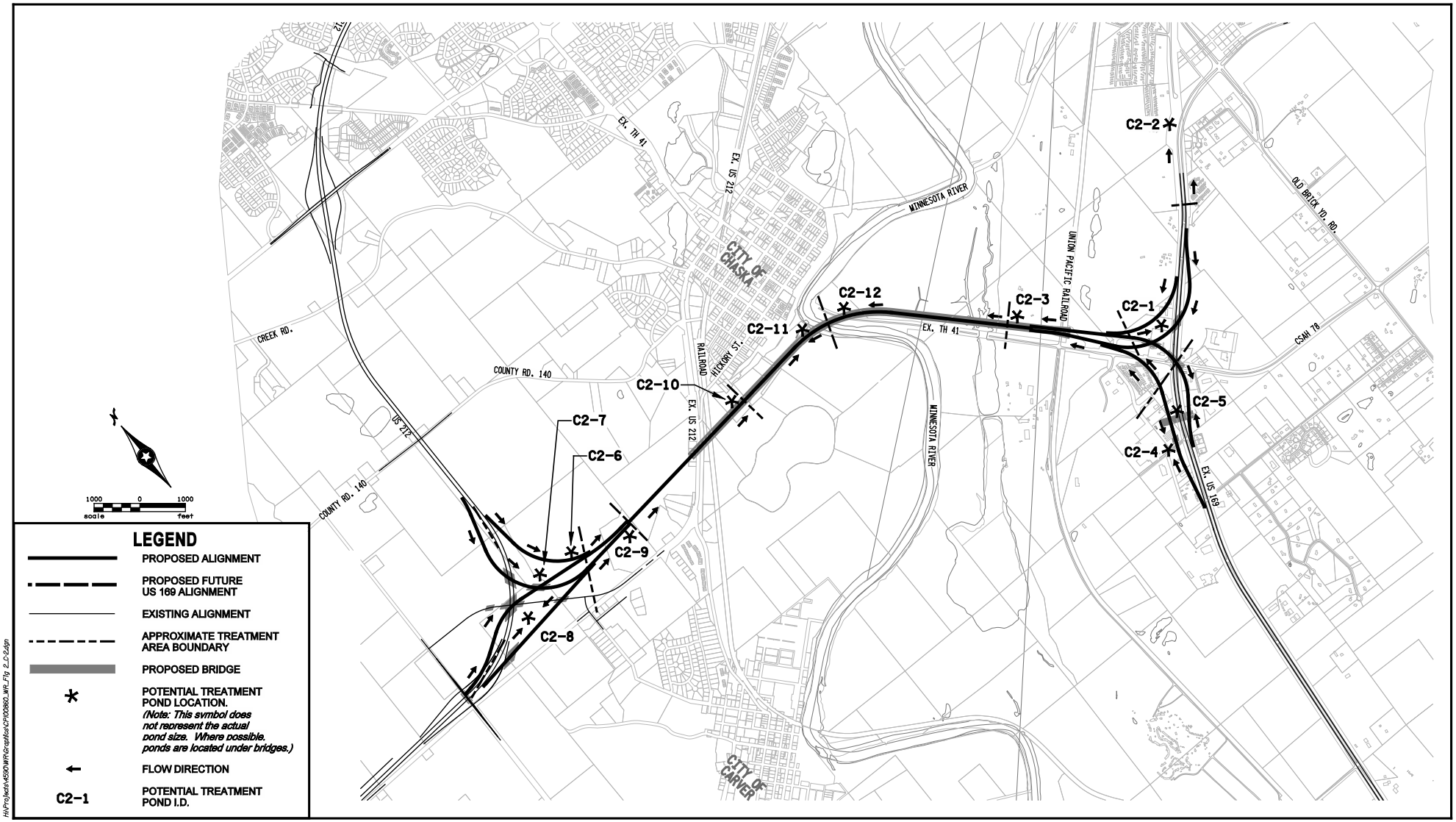

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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE C-2

Figure 9-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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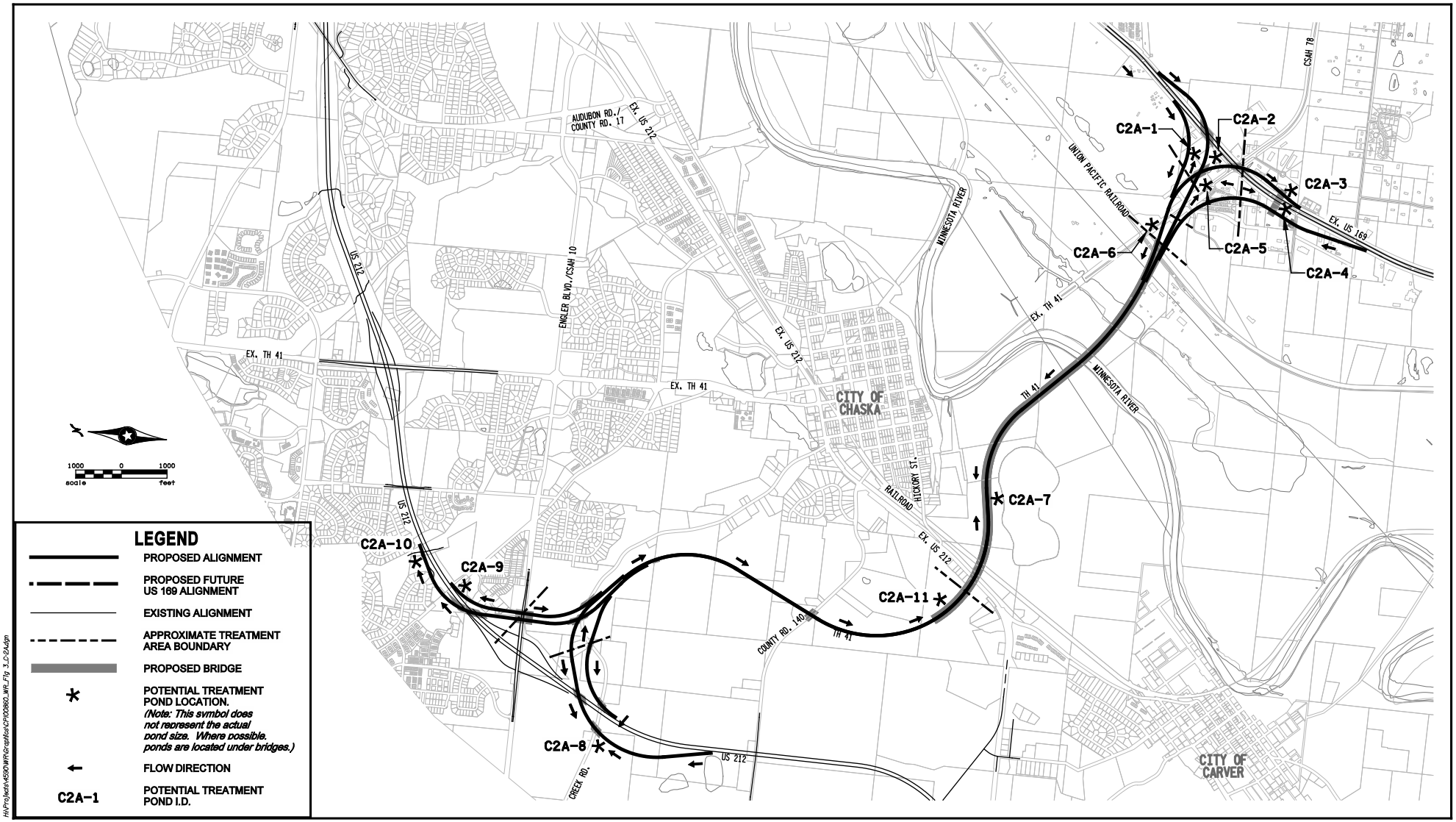

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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE C-2A

Figure 9-4

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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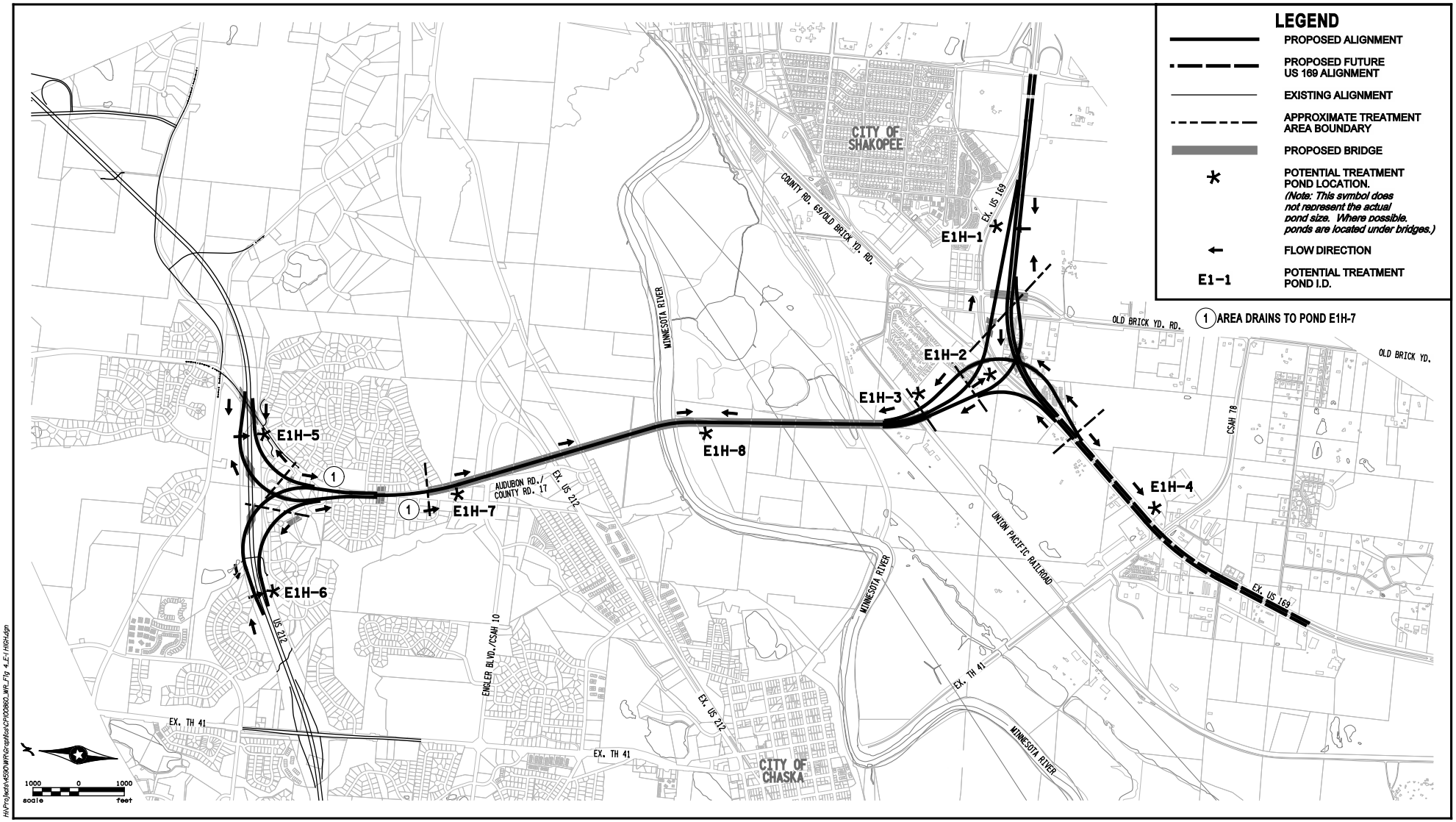

PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-1, HIGH PROFILE

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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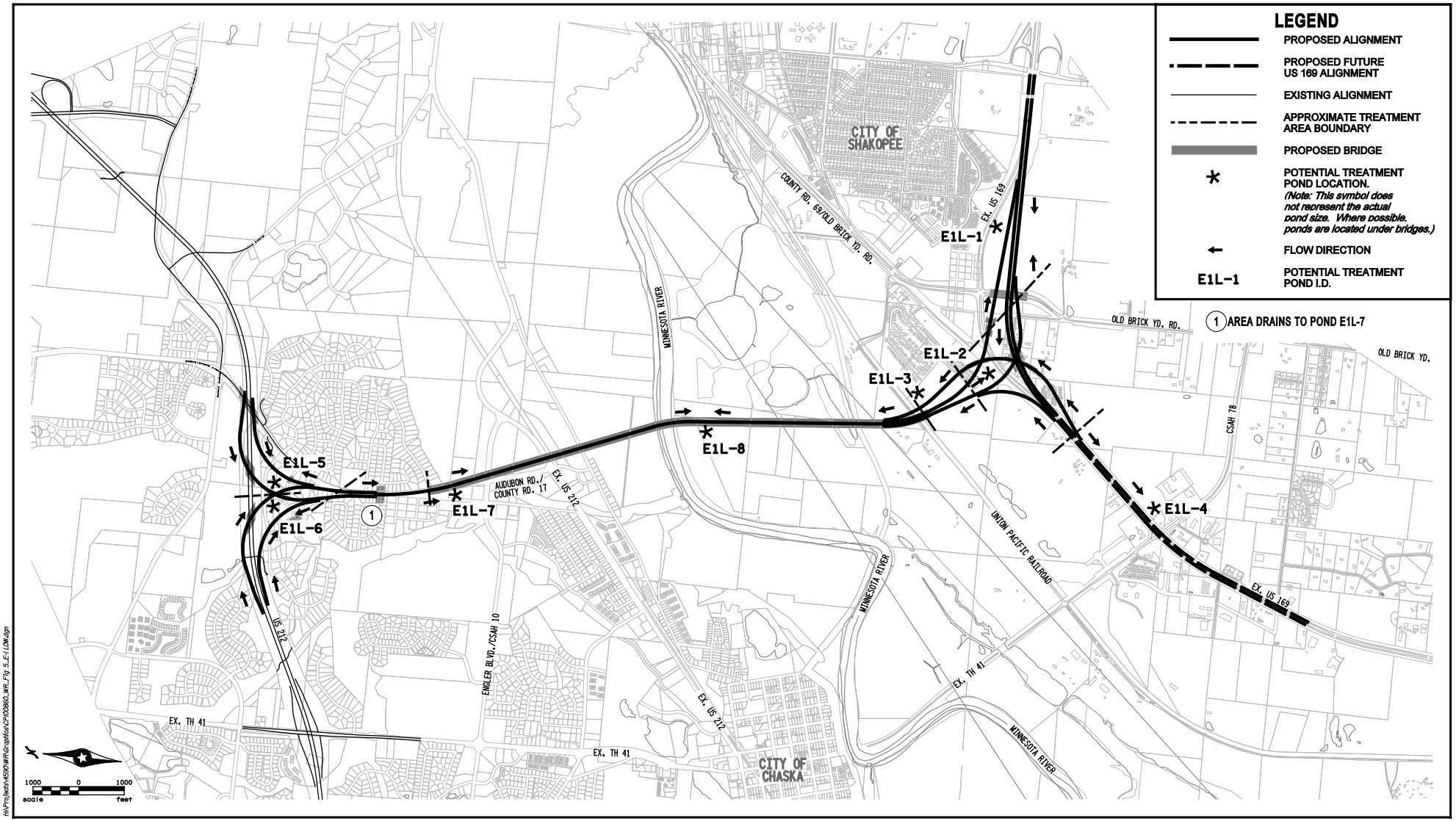
Figure 9-5



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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-1, LOW PROFILE

Figure 9-6

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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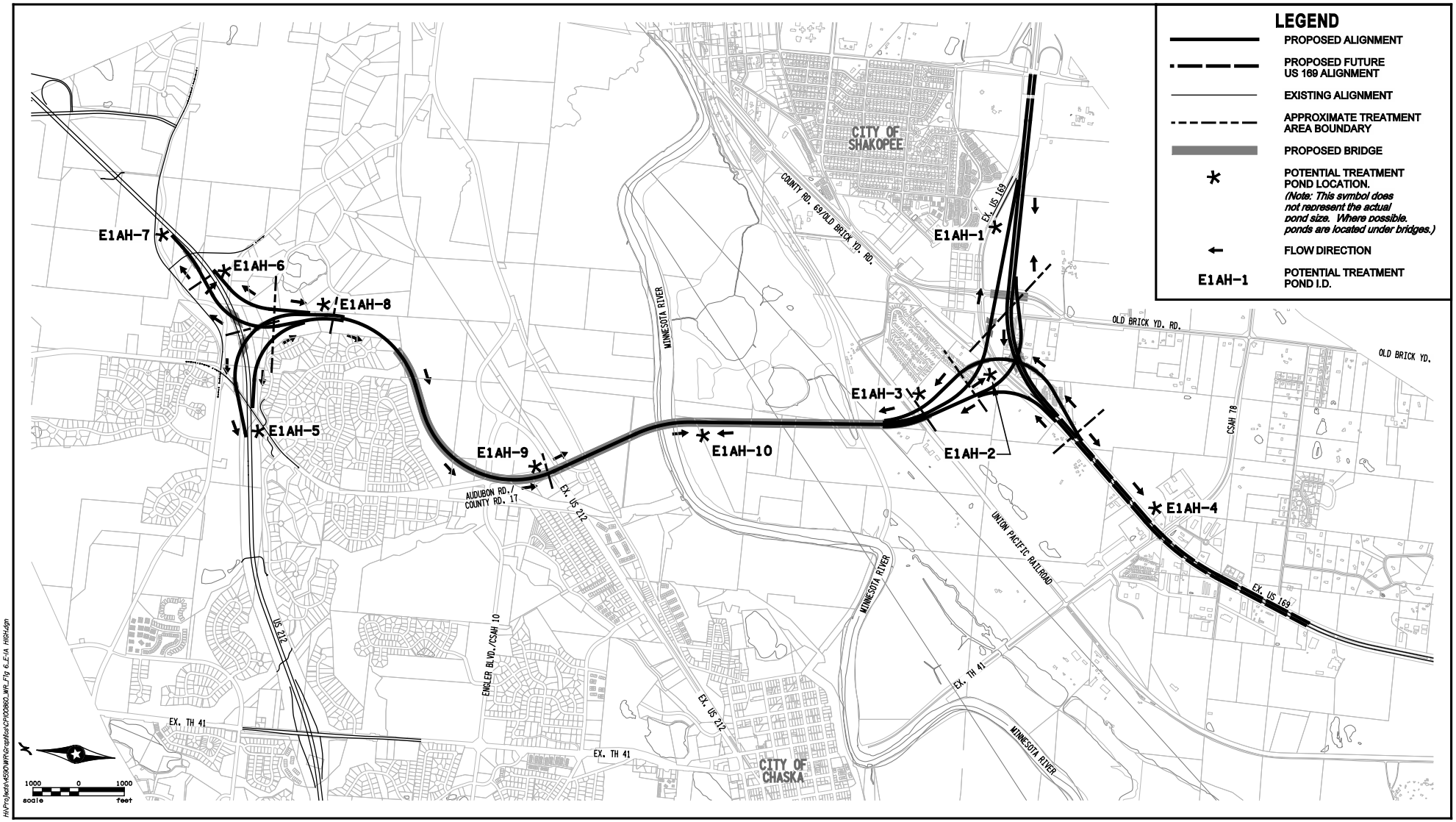

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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-1A, HIGH PROFILE

Figure 9-7

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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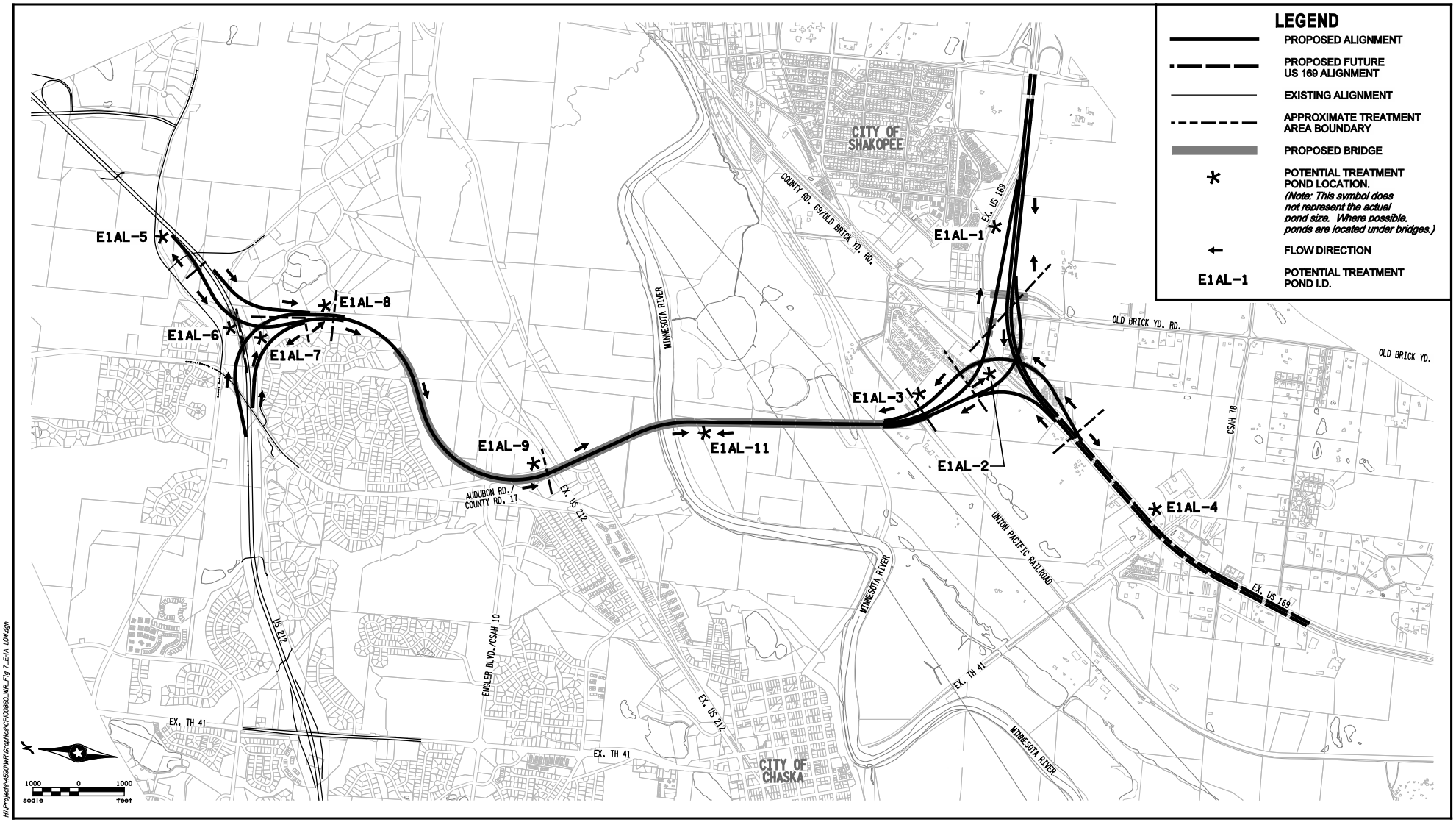

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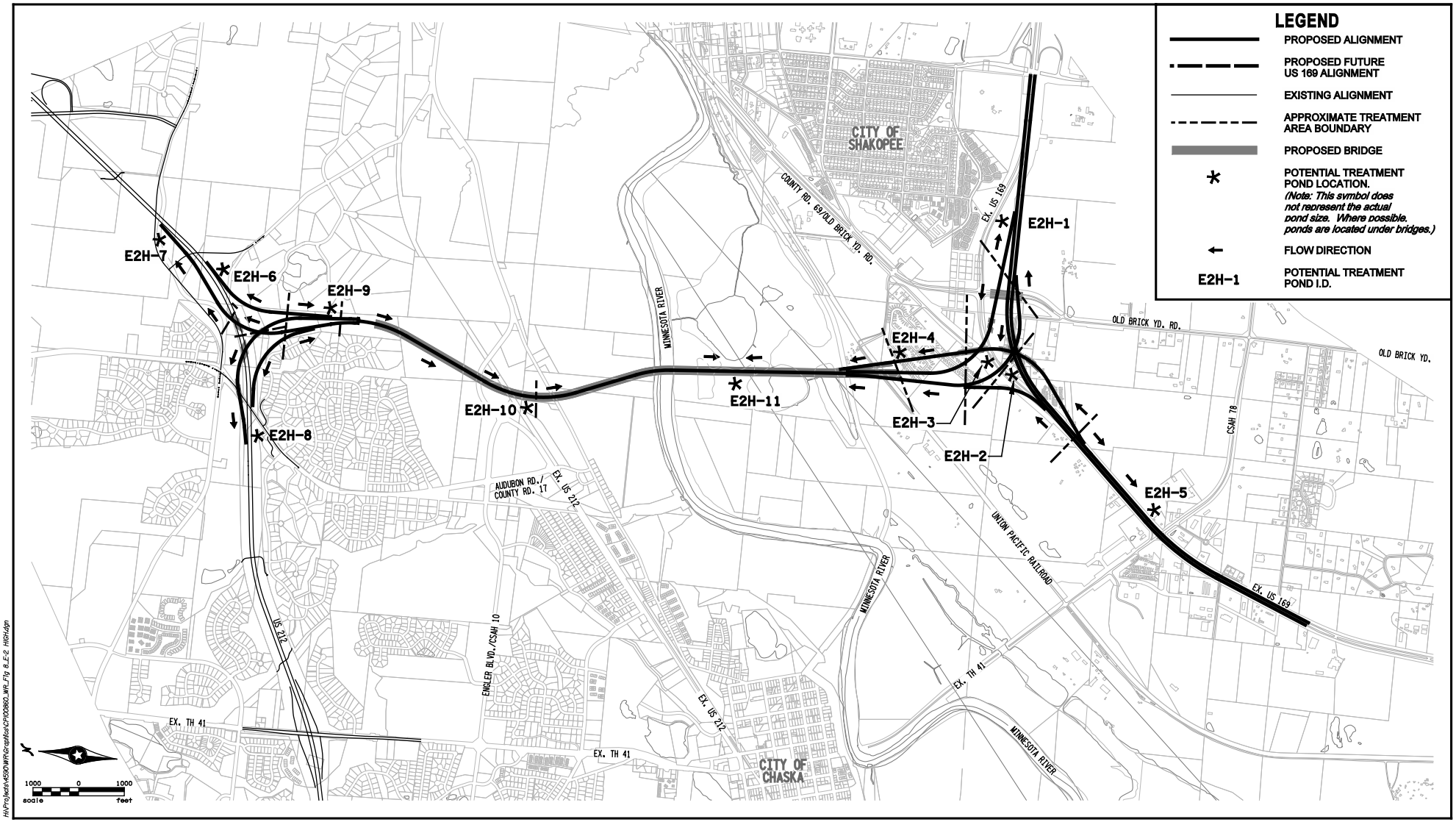
PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-1A, LOW PROFILE

Figure 9-8

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
S.P. 1008-60
Minnesota Department of Transportation



PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-2, HIGH PROFILE

Figure 9-9

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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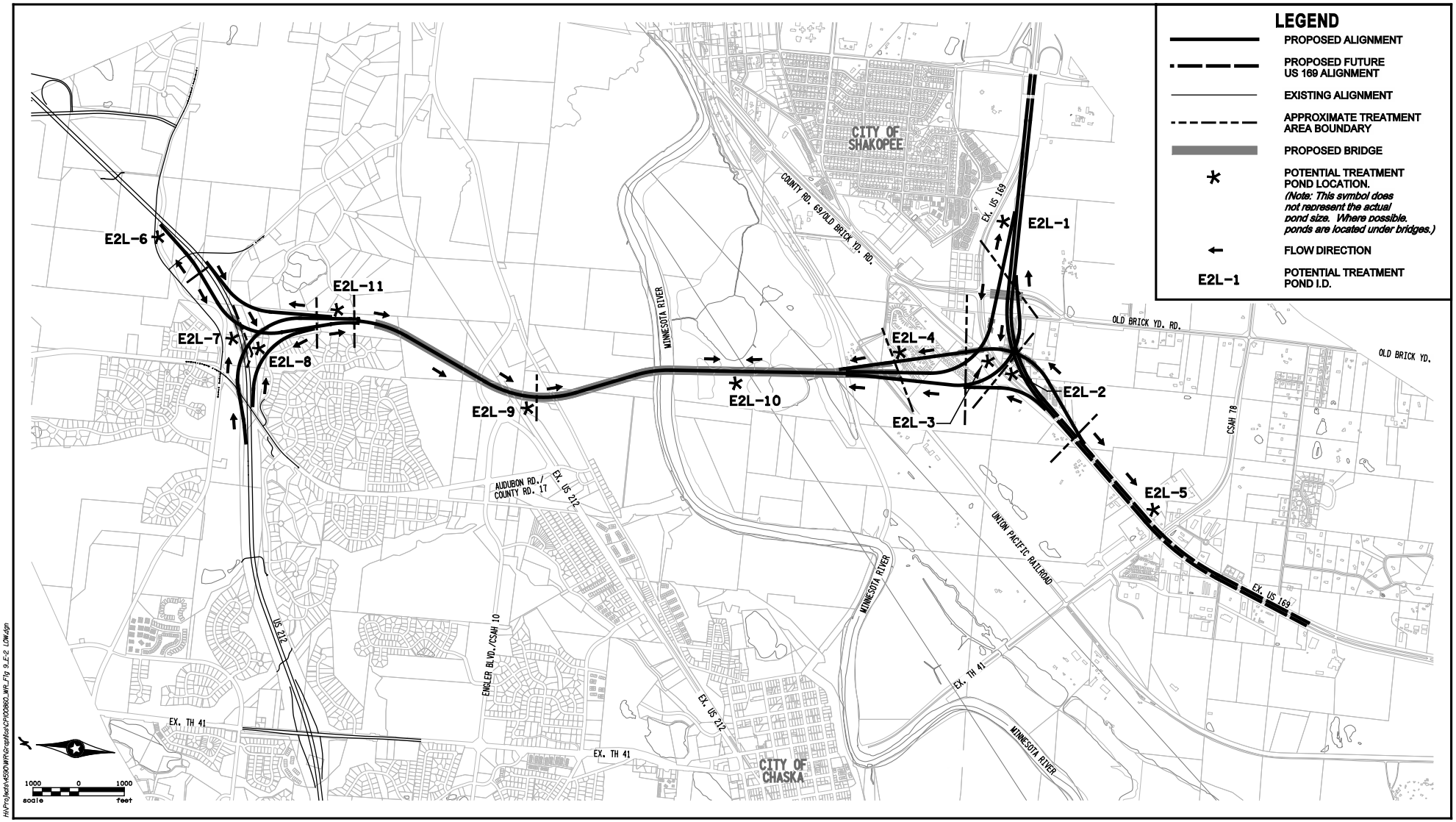

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PROPOSED STORM TREATMENT PONDS - ALTERNATIVE E-2, LOW PROFILE

Figure 9-10

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Alternative W-2

In Scott County, Alternative W-2 lies almost entirely within the Minnesota River watershed. Only the westbound US 169 interchange ramp has the potential to cross to the Sand Creek sub-watershed of the Minnesota River.

In Carver County, Alternative W-2 lies almost entirely within the Minnesota River watershed. The westbound interchange with New US 212 has the potential to cross a small portion of the Carver Creek sub-watershed of the Minnesota River, located in the western portion of the study area, northeast of the City of Carver. As shown in Figure 9-2, nine potential treatment locations were identified for this alternative. One pond, with an approximate treatment volume of 3.5 acre-feet (ac-ft), would need to be located in the floodplain near the lowest point of the bridge. This pond would be located within the MVNWR.

Alternative C-2

Alternative C-2 lies within the Minnesota River watershed in Scott County and within a small portion of the Chaska Creek sub-watershed of the Minnesota River, southwest of downtown Chaska in Carver County. As shown on Figure 9-3, twelve potential pond treatment locations were identified for this alternative. Three storm water ponds would be located within the floodplain below the low point of the bridge in order to minimize the amount of runoff collecting over the river. The approximate total treatment volume in the floodplain would be 4.4 ac-ft.

Alternative C-2A

Alternative C-2A lies within the Minnesota River watershed in Scott and Carver counties and within the Chaska Creek sub-watershed of the Minnesota River, south and west of downtown Chaska in Carver County. As shown on Figure 9-4, 11 potential pond treatment locations were identified for this alternative. One pond near the New US 212 interchange would be located in a wetland area, due to the location of a ramp low point. One pond, with an approximate treatment volume of 4.1 ac-ft, would be located in the MVNWR.

Alternative E-1

Most of Alternative E-1 is located entirely within the watershed of the Minnesota River. The interchange with New US 212 is located within the Hazeltine-Bavaria sub-watershed to the Minnesota River. Two sub-alternatives are being considered for the proposed alignment: E-1 High Profile and E-1 Low Profile, in which ramps from New TH 41 travel over or under New US 212, respectively. The purpose of discussing the two sub-alternatives is to provide a comparison between potential groundwater impacts to the Seminary Fen versus visual impacts to the neighborhoods in the area. Both sub-alternatives bisect the bluff in a location where treatment for the drainage area is better suited at the bottom of the bluff. Therefore, treatment for the interchange ramps will be treated at the base of the bluff, rather than within the drainage area at the top of the bluff.

E-1 High Profile

As shown on Figure 9-5, eight potential pond treatment locations were identified for this sub-alternative. One pond, with an approximate treatment volume of 5.0 ac-ft, would be located in the floodplain.

E-1 Low Profile

Figure 9-6 shows the eight potential treatment locations that were identified for this sub-alternative. One pond, with an approximate treatment volume of 5.0 ac-ft, would be located in the floodplain.

Alternative E-1A

Alternative E-1A is located mainly within the Minnesota River watershed. Both ramps of the interchange with New US 212 cross into small portions of the Hazeltine-Bavaria and Bluff Creek sub-watersheds of the Minnesota River. Two sub-alternatives are being considered for the proposed alignment: E-1A High Profile and E-1A Low Profile, in which ramps from New TH 41 travel over or under New US 212, respectively.

E-1A High Profile

Figure 9-7 shows the 10 potential pond treatment locations that were identified for this sub-alternative. One pond, with an approximate treatment volume of 3.9 ac-ft, would be located in the floodplain.

E-1A Low Profile

Figure 9-8 shows the 10 potential pond treatment locations that were identified for this sub-alternative. One pond, with an approximate treatment volume of 3.9 ac-ft, would be located in the floodplain.

Alternative E-2

Alternative E-2 is located mainly within the Minnesota River watershed. Both ramps of the interchange with New US 212 cross into small portions of the Hazeltine-Bavaria and Bluff Creek sub-watersheds of the Minnesota River. Two sub-alternatives are being considered for the roadway alignment: E-2 High Profile and E-2 Profile Low, in which ramps from New TH 41 travel over or under New US 212, respectively.

E-2 High Profile

Figure 9-9 shows the eleven potential pond treatment locations that were identified for this sub-alternative. One pond, with an approximate treatment volume of 4.4 ac-ft, would be located in the floodplain.

E-2 Low Profile

Figure 9-10 shows the eleven potential pond treatment locations that were identified for this sub-alternative. One pond, with an approximate treatment volume of 4.4 ac-ft, would be located in the floodplain.

9.1.4 Mitigation

As stated in Section 9.1.2, the Build Alternatives would increase the volume and rate of runoff compared to No-Build conditions and, as described in Section 9.1.2, this runoff would contain contaminants common to roadways. Best management practices (BMPs) would be incorporated as required to meet state and federal water quality regulatory requirements. These may include wet detention basins, filter strips, and infiltration areas. These features would be designed to meet the regulatory requirements in effect at the time of final design.

To the extent practicable, storm water runoff from any of the proposed alternatives would also be routed through a wet detention basin prior to discharging in to the river. This would provide both water quality treatment as well as contaminated spill containment. Section 9.1.3.2 describes the availability of ponding locations in the vicinity of the Minnesota River.

Under Alternatives E-1, E-1A and E-2, the New TH 41/US 169 interchange would lie close to the wellhead protection area for Scott County. Under Alternative C-2, the New TH 41/New US 212 interchange would lie close to the wellhead protection area for the Chaska municipal water supply (see Section 9.4.2). Design of the various conveyance systems for mitigation of water quality impacts will also need to consider potential impacts to groundwater.

As noted in Section 9.1.2 above, surface water quality impacts from winter de-icing materials present special problems. Mitigation strategies for these roadway pollutants include minimization and removal/treatment strategies such as carefully monitoring timing, method and application rates of de-icing materials. Plow operators should be trained to lower application rates to the recommended amount and, when possible, be provided with new equipment (e.g., infrared sensors that measure pavement temperature) that increase efficiency of application. Plow operators should also be monitored for the amount of material they are applying, to identify operators who tend to over-apply. Pre-wetting can also be used to increase effectiveness of materials and help increase adhesion to the pavement surface, resulting in lower application rate requirements. These techniques currently offer the most promising mitigation to reduce de-icing impacts. They are currently a major emphasis of Mn/DOT maintenance staff.

Additional strategies and de-icing chemicals will likely be developed in future years, as this is a dynamic and growing field of study. The state of the art in de-icing procedures will be discussed in the Tier II EIS.

9.2 SURFACE WATER QUANTITY (DRAINAGE)

This subsection presents background information regarding the watersheds and drainage areas that flow into and through the project area, as well as a comparison of the DEIS alternatives with respect to opportunities for avoiding or mitigating water flow impacts.

The conversion of land from “pre-settlement” natural conditions to intensive agriculture and urban development has affected water drainage patterns in the project area in many ways. When the land was converted to agricultural use, runoff rates increased as trees were removed and the ground was compacted and left uncovered for a good portion of the year. With the conversion of agricultural land to urban development, impervious surface area has reduced infiltration and increased runoff volumes and rates. Runoff from land modified by human activities changes natural hydrologic patterns, accelerates stream flows, modifies stream channels and degrades aquatic habitat, and, left unmanaged, these effects can be highly detrimental to these resources.

9.2.1 Regulatory Overview

As discussed above in Section 9.1, EPA regulates storm water as part of the NPDES permit program under the federal Clean Water Act. The EPA delegated permitting authority for Minnesota's NPDES program to the MPCA. The MPCA issues combined State Disposal System (SDS) and NPDES storm water permits, which address water quantity issues, as well as water quality. Under the NPDES program, all regulated parties must develop storm water pollution prevention plans to address storm water discharges, both during and after construction. Similarly, at the local level, Carver and Scott Counties have adopted comprehensive water resource management plans, which also address water quantity management.

9.2.2 Affected Environment

The Minnesota River and associated floodplain, wetlands, and tributaries exist within each of the Build Alternative corridors. The stretch of the Minnesota River within the study area is part of the 1,760 square-mile Lower Minnesota River watershed. Identification of the surface water resources within the entire project area was based on a review of aerial photography, U.S. Geological Survey (USGS) maps, National Wetland Inventory (NWI) maps, Minnesota Department of Natural Resources (MnDNR) public waters maps and field investigations.

As discussed in previous sections, the existing land uses are a mix of commercial and residential development, agricultural, aggregate mining, wildlife refuge, and recreational parks. Drainage from these areas flows toward the Minnesota River, often through various wetlands, storm water ponds, small lakes and creeks. In developed areas, the existing roadways utilize urban roadway designs, collecting storm water in catch basins to be treated within the storm water management system of the community. In areas without formal development or with large-lot development, existing roadways utilize rural designs where ditches and culverts allow for infiltration and convey excess storm water to ponding areas or directly to water resources. Within the next two decades prior to construction of the preferred alternative, the land uses are expected to gradually change to a fully developed area with little to no agricultural activities remaining.

As described in Section 9.1.3.2, all of the Build alternatives lie within the watershed of the Minnesota River. Additionally, many of the Build alternatives include small segments in watersheds of tributaries to the Minnesota River. Figure 9-1 shows the sub-watershed boundaries surrounding each alternative, along with the dominant flow patterns within each boundary. A brief description of the drainage patterns for each Build alternative is provided below.

<u>Alternative W-2</u>

Alternative W-2 lies primarily within the Minnesota River watershed in Scott County. In Carver County, Alternative W-2 lies mainly within the Carver Creek sub-watershed.

<u>Alternatives C-2 and C-2A</u>

The easternmost portions of Alternatives C-2 and C-2A fall within the Minnesota River watershed. Most of the western half of Alternative C-2 also falls within the Chaska Creek sub-watershed. The westernmost Alternative C-2/New US 212 interchange lies within an unnamed

sub-watershed, which drains through the Chaska Creek sub-watershed of the Minnesota River before outletting to the Minnesota River. The entire western half of the Alternative C-2A corridor falls within the Chaska Creek sub-watershed, which drains to the Minnesota River.

Alternatives E-1, E-1A and E-2

The vast majority of each of the eastern alternatives lies directly within the Minnesota River watershed. The interchanges of Alternatives E-1A and E-2 with New US 212 fall within the Bluff Creek and Hazeltine-Bavaria subwatersheds, which drain to the Minnesota River. The northern interchange of Alternative E-1 also lies within the Hazeltine-Bavaria Creek sub-watershed.

9.2.3 Environmental Consequences

No-Build Alternative

The No-Build alternative would not increase the amount of impervious roadway surface in the project area and would not alter the existing drainage conditions with regard to quantity of storm water runoff.

Build Alternatives

Each of the Build alternatives would increase the amount of impervious area within their respective project corridors, decreasing infiltration, therefore increasing the quantity of storm water runoff. As discussed in Section 9.1.3.2, storm water ponds would be sized for the active storage volumes necessary to provide runoff rate control, in addition to the dead storage volume calculated for the storm water quality treatment requirements. The amount of impervious surface added to the project area by each of the Build alternatives is as follows:

- Alternative W-2: 44.1 acres
- Alternative C-2: 47.7 acres
- Alternative C-2A: 60.3 acres
- Alternative E-1: 48.3 acres
- Alternative E-1A: 52.9 acres
- Alternative E-2: 47.7 acres

Where ponds are located with the floodplain of the Minnesota River, they are placed high enough to be protected to the 50-year flood event, but not the 100-year flood event. Therefore the effectiveness of treatment would be reduced during those 100-year flood events.

9.2.4 Mitigation

As stated in Section 9.2.1, the Build alternatives would increase the volume and rate of runoff compared to No-Build conditions. Mitigation for the majority of the Build alternatives would involve utilizing storm ponds to encourage infiltration and evapotranspiration by plants. Other BMPs would be incorporated as required to meet state and federal water quantity regulatory requirements. These may include wet detention basins, filter strips, and infiltration areas. These features would be designed to meet the regulatory requirements in effect at the time of final design.

To the extent practicable, storm water runoff from any of the proposed alternatives would also be routed through a wet retention basin prior to discharging into the river. The availability of ponding locations in the vicinity of the Minnesota River is described in Section 9.1.3. Design of the various conveyance systems to mitigate runoff increases will also need to consider potential impacts to groundwater.

9.3 FLOODPLAINS/WATER BODY MODIFICATION

This section addresses the existing floodplain and potential impacts to this resource with each of the Build Alternatives. This section includes references to the following:

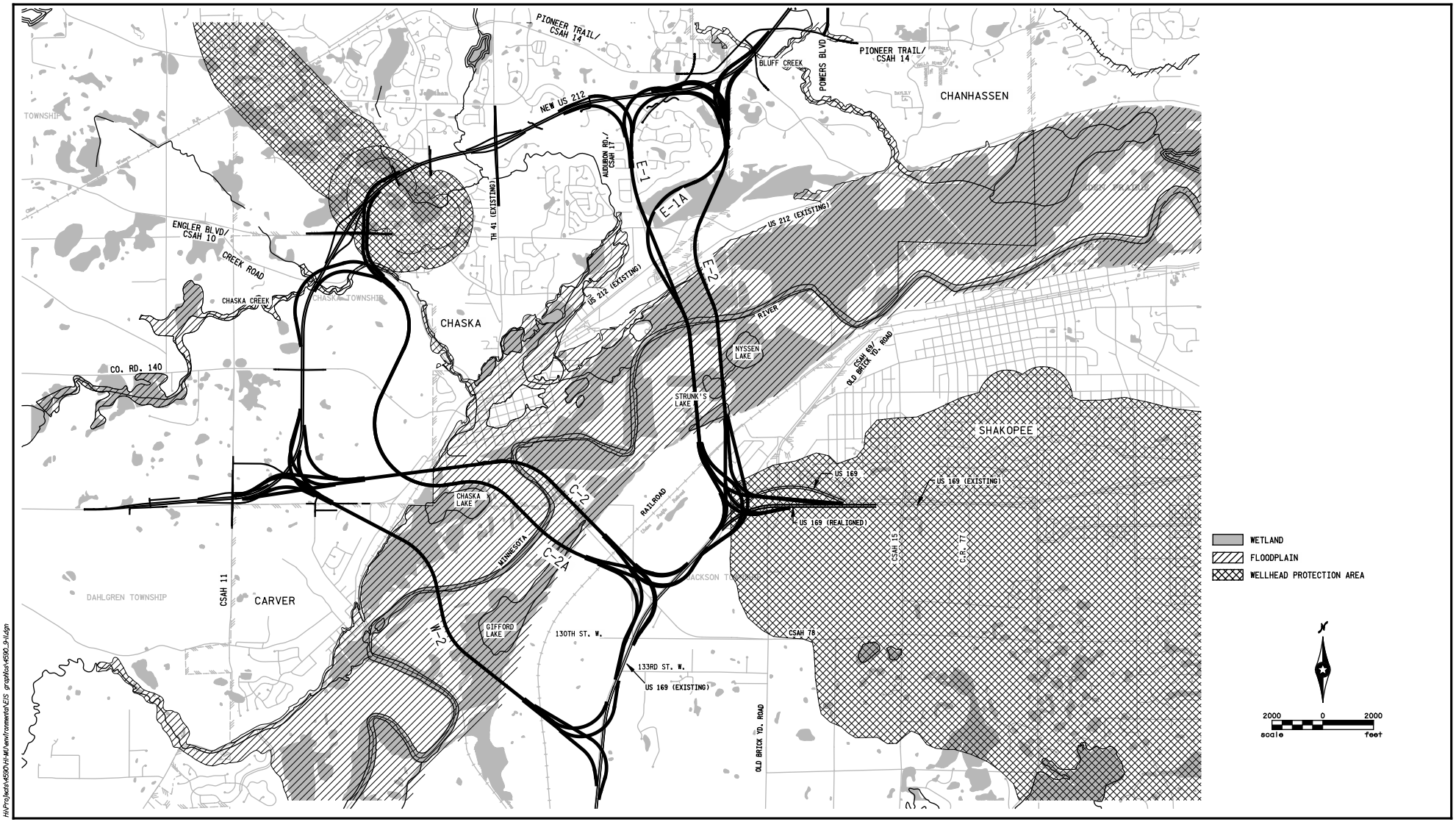
- floodplain –the land adjoining lakes and rivers that is covered by the "100-year" or "regional" flood, i.e. that has a one percent chance of occurring in any given year,
- floodway – the land immediately adjoining the river channel that is the natural conduit for flood waters,
- flood fringe – the remainder of the floodplain lying outside of the floodway, and the
- Regulatory Flood Protection elevation – one foot minimum above the 100-year flood plus any stage increase due to the designation of flood fringe areas.

9.3.1 Regulatory Overview

Presidential Executive Order 11988 and Minnesota Statute 103F.101 – 103F.155 on floodplain management set the basis for consideration, evaluation and mitigation of floodplain impacts resulting from federally funded projects. State of Minnesota statute provides that for new crossings, no approach fill for a crossing shall encroach upon a community designated floodway. When a floodway has not been designated or when a floodplain management ordinance has not been adopted, increases in flood stage in the regional flood of up to one-half of one foot shall be approved if they will not materially increase flood damage potential. Generally, no structure, fill, deposit, obstruction, storage of materials or equipment, or other uses may be allowed that will cause any increase in the stage of the 100-year or regional flood or cause an increase in flood damages. Roads and bridges within the floodplain, failure or interruption of which would result in danger to the public health or safety or disrupt the orderly functioning of the area, should be built at least to the Regulatory Flood Protection Elevation.

9.3.2 Affected Environment

The study area is located in the Minnesota River Valley, and includes floodplains associated with the Minnesota River, Chaska Creek and Bluff Creek, as shown on Figure 9-11. The floodplain width (within which floodplain fringe and floodway boundaries are defined) is very similar in the location of each of the six Build Alternatives, approximately one mile wide. Within the study area, the limits of the 100-year floodplain and the floodway are virtually identical.



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FLOODPLAIN, WETLANDS AND WELLHEAD PROTECTION AREAS

Figure 9-11

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

The flood profile of this stretch of the Minnesota River is governed by hydraulic structures on the Mississippi River. The Corps of Engineers (COE) Minnesota River flood control project includes an earthen levee along the north bank in the cities of Carver and Chaska, with diversion channels in the City of Chaska. The flood control project was completed in 2001.

As noted in Section 9.1.2, Assumption Creek is located in the eastern portion of the study area and is one of the last remaining trout streams located in the Twin Cities. The hydrology of Assumption Creek within the study area was investigated. The Phase 1 Fen Study reports that Assumption Creek has very complex hydrology and has been substantially affected by historic diversions and channelization. In its current configuration, Assumption Creek headwaters lie within the north unit of the SFWC, where it has two main tributaries originating to the west and to the east of Area 2, respectively. Assumption Creek flows as an ephemeral stream to the south and makes an abrupt easterly turn, flowing between Fen areas and existing US 212. It passes underneath existing US 212 and flows toward the Minnesota River. The *Phase I Fen Study* reports that north of the railroad embankment the tributaries were observed to be perennial through the field season; however, once the tributaries join and flow under the railroad embankment, the stream becomes intermittent and loses water to the groundwater system.

Water bodies within the Minnesota River Valley are depicted in Chapter 8, Figure 8-1, and include Gifford Lake, Chaska Lake, Strunk's Lake and Nyssen Lake.

Other water bodies located in the study area but not within any of the Build corridors include Courthouse Lake, located just south of downtown Chaska, which is a trout lake stocked by the DNR; Firemens Lake, and Clay Lake, located respectively west and east of existing TH 41, just north of downtown Chaska; East Chaska Creek; Porter Creek; and numerous small creeks.

9.3.3 Environmental Consequences

9.3.3.1. Floodplain

Federal and state laws, rules and guidelines establish a framework to address impacts to designated floodplains. This framework consists of four issues (listed below) that have been evaluated to assess the impact each proposed alternative would have on a floodplain environment. If the assessment of these issues indicates the potential for significant floodplain impacts, then further assessment in the form of a floodplain finding, would be required. The No-Build and Build alternatives will be determined to have no adverse floodplain impacts if:

- No significant potential for interruption of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route will occur,
- No significant impact on natural and beneficial floodplain values will occur,
- No significant increased risk of flooding will result, and
- The project will not support and/or result in incompatible floodplain development.

No-Build Alternative

The No-Build alternative would not result in further encroachment on the floodplain.

Build Alternatives

In accordance with Executive Order 11988 and Minnesota Statute 103F.101 – 103F.155, an analysis of floodplain impacts that would result from the Build Alternatives was completed. The floodplain assessment consists of an analysis of the flooding risks, excavation/fill impacts, and activities that would occur in the floodway and floodplain as a result of each alternative. The floodplain will be affected in some way by all of the Build alternatives through the possible introduction of project design elements such as bridge piers, retaining walls, and fill for the construction of berms around storm water treatment pond(s). As noted above, in the study area the floodplain and floodway are virtually identical. Table 9-2 summarizes the type and extent of 100-year floodplain encroachments anticipated for each alternative.

TABLE 9-2
SUMMARY OF TYPE AND EXTENT OF 100-YEAR FLOODPLAIN IMPACTS WITHIN THE PROJECT AREA FOR EACH ALTERNATIVE

Alternative	Type of Encroachment	Length of Impact (ft)
Alternative W-2	Minnesota River – Transverse	7,920
Alternative C-2	Minnesota River – Transverse	7,250
Alternative C-2A	Minnesota River – Transverse Chaska Creek – Transverse	6,506 1,464
Alternative E-1	Minnesota River – Transverse	5,730
Alternative E-1A	Minnesota River – Transverse Bluff Creek – Transverse	5,716 163
Alternative E-2	Minnesota River – Transverse Bluff Creek – Transverse	5,934 166

- **No significant potential for interruption of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route will occur.**

  None of the alternatives would affect roadways needed for evacuation during periods of high floodwaters. All of the proposed Build alternative bridges and connecting roadways would be constructed above the 100-year floodplain.

- **No significant impact on natural and beneficial floodplain values will occur.**

  Construction of any of the Build Alternatives has the potential to impact natural and beneficial floodplain values of seasonally flooded and floodplain forest ecosystems, the extent to which is discussed below. As discussed in Section 7.1.2 permanent impacts within the floodplain from the Build Alternatives would be shading effects upon the vegetative communities below the bridge, trash and debris from the bridge structure, as well as the impacts from salt spray for winter de-icing. Impacts identified from other nearby river crossings (i.e., similar elevated bridges) indicate that the vegetative communities below may be impacted, because opportunistic, invasive species could begin to crowd out the less-adaptable native species. Shading impacts are minimized by bridges of high elevation, as well as those with a distance separating each direction of travel, that allow penetration of adequate light. In addition, elevated bridges crossing through floodplain forest help to minimize the creation of new edge effect by simulating the canopy created by the larger stature trees of the native forest. Impacts to wetlands in the floodplain that are discussed below are also covered in more detail in Section 9.5.3.2.

The discussion that follows is meant to address only the impacts to "natural and beneficial floodplain values." Impacts to floodplain forest include the loss of the canopy and shade from the trees as well as the surface roughness that increases the detention of high water flows, therefore reducing peak flows downstream.

Not all floodplain forests are wetlands. Impacts to floodplain wetlands reported below, including those located within the floodplain forest, address the actual footprint of fill that would result in the loss of wetland acreage. (Note that the pier footprint of approximately 0.6 acres is based on an assumed individual pier impact of 110 feet by 120 feet with the area between the two piers assumed to be impacted as well.)

Alternative W-2

Alternative W-2 would cross the MVNWR, including Carver Marsh and portions of floodplain forest. This would result in impacts to 25 acres of floodplain forest on both sides of the river. Within floodplain wetlands, 36 bridge piers, 18 in each direction of travel, would result in total direct impacts of 10.5 acres.

Alternative C-2

In Scott County, Alternative C-2 would minimize the impacts to natural resources in the area by closely paralleling the alignment of existing TH 41 from US 169 nearly to the existing crossing. On the west bank of the Minnesota River, in Carver County, Alternative C-2 crosses a narrow band of old growth floodplain forest at the northernmost edge of the Chaska Unit of the MVNWR. Impacts to a total of 15.9 acres of floodplain forest would result from this configuration.

A total of 36 bridge piers, 18 in each direction of travel, are assumed within floodplain wetlands for Alternative C-2, resulting in 10.5 acres of floodplain wetland impact.

Alternative C-2A

Alternative C-2A drops down from the Scott County bluffs into the river valley fairly quickly, and therefore no substantial impacts are expected to natural and floodplain values on this side of the river.

In Carver County, Alternative C-2A skirts the southern edge of a 100-plus acre of the old growth floodplain forest at the northernmost edge of the Chaska Unit of the MVNWR, and would result in impacts to 20.9 acres of this resource. It then winds to the west around the north end of Chaska Lake in the Chaska Unit of the MVNWR. By following along the edge of the forested area, fragmentation of the resource is minimized. However, this alternative assumes 20 bridge piers at 250-foot intervals, 10 in each direction of travel across the Chaska Unit of the MVNWR. This alternative takes the longest route through the river valley and the MVNWR. Aside from the old growth floodplain forest impact mentioned above, there is an additional impact to five acres of non-old growth floodplain forest.

Within floodplain wetland areas, 38 bridge piers, 19 in each direction of travel, would result in a total of 11.1 acres of direct fill impact. These impacts are in the Minnesota River Valley. It is expected that the Chaska Creek floodplain can be spanned.

Alternative E-1

In Scott County, the bridge would impact three acres of floodplain forest at the bank of the Minnesota River. In Carver County, construction of Alternative E-1 would impact four acres of floodplain forest immediately adjacent to the bank of the Minnesota River.

Within floodplain wetland areas, 26 bridge piers, 13 in each direction of travel, are assumed, resulting in 7.6 acres of direct fill impact.

Alternative E-1A

In Scott County, Alternative E-1A crosses floodplain agricultural fields prior to starting across the river. At the bank of the Minnesota River, the bridge would impact three acres of floodplain forest. In Carver County, Alternative E-1A impacts four acres of floodplain forest along the bank of the Minnesota River.

Within floodplain wetland areas, 26 bridge piers, 13 in each direction of travel, are assumed, resulting in 7.6 acres of direct fill impact. These impacts are in the Minnesota River Valley. It is expected that the Bluff Creek floodplain can be spanned.

Alternative E-2

As described in Section 7.1.1.3, a native plant community of special note is located within the river bottom in Nyssen's Lake, below the proposed bridge of Alternative E-2. Up to 4 bridge piers at 250-foot intervals, 2 in each direction of travel, are assumed across this resource, and those located within this plant community would result in direct impacts of 1.2 acres. Depending upon the height of the bridge structure, the shading, debris and salt spray from a bridge structure also create the opportunity for invasive, exotic species to out-compete the native species, thereby having the potential compromise the integrity of the existing vegetative community even without direct fill impacts. Alternative E-2 impacts a one-acre area of floodplain forest in Scott County and 8 acres of floodplain forest along the bank of the Minnesota River in Carver County.

Within floodplain wetland areas, 30 bridge piers are assumed, 15 in each direction of travel, resulting in 8.8 acres of direct fill impacts. These impacts are in the Minnesota River Valley. It is expected that the Bluff Creek floodplain can be spanned.

TABLE 9-3
NATURAL AND BENEFICIAL FLOODPLAIN VALUES IMPACT SUMMARY

Alternative	Total Floodplain Forest Impacts (acres)[1]	Total Floodplain Wetland Impacts (acres)2
W-2	25.0	10.5
C-2	15.9	10.5
C-2A	25.9	11.1
E-1	7.1	7.6
E-1A	7.2	7.6
E-2	9.3	2.8 (1.2 to Native Plant Community: Nyssen's Lake)

[1]Floodplain forest (not all of which is wetland) impact area is based upon loss within 300-foot construction corridor.
[2]Floodplain wetland impacts are calculated from the proposed bridge pier footprint (0.583 ac)only.

- **No significant increased risk of flooding will result.**

  Impacts on floodplain storage from potential storm water treatment pond berms in the floodplain and impacts on floodplain conveyance due to piers and storm water treatment ponds were analyzed for each Build alternative. The results are presented in Table 9-4.

TABLE 9-4
FLOODPLAIN IMPACTS TO MINNESOTA RIVER – BUILD ALTERNATIVES

	Volume Impacts			Conveyance Impacts	
Alternative	**Impact Volume[1] CY**	**Floodplain Volume[2] CY**	**Floodplain Storage Reduction %**	**Number of Piers in Floodplain**	**Water-Surface Elevation (WSEL)[3] Impact (ft)**
W-2	5,567	15,782,900	0.04%	32	+0.01
C-2	12,106	15,155,556	0.08%	27	+0.02
C-2A	5,900	14,175,556	0.04%	29	+0.01
E-1	6,333	11,231,111	0.06%	23	+0.02
E-1A	5,767	11,085,556	0.05%	23	+0.02
E-2	6,033	11,853,889	0.05%	24	+0.01

Notes:
(1) Impacts due to storm water treatment pond berms in floodplain.
(2) Volume in the 300-foot wide highway right of way below the 100-year flood elevation.
(3) Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency (FEMA)

Hydraulically, the impacts in the base flood (100-year) water surface elevation caused by the Build alternatives are in the range of 0.01 feet to 0.02 feet. Refinement of pier shape, pier alignment, and pier spacing may be able to minimize the 0.02 feet increase. The lack of impact is primarily due to the expansive floodplain width, the high flow capacity, and the extremely low flow velocities. Note that, while no increase to 100-year flood elevation is desirable, the maximum flood stage increase (i.e. within the floodway) allowed by state rules in 0.5 feet.

- **The project will not support and/or result in incompatible floodplain development.**

  No incompatible floodplain development will result from constructing any of the Build Alternatives since the proposed project does not provide local access in the vicinity of floodplain areas. Also, county and city ordinances govern development within the floodplain.

Based upon the above assessment, no significant floodplain impacts are expected from any of the alternatives.

Regarding other water body modification, wetland impacts are presented in Section 9.5, and impacts to Assumption Creek in relation to Seminary Fen are presented in Chapter 7, Section 7.3, and aquatic impacts are presented in Chapter 7, Section 7.1.

9.3.3.2. Chaska Flood Control Project

Alternative C-2 is proximate to the Chaska levee; however the corridor was located so as to avoid any impact to the project. Alternative E-1 is proximate to the East Chaska Creek diversion channel; however, the corridor was located so as to avoid any impact to the project.

9.3.4 Mitigation

All of the Build alternatives have been designed to limit floodplain impacts wherever feasible. Impacts due directly to roadway construction are relatively small and have been minimized as much as possible. The preliminary designs for wet detention ponds included minimization of floodplain encroachment by locating the ponds above the 100-year floodplain where possible. In addition, waterway crossings (including the proposed bridge for all options and any localized flood area crossings that may be identified during final design) would comply with state and federal regulations, and would minimize the headwater and tailwater impacts of structures.

The Build alternatives would not substantially increase flooding risks, impact floodplain's natural and beneficial values, or support incompatible floodplain development. All alternatives except the No-Build alternative would eliminate any potential for disruption of a transportation facility. All alternatives include measures to minimize floodplain impacts and preserve the natural and beneficial floodplain values, including the use of a bridge of high elevation to allow the penetration of light below. Any adverse impacts can be successfully minimized through careful design and construction considerations. Temporary and permanent erosion control measures would be used where appropriate and would be designed to meet regulatory guidelines. Therefore, no substantial impacts on the floodplain would result from any of the Build Alternatives.

As noted, it is not anticipated that any of the Build alternatives would directly impact the Chaska Flood Control project; however, the potential for impact will be evaluated during the Tier II EIS process and a mitigation plan for identified impacts will be devised in consultation with COE.

9.4 GROUNDWATER/HYDROGEOLOGY

9.4.1 Affected Environment

Information in this section was taken from the Scott County Geological Atlas, 1982, Minnesota County Well Index (CWI) database, and from the Minnesota Department of Health's Wellhead Protection Database and analysis completed by Barr Engineering.

On average, the depth to groundwater in the study area ranges from zero in the river bottom areas to 50 feet in the bluff areas. The Prairie du Chien-Jordan aquifer, ranging in thickness from one foot to more than 200 feet, is a major source of water in the project area, and, when present, is generally the first aquifer to be reached. Underlying aquifers are the Jordan Sandstone Aquifer and the Franconia-Ironton-Galesville Aquifer. The regional groundwater flow direction within the unconsolidated deposits in the study area is generally to the northwest south of the Minnesota River and to the southeast north of the Minnesota River. Local, smaller scale groundwater movement varies based on terrain and may be discharged to lakes and streams. In the vicinity of

the river valley, the water table generally slopes down towards the elevation of the river. Groundwater discharge areas occur in this environment where the water table intersects with the bluffs, as is the case at the eastern end of the study area. This is discussed in detail in Section 7.4.

Soils in the project area generally consist of relatively permeable sandy outwash deposits. The Minnesota River valley is highly susceptible to contamination of the water supply due to this general soil composition of outwash and ice-contact deposits of sand and gravel. These soil types are highly permeable because of the course grain of the soils. While some layers of marl, clay and silt are present at varying depths, there does not appear to be a regional confining layer in the outwash aquifer. The glacial outwash aquifer is used by residential, commercial, municipal and irrigation wells.

Water supply wells are common in the study area. Due to the relatively permeable soils and lack of a continuous confining layer between the surface and utilized aquifer, the groundwater supply wells in the study area are vulnerable to contamination. The potential for contamination exists within current designated wellhead protection areas (WPA). These WPAs are designed to prevent well contamination by effectively managing potential sources of contamination in all or a portion of the well's recharge area. WPAs are defined by Minnesota Rules Chapter 4720, and, once delineated, are protected through implementation at the local level of a wellhead management plan that includes land use and development controls, site clean-up, well-sealing, and education programs, among other measures. One WPA is located north of Chaska and starting just to the west of existing TH 41. This WPA extends to the northwest out of the study area. Another WPA is located south of Shakopee, from approximately the existing TH 41/US 169 interchange and extending to the southeast. Refer to Figure 9-11 for locations of the wellhead protection areas within the study area.

9.4.2 Environmental Consequences

9.4.2.1 No-Build Alternative

The potential for impacts to the groundwater and hydrogeologic resources in the area from the No-Build Alternative is through contamination from inadequate water quality treatment and spills with the existing conditions. Existing TH 41 does not currently lie within a WPA, though contamination of groundwater in general is still a risk throughout the study area.

9.4.2.2 Build Alternatives

Dewatering/Flowpaths/Recharge

An evaluation was performed to predict the potential hydrogeologic effects of construction and post-construction of the proposed project, (Phase 2 Study [See Chapter 7, Section 7.3 for additional detail.]). The predictions were generated through the use of computer groundwater flow models specifically developed (based on regional geology and hydrogeology) and calibrated for potential impact on groundwater as it relates to Seminary Fen. That resource is considered to be much more vulnerable than any other area resource to changes in groundwater because its special character is dependent on upwelling groundwater. A calibrated local model

of the fen was created and assumptions were used concerning construction methodologies and post-construction conditions in order to make predictions of effects. Due to the sensitive nature of the calcareous fen resource and the presence of organic, marly and peaty soils, it is assumed that each of the bridge pilings within the Seminary Fen Wetland Complex (SFWC) would use a sheet-piling coffer dam with a concrete bottom seal. See Figure 9-11A. The evaluation of groundwater impacts in the area of Seminary Fen applied only to Alternatives E-1, E-1A and E-2, as modeled effects of Alternatives W-2, C-2 and C-2A were all determined to be far enough removed from the SFWC. For Alternatives E-1, E-1A and E-2, the results of the modeling analyses are as follows:

1. Of the three alternatives closest to the Seminary Fen (eastern alignments), Alternative E-1 is predicted to have the least impact on the fen in terms of the drawdown during construction, reduced discharge of groundwater to the fen during construction, and in terms of discharge of degraded groundwater to the fen after construction. Alternative E-1 is also predicted to have the lowest dewatering rate of the three alternatives located nearest the fen. This conclusion assumes that the coffer dam approach to bridge construction will be used in areas near the fen.

2. Alternative E-1A is predicted to have the greatest effect on seepage to fen areas during construction, followed by Alternative E-2. However, Alternative E-1A is predicted to result in a small net increase in seepage to fen areas – this seems to primarily be due to some rerouting of seepage paths through compaction of soils, forming shallow barriers to flow.

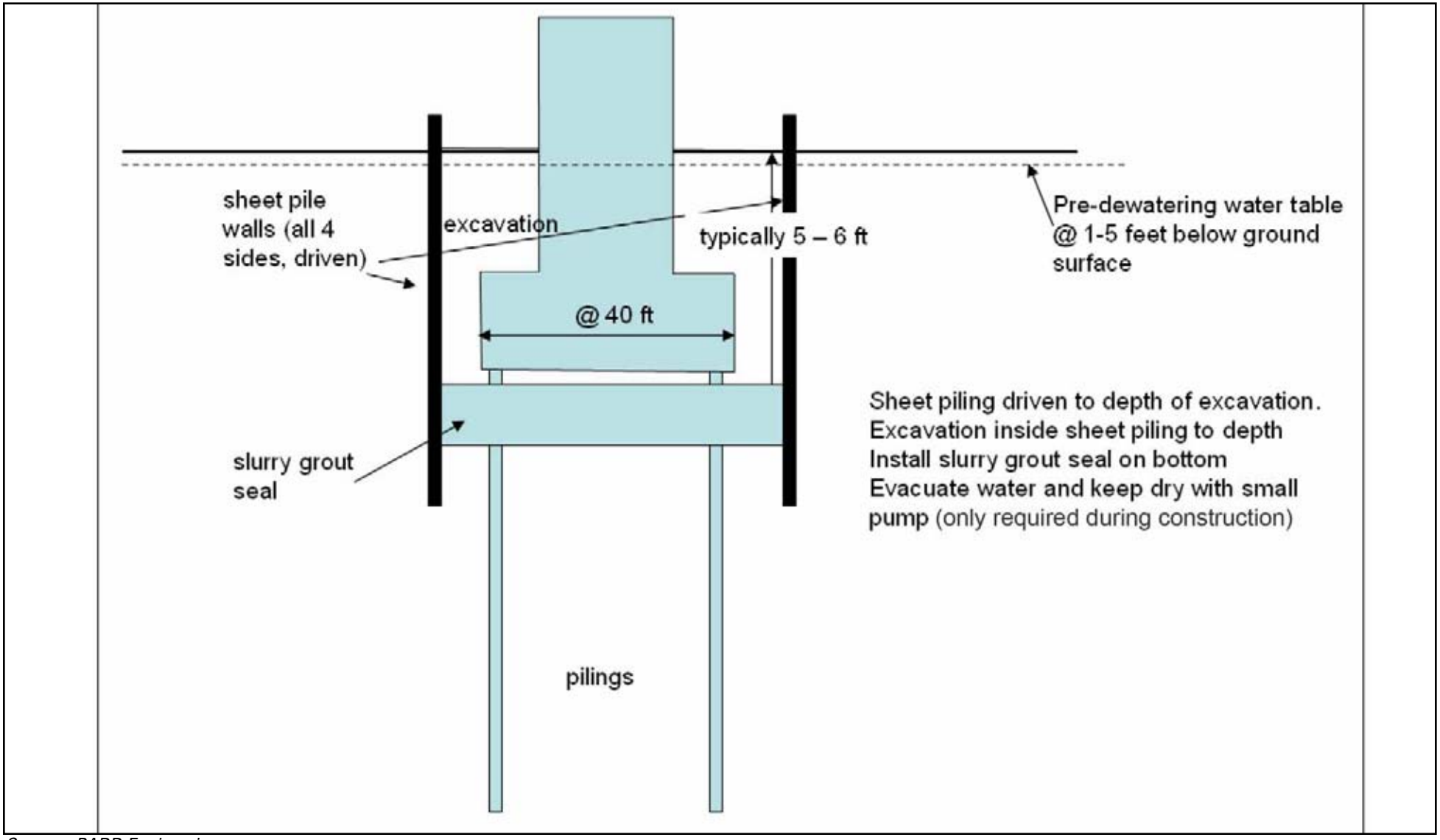
3. Alternatives E-1A and E-2 have a greater likelihood of transmitting salt spray to fen areas via groundwater transport than Alternative E-1. Alternative E-1 primarily affects the westernmost portion of the fen complex and does not appear to generate flow paths that would be directed to the better fen areas in the eastern portion of the wetland complex.

Interpretation of these hydrologic findings regarding the impacts on the health of Seminary Fen is provided within Section 7.3.

As discussed elsewhere in this document, high and low profile options were developed for Alternatives E-1, E-1A and E-2 in order to evaluate the trade-off between potential visual and groundwater effects. In each case, the “High Profile” will have less potential for groundwater impact than the “Low Profile.”

In order to understand the potential of the project to have impacts on groundwater elsewhere in the study area, a calibrated local model focused on water resources near the Minnesota River was created and assumptions about construction were used to predict resulting groundwater impacts, for Alternatives W-2, C-2 and C-2A. The results of the modeling analyses are as follows:

1. Any dewatering performed during construction on any of these alternatives is not predicted to cause measurable drawdown in the Seminary Fen area or measurable reduction in groundwater discharge to the fen.



Graphics/Support/4590/EIS Figures

Source: BARR Engineering

BRIDGE PIER CONSTRUCTION SCHEMATIC FOR PEAT OR ORGANIC SOILS

Figure 9-11A

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2. Less drawdown is predicted for any of the western/central alternatives than for the eastern alternatives, which are located closer to the fen, because on average the modeled water table is further below land surface in this area than near the fen. Of the west and central alternatives, Alternative W-2 is predicted to result in the least impact on local water resources in terms of drawdown.

3. None of these alternatives will generate excessive drawdown on local water resources if the depth of dewatering is limited to within five feet of ground surface.

Construction of additional impervious surfaces can impede recharge of groundwater. However, construction of any of the alternatives would not likely have any regional effect on groundwater recharge because road runoff collected into storm water ponds would infiltrate into the permeable soils.

Contamination

Grading for project construction may be expected to intersect the water table, especially where the bridge structures make landfall along the bluffs on both sides of the river valley. Potential project related sources of ground and surface water contaminants include spills during construction and traffic related spills and runoff after the project is built. During construction, spills could occur from on-site transport, storage and transfer of fuels for construction equipment. After construction, spills of fuel and various hazardous materials can occur along roads primarily as a result of crashes.

Runoff from road surfaces can contain various organic and mineral pollutants. Road runoff is considered a non-point source of pollution with relatively low concentrations of pollutants, generally measured in parts per million. These pollutants generally include heavy metals, hydrocarbons, sediment, de-icing chemicals, and debris that can threaten the quality of surface waters if not properly controlled. Road runoff is not considered a major source of groundwater contamination due to the relatively low concentrations of pollutants in road runoff and the ability of soil to filter these pollutants as water infiltrates through soil.

9.4.3 Mitigation

With regard to potential groundwater impacts to Seminary Fen, and as discussed in Section 7.3, the groundwater modeling conducted for this evaluation indicate the benefits of using sheet piling and installing a grout seal in the base of the excavations for the bridge piers. These benefits include reduced drawdown beyond the limits of the excavation and reduced impact to the rate of seepage of groundwater into the fen.

Construction dewatering during the non-growing season has the potential to cause less impact to plants that depend on upwelling groundwater conditions. Utility dewatering in the vicinity of the Savage Fen Wetland Complex on the south side of the Minnesota River has been performed during non-growing season to minimize impacts.

Soil compaction during construction may lead to longer term disturbances of groundwater flow paths (and in some case actually increase flows to fen areas). Methodologies to minimize the footprint and extent of compaction could be evaluated.

Beyond these measures particular to the fen, note that measures such as vegetated filter strips along road embankments, grassed swales/ditches and detention basins can be implemented to promote infiltration/groundwater recharge of highway runoff. As discussed in Section 9.1, best management practices will be implemented as part of the proposed project to treat road runoff and to minimize water quality and drainage impacts.

If necessary, roads that encroach on wellhead protection areas can be constructed with additional containment features such as clay-lined ditches that would contain spills and prevent contamination to water supply aquifers. Not all Build alternatives are located in the vicinity of wellhead protection areas; therefore, the need to address special design issues related to wellhead protection will be addressed in the Tier II EIS.

9.5 WETLANDS

This section identifies and characterizes wetlands that may be impacted by any of the Build alternatives. This section contains an inventory and an analysis of potential impacts for each alternative. Note that direct impacts to wetlands in the Seminary Fen Wetland Complex (SFWC) are included in Tables 9-6, 9-7 and 9-8; more extensive analysis of potential impacts to the SWFC is provided in Chapter 7, Section 7.3.

9.5.1 Regulatory Overview

Wetlands provide valuable functions such as wildlife habitat, water quality improvement, flood storage, groundwater recharge, aesthetics and recreation and, as a result, are protected by state and federal regulations. These regulations require avoidance and minimization of wetland impacts where possible and compensation for impacts that cannot be avoided.

At the federal level, Executive Order 11990, “Protection of Wetlands” (1977) established a national policy requiring that adverse impacts on wetlands be avoided and minimized to the greatest extent practicable. The U.S. Army Corps of Engineers (COE) regulates the placement of fill in waters of the United States, including wetlands, through Section 404 of the Clean Water Act. Mitigation is required for unavoidable impacts. The level of impact resulting from the project determines whether the COE would issue a Nationwide, General or Individual Permit. Larger, more complex projects, such as the proposed project, would likely be regulated through an Individual Permit. Individual Permits are subject to an extensive multi-agency review process.

At the state level, the Minnesota Wetland Conservation Act (WCA) established requirements for wetland protection, with oversight provided by the Board of Water and Soil Resources (BWSR). The WCA requires the Local Governmental Unit (LGU) within which an impacted wetland exists, to administer the wetland permitting process and enforce mitigation requirements. In addition, the MnDNR regulates lakes, larger wetlands and watercourses that are identified as state public waters. These water bodies are identified on public waters inventory maps by an assigned number designation.

9.5.2 Affected Environment

Many wetlands along each Build Alternative were identified based on published mapping (National Wetlands Inventory (NWI); see Figures 9-2 through 9-10), examination of aerial photos, topographical maps, soil surveys and finally a field inspection of each alternative. As the alternatives were refined, alignment shifts and interchange configurations were considered to avoid identified wetland areas wherever possible. While many wetlands were identified in the vicinity of each corridor, only those that would potentially be impacted by each alternative are described here, with the exception of the SFWC, for which a thorough study was conducted and is described in detail in Section 7.3.

For this DEIS, formal delineations were not completed for the wetlands within the corridors for each alternative. That level of detail will likely be completed during the Tier II process. The decision about the appropriate time to complete delineations will be dependent upon the rules in place at the time the Tier II EIS is being conducted.

Classification

All identified wetlands are classified in accordance with two classification systems. The simpler of the two systems is known as the Circular 39 System, and it characterizes wetland basins into eight different types in Minnesota, based on the predominant water regime. The classification used on the NWI mapping is known as the Cowardin System and is based on a combination of water regime and vegetative community, among other characteristics. Cowardin subdivides wetland basins into different classifications if different types exist within one wetland complex. These two systems are summarized in Table 9-5 below.

TABLE 9-5
WETLAND CLASSIFICATION SYSTEM DESCRIPTORS/MODIFIERS

Circular 39		
Type 1	Seasonally flooded basins and flats	
Type 1L	Seasonally flooded hardwoods	
Type 2	Inland fresh meadow, saturated at or near the surface after heavy rains or seasonally	
Type 3	Inland shallow fresh marsh, flooded up to 6-inch depth	
Type 4	Inland deep fresh marsh, flooded up to 3-foot depth	
Type 5	Inland open fresh water, flooded up to 6.6-foot depth, marshy border may be present	
Type 6	Shrub swamp, flooded up to 6-inch depth	
Type 7	Forested swamp, flooded up to 6-inch depth	
Type 8	Bog	
Cowardin System		
System/Subsystem	**Class/Subclass**	**Water Regime**
P – Palustrine	EM – Emergent	A – Temporarily flooded
	1 – Persistent	B – Saturated
R – Riverine		C – Seasonally flooded
	FO – Forested	F – Flooded
L – Lacustrine		G – Intermittently exposed
1 – Limnetic	SS – Scrub-Shrub	H – Permanently flooded
2 – Littoral		J – Intermittently flooded
	UB – Unconsolidated bottom	d – Partially drained/ditched

A summary of wetlands that could be impacted by any of the Build Alternatives is presented in Table 9-7 below. This table includes information on each wetland type, approximate size, dominant vegetation and topographic setting. Locations of these wetlands are shown on Figures 9-11 through 9-13. Information includes data gathered during field review by Barr, as well as the Minnesota Land Coverage Classification System (MLCCS).

The wetlands identified in the project area generally consist of either floodplain wetlands in the river valley or depressions within the surrounding outwash plains and above the bluffs. Most of the identified wetlands are vegetated with cattails and/or reed canary grass. Surrounding uplands are agricultural fields or developed areas. As noted previously, for the Tier I EIS process, a detailed assessment of wetland functions was not completed; however, indicators of high functional levels are noted with respect to potential impacts in Section 9.5.2. The indicators of high functional levels noted below include the presence of notable plant communities, records of the presence of endangered or threatened wildlife species or species of concern in or using the wetland or adjacent lands, and the presence of ground water discharge areas. A functional analysis, using the Minnesota Routine Assessment Method (MnRAM) may be completed in the Tier II EIS for select, representative wetlands that would be impacted by the preferred alternative. Results of functional analysis will be used to develop appropriate mitigation.

Wetlands identified within the study area of each of the alignments are listed in Table 9-6.

TABLE 9-6
WETLAND AND WATERCOURSE INVENTORY

Wetland Basin ID (DNR #)	Circular 39/ Cowardin Classification/ Topographic Setting	Approximate Size (est. from NWI polygons)	Impact by Alternative	Notes
W-A (118P)	Type 5 L2UBG PFO5F PEM/UBF PEMCd Floodplain	>100 ac	W-2 5.2 acres C-2A: 1.7 acres	Gifford Lake
W-B (4P)	Type 3/1L PEM/FO1C PEMC PEMFd Floodplain	>100 ac	W-2: 4.1 acres	Carver Marsh
W-C (4P)	Type 5/L L1UBH/PFOIC Floodplain	>100 ac	C-2: 4.1 acres of 1L C-2A: 9.3 acres of 1L	Chaska Lake
W-D	Type 3 PUBF Isolated	0.5 ac	W-2: 0.3 acre C-2: 0.3 acre	
W-E	Type 3 PEMC Isolated	0.25 ac	W-2: 0.01 acre C-2: 0.1 acre	

TABLE 9-6 continued
WETLAND AND WATERCOURSE INVENTORY

Wetland Basin ID (DNR #)	Circular 39/ Cowardin Classification/ Topographic Setting	Approximate Size (est. from NWI polygons)	Impact by Alternative	Notes
W-F	Type 3 PEM/UBC Isolated	2 ac	W-2: 0.8 acre	
W-G	Type 3 PEMC Isolated	0.5 ac	Temporary Impacts only (W-2)	
W-H	Type 3 PEMC Isolated	0.5 ac	W-2: 0.1 acre	
W-I	Type 5 PUBGh Tributary	7.5 ac	C-2A: 0.5 acre	
W-J	Type 3 PEMC Tributary	0.5 ac	C-2A: 0.2 acre	
W-K	Type 3 PEMC Isolated	4.6 ac	C-2A: 1.6 acres	
W-L	Type 3 PEMC Isolated	4.0 ac	C-2A: 0.2 acre	
W-M	Type 3 PEMCd Isolated	90 ac	C-2A: 2.6 acres	
W-N	Type 3/1L PEM/FO1Cd Floodplain	75 ac	C-2: 2.9 acres	MVSRA property
W-O	Type 3/1L PEM/SS1Cd Floodplain	16 ac	C-2: 1.7 acres	MVSRA property
W-P	Type 1L PFO1C PSS1/EMC Floodplain	1 ac	C-2: 0.6 acres	MVSRA property
W-Q	Type 1L PFO1C PSS1/EMC Floodplain	92 ac	C-2: 1.2 acres	MVSRA property
W-R	Type 3 PEMC Floodplain	30 ac	E-1: 1.7 acres E-1A: 1.7 acres E-2: 1.2 acres	
W-S (117W)	Type 3 PEMCd Floodplain	40 ac	E-1: 1.2 acres E-1A: 1.2 acres E-2: 1.7 acres	
W-T (116P)	Type 3 PEMFd Floodplain	>100 ac	E-2: 1.2 acres	Nyssen's Lake, part of MCBS Natural Community

TABLE 9-6 continued
WETLAND AND WATERCOURSE INVENTORY

Wetland Basin ID (DNR #)	Circular 39/ Cowardin Classification/ Topographic Setting	Approximate Size (est. from NWI polygons)	Impact by Alternative	Notes
W-U	Type 3 PEMC Floodplain	5 ac	Assumes can be spanned	
W-V (223W)	Type 3/1L PFO1C PSS1/EMC Floodplain	>100 ac	E-1: 3.5 acres E-1A: 3.5 acres E-2: 4.1 acres	
W-W	Type 2/6 PEM/SSBd PFO1/EMCd Assumption Creek Flowthrough	>100 ac	E-1: 1.2 acres E-1A: 6.4 acres E-2: 4.1 acres	Seminary Fen Wetland Complex
W-X	Type 3 PEMC Isolated	10 ac	E-1A High: 0.4 acre E-1A Low: 0.1 acre E-2: 2.3 acres	
W-Y	Type 3 PEMC Isolated	0.5 ac	E-1A High: 0.19 acre E-1A Low: 0.19 acre E-2: 0.2 acre	
W-Z	Type 3 PEMC Isolated	0.5 ac	E-1A High: 0.33 acre E-1A Low: 0.33 acre E-2: 0.3 acre	
W-Aa	Type 2 PEMB Isolated	0.5 ac	E-1: 0.01 acre E-1A High: 0.01 acre E-1A Low: 0.01 acre	
W-Bb	Type 3 PEMC Isolated	1.5 ac	Assumes can be spanned (E-1)	
W-Cc	Type 3 PEMC Isolated	0.5 ac	E-1: 0.2 acres	
W-Dd	Type 3/1L PFO1C PSS1/EMC Floodplain	32 ac	E-1: 1.2 acres E-1A: 1.2 acres E-2: 0.6 acres	
W-Ee	Type 1L PFO1C Floodplain	6.8 ac	W-2: 1.2 acres	
Watercourse	**Circular 39/ Cowardin Classification/ Topographic Setting**	**Approximate Size (est. from NWI polygons)**	**Impact by Alternative**	**Notes**
Chaska Creek	R2UBG Riverine Flowthrough	N/A	Assumes C-2A can span channel	DNR Protected Waterway
Minnesota River	R2UBH Riverine Flowthrough	N/A	Assumes any alternative can span channel	DNR Protected Waterway

9.5.3 Environmental Consequences

9.5.3.1 No-Build Alternative

The No-Build Alternative would have no impacts upon wetland resources.

9.5.3.2 Build Alternatives

Impacts to wetlands are summarized in Tables 9-6, 9-7 and 9-8 and discussed below.

Permanent impacts from bridge piers are based upon a 14,300-square foot (130 ft x 110 ft), or 0.33-acre footprint per pier. This footprint also accounts for impacts from construction access, including temporary roads and swamp mats that may result in compaction of the soil surrounding the permanent pier footprint. Temporary impacts for construction access will be removed and restored upon completion.

The Phase 2 Study also analyzed impacts to wetlands with native plant communities. The assumptions used in the Phase 2 Study were a complete impact to the resource within the 300-foot corridor for each alternative. The wetland impacts analyzed in this DEIS are more precise based on more detailed design and bridge pier location information. Outside of the impacts to wetlands from bridge pier construction, no direct fill impacts are expected with any of the alternatives. Based on the impact analysis conducted for Phase 2 Study, it would appear that Alternative E-1A has the largest area of direct impact to wetlands with native plant communities. However, using the more precise calculations for the DEIS, Alternative E-2 would have the largest overall direct fill impact to wetland resources, with or without intact native plant communities.

Alternative W-2

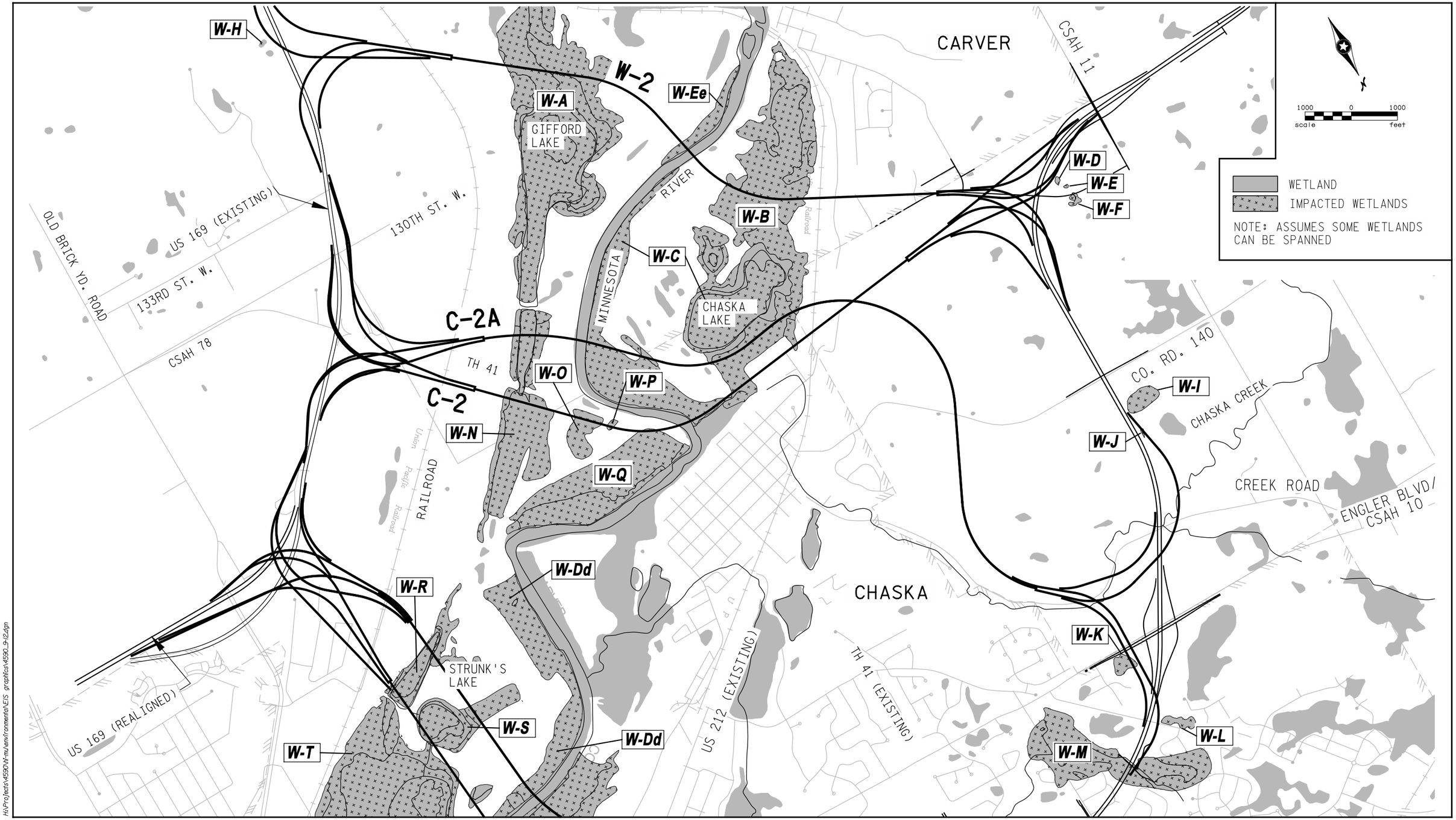
In Scott County, less than 0.1 acres of wetland W-H would be impacted for the interchange with US 169. In the river valley, where the bridge spans the wetlands on the valley floor, 36 bridge piers, 18 in each direction of travel, are anticipated that would directly impact a total of 10.5 acres of wetland. In Carver County, a total of 1.1 acres of wetlands W-D (0.3 ac), W-E (0.01 ac) and W-F (0.8 ac) would be impacted for the interchange with New US 212. Total wetland impacts for Alternative W-2 equal 11.6 acres.

Alternative C-2

A total of 36 bridge piers within wetland areas, 18 in each direction of travel, are anticipated with this alternative, resulting in a total of 10.5 acres of direct impact to wetlands in the river valley. In Carver County, a total of 0.4 acres of wetlands W-D (0.3) and W-E (0.1) would be impacted for the interchange with New US 212. Total wetland impacts for Alternative C-2 equal 10.9 acres.

Alternative C-2A

A total of 38 bridge piers within wetland areas, 19 in each direction of travel, are anticipated with this alternative, resulting in 11.1 acres of direct impact to wetlands in the river valley. In Carver County, a total of 5.0 acres of wetlands W-K (1.6 ac), W-L (0.2 ac), W-M (2.6 ac), W-J (0.2) and W-I (0.5 ac) would be impacted for the interchanges with New US 212. Total wetland impacts for Alternative C-2A equal 16.1 acres.



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POTENTIALLY IMPACTED WETLANDS, WESTERN PORTION OF THE STUDY AREA

Figure 9-12

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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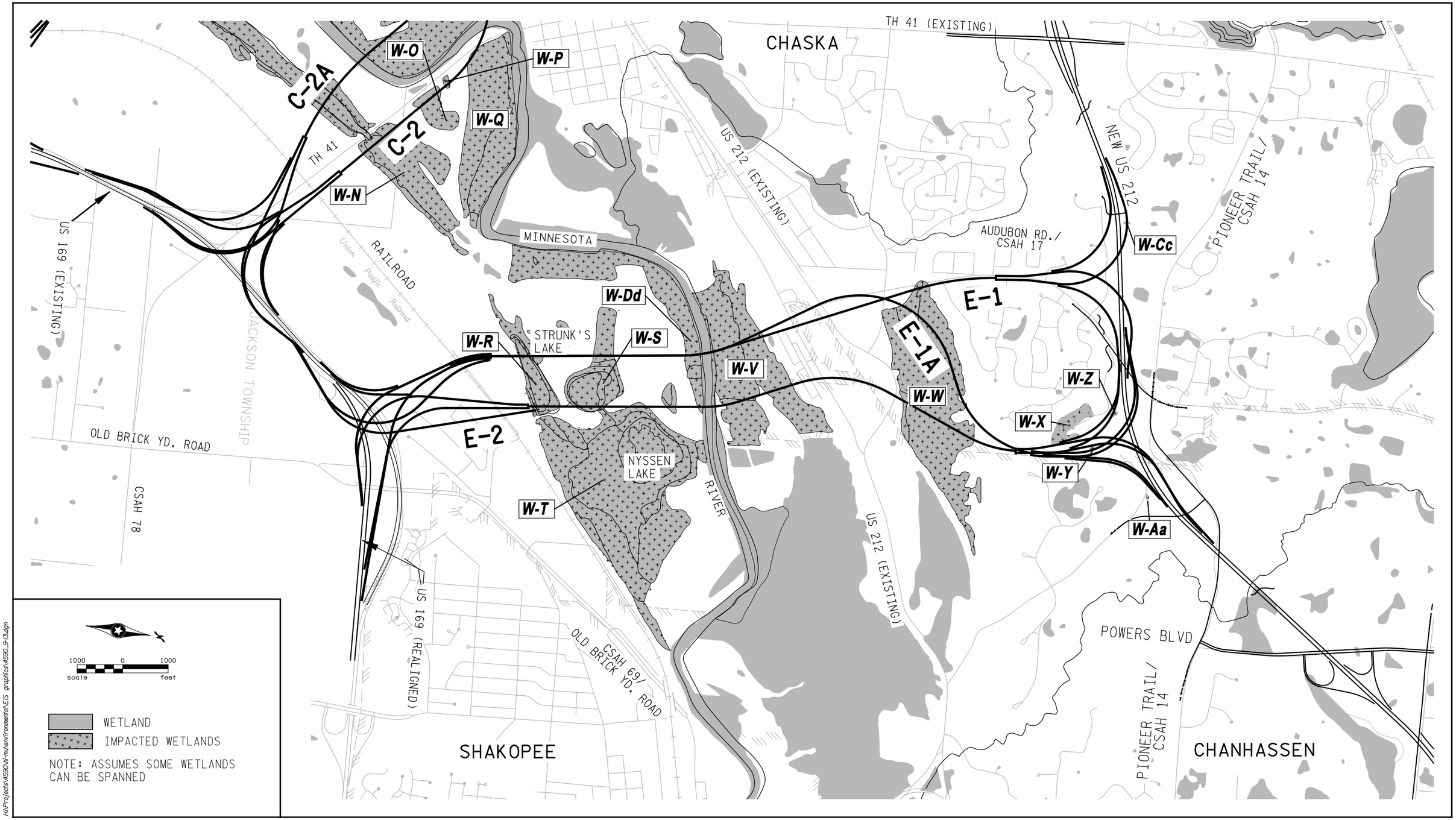

POTENTIALLY IMPACTED WETLANDS, EASTERN PORTION OF THE STUDY AREA

Figure 9-13

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Alternative E-1

A total of 26 bridge piers in the river valley, 13 in each direction of travel, and four within the SFWC, two in each direction of travel are anticipated with this alternative, resulting in 7.6 acres of direct impact to wetlands in the river valley and 1.2 acres of impact to W-W, at the extreme western edge of the SFWC. In Carver County, a total of 0.2 acres of wetland W-Cc would be impacted with the interchange with New US 212. Total wetland impacts for Alternative E-1 equal 9.0 acres.

Alternative E-1A

For both the High and Low Profiles of E-1A, 26 bridge piers are anticipated within the river valley wetlands, 13 in each direction of travel, resulting in 7.6 acres of direct wetland impact. This alternative also crosses the SFWC with 22 bridge piers, 11 in each direction of travel resulting in 6.4 acres of direct wetland impact at its northern edge along the base of the bluffs. Both the E-1A High and E-1A Low alternatives would impact 0.5 total acres of wetlands W-Y (0.19 ac), W-Z (0.33 ac) and W-Aa (0.01 ac).

E-1A High Profile would also impact 0.4 acres of wetland W-X, resulting in a total wetland impact of 14.9 acres.

E-1A Low Profile would also impact 0.1 acres of wetland W-X, resulting in a total wetland impact of 14.6 acres.

Alternative E-2

Within the river valley wetlands, 30 bridge piers are anticipated, 15 in each direction of travel, resulting in 8.7 acres of direct wetland impact. This alternative also requires 14 bridge piers, 7 for each direction of travel, across the SFWC, including calcareous fen areas. This results in 4.1 acres of direct wetland impact to the SFWC. Above the bluff, a total of 2.8 acres of wetlands W-X (2.3 ac), W-Y (0.2 ac) and W-Z (0.3 ac) would be impacted for this alternative. Total wetland impacts for both the high and low profiles of Alternative E-2 equal 15.7 acres.

TABLE 9-7
WETLAND IMPACT SUMMARY – BRIDGE, OTHER

Alternative	Number/Location of Bridge Piers within Wetlands	Impact from Bridge Piers (ac)	Other Wetland Impacts (ac)	Total Wetland Impacts (ac)
W-2	**36**/river valley	10.5	1.2	**11.7**
C-2	**36**/river valley	10.5	0.4	**10.9**
C-2A	**38**/river valley	11.1	5.0	**16.1**
E-1	**26**/river valley **4**/SFWC	7.6 1.2	0.2	**9.0**
E-1A High Profile	**26**/river valley **22**/SFWC	7.6 6.4	0.9	**14.9**
E-1A Low Profile	**26**/river valley **22**/SFWC	7.6 6.4	0.6	**14.6**
E-2[(1)]	**30**/river valley **14**/SFWC	8.8 4.1	2.8	**15.7**

[(1)] No difference between High Profile and Low Profile.

TABLE 9-8
WETLAND IMPACT SUMMARY – TYPE

Alternative	Type						
	1L	2	3	5	3/1L	2/6	Total
W-2	1.2	0	1.2	5.2	4.1	0	**11.7**
C-2	5.9	0	0.4	0	4.6	0	**10.9**
C-2A	9.3	0	4.6	2.2	0	0	**16.1**
E-1	0	.01	3.1	0	4.7	1.2	**9.0**
E-1A High Profile	0	.01	3.8	0	4.7	6.4	**14.9**
E-1A Low Profile	0	.01	3.5	0	4.7	6.4	**14.6**
E-2[(1)]	0	0	6.9	0	4.7	4.1	**15.7**

[(1)]No difference between High Profile and Low Profile.

9.5.4 Mitigation

Evaluation for this Tier I DEIS was completed with the understanding of the rules in place at the time of publication. Closer to the time of construction the Tier II EIS process will review the status of Federal and state regulations.

Federal and state wetland regulations require the use of a sequenced approach when projects have the potential to impact wetlands. Sequencing requires first avoiding wetland impacts if possible, and, if impacts are not avoidable, they must be minimized to the greatest extent practicable. Sequencing also includes repair of temporary impacts and reduction or elimination of impacts over time. After all options for avoidance, minimization, rectification and long term reduction of impacts have been considered and implemented, compensation that will replace lost wetland functions is required for those impacts that are not avoidable.

Efforts to avoid wetland impacts from the proposed river crossing began when potential alignments were being developed. See Chapter 3 for discussion of the alternatives development process. The alignments within each broad corridor were refined during scoping to avoid/minimize wetland impacts. Minor shifts in the alignments as they were developed during the DEIS process avoided wetland impacts where possible. The following shifts in alignments were made specifically to avoid or minimize wetland impacts:

- Alternative W-2 was shifted to avoid the open water area of Chaska Lake (W-3).
- Alternative C-2A takes a winding route which was meant to avoid Chaska Lake (W-3) and fragmentation impacts to old-growth floodplain forest.
- Alternative E-1A is currently aligned to avoid impact to Nyssen's Lake (W-17) and minimize impact to the Seminary Fen wetland protection area (W-19).

Complete avoidance of wetland impacts was not deemed prudent and feasible in all cases due to the need to balance impacts to other natural communities and the social environment.

Further minimization, rectification, long term reduction and compensation of wetland impacts will be addressed in detail in subsequent steps in the environmental process. Additional design modifications will also be considered during the design of the final project to further minimize wetland impacts. Temporary construction access within the river valley that impact wetlands will be restored upon completion. In addition, these temporary impacts may be further minimized through timing of construction during winter months when soils are frozen.

Long term reduction of impacts will be accomplished by maintaining the existing hydrologic characteristics of basins experiencing partial impacts as a result of the project. Specifically, this would be accomplished through measures that ensure that drainage patterns between and through wetlands are maintained and prevent wide fluctuations from existing water levels.

After a preferred alternative is identified, a wetland compensation plan for replacement of the affected wetland areas will be developed in subsequent steps in the environmental process. That plan would reassess the areas of wetland impacts (and mitigation needed) based on refined design plans, formal wetland delineations, and the current and applicable wetland mitigation guidelines and regulations in effect at that time. The intent of a wetland mitigation plan is to replace lost wetland functions in the project area, where possible, by creating new wetlands or restoring degraded wetlands. Where suitable on-site locations are not available for some impacts, off-site wetland mitigation, preferably within the same watershed, may be considered to accomplish some of the required mitigation. The mitigation strategies and implementation will be developed, permitted and carried out in coordination with the appropriate state and federal wetland regulatory agencies.

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10.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This chapter describes historical, architectural and archeological resources found within the proposed project's Area of Potential Effect (APE), and anticipated effects on these cultural resources resulting from the No-Build alternative and the Build alternatives as required by Minnesota Statute Chapter 138 and Section 106 of the National Historic Preservation Act of 1966 (as amended). Minnesota statutes requires that state departments and agencies consider impacts on properties listed on the National Register of Historic Places (NRHP), the State Register of Historic Places, and the State Historic Site Network in their project planning. The Minnesota Field Archaeology Act requires investigations of non-federal public land where archaeological sites are known or suspected to be located. Section 106 requires federal agencies to consider the effects of their actions on historic properties and consult with interested parties to determine ways to avoid, minimize, or mitigate effects caused by an undertaking.

Minnesota Rules Chapter 4410.3900 (Environmental Review Program) states that when a joint federal and state environmental document is being prepared, governmental agencies shall, to the fullest extent, avoid duplication between Minnesota Statutes and federal requirements. Therefore, for the purposes of this Tier I Draft EIS, the federal Section 106 process, described below, is being conducted to meet requirements set forth by Minnesota Statute Chapter 138 and the Field Archaeology Act. Section 106 includes a review process whereby the federal agency consults with the State Historic Preservation Office (SHPO), the Tribal Historic Preservation Office (THPO) on tribal land, the Advisory Council on Historic Preservation (AHCP) if appropriate, tribes with historic ties to the area, other interested parties, and the public to identify, evaluate, assess effects, and mitigate adverse impacts on any historic properties affected by their undertaking.

The Section 106 process consists of four steps: (1) initiation of the Section 106 process; (2) identifying and evaluating historic properties; (3) assessing the effects of an undertaking on historic properties; and (4) consultation for methods to avoid, minimize, or mitigate any adverse effects. An historic property is defined as any prehistoric or historic building, structure, site, object or district included in, or eligible for inclusion on the NRHP.

Criteria for determining whether a site, building, structure, or object is eligible for listing on the NRHP, as set forth in federal regulation 36 CFR 60, are used to evaluate the significance of historic properties. To qualify for listing in the NRHP, a property must possess integrity of location, design, setting, materials, workmanship, feeling, association, and significance in American history, architecture, archaeology, engineering and culture under one of the following criterion:

Criterion A: association with events that have made a significant contribution to the broad patterns of history; or

Criterion B: association with the lives of persons significant in our past; or

Criterion C: embodiment of the distinctive characteristics of a type, period, or method of construction, or representation of the work of a master, possession of high artistic values, or representation of a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: the ability to yield information important in prehistory or history (U.S. Department of the Interior 1997: 2).

Identification of significant cultural resources and potential effects to those resources has been and continues to be coordinated with SHPO. Consultation with Native American tribes has been coordinated by the Federal Highway Administration (FHWA). See FHWA correspondence to the Lower Sioux Indian Community dated March 15, 2007 in Appendix A.

Potential effects to cultural resources can include direct impacts caused by the proposed project, including demolition and construction activities; however, it can also include indirect impacts such as visual and noise. All possible impacts have been considered in determining effects to cultural resources. Analysis for this Tier I EIS is based on an assumed corridor width of 300 feet adjusted where appropriate for topographic considerations, storm water pending and at interchanges; design detail will be developed during the Tier II EIS process. A Section 106 process will be conducted with the Tier II EIS process. At that time, the APE will be updated, properties within the APE will be evaluated for NRHP eligibility, and a determination of effect on NRHP-listed or eligible properties will be made.

10.1 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

FHWA is the agency responsible for cultural resources review and has delegated authority to Mn/DOT Cultural Resources Unit (CRU) to lead the review efforts in consultation with FHWA. Periodic updates on the cultural resources studies were provided to agencies at the Project Management Team (PMT) meetings (June 16, 2005 and September 22, 2005) and the Study Advisory Committee (SAC) meetings (May 5, 2005, July 20, 2005, October 31, 2005 and May 17, 2006) during the study process. Updates were provided to the general public at open houses held December 7, 2005 and June 21, 2006. Information and handouts on the status of the Section 106 process were available at these meetings. A handout was also posted on the project website. The preliminary findings of the cultural resources studies were presented at the public open house on June 21, 2006, as described in Chapter 15 of this DEIS.

The Heritage Preservation Commissions (HPCs) of Carver and Chaska are consulting parties on the project for the Section 106 process. This means that they are invited to participate in the meetings and receive updates on the Section 106 process as it proceeds. They are also given the opportunity to review and comment on official determinations made and can be involved in mitigation discussions. The HPCs can also be signatories on a Memorandum of Agreement (MOA), if one is undertaken as part of the Section 106 process. Staff from Mn/DOT CRU met with representatives of the Chaska HPC, April 25, 2006 July 20, 2006, and August 15, 2006.

10.2 CULTURAL RESOURCE STUDIES

Phase I/II architecture/history and archeological history investigations were conducted between 2004 and 2006 by Louis Berger, Inc. as part of the Section 106 process for the proposed project. These studies:

- developed a historic context for the project area (See Section 10.2.1);
- compiled data on previously documented architectural resources and identified and evaluated additional potentially eligible architectural historic properties for NRHP eligibility (See Section 10.2.2); and
- compiled data on previous archeological investigations and recorded sites and evaluated potentially eligible archeological sites for NRHP eligibility (See Section 10.2.3).

The management summaries for these reports (entitled *Phase I/II Architecture/History Investigation for Five Proposed Alternative Route Corridors for Trunk Highway 41 Near Chaska, Carver and Scott Counties, Minnesota, June 2006* and *Phase I and II Archeological Investigations of Alternative Route Corridors for Trunk Highway 41 Near Chaska, Carver and Scott Counties, Minnesota, June 2006*) are included in *Volume II: Technical Memoranda*. The full reports are available from Mn/DOT. The findings of these studies are summarized below.

10.2.1 Historical Background and Context

For the architecture and historic investigations, the historic contexts of development in the study area are principally "Early Agriculture and River Settlement 1840-1870" and "Railroad and Agricultural Development 1870-1940". Rivers played a key role in the early pattern of settlement in the area and the Minnesota River was an important transportation route. The inception in the late 1860s of railroad construction in the counties in the study area lent new impetus to their general development. The coming of the railroad was a great boon to the area, since its relative dependence in the river for the transport of goods meant that commercial shipping ceased during the winter and in low water conditions. Chaska became the preeminent urban center and home to the town's brickmaking industry. The buff-colored "Chaska brick" contributed to the architectural look of the Twin Cities and other central Minnesota communities throughout the region.

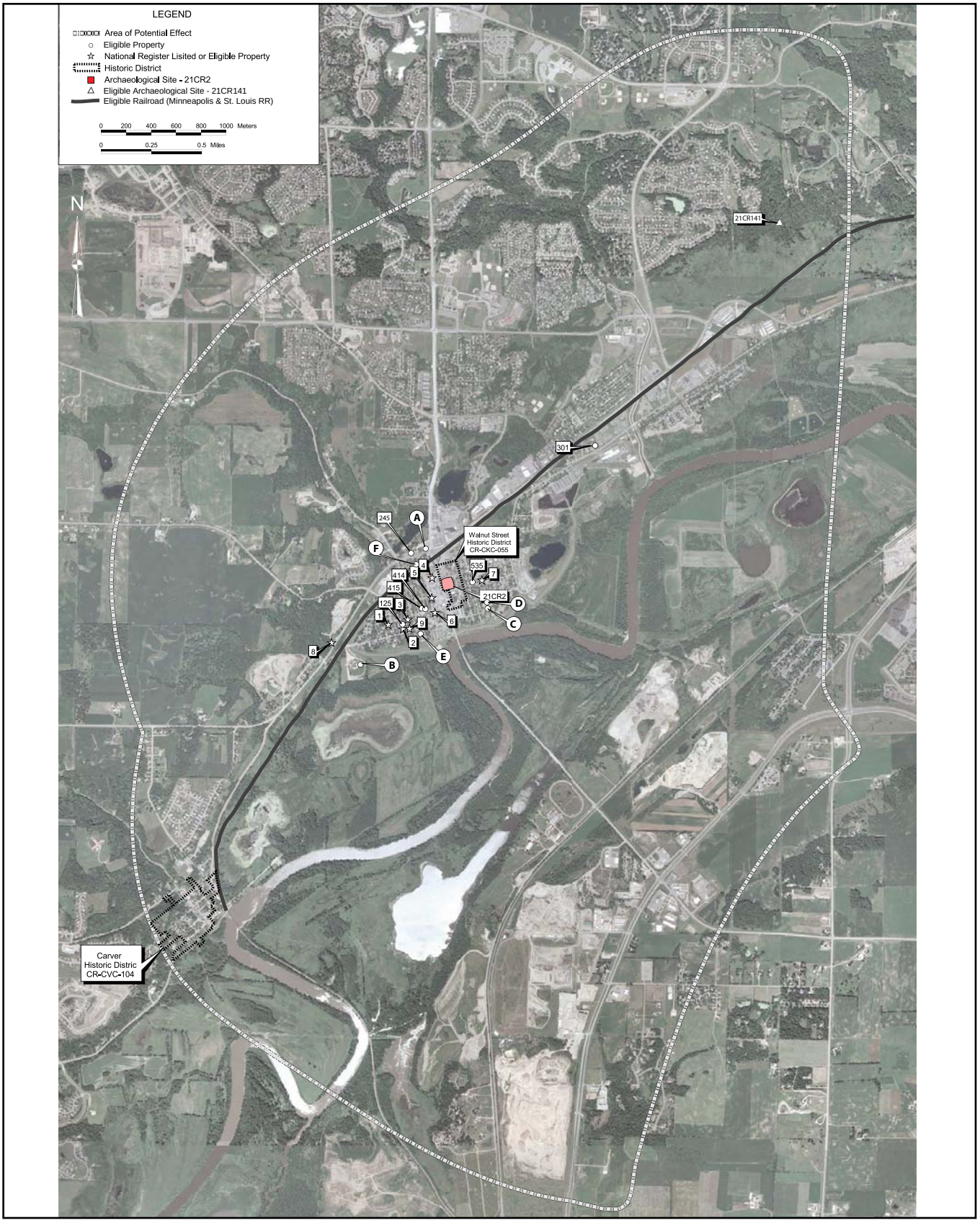
Agriculture formed the dominant aspect of economic life from initial settlement until recent years. Food processing emerged as a leading industry during the early twentieth century, and in Chaska, ultimately surpassing brickmaking as the town's most important manufacturing activity. Recent decades have seen another period of transition for the area, evolving increasingly into "bedroom communities" with many old farmsteads being built over with new residential developments.

For the archeological investigations, the pre-contact period of cultural history in the study area dates after about 12,000 years ago because most of the region was covered by glaciers until that time. The historic Dakota were present in the Carver-Scott County area by A.D. 1600. Driven west from lands in the Western Great Lakes by the Ojibwe and others, the Dakota became the dominant tribe in present-day Minnesota, South Dakota, western Wisconsin, and northern Iowa by 1800. The European-American exploration and latter settlement of south and central Minnesota followed navigable rivers and streams, which were the easiest modes of transportation. Subsequent settlements occurred along trails and roadways, and then along rail lines.

10.2.2 Architectural/Historical Resources

10.2.2.1 Area of Potential Effect (APE)

The area of potential effect (APE) for architectural resources was defined as the area liable to physical or visual impacts from the proposed alternative river crossings. Because of the large scale of the project and the potential direct and indirect impacts to historic properties and the potential for the project corridor locations to be adjusted, in 2004 Mn/DOT CRU, in consultation with SHPO, delineated an architectural APE that encompassed a large region around the proposed alternatives (Figure 10-1).



Graphics/Support/4590/EIS Figures

AREA OF POTENTIAL EFFECT (APE)
for Architectural Investigation and NRHP Eligible Resources

Figure 10-1

TH 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

10.2.2.2 Previous Documented Resources

Several architectural/historic resource studies had been done in the area prior to the studies undertaken for the proposed project. The earliest of these studies dates from 1977 and resulted in the NRHP listing or eligibility of 10 architectural resources and two historic districts (Carver Historic District and Walnut Street Historic District) within the APE for the proposed project. The properties in the Carver Historic District are presented in Table 10-1 and depicted on Figure 10-1. The properties in the Walnut Street Historic District in the City of Chaska are presented in Table 10-2 and depicted on Figure 10-1.

TABLE 10-1
CARVER HISTORIC DISTRICT, CITY OF CARVER (CR-CVC-104)

Site No.	Property	Address	C/NC Status
CR-CVC-001	Railroad Water Tower	Co. Hwy. 40	Contributing
CR-CVC-004	Pesek House	217 4th St. E	Contributing
CR-CVC-005	Roger Dauwalter House	209 4th St. E	Contributing
CR-CVC-006	John Hebeison House (The Gables)	201 4th St. E	Contributing
CR-CVC-007	Thaemart House	121 4th St. E	Contributing
CR-CVC-008	Levi Griffin House	113 4th St. E	Contributing
CR-CVC-009	Golnick House	109 4th St. E	Contributing
CR-CVC-010	Springside	113 4th St. W	Contributing
CR-CVC-011	Walter Anderson House	117 4th St. W	Contributing
CR-CVC-012	M. Dauwalter House	121 4th St. W	Non-Contributing
CR-CVC-013	Larson House	201 4th St. W	Contributing
CR-CVC-014	Claesson House	205 4th St. W	Non-Contributing
CR-CVC-015	Tholen House	213 4th St. W	Contributing
CR-CVC-016	Swanson House	221 4th St. W	Contributing
CR-CVC-017	Earl Dauwalter House	320 Ash St.	Contributing
CR-CVC-018	St. Nicholas Church	412 4th St. W	Contributing
CR-CVC-019	Swedish Methodist Church	220 4th St. W	Contributing
CR-CVC-020	Duncan House	216 4th St. W	Contributing
CR-CVC-021	M. Goetz House	212 4th St. W	Contributing
CR-CVC-022	Drazen House	200 4th St. W	Contributing
CR-CVC-023	Wiebe House	116 4th St. W	Contributing
CR-CVC-024	Phillips House	112 4th St. W	Contributing
CR-CVC-025	Swanson House	108 4th St. W	Contributing
CR-CVC-026	Old Fire Station	108 4th St. E	Contributing
CR-CVC-027	John Funk House	112 4th St. E	Contributing
CR-CVC-028	Oesterich House	400 Oak St. N	Contributing
CR-CVC-029	Buetow House	200 3rd St. E	Contributing
CR-CVC-030	Houghton/Skoog House	120 3rd St. E	Contributing
CR-CVC-031	Anton Knoblach House	112 3rd St. E	Contributing
CR-CVC-032	Floyd Holtz House	116 3rd St. W	Contributing
CR-CVC-033	Finkel House	120 3rd St. W	Contributing
CR-CVC-034	Christian Bristle House	200 3rd St. W	Contributing
CR-CVC-035	Lenzen House	208 3rd St. W	Non-Contributing

TABLE 10-1 continued
CARVER HISTORIC DISTRICT, CITY OF CARVER (CR-CVC-104)

Site No.	Property	Address	C/NC Status
CR-CVC-036	Meusissen House and Barn	220 3rd St. W	Contributing
CR-CVC-037	D. Swanson House	212 3rd St. W	Non-Contributing
CR-CVC-038	G. Reisgraf House	300 3rd St. W	Contributing
CR-CVC-039	Roger Dauwalter House	316 3rd St. W	Contributing
CR-CVC-040	Cordrary House/Carver County Printing	320 3rd St. W	Contributing
CR-CVC-041	Hilldale	412 3rd St. W	Contributing
CR-CVC-042	Salem Lutheran Church	221 3rd St. W	Contributing
CR-CVC-043	Poppitz House	217 3rd St. W	Contributing
CR-CVC-044	Lund House	209 3rd St. W	Contributing
CR-CVC-045	Dragotis House	201 3rd St. W	Contributing
CR-CVC-046	John Hebeisen Hardware Store	213 Broadway	Contributing
CR-CVC-047	Goetz House	117 3rd St. E	Contributing
CR-CVC-048	Doubel House	121 3rd St. E	Contributing
CR-CVC-049	Presbyterian Church	109 Main St. E	Contributing
CR-CVC-050	Dikeside	121 Main St. W	Contributing
CR-CVC-051	Read House	201 Main St. W	Contributing
CR-CVC-052	Luthy House	209 Main St. W	Contributing
CR-CVC-053	Olaf Hanson House	217 Main St. W	Contributing
CR-CVC-054	Piekkenpol House	301 Main St. W	Contributing
CR-CVC-055	P. Swenson House	309 Main St. W	Contributing
CR-CVC-056	Greek Revival House	401 Main St. W	Contributing
CR-CVC-057	Tengblad House	220 Main St. W.	Contributing
CR-CVC-058	East Lake House	208 Main St. W	Contributing
CR-CVC-059	Dennin House	200 Main St. W	Contributing
CR-CVC-060	Kling House	xxx Jorgenson St.	Contributing
CR-CVC-061	Moldenhauer House	120 Main St. W	Contributing
CR-CVC-063	Temperance Hotel	100 Broadway	Contributing
CR-CVC-064	Riverside Bar	120 Broadway	Contributing
CR-CVC-065	Mobil Gas Station	200 Broadway	Contributing
CR-CVC-066	Mobil Oil Gas Station Office	Broadway (200 block)	Contributing
CR-CVC-067	Commercial Building	Broadway (200 block)	Contributing
CR-CVC-068	Gehl's Meat Market & Ice House	212 Broadway	Contributing
CR-CVC-069	Harvey's Bar	220 Broadway	Contributing
CR-CVC-070	Post Office	Broadway	Contributing
CR-CVC-071	Barber Shop & Saloon	300 Broadway	Contributing
CR-CVC-072	Nelson Drugstore	304 Broadway	Contributing
CR-CVC-073	Funk Bank	308 Broadway	Contributing
CR-CVC-074	Village Hall	316 Broadway	Non-Contributing
CR-CVC-075	House	404 Broadway	Contributing
CR-CVC-076	Woodman Hall	408 Broadway	Contributing
CR-CVC-077	House	416 Broadway	Contributing
CR-CVC-078	House	420 Broadway	Contributing
CR-CVC-079	Sexton House	100 5th St. W	Contributing

TABLE 10-1 continued
CARVER HISTORIC DISTRICT, CITY OF CARVER (CR-CVC-104)

Site No.	Property	Address	C/NC Status
CR-CVC-080	Carver Cottage	121 6th St. W	Contributing
CR-CVC-081	Carver Creamery and Ice House	Broadway & 5th St. (Non-Extant)	Non-Contributing
CR-CVC-083	Rev. Raedeke House	501 Oak St.	Non-Contributing
CR-CVC-084	Trinity Lutheran Church	417 Oak St.	Non-Contributing
CR-CVC-085	Dauwalter Garage/Blacksmith	421 Broadway	Non-Contributing
CR-CVC-086	Charles Dauwalter House	413 Broadway	Contributing
CR-CVC-087	Funk Hardware Store	401 Broadway	Contributing
CR-CVC-089	The Sunflower	317 Broadway	Contributing
CR-CVC-090	Drugstore	313 Broadway	Contributing
CR-CVC-091	Anton Knoblach Bank	309 Broadway	Contributing
CR-CVC-092	Drugstore and Post Office	217/221 Broadway	Contributing
CR-CVC-093	Kings Arms Company	205 Broadway	Contributing
CR-CVC-094	House	205 4th St. W	Contributing
CR-CVC-095	George DuTroit Bank	205 Broadway	Contributing
CR-CVC-096	Carver Fire Department	117 Broadway	Non-Contributing
CR-CVC-097	Carver School	420 Oak St.	Contributing
CR-CVC-098	Stone Arch Bridge (L-2526)	4th St. over Carver Spring	Contributing
CR-CVC-099	Stone Arch Bridge (L-2722)	6th St. over Carver Spring	Contributing
CR-CVC-100	Stone Arch Bridge (L-2783)	Main St. over Carver Spring	Contributing
CR-CVC-105	St. Nicholas School	5th St. & Ash St.	Contributing
CR-CVC-106	St. Nicholas Church Activity Hall	5th St. & Ash St.	Non-Contributing

TABLE 10-2
WALNUT STREET HISTORIC DISTRICT IN THE CITY OF CHASKA (CR-CKC-055)

Site No.	Property Name	Address	C/NC Status
CR-CKC-019	Tenement Houses	414-422 Walnut St.	Contributing
CR-CKC-026	Dienslake House	412 Walnut St.	Contributing
CR-CKC-027	Chris Klein House/City Hall	205 - 4th St.	Contributing
CR-CKC-028	Steinberger House	320 Walnut St.	Contributing
CR-CKC-029	Charles Klein House/Library	314 Walnut St.	Contributing
CR-CKC-056	Gibson House	308 Walnut St.	Contributing
CR-CKC-031	K.K. Klammer House	302 Walnut St.	Contributing
CR-CKC-032	Ess Brothers Foundry and Machine Shop	218 Walnut St.	Contributing
CR-CKC-033	Edmund Ess House	212 Walnut St.	Non-contributing
CR-CKC-034	Frank Meisseler House	206 Walnut St.	Contributing
CR-CKC-035	Second Faber and Linenfelser Store	200 Walnut St.	Contributing
CR-CKC-036	First Faber and Linenfelser Store	123 Walnut St.	Non-contributing
CR-CKC-037	Werner Store	2nd St. E.	Non-contributing

TABLE 10-2 continued
WALNUT STREET HISTORIC DISTRICT IN THE CITY OF CHASKA (CR-CKC-055)

Site No.	Property Name	Address	C/NC Status
CR-CKC-038	George DuToit Bank	xxx 2nd St. E.	Contributing
CR-CKC-039	Philip Henk Hardware Store	122 2nd St. E.	Contributing
CR-CKC-040	Anne Marie's Decorating	xxx 2nd St. E.	Contributing
CR-CKC-041	Diedrick Building	100 2nd St. E.	Contributing
CR-CKC-042	Henry Young House	109 2nd St. E.	Contributing
CR-CKC-043	Hammer & Bierstettel Store	107 2nd St. E.	Contributing
CR-CKC-044	Chaska Auto Body	115 2nd St. E.	Non-contributing
CR-CKC-045	K. Hammer Building	123 2nd St. E.	Contributing
CR-CKC-046	Wolff House	207 Walnut St.	Contributing
CR-CKC-047	Ess House	211 Walnut St.	Contributing
CR-CKC-048	Ess House	217 Walnut St.	Contributing
CR-CKC-049	Garage	N/A	Contributing
CR-CKC-050	public square	N/A	Contributing
CR-CKC-051	Moravian Church	115 - 4th St. E.	Contributing
CR-CKC-052	Schmidt House	415 Walnut St.	Contributing
CR-CKC-053	Nord House	423 Walnut St.	Contributing

10.2.2.3 Current Studies and Determination of Eligibility

The Phase I architecture/history investigation was conducted in November and December, 2004. The survey identified a total of 619 properties within the proposed project's APE that were constructed before 1964. Of those properties, 75 were constructed between 1956 and 1964. The remaining 531 properties are more than 50 years of age. Most of the 531 properties that are more than 50 years of age are not eligible for inclusion in the NRHP as they have poor integrity or are of a common property type that lacks distinction.

Of the 619 properties identified in the Phase I survey that were constructed before 1964, nine individual properties were recommended for Phase II evaluation with respect to NRHP criteria. Another 17 properties located on Oak Street between 2nd and 4th Streets in Chaska adjacent to the Walnut Street Historic District were identified as being potentially eligible for inclusion in the NRHP under Criterion B and were also recommended for Phase II evaluation. The Phase II evaluation, conducted in March 2006, evaluated the significance of properties identified in the Phase I investigation.

The Phase II report provided a detailed investigation of these 26 properties. Based on this research, seven of the properties were considered eligible for inclusion in the NRHP under various criteria. Subsequent to the Phase II report, and at the request of the Chaska HPC, four additional properties were identified, investigated and determined eligible by Mn/DOT CRU. All of these properties are listed on Table 10-3, along with previously listed or determined eligible properties, and depicted in Figure 10-1. A summary of the historical significance and determination criteria for each of these recently determined-eligible properties is provided below.

TABLE 10-3
PROPERTIES LISTED OR ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES

Map ID	Site No.	Property Name	NREG Status/ Criteria	Brief Significance Statement
125	CR-CKC-174	H. Oesterreich House	C	The Oesterreich House is determined eligible under Criterion C for inclusion in the NRHP as a significant example of a Chaska brick residence constructed in the Queen Anne style.
245	CR-CKC-009	Riedele House	B, C	The Riedele House is determined eligible under Criterion B for its association with Andreas [Andrew] Riedele, one of Chaska's prominent brick manufacturers and under Criterion C as a significant example of the cross-wing type of Chaska brick residence utilized in an urban area.
301	CR-CKC-293	Crystal Sugar Beet Factory Office	A, C	The Crystal Sugar Beet Factory Office is determinedd eligible under Criteria A for its association with the sugar beet industry in Chaska and under Criteria C as a significant example of a commercial Chaska brick building.
415	CR-CKC-007	George A. DuToit House	C	The George A. DuToit house is determined eligible under Criteria C as a significant example of a Queen Anne style Chaska brick house.
414	CR-CKC-006	Guardian Angels Catholic Church, Rectory, and School	C	The Guardian Angels Catholic Church and Rectory is determined eligible under Criteria C as it is a significant example of a Gothic Revival church built with Chaska brick.
535	CR-CKC-021	Lyman W. Noble/ John Sutheimer House	C	The Noble/Sutheimer House is determined eligible under Criterion C as an early, significant example of a Chaska brick residence constructed in 1858 in Chaska, Minnesota.
A	CR-CVC-146 CR-CKC-623 CR-CHC-035	Minneapolis & St. Louis Railroad and Depot	A	The Minneapolis and St. Louis Railroad in Carver County is determined eligible under Criterion A for its association with the development of several key industries in Chaska including the Carver County Sugar Beet Factory, the numerous Chaska brick yards and manufacturers, and the Chaska Flour Mill.
21CR141	21CR141	Archeology Site	D	This multi-component pre-contact site is determined eligible for its deeply buried archeological deposits that were found to have integrity and potential for contributing significant information about the occupation of the lower Minnesota River valley during the Archaic Period.
B	XXXXXXX	Chaska Cubs Ball Field* (Athletic Park)	A	The Chaska Cubs Ball Field is locally significant and determined eligible under Criterion A, in the areas of recreational and social history and retains the key features of a 1950s ball field.

*Identified subsequent to the Phase II report.

TABLE 10-3 continued
PROPERTIES LISTED OR ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES

Map ID	Site No.	Property Name	NREG Status/ Criteria	Brief Significance Statement
C	CR-CKC-0572	Griep House*	C	The Griep House is determined eligible under Criterion C as a significant example of a Chaska brick residence.
D	CR-CKC-0381	House*	C	This house is determined eligible under Criterion C as a significant example of the cross-wing type of Chaska brick residence.
E	CR-CKC-545	Fink-Young House*	C	The Fink-Young House is determined eligible under Criterion C as a significant example of a Chaska brick residence.
1	CR-CKC-002	Frederick E. DuToit House	NRHP-Listed	Victorian vernacular, c 1870
2	CR-CKC-004	Eder-Baer House	NRHP-Listed	Queen Anne, c 1900
3	CR-CKC-005	E. H. Lewis House	NRHP-Listed	Victorian vernacular, c 1870
4	CR-CKC-011	Brinkhaus Saloon Livery Barn	NRHP-Listed	Livery barn, c 1872
5	CR-CKC-012	Courthouse Saloon	NRHP-Listed	Commercial building & livery barn, 1888
6	CR-CKC-015	Herald Block	NRHP-Listed	Commercial building, 1871
7	CR-CKC-022	Frederick Greiner House	NRHP-Listed	Victorian vernacular, c 1870
Area Out-lined on Map	CR-CKC-055	Walnut Street Historic District	NRHP-Listed	Includes 200-500th Block of Walnut Street, the Public Square, and E. 2nd Street between Walnut and Chestnut Sts. Twenty-nine properties total are in the district; twenty-one of which are contributing. A prehistoric burial ground (21-CR-2) is located in the Public Square.
8	CR-CKC-057	Chaska Historical Marker	Eligible (DOE) (previous determination)	Commemorative roadside marker, 1938
9	CR-CKC-059	Conrad Fink House	Eligible (CEF) (previous determination)	Victorian vernacular, c 1900
F	CR-CKC-0516	Scott House		
Area Outlined	CR-CVC-104	Carver Historic District	NRHP-Listed	Roughly bounded by Fifth Street, County Highway 40, Hickory Street, and the levee. Ninety-seven properties are in the district; eighty-six of which are contributing.

- **H. Oesterreich House (CR-CKC-174).** The Oesterreich dwelling is a two-story Queen Anne style Chaska brick house constructed in 1885. Helmuth Oesterreich, a brick mason, came to the United States from Prussia and formed the contracting firm of Oesterreich Brothers, responsible for the masonry work on the Catholic and New Moravian Churches in Chaska. The Oesterreich House is eligible for inclusion in the NRHP under Criterion C as a significant example of a Chaska brick residence constructed in the Queen Anne style. Unlike its vernacular counterparts, the Oesterreich Chaska brick house displays typical Queen Anne

style characteristics including a hipped roof with lower cross gables, a prominent bay window, decorative sandwich brackets in the eaves, and false half-timbering in the uppermost gable.

- **Riedele House (CR-CKC-009).** The two-story Riedele House near the railroad in Chaska is a Chaska brick dwelling constructed in 1879 by Andreas Riedele that was operated as a hotel for an unknown period of time. The house was constructed of bricks that were salvaged from the Ulmer and Lieverman Brewery, which burned in 1878. Andreas Riedele was born in Germany in 1829. He came to the United States in the mid 1850s, farming near Philadelphia for one year before coming to Minnesota in 1855. In 1881, he entered into the brick manufacturing industry. The Riedele House is eligible for inclusion in the NRHP under Criterion B for its association with Andreas Riedele and the Klein Brothers, two of Chaska's prominent brick manufacturers. The house is also eligible under Criterion C as a significant example of the cross-wing type of Chaska brick residence. The Riedele Chaska brick house displays the typical characteristics of the Chaska brick farmhouse including a cross-wing form and segmental arch windows with a double row of brick headers. The house is a significant example of the typical Chaska brick farmhouse type utilized in an urban area.

- **Crystal Sugar Beet Factory (Office - CR-CKC-293).** The Crystal Sugar Beet Factory one-story Chaska brick office building was constructed in 1906 across the road from the processing plant. As the office for the Carver County Sugar Company, the building has a significant association with one of Chaska's most important industries. There are also very few significant examples of Chaska brick commercial buildings in the area. The office building is eligible for listing in the NRHP under Criteria A for its association with the sugar beet industry in Chaska and under Criteria C as a good example of a commercial Chaska brick building. Though the windows on the office have been replaced on the building, the factory office retains its integrity of workmanship, materials, feeling, association, location and setting.

- **George A. DuToit House (CR-CKC-007).** The George A. DuToit House is a two-story Chaska brick house constructed in 1878. George A. DuToit was born in New York in 1847. He came to Carver County in 1856. He studied pharmacy in Shakopee and established a drug store in Carver. Around 1870, DuToit established a bank in the rear section of his drug store. In 1874, DuToit closed the drugstore in Carver and moved the bank to Chaska. DuToit was appointed by Governor Knute Nelson to the State Capitol Commission, responsible for construction of the state capitol building. By 1915, DuToit was president of the Carver County State Bank in Chaska. DuToit served two terms as the mayor of Chaska. The George A. DuToit house is eligible for inclusion in the NRHP under Criteria C as a significant example of a Queen Anne style Chaska brick house. The house features typical Queen Anne characteristics including a hipped roof with cross gables, a large bay window with Queen Anne style leaded glass windows, deep eaves with modillions, pedimented gables with pseudo-Palladian style windows and shingle siding, an oval window on the east façade, and decorative corbelled chimneys.

- **Guardian Angels Catholic Church and Rectory (CR-CKC-006).** The Guardian Angels Catholic Church is a Gothic Revival style building constructed of Chaska brick in 1885. The church was designed by John Geiser with a 162-foot high steeple. The entire church complex is surrounded by a stone and Chaska brick wall. The new building was dedicated

by Bishop Thomas L. Grace of St. Paul in 1885. In 1902, fire broke out at the church while a new furnace was being installed. The church was gutted and the steeple collapsed. Though the damage was extensive, the congregation reconstructed the church using the walls of the gutted building. Within a year the new church was dedicated by Archbishop John Ireland of St. Paul. The new building was nearly identical to the original 1885 structure.

- The Guardian Angels Catholic Church and Rectory is eligible for inclusion in the NRHP under Criteria C as it is a significant example of a Gothic Revival church built with Chaska brick. Though the church is a religious property, it does meet Criteria Consideration G as the complex's significance is derived from architectural distinction. The church exhibits all of the hallmark characteristics of the Gothic Revival style including Gothic arch windows and doors, corbelled brick, brick buttresses, quatrefoil motifs in the stained glass windows, and a central buttressed tower with a steeply pitched steeple.

- **Lyman W. Noble/John Sutheimer House (CR-CKC-021).** The Noble/Sutheimer dwelling, a two-story, Chaska brick house, was constructed in 1858. It is thought to have been the first Chaska brick house built in Carver County. Lyman Noble was working as a brick mason and it is likely that he constructed the house for Ezekiel Ellsworth. In 1861, Sarah Ellsworth obtained ownership of her father's home. In 1868, Lyman Noble married Sarah Ellsworth. In 1894, John Sutheimer purchased the Noble property. Sutheimer immigrated to the United States from Germany in 1853 with his parents. By 1870 Sutheimer and his family moved to St. Paul and began a cigar manufacturing business. In 1886, Sutheimer moved his cigar business to Chaska and later established a new cigar manufacturing firm.

- **The Noble/Sutheimer House** is eligible for inclusion in the NRHP under Criterion C as a significant example of a Chaska brick residence in Chaska, Minnesota. It is one of the best preserved examples of a Chaska brick house. The house was one of the first built in the newly platted townsite of Chaska by Lyman W. Noble, one of the earliest known masons in the area.

- **The Minneapolis and St. Louis Railroad (CR-CVC-146, CR-CKC-623, CR-CHC-035).** The Minneapolis and St. Louis Railroad in Carver County (approximately 7.5 miles) runs from the Minnesota River, just northeast of the city of Carver, along US Highway 212 through the northern section of Chaska and Chanhassen Township to the Hennepin County line. The railroad continued to operate until the late 1980s. In 1991, the tracks were taken out of the Hopkins to Chaska section of the line. Shortly thereafter, the same section of line was purchased by the Hennepin County Regional Railroad Authority (HCRRA) for future rail transit use. The section has been temporarily converted into a bike/walking trail, known as the Southwest LRT Trail.

  The Minneapolis and St. Louis Railroad in Carver County is eligible for inclusion in the NRHP under Criterion A for its association with the development of several key industries in Chaska including the Carver County Sugar Beet Factory, the numerous Chaska brick yards and manufacturers, and the Chaska Flour Mill. As with many Minnesota towns, Chaska and Carver owed their development to the railroad that was an important link to the Twin Cities.

Based on the Phase II study, Mn/DOT CRU made a determination of eligibility for each of these properties. This determination was submitted to the SHPO on July 13, 2006 (Appendix A). The Carver HPC and the Chaska HPC were provided with a copy of the determination and given the

opportunity to review and comment. Subsequent to the Phase II study, the Chaska HPC identified the following properties which Mn/DOT CRU investigated and determined to be eligible on the NRHP. This determination was submitted to the SHPO in August 25, 2006, with copies provided to the Carver HPC and the Chaska HPC (Appendix A). The SHPO provided comments in a letter dated September 27, 2006 (Appendix A).

- **Chaska Cubs Ball Field at Athletic Park (Not Yet Assigned).** The Chaska Cubs Ball Field at Athletic Park is an intact 1950s ball field built during the heyday of town ball in Minnesota, which was a major recreational activity following World War II. The Chaska Cubs were founded in 1929 and played in the Class A league of the Association of Minnesota Amateur Baseball Leagues (now the Minnesota Baseball Association). The property type that best illustrates the town ball phenomena in post-World War II Minnesota is the town ball field. Town ball fields from this era are characterized by a wood or wood and cinderblock grandstand, with wood bleachers, chicken-wire screen, and concession stand; wooden or cinderblock dug outs; a grassy field; and large flood lights that allowed for evening games. The Chaska Cubs Ball Field at Athletic Park is locally significant under Criteria A under the areas of recreational and social history.

- **Griep House (CR-CKC-0572).** This two-story gable front Chaska brick house was built in 1890 and owned by Herman Griep, a sugar factory laborer. It is eligible under Criterion C as a significant example of a Chaska brick residence.

- **House (CR-CKC-0381).** This two-story cross-wing Chaska brick house was built in 1895 by the Lipinski family, descendants of local Polish settlers. It features an entry on the gable-front of the main façade as well as an entry on the side gable of the wing. It is eligible under Criterion C as a significant example of the cross-wing type of Chaska brick residence.

- **Fink-Young House (CR-CKC-545).** This Chaska brick house was built in 1883 by Conrad Fink. It was sold to Horace Young, owner of the Rex Theater, in 1938 and remained in the family until 2006 when it was sold to a great-great granddaughter of Conrad Fink. It is eligible under Criterion C as a significant example of a Chaska brick residence.

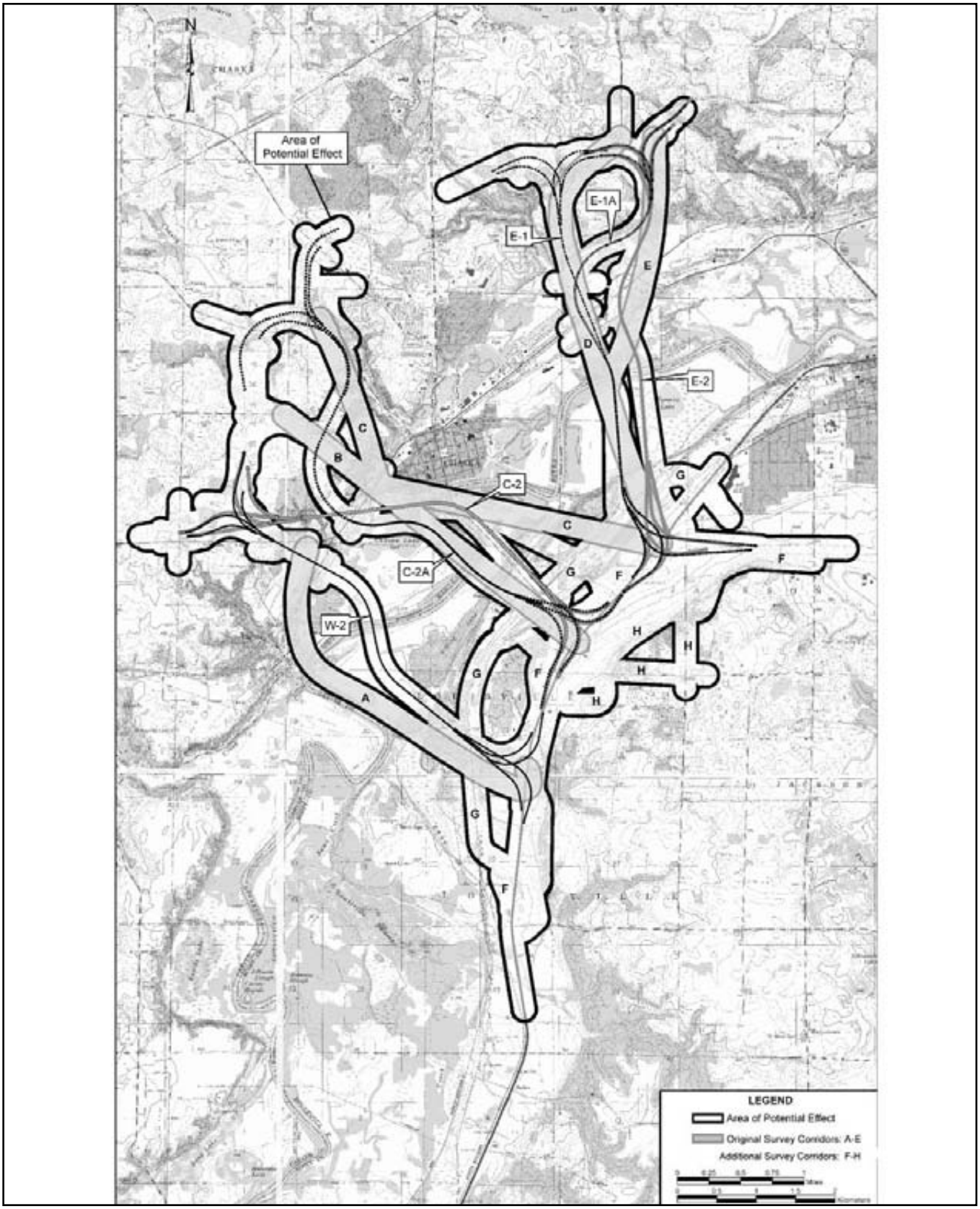
10.2.3 Archeological Resources

10.2.3.1 Area of Potential Effect

The APE for geomorphological and archeological work was defined as the construction limits of the proposed alternative route corridors (Figure 10-2). The different corridors that were investigated as part of the archeological investigation had a combined length of approximately 45.8 miles and included an estimated 5,552 acres. The APE was adjusted as needed as the DEIS Build alternatives were refined.

10.2.3.2 Previous Investigations and Recorded Sites

A number of archeological investigations dating back to 1882 have been performed within one mile of the project site and several pre-contact and historical sites have been recorded. No archeological sites within the project APE have been previously NRHP-listed or determined to be eligible.



Graphics/Support/4590/EIS Figures

AREA OF POTENTIAL EFFECT (APE)
for Archaeological and Geomorphological Investigation

Figure 10-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Environmental Impact Statement
S.P. #1008-60
Minnesota Department of Transportation

10.2.3.3 Current Studies and Determinations of Eligibility

The archeological studies for the proposed project included a geomorphological assessment (November/December 2004 and March 2005), a Phase I investigation (October/ November 2004 and June and October 2005) and a Phase II site evaluation (May 2006).

The geomorphological assessment was conducted to identify areas of high to moderate potential for deeply buried archeological deposits within the APE. Fifty-one geomorpholigical cores were extracted on alluvial fans, on terraces and on the floodplain to assess the geologic potential for archeological deposits and to interpret the depositional character of the lower Minnesota River valley. The potential for buried archeological sites was determined by examining 1) the soil-stratigraphic character of the buried portion of the landscape, 2) the age of these deposits and 3) the potential for archeological sites in unburied and buried contexts of the same landscape.

The Phase I archeological investigation was designed to identify archeological resources within the corridors and provide recommendations for identified cultural resources as to their eligibility for listing on the NRHP. It included a literature search to identify locations of previously recorded archeological sites to help assess the potential for unrecorded sites in the project corridors. Surface and limited subsurface investigations of archeological resources within the project area to assess their nature and integrity were also part of the Phase I investigation. Finally, Phase I defined spatial boundaries of archeological sites in relation to the project area.

Three archeological sites were identified during the course of the Phase I investigation that yielded artifacts which were clearly cultural. One of these sites was recommended for a Phase II site evaluation. The site, (21CR141), is situated on a broad alluvial fan in a steep, narrow drainage of the Hazeltine Bluffs. Because of the recovered artifacts and buried soil horizons recovered from Site 21CR141, the site was recommended for Phase II testing to evaluate its potential for inclusion on the NRHP. The deposits discovered during Phase I included four Oneota pottery sherds, six small flakes, very small bone fragments and charcoal. These were found in a deeply buried (5Ab) horizon at 315 to 350 centimeters below ground surface near the base of the ravine.

The Phase II investigation evaluated the scientific significance of the archeological deposits identified at site 21CR141 in the Phase I investigation. Sub surface testing was done to refine the horizontal and vertical boundaries of the site deposits and look for evidence of archeological features or diagnostic artifacts that would facilitate interpretation of the site's chronology and primary functions. Phase II test excavations at Site 21CR141 resulted in the recovery of a small amount of bone and one flake from the Surface A horizon and buried soils in the test units on top of the alluvial fan. Animal bone fragments were found between the ground surface and 46 centimeters below ground surface in the test units. The four Oneota pottery sherds recovered in Phase I investigation appear not to be associated with other deposits of this culture and may be considered an isolated find. The site is a multi-component pre-contact site. The deeply buried archeological deposits in the area were found to have integrity and potential for contributing significant information about the occupation of the lower Minnesota River valley during the Archaic Period (5,000 -3,000 B.C.).

Based on this study, Mn/DOT CRU made a determination that the site is eligible for listing in the NRHP based on Criteria D (Letter dated July 13, 2006, Appendix A). The site is listed in Table 10-3 and depicted on Figure 10-2. No other archeological resources were identified in the study area.

10.3 REQUESTS FROM LOCAL HERITAGE PRESERVATION COMMISSIONS FOR CONSIDERATION OF ADDITIONAL PROPERTIES

Subsequent to the Phase II study the Carver HPC contacted Mn/DOT CRU to request that four properties be considered for eligibility on the NRHP. Mn/DOT CRU determined that none of the identified properties in the City of Carver retained sufficient integrity to be considered eligible for listing on the NRHP, as noted in Table 10-4. The Chaska HPC requested that 30 properties be considered. (Note: three of the properties identified by the Chaska HPC already been determined to be eligible prior to their request). Mn/DOT CRU determined that four of the identified properties in the City of Chaska be further considered to determine eligibility, as shown in Table 10-5. Mn/DOT CRU made a determination that three of these properties are eligible to be listed on the NRHP. These three properties are discussed in Section 10.2.2.3 and listed in Table 10-3.

It is important to note that any sites not determined to be eligible for the NRHP through the Section 106 process being conducted for the proposed project are not precluded from being eligible in the future, should measures be taken to restore their integrity.

TABLE 10-4
CITY OF CARVER – ADDITIONAL POTENTIALLY ELIGIBLE HISTORIC PROPERTIES REQUESTED FOR FURTHER CONSIDERATION

Property Name	Property Address	Property Status/Determination
Minneapolis Hotel and Saloon	212 Fourth Street East	Not being considered
Railroad Hotel	216 Fourth Street East	Not being considered
Railroad Hotel Saloon	220 Fourth Street East	Not being considered
Residence of owners of the Railroad Hotel and Saloon	430 Lime Street North	Not being considered

TABLE 10-5
CITY OF CHASKA – ADDITIONAL POTENTIALLY ELIGIBLE HISTORIC PROPERTIES REQUESTED FOR FURTHER CONSIDERATION

Property Name	Property Address	Property Status/Determination
Oesterreich Hardware	103 West Second Street	Not being considered
Butch's Bar	100 East Second Street	Contributing to Walnut Street Historic District
Philip Henk Cigar Factory	102-104 East Second Street	Contributing to Walnut Street Historic District
Young Family Home	109 East Second Street	Contributing to Walnut Street Historic District
Moravian Church	115 East Fourth Street	Contributing to Walnut Street Historic District
Minneapolis - St. Louis Depot	101 East Highway 212	**Determined eligible prior to request**
E.A. Taylor House	403 East Third Street	Not being considered
Music Teacher's Home	113 Oak Street	Not being considered
Griep House	116 Maple Street	Not being considered
Griep House	512 East Second Street	**Determined eligible after request**
House	620 Willow	Not being considered
Nikolai House	906 Stoughton (205 W First)	Not being considered
Jasper/Heller/Holtz Home	1201 Valley Street	Not being considered
Liberty Heights	599 Independence	Out of APE
Pass House	1695 Bavaria Road	Out of APE
Koehnen House	111000 Bavaria Road	Out of APE
Eitel House	Not available	Out of APE
House	300 West Sixth Street	Not being considered
House	512 Cedar Street	Not being considered
Scott House	516 Pine Street	**Determined eligible prior to request**
Chaska Mill	500 Pine Street	Not being considered
House	205 West First Street	**Determined eligible after request**
Fink-Young House	322 West First Street	**Determined eligible after request**
Glatzel House	403 West First Street	Not being considered
Cottage	622 West First Street	Not being considered
Building	201 Hickory	Not being considered
Fink-Koehnen Family	205 Elm Street	Not being considered
Guardian Angels Monastery and brick walls	Not available	**Determined eligible prior to request**
Brickyards	North side of 212 at 41	Not being considered
Mount Pleasant Cemetery	Not available	Not being considered

10.4 DETERMINATION OF EFFECT/ENVIRONMENTAL CONSEQUENCES

Mn/DOT CRU reviewed the project pursuant to its Federal Highway Administration (FHWA)-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800). Preliminary findings were made by Mn/DOT CRU in a letter dated July 13, 2006 (Appendix A). Final findings were made in a letter to the SHPO dated August 24, 2006 (Appendix A).

The findings are as follows:

No-Build Alternative. The No-Build alternative would have an adverse effect on the Walnut Street Historic District in Chaska.

Alternative W-2. A determination of effect on the Carver Historic District cannot be made at this time because the design elements cannot be known at this time and because of uncertainty about noise impacts.

Alternative C-2. Alternative C-2 as planned would have no adverse effect on the Walnut Street Historic District in Chaska. A determination of effect on six historic properties in the area of Elm Street and 1st Street in Chaska cannot be made at this time because of uncertainty about noise impacts. Alternative C-2 would have an adverse effect on the Chaska Cubs Ball Field (a.k.a. Athletic Field) since it will directly impact the property. A determination of effect on seven historic properties in Chaska cannot be made at this time because of uncertainty about noise impacts and visual effects.

Alternative C-2A. Alternative C-2A would have no visual impacts on the identified historic properties, but that it may have potential auditory impacts. A determination of effect cannot be made at this time because of uncertainty about noise impacts.

Alternatives E-1, E-1A and E-2. Each of the eastern alternatives (E-1, E-1A and E-2) will have no adverse effects on historic properties, based on the condition that archeological site 21CR141 be avoided through adjustments to the proposed E-1A or E-2 alignments if either is selected (Alternative E-1 would completely avoid the site area).

Mn/DOT CRU stated that because a complete determination of effects cannot be made for Alternatives W-2, C-2 and C-2A based on available data, FHWA will develop a Programmatic Agreement (PA) with SHPO that would establish a review process for additional information about noise and visual impacts to avoid or minimize any potential adverse effects.

In a letter dated September 27, 2006, the SHPO concurred with Mn/DOT CRU that one archeological site meets National Register criteria and that the eleven history/architecture properties identified are National Register eligible (Appendix A). In regards to the Build alternatives, SHPO indicated that Alternative C-2 has the greatest potential for effects on historic properties (including direct effects), and that this issue should be closely considered as part of the alternative selection process. Finally, SHPO requested that the Programmatic Agreement developed with FHWA include provisions for review and update of survey data and updated effects analysis at the time of the Tier II EIS, or at another appropriate point in the planning process. This is being requested since the detailed design and construction of the project may be many years in the future.

11.0 CONSTRUCTION IMPACTS

This chapter describes potential construction-related impacts that may result from the proposed project. Impacts associated with construction may include: traffic congestion, impacts to the transportation system, impacts to business access, noise, air quality, visual, water quality and soil erosion, river substrate/habitat impacts, canoe/boat use, potential contaminated substance spills/leaks, borrow and excess materials, utility disruption, and earthborn vibrations. A more detailed discussion of potential construction impacts and mitigation will be provided as part of the Tier II EIS assuming one of the six Build alternatives is identified as the preferred alternative. With the implementation of the preferred alternative, all applicable precautions would be taken to limit impacts connected with highway, interchange and bridge construction activities.

11.1 AFFECTED ENVIRONMENT

The study area encompasses the cities of Carver, Chaska, and Chanhassen, in Carver County and the City of Shakopee and Jackson and Louisville Townships in Scott County. Existing TH 41 and the Minnesota River are also within the study area. Chapters 4, 5, 7, 8, and 9 of this DEIS describe the existing transportation system, land use and natural resources in the study area.

11.2 ENVIRONMENTAL CONSEQUENCES

Because the No-Build alternative would not have construction impacts associated with it, impacts discussed below relate only to Build Alternatives. Note that construction impacts to Seminary Fen are addressed in Section 7.3.3.

11.2.1 Traffic Congestion, Detour and Neighborhood and Business Access Issues

Construction of the proposed project is expected to take approximately four years to complete, with no difference in construction time among alternatives. Construction of any of the Build alternatives is likely to cause temporary traffic delays making it more difficult to access adjacent development during construction. Assuming that development planning for currently undeveloped land provides for corridor right of way, Build alternative corridors that are located where there is less existing development will result in less traffic disruption than Build alternative corridors that are located where there is more existing development. Anticipated impacts to traffic resulting in congestion would continue until construction is complete. A construction staging plan would be developed during final design. The staging plan would further assess potential construction-related traffic congestion problems, property access needs, and total length of construction time. Traffic control measures would be in accordance with the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD).

During the construction phase, detours maybe needed, but will be minimized to the greatest extent possible. Specific detour routes will be determined in consultation with affected communities prior to construction.

Existing businesses within the study area would experience access impacts during construction. Each of the six Build alternatives would result in varying degrees of access impacts for businesses in the vicinity of each proposed interchange and along each corridor. The construction staging plan would include efforts to ensure that traffic movements and access to businesses would be maintained. The effects on businesses and neighborhoods are:

Alternative W-2

Businesses near the TH 41/US 169 interchange in Scott County and residences near US 212 in the vicinity of CSAH 40 in the City of Carver may experience access impacts during construction. Traffic congestion may occur at US 169, existing US 212, CSAH 40, Mt. Hope Road, New US 212, and CSAH 11.

Alternative C-2

Access and congestion problems may occur at the intersection of US 169 and existing TH 41 in Scott County. Temporary traffic congestion may also occur at existing US 212 and New US 212.

Alternative C-2A

Businesses near the US 169 interchange in Scott County may experience access impacts during construction. Increased congestion may occur during construction of the grade-separated intersections with existing US 212 and existing TH 41. Additional traffic impacts may occur at CSAH 10, Creek Road, CSAH 140 and New US 212.

Alternative E-1

Access to neighborhoods along Audubon Road and to the Pioneer Ridge Freshman Center in Chaska will likely be disrupted during construction. Congestion and access impacts would occur at US 169 and CSAH 69 in Scott County and for businesses and residences near Stoughton Avenue and existing US 212 in the City of Chaska.

Alternative E-1A

Temporary congestion may occur around New US 212, existing US 212, existing TH 41, and US 169. Access impacts can be expected to occur around the Pioneer Ridge Freshman Center and for businesses located near existing US 212 and along Stoughton Avenue.

Alternative E-2

Temporary congestion around New US 212, along with access impacts to the Freshman Center could occur during construction. In addition congestion and access limitations may occur around US 169 and existing US 212 and along Stoughton Avenue.

11.2.2 Noise

Noise would be generated by construction equipment (including pile driving) used in the construction of highway improvements. Noise levels due to construction activities in the project area would vary depending on the types of equipment used, the location of the equipment, and the operating mode. During a typical work cycle, construction equipment may be idling, preparing to perform tasks, or operating under a full load. Equipment may be congregated in a specific location or spread out over a larger area. Adverse impacts resulting from construction noise are expected to be temporary and limited to properties adjacent to the project corridor. Project construction would be expected to take approximately four years. Noise impacts during construction would not be continuous along the entire corridor. Construction would take place in phases (e.g., south of the river, the bridge and north of the river). The construction noise impacts would be localized near the area where construction was taking place.

Section 6.2 identifies the potential traffic noise impacts for each of the Build alternatives. Noise impacts from construction equipment and related activities may be experienced at the identified receptors. Among receptors that may be particularly sensitive to daytime construction noise are the Minnesota Valley National Wildlife Refuge (W-2, C-2, and C-2A Build alternatives), the Minnesota Valley State Recreation Area (C-2, C-2A Build alternatives) and the Pioneer Ridge Freshman Center and Chaska High School, (E-1, E-1A and E-2 Build alternatives).

All construction equipment would be properly muffled and held to the manufacturer's specifications as they pertain to operational noise levels. Construction methods that could result in noise of inordinate levels or intrusiveness (such as pile driving) may be necessary. The noise associated with these activities would be minimized in intrusiveness by restricting the hours of operation as much as possible. The City codes of Chanhassen, Shakopee, and Chaska contain ordinances restricting construction activities that create noise to certain hours of the day, with further restrictions being implemented on weekends and holidays. The specific hours in which construction activities are allowed vary depending on the jurisdiction, but all are between 7:00 a.m. and 10:00 p.m. Mn/DOT will make a good faith effort to comply with local ordinances.

11.2.3 Air Quality

Air quality impacts from construction include increased dust and airborne particulates caused by grading, filling, removals and other construction activities. Dust impacts would be minimized through standard dust control measures such as watering. After construction is complete, dust levels are expected to return to near existing conditions. Air quality impacts may also result from emissions from construction equipment and possibly from traffic stopped at intersecting roadways or on potential detour routes. These impacts are expected to be minimal and of short duration.

11.2.4 Visual

Visual impacts would occur with all of the Build alternatives. Temporary visual impacts include the presence of construction equipment and workers, temporary changes in the views experienced by travelers when re-routing is necessary, a decrease in vegetation in some areas and the addition of increased time in which traffic remains in a certain area due to the increased congestion associated with construction.

11.2.5 Water Quality and Soil Erosion

The potential for soil erosion and impacts on water quality are greatest during construction when removal of vegetation for initial clearing, grubbing, and grading activities exposes soil and makes it more susceptible to erosion. Areas adjacent to the Minnesota River, lakes, streams, and wetlands have the highest potential for adverse impacts. A National Pollutant Discharge Elimination System (NPDES) permit would be required for this project. Erosion prevention and sediment control requirements would be followed in accordance with the NPDES permit, which includes an erosion control plan, as well as best management practices (BMPs) contained in Mn/DOT's standard specifications, details and special provisions. These BMPs may include, but are not limited to, the following: minimizing vegetation clearing, construction of sedimentation basins, silt control devices (silt fences, hay bales), slope drains, and prompt revegetation of exposed construction areas. An erosion control plan would be developed as part of the design for the preferred alternative.

Also, construction in or near waterways and wetlands would be undertaken in accordance with Mn/DOT's Standard Specifications for Road and Bridge Construction or special provisions to minimize erosion and sedimentation. Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching. Drainage systems, including ditches on private lands, would be maintained, restored or re-established in a manner that would not impound water. Where appropriate, permanent storm water detention facilities would be located in areas adjacent to the river, streams and wetlands such that roadway runoff would be intercepted before entering the waterway.

11.2.6 Seminary Fen

Construction impacts and potential mitigation to Seminary Fen are detailed in Chapter 7.

11.2.7 River Substrate/Habitat Impacts

Construction of the bridge piers for each of the Build alternatives would result in some disturbance of the river substrate and therefore may impact aquatic species habitat (including potential mussel habitat). Direct impacts to river substrate/habitat would be minimized by planning construction activities to minimize disturbance of the river bottom.

11.2.8 Canoe/Boat Use

Each of the Build alternatives includes the construction of bridge piers in the river. The Build alternatives would result in temporary impacts to river users near work areas resulting from construction activities that may include launching materials via barges and setting bridge pier and support materials in place with cranes. Barge and crane operations would cause temporary channel obstructions that could affect river use for recreational boaters and canoeists. The segment of the Minnesota River in the study area is designated by the Minnesota Department of Natural Resources (MnDNR) as a "Canoe and Boating Route."

Temporary impacts may affect the City of Carver's boat launch adjacent to the Alternative W-2 corridor and the Winkel Park boat launch located near the Alternative C-2 corridor. These temporary effects could cause closure for several months while the adjacent span is being constructed.

MnDNR staff would review construction plans to ensure that there is an adequate channel for boat passage during construction. If such a passage cannot be preserved, provisions for a portage would likely be created.

11.2.9 Potential Contaminated Substance Spills/Leaks

Each of the Build alternatives has potential for spills or leaks of hazardous or toxic substances. If such an incident should occur during construction of the proposed project, it would be responded to according to Minnesota Pollution Control Agency (MPCA) containment and remedial action procedures. Of specific concern would be the release of hazardous or toxic substance (e.g., during refueling) into the river – a source water protection area. A spill containment plan would be required to be in place prior to construction to minimize these potential impacts.

11.2.10 Borrow or Excess Material

Preliminary estimates indicate that up to 3.3 million cubic yards of borrow may be required for this project. This figure is an estimate based on Tier I level design.

Selection of borrow material that may be required for the construction of the proposed improvements would be the responsibility of the construction contractor. Any new borrow sites would be subject to environmental reviews under Minnesota Rule Chapter 4410.4300, Subp. 12 and may require an archaeological survey of the site. Archaeological reviews of these areas are conducted by the Cultural Resources Unit at Mn/DOT. It is not possible to identify potential areas from which borrow might be obtained, and therefore what specific environmental impacts might potentially occur, as the project is many years in the future.

The disposal of excess material would be conducted in accordance with Mn/DOT specifications and according to a project disposal plan that would conform to state regulatory requirements. There would be no disposal of excess materials into wetlands, floodplains or other sensitive areas.

11.2.11 Utility Disruption

Throughout the corridor both above- and underground utilities, such as electric, telephone, cable, public water supply and sanitary sewer, are distributed to users within and near the study area. In addition to the sanitary sewer system that currently exists in the study area, a sanitary sewer to connect the cities of Carver and Chaska line is in the conceptual planning stage. Known utilities in the study area include power transmission lines, gas lines and an electric substation. Additionally, the Metropolitan Council Environmental Services (MCES) Chaska Sanitary Forcemain crosses under the Minnesota River northeast of the existing TH 41 river crossing. Identification of other above- and underground utilities would be completed once a preferred alternative is selected; exact locations would be defined during final design.

Impacts to utilities are anticipated during construction of each of the six Build alternatives. Impacts could include utility relocation and/or temporary interruptions in service. If a Build alternative is selected as the preferred alternative, a design plan would be developed to minimize potential impacts to utilities, including coordination with utility providers.

11.2.12 Earthborn Vibrations

This project is not anticipated to require blasting; however, it could involve pile driving, compacting and/or pavement breaking or the operation of other construction equipment that may result in temporary earthborn vibrations that have the potential to affect homes. The location and magnitude of construction vibrations cannot be assessed until the final design phase of the project. However, the typical practice is to use vibration monitoring, and if the vibrations reach a certain level, require that the contractor shut down and revise operations to reduce earthborn vibrations.

11.3 MITIGATION

The discussions in Section 11.2 include identification of mitigation measures that could be used to avoid/minimize construction impacts. (Mitigation of construction impacts to SWFC is addressed in Chapter 7.) As part of the Tier II EIS process, details of the construction activities including mitigation measures such as a detailed erosion control plan, a plan for management and disposal of any excess material, a construction staging plan, special construction techniques for river bridge construction, traffic flow management techniques and access maintenance and/or detour plan would be developed. In addition, safety measures would be used (fencing, signage) that would prevent the public from entering areas of construction or from passing beneath bridge construction (when overhead activities are a concern).

12.0 POTENTIAL INDIRECT EFFECTS

The Council on Environmental Quality (CEQ) regulations (40 CFR 15888.8) distinguishes between direct and indirect effects. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects (also referred to as secondary impacts) are reasonably foreseeable effects caused by the action that occur later in time or farther in distance. Indirect impacts may include effects related to changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems.

Chapters 4 through 11 of this DEIS are focused chiefly on direct impacts resulting from the proposed project. The areas where direct impacts have the potential to cause indirect impacts are as follows:

1. Land Use Patterns. The proposed project has the potential to change land use patterns in the study area by increasing visibility of and accessibility to developable land. Such change in land use patterns could result in different impacts on the social and natural environment than otherwise would occur. The proposed project may also induce growth (and therefore the potential for additional environmental impacts) beyond the study area.

2. Related Transportation Improvements. Each of the Build alternatives would require that certain improvements to US 169 (that are planned as separate projects) be designed within certain parameters (i.e., interchanges would have to be configured to achieve adequate spacing from the proposed New TH 41/US 169 system interchange). This influence on the design of US 169 local access interchanges could result in those interchanges having different impacts on the environment than they otherwise would. In addition, the proposed project has a direct effect on traffic volumes on area roadways which could result in indirect environmental impacts if these volumes change in a way that requires expansion of any of these other roadways.

3. Area Economic Conditions. Depending on which Build alternative is selected, the proposed project has direct impacts that may indirectly affect broader economic conditions in the study area. The direct impacts that have the potential to affect economic conditions include changes in traffic levels in or near business areas, removal of affordable housing, and physical and social impacts on certain neighborhoods.

4. Ecological Relationships. The proposed project has direct impacts on specific vegetation resources which may indirectly affect the wildlife species that use those areas as habitat. In addition, more widespread indirect effects may also occur through the complex relationships within the affected ecosystem.

These four topics are discussed below. (Note that indirect impacts on cultural resources are discussed in Chapter 10.)

12.1 LAND USE PATTERNS

12.1.1 Affected Environment

As identified in the CEQ regulations, indirect impacts may include growth induced development or a change in both short-term and long-term land use patterns. It is important to distinguish between "induced travel" and "induced development" or "induced growth." As discussed in Chapter 4, the proposed project will induce *travel* within the travelshed, i.e., more of the total trips in the area will cross the river under Build conditions than under No-Build conditions. The effects of induced travel are direct impacts that have been accounted for in the Chapter 4 discussion of changes in VMT and in the benefit/cost analysis. Induced *growth* refers to more population and/or jobs or more development of land in the study area under Build conditions than under No-Build conditions.

Mn/DOT has met with communities in the study area to review their planned future land use and development trends. Population, household and employment forecasts for the study area have been developed based on Metropolitan Council projections and in consultation with affected communities. All of the study area communities are expected to be effectively built-out by the 2040 study year. This projected growth is anticipated to occur with the proposed new river crossing (Build condition) or without the proposed project (No-Build condition). None of the affected communities has indicated intent to reduce growth under No-Build conditions. While, depending on timing of construction, the project may affect the pace of planned growth within the study area, the project is not anticipated to induce growth in the study area beyond what will likewise occur under No Build conditions.

The proposed project does have the potential to influence the location and type of development within the study area. Visibility and accessibility from the proposed river crossing would improve the attractiveness of land for more intensive development. All communities within the study area have prepared and adopted land use and comprehensive plans to guide and phase their future development. The location and current planned use of developable land in relationship to the proposed project is summarized in Table 12-1. Cities are in the process of updating their comprehensive plans. It is likely that cities will consider the location of the proposed project in guiding their future land use.

12.1.2 Environmental Consequences

The relative amount of development in the study area is anticipated to be the same no matter which of the potential six alignments is selected as the final preferred alternative. However, the construction of any of the six Build alternatives could result in the planned growth that is already identified by the communities, to occur in a somewhat different configuration than currently planned. For example, implementation of any of the Build alternatives could result in commercial development occurring in the vicinity of local access to the new river crossing, rather than at some other location in the community. This has been specifically suggested for land located north of the combined regional/local interchanges in Carver County associated with Alternatives W-2 and C-2. The expected increase in visibility and accessibility from development areas caused by any of the Build alternatives may result in more intense development than otherwise would occur. The more intensive use of land could pose localized traffic congestion, greater impacts to vegetation, more impervious surface/storm water runoff, and more dramatic visual change.

TABLE 12-1
DEVELOPABLE LAND/ACCESS TO/FROM NEW TH 41

	Alternative					
	W-2	**C-2**	**C-2A**	**E-1**	**E-1A**	**E-2**
Scott[(1) (2)]						
Availability of developable land near New TH 41/ US 169 system interchange.	90%+ developable. Planned as commercial/ industrial.	60% developable – substantial developments in place. Planned as commercial/ industrial.	60% developable – substantial developments in place. Planned as commercial/ industrial.	90% developable. Planned as commercial/ industrial.	90% developable. Planned as commercial/ industrial.	90% developable. Planned as commercial/ industrial.
Closest local access to/ from New TH 41.	Two miles west at US 169/CSAH 14 interchange; one-half mile east at US 169/existing TH 41 interchange.	Local ramps at New TH 41/US 169/ existing TH 41 system interchange.	Local ramps at New TH 41/US 169/ existing TH 41 system interchange.	Local ramps at New TH 41/US 169/ CSAH 69 system interchange.	Local ramps at New TH 41/US 169/ CSAH 69 system interchange.	Local ramps at New TH 41/US 169/ CSAH 69 system interchange.
Carver[(2)]						
Availability of developable land near New TH 41/ New US 212 system interchange.	90% developable. Planned for mixed use, residential to north, with some commercial within Height of Chaska and commercial at US 212/CSAH 11.	90% developable, planned for mixed use, residential to north, with some commercial within Height of Chaska and commercial at US 212/CSAH 11.	90% developable. Planned for residential to north and northeast office/ commercial to northwest Heights of Chaska to south.	15% developable, substantially developed as residential, public, minor commercial. No plans for land use change.	15% developable, substantially developed as residential, public, minor commercial. No plans for land use change.	15% developable, substantially developed as residential, public, minor commercial. No plans for land use change.
Closest local access to/ from New TH 41.	Local ramps at New TH 41/ New US 212/ CSAH 11 system interchange.	Local ramps at New TH 41/ New US 212/ CSAH 11 system interchange.	One-half mile west at New TH 212/ CSAH 11 inter-change; one mile east at New US 212/ existing TH 41 interchange.	One-half mile west at New US 212/ existing TH 41; 1½ mile east at New US 212/ Powers Boulevard interchange.	1½ mile west at New US 212/ existing TH 41; one mile east at New US 212/ Powers Boulevard interchange.	1½ mile west at New US 212/ existing TH 41; one mile east at New US 212/ Powers Boulevard interchange.

(1) The City of Shakopee plans to conduct a market analysis/land use study for the portion of US 169 in the project area.
(2) Comprehensive Plan updates are underway for communities in the study area.

Because of the time frame for the proposed project, it is likely that many of the developable sites in the study area will be developed before the project is constructed. The type and intensity of development that occurs will be in anticipation of the project, rather than in reaction to it, and will be subject to local land use controls. The purpose of planning for the proposed project in a tiered process is not only to preserve the corridor well in advance of design and construction, but also to ensure that cities and counties can properly plan and regulate for development in the area adjacent to the river crossing corridor and throughout the community. While there is a potential for environmental consequences from any potential change in planned land use, local land use controls are adequate to manage any potential development in the areas of Scott and Carver Counties within the study area. The counties have fairly stringent controls for infiltration, water quality treatment, volume, and rate control and it is expected that permitting requirements will continue to be strengthened in response to TMDL requirements.

The improved accessibility between the two sides of the river may provide additional impetus for development beyond the study area. In particular, residential development of land in western Carver County may be encouraged by the combination of relatively affordable land values and the improved ease of access to the commercial/industrial development planned along US 169. Development in rural areas beyond the project study area will be subject to local land use controls and implementation capability, orderly annexation agreements and sewer capacity.

As the question of induced growth and accompanying environmental impacts is considered for any transportation project, it is important to consider that transportation improvements only affect the *location* of households and jobs within the region, not the *total number* of households and jobs within the region, which is a function of overall economic conditions. If there is faster development in one part of the region due to improvement in accessibility, there will be slower development elsewhere in the region. It is not possible to predict accurately where development elsewhere in the region would occur under No-Build conditions or what the resulting impacts would be to sensitive resources.

12.1.3 Mitigation

As discussed above, local governments have the authority to avoid, minimize and mitigate indirect impacts to land through their local land use plans and land use controls. With these means, local governments can guide where development will be allowed and where land should be preserved. Local governments retain control over the intensity and type of development through their zoning ordinance and subdivision regulatory authority. Additionally, local governments have the authority and responsibility for making land use decisions in and beyond the study area and have several tools in place that if implemented would minimize indirect impacts to land use. Planning tools may need to be strengthened in communities beyond the study area that may experience accelerated growth pressures as a result of improved river crossing accessibility.

Numerous regulatory, permitting and approval processes are required for the approval and construction of a project of this scale and magnitude. These are in place to ensure additional agency review and to minimize development impacts. These include:

- Minnesota Environmental Quality Board regulations, which require environmental analysis and documentation for larger projects (e.g., residential and commercial developments)

- State and federal wetland permits and approvals, including:
  - Minnesota DNR Public Waters Permit
  - MPCA NPDES Construction Permit
  - MPCA Clean Water Act 401 Certification
  - U.S. Army Corps of Engineers Section 404 Permits
  - Wetlands Conservation Act (WCA) Permits

12.2 RELATED TRANSPORTATION IMPROVEMENTS

12.2.1 Affected Environment

Planned US 169 Corridor Improvements

Each of the Build alternatives has an effect on the design of a future interchange and/or local roadway connections in the US 169 corridor in Scott County. Interchange improvements at US 169/CSAH 14, US 169/existing TH 41/CSAH 78, and US 169/CSAH 69, as well as development of the local roadway system in the US 169 corridor, are planned under No-Build and Build conditions. These improvements are separate projects that have not yet been designed; each project would be evaluated under its own environmental process. For design and analysis purposes, this DEIS assumes that these separate improvements (hereafter referred to as the "planned US 169 corridor improvements") will be designed to accommodate the New TH 41 Build alternative that is selected.

The US 169 corridor improvements (including interchanges and local road networks) described in Chapter 3 and depicted in Figures 3-6 – 3-11, are concepts only, developed for the purpose of designing New TH 41 Build alternatives that can function operationally with planned US 169 corridor improvements (i.e., have adequate interchange spacing) and fit with local transportation system needs. These planned US 169 corridor improvement concepts are the basis for this discussion of potential indirect impacts. However, it is important to note that alternate US 169 improvement designs that can accommodate any of the New TH 41 Build alternatives are possible.

This discussion assumes that planned US 169 corridor improvements would be designed to minimize impacts (e.g., assumes that a diamond interchange would be selected if possible and that diamond ramps would generally have fewer impacts than loop ramps). This discussion is focused on the potential for planned US 169 corridor improvements to have greater environmental impacts than they otherwise would have, because their design needs to accommodate the New TH 41 Build alternative. Any such difference in impacts of a planned US 169 corridor improvement would be considered an indirect impact of the proposed New TH 41 project.

The future alignment of US 169 in the vicinity of CSAH 69 is unknown at this time. As part of the future US 169/CSAH 69 interchange project, US 169 could be reconstructed along its existing alignment, with relatively minor geometric improvements, or it could be straightened out and shifted south. This alignment decision is not dependent upon which

New TH 41 alternative is selected; however, the designs of US 169 and of Alternative E-1, Alternative E-1A or Alternative E-2 would need to accommodate each other. The designs of Alternative E-1, Alternative E-1A and Alternative E-2 evaluated in this DEIS assume that US 169 is straightened out and shifted south. (See Figures 3-9, 3-10, and 3-11.) The impact of this assumed realignment of US 169 is described in Section 12.2.2., but it is important to note that it is not an indirect effect of (i.e., not necessitated by) the proposed New TH 41 project per se. Any of the eastern Build alternatives could be redesigned to accommodate a reconstructed US 169 on its existing alignment.

Area Roadways

The construction of the proposed project will influence the traffic flow on roadways throughout the study area. While it is not practical to model changes in traffic on all roadways, the travel forecasts do include No-Build and Build average daily traffic (ADT) for major area roadways. The discussion of potential indirect impacts is focused on whether the changes in traffic that result from any Build alternative (compared to No-Build) could require expansion of a roadway, potentially causing environmental impacts that otherwise would not occur.

12.2.2 Environmental Consequences

Planned US 169 Corridor Improvements

Alternative W-2 assumes that the planned US 169/CSAH 14 interchange would include a loop in the southwest quadrant, in order to maintain adequate spacing from the New TH 41/ US 169 interchange to the east. Compared to a standard diamond design (assumed if there were no spacing constraint), such a design would increase impacts in the southwest quadrant while decreasing impacts in the southeast quadrant of the US 169/CSAH 14 interchange. The total area of impact due to ramps would likely be slightly greater, but there appear to be no sensitive resources (e.g., wetlands, native vegetation, structures) in the area that would be additionally impacted (i.e., the southwest quadrant). Alternative W-2 also has an effect on the location of the future frontage road on the south side of US 169, requiring that it be located close to bluff, potentially impacting commercial structures. It is not known what the specific location of this local road would be if Alternative W-2 is not selected as the river crossing corridor; it may or may not affect these structures.

Alternative C-2 and Alternative C-2A each assume a folded diamond design of the planned US 169/existing TH 41/CSAH 78 interchange (which would be combined with the system interchange when it is built) in order to maintain adequate spacing from the planned US 169/CSAH 69 interchange to the east. They also assume location of the interchange west of existing TH 41 in order to accommodate the New TH 41/US 169 system interchange. For each, this design and location would increase impacts to the area west of existing TH 41 (including three single family homes) and decrease impacts at and east of existing TH 41. Compared to a standard diamond design, the total area of impact due to ramps would be slightly greater, but other than the homes, there appear to be no other sensitive resources in the area that would be additionally impacted. Alternative C-2 and Alternative C-2A both also assume realignment of existing TH 41/CSAH 78 as part of the planned US 169/existing TH 41 interchange design. This

realigned roadway would be approximately 3,000 feet longer for Alternative C-2 and 3,060 feet longer for Alternative C-2A, than the existing alignment, resulting in additional cost and right of way impacts compared to maintaining existing TH 41/CSAH 78 in place.

Alternative E-1/E-1A (note that Alternative E-1 and Alternative E-1A are identical in Scott County) and Alternative E-2 each assume a folded diamond design of the planned US 169/existing TH 41/CSAH 78 interchange in order to maintain adequate spacing from the New TH 41/US 169/CSAH 69 interchange to the east. Compared to a standard diamond design and as described above, this design would increase impacts west of existing TH 41 while decreasing impacts east of existing TH 41. The total area of impact due to ramps would be slightly greater with a folded diamond design, but there are no sensitive resources in the area that would be additionally impacted. (These alternatives do not assume location of the US 169/existing TH 41 interchange west of existing TH 41 nor realignment of existing TH 41/CSAH 78.)

As noted, Alternative E-1/E-1A and Alternative E-2 designs assume that US 169 in the vicinity of CSAH 69 will be realigned to the south. This realignment would be approximately one mile long and would have additional right of way impacts compared to reconstructing US 169 on its existing alignment, though this additional impact would be offset by the likely conversion of excess right of way to private land. It is important to note that these right of way impacts are not an indirect effect of the New TH 41 project; either Alternative E-1/E-1A or Alternative E-2 could be redesigned to accommodate reconstruction of US 169 on its existing alignment. However, if the decision were made to reconstruct US 169 on its existing alignment, the resulting redesign of Alternative E-1/E-1A or Alternative E-2 would impact additional mobile homes at the Bonnevista mobile home park. If one of the eastern alternatives is identified as the preferred alternative for the New TH 41 river crossing, additional analysis will be done in the Tier I FEIS regarding the advantages and disadvantages of the two alignment options for US 169.

Area Roadways

The differences among alternatives in 2040 traffic volumes on area roadways included in the travel forecast was examined to determine whether selection of any New TH 41 Build alternative would result in traffic levels that would require expansion of other area roadways that otherwise would not occur.

In many cases, area roadways included in the travel forecast model experience a reduction in forecast ADT under Build conditions. Of the roadways where one or more of the Build alternatives results in an increase in volumes over No-Build conditions, only US 212 at the western end of the project area had 2040 Build volumes (for Alternatives W-2, C-2 and C-2A) that may pose capacity issues. Mn/DOT is currently studying the need for improvements to US 212 west of the project area; this study will assess the environmental impacts associated with any recommended improvements.

12.2.3 Mitigation

Because of the time frame involved (i.e., the proposed project is not scheduled to be implemented for several years), the potential indirect impacts of the proposed project that are

related to other transportation projects (planned US 169 corridor improvements; future US 212 improvements) can be managed through coordination with those projects as they proceed. Each of the potentially-affected transportation projects would be subject to its own environmental review and resulting mitigation plans and commitments. Mn/DOT will be the planning and implementing agency for future US 169 and US 212 improvements, and therefore will be responsible for mitigation of any impacts of these projects, whether or not they are considered secondary impacts of the proposed river crossing project.

12.3 AREA ECONOMIC CONDITIONS

12.3.1 Affected Environment

Business Area Traffic

The proposed project results in changes to traffic levels in or entering business areas, specifically in downtown Chaska (existing TH 41) and on the westernmost entrance from US 169 to downtown Shakopee (CSAH 69). Businesses rely on traffic for exposure and customer access, however excessive traffic congestion becomes counterproductive for business viability by causing delays and parking difficulties for potential customers. Congestion, particularly involving heavy trucks, has been identified as a problem for business in downtown Chaska. Under all Build conditions, congestion and truck percentages in downtown Chaska decrease and traffic becomes more local, less regional in nature.

Historically, the route that is now CSAH 69 was the main road through the downtown Shakopee business area. In 1996, the completion of US 169 (the Shakopee Bypass) removed through regional traffic from Shakopee's downtown. Access from US 169 to downtown Shakopee from the west is available at the US 169/CSAH 69 intersection. The next access to the east is at the US 169/CSAH 15 (Marystown Road) interchange. Access to the downtown business area is circuitous from this interchange. CSAH 15 travels through a residential neighborhood, park and institutional area of the community and terminates at railroad tracks north of CSAH 69. Because CSAH 15 does not provide a good entrance to downtown, access from US 169 to downtown Shakopee via CSAH 69 has been expressed as being very important to downtown Shakopee merchants. Under all Build conditions, access from US 169 to CSAH 69 is maintained. Of the Build alternatives, Alternative E-1A results in the lowest 2040 ADT on CSAH 69 (11,600) and Alternative C-2 results in the highest 2040 ADT on CSAH 69 (16,500). Under the No-Build condition, 2040 ADT on CSAH 69 is 12,500.

Affordable Housing

Five of the six Build alternatives affect the supply of affordable housing in the study area due to right of way acquisition within one or more of four mobile home parks. These impacts range from 18 units (Alternative C-2) to 182 units (Alternative E-2). 2000 Census data as well as current anecdotal data indicate these mobile home communities have high percentages of persons in poverty and lower average household incomes.

According to the Metropolitan Council, (*Transportation Policy Plan Demographics, Appendix E,* November 2004), less than 45 percent of residents in the southwest quadrant of the metropolitan area (which includes the project study area) commute to the central cities (Minneapolis and

St. Paul) for work, and the jobs per household ratio in the southwest quadrant is higher than exists in either the central cities or any other quadrant of the metropolitan area. While data on the location of jobs held by residents of the affected mobile home parks has not been collected, it is reasonable to assume that many work in or near the study area communities.

The supply of affordable housing has been an issue of concern throughout the metropolitan area for several years. Based on its examination of jobs proximity (i.e., ratio of lower-wage jobs to lower-wage workers), existing amount of affordable housing, and availability of transit service, the Metropolitan Council projects that, by 2020, the four cities in the study area together will need over 4,200 additional affordable housing units and that Scott and Carver counties together will need over 11,000 additional affordable units. (*Affordable Housing Need in the Twin Cities, 2011-2020*, summary report dated January 2006.)

A mobile home is a unique affordable housing option in that, while the resident in many cases owns the unit itself, he or she rents the lot on which the unit is located. There are currently few options within the study area to which a mobile home unit could be moved and there is little likelihood that any new mobile home parks will be developed within the study area.

Impacts on Neighborhoods

Neighborhood investment is important to the economic vitality of the local communities and the region as a whole. Direct impacts of the proposed project on neighborhoods in the study are presented earlier in this DEIS. In summary, these effects are as follows:

- The proposed project results in the estimated removal of 11 to 266 housing units depending upon the Build alternative.
- Noise levels in residential areas would be generally discernibly higher than No Build conditions under one or more Build alternatives, with some exceptions. There are a number of locations where noise levels are increased in a neighborhood under a particular Build alternative, but decreased under one or more of the other Build alternatives. Note that noise levels reported in Chapter 6 are presented without consideration of mitigation (i.e., noise walls).
- The proposed project will affect visual quality in several neighborhoods including neighborhoods immediately adjacent to proposed roadway, but also neighborhoods that view the river valley from a distance.
- Certain alternatives will create barriers between neighborhoods and the broader community. Access will be provided but it will be more circuitous.

12.3.2 Environmental Consequences

Business Area Traffic

Any indirect effect to the viability of the Shakopee business community due to reduction in traffic levels on CSAH 69 (which occurs for the eastern Build alternatives only) are expected to be minor and would be offset by increased market area accessibility.

Projected reduction in traffic on existing TH 41 will benefit businesses in downtown Chaska. The shift from regional trips to local trips on existing TH 41 may have an indirect impact on Chaska hospitality businesses that have a regional market; however any such impact should be minimized by the ease of access between US 169 and downtown Chaska that will be provided by the planned US 169/existing TH 41 interchange.

Affordable Housing

It is not possible to predict the total supply of affordable housing nor the balance between the availability of lower cost housing and lower wage jobs that will exist in the study area if and when mobile home units are acquired for right of way for the proposed project. First, while Mn/DOT plans to work with local communities to begin right of way corridor preservation activities soon after the conclusion of the Tier I EIS process, acquisition of property through eminent domain cannot occur until after the Tier II EIS process is completed; many factors will affect the timing of any earlier voluntary right of way acquisition. Second, timing of right of way acquisition as it affects mobile home communities is particularly uncertain, because, as noted, while these residents may own their units, park owners (who may have different acquisition timing interests) own the lots. Third, the extent to which communities in the study area will be able to increase the supply of affordable housing, and thereby offset the removal of units by the proposed project, is unknown.

Despite these uncertainties, there is the potential that any removal of affordable housing (i.e., mobile home units) by the proposed project will have indirect impacts (1) on local businesses, by reducing the availability of labor if potential workers cannot find housing in the area, and (2) on low and moderate income families throughout the housing market area who would have fewer housing options if the impact is not offset by an increase in the area supply of affordable units. Local planning to meet the long-term affordable housing needs is done in the context of metropolitan housing goals and local needs. The Scott County Housing and Redevelopment Authority completed a comprehensive housing needs assessment in 2006, which addressed affordable housing needs. The Carver County Community Development Agency has as its stated mission the provision of affordable housing for County residents.

Impacts on Neighborhoods

There is little potential that the direct impacts of the proposed project on neighborhoods addressed in Chapters 5 and 6 (social, noise and visual) will result in indirect impacts on neighborhood quality to the degree that there would be large-scale disinvestment in property. Well-established, economically stable neighborhoods, as well as new residential developments exist near freeway-type facilities throughout the metropolitan area, the closest examples being along US 169 in Shakopee, Eden Prairie and Bloomington. Direct impacts will be mitigated as appropriate (e.g., noise walls, landscaping) to minimize the potential for adverse indirect effects on overall neighborhood stability. Increased regional accessibility and alleviation of local traffic congestion also provide positive offsets to the negative impacts of roadway projects on neighborhoods.

This Tier I DEIS assumes broad corridors for impact analysis purposes. The actual right of way requirements for the proposed project will not be determined until detailed design is completed during the Tier II EIS process, likely several years in the future. As noted above, Mn/DOT cannot acquire land for right of way through eminent domain until conclusion of the Tier II EIS process. In the meantime, the uncertainty about the details and timing of right of way acquisition has the potential to indirectly affect investment in properties that are located within the Build alternative corridor that is selected during the Tier I process. Communication between Mn/DOT and affected property owners about timing and the right of way acquisition process will be important to alleviating uncertainty and minimizing the potential for such indirect effect.

Alternative C-2A and Alternative E-1 each create a physical division between a sizable Chaska neighborhood area (Alternative C-2A: future Heights of Chaska; Alternative E-1: the existing neighborhood located east of Audubon Road) and the remainder of the community, and particularly the downtown. This poses potential indirect impacts on viability of businesses that rely on the local market and on long-term investment in the downtown.

12.3.3 Mitigation

Because of the timeframe for actual construction of the proposed project, the potential for indirect impacts on area economic conditions can only be speculative at this time. However, an advantage of selecting a corridor to be preserved well in advance of project implementation is that it allows each community to not only plan for its future land use and transportation system to fit physically with the project, but also to plan for potential indirect effects of the project. Communities will have time to plan for an adequate supply of affordable housing, businesses will have time to plan for expected change in market accessibility, and potentially-affected property owners will have time to plan for eventual acquisition.

The Tier II EIS will evaluate the potential for more specific indirect effects of the project on area economic conditions and develop mitigation strategies as appropriate.

12.4 ECOLOGICAL RELATIONSHIPS

12.4.1 Affected Environment

Each of the Build alternatives affects sensitive natural resources. Chapters 7 and 9 discuss the direct impacts of the proposed project on resources including floodplain forests, old growth floodplain forests, oak forest, maple-basswood forests, native plant communities, and wetlands.

12.4.2 Environmental Consequences

It is beyond the scope of this DEIS to quantify any specific indirect effect occurring farther in distance or later in time due to direct impacts of the project on any natural area. Because ecological relationships are by their nature complex and would extend beyond the study area, the indirect impacts that would result from the removal of habitat by the proposed project are discussed here only in general terms. Each of the affected resources represents an ecosystem

involving a web of physical and biological links among air, water, soil, plants, and animals. Therefore the project will indirectly impact these resources as well. Chapter 7 discusses the indirect effects of hydrological changes on Seminary Fen, the effects of fragmentation of native vegetation and edge effect on wildlife habitat.

The potential for indirect impacts due to ecosystem effects also extends to humans because they view and/or recreate in natural areas, encounter wildlife, experience microclimate effects, breathe air, use surface and groundwater, and enjoy other connections, many intangible, with the natural environment.

Impacts of the project on natural areas can result in impacts on biodiversity, the value of which is well documented and encompasses global life support (energy transfer, storage and release of carbon, nutrient, oxygen and water cycling); economic benefit; aesthetics and stewardship value.

While broader ecosystem changes may be legitimately considered as secondary effects of the proposed project, they occur within a much more involved and far-reaching context.

12.4.3 Mitigation

Provisions to restore or preserve habitat elsewhere are among the potential mitigation measures for the direct impacts of the proposed project on natural areas. Wetland mitigation is required by law. Impacts on natural areas in public recreation lands (i.e., MVNWR and MVSRA) would be subject to Section 4(f) and Section 6(f) mitigation requirements. Restoration or protection of habitat that would be done to mitigate direct impacts would have a corresponding beneficial indirect impact on the broader ecosystem. Mitigation of specifically-identified indirect effects of the proposed project will be addressed in the Tier II EIS process.

13.0 CUMULATIVE IMPACTS

This chapter describes the potential for cumulative impacts from the Build alternatives in combination with other past, present, and future actions. Cumulative impacts analysis takes into account an array of potential actions and their impacts that are unrelated to the proposed action (Build alternatives), except to the extent that their impacts may, in combination with the impacts from the proposed action, result in adverse impacts. Cumulative impacts are defined, as follows, in the Council on Environmental Quality's (CEQ) regulations (40 CFR 1500-1508) when implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended:

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. (40 CFR 1508.7)

Direct and indirect impacts of the Build alternatives have been discussed in the previous chapters of this DEIS. Cumulative impacts are not causally linked to the Build alternatives, but are the total effect of actions with similar impacts in a broader geographic area. The purpose of a cumulative impacts analysis is to identify impacts that may be minimal and therefore neither significant nor adverse when examined within the context of the proposed action, but that may accumulate and become both significant and adverse over a large number of actions.

13.1 CUMULATIVE IMPACT METHODOLOGY

This discussion of cumulative impacts will assess the effects of the Build alternatives as described in the previous chapters of this DEIS for their potential to combine with the impacts of other foreseeable activities in the past, present, and future which, when combined, have the potential to create further adverse impacts. To that end, this chapter will attempt to anticipate the impacts of other actions with similar impacts and to assess the cumulative impacts of those actions in combination with the direct and indirect impacts of the Build alternatives. Note that this Tier I Draft EIS identifies and evaluates the social, economic and environmental issues associated with alternative corridor locations, as a basis for identifying a preferred alignment corridor that can be preserved for future use, and therefore is limited in its ability to quantify all impacts of the project. A Tier II EIS process will be initiated in the future, as the project moves forward for implementation. The Tier II process will focus on preferred alignment design alternatives, and an updated assessment of environmental impacts including cumulative impacts.

The cumulative impacts analysis includes the following five steps:

1. Identify the geographic area to be studied for each resource
2. Establish a time frame for the analysis
3. Identify past, present and future conditions
4. Identify past actions
5. Identify future actions anticipated

Each of these steps is described below.

13.1.1 Geographic Area to be Studied for Each Resource

Chapters 4 through 11 of this Tier I DEIS analyze the social, economic and environmental impacts that would occur within and immediately adjacent to the construction limits of the six Build alternatives. Chapter 12 describes the potential indirect impacts for each of the Build alternatives.

The land encompassing the overall project study area (See Figure 1-2 in Chapter 1) was chosen as the broadest geographic area for the cumulative impacts analysis as it relates to land development, social impacts, noise, vegetation and wildlife, water quantity and quality, and visual quality. Exceptions to this broad geographic study area for cumulative impacts are as follows:

- Minnesota Valley National Wildlife Refuge (MVNWR): geographic study area includes all eight units of the Refuge as defined by the U.S. Fish and Wildlife Service, an area described in Section 13.3.9.
- Minnesota Valley State Recreation Area (MVSRA) and Minnesota Valley State Trails (MV Trail): geographic study area includes the portion of the MVSRA and MV Trail within the project study area, an area described in Section 13.3.10.
- Seminary Fen Wetland Complex (SFWC): geographic study areas include the individual areas specifically identified as meeting the criteria for a calcareous fen, and the supporting wetland complex as described in Chapter 7 and Section 13.3.6.
- Parks, Trails and Outdoor Public Recreation Facilities: geographic study area includes Athletic Park, the system of trails and the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center in the City of Chaska, as described in Section 13.3.11.

13.1.2 Time Frame for the Analysis

Many of the potential impacts considered in this analysis are related to direct or indirect effects of changes to, and intensification of, land use and associated infrastructure. Cumulative impacts analysis suggests considering past conditions and activities, current day actions as well as reasonably foreseeable future actions. Therefore, the period between 1970 and 2040 was defined for all resources being studied.

The timeframe of the analysis considers previous impacts that have occurred to resources since the 1970s, the time when the rate of development became accelerated in the project area. Information about existing conditions is based on the most recent data available and can be from data obtained between 2000 and 2006. For example, 2000 Census data are used and 2005-2006 field surveyed conditions are used. Year 2040 was selected as the future conditions analysis year because that is as far in the future as Metropolitan Council population and employment projections are available.

13.1.3 Past, Present and Future Conditions

As described above, cumulative impacts are defined as those impacts resulting from the proposed project combined with those from other past, present, or reasonably foreseeable future actions. Ideally, all potential future development activities in the study area would be identified as part of this analysis so that their potential impacts could be taken into consideration in combination with those from the Build alternatives. Actions that could, in combination with the proposed action, result in cumulative impacts on the environment, can be generally classified as those related to intensification of land use (urbanization). The conversion of rural, agricultural, or open space land to residential, commercial, industrial or infrastructure uses is an example of this change.

13.1.3.1 Past Actions

Since 1970 the communities in the study area have experienced a transition from a small town or agricultural setting to a more urban environment. Past actions include residential and commercial development and highway and other infrastructure improvements. This development has increased the population of the municipalities in the study area and expanded employment opportunities. Between 1990 and 2000 Scott County was the fastest growing county in the state and Carver County was the third fastest. Scott County's population increased by over 54 percent during that time period and Carver County's grew by over 46 percent. Recent actions in the study area include:

- Residential and commercial development.
- Reconstruction of the existing TH 41 Bridge.
- Initiation of construction of New US 212.
- Improvements to the US 169/existing TH 41/CSAH 78 intersection and system of backage roads north of US 169.

13.1.3.2 Future Actions Anticipated

The proposed project would occur in the context of a trend of urbanization throughout the study area. Extensive amounts of residential and commercial development are planned within and adjacent to the study area in the cumulative impacts analysis time frame. Tables 2-1 and 2-2 in Chapter 2 show 2040 population and employment projects for cities and counties in the study area. Table 5-7 in Chapter 5 shows existing (2000) and planned (2030) land uses. For the purposes of this analysis, the "other actions" discussed include projected land development as currently anticipated in county and local plans, known private development actions as provided by local planning officials, and planned and proposed roadway or other infrastructure projects within the broad geographic study area. These include the following:

Scott County:

- Bluffs at Marystown: (west of Marystown Road and north of 130th Street in Shakopee) residential development of approximately 750 residential units, 45,000 square feet of commercial/office space and a new elementary school.

- Countryside: (east of Marystown Road and north of 128th Street in Shakopee) residential development of approximately 430 units.
- Bruggeman: (east of Old Brick Yard Road and north of 130th Street in Shakopee) residential development of approximately 750 units.
- New high school: (immediately south of the Countryside residential development, noted above, in Shakopee) planned for approximately 1,600 students.
- Commercial development: (Jackson Township adjacent to US 169 northeast of existing TH 41 and US 169) characterized as "major."
- Conversion of US 169 to an expressway with interchanges at CSAH 14, existing TH 41/CSAH 78, and CSAH 69.
- Potential realignment of US 169 as part of conversion referenced above. (Note: impacts that would result from a realignment of US 169 are also discussed in Chapter 12.)
- Continued development of local roadway network paralleling US 169.

Carver County:

- Heights of Chaska: (west of downtown Chaska on the south and north sides of CR 140) a 1,000 acre development site that includes a mix of residential, employment, commercial and civic uses. Approximately 3,550 residential units and 70,000 square feet of commercial space are planned.
- River Bluff Estates: (south side of CR 40 in Carver) a residential town home development of approximately 42 units, currently under construction.
- Spring Creek: (southeast quadrant of the CR 147/US 212 intersection) a residential development of approximately 350 units. The land has been platted.
- City of Carver AUAR: (south of existing US 212, west of CSAH 11) a 1,700-acre development area with various mixed use scenarios under consideration.
- Completion of New US 212 construction.
- Potential improvements to Highway 101 corridor (under study).

13.2 EFFECTS ON RESOURCES

To the degree practical given available information and resources, the following steps were taken to analyze the potential for cumulative effects:

- Summarize the existing condition of each potentially affected resource and how it has been affected by other actions, public or private.
- Summarize impacts to the affected resource from the Build alternatives.

- Identify other present actions and reasonably foreseeable future actions and their possible impacts on that resource.
- Summarize the impacts to the affected resources from reasonably foreseeable future actions. Discuss the potential for cumulative impacts to the resource based on consideration of effects of all past, present and future actions as well as consideration of special designations or standards that relate to the resource, ongoing regulatory authority, policies, or plans that afford some measure of protection to the affected resources, and measures that could avoid or minimize negative effects on the resource.

13.3 RESOURCES ANALYZED

This chapter discusses cumulative impacts to the following: land development/conversion of agricultural and open space to more intensive uses, social/community cohesion/access/environmental justice/community facilities, traffic noise, visual quality, vegetation/wildlife, Seminary Fen Wetland Complex, wetlands, water quality and quantity, Minnesota Valley National Wildlife Refuge, Minnesota Valley State Recreation Area and Trails, parks/trails/outdoor recreation facilities, and cultural resources.

13.3.1 Land Development/Conversion of Agriculture and Open Space Land to More Intensive Uses

This section addresses the potential for cumulative impacts on land development generally, with particular consideration of the impact on conversion of agricultural and open space land to more intensive uses.

13.3.1.1 Past and Existing Conditions

The study area includes land in the Cities of Carver, Chaska and Chanhassen in Carver County and the City of Shakopee and townships of Louisville and Jackson in Scott County. Existing land uses include agricultural, residential (including mobile home parks), commercial, industrial and public (including the MVNWR and the MVSRA).

Since 1970 many acres of land have been developed in Scott and Carver Counties. Metropolitan Council research indicates that the amount of land devoted to residential and commercial uses in Scott and Carver Counties has more than doubled from 1970 to 2000. Similar data on the growth in residential and commercial land uses are reported for the cities and townships in the study area. The Metropolitan Council reported that the percentage of city land in urbanized use in 1970 in Shakopee (22 percent), Chaska (20 percent) and Chanhassen (32 percent) increased to 48, 59, and 63 percent respectively in 2000. This increase has resulted in intensification of already developed areas as well as conversion of land previously used for agriculture. In addition, roadways such as US 169 and New US 212 have been and are being constructed to meet local and regional transportation demands.

13.3.1.2 Impacts from Proposed Action

The proposed action will result in direct impacts due to acquisition of land for right of way, including land currently used for residential, commercial, agricultural and public purposes (see Table 5-8 in Chapter 5). The Build alternatives, depending upon which is selected as the preferred alternative, will acquire between 26 and 190 acres of land currently classified as agricultural affecting between nine and 17 agricultural landowners. The affected land is either under cultivation or open space.

The proposed project is not anticipated to change the projected number of households or employment in the study area compared to the No-Build alternative since the same assumptions were used for No-Build and Build alternatives. As discussed in Chapter 12, the indirect impact of the proposed action on land development could result in planned growth to occur in a different configuration or intensity than otherwise planned and could provide impetus for development beyond the study area. In summary, construction of the proposed project in Scott County would facilitate and enhance the planned mixed commercial-industrial development along US 169. In Carver County, the project would facilitate and enhance planned commercial nodes at the proposed interchanges with New US 212 for Alternatives W-2, C-2, and C-2A.

13.3.1.3 Impacts from Other Future Actions

The City of Shakopee in Scott County is likely to be fully developed by 2040, including land annexed from Jackson and Louisville Townships (with the exception of the land owned by the Shakopee Mdewakanton Sioux Community). In Carver County, the City of Carver is expected to be fully developed by 2010; developers are currently seeking to annex to and develop an additional 2,000 acres in the City of Carver. The City of Chaska is expected to be fully developed by 2015 and the City of Chanhassen is expected to be fully developed by 2040.

The anticipated growth in the study area will result in the conversion of undeveloped and agricultural land to urban uses. This growth is provided for in the comprehensive plans of the communities in the study area. In Scott County reconstruction of US 169 and other roadways, and the major commercial development planned along US 169 will impact agricultural land; these actions may also result in the conversion of existing land to more intensive uses. In Carver County, anticipated development and infrastructure will affect mainly agricultural land.

13.3.1.4 Potential for Cumulative Impacts

The proposed project will result in cumulative impacts to land use as the impacts from the proposed project together with those from other past and future actions represent a substantial change in land use. While this is a cumulative impact, it is not an adverse one because the project and other future actions are assumed and anticipated in the comprehensive plans of the communities within the study area. The western and central portions of study area encompass a substantial amount of undeveloped land, some of which is platted or being planned for development. The proposed project will require conversion of farmland and open space for right of way, the amount varying depending upon which alternative is selected as the preferred. The Build alternatives, in combination with other land development and roadway projects, could

result in intensification of land use in already developed areas, and could encourage development of areas previously used for agriculture and open space. Planned roadway improvements will improve the perceived accessibility of these areas if existing transportation routes are substantially improved relative to total travel time and convenient use or access to the regional system. However, the goal of comprehensive planning is to reduce the negative cumulative effects of land development through orderly growth.

Land development is guided by city and county comprehensive plans and zoning regulations. These plans document consideration of the benefits and negative impacts of land development and prescribe patterns of development that are conducive to the goals of the community. Through zoning regulations, these same entities can control the intensification of development and protection of agricultural land and open space from further development. Development of local transportation facilities are also guided by these comprehensive plans and are evaluated based on consistency with comprehensive plans. Careful planning coordination and consistency among local, county, and regional agencies should continue in order to avoid non-compact and disorderly development known as "sprawl."

All future right of way acquisition would be completed in accordance with the Uniform Relocation and Real Property Acquisition Act of 1970, as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987 and 49 Code of Federal Regulations, Part 24, and effective April 1989. The Federal Farmland Protection and Policy Act (FPPA) of 1981 and the Minnesota Agricultural Land Preservation and Conservation Policy Act (M.S. 17.80-17.84) have been enacted to ensure that impacts on agricultural lands and operations are integrated into the decision-making process, and that impacts upon agricultural land are minimized to a reasonable extent. It is anticipated that future actions in the study area will be evaluated to identify any soils classified by the Natural Resources Conservation Service (NRCS) as being prime and unique farmland or statewide and local important farmland. In addition, areas proposed for future actions would be reviewed to identify land held under state and/or federal easement or protection programs.

13.3.2 Social

This section addresses the potential for cumulative impacts on social conditions, specifically on neighborhoods (neighborhoods and community cohesion, access, environmental justice and community facilities).

13.3.2.1 Past and Existing Conditions

As previously described, existing communities within the study area include Carver, Chaska, Chanhassen and Shakopee, as well as the townships of Louisville and Jackson, and are considered part of the Twin Cities metropolitan area. Historically, these communities developed as river towns surrounded and supported by agricultural uses. Since the 1970s, and increasingly in the 1990s to the present, they have experienced substantial growth and urbanization. The area has transformed from a small town agricultural setting to a suburban setting. Today, there are established neighborhoods as well as developing neighborhoods within each of these communities. Scott County neighborhoods within the study area consist of three mobile home

parks and a small group of homes west of the US 169/existing TH 41 intersection. Past impacts on these neighborhoods related to increased traffic on US 169 and existing TH 41 and change in character due to development along the US 169 corridor. In Carver County, the study area includes an array of neighborhood types including townhome developments, long-established residential areas, areas of older homes in and near historic districts, more "upscale" neighborhoods and mobile home parks. Depending on neighborhood location, past impacts include construction of New US 212 (on-going) and traffic increases on area roadways.

13.3.2.2 Impacts from the Proposed Action

Each of the Build alternatives requires acquisition of businesses and residential properties. These impacts are detailed in Section 5.1.2.1. Potential additional property impacts due to indirect impacts (i.e., influence on design of other planned roadway improvements) are discussed in Section 12.2.2. Existing or planned local roadway connections that are impacted by the proposed project will be functionally restored via grade-separation and/or local roadway realignment. The continuity of the local road network would be impacted by the Build alternatives resulting in minor impacts on the ease of access to community facilities for residents.

All of the Build alternatives result in fewer hours of congestion on existing TH 41, thus improving the overall general circulation and access to community facilities and services.

The environmental justice finding in Section 5.1.2.4 of Chapter 5 states that social and right of way impacts are disproportionate to low-income/minority communities for Alternatives C-2, C-2A, E-1, E-1A, and E-2. The loss of housing units in general and the loss of affordable housing units in particular, would impact the diversity of housing in the communities in the study area. According to City staff, Shakopee's current zoning ordinance is generally not amenable to the establishment of new mobile home parks. And while the City of Chaska ordinance allows for new mobile home parks, City staff indicated that the cost of land would make it unlikely to occur.

The number of residential units impacted by the Build alternatives, including single family homes, townhome units (under construction) and mobile home units, is as follows:

Alternative W-2:	13 units
Alternative C-2:	29 units (plus potential impacts of 3 units due to indirect impact)
Alternative C-2A:	78 units (plus potential impacts of 3 units due to indirect impact)
Alternative E-1:	261 units
Alternative E-1A:	136 units
Alternative E-2:	210 units

13.3.2.3 Impacts from Other Future Actions

Commercial development in Jackson Township in the vicinity of US 169 that is projected in current land use plans could result in the development of one or more of the mobile home parks in Scott County. Improvements to US 169, if realigned as assumed for Alternatives E-1, E-1A, and E-2, would likely impact Mobile Manor. This impact is noted in Chapters 5 and 12.

13.3.2.4 Potential for Cumulative Impacts

The proposed action, in conjunction with future actions could have a cumulative impact on the social environment. Reconstruction of US 169 (depending upon alignment) and the major commercial development planned in the same area has the potential to remove some or all of Mobile Manor mobile home park. The proposed project would take the remainder of the homes in the mobile home park if any of the eastern alternatives is chosen as the preferred alternative.

The comprehensive plans for the cities within the study area, which serve as an official community vision for each city, assume and provide for future growth and urbanization. Increasing development pressure will require continued careful policy- and decision-making by local units of government to minimize cumulative impacts on the affected communities.

13.3.3 Traffic Noise

13.3.3.1 Past and Existing Conditions

Generally, noise levels in the study area have increased as the transition from a small town agricultural setting to a suburban environment has occurred. Existing daytime L_{10} noise levels along all Build alternatives range from 43 dBA in isolated areas away from traffic noise sources to 73 dBA along existing TH 41 in the City of Chaska. Daytime noise standards at several existing receptor locations are exceeded (see Tables 6-4A-6-4F in Chapter 6). Traffic noise is a growing concern as the area continues to develop.

13.3.3.2 Impacts from the Proposed Action

Noise impacts would result from construction of any of the Build alternatives. Construction of the proposed project would result in an increase in daytime L_{10} noise levels from 0 dBA to 22 dBA over existing conditions in areas close to existing high volume roadways and up to 32 dBA in isolated areas currently not exposed to traffic noise.

13.3.3.3 Impacts from Other Future Actions

The general increase in growth and urbanization of the area will result in increased noise levels in the study area. Anticipated land development will both increase the number of sensitive receptors (e.g., residential uses) and the number of roadways that generate traffic noise. The most notable change in noise levels will be observed in the relatively undeveloped portions of the Cities of Shakopee, Carver and Chaska. Note, however, that area growth and planned roadway improvements are included as assumptions in the travel forecasting done for the proposed project and that changes in traffic on major roadways throughout the system under No-build conditions are included in the noise modeling for the project.

13.3.3.4 Potential for Cumulative Impacts to Traffic Noise

Traffic volumes from future development have been assumed in the model for the Build alternatives, therefore cumulative impacts have been accounted for in the analysis. The number of sensitive receptors experiencing noise levels exceeding state standards is expected to increase in the study area as development and traffic levels increase. As development in the study area occurs in the future there will be opportunities to create buffers to decrease noise impacts.

Where feasible and reasonable, noise mitigation (noise walls or barriers) along high-volume roadways must be considered to satisfy state and federal requirements. This evaluation will be included in the Tier II EIS, closer to the time of construction.

Two physical characteristics of noise lessen the potential for cumulative noise impacts. First, noise does not grow proportionally with the amount of traffic growth. As explained in Chapter 6 of the DEIS, a doubling of traffic along a roadway results in only an additional 3 dBA in sound level, a difference that is barely audible to the human ear. Second, traffic noise levels are generally localized and tend to disburse over relatively short distances.

In addition, local governmental units have the authority to decrease noise impacts on sensitive receptors by designating exclusive land uses in areas of highest noise impact, requiring appropriate subdivision design that would create a buffer to reduce the impacts of traffic noise on sensitive receptors, requiring noise insulation, or restricting time periods when noise can be generated.

13.3.4 Visual Quality

The natural environment is composed of those visual elements not constructed by humans. Natural elements within the project corridor include the maple-basswood and oak forests, floodplains, wetlands and the Minnesota River. The cultural environment includes those visual elements that are the result of human modification of the natural landscape or construction activities such as clearing and grading for agriculture and construction of homes, businesses and roadways.

13.3.4.1 Past and Existing Conditions

Visual conditions in the study area vary and include natural areas, agricultural areas, and developed areas. The visual setting includes the Minnesota River valley, rural landscapes, and historic districts and properties in the Cities of Carver and Chaska. The area has experienced a transition from small town agricultural environment to a more developed and urbanized environment. The natural and cultural environments combine to create a varied landscape dominated by agricultural and residential cultural elements such as fields, barns, industrial buildings and houses in areas to the south and west, and a small city/suburban landscape in areas to the north and east. City of Shakopee staff note that US 169 and adjacent development have had a substantial impact on the visual landscape in that area.

13.3.4.2 Impacts from the Proposed Action

All of the Build alternatives would impact, in varying degrees, the viewsheds and visual corridors within the study area by introducing views of traffic, pavement and other structural roadway features, including bridges, through currently undisturbed natural areas and farm fields.

13.3.4.3 Impacts from Other Future Actions

Additional development and associated roadway construction may affect the visual qualities of the study area as it continues its transition to an urban landscape. While some individuals may

value the aesthetic qualities of natural and rural environments, other individuals equally value orderly and well-designed developed areas. Local controls may affect the visual quality of development.

13.3.4.4 Potential for Cumulative Impacts

Anticipated future development and the proposed action are anticipated in the comprehensive plans for the cities and counties in the study area therefore are not expected to have a cumulative impact. Individuals who value natural environments may view further development in the study area as a degradation of visual quality. Orderly and well-designed built environments may be equally valued by others. These differences in values cannot be clearly interpreted as adverse impacts. Comprehensive plans for area communities identify a community vision that includes the proposed project (though not the location).

13.3.5 Vegetation and Wildlife

13.3.5.1 Past and Existing Conditions

Where development has occurred, impacts to vegetation and wildlife have also occurred. Impacts are greatest where natural areas are developed and trees, vegetation and wildlife habitat are impacted. The health and abundance of wildlife populations is largely dependent on the quality and quantity of habitat available to support them. Past and present development has fragmented and reduced the quality of wildlife habitat.

In 2002 the City of Shakopee completed a natural resources inventory for the City and adjacent townships. City staff characterizes impacts to natural resources since the 1970s as substantial. Since the early 1990s, the City of Chanhassen has been one of the Metropolitan Council's plat monitoring communities. City staff confirmed that despite tree preservation efforts, development is claiming between 30 and 60 percent of the trees on development sites. There is a large forested area in southern Chanhassen that is protected from development. The cities of Carver and Chaska have not undertaken similar studies.

Vegetative resources in and near the study area, as addressed in Chapter 7 of the DEIS, include floodplain forest near the river, calcareous fens, maple-basswood forest, oak forest, native vegetation, wetlands and cultivated agricultural land. Kitten-tails (threatened), Hill's Thistle (special concern) and Sterile Sedge (threatened) are found in the study area. The Seminary Fen is home to vascular plant and bryophyte (moss) calcephiles, including several protected plant species. Threatened and endangered animal resources in the study area include numerous types of mussels, the Fritillary Butterfly and the Bald Eagle. These resources are found on both publicly and privately owned property.

13.3.5.2 Impacts from the Proposed Action

All of the Build alternatives cross the Minnesota River valley and impact floodplain forest, wetlands, native vegetation and agricultural land. The Build alternatives would directly impact wildlife habitat and could potentially create a barrier to wildlife movement. Alternatives W-2, C-2 and C-2A would occur in areas in Carver County that are largely undeveloped natural areas.

Alternatives W-2 and C-2A cross directly through the Minnesota Valley National Wildlife Refuge (MVNWR), and to a lesser extent Alternative C-2, resulting in fragmentation of the MVNWR. All of the Build alternatives cross the Minnesota Valley State Recreation Area and MV Trail.

All of the Build alternatives would result in direct impacts on Minnesota River aquatic species during construction of the new river crossing and implementation of mitigation items. The Shovelnose Sturgeon (a species of special concern in the State) could be impacted by all of the Build alternatives. Numerous types of mussels (threatened, endangered or special concern) could be impacted by Alternative W-2, as could the Fritillary Butterfly (a species of special concern in the State). Bald Eagles (threatened) could be impacted by Alternatives E-1A and E-2. Sterile sedge (federal threatened and endangered) along with other native plant species associated with Seminary Fen could also be impacted by E-1A and E-2. Mitigation measures would be designed to avoid, minimize and alleviate impacts to threatened/endangered or other protected species and sites of biodiversity significance during the Tier II EIS process.

Areas impacted by the Build alternatives would experience exposure to the new roadway including impacts from bridge abutments, piers, storm water ponds and channels, and any areas shaded by the new structure. Trash, debris and salt spray for winter deicing could impact the vegetation below the bridge and could create an opportunity for invasive species to crowd out less-adaptable native species. Build alternatives would impact the following types of vegetation and threatened, endangered or special concern species:

Alternative W-2: floodplain forest, oak forest, lowland hardwood forest, Kitten Tails, Hills Thistle, Regal Fritillary Butterfly, various mussel types, Shovelnose Sturgeon

Alternative C-2: floodplain forest, aspen woodland, maple-basswood forest, lowland hardwood forest, oak forest, Shovelnose Sturgeon

Alternative C-2A: floodplain forest, maple-basswood forest, oak forest, oak woodland brushland, lowland hardwood forest, Shovelnose Sturgeon

Alternative E-1: floodplain forest, maple-basswood forest, lowland hardwood forest, oak forest, Shovelnose Sturgeon

Alternative E-1A: floodplain forest, calcareous fen, maple-basswood forest, lowland hardwood forest, oak forest, and oak-woodland brush, threatened, endangered, and special concern species associated with Seminary Fen (including, but not limited to, Sterile sedge, Low nutrush, Beaked spikerush, White lady's slipper, Twig rush), Shovelnose Sturgeon

Alternative E-2: floodplain forest, calcareous fen, maple-basswood forest, lowland hardwood forest, oak forest, and oak-woodland brush, threatened, endangered, and special concern species associated with Seminary Fen (including, but not limited to, Sterile sedge, Low nutrush, Beaked spikerush, White lady's slipper, Twig rush), Shovelnose Sturgeon

As noted in Chapter 12, direct impacts to vegetation and wildlife habitat have the potential for indirect impacts to resources within the broader ecosystem due to the web of ecological relationships among habitat and wildlife.

13.3.5.3 Impacts from Other Future Actions

Future anticipated developments in the study area (described in Section 13.1.3.2) on undeveloped land could result in loss of native vegetation, wooded areas and wetlands, and wildlife habitat.

This is especially true in the largely undeveloped areas of Carver County. River Bluff Estates, currently under construction, and the Heights of Chaska planned development in Carver County are located in undeveloped natural areas and agricultural areas. Construction of New US 212 will also remove vegetation, including forested areas as noted in Chapter 7. A large amount of land in the Minnesota River valley is under public ownership and thereby protected from future development. It is anticipated that future actions, including roadway construction and residential and commercial development, will include land use planning and preliminary studies to avoid and/or minimize impacts to wildlife habitat. Where impacts are unavoidable, it is likely that exercise of land use controls through project review and permitting by the appropriate regulatory agencies would include use of design considerations to reduce the overall impact.

13.3.5.4 Potential for Cumulative Impacts

The proposed action, in combination with other foreseeable actions in the area, could result in cumulative impacts on vegetative and wildlife habitat resources regardless of which alternative is chosen as preferred. Development controls of the governmental units within the study area include one or more of the following: natural resource corridor plan, conservation easements, woodland management ordinance, shore land protection ordinance, tree preservation and reforestation ordinance, bluff protection ordinance, wetland protection ordinance, wooded steep slopes ordinance. The City of Shakopee is developing regulations based on its Natural Resource Corridor Plan to protect identified greenways. These controls can help to protect natural areas, if they are in place before development occurs. Local governmental units should continue to take appropriate steps to protect these resources from other future actions. In addition, large amounts of habitat would continue to exist in a natural state through the protection of the MVNWR and the MVSRA.

13.3.6 Seminary Fen

13.3.6.1 Past and Existing Conditions

As discussed in Chapter 7 of the DEIS, the Seminary Fen Wetland Complex (SFWC) is a calcareous seepage fen, a rare and threatened type of wetland that is sensitive to changes in water chemistry and groundwater flow. Calcareous fens have special protection under state law, and are formally defined and delineated based on the presence of specific hydrology, water chemistry, soils, and vegetation indicator criteria. Many of the plants specific to calcareous fens

are state-listed as threatened or endangered because they are rarely found outside of the calcareous fen environment. Calcareous fens are often found as embedded discharge areas within a larger wetland complex. This is particularly true of calcareous fens that have been identified in the Minnesota River Valley where extensive wetlands are located in backswamp areas distant from the river, and in depressions and abandoned channels within the broad valley floor.

Because of their size and location in and near urbanizing areas, Minnesota Valley wetlands are particularly subject to various disturbances. Historic impacts to the fen are noted on aerial photos dating back to 1937. While the SFWC is considered to be relatively pristine, the immediate area of the wetland and the adjacent bluffs have been impacted by fragmentation, municipal well withdrawals, bluff top urbanization and storm water management, ditch and tile drainage, hydrologic alteration and surface water diversions, potential mining of peat and/or underlying sediments, and limited industrial development. The Seminary Fen may, in fact, be maintained in the face of existing and historic disturbance by the sheer size of the wetland complex within which it is embedded, combined with the calcareous nature of the underlying sediments. Assumption Creek, which flows through the SFWC and is designated as a trout stream, has very complex hydrology and has been substantially affected by historic diversions and channelization.

Residential development of the bluff top started prior to 1990 where ongoing construction is evident in an historic agricultural field northwest of the fen. Aerial photographs of the bluff-top area indicate that it was completely developed by 2000.

Recent studies discussed in Chapter 7 have identified the boundaries of calcareous fen within the SFWC based on current hydrologic, soil, water chemistry and vegetation criteria, finding that CFC Areas 1, 2 and 3 are calcareous fen. Each area has been disturbed and are threatened by invasive species. CFC Area 2 is of most concern in relation to the proposed project. Previous assessments did not identify this area as fen, most likely because it is overgrown with woody vegetation. The Phase II study conducted for the DEIS found that, despite the presence of several fen indicator species and the abundance of some of the, the amount of calcareous fen and native wetland plant communities has been substantially reduced over time. Shrub coverage and invasive species encroachment are serious and immediate threats to remaining fen vegetation.

13.3.6.2 Impacts from the Proposed Action

Alternatives E-1A and E-2 would result in direct impacts to wetlands, including calcareous fen wetland, due to bridge pier construction. Additional calcareous fen area would be lost within and around the highway corridor due to temporary dewatering, construction traffic, soil compaction and shading. The proposed action would also increase the amount of altered edge and allow for transport of contaminants, including road salt, through groundwater flow paths. In both cases, degradation may be so severe as to eliminate calcareous fen from large areas. As noted above, however, the relevant area (Area 2) is already degraded and threatened with further degradation regardless of the project.

13.3.6.3 Impacts from Other Future Actions

Chapter 7 reports that without active and sustained management of the SWFC, it is likely that the ongoing degradation (i.e., domination by non-fen plant species) will continue, independent of the proposed project. Potential future actions, other than construction of the proposed project within the Alternative E-1A or E-2 corridors, that would negatively affect the resource would therefore include not only any development on the calcareous fen (which would be subject to state regulation), but also continued lack of proactive management. It should be noted that the hydrology study found the groundwater recharge area for the SWFC to be fairly limited. The recharge area is already developed, except for available land along Bluff Creek Drive.

13.3.6.4 Potential for Cumulative Impacts

If Alternative E-1A or E-2 is constructed, the resources in CFC Area 2 will effectively be lost due to direct impacts, therefore no cumulative impact applies specific to CFC Area 2. There is potential for cumulative impacts to the entire SWFC, however, if either Alternatives E-1A or E-2 is constructed (assuming the resource exists at the time of construction), management of the remaining CFC Areas 1 and 3 and the broader wetland complex does not occur, or if development that directly affects the resource takes place.

The Wetland Conservation Act (WCA) states that calcareous fens may not be drained or filled or otherwise altered or degraded except as provided for in a management plan approved by the Minnesota Department of Natural Resources (MnDNR). The MnDNR would provide technical assistance in the development of a management plan for the SFWC, if a Build alternative that impacts it is chosen. The development of this plan would occur during the Tier II EIS process, closer to the time of design and construction.

In addition, federal and state wetland regulations require the use of a sequenced approach when projects have the potential to impact wetlands. Sequencing requires first avoiding wetland impacts if possible, and, if impacts are not avoidable, they must be minimized to the greatest extent practicable. Sequencing also includes rectification of temporary impacts and reduction or elimination of impacts over time. After all options for avoidance, minimization, rectification and long term reduction of impacts have been considered and implemented, compensation that will replace lost wetland functions is required for those impacts that are not avoidable.

13.3.7 Wetlands (Seminary Fen Discussed in Section 13.3.6)

13.3.7.1 Past and Existing Conditions

Historically, many of the wetlands in this region of the Minnesota River Valley have been filled, drained or otherwise disturbed since the area was initially settled to accommodate agriculture and development, according to a report by the University of Minnesota on water quality in the Minnesota River Basin. Also, “exemptions in place” have had some impact on wetlands.

Wetlands in Minnesota are federally regulated by Executive Order 11990, US DOT Administrative Order related to the impacts of transportation projects on wetlands and by the

U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. In addition to federal regulation, Minnesota wetlands are also regulated by Governor's Executive Order 91-3, and the Minnesota Wetland Conservation Act as well as the MnDNR Division of Waters.

A survey in the study area of each of the Build alternatives identified a total of 32 wetlands that could be potentially impacted by the proposed action. Wetland basins were found in four general areas–along the Minnesota River valley floodplain, near the proposed interchange of New US 212 and Alternative C-2A, near the proposed interchange of New US 212 and the eastern alternatives, and in the Seminary Fen. The wetlands were classified according to methodology described in Section 9.5.2 of Chapter 9.

13.3.7.2 Impacts from the Proposed Action

As described in Table 9-7 in Chapter 9, the Build alternatives would directly wetlands as follows:

Alternative W-2:	11.7 acres
Alternative C-2:	10.9 acres
Alternative C-2A:	16.1 acres
Alternative E-1:	9.0 acres
Alternative E-1A:	14.9 acres (High Profile) and 14.6 acres (Low Profile)
Alternative E-2:	15.7 acres (High and Low Profiles)

Wetland functions and attributes include vegetation diversity, wildlife habitat and food, flood/storm water discharge, sediment and nutrient retention, aesthetics/recreation and groundwater recharge/discharge. Impacts to wetlands caused by construction can diminish these functions and affect the benefits these unique ecosystems contribute to landscapes.

13.3.7.3 Impacts from Other Future Actions

The continued growth and development associated with the trend of urbanization throughout the study area is likely to have a corresponding continued impact on wetlands through filling. Similarly, expansion of existing or construction of new roadways may impact wetlands.

Potential indirect impacts on wetlands from residential development could occur from storm water discharges into wetlands. Increased flow into wetlands could alter hydrology, causing changes in plant communities and disrupting life cycles of wetland inhabitants. Increases in storm water flow and increased nutrients and sediment also could result in wetland degradation. Fragmentation of wildlife habitat could also occur with increased development since many animals use both wetlands and uplands during their life cycles.

13.3.7.4 Potential for Cumulative Impacts

The amount of wetland impact ranges from approximately 10 to 23 acres. However, the impact to wetlands from past and future development in this area, which has been and will continue to experience rapid urbanization, is anticipated to result in cumulative impacts to the area's wetland resources. There are extensive regulations in place to protect wetlands in Minnesota. Despite this, there are some limitations of the wetland protection system that allow for exemptions to the regulations that result in wetland loss.

13.3.8 Water Quality and Quantity

13.3.8.1 Past and Existing Conditions

The Minnesota River basin, historically a wetland landscape, is now dominated by an agricultural landscape and the large urban population of the Twin Cities. These changes in land use over time help explain the poor water quality in the river, according to a report by the University of Minnesota on water quality in the Minnesota River basin. Because of the poor water quality of the Minnesota River, the river has been identified as an impaired water subject to Total Maximum Daily Loads (TMDLs) (pollution reduction plan, which will form the basis for an implementation plan.

As discussed in Chapter 9, conversion of open land to impervious surface increases runoff that may carry pollution and sediments and cause erosion as it discharges into surface water bodies. Degrading water quality can adversely affect fish, waterfowl, wildlife, and plant life sustained by the affected water body.

Groundwater can also be affected as land is converted from open space to more urbanized (residential, commercial or industrial) uses. Depending on the nature of wastewater systems in place, seepage of nitrates from septic systems as well as from agricultural uses can cause potential threats to groundwater quality.

13.3.8.2 Impacts from the Proposed Action

As described in Chapter 9, any of the Build alternatives chosen as the preferred alternative, would incorporate design features to effectively treat roadway and bridge storm water runoff prior to discharge into surface waters. In addition to permanent storm water runoff treatment and permanent erosion control, temporary erosion control and temporary storm water pollution prevention measures would be used during construction. Some of the Build alternatives have more storage than others in the floodplain which has an impact on pond effectiveness.

There would likely be short-term impacts on water quality and aquatic life resulting from construction related activities that disturb river-bottom sediment. These impacts are expected to be transitory but will differ depending on the bridge design and the method of construction.

13.3.8.3 Impacts from Other Future Actions

In general, urbanization of existing agricultural land uses is expected to result in increased impervious surfaces. As the percent of impervious surface increases in a watershed, the volume of storm water runoff increases. Increased runoff, if not properly managed, can have a variety of negative impacts on receiving water bodies. These potential impacts include increased chances of flooding, erosion of streambanks and drainage ways, warming of stream waters, and decreased groundwater base flow due to less infiltration. Storm water management practices are routinely used to reduce the magnitude of these potential impacts.

13.3.8.4 Potential Cumulative Impacts

Given the design standards and management controls available for protecting the quality of surface waters and groundwater, it is likely that potential impacts of the project, along with other foreseeable actions, would be minimized or mitigated to a substantial degree, and cumulative impacts on water quality and quantity are not anticipated.

Stringent standards and regulations at the state and federal level are in place to protect water quality. Regulatory authorities, such as Watershed Districts, have considerable authority to regulate activities that affect water quality. Storm water management is required for all new roadway projects, which often incorporate drainage from adjacent land, thereby increasing the area receiving runoff treatment. Over time, the increasing amount of runoff treatment is likely to reduce the concentration of pollutants reaching surface waters.

Water quality can be impaired from development related activities, raising the concern for potential cumulative impacts. However, the regulatory structures currently in place reduce the potential for adverse impacts to water quality resulting from the proposed action in combination with other public and private actions. To prevent cumulative impacts on water quality and quantity, local and regional government agencies should continue their efforts to develop and administer comprehensive storm water management and erosion control plans.

13.3.9 Minnesota Valley National Wildlife Refuge

13.3.9.1 Past Impacts and Existing Conditions

The Minnesota Valley National Wildlife Refuge (MVNWR), established in 1976 and managed by the U.S. Fish and Wildlife Service (USFWS), is located in the study area. MVNWR consists of eight non-contiguous units (Long Meadow, Black Dog, Bloomington Ferry, Wilkie, Upgrala, Chaska, Louisville Swamp, Rapids Lake) that stretch 34 miles from Fort Snelling to the City of Jordan. Since its creation, the size of MVNWR has grown from 9,300 acres to 16,000 acres in 2006. According to USFWS staff, MVNWR will add 8,000 acres as the USFWS is able to acquire additional land as part of the mitigation for impacts of the Minneapolis-St. Paul Airport expansion on MVNWR land. There are no plans to expand MVNWR beyond 24,000 acres.

The 600-acre Chaska Unit is located in the northeastern part of the City of Carver and the extreme southwest part of the City of Chaska. Acquisition of this unit was completed in 2003. The Chaska Unit consists of marsh-edged lake surrounded by farmland and floodplain forest. There is a trail through the Chaska Unit that is almost complete and there are plans to open the area for archery hunting.

While there have been no past impacts on the Chaska Unit, USFWS staff report that all of the other units experience impacts from storm water runoff. For example, the Bloomington Ferry Unit has 27 storm water outlets for the City of Bloomington. Concerns cited by USFWS staff include erosion potential from development on fragile soils and steep slopes along the bluffs in the river valley and impacts to groundwater from well withdrawals by cities in the metropolitan area.

The Cedar Avenue Bridge was built through the Long Meadow Unit in 1982. The Bloomington Ferry Bridge (US 169), was built through the Wilkie and Bloomington Ferry Units in 1996. Most recently, the Minneapolis-St. Paul Airport was expanded in the Long Meadow

Unit in 2003. Past impacts from river crossings, cited by USFWS staff, include aesthetics, noise, trash, deicing chemicals, lighting, habitat fragmentation, and invasive species in disturbed areas. Concerns about possible fuel and chemical spills are also cited, though none have occurred.

13.3.9.2 Impacts from the Proposed Action

Three of the Build alternatives would directly impact MVNWR by requiring land to be acquired for right of way (Alternative W-2 20.4 acres, Alternative C-2 8.5 acres, and Alternative C-2A 36.1 acres). Two of these alternatives, W-2 and C-2A, would substantially fragment wildlife habitat in the MVNWR. Alternative C-2 would impact MVNWR to a lesser extent since it runs through the northernmost edge of the Chaska Unit.

The impacts experienced at other river crossings in the MVNWR could occur with the proposed project as well. These impacts include aesthetics, noise, trash, deicing chemicals, lighting, habitat fragmentation, and influx of invasive species in disturbed areas. Concerns about potential fuel and chemical spills reaching MVNWR marshes and lakes and ground water are cited by USFWS staff, though no spills from tanker trucks have occurred.

13.3.9.3 Impacts from Other Future Actions

USFWS staff did not identify any specific threats to MVNWR in terms of other future actions requiring acquisition of land. The impacts from urbanization on storm water and groundwater are cited as issues of concern. Storm water outlets in MVNWR and the ability to treat the volume of runoff are of concern at all units except the Chaska Unit. As development, and associated storm water runoff, in the City of Carver continues, this may become a concern for the Chaska Unit as well. In addition, there are concerns about long term water table reductions resulting from well withdrawals by nearby cities because this could result in lakes and marshes drying up.

13.3.9.4 Potential for Cumulative Impacts

The proposed project has the potential for having a cumulative impact on the MVNWR, depending upon which alternative is chosen as preferred, since three of the Build alternatives go through it. MVNWR has experienced impacts from other river crossings and the airport expansion. In addition, continued development of the communities along the Minnesota River valley will impact MVNWR through storm water runoff and long term well withdrawals.

However, the size of impact from the proposed project in relation the overall size of MVNWR is relatively small. Also, MVNWR has more than doubled in size since it was created in 1976. Finally, MVNWR is given a high degree of protection by federal laws, reducing the potential for substantial impacts resulting from the proposed action in combination with other actions.

13.3.10 Minnesota Valley State Recreation Area and Minnesota Valley State Trail

13.3.10.1 Past and Existing Conditions

The Minnesota Valley State Recreation Area (MVSRA) and Minnesota Valley State Trail (MV Trail), established in 1969, links Fort Snelling State Park and units of the Minnesota Valley

National Wildlife Refuge to waysides and other public lands as far west as Le Sueur. The MVSRA and MV Trail is owned and managed by the Minnesota Department of Natural Resources (MnDNR). A portion of the 5,000-acre MVSRA is located within the study area. The area's river, lakes, and scenic qualities attract more than 150,000 visitors every year. The portion of the MVSRA in the study area stretches from Carver on the west to Chanhassen on the east. There were some expansions to the MVSRA in the mid-1970s, including the Chaska section; however, there are no expansion plans for the MVSRA other than that the MnDNR is slowly adding to MV Trail system as opportunities become available.

Past impacts to the MVSRA and MV Trail include installation of a gas line in 2001 and the current reconstruction of the existing TH 41 bridge crossing the Minnesota River. MVSRA staff indicates that impacts from the gas line installation were temporary and occurred during construction. The current bridge reconstruction of existing TH 41 is requiring approximately two additional acres of MVSRA land for right of way purposes.

13.3.10.2 Impacts from the Proposed Action

All of the Build alternatives would require acquisition of or easements through the MVSRA and MV Trail and would result in temporary construction impacts to recreation facilities and permanent visual impacts. The specific amount of land required for right of way is as follows:

Alternative W-2:	30.6 acres
Alternative C-2:	22.3 acres
Alternative C-2A:	5.4 acres
Alternative E-1:	12.0 acres
Alternative E-1A:	12.0 acres
Alternative E-2:	4.2 acres

13.3.10.3 Impacts from Other Future Actions

MVSRA staff does not anticipate any future actions that will require land to be acquired from its holdings. As the area becomes increasingly developed there will be more demand by area users on the MVSRA and MV Trail. In addition, as development occurs along the bluff areas there will be visual impacts on the resource.

13.3.10.4 Potential for Cumulative Impacts

Past actions have impacted the MVSRA and MV Trail and all of the Build alternatives would impact the MVSRA and MV Trail as well. The magnitude of these impacts, in relation the overall size of the resource, however, is relatively small. Therefore, cumulative impacts are not anticipated. Parklands are given a high degree of protection by local, county, state, and federal laws, reducing the potential for substantial impacts resulting from the proposed action in combination with other actions.

13.3.11 Other Parks, Trails and Outdoor Public Recreation Facilities

13.3.11.1 Past and Existing Conditions

Athletic Park in the City of Chaska is an eight acre community park that provides a ball field and grandstand with seating for 1,000. Built in the 1950s, Athletic Park (a.k.a., Chaska Cubs Ball Field) has been determined to be eligible for the National Register of Historic Places (NRHP). The levee and flood control project in the area impacted the park by requiring removal of a portion of the parking lot, approximately 24 spaces. This did not impact the playability of the ball field. Since there is a strong demand for this type of recreation facility the City has plans to construct an additional ball field on the grounds at Athletic Park, add a picnic area and make improvements to the parking lot.

In addition to Athletic Park, the City of Chaska owns and manages a system of trails. The system consists of greenway trails (leisure and recreation trails) and roadway trails (destination trails) built primarily in the 1980s. Several segments of the trail system are being temporarily impacted by the New US 212 construction. In these instances, trail segments are being preserved through bridges and tunnels so no permanent impacts are expected.

In addition, public outdoor recreation facilities exist at the Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center Complex that include ball fields, soccer fields, play structure, and picnic area. The size of Pioneer Park was decreased in 2002 to allow for an expanded site for the recently constructed Pioneer Ridge Freshman Center. Ball fields that were lost at Pioneer Park at that time were replaced on Chaska High School property.

13.3.11.2 Impacts from the Proposed Action

Alternatives W-2 and C-2A would not impact park, trails or outdoor recreation facilities. Alternative C-2 would directly impact Athletic Park by requiring 3.5 acres for right of way. It is possible that the entire park would need to be acquired if the remaining land is not usable for park purposes. City of Chaska staff has stated that if the playability of the ball field is impacted the City would want to relocate it and replace it with an equivalent facility, preferably near downtown. Alternative E-1 would impact three trail segments in the City of Chaska including a 1.4 mile segment of Audubon Trail. Alternatives E-1A and E-2 would impact two trail segments including approximately 1,000 feet of Audubon Trail. Three of the Build alternatives (E-1, E-1A, E-2) would impact Pioneer Park and/or the outdoor recreational facilities at Chaska High School and Pioneer Ridge Freshman Center through right of way acquisition. All of the eastern alternatives would likely result in temporary construction impacts to these outdoor recreation facilities.

13.3.11.3 Impacts from Other Future Actions

There are no anticipated developments that will impact these resources.

13.3.11.4 Potential for Cumulative Impacts

Impacts from past actions combined with the proposed action could result in cumulative impacts to Athletic Park if Alternative C-2 is chosen as the preferred alternative. The levee and flood

control project took a small portion of the park and the proposed action would take about half of the remaining park. As noted, it is possible that the entire park would need to be acquired if the remaining land is not useable for park purposes.

The proposed project could impact three trail segments that are also being impacted by New US 212 construction. However, all three segments are being preserved as part of the New US 212 project and are planned to be preserved as part of the proposed project as well. Therefore, cumulative impacts to the city's trail system are not anticipated.

Past actions have decreased the size of Pioneer Park. Alternatives E-1, E-1A and E-2 would directly impact Pioneer Park/Chaska High School/Pioneer Ridge Freshman Center Complex by requiring land from the outdoor facilities, though this is not expected to result in cumulative impacts to the resource because the facilities could still function.

13.3.12 Historic and Archeological Resources

13.3.12.1 Past and Existing Conditions

Several archaeological and historic resources exist within the study area reflecting patterns of Native American settlement, and nineteenth and early twentieth century development patterns. Historic resources in the area include archaeological sites and structures. Designated historic districts can be found in the Cities of Carver and Chaska. Historic property types present in the area include residences, commercial buildings, railroad, church, and park.

13.3.12.2 Impacts from the Proposed Action

Alternative C-2 is the only alternative that will directly impact an historic property (Athletic Park a.k.a. Chaska Cubs Ball Field) that is listed or determined eligible for the National Register of Historic Places (NRHP). A determination was made that the eastern alternatives (E-1, E-1A and E-2) will have no adverse effects on historic properties (this determination is based on the condition that the archeological site 21CR141 can be avoided through adjustments to the proposed E-1A or E-2 alignments if either is selected); E-1 would completely avoid the site. A final determination of effects on the other Build alternatives (W-2 and C-2A) as well as potential effects of Alternative C-2 on additional resources has not yet been made. The No-Build alternative will have an adverse effect on the Walnut Street Historic District in downtown Chaska. A complete discussion of each property listed on or determined eligible for the NRHP and the assessment of effects on each property are provided in Chapter 10 of this DEIS.

13.3.12.3 Impacts from Other Future Actions

The proposed future actions (i.e., development and new transportation infrastructure) considered in this analysis are planned to occur in areas beyond the developed areas of Carver and Chaska where historic properties tend to be located. Archeological sites on the other hand can be located in areas beyond the developed areas of cities and could be impacted by future actions. Impacts

resulting from intensification of land use can be controlled through local comprehensive planning and zoning controls. Local communities can also enact further controls to protect historic properties as the Cities of Carver and Chaska have already done.

Designation of historic properties by local governments can provide some protection for their preservation, as well as design review to guard against inappropriate changes that can destroy the historic characteristics of properties. Changes to National Register-listed or eligible properties would be reviewed under the Section 106 process if federal funds, permits or licenses are required as part of an undertaking. National Register listing, however, does not prevent demolitions or other negative effects on properties if federal funds, licenses or permits are not required. Privately funded development related to historic properties is not regulated under federal regulations and would only be reviewed if located in a local historic district, or applied to a locally designated property.

13.3.12.4 Potential for Cumulative Impacts

The proposed action, in combination with past and future actions, is not expected to result in cumulative impacts to historic properties or archeological sites. Cumulative impacts to historic properties are identified in conjunction with the criteria of adverse effect in 36 CFR 800.5 (a) (1), noting that adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

The proposed Build alternatives would redirect traffic, including truck traffic, from traveling through downtown Chaska resulting in a positive impact and improved environment for the Walnut Street Historic Districts and nearby properties. Changes in land-use patterns associated with development could alter the setting of some historic properties. Further development of previously undeveloped lands may also disturb existing archaeological sites, both in rural areas and the historic archaeology in urbanized areas.

13.4 CONCLUSIONS

13.4.1 Summary of Potential Cumulative Impacts

The greatest potential for cumulative impacts exists in issue areas related to land development, vegetation and wildlife, wetlands, MVNWR, and Athletic Park in the City of Chaska. Table 13-1 summarizes potential cumulative impacts. Potential impacts to these resources resulting from development projects are typically considered through local and county comprehensive planning efforts, permitting regulations and environmental review processes of NEPA and MEPA. Many of these impacts can be avoided or minimized through the continued application and enforcement of land use controls, development controls and roadway access restrictions.

TABLE 13-1
SUMMARY OF POTENTIAL CUMULATIVE IMPACTS FINDINGS

Resource/Ecosystem/Human Community	**Potential for Cumulative Impact**	
	✓greater potential	**×less potential**
Land Development-Conversion of Agricultural Land to more Intensive Uses	✓	
Social	✓	
Traffic Noise		×
Visual Quality		×
Vegetation/Wildlife/Threatened and Endangered	✓	
Seminary Fen Wetland Complex	✓	
Wetlands	✓	
Water Quality and Quantity		×
Minnesota Valley National Wildlife Refuge	✓	
Minnesota Valley State Recreation Area and MV Trail		×
Parks, Trails and Outdoor Recreation Facilities	✓	
Cultural Resources		×

14.0 UNAVOIDABLE ADVERSE IMPACTS

This chapter documents the adverse environmental impacts of the Build alternatives that cannot be avoided; the relationship between short-term use of the environment and the maintenance and enhancement of long-term productivity; and irreversible and irretrievable commitment of resources. This chapter is not intended to repeat the environmental impacts discussed in the previous chapters, but rather to summarize the impacts that cannot be avoided as required under 40 CFR, Part 1502.16. A complete summary of impacts can be found in the Executive Summary of this Tier I DEIS.

14.1. ADVERSE IMPACTS THAT CANNOT BE AVOIDED

Note that for the purpose of the Tier I DEIS, impacts are based on an assumed 300-foot corridor, adjusted for topography, potential stormwater ponds, and at interchanges. Mitigation opportunities for the impacts summarized below are discussed in previous chapters. The Tier I FEIS will provide additional discussion of mitigation for the preferred alternative, however, mitigation detail will be finalized during the Tier II EIS process.

14.1.1 Right of Way

Households and businesses would be relocated due to right of way acquisition needed for the Build alternatives. The displacement of businesses and residences could have a negative impact on the tax bases of the affected areas if the businesses are not reestablished or residents not relocated within their original communities. Each property owner would be compensated for acquisition and/or relocation costs according to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended) (49 CFR Part 24). However, property owners and occupants would experience unavoidable inconvenience as a result of relocation.

Estimated right of way requirements range from 214 acres to 360 acres. Estimated residential and business relocations range from 13 to 261 and 3 to 12, respectively. More detailed information on right of way acquisition can be found in Chapter 5.

14.1.2 Noise

The Build alternatives would result in year 2040 noise levels exceeding the Minnesota daytime and nighttime state noise standards at several locations in the study area. See Chapter 6 for a discussion of noise levels along the alternative corridors and potential noise mitigation. Noise mitigation will be analyzed along the project corridor selected as the preferred alternative in the Tier II EIS.

Noise modeling conducted for this Tier I DEIS and detailed in Chapter 6 indicates that, compared to No-Build conditions, the proposed project would result in an increase of 9 to 45 additional properties exceeding state daytime noise standards, 0 to 44 additional properties approaching or exceeding federal noise abatement criteria (69 dBA), and 6 to 26 additional properties meeting federal noise abatement criteria (increasing ≥5 dBA over existing conditions).

14.1.3 Visual

Construction of a bridge over the Minnesota River under any of the Build alternatives would have an impact on the existing visual setting for residents and visitors in the area. Visual impacts of the Build alternatives cannot be avoided since the bridge is a key component of each alternative.

14.1.4 Farmland

As determined by the Farmland Conversion Impact rating process, reported in Section 6.3, each of the Build alternatives would result in the conversion of farmland to roadway use. The total acreage of farmland to be converted directly varies with each Build alternative and ranges from 51 to 148 acres. (Note: Data used to make this determination was 1990s MLCCS information because it was the most current available, however, it does not reflect recent land use changes. Farm owners would be compensated in accordance with 49 CFR Part 24, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended).

14.1.5 Vegetation

All Build alternatives would require removal of trees and vegetation for bridge, roadway and interchange construction. Depending on alternative, there will be impacts to floodplain forest, (7 to 25 acres), oak forest (1 to 6 acres), maple-basswood forest (0 to 22 acres) lowland hardwood forest (1 to 12 acres) and oak woodland brush (0 to 9 acres). The amount of vegetative loss varies among alternatives and is discussed in detail in Chapter 7.

14.1.6 Floodplain

For all Build alternatives, river bridge construction would result in fill in the floodplain. The Build alternatives would result in transverse floodplain disturbance ranging from 5,730 feet to 7,970 feet. Some of the storm water ponds for the Build alternatives would be located within the floodplain. No substantial impact on 100-year flood elevations is expected.

14.1.7 Wetlands

The amount of wetland impact varies with each Build alternatives and ranges from 9.4 to 22.5 acres. Complete avoidance of wetland impacts would not be possible. Impacts on wetlands would be mitigated in accordance with U.S. Army Corps of Engineers and Wetland Conservation Act (WCA) requirements.

14.1.8 Minnesota Valley State Recreation Area and the Minnesota Valley State Trail

All alternatives would result in impacts to the Minnesota Valley State Recreation Area and the Minnesota Valley State Trail (MVSRA/MV Trail), ranging from 4.2 to 30.6 acres. Mn/DOT would allow recreational facilities to occur within the right of way beneath the bridge (e.g., trails, canoe and boating).

14.1.9 Soils

All Build alternatives cross steep slopes on hills and bluffs which are characterized by highly erodible soils. The length of these approximately 300-foot wide crossings ranges from 550 to 5,430 feet. Erosion resulting from disturbances of vegetative cover during construction could occur.

14.1.10 Water Quality and Quantity

All Build alternatives lie within sub-watersheds of the Minnesota River watershed, which drains to the Minnesota River. The Build alternatives would increase the amount of impervious surface and decrease infiltration resulting in an increase in the quantity of storm water runoff. All of the Build alternatives require storm water ponds, including some ponds within the 100-year floodplain.

14.1.11 Construction

Any of the Build alternatives would result in unavoidable temporary impacts on the environment due to the necessary construction activities. Construction related impacts include disruption of the flow of traffic, noise and air quality impacts, possible utility outages and relocations and earthborn vibrations.

14.2 SHORT-TERM USE OF RESOURCES VERSUS LONG-TERM PRODUCTIVITY

Each of the six Build alternatives results in similar impacts to fiscal, social, economic, physical and natural resources in the study area. Potential impacts to fiscal resources include the use of state and federal funds for the materials, labor and right of way acquisition required for construction of a Build alternative. The cost of constructing a Build alternative and converting existing residential, commercial and agricultural land use to transportation uses would be recovered through more efficient travel and an increase in tax base due to accessibility to existing and future land uses.

Impacts to social and economic resources (see Chapter 5) such as changes in access and the impacts to humans as a result of right of way acquisition and relocation would be counteracted, similar to the fiscal resource impact, by providing a more efficient transportation facility that would, in the long-term, improve accessibility and mobility in the area.

Chapters 6, 7 and 9 identify the impacts to the physical and natural environment resulting from the Build alternatives, including impacts to air quality, noise, wildlife, and wetlands. The long-term transportation service and efficiency benefits would outweigh short-term adverse impacts to the physical environment (e.g., air quality and noise impacts). Short-term impacts to the natural environment (e.g., wetlands and wildlife) would be mitigated to alleviate long-term consequences.

Although each Build alternative would result in the short-term use of resources, the short-term use of these resources is consistent with long-term productivity of the area, including present and future transportation needs of the state and region (see Chapter 2 – Purpose and Need). The transportation improvements are based on local, regional and state planning documents which have considered the need for existing and future transportation needs within the context of present and future land use development.

14.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the proposed project involves the commitment of a range of fiscal, social and economic, and physical and natural resources. Construction of a Build alternative would require a substantial one-time expenditure of both state and federal funds which are not retrievable. While these public funds are not directly retrievable, the money spent can be considered a long-term investment in the economic vitality of the region.

The amount of land required for each of the six Build Alternatives would vary ranging from approximately 194 to 360 acres. Land used in the construction of the proposed project is considered an irreversible commitment during the time period that the land is used for a highway facility. However, if a greater need arises for use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion would ever be necessary or desirable.

Considerable amounts of fossil fuels, labor and highway construction materials such as cement, aggregate and bituminous material would be required for each of the Build alternatives. Additionally, large amounts of labor and natural resources are used in the fabrication and preparation of construction materials. The use of these materials is generally considered irretrievable. However, these materials are not in short supply and their use would not have an adverse effect upon continued availability of these resources. In addition, some of these materials may have salvage value and may be recycled at the end of the facility's design life.

The commitment of these resources is based on the concept that residents in the immediate area, state and region would benefit by the improved quality of the transportation system. These benefits would consist of improved accessibility, safety, savings in time and greater availability of quality services which are anticipated to outweigh the commitment of these resources.

15.0 COMMENTS AND COORDINATION

This chapter describes the process used to involve stakeholders (public and government agencies) in the preparation of the DEIS, as well as the scoping process, for the proposed project.

Public and agency involvement for this project has been on-going since 2002. The scoping and DEIS preparation process have included meetings with local governments and other interested parties, input from the Project Management Team (PMT), Study Advisory Committee (SAC), Fen study groups, Policy Advisory Committee (PAC), and public information meetings.

15.1 AGENCY/LOCAL GOVERNMENT COORDINATION

The Minnesota Department of Transportation (Mn/DOT) is the lead agency for the project and the Federal Highway Administration is the lead federal agency for the project. Table 15-1 lists the agencies/governments that have been involved in the project.

TABLE 15-1
AGENCY AND ORGANIZATION INVOLVEMENT

Project Management Team (PMT)	
▪ Minnesota Department of Transportation (Mn/DOT) ▪ Scott County ▪ Carver County ▪ City of Shakopee ▪ City of Carver	▪ City of Chaska ▪ City of Chanhassen ▪ Metropolitan Council ▪ Federal Highway Administration (FHWA)
Study Advisory Committee (SAC)	
▪ Mn/DOT ▪ Scott County ▪ Carver County ▪ City of Shakopee ▪ City of Carver ▪ City of Chaska ▪ City of Chanhassen ▪ Metropolitan Council ▪ FHWA ▪ Jackson Township ▪ Louisville Township	▪ U.S. Fish and Wildlife Service (USFWS) ▪ U.S. Army Corps of Engineers (COE) ▪ Lower Minnesota River Watershed District (LMRWD) ▪ Shakopee Mdewakanton Sioux Community ▪ Riley-Purgatory-Bluff Creek Watershed District ▪ Scott Watershed Management Organization

TABLE 15-1 continued
AGENCY AND ORGANIZATION INVOLVEMENT

Study Advisory Committee (SAC) continued	
▪ Minnesota Department of Natural Resources (MnDNR) ▪ Minnesota Pollution Control Agency (MPCA) ▪ U.S. Environmental Protection Agency (USEPA) ▪ Audubon Society ▪ Southwest Corridor Coalition ▪ Shakopee Chamber of Commerce ▪ Minnesota Center for Environmental Advocacy	▪ Carver Watershed Management Organization ▪ Minnesota Board of Water and Soil Resources (BWSR) ▪ Friends of the Minnesota Valley ▪ Sierra Club ▪ East Chaska Neighborhood Group ▪ Chaska Heritage Preservation Commission (HPC) ▪ Carver Downtown and HPC
Policy Advisory Committee (PAC)	
▪ Mn/DOT ▪ Scott County ▪ Carver County ▪ City of Shakopee ▪ City of Carver ▪ City of Chaska	▪ City of Chanhassen ▪ Metropolitan Council ▪ Jackson Township ▪ Louisville Township ▪ Shakopee Mdewakanton Sioux Community ▪ Southwest Corridor Coalition
Fen Study Group	
▪ Mn/DOT ▪ Scott County ▪ City of Chanhassen ▪ Metropolitan Council ▪ FHWA ▪ MnDNR	▪ City of Chaska ▪ USEPA ▪ USFWS ▪ COE ▪ LMRWD ▪ BWSR ▪ Friends of the Minnesota Valley

Table 15-2 presents the agencies and organizations that receive the DEIS.

TABLE 15-2
AGENCIES AND ORGANIZATIONS RECEIVING COPIES OF THE DEIS

Federal Agencies U.S. Army Corps of Engineers U.S. Fish and Wildlife Service U.S. Environmental Protection Agency U.S. Department of Agriculture-Natural Resource Conservation Service U.S. Department of the Interior
State Agencies Minnesota Department of Natural Resources Minnesota Department of Agriculture Minnesota Department of Commerce Minnesota Environmental Quality Board Minnesota Pollution Control Agency Minnesota State Historic Preservation Officer Minnesota Department of Health Board of Water and Soil Resources Minnesota State Patrol Division-Department of Public Safety
Metropolitan Planning Organization Metropolitan Council
Counties Carver Scott
Cities Carver Chaska Chanhassen Shakopee
Townships Jackson Louisville
Tribal Government Shakopee Mdewakanton Sioux Community
Libraries Legislative Reference Library Environmental Conservation Library

15.1.1 Project Management Team (PMT)

The Project Management Team (PMT) consists of staff from Mn/DOT, the Metropolitan Council, FHWA, Scott County, Carver County, and the cities of Shakopee, Carver, Chaska, and Chanhassen. The role of the PMT is to advance the study to key milestones in the development of the Scoping Decision Document and the Tier I EIS. In addition, the PMT reviews recommendations provided by the Study Advisory Committee (SAC) and the Policy Advisory Committee (PAC).

15.1.2 Study Advisory Committee (SAC)

The Study Advisory Committee (SAC) represents all of the local government units in the study area, key state and federal environmental agencies, regional agencies, environmental organizations and associations and other interested parties. The role of the SAC is to review and provide comments on the overall study, as well as to communicate project information to the represented agencies.

15.1.3 Policy Advisory Committee (PAC)

The Policy Advisory Committee (PAC) includes elected or appointed officials from local and regional agencies. The agencies involved are Mn/DOT, Scott County, Carver County, Cities of Carver, Chanhassen, Chaska, and Shakopee, along with the Southwest Corridor Coalition, Metropolitan Council, Jacksonville Township, Louisville Township, and the Shakopee Mdewakanton Sioux Community. The PAC meets at key points in the process to review information and provide recommendations.

15.1.4 Fen Study Groups

The Fen Study Group was formed to provide input to a special study of the Seminary Fen (see Section 7.1.) This group met on the following dates:

- May 3, 2004
- May 25, 2004
- July 27, 2004
- May 26, 2005
- September 20, 2005
- July 17, 2006
- January 24, 2007

In addition, a small agency group (Mn/DOT, MnDNR, COE, LMRWD) advised on the technical protocols and methodologies for the Seminary Fen study. The technical group met on the following dates:

- May 24, 2005
- August 19, 2005
- September 2, 2005
- September 8, 2005
- March 15, 2006
- December 15, 2006

15.1.5 Natural Resource Coordination

In addition to the natural resource coordination and discussions that occurred during the SAC meetings and as noted in Section 15.1.4, Mn/DOT held separate meetings with agency staff to discuss natural resource issues. Meeting dates and agencies were:

- April 3, 2003 (MnDNR)
- September 10, 2003 (FHWA, Corps of Engineers, EPA)
- August 2, 2005 (MnDNR, USFWS, LMRWD)
- January 11, 2006 (MnDNR, USFWS, LMRWD, Friends of the Minnesota Valley, FHWA)

In addition, the National Park Service was consulted regarding potential Wild and Scenic River status.

15.1.6 Cooperating Agencies

The following agencies were invited by FHWA to be "cooperating agencies" for the project.

- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

The role of cooperating agencies is to provide input related to relevant areas of expertise during the EIS development process. Cooperating agencies receive relevant technical studies and preliminary drafts of the DEIS and FEIS and participate in meetings to discuss the project and relevant findings.

15.1.7 Cultural Resources Coordination

Mn/DOT Cultural Resources Unit (CRU) is the lead agency on cultural resources for the proposed project. Periodic updates on the cultural resources studies were provided at the Project Management Team (PMT) meetings (June 16, 2005 and September 22, 2005) and the Study Advisory Committee (SAC) meetings (May 5, 2005, October 31, 2005 and May 17, 2006) during the study process. Information and handouts on the status of the Section 106 process were available at these meetings. A handout was also posted on the project website. The findings of the cultural resources studies were presented at the public open house on June 21, 2006.

The Heritage Preservation Commissions (HPC) of Carver and Chaska are consulting parties on the project for the Section 106 process. This means that they are invited to participate in the meetings and receive updates on the Section 106 process as it proceeds. They are also given the opportunity to review and comment on official determinations made and can be involved in mitigation discussions. The HPCs can also be signatories on a Memorandum of Agreement (MOA), if one is undertaken as part of the Section 106 process. Staff from Mn/DOT CRU met with representatives of the Chaska HPC three times in 2006, April 25, July 20, August 15.

15.2 PUBLIC INVOLVEMENT

Mn/DOT encourages public involvement and outreach at all stages in the decision-making process for the proposed project. Mn/DOT has engaged community organizations, area property owners, business owners, and residents; as well as local, county, regional and state agencies in the development of the project. Specific public involvement and outreach efforts are discussed in detail below.

15.2.1 Project Updates

During scoping, project updates were mailed to stakeholder agencies, organizations and other interested persons. During the DEIS process, updates are listed on the project website.

15.2.2 Website

Mn/DOT maintains a project website that is updated at key points in the study process. The project website (http://projects.dot.state.mn.us/srf/041/index.html) provides background information on the project, updates to reflect current project status, maps, and answers to frequently asked questions.

15.2.3 Media Coverage

Press releases were provided to local media outlets to inform the public about the open house meetings (discussed in Section 15.2.4.) Articles about the proposed project have appeared in local newspapers throughout the scoping and DEIS preparation period.

15.2.4 Public Meetings

Notice of the public meetings was provided on the project website, in newspaper advertisements and articles, and in mailings to potentially affected property owners in the study area. At each of the meetings noted below, Mn/DOT and consultant staff were present to answer questions. Attendees were given the opportunity to provide written comments at and following the meeting. A court reporter was present at the Scoping Meeting to record oral comments.

The public information meetings that have taken place prior to the publication of the DEIS are as follows:

<u>April 10, 2003 Open House</u> (31 Attendees)

An informational open house meeting was held at the Carver County Government Center, Chaska, MN to provide information on the study purpose, review the study process, highlight initial findings regarding project need, identify potential environmental issues and alternatives development to date.

May 20, 2004 Scoping Meeting (11 Attendees)

A public scoping meeting was held at the Carver County Government Center, Chaska, MN during the public comment period for the Scoping Document to present the findings of the Scoping Document and the Draft Scoping Decision Document.

December 7, 2005 Open House (237 Attendees)

An informational open house was held at the Carver County Government Center, Chaska, MN to provide information about the need for the project, the EIS process, schedule, and the current No-Build and Build alternatives.

January 23-24, 2006 Open Houses (50 Attendees – Combined)

Two informational open houses for residents/owners of the mobile home communities located within affected portions of the study area were held at the Riverview Terrace Community Room, Chaska, MN and the Scott County Government Center, Shakopee, MN respectively. Because many of the mobile home community residents are Spanish-speaking, the flyer advertising the open house included a Spanish translation and a Spanish translator was provided at the open house meetings. The information provided at these open house meetings was the same as provided at the December 7, 2005 open house.

March 16, 2006 Open House (98 Attendees)

An informational open house was held at the Chaska City Hall, Chaska, MN to explain revisions made to the C-2 alignment and give attendees a chance to view and make comments on the revised alignment.

June 21, 2006 Open House (195 Attendees)

An informational open house was held at the Chaska Community Center, Chaska, MN, to present preliminary findings of environmental impact analyses.

July 19, 2006 Open Houses (53 Attendees)

Two informational open houses for residents/owners of the mobile home communities discussed above were held at the Riverview Terrace Community Room, Chaska, MN, and the Scott County Government Center, Shakopee, MN. The flyer included a Spanish translation and a Spanish translator was provided at the meeting. The information provided at these open house meetings was the same as provided at the June 21, 2006 open houses.

Comments received during and following all public meetings were summarized and provided to the PMT and SAC for information.

15.2.5 Other Meetings

Mn/DOT has met with other stakeholders, including representatives of the study area cities and counties, neighborhood organizations, chambers of commerce, transportation coalitions, and state, regional and federal agencies, to discuss the project and specific issues and concerns.

15.2.6 Business Input

The scoping process included surveys of downtown Chaska customers and retail establishment owners/managers and downtown Shakopee business owners/managers to gather information on trade areas and perceptions about the effect of traffic-related conditions on businesses. Mn/DOT also met with various business groups during the study process to provide updates and discuss comments and questions.

15.2.7 Public Hearing

Two opportunities for public hearing (one in Scott County and one in Carver County) will be held on the DEIS not less than 15 days after the notice of its availability is published in the EQB Monitor. The purpose of the public hearing will be to provide the public the opportunity to review the six Build alternatives and the findings of the impact analysis completed as part of the DEIS process, and comment on the DEIS.

The availability of the DEIS will be published in the Federal Register and the Minnesota EQB Monitor. Advertisements announcing the availability of the DEIS and the date of the public hearing will be published in local newspapers. Adjacent property owners and interested persons will also be mailed notices announcing availability of the DEIS. The record for public comment will remain open for not less than 10 days after the last date of the informational meeting. Written comments may be submitted anytime during the comment period, which in total will be at least 45 days from notice of availability.

16.0 LIST OF PREPARERS

Agency/Staff Name	DEIS Responsibility
Federal Highway Administration	
Cheryl Martin	Review of DEIS; coordination of DEIS Input
Minnesota Department of Transportation	
Diane Langenbach	Project Manager, review of DEIS
Lynn Clarkowski	Project Manager, review of DEIS
Lisa Freese	Area Manager, review of DEIS
Gerry Larson	Review of DEIS
Nancy Radle	Review of contaminated properties information
Peter Wasko	Review of noise analysis and information
Nick Tiedeken	Review of wetlands/fen study
Sarma Straumanis	Review of wetlands/fen study
Kristen Zschomler	Preparation of cultural resource studies
SRF Consulting Group, Inc.	
Nancy Frick	Project Manager, review of DEIS
Don Demers	DEIS preparation-engineering oversight and coordination
Curt Kobilarcsik	DEIS preparation-engineering oversight and coordination
Dave Montebello	Transportation Planning
Matt Meyer	DEIS preparation (soils)
Geoff Mass	DEIS preparation (visual, social)
Barbara Walther	DEIS preparation (wetlands, vegetation, wildlife and fisheries)
Kady Dadlez	DEIS preparation (cultural, cumulative impacts)
Brett Danner	Noise analysis
Jonathan Ehrlich	Preparation of travel forecasts
Todd Polum	Traffic operations analysis
David Filipiak	DEIS preparation (water resources)
Eric Roerish	DEIS preparation (water resources)
Mary Karlsson	Benefit-cost analysis
Sub-Consultants	
Braun Intertec Corporation	Phase I Environmental Site Assessment
Barr Engineering	Seminary Fen Phase 1 hydrology, Seminary Fen Phase 2 Study
Peterson Environmental Consulting, Inc.	Seminary Fen Phase 1 Study
Louis Berger	Cultural Resources Investigations

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APPENDIX A

CORRESPONDENCE

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Minnesota Department of Natural Resources

Natural Heritage and Nongame Research Program, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-40__
Phone: (651) 296-7863 Fax: (651) 296-1811 E-mail: sarah.hoffmann@dnr.state.mn.us

June 14, 2005

Ms. Barbara Walther
SRF Consulting Group, Inc.
One Carlson Parkway North, Suite #150
Minneapolis, MN 55447-4443

Re: Request for Natural Heritage information for vicinity of proposed TH 41 over the Minnesota River, Carver and Scott Counties
NHNRP Contact #: ERDB 20030506-0004

Dear Ms. Walther,

The Minnesota Natural Heritage database has been reviewed to determine if any rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the area indicated on the map enclosed with your information request. Based on this review, there are 119 known occurrences of rare species or native plant communities in the area searched. Please see the enclosed database printouts for details. As this project is in the scoping stages and details on the exact location of the crossing are unknown at this time, we have not provided interpretation as to which elements may be impacted by the various alignments, as this would greatly delay the delivery of information on rare feature locations to you. Please compare the rare feature locations on the database printouts with maps of the project study area, and note areas where impacts to rare features are possible. As you may know, the rare features data are also available electronically as Arcview shapefiles. This provides a much more efficient and accurate way of assessing impacts to rare species and native plant communities for large study areas, so we encourage you to view the data this way. The native plant community and "Sites of Biodiversity Significance" GIS data can be downloaded from the DNR's Data Deli website at http://maps.dnr.state.mn.us/deli. The rare species data are only released under the terms of a license agreement, so please contact me to discuss adding Carver and Scott County to SRF's license agreement if you are interested in obtaining these data.

The Natural Heritage database is maintained by the Natural Heritage and Nongame Research Program, a unit within the Division of Ecological Services, Department of Natural Resources. It is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. Its purpose is to foster better understanding and protection of these features.

Because our information is not based on a comprehensive inventory, there may be rare or otherwise significant natural features in the state that are not represented in the database. A county-by-county survey of rare natural features is now underway, and has been completed for both Carver and Scott County. Our information about native plant communities is, therefore, quite thorough for those counties. However, because survey work for rare plants and animals is less exhaustive, and because there has not been an on-site survey of all areas of the counties, ecologically significant features for which we have no records may exist on the project area.

The enclosed results of the database search are provided in two formats: index and full record. To control the release of locational information, which might result in the damage or destruction of a rare element, both printout formats are copyrighted.

The index provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an Environmental Assessment Worksheet, Environmental Impact Statement, municipal natural resource

plan, or report compiled by your company for the project listed above. If you wish to reproduce the index for any other purpose, please contact me to request written permission. **The full-record printout includes more detailed locational information, and is for your personal use only. If you wish to reprint the full-record printouts for any purpose, please contact me to request written permission.**

Please be aware that review by the Natural Heritage and Nongame Research Program focuses only on *rare natural features*. It does not constitute review or approval by the Department of Natural Resources as a whole. If you require further information on the environmental review process for other natural resource-related issues, you may contact your Regional Environmental Assessment Ecologist, Wayne Barstad, at (651) 772-7940.

An invoice in the amount of $135.45 will be mailed to you under separate cover within two weeks of the date of this letter. You are being billed for map and database search and staff scientist review. Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Sarah D. Hoffmann
Endangered Species Environmental Review Coordinator

encl: Database search results
Rare Feature Database Print-Outs: An Explanation of Fields

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TWP	RNG	PRIMARY SECTION	FED STATUS	MN STATUS	S RANK	ELEMENT and OCCURRENCE NUMBER	MANAGED AREA
T114N	R23W	04				SEDIMENTARY STRUCTURE (ORDOVICIAN) #9	
T114N	R23W	04				SEDIMENTARY UNIT OR SEQUENCE (ORDOVICIAN) #26	
T114N	R23W	05	LT	SPC		HALIAEETUS LEUCOCEPHALUS (BALD EAGLE) #1774	MINNESOTA VALLEY NWR
T114N	R23W	06			S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #112	
T114N	R24W	01		THR		BESSEYA BULLII (KITTEN-TAILS) #2	
T114N	R24W	01			S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #113	
T114N	R24W	02		NON		REITHRODONTOMYS MEGALOTIS (WESTERN HARVEST MOUSE) #8	
T115N	R22W	06		NON		LAMPROPELTIS TRIANGULUM (MILK SNAKE) #18	
T115N	R22W	06		THR		LANIUS LUDOVICIANUS (LOGGERHEAD SHRIKE) #130	
T115N	R22W	06		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #13	
T115N	R23W	02		THR		ACTINONAIAS LIGAMENTINA (MUCKET MUSSEL) #93	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	02		END		ARCIDENS CONFRAGOSUS (ROCK POCKETBOOK MUSSEL) #9	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	02	LT	SPC		HALIAEETUS LEUCOCEPHALUS (BALD EAGLE) #2225	
T115N	R23W	02		END		LAMPSILIS TERES (YELLOW SANDSHELL MUSSEL) #8	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	02				MUSSEL SAMPLING SITE #135	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	02		END		QUADRULA NODULATA (WARTYBACK MUSSEL) #9	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	02		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #1	
T115N	R23W	02		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #87	
T115N	R23W	03			S2	MIXED EMERGENT MARSH (PRAIRIE) #27	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	09		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #2	
T115N	R23W	09		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #73	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	16				BAT CONCENTRATION #41	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	17		THR		ACTINONAIAS LIGAMENTINA (MUCKET MUSSEL) #92	MINNESOTA VALLEY NWR
T115N	R23W	17		THR		ALASMIDONTA MARGINATA (ELKTOE MUSSEL) #67	MINNESOTA VALLEY NWR
T115N	R23W	17		END		ARCIDENS CONFRAGOSUS (ROCK POCKETBOOK MUSSEL) #8	MINNESOTA VALLEY NWR
T115N	R23W	17		END		FUSCONAIA EBENA (EBONYSHELL MUSSEL) #7	MINNESOTA VALLEY NWR
T115N	R23W	17	LE	END		LAMPSILIS HIGGINSI (HIGGINS EYE MUSSEL) #9	MINNESOTA VALLEY NWR
T115N	R23W	17		SPC		LASMIGONA COSTATA (FLUTED-SHELL MUSSEL) #50	MINNESOTA VALLEY NWR
T115N	R23W	17		SPC		LIGUMIA RECTA (BLACK SANDSHELL MUSSEL) #93	MINNESOTA VALLEY NWR
T115N	R23W	17				MUSSEL SAMPLING SITE #134	MINNESOTA VALLEY NWR
T115N	R23W	17		SPC		OBOVARIA OLIVARIA (HICKORYNUT MUSSEL) #55	MINNESOTA VALLEY NWR
T115N	R23W	17		THR		PLEUROBEMA COCCINEUM (ROUND PIGTOE MUSSEL) #74	MINNESOTA VALLEY NWR
T115N	R23W	17		THR		QUADRULA METANEVRA (MONKEYFACE MUSSEL) #25	MINNESOTA VALLEY NWR
T115N	R23W	17		END		QUADRULA NODULATA (WARTYBACK MUSSEL) #8	MINNESOTA VALLEY NWR
T115N	R23W	17		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #3	
T115N	R23W	17		THR		TRITOGONIA VERRUCOSA (PISTOLGRIP MUSSEL) #26	MINNESOTA VALLEY NWR
T115N	R23W	18			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #137	
T115N	R23W	20		THR		ACTINONAIAS LIGAMENTINA (MUCKET MUSSEL) #164	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	20		END		ARCIDENS CONFRAGOSUS (ROCK POCKETBOOK MUSSEL) #18	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	20		SPC		CYCLEPTUS ELONGATUS (BLUE SUCKER) #4	
T115N	R23W	20		THR		PLEUROBEMA COCCINEUM (ROUND PIGTOE MUSSEL) #80	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	21		THR		BESSEYA BULLII (KITTEN-TAILS) #3	
T115N	R23W	28		THR		BESSEYA BULLII (KITTEN-TAILS) #25	MINNESOTA VALLEY NWR
T115N	R23W	28		SPC		CIRSIUM HILLII (HILL'S THISTLE) #13	
T115N	R23W	28		SPC		SPEYERIA IDALIA (REGAL FRITTILARY) #41	
T115N	R23W	29				BAT CONCENTRATION #42	MINNESOTA VALLEY NWR
T115N	R23W	29			S2	DRY OAK SAVANNA (SOUTHEAST) SAND-GRAVEL SUBTYPE #7	MINNESOTA VALLEY NWR
T115N	R23W	30		THR		BESSEYA BULLII (KITTEN-TAILS) #108	MINNESOTA VALLEY NWR

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TWP	RNG	PRIMARY SECTION	FED STATUS	MN STATUS	S RANK	ELEMENT and OCCURRENCE NUMBER	MANAGED AREA
T115N	R23W	30			S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #90	MINNESOTA VALLEY NWR
T115N	R23W	30	LT	SPC		HALIAEETUS LEUCOCEPHALUS (BALD EAGLE) #1678	MINNESOTA VALLEY NWR
T115N	R23W	31		THR		ACTINONAIAS LIGAMENTINA (MUCKET MUSSEL) #91	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		END		ARCIDENS CONFRAGOSUS (ROCK POCKETBOOK MUSSEL) #7	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		SPC		BUTEO LINEATUS (RED-SHOULDERED HAWK) #264	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		SPC		DENDROICA CERULEA (CERULEAN WARBLER) #73	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		END		ELLIPTIO CRASSIDENS (ELEPHANT-EAR MUSSEL) #9	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		SPC		ELLIPTIO DILATATA (SPIKE MUSSEL) #159	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31			S3	FLOODPLAIN FOREST SILVER MAPLE SUBTYPE #62	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		END		FUSCONAIA EBENA (EBONYSHELL MUSSEL) #13	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		NON		GYMNOCLADUS DIOICA (KENTUCKY COFFEE-TREE) #12	CARVER RAPIDS WAYSIDE
T115N	R23W	31		END		LAMPSILIS TERES (YELLOW SANDSHELL MUSSEL) #7	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		SPC		LASMIGONA COSTATA (FLUTED-SHELL MUSSEL) #125	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #119	MINNESOTA VALLEY NWR
T115N	R23W	31				MUSSEL SAMPLING SITE #133	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		SPC		OBOVARIA OLIVARIA (HICKORYNUT MUSSEL) #98	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		THR		QUADRULA METANEVRA (MONKEYFACE MUSSEL) #24	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		END		QUADRULA NODULATA (WARTYBACK MUSSEL) #7	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		NON		SCAPHIRHYNCHUS PLATORYNCHUS (SHOVELNOSE STURGEON) #5	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	31		THR		TRITOGONIA VERRUCOSA (PISTOLGRIP MUSSEL) #25	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		NON		ALOPECURUS CAROLINIANUS (CAROLINA FOXTAIL) #34	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		SPC		BACOPA ROTUNDIFOLIA (WATER-HYSSOP) #16	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		THR		BESSEYA BULLII (KITTEN-TAILS) #98	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		THR		BESSEYA BULLII (KITTEN-TAILS) #103	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32			S2	DRY OAK SAVANNA (SOUTHEAST) SAND-GRAVEL SUBTYPE #5	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		END		ELEOCHARIS WOLFII (WOLF'S SPIKE-RUSH) #4	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		SPC		EMPIDONAX VIRESCENS (ACADIAN FLYCATCHER) #49	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		NON		MYOSOTIS VERNA (FORGET-ME-NOT) #13	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		NON		MYOSURUS MINIMUS (MOUSETAIL) #34	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32			S4	ROCK OUTCROP (CENTRAL) #22	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	32		END		TALINUM RUGOSPERMUM (ROUGH-SEEDED FAMEFLOWER) #24	MINNESOTA VALLEY RECREATION AREA
T115N	R23W	33				COLONIAL WATERBIRD NESTING SITE #862	MINNESOTA VALLEY NWR
T115N	R23W	33			S2	DRY PRAIRIE (SOUTHEAST) SAND-GRAVEL SUBTYPE #44	MINNESOTA VALLEY NWR
T115N	R23W	33			S3	FLOODPLAIN FOREST SILVER MAPLE SUBTYPE #43	MINNESOTA VALLEY NWR
T115N	R23W	33			S4	OAK WOODLAND-BRUSHLAND (BIG WOODS) #8	MINNESOTA VALLEY NWR
T115N	R23W	34			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #120	
T115N	R23W	34		SPC		PANAX QUINQUEFOLIUS (AMERICAN GINSENG) #196	
T115N	R24W	13			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #115	
T115N	R24W	13		SPC		PANAX QUINQUEFOLIUS (AMERICAN GINSENG) #194	
T115N	R24W	24		THR		BESSEYA BULLII (KITTEN-TAILS) #119	
T115N	R24W	36		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #96	MINNESOTA VALLEY NWR
T116N	R22W	19			S3	POOR FEN SEDGE SUBTYPE #20	
T116N	R22W	30		NON		ARABIS LAEVIGATA (SMOOTH ROCK-CRESS) #27	RICHARD T. ANDERSON CONSERVATION AREA
T116N	R22W	30		THR		BESSEYA BULLII (KITTEN-TAILS) #101	
T116N	R22W	30		SPC		PANAX QUINQUEFOLIUS (AMERICAN GINSENG) #260	RICHARD T. ANDERSON CONSERVATION AREA
T116N	R22W	30		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #97	
T116N	R22W	31		THR		BESSEYA BULLII (KITTEN-TAILS) #102	
T116N	R22W	31			S2	DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #91	

TWP	RNG	PRIMARY SECTION	FED STATUS	MN STATUS	S RANK	ELEMENT and OCCURRENCE NUMBER	MANAGED AREA
T116N	R23W	26			S2	DRY PRAIRIE (CENTRAL) HILL SUBTYPE #15	
T116N	R23W	26			S4	LOWLAND HARDWOOD FOREST #33	
T116N	R23W	26			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #111	
T116N	R23W	26			S2	OAK FOREST (BIG WOODS) MESIC SUBTYPE #26	
T116N	R23W	34			SU	CALCAREOUS SEEPAGE FEN (CENTRAL) PRAIRIE SUBTYPE #2	
T116N	R23W	34		THR		CAREX STERILIS (STERILE SEDGE) #104	
T116N	R23W	34			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #138	
T116N	R23W	34			S3	WET MEADOW #65	
T116N	R23W	35			SU	CALCAREOUS SEEPAGE FEN (CENTRAL) PRAIRIE SUBTYPE #1	
T116N	R23W	35			SU	CALCAREOUS SEEPAGE FEN (CENTRAL) PRAIRIE SUBTYPE #3	
T116N	R23W	35		THR		CAREX STERILIS (STERILE SEDGE) #105	
T116N	R23W	35		THR		CAREX STERILIS (STERILE SEDGE) #106	
T116N	R23W	35		THR		CAREX STERILIS (STERILE SEDGE) #107	
T116N	R23W	35		SPC		CLADIUM MARISCOIDES (TWIG-RUSH) #35	
T116N	R23W	35		SPC		CYPRIPEDIUM CANDIDUM (SMALL WHITE LADY'S-SLIPPER) #261	
T116N	R23W	35		THR		ELEOCHARIS ROSTELLATA (BEAKED SPIKE-RUSH) #11	
T116N	R23W	35		NON		LAMPETRA APPENDIX (AMERICAN BROOK LAMPREY) #114	RAQUET WMA
T116N	R23W	35			S2	MAPLE-BASSWOOD FOREST (BIG WOODS) #139	
T116N	R23W	35		SPC		PANAX QUINQUEFOLIUS (AMERICAN GINSENG) #198	
T116N	R23W	35		THR		RHYNCHOSPORA CAPILLACEA (HAIR-LIKE BEAK-RUSH) #65	
T116N	R23W	35		THR		SCLERIA VERTICILLATA (WHORLED NUT-RUSH) #20	
T116N	R23W	35		NON		TRIGLOCHIN PALUSTRIS (MARSH ARROW-GRASS) #91	
T116N	R23W	35		THR		VALERIANA EDULIS VAR. CILIATA (VALERIAN) #47	

RECORDS PRINTED = 119

U.S. Department of Homeland Security

United States Coast Guard

Commander
Eighth Coast Guard District

1222 Spruce Street
St. Louis, MO 63103
Staff Symbol: (dwb)
Phone: 314-269-2381
Fax: 314-539-3755
Email:

16210.1/MN
April 11, 2006

Ms. Nancy C. Frick
SFR Consulting Group, Inc.
One Carlson Parkway North, Suite 150
Minneapolis, MN 55447-4443

Subj: PROPOSED TRUNK HIGHWAY 41 BRIDGE CROSSING, MINNESOTA RIVER

Dear Ms. Frick:

Please refer to your letter dated March 23, 2006, concerning the subject project.

Pursuant to the Coast Guard Authorization Act of 1983, we will not exercise jurisdiction for bridge administration purposes over the Minnesota River at the proposed crossing site in the vicinity of Chaska, Minnesota. Accordingly, the Coast Guard offers no objection to the project and a Coast Guard bridge permit will not be required.

We appreciate the opportunity to comment on the navigational aspects of bridge projects. If there are any questions on this matter, please contact Mr. Dave Studt at the above number.

Sincerely,

ROGER K. WIEBUSCH
Bridge Administrator
By direction of the District Commander

Copy: Lynn Clarkowski, MNDOT, Roseville, MN

APR 2006

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/12/06
Name Of Project TH 41 New Minnesota River Crossing	Federal Agency Involved MnDOT
Proposed Land Use A new river crossing – Trunk Highway	County And State Scott County/ Minnesota
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form)*	Yes ☐	No ☒	Acres Irrigated NONE	Average Farm Size N/A 146 Acres
Major Crop(s) CORN SOYBEANS	Farmable Land In Govt. Jurisdiction Acres		Amount Of Farmland As Defined In FPPA Acres	%
Name Of Land Evaluation System Used	Name Of Local Site Assessment System		Date Land Evaluation Returned By NRCS 4/19/06	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	W-2 Site A	W-2A Site B	W-2 Site C	E-1/E-1A (same on Scott co. side) Site D
A. Total Acres To Be Converted Directly	4.1	24.2	38.2	43.4
B. Total Acres To Be Converted Indirectly	0	.7	7	2.7
C. Total Acres In Site	0.0 4.1	0.0 24.9	0.0 45.2	0.0 46.1
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	53,683	53,683	53,683	53,683
B. Total Acres Statewide And Local Important Farmland	N/A	N/A	N/A	N/A
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	.007%	.03%	.08%	.09%
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by NRCS)* Land Evaluation Criterion				
Relative Value Of Farmland To Be Converted (Scale of 0 to 100 Points)	0 80	0 45	0 85	0 90

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	15	15	15	13
2. Perimeter In Nonurban Use	10	10	8	8	10
3. Percent Of Site Being Farmed	20	0	3	3	10
4. Protection Provided By State And Local Government	20	0	0	0	0
5. Distance From Urban Builtup Area	0	0	0	0	0
6. Distance To Urban Support Services	0	0	0	0	0
7. Size Of Present Farm Unit Compared To Average	10	0	0	0	0
8. Creation Of Nonfarmable Farmland	25	25	25	25	25
9. Availability Of Farm Support Services	5	5	5	5	5
10. On-Farm Investments	20	0	0	2	5
11. Effects Of Conversion On Farm Support Services	25	0	0	0	0
12. Compatibility With Existing Agricultural Use	10	2	1	2	2
TOTAL SITE ASSESSMENT POINTS	160	57	57	60	66
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	80	45	85	90
Total Site Assessment *(From Part VI above or a local site assessment)*	160	57	57	60	66
TOTAL POINTS *(Total of above 2 lines)*	260	137	102	145	156

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

See Instructions on reverse side) Form AD-1006 (10-83)

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Part V – Relative Value is based on a visual Average of Prime Farmland Soil Types

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/12/06
Name Of Project TH 41 New Minnesota River Crossing	Federal Agency Involved MnDOT
Proposed Land Use A new river crossing – Trunk Highway	County And State Scott County/ Minnesota
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form)*	Yes ☐	No ☐	Acres Irrigated None	Average Farm Size NA 146
Major Crop(s) Corn, Soybeans, Hay	Farmable Land In Gov't Jurisdiction Acres: %		Amount Of Farmland As Defined In FPPA Acres: %	
Name Of Land Evaluation System Used	Name Of Local Site Assessment System		Date Land Evaluation Returned By NRCS 5/2/06	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	E-2 Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	27.2			
B. Total Acres To Be Converted Indirectly	1			
C. Total Acres In Site	0.0 28.2	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	53.683			
B. Total Acres Statewide And Local Important Farmland	NA			
C. Percentage Of Farmland In County Or Local Gov't Unit To Be Converted				
D. Percentage Of Farmland In Gov't Jurisdiction With Same Or Higher Relative Value	105 %			
PART V *(To be completed by NRCS)* Land Evaluation Criterion				
E. Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	80	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	13			
2. Perimeter In Nonurban Use	10	9			
3. Percent Of Site Being Farmed	20	1			
4. Protection Provided By State And Local Government	20	0			
5. Distance From Urban Builtup Area	0	0			
6. Distance To Urban Support Services	0	0			
7. Size Of Present Farm Unit Compared To Average	10	1			
8. Creation Of Nonfarmable Farmland	25	25			
9. Availability Of Farm Support Services	5	5			
10. On-Farm Investments	20	0			
11. Effects Of Conversion On Farm Support Services	25	0			
12. Compatibility With Existing Agricultural Use	10	2			
TOTAL SITE ASSESSMENT POINTS	160	61	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	80	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	61	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	141	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

(See Instructions on reverse side) Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Part V - Relative Value is based on a visual Average of Prime Farmland Soil Types

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/12/06
Name Of Project TH 41 New Minnesota River Crossing	Federal Agency Involved MnDOT
Proposed Land Use A new river crossing – Trunk Highway	County And State Carver County/ Minnesota
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 08/09/06

Does the site contain prime, unique, statewide or local important farmland? Yes ☒ No ☐ (If no, the FPPA does not apply – do not complete additional parts of this form). Acres Irrigated: Average Farm Size: 197

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined In FPPA
Corn & Soybeans	Acres: 202,750 93 %	Acres: 189,535 87 %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating: Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	48.5	51.4		
B. Total Acres To Be Converted Indirectly	9.4	10.7		
C. Total Acres In Site	0.0 57.9	0.0 62.1	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	189,535	189,535		
B. Total Acres Statewide And Local Important Farmland	202,750	202,750		
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	48%	48%		
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	.03%	.03%		
PART V *(To be completed by NRCS)* Land Evaluation Criterion: Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	0 66	0 64	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Nonurban Use	15	12	12		
2. Perimeter In Nonurban Use	10	8	9		
3. Percent Of Site Being Farmed	20	10	10		
4. Protection Provided By State And Local Government	20	0	0		
5. Distance From Urban Builtup Area	0	0	0		
6. Distance To Urban Support Services	0	0	0		
7. Size Of Present Farm Unit Compared To Average	10	0	0		
8. Creation Of Nonfarmable Farmland	25	25	25		
9. Availability Of Farm Support Services	5	5	5		
10. On-Farm Investments	20	1	0		
11. Effects Of Conversion On Farm Support Services	25	0	0		
12. Compatibility With Existing Agricultural Use	10	1	1		
TOTAL SITE ASSESSMENT POINTS	160	62	62	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	66	64	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	62	62	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	124	126	0	0

Site Selected: Date Of Selection: Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

(See *Instructions on reverse side*) Form AD-1006 (10-83)

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U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 4/12/06
Name Of Project TH 41 New Minnesota River Crossing	Federal Agency Involved MnDOT
Proposed Land Use A new river crossing – Trunk Highway	County And State Carver County/ Minnesota
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 8/09/06

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☒ No ☐ | Acres Irrigated | Average Farm Size 197

Major Crop(s) Corn & Soybeans	Farmable Land In Govt. Jurisdiction Acres: 202750 93 %	Amount Of Farmland As Defined In FPPA Acres: 189,535 87 %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By NRCS 08/29/2006

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	C-2 Site A	C-2A Site B	C-2 Site C	E-1 Site D
A. Total Acres To Be Converted Directly	86.8	76.7	109.8	7.1
B. Total Acres To Be Converted Indirectly	8.9	4.2	3.8	0
C. Total Acres In Site	0.0 95.7	0.0 80.9	0.0 113.6	0.0 7.1
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	189,535	189,535	189,535	189,535
B. Total Acres Statewide And Local Important Farmland	202,750	202,750	202,750	202,750
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	48%	48%	48%	48%
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	.05%	.04%	.06%	.004%
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	62	74	79	67

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15	15	12	13	11
2. Perimeter In Nonurban Use	10	10	10	10	5
3. Percent Of Site Being Farmed	20	8	11	7	10
4. Protection Provided By State And Local Government	20	0	0	0	0
5. Distance From Urban Builtup Area	0	0	0	0	0
6. Distance To Urban Support Services	0	0	0	0	0
7. Size Of Present Farm Unit Compared To Average	10	0	0	0	0
8. Creation Of Nonfarmable Farmland	25	25	25	25	25
9. Availability Of Farm Support Services	5	5	5	5	5
10. On-Farm Investments	20	4	2	1	0
11. Effects Of Conversion On Farm Support Services	25	0	0	0	0
12. Compatibility With Existing Agricultural Use	10	4	5	4	1
TOTAL SITE ASSESSMENT POINTS	160	71	70	65	57
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	62	74	79	67
Total Site Assessment *(From Part VI above or a local site assessment)*	160	71	70	65	57
TOTAL POINTS *(Total of above 2 lines)*	260	133	144	144	124

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection: Minnesota River proposed crossings.

(See instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

Minnesota Department of Transportation

Transportation Building
395 John Ireland Boulevard
Saint Paul, Minnesota 55155-1899

July 13, 2006

Direct Line: (651) 296-3243
Mail Stop 620

Mr. Dennis A. Gimmestad
Government Programs & Compliance Officer
State Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. W.
St. Paul, MN 55101

Re: S.P. 1008-60 (Trunk Highway 41 River Crossing Study, Carver and Scott Counties)
SHPO No. Pending

Dear Mr. Gimmestad:

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the FHWA-SHPO Programmatic Agreement (2005).

The proposed action is the future construction of a new Minnesota River crossing connecting TH 169 in Scott County and the proposed realigned TH 212 (New TH 212), north of the existing TH 212 corridor in Carver County in the vicinity of existing TH 41. Each of the six Build alternatives is a freeway design with an interchange at TH 169 and an interchange at New TH 212 (see enclosed alternatives map).

- Alternative W-2 is located in the western portion of the study area. This alternative intersects with TH 169 one mile west of existing TH 41/CSAH 78 and connects with New TH 212 at the New TH 212/CR 147 interchange.
- Alternative C-2 is in the central/western portion of the study area. This alternative connects to TH 169 at the planned TH 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New TH 212 at the New TH 212/CR 147 interchange.
- Alternative C-2A is located in central portion of the study area. This alternative connects to TH 169 at the planned TH 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New TH 212 at CSAH 10/Engler Boulevard.
- Alternative E-1 is in the eastern portion of the study area. This alternative connects to TH 169 at the planned TH 169/CSAH 69 interchange, and connects with New TH 212 at CSAH 17/Audubon Road. This alternative assumes that TH 169 is realigned south of its existing alignment in the vicinity of CSAH 69.
- Alternative E-1A is located in the eastern portion of the study area. This alternative is identical to Alternative E-1 south of the Minnesota River. This alternative connects to new TH 212 near Bluff Creek Road.
- Alternative E-2 is located in the eastern portion of the study area. It is the easternmost alignment of all the Build alternatives. This alternative connects to TH 169 at the planned TH 169/CSAH 69 interchange and connects to New TH 212 near Bluff Creek Road. This alternative assumes that TH 169 is realigned south of its existing alignment in the vicinity of CSAH 69.

Because of the high potential for archaeological sites and eligible architectural history properties, we hired the Louis Berger Group to conduct archaeological and architectural history investigations. Enclosed please find two (2) copies of the report *Phase I and II Archaeological Investigations of Alternative Route Corridors for Trunk Highway 41 Near Chaska, Carver and Scott Counties*, by the Louis Berger Group. Also enclosed please find

two (2) copies of the report *Phase I/II Architecture/History Investigations for Five Proposed Alternative Route Corridors for Trunk Highway 41 near Chaska, Carver and Scott Counties, Minnesota*, by the Louis Berger Group.

The APE for the archaeological and geomorphological work was defined as the construction limits of the proposed alternative route corridors. Each corridor was 1,000 feet wide. It should be noted that the proposed corridor locations changed after the start of the Phase I archaeological fieldwork. Berger labeled the five alternatives A through E (from southwest to northeast). The original five corridors plus the revised corridors were surveyed (please see Figure 2 in the enclosed archaeology report for the most current proposed alignments). Three additional proposed interchanges related to the corridors also were added during the course of the project (Alternatives F-H). The different corridors that were investigated as part of the archaeological investigation had a combined length of approximately 45.8 miles and included an estimated total of 5,552 acres.

Three archaeological sites were identified during the survey. Site 21CR141 was identified by Berger as a multi-component archaeological site on an alluvial fan below Hazeltine Bluff which included Oneota and non-diagnostic pre-contact materials in three buried A horizons. Given the presence of buried A horizons with the potential for intact archaeological deposits, the site was recommended for Phase II site testing. Phase II testing determined that the Oneota pottery found in Shovel Test 17 at 35 to 40 centimeters below ground surface in the 2Ab horizon appears not to be associated with other deposits and may be considered an isolated find. The flake found in Shovel Test 16 at 165 centimeters and the flake fragment recovered from Test Unit 2 at 124 centimeters below ground surface suggest a thin distribution of material in the 3Ab horizon with limited archaeological potential for the upper strata of the alluvial fan. However, the intact archaeological deposits associated with the 5Ab horizon between about 315 and 350 centimeters below ground surface have very good potential for contributing significant information about Archaic Period sites in the lower Minnesota River Valley. The consultant recommended the site as eligible for listing in the National Register of Historic Places (NRHP). The two other sites, 21CR140 and 21CR142, were recommended not eligible due to lack of integrity. It should be noted that Site 21CR140 extends to the east of the archaeology APE and may contain intact deposits. So if the project APE is altered to extend further east, additional archaeological investigation to evaluate the condition of that part of the site will be needed. Berger also recommended parcels for survey work (if they end up in the selected corridor) for which they were not granted access. These parcels appear to have a moderate to high potential for archaeological deposits and have not been subject to previous archaeological investigation (Parcels C-51, E-69, E-73, E-75, E-79, A-102, B-108, C-115, D-119, D-122A, D-122B, D-123, D-126, D-127, and W2-141). We agree with all of the consultant's recommendations regarding archaeological resources.

The APE for architectural resources was defined based on the original 5 corridor routes (Alternatives A-E). Because of the project's potential direct and indirect impacts to historic properties and the potential for the project corridor locations to be adjusted (which did occur), Mn/DOT CRU, in consultation with your office in 2004, delineated an architectural APE that encompassed a large region around the five proposed alternatives (please see Figure 1 in enclosed architectural history report). This originally defined APE adequately covered the areas of the refined corridor locations for Alternatives A-E, as well as the added interchange locations.

There are 12 previously determined eligible properties or properties listed on the National Register within the study area. These include CR-CKC-0002 (DuToit House), CR-CKC-0004 (Eder-Baer House), CR-CKC-0005 (Lewis House), CR-CKC-0011 (Brinkhaus Saloon Livery Barn), CR-CKC-0012 (Courthouse Saloon), CR-CKC-0015 (Herald Block), CR-CKC-0022 (Greiner House), CR-CKC-0055 (Walnut Street Historic District), CR-CKC-0057 (Chaska Historical Marker), CR-CKC-0059 (Fink House), CR-CKC-0516 (Scott House), and CR-CVC-104 (Carver Historic District). The consultant surveyed over 600 properties, and recommended the following as eligible. We agree with these recommendations.

- CR-CKC-174 (H. Oesterreich House) recommended eligible under Criteria C as a significant example of a Chaska brick residence constructed in the Queen Anne style.

- CR-CKC-009 (Riedele House) recommended eligible under Criteria B for its association with Andrew Riedele, prominent Chaska brick manufacture, and under Criteria C as a significant example of the cross-wing type of Chaska brick residence.
- CR-CKC-293 (Crystal Sugar Beet Factory Office) recommended eligible under Criteria A for its association with the sugar beet industry in Chaska and under Criteria C as a significant example of a commercial Chaska brick building.
- CR-CKC-007 (George A. DuToit House) recommended eligible under Criteria C as a significant example of a Queen Anne style Chaska brick house.
- CR-CKC-006 (Guardian Angels Catholic Church and Rectory) recommended eligible under Criteria C a significant example of a Gothic Revival church built with Chaska brick. In addition, it is the determination of this office that the school (1912-1918) associated with the Guardian Angels should be considered a contributing element of the Guardian Angles Church, Rectory, and School District, also eligible under Criteria A.
- CR-CKC-021 (Lyman W. Noble/John Sutheimer House) recommended eligible under Criteria C as an early, significant example of a Chaska brick residence constructed in 1858 in Chaska, Minnesota.
- CR-CVC-146, CR-CKC-623, CR-CHC-035 (Minneapolis & St. Louis Railroad) recommended eligible under Criteria A for its association with the development of several key industries in Chaska including the Carver County Sugar Beet Factory, the numerous Chaska brick yards and manufacturers, and the Chaska Flour Mill. In addition, it is the determination of this office that the Chaska Depot is a contributing element to the Minneapolis & St. Louis Railroad property and is eligible under Criteria A.

Our office consulted with the Carver Historic Preservation Commission (HPC) and the Chaska HPC regarding historic properties in the area. Both HPCs are consulting parties on the project. The Carver HPC contacted us to request that we consider four properties as eligible. These were CR-CVC-0116 (212 4th Street East), CR-CVC-0144 (216 Fourth Street East), CR-CVC-0117 (220 Fourth Street East), and CR-CVC-0126 (430 Lime Street North) (please see enclosed pictures for these properties). Our office determined that they did not retain sufficient integrity to be considered eligible for listing on the National Register.

The City of Chaska and Chaska HPC also presented a number of properties for additional consideration of NRHP eligibility. Staff members from your office attended a meeting in Chaska with our office and Chaska city official to conduct a field review of the properties. The recommendations from the City are presented in the report *Tour of Chaska with the Minnesota Department of Transportation & the State Historic Preservation Office: Evaluating Additional Potentially Eligible Historic Properties for the Section 106 Study/EIS of the TH 41 New River Crossing* (June 20, 2006). Based on our review of the properties presented by the city, properties 14, 15, 16, and 17 are outside of the project APE. CR-CKC-041 (100 East 2nd Street, #2), CR-CKC-040 (102-104 East 2nd Street, #3), CR-CKC-0042 (109 East 2nd Street, #4) and CR-CKC-0051 (the Moravian Church, #5) are contributing elements to the existing Chaska Historic District.

It is the determination of our office that the following properties presented in the report do not retain sufficient integrity for consideration to the National Register: CR-CKC-0413 (103 West 2nd Street, #1) (please note the modern storefront windows, modern doors, and the removal of the top section of the cornice), 403 3rd Street East (E.A. Taylor House, #7), CR-CKC-0472 (113 Oak Street, #8), CR-CKC-0534 (116 Maple, Griep House, #9), 620 Willow (No SHPO number, #11), CR-CKC-0311 (906 Stoughton, #12), 1201 Valley Street (no SHPO number, Jasper/Heller/Holtz Home, #13), 300 West Sixth Street (no SHPO number, #18), CR-CKC-0451 (512 Cedar Street, #19), CR-CKC-0010 (500 Pine Street, Chaska Mill, #21), CR-CKC-0152 (403 West 1st Street, Glatzel House, #24) (see enclosed photo showing enclosed front porch), CR-CKC-0127 (622 West 1st Street, #25), CR-CKC-0334 (201 Hickory, #26), CR-CKC-0366 (205 Elm Street, #27), the clay pits (No SHPO number, #29).

There are currently four properties recommended by the Chaska HPC for further consideration that we would like to discuss in more detail with your office: CR-CKC-0572 (512 2nd Street East, #10), and CR-CKC-0381 (205

West First Street, #22), 322 West 1st Street (no SHPO number, Fink-Young House #23), and the Mount Pleasant Cemetery (no SHPO number, #30). These properties appear to retain sufficient integrity, but we would like to further discuss their possible historical significance.

Based on the current information, it does not appear that any of the proposed corridors will directly impact any of the historic properties. **It is the determination of this office that the E Alternatives (E-1, E-1A, and E-2) will have no adverse effects on historic properties. This determination is based on the condition that the archaeological site 21CR141, which is very small (5 m E-W by 30 M N-S; see Figure 13 in enclosed archaeological report), can be avoided through adjustments to the proposed E-1A or E-2 alignments if they are selected (E-1 would completely avoid the site area).** CR-CKC-293 (Crystal Sugar Beet Factory Office) is located approximately ¼ mile to the west of the E-1 and E-1A alignments, and will not be impacted through visual, auditory, or setting changes.

We cannot make a final determination of effects on the other alternatives (C-2, C-2A, and W-2) and the No Build alternative at this time. It is unclear what the visual impacts of this elevated roadway will be on historic properties within Chaska and Carver, and further information on noise levels is needed. We anticipate receiving that information in the next several weeks, and will provide a determination on the remaining alignments at that time.

We are providing you with this determination pursuant to the responsibilities given the State Historic Preservation Office (SHPO) by the regulations at 36 CFR 800 and as per the terms of the FHWA-SHPO PA (2005). We look forward to completing this review with your office.

Sincerely,

Kristen Zschomler

Kristen Zschomler, RPA
Historian/Archaeologist
Cultural Resources Unit (CRU)

encs.

cc: Cheryl Martin, FHWA
Leonard Wabasha, Shakopee Mdewakanton Sioux (Dakota) Community (1 copy archaeology report)
Melissa Duchinsky, City of Chaska Planning Department (2 copies architectural history report)
Jim Elmquist, City of Carver (1 copy architectural history report)
Cindy Olness, Collaborative Planning Process (1 copy architectural history report)
Dennis Roof (1 copy archaeology report)
Dr. Scott Anfinson, State Archaeologist
Lisa Freese, Mn/DOT Metro
Lynn Clarkowski, Mn/DOT Metro (2 copies each report + CDs of electronic files)
Diane Langenbach, Mn/DOT Metro
Nancy Frick, SRF Consulting (2 copies each report + CDs of electronic files)
Legislative Library (1 copy each report)
Joe Hudak, Mn/DOT CRU
Mn/DOT CO File
Mn/DOT CRU Project File

Minnesota Department of Transportation

Transportation Building
395 John Ireland Boulevard
Saint Paul, Minnesota 55155-1899

August 24, 2006

Direct Line: (651) 296-3243
Mail Stop 620

Mr. Dennis A. Gimmestad
Government Programs & Compliance Officer
State Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. W.
St. Paul, MN 55101

Re: S.P. 1008-60 (Trunk Highway 41 River Crossing Study, Carver and Scott Counties)
SHPO No. Pending

Dear Mr. Gimmestad:

We have reviewed the above-referenced undertaking pursuant to our FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the FHWA-SHPO Programmatic Agreement (2005).

We previously wrote to your office on July 13, 2006 with our initial determinations of eligibility and an effects determination of E Alternatives. In that letter, we identified four properties that we wanted to discuss further with your office in order to determine eligibility. In a conversation with Susan Roth, National Register Historian with your office, we determined that three of the four properties are eligible for the purpose of this review: CR-CKC-0572 (512 2nd Street East, #10), CR-CKC-0381 (205 West First Street, #22), and 322 West 1st Street (CR-CKC-545; Fink-Young House #23). The Mount Pleasant Cemetery (CR-CKC-077, #30) was recommended by our consultant as not eligible, and based on further review by our office and in consultation with Ms. Roth, we have determined that it is not eligible.

One additional property was identified during a meeting with the Chaska HPC on August 15, 2006: the Chaska Ball Field (a.k.a. Chaska Athletic Park). The Chaska Cubs were founded in 1929 and played in the Class A league of the Association of Minnesota Amateur Baseball Leagues (now the Minnesota Baseball Association) (the Cubs are now in the Class B league). The role of town ball in the years immediately following World War II is summed up by Armand Peterson and Tom Tomashek in the recently published book, *Town Ball: The Glory Days of Minnesota Amateur Baseball* (University of Minnesota Press, 2006).

> [The fans] loved major league baseball despite living several hundred miles from Chicago, the closest big-league city, and they rooted for the state's minor league teams competing in the American Association and Northern League, but the backbone of Minnesota baseball was town team ball. The amateur game was upfront and personal. It offered townspeople the opportunity to embrace a team that included their family and friends, Main Street's professionals, tradesman and merchants, high school teachers and their student-athletes, and farmers from the surrounding countryside.
>
> By the turn of the 20th century, town team baseball was already a part of Minnesota's community fabric and continued to grow through World War I and the Great Depression. Participation plummeted during the four years of World War II, with Minnesota Baseball Association membership slipping from an all-time high of four hundred teams in 1940 to 150 in 1945. Once the war ended in the late summer of 1945 and the soldiers began marching home, the groundswell of interest in hometown baseball began to build. From 1945 through 1960, Minnesota experienced a magical era of amateur ball, setting records in town participation and attendance that have not been matched since. ...

With little competition for the entertainment dollar immediately following the war, town team ball became a summer staple for both hardcore baseball fans and entire families. Town participation made a giant leap from 1945 to 1950, when 800 teams began the season in three different divisions.

The property type that best illustrates the town ball phenomena in post-World War II Minnesota is the town ball field. Town ball fields from this era are characterized by a wood and cinderblock grandstand, with wood bleachers, chicken-wire screen, announcer's booth, and concession stand; wooden or cinderblock dug outs; a grassy infield (unlike a softball infield that has no grass); and large flood lights that allowed for evening games. The Chaska Cub Ball Field (Athletic Park) is locally significant under Criterion A in the areas of recreational and social history, and retains the key features of a 1950s ball field as listed above (see attached pictures).

E ALTERNATIVES (E-1, E-1A, AND E-2)

We previously determined that they will have **no adverse effects** on historic properties, based on the condition that the archaeological site 21CR141 be avoided through adjustments to the proposed E-1A or E-2 alignments if they are selected (E-1 would completely avoid the site area). This determination remains appropriate as there have been no changes to the proposed alignments and no additional historic properties identified in the area of these alternatives.

ALTERNATIVE C-2

It is also the determination of this office that the C-2 Alternative as currently planned would have **no adverse effects** on the **Chaska Historic District**. There are no direct impacts to properties in the district, and the proposed elevated roadway would not visually affect the district since the only place where the roadway would be visible is from the southeastern corner at TH 41 and 2nd Avenue. In the Chaska Historic District, noise levels under the No Build Alternative would go up 3 decibel levels, which is not a perceptible change. Under both the W2 and C Alternatives (both C-2 and C-2A) the noise level in the historic district would stay the same as current conditions.

Our office requested additional noise information in order to get a better idea as to the potential changes in noise levels for 6 historic properties in the area of Elm Street and 1st Street in Chaska. Noise modeling indicates a possible 2 to 3 decibel level increase in this area between the 2040 No Build levels and the C-2 and C-2A alternatives. The noise model, however, did not have programmed into it the local roadway network and traffic volumes (existing and future), and it was noted by the consultant that this would need to be done in order to accurately describe the existing and future noise environment in the Elm and 1st Street areas (please see attached noise information).

It is the determination of this office that the C-2 Alternative would have **an adverse effect** on the **Chaska Cubs Ball Field** since it will directly impact the property. Also, it is unknown at this time if the C-2 Alternative will have an adverse effect on the following historic properties due to potential visual and auditory impacts: **CR-CKC-0002 (Fredrick DuTroit House, 121 Hickory Avenue); CR-CKC-0004 (Eder/Baur House, 105 Elm); CR-CKC-0005 (E.H. Lewis House; 321 2nd Street West); CR-CKC-0059 (Conrad Fink House, 322 1st Street West); CR-CKC-0381 (Liprisk House; 205 1st Street West); CR-CKC-0174 (H. Oeterreich House, 115 Elm Street); CR-CKC-0006 (Guardian Angels Church and School).** If this alternative is selected, additional noise studies may be needed in order to determine if there will be an impact to these properties from increased noise levels. Also, since design elements of the elevated roadway cannot be known at this time, it is not possible to make a determination of effects regarding potential visual impacts.

ALTERNATIVE C-2A

It is the determination of this office that the C-2A Alternative would have **no visual impacts** on the identified historic properties, **but may have potential auditory impacts**. Since local roadway networks and traffic data were not programmed into the current noise models, more noise analysis would be needed to determine if there will be an adverse effect on the **Chaska Ball Field, CR-CKC-0002 (Fredrick DuTroit House, 121 Hickory Avenue); CR-CKC-0004 (Eder/Baur House, 105 Elm); CR-CKC-0005 (E.H. Lewis House; 321 2nd Street West); CR-CKC-0059 (Conrad Fink House, 322 1st Street West); and CR-CKC-0174 (H. Oeterreich House, 115 Elm Street)**

from increased noise levels. If this alternative is selected, additional noise studies may be needed in order to determine if there will be an impact to these properties from increased noise levels.

ALTERNATIVE W-2

It is unknown at this time if the W-2 Alternative will have an adverse effect on the **Carver Historic District**. While the roadway is located 3000 feet to the east of the historic district, since the design elements of the elevated roadway cannot be known at this time, no determination can be made at this point. The current noise analysis indicates that there would be only a 2 decibel increase between the future No Build and Build alternative, but it is with the understanding that local roadway networks and traffic data are missing from the model. Since more refined noise analysis may indicate a higher noise level, again no determination can be made at this point. If this alternative is selected, additional noise studies may be needed in order to determine if there will be an impact to these properties from increased noise levels.

NO BUILD ALTERNATIVE

It is the determination of this office that the No Build Alternative would have **an adverse effect the Chaska Historic District**. Noise and traffic levels along the current T.H. 41 through Chaska are very disruptive to the feeling and setting, and with projected traffic increase this situation will continue into 2040.

Because the effects of Alternatives C-2, C-2A, and W-2 cannot be determined based on the data available, we feel it would be appropriate to develop a Programmatic Agreement (PA) between the FHWA and your office. The PA would layout a review process by which additional information regarding noise and visual impacts can be reviewed and hopefully modified in order to avoid or minimize any potential adverse effects.

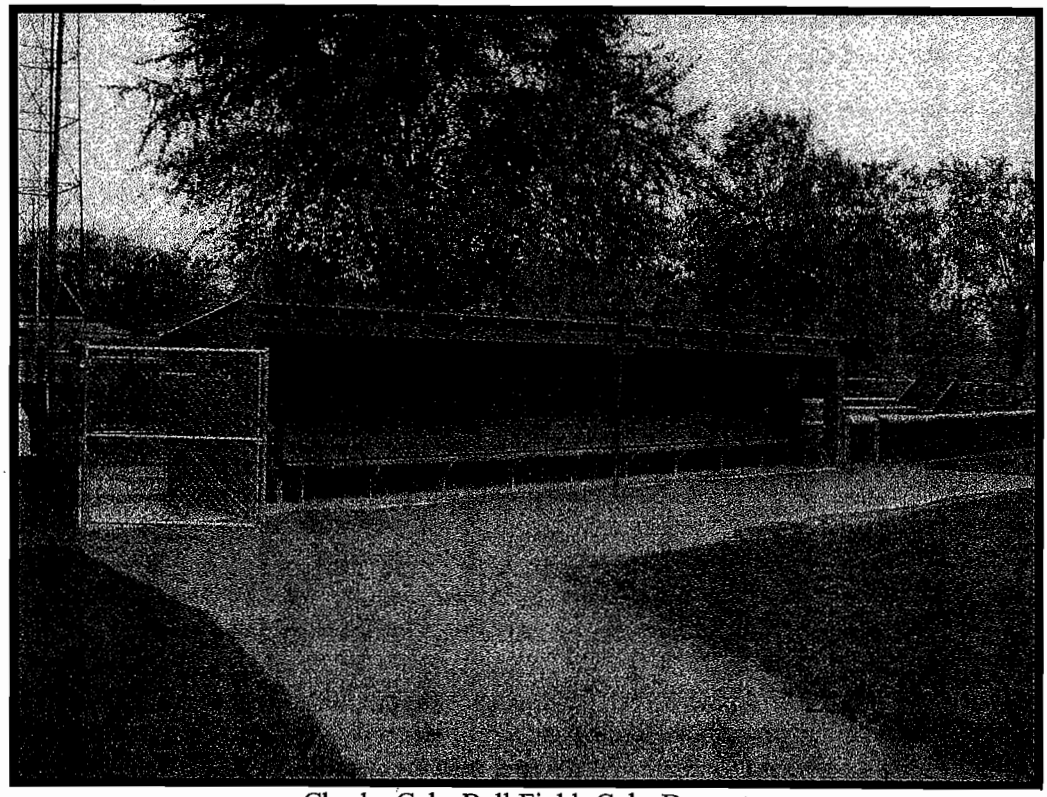
Sincerely,

Kristen Zschomler

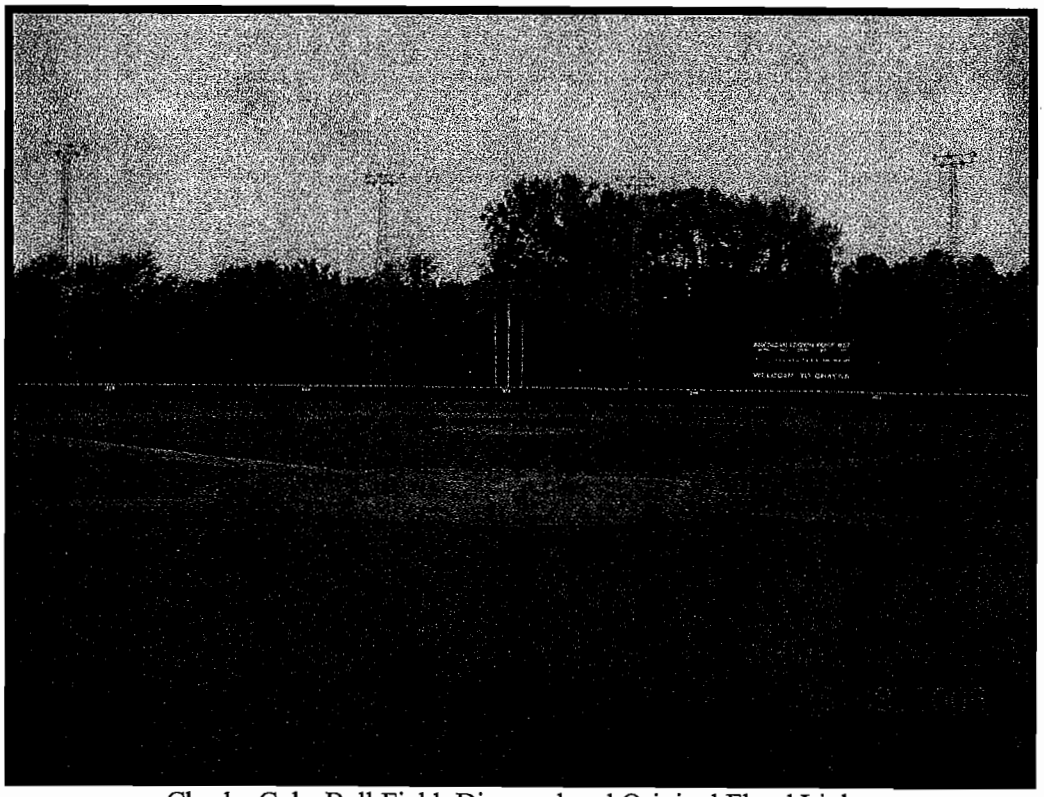
Kristen Zschomler, RPA
Historian/Archaeologist
Cultural Resources Unit (CRU)

encs.

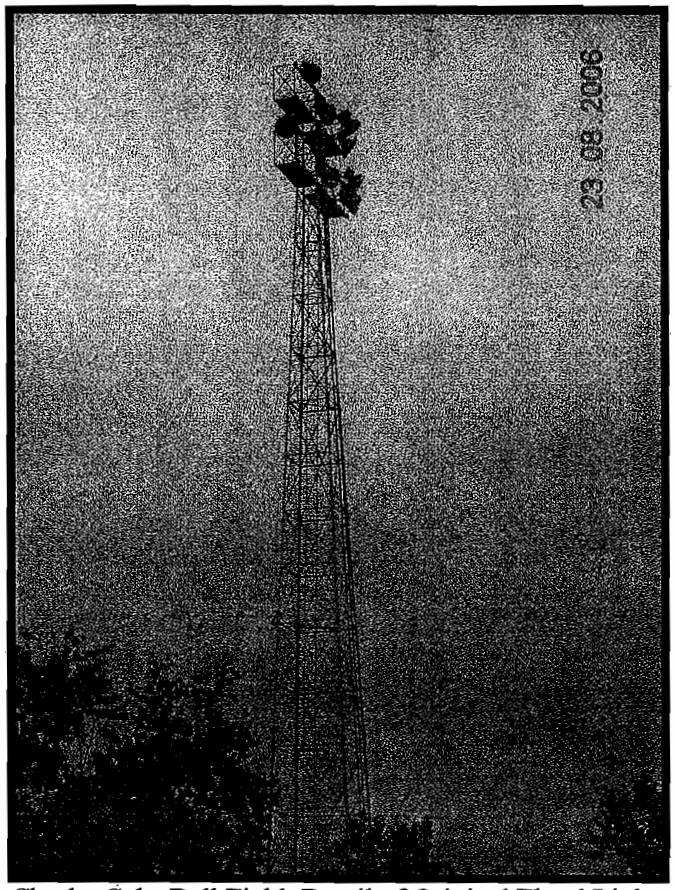
cc: Cheryl Martin, FHWA
Leonard Wabasha, Shakopee Mdewakanton Sioux (Dakota) Community
Melissa Duchinsky, City of Chaska Planning Department
Jim Elmquist, City of Carver
Dr. Scott Anfinson, State Archaeologist
John Dobrovolny, Fish and Wildlife Service
Jeanette Leete, DNR
Hannah Texler, DNR
Julie Ekman, DNR
Joe Yanta, COE
Steve Eggers, COE
Virginia Laszewski, EPA
Lisa Freese, Mn/DOT Metro
Lynn Clarkowski, Mn/DOT Metro
Diane Langenbach, Mn/DOT Metro
Nancy Frick, SRF Consulting
Joe Hudak, Mn/DOT CRU
Mn/DOT CO /CRU Project File



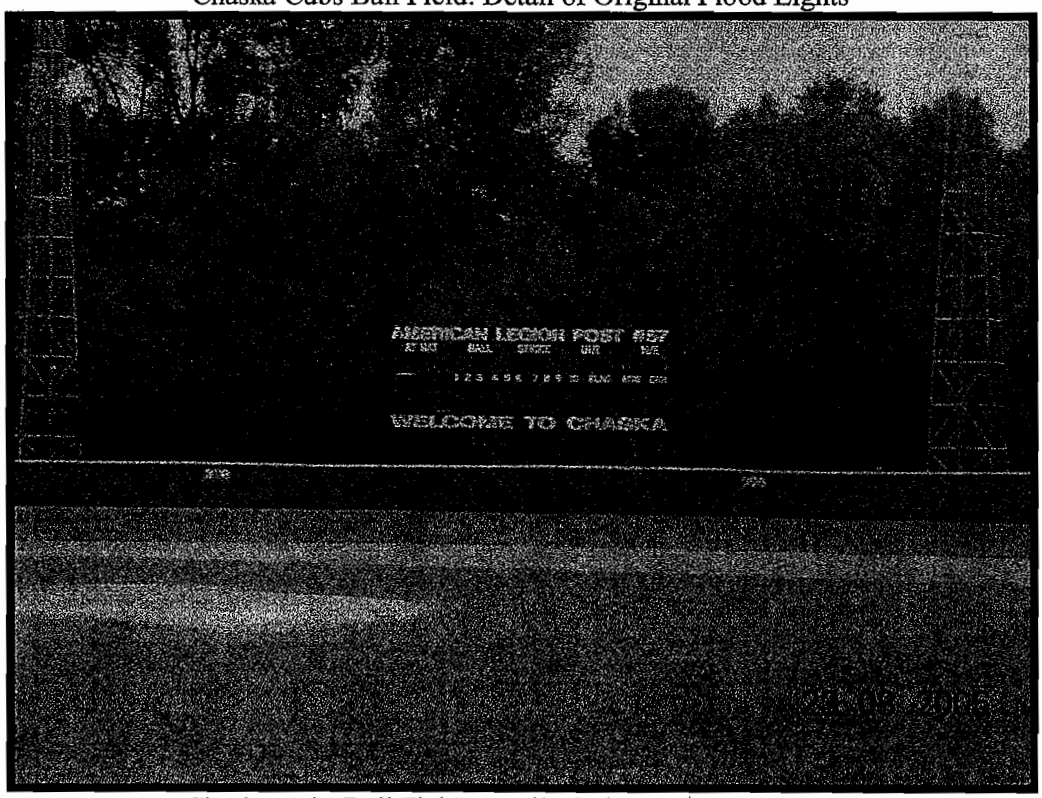
Chaska Cubs Ball Field: Cubs Dugout



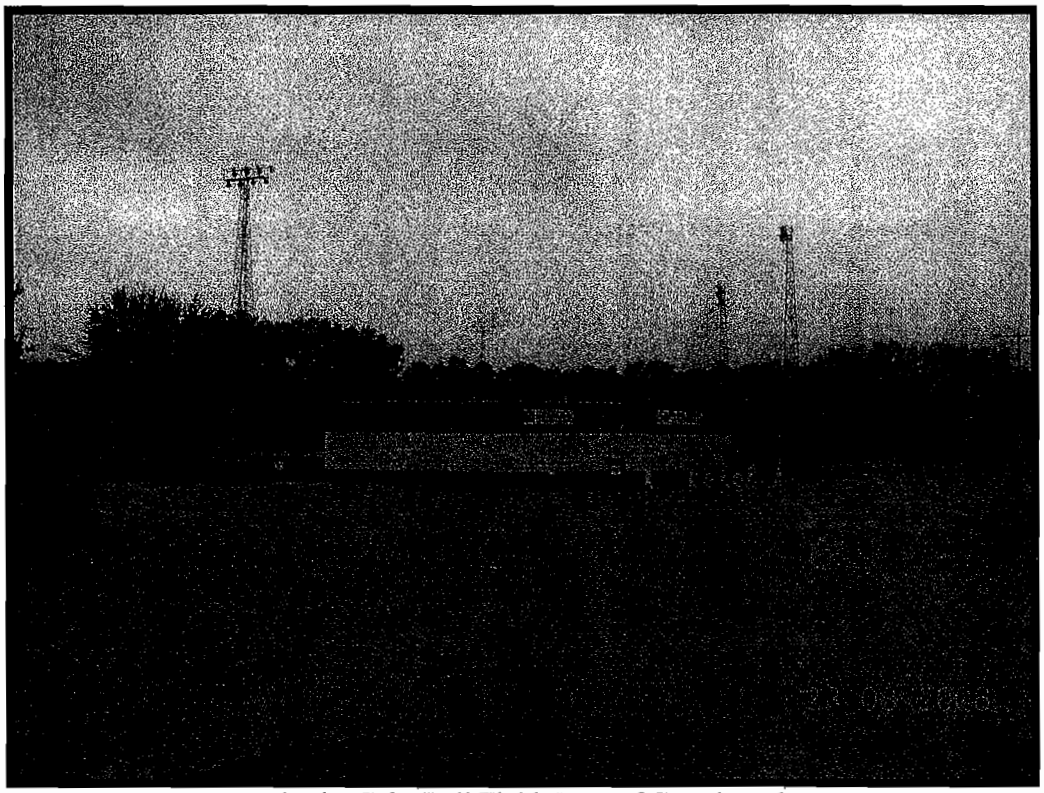
Chaska Cubs Ball Field: Diamond and Original Flood Lights



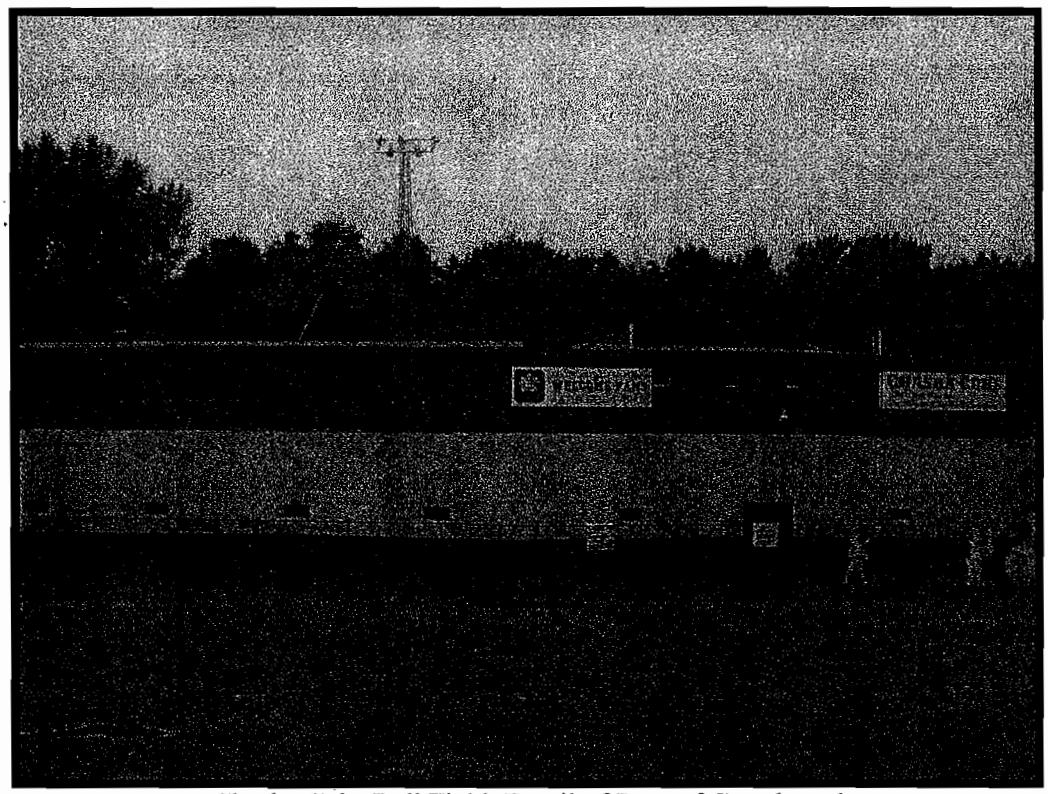
Chaska Cubs Ball Field: Detail of Original Flood Lights



Chaska Cubs Ball Field: Detail of Electronic Score Board



Chaska Cubs Ball Field: Rear of Grandstand



Chaska Cubs Ball Field: Detail of Rear of Grandstand

MINNESOTA HISTORICAL SOCIETY

State Historic Preservation Office

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SRF, Inc.

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CULTURAL RESOURCES UNIT

September 27, 2006

Ms. Kristen Zschomler
Cultural Resources Unit
MN Dept. of Transportation
Transportation Building, MS 620
395 John Ireland Boulevard
St. Paul, MN 55155-1899

Re: S.P. 1008-60, T.H. 41 River Crossing
Carver & Scott Counties
SHPO Number: 2005-1474

Dear Ms. Zschomler:

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800), and to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

We have reviewed the results of the archaeology survey and the history/architecture survey of the alternate route corridors for this project. Our comments are as follows:

1. Twelve properties within the study area are listed on or have been previously determined eligible for the National Register. These are: Frederick DuToit House, Eder-Baer House, E. H. Lewis House, Brinkhous Saloon Livery Barn, Courthouse Saloon, Herald Block, Frederick Greiner House, Walnut Street Historic District, Chaska Historical Marker, Fink House, Scott House, and the Carver Historic District.

2. One National Register eligible archaeological property was identified during the survey: 21CR0141. We concur with the determination that the site meets National Register criteria. Should a project alternative that potentially affects this site be chosen, we would recommend survey/assessment to clarify site boundaries and to ensure that the evaluation is adequate to serve as a basis for management decisions, including mitigation, if needed. We also note that archaeological survey was not completed for some areas where access permission was not granted; it is important to track these parcels so that they are surveyed as early as possible as the Section 106 review process moves forward.

3. Eleven National Register eligible history/architecture properties were identified during the survey: Oesterreich House, Riedele House, Crystal Sugar Beet Factory Office, George A. DuToit House, Guardian Angels Catholic Church Rectory and School District, Lyman W. Noble/John Sutheimer House, Minneapolis & St. Louis Railroad, House at

512 2nd Street East, House at 205 West 1st Street, House at 322 West 1st Street, and the Chaska Ball Field.

4. Your letter includes a determination that the E Alternatives will have no adverse effect on historic properties; that Alternate C-2 has an adverse effect, with some effects not known; that the effects of Alternate C-2A are not known; that the effects of Alternative W-2 are not known, and that the no-build alternative has an adverse effect on historic properties. In general, it would seem to us that Alternate C-2 has the greatest potential for effects on historic properties (including direct effects), and that this issue should be closely considered as part of the alternate selection process.

5. You propose to develop a programmatic agreement to outline the completion of the Section 106 process as the planning for this project proceeds. Since the detailed design and construction of the project may be many years away, such a programmatic should include provisions for review and update of survey data and updated effects analysis at the time of the Tier Two EIS or at another appropriate point in the planning process.

We appreciate your efforts in providing cultural resource data at the corridor selection stage, and look forward to working with your office as this project continues to move through the planning process. Contact Dennis Gimmestad at 651-205-4205 with questions or concerns.

Sincerely,

Britta L. Bloomberg
Deputy State Historic Preservation Officer

U.S. Department
of Transportation

**Federal Highway
Administration**

Minnesota Division

380 Jackson Street
Galtier Plaza, Suite 500
St. Paul, MN 55101-4802

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March 15, 2007

MAR 2007
Received
SRF, Inc.

Ms. Shannon Blue
President
Lower Sioux Indian Community
P. O. Box 308
Morton, MN 56270

Re: Section 106 Consultation
TH 41, Connecting TH 169 and New TH 212
Including a New Minnesota River Crossing
Carver and Scott Counties, Minnesota

Dear President Blue:

The Federal Highway Administration (FHWA), in cooperation with the Minnesota Department of Transportation (Mn/DOT), is preparing a Tier I Environmental Impact Statement (EIS) to address capacity improvements to Trunk Highway (TH) 41, including a crossing of the Minnesota River, in Carver and Scott Counties, Minnesota. The study area for the proposed project is located between proposed TH 212 and TH 169 (the north-south limits) and between TH 101 at the Chanhassen/Shakopee border and County Road (CR) 45 just west of Carver (the east-west limits) in the vicinity of existing TH 41 (see enclosed map of the project area). The Tier I EIS will include the analysis needed for a location decision.

In addition to the No-Build Alternative, six Build Alternatives are being studied in the Tier I EIS. Each of the six Build Alternatives is a freeway design with an interchange at TH 169 and an interchange at New TH 212 (see enclosed alternatives map).

- Alternative W-2 is located in the western portion of the study area. This alternative intersects with TH 169 one mile west of existing TH 41/County State Aid Highway (CSAH) 78 and connects with New TH 212 at the New TH 212/CR 147 interchange.
- Alternative C-2 is in the central/western portion of the study area. This alternative connects to TH 169 at the planned TH 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New TH 212 at the New TH 212/CR 147 interchange.

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Federal Highway Administration

- Alternative C-2A is located in the central portion of the study area. This alternative connects to TH 169 at the planned TH 169/existing TH 41 interchange (the design assumes a realigned existing TH 41/CSAH 78) and connects to New TH 212 at CSAH 10/Engler Boulevard.

- Alternative E-1 is in the eastern portion of the study area. This alternative connects to TH 169 at the planned TH 169/CSAH 69 interchange, and connects with New TH 212 at CSAH 17/Audubon Road. This alternative assumes that TH 169 is realigned south of its existing alignment in the vicinity of CSAH 69.
- Alternative E-1A is located in the eastern portion of the study area. This alternative is identical to Alternative E-1 south of the Minnesota River. This alternative connects to new TH 212 near Bluff Creek Road.
- Alternative E-2 is located in the eastern portion of the study area. It is the easternmost alignment of all the Build alternatives. This alternative connects to TH 169 at the planned TH 169/CSAH 69 interchange and connects to New TH 212 near Bluff Creek Road. This alternative assumes that TH 169 is realigned south of its existing alignment in the vicinity of CSAH 69.

The Mn/DOT Cultural Resources Unit (CRU) has reviewed the above-referenced undertaking pursuant to their FHWA-delegated responsibilities for compliance with Section 106 of the National Historic Preservation Act, as amended (36 CFR 800), and as per the terms of the FHWA-State Historic Preservation Office (SHPO) Programmatic Agreement (2005).

Because of the high potential for archaeological sites and eligible architectural history properties, a consultant was hired to conduct archaeological and architectural history investigations. They completed two reports, *Phase I and II Archaeological Investigations of Alternative Route Corridors for Trunk Highway 41 Near Chaska, Carver and Scott Counties* and *Phase I/II Architecture/History Investigations for Five Proposed Alternative Route Corridors for Trunk Highway 41 near Chaska, Carver and Scott Counties, Minnesota.*

The Area of Potential Effect (APE) for the archaeological and geomorphological work was defined as the construction limits of the proposed alternative route corridors. Each corridor was 1,000 feet wide. It should be noted that the proposed corridor locations changed after the start of the Phase I archaeological fieldwork. The original five corridors plus the revised corridors were surveyed. Three additional proposed interchanges related to the corridors were also added during the course of the project. The different corridors that were investigated as part of the archaeological investigation had a combined length of approximately 45.8 miles and included an estimated total of 5,552 acres.

Three archaeological sites were identified during the survey. However, only Site 21CR141 was determined eligible for the National Register of Historic Places (NRHP). This multi-component pre-contact site is determined eligible for its deeply buried archaeological deposits that were found to have integrity and potential for contributing significant information about the occupation of the lower Minnesota River valley during the Archaic Period. The other two sites, 21CR140 and 21CR142, were determined not eligible due to lack of integrity.

The APE for architectural resources was defined based on the original 5 corridor routes. Because of the project's potential direct and indirect impacts to historic properties and the potential for the project corridor locations to be adjusted (which did occur), Mn/DOT's CRU, in consultation with the Minnesota SHPO in 2004, delineated an architectural APE that encompassed a large region around the five proposed alternatives. This originally defined APE adequately covered the areas of the refined corridor locations, as well as the added interchange locations.

There are 12 previously determined eligible properties or properties listed on the NRHP within the study area. These include CR-CKC-0002 (DuToit House), CR-CKC-0004 (Eder-Baer House), CR-CKC-0005 (Lewis House), CR-CKC-0011 (Brinkhaus Saloon Livery Barn), CR-CKC-0012 (Courthouse Saloon), CR-CKC-0015 (Herald Block), CR-CKC-0022 (Greiner House), CR-CKC-0055 (Walnut Street Historic District), CR-CKC-0057 (Chaska Historical Marker), CR-CKC-0059 (Fink House), CR-CKC-0516 (Scott House), and CR-CVC-104 (Carver Historic District). After surveying over 600 additional properties, the following seven properties were also determined to be eligible for the NRHP:

- CR-CKC-174 (H. Oesterreich House) recommended eligible under Criteria C as a significant example of a Chaska brick residence constructed in the Queen Anne style.
- CR-CKC-009 (Riedele House) recommended eligible under Criteria B for its association with Andrew Riedele, prominent Chaska brick manufacturer, and under Criteria C as a significant example of the cross-wing type of Chaska brick residence.
- CR-CKC-293 (Crystal Sugar Beet Factory Office) recommended eligible under Criteria A for its association with the sugar beet industry in Chaska and under Criteria C as a significant example of a commercial Chaska brick building.
- CR-CKC-007 (George A. DuToit House) recommended eligible under Criteria C as a significant example of a Queen Anne style Chaska brick house.
- CR-CKC-006 (Guardian Angels Catholic Church and Rectory) recommended eligible under Criteria C as a significant example of a Gothic Revival church built with Chaska brick. In addition, it was determined that the school (1912-1918) associated with the Guardian Angels should be considered a contributing element of the Guardian Angels Church, Rectory, and School District, also eligible under Criteria A.
- CR-CKC-021 (Lyman W. Noble/John Sutheimer House) recommended eligible under Criteria C as an early, significant example of a Chaska brick residence constructed in 1858 in Chaska, Minnesota.
- CR-CVC-146, CR-CKC-623, CR-CHC-035 (Minneapolis & St. Louis Railroad) recommended eligible under Criteria A for its association with the development of several key industries in Chaska including the Carver County Sugar Beet Factory, the numerous Chaska brick yards and manufacturers, and the Chaska Flour Mill. In addition, it was determined that the Chaska Depot is a contributing element to the Minneapolis & St. Louis Railroad property and is eligible under Criteria A.

Mn/DOT's CRU consulted with the Carver Historic Preservation Commission (HPC) and the Chaska HPC regarding historic properties in the area. Based on this consultation, four properties, CR-CKC-041 (100 East 2nd Street), CR-CKC-040 (102-104 East 2nd Street), CR-CKC-0042 (109 East 2nd Street) and CR-CKC-0051 (the Moravian Church) have been determined to be contributing elements to the existing Chaska Historic District. And three properties, CR-CKC-0572 (512 2nd Street

0572 (512 2nd Street East), CR-CKC-0381 (205 West First Street), and 322 West 1st Street (no SHPO number, Fink-Young House) have been determined to be eligible for the NRHP (see enclosed matrix of listed or eligible properties).

Based on the current information, it does not appear that any of the proposed corridors will directly impact any of the historic properties. **It is the determination of Mn/DOT's CRU that the E Alternatives (E-1, E-1A, and E-2) will have no adverse effects on historic properties. This determination is based on the condition that the archaeological site 21CR141, which is very small (5 meters east-west by 30 meters north-south), can be avoided through adjustments to the proposed E-1A or E-2 alignments if they are selected (E-1 would completely avoid the site area).** CR-CKC-293 (Crystal Sugar Beet Factory Office) is located approximately ¼ mile to the west of the E-1 and E-1A alignments, and will not be impacted through visual, auditory, or setting changes.

Mn/DOT's CRU cannot make a final determination of effects on the other alternatives (C-2, C-2A, and W-2) and the No Build alternative at this time. It is unclear how the elevated roadway will visually impact the historic properties within Chaska and Carver, and further information on noise levels is needed.

In accordance with 36 CFR Part 800 which describes the Section 106 Process of the NHPA, as amended, we are requesting your assistance in identifying historic properties to which your tribe attaches religious and cultural significance in the project area. If such properties are identified in the area of potential effect, we will invite your tribe to be a consulting party in the Section 106 process.

Our office is working with the Minnesota MnSHPO and Mn/DOT to ensure that projects funded with Federal-aid highway funds conform to the NHPA. We are continuing to meet with each tribe, which has historical ties to the State of Minnesota, to discuss consultation on future projects. Besides the eleven federally recognized tribes which are currently located in the State, our list of tribal contacts was derived from the Native American Consultation Database which is maintained by the National Park Service.

If you have any questions or information regarding the proposed project, please contact Kristen Zschomler, Mn/DOT Historian at (651) 366-3633; Diane Langenbach, Mn/DOT Project Manager at (651) 582-1468; or me at (651) 291-6120. We would appreciate receiving your comments on the proposed project by April 20, 2007.

Cheryl B. Martin

Cheryl B. Martin
Environmental Engineer

Enclosure

APPENDIX B

DRAFT SECTION 4(F)/SECTION 6(F) EVALUATION

DRAFT TIER I SECTION 4(f) EVALUATION
TH 41 MINNESOTA RIVER CROSSING
FROM US 169 TO NEW US 212
CITIES OF CARVER, CHASKA, AND CHANHASSEN, DAHLGREN TOWNSHIP
CARVER COUNTY
LOUISVILLE AND JACKSON TOWNSHIP
SCOTT COUNTY,
MINNESOTA

I. INTRODUCTION

This Draft Section 4(f)/6(f) Evaluation provides information on the proposed action and potentially affected Section 4(f) park and historic resources.

Section 4(f) and Section 6(f) Impacts

The Section 4(f) legislation as established under the Department of Transportation Act of 1966 (49 USC 303, 23 USC 138) provides protection for publicly owned parks, recreation areas, historic sites (regardless of ownership), wildlife and/or waterfowl refuges from conversion to a transportation use. The Federal Highway Administration (FHWA) may not approve the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that:

- There is no feasible and prudent alternative to the use of the land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 771.135).

Additional protection is provided for outdoor recreational lands under the Section 6(f) legislation (16 USC 4602-8(f)(3)) where Land and Water Conservation (LAWCON) funds were used for the planning, acquisition or development of the property. These properties may be converted to a non-outdoor recreational use only if replacement land of at least the same fair market values and reasonable equivalent usefulness and location is assured.

II. PROPOSED ACTION

A. PROJECT BACKGROUND, NEED AND ALTERNATIVES CONSIDERED

The proposed action is the construction of a new river crossing connecting United States Highway (US) 169 in Scott County with New US 212, now under construction in Carver County, in the vicinity of existing Trunk Highway (TH) 41. The new river crossing would be constructed above the 100-year floodplain and would be a freeway-type facility. The Draft Environmental Impact Statement (DEIS) for the proposed project of which this Draft Section 4(f)/Section 6(f) Evaluation is an appendix, describes the project background (Chapter 1), need (Chapter 2), and alternatives considered (Chapter 3), and provides figures locating the project within the Twin Cities metropolitan area.

B. DEIS ALTERNATIVES

The DEIS evaluates a No-Build and six Build alternatives. See Figure B-1. Figures for individual Build alternatives are presented in Chapter 3 of the DEIS.

III. EVALUATION

A. SUMMARY

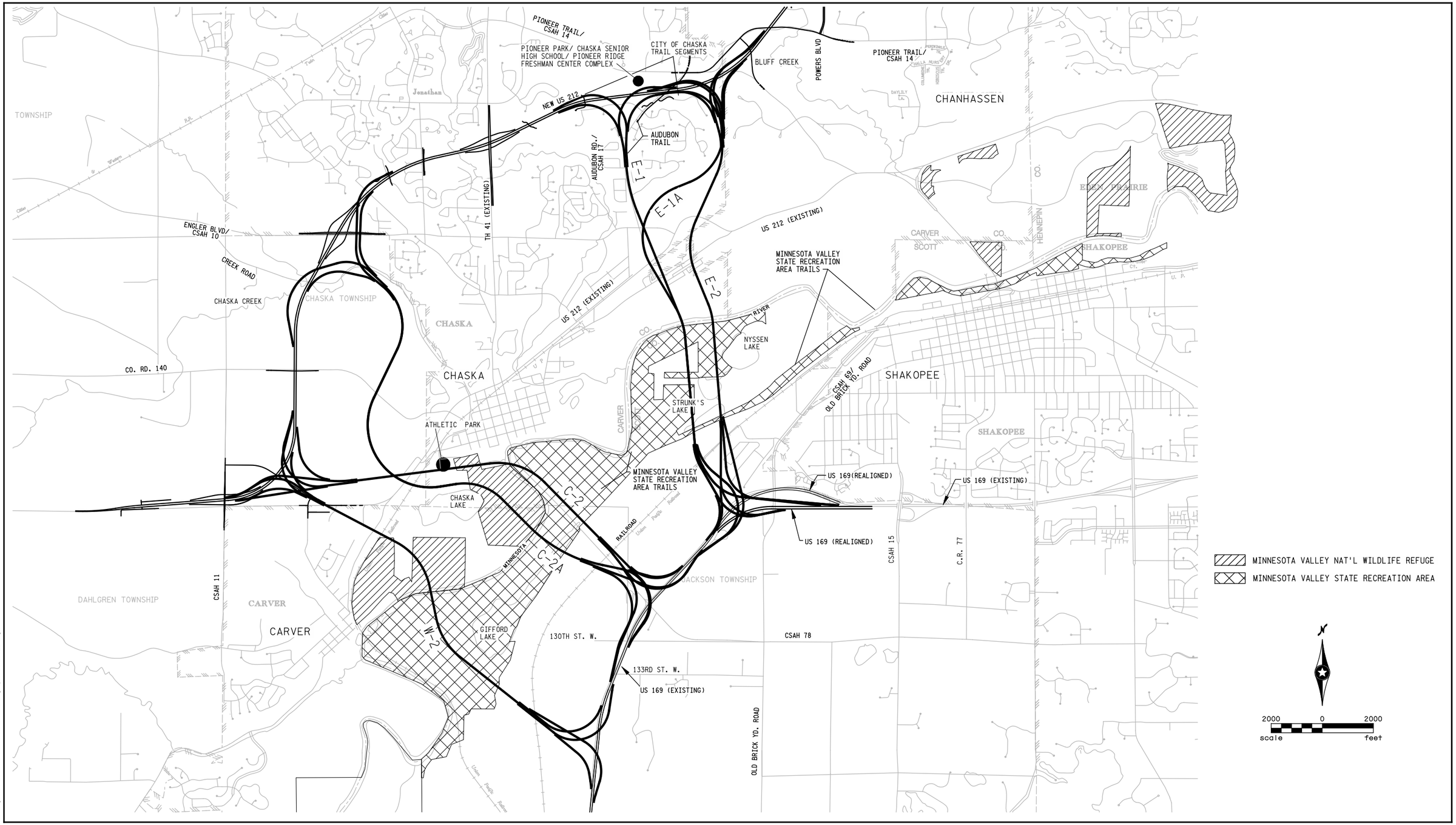
There are five Section 4(f) resources that are directly affected by one or more of the DEIS alternatives. The five resources and evaluation of impacts on each are described in Section III.B-III.E below. Table B-1 summarizes the impacts on resources.

(For purposes of this evaluation, the Minnesota Valley State Recreation Area and the Minnesota Valley State Trail are combined because the trail is contained within the recreation area; the Chaska Senior High School, Pioneer Park and Pioneer Ridge Freshman Center are also combined because they operate as a complex. Note that the Minnesota River itself is a recreational resource, but in the project area is contained within the Minnesota Valley National Wildlife Refuge and/or Minnesota Valley State Recreation Area and therefore is considered an attribute of each of those resources, not assessed separately.)

TABLE B-1
IMPACT ON SECTION 4(F) RESOURCES (IN ACRES)

Section 4(f) Resource	ALTERNATIVES					
	W-2	C-2	C-2A	E-1	E-1A	E-2
Minnesota Valley National Wildlife Refuge (MVNWR)	20.4 ac.	8.5 ac.	36.1 ac.	0.0 ac.	0.0 ac.	0.0 ac.
Minnesota Valley State Recreation Area (MVSRA)/Minnesota Valley State Trail (MV Trail)	30.6 ac.	22.3 ac.	5.4 ac.	12.0 ac.	12.0 ac.	4.2 ac.
Athletic Park (Chaska Cubs Ball Field)	0.0 ac.	3.5 ac.	0.0 ac.	0.0 ac.	0.0 ac.	0.0 ac.
Audubon Trail	0.0 ac.	0.0 ac.	0.0 ac.	1.32 ac.	0.18 ac. (1,000 ft.)	0.18 ac. (1,000 ft.)
City of Chaska Trail Segments	0.0 ac.	0.0 ac.	0.0 ac.	0.77 ac.	0.15 ac.	0.15 ac.
Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex	0.0 ac.	0.0 ac.	0.0 ac.	10.4 ac.	2.7 ac.	1.1 ac.

There are also 21 properties and two historic districts in the study area that are listed on or eligible for the National Register of Historic Places (NRHP). These are discussed in Chapter 10 of the DEIS. One of these resources is Athletic Park (a.k.a. Chaska Cubs Ball Field) and is described in Section III.D. Eight of the other NRHP-eligible or listed resources have been identified as being potentially affected under the provisions of Section 106, however the effect has not been determined at this time due to uncertainties about noise and visual impacts. These uncertainties also affect the potential for Section 4(f) to apply due to



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SECTION 4(f) RESOURCES

Figure B-1

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Section 4(f)/6(f) Evaluation
S.P. #1008-60
Minnesota Department of Transportation

"constructive use," i.e., whether proximity impact(s) will substantially impair the features or attributes that contribute to the NRHP-eligibility of the resource. However, the definition of "constructive use "under Section 4(f) is not the same as "adverse effect" Section 106; it is usually a very high threshold, rarely applied, and is not likely to apply to the historic resources in question. These properties for which the Section 106 effect determination is pending are included on Figure 10-1 in the DEIS and listed (with the relevant Build Alternative(s) below:

1. Carver Historic District, (W-2)
2. Frederick DuTroit House, 121 Hickory Avenue, Chaska (C-2, C-2A)
3. Eder/Baur House, 105 Elm Street, Chaska (C-2, C-2A)
4. E.H. Lewis House, 321 2nd Street West, Chaska (C-2, C-2A)
5. Conrad Fink House, 322 1st Street West, Chaska (C-2, C-2A)
6. Liprisk House, 205 1st Street West, Chaska (C-2, C-2A)
7. H. Oeterreich House, 115 Elm Street, Chaska (C-2, C-2A)
8. Guardian Angels Church and School, Chaska (C-2, C-2A)

B. MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE – CHASKA UNIT

Description of Section 4(f) Resource

The Section 4(f) resource that could be affected by the proposed action is the Minnesota Valley National Wildlife Refuge (MVNWR) – Chaska Unit.

Detailed Map

Figure B-2 shows the relationship of the applicable Build alternatives to MVNWR – Chaska Unit.

Size and Location

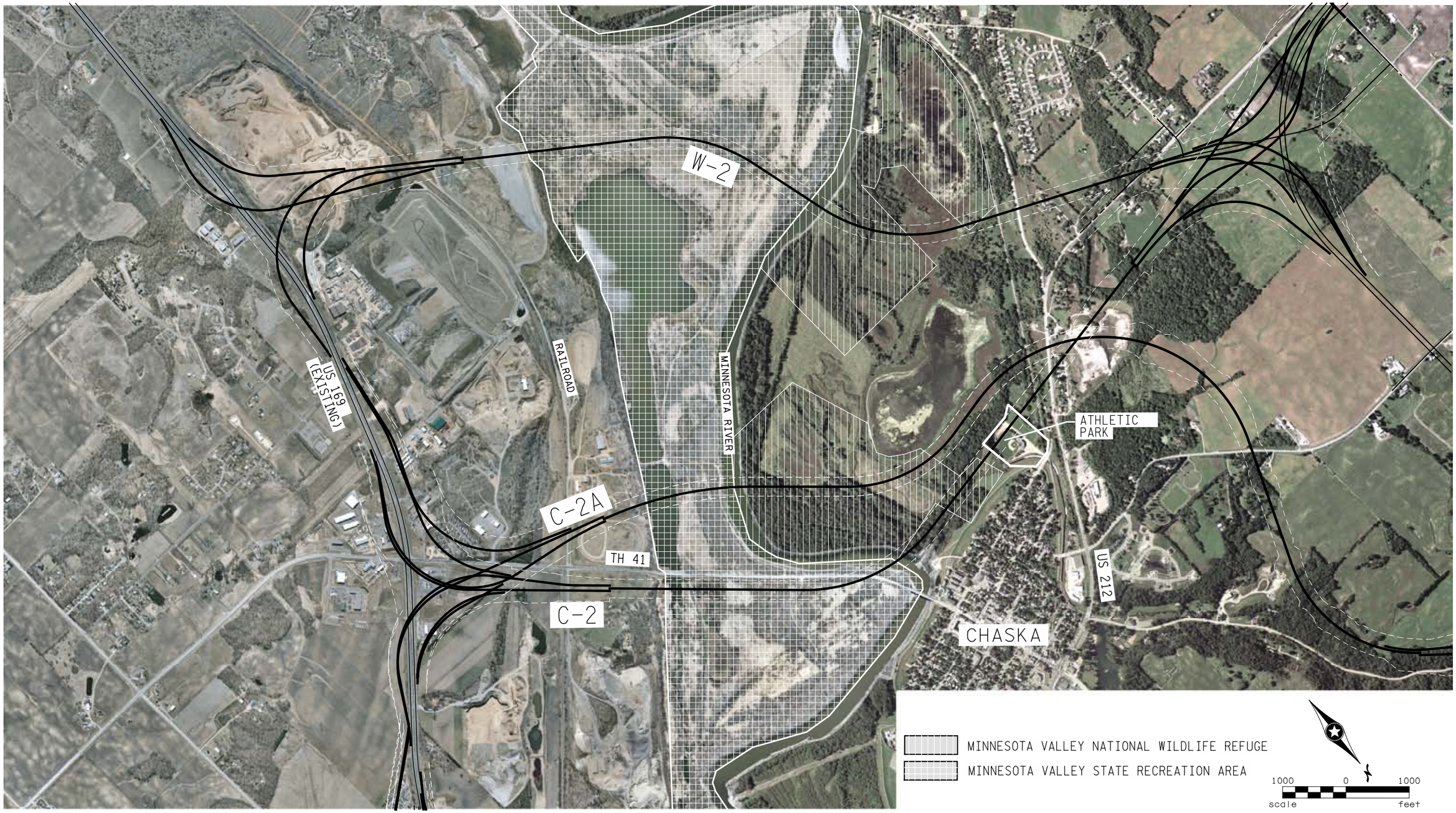
The MVNWR – Chaska Unit is located in the northeastern part of the City of Carver and the extreme southwest part of the City of Chaska and is about 600 acres in size.

Ownership and Type

The MVNWR is owned by the U.S. Department of the Interior; the U.S. Fish and Wildlife Service (USFWS) is responsible for its management. The site was designated as a National Wildlife Refuge in 1976 and includes 14,000 authorized acres (Chaska Unit is 600 acres).

Function of and/or Available Activities/Activities and Use

The MVNWR – Chaska Unit is used for a variety of activities; these range from hiking and biking to wildlife observation and birdwatching.



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SECTION 4(f) RESOURCES- MVNWR, MVSRA, ATHLETIC PARK

Figure B-2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
Draft Section 4(f)/6(f) Evaluation
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Description of Existing and Planned Uses

According to its website, the Minnesota Valley National Wildlife Refuge (MVNWR) is one of four urban wildlife refuges in the nation. It was established in 1976 to preserve and protect wildlife and wildlife habitat and to provide opportunities for wildlife-oriented recreation and education. The Refuge is home to many animals such as the bald eagle and is a crucial corridor for migrating birds. The MVNWR consists of eight non-contiguous units that stretch 34 miles from Fort Snelling to the City of Jordan. The 600-acre Chaska Unit consists of marsh-edged lake surrounded by farmland and floodplain forest.

The MVNWR is a largely undeveloped natural area with sites developed for hiking, biking and parking (USFWS staff indicate they are considering allowing bow-hunting in the Refuge within the next five years). A gravel hiking and biking trail runs through the Refuge, with a trailhead in Riverside Park in the City of Carver; the trail receives moderate use, according to City of Carver staff. A trailhead is planned at Athletic Park in the City of Chaska in the next few years, according to City of Chaska staff.

Access and Usage

Vehicle access and parking for the Chaska Unit of the MVNWR are provided at two locations: north gate entrance is at the southern edge of Athletic Park in the City of Chaska; south gate entrance and trailhead is at Riverview Park in the City of Carver. Riverview Park also provides boat launching facilities. There is a gravel service road that also serves as a trail. The Refuge receives about 275,000 visitors annually.

Relationship to Similar Resources in the Area

Minnesota Valley State Recreation Area (MVSRA) and Minnesota Valley State Trail (MV Trail) are adjacent to the MVNWR to the south, east and west. These resources are described in Section III-C.

Riverside Park is an 18-acre park owned by the City of Carver and managed by the USFWS. Its primary use is for boat launching; it provides a trailhead for the MVNWR trail system. The City is considering offering primitive camping. No potable water, picnic or restroom facilities are present. Athletic Park, an 8-acre community park in the City of Chaska is immediately west of a portion of the MVNWR and is described in Section III-D. The MVNWR is visible from Riverside Park in Carver and from Hickory, Winkel, Fireman's, and Schalow parks in the City of Chaska.

Applicable Clauses Affecting Ownership

MVNWR has received funding from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is applicable to this resource.

Unusual Characteristics

The USFWS has begun the long process of returning the farmland in the Chaska Unit to the native floodplain forest, creating one large area of forest. The Refuge is located along the Mississippi Flyway; over 200 species of birds have been seen on the Refuge. Many species of waterfowl, songbirds, and raptors use the Refuge as a stop-over on their migrations to and from

breeding grounds. Restoring the floodplain forest will benefit habitat for these species. In addition, the Refuge is home to about 50 mammals, from the red squirrel to the coyote. Common sightings include white-tailed deer, red fox, muskrat, beaver, wood chuck and raccoon. Thirty species of reptiles and amphibians make their home on the Refuge, including the leopard frog, green frog, painted and snapping turtles, and the bull snake.

Impacts on the Section 4(f) Resource

Below is a discussion of each Build alternative and its impact on MVNWR. Complete descriptions of the Build alternatives are found in the DEIS, Chapter 3.

Alternative W-2

Alternative W-2 would cross directly through the MVNWR, requiring 20.4 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVNWR. USFWS staff indicate that the fragmentation of the emergent marsh resource in the refuge by the Alternative W-2 corridor would seriously damage the habitat function of the Chaska Unit.

Alternative C-2

Alternative C-2 would cross directly through the edge of the MVNWR, requiring 8.5 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVNWR. USFWS staff indicate that the Alternative C-2 corridor impacts floodplain forest, but that the location minimizes the fragmentation of this habitat and also avoids fragmentation of the emergent marsh habitat located further west in the unit.

Alternative C-2A

Alternative C-2A would cross directly through the MVNWR, requiring 36.1 acres through partial acquisition or an easement. The bridge crossing would be approximately 75 feet above the river and would be visible from the MVNWR. USFWS staff indicate that the impacts to the emergent marsh and floodplain forest resources in the refuge by the Alternative C-2A corridor would seriously damage the habitat function of the Chaska Unit.

Alternative E-1

Alternative E-1 is about one-half mile from the MVNWR at its closest point and would therefore not have a direct impact on it. The bridge crossing would be approximately 65 feet above the river and would not be immediately visible from the MVNWR.

Alternative E-1A

Alternative E-1A is about one-half mile from the MVNWR at its closest point and would therefore not have a direct impact on it. The bridge crossing would be approximately 60 feet above the river and would not be immediately visible from the MVNWR.

Alternative E-2

Alternative E-2 is more than one-half mile from the MVNWR at its closest point and would therefore not have a direct impact on it. The bridge crossing would be approximately 60 feet above the river and would not be immediately visible from the MVNWR.

C. MINNESOTA VALLEY STATE RECREATION AREA/MINNESOTA VALLEY STATE TRAIL

Description of Section 4(f) Resource

The Section 4(f) resource that could be affected by the proposed action is the Minnesota Valley State Recreation Area (MVSRA), together with the Minnesota Valley State Trail (MV Trail) which is located within the MVSRA.

Detailed Map

Figures B-2 and B-3 show the relationship of the applicable Build alternatives to MVSRA.

Size and Location

The portion of the MVSRA in the study area is in the Minnesota River valley and runs from the City of Carver on the south end through the City of Chanhassen on the north end, about four miles. The entire MVSRA is 5,490 acres. The MV Trail is located therein. Existing TH 41 crosses over the MVSRA connecting the City of Shakopee with downtown Chaska.

Ownership and Type

The MVSRA is owned by the Minnesota Department of Natural Resources (MnDNR). The site was designated as a recreation area as was the trail in the late 1960s.

Function of and/or Available Activities/Activities and Use

The portion of the MVSRA in the study area is used for a variety of activities; these range from boating and canoeing to hiking, biking, horseback riding and snowmobiling, to wildlife observation and birdwatching. Outside of the study area the MVSRA also provides a variety of camping opportunities including equestrian, watercraft, walk-in and primitive. The MV Trail is used for a variety of activities ranging from hiking and biking, to horseback riding and snowmobiling, to wildlife observation and birdwatching.

Description of Existing and Planned Uses

The MVSRA preserves part of the Minnesota River valley. The area is used for hiking, biking, cross-country skiing, mountain biking, and snowmobiling. The Minnesota River valley is a rich mosaic of plant and animal communities. The valley holds floodplain marshes, wet meadows, fens, and lakes. These wetlands are maintained by the river and by the spring-fed streams draining from the base of the bluffs. The hillsides and bluffs support oak forest and oak savanna remnants. They offer scenic overlooks.

The portion of the MVSRA in the study area runs from the City of Carver on the south end through the City of Chanhassen on the north end. Set in the Minnesota River valley, it is an

important resource to residents of the Twin Cites metropolitan area. The Nyssen's Lake Area offers trail access for snowmobiling, horseback riding, mountain biking, and hiking. The Gifford Lake Area offers fishing and trail access.

This well-used recreation area is a largely undeveloped natural area with sites developed for more active use including paths, picnic areas, boat launches, vehicle access and parking.

The MV Trail in the MVSRA runs through the study area and offers recreational opportunities for biking, hiking, snowmobiling, and horseback riding as well as wildlife observation and birdwatching. The five-mile paved trail in the study area, referred to as the Chaska/Shakopee Bike Trail, runs from the former Milwaukee Railroad right of way near the Carver County Courthouse area in Chaska to Murphy's Landing in Shakopee. When reconstruction of the existing TH 41 river bridge is complete in 2007 it will restore the MV Trail connection between the City of Chaska and Murphy's Landing in the City of Shakopee. This trail river crossing is being restored after a deteriorated bridge crossing was removed by the MnDNR in 1997.

The north end of the MV Trail Carver Rapids Wayside recreation area is located directly south of Chaska across the Minnesota River. The MnDNR has developed a horse, mountain bike, and snowmobile trail from Chaska upriver to Belle Plaine. The northerly trailhead is located on the east side of existing TH 41 about one-half mile south of the Minnesota River/Chaska city limits. These trails are grass or sand.

Access and Usage

Vehicle access to the MVSRA and the MV Trail is provided from Trunk Highway 41 in the City of Chaska and from Highway 101 in the City of Shakopee; three parking lots are available. The MVSRA is easily accessed by pedestrians and bicyclists via these routes as well. There are three boat launching facilities in the MVSRA within the study area. Over 170,000 people visit the MVSRA annually.

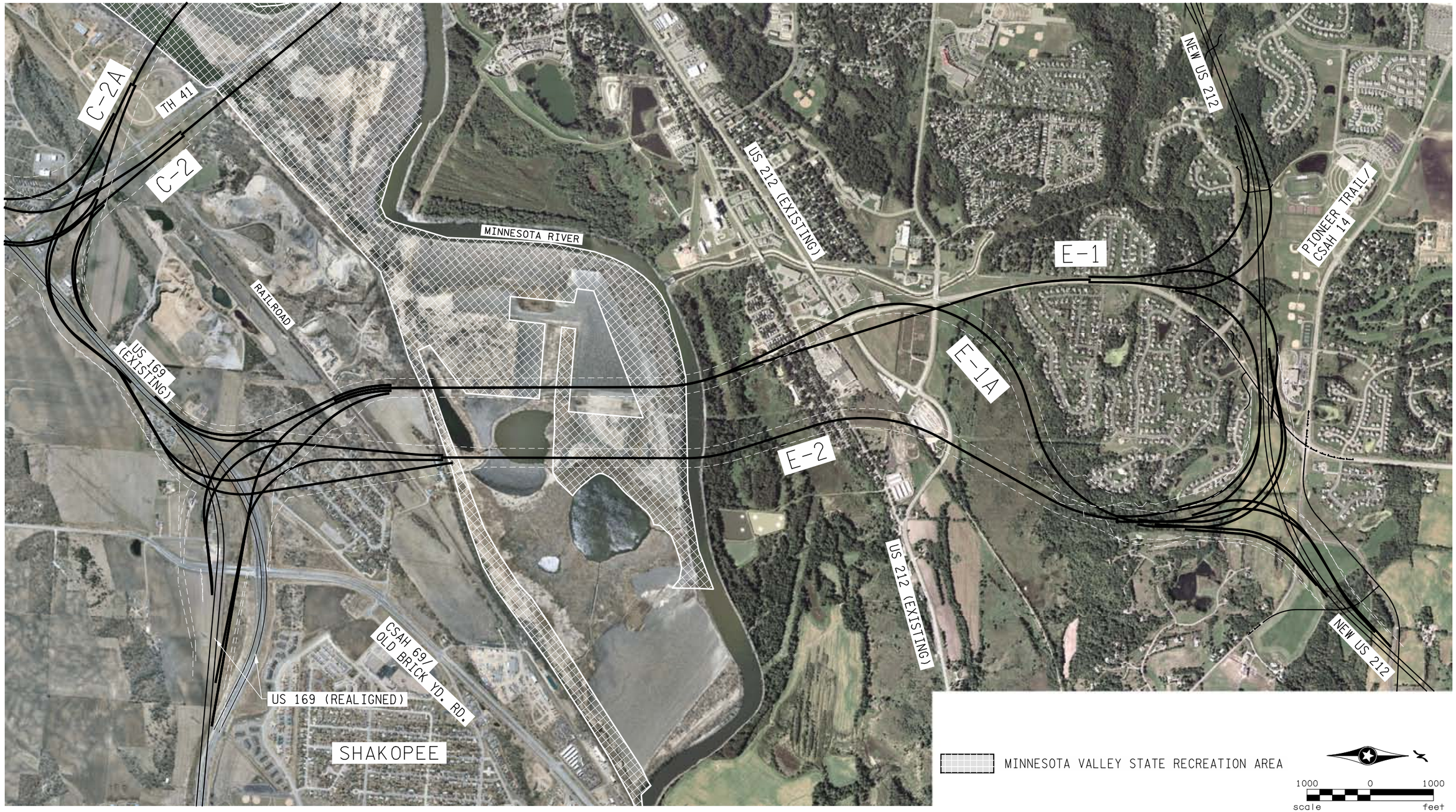
Relationship to Similar Resources in the Area

The Minnesota Valley National Wildlife Refuge (MVNWR) is adjacent to the MVSRA to the southwest and northeast in the river valley. The MVNWR is described in Section III.B.

There are several city-owned parks along the river adjacent to the MVSRA; they include Riverside Park in the City of Carver, and Hickory, Winkle, Fireman's II, Schalow and Riverview parks in the City of Chaska.

The City of Chaska owns and operates a network of trails. The network consists of greenway trails (leisure and recreation trails which primarily parallel the watershed system of East Chaska Creek leading to the University of Minnesota Arboretum) and roadway trails (destination trails that interconnect most of Chaska's major public facilities and service centers).

Creek Road in Chaska is scheduled to be converted to a City-owned trail in conjunction with the Heights of Chaska development (described in Chapter 5 of the DEIS). The Metropolitan Council has plans to connect this trail with a proposed Victoria-to-Chaska Regional Trail (Carver Regional Park to Minnesota Valley State Trail – generally located on existing CR 11). Conversion is planned to occur when CR 11 is upgraded, sometime in the next five to ten years, according to City of Chaska staff.



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SECTION 4(f) RESOURCES- MVSRA

Figure B-3

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Applicable Clauses Affecting Ownership

The MVSRA and the MV Trail have received funding from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is applicable to these resources.

Unusual Characteristics

There are no notably unusual characteristics.

Impacts on the Section 4(f) Resource

Below is a discussion of each Build alternative and its impact on MVSRA and MV Trail.

Alternative W-2

Alternative W-2 would cross directly through the MVSRA and the MV Trail, requiring 30.6 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVSRA and MV Trail.

Alternative C-2

Alternative C-2 would cross directly through the MVSRA and the MV Trail, requiring 22.3 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVSRA and MV Trail.

Alternative C-2A

Alternative C-2A would cross directly through the MVSRA and the MV Trail, requiring 5.4 acres through partial acquisition or an easement. The bridge crossing would be approximately 75 feet above the river and would be visible from the MVSRA and the MV Trail.

Alternative E-1

Alternative E-1 would cross directly through the MVSRA and the MV Trail, requiring 12.0 acres through partial acquisition or an easement. The bridge crossing would be approximately 65 feet above the river and would be visible from the MVSRA and MV Trail.

Alternative E-1A

Alternative E-1A would cross directly through the MVSRA and the MV Trail, requiring 12.0 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVSRA and the MV Trail.

Alternative E-2

The alignment of Alternative E-2 would cross directly through the MVSRA and the MV Trail, requiring 4.2 acres through partial acquisition or an easement. The bridge crossing would be approximately 60 feet above the river and would be visible from the MVSRA and the MV Trail.

D. ATHLETIC PARK

Description of Section 4(F) Resource

The Section 4(f) resource that could be affected by the proposed action is Athletic Park. In addition to being a park resources, Athletic Park (Chaska Cubs Ball Field) has been determined to be eligible for the National Register of the Historic Places (NRHP).

Detailed Map

Figure B-2 shows the relationship of the six Build alternatives to Athletic Park.

Size and Location

Athletic Park, 725 West First Street in the City of Chaska, is eight acres in size. The park is located north of Chaska Lake and west of the Minnesota Valley National Wildlife Refuge (MVNWR).

Ownership and Type

Athletic Park is a community park owned by the City of Chaska. The site was designated as a park in the early 1950s.

Function of and/or Available Activities/Activities and Use

Athletic Park is used primarily for baseball and softball games. Facilities at the park include a grandstand with a capacity of 1,000, concession stand, lighting, restrooms and off-street parking.

Description of Existing and Planned Uses

The park is heavily used by high school and adult municipal ball teams including the Chaska Cubs, a Class B baseball team. The park hosts four or five tournaments each year and the state Class B baseball tournament every ten years.

The *Chaska Comprehensive Plan* states that very little development is contemplated other than a trail between Chaska and Carver, primarily for nature interpretive purposes. It states a trailhead is planned at Athletic Park and another near downtown Carver. The trailhead in Carver has been created; the trailhead at Athletic Park has not been created. In addition, City staff states there are plans to pave the existing gravel parking lot and provide and additional ball field in the next five to ten years.

Access and Usage

Vehicle access to the park is provided via First Street near existing US 212. The park includes a paved roadway that leads to off-street parking on a gravel surface for about 500 cars. The park is used heavily by high school ball teams and adult municipal ball teams.

Relationship to Similar Resources in the Area

Hickory and Winkel parks are owned by the City of Chaska and are in the vicinity of Athletic Park; both are neighborhood parks. Hickory Park is used primarily for play and picnicking; level of use is light. Winkel Park is used primarily as a trailhead and boat launch; level of use is moderate. Hickory and Winkel parks are not visible from Athletic Park.

Chaska has plans to build a new sports facility about three miles to the north once construction of US 212 is complete. The new park will provide ball fields, concession stand, lighting and off-street parking. Anticipated future use is heavy.

Immediately to the east is the Minnesota Valley National Wildlife Refuge (MVNWR) and to south is the Minnesota Valley State Recreation Area (MVSRA), as described in Section III-C. These resources are quite large in size (hundreds of acres) occupying most of the Minnesota River floodplain in the study area. Both the MVNWR and the MVSRA are visible from the Athletic Park.

Applicable Clauses Affecting Ownership

Athletic Park has not received funding from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is not applicable to this resource.

Unusual Characteristics

Given its proximity to the Minnesota River floodplain, Athletic Park is subject to periodic flooding in the spring. As noted, the park is also know as Chaska Cubs Ball Field and has been determined to be eligible for the NRHP.

Impacts on the Section 4(f) Resource

Below is a discussion of each Build alternative and its impact on Athletic Park.

Alternative W-2

Alternative W-2 is about 2,500 feet from Athletic Park at its closest point. Therefore, no direct impact to Athletic Park is anticipated. Given the distance between Athletic Park and Alternative W-2, visual and noise impacts are not likely.

Alternative C-2

Alternative C-2 would cross directly through Athletic Park requiring 3.5 acres. This represents over half of the size of the park and effectively includes all facilities at the park. The remaining land could no longer be used as a ballfield. It is possible that the entire 8-acre site would need to be acquired if the remaining portion is not usable for park purposes.

Alternative C-2A

Alternative C-2A is about 400 feet from Athletic Park at its closest point. Therefore, no direct impact to Athletic Park is anticipated. The level of visual and noise impacts is uncertain.

Alternative E-1

Alternative E-1 is more than one mile from Athletic Park at its closest point. Therefore, no direct impact to Athletic Park is anticipated. Given the distance between Athletic Park and Alternative E-1, visual and noise impacts are not likely.

Alternative E-1A

Alternative E-1A is more than one mile from Athletic Park at its closest point. Therefore, no direct impact to Athletic Park is anticipated. Given the distance between Athletic Park and Alternative E-1A, visual and noise impacts are not likely.

Alternative E-2

Alternative E-2 is more than one mile from Athletic Park at its closest point. Therefore, no direct impact to Athletic Park is anticipated. Given the distance between Athletic Park and Alternative E-2, visual and noise impacts are not likely.

E. AUDUBON TRAIL

Description of Section 4(f) Resource

The Section 4(f) resource that could be affected by the proposed action is Audubon Trail.

Detailed Map

Figure B-4 shows the relationship of the applicable Build alternatives to Audubon Trail.

Size and Location

Audubon Trail, about three miles in length, is located on the eastern side of the City of Chaska connecting the City from the south to the north. It is parallel to Audubon Road, running south-north near the border with the City of Chanhassen between Engler Boulevard/CSAH 10 on the south and Lyman Boulevard/CSAH 18 on the north.

Ownership and Type

Audubon Trail is a trail owned by the City of Chaska. The trail was created in the early 1980s and upgraded in the early 1990s.

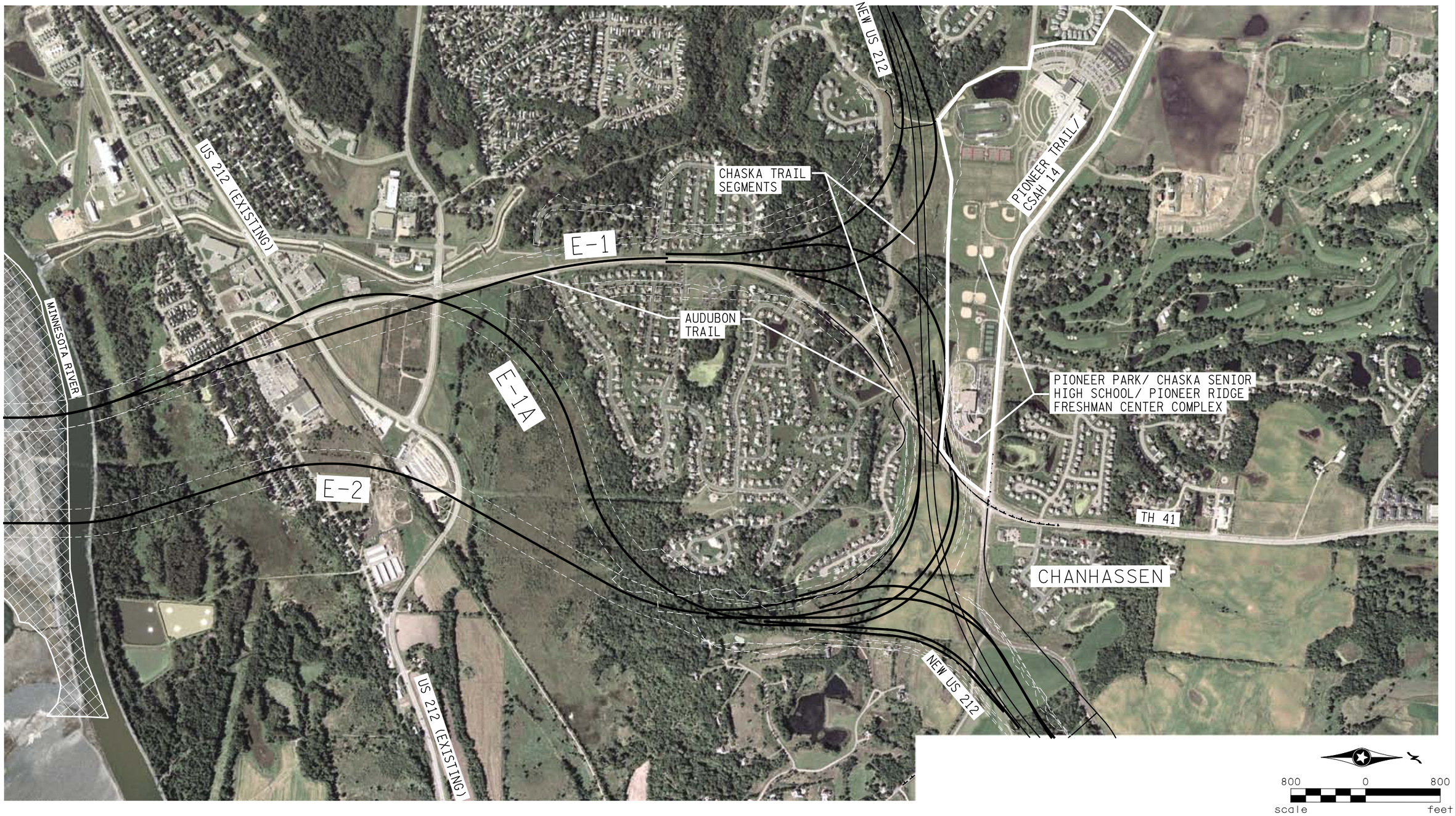
Function of and/or Available Activities/Activities and Use

Audubon Trail is used for walking and biking.

Description of Existing and Planned Uses

Audubon Trail is an eight foot wide pedestrian and bike trail and provides connections to the main east-west trails in the City. It parallels Audubon Road and serves residents in the neighborhoods to the east and west. Students at the Pioneer Ridge Freshman Center, and users of the outdoor recreational facilities at the school and Pioneer Park, use the trail to walk to school.

Construction of New US 212 will require a new bridge for Audubon Road, including Audubon Trail, to cross over New US 212.



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SECTION 4(f) RESOURCES- AUDUBON TRAIL, CHASKA TRAIL SEGMENTS, PIONEER PARK/ HIGH SCHOOL/ FRESHMAN CENTER COMPLEX

Figure B-4

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING
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Access and Usage

The trail is accessible along its entirety and provides connections to the main east-west trails in the City. The trail is moderately to heavily used.

Relationship to Similar Resources in the Area

The City of Chaska owns and operates a network of trails. The network consists of greenway trails (leisure and recreation trails which primarily parallel the watershed system of East Chaska Creek leading to the University of Minnesota Arboretum) and roadway trails (destination trails that interconnect most of Chaska's major public facilities and service centers).

The Minnesota Valley State Trail (MV Trail) in the Minnesota Valley State Recreation Area (MVSRA) runs through the study area and is described in Section III-C. The five-mile section of paved trail, referred to as the Chaska/Shakopee Bike Trail, runs from the former Milwaukee Railroad right of way near the Carver County Courthouse area in Chaska to Murphy's Landing in Shakopee. When reconstruction of the existing TH 41 river bridge is complete in 2007 it will restore the MV Trail connection between the City of Chaska and Murphy's Landing in the City of Shakopee.

Applicable Clauses Affecting Ownership

Audubon Trail has not received funding from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is not applicable to this resource.

Unusual Characteristics

There are no notably unusual characteristics of the resource.

<u>Impacts on the Section 4(f) Resource</u>

Below is a discussion of each Build alternative and its impact on Audubon Trail.

Alternative W-2

Alternative W-2 is several miles from Audubon Trail at its closest point. Therefore, no direct impact to Audubon Trail is anticipated.

Alternative C-2

Alternative C-2 is several miles from Audubon Trail at its closest point. Therefore, no direct impact to Audubon Trail is anticipated.

Alternative C-2A

Alternative C-2A is several miles from Audubon Trail at its closest point. Therefore, no direct impact to Audubon Trail is anticipated.

Alternative E-1

Alternative E-1 would directly impact Audubon Trail by requiring removal of a portion of it (approximately 7,200 linear feet or 1.3 acres) and a portion of Audubon Road that parallels it. Audubon Trail would be realigned/reconstructed with Audubon Road before construction of New TH 41 begins to maintain access and minimize disruption to residents in the neighborhoods at the northern end of the alternative.

Alternative E-1A

Alternative E-1A would directly impact Audubon Trail by requiring removal of a portion of it (approximately 1,000 linear feet or 0.2 acres) and a portion of Audubon Road that parallels it. Audubon Trail would be realigned/reconstructed with Audubon Road before construction of New TH 41 begins to maintain access and minimize disruption to residents in the neighborhoods at the northern end of the alternative.

Alternative E-2

Alternative E-2 would directly impact Audubon Trail by requiring removal of a portion of it (approximately 1,000 linear feet or 0.2 acres) and a portion of Audubon Road that parallels it. Audubon Trail would be realigned/reconstructed with Audubon Road before construction of New TH 41 begins to maintain access and minimize disruption to residents in the neighborhoods at the northern end of the alternative.

F. CHASKA TRAIL SYSTEM

Description of Section 4(f) Resource

The Section 4(f) resource that could be affected by the proposed action is a portion of the Community Trail System in the City of Chaska.

Detailed Map

Figure B-4 shows the relationship of the six Build alternatives to the trail segments.

Size and Location

Two segments of the Chaska owned and operated greenway trail system are under discussion here. One segment originates at Pioneer Ridge Freshman Center, and runs parallel to Audubon Trail for about one-half mile and then continues to the southwest along side a ravine for another one-half mile where it connects to other trail segments in the system. This trail segment is slightly less than one mile in length (approximately 4,500 feet). The other segment originates at the southwestern edge of Chaska Senior High School property and runs south to New US 212 where it meanders southwest and southeast along side a ravine and eventually connects to the trail mentioned above. This trail segment is about one-half mile in length (approximately 3,000 feet).

Ownership and Type

The trails are owned by the City of Chaska. The trails were created in the 1980s.

Function of and/or Available Activities/Activities and Use

The trails are used for walking and biking.

Description of existing and planned uses

The trails are eight foot wide pedestrian and bike paths that provide connections to other trail segments in the City system. They serve residents in the neighborhoods to the south. Students at Chaska Senior High School and Pioneer Ridge Freshman Center use the trails to get to and from school as do and users of the outdoor recreational facilities at the schools and Pioneer Park.

Construction of New US 212 will require new bridges for the trails to cross over New US 212.

Access and Usage

The trails are accessible along their entirety and provide connections to other trails in the City system. The trail is moderately to heavily used.

Relationship to Similar Resources in the Area

The City of Chaska owns and operates a network of trails. The network consists of greenway trails (leisure and recreation trails which primarily parallel the watershed system of East Chaska Creek leading to the University of Minnesota Arboretum) and roadway trails (destination trails that interconnect most of Chaska's major public facilities and service centers).

The Minnesota Valley State Trail (MV Trail) in the Minnesota Valley State Recreation Area (MVSRA) runs through the study area and offers recreational opportunities for biking, hiking, snowmobiling, and horseback riding. The five-mile paved trail, referred to as the Chaska/Shakopee Bike Trail, runs from the former Milwaukee Railroad right of way near the Carver County Courthouse area in Chaska to Murphy's Landing in Shakopee. When reconstruction of the existing TH 41 river bridge is complete in 2007 it will restore the MV Trail connection between the City of Chaska and Murphy's Landing in the City of Shakopee.

Applicable Clauses Affecting Ownership

These segments of the trail system in the City of Chaska have not received funding from the Land and Water Conservation Act of 1965 (LAWCON). Therefore, Section 6(f) is not applicable to this resource.

Unusual Characteristics

There are no notably unusual characteristics of the resource.

Impacts on the Section 4(f) Resource

Below is a discussion of each Build Alternative and its impact on the trail segments.

Alternative W-2

Alternative W-2 is several miles from the trail segments at its closest point. Therefore, no direct impact to the trails is anticipated.

Alternative C-2

Alternative C-2 is several miles from the trail segments at its closest point. Therefore, no direct impact to the trails is anticipated.

Alternative C-2A

Alternative C-2A is several miles from the trail segments at its closest point. Therefore, no direct impact to the trails is anticipated.

Alternative E-1

Alternative E-1 would directly impact the trail segments by requiring acquisition of property (approximately 3,000 feet of the easterly trail and 1,200 feet of the westerly trail) for construction of the interchange with New US 212. Box culverts would be installed to maintain the easterly trail. The westerly trail is being impacted and restored with a pedestrian overpass by the New US 212 project now under construction. The impact of the proposed project would require that the pedestrian overpass be replaced with a longer overpass.

Alternative E-1A

Alternative E-1A would directly impact the one of the trail segments by requiring acquisition of property (approximately 800 feet of the easterly trail) for construction of the interchange with New US 212. A box culvert would be installed to maintain the easterly trail. The westerly trail is being impacted and restored with a pedestrian overpass by the New US 212 project now under construction. The impact of the proposed project would require that the pedestrian overpass be replaced with a longer overpass.

Alternative E-2

Alternative E-2 would directly impact one of the trail segments by requiring acquisition of property (approximately 800 feet of the easterly trail) for construction of the interchange with New US 212. A box culvert would be installed to maintain the easterly trail. The westerly trail is being impacted and restored with a pedestrian overpass by the New US 212 project now under construction. The impact of the proposed project would require that the pedestrian overpass be replaced with a longer overpass.

G. PIONEER PARK/CHASKA SENIOR HIGH SCHOOL/PIONEER RIDGE FRESHMAN CENTER COMPLEX

Description of Section 4(f) Resource

The Section 4(f) resource that could be affected by the proposed action is the outdoor recreation facilities complex comprising Pioneer Park, Chaska Senior High School, and Pioneer Ridge Freshman Center sports fields and facilities.

Detailed Map

Figure B-4 shows the relationship of the applicable Build alternatives to Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex.

Size and Location

Pioneer Park, Chaska Senior High School, and Pioneer Ridge Freshman Center form a school/community recreation complex in the vicinity of New US 212/Audubon Road/Pioneer Trail in Chaska. Together these facilities are 12.1 acres in size.

Ownership and Type

Pioneer Park is made up of outdoor recreation facilities at Chaska Senior High School, Pioneer Park and Pioneer Ridge Freshman Center. The City of Chaska owns about ten acres of the park; the remainder is owned by School District 112. The site was designated a park in the early 1990s. The City of Chaska maintains a small portion of the park including a picnic shelter and play structure; School District 112 maintains the rest of Pioneer Park. Chaska Senior High School and the Pioneer Ridge Freshman Center are owned and maintained by School District 112. Chaska Senior High School was built in 1966. Pioneer Ridge Freshman Center was built in 2002.

Function of and/or Available Activities/Activities and Use

The outdoor recreational facilities at Pioneer Park are used for play, picnicking, soccer, baseball and softball. Portable restrooms are available. No permanent restrooms facilities are present. The outdoor facilities at Chaska Senior High School and Pioneer Ridge Freshman Center are used for tennis, soccer, baseball and softball. The track and football field are not open to the public for recreational purposes. Portable restrooms are available. No permanent restrooms facilities are present.

Description of Existing and Planned Uses

The outdoor recreational facilities at Pioneer Park are used primarily for play, picnicking, and sporting activities on the fields. Park facilities include six multi-purpose/ball fields, a picnic shelter, and play structure. Portable restroom facilities are present. The majority of what is called “Pioneer Park” is owned and maintained by School District 112. About 10 acres of the park are owned by the City of Chaska – two acres west of the high school building and eight

acres east of the school. The fields are in high demand after school hours and are fully scheduled, April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

Pioneer Park is part of a larger educational and recreational complex that includes Chaska Senior High School and Pioneer Ridge Freshman Center, immediately adjacent to the park to the west and east respectively. Outdoor recreational facilities (ball fields, multi-purpose fields, and tennis courts) open to the public at Chaska Senior High School are used primarily for outdoor sporting activities by students at the adjacent schools and by municipal athletic groups in the evenings and on weekends. Outdoor recreational facilities open to the public at Pioneer Ridge Freshman Center include ball fields, multi-purpose fields and tennis courts. The fields are scheduled similar to Pioneer Park.

City of Chaska staff state there are plans to upgrade the dugouts and backstops and install an irrigation system in the next five years. According to the *Chaska Comprehensive Plan* Chaska Senior High School was built with three wings that accommodate 500 students each. The site can accommodate a fourth wing for future expansion. As of Fall 2006, enrollment at Chaska Senior High School and Pioneer Ridge Freshman Center is 1,831 and 593, respectively.

Access and Usage

Vehicle access to the complex is provided by Pioneer Trail/CSAH 14. There are paved roadways providing access and off-street parking for visitors. An existing City of Chaska trail also serves the complex. The park and school facilities are heavily used. The fields are fully scheduled April through October, by various athletic groups during the weekday evening hours and Saturday mornings. The fields are available for unscheduled use on Saturday afternoons and all day Sunday.

Relationship to Similar Resources in the Area

The Chaska elementary and middle school complex, about one mile to the southwest, offers similar public outdoor recreational opportunities as Pioneer Park including eight multi-purpose fields, five ball fields, running track and playground structure. One soccer field is fenced and not open to the public for recreational use.

Applicable Clauses Affecting Ownership

There are/no known restrictions on property ownership relevant to Section 4(f) considerations.

Unusual Characteristics

There are no notably usual characteristics.

Impacts on the Section 4(F) Resource

Below is a discussion of each Build alternative and its impact on the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex.

Alternative W-2

Alternative W-2 is several miles from the complex at its closest point; therefore, no direct impact is anticipated. Given the distance between the complex and Alternative W-2, noise and visual impacts are not likely.

Alternative C-2

Alternative C-2 is several miles from the complex at its closest point; therefore, no direct impact on Pioneer Park is anticipated. Given the distance between the complex and Alternative C-2, noise and visual impacts are not likely.

Alternative C-2A

Alternative C-2A is about one mile from the complex at its closest point; therefore, no direct impact on Pioneer Park is anticipated. Given the distance between the complex and Alternative C-2A, noise and visual impacts are not likely.

Alternative E-1

Alternative E-1 encroaches on the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex property requiring 10.4 acres of land, a partial acquisition. The ramp connecting Alternative E-1 with New US 212 would require right of way from a portion of the park property and would affect the southern portion of the ball fields. Alternative E-1 would be visible from the complex. Given Alternative E-1's close proximity to Pioneer Park noise could be a factor for users of its outdoor recreational facilities.

Alternative E-1A

Alternative E-1A encroaches on the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex property requiring 2.7 acres of land, a partial acquisition. The ramp connecting Alternative E-1A with New US 212 would require right of way from a portion of the park property and would affect the vehicle access road to the park. Alternative E-1A would be visible from the park. Given its close proximity to Pioneer Park noise could be a factor for users of its outdoor recreational facilities.

Alternative E-2

Alternative E-2 encroaches on the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex property requiring 1.1 acres of land, a partial acquisition. The ramp connecting Alternative E-2 with New US 212 would require right of way from the park property and would affect the vehicle access road to the park. Alternative E-2 would be visible from the park. Given its close proximity to Pioneer Park noise could be a factor for users of its outdoor recreational facilities.

IV. AVOIDANCE ALTERNATIVES

Each of the six Build alternatives impacts more than one Section 4(f) resource. Avoidance of the MVNWR involves impacts to the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex, as well as other social, economic and environmental impacts. Impacts to the MVSRA or MV Trail are not avoided by any of the alternatives; these resources are essentially unavoidable in the study area. Avoidance of Athletic Park is achieved by selection of a corridor other than Alternative C-2; some of these other alternatives result in greater impact to the MVNWR and/or the MVSRA; other alternatives impact the Pioneer Park/Chaska Senior High School/Pioneer Ridge Freshman Center complex and have further social, economic and environmental impacts. Alternatives that were studied during the project scoping process and eliminated from further consideration are discussed in Chapter 3 of the DEIS.

V. MEASURES TO MINIMIZE HARM

With the potential exception of the impact of Alternative C-2 on Athletic Park, the proposed project would not require total use of the resources and would allow for continued use and enjoyment of the recreational facilities at the affected resources after construction; efforts would be made to maintain access to, and use of, the facilities during construction. To the extent possible, changes to the visual setting of any of the affected resources caused by the construction of the Build alternative would be minimized through roadway and/or bridge design.

VI. COORDINATION

Extensive agency coordination has occurred throughout the DEIS process, as discussed in the DEIS, Chapter 15. Coordination related to the discussion of impacts has occurred with federal, state, and local government agencies and non-governmental groups. Further coordination will continue with the USFWS (MVNWR), the MnDNR (MVSRA and MV Trail), the City of Chaska (Athletic Park, Audubon Trail, Pioneer Park), and the School District (Chaska Senior High School, Pioneer Ridge Freshman Center).

APPENDIX C

LIST OF ACRONYMS

ADT	Average Daily Traffic
BG	(Census) Block Group
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
BWSR	Board of Water and Soil Resources
CO	Carbon Monoxide
CEQ	Council on Environmental Quality
CFC	Calcareous Fen Components
CMP	Corridor Management Plan
COE	Corps of Engineers (U.S. Army)
CR	County Road
CSAH	County State Aid Highway
dB(A)	Decibels (A-weighted)
DE	Diesel Exhaust
D/(F)EIS	Draft /(Final)Environmental Impact Statement
DOI	Department of the Interior
EIS	Environmental Impact Statement
EMS	Emergency Medical Service
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FCAs	Fish Consumption Advisories
FHWA	Federal Highway Administration
FPPA	Farmland Protection and Policy Act
HCRRA	Hennepin County Regional Rail Authority
IBI	Index of Biotic Integrity
IRC	Interregional Corridor
IRIS	Integrated Risk Information System
LAWCON	Land and Water Conservation Fund
LMRWD	Lower Minnesota River Watershed District
LGU	Local Governmental Unit
LOS	Level of Service
LRT	Light Rail Transit
MCBS	Minnesota County Biological Survey
MCES	Metropolitan Council Environmental Services
MEPA	Minnesota Environmental Policy Act
MLCCS	Minnesota Land Cover Classification System
MMUTCD	Minnesota Manual on Uniform Traffic Control Devices
Mn/DOT	MN Department of Transportation
MnDNR	MN Department of Natural Resources
MNRAM	Minnesota Routine Assessment Method
MPCA	Minnesota Pollution Control Agency
MSAT	Mobile Source Air Toxic
MV(M)	Million Vehicle (Miles)
MVNWR	Minnesota Valley National Wildlife Refuge
MVSRA	Minnesota Valley State Recreation Area
MV Trail	Minnesota Valley State Trail
NAAQS	National Ambient Air Quality Standards
NAC	Noise Area Classification
NAC	Noise Abatement Criteria
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NHP	Natural Heritage Program
NHS	National Highway System
NLEV	National Low Emission Vehicle
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resource Conservation Services
NRI	Nationwide Rivers Inventory
NWI	National Wetlands Inventory
PAC	Policy Advisory Committee
PCB	Polychlorinated Biphenyls
PMT	Project Management Team
PM	Particulate Matter
RFG	Reformulated Gasoline
RGU	Responsible Governmental Unit
SAC	Study Advisory Committee
SD/SDD	Scoping Document/Scoping Decision Document
SDS	State Disposal System
SIP	State Implementation Plan
SFWC-CFC	Seminary Fen Wetland Complex - Calcareous Fen Components
TDM	Travel Demand Management
TSM	Transportation System Management
TSP	Transportation System Plan
TAZ	Traffic Analysis Zone
TH	Trunk Highway
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VHT	Vehicle Hours Traveled
VMT	Vehicles Miles Traveled
VOCs	Volatile Organic Compounds
WCA	Wetland Conservation Act
WHEP	Wetland Health Evaluation Program
WPA	Wellhead Protection Area

TH 41 MINNESOTA RIVER CROSSING:

A Future US169/US 212 Regional Freeway Connection

MINNESOTA DEPARTMENT OF TRANSPORTATION

State Project Number: S.P. 1008-60
Trunk Highway Number: TH 41

Draft Tier I Environmental Impact Statement
and Draft Section 4(f)/6(f) Evaluation

June 2007

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TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:

A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

FOR

TRAVEL DEMAND FORECASTING

MAY 1, 2006

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF CONSULTING GROUP, INC.

Transportation • Civil • Structural • Environmental • Planning • Traffic • Landscape Architecture • Parking • Right of Way

SRF No. 0024590

MEMORANDUM

TO: Lynn Clarkowski, Mn/DOT

FROM: Jonathan Ehrlich, P.E., Senior Engineer

DATE: May 1, 2006

SUBJECT: TH 41 EIS: TECHNICAL MEMORANDUM ON TRAVEL DEMAND FORECASTING
MINNESOTA DEPARTMENT OF TRANSPORTATION

The purpose of this memorandum is to document the travel demand forecasts for the TH 41 DEIS. This memorandum includes a discussion of the forecast modeling process, model validation information, transportation facility and socio-economic data assumptions, and forecast results.

I. THE PURPOSE OF TRAVEL DEMAND FORECASTS

Travel demand models estimate the amount of travel on transportation facilities given sets of development and transportation system development. The forecast provide basic descriptors of facility use (such as roadway volumes or transit ridership) and generalized travel impacts such as vehicle miles of travel and vehicle hours of travel. Travel demand forecasts are also used as inputs to other areas of analysis such as benefit-cost, noise, and air quality impacts.

This technical memorandum summarizes the travel demand forecast methodology and results for the TH 41 Draft EIS in the southwest Twin Cities. The Twin Cities regional travel demand model, developed by the Metropolitan Council in 2004, was used to develop forecasts in the Twin Cities Metropolitan Area.

Travel demand models are based on mathematical relationships and assumptions regarding future conditions. Models provide a representation of the future, but lack of certainty regarding future-year conditions dictates that model results should not be considered as having unwarranted precision. Their best use is as a comparison among alternatives for relative differences and impacts. Decision-makers and designers should be aware of the uncertainty in long-range forecasts and whether that uncertainty would affect outcomes related to forecast volumes.

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II. MAJOR FINDINGS AND CONCLUSIONS

- The southeastern edge of the urbanizing development in the Twin Cities will encompass the TH 41 travelshed. Population in the study area will nearly triple between 2000 and 2040, increasing from 60,000 to 179,000. Employment will increase by 130 percent in the same period, from 30,000 to 71,000.

- Demand to travel across the Minnesota River will increase substantially by 2040, both on existing TH 41 and on adjacent river crossings. Demand on the existing TH 41 crossing will double by 2040, from 18,500 to 36,500. Demand on all crossings from CSAH 9/45 to TH 169 will increase by 135 percent in the same period, from 100,000 to 237,000 per day.

- As demand increases, congestion will increase on existing TH 41 from two hours per day in 2000 to ten hours per day in 2040.

- Forecast traffic for the New TH 41 river crossing ranges from 45,000 to 59,000 per day, with the eastern Build alternatives generally carrying more traffic than the western and central alternatives.

- Because all Build alternatives provide capacity exceeding 60,000 vehicles per day, and daily volumes on these crossings are forecast to be less than 60,000, the Build alternatives represent largely unconstrained demand on the new river crossings.

- The Build alternatives all divert a substantial amount of traffic (11,400-14,500 vehicles per day) from the existing TH 41 river crossing.

- Alternatives W-2, C-2, and C-2A divert 4000 vehicles per day from the Highway 101 river crossing. Alternatives E-1, E-1A, and E-2 divert 10,000 vehicles per day.

- The Build alternatives all enable approximately 18,000 additional trips per day to cross the Minnesota River between CSAH 9/45 and TH 169.

- All Build alternatives all relieve congestion from existing TH 41 from ten hours per day under the No-Build alternative to fewer than four.

- All Build alternatives increase the amount of highway travel in the study area (represented by a two percent increase in vehicle miles traveled) and increase the average speed of travel (represented by 1 one percent decrease in vehicle hours traveled)

III. TRAVEL DEMAND MODELING PROCESS

Travel forecasts were prepared using a modified version of the travel demand models developed and approved by the Metropolitan Council and the Minnesota Department of Transportation. These models are computerized procedures for systematically predicting travel demand changes in response to development and transportation facility changes.

These models, used primarily for major project planning efforts, are calibrated and validated at a level of accuracy sufficient for planning regional facilities such as freeways and major arterials. This provides sufficient accuracy for most regional and corridor-level planning. The models were completed in 2004 using data from an extensive regional Travel Behavior Inventory (TBI) conducted by the Metropolitan Council and Mn/DOT in 2001. These forecasts include modifications made by the Metropolitan Council as of November, 2005.

The procedure used to simulate and forecast travel patterns is a complex battery of input data and computer processes that transform data into representations of travel. The process uses the standard "four-step" approach to travel forecasting with sequential generation, distribution, mode choice, and assignment models. The models use stand-alone FORTRAN-language modules developed for the Twin Cities as well as the Cube Voyager travel forecasting software.

The main components of the travel forecasting process are shown in Figure 1 and are described below. Detailed documentation of the model parameters is available from the Metropolitan Council.

Highway Network Representation

All of the freeways, expressways, and major arterial roadways in the Twin Cities area are compiled into a computer representation of the region's highway system. In addition, most minor arterials and many collector roads and other local streets are included. The attributes of the roadways are described in terms of area type, facility type, distance, free-flow speed, number of lanes, and capacity.

The regional network was prepared using values for speed and capacity by area type and facility type based, in part, on speed studies conducted as part of the 2001 regional Travel Behavior Inventory. These values are shown in Table 1.

Transit Network Representation

All regional transit routes are included in a computer representation of the transit system. The transit network defines the transit system in terms of links (which represent the highway system) and lines (which define a transit route's frequency and path). Data in the transit network include link speed, link distance, route frequency, and route type.

Zonal Data Representation

The regional models divide the seven-county Twin Cities Metropolitan area into 1,201 geographic transportation analysis zones (or TAZs). The thirteen ring counties are divided into 365 TAZs. Various demographic and socioeconomic data are allocated into these zones for the purposes of the forecast models. The main exogenous data are population, household, retail employment, and non-retail employment. The zones also serve as the beginning and end locations of travel in the region. In addition to the 1,566 zones, the 35 most important interface points between the seven-county core and the thirteen county ring are identified and included as "external" zones. The 31 most important points of entry into the twenty county regions are identifies and included as "perimeter" zones. The zonal system was determined primarily on the basis of physical boundaries and major roadways.

Socioeconomic inputs for the regional model are currently developed outside the travel demand forecasting process. Documentation on the methodology used to generate these inputs is available from the Metropolitan Council. Modifications to the base zonal data are discussed in a subsequent section.

Trip Generation

Trip generation is the process by which the number of trips attributed to a zone is estimated based on the amount and type of activity in that zone. Trips are either "produced" by or "attracted" to a zone, depending on the type of trip. Each trip has two ends. Trips either beginning at a household or ending at a household are considered to be produced by that household. Trips are attracted to non-residential activities such as universities, workplaces, or shopping areas.

The end result of trip generation estimation is a total number of trips produced by and attracted to each zone. The trips at this point are called "person-trips" and do not have any association with a given mode of travel.

The determinants of household trip production are household size, household income, the number of automobiles owned, and location. Several factors contribute to trip attractions, depending on the trip purpose. The main factors are retail employment, non-retail employment, and the amount of activity within a given proximity and area type.

The trip generation phase of the forecasting process uses trip rates (i.e., number of trips per person, household, or employee) based on the 2001 regional TBI applied to each zone to calculate the number of trips taken, by purpose (home-based work, shopping, grade school, work-related, and other, and non home-based work and other). Trip generation in the ring counties employs only three trip purposes (home-based work, home-based other, and non home-based).

Within the trip generation model are two socio-economic sub-models: an employment density-based parking model, and in income/household size related auto ownership model.

Destination Choice

The destination choice process coverts the person-trips estimated in the generation step to movements between pairs of zones based on the amount of travel activity in a zone and the generalized travel time proximity of the producing zone to other zones. The resulting trip tables provide the number of trips between zones. Trip tables are calculated for each trip purpose (stratified by auto-ownership and also by income for home-based work trips) for both peak and off-peak travel.

A discrete choice model is the backbone of the destination choice process. This process distributes trips from each production zone to attraction zones based on the relative utility, or attractiveness of each attraction zone. Attractiveness is a function of the number of attractions in the zone, level of service (distance, travel time by different modes, travel cost of different modes, parking cost), and location (area type).

The generic destination choice model does not fully account for all trip distribution patterns. Other factors factor into destination selection such as reluctance to cross a geographic barrier, tax-favorable residential area, or a "prestigious" shopping district. The Twin Cities destination choice model is calibrated to include adjustment coefficients, or "K-factors" to account for these other factors among forty-three internal districts in the seven-county area.

Certain major destinations (such as universities colleges, major airports, and regional malls) have different distribution patterns than other internal trips. Trips are distributed to these "special generator" locations first in the trip generation step, and the productions associated with these trips are removed from their respective zones before trip distribution.

Mode Choice

The mode choice phase of the regional model uses a nested discrete choice model to identify the number of person-trips between each pair of zones and determine whether the trips are made by single-occupant vehicles, carpools, or transit riders. The model is further used to determine if a trip is a candidate for a high-occupancy vehicle lane.

External Station Choice

The external-station choice model connects trips between the core seven-county area and the ring county area. It uses a discrete choice model to identify an external station for each trip that enters, exits, or passes through the seven-county area. It then splits each trip into a ring county trip (between the external station and either a ring county TAZ or a perimeter station) and a core county trip (between the external station and a core county TAZ).

Temporal Distribution

The time-of-day or temporal distribution model takes the estimated daily vehicle trips and distributes them across periods of time in order to more accurately reflect peaking conditions on the roadway system. The basis for the temporal distribution is the 2001 regional TBI. 24 time periods ranging in length from 30 to 120 minutes are differentiated. Differentiation among peak hours enables better estimates of congested conditions on an hourly basis and better-assigned highway volumes (discussed in the next section).

Highway Assignment

The highway assignment model chooses the route between zones for any given trip. The process chooses routes based on travel times that reflect the appropriate traffic volume, roadway capacity, and speed relationship. It is an equilibrium model, which uses multiple iterations to balance demand with capacity, thereby reflecting capacity constraint.

The model will permit a demand in excess of capacity. Capacity in the Twin Cities area is generally defined at Level of Service D, therefore assignment of demand above capacity indicates Level of Service E or F. The delay functions in the model are link-based, meaning the effect of intersection delays and long backup queues are not fully represented.

Trips for each of the 24 previously mentioned time periods were assigned separately, and later combined to produce a daily highway assignment.

Transit Assignment

The transit assignment process selects routes based on walk time, automobile access (park/ride), waiting time, and transferring time. Transit assignment was not used in this study since route-level transit analysis was not an issue.

Model Iterations

The regional model is run on an iterative process. Congested highway travel times are estimated by the highway assignment process, and then cycles back through the steps of the model. Congested travel times affect trip generation, destination choice, and mode choice. The end result is a set of travel demand forecasts that reflect the effects of congestion on travel choices.

The method of successive averages technique was used to estimate congested travel times for each iteration. This technique involved taking the weighted volumes from previous iterations for each link, calculating a new weighted average including the current iteration, recalculating congested travel times, then using those times in the subsequent iteration. The model is run until sufficient convergence is reached, which for the purpose of this study, was four iterations.

FIGURE 1
TRAVEL DEMAND FORECASTING PROCESS

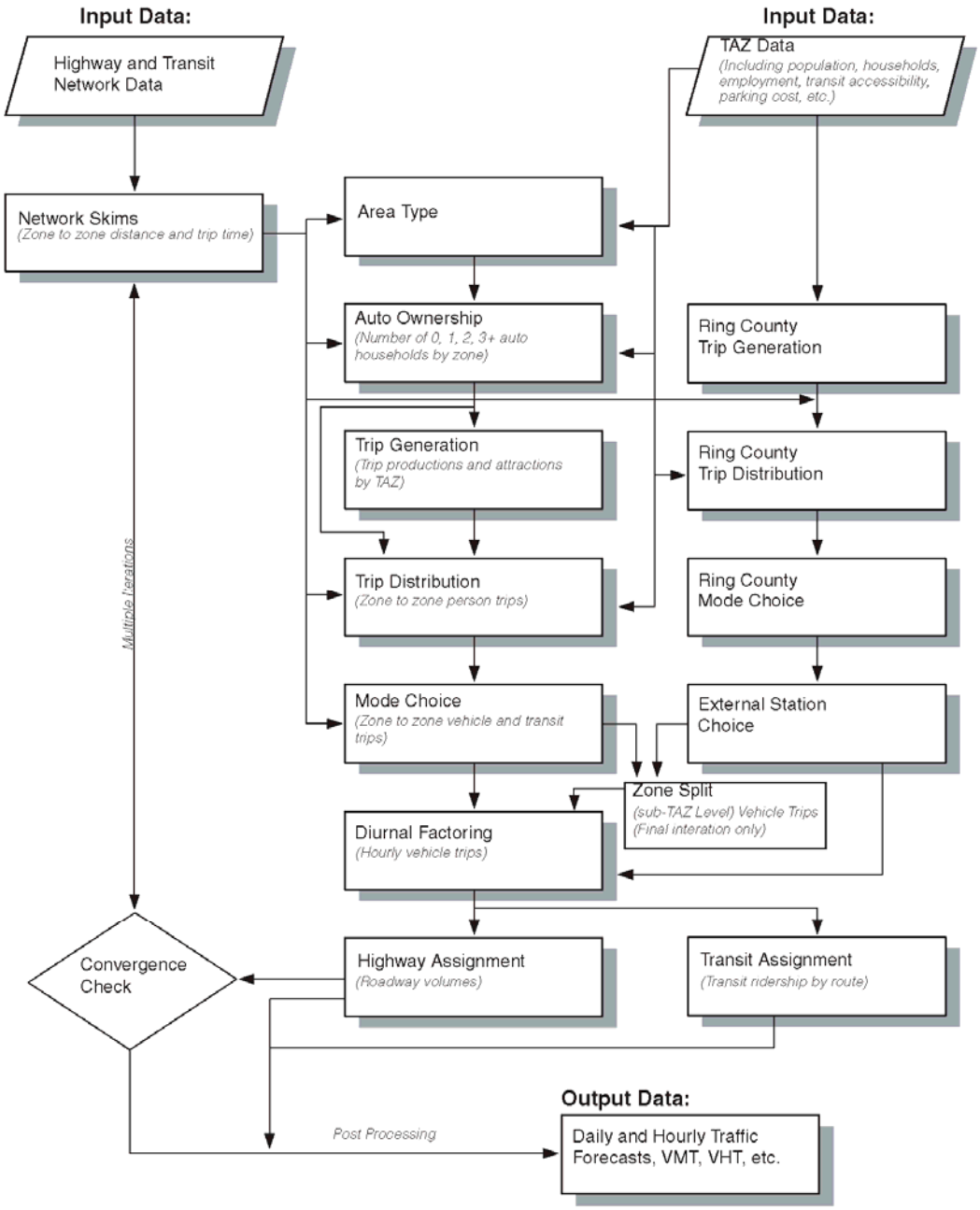


TABLE 1
REGIONAL MODEL DEFAULT SPEEDS AND PER-LANE CAPACITIES

Facility Type		Area Type					
		Rural	**Developing**	**Developed**	**Residential Core**	**Business Core**	**Outlying Business District**
Metered Freeway	Capacity	1950	1950	1950	1950	1950	1950
	Speed	110 Percent of Posted Speed					
Unmetered Freeway	Capacity	1750	1750	1750	1750	1750	1750
	Speed	110 Percent of Posted Speed					
Metered Ramp	Capacity	750	725	675	625	600	600
	Speed	37	37	36	35	35	39
Unmetered Ramp	Capacity	1500	1450	1350	1250	1200	1200
	Speed	37	37	36	35	35	39
Divided Arterial	Capacity	1000	950	850	750	700	700
	Speed	59	42	33	27	23	31
Undivided Arterial	Capacity	900	850	750	650	600	600
	Speed	55	39	31	24	22	30
Collector	Capacity	600	550	500	450	400	400
	Speed	51	34	30	23	22	28
HOV Lane	Capacity	1400	1400	1400	1400	1400	1400
	Speed	110 Percent of Posted Speed					
HOV Ramp	Capacity	NA	1450	1350	1250	1250	1250
	Speed	37	37	36	35	35	39
Centroid Connector	Capacity	NA	NA	NA	NA	NA	NA
	Speed	23	23	23	23	23	23

IV. MODEL MODIFICATIONS

A few model modifications were made as part of developing and running the model. These modifications are discussed below.

Transportation Analysis Zone (TAZ) Splits

Metropolitan Council TAZs were subdivided in the vicinity of the TH 41 study area to better characterize trip patterns. Zonal boundaries were drawn in accordance with previous studies in the area or by municipal direction. TAZ boundaries in Eden Prairie were based on municipal TAZs in the *Eden Prairie Transportation Plan*. TAZ boundaries in Carver were based on direction from city staff. TAZ boundaries in Chaska were based on the 2003 *Pioneer Trail Traffic Analysis.* TAZ splits in the rest of eastern Carver County were based on the *Carver County Transportation Plan.* TAZ boundaries in the City of Shakopee (including future annexation areas) were based on the *Shakopee Transportation Plan*. The TAZ refinement process converted the 75 zones in the study area to 238 zones, increasing the total number of zones in the seven county area from 1201 to 1364.

Highway Network

The roadway network was modified to include more detail in the study area, including Eden Prairie, Chanhassen, Chaska, Carver, Victoria, and Shakopee. This detail was necessitated both as a result of the refinement of TAZs and the desire to include lower volume roadways in the model to better estimate travel patterns. All arterials in northern Scott County and eastern Carver County were included.

Several adjustments were made to model default uncongested highway speeds (Table 1) to better reflect topography, actual speed limits, and traffic control on these facilities:

- TH 5 from TH 212 to Victoria: Decreased free-flow speed
- TH 41 from Pioneer Trail to TH 5: Decreased free-flow speed
- Pioneer Trail from TH 41 to Flying Cloud Drive: Decreased free-flow speed
- CSAH 43 from CSAH 10 to TH 212: Decreased free-flow speed
- CSAH 16 (Shakopee) from CSAH 69 to CSAH 17: Decreased free-flow speed
- CSAH 143 from CSAH 43 to CR 147: Decreased free-flow speed
- CSAH 11 from CSAH 10 to CSAH 143:Decreased free-flow speed

Highway Assignment Process

The default regional highway assignment process uses a 0.5 percent “gap” closure, wherein the model is assumed to reach equilibrium if the difference in link cost (travel time) from one iteration to the weighted composite of the previous iterations is less than 0.5 percent. This typically occurs within ten iterations. For the purpose of this study, the number of iterations during the peak period was increased to 60 to reduce the gap and thereby increase the stability of individual link volumes.

V. MODEL VALIDATION

Model calibration refers to the adjustment of parameters used in models to improve the goodness of model fit to observed data. Validation refers to the process of comparing the applied model to external data to corroborate the fit of the model. The TH 41 over the Minnesota River Crossing travel demand forecasting model generally used existing model parameters, calibrating new parameters where necessary and appropriate, and using a variety of available data sourced, including Year 2000 census data, the Metropolitan Council's 2001 Travel Behavior Inventory datasets, and validating the results against traffic counts.

Screenline Validation

The most critical element of the validation of the TH 41 over the Minnesota River Crossing travel demand forecasting model is the ability of the model to replicate the traffic volume and distribution across the Minnesota River. Table 2 shows the model fit against ADT counts obtained from Mn/DOT. The overall screenline validation was seven percent. The only two crossings that did not validate well are TH 25 and TH 169. TH 25 is a low volume roadway at the edge of the model area serving a travelshed far from the project area. The regional model traditionally has difficulty replicating the signal-based delay on the TH 169 expressway. As the expressway condition is not relevant for future year forecasts (which all occur after the upgrade to a freeway) this error is not of concern. The rest of the river crossings are within fifteen percent of ground counts, which is considered a good fit.

TABLE 2
MINNESOTA RIVER CROSSING DAILY SCREENLINE

Crossing	2000 Count	2000 Model	Percent Difference
TH 25	4,600	11,200	143%
CSAH 9/45	6,400	6,400	0%
TH 41	18,500	19,500	5%
Highway 101	21,400	23,800	11%
TH 169	54,000	66,000	22%
I-35W	102,000	106,000	4%
TH 77	98,000	100,000	2%
I-494	101,000	102,000	1%
TH 55	40,000	43,000	8%
Total	**445,900**	**477,900**	**7%**

A second screenline was used to determine the model's ability to replicate east-west traffic across Carver County. This is important in assessing the reliability of forecasts on new TH 212. Table 3 shows the model fit against Mn/DOT ADT counts. There is an imbalance between traffic on TH 7 and TH 5 which does not affect the differences between alternatives. The assigned volume on CSAH 1 is 11 percent too high, which is acceptable for a low volume roadway. The overall screenline validation was within one percent.

TABLE 3
HENNEPIN-CARVER DAILY SCREENLINE

Crossing	2000 Count	2000 Model	Percent Difference
TH 7	37,000	31,000	-16%
TH 5	43,000	49,000	14%
CSAH 1	7,500	8,300	11%
TH 212 (Flying Cloud Drive)	17,000	16,600	-2%
Total	**104,500**	**104,900**	**0%**

Study Area Traffic Volume Validation

The TH 41 River Crossing travel demand forecasting model daily traffic volumes were validated against daily traffic counts (ADT) obtained from Mn/DOT for 2000 (or adjacent years). These years were selected for validation because they are consistent with the socioeconomic data available for model input. The resulting model assignment good-ness-of-fit is shown in Figure 2. The model validates overall with an overall root mean squared error (RMSE) of 40 percent for an average link volume of 13,200 vehicles and error generally distributed both high and low; low volume roadways tend to be above-count because the roadway network does not include local streets that are used for traffic circulation. A higher percentage of error can be tolerated on lower volume roadways where the numeric difference is lower. A good fit was achieved for study-critical freeways and expressways with a RMSE of 30 percent on roadways with current ADT values exceeding 10,000 vehicles per day. 81 percent of counts in the study area fall within the FHWA percent difference targets[1] shown as the black lines in Figure 2.

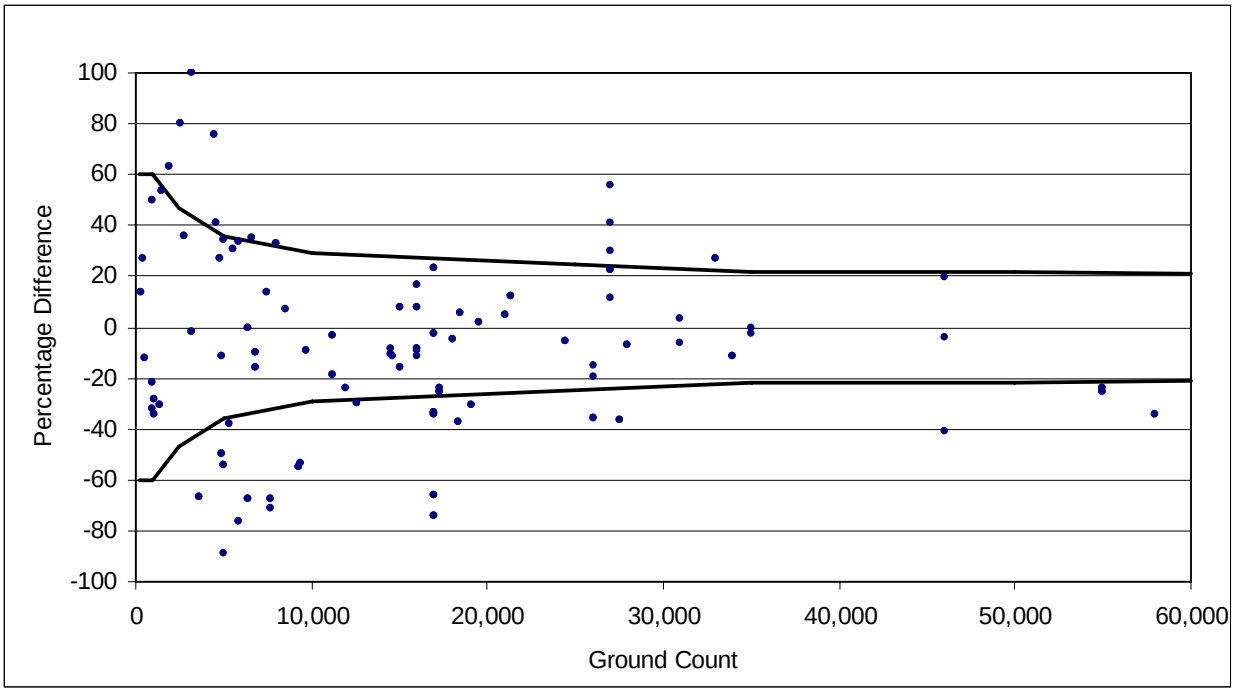
Figure 3 shows the existing average daily traffic volumes for selected roadway segments; these values represent most recent published information and may differ from the model calibration year, which was 2000.

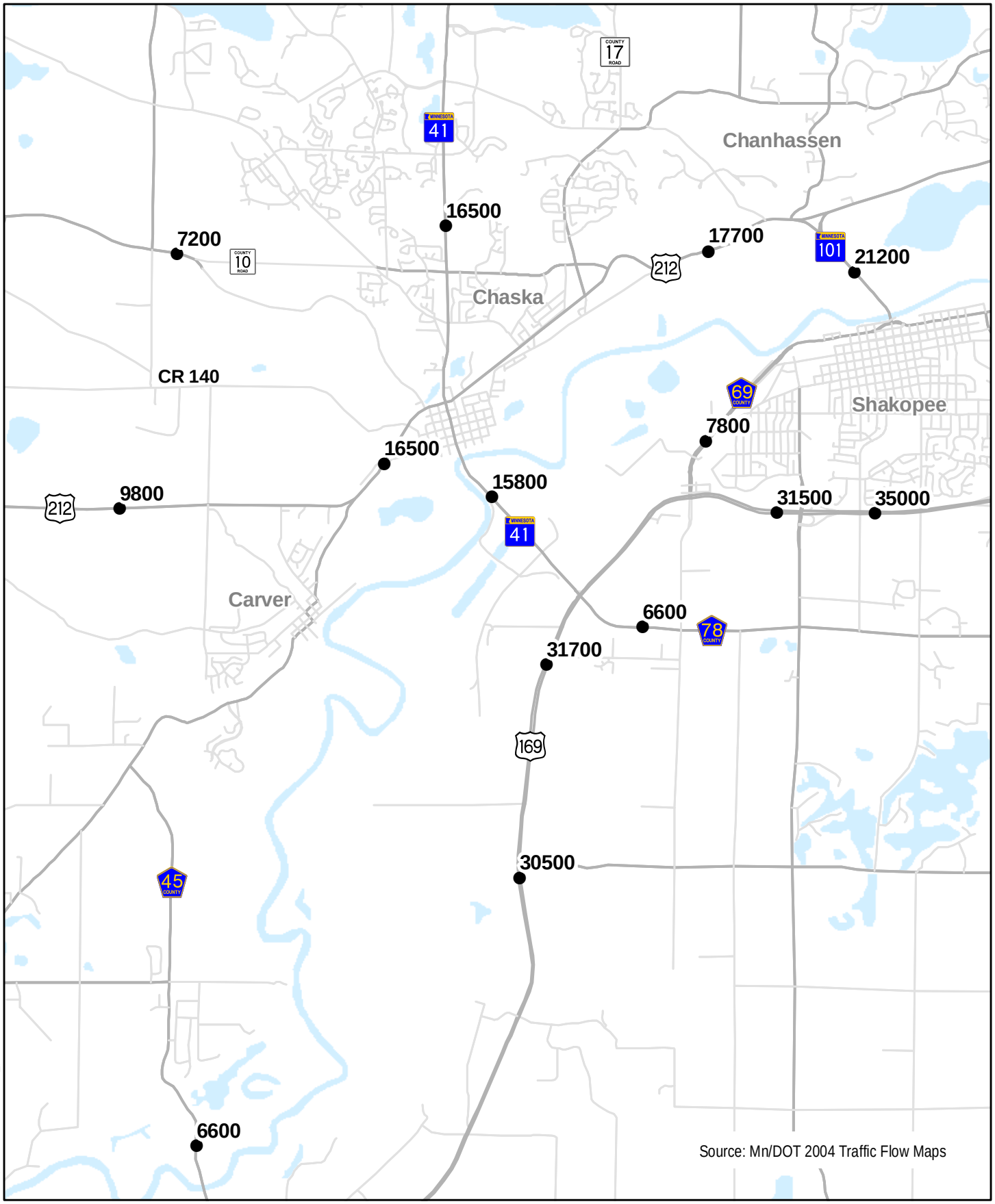
Model Closure

Four model iterations provided adequate and consistent results among alternatives. The root mean squared error (RMSE) differences for final model iterations range from one to four percent.

[1] FHWA-EP-01-023 *Model Validation and Reasonableness Checking Manual*

FIGURE 2
COMPARISON OF MODEL ERROR TO GROUND COUNTS





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2004 DAILY TRAFFIC VOLUMES

TH 41 RIVER CROSSING EIS

Mn/DOT

Figure 3

VI. FUTURE YEAR TRANSPORTATION FACILITY ASSUPTIONS

In a 40-year forecast horizon, specific transportation improvements are difficult to guarantee or even to predict. Twenty and twenty-five year policy plans are the best reliable estimate. The 2004 Metropolitan Council Transportation Policy Plan and the most current local transportation plans form the base of the 2030 and 2040 highway networks.

On the local level, roadway improvements and functional classification were informed by Carver and Scott County comprehensive plans and communications with county staff (April 2005). All arterial roadways and most collectors are included in the highway network.

Speeds and capacities for all roadways are derived from the 2001 Travel Behavior Inventory, which sets default network values by area type (rural, developing, developed, residential core, business core, and outlying business concentration) and facility type (freeway, ramp, divided arterial, undivided arterial, and collector).

Regional and Trunk Highway Assumptions

All improvements listed in the 2004 Metropolitan Council Transportation Policy Plan are assumed for 2030, including those listed in Table 4 in the vicinity of the project. Additionally, the improvements listed in Table 5 are assumed for the year 2040.

TABLE 4
ASSUMED 2030 REGIONAL AND TRUNK HIGHWAY IMPROVEMENTS

ROADWAY	IMPROVEMENT/ADDITION
TH 169	Four-Lane freeway from I-494 to CSAH 69, four-lane expressway to county line with interchanges at I-494, Anderson Lakes Parkway, Pioneer Trail, Old Shakopee Road, TH 13, CSAH 18, CSAH 83, CSAH 17, CSAH 15, CSAH 69, Current TH 41, TH 282, and CSAH 64.
New TH 212	Four-lane freeway to CR 147 with interchanges at Prairie Center Drive, Mitchell Road, TH 5, Eden Prairie Road, Dell Road, Highway 101, CSAH 17, TH 41, CSAH 10, and CR 147.
I-494	Consistent with Final EIS
TH 12	4-lane Freeway: Long Lake Bypass

TABLE 5
ASSUMED 2040 REGIONAL AND TRUNK HIGHWAY IMPROVEMENTS

ROADWAY	IMPROVEMENT/ADDITION
TH 5	4 Lane from TH 212 to Victoria
TH 12	4 Lane from CSAH 17 to Prior Lake and from Prior Lake to CSAH 42
TH 41	4 Lane north of old TH 212
HIGHWAY 101	4 Lane from old TH 212 to new TH 212
TH 169	A six lane alternative (in Hennepin County) was tested with two of the Build alternatives

Transit System

The 2030 transit network includes all transit corridor improvements in the 2004 Metropolitan Council Transportation Policy Plan. This includes the Southwest Transit Corridor. No changes in the transit network are assumed between 2030 and 2040.

Aviation

The Minneapolis-St. Paul International airport is assumed to carry 32,366 passengers per day in 2030 and 35,680 passengers a day in 2040.

Local Assumptions

Tables 6 and 7 list local improvements by roadway. Minor realignments and intersection upgrades are not included because the regional model is not sensitive to changes at that level.

TABLE 6:
CARVER COUNTY 2030/2040 ASSUMED ARTERIAL AND COLLECTOR IMPROVEMENTS

ROADWAY	FROM	TO	IMPROVEMENT/ADDITION	Year
CSAH 10	TH 284	CSAH 30	New Connection (4-Lanes)	2030
CSAH 10	CSAH 11	Old TH 212	Engler Blvd Extension (4-Lanes)	2030
CSAH 11	TH 212	CSAH 10	Realignment	2030
CSAH 11	CSAH 10	CSAH 18	4-Lanes	2030
CSAH 14	CSAH 11	Bavaria Road	New Connection	2030
CSAH 14	Bavaria Road	TH 41	4-Lanes	2030
CSAH 15	Old TH 212	CSAH 10	4-Lanes	2030
CSAH 17	CSAH 14	78th Street	4-Lanes	2030
CSAH 18	CSAH 13	TH 41	New Connection	2030
CSAH 30 West	TH 5	CSAH 10	New Connection (4-Lanes)	2030
CSAH 30 East	TH 212	102nd Street	New Connection	2030
CSAH 30 East	102nd Street	TH 5	New Connection (4-Lanes)	2030
Old TH 212	TH 41	CSAH 15	4-Lanes	2030
TH 212	CR 147	West Limits	4-Lane Expressway	2040
CSAH 10	CSAH 30	CSAH 11	4-Lanes	2040
CSAH 14	TH 41	East Limits	4-Lanes	2040
CSAH 40	CSAH 45	CSAH 11	4-Lanes	2040
CSAH 41	CSAH 50	TH 212	New Csah 41 Extension	2040
CSAH 41	CSAH 40	CSAH 52	New Csah 41 Extension	2040
CSAH 41	TH 212	TH 5	New Csah 41 Extension	2040
CSAH 43	TH 212	CR 140	Realignment	2040
CSAH 45	South Limits	CSAH 40	4-Lanes	2040
New CSAH	CSAH 53	CSAH 11	East-West Arterial South of TH 212	2040

TABLE 7
SCOTT COUNTY 2030/2040 ASSUMED ARTERIAL AND COLLECTOR IMPROVEMENTS

ROADWAY	FROM	TO	IMPROVEMENT/ADDITION
CSAH 16	CSAH 18	CSAH 83	4 Lane Divided
CSAH 17	Vierling Drive	CSAH 101	4 Lane Divided
CSAH 17	St. Francis Ave.	TH 13	4 Lane Divided
CSAH 21	CSAH 82	County Border	4 Lane Undivided
CSAH 27	CSAH 68	CSAH 44	4 Lane Divided
CSAH 42	CSAH 18	County Border	6 Lane Divided
CSAH 68	CSAH 23	TH 13	4 Lane Divided
CSAH 68	CSAH 21	CSAH 27	4 Lane Divided
CSAH 78	TH 169	CSAH 17	4 Lane Divided
CSAH 82	CSAH 17	CSAH 21	4 Lane Divided
CSAH 83	TH 169	CSAH 82	4 Lane Divided
CSAH 101	CSAH 69	CSAH 17	4 Lane Undivided
CSAH 2	CR 61	TH 169	2 Lane Undivided
CSAH 8	CSAH 23	CSAH 23	2 Lane Undivided
CSAH 8	TH 21	CSAH 59	2 Lane Undivided
CSAH 15	270th Street	Alton Avenue	2 Lane Undivided
CSAH 15	CSAH 10	TH 282	2 Lane Undivided
CSAH 16	CSAH 83	CSAH 68	4 Lane Divided
CSAH 21	CSAH 42	CSAH 18	4 Lane Divided, 6 lane at CSAH 18
CSAH 27	CSAH 16	TH 13	4 Lane Divided- Quentin Alignment
CR 64	CSAH 11	CR 61	2 Lane Undivided
CR 64	CSAH 59	Galena Ave.	2 Lane Undivided
CR 70	CSAH 17	TH 169	2 Lane Undivided
CR 87	CSAH 2	CR 56	2 Lane Undivided
190th Street	CR 81	Vergus Avenue	2 Lane Undivided

VII. FUTURE YEAR SOCIOECONOMIC ASSUMPTIONS

As noted previously, the forecast of future-year development in the model area is a primary determinant of the amount and characteristics of travel.

Base Year Estimates

The travel demand model uses a base year of 2000 for model calibration, which coincides with the 2000 U.S. Census. Data for the entire region was provided by the Metropolitan Council. Employment data are derived from the Metropolitan Council from the Minnesota Department of Economic Development. For TAZs in the project area that were subdivided for the purpose of the study, the allocation was made based on existing transportation plans and direction of county and city staff.

Future Year Estimates

The official year 2030 forecast socioeconomic data for the entire region was provided by the Metropolitan Council based on the *Regional Development Framework.* Official regional socioeconomic forecasts for 2040 have not yet been prepared by the Metropolitan Council. For the purposes of this study, the Metropolitan Council provided preliminary socioeconomic data based on sewer planning projections.

Within the project area, socioeconomic data was prepared with each community for the subdivided TAZ structure as described below. 2030 and 2040 socioeconomic data was provided by community and was allocated to subdivided model TAZs.

Project area community level socioeconomic projections are listed in Table 8 and 9. The listed municipalities include projected annexations.

Municipal and County Estimates

2030 and 2040 socioeconomic data was forecast with consultation from city and county staff. Municipal control totals were based on Metropolitan Council projections. TAZ allocation was based on the *Carver County Transportation Plan,* the *Shakopee Transportation Plan,* the *Eden Prairie Major Center Study,* and the *Pioneer Trail Traffic Analysis* (portions of Chaska).

In the City of Carver, municipal control totals are based on city “Low” growth estimates and on unofficial Metropolitan Council illustrative sewer planning forecasts. TAZ allocations were based on direction from city staff.

TABLE 8
COMMUNITY-LEVEL FORECASTS OF POPULATION AND HOUSEHOLDS

Community	Population			Households		
	2000	2030	2040	2000	2030	2040
Carver County	70,205	161,690	184,910	24,356	64,120	72,050
Scott County	89,498	220,090	247,378	30,692	87,250	96,714
Eden Prairie	54,901	70,572	71,706	20,457	29,497	30,243
Carver	1,266	14,100	20,000	459	5,800	8,320
Chanhassen	20,321	38,000	45,900	6,914	15,000	17,500
Chaska	17,603	35,700	42,036	6,169	14,500	16,575
Shakopee	20,568	52,000	71,185	7,540	21,500	28,820

TABLE 9
COMMUNITY-LEVEL FORECASTS OF EMPLOYMENT

Community	Employment		
	2000	2030	2040
Carver County	26,657	52,430	63,650
Scott County	32,009	60,890	75,006
Eden Prairie	49,392	67,654	86,463
Carver	156	600	2,325
Chanhassen	7,571	13,900	17,860
Chaska	10,251	16,600	20,400
Shakopee	12,476	22,800	30,149

VI. TRAVEL DEMAND FORECAST RESULTS

Forecast Traffic Volumes

Table 11 shows the results of the 2040 travel demand forecasts for each alternative at six Minnesota River crossing locations (including the new river crossing at TH 41).

TABLE 10
DAILY RIVER CROSSING VOLUMES

Crossing	2000	2040						
		No-Build	W-2	C-2	C-2A	E-1A	E-1	E-2
CSAH 9/45	*6,400*	25,100	19,200	21,600	21,300	21,300	20,800	21,300
TH 41	*18,500*	36,500	24,700	22,000	24,800	25,100	23,800	24,200
New TH 41			45,000	48,000	43,000	56,000	56,000	59,000
Highway 101	*21,400*	34,000	30,400	30,000	29,900	24,300	24,800	23,300
TH 169	*54,000*	141,000	135,000	135,000	135,000	129,000	131,000	129,000
I-35W	*102,000*	133,000	133,000	133,000	133,000	132,000	132,000	132,000
Total	*202,300*	369,600	387,300	389,600	387,000	387,700	388,400	388,800

Forecast traffic for the new TH 41 river crossing ranges from 45,000 to 59,000 per day, with the eastern alternatives generally carrying more traffic than the western and central alternatives. Because the Build alternatives all provide increased river crossing capacity exceeding 60,000 vehicles per day, these alternatives represent largely unconstrained demand. These trips come largely from five sources:

Diversion from existing TH 41

Under the No-Build condition, the existing TH 41 crossing is predicted to have a demand exceeding practical capacity (ten hours of congestion). Each alternative diverts a substantial amount of the No-Build traffic from the existing crossing, bringing the volume down to no more than 7,000 above current levels.

Diversion from CSAH 9/45

Under the No-Build condition, CSAH 9/45 is predicted to have a volume nearing practical capacity in the peak period (five hours of congestion). All of the alternatives divert at least 3,500 vehicles per day from this crossing. Alternative W-2 diverts the most traffic, 5,900 vehicles per day.

Diversion from Highway 101

The eastern alternatives divert the most traffic from Highway 101, reducing its volume by 10,000 vehicles per day. Alternatives W-2, C-2, and C-2A divert 4,000 vehicles per day.

Diversion from TH 169

The eastern alternatives divert the most traffic from TH 169, reducing its volume by 10,000 - 12,000 vehicles per day. Alternatives W-2, C-2, and C-2A divert 6,000 vehicles per day.

Trips which do not cross the river under the No-Build:

18,000 to 20,000 trips per day, which would have chosen a different destination under the No-Build, cross the river under the Build alternatives. While the total number of these trips is essentially the same across all alternatives, it makes up higher percentage of total traffic under alternatives W-2, C-2, and C-2A than under alternatives E-1A, E-2, and E-2.

The year 2040 traffic forecasts for other roadways in the study area can be found in Figures 4-10 for all of the EIS alternatives.

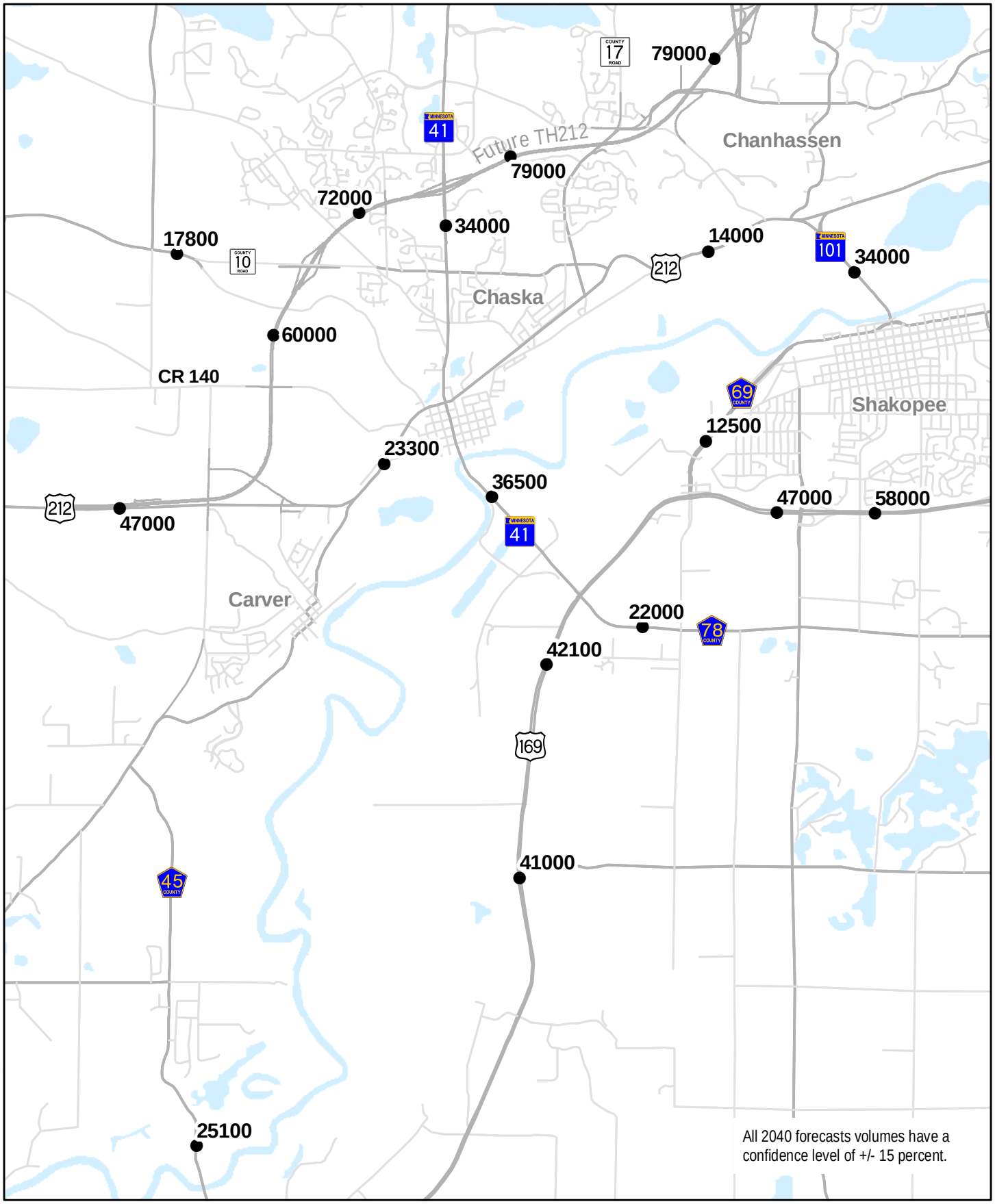
Travelshed Analysis

In addition to serving different amounts of traffic, and diverting traffic from different crossings, the various alternatives, because of their location and orientation, serve overlapping but distinct travel markets. To illustrate this, Figures 11 and 12 display the results of a "selected link" [1]analysis on the existing and new TH 41 crossings for each alternative. Each plot displays the travelshed which uses the selected link. This allows graphical comparison of trip lengths and trip markets.

Under the No-Build condition, existing TH 41 carries a significant amount of long distance traffic north of the Minnesota River. Under all of the Build alternatives, this long distance traffic on existing TH 41 is substantially reduced. Under Alternative W-2, some traffic serving Chanhassen and northern Chaska remains on existing TH 41 since the new crossing passes far west of there. The eastern alignments carry more north-south trips than the western and central alignments, which carry more traffic from western Carver County.

Access restrictions can have a significant effect on the travelshed for different alignments. South of the Minnesota River, some long distance traffic remains on existing TH 41 under all alternatives as existing TH 41 still provides better access to all of Scott County from Chaska than the Build alternatives, which serve TH 212. As alternative C-2A doesn't allow any access from CSAH 10, it carries fewer trips from western Chaska and southern Victoria.

[1] A selected link analysis collects all of the trip origins and destinations which use a specified link, in this case existing and New TH 41.



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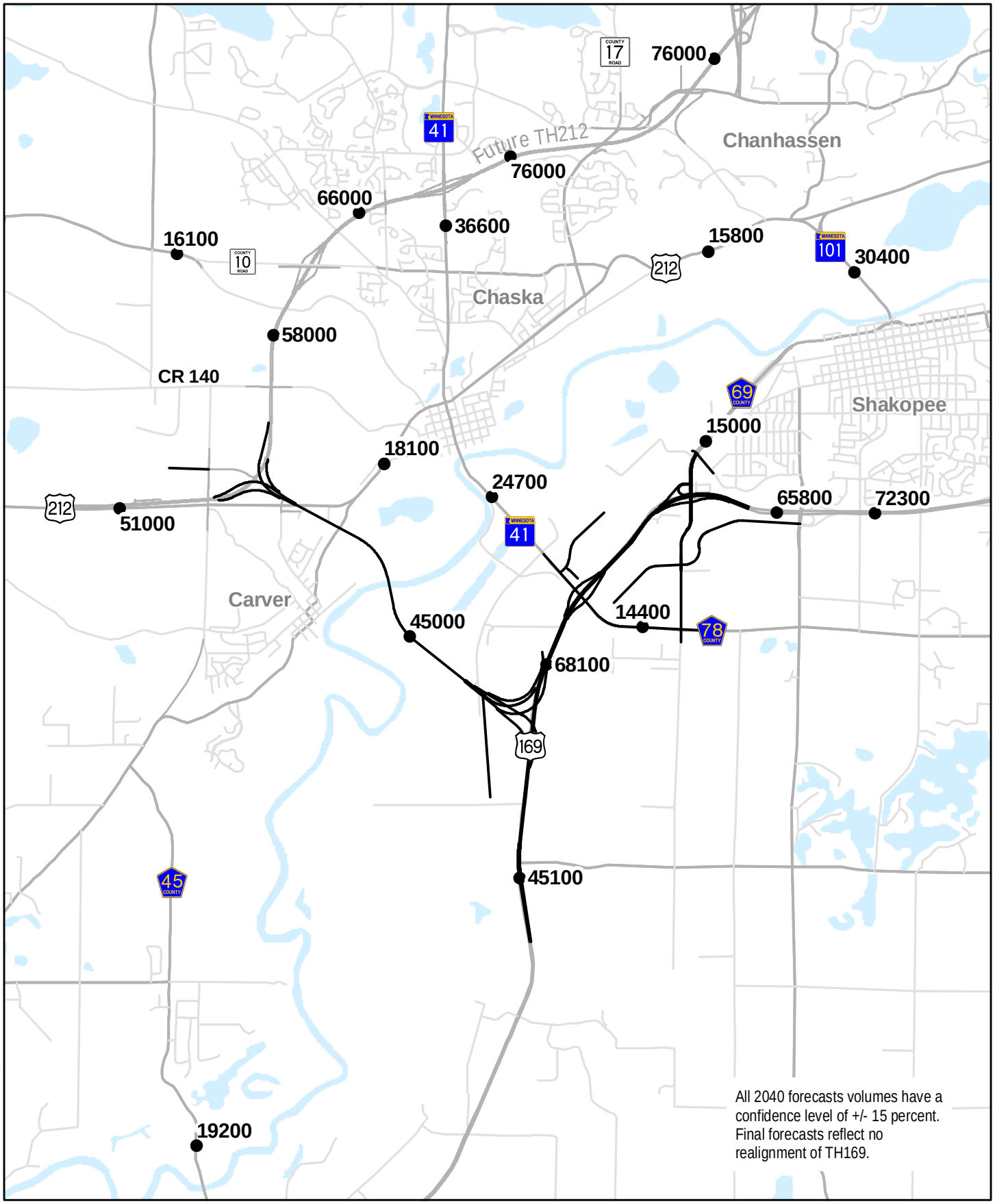
NO BUILD DAILY TRAFFIC VOLUMES (2040)

TH 41 RIVER CROSSING EIS

Mn/DOT

Figure 4



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ALTERNATIVE W2 DAILY TRAFFIC VOLUMES (2040)

Figure 5

TH 41 RIVER CROSSING EIS

Mn/DOT

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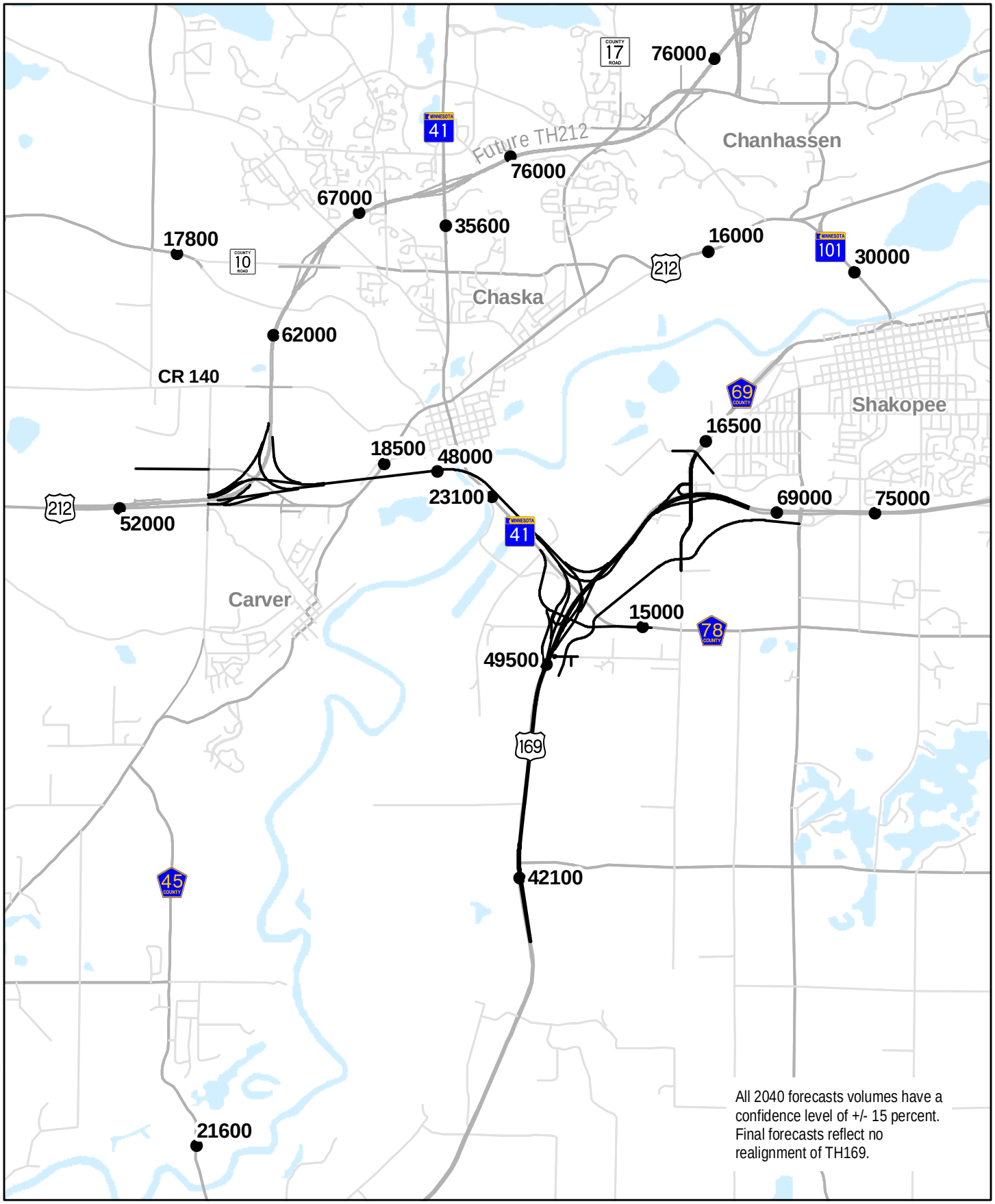

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ALTERNATIVE C2 DAILY TRAFFIC VOLUMES (2040)

Figure 6

TH 41 RIVER CROSSING EIS

Mn/DOT

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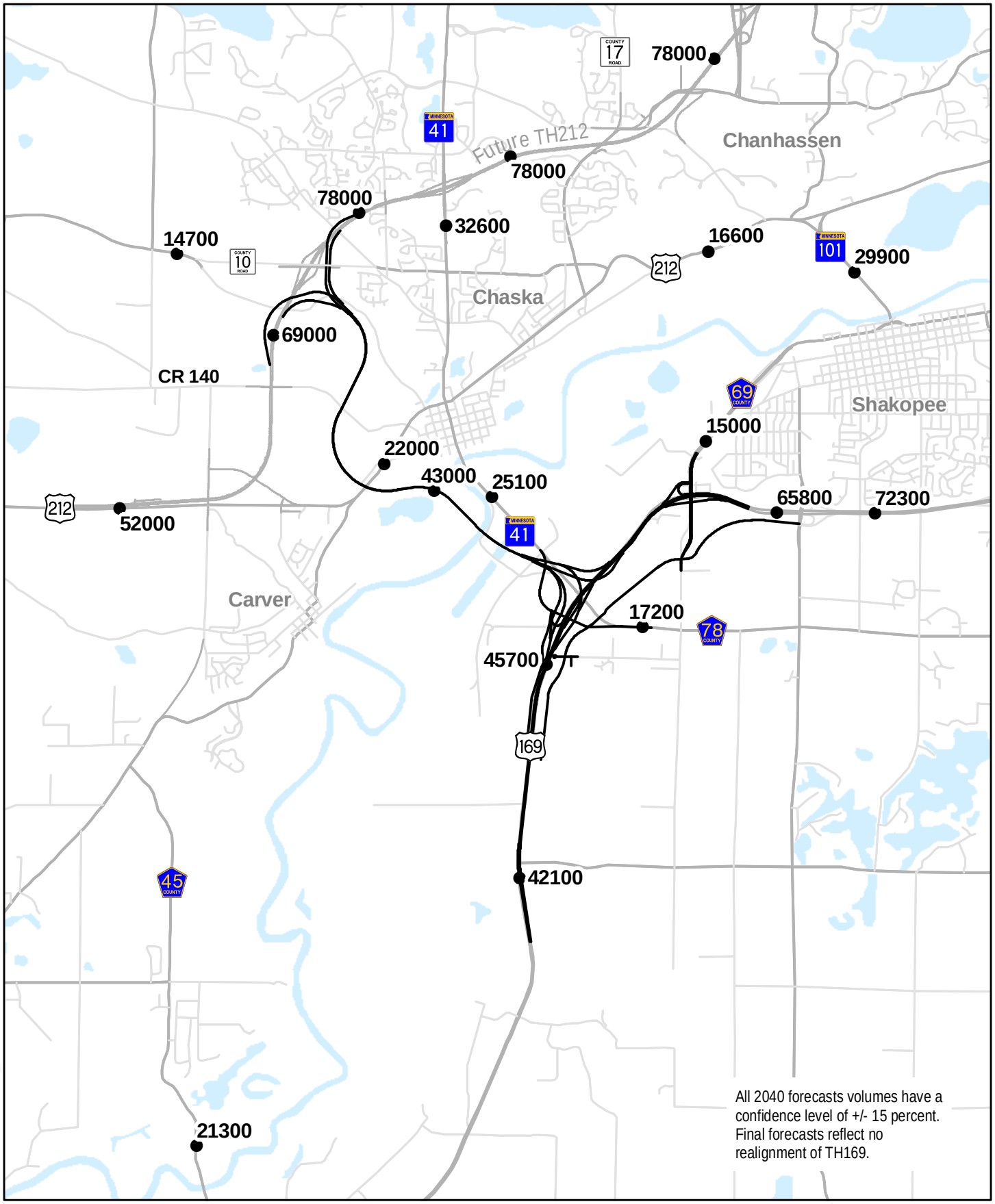

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ALTERNATIVE C2A DAILY TRAFFIC VOLUMES (2040)

Figure 7

TH 41 RIVER CROSSING EIS

Mn/DOT

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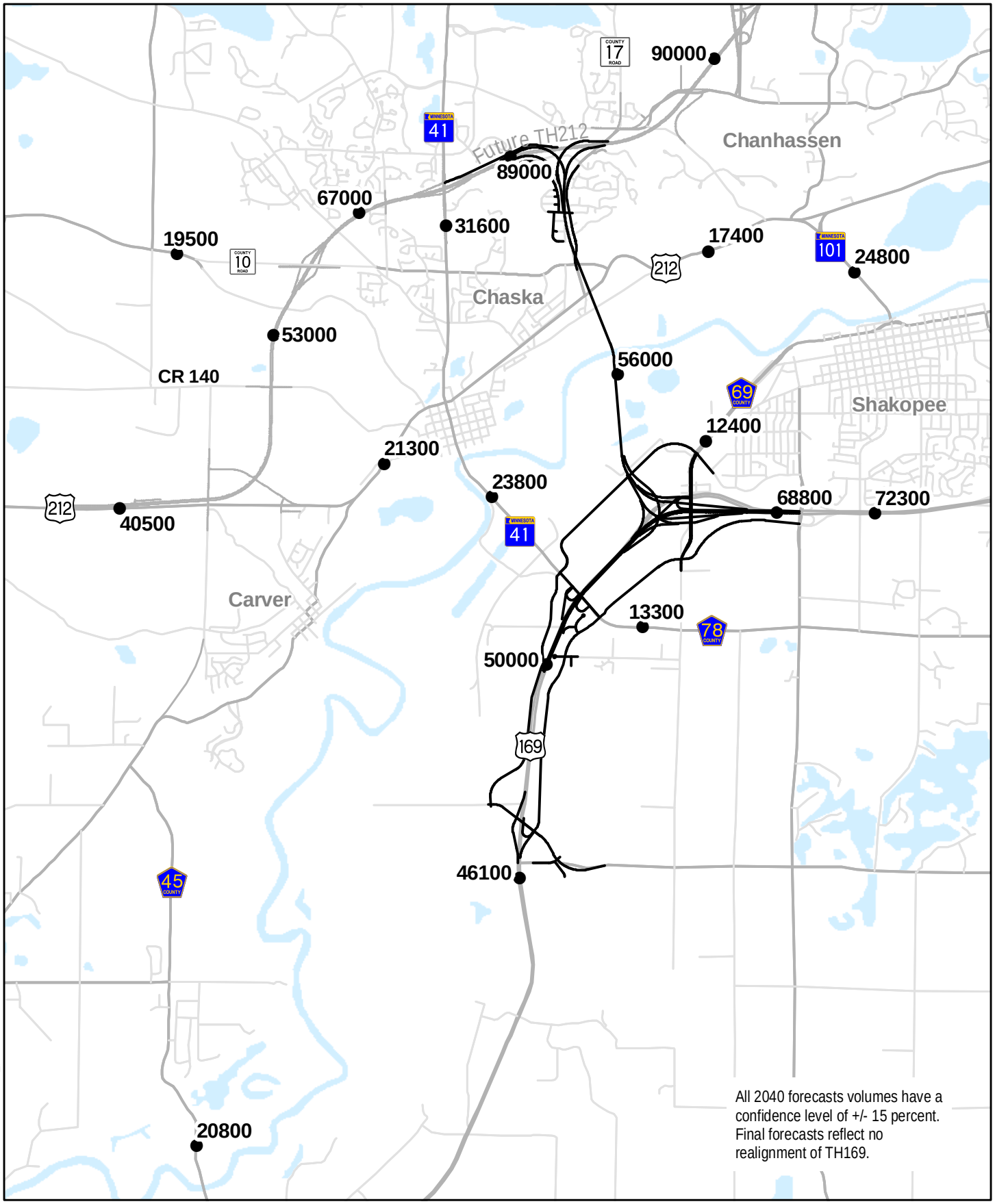

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ALTERNATIVE E1 DAILY TRAFFIC VOLUMES (2040)

Figure 8

TH 41 RIVER CROSSING EIS

Mn/DOT

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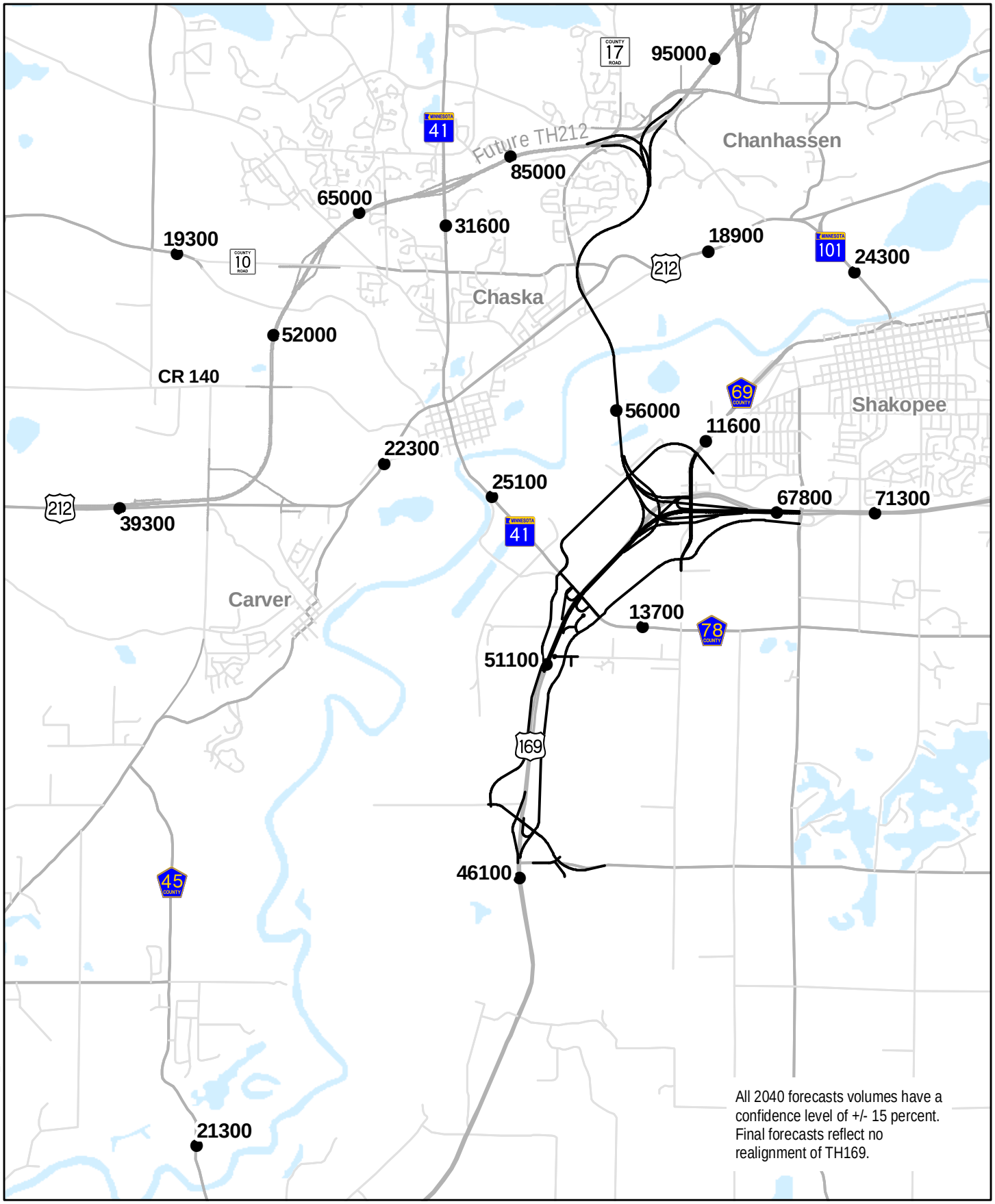

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ALTERNATIVE E1A DAILY TRAFFIC VOLUMES (2040)

Figure 9

TH 41 RIVER CROSSING EIS

Mn/DOT

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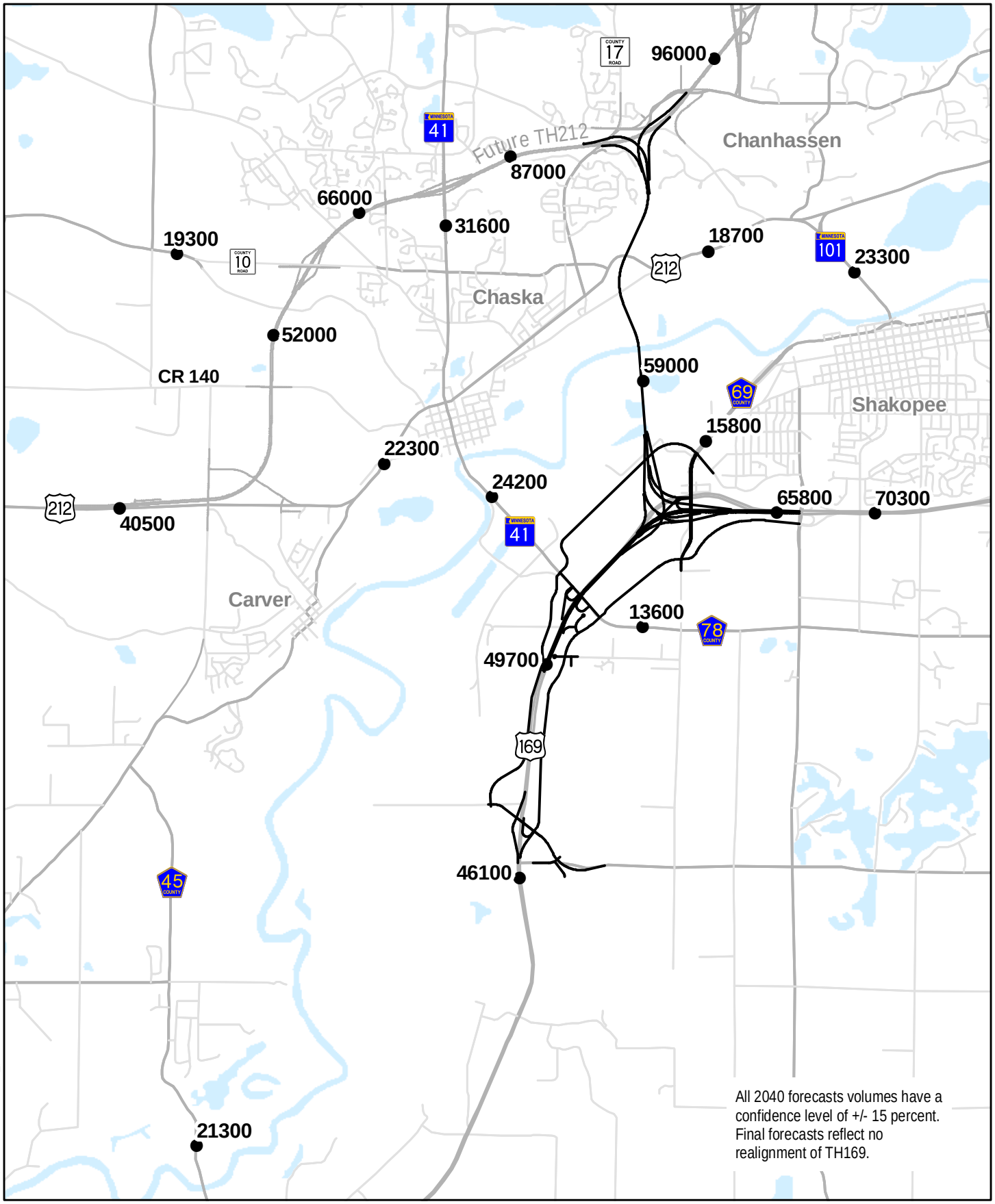

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ALTERNATIVE E2 DAILY TRAFFIC VOLUMES (2040)

TH 41 RIVER CROSSING EIS

Mn/DOT

Figure 10

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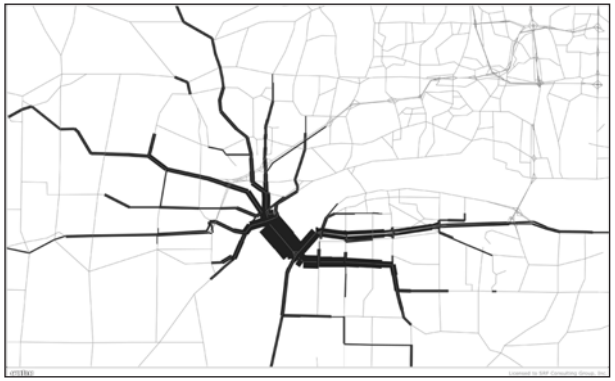
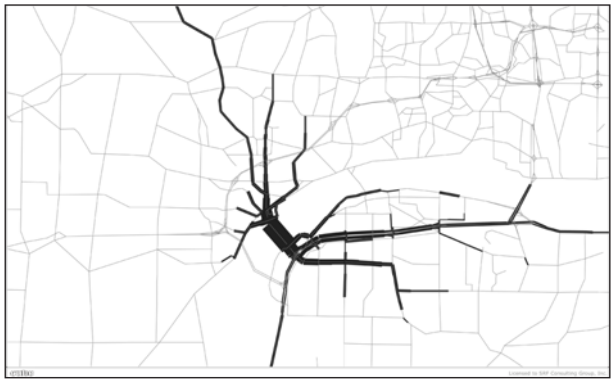
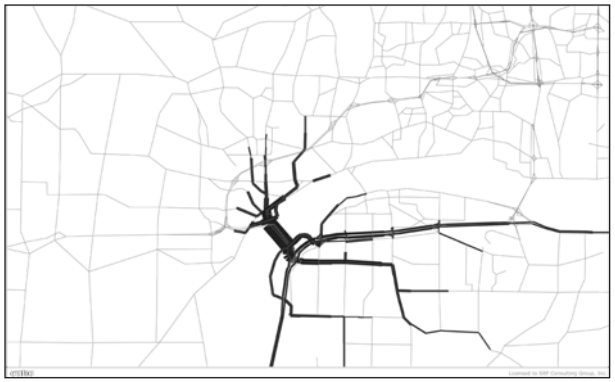
Alternative No Build: Old TH 41 Travelshed



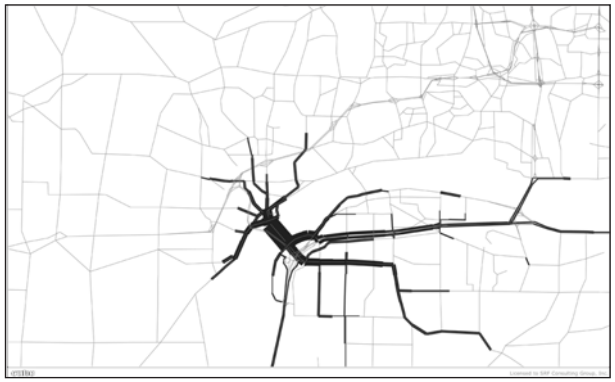
Alternative W2: Old TH 41 Travelshed



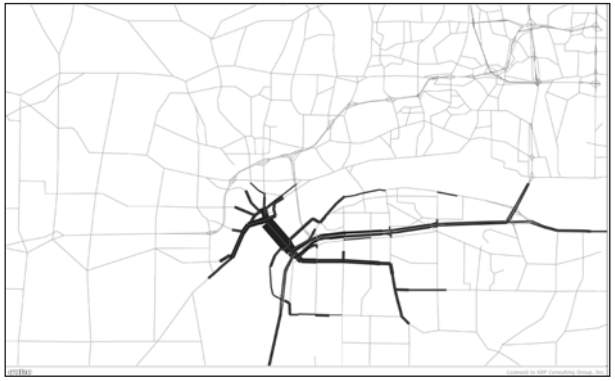
Alternative C2: Old TH 41 Travelshed



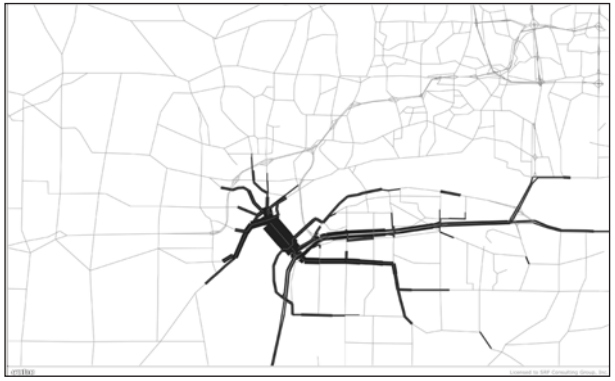
Alternative C2A: Old TH 41 Travelshed



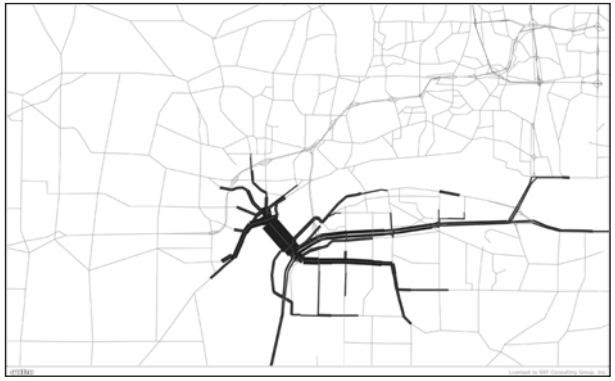
Alternative E1: Old TH 41 Travelshed



Alternative E1A: Old TH 41 Travelshed



Alternative E2: Old TH 41 Travelshed



Graphics/Support/4590/EIS Figures

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2040 TRAVELSHED — OLD TH 41

TH 41 RIVER CROSSING EIS

Mn/DOT

Figure 11

4590
2/23/06

Alternative W2: New TH 41 Travelshed

Alternative C2: New TH 41 Travelshed

Alternative C2A: New TH 41 Travelshed

Alternative E1: New TH 41 Travelshed

Alternative E1A: New TH 41 Travelshed

Alternative E2: New TH 41 Travelshed

Graphics/Support/4590/EIS Figures

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2040 TRAVELSHED — NEW TH 41

TH 41 RIVER CROSSING EIS

Mn/DOT

Figure 12

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Congestion

The regional model produces traffic volume forecasts for 24 time periods. Most (20 of 24) of these time periods are one hour in length; for the purpose of determining congestion duration, each time period was counted an "hour"

Congestion in the regional model is based on link capacity. While link capacity on arterials reflects the existence of signalized intersections, it does not account of individual intersection operations. Factors such as opposing traffic may produce congestion that is unrecognized by the regional model. This congestion duration analysis should be used as a comparative tool.

Directional hours of congestion at selected locations are displayed in Table 11. This measure counts the hours of congestion in each direction and adds them. One concurrent hour of congestion in both directions is counted as two directional hours of congestion. One hour of congestion in each direction at different times of the day is also counted as two hours of congestion.

A time period is considered congested if the volume in that time period exceeds a specific congestion threshold. The difference between time periods near that threshold being congested or uncongested may be within the acceptable variation of the model. Therefore, differences in congestion duration of one hour may not be significant.

The results in Table 11 show that Build alternatives would substantially reduce the number of hours of congestion on existing TH 41 and Highway 101.

TABLE 11
DIRECTIONAL HOURS OF CONGESTION

Alternative *Link Capacity*[1]	**Existing TH 41 N of Existing TH 212** *(900 vplph*[2]*)*	**Existing TH 41 Crossing** *(1200 vplph)*	**Highway 101 Crossing** *(1200 vplph)*
No Build	0	10	10
W-2	0	3	7
C-2	0	2	7
C-2A	0	3	7
E-1	0	2	6
E-1A	0	3	6
E-2	0	2	5

[1] Average link capacity, not directly considering intersection delay
[2] Vehicles-per-lane-per-hour

Regional Travel Effects

In addition to traffic volumes, travel demand models also forecast daily vehicle hours traveled (VHT) and daily vehicle miles traveled (VMT). These two elements provide indications of the overall system efficiency of alternatives.

The VMT/VHT analysis is limited to a smaller area where the background fluctuations in the regional model are small compared to the direct effects of the project. Reasons for background fluctuations include heavy congestion throughout the region, particularly in the 2040 network, lack of peak-spreading capabilities, and other structural characteristic of the regional model.

The study area for which results are reported consists of all of Carver and Scott Counties, and the portion of Hennepin County bounded by the Minnesota River, TH 169, and TH 7. This study area was selected to account for the majority of the travel shed of the TH 41 crossing and all river crossings whose volumes are affected by differing TH 41 alternatives.

TABLE 12
VEHICLE MILES/HOURS TRAVELED

Year	Alternative	Vehicle Miles Traveled		Vehicle Hours Traveled	
		Total VMT	*Increase/ (Decrease) over No-Build*	Total VHT	*Increase/ (Decrease) over No-Build*
2000	Existing	7,350,700		198,000	
2030	No-Build	14,051,000		410,100	
	W-2	14,177,000	*126,000*	400,400	*(9,700)*
	C-2	14,170,000	*119,000*	400,200	*(9,900)*
	C-2A	14,202,000	*151,000*	400,600	*(9,500)*
	E-1A	14,174,000	*123,000*	400,400	*(9,700)*
	E-1	14,160,000	*109,000*	399,900	*(10,200)*
	E-2	14,164,000	*113,000*	400,000	*(10,100)*
2040	No-Build	15,688,000		476,600	
	W-2	15,998,000	*310,000*	472,700	*(3,900)*
	C-2	16,002,000	*314,000*	473,100	*(3,500)*
	C-2A	16,042,000	*354,000*	473,500	*(3,100)*
	E-1A	15,997,000	*309,000*	473,000	*(3,600)*
	E-1	15,973,000	*285,000*	472,600	*(4,000)*
	E-2	15,980,000	*292,000*	472,600	*(4,000)*

All alternatives create a net increase of VMT and a net decrease in VHT compared to the No-Build. This is consistent with a project which creates a fundamental new link in the freeway system, improving overall system efficiency while encouraging longer trips across the Minnesota River.

Truck Volumes

Existing truck volumes on the TH 41 crossing are currently very high, in excess of 10 percent. This is a result of many factors, including the crossing's location at the urban fringe, and the relative isolation of the crossing.

Several factors are expected to cause truck percentages to decline in the future. As the developing fringe of the metropolitan area moves outward, agricultural transport, gravel mining and residential construction can be expected to decline in the Chaska area. Commuting trips would be expected to grow faster than truck traffic

The Metropolitan Council regional freight model was used to forecast truck traffic across the Minnesota River. This model is based on the *FHWA Quick Response Freight Manual*. The model was used to estimate the relative differences between alternatives and the total Minnesota River crossing truck traffic.

The primary inputs to the regional freight model include TAZ-level projections of employment by four classifications[1]. These projections were not available for this study; the existing classification of employment was assumed. As a result, the precision associated with these freight forecasts is less than that for auto travel demand forecasts.

The truck forecast results are listed in Table 13. Truck volumes on existing TH 41 remain stable between 2000 and 2040, but their portion of daily traffic falls from 14 percent to 7 percent. Under the Build alternatives, two thirds of the truck traffic is diverted to the new regional crossing. The new TH 41 crossing, with its higher volume, carries an unremarkable 5 percent of total traffic as trucks. Truck volumes on TH 169 and Highway 101 are not significantly different among either the No-Build or Build alternatives.

[1] (1)Agriculture, Mining, and Contruction, (2) Manufacturing, Transportation, Communication, Utilites, and Wholesale Trade , (3) Office and Services, (4) Retail Trade

TABLE 13
MINNESOTA RIVER CROSSING 2040 TRUCK FORECASTS

Alternative			TH 41	New TH 41	Highway 101[1]	TH 169	Total
2000	Existing	Trucks	2,500			3,640	6,000
		Pct. of ADT	14%			7%	6%
2040	No-Build	Trucks	2,700		1,400	8,900	13,000
		Pct. of ADT	7%		4%	6%	6%
	W-2	Trucks	900	2,360	1,500	8,700	13,000
		Pct. of ADT	4%	5%	5%	6%	6%
	C-2	Trucks	700	2,350	1,500	8,700	13,000
		Pct. of ADT	3%	5%	5%	6%	6%
	C-2A	Trucks	800	2,210	1,300	9,100	13,000
		Pct. of ADT	3%	5%	4%	7%	6%
	E-1	Trucks	700	3,650	1,300	8,300	14,000
		Pct. of ADT	3%	7%	5%	6%	6%
	E-1A	Trucks	700	4,130	1,300	8,200	14,000
		Pct. of ADT	3%	7%	5%	6%	6%
	E-2	Trucks	700	4,040	1,000	8,100	14,000
		Pct. of ADT	3%	7%	4%	6%	6%

Sensitivity Tests

A sensitivity test was conducted to determine whether congestion in downtown Chaska and on existing TH 41 would be significantly relieved if an interchange was constructed between Alternative E-1 and existing TH 212. The test showed that an additional 8,000 vehicles per day would use the new TH 41 river crossing and that half of that traffic would be diversion from the existing TH 41 river crossing, reducing volume to 19,500 per day (similar to existing levels). Additionally, the interchange would provide an additional pathway for traffic to access new TH 212 from the downtown Chaska area; Alternative E-1 would carry an additional 10,000 vehicles per day north of the existing TH 212 interchange that would not be river crossing trips.

A second sensitivity test was performed on Alternative E-1A and the No-Build to determine what the effect on the project area would be if TH 169 from Old Shakopee Road to I-494[2] were expanded to six lanes. These two alternatives were selected to evaluate the need for a new TH 41 crossing with the TH 169 expansion (No-Build) and the need for a TH 169 expansion with the construction of the alternative located closest to TH 169 (E-1A). The results of this test are listed in Table 14. Additional capacity on TH 169 has no effect on demand for existing TH 41 on

[1] No commercial vehicle counts at the HIGHWAY 101 crossing were available for this study. No validation was possible for HIGHWAY 101.
[2] This test only considers expansion of TH 169 north of Old Shakopee Road. The TH 169 river crossing is currently six lanes and is assumed in that configuration under all alternatives.

either alternative. Demand on the TH 169 crossing is raised by 10,000 under the No-Build and 16,000 under Alternative A. Demand on the new TH 41 crossing is similar, with 3,000 fewer trips per day with additional capacity on TH 169. It appears that six lanes on TH 169 will not relieve TH 41 or Highway 101 significantly, and while the volume on Alternative E-1A is lower with six lanes on TH 169, it does not lower the volume to the level of alternatives W-2, C-2, or C-2A.

TABLE 14
TH 169 SIX LANE SENSITIVITY TEST

Crossing	2000	2040			
		TH 169: Four Lanes		TH 169: Six Lanes	
		No-Build	E-1A	No-Build	E-1A
CSAH 9/45	6,400	25,100	21,300	24,900	21,200
TH 41	18,500	36,500	25,100	37,100	25,000
New TH 41			56,000		53,000
Highway 101	21,400	34,000	24,300	35,000	23,600
TH 169	54,000	141,000	129,000	151,000	145,000
I-35W	102,000	133,000	132,000	130,000	130,000
Total	202,300	369,600	387,700	378,000	397,000
TH 169 between Pioneer Trail and Anderson Lakes Parkway	56,000	111,000	108,000	131,000	128,000
TH 169 between Old Shakopee Road and Pioneer Trail	55,000	127,000	120,000	146,000	139,000

A third sensitivity test was performed on the No-Build alternative, Alternative W-2 and Alternative E-2 to assess regional travel efficiency under flood conditions. These alternatives are located farthest to the east and west and can be used to set a reasonable range for all Build alternatives for the change in daily VMT/VHT under flood conditions. To model flood conditions, the river crossings at CSAH 9/45, existing TH 41, and Highway 101 were removed. Trip redistribution was not assumed to occur, as flood events are temporary conditions that have a limited effect on travelers' destination choice options. Table 15 summarizes VMT and VHT data for the modeled alternatives under normal weekday conditions and flood conditions.

Compared to normal weekday conditions, VMT increases 6 percent and VHT increases 8 percent for the No-Build alternative during a flood event. Travelers are forced to drive farther and longer during a flood under No-Build conditions. For the Build alternatives, VMT increases 2 percent and VHT increases 2 to 3 percent during a flood event as compared to a normal weekday. Floods would continue to effect travel on the highway network under Build conditions, but the effect would be substantially less than under No-Build conditions.

Among alternatives under flood conditions, Table 15 also shows the Build alternatives reduce both the vehicle-miles and vehicle-hours traveled as compared to No-Build. This is noteworthy because under normal weekday conditions, the opposite is true for VMT (see Table 12, VMT is higher for Build alternatives as compared to No-Build for normal weekdays). In addition, VHT savings for Build alternatives as compared to No-Build are eight times larger for flood conditions as compared to normal weekday conditions. Differences among Build alternatives under flood conditions are one-half percent or less.

TABLE 15
COMPARISON OF 2040 DAILY VEHICLE MILES AND VEHICLE HOURS TRAVELED DURING NORMAL WEEKDAY AND FLOOD EVENT CONDITIONS

Alternative		Normal Weekday	Flood Event	*Increase/ (Decrease) over Normal Weekday*	*Increase/ (Decrease) over No-Build*
VMT	**No-Build**	15,688,000	16,633,000	*945,000*	
	W-2	15,998,000	16,346,600	*348,600*	*(286,400)*
	E-2	15,980,000	16,261,300	*281,300*	*(371,700)*
VHT	**No-Build**	476,600	516,700	*40,100*	
	W-2	472,700	485,400	*12,700*	*(31,300)*
	E-2	472,600	483,800	*11,200*	*(32,900)*

cc: Brian Isaacson, Mn/DOT
Brian Vollum. Mn/DOT
Lisa Freese, Mn/DOT
Mark Filipi, Metropolitan Council

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

TH 41 TRAFFIC STUDY

MARCH 12, 2003

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF No. 0024590

DRAFT MEMORANDUM

TO: Brian Isaacson
MINNESOTA DEPARTMENT OF TRANSPORTATION

FROM: Dave Montebello, P.E., Principal
Renae Cornelius, Engineer

DATE: March 12, 2003

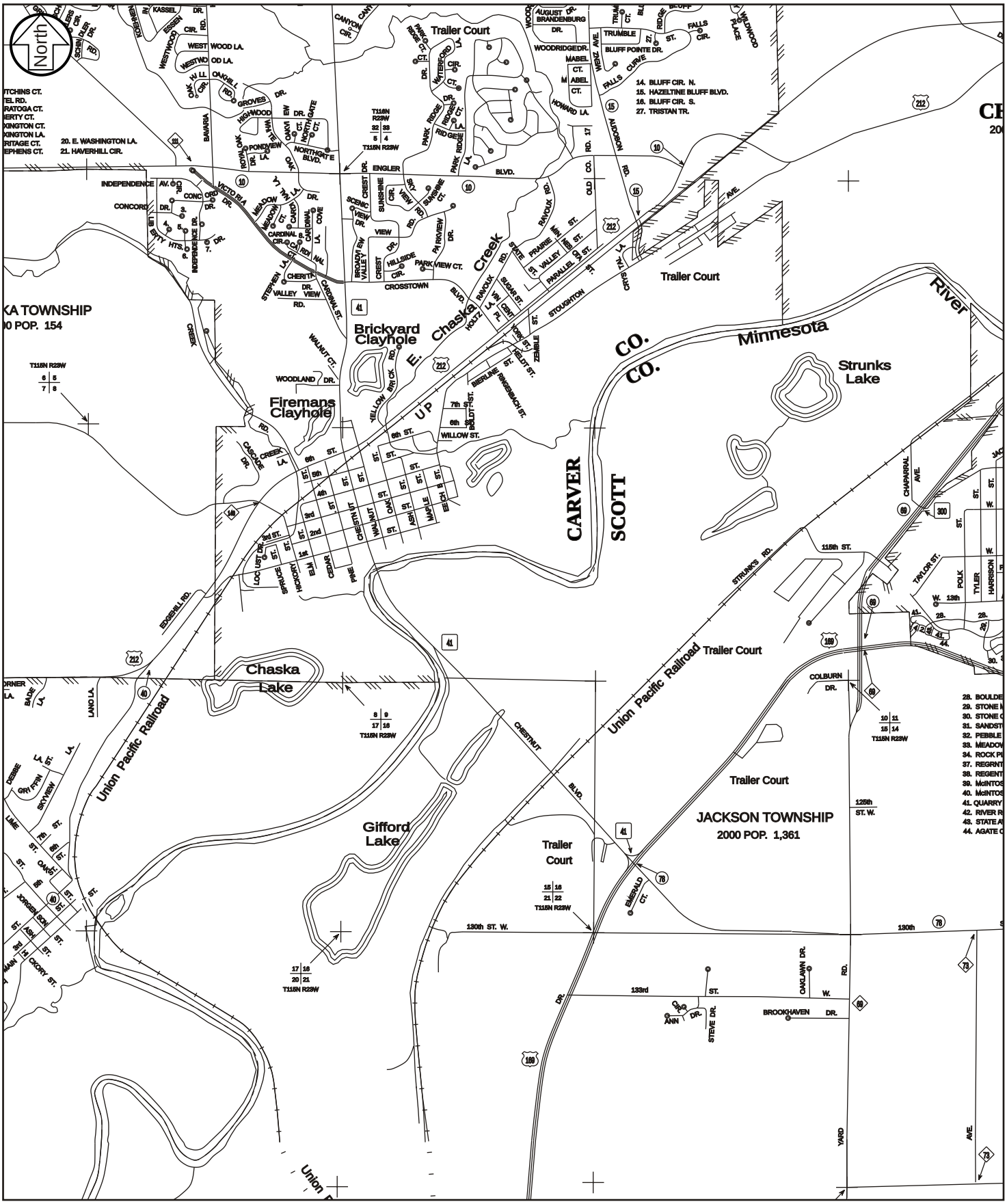
SUBJECT: TH 41 TRAFFIC STUDY

Introduction

The Minnesota Department of Transportation requested a review of traffic operation issues on TH 41 from US Highway 212 in the City of Chaska to US Highway 169 (see Figure 1:Project Location). An operations analysis was conducted for the six key intersections along TH 41 in downtown Chaska, as well as the intersection of TH 41/US Highway 169 in Scott County. The primary concern along this corridor is queuing at the intersections of TH 41/US Highway 212 and TH 41/US Highway 169. The following memorandum includes an evaluation of existing volumes on the two major river crossings at TH 41 and Highway 101, a traffic operations analysis for TH 41 during the a.m. and p.m. peak hours for existing conditions and during the p.m. peak hour for future year 2030 conditions, and a three-year crash analysis.

Existing Volumes

Daily and peak hour traffic volumes were collected for TH 41 and Highway 101 in October, 2002. As shown in Table 1, the directional peak hour splits were reviewed and results show that the a.m. peak hour distribution favored the northbound traffic for both TH 41 and Highway 101. The peak hour distribution for the p.m. peak hour favored the northbound traffic at TH 41; however it favored the southbound traffic at Highway 101.



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March 2003

PROJECT LOCATION

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 1

Table 1
Directional Splits/Percent Peak Hour

Location	Directional Splits		Percent Peak Hour	
	AM	PM	AM	PM
TH 41	61/39	55/45	7.7	8.3
Highway 101	66/34	32/68	9.3	10.0

XX/XX = northbound traffic/southbound traffic

Twenty-four hour volume profiles were developed for Highway 41 and Highway 101 to compare total volumes and peaking as well as to compare northbound to southbound traffic (Figures 2 and 3). While each of the roadways has a commuter pattern, the peaks are significantly greater on Highway 101 versus TH 41. For example, noon volumes on TH 41 are near 700 vehicles per hour as compared to a peak hour volume of 1,350 vehicles per hour (a 68 percent change). On Highway 101 values range from approximately 1,000 vehicles per hour at noon to over 2,000 vehicles per hour in the p.m. peak hour (a 100 percent change).

Figure 2
TH 41 Volume Profile

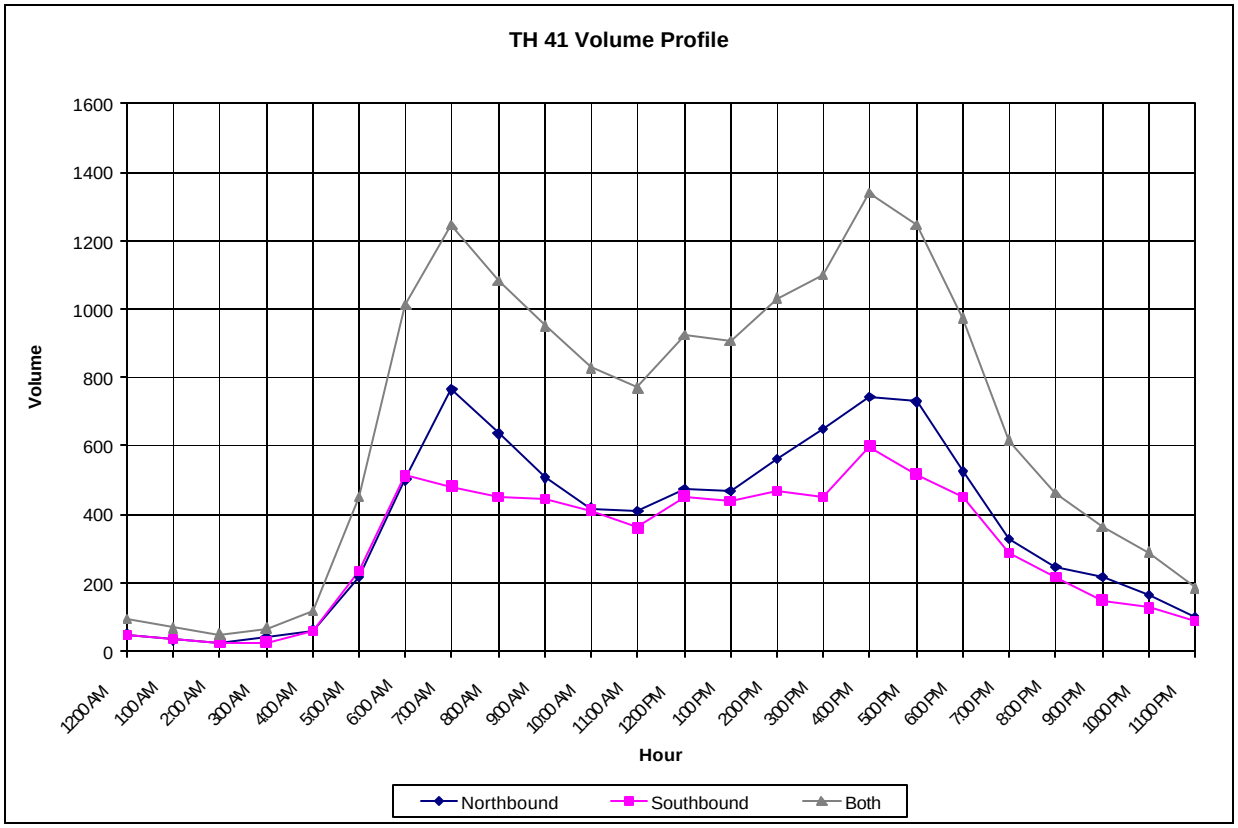
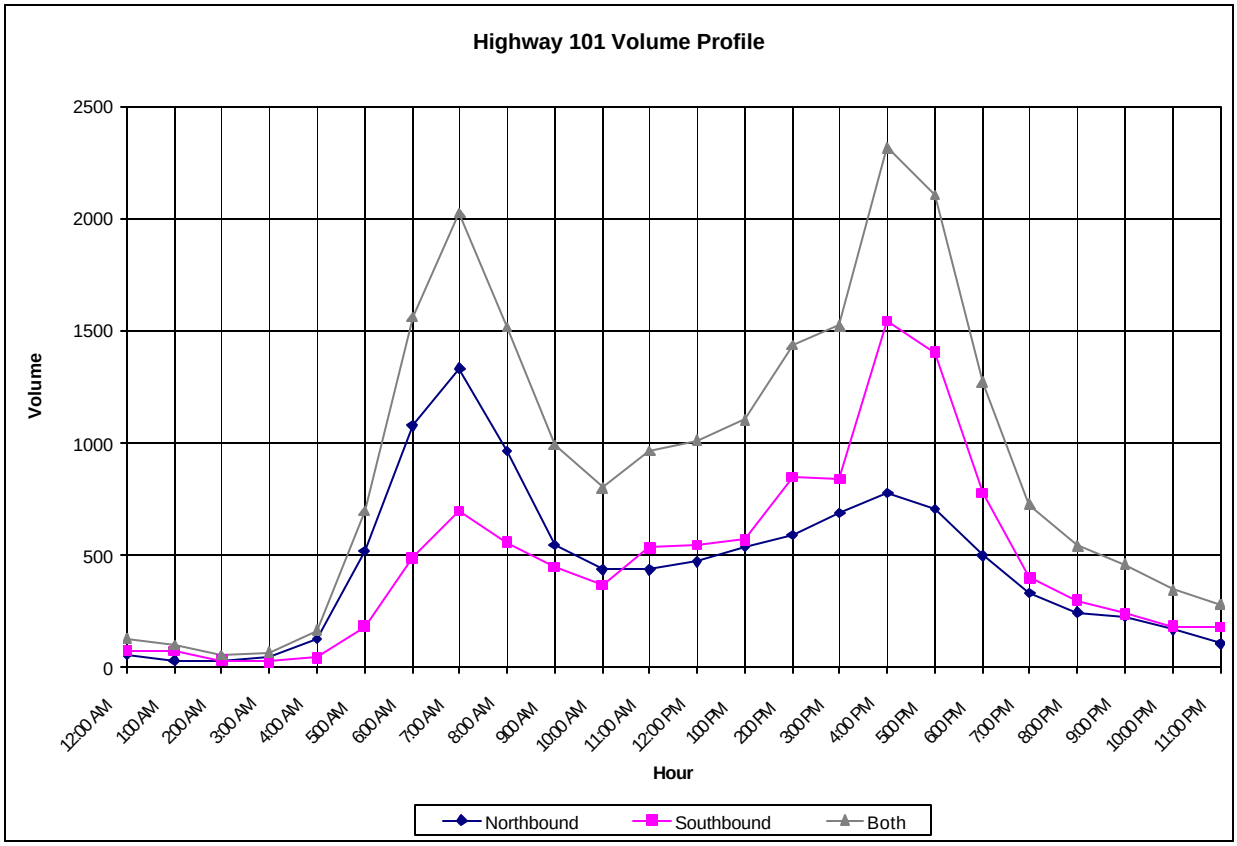


Figure 3
Highway 101 Volume Profile



Truck Volumes

Truck counts were conducted for the a.m. and p.m. peak hours by SRF staff in October at the intersections of Highway 101/US Highway 212, Highway 101/CSAH 69, TH 41/US Highway 212 and TH 41/US Highway 169. The area surrounding the river crossings at TH 41 and Highway 101 has many businesses that utilize heavy trucks. As a result, the percent of trucks on the major roadways in the area is much higher than the average of a typical trunk highway. Nineteen percent of the 16,000 vehicles that travel TH 41 on a daily basis are trucks. A typical trunk highway has an average of eight to 12 percent trucks. Table 1 in the Appendix shows the percent of heavy vehicles that travel along TH 41 and Highway 101, as well as their major cross streets during the peak hours.

Existing Conditions

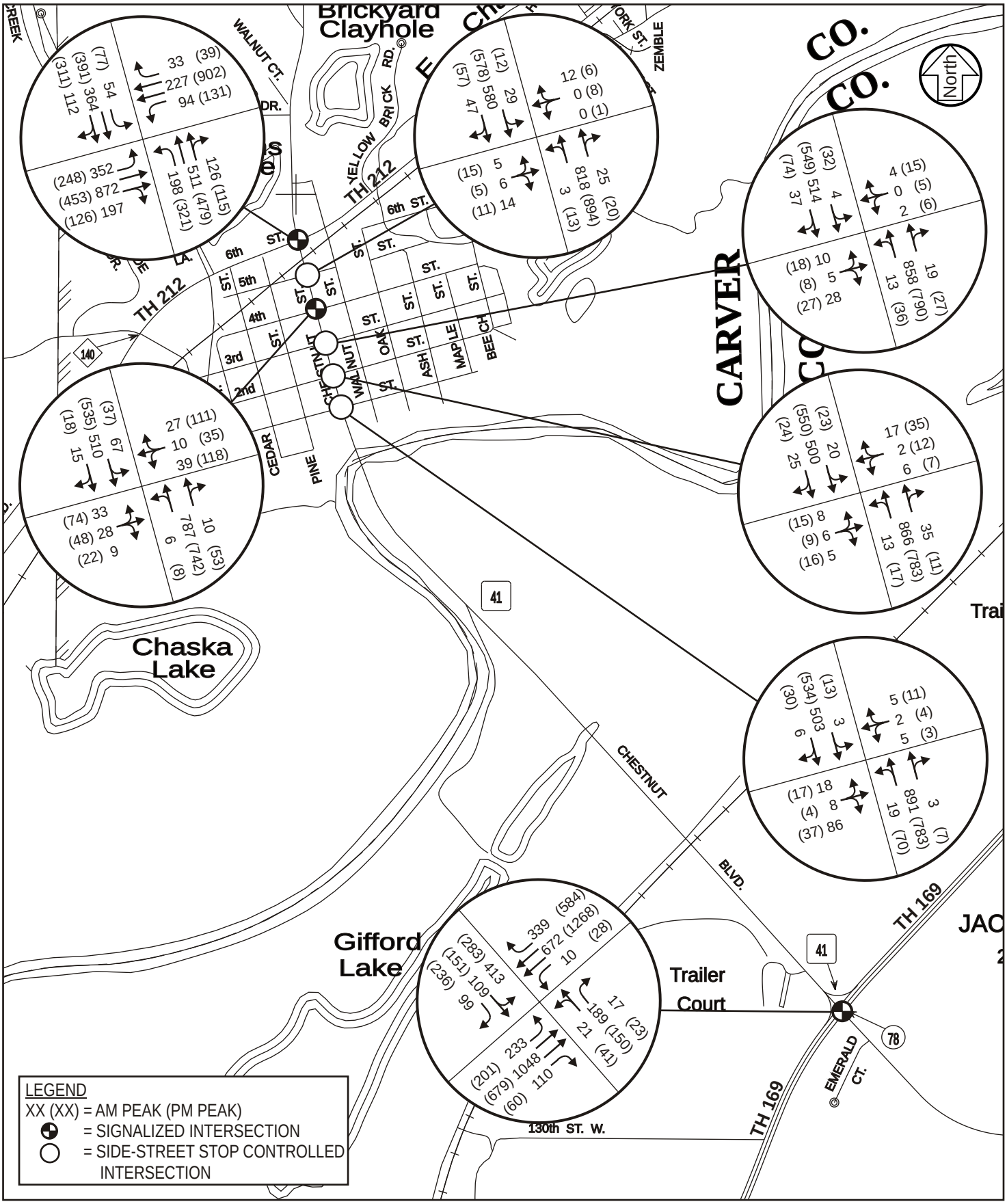
A traffic operations analysis was included for TH 41 from US Highway 212 to US Highway 169 to analyze existing traffic operations in the downtown Chaska area. This analysis will be used to help assess the geometry of the TH 41 bridge which is scheduled for replacement in 2005. As part of this analysis, existing conditions were analyzed at the following key intersections:

- TH 41 and US Highway 212
- TH 41 and 5th Street
- TH 41 and 4th Street
- TH 41 and 3rd Street
- TH 41 and 2nd Street
- TH 41 and 1st Street
- TH 41 and US Highway 169

Peak hour turning movement counts were collected by SRF Consulting Group, Inc. in October 2002, at all key intersections, except for the intersection of TH 41/US Highway 169. This intersection was counted by MnDOT in July 2001. Existing geometrics and peak hour traffic volumes for the key intersections are shown in Figure 4. Current traffic controls include signalization at the intersections of TH 41/US Highway 212, TH 41/4th Street and TH 41/US Highway 169; and side-street stop control at the intersections of TH 41/5th Street, TH 41/3rd Street, TH 41/2nd Street and TH 41/1st Street.

A traffic operations analysis was conducted for the a.m. and p.m. peak hours at each of the key intersections to determine how traffic currently operates within the project area. All signalized intersections were analyzed using Synchro, with SimTraffic simulation software. The unsignalized intersections were analyzed using Highway Capacity Software. Capacity analysis results identify a Level of Service (LOS), which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. LOS A through D are generally considered acceptable by drivers. LOS E indicates that an intersection is operating at, or very near its capacity and that vehicles experience substantial delays.

Traffic operations at an unsignalized intersection with side-street stop control are analyzed in two different ways. First, consideration is given to the overall intersection level of service. This takes into account the total volume of the intersection and the capability of the intersection to support that volume. Second, consideration is given to the level of service on the side-street approach. Since the mainline does not stop at an intersection that has side-street stop control, a majority of intersection delay can be attributed to the side-street approaches. It is typical of intersections with high mainline traffic volumes to experience significant levels of delay on the side-street approaches (poor levels of service),



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March 2003

EXISTING PEAK HOUR TRAFFIC VOLUMES

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 4

but an acceptable overall intersection level of service during the peak periods. However, as the side-street delay increases, motorists tend to accept smaller gaps and/or take greater risks. Aggressive actions taken by drivers experiencing long delays can lead to safety problems.

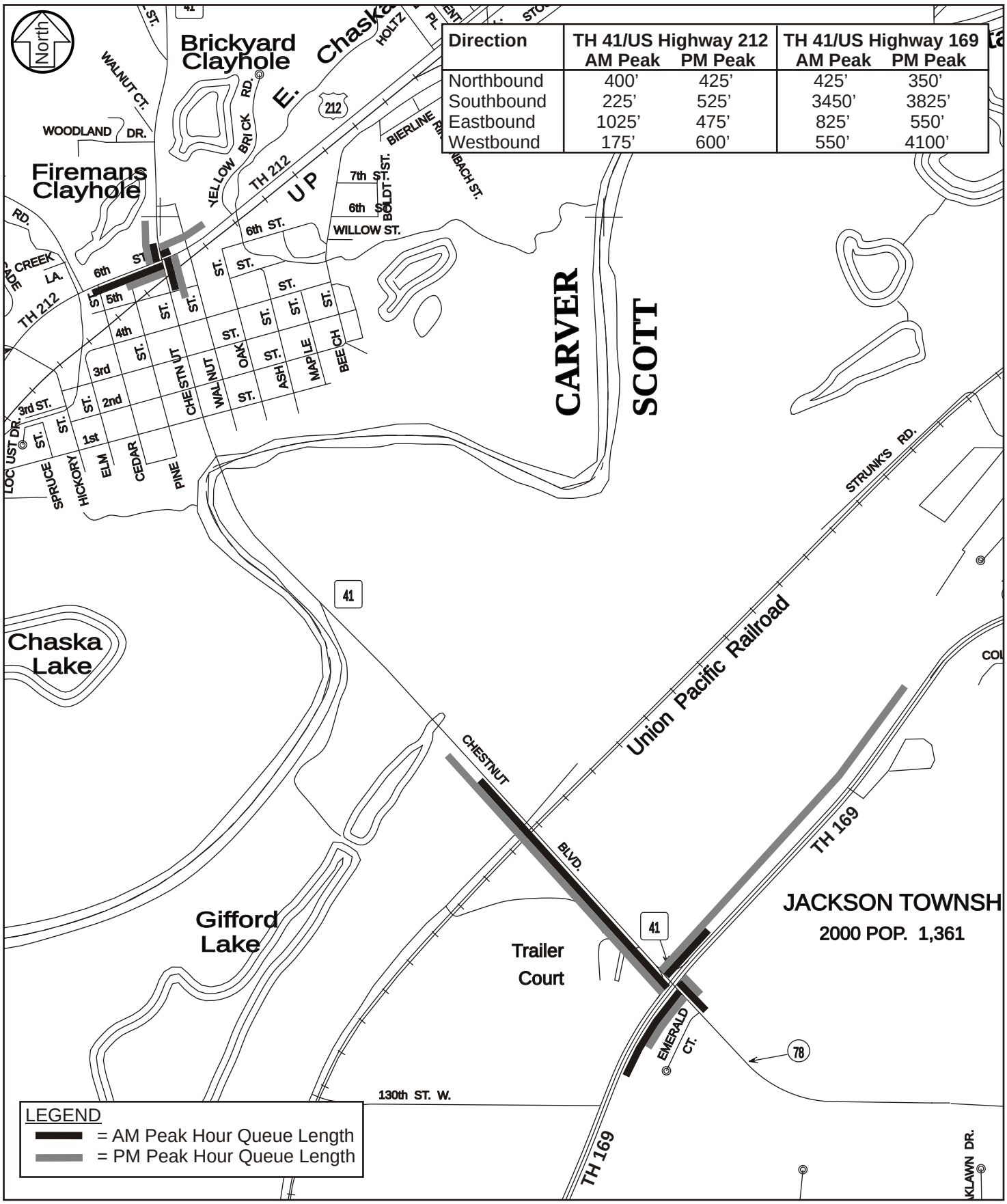
To complete the operations analysis, a traffic model was developed using existing signal timing, volumes and geometrics for the a.m. and p.m. peak hours. It is important to replicate existing field conditions in the traffic model to assess the changes that will be produced with proposed improvements. Field observations concluded that pedestrian activity was light for both peak hours, and as a result it has little impact on the operation of TH 41. On-street parking exists on the east side of TH 41 between 1st Street and 5th Street in downtown Chaska. Observations concluded that parking maneuvers on TH 41 are minimal and have little impact on operations. Truck percents were determined by movement and used in the model to accurately replicate the distribution of trucks and their impacts to specific movements.

Results of the analysis shown in Table 3 indicate that all key intersections currently operate at an acceptable LOS D or better during the a.m. and p.m. peak hours, with existing traffic controls and geometric layout, except for the intersections of TH 41/US Highway 212 and TH 41/US Highway 169. TH 41/US Highway 212 currently operates at LOS E during the p.m. peak hour. The intersection of TH 41/US Highway 169 currently operates at LOS F for both peak hours. The poor level of service at these intersections is due to the high volume demand and a high percent of trucks utilizing these intersections. The start-up time for a stopped truck is much greater then that of a passenger vehicle which creates a greater amount of lost green time at the intersections. This in turn creates queuing for the approaches with high demand. Queuing was observed in the field and was closely replicated in the model. The approximate queue lengths determined by the model are shown Table 4 as well as in Figure 5.

Table 3
Existing Capacity Analysis
Level of Service Results

Intersection – TH 41 and	**Level of Service**	
	A.M. Peak	**P.M. Peak**
US Highway 212	D	E
5th Street*	A/C	A/E
4th Street	A	B
3rd Street*	A/C	A/C
2nd Street*	A/C	A/C
1st Street*	A/C	A/C
US Highway 169	F	F

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.



Direction	TH 41/US Highway 212		TH 41/US Highway 169	
	AM Peak	PM Peak	AM Peak	PM Peak
Northbound	400’	425’	425’	350’
Southbound	225’	525’	3450’	3825’
Eastbound	1025’	475’	825’	550’
Westbound	175’	600’	550’	4100’

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March 2003

EXISTING P.M. PEAK HOUR QUEUE LENGTHS

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 5

Future Traffic Operations Analysis

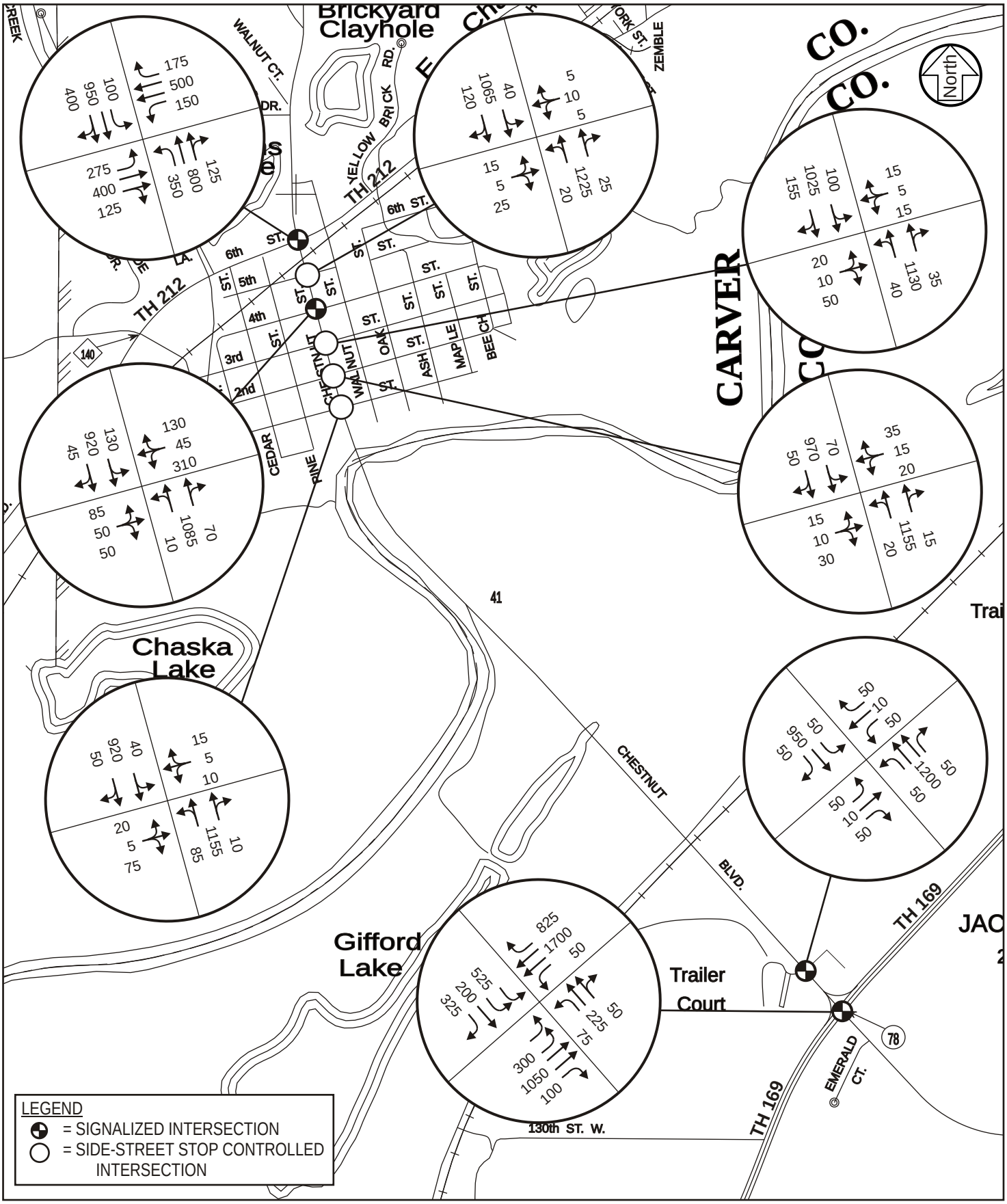
To determine how well the existing roadway system will accommodate future traffic volumes under the no-build condition, an intersection operations analysis was completed for year 2030. The purpose of this analysis is to determine if the two-lane bridge south of 1st Street on TH 41 will need to be expanded to four-lanes for future conditions. All key intersections were analyzed with existing geometrics and traffic control, except for the intersection of TH 41/US Highway 169. Improvements at this intersection are programmed for 2004. These improvements are shown in Figure 6. For purposes of this analysis, it was assumed that signal timing at existing signalized intersections would be updated before year 2030. All intersections were analyzed using Synchro, with SimTraffic traffic simulation software to model the intersection operations. The 2030 no-build level of service results are shown in Table 4. Year 2030 no-build geometrics and p.m. peak hour traffic volumes for the key intersections are shown in Figure 6.

Table 4
Year 2030 No-Build Capacity Analysis
Level of Service Results

Intersection – TH 41 and	Level of Service P.M. Peak
US Highway 212	F
5th Street*	F/F(1)
4th Street	F(1)
3rd Street*	C/F(1)
2nd Street*	C/F(1)
1st Street*	A/D
North Service Road	A
US Highway 169	F

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
(1) Poor level of service at these intersections is due to queuing at the intersection of TH 41/US Highway 212 which extends through downtown Chaska on TH 41 and does not provide gaps for vehicles on the side streets.

Results from this analysis indicate that most intersections will operate at an unacceptable LOS E or worse during the p.m. peak hour, with the exception of the intersections of TH 41/3rd Street, TH 41/2nd Street and TH 41/1st Street, which will operate at an overall LOS C or better. The poor level of service at the intersection of TH 41/US Highway 212 is due to extensive queuing that occurs for northbound and southbound vehicles. The northbound queue extends through downtown Chaska to 2nd Street and does not provide gaps for vehicles trying to access TH 41 from the side streets. The long queues result in an unacceptable LOS F for the side streets. In addition, southbound



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March 2003

YEAR 2030 NO BUILD PM PEAK HOUR TRAFFIC VOLUMES

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 6

traffic at TH 41/4th Street has problems once a vehicle tries to make a left turn onto 4th Street across the northbound queuing traffic. The through and left-turning vehicles share a lane at this intersection which causes queuing for the through traffic on TH 41 to the north and backs up into the intersection of TH 41/US Highway 212. The intersection of TH 41/ US Highway 169 operates at a LOS F due to the high volume of westbound vehicles.

In addition to evaluating future operations at the major intersections along TH 41, an analysis was also conducted to determine operational issues at the bridge in downtown Chaska. In 2006, Mn/DOT will replace the existing bridge due to its poor physical condition; and the Department is seeking guidance on the number of lanes that the future bridge should be. Operationally, a two-lane bridge will be sufficient because traffic is prevented from getting to the bridge by the bottleneck at the intersection of TH 41 and US Highway 212. If more traffic were able to get through the TH 41 and US Highway 212 intersection, a two-lane bridge would start to have operational problems once southbound traffic volumes reached 1,500 during the peak hour. Future volumes in 2030 are currently estimated at 1,000 vehicles during the peak hour due to the constraints at TH 41 and US Highway 212. Although operational issues are not as significant as anticipated, there are valid reasons for constructing a four-lane bridge. The rational for a four-lane bridge includes the following:

- For continuity reasons, it makes sense to continue the four-lane all the way through Chaska. The downtown area has four lanes of traffic and the backwater bridge further to the south also accommodates four lanes of traffic. Proposed improvements at the TH 41 and US Highway 169 will also accommodate more than four lanes of traffic.

- Construction for replacing the existing bridge will be significantly easier to stage (drivers can continue to use TH 41) if a four-lane bridge built. During construction of a four-lane bridge the roadway will be able to remain open; traffic can be shifted to one-lane in each direction while the construction is occurring. Construction of a two-lane bridge does not allow for this shifting of traffic. Under this scenario, drivers are forced to divert to a different roadway during construction.

- Construction of a four-lane bridge facility allows for better pedestrian and bicycle accommodations and connections to regional trails. It should be noted that an entrance to part of the state's regional trail system is just south of the bridge.

Crash Analysis

In conjunction with level of service analysis, a crash analysis was conducted to determine how many crashes occurred along the TH 41 corridor for a three-year period between January 1, 1999 and December 31, 2001. A segment crash analysis was conducted for TH 41 from US Highway 212 to the Minnesota River bridge, and also from the Minnesota River bridge to US Highway 169. In addition, an

intersection analysis was conducted for the intersections of TH 41/US Highway 212 and TH 41/US Highway 169. Due to extended queues, it was assumed, that all crashes within 1,000 feet of the intersection were a result of operations at the intersection and were included in the intersection crash analysis. The intersection of TH 41/US Highway 169 experiences significant queuing that extends beyond 1,000 feet on southbound TH 41 and westbound US Highway 169, during the peak hours. A significant number of rear-end crashes occurred outside this 1,000-foot influence area for both of these approaches (approximately 3,000 feet). It was assumed that many of the crashes in this segment are due to the queuing, and therefore were assumed to be a result of the operations from the intersection. As a result, crashes within the 1,000-foot influence area as well as rear-end crashes beyond the 1,000-foot influence area were analyzed. The results that include the additional crashes are shown in parenthesis in Table 4.

Table 4 shows a comparison of the calculated crash and severity rates to the Hennepin County average segment and intersection rates for the West Metro area. All calculated crash and severity rates are higher then the Hennepin County average rates. It should be noted that the average severity rate is typically twice the average crash rate, assuming that there is an even distribution of all crashes severities. Since the calculated severity rate is less then twice the calculated crash rate, it can be concluded that the crash severities are not evenly distributed and a high percent of the crashes are property damage crashes. The high percent of property damage crashes is most likely due to rear-end crashes caused by slow moving vehicles in the queues.

As shown in Table 5, additional analysis was conducted for the previously analyzed intersections and segments based on crash severity. The results indicate that property damage crashes account for approximately 73 percent of all segment crashes, approximately 85 percent of the crashes at the intersection of TH 41/US Highway 212, and approximately 71 percent of the crashes at the intersection of TH 41/US Highway 169. The remaining crashes were injury type crashes. No fatalities occurred within the analyzed segments or intersections.

Additional analysis was conducted for the previously analyzed intersections and segments based on crash type. As shown in Table 6, the majority of crashes that occurred at the intersections and within the segment from the Minnesota River bridge to US Highway 169 were rear end crashes. The segment from US Highway 212 to the Minnesota River bridge is a downtown area that has many side streets that create conflict points, and therefore create a wider range of crash types.

Table 4
Crash and Severity Rates Comparison (1999-2001)
TH 41

Facility Type	Crash Rate[2]	Severity Rate
Segment Crashes (including intersections)		
TH 41: US Highway 212 to Minnesota River Bridge (4-Lane)	8.5	15.3
Urban 4-Lane Undivided (West Metro)	7.0	13.7
TH 41: Minnesota River Bridge to US Highway 169 (2-Lane)	2.6	4.5
Rural 2-Lane ADT>8000 (West Metro)	1.6	3.3
Intersections Crashes		
TH 41/US Highway 212	1.5	2.1
Signalized with high volume; low speed (West Metro)	0.6	1.2
TH 41/US Highway 169[1]	2.4 (3.1)	4.4 (5.7)
Signalized with high volume; high speed (West Metro)	0.6	1.3

[1]SB and WB queues at TH 41/US Highway 169 extend past the assumed 1,000' influence area. Values in parentheses include rear end crashes that occurred outside the influence area, but were a result of queuing from the intersection.

[2]Crash rate reported per Million Vehicle Miles (MVM) for segment crashes and per Million Vehicles (MV) for the intersection crashes.

Table 5
Crash Severity Summary (1999-2001)
TH 41

	Segment Crashes on TH 41			
	US Highway 212 to Downtown Chaska		Downtown Chaska to US Highway 169	
Crash Severity Codes	**Frequency**	**Percent**	**Frequency**	**Percent**
Fatal	0	0.0	0	0.0
Incapacitating Injury	1	1.3	0	0.0
Non-incapacitating Injury	3	4.0	6	7.1
Possible Injury	16	21.3	16	19.0
Property Damage	55	73.3	62	73.8
Unknown	0	0.0	0	0.0
Total	**75**	**100**	**84**	**100**

	Intersection Crashes – TH 41 and			
	US Highway 212		US Highway 169*	
Crash Severity Codes	**Frequency**	**Percent**	**Frequency**	**Percent**
Fatal	0	0.0	0 (0)	0 (0)
Incapacitating Injury	0	0.0	1 (1)	1 (1)
Non-incapacitating Injury	2	3.6	6 (7)	6 (5)
Possible Injury	6	10.9	24 (32)	22 (23)
Property Damage	47	85.5	76 (101)	71 (71)
Unknown	0	0.0	0 (0)	0 (0)
Total	**55**	**100**	**107 (141)**	**100 (100)**

* SB and WB queues at TH 41/US Highway 169 extend past the assumed 1,000' influence area. Values in parentheses include rear end crashes that occurred outside the influence area, but were a result of queuing from the intersection.

Table 6
Crash Type Summary (1999-2001)
TH 41

	Segment Crashes on TH 41			
	US Highway 212 to Downtown Chaska		Downtown Chaska to US Highway 169	
Crash Diagram Codes	**Frequency**	**Percent**	**Frequency**	**Percent**
Read End	16	21.3	37	44.0
Sideswipe - Same Direction	6	8.0	5	6.0
Left Turn onto Oncoming Traffic	11	14.7	11	13.1
Ran off Road - Left Side	0	0.0	1	1.2
Right Angle	27	36.0	13	15.5
Right Turn into Cross-Street Traffic	0	0.0	0	0.0
Ran off Road - Right Side	0	0.0	2	2.4
Head On	0	0.0	4	4.8
Sideswipe - Opposite Direction	3	4.0	3	3.6
Other	2	2.7	2	2.4
Unknown	8	10.7	1	1.2
Not Applicable	2	2.7	5	6.0
Total	**75**	**100**	**84**	**100**

	Intersection Crashes at TH 41 and			
	US Highway 212		US Highway 169*	
Crash Diagram Codes	**Frequency**	**Percent**	**Frequency**	**Percent**
Read End	23	41.8	52 (86)	48 (61)
Sideswipe - Same Direction	3	5.5	15 (15)	14 (11)
Left Turn onto Oncoming Traffic	15	27.3	13 (13)	12 (9)
Ran off Road - Left Side	1	1.8	3 (3)	3 (2)
Right Angle	2	3.6	12 (12)	11 (9)
Right Turn into Cross-Street Traffic	1	1.8	2 (2)	2 (1)
Ran off Road - Right Side	1	1.8	2 (2)	2 (1)
Head On	1	1.8	0 (0)	0 (0)
Sideswipe - Opposite Direction	0	0.0	0 (0)	0 (0)
Other	0	0.0	1 (1)	1 (1)
Unknown	5	9.1	4 (4)	4 (3)
Not Applicable	3	5.5	3 (3)	3 (2)
Total	**55**	**100**	**107 (141)**	**100 (100)**

* SB and WB queues at TH 41/US Highway 169 extend past the assumed 1,000' influence area. Values in parentheses include rear end crashes that occurred outside the influence area, but were a result of queuing from the intersection.

Appendix

Table 1
Trucks as a Percent of Peak Hour Traffic

Location	Northbound/Southbound Percent AM Peak	Northbound/Southbound Percent PM Peak
TH 41		
North of US Highway 212	10	5
Between US Highway 212 and US Highway 169	16	9
South of US Highway 169 (CSAH 78)	23	21
Highway 101		
Between US Highway 212 and US Highway 69	8	7

Location	Eastbound/Westbound Percent AM Peak	Eastbound/Westbound Percent PM Peak
US Highway 212		
West of TH 41	13	6
Between TH 41 and Highway 101	17	6
US Highway 169		
West of TH 41	15	18
East of TH 41	15	14
TH 69		
West of Highway 101	9	2
East of Highway 101	3	2

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

TH 41 TRAFFIC STUDY UPDATE

APRIL 5, 2006

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF No. 0024590

MEMORANDUM

TO: Lisa Freese, Area Manager
Lynn Clarkowski, P.E., Project Engineer
MINNESOTA DEPARTMENT OF TRANSPORTATION

FROM: Dave Montebello, P.E., Principal
Renae Cornelius, P.E., Senior Engineer

DATE: April 5, 2006

SUBJECT: TH 41 TRAFFIC STUDY UPDATE

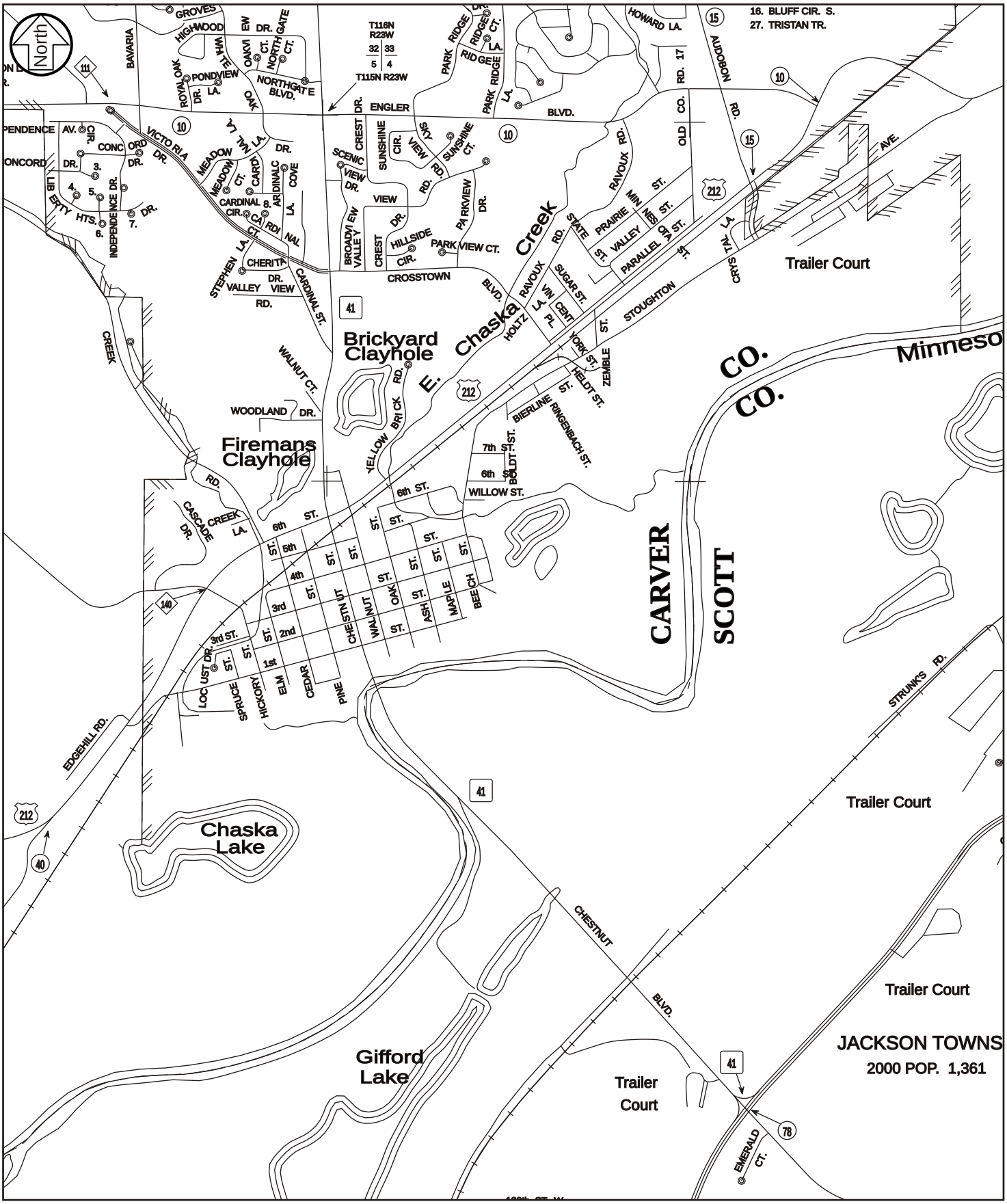
Introduction

The Minnesota Department of Transportation has requested a review of traffic operations issues on existing TH 41 from Engler Boulevard to the river crossing in the City of Chaska (see Figure 1:Project Location). The main concern is how the proposed TH 41 river crossing will impact traffic at the local intersections in downtown Chaska. This study includes an evaluation of existing volumes on existing TH 41, a traffic operations analysis for existing TH 41 during the a.m. and p.m. peak hours for existing conditions and a future evaluation of impacts of the proposed TH 41 river crossing.

Existing Conditions

A traffic operations analysis was included for TH 41 from Engler Boulevard to the river crossing, to analyze existing traffic operations in the downtown Chaska area. As part of this analysis, existing conditions were analyzed at the following key intersections:

- TH 41 and Engler Boulevard
- TH 41 and Victoria Drive
- TH 41 and existing TH 212
- TH 41 and 5th Street
- TH 41 and 4th Street
- TH 41 and 3rd Street
- TH 41 and 2nd Street
- TH 41 and 1st Street
- TH 41 and TH 169



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April 2006

PROJECT LOCATION

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

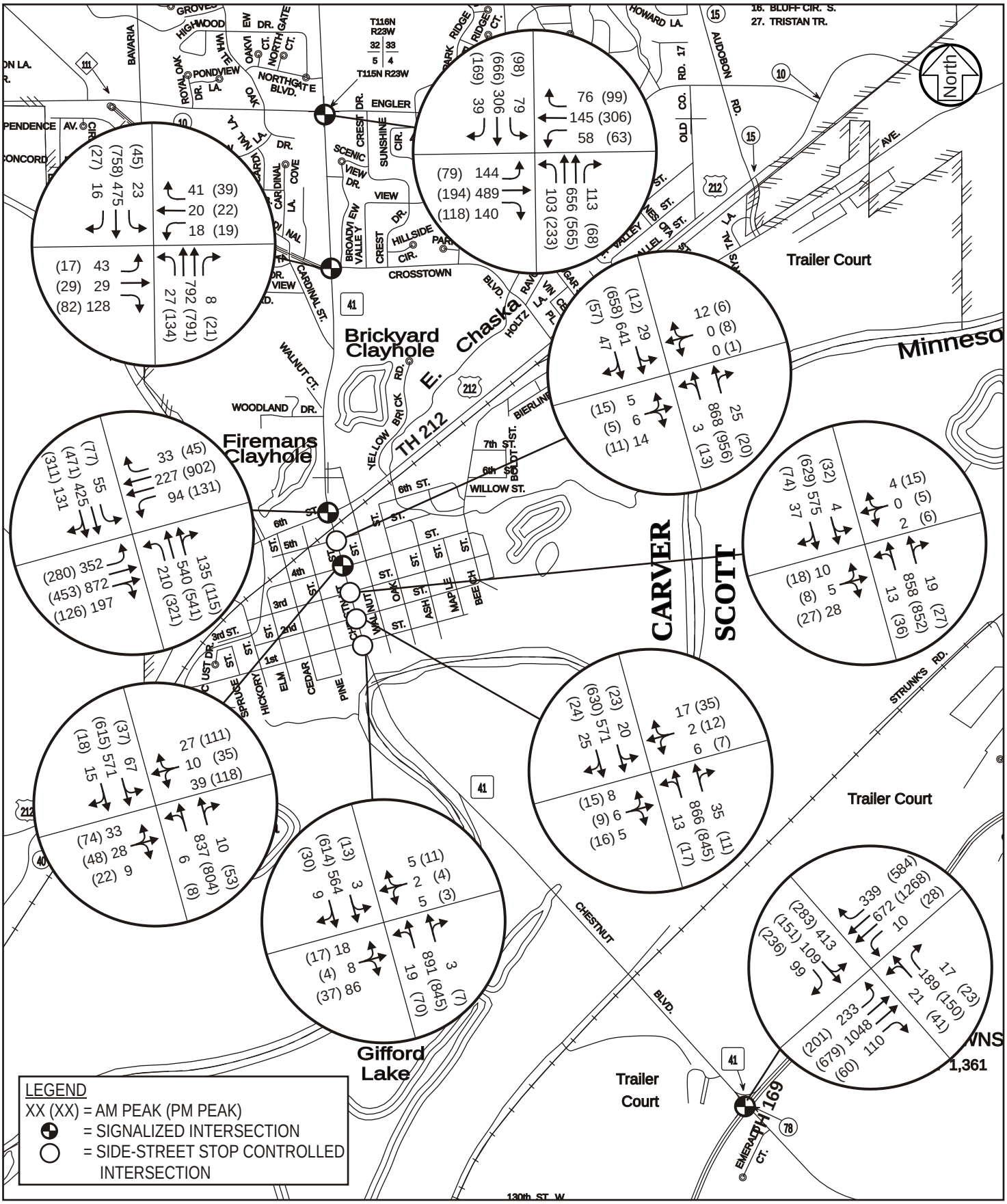
Figure 1

Current traffic controls include signalization at the intersections of TH 41/Engler Boulevard, TH 41/Victoria Drive, TH 41/existing TH 212, TH 41/4th Street and TH 41/TH 169; and side-street stop control at the intersections of TH 41/5th Street, TH 41/3rd Street, TH 41/2nd Street and TH 41/1st Street. SRF Consulting Group collected a.m. and p.m. peak hour turning movement counts in October 2002 for the *TH 41 Traffic Study* by SRF Consulting Group dated March 12, 2003, for all key intersections, with the exception of TH 41/Engler Boulevard and TH 41/Victoria Drive. New counts were collected by SRF Consulting Group for the intersections of TH 41/Engler Boulevard and TH 41/Victoria Drive in October 2005. Mn/DOT provided approach counts at all intersections on TH 41 from TH 212 to 2nd street, from June 2005. Traffic volumes on TH 41 through the downtown intersections were balanced and adjusted based on the new approach counts. Existing geometrics, traffic controls and peak hour traffic volumes for the key intersections are shown in Figure 2. Existing signal timing obtained from Mn/DOT is used for all signalized intersections.

A traffic operations analysis was conducted for the a.m. and p.m. peak hours at each of the key intersections to determine how traffic currently operates within the project area. All signalized intersections were analyzed using Synchro, with the SimTraffic simulation software. The unsignalized intersections were also analyzed using the Highway Capacity Software. Capacity analysis results identify a Level of Service (LOS), which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. LOS A through D are generally considered acceptable by drivers. LOS E indicates that an intersection is operating at, or very near its capacity and that vehicles experience substantial delays.

The traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total entering volume into the intersection and the capability of the intersection to accommodate these volumes. Second, it is also important to consider the level of service on the side-street approach. Since the mainline does not have to stop at an unsignalized intersection that has side-street stop control, the majority of intersection delay can be attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay on the side-street approaches (poor levels of service), but an acceptable overall intersection level of service during the peak hour periods. However, as the side-street delay increases, motorists tend to accept smaller gaps and/or take greater risks. These eventually could lead to safety problems.

Results of the analysis shown in Table 1 indicate that all key intersections currently operate at an acceptable LOS D or better during the a.m. peak hour, with existing traffic controls and geometric layout. All key intersections operate at an unacceptable LOS E or worse during the p.m. peak hour, except for the intersections of TH 41/Victoria Drive and TH 41/TH 169. The poor level of service during the p.m. peak hour is due to the high volume demand and a high percentage of trucks utilizing these intersections. The side-streets approaches to TH 41 in the downtown area have extensive delays (LOS F). This is due to the high volume of traffic and queuing of vehicles on TH 41 from the



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EXISTING PEAK HOUR TRAFFIC VOLUMES

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 2

intersection of TH 41/existing TH 212. These slow moving vehicles are not conducive in creating sufficient gaps for side-street vehicles to enter TH 41. It is important to note that the intersection of TH 41/TH 169 operates at an acceptable LOS D during both time periods. The level of service has improved from the previous study conducted in 2002 (reported LOS F). The improved operation is due to recent improvements that have been made to this intersection.

Table 1
Existing Capacity Analysis
Level of Service Results

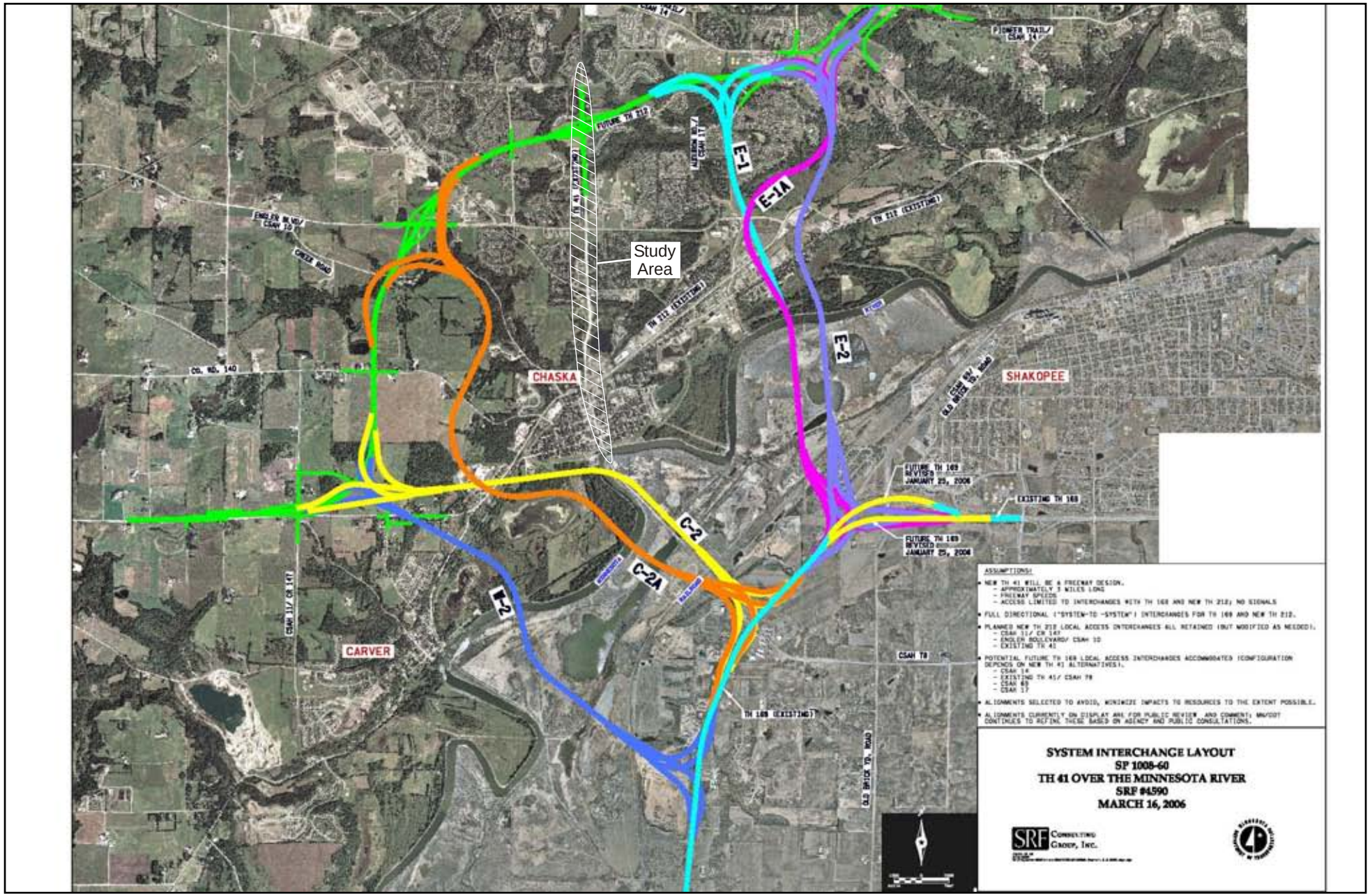
Intersection	Level of Service	
	A.M. Peak	P.M. Peak
TH 41/Engler Boulevard	D	E
TH 41/Victoria Drive	B	C
TH 41/Existing TH 212	D	F
TH 41/5th Street*	B/F (1)	F/F (1)
TH 41/4th Street	A	E (1)
TH 41/3rd Street*	A/C	F/F (1)
TH 41/2nd Street*	A/C	E/F (1)
TH 41/1st Street*	A/D	C/F (1)
TH 41/TH 169	D	D

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.

(1) Poor level of service is due to queuing from the intersection of TH 41/TH 212 which extends through downtown Chaska on TH 41 and does not provide gaps for vehicles on the side-streets.

2040 Future Conditions

The purpose of this study is to determine if and how each of the proposed TH 41 river crossings will impact existing TH 41 and the downtown Chaska area under year 2040 future conditions. Currently, there are six alternative corridors for the proposed river crossing under study (see Figure 3), all producing slightly different traffic volumes within the study area. Forecasts for each alternative, as well as for No-Build conditions, assume that New TH 212 will be completed and open to traffic and that existing TH 41 will remain in place. The only difference between the scenarios is the location of the proposed TH 41 river crossing. The previous traffic study completed for this area analyzed the p.m. peak hour for year 2030 No-Build conditions, without a new river crossing. These peak hour forecasts are lower than those for the 2040 No-Build and 2040 Build alternatives. As a result, we have concluded that most of the intersections within the study area will operate similar to the 2030 analysis



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PROPOSED TH 41 ALIGNMENTS

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 3

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previously completed (LOS F) during the p.m. peak hour. The 2030 No-Build level of service results from the previous study are shown in Table 2, along with results from new analysis conducted for the intersections of TH 41/Engler Boulevard and TH 41/Victoria Drive. It was assumed that by Year 2030, TH 41 north of existing TH 212 will be a four-lane section (currently there are two-lanes northbound and one-lane southbound). Year 2030 analysis does not include the intersection on TH 41/TH 169 because it is assumed that this intersection will be an interchange in the future. Year 2030 No-Build geometrics and p.m. peak hour traffic volumes for the key intersections are shown in Figure 4.

Table 2
Year 2030 No-Build Capacity Analysis
Level of Service Results

Intersection	**Level of Service P.M. Peak**
TH 41/Engler Boulevard	F
TH 41/Victoria Drive	C
TH 41/Existing TH 212	F
TH 41/5th Street*	F/F (1)
TH 41/4th Street	F (1)
TH 41/3rd Street*	C/F (1)
TH 41/2nd Street*	C/F (1)
TH 41/1st Street*	A/D
TH 41/TH 169	n/a (2)

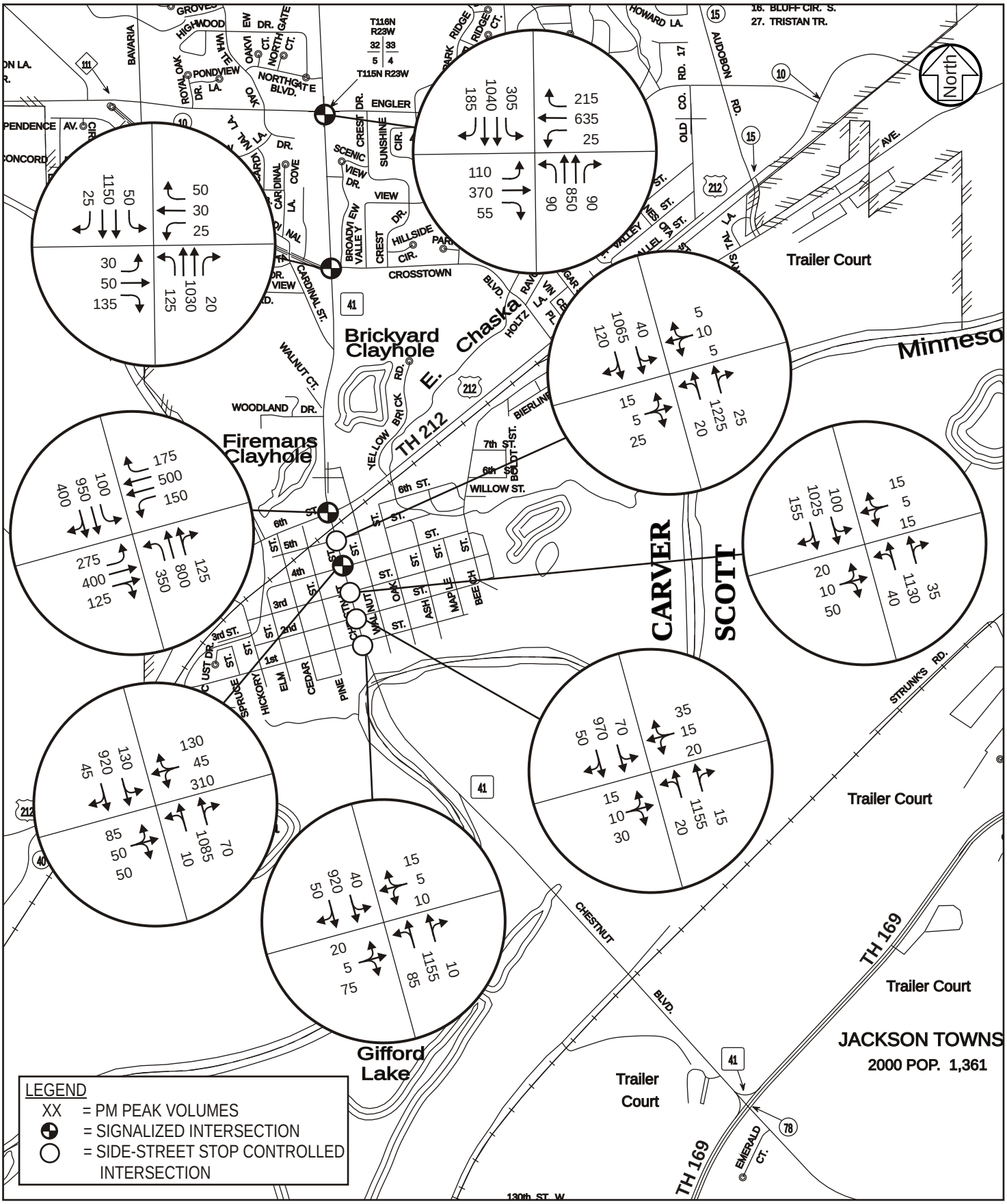
Note: Analysis results shown above, with the exception of the intersections of TH 41/Engler Boulevard and TH 41/Victoria Drive, are from the *TH 41 Traffic Study* completed by SRF Consulting Group, dated March 12, 2003.

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.

(1) Poor level of service is due to queuing from the intersection of TH 41/ existing TH 212.

(2) Year 2030 analysis does not include the intersection on TH 41/TH 169 because it is assumed that this intersection will be an interchange in the future.

Analysis results above show that the intersections on TH 41 at Engler Boulevard, existing TH 212, 5th Street and 4th Street operate at an overall unacceptable LOS F, with worst approach LOS F at 3rd Street and 2nd Street. When compared to existing p.m. peak hour results, the 2030 No-Build conditions operate at better overall levels of service at the intersections of TH 41/3rd Street, TH 41/2nd Street and TH 41/1st Street. Improved operations are due to the construction of New TH 212 which reduces the volume of traffic for eastbound and westbound traffic on existing TH 212. This allows for more green time for northbound TH 41 at the intersection of TH 41/existing TH 212. This improvement in traffic flow reduces the extent of the northbound queuing on TH 41 and improving



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April 2006

2030 NO-BUILD PM PEAK HOUR TRAFFIC VOLUMES

TH 41 TRAFFIC STUDY
Minnesota Department of Transportation

Figure 4

operations at the southern-most intersections. It should be noted that although the queuing on northbound TH 41 is reduced under year 2030 No-Build conditions, the delay at the intersection of TH 41/existing TH 212 is worse than existing conditions, with the overall delay affecting all approaches, rather than just the northbound approach.

As stated above, the traffic volumes for the 2040 No-Build and six Build alternatives during the p.m. peak hour are higher than those of the 2030 No-Build analysis and as a result, the intersection operations are expected to yield similar results (LOS F). The reason for this is that even though river crossing capacity is being added under the Build alternatives, future land use changes are adding more trips in the peak hour than the new capacity that is constructed. While this analysis demonstrates that peak hour operations will not necessarily change much, the duration of congestion on existing TH 41 is expected to be significantly reduced. An additional analysis was conducted to determine the expected number of hours of congestion during a typical day for 2040 No-Build and Build conditions. Congestion hours were determined based on the capacity of each lane for TH 41 north and south of existing TH 212, as well as the adjacent Highway 101 river crossing. Results from this analysis are shown in Table 3.

Table 3
Year 2040 Directional Hours of Congestion Analysis
Analysis Results

Alternative	Location		
	TH 41 North of Existing TH 212 (north of downtown Chaska)	**Existing TH 41 river crossing (south of downtown Chaska)***	**Existing Highway 101 river crossing**
Capacity	750 vplph	1200 vplph	1200 vplph
No Build	0	10	10
W2	0	**3**	7
C2	0	**2**	7
C2A	0	**3**	7
E1	0	**2**	6
E1A	0	**3**	6
E2	0	**2**	5

Note: Directional hours of congestion are based on 48 hours, 24 hours for each direction.
BOLD indicates locations where the hours of congestion are reduced by 70 percent or more.
* Hours are discrete; the difference between two and three hours of congestion may not be significant.

Results of the analysis above show that the addition of a new river crossing will greatly reduce the number of hours of congestion on existing TH 41 and Highway 101 for the majority of the alternatives. Conclusions for each of the locations above are discussed in detail below.

Existing TH 41 North of Existing TH 212

- Based on lane capacity alone, this section will not experience congestion in the future. However, in should be noted that based on the Level of Service analysis, the intersection of existing TH 41/Engler Boulevard operates at a LOS F during the p.m. peak hour for 2030 No-Build conditions. Capacity for existing TH 41 is reduced at this intersection due to opposing traffic on Engler Boulevard. While there is delay for vehicles on existing TH 41 at this intersection, it is not significant enough to create hours of congestion.

Existing TH 41 River Crossing

- The daily hours of congestion and gridlock, from year 2040 No-Build to Build conditions, are reduced by 70 to 80-percent for all alternatives.
- There is limited ability to add capacity on TH 41 through downtown Chaska in the future due to historic existing buildings.

Existing Highway 101 River Crossing

- The daily hours of congestion and gridlock, from year 2040 No-Build to Build conditions, are reduced by 30-percent for the western Alternatives W2, C2, and C2A.
- The daily hours of congestion and gridlock, from year 2040 No-Build to Build conditions, are reduced by 40 to 50-percent for the eastern Alternatives E1, E1A and E2.
- Highway 101 has the ability to add capacity in the future.

It is important to note that with any of the proposed TH 41 river crossing alternatives, the truck traffic on existing TH 41 through the downtown Chaska area will be reduced by approximately 65-percent.

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

FOR

SHIPPER AND CARRIER SURVEY

PREPARED FOR
SRF CONSULTING GROUP, INC.

JULY 2003

PREPARED BY
CJ PETERSEN ASSOCIATES

SRF NO: 0024590

Shipper & Carrier Survey Results
TH 41 over Minnesota River

Prepared by
C J Petersen & Associates
July 2003

Prepared for
SRF Consulting Group, Inc.

Acknowledgements

This research could not have been possible without the cooperation of the many firms and their employees who responded to the survey. Thank you for your willingness to share your insights about the TH 41 Highway System that is a vital link for commerce in and through Minnesota.

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SHIPPER & CARRIER SURVEY RESULTS

PURPOSE

In July 2002 the Minnesota Department of Transportation (Mn/DOT) requested proposals for the purpose of identifying a preferred corridor/river crossing alignment between TH 169 and new TH 212. The study addresses the recognized need for a new regional river crossing connecting Carver and Scott Counties. The existing river crossing travels through downtown Chaska, effectively dividing the community. Between 1990 and 2000, there was significant growth in traffic, both auto and truck. Traffic on TH 41 has increased from 10,300 vehicles per day in 1990 to 18,500 in 2000. The traffic volumes are exacerbated by other factors including springtime flooding of the TH 41 river crossing and seasonal increases in truck traffic in the spring and fall of each year. The truck traffic is generated by a variety of businesses that service rural agriculture producers and the metropolitan area's construction industry.

C J Petersen & Associates' role in the project was to provide a better understanding of heavy commercial vehicle flow on TH 41 and other river crossings in the study area. There were two parts to studying and understanding the traffic patterns. First, a roadside truck count was conducted in October 2002 by SRF Consulting Group. Information on the number and type of commercial vehicles along with their turning movements was documented. Second, a phone survey of motor carriers and shippers was conducted. This phone survey was designed to capture detailed information that would complement SRF's counts at intersections and highway segments. The survey collected information on the following:

1. Origin and destination areas for trucks moving along TH 41
2. Adequacy of TH 41 and other river crossings
3. Commodities moved
4. Seasonal peaks of truck movements and routes they typically use
5. Foreseeable expansion plans (i.e., increases in truck use in the future)

SCOPE

There were three databases from which survey participants were drawn; they were:

- Mn/DOT's Freight Facilities Database based on the Harris InfoSource 2000 Database sorted for firms in the TH 41 Study Area,
- Mn/DOT District 8 Sand and Gravel Operator Listing combined with the Mn/DOT Freight Facility designated Sand, Gravel and Landfill Operators,
- SRF Consulting Group, Inc.'s October 2002 Truck Count and Motor Carrier Listing.

The databases were sorted to eliminate duplicate entries, as well as firms who had previously provided detailed data regarding the volumes shipping to and from their facilities along TH 41 and other river crossings in the study area as a part of previous studies. The survey team then called all of the firms on the sorted lists to verify and update the company name, address, phone numbers, fax numbers, contact names and titles. The total number of firms that responded was 47, which included one firm that did not respond to the survey but provided extensive information about their receiving and shipping. This provided detailed information about the volume of trucks traveling to and from their facility, but would not respond to the survey itself regarding the adequacy of the bridges or routes. This firm stated that the truckers chose their routes to their facility, and he did not have records of the routes they chose.

The following table shows the iteration of the database verification process for each of the three lists by count of company names on the lists.

Table 1
Survey Participant Database

Database	1. Original Count	2. Sorted Count	3. Final Count	4. Total
Mn/DOT Freight Facilities	144	62	48	38
Mn/DOT District 8 Sand & Gravel Operator Listing combined with the Mn/DOT Freight Facility designated haulers of Sand, Gravel, Landfill Haulers	41	9	7	3
SRF Consulting Group, Inc.'s October 2002 Motor Carrier Physical Count Listing combined with Mn/DOT's Freight Facility Listing	19	12	9	6
Totals	**204**	**83**	**64**	**47**

1. Original Count = All firms on the list.
2. Sorted Count = Eliminates duplicate firms, firms that would typically not be considered shippers, such as retail establishments and postal facilities.
3. Final Count = Updated with current addresses, phone numbers and contact information; eliminates those that no longer have an address in the study area or are no longer listed in an area directory or with directory assistance.
4. Total=Number of firms that responded to the survey.

METHODOLOGY

Through discussions with SRF and advice given by the TH 41 Project Management Team, a process was developed for conducting the survey. The process was accomplished through a series of steps, which included:

1. developing a list of unanswered questions relative to TH 41 truck traffic,
2. creation of a survey instrument,
3. reviewing the survey with the Project Management Team,
4. obtaining the database,
5. updating the database with shipper and motor carrier contact names, company, addresses, phone numbers and fax numbers,
6. testing the survey with 5 shippers and motor carriers in the TH 41 study area,
7. revising the cover letter and survey,
8. faxing the survey to the TH 41 shippers and motor carriers,
9. calling shippers and motor carriers to complete the survey by appointment or at the time of the initial phone call; it was the respondent's choice, and
10. recording responses in an Excel database.

The database was updated and verified in December 2002. Also in December, test surveys were completed by three shippers and two carriers to assure that the questions were clearly understood by the respondents. Revisions were made to the order in which the questions were asked not to the content of the questions being asked. After revisions were made, a cover letter and the survey were faxed to the contact name in the database. Each firm was contacted by phone to set an appointment to complete the survey.

There were between three to five follow-up phone calls made to each potential respondent to attain phone appointments. There were seven shippers and two motor carriers who mailed or faxed their responses and were contacted for follow-up phone interviews by phone. The survey was administered between January and March 2003.

The supporting documentation for this project is included in the Appendix to the report and includes the:

1. Screener,
2. Cover Letter and Shipper Survey, and
3. Cover Letter and Motor Carrier Survey.

Respondent Profile
Forty-two percent of the participants represented firms of less than 100 employees and fifty-eight percent represented firms of 100 or more employees. See Table 2.

Table 2
Participating Companies by Number of Employees - 2002

Company Type	Number of Employees				
	1 TO 49	50 TO 99	100 TO 499	500 OR MORE	Total
Motor Carriers including Garbage, Sand & Gravel Haulers	1	1	2	1	5
Manufacturers or Processors as Shippers	13	3	21	1	38
Total	14	4	23	2	43
%	33%	9%	53%	5%	

Study respondents have a different employee count profile from typical Minnesota employers and the U. S. national distribution of employers. According to the publication "Compare Minnesota Economic Diversity," this is the breakout for Minnesota by count of employees for firms in 1999:[1]

- 1 to 99 employees for all employers: 97.2%
- 100 to 499 employees for all employers: 2.5%
- 500 + employees for all employers: 0.3%

Table 2 indicates that this study captured information from the largest firms and potentially the largest shippers in the study area. This is significant, since larger firms generate the greatest volumes of truck traffic, as shippers, receivers or both. However, there is a caveat, traffic, distribution, warehousing, and logistics respondents generally do not have a record of the truck volumes arriving or departing from their facilities. The majority of the respondents were only able to provide an estimate of their truck volumes traveling through, to, or from the study area.

The manufacturer, processor or distribution center have a different role from the motor carrier in the supply chain. These firms in the supply chain generate who ship commodities, semi-finished or finished goods or receivers of supplies cause the motor carrier to generate a trip to or from their facility. Truck traffic does not occur in isolation, it occurs because there one of their customers has instructed them pick-up or

[1] Distribution of Minnesota Employment by Industry and Establishment Size, 1999, "Compare Minnesota Economic Diversity," Minnesota Department of Trade and Economic Development, p. 2.4.

deliver a product or by-product of a transaction. In the remainder of this report, the word "shipper" will refer to a firm that is a manufacturer, processor, or distribution center that is generating a trip to their facility in the study area. The designation of "motor carrier" will refer to truckers and garbage haulers with trips to, from and through the study area.

Table 3 profiles the types of products being hauled in, through and out of the study area along with an estimated count of trucks. There is an imbalance between the numbers reported for inbound and outbound truck moves. There are several reasons that this reporting difference occurred:

- Some responding firms are located on the edge of the study area and will maximize their logistical capabilities by routing them to destinations outside the study area,
- There were inaccuracies in the verbal reporting of truck volumes inbound and outbound,
- Seasonal variations in truck traffic were averaged, which would skew the inbound and outbound truck volumes, and
- There is an inland waterway port that receives truckloads of agricultural products, but may not generate as much outbound traffic into the area, which could distort the balance reported.

Table 3 provides the detail needed to arrive at the bullet points above; it reports first; the respondents estimated daily truck count by type of product shipped. The primary products shipped as reported by these respondents include sand and gravel, grain and feed generate the most truck trips. Second, it reports truck volumes that were prorated to arrive at a daily truck count. Some of the respondents did not have daily truck deliveries or pick-ups at their facilities; instead they might have three trucks moving goods to and from their facility in a week. In those cases, the truck count was prorated to a partial truck then aggregated with other shipper counts.

The motor carriers indicated that they routed nearly 150 trucks through this area on any given day hauling in rank order petroleum, agricultural products, such as grain, seed and feed, sand and gravel, and garbage.

Table 3
Typical Products Reported as Shipped by Respondents - 2002

Outbound			*Inbound*		
Products	**Average Number Trucks per Day**	**Percent**	**Products**	**Average Number Trucks per Day**	**Percent**
ag & farm equipment	0	0.0%	ag & farm equipment	0	0.0%
ag products: grain, seed, fertilizer, feed	590	29.9%	ag products: grain, seed, fertilizer, feed	1,363	60.5%
building materials	262	13.3%	building materials	17	0.8%
consumer items	0	0.0%	consumer items	0	0.0%
distilled spirits	0	0.0%	distilled spirits	0	0.0%
electronics, electric & communications equipment	58	2.9%	electric & communications equipment	43	1.9%
food & food products	25	1.2%	food & food products	60	2.7%
metal	20	1.0%	metal	91	4.1%
miscellaneous	431	21.9%	miscellaneous	393	17.4%
paper & paper products	110	5.6%	paper & paper products	172	7.6%
petroleum	8	0.4%	petroleum	40	1.8%
sand & gravel	469	23.8%	sand & gravel	73	3.3%
textiles	0	0.0%	textiles	0	0.0%
transportation equipment & vehicles	0	0.0%	transportation equipment & vehicles	0	0.0%
Estimated Truck Count Outbound	**1,972**	**100.0%**	**Estimated Truck Count Inbound**	**2,253**	**100.0%**

KEY FINDINGS

Discussion with the survey participants identified five areas of interest for this study. These five areas included:

- Business Growth
- Safety
- Adequacy of Existing River Crossings
- Local Heavy Truck Hauling: Gravel, Sand, Garbage
- Agriculture and Seasonal peaks

Business Growth

During the time frame that the phone survey was conducted, economic news was not positive and the United States was on the brink of war. In spite of conditions that many viewed as negative, business people in the study area were at worse anticipating a stable or flat business projection and at in some cases increases in business volume.

Table 4 reports the shippers' projections based on existing trends and a potentially optimistic view of the economy from a small group of firms that will be affected by the economy of the nation and region. Twelve firms, each with more than 100 employees, projected an increase in volumes being shipped to and from this study area in the next five years.

Table 4
Shippers' Expected Change in Truck Volumes – 2002

Firms by Number of Employees	NO Change in 5 Years	1-10 % Increase in 5 Years	11-25 % Increase in 5 Years	>25 % Increase in 5 Years	1-10 % Decrease in 5 Years	>10 % Decrease in 5 Years	Total
1-49	6	3	4	0	0	0	
50-99	2	1	0	0	0	0	
100-499	10	7	3	1	0	0	
500+	0	0	1	0	0	0	
Firms Reporting	**18**	**11**	**8**	**1**	**0**	**0**	**38**
Percentage	*47%*	*29%*	*21%*	*3%*	*0*	*0*	*100%*

The motor carriers reported that they expected either no growth in their volumes or some grown. Two carriers responded that they do not expect any change in their business volumes in the next five years and the remaining three respondents indicating that they would experience growth in their business in the next five years.

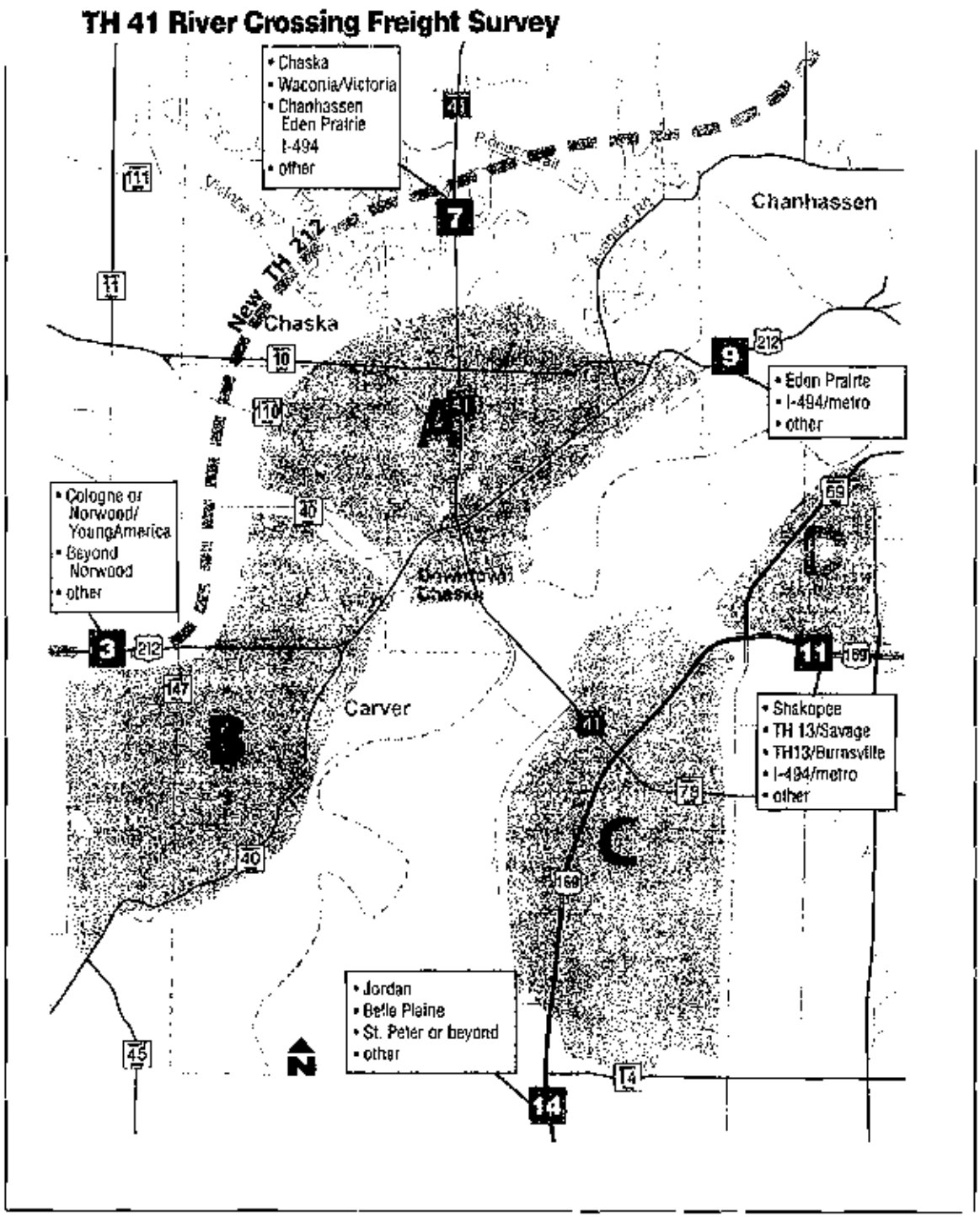
Table 5 provides an estimate of the daily volume of trucks that are routed in, out and through the study area by respondent firms. It is important to remember that this is a snapshot of traffic volumes based on verbal estimates provided in a series of phone interviews with logistics, transportation or a firm's management team. Based on Table 4, Table 5 and the respondents' comments, the numbers of trucks traveling in the study area are expected to increase in the next five years. (See Map for "Areas" or Origins and Destinations.)

Table 5
Shipper Estimated Volume of Trucks per Day – 2002

Destination Area	Truck Count per Day	Percent	Firms per Area	Average Truck Count Per Day Per Firm	Origin Area	Truck Count per Day	Percent	Firms per Area	Average Truck Count Per Day Per Firm	*Estimated Outbound and Inbound Per Day*
Area A - Chaska	31	1.6%	8	4	Area A - Chaska	42	1.9%	8	5	*73*
Area B - West Chaska/Carver	22	1.1%	7	3	Area B - West Chaska/Carver	26	1.1%	5	5	*48*
Area C - TH41/169	48	2.4%	14	3	Area C - TH41/169	125	5.5%	10	12	*173*
Area D - Downtown Shakopee	40	2.0%	11	4	Area D - Downtown Shakopee	24	1.0%	8	3	*63*
Area 3 - TH212 West	147	7.4%	11	13	Area 3 - TH212 West	223	9.9%	7	32	*370*
Area 7 - TH41 North	328	16.6%	12	27	Area 7 - TH41 North	104	4.6%	9	12	*432*
Area 9 - TH212 East	38	1.9%	11	3	Area 9 - TH212 East	34	1.5%	9	4	*72*
Area 11 - TH169 North/East	402	20.4%	14	29	Area 11 - TH169 North/East	184	8.2%	11	17	*585*
Area 14 - TH169 South	323	16.4%	16	20	Area 14 - TH169 South	256	11.4%	10	26	*578*
Other Areas	594	30.1%	23	26	Other Areas	1,237	54.9%	23	54	*1,831*
Total	***1,972***	***100%***	***127***	***16***	***Total***	***2,253***	***100%***	***100***	***23***	***4,225***

Shippers and truckers were asked to reference a map in allocating their truck traffic in, out and through the study area, which is included on the following page.

Figure 1
Map Depicting Origins and Destinations



Motor carriers and shippers have two separate perspectives about the highway system, in this case, TH 41 and the bridge system that connects its various segments.

Motor carriers reflect the opinions of the truck drivers who are contending with the geometrics of the system, the rules and regulations that specifically apply to them and their use of the system, and the day-to-day requirements imposed on them by their customers, the shippers and receivers.

Shippers, unless they have their own private fleet of trucks, are concerned about their ability to meet their customer's demands; none of the shippers participating in this study own their own fleet of trucks. Whether they are acting as shippers or receivers of goods, they must ship on-time, deliver the product in the condition promised the customer at the time promised. Shippers do not select the routes that the carriers use, although they often have opinions about the adequacy of the roads and the carriers' ability to access their particular facility.

Comments from both groups are included here with little or no editing; these are quotes from the respondents.

Carrier Comments
TH 169 River Crossing:

- The expansion of new businesses and residential sprawling to South and Southwest, for example, if there was snow like February 5, 2003 then the commute will be one hour for a 13 mile commute the traffic is that heavy and weather related now. But in five years it will be traffic related; not because of the crossing, but because of the lights north of the crossing and the lights on the ramps.

Shipper Comments
TH 41 River Crossing

- We're growing; getting a lot bigger this year and it won't be adequate. It won't be adequate just for the volume that this area is growing. For example, we are in the middle of a $35 million expansion. Right now we are seasonal since our product is applied primarily in warmer weather, but the construction industry is moving to year round construction and so are we. With our expansion, it has to be year-round volumes.

Safety

Discussions with the businesses in the study area indicated that there was concern for the current adequacy of the transportation system for trucks and general traffic. Both shippers and carriers stated that safety was a concern for themselves, their trucks and drivers and for pedestrians. Some provided very specific examples; others were generally concerned about the volume of traffic through a downtown area and at specific intersections. These comments are representative of those made by other respondents.

Carrier Comments

TH 169 River Crossing:

- Terrible road, I don't know what kind of idiot would put stoplights on a freeway.

TH 41 River Crossing:

- It floods out every spring. It will need to be a 4-lane to TH 169.
- If a new crossing is built for TH 41, then it should not dump into Downtown Chaska; it would be better if it would feed east or west of Chaska.

Shipper Comments

TH 41 River Crossing:

- We are concerned about TH 41 through downtown Chaska. Because of the (high volume of) grain trucks in the fall, we don't let out our kids on bikes or to walk the streets alone.
- There should be real easy access off of TH 41 for the industrial park including the new one being planned on the other side of Chaska. We will need ramps that are truck friendly; the 15 mile per hour ramps are a problem. Our oversize product stands 8' tall with 80% of the weight in the top 3'; it puts product shipped at risk. The straps are the only thing holding the equipment and the truckers try to avoid tight corners, but the ramps are a problem.

Adequacy

Respondents made general comments that the system is not adequate to meet their needs, especially the bridges. Yet, they did not pinpoint which bridges were inadequate. This may be explained by the fact that the overwhelming majority of shippers do not own trucks and do not determine the routes that the trucks will use. It is the driver's and carrier's responsibility to choose the route.

Carriers must meet deadlines imposed by their customers and other carrier partners, such as railroads, airlines or courier companies such as UPS or DHL. They were consistent in what they said in general comments and in responding to survey questions about bridge adequacy. The carrier pays attention to the delays on roads and bridges, since it is the carrier who bears the financial burden of using a driver and truck efficiently. In addition, the carrier may also pay financial penalties to their customers if they miss the delivery time promised.

Tables 6, 7, 8 and 9 provide a snapshot of shipper and carrier estimated truck volumes and their viewpoints about adequacy of the bridges. It also identifies which bridges are more frequently traveled.

Table 6
2002 Shipper Opinion of Bridges for Daily Truck Moves Outbound from the Study Area

BRIDGES USED FOR OUTBOUND MOVES	Average No. Trucks / Day	Adequate 2002	NOT Adequate 2002	Number of Respondents	Adequate in 5 years	NOT Adequate in 5 years	Number of Respondents
TH 101	93	20	4	*24*	22	4	*26*
TH 169	460	20	4	*24*	15	9	*24*
TH 41	110	18	4	*22*	14	9	*23*
TH 13 to I-35	25	0	1	*1*	0	1	*1*
I-35W	25	1	0	*1*	1	0	*1*
TH 41 No.	8	1	0	*1*	1	0	*1*
TH 212	55	1	0	*1*	1	0	*1*

Table 7
2002 Carrier Opinion of Bridges for Daily Truck Moves Outbound from the Study Area

BRIDGES USED FOR OUTBOUND MOVES	Average No. Trucks / Day	Adequate 2002	NOT Adequate 2002	Number of Respondents	Adequate in 5 Years	NOT Adequate in 5 Years	Number of Respondents
TH 101	48	2	2	*4*	1	3	*4*
TH 169	105	4	1	*5*	1	4	*5*
TH 41	45	2	3	*5*	1	4	*5*

Table 8
2002 Shipper Opinion of Bridges for Daily Truck Moves Inbound to the Study Area

BRIDGES USED FOR INBOUND MOVES	Average No. Trucks / Day This Road Segment	Adequate 2002	NOT Adequate 2002	Number of Respondents	Adequate in 5 years	NOT Adequate in 5 years	Number of Respondents
TH 101	94	22	4	26	18	8	26
TH 169	401	20	4	24	16	8	24
TH 41	170	19	4	23	14	9	23
TH 13 to I-35	5	0	1	1	0	1	1
I-35W	0	0	0	0	0	0	0
TH 41 No.	8	1	0	1	1	0	1
TH 212	55	1	0	1	1	0	1

Table 9
2002 Carrier Opinion of Bridges for Daily Truck Moves Inbound to the Study Area

BRIDGES USED FOR INBOUND MOVES	Average No. Trucks / Day	Adequate 2002	NOT Adequate 2002	Number of Respondents	Adequate in 5 years	NOT Adequate in 5 Years	Number of Respondents
TH 101	48	2	2	2	1	3	4
TH 169	95	3	1	3	1	3	4
TH 41	40	2	2	4	1	3	4

Carrier Comments

TH 169

- People have "taken" to using the TH 169 crossing from the south side of Chaska. Bloomington & Minneapolis residents use TH 169 to avoid I-494.
- TH 169 can be very congested, we are a large trucking company and there are complaints about transit times from our customers due to the congestion. A new way to get through Shakopee is not such a bad idea.

Shipper Comments

TH 169 River Crossing

- Every year it's getting worse to get onto TH 169 as compared to 5 or 10 years ago. It won't get better in the next 2 to 5 to 10 years, instead it will be worse.

TH 41 River Crossing

- Never seen it so bad as last year, it was 20 minutes from Chaska to our quarry 1/2 mile south of TH 41. Lived in Chaska for 10 years, now have to wait for traffic at 6:40 a.m. for 10 minutes; there wasn't any waiting 10 years ago. (Comment made by someone who lives by Mn/DOT's Truck Station.)
- Major flood issues: TH 101 and 41 go under water every spring for 4 to 6 weeks. This causes us major drive-around time. TH 212 traffic is 'crazy'. We have to get all our trucks out by 7:00 a.m. or else it takes 15 to 20 minutes to go 2 miles.

Local Hauling Issues: Sand, Gravel and Garbage Haulers

Sand and Gravel

The construction of housing, retail space, office and industrial buildings have fueled the construction industry's use of sand and gravel. Within the study, construction related traffic is generated by the gravel pits. Some of the sand and gravel pits are anticipated to last over 40 years. Generally, traffic related to construction is seasonal and peaks during the summer months, during the same period as the peak traffic for compost and waste shipping, and agriculture and related product shipments. (See section on Seasonal Peaks.)

Garbage Hauler

The garbage haulers expect that their volume of traffic will continue to grow with housing developments and population growth in this area. Carver and Scott Counties have been identified by the Metropolitan Council as containing "Developing Suburbs with Substantial Area for Development."[2] One of the area's larger garbage haulers stated that as housing developments are built, it will correlate with population growth and trucks operating on area streets.

Chaska and Chanhassen Residential and Commercial Areas:

- As a waste hauler we follow routes through the residential areas, the peak season is from April through November when compost and brush or yard waste is collected. Summer truck volumes are 40 to 50 per day as compared to the lower volume winter routes at 8 to 10 per day (See Tables 6, 7, 8 and 9). This hauler's shipping patterns "run" on a weekly cyclical basis. The primary pick-up days are Monday to Friday; which is the same number of trucks each day. Saturday and

[2] Metropolitan Council Work Map, Map 1-35: Developing Suburbs with Substantial Area for Development, "The Economic Component of the Metro Freight Study," Minnesota Department of Transportation, p. 1-20.

Sunday they run one truck. They don't run during rush hour on major routes which are heavily traveled, but during working hours or off-peak. Roll-off Trucks run on the major highways at all times-like a dump-truck, i.e. for commercial compacted trash or construction.

Agriculture and Seasonal Peaks

This section is divided into two parts; the first covers the inland waterway ports that generate high volumes of truck traffic related to agriculture. The second peak in truck traffic follows the seasons for planting and harvesting crops. According to shippers in this study area there is harvest traffic from April to August, and then in October.

Agriculture

Combined, the ports of St. Paul, Winona and Savage (the lone port on the Minnesota River) handle the majority of the district's river trade at more than 11 million tons. Waterborne transport remains a very competitive mode compared with intermodal highway and rail. In fact, it is the most efficient way to move dry or liquid commodities like grain and petroleum or general cargo such as fertilizer or coal that isn't time sensitive or of extremely high value. According to a 2000 state report, in Minnesota 21 percent of all freight tonnage, but only 3 percent of the freight value, went by water---indicative of the commodity freight handled in ports. Water transport via inland ports is estimated to be at least five times more efficient than rail and trucks at delivering similar cargo on a fuel cost-per-gallon basis. U.S. inland waterways move about 15 percent of interstate commerce for bulk commodities at only 2 percent of the cost.[3]

There is a larger volume of grain coming into the port facilities by way of rail due to an agreement between Bunge, Harvest States and the Twin Cities & Western RR effective in September 2001. Western MN shippers can now use this connection for delivery direct by railcar to these port facilities.[4] This means that rather than increasing truck volumes, the truck traffic will remain static at significant levels at the Ports of Savage. One firm indicated that they had 59,000 trucks dumping (loads in and empty out) at their facility in 2002 that resulted in dumping a total of 68 million bushels. The volumes of grain are affected by trade agreements, flooding of the Minnesota River and other market pressures. For example, in 2001 they handled 10,000 fewer trucks or 51 million bushels due to flooding of the Minnesota River.

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[3] Jedd, Marcia, The shipping news & forecast, "District ports face many competitive challenges, but whether they sink or swim over the long term will likely depend on infrastructure improvements." The Federal Reserve Bank of Minneapolis, January 2003, http://minneapolisfed.org/pubs/fedgaz/03-01/shipping.cfm.

[4] http://www8.cpr.ca/cms/

Due to reasons of confidentiality and lack of specific knowledge about the routes that the truckers follow to their port facilities, the port shippers are reluctant to specify which routes their vendors use to deliver grain or pick-up fertilizers or chemicals. In a prior study regarding the Interregional Corridor System, TH 212 rural shippers stated in a focus group that their truck follows a route from western Minnesota along TH 212 to TH 41 to TH 169 to TH 13 into the Ports of Savage.

There are a wide range of carriers coming into the port facilities. There can be up to 150 trucks in the port yard at one time during peak season. The port facilities anticipate using transponders and tags with the truckers by the end of 2003 replacing the existing paper exchange, which will allow processing of a truck every 1.5 minutes.

Agricultural products are not "scheduled" for delivery and pickup at any time, including peak season. It is driven by the purchase of grain at the market level. When the co-op is buying grain, then the trucks deliver the product without any notice as to the volume and timing of incoming freight.

It is difficult to anticipate volumes in five years, 10 years, or 15 years according to those familiar with agricultural commodities. Volumes are completely market driven and cannot be predicted at the port level. Factors affecting the volumes include market demand, farm productivity, requirements for Genetically Modified Organisms and the processor's ability to tag the product and retain identity of the product through the supply chain. In addition, viability of the river and the corresponding locks and dams and access to regional rail delivery systems all have an impact on the volumes that will be generated.

Shipper Comments
TH 41 River Crossing

- The TH 41 and 169 intersection is backed up all the way to Chaska when coming in to unload during peak season and even sometimes in off-season. There is a long turn light on that road affecting 2,500 different individuals, including farmers, elevators and truckers.

Seasonal Peaks
The seasonal peaks are generated by agriculture, garbage haulers, and sand and gravel industries. This correlates with the opening of the inland waterway ports for barge traffic from April through November each year. The receivers and generators of freight traffic over the highway system are able to identify the number of tons shipped, which translate into trucks that move from their facility.

Carrier Comments

Seasonal Trucking

- We haul a lot of sugar out of Chaska and it is seasonal. We also haul out of Shakopee and Savage that is canned business and it is seasonal in fall; it lightens up after harvest, however cans are year-around including empty cans for corn pack, etc.

TH 41 River crossing

- We move goods short distances on TH 41 constantly between April and November or December; under 20 miles each direction.
- A large waste hauler stated that TH 41 is less traveled during the winter, between April and November traffic increases for compost and yard waste disposal. He predicted that TH 41 between TH 212 and TH 169 will need to be four lanes in five years.

TH 212

- As a trucker, we move thousands of loads of gas year-round through the study area on TH 212. From March 15th to November 15th each year it is asphalt season when 5,000 loads are hauled through this (study) area. We move them (from refineries such as those in Savage through the study area) primarily on TH 212 for final delivery in Granite Falls to Marshall. We ship 58,000 loads in a year out of which the majority (49,300) is in Minnesota; specifically in the seven-county metro where 40,000 loads are routed.

Shipper Comments

- This company has seasonal business from April to November when the barge season opens up; December to March is low with limited volumes. It peaks on the front end and then again at harvest season from October to November, but not quite the numbers as in the summer. Total number of loads coming in / out each year is 50,000 - the numbers of the loads between 80-82,000 lbs gross weight, empty 24-26,000 lbs on a tare.

SUMMARY

Shippers and carriers using the bridges and routes within the study area are concerned about:

- Safety
- Increasing the capacity of the roads and bridges now
- The growing volumes of truck and car traffic that occur during business hours, especially through downtown Chaska

The shippers and carriers predict growth, but the range and exact volume of truck traffic on the study area roads is not an exact science. Instead, they said that:

- Volumes are unpredictable
- Routes are not fixed
- Market forces will dictate the geographic area where agricultural commodities are sourced and the destination points for commercial cargo
- Smooth, efficient delivery of goods is critical to firms' economic viability

Conclusions

Trucks can either be viewed as impediments to transportation planning or they can be viewed as the reflection of a vibrant economy.

Conclusions that can be made based on responses from those who participated in this study include:

- TH 41 crossings will become increasingly congested due to growth in population and business activity in this suburban area of Minneapolis-St. Paul. The wait times at lights will lengthen, delays will occur in the delivery and pick-up of goods at the ports, at retail facilities and at area manufacturers.
- When possible, shippers and motor carriers modify their business practices to avoid costs associated with congestion. Some of those costs include labor, fuel, wear and tear on the vehicle, and the cost of lost business opportunities since their assets are tied up in traffic. Motor carriers advised researchers in a previous study that they send their drivers in or out of the Twin Cites as early as 4:30 or 5:00 a.m. to avoid "rush hour" driving and to meet customer demands.[5]
- The river will remain a draw for truck traffic for shipment and receipt of commodities by barge; the truck volumes may flatten, but are not likely to decrease even if rail service expands.
- Motor carriers and shippers list traffic safety as a major concern; especially during late spring and early fall when there is a peak in auto and truck traffic through Chaska along TH 41.
- Most motor carriers traveling the TH 41 study area do not have their offices inside the study area. As a consequence, when the carriers were contacted for information about the TH 41 study area, they had general comments rather than specific opinions about intersections and highway conditions or chose not dto respond. Engaging these motor carriers in a discussion about the TH 41 study area will be an on-going challenge.

[5] "Inter-Regional Corridor Shipper Focus Group Results," July 2001, Prepared for The Office of Freight, Rail and Waterways, Minnesota Department of Transportation

Appendix

A. Screener

Hello, may I please speak with someone in human resources (or someone else familiar with the roles of your managers.)

Hello, this is _____ from C J Petersen & Associates. We are working with the Minnesota Department of Transportation or Mn/DOT to conduct a study with those involved in shipping or receiving of products for your firm.

We are calling to verify contact information for a survey to be conducted on behalf of Mn/DOT in the next month. Is your company still located at?

(Read from list, make changes to company name, address, phone numbers, fax number, in the applicable column.)

Who at a manager level in your organization has primary responsibility for the areas that handle logistics or transportation of products or supplies?
Name:

What is this person's title?

Is their address the same as the one we just noted?

Yes _____

No _____ **if no, then please add their address here for update in the database:**

We will be sending them a survey during the next 2 weeks. The information gathered in the survey will be very important in helping to improve and maintain highways. Responses will be ANONYMOUS and **NOT** ASSOCIATED WITH A PARTICULAR Firm. Information generated is only for research purposes.

Please end all of your conversations with: "Thank you for your time and the information you have just verified. This information is confidential and will only be used for the purposes of the survey."

B. Cover Letter and Survey for Shippers

January 2003

Contact Name
Company
Address
Shakopee, MN55379

Re: Trunk Highway 41 Over the Minnesota River Crossing Study

Dear Contact Name,

We invite you to participate in a study on TH 41 Over the Minnesota River Crossing being conducted by the Minnesota Department of Transportation (Mn/DOT). In preparing for long-term transportation needs, Mn/DOT is evaluating a new river crossing in the Chaska/Shakopee area. As part of the study, Mn/DOT is trying to determine truck traffic needs in terms of bridge location and bridge orientation.

We are asking for your help in understanding the movement of truck traffic along existing river crossings located at Trunk Highway 41, Highway 101 and Trunk Highway 169. This information will add to the knowledge that Mn/DOT has gathered through counting trucks on various roadways in the study area. As a representative of a business or a motor carrier located or operating in the study area, we need your help in providing us with information and guidance about your transportation needs and concerns. We invite you to participate by:

1. Reviewing the attached survey and
2. Responding to a brief phone call from us to complete the survey.

All information received will be aggregated to maintain confidentiality for individual firms.

Study results will be used to help make decisions on the design and location of a new river crossing between TH 169 and TH 212 in the Chaska/Shakopee area. This survey focuses on freight movements in order to identify:

- Origins and destinations of truck movements,
- Trends in truck movements within the study area,
- Types of cargo being shipped, and
- Problems now experienced by trucks using the highways in the study area.

Please contact Catherine Petersen, C J Petersen & Associates, at 651-690-4324 if you have questions or if you require any additional information. You may also contact your local Mn/DOT representative on the project Brian Isaacson at 651-582-1659. Thank you for your assistance in advance.

Sincerely,
C J Petersen & Associates

Catherine Petersen

Catherine Petersen

Shippers' or Receivers' Survey – 2003

Thank you for taking time to participate in this survey regarding a new river crossing in the Chaska/Shakopee area. Please provide your "best" estimate of information requested. Findings from this study will be presented for the total group; no one company or its information will be identified. *Questions related to this questionnaire may be directed to C J Petersen & Associates at 651-690-4324, e-mail cjpassoc@earthlink.net, or fax at 651-699-8453.*

1. Please state your job title:

2. How many employees are there at this facility? (Please "X" one.)
   ____ 1-49 ____ 100-499
   ____50-99 ____ 500 or more

3. What types of products do you ship from your facility? Please list top 3.
   a. _____ _____
   b. _____
   c. _____

4. What types of products do you receive at your facility? Please list top 3.
   a. _____
   b. _____
   c. _____

5. Does your firm have barge access on-site at any facilities along the TH 41 or TH 101 corridor?
   _ No
   ___ Yes If yes, which roadway: __

6. Please check the type of vehicles (company owned or other) that deliver and pick-up goods at your facility (ies) within the Study Area. **Please *check all that* apply.**
   a. ____ Two or Three Axle Straight Truck
   b. ____ Five Axle Tractor Trailer Combination
   c. ____ Step Van Delivery Truck (for example UPS, DHL or FedEx)
   d. ____ *Other type of vehicle, please identify:*_____

7. Please refer to the attached map to assist in answering the following questions:

a. Is your business or facility located in one of the lettered or numbered (numbered areas indicate roadway facilities and cities outside the study area) areas on the map? ____ No ____ Yes

If yes, circle the letter or number representing your facility location(s):

A B C D 7 9 11 14

City:_____

b. Identify the percent and number of trucks bringing raw materials or product to your business from the following areas.

Area A - Chaska:	Percent _____	Number _____
Area B - West Chaska/Carver:	Percent _____	Number _____
Area C - TH 41/169:	Percent _____	Number _____
Area D - Downtown Shakopee:	Percent _____	Number _____
Area 3 - TH212 West:	Percent _____	Number _____
Area 7 - TH 41 North:	Percent _____	Number _____
Area 9 - TH212 East:	Percent _____	Number _____
Area 11 - TH169 North/East	Percent _____	Number _____
Area 14 - TH169 South	Percent _____	Number _____
Other, please specify:	Percent _____	Number _____

c. Identify the percent and number of trucks shipping out materials or products from your business to the following map areas:

Area A - Chaska:	Percent _____	Number _____
Area B - West Chaska/Carver:	Percent _____	Number _____
Area C - TH 41/169:	Percent _____	Number _____
Area D - Downtown Shakopee:	Percent _____	Number _____
Area 3 - TH212 West:	Percent _____	Number _____
Area 7 - TH 41 North:	Percent _____	Number _____
Area 9 - TH212 East:	Percent _____	Number _____
Area 11 - TH169 North/East	Percent _____	Number _____
Area 14 - TH169 South	Percent _____	Number _____
Other, please specify:	Percent _____	Number _____

8. The following question relates to actual truck use of TH 41, TH 169 and Highway 101 river crossings. I will read off the river crossing routes then ask you to provide an ESTIMATE of the number of trucks that might use this river crossing to gain access to your manufacturing, warehousing or intermodal facilities.

	(1) Bridges used for outbound moves	(2) Average No. of vehicles per day on this river crossing	Adequate Now ? Yes/No	Adequate In 5 years? Yes/No	(3) Bridges used for inbound moves	(4) Average No. of vehicles per day on this river crossing	Adequate Now? Yes/No	Adequate In 5 years? Yes/No
a	TH 101				TH 101			
b	TH 41				TH 41			
c	TH 169				TH 169			
d	Other				Other			

9. Does your firm expect to expand or decrease the volume of trucks shipped from or to this facility during the next 5 years?
   _ *% Expand*
   _ *% Decrease*
   __ *Stay the Same* (no % change)

10. Is there anything else you would like us to know about your shipping patterns? For example, is there heavy seasonality in the shipping of goods/products to and from your facility (ies) in these areas?

    _____

11. Additional suggestions, comments or improvements would you like to submit to Mn/DOT in planning improvements to the TH 41/Highway 101 segments discussed today?

    _____

Thank you for agreeing to participate in this confidential survey.

C. Cover Letter and Survey for Motor Carriers

January 2003

Contact Name
Company
Address

Re: Trunk Highway 41 Over the Minnesota River Crossing Study

Dear Contact Name:

We invite you to participate in a study on TH 41 Over the Minnesota River Crossing being conducted by the Minnesota Department of Transportation (Mn/DOT). In preparing for long-term transportation needs, Mn/DOT is evaluating a new river crossing in the Chaska/Shakopee area. As part of the study, Mn/DOT is trying to determine truck traffic needs in terms of bridge location and bridge orientation.

We are asking for your help in understanding the movement of truck traffic along existing river crossings located at Trunk Highway 41, Highway 101 and Trunk Highway 169. This information will add to the knowledge that Mn/DOT has gathered through counting trucks on various roadways in the study area. As a representative of a business or a motor carrier located or operating in the study area, we need your help in providing us with information and guidance about your transportation needs and concerns. We invite you to participate by:

1. Reviewing the attached survey and
2. Responding to a brief phone call from us to complete the survey.

All information received will be aggregated to maintain confidentiality for individual firms.

Study results will be used to help make decisions on the design and location of a new river crossing between TH 169 and TH 212 in the Chaska/Shakopee area. This survey focuses on freight movements in order to identify:

- Origins and destinations of truck movements,
- Trends in truck movements within the study area,
- Types of cargo being shipped, and
- Problems now experienced by trucks using the highways in the study area.

Please contact Catherine Petersen, C J Petersen & Associates, at 651-690-4324 if you have questions or if you require any additional information. You may also contact your local Mn/DOT representative on the project Brian Isaacson at 651-582-1659. Thank you for your assistance in advance.

Sincerely,
C J Petersen & Associates

Catherine Petersen

Catherine Petersen

Motor Carriers' Survey – 2003

Thank you for taking time to participate in this survey regarding a new river crossing in the Chaska/Shakopee area. Please provide your "best" estimate of information requested. Findings from this study will be presented for the total group; no one company or its information will be identified.

Questions related to this questionnaire may be directed to C J Petersen & Associates at 651-690-4324, e-mail cjpassoc@earthlink.net, or fax at 651-699-8453.

1. Please state your job title:

2. How many employees are there at this facility? (Please "X" one.)
   ___ 1-49 ____ 100-499
   ___50-99 ____ 500 or more

3. What types of products do you carry on trucks routed through Chaska/Shakopee? Please list top 3.
   a. _____
   b. _____
   c. _____
   d. ____ Unknown

4. Please check the type of vehicles that deliver and pick-up goods at facilities in the Chaska/Shakopee area. **Please *check all that* apply.**
   a. ___ Two or Three Axle Straight Truck
   b. ____ Five Axle Tractor Trailer Combination
   c. ____ Step Van Delivery Truck
   d. ____ *Other type of vehicle, please identify:*_____

5. The following question relates to actual truck use of TH 41, TH 169 and Highway 101 river crossings. I will read off the river crossing routes then ask you to provide an ESTIMATE of the number of trucks that might use this river crossing to gain access to manufacturing, warehousing or intermodal facilities.

	(1) BRIDGES USED FOR OUTBOUND MOVES	(2) Average No. Of Vehicles / Day On This Road Segment	Adequate Now ? Yes/No	Adequate In 5 years? Yes/No	(3) BRIDGES USED FOR INBOUND MOVES	(4) Average No. Of Vehicles / Day On This Road Segment	Adequate Now? Yes/No	Adequate In 5 years? Yes/No
a	TH 101				TH 101			
b	TH 169				TH 169			
c	TH 41				TH 41			
d	Other				Other			

6. Does your firm expect to expand or decrease the volumes of trucks traffic in the areas mentioned above during the next 5 years? PLEASE IDENTIFY THE AMOUNT OF CHANGE EXPECTED.

__ *% Expand*
__ *% Decrease*
__ *Stay the Same* (no % change)

7. Please refer to the attached map for answers to the following questions:

Which area on the map is your business located in? Circle one of the following letters representing areas:

A B C D E not shown

8. Please refer to the attached map for answers to the following questions:

a. Is your business or facility located in one of the lettered or numbered (numbered areas indicate roadway facilities and cities outside the study area) areas on the map? ____ No ____ Yes

If yes, circle the letter or number representing your facility location(s):

A B C D 7 9 11 14 not shown

b. Identify the percent and number of trucks bringing raw materials or product to your business from the following areas.

Area A - Chaska:	Percent _____	Number _____
Area B - West Chaska/Carver:	Percent _____	Number _____
Area C - TH 41/169:	Percent _____	Number _____
Area D - Downtown Shakopee:	Percent _____	Number _____
Area 3 - TH212 West:	Percent _____	Number _____
Area 7 - TH 41 North:	Percent _____	Number _____
Area 9 - TH212 East:	Percent _____	Number _____
Area 11 - TH169 North/East	Percent _____	Number _____
Area 14 - TH169 South	Percent _____	Number _____
Other, please specify:	Percent _____	Number _____

9. Continued - Please refer to the attached map for the following questions:

a. Identify the percent and number of trucks shipping out materials or products from your business to the following map areas:

Area A - Chaska:	Percent _____	Number _____
Area B - West Chaska/Carver:	Percent _____	Number _____
Area C - TH 41/169:	Percent _____	Number _____
Area D - Downtown Shakopee:	Percent _____	Number _____
Area 3 - TH212 West:	Percent _____	Number _____
Area 7 - TH 41 North:	Percent _____	Number _____
Area 9 - TH212 East:	Percent _____	Number _____
Area 11 - TH169 North/East	Percent _____	Number _____
Area 14 - TH169 South	Percent _____	Number _____
Other, please specify:	Percent _____	Number _____

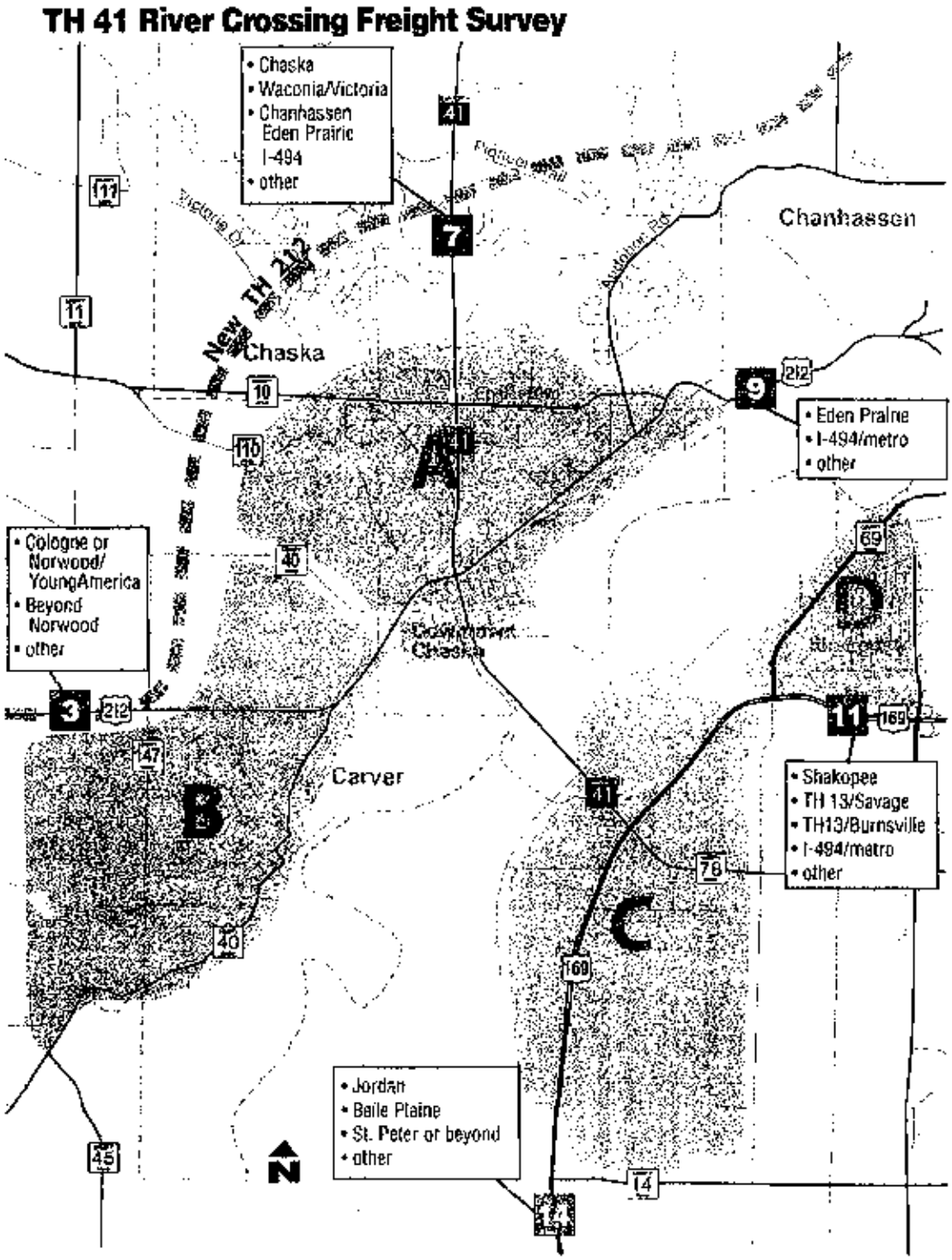
10. Is there anything else you would like us to know about your shipping patterns? For example, is there heavy seasonality in the shipping of goods/products to and from your facility (ies) in these areas?

11. Additional suggestions, comments or improvements would you like to submit to Mn/DOT in planning improvements to the TH 41/TH101 segments discussed today?

_____

Thank you for agreeing to participate in this confidential survey.

D. Map Sent with Both Motor Carrier and Shipper Surveys



TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

TH 41 FREEWAY ALTERNATIVES REVIEW

APRIL 26, 2006

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF No. 0024590

MEMORANDUM

TO: Nancy Frick, Senior Associate

FROM: Todd Polum, P.E., PTOE, Associate

DATE: April 26, 2006

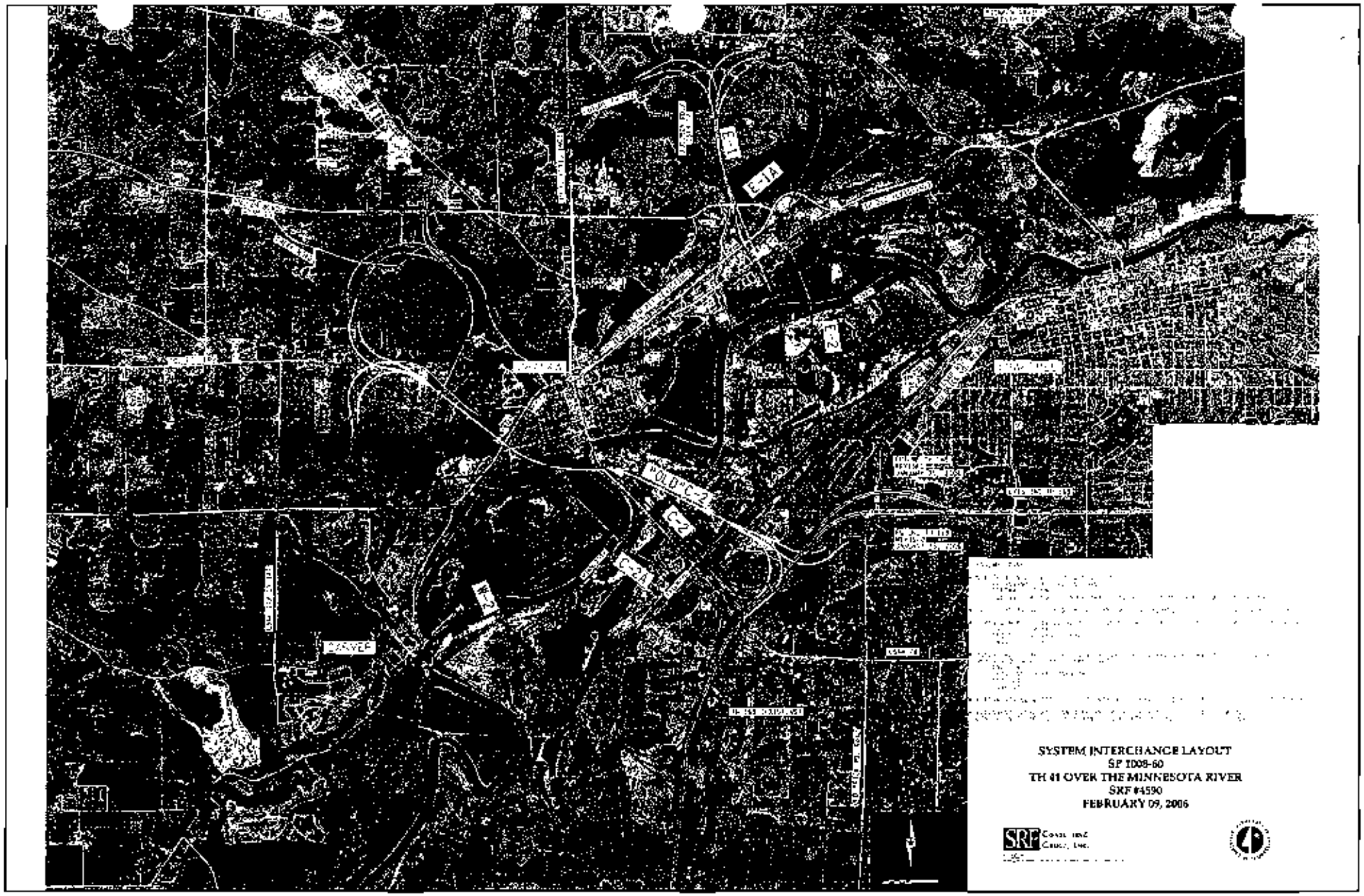
SUBJECT: TH 41 FREEWAY ALTERNATIVES REVIEW

Introduction

Mn/DOT and its local planning partners have identified a need for a new river crossing between TH 169 in Scott County and the proposed realignment of TH 212 ("New TH 212") in Carver County. As part of identifying solutions to this important transportation problem, Mn/DOT is preparing an Environmental Impact Statement (EIS). Figure 1 shows the six proposed river crossing alternatives being considered. This memorandum documents the recommended roadway geometry (basic number of lanes and auxiliary lanes) for each alternative. The roadway geometry identified has been incorporated into the geometric layouts, cost estimates, and the footprint for determining the potential project impacts.

Methodology

Preliminary concepts were developed for each of the six alternatives assuming a four-lane section within study area for TH 169, TH 212 and the "new river crossing", as well as single-lane ramps for all regional movements. Year 2040 a.m. and p.m. peak hour traffic forecast were developed for each of the six alternatives using the Metropolitan Council Twin Cities regional forecasting travel demand model. Traffic forecasts for each alternative assumed that New TH 212 will be completed and open to traffic and that existing TH 41 will remain in place. A planning-level analysis was then performed to determine the need for any additional lanes or other geometric features. This analysis considered the following volume-per-lane thresholds: 2,000 vehicles-per-hour-per-lane (vphpl) for normal roadway sections, and 1,600 vphpl in weaving sections. In certain locations, the physical distance between ramps necessitated the need for auxiliary lanes. A more detailed analysis of ramp merge areas was performed using CORSIM software where ramp volumes exceeded 1,500 vphpl. This was done to determine the need for geometric modifications (e.g. additional auxiliary lanes).



SRF Consulting Group, Inc.

PROPOSED TH 41 ALIGNMENTS

TH 41 FREEWAY ALTERNATIVES REVIEW

Minnesota Department of Transportation

Figure 1

0024590
March 2006

Year 2040 Build Analysis

The following are the results of the traffic analysis for each of the alignment alternatives. The alternatives are presented from the western river crossing alternative, W2, to the most eastern alternative, E-2.

W-2 Alignment

Alternative W-2 involves the construction of a new east-west freeway connection between TH 169 and New TH 212. Alternative W-2 is the westernmost Build alternative. This alternative includes the following:

- New interchange connections at TH 169 and new TH 212
- A four-lane freeway section (approximately 3.1 miles)
- A new bridge crossing the Minnesota River
- A grade separation connecting existing TH 212 to a local street in the City of Carver
- A ramp connecting existing TH 212 to CSAH 11/CR 147
- A new ramp connecting New TH 212 to CSAH 11/CR 147

Based on the analysis, several operational areas of concern were identified where future traffic demand exceeded the identified capacity thresholds (see Figure 2). Table 1 shows where auxiliary lanes or other geometric features were added or modified.

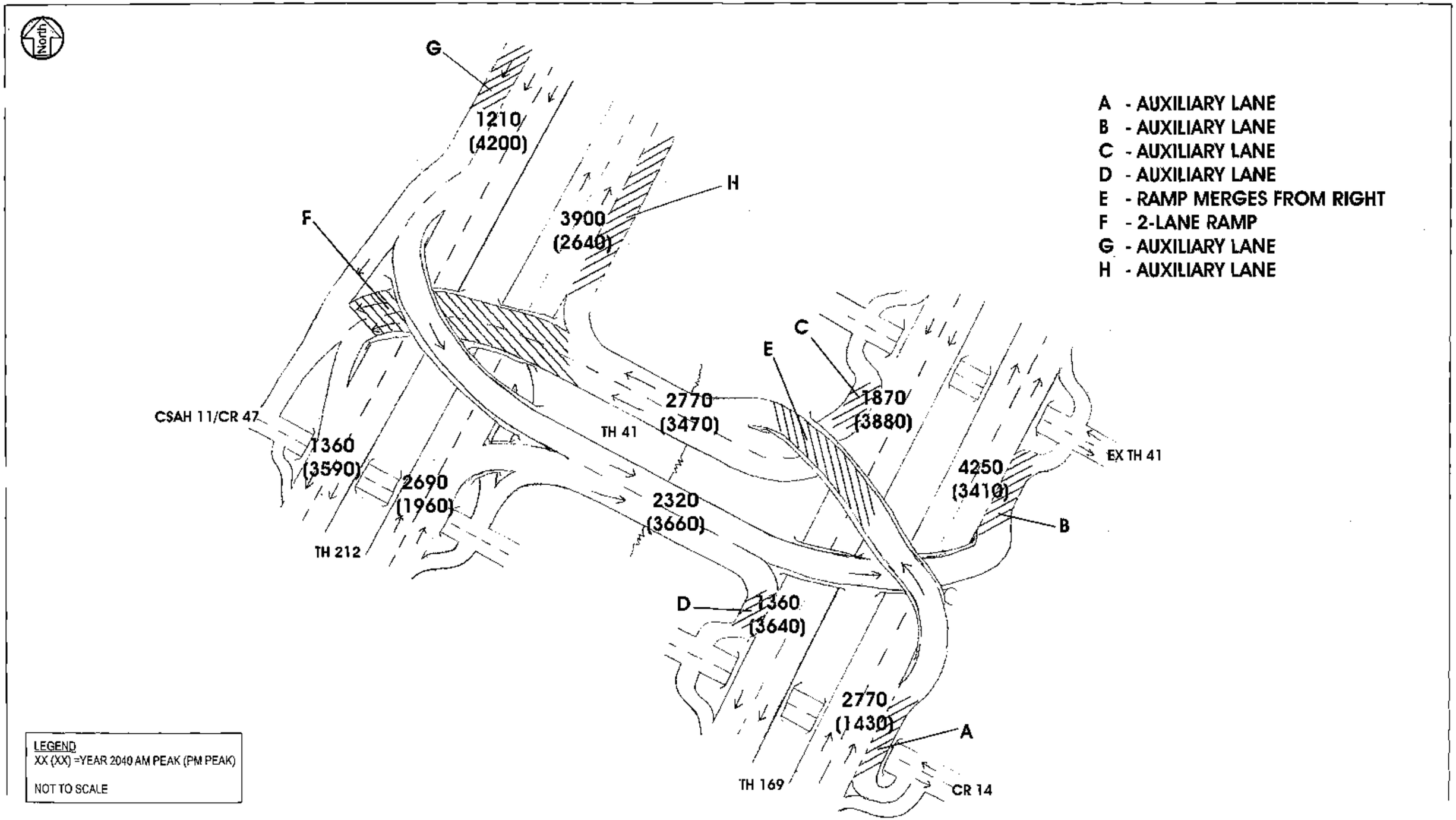
Table 1
Year 2040 Build – Alternative W-2
Freeway Analysis Results

Area	2040 Volume		Volume Threshold	Identified Improvement
	A.M. Peak	P.M. Peak		
A	2770 vhp	1430 vph	3600 vph	Auxiliary Lane
B	**4250 vph**	3410 vph	3600 vph	Auxiliary Lane
C	1870 vph	**3880 vph**	3600 vph	Auxiliary Lane
D	1360 vph	**3640 vph**	3600 vph	Auxiliary Lane
E	N-A	N-A	N-A	Ramp Merges from the right
F	1380 vph	**2000 vph**	2000 vph	2-Lane Ramp
G	1210 vph	**4200 vph**	3600 vph	Auxiliary Lane
H	**3900 vph**	2640 vph	3600 vph	Auxiliary Lane

BOLD indicates locations where additional lanes are needed to accommodate future 2040 build volumes.

For segment A, although the traffic volumes do not exceed the capacity threshold, an auxiliary lane is recommended because there is less than 3,000 feet between ramps.

For segment E, the recommendation to be merged from the right is due high local ramp volumes.



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PROPOSED W-2 ALIGNMENT

TH 41 FREEWAY ALTERNATIVES REVIEW
Minnesota Department of Transportation

Figure 2

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C-2A Alignment

Alternative C-2A involves the construction of a new freeway connection between TH 169 and New TH 212. The alignment runs from TH 169 to the current alignment of TH 212. The location of the proposed alignment is in the center portion of the study area, located along the western edge of downtown Chaska. This alternative includes the following:

- New interchange connections at TH 169 and new TH 212
- A four-lane freeway section (approximately 3 miles)
- A new bridge crossing the Minnesota River
- A grade separation at CR 140

Based on the analysis, several operational areas of concern were identified where future traffic demand exceeded the identified capacity thresholds (see Figure 3). Table 2 shows where auxiliary lanes or other geometric features were added or modified.

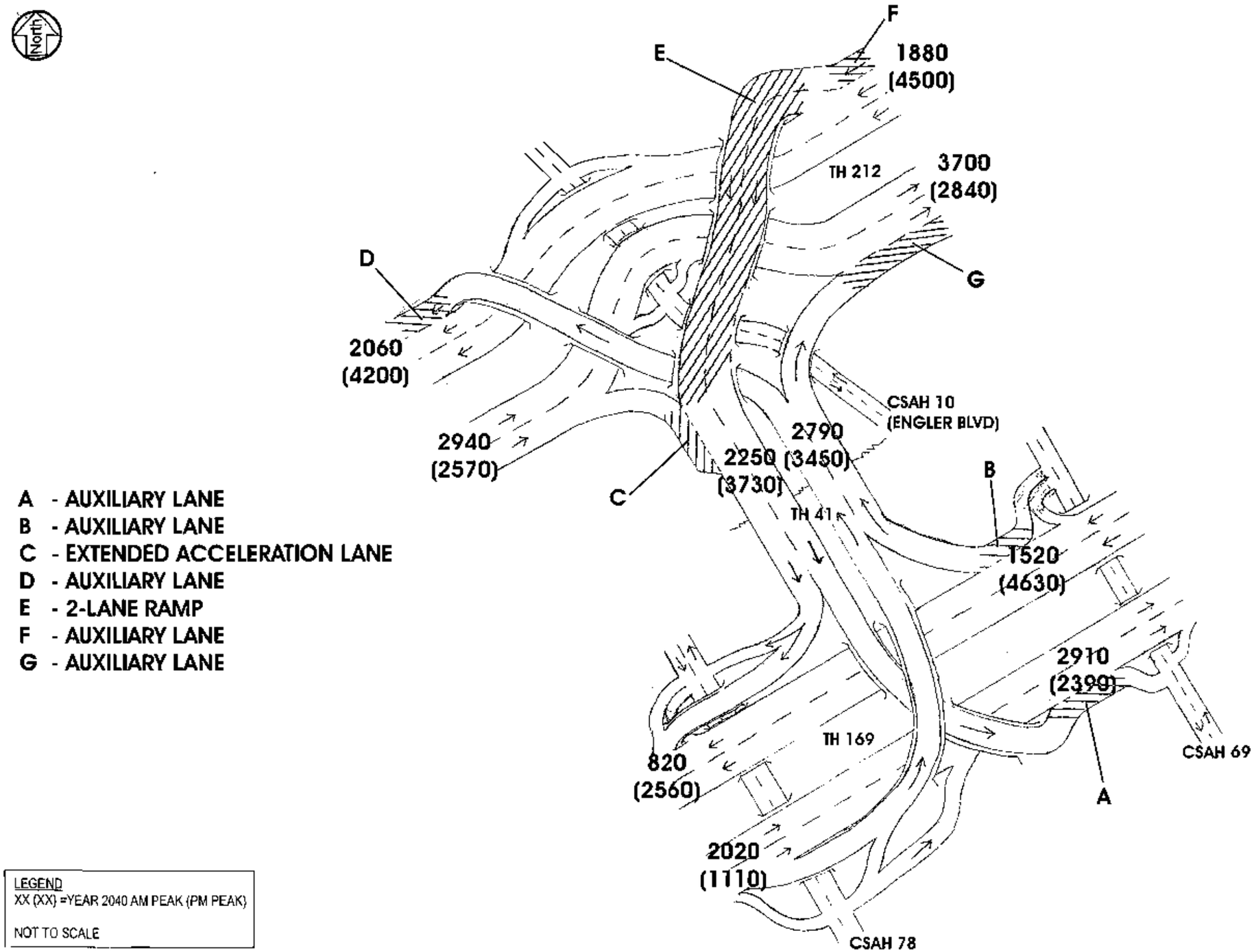
Table 2
Year 2040 Build – Alternative C-2A
Freeway Analysis Results

Area	2040 Volume		Volume Threshold	Identified Improvement
	A.M. Peak	P.M. Peak		
A	2910 vph	2390 vph	3600 vph	Auxiliary Lane
B	1520 vph	**4630 vph**	3600 vph	Auxiliary Lane
C	1500 vph	**1680 vph**	1500 vph	Parallel Acceleration Lane
D	2060 vph	**4200 vph**	3600 vph	Auxiliary Lane
E	750 vph	**2050 vph**	2000 vph	2-Lane Ramp
F	1880 vph	**4500 vph**	3600 vph	Auxiliary Lane
G	**3700 vph**	2840 vph	3600 vph	Auxiliary Lane

BOLD indicates locations where additional lanes are needed to accommodate future 2040 build volumes.

For segment A, although the traffic volumes do not exceed the capacity threshold, an auxiliary lane is recommended because there is less than 3,000 feet between ramps.

For segment C, due to the ramp volume exceeding 1,500 vph, a detailed merge analysis was completed using CORSIM to determine the need for a parallel acceleration lane.



A - AUXILIARY LANE
B - AUXILIARY LANE
C - EXTENDED ACCELERATION LANE
D - AUXILIARY LANE
E - 2-LANE RAMP
F - AUXILIARY LANE
G - AUXILIARY LANE

LEGEND
XX (XX) =YEAR 2040 AM PEAK (PM PEAK)

NOT TO SCALE

SRF Consulting Group, Inc

PROPOSED C-2A ALIGNMENT

TH 41 FREEWAY ALTERNATIVES REVIEW
Minnesota Department of Transportation

Figure 3

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March 2006

C-2 Alignment

Alternative C-2 involves the construction of a new freeway connection between TH 169 and New TH 212. The location of the proposed alignment is in the center portion of the study area, located along the western edge of downtown Chaska. This alternative includes the following:

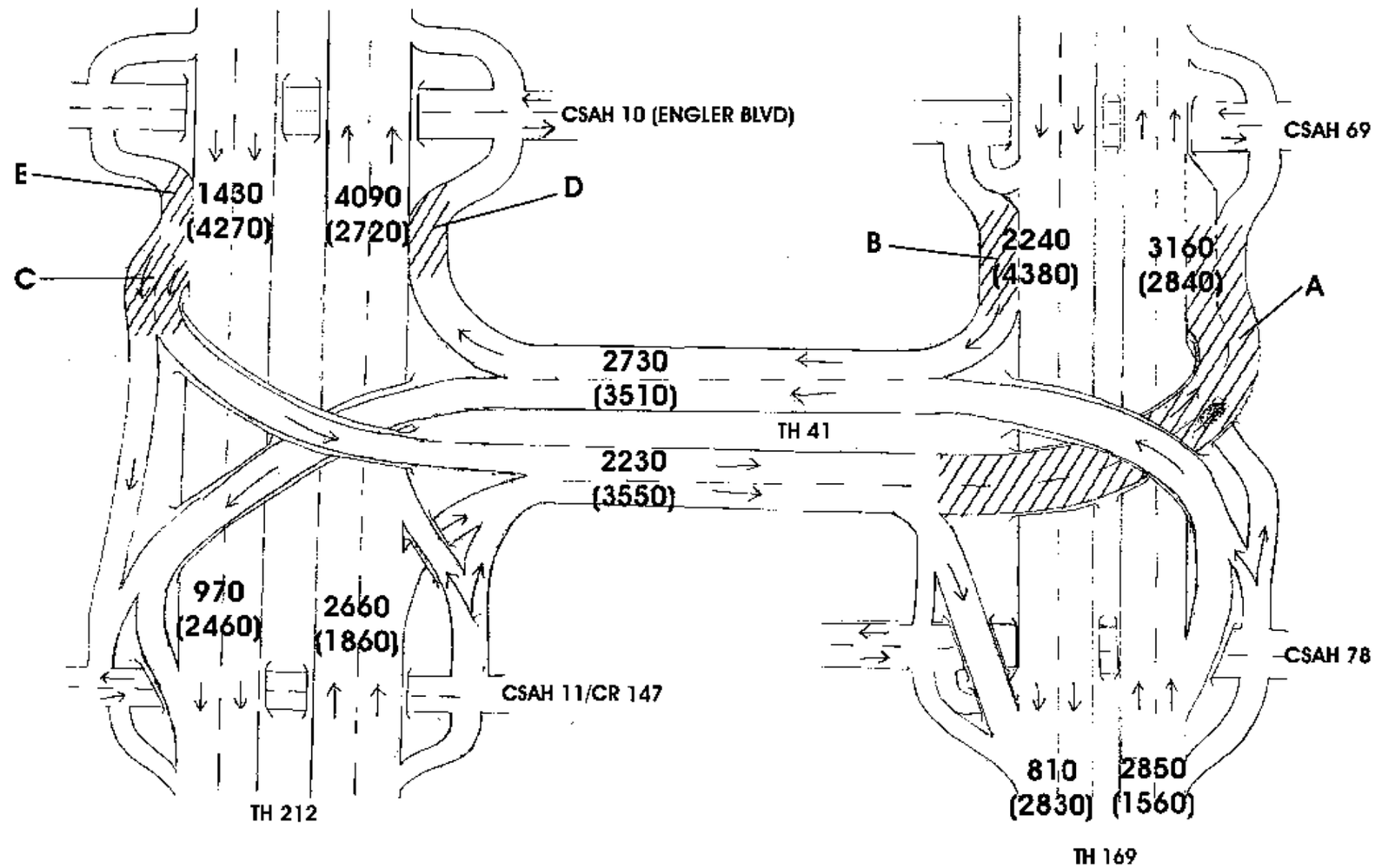
- New interchange connections at TH 169 and new TH 212
- A four-lane freeway section
- A new bridge crossing the Minnesota River
- A new ramp connecting New TH 212 to CSAH 11/CR 147

Based on the analysis, several operational areas of concern were identified where future traffic demand exceeded the identified capacity thresholds (see Figure 4). Table 3 shows where auxiliary lanes or other geometric features were added or modified.

Table 3
Year 2040 Build – Alternative C-2
Freeway Analysis Results

Area	2040 Volume		Volume Threshold	Identified Improvement
	A.M. Peak	P.M. Peak		
A	**2320 vph**	1950 vph	2000 vph	2-Lane Ramp
B	2240 vph	**4380 vph**	3600 vph	Auxiliary Lane
C	**3010 vph**	1260 vph	2000 vph	2-Lane Ramp
D	**4090 vph**	2720 vph	3600 vph	Auxiliary Lane
E	1430 vph	**4270 vph**	3600 vph	Auxiliary Lane

BOLD indicates locations where additional lanes are needed to accommodate future 2040 build volumes.



A - 2 LANE RAMP
B - AUXILIARY LANE
C - 2 LANE RAMP
D - AUXILIARY LANE
E - AUXILIARY LANE

LEGEND
XX (XX) =YEAR 2040 AM PEAK (PM PEAK)

NOT TO SCALE

SRF Consulting Group, Inc

0024590
March 2006

PROPOSED C-2 ALIGNMENT

TH 41 FREEWAY ALTERNATIVES REVIEW
Minnesota Department of Transportation

Figure 4

E-1 Alignment

Alternative E-1 involves the construction of a new freeway connection between TH 169 and New TH 212. The location of the proposed alignment on the eastern portion of the study area. This alternative includes the following:

- New interchange connections at TH 169 and new TH 212
- A four-lane freeway section (approximately 3 miles)
- A new bridge crossing the Minnesota River
- Realignment of CSAH 17, with an overpass connecting two residential areas

Based on the analysis, several operational areas of concern were identified where future traffic demand exceeded the identified capacity thresholds (see Figure 5). Table 6 shows where auxiliary lanes or other geometric features were added or modified.

Table 6
Year 2040 Build – Alternative E-1
Freeway Analysis Results

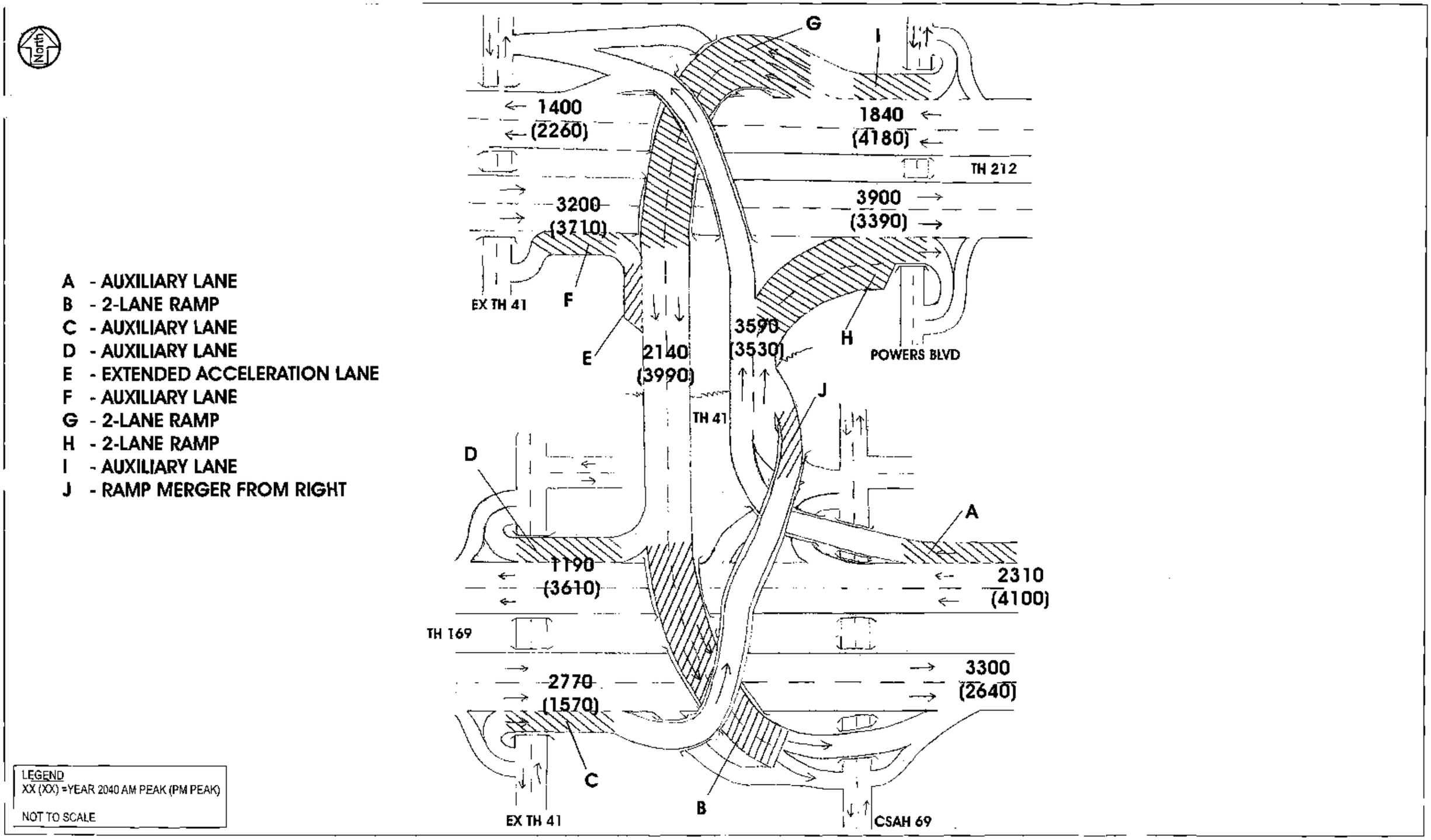
Area	2040 Volume		Volume Threshold	Identified Improvement
	A.M. Peak	P.M. Peak		
A	2310 vph	**4100 vph**	3600 vph	Auxiliary Lane
B	1540 vph	**2210 vph**	2000 vph	2-Lane Ramp
C	2770 vph	1570 vph	3600 vph	Auxiliary Lane
D	1190 vph	**3610 vph**	3600 vph	Auxiliary Lane
E	1400 vph	**1990 vph**	1500 vph	Parallel Acceleration Lane
F	3200 vph	**3710 vph**	3600 vph	Auxiliary Lane
G	740 vph	**2000 vph**	2000 vph	2-Lane Ramp
H	**2100 vph**	1670 vph	2000 vph	2-Lane Ramp
I	1840 vph	**4180 vph**	3600 vph	Auxiliary Lane
J	N-A	N-A	N-A	Ramp Merges from Right

BOLD indicates locations where additional lanes are needed to accommodate future 2040 build volumes.

For segment C, although the traffic volumes do not exceed the capacity threshold, an auxiliary lane is recommended because there is less than 3,000 feet between ramps.

For segment E, due to the ramp volume exceeding 1,500 vph, a detailed merge analysis was completed using CORSIM to determine the need for a parallel acceleration lane.

For segment J, the recommendation to be merged from the right is due high local ramp volumes.



SRF Consulting Group, Inc.

0024590
March 2006

PROPOSED E-1 ALIGNMENT

TH 41 FREEWAY ALTERNATIVES REVIEW
Minnesota Department of Transportation

Figure 5

E-1A Alignment

Alternative E-1A involves the construction of a new freeway connection between TH 169 and New TH 212. Alternative E-1A follows the same alignment as Alternative E-1 from TH 169 to approximately Engler Boulevard. North of Engler Boulevard, the connection of Alternative E-1A to New TH 212 is shifted to the east (located east of Audubon Road/CSAH 17) with connection to new TH 212 near Bluff Creek Drive. Alternative E-1A includes the following:

- New interchange connections at TH 169 and new TH 212
- A four-lane freeway section (approximately 3.6 miles)
- A new bridge crossing the Minnesota River

Based on the analysis, several operational areas of concern were identified where future traffic demand exceeded the identified capacity thresholds (see Figure 6). Table 7 shows where auxiliary lanes or other geometric features were added or modified.

Table 7
Year 2040 Build – Alternative E-1A
Freeway Analysis Results

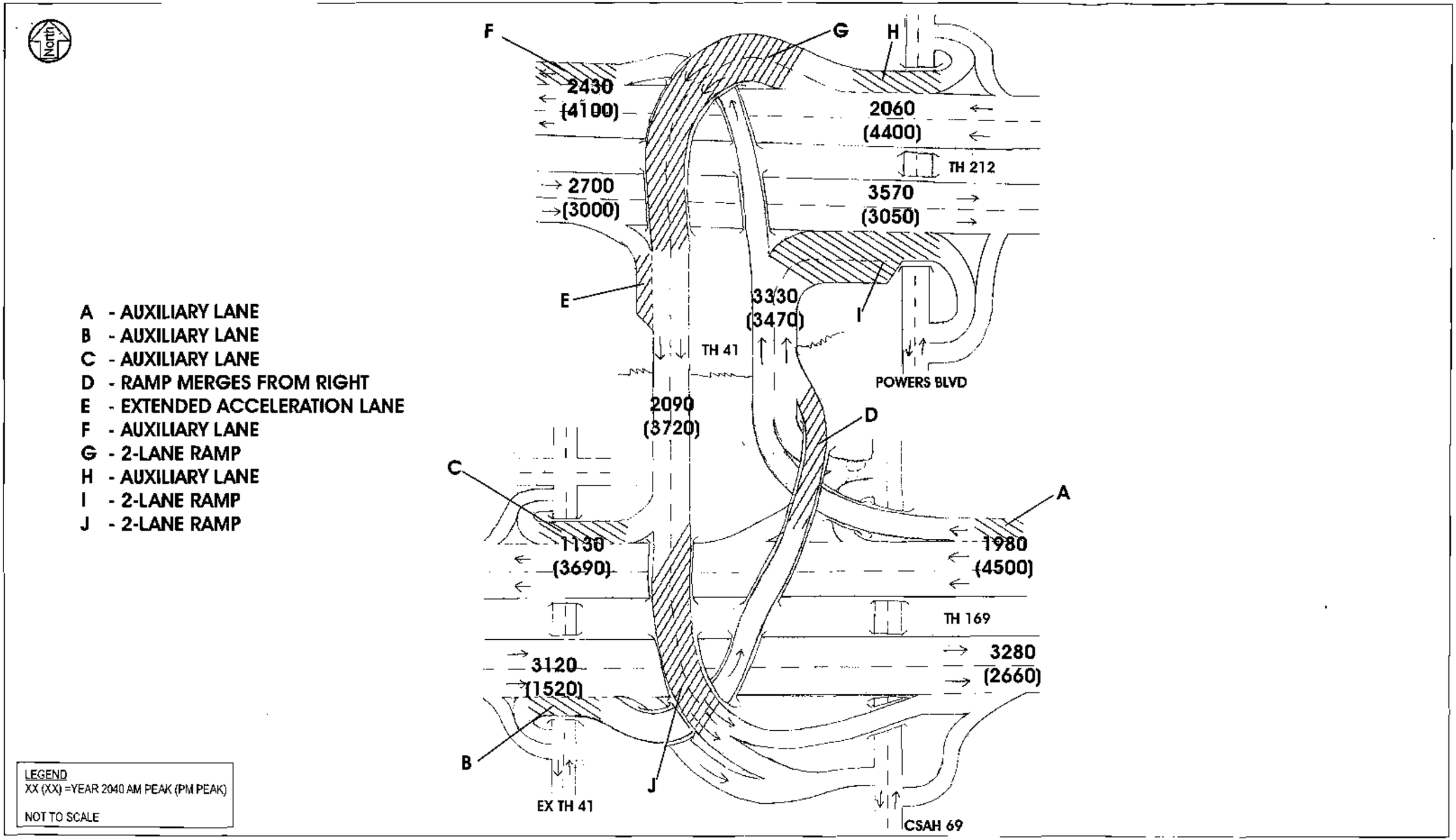
Area	2040 Volume		Volume Threshold	Identified Improvement
	A.M. Peak	P.M. Peak		
A	1980 vph	**4500 vph**	3600 vph	Auxiliary Lane
B	3120 vph	1520 vph	3600 vph	Auxiliary Lane
C	1130 vph	**3690 vph**	3600 vph	Auxiliary Lane
D	N-A	N-A	N-A	Ramp Merges from Right
E	1130 vph	**1770 vph**	1500 vph	Parallel Acceleration Lane
F	2430 vph	**4100 vph**	3600 vph	Auxiliary Lane
G	960 vph	**1950 vph**	2000 vph	2-Lane Ramp
H	2060 vph	**4400 vph**	3600 vph	Auxiliary Lane
J	**2000 vph**	1820 vph	2000 vph	2-Lane Ramp
J	1510 vph	**2300 vph**	2000 vph	2-Lane Ramp

BOLD indicates locations where additional lanes are needed to accommodate future 2040 build volumes.

For segment B, although the traffic volumes do not exceed the capacity threshold, an auxiliary lane is recommended because there is less than 3,000 feet between ramps.

For segment D, the recommendation to be merged from the right is due high local ramp volumes.

For segment E, due to the ramp volume exceeding 1,500 vph, a detailed merge analysis was completed using CORSIM to determine the need for a parallel acceleration lane.



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0024590
March 2006

PROPOSED E-1A ALIGNMENT

TH 41 FREEWAY ALTERNATIVES REVIEW
Minnesota Department of Transportation

Figure 6

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

TH 41 RIVER CROSSING BENEFIT-COST ANALYSIS
ASSUMPTIONS AND RESULTS

AUGUST 23, 2006
UPDATED NOVEMBER 13, 2006

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF CONSULTING GROUP, INC.

Transportation • Civil • Structural • Environmental • Planning • Traffic • Landscape Architecture • Parking • Right of Way

SRF No. 0024590

MEMORANDUM

TO: Rabinder Bains
Mn/DOT OIM

FROM: Dave Montebello, P.E. – Principal
Mary Karlsson, Engineer

DATE: November 13, 2006

SUBJECT: TRUNK HIGHWAY 41 (TH 41) RIVER CROSSING
BENEFIT-COST ANALYSIS
TECHNICAL MEMORANDUM UPDATE

This memorandum provides an update to the August 23, 2006 technical memorandum that presented the benefit-cost analysis performed for the TH 41 River Crossing alternatives being evaluated as part of the TH 41 River Crossing Tier 1 Draft Environmental Impact Statement (DEIS). This update was prepared because the cost estimates for the proposal project alternatives were revised from the time that the original benefit-cost analysis was performed. The cost estimates were revised in response to their review under the new Mn/DOT cost risk assessment process.

Note that the net benefits did not change, nor did maintenance costs. The most substantial revision was in assumed right of way cost. The attached appendix presents updated itemized cost summaries, calculations of capital cost and remaining capital value, and benefit cost ratios comparing each of the six Build alternatives to the No-Build alternative.

Table 1 below compares the benefit cost ratios with the preliminary costs (August 2006) and those resulting from the analysis done with the revised costs (November 2006). As shown, each alternative exceeds the benefit-cost target of 1.0, therefore each is acceptably cost-effective as compared to the No-Build alternative. Also note that, under either cost estimate, the range of benefit-cost ratios among Build alternatives is relatively limited. In terms of ranking of alternatives according to benefit-cost performance, note that under the preliminary cost estimate, Alternative C-2 has the highest benefit-cost ratio (slightly higher than the ratio for Alternative W-2), but that under the revised cost estimate, Alternative W-2 has a very slightly higher ratio than Alternative C-2. This is because the net cost of Alternative C-2 changed more than the net cost of Alternative W-2.

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Table 1
Comparison of Benefit Cost Analysis Results
Preliminary Cost Estimates (August 2006) and Revised Cost Estimates (November 2006)
TH 41 River Crossing EIS

Month of Analysis	Base vs. Build Alternative	Net Benefit (mil.$)	Net Cost (mil.$)	B/C Ratio	Net Present Value (mil.$)
Aug 06	W-2	497.74	111.25	4.48	386.52
	C-2	486.87	105.75	4.60	381.11
	C-2A	513.8	115.15	4.46	398.64
	E-1	478.84	149.06	3.40	329.78
	E-1A	486.95	143.3	3.40	343.65
	E-2	484.25	133.18	3.64	351.11
Nov 06	W-2	497.74	145.30	3.43	352.44
	C-2	486.87	143.50	3.39	343.37
	C-2A	513.8	156.08	3.29	357.72
	E-1	478.84	205.76	2.33	273.08
	E-1A	486.95	178.86	2.72	308.08
	E-2	484.25	170.49	2.84	313.76

All other assumptions, methodology descriptions, and findings presented in the August 23, 2006 memo remain the same.

DK/MK

Attachment: Appendix

cc: Diane Langenbach, Mn/DOT
Lise Freese, Mn/DOT
Nancy Frick, SRF

APPENDIX

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TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative W-2

SRF PROJECT NUMBER:	4590
PROJECT NAME:	TH 41 River Crossing - Alternative W-2
B/C ANALYSIS FIRST YEAR OF BENEFIT:	2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS:	2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$4.85
Travel Time Savings	$458.02
Crash Reduction Benefits	$34.87
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	**$497.74**

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$214.18
Maintenance Cost Differential	$0.41
Remaining Capital Value Differential [a]	$69.29
PRESENT VALUE OF TOTAL COSTS (mil. $)	**$145.30**

Net Cost of Project (mil. $)	$145.30
Present Value of Benefits (mil. $)	$497.74
Net Present Value (mil. $)	**$352.44**
BENEFIT/COST RATIO:	**3.43**

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost

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SRF Consulting Group, Inc

TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE

TH 41 River Crossing - Alternative W-2

	Year	PRESENT VALUE OF COSTS [a]						Present Value of Net Annual Costs [e]
		Capital Cost		Maintenance Cost [c]		Remaining Capital Value [d]		
		Base Case	Alternative [b]	Base Case	Alternative	Base Case	Alternative	
2027	-	$0	$56,259,083			Not Applicable	Not Applicable	$56,259,083
2028	-	$0	$54,409,171			Not Applicable	Not Applicable	$54,409,171
2029	-	$0	$52,620,088			Not Applicable	Not Applicable	$52,620,088
2030	-	$0	$50,889,834			Not Applicable	Not Applicable	$50,889,834
2031	1	$0	$0	$3,320	$30,965	Not Applicable	Not Applicable	$27,645
2032	2	$0	$0	$3,211	$29,947	Not Applicable	Not Applicable	$26,736
2033	3	$0	$0	$3,105	$28,962	Not Applicable	Not Applicable	$25,857
2034	4	$0	$0	$3,004	$28,010	Not Applicable	Not Applicable	$25,007
2035	5	$0	$0	$2,905	$27,089	Not Applicable	Not Applicable	$24,184
2036	6	$0	$0	$2,809	$26,198	Not Applicable	Not Applicable	$23,389
2037	7	$0	$0	$2,717	$25,337	Not Applicable	Not Applicable	$22,620
2038	8	$0	$0	$2,628	$24,504	Not Applicable	Not Applicable	$21,876
2039	9	$0	$0	$2,541	$23,698	Not Applicable	Not Applicable	$21,157
2040	10	$0	$0	$2,458	$22,919	Not Applicable	Not Applicable	$20,461
2041	11	$0	$0	$2,377	$22,165	Not Applicable	Not Applicable	$19,788
2042	12	$0	$0	$2,299	$21,436	Not Applicable	Not Applicable	$19,138
2043	13	$0	$0	$2,223	$20,731	Not Applicable	Not Applicable	$18,508
2044	14	$0	$0	$2,150	$20,050	Not Applicable	Not Applicable	$17,900
2045	15	$0	$0	$2,079	$19,390	Not Applicable	Not Applicable	$17,311
2046	16	$0	$0	$2,011	$18,753	Not Applicable	Not Applicable	$16,742
2047	17	$0	$0	$1,945	$18,136	Not Applicable	Not Applicable	$16,191
2048	18	$0	$0	$1,881	$17,540	Not Applicable	Not Applicable	$15,659
2049	19	$0	$0	$1,819	$16,963	Not Applicable	Not Applicable	$15,144
2050	20	$0	$0	$1,759	$16,405	$0	$69,290,195	-$69,275,549
Total for Project Life	2031-2050	$0	$214,178,177	$49,240	$459,200	$0	$69,290,195	$ 145,297,942
Net Cost Differentials	2031-2050	$214,178,177		$409,960		$69,290,195		

NOTES:

(a) *Present value of costs in terms of 2006 dollars*

(b) *Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.*

(c) *Annual cost of routine maintenance, e.g., plowing, striping, etc.*

(d) *Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.*

(e) *Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.*

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [a]
TH 41 River Crossing - Alternative W-2

Alternative

Cost Category	Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$ 60,005,600
Right of Way - Land	$ 54,000,000
Right of Way - Building and Relocate	$ 28,000,000
Major Structures	$ 260,499,900
Drainage and Grading	$ 27,507,321
Sub-base and Base	$ 9,574,732
Surface [c]	$ 28,582,736
Total	$ 469,574,490

Final Year of Construction: 2027
Duration of Construction (years): 4

Cost Category	Initial Capital Costs in Constant Dollars	Factor [d]	Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$ 60,005,600	0.00	$ -
Right of Way - Land	$ 54,000,000	0.97	$ 52,380,000
Right of Way - Building and Relocate	$ 28,000,000	0.00	$ -
Major Structures	$ 260,499,900	0.85	$ 221,974,915
Drainage and Grading	$ 27,507,321	0.78	$ 21,456,711
Sub-base and Base	$ 9,574,732	0.86	$ 8,321,853
Surface [c]	$ 28,582,736	0.27	$ 7,675,338
Total Remaining Capital Value in Constant Dollars			$ 311,957,818

Year of Remaining Capital Value: 2050 [g]

	Year	CAPITAL COST TOTALS: Alternative Capital Cost in Constant Dollars [e]	CAPITAL COST TOTALS: Present Value of Capital Cost (dollars) [f]	REMAINING CAPITAL VALUE (RCV) TOTALS: Alternative RCV in Constant Dollars [g]	REMAINING CAPITAL VALUE (RCV) TOTALS: Present Value of RCV (dollars) [f]
2027	-	$117,393,623	$56,253,082	Not Applicable	Not Applicable
2028	-	$117,393,623	$54,409,171	Not Applicable	Not Applicable
2029	-	$117,393,623	$52,630,066	Not Applicable	Not Applicable
2030	-	$117,393,623	$50,909,634	Not Applicable	Not Applicable
2031	1	$0	$0	Not Applicable	Not Applicable
2032	2	$0	$0	Not Applicable	Not Applicable
2033	3	$0	$0	Not Applicable	Not Applicable
2034	4	$0	$0	Not Applicable	Not Applicable
2035	5	$0	$0	Not Applicable	Not Applicable
2036	6	$0	$0	Not Applicable	Not Applicable
2037	7	$0	$0	Not Applicable	Not Applicable
2038	8	$0	$0	Not Applicable	Not Applicable
2039	9	$0	$0	Not Applicable	Not Applicable
2040	10	$0	$0	Not Applicable	Not Applicable
2041	11	$0	$0	Not Applicable	Not Applicable
2042	12	$0	$0	Not Applicable	Not Applicable
2043	13	$0	$0	Not Applicable	Not Applicable
2044	14	$0	$0	Not Applicable	Not Applicable
2045	15	$0	$0	Not Applicable	Not Applicable
2046	16	$0	$0	Not Applicable	Not Applicable
2047	17	$0	$0	Not Applicable	Not Applicable
2048	18	$0	$0	Not Applicable	Not Applicable
2049	19	$0	$0	Not Applicable	Not Applicable
2050	20	$0	$0	$311,957,818	$69,290,198
	Total for Project Life (2021 - 2050)		$214,178,177		$69,290,198

NOTES

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery.

(b) Miscellaneous costs include mobilization, contingencies, and moving systems, temporary pavement and drainage, and traffic control during construction.

(c) Surface costs include pavement, lighting, signals, and signing.

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005.

(e) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2005 to determine present value.

(f) Present value of costs in terms of 2005 dollars.

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2005 to determine present value.

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TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative C-2

SRF Consulting Group, Inc

SRF PROJECT NUMBER:	4590
PROJECT NAME:	TH 41 River Crossing - Alternative C-2
B/C ANALYSIS FIRST YEAR OF BENEFIT:	2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS:	2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$5.17
Travel Time Savings	$451.60
Crash Reduction Benefits	$30.10
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	**$486.87**

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$209.19
Maintenance Cost Differential	$0.37
Remaining Capital Value Differential [a]	$66.06
PRESENT VALUE OF TOTAL COSTS (mil. $)	**$143.50**

Net Cost of Project (mil. $)	$143.50
Present Value of Benefits (mil. $)	$486.87
Net Present Value (mil. $)	**$343.37**
BENEFIT/COST RATIO:	**3.39**

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE

TH 41 River Crossing - Alternative C-2

	Year	PRESENT VALUE OF COSTS [a]						Present Value of Net Annual Costs [e]
		Capital Cost		Maintenance Cost [c]		Remaining Capital Value [d]		
		Base Case	Alternative [b]	Base Case	Alternative	Base Case	Alternative	
2027	-	$0	$54,947,767			Not Applicable	Not Applicable	$54,947,767
2028	-	$0	$53,140,974			Not Applicable	Not Applicable	$53,140,974
2029	-	$0	$51,393,592			Not Applicable	Not Applicable	$51,393,592
2030	-	$0	$49,703,667			Not Applicable	Not Applicable	$49,703,667
2031	1	$0	$0	$3,320	$28,047	Not Applicable	Not Applicable	$24,727
2032	2	$0	$0	$3,211	$27,125	Not Applicable	Not Applicable	$23,914
2033	3	$0	$0	$3,106	$26,233	Not Applicable	Not Applicable	$23,128
2034	4	$0	$0	$3,004	$25,371	Not Applicable	Not Applicable	$22,367
2035	5	$0	$0	$2,905	$24,536	Not Applicable	Not Applicable	$21,632
2036	6	$0	$0	$2,809	$23,730	Not Applicable	Not Applicable	$20,920
2037	7	$0	$0	$2,717	$22,949	Not Applicable	Not Applicable	$20,232
2038	8	$0	$0	$2,628	$22,195	Not Applicable	Not Applicable	$19,567
2039	9	$0	$0	$2,541	$21,465	Not Applicable	Not Applicable	$18,924
2040	10	$0	$0	$2,458	$20,759	Not Applicable	Not Applicable	$18,301
2041	11	$0	$0	$2,377	$20,076	Not Applicable	Not Applicable	$17,700
2042	12	$0	$0	$2,299	$19,416	Not Applicable	Not Applicable	$17,118
2043	13	$0	$0	$2,223	$18,778	Not Applicable	Not Applicable	$16,555
2044	14	$0	$0	$2,150	$18,160	Not Applicable	Not Applicable	$16,010
2045	15	$0	$0	$2,079	$17,563	Not Applicable	Not Applicable	$15,484
2046	16	$0	$0	$2,011	$16,986	Not Applicable	Not Applicable	$14,975
2047	17	$0	$0	$1,945	$16,427	Not Applicable	Not Applicable	$14,482
2048	18	$0	$0	$1,881	$15,887	Not Applicable	Not Applicable	$14,006
2049	19	$0	$0	$1,819	$15,365	Not Applicable	Not Applicable	$13,546
2050	20	$0	$0	$1,759	$14,859	Not Applicable	$66,057,531	-$66,044,430
Total for Project Life	2031-2050	$0	$209,185,999	$49,240	$415,928	$0	$66,057,531	$ 143,495,157
Net Cost Differentials	2031-2050	$209,185,999		$366,688		$66,057,531		

NOTES:

(a) Present value of costs in terms of 2006 dollars.

(b) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.

(c) Annual cost of routine maintenance, e.g., plowing, striping, etc.

(d) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

(e) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [a]

TH 41 River Crossing - Alternative C-2

Alternative

Cost Category	Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$ 54,238,860
Right of Way - Land	$ 82,000,000
Right of Way - Building & Relocation	$ 42,000,000
Major Structures	$ 246,861,340
Drainage and Grading	$ 18,856,389
Sub-base and Base	$ 8,820,677
Surface [c]	$ 26,052,134
Total	$ 458,829,400

First Year of Construction: 2027
Duration of Construction (years): 4

Cost Category	Initial Capital Costs in Constant Dollars	Factor [d]	Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$ 54,238,860	0.00	$ -
Right of Way - Land	$ 82,000,000	0.97	$ 80,140,000
Right of Way - Building & Relocation	$ 42,000,000	0.00	-
Major Structures	$ 246,861,340	0.85	$ 209,832,139
Drainage and Grading	$ 18,856,389	0.78	$ 14,737,933
Sub-base and Base	$ 8,820,677	0.66	$ 5,829,647
Surface [c]	$ 26,052,134	0.27	$ 7,034,076
Total Remaining Capital Value in Constant Dollars			$ 297,403,646

Year of Remaining Capital Value: 2050 [g]

Year		CAPITAL COST TOTALS: Alternative Capital Cost in Constant Dollars [e]	CAPITAL COST TOTALS: Present Value of Capital Cost (dollars) [f]	REMAINING CAPITAL VALUE (RCV) TOTALS: Alternative RCV in Constant Dollars [g]	REMAINING CAPITAL VALUE (RCV) TOTALS: Present Value of RCV (dollars) [f]
2027	-	$114,657,350	$54,047,757	Not Applicable	Not Applicable
2028	-	$114,657,350	$53,140,974	Not Applicable	Not Applicable
2029	-	$114,657,350	$51,303,692	Not Applicable	Not Applicable
2030	-	$114,657,350	$49,703,067	Not Applicable	Not Applicable
2031	1	$0	$0	Not Applicable	Not Applicable
2032	2	$0	$0	Not Applicable	Not Applicable
2033	3	$0	$0	Not Applicable	Not Applicable
2034	4	$0	$0	Not Applicable	Not Applicable
2035	5	$0	$0	Not Applicable	Not Applicable
2036	6	$0	$0	Not Applicable	Not Applicable
2037	7	$0	$0	Not Applicable	Not Applicable
2038	8	$0	$0	Not Applicable	Not Applicable
2039	9	$0	$0	Not Applicable	Not Applicable
2040	10	$0	$0	Not Applicable	Not Applicable
2041	11	$0	$0	Not Applicable	Not Applicable
2042	12	$0	$0	Not Applicable	Not Applicable
2043	13	$0	$0	Not Applicable	Not Applicable
2044	14	$0	$0	Not Applicable	Not Applicable
2045	15	$0	$0	Not Applicable	Not Applicable
2046	16	$0	$0	Not Applicable	Not Applicable
2047	17	$0	$0	Not Applicable	Not Applicable
2048	18	$0	$0	Not Applicable	Not Applicable
2049	19	$0	$0	Not Applicable	Not Applicable
2050	20	$0	$0	$297,403,646	$44,067,531
Total for Project Life (2031 - 2050)			$209,185,999		$44,067,531

NOTES:

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery.

(b) Miscellaneous costs include mobilization, contingencies, mitigating systems, temporary pavement and drainage, and traffic control during construction.

(c) Surface costs include pavement, lighting, signals, and signing.

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005.

(e) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.

(f) Present value of costs in terms of 2006 dollars.

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

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TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative C-2A

SRF PROJECT NUMBER: 4590
PROJECT NAME: TH 41 River Crossing - Alternative C-2A
B/C ANALYSIS FIRST YEAR OF BENEFIT: 2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS: 2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$5.31
Travel Time Savings	$475.83
Crash Reduction Benefits	$32.66
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	$513.79

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$224.84
Maintenance Cost Differential	$0.45
Remaining Capital Value Differential [a]	$69.21
PRESENT VALUE OF TOTAL COSTS (mil. $)	$156.08

Net Cost of Project (mil. $)	$156.08
Present Value of Benefits (mil. $)	$513.79
Net Present Value (mil. $)	$357.72
BENEFIT/COST RATIO:	3.29

NOTES
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost

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TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE
TH 41 River Crossing - Alternative C-2A

	Year	PRESENT VALUE OF COSTS [a]						Present Value of Net Annual Costs [e]
		Capital Cost		Maintenance Cost [c]		Remaining Capital Value [d]		
		Base Case	Alternative [b]	Base Case	Alternative	Base Case	Alternative	
2027	-	$0	$59,058,587			Not Applicable	Not Applicable	$59,058,587
2028	-	$0	$57,116,622			Not Applicable	Not Applicable	$57,116,622
2029	-	$0	$55,238,513			Not Applicable	Not Applicable	$55,238,513
2030	-	$0	$53,422,159			Not Applicable	Not Applicable	$53,422,159
2031	**1**	**$0**	**$0**	**$3,320**	**$33,355**	**Not Applicable**	**Not Applicable**	**$30,035**
2032	2	$0	$0	$3,211	$32,258	Not Applicable	Not Applicable	$29,047
2033	3	$0	$0	$3,106	$31,197	Not Applicable	Not Applicable	$28,092
2034	4	$0	$0	$3,004	$30,172	Not Applicable	Not Applicable	$27,168
2035	5	$0	$0	$2,905	$29,180	Not Applicable	Not Applicable	$26,275
2036	6	$0	$0	$2,809	$28,220	Not Applicable	Not Applicable	$25,411
2037	7	$0	$0	$2,717	$27,292	Not Applicable	Not Applicable	$24,575
2038	8	$0	$0	$2,628	$26,395	Not Applicable	Not Applicable	$23,767
2039	9	$0	$0	$2,541	$25,527	Not Applicable	Not Applicable	$22,986
2040	10	$0	$0	$2,458	$24,687	Not Applicable	Not Applicable	$22,230
2041	11	$0	$0	$2,377	$23,876	Not Applicable	Not Applicable	$21,499
2042	12	$0	$0	$2,299	$23,091	Not Applicable	Not Applicable	$20,792
2043	13	$0	$0	$2,223	$22,331	Not Applicable	Not Applicable	$20,108
2044	14	$0	$0	$2,150	$21,597	Not Applicable	Not Applicable	$19,447
2045	15	$0	$0	$2,079	$20,887	Not Applicable	Not Applicable	$18,808
2046	16	$0	$0	$2,011	$20,200	Not Applicable	Not Applicable	$18,189
2047	17	$0	$0	$1,945	$19,536	Not Applicable	Not Applicable	$17,591
2048	18	$0	$0	$1,881	$18,893	Not Applicable	Not Applicable	$17,013
2049	19	$0	$0	$1,819	$18,272	Not Applicable	Not Applicable	$16,453
2050	**20**	**$0**	**$0**	**$1,759**	**$17,671**	**Not Applicable**	**$69,205,613**	**-$69,189,700**
Total for Project Life	**2031-2050**	**$0**	**$224,835,881**	**$49,240**	**$494,637**	**$0**	**$69,205,613**	**$ 156,075,665**
Net Cost Differentials	**2031-2050**		**$224,835,881**		**$445,398**		**$69,205,613**	

NOTES:

(a) Present value of costs in terms of 2006 dollars.

(b) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value

(c) Annual cost of routine maintenance, e.g., plowing, striping, etc.

(d) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

(e) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [a]
TH 41 River Crossing - Alternative C-2A

Alternative

Cost Category		Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$	83,317,980
Right of Way - Land	$	44,500,000
Right of Way - Building & Relocation	$	44,500,000
Major Structures	$	274,710,680
Drainage and Grading	$	25,753,119
Sub-base and Base	$	10,189,050
Surface [c]	$	29,960,141
Total	$	522,940,050

First Year of Construction: 2027
Duration of Construction (years): 4

Cost Category		Initial Capital Costs in Constant Dollars	Factor [d]		Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$	83,317,980	0.00	$	-
Right of Way - Land	$	44,500,000	0.97	$	43,165,000
Right of Way - Building & Relocation	$	44,500,000	0.00		
Major Structures	$	274,710,680	0.85	$	233,504,078
Drainage and Grading	$	25,753,119	0.78	$	20,087,433
Sub-base and Base	$	10,189,050	0.66	$	6,791,373
Surface [c]	$	29,960,141	0.27	$	8,089,238
Total Remaining Capital Value in Constant Dollars				$	311,577,122

Year of Remaining Capital Value: 2050 [g]

	Year	CAPITAL COST TOTALS: Alternative Capital Cost in Constant Dollars [e]	CAPITAL COST TOTALS: Present Value of Capital Cost (dollars) [f]	REMAINING CAPITAL VALUE (RCV) TOTALS: Alternative RCV in Constant Dollars [g]	REMAINING CAPITAL VALUE (RCV) TOTALS: Present Value of RCV (dollars) [h]
2027	-	$123,235,238	$89,058,587	Not Applicable	Not Applicable
2028	-	$123,235,238	$87,118,832	Not Applicable	Not Applicable
2029	-	$123,235,238	$85,208,012	Not Applicable	Not Applicable
2030	-	$123,235,238	$83,422,150	Not Applicable	Not Applicable
2031	1	$0	$0	Not Applicable	Not Applicable
2032	2	$0	$0	Not Applicable	Not Applicable
2033	3	$0	$0	Not Applicable	Not Applicable
2034	4	$0	$0	Not Applicable	Not Applicable
2035	5	$0	$0	Not Applicable	Not Applicable
2036	6	$0	$0	Not Applicable	Not Applicable
2037	7	$0	$0	Not Applicable	Not Applicable
2038	8	$0	$0	Not Applicable	Not Applicable
2039	9	$0	$0	Not Applicable	Not Applicable
2040	10	$0	$0	Not Applicable	Not Applicable
2041	11	$0	$0	Not Applicable	Not Applicable
2042	12	$0	$0	Not Applicable	Not Applicable
2043	13	$0	$0	Not Applicable	Not Applicable
2044	14	$0	$0	Not Applicable	Not Applicable
2045	15	$0	$0	Not Applicable	Not Applicable
2046	16	$0	$0	Not Applicable	Not Applicable
2047	17	$0	$0	Not Applicable	Not Applicable
2048	18	$0	$0	Not Applicable	Not Applicable
2049	19	$0	$0	Not Applicable	Not Applicable
2050	20	$0	$0	$311,577,122	$89,205,813
Total for Project Life (2021 - 2050)			$224,835,661		$89,205,813

NOTES

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery

(b) Miscellaneous costs include mobilization, contingencies, anti-icing systems, temporary pavement and drainage, and traffic control during construction

(c) Surface costs include pavement, lighting, signals, and signing

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005

(e) Assumes total capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value

(f) Present value of costs in terms of 2006 dollars

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value

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TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative E-1

SRF PROJECT NUMBER: 4590
PROJECT NAME: TH 41 River Crossing - Alternative E-1
B/C ANALYSIS FIRST YEAR OF BENEFIT: 2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS: 2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$4.69
Travel Time Savings	$442.27
Crash Reduction Benefits	$31.87
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	**$478.84**

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$282.79
Maintenance Cost Differential	$0.46
Remaining Capital Value Differential [a]	$77.50
PRESENT VALUE OF TOTAL COSTS (mil. $)	**$205.76**

Net Cost of Project (mil. $)	$205.76
Present Value of Benefits (mil. $)	$478.84
Net Present Value (mil. $)	**$273.08**
BENEFIT/COST RATIO:	**2.33**

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost

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TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE

TH 41 River Crossing - Alternative E-1

	Year	PRESENT VALUE OF COSTS [a]						Present Value of Net Annual Costs [e]
		Capital Cost		Maintenance Cost [c]		Remaining Capital Value [d]		
		Base Case	Alternative [b]	Base Case	Alternative	Base Case	Alternative	
2027	-	$0	$74,282,309			Not Applicable	Not Applicable	$74,282,309
2028	-	$0	$71,839,757			Not Applicable	Not Applicable	$71,839,757
2029	-	$0	$69,477,521			Not Applicable	Not Applicable	$69,477,521
2030	-	$0	$67,192,961			Not Applicable	Not Applicable	$67,192,961
2031	1	$0	$0	$3,320	$34,487	Not Applicable	Not Applicable	$31,167
2032	2	$0	$0	$3,211	$33,353	Not Applicable	Not Applicable	$30,142
2033	3	$0	$0	$3,106	$32,258	Not Applicable	Not Applicable	$29,151
2034	4	$0	$0	$3,004	$31,196	Not Applicable	Not Applicable	$28,192
2035	5	$0	$0	$2,905	$30,170	Not Applicable	Not Applicable	$27,265
2036	6	$0	$0	$2,809	$29,178	Not Applicable	Not Applicable	$26,369
2037	7	$0	$0	$2,717	$28,218	Not Applicable	Not Applicable	$25,501
2038	8	$0	$0	$2,628	$27,290	Not Applicable	Not Applicable	$24,663
2039	9	$0	$0	$2,541	$26,393	Not Applicable	Not Applicable	$23,852
2040	10	$0	$0	$2,458	$25,525	Not Applicable	Not Applicable	$23,068
2041	11	$0	$0	$2,377	$24,688	Not Applicable	Not Applicable	$22,309
2042	12	$0	$0	$2,299	$23,874	Not Applicable	Not Applicable	$21,576
2043	13	$0	$0	$2,223	$23,089	Not Applicable	Not Applicable	$20,866
2044	14	$0	$0	$2,150	$22,330	Not Applicable	Not Applicable	$20,180
2045	15	$0	$0	$2,079	$21,596	Not Applicable	Not Applicable	$19,516
2046	16	$0	$0	$2,011	$20,886	Not Applicable	Not Applicable	$18,875
2047	17	$0	$0	$1,945	$20,199	Not Applicable	Not Applicable	$18,254
2048	18	$0	$0	$1,881	$19,535	Not Applicable	Not Applicable	$17,654
2049	19	$0	$0	$1,819	$18,892	Not Applicable	Not Applicable	$17,073
2050	20	$0	$0	$1,759	$18,271	Not Applicable	$77,497,884	-$77,481,372
Total for Project Life	2031-2050	$0	$282,792,548	$49,240	$511,424	$0	$77,497,884	$ 205,756,847
Net Cost Differentials	2031-2050	$282,792,548		$462,184		$77,497,884		

NOTES:

(a) Present value of costs in terms of 2006 dollars.

(b) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.

(c) Annual cost of routine maintenance, e.g., plowing, striping, etc.

(d) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

(e) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [a]

TH 41 River Crossing - Alternative E-1

Alternative

Cost Category	Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$ 83,767,000
Right of Way - Land	$ 35,000,000
Right of Way - Building & Relocation	$ 102,000,000
Major Structures	$ 314,395,440
Drainage and Grading	$ 40,627,282
Subbase and Base	$ 10,480,598
Surface [c]	$ 30,726,602
Total	$ 626,007,020

First Year of Construction: 2027

Duration of Construction (years): 4

Cost Category	Initial Capital Costs in Constant Dollars	Factor [d]	Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$ 83,767,000	0.00	$ -
Right of Way - Land	$ 35,000,000	0.97	$ 33,950,000
Right of Way - Building & Relocation	$ 102,000,000	0.00	
Major Structures	$ 314,395,440	0.85	$ 267,236,124
Drainage and Grading	$ 40,627,282	0.78	$ 31,697,080
Subbase and Base	$ 10,480,598	0.66	$ 6,924,153
Surface [c]	$ 30,726,602	0.27	$ 9,136,182
Total Remaining Capital Value in Constant Dollars			$ 348,910,540

Year of Remaining Capital Value: 2050 [g]

Year	Alternative Capital Cost in Constant Dollars [e]	Present Value of Capital Cost (dollars) [f]	Alternative RCV in Constant Dollars [e]	Present Value of RCV (dollars) [f]
	CAPITAL COST TOTALS		REMAINING CAPITAL VALUE (RCV) TOTALS	
2027	$155,901,060	$74,282,309	Not Applicable	Not Applicable
2028	$155,901,060	$71,829,757	Not Applicable	Not Applicable
2029	$155,901,060	$69,477,871	Not Applicable	Not Applicable
2030	$155,901,060	$67,102,981	Not Applicable	Not Applicable
2031	$0	$0	Not Applicable	Not Applicable
2032	$0	$0	Not Applicable	Not Applicable
2033	$0	$0	Not Applicable	Not Applicable
2034	$0	$0	Not Applicable	Not Applicable
2035	$0	$0	Not Applicable	Not Applicable
2036	$0	$0	Not Applicable	Not Applicable
2037	$0	$0	Not Applicable	Not Applicable
2038	$0	$0	Not Applicable	Not Applicable
2039	$0	$0	Not Applicable	Not Applicable
2040	$0	$0	Not Applicable	Not Applicable
2041	$0	$0	Not Applicable	Not Applicable
2042	$0	$0	Not Applicable	Not Applicable
2043	$0	$0	Not Applicable	Not Applicable
2044	$0	$0	Not Applicable	Not Applicable
2045	$0	$0	Not Applicable	Not Applicable
2046	$0	$0	Not Applicable	Not Applicable
2047	$0	$0	Not Applicable	Not Applicable
2048	$0	$0	Not Applicable	Not Applicable
2049	$0	$0	Not Applicable	Not Applicable
2050	$0	$0	$348,910,540	$77,497,884
Total for Project Life (2031 - 2050)		$282,792,560		$77,497,884

NOTES

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery.

(b) Miscellaneous costs include mobilization, contingencies, anti-icing systems, temporary pavement and drainage, and traffic control during construction.

(c) Surface costs include pavement, lighting, signals, and signing.

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005.

(e) Assumes total capital construction costs distributed evenly for 2027 - 2030. Total capital costs were brought back to 2006 to determine present value.

(f) Present value of costs in terms of 2006 dollars.

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

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SRF Consulting Group, Inc.

TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative E-1A

SRF PROJECT NUMBER:	4590
PROJECT NAME:	TH 41 River Crossing - Alternative E-1A
B/C ANALYSIS FIRST YEAR OF BENEFIT:	2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS:	2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$4.93
Travel Time Savings	$449.14
Crash Reduction Benefits	$32.88
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	**$486.94**

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$257.63
Maintenance Cost Differential	$0.42
Remaining Capital Value Differential [a]	$79.19
PRESENT VALUE OF TOTAL COSTS (mil. $)	**$178.86**

Net Cost of Project (mil. $)	$178.86
Present Value of Benefits (mil. $)	$486.94
Net Present Value (mil. $)	**$308.08**
BENEFIT/COST RATIO:	**2.72**

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE

TH 41 River Crossing - Alternative E-1A

	Year	PRESENT VALUE OF COSTS [a] Capital Cost Base Case	Capital Cost Alternative [b]	Maintenance Cost [c] Base Case	Maintenance Cost [c] Alternative	Remaining Capital Value [d] Base Case	Remaining Capital Value [d] Alternative	Present Value of Net Annual Costs [e]
2027	-	$0	$67,674,063			Not Applicable	Not Applicable	$67,674,063
2028	-	$0	$65,448,804			Not Applicable	Not Applicable	$65,448,804
2029	-	$0	$63,296,716			Not Applicable	Not Applicable	$63,296,716
2030	-	$0	$61,215,392			Not Applicable	Not Applicable	$61,215,392
2031	1	$0	$0	$3,320	$31,443	Not Applicable	Not Applicable	$28,123
2032	2	$0	$0	$3,211	$30,409	Not Applicable	Not Applicable	$27,198
2033	3	$0	$0	$3,106	$29,409	Not Applicable	Not Applicable	$26,304
2034	4	$0	$0	$3,004	$28,442	Not Applicable	Not Applicable	$25,439
2035	5	$0	$0	$2,906	$27,507	Not Applicable	Not Applicable	$24,602
2036	6	$0	$0	$2,809	$26,603	Not Applicable	Not Applicable	$23,793
2037	7	$0	$0	$2,717	$25,728	Not Applicable	Not Applicable	$23,011
2038	8	$0	$0	$2,628	$24,882	Not Applicable	Not Applicable	$22,254
2039	9	$0	$0	$2,541	$24,064	Not Applicable	Not Applicable	$21,523
2040	10	$0	$0	$2,458	$23,272	Not Applicable	Not Applicable	$20,815
2041	11	$0	$0	$2,377	$22,507	Not Applicable	Not Applicable	$20,130
2042	12	$0	$0	$2,299	$21,767	Not Applicable	Not Applicable	$19,469
2043	13	$0	$0	$2,223	$21,051	Not Applicable	Not Applicable	$18,828
2044	14	$0	$0	$2,150	$20,359	Not Applicable	Not Applicable	$18,209
2045	15	$0	$0	$2,079	$19,690	Not Applicable	Not Applicable	$17,610
2046	16	$0	$0	$2,011	$19,042	Not Applicable	Not Applicable	$17,031
2047	17	$0	$0	$1,945	$18,416	Not Applicable	Not Applicable	$16,471
2048	18	$0	$0	$1,881	$17,811	Not Applicable	Not Applicable	$15,930
2049	19	$0	$0	$1,819	$17,225	Not Applicable	Not Applicable	$15,406
2050	20	$0	$0	$1,759	$16,659	Not Applicable	$79,194,827	-$79,179,927
Total for Project Life	2031-2050	$0	$257,634,976	$49,240	$456,287	$0	$79,194,827	$ 178,857,195
Net Cost Differentials	2031-2050		$257,634,976	$417,047		$79,194,827		

NOTES.

(a) Present value of costs in terms of 2006 dollars.

(b) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.

(c) Annual cost of routine maintenance, e.g., plowing, striping, etc.

(d) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

(e) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [a]
TH 41 River Crossing - Alternative E-1A

SRF Consulting Group Inc

Alternative

Cost Category	Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$ 78,877,785
Right of Way - Land	$ 25,000,000
Right of Way - Building and Relocate	$ 48,000,000
Major Structures	$ 350,024,220
Drainage and Grading	$ 28,491,047
Sub-base and Base	$ 8,419,864
Surface [c]	$ 28,098,244
Total	$ 564,851,255

Fiscal Year of Construction 2027
Duration of Construction (years) 4

Cost Category	Initial Capital Costs in Constant Dollars	Factor [d]	Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$ 78,877,785	0.00	$ -
Right of Way - Land	$ 25,000,000	0.97	$ 24,250,000
Right of Way - Building and Relocate	$ 48,000,000	0.00	
Major Structures	$ 350,024,220	0.85	$ 297,520,587
Drainage and Grading	$ 28,491,047	0.78	$ 22,178,217
Sub-base and Base	$ 8,419,864	0.66	$ 5,557,170
Surface [c]	$ 28,098,244	0.27	$ 7,946,526
Total Remaining Capital Value in Constant Dollars			$ 356,550,506

Year of Remaining Capital Value 2050 [g]

	Year	CAPITAL COST TOTALS: Alternative Capital Cost in Constant Dollars [e]	CAPITAL COST TOTALS: Present Value of Capital Cost (dollars) [f]	REMAINING CAPITAL VALUE (RCV) TOTALS: Alternative RCV in Constant Dollars [g]	REMAINING CAPITAL VALUE (RCV) TOTALS: Present Value of RCV (dollars) [f]
2027	-	$141,212,814	$87,874,083	Not Applicable	Not Applicable
2028	-	$141,212,814	$86,446,804	Not Applicable	Not Applicable
2029	-	$141,212,814	$83,296,710	Not Applicable	Not Applicable
2030	-	$141,212,814	$81,215,392	Not Applicable	Not Applicable
2031	1	$0	$0	Not Applicable	Not Applicable
2032	2	$0	$0	Not Applicable	Not Applicable
2033	3	$0	$0	Not Applicable	Not Applicable
2034	4	$0	$0	Not Applicable	Not Applicable
2035	5	$0	$0	Not Applicable	Not Applicable
2036	6	$0	$0	Not Applicable	Not Applicable
2037	7	$0	$0	Not Applicable	Not Applicable
2038	8	$0	$0	Not Applicable	Not Applicable
2039	9	$0	$0	Not Applicable	Not Applicable
2040	10	$0	$0	Not Applicable	Not Applicable
2041	11	$0	$0	Not Applicable	Not Applicable
2042	12	$0	$0	Not Applicable	Not Applicable
2043	13	$0	$0	Not Applicable	Not Applicable
2044	14	$0	$0	Not Applicable	Not Applicable
2045	15	$0	$0	Not Applicable	Not Applicable
2046	16	$0	$0	Not Applicable	Not Applicable
2047	17	$0	$0	Not Applicable	Not Applicable
2048	18	$0	$0	Not Applicable	Not Applicable
2049	19	$0	$0	Not Applicable	Not Applicable
2050	20	$0	$0	$356,550,506	$79,194,827
	Total for Project Life (2031 - 2050)		$257,634,978		$79,194,827

NOTES

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery.

(b) Miscellaneous costs include mobilization, contingencies, antivoing systems, temporary pavement and drainage, and traffic control during construction.

(c) Surface costs include pavement, lighting, signals, and signing

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005

(e) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.

(f) Present value of costs in terms of 2006 dollars

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.

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TABLE B/C: BENEFIT-COST SUMMARY
TH 41 River Crossing - Alternative E-2

SRF PROJECT NUMBER: 4590
PROJECT NAME: TH 41 River Crossing - Alternative E-2
B/C ANALYSIS FIRSY YEAR OF BENEFIT: 2031
B/C ANALYSIS FINAL YEAR OF ANALYSIS: 2050

BENEFIT-COST ANALYSIS
SUMMARY RESULTS [a]

PRESENT VALUE OF ITEMIZED BENEFITS (mil. $)	
Vehicle Operating Savings	$4.76
Travel Time Savings	$447.42
Crash Reduction Benefits	$32.07
PRESENT VALUE OF TOTAL BENEFITS (mil. $)	**$484.25**

PRESENT VALUE OF ITEMIZED COSTS (mil. $)	
Capital Cost Differential	$242.37
Maintenance Cost Differential	$0.38
Remaining Capital Value Differential [a]	$72.27
PRESENT VALUE OF TOTAL COSTS (mil. $)	**$170.49**

Net Cost of Project (mil. $)	$170.49
Present Value of Benefits (mil. $)	$484.25
Net Present Value (mil. $)	**$313.76**
BENEFIT/COST RATIO:	**2.84**

NOTES:
(a) Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost.

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TABLE C1: ITEMIZED COST SUMMARY - ALTERNATIVE VS. BASE CASE

TH 41 River Crossing - Alternative E-2

	Year	PRESENT VALUE OF COSTS [a]						Present Value of Net Annual Costs [e]
		Capital Cost		Maintenance Cost [c]		Remaining Capital Value [d]		
		Base Case	Alternative [b]	Base Case	Alternative	Base Case	Alternative	
2027	-	$0	$63,665,109			Not Applicable	Not Applicable	$63,665,109
2028	-	$0	$61,571,672			Not Applicable	Not Applicable	$61,571,672
2029	-	$0	$59,547,072			Not Applicable	Not Applicable	$59,547,072
2030	-	$0	$57,589,044			Not Applicable	Not Applicable	$57,589,044
2031	1	$0	$0	$3,320	$29,179	Not Applicable	Not Applicable	$25,859
2032	2	$0	$0	$3,211	$28,220	Not Applicable	Not Applicable	$25,009
2033	3	$0	$0	$3,106	$27,292	Not Applicable	Not Applicable	$24,186
2034	4	$0	$0	$3,004	$26,395	Not Applicable	Not Applicable	$23,391
2035	5	$0	$0	$2,905	$25,527	Not Applicable	Not Applicable	$22,622
2036	6	$0	$0	$2,809	$24,687	Not Applicable	Not Applicable	$21,878
2037	7	$0	$0	$2,717	$23,875	Not Applicable	Not Applicable	$21,159
2038	8	$0	$0	$2,628	$23,090	Not Applicable	Not Applicable	$20,463
2039	9	$0	$0	$2,541	$22,331	Not Applicable	Not Applicable	$19,790
2040	10	$0	$0	$2,458	$21,597	Not Applicable	Not Applicable	$19,139
2041	11	$0	$0	$2,377	$20,887	Not Applicable	Not Applicable	$18,510
2042	12	$0	$0	$2,299	$20,200	Not Applicable	Not Applicable	$17,901
2043	13	$0	$0	$2,223	$19,536	Not Applicable	Not Applicable	$17,313
2044	14	$0	$0	$2,150	$18,893	Not Applicable	Not Applicable	$16,743
2045	15	$0	$0	$2,079	$18,272	Not Applicable	Not Applicable	$16,193
2046	16	$0	$0	$2,011	$17,671	Not Applicable	Not Applicable	$15,660
2047	17	$0	$0	$1,945	$17,090	Not Applicable	Not Applicable	$15,145
2048	18	$0	$0	$1,881	$16,528	Not Applicable	Not Applicable	$14,647
2049	19	$0	$0	$1,819	$15,985	Not Applicable	Not Applicable	$14,166
2050	20	$0	$0	$1,759	$15,459	Not Applicable	$72,265,633	-$72,251,933
Total for Project Life	2031-2050	$0	$242,372,898	$49,240	$432,715	$0	$72,265,633	$ 170,490,739
Net Cost Differentials	2031-2050	$242,372,898		$383,475		$72,265,633		

NOTES

(a) *Present value of costs in terms of 2006 dollars*

(b) *Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2006 to determine present value.*

(c) *Annual cost of routine maintenance, e.g., plowing, striping, etc.*

(d) *Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2006 to determine present value.*

(e) *Remaining capital value was considered a reduction of cost in this analysis and was subtracted from construction and maintenance costs to obtain a net cost*

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TABLE C2: CALCULATION OF CAPITAL COST AND REMAINING CAPITAL VALUE - ALTERNATIVE [e]

TH 41 River Crossing - Alternative E-2

Alternative

Cost Category	Initial Capital Costs in Constant Dollars
Miscellaneous Costs [b]	$ 73,759,270
Right of Way	$ 24,000,000
Right of Way - Bldg & Relocation	$ 56,000,000
Major Structures	$ 314,051,000
Drainage and Grading	$ 28,591,653
Sub-base and Base	$ 8,671,276
Surface [c]	$ 26,315,937
Total	$ 511,376,945

First Year of Construction: 2027
Duration of Construction (years): 4

Cost Category	Initial Capital Costs in Constant Dollars	Factor [d]	Remaining Capital Value in Constant Dollars
Miscellaneous Costs [b]	$ 73,759,270	0.00	$ -
Right of Way	$ 24,000,000	0.97	$ 23,280,000
Right of Way - Bldg & Relocation	$ 56,000,000	0.00	
Major Structures	$ 314,051,000	0.85	$ 266,944,115
Drainage and Grading	$ 28,591,653	0.78	$ 22,301,497
Sub-base and Base	$ 8,671,276	0.66	$ 5,723,042
Surface [c]	$ 26,315,937	0.27	$ 7,105,276
Total Remaining Capital Value in Constant Dollars			$ 325,353,930

Year of Remaining Capital Value: 2050 (g)

	Year	CAPITAL COST TOTALS: Alternative Capital Cost in Constant Dollars [e]	CAPITAL COST TOTALS: Present Value of Capital Cost (dollars) [d]	REMAINING CAPITAL VALUE (RCV) TOTALS: Alternative RCV in Constant Dollars [e]	REMAINING CAPITAL VALUE (RCV) TOTALS: Present Value of RCV (dollars) [d]
2027	-	$132,847,486	$40,605,109	Not Applicable	Not Applicable
2028	-	$132,847,486	$61,671,672	Not Applicable	Not Applicable
2029	-	$132,847,486	$69,547,037	Not Applicable	Not Applicable
2030	-	$132,847,486	$67,559,644	Not Applicable	Not Applicable
2031	1	$0	$0	Not Applicable	Not Applicable
2032	2	$0	$0	Not Applicable	Not Applicable
2033	3	$0	$0	Not Applicable	Not Applicable
2034	4	$0	$0	Not Applicable	Not Applicable
2035	5	$0	$0	Not Applicable	Not Applicable
2036	6	$0	$0	Not Applicable	Not Applicable
2037	7	$0	$0	Not Applicable	Not Applicable
2038	8	$0	$0	Not Applicable	Not Applicable
2039	9	$0	$0	Not Applicable	Not Applicable
2040	10	$0	$0	Not Applicable	Not Applicable
2041	11	$0	$0	Not Applicable	Not Applicable
2042	12	$0	$0	Not Applicable	Not Applicable
2043	13	$0	$0	Not Applicable	Not Applicable
2044	14	$0	$0	Not Applicable	Not Applicable
2045	15	$0	$0	Not Applicable	Not Applicable
2046	16	$0	$0	Not Applicable	Not Applicable
2047	17	$0	$0	Not Applicable	Not Applicable
2048	18	$0	$0	Not Applicable	Not Applicable
2049	19	$0	$0	Not Applicable	Not Applicable
2050	20	$0	$0	$325,353,930	$72,205,635
Total for Project Life (2031 - 2050)			$242,372,858		$72,205,635

NOTES

(a) Right of way and construction costs developed by SRF Consulting Group, Inc. Costs do not include risk or project delivery

(b) Miscellaneous costs include mobilization, contingencies, antifreeze systems, temporary pavement and drainage, and traffic control during construction

(c) Surface costs include pavement, lighting, signals, and signing.

(d) Factors based on the "Recommended standard values for use in economic analysis", MnDOT Office of Investment Management, July 2005

(e) Assumes initial capital construction costs distributed evenly for 2027 - 2030. Initial capital costs were brought back to 2005 to determine present value

(f) Present value of costs in terms of 2005 dollars

(g) Assumes base year for remaining capital value as 2050. Remaining value in constant dollars was brought back from 2050 to 2005 to determine present value.

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SRF CONSULTING GROUP, INC.

Transportation • Civil • Structural • Environmental • Planning • Traffic • Landscape Architecture • Parking • Right of Way

SRF No. 0024590

MEMORANDUM

TO: Rabinder Bains, Mn/DOT OIM

FROM: Dave Montebello, P.E. – Principal
Mary Karlsson, Engineer
SRF Consulting Group, Inc.

DATE: August 23, 2006

SUBJECT: TRUNK HIGHWAY 41 (TH 41) RIVER CROSSING
BENEFIT-COST ANALYSIS ASSUMPTIONS AND RESULTS

This memorandum summarizes the benefit-cost analysis performed for the TH 41 River Crossing alternatives being evaluated as part of the TH 41 River Crossing Tier 1 Draft Environmental Impact Statement (DEIS). The purpose of the Tier I DEIS is to identify and evaluate social, economic, and environmental issues associated with alternative corridor locations for a new TH 41 river crossing as the basis for identifying a preferred alignment corridor that can be preserved for future use. Specific alignment design alternatives will be identified and evaluated later in a Tier II EIS.

The objective of a benefit-cost analysis is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years. The primary elements that can be monetized are travel time, changes in vehicle operating costs, vehicle crashes, and remaining capital value. The benefit-cost analysis can provide an indication of the economic desirability of an alternative, but decision-makers must weigh the results against other considerations, effects, and impacts of the project.

As shown in Figure 1, the project is located in the Minnesota River valley near Chaska and Shakopee, Minnesota. Figure 2 shows the study area is bordered on the north by New TH 212 and on the south by TH 169. To the east, the study area is bordered by Highway 101. The western study border is west of County State Aid Highway (CSAH) 14 in Scott County and just west of the City of Carver in Carver County. The major roadways impacted by the project

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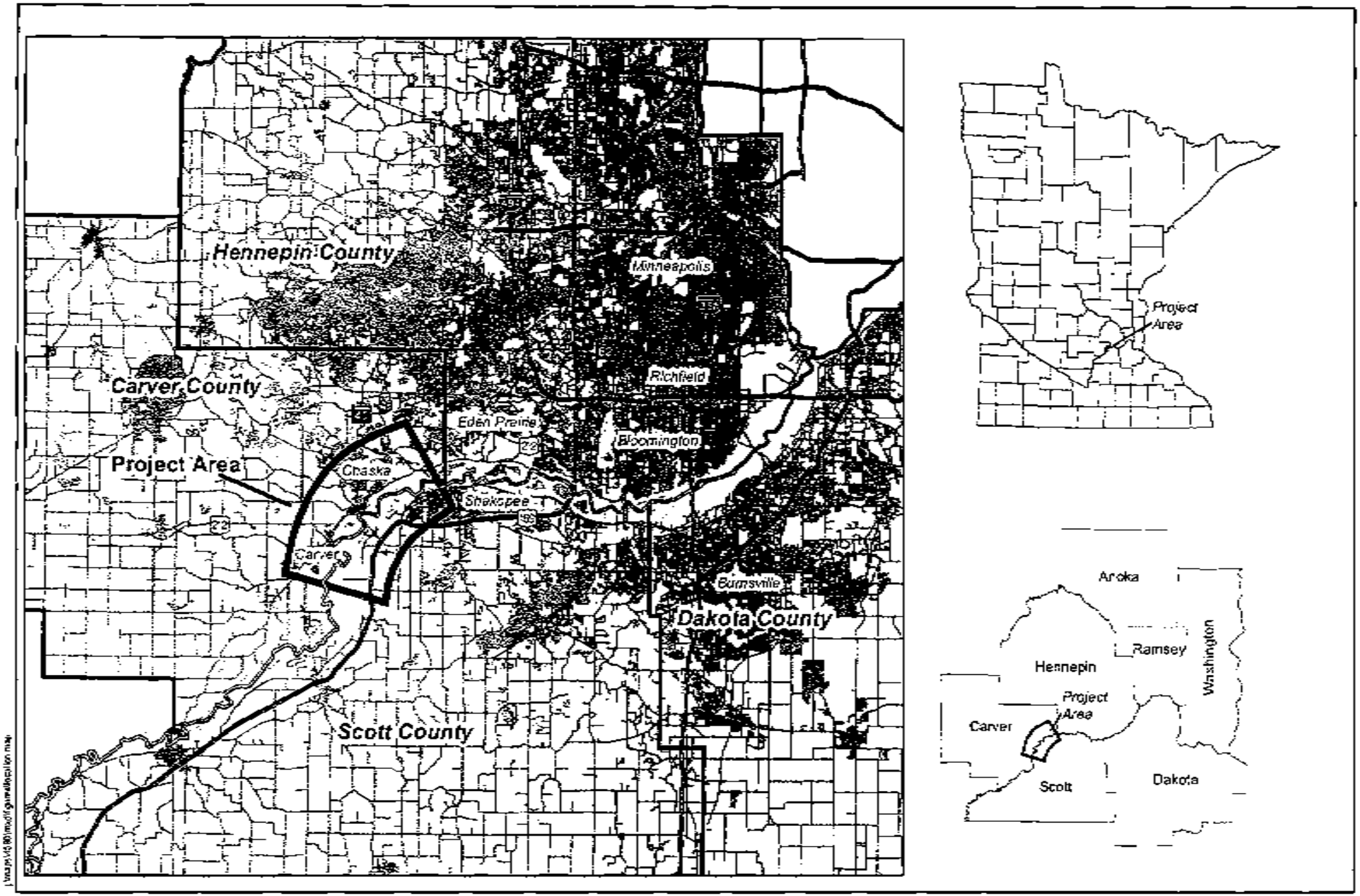
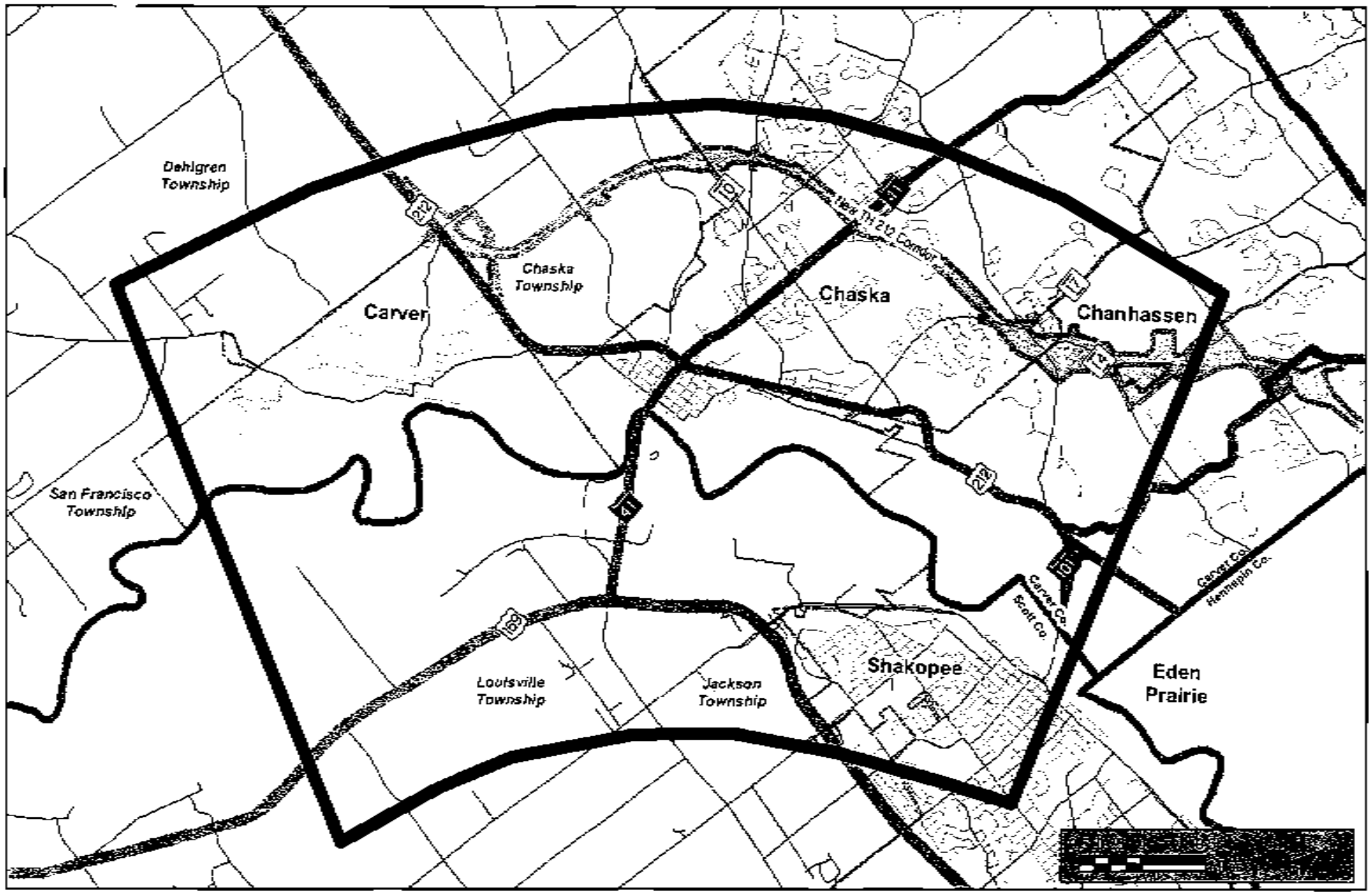


STATE / COUNTY LOCATION MAP

Figure 1

TRUNK HIGHWAY 41 RIVER CROSSING EIS
MnDOT
Benefit - Cost Analysis Technical Memorandum



STUDY AREA MAP

Figure 2

TRUNK HIGHWAY 41 RIVER CROSSING EIS
Mn/DOT
Benefit - Cost Analysis Technical Memorandum

include existing TH 41, existing and New TH 212, TH 169, Highway 101, Scott CSAH 9/Carver CSAH 45, TH 25, Scott CSAH 78, Scott CSAH/CR 69, and local routes in the City of Chaska.

The primary issues to be addressed by the project are the operational, safety, and capacity issues associated with river crossing trips moving reliably across the Minnesota River floodplain, between TH 169 and New TH 212, and through the Chaska and Shakopee areas. Capacity and reliability are key issues for the existing TH 41 river crossing. Existing TH 41 travels directly through historic downtown Chaska. Historic structures, traffic signals, and an at-grade railroad crossing limit the amount of available highway capacity. The existing TH 41 river crossing is also located within the 100-year flood plain and on average floods five days per year[1]. The closest river crossings built above the 100-year flood plain are the Bloomington-Ferry Bridge (TH 169) in the Shakopee-Bloomington/Eden Prairie area (located approximately 10 miles to the north and east of existing TH 41), and TH 25 in Belle Plain (approximately 14 miles to the south and west of existing TH 41).

DESCRIPTION OF ALTERNATIVES

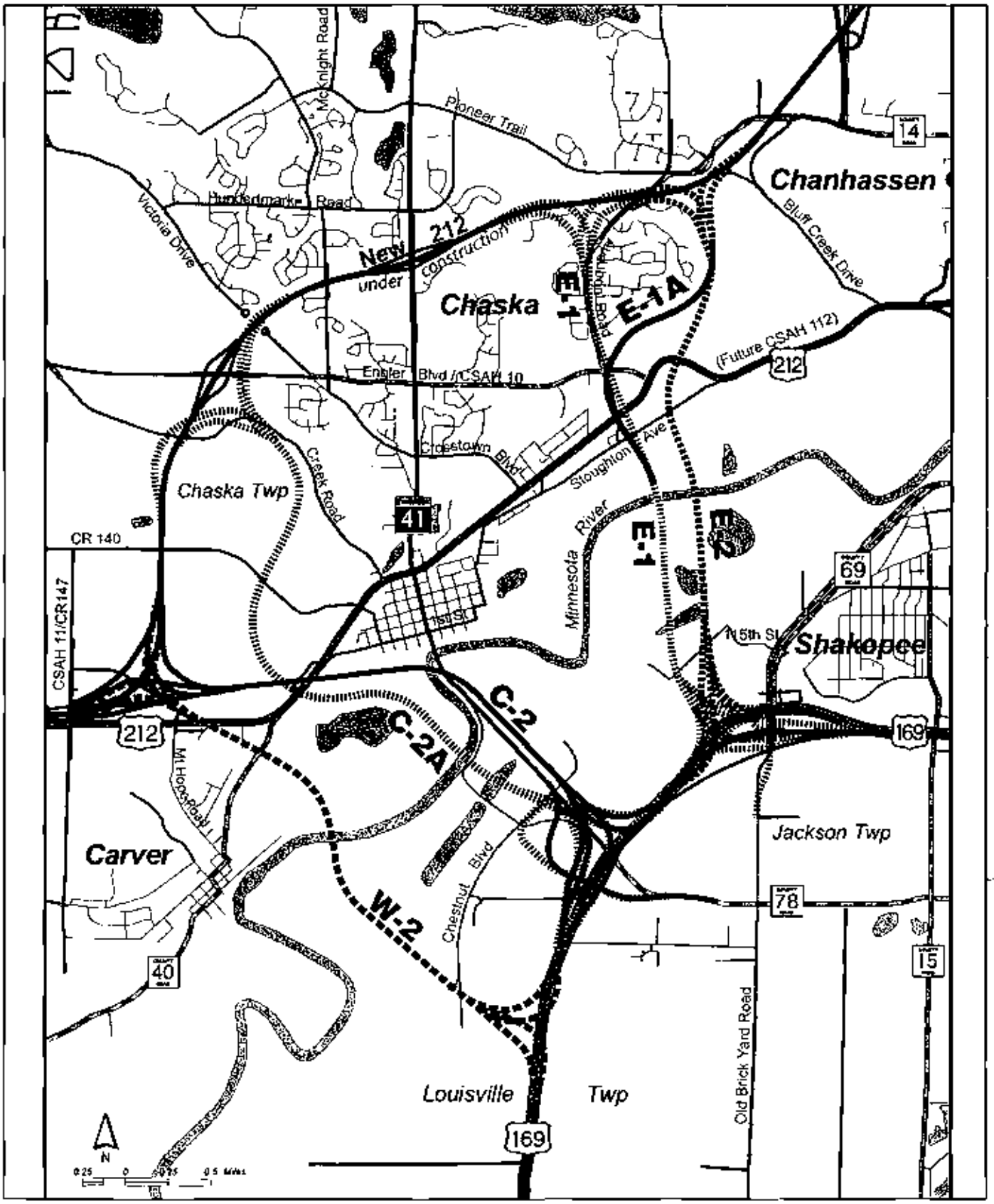
The EIS analyzes two general types of alternatives – No Build and Build. Both types are discussed in more detail below. Note that the Build Alternatives assume a new bridge crossing over the Minnesota River built above the 100-year flood plain. The Build Alternative alignments represent efforts to identify corridors that would provide high-capacity connections between TH 169 and New TH 212 that optimize interchange spacing on those roadways, and that attempt to minimize social, economic, environmental, and transportation system impacts based on known constraints in the study area. All Build Alternatives are proposed as freeway corridors with no interchanges along new TH 41 between TH 169 and New TH 212. The eastern Build Alternatives (E-1, E-1A, and E-2) also assume TH 169 is realigned south of its existing alignment. Figure 3 shows the alignments of all alternatives.

Base Condition – No Build Alternative

The Base Condition, or "No Build" Alternative, is defined as future conditions that include programmed improvements to the regional transportation system and routine maintenance and/or other major maintenance that would preserve the present functional integrity of the system. This alternative does not include construction of a new TH 41 river crossing nor any non-maintenance improvements to the existing TH 41 or other area roadways that are not currently programmed. Currently programmed improvements within the study area include the following:

- Construction of a New TH 212 freeway on a new alignment – The new alignment is located north of the existing TH 212 alignment. Construction completion is anticipated by Fall 2008.
- TH 169 conversion to a limited access expressway on the existing alignment - The conversion would include replacing existing, at-grade TH 169 intersections with interchanges at existing TH 41, CSAH 14, and CSAH/CR 69.

[1] According to data from Mn/DOT and the local jurisdictions for 1993 through 2001, the TH 41 river crossing does not flood every year. When it does flood, it is closed for a number of days at a time (from 1993 to 2001 closures ranged from 10 to 25 days). This averages out to five days per year.



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TH 41 Alternatives

Figure 3

TH 41 RIVER CROSSING EIS
Mn/DOT
Benefit-Cost Analysis Technical Memorandum

Build Alternative W-2

Alternative W-2 is proposed for the western portion of the study area. It connects to TH 169 one mile west of existing TH 41 and connects to New TH 212 through an interchange at the junction of the existing and New TH 212 alignments (near the existing intersection of TH 212 and CSAH 11/CR 147).

Build Alternative C-2

Alternative C-2 is proposed for the central portion of the study area and includes elements from Alternatives W-2 and C-2A. Alternative C-2 includes a junction with TH 169 near the existing TH 41/TH 169 at-grade intersection (like Alternative C-2A) and a western junction with New TH 212 through an interchange at the junction of the existing and New TH 212 alignments (near the existing intersection of TH 212 and CSAH 11/CR 147, like Alternative W-2).

Build Alternative C-2A

Alternative C-2A is also proposed for the central portion of the study area. Initially, this alternative was a sub-alternative of C-2, but as its alignment and termini have shifted, it has evolved into a separate alternative. Figure 3 shows the alignment of Alternative C-2A; it includes a western junction with TH 169 at the existing TH 41/TH 169 intersection and an eastern junction with New TH 212 near the CSAH 10 interchange.

Build Alternative E-1

Alternative E-1 is proposed for the eastern portion of the study area. This alternative is similar to Alternative E-1A (see next description); they differ based on the location of their junctions with New TH 212. Both alternatives connect to TH 169 in the CSAH/CR 69 area and have concurrent alignments from TH 169 to CSAH 11 (Engler Boulevard). The alignments diverge north of CSAH 11. Alternative E-1 includes a western junction with New TH 212 near CSAH 17 (Audubon Road).

Build Alternative E-1A

Alternative E-1A is the second alternative proposed for the eastern portion of the study area. Like Alternative E-1, this alternative connects to TH 169 in the CSAH/CR 69 area and shares the Alternative E-1 alignment from TH 169 to CSAH 11. North of CSAH 11 it includes an eastern junction with New TH 212 at Bluff Creek Drive.

Build Alternative E-2

Alternative E-2 is the third alternative proposed for the eastern portion of the study area. It connects to TH 169 near CSAH/CR 69 and connects to New TH 212 at Bluff Creek Drive. Alternative E-2 uses the greatest amount of land reserved by the City of Chaska for a new TH 41 river crossing.

PROPOSED BCA METHODOLOGY

The following methodology and assumptions are proposed for the benefit-cost analysis:

1. The main components analyzed include:
   - Travel time/delay (vehicle hours traveled - VHT - changes)
   - Operating costs (vehicle miles traveled - VMT – changes, caused by traffic using the new TH 41 river crossing and also by the realignment of TH 169 in the eastern Build Alternatives)
   - Safety
   - Annual maintenance costs
   - Major maintenance costs
   - Remaining Capital Value: The remaining capital value (value of improvement beyond the analysis period) will be considered as a reduction in cost and will be subtracted from total cost to obtain a net cost.
   - Initial capital costs will be broken into different categories in accordance with service life (consistent with the recommendations of OIM) and applied evenly over the duration of the construction period.

2. The analysis compared the different build alternatives to the "Base Condition" using a sub-area of the regional traffic forecasting model. The regional model assumptions are included in Attachment A.

   The sub-area consisted of all of Carver and Scott Counties and the portion of Hennepin County bounded by the Minnesota River, TH 169, and TH 7. This study area was selected to account for the majority of the travelshed of the TH 41 crossing.

3. This analysis assumes that the Build Alternatives will be constructed over four years, starting in 2026 with completion in 2030. Therefore, 2031 will be assumed to be the first full year that benefits will be realized from the project. The analysis focused on the estimated benefits for the twenty-year period from 2031 to 2050. We estimated the benefits for the entire year, 365 days, as compared to focusing on weekday benefits only. The present value of all benefits and all costs were calculated considering 2006 as the year of current dollars.

   The value of time, operating costs for vehicles, and remaining capital value assumptions are consistent with values published in July 2005 by Mn/DOT Office of Investment Management (OIM, see Attachment B for values).

4. The assumed discount rate is 3.4 percent. This rate is consistent with the rate published by OIM as of July 2005.

5. Year 2030 and 2040 VMT and VHT was determined using the Twin Cities regional model. VMT and VHT data for the years between 2030 and 2040 was projected using a compound growth rate. From 2040 to 2050, the analysis assumed that that VMT and VHT data remained constant, based on the assumption that miles traveled and delay do not increase infinitely for a given network. Instead, a threshold exists for each network. SRF assumed that the 2040 VMT and VHT forecasts represent the maximum practical threshold for the modeled network.

For the purpose of this analysis, all trips from the sub-area of the regional model were counted. Savings due to reduction of VMT and VHT were calculated using costs per mile and per hour that account for vehicle occupancy and different vehicle types.

6. Truck percent is a key factor for the TH 41 river crossing as trucks presently make up 20 percent of the daily traffic stream[2]. However, this proportion is likely to change (i.e., as commuter volume increases, it becomes a larger proportion of the daily traffic stream) and may not be representative of actual VMT/VHT in the study area.

   As a result, SRF developed a representative truck percentage for the project area using both the regional freight forecast model and a factored truck count. The following bullets describe the two approaches.

   - The freight model method developed a truck percent by comparing truck volumes from the regional freight model with total forecast daily traffic volumes (autos and trucks) from the general regional model.
   - The factored truck count method started with the existing number of trucks and then factored them by a modest growth rate to develop a future truck volume. This method then assumed a majority of trucks (75 percent) would shift from the existing river crossing to the new freeflow route (new bridge). A truck percent was computed by comparing the factored truck volume to the total forecast volume (autos and trucks).

   Table 1 summarizes the results of the two methods. The analyses used the truck percentage from the regional model in the benefit-cost analysis (6 percent) because this value yields the most conservative travel time benefits (which typically comprise a majority of the user benefit).

Table 1
Comparison of Truck Volume Estimates

Estimation Method	Estimated Truck Percent
Regional Freight Model	6
Factored Traffic Count	6 to 8 (1)

Notes
(1) Percent varies based on alternative. Range reflects proportion of highest and lowest 2040 ADT forecasts.

The composite cost per mile used in the benefit-cost analysis takes into account the percentage split of autos and trucks traveling in the area. The composite cost per hour takes into account peak and non-peak vehicle occupancy ratios[3], the number of hours of congested (peak) operation, and the percent split of autos and trucks traveling in the area.

[2] Twenty percent truck flow is based on results from a freight survey completed in October 2002 by SRF Consulting Group, Inc. as part of the TH 41 scoping study.

[3] The benefit-cost analysis will use peak and off-peak vehicle occupancy produced by the Twin Cities regional model.

7. Safety benefits were estimated based on the forecasted change in VMT by facility type for the scenarios. VMT data segmented by facility type (freeway and non-freeway) was estimated using the Twin Cities regional model. Alternatives that shift trips to safer, lower crash cost facilities generated safety benefits. In this case, a shift to freeway facilities would generate safety benefits. Crash data for different facility types was gathered from Mn/DOT statistics for a three-year period (2000, 2001, and 2002[4]) and this information was used to find a crash rate per million vehicles miles and comparisons made to statewide averages[5]. The same method was used to estimate a crash distribution. Once a crash distribution was established, the study quantified a safety benefit using crash cost assumptions that are consistent with values published by the OIM.

8. An improved TH 41 Minnesota River crossing will reduce user delay and therefore reduce user costs for both:

   - Base travel – travel done in both the Base Condition and Build Alternative. The origin, destination, and mode of travel for each trip stays the same for both road network alternatives.

   - Added travel the user was traveling on the network in the Base Condition, but changes mode, destination, or route in the Build Alternative scenario[6]. A portion of these trips (the added travel) results in an increase in vehicle-miles traveled.

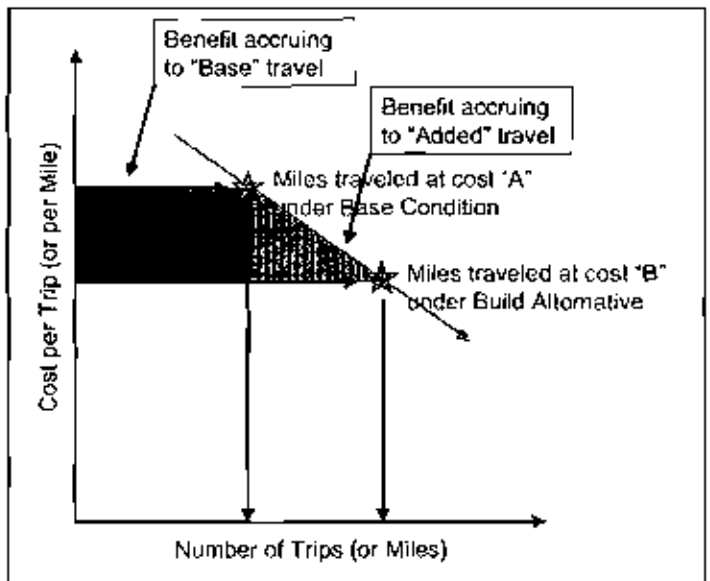

Figure 4 Illustration of User Benefit

In a benefit-cost analysis, the benefit attributable to the Build Alternative is defined as the difference in user cost between the Base Condition and the Build Alternative. This user benefit, accrues to the two travel types: base and added. The differentiation between the two travel types is important. Economists and the industry agree that

[4] 2003 and 2004 crash statistics are not yet available from Mn/DOT.

[5] Statewide crash data for rural freeways will be used to estimate freeway facility crashes. A weighted average of statewide crash data for rural four-lane expressways, urban two-lane roadways with average daily traffic of 5,000 to 8,000 and urban two-lane roadways with average daily traffic of 1,500 to 5,000 will be used to estimate non-freeway facility crashes.

[6] Twin Cities Metropolitan Area Travel Demand Forecast Model does *not* generate entirely new trips or allow trips to shift the time of day that it is made.

benefit accrued by added travel is less valuable to users than benefit accrued by base travel because the added travel is the travel that people are most willing to forego. To calculate the benefit to added travel, the *Rule of Half* is used, where the benefits of additional travel are valued at half the per-trip saving that is allocated to base trips. Figure 4 illustrates this concept where the benefit to base trips is shown by the area of the shaded rectangle and the benefit to added trips is shown as the area of the shaded triangle.

The following points summarize the detail of how benefit is calculated:

A. For each alternative studied, SRF used the travel demand forecast model to generate vehicle-miles traveled (VMT) and vehicle-hours traveled (VHT) for the years 2030 and 2040.

B. The 2030 and 2040 VMT data was used along with Mn/DOT crash rates (2000-2002) to generate number of crashes by severity for each year.

C. SRF used the 2030 and 2040 data (note that VMT and VHT data will be held constant for each year from 2040 to 2050, see assumption 5) to extrapolate VMT, VHT, and crash data for each year in the 20-year benefit-cost analysis and calculate a total annual user cost (operating costs, travel time, and crash costs) for each alternative.

D. SRF found the present value of the alternative's annual user cost and summed each year together to yield a 20-year user cost.

E. SRF calculated a cost per mile for each alternative by dividing the 20-year user cost by the 20-year sum of vehicle-miles traveled.

F. SRF defines benefit as follows:

$$\text{Benefit} = \Delta\text{Cost} * \text{VMT}_{\text{Base}} + 0.5 * \Delta\text{Cost} * (\text{VMT}_{\text{Alt}} - \text{VMT}_{\text{Base}})$$

Where:

ΔCost	=	Change in 20-year (cumulative) cost; Cost per mile in Base Condition (Base Travel) minus Cost per mile in Alternative
VMT_{Base}	=	20-Year (cumulative) VMT in Base Condition
VMT_{Alt}	=	20-Year (cumulative) VMT in Alternative

This approach values benefit accruing to base travel (VMT_{Base}) at 100 percent and, consistent with the *Rule of Half*, values benefit accruing to the added travel (the difference between VMT_{Base} and VMT_{Alt}, i.e., the additional travel stimulated by improvements made in the Alternative) at 50 percent. Additional information on this approach is available in Attachment C.

9. Roadway maintenance costs were approximated using an annual maintenance cost per lane-mile per estimates provided by Mn/DOT.

10. Because many components of the initial capital costs have service lives well beyond the 20-year analysis period, the remaining capital value was calculated for each alternative. This value was then be subtracted from the initial capital cost to determine the net capital cost and the final value expressed in terms of 2005 dollars. In determining remaining capital value, we separated the initial costs of the proposed alternatives into the following categories:
    - Right of Way
    - Structural Elements (bridges, retaining wall, etc.)
    - Roadway/Pavement
    - Lighting, striping and signing
11. Due to its location within the 100-year flood plain, the existing TH 41 river crossing is occasionally closed during flood events. Based on historical data for bridge closures due to flooding from 1993 to 2001, SRF estimates an annual closure rate of five days[7]. SRF accounted for bridge closure by quantifying the attributable, annual increase in VMT/VHT using results from the Twin Cities regional model. SRF assumed that the VMT/VHT changes due to flooding differs little among Build Alternatives. For that reason, SRF used overall, general VMT/VHT results to identify the alternative most representative of all alternatives and model the effects of flooding using the representative alternative. We used the results from the representative alternative for all Build Alternatives. These costs and miles are included in the calculation of overall user costs per mile (see number 8).
12. Operational benefits related to reductions in speed cycling (e.g., vehicles on a free-flow facility versus traveling through signals on existing TH 41) were not quantified as part of the analysis. This evaluation, if done, would provide additional benefit for all of the Build Alternatives.

The results of the analysis are as follows:

[7] Historical data on bridge closures due to flooding is not well documented. Closures are based on review of limited data from Mn/DOT and the local jurisdictions. Five-day estimate is documented in an SRF Consulting Group, Inc. technical memo for Mn/DOT, Trunk Highway 41 over the Minnesota River from Trunk Highway 169 to Trunk Highway 212, July 2003.

BUILD ALTERNATIVE W-2 VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [8] (million $)	$ 4.85	
VHT benefits [8]	$ 458.02	
Safety benefits [8]	$ 34.87	
Total benefits	$ 497.74	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8]	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative W-2		
Miscellaneous Costs (million $)	$ 65.6	
Right-of-Way Costs - Land	$ 4.9	
Right-of-Way Costs -- Buildings	$ 2.4	
Major Structures	$ 250.5	
Grading and Drainage	$ 14.4	
Sub-Base and Base	$ 5.0	
Surface	$ 15.2	
Total Initial Capital Costs	$ 358.0	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 163.3	(Present Value)
Maintenance Costs [8]	$ .50	(Present Value)
Remaining Cap. Value [8]	$ -52.5	(Present Value)
6-Lane Alternative Net Cost	$ 111.3	(Present Value)

Cost Exclusive to Alt. W-2 = Alt. W-2 Net Cost - Base Condition Net Cost

= $111.3 - $.05 = $111.25

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $497.74 / 111.25 = 4.48 [9]

NET PRESENT VALUE CALCULATION

Net Present Value = $497.74 - 111.25 = $386.52 [9]

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[8] See Attachment C for assumptions and calculations.

[9] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

BUILD ALTERNATIVE C-2 VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [10] (million $)	$ 5.17	
VHT benefits [8]	$ 451.60	
Safety benefits [8]	$ 30.10	
Total benefits	$ 486.87	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8]	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative C-2		
Miscellaneous Costs (million $)	$ 60.4	
Right-of-Way Costs - Land	$ 9.8	
Right-of-Way Costs - Buildings	$ 6.6	
Major Structures	$ 229.8	
Grading and Drainage	$ 11.4	
Sub-Base and Base	$ 5.2	
Surface	$ 15.8	
Total Initial Capital Costs	$ 339.0	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 154.6	(Present Value)
Maintenance Costs [8]	$ .42	(Present Value)
Remaining Cap. Value [8]	$ - 49.2	(Present Value)
6-Lane Alternative Net Cost	$ 105.8	(Present Value)

Cost Exclusive to Alt. C-2 = Alt. C-2 Net Cost - Base Condition Net Cost

= $105.8 - $.05 = $105.75

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $486.87 / 105.75 = 4.60 [11]

NET PRESENT VALUE CALCULATION

Net Present Value = $486.87 - 105.75 = $381.11 [11]

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[10] See Attachment D for assumptions and calculations.

[11] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

BUILD ALTERNATIVE C-2A VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [12] (million $)	$ 5.31	
VHT benefits [8]	$ 475.83	
Safety benefits [8]	$ 32.66	
Total benefits	$ 513.80	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8] (million $)	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative C-2A		
Miscellaneous Costs (million $)	$ 64.8	
Right-of-Way Costs - Land	$ 10.2	
Right-of-Way Costs -- Buildings	$ 10.2	
Major Structures	$ 243.5	
Grading and Drainage	$ 14.9	
Sub-Base and Base	$ 5.9	
Surface	$ 17.4	
Total Initial Capital Costs	$ 366.9	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 167.3	(Present Value)
Maintenance Costs [8]	$ .50	(Present Value)
Remaining Cap. Value [8]	$ -52.6	(Present Value)
6-Lane Alternative Net Cost	$ 115.2	(Present Value)

Cost Exclusive to Alt. C-2A -- Alt. C-2A Net Cost - Base Condition Net Cost

= $115.2 - $.05 = $115.15

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $513.80 / 115.15 = 4.46 [13]

NET PRESENT VALUE CALCULATION

Net Present Value = $513.80 - 115.15 = $398.64 [13]

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[12] See Attachment E for assumptions and calculations.

[13] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

BUILD ALTERNATIVE E-1 VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [14] (million $)	$ 4.69	
VHT benefits [8]	$ 442.27	
Safety benefits [8]	$ 31.87	
Total benefits	$ 478.84	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8] (million $)	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative E-1		
Miscellaneous Costs (million $)	$ 77.3	
Right-of-Way Costs - Land	$ 13.2	
Right-of-Way Costs – Buildings	$ 38.7	
Major Structures	$ 292.7	
Grading and Drainage	$ 20.6	
Sub-Base and Base	$ 5.3	
Surface	$ 17.1	
Total Initial Capital Costs	$ 464.9	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 212.1	(Present Value)
Maintenance Costs [8]	$ .5	(Present Value)
Remaining Cap. Value [8]	$ -63.5	(Present Value)
6-Lane Alternative Net Cost	$ 149.1	(Present Value)

Cost Exclusive to Alt. E-1 = Alt. E-1 Net Cost - Base Condition Net Cost
= $149.1 - $.05 = $149.06

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $478.84 / 149.06 = 3.21 [15]

NET PRESENT VALUE CALCULATION

Net Present Value = $478.84 - 149.06 = $329.78 [15]

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[14] See Attachment F for assumptions and calculations.
[15] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

BUILD ALTERNATIVE E-1A VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [16] (million $)	$ 4.93	
VHT benefits [8]	$ 449.14	
Safety benefits [8]	$ 32.88	
Total benefits	$ 486.95	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8] (million $)	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative E-1A		
Project Development (million $)	$ 82.9	
Right-of-Way Costs - Land	$ 6.0	
Right-of-Way Costs -- Buildings	$ 11.1	
Major Structures	$ 327.7	
Grading and Drainage	$ 14.8	
Sub-Base and Base	$ 4.4	
Surface	$ 13.6	
Total Initial Capital Costs	$ 460.5	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 210.1	(Present Value)
Maintenance Costs [8]	$ .5	(Present Value)
Remaining Cap. Value [8]	$ -67.2	(Present Value)
6-Lane Alternative Net Cost	$ 143.4	(Present Value)

Cost Exclusive to Alt. E-1A = Alt. E-1A Net Cost - Base Condition Net Cost

= $143.4 - $.05 = $143.30

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $486.95 / 143.30 = 3.40 [17]

NET PRESENT VALUE CALCULATION

Net Present Value = $486.95 - 143.30 = $343.65 [17]

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[16] See Attachment G for assumptions and calculations.

[17] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

BUILD ALTERNATIVE E-2 VERSUS NO BUILD

BENEFIT CALCULATIONS

VMT benefits [18] (million $)	$ 4.76	
VHT benefits [8]	$ 447.42	
Safety benefits [8]	$ 32.07	
Total benefits	$ 484.25	(Present Value)

COST CALCULATIONS

Costs for both No Build (the Base Condition) and the Build Alternative were organized into the following categories:

Base Condition		
Maintenance Costs [8] (million $)	$ .05	
Net Cost	$ .05	(Present Value)
Build Alternative E-2		
Project Development (million $)	$ 76.3	
Right-of-Way Costs - Land	$ 5.6	
Right-of-Way Costs - Buildings	$ 13.0	
Major Structures	$ 300.4	
Grading and Drainage	$ 14.0	
Sub-Base and Base	$ 4.2	
Surface	$ 12.9	
Total Initial Capital Costs	$ 426.4	(In Constant Dollars)
Total Initial Capital Costs [8] (million)	$ 194.5	(Present Value)
Maintenance Costs [8]	$ .43	(Present Value)
Remaining Cap. Value [8]	$ -61.7	(Present Value)
6-Lane Alternative Net Cost	$ 133.23	(Present Value)

Cost Exclusive to Alt. E-2 = Alt. E-2 Net Cost - Base Condition Net Cost

= $133.23 - $.05 = $133.18

BENEFIT-COST CALCULATION

Benefit-Cost Ratio = $484.25 / 133.18 = 3.64 [19]

NET PRESENT VALUE CALCULATION

Net Present Value = $484.25 - 133.18 = $351.11 [19]

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[18] See Attachment H for assumptions and calculations.

[19] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

SUMMARY OF BENEFIT-COST ANALYSIS RESULTS

A summary of the analysis results are shown in Table 2. The following conclusions can be drawn from these results:

- All Build Alternatives are beneficial from the economic perspective as compared to the No Build Alternative (Base Condition).
- Alternative C-2 has the highest benefit-cost ratio and lowest net cost.
- Alternative C-2A has the highest net present value and highest net benefit.
- The benefit-cost ratios and net present values for Alternatives W-2, C-2, and C-2A are higher than those for Alternatives E-1, E-1A, and E-2. The eastern alternatives (E-1, E-1A, and E-2) have higher net costs than Alternatives W-2, C-2, and C-2A.

Table 2
Summary of Benefit-Cost Analysis Results

Base vs. Build Alternative	Net Benefit (mil.$)	Net Cost (mil.$)	B/C Ratio [20]	Net Present Value [20] (mil.$)
W-2	497.74	111.25	4.48	386.52
C-2	486.87	105.75	4.60	381.11
C-2A	513.80	115.15	4.46	398.64
E-1	478.84	149.06	3.40	329.78
E-1A	486.95	143.30	3.40	343.65
E-2	484.25	133.18	3.64	351.11

Results from the benefit-cost analysis are only one piece of information being used in the selection of an alternative. Because all Build Alternatives are beneficial from the economic perspective, this analysis leaves the selection of an alternative open in recognition that decision-makers must select the Preferred Alternative based on the goals of the project and Mn/DOT.

CC: Lynn Clarkowski, Mn/DOT
Lisa Freese, Mn/DOT
Nancy Frick, SRF

H:\Projects\4590\TP\Benefit Cost\Final Memo\TH 41 BCA.doc

[20] Costs developed by SRF and do not include risk or project development costs for Build Alternatives.

ATTACHMENTS TO THE BENEFIT-COST ANALYSIS TECHNICAL MEMORANDUM ARE AVAILABLE FROM MN/DOT

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

EXECUTIVE SUMMARIES

PHASE I ENVIRONMENTAL SITE ASSESSMENTS
PROPOSED TH 41 RIVER CROSSING

PREPARED FOR
SRF CONSULTING GROUP, INC.

FEBRUARY 2, 2006

PREPARED BY
BRAUN INTERTEC CORPORATION

SRF NO: 0024590

Executive Summaries

Phase I Environmental Site Assessments (ESAs)
Proposed TH 41 River Crossing
Alternatives W-2, C-2 (includes C-2A), E-1 (includes E-1A), and E-2
Braun Intertec Corporation
February 2, 2006

and

Letter Addendum to Phase I ESA
for Alternative C-2
Braun Intertec Corporation
May 16, 2006

Phase I Environmental Site Assessment

Proposed TH 41 W-2 Alternative
Scott and Carver Counties
Carver and Louisville Township, Minnesota

Prepared For

SRF Consulting Group, Inc.

Volume 1 of 2

Project BL-04-05681
February 2, 2006

Braun Intertec Corporation

Executive Summary

Braun Intertec Corporation performed a Phase I environmental site assessment of the proposed W-2 TH 41 Alternative located in Carver and Louisville Township in Scott and Carver Counties, Minnesota (Corridor) in general conformance with the scope and limitations of ASTM Practice E 1527-00.

The Corridor is located within Sections 7, 17, 18, 20, and 21; Township 115 North; Range 23 West in Carver and Louisville Township, Carver and Scott Counties, Minnesota. The Corridor extends from slightly beyond Highway 212 to the north to slightly beyond Highway 169 on the south and traverses the Minnesota River in a northwest-southeast direction. This assessment included approximately 250 feet on either side of the approximately 3.1-mile-long Corridor.

The Corridor traverses the Minnesota River with the City of Carver near the western boundary. The Chaska Lake Area of the Minnesota Valley Federal Wildlife Refuge and the Gifford Lake Area of the Minnesota Valley State Recreation Area are located northwest and southeast of the Minnesota River, respectively in the central portion of the Corridor. Properties within the Corridor consisted of residential, commercial, and industrial. The surrounding area includes a mix of residential, commercial, and industrial properties.

This assessment has revealed no indications of recognized environmental conditions in connection with the Corridor, with the exception of the following:

- According to the FirstSearch report, one facility was listed on the underground storage tank (UST) database that is located within the Corridor (Bryan Rock Products, Inc.).
- On the 1928 Sanborn map, Minnesota Valley Oil, Co. was located between Third and Fourth Streets near the western Corridor boundary in the City of Carver.
- A gasoline station (Carver Depot) was located near the western boundary of the Corridor at 300 County Road 40 East in the City of Carver.
- According to the Scott County Environmental Health Department (SCEHD) file review, Hollander Auto Salvage, located within and adjacent to the southeast end of the Corridor, operated at 13901 Johnson Memorial Drive in Louisville Township until the mid-1980s.
- A gravel pit was located at 13580 Johnson Memorial Drive and 13900 Johnson Memorial Drive in Louisville Township within the Corridor. According to the Scott County web page, the properties are owned by Bryan Rock Products and Valley Mining and Development, respectively.

Although not considered a recognized environmental condition, seven wells and possibly septic systems are located within the Corridor. If the wells will no longer be used, the wells must be properly sealed by a licensed water well contractor in accordance with Minnesota Department of Health regulations or a maintenance permit must be obtained. If a septic system is encountered during future Corridor development activities, we recommend that the septic system be properly abandoned in accordance with local city, county, and state regulations.

Although not considered a recognized environmental condition, historically, houses and buildings were likely demolished within the Corridor. It is unknown if the demolition debris was buried on the respective properties or hauled away for disposal. The potential exists that buried materials are present within the Corridor that require management as solid or hazardous waste.

Braun Intertec ranked properties on or adjacent to the Corridor as to their potential to impact the Corridor using the ranking criteria provided by Minnesota Department of Transportation (Mn/DOT) as high, medium, low, or unlikely risk sites.

A majority of the Corridor consists of residential properties, vacant land, roads, and other commercial facilities that do not meet the conditions of a high, medium, or low risk site set forth in the ranking criteria provided by Mn/DOT. It is our opinion that these areas and facilities have the unlikely potential for contamination.

Low Environmental Risk sites were defined as properties with known or inferred small or very small quantities of chemicals used or stored on-site. *Low Environmental Risk* sites also show indications of good housekeeping practices. The following facilities listed on the RCRA-GEN database were ranked as *Low Environmental Risk* sites during this assessment:

- Westin Marine Shakopee, 13727 Johnson Memorial Drive; located within the Corridor
- Bryan Rock Products, Inc., 13580 Johnson Memorial Drive; located within the Corridor
- Butch's Auto, Inc., 220 East 3rd Street; located approximately 0.03 mile southwest of the Corridor

Aboveground storage tanks were observed at the following facilities during our Corridor reconnaissance and were ranked as *Low Environmental Risk* sites during this assessment:

- Jimmy's Classic Cars on the southeast end of the Corridor along Johnson Memorial Drive
- City of Carver Water Treatment Facility City Well #2, 1765 Mount Hope Road; located near the northwestern end of the Corridor

Braun Intertec recommends that care be taken to educate the contractors and Mn/DOT construction managers to identify conditions at *Low Environmental Risk* sites that may indicate adverse environmental impact to the soil or groundwater within the construction area. These conditions may include stained soils, unusual odors or debris disposal (i.e., building material, pipes, tanks or drums). Braun Intertec recommends that a contingency plan be in place to allow quick response to minimize construction delays, if indication of potential adverse environmental impacts are observed.

Medium Environmental Risk sites included properties located a short distance (<1/8 mile) from the Corridor, which have had documented releases, as well as properties located immediately adjacent to the Corridor with only the potential for environmental impacts due to current or historical uses.

The following facilities listed on the UST database were ranked as *Medium Environmental Risk* sites during this assessment:

- Bryan Rock Products, Inc., 13500 Johnson Memorial Drive; located within the Corridor. This facility is also considered a *High Environmental Risk* site due to the past and current land use as a gravel pit.

- Butch's Auto, Inc., 220 East 3rd Street; located approximately 0.03 mile southwest of the Corridor.

On the 1928 Sanborn map, Minnesota Valley Oil, Co. was located between Third and Fourth Streets near the western boundary in the City of Carver. Two of the three storage tanks were labeled, "capacity 15,000 gallons each" and the third was labeled "capacity 2,000 gallons." Based on the ranking criteria provided by Mn/DOT, it is our opinion that the Minnesota Valley Oil, Co. is considered a *Medium Environmental Risk* site.

A gasoline station (Carver Depot) was located near the western boundary of the Corridor at 300 County Road 40 East in the City of Carver. The facility was not listed on the FirstSearch report as a UST or LUST facility. No groundwater monitoring wells were observed at the time of our Corridor reconnaissance. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the gasoline station (Carver Depot) was located near the western boundary of the Corridor is considered a *Medium Environmental Risk* site.

Braun Intertec recommends additional environmental evaluation of *Medium Environmental Risk* sites on a case-by-case basis depending on the type of site historical activity and corridor construction details. The additional environmental evaluation of these sites may be limited to additional information source review, but may also include subsurface assessment.

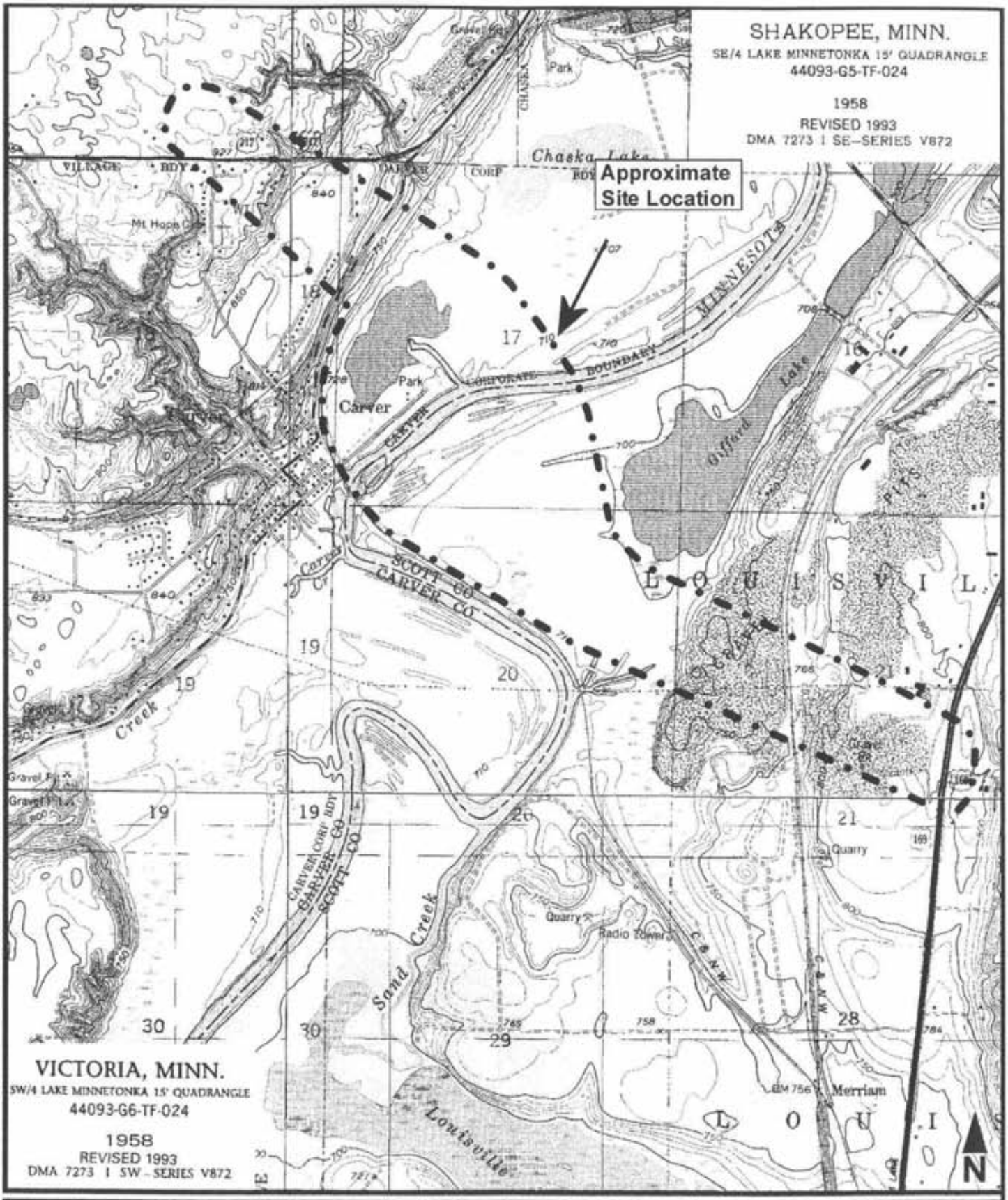
High Environmental Risk sites included properties located within the Corridor or adjacent to the Corridor and either presented strong indications suggesting environmental impacts or was reported to have documented releases. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the following facilities are considered *High Environmental Risk* sites:

- Former Hollander Auto Salvage, 13901 Johnson Memorial Drive; located within and adjacent to the southeast end of the Corridor.

- Bryan Rock Products, 13580 Johnson Memorial Drive; located within the Corridor. This facility is also considered a *Medium Environmental Risk* site due to the facilities listing on the UST database.

- Valley Mining and Development, 13900 Johnson Memorial Drive; located within the Corridor.

Braun Intertec recommends conducting additional environmental assessment of the *High Environmental Risk* sites. The assessment should include additional information source review. Subsurface assessment of the *High Environmental Risk* sites may be required to evaluate suspected environmental impacts.



BRAUN INTERTEC

Site Location Map
Phase I Environmental Site Assessment
TH 41 W-2 Alternative
Scott and Carver Counties
Carver and Chaska, Minnesota

USGS TOPOGRAPHIC MAP		
Victoria and Shakopee, MN		
DATE:	10/13/2005	
JOB NO:	BL-04-05681	
SCALE:	1 : 24,000	FIGURE NO:
DRAWN BY:	FER	1

Phase I Environmental Site Assessment

Proposed TH 41 C-2 Alternative
Scott and Carver Counties
Jackson Township and Chaska, Minnesota

Prepared For

SRF Consulting Group, Inc.

Volume 1 of 2

Project BL-04-05681
February 2, 2006

Braun Intertec Corporation

Executive Summary

Braun Intertec Corporation performed a Phase I environmental site assessment of the proposed TH 41 C-2 Alternative located in Jackson Township and Chaska in Scott and Carver Counties, Minnesota (Corridor) in general conformance with the scope and limitations of ASTM Practice E 1527-00.

The Corridor is located within Sections 5, 6, 7, 8, 9, 10, 15, 16, and 17, Township 115 North, Range 23 West; in Chaska and Shakopee, Carver and Scott Counties, Minnesota. The Corridor extends to Engler Boulevard to the north with another extension that follows Country Road 140 to the west. The northeastern boundary of the Corridor traverses the southwestern corner of the City of Chaska and continues around the City. The Corridor boundary line continues to the east, crossing the Minnesota River and continuing on to Highway 169 southwest of the City of Shakopee. The southeastern boundary of the Corridor extends slightly beyond Highway 169. The southwestern boundary of the Corridor extends to the northwest across the Minnesota River to Chaska Lake where the boundary turns to the west and continues to the north at the intersection of Highway 212 and County Road 40 to County Road 140. This assessment included approximately 500 feet on either side of the approximately 5.5-mile-long Corridor.

The Corridor traverses the Minnesota River with the City of Chaska along the northeastern boundary. The Chaska Lake Area of the Minnesota Valley Federal Wildlife Refuge and the Gifford Lake Area of the Minnesota Valley State Recreation Area are located northwest and southeast of the Minnesota River, respectively in the central portion of the Corridor. Properties within the Corridor consisted of agricultural, residential, commercial, and industrial. The surrounding area includes a mix of agricultural, residential, commercial, and industrial properties.

This assessment has revealed no indications of recognized environmental conditions in connection with the Corridor, with the exception of the following:

- According to the FirstSearch report, a UST facility (Dueco, 12716 Chestnut Boulevard) was located on the southwestern corner of the Corridor.

- According to the information provided by FirstSearch, one facility (MNDOT Theis Auto) located within the Corridor was listed twice on the State Site (MPCA-VIC) database.

- At the time of our reconnaissance, three active gravel pits were observed located within the Corridor.

This assessment has revealed no indications of historical recognized environmental conditions in connection with the Corridor, with the exception of the following:

- According to the information provided by FirstSearch, six facilities located within the Corridor were listed seven times on the LUST database. One of the facilities was listed twice for a total of seven listings. All seven of the listings on the LUST database were "closed" by the MPCA.

Although not considered a recognized environmental condition, seven wells and possibly septic systems are located at within the Corridor. If the wells will no longer be used, the wells must be properly sealed by a licensed water well contractor in accordance with Minnesota Department of Health regulations or a maintenance permit must be obtained. If a septic system is encountered during future Corridor development activities, we recommend that the septic system be properly abandoned in accordance with local city, county, and state regulations.

Although not considered a recognized environmental condition, historically, houses and buildings were likely demolished at the Corridor. It is unknown if the demolition debris was buried on the property or hauled away for disposal. The potential exists that buried materials are present at the Corridor that require management as solid or hazardous waste.

Braun Intertec ranked properties on or adjacent to the Corridor as to their potential to impact the Corridor using the ranking criteria provided by Mn/DOT as high, medium, low, or unlikely risk sites.

A majority of the Corridor consists of residential properties, vacant land, roads, and other commercial facilities that no not meet the conditions of a high, medium, or low risk site set forth in the ranking criteria provided by Mn/DOT. It is our opinion that these areas and facilities have the unlikely potential for contamination.

Low Environmental Risk sites were defined as properties with known or inferred small or very small quantities of chemicals used or stored on-site. *Low Environmental Risk* sites also show indications of good housekeeping practices. Fourteen facilities located within the Corridor and eight facilities located adjacent to the Corridor were listed on the RCRA-GEN database. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the RCRA-GEN facilities are considered a *Low Environmental Risk* and do not constitute recognized environmental conditions.

Braun Intertec recommends that care be taken to educate the contractors and Mn/DOT construction managers to identify conditions at *Low Environmental Risk* properties that may indicate adverse environmental impact to the soil or groundwater within the construction area. These conditions may include stained soils, unusual odors or debris disposal (i.e., building material, pipes, tanks or drums).

Braun Intertec recommends that a contingency plan be in place to allow quick response to minimize construction delays, if indication of potential adverse environmental impacts is observed.

Medium Environmental Risk properties included properties located a short distance (<1/8 mile) from the Corridor, which have had documented releases, as well as properties located immediately adjacent to the Corridor with only the potential for environmental impacts due to current or historical uses. According to the FirstSearch report, a UST facility (Dueco, 12716 Chestnut Boulevard) was located on the southwestern corner of the Corridor. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the UST facility with no documented release located within the Corridor is considered a *Medium Environmental Risk* and a recognized environmental condition.

According to the FirstSearch report, one UST facility (R&R Marine, 12827 Chestnut Boulevard) was listed within 500 feet of the Corridor. Based on the ranking criteria provided by Mn/DOT, it is our opinion that R&R Marine located near the southwestern boundary of the Corridor is considered a *Medium Environmental Risk* and not a recognized environmental condition.

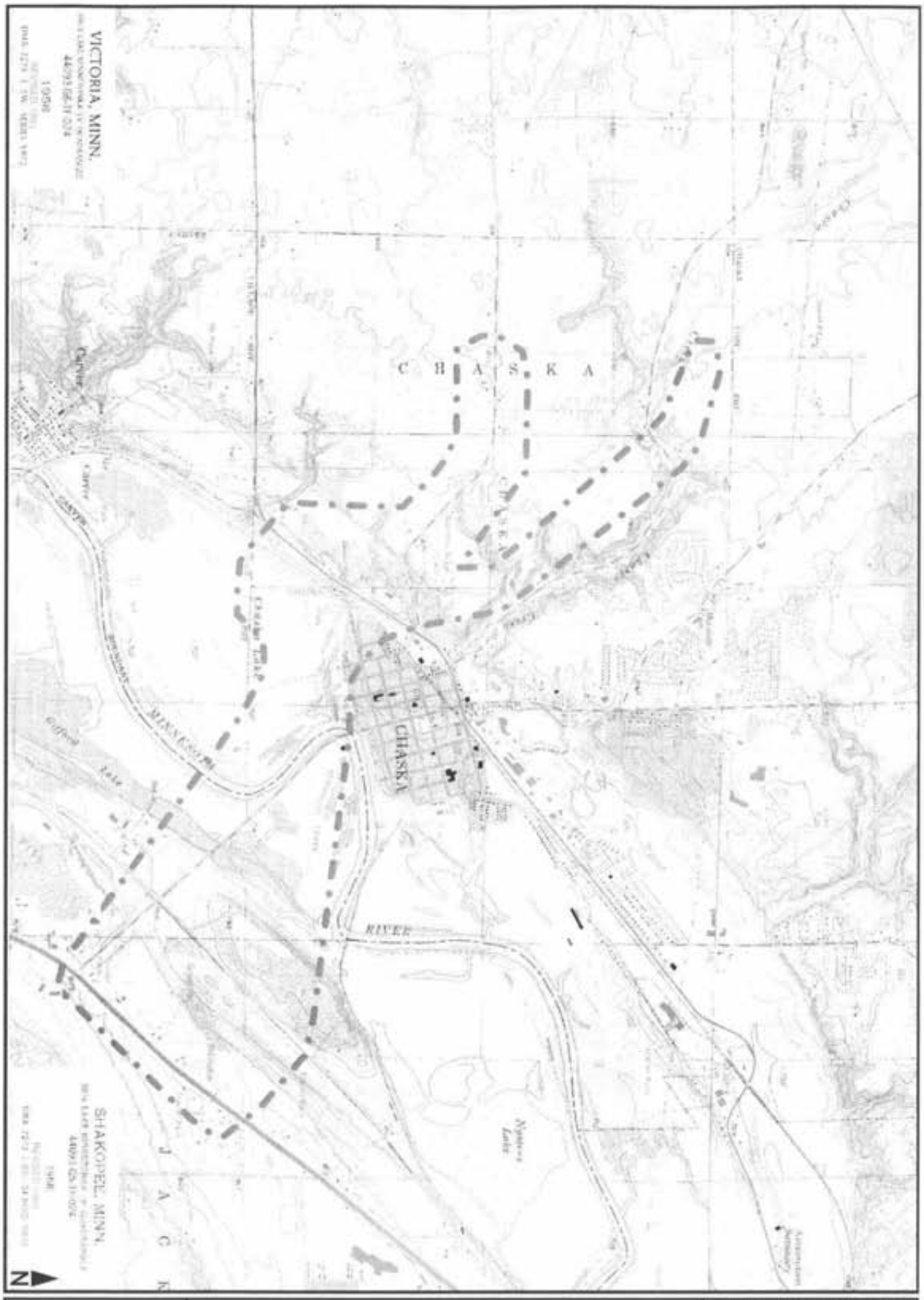
Braun Intertec recommends additional environmental evaluation of *Medium Environmental Risk* sites on a case-by-case basis depending on the type of site historical activity and corridor construction details. The additional environmental evaluation of these sites may be limited to additional information source review, but may also include subsurface assessment.

High Environmental Risk properties included properties located within the Corridor or adjacent to the Corridor and either presented strong indications suggesting environmental impacts or were reported to have documented releases. The following facilities located within the Corridor were considered to be *High Environmental Risk* properties:

- MNDOT Theis Auto, 12706 Chestnut Boulevard; listed on the State Site (MPCA-VIC) database.
- Holiday Stationstore-Store Number 246, 12681 Chestnut Boulevard; located on the southwestern corner of the Corridor (LUST database)
- Malkerson Farm, 12351 Chestnut Boulevard; located on the southwestern portion of the Corridor (LUST database).
- Patriot Auto Sales, 12810 Chestnut Boulevard; located on the southwestern corner of the Corridor (LUST database).
- Shakopee Truck Station, 12550 Chestnut Boulevard; located on the southwestern portion of the Corridor (LUST database).
- Superamerica Store #4439, 12835 Ventura Court; located on the southwestern corner of the Corridor (LUST database).

- Theis Auto Repair, 12706 Chestnut Boulevard; located on the southwestern corner of the Corridor (LUST database).
- Lano Sand and Gravel, located on Highway 212 between Chaska and Carver.
- Commercial Asphalt, located between the Minnesota River and railroad tracks northeast of Highway 41 (Chestnut Boulevard) in Scott County.
- Gravel pit located southwest of the Commercial Asphalt gravel pit between the railroad tracks and Highway 169.

Braun Intertec recommends conducting additional environmental assessment of the *High Environmental Risk* sites. The assessment should include additional information source review. Subsurface assessment of the *High Environmental Risk* sites may be required to evaluate suspected environmental impacts.



BRAUN INTERTEC

Site Location Map
Phase I Environmental Site Assessment
TH 41 C-2 Alternative
Scott and Carver Counties
Carver and Chaska, Minnesota

USGS TOPOGRAPHIC MAP		
Shakopee and Victoria, MN		
DATE	10/20/05	
JOB NO	BL-04-05681	
SCALE	1 : 24,000	FIGURE NO
DRAWN BY	FER	1

Phase I Environmental Site Assessment

Proposed TH 41 E-1 Alternative
Scott and Carver Counties
Carver and Louisville Township, Minnesota

Prepared For

SRF Consulting Group, Inc.

Volume 1 of 2

Project BL-04-05681
February 2, 2006

Braun Intertec Corporation

Executive Summary

Braun Intertec Corporation performed a Phase I environmental site assessment of the proposed E-1 TH 41 Alternative located in Shakopee and Chaska in Scott and Carver Counties, Minnesota (Corridor) in general conformance with the scope and limitations of ASTM Practice E 1527-00.

The Corridor is located within Sections 3, 10, and 15; Township 115 North; Range 23 West and Sections 27, 33, and 34; Township 116 North; Range 23 West in Shakopee and Chaska, Scott and Carver Counties, Minnesota. The Corridor consists of a Y-shape. The western fork of the Corridor extends from slightly beyond the intersection of Pioneer Trail and Audubon Road on the north and follows Audubon Road to the south. The eastern fork of the Corridor extends from West Farm Road, south of Pioneer Trail, on the north and continues to the southwest where it meets with the western fork in the vicinity of Engler Boulevard and Audubon Road. The Corridor continues to the south and ends just southeast of Highway 169. This assessment included approximately 500 feet on either side of the approximately 5-mile-long Corridor.

At the time of this assessment, the Corridor consisted of approximately 5 miles. The Corridor traverses the Minnesota River with downtown Chaska to the southwest. The Nyssen's Lake Area of the Minnesota Valley State Recreation Area is located south of the Minnesota River within the south-central portion of the Corridor. Properties within the Corridor consisted of residential, commercial, and industrial. The surrounding area includes a mix of residential, commercial, and industrial properties.

This assessment has revealed no indications of recognized environmental conditions in connection with the Corridor, with the exception of the following:

- According to the FirstSearch report, a facility (SuperAmerica #4519, 1400 Crystal Lane) within the Corridor was listed on the UST database.

- According to the SCHED file review, septage from the Bonnevista Mobile Home Park had been spread repeatedly at the farm site of Charlie Wellens, 2200 Strunks Road in Jackson Township located within the Corridor.

- Two facilities adjacent to the Corridor (Minnesota Valley Gas, 1155 Highway 212 East and All Steel Products, 1165 Highway 212 East) were identified in the city directories as environmental concerns.

- Beginning on the 1957 aerial photograph and continuing the remaining aerial photographs, an area of disturbed soil that appears to be associated with an adjacent gravel pit was apparent between the railroad tracks on the southwestern portion of the Corridor.

- Based on aerial photographs, a lime pond associated with a sugar beet facility was located on the west-central portion of the Corridor along the Minnesota River.

- The Chaska Laundry Center was located in a strip mall located on the north side of Highway 212 west of the intersection of Audubon Road and Highway 212. A dry-cleaning sign was observed at the Chaska Laundry Center at the time of our reconnaissance.

- An auto/truck service facility was observed in a strip mall located on the north side of Highway 212 west of the intersection of Audubon Road and Highway 212.

- A Tires Plus facility was observed south of the SuperAmerica gas station at the intersection of Crystal Lane and Audubon Road.

- The United Sugars facility was observed near the western boundary of the Corridor, south of Stoughton Avenue.

- According to the information provided by FirstSearch, a facility (Spuhl Anderson Machine Company, 1610 Parallel Street) within the Corridor was listed on the State Site (MPCA-VIC) database.

This assessment has revealed no indications of historical recognized environmental conditions in connection with the Corridor, except for the following:

- According to the FirstSearch report, a facility (M.A. Gedney) located within the Corridor was listed twice as a "closed" LUST facility.

Although not considered a recognized environmental condition, three wells and possibly septic systems are located within the Corridor. If the wells will no longer be used, the wells must be properly sealed by a licensed water well contractor in accordance with Minnesota Department of Health regulations or a maintenance permit must be obtained. If a septic system is encountered during future Corridor development activities, we recommend that the septic system be properly abandoned in accordance with local city, county, and state regulations.

Although not considered a recognized environmental condition, historically, buildings located within the Corridor were demolished. It is unknown if the demolition debris was buried on the specific properties or hauled away for disposal. The potential exists that buried materials are present within the Corridor that require management as solid or hazardous waste.

Braun Intertec ranked properties on or adjacent to the Corridor as to their potential to impact the Corridor using the ranking criteria provided by Mn/DOT as high, medium, low, or unlikely risk sites.

A majority of the Corridor consists of residential properties, vacant land, roads, and other commercial facilities that no not meet the conditions of a high, medium, or low risk site set forth in the ranking criteria provided by Mn/DOT. It is our opinion that these areas and facilities have the unlikely potential for contamination.

Low Environmental Risk sites were defined as properties with known or inferred small or very small quantities of chemicals used or stored on-site. *Low Environmental Risk* sites also show indications of good housekeeping practices. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the nine facilities located within the Corridor and one facility located adjacent to the Corridor listed on the RCRA-GEN database are considered a *Low Environmental Risk*.

Braun Intertec recommends that care be taken to educate the contractors and Mn/DOT construction managers to identify conditions at *Low Environmental Risk* properties that may indicate adverse environmental impact to the soil or groundwater within the construction area. These conditions may include stained soils, unusual odors or debris disposal (i.e., building material, pipes, tanks or drums). Braun Intertec recommends that a contingency plan be in place to allow quick response to minimize construction delays, if indication of potential adverse environmental impacts are observed.

Medium Environmental Risk properties included properties located a short distance (<1/8 mile) from the Corridor, which have had documented releases, as well as properties located immediately adjacent to the Corridor with only the potential for environmental impacts due to current or historical uses. The following facilities located within the Corridor were considered to be *Medium Environmental Risk* properties:

- SuperAmerica #4519, 1400 Crystal Lane.
- Charlie Wellens' Property, 2200 Strunks Road in Jackson Township. Septage from the Bonnevista Mobile Home Park had been spread repeatedly at the farm site.
- Minnesota Valley Gas, 1155 Highway 212 East; located within the Corridor (past land use at the facility).

- All Steel Products, 1165 Highway 212 East; located within the Corridor (past land use at the facility).

- Chaska Laundry Center located in a strip mall on the north side of Highway 212 west of the intersection of Audubon Road and Highway 212.

- An auto/truck service facility observed in a strip mall located on the north side of Highway 212 west of the intersection of Audubon Road and Highway 212.

- A Tires Plus facility observed south of the SuperAmerica gas station at the intersection of Crystal Lane and Audubon Road.

- The United Sugars facility observed near the western boundary of the Corridor, south of Stoughton Avenue.

Braun Intertec recommends additional environmental evaluation of *Medium Environmental Risk* sites on a case-by-case basis depending on the type of site historical activity and corridor construction details. The additional environmental evaluation of these sites may be limited to additional information source review, but also may include subsurface assessment.

High Environmental Risk properties included properties located within the Corridor or adjacent to the Corridor and either presented strong indications suggesting environmental impacts or were reported to have documented releases. The following facilities located within the Corridor were considered to be a *High Environmental Risk* property:

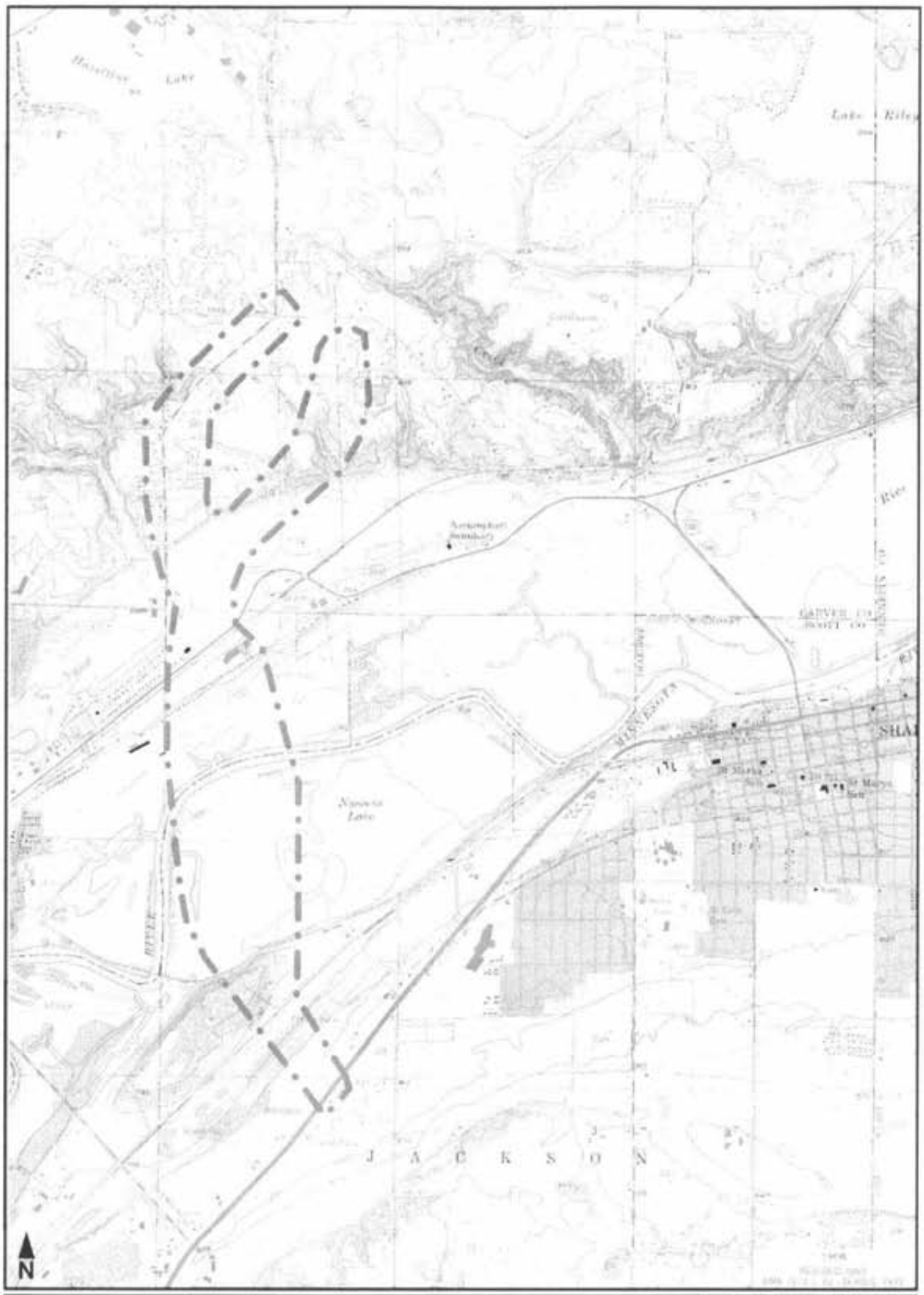
- Spuhl Anderson Machine Company, 1610 Parallel Street; listed on the State Site (MPCA-VIC) database.

- M.A. Gedney, 2100 Stoughton Avenue; listed twice as a "closed" LUST facility on the LUST database.

- Disturbed soil associated with an adjacent gravel pit, located between the railroad tracks on the southwestern portion of the Corridor.

- Based on aerial photographs, a lime pond associated with a sugar beet facility was located on the west-central portion of the Corridor along the Minnesota River.

Braun Intertec recommends conducting additional environmental assessment of the *High Environmental Risk* sites. The assessment should include additional information source review. Subsurface assessment of the *High Environmental Risk* sites may be required to evaluate suspected environmental impacts.



BRAUN INTERTEC

Site Location Map
Phase I Environmental Site Assessment
TH 41 E-1 Alternative
Scott and Carver Counties
Carver and Chaska, Minnesota

USGS TOPOGRAPHIC MAP		
Shakopee, MN		
DATE	10/19/05	
JOB NO.	BL-04-65681	
SCALE	1 : 24,000	FIGURE NO.
DRAWN BY	FER	1

Phase I Environmental Site Assessment

Proposed TH 41 E-2 Alternative
Scott and Carver Counties
Carver and Louisville Township, Minnesota

Prepared For

SRF Consulting Group, Inc.

Volume 1 of 2

Project BL-04-05681
February 2, 2006

Braun Intertec Corporation

Executive Summary

Braun Intertec Corporation performed a Phase I environmental site assessment of the proposed E-2 TH 41 Alternative located in Shakopee and Chaska in Scott and Carver Counties, Minnesota (Corridor) in general conformance with the scope and limitations of ASTM Practice E 1527-00.

The Corridor is located within Sections 3, 10, and 15, Township 115 North; Range 23 West and Sections 27 and 34; Township 116 North; Range 23 West in Shakopee and Chaska, Scott and Carver Counties, Minnesota. The northern end of the Corridor extends from the intersection of Pioneer Trail and Bluff Creek Drive in Chaska to the south beyond Highway 169 in Shakopee. Highway 212, Stoughton Avenue, Strunks Road, and Highway 169 cross the Corridor. This assessment included approximately 500 feet on either side of the approximately 3.5-mile-long Corridor.

At the time of this assessment, the Corridor consisted of approximately 3.5 miles. The Corridor traverses the Minnesota River with downtown Chaska to the southwest. The Nyssen's Lake Area of the Minnesota Valley State Recreation Area is located south of the Minnesota River within the central portion of the Corridor. Properties within the Corridor consisted of residential, commercial, and industrial. The surrounding area includes a mix of residential, commercial, and industrial properties.

This assessment has revealed no indications of recognized environmental conditions in connection with the Corridor, with the except for the following:

- According to the SCHED file review, septage from the Bonnevista Mobile Home Park had been spread repeatedly at the farm site of Charlie Wellens, 2200 Strunks Road in Jackson Township located within the Corridor.

- Two facilities (Minnesota Valley Gas, 1155 Highway 212 East and All Steel Products, 1165 Highway 212 East) were identified in the city directories as environmental concerns.

- Beginning on the 1957 aerial photograph and continuing the remaining aerial photographs, an area of disturbed soil that appears to be associated with an adjacent gravel pit was apparent between the railroad tracks on the southwestern portion of the Corridor.

- Aboveground storage tanks (ASTs) were observed at three parcels located within or adjacent to the Corridor. The parcels within the Corridor where the ASTs were observed included a small construction company located at 1910 Stoughton Avenue in Chaska and at the Wellens' farmstead at 2200 Strunks Road in Shakopee. The parcel located adjacent to the Corridor where ASTs were observed was Ron's Mechanical at 12010 Old Brick Yard Road in Shakopee.

- Based on aerial photographs, three wastewater treatment ponds associated with the Gedney Pickle facility were located near the east-central boundary of the Corridor, just north of the Minnesota River.

This assessment has revealed no indications of historical recognized environmental conditions in connection with the Corridor, except for the following:

- According to the FirstSearch report, a facility (M.A. Gedney) located adjacent to the Corridor was listed twice as a "closed" LUST facility.

Although not considered a recognized environmental condition, thirteen wells and possibly septic systems are located within the Corridor. If the wells will no longer be used, the wells must be properly sealed by a licensed water well contractor in accordance with Minnesota Department of Health regulations or a maintenance permit must be obtained. If a septic system is encountered during future Corridor development activities, we recommend that the septic system be properly abandoned in accordance with local city, county, and state regulations.

Although not considered a recognized environmental condition, historically, buildings located within the Corridor have been demolished. It is unknown if the demolition debris was buried on the specific properties or hauled away for disposal. The potential exists that buried materials are present within the Corridor that require management as solid or hazardous waste.

Braun Intertec ranked properties on or adjacent to the Corridor as to their potential to impact the Corridor using the ranking criteria provided by Mn/DOT as high, medium, low, or unlikely risk sites.

A majority of the Corridor consists of residential properties, vacant land, roads, and other commercial facilities that no not meet the conditions of a high, medium, or low risk site set forth in the ranking criteria provided by Mn/DOT. It is our opinion that these areas and facilities have the unlikely potential for contamination.

Low Environmental Risk sites were defined as properties with known or inferred small or very small quantities of chemicals used or stored on-site. *Low Environmental Risk* sites also show indications of good housekeeping practices. Based on the ranking criteria provided by Mn/DOT, it is our opinion that the three facilities located within the Corridor and two facilities located adjacent to the Corridor listed on the RCRA-GEN database are considered a *Low Environmental Risk*.

Braun Intertec recommends that care be taken to educate the contractors and Mn/DOT construction managers to identify conditions at *Low Environmental Risk* properties that may indicate adverse environmental impact to the soil or groundwater within the construction area. These conditions may include stained soils, unusual odors or debris disposal (i.e., building material, pipes, tanks or drums). Braun Intertec recommends that a contingency plan be in place to allow quick response to minimize construction delays, if indication of potential adverse environmental impacts is observed.

Medium Environmental Risk properties included properties located a short distance (<1/8 mile) from the Corridor, which have had documented releases, as well as properties located immediately adjacent to the Corridor with only the potential for environmental impacts due to current or historical uses. The following facilities located within the Corridor were considered to be *Medium Environmental Risk* properties:

- Minnesota Valley Gas, 1155 Highway 212 East; located within the Corridor (past land use at the facility).

- All Steel Products, 1165 Highway 212 East; located within the Corridor (past land use at the facility).

- Small construction company, 1910 Stoughton Avenue in Chaska; located within the Corridor (ASTs were observed during our reconnaissance).

- Charlie Wellens' farmstead, 2200 Strunks Road in Shakopee; located within the Corridor (ASTs were observed during our reconnaissance and, according to the SCHED, septage from the Bonnevista Mobile Home Park had been spread repeatedly at the farm site).

- Ron's Mechanical, 12010 Old Brick Yard Road in Shakopee; located adjacent to the Corridor (ASTs were observed during our reconnaissance).

Braun Intertec recommends additional environmental evaluation of *Medium Environmental Risk* sites on a case-by-case basis depending on the type of site historical activity and corridor construction details. The additional environmental evaluation of these sites may be limited to additional information source review, but also may include subsurface assessment.

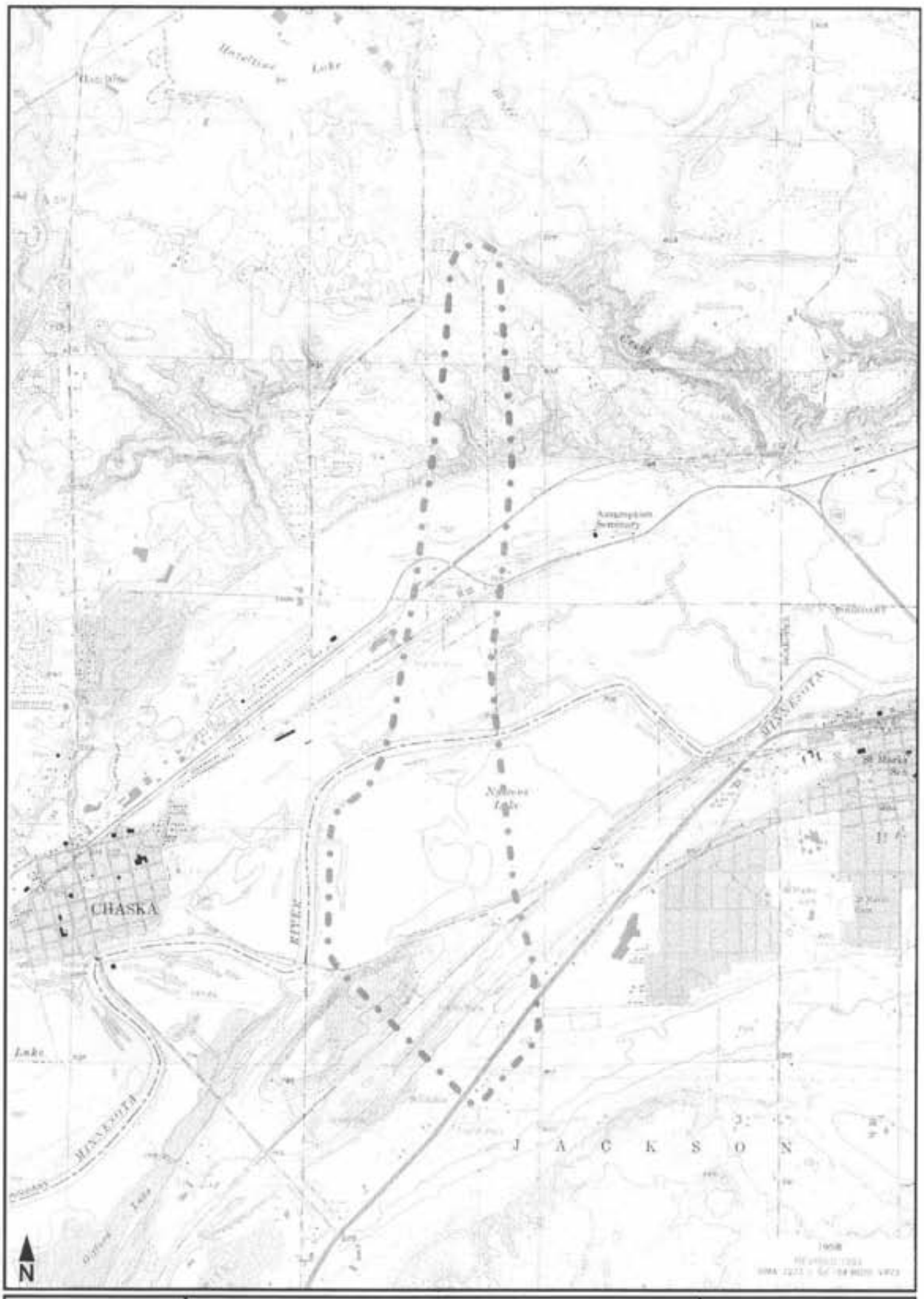
High Environmental Risk properties included properties located within the Corridor or adjacent to the Corridor and either presented strong indications suggesting environmental impacts or was reported to have documented releases. The following facilities located within the Corridor were considered to be a *High Environmental Risk* property:

- M.A. Gedney, 2100 Stoughton Avenue (two "closed" LUST incidents were reported at the facility).

- Based on aerial photographs, three wastewater treatment ponds associated with the Gedney Pickle facility were located near the east-central boundary of the Corridor, just north of the Minnesota River.

- Disturbed soil associated with an adjacent gravel pit, located between the railroad tracks on the southwestern portion of the Corridor.

Braun Intertec recommends conducting additional environmental assessment of the *High Environmental Risk* sites. The assessment should include additional information source review. Subsurface assessment of the *High Environmental Risk* sites may be required to evaluate suspected environmental impacts.



BRAUN INTERTEC

Site Location Map
Phase I Environmental Site Assessment
TH 41 E-2 Alternative
Scott and Carver Counties
Shakopee and Chaska, Minnesota

USGS TOPOGRAPHIC MAP		
Shakopee, MN		
DATE:	12/28/2005	
JOB NO:	BL-04-05681	
SCALE:	1 : 24,000	FIGURE NO:
DRAWN BY:	FER	1

BRAUN
INTERTEC

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
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Web: braunintertec.com

May 16, 2006

Project BL-04-05681.A

Ms. Barbara Walther
SRF Consulting Group, Inc.
One Carlson Parkway North, Suite 150
Minneapolis, MN 55447

Dear Ms. Walther:

Re: Addendum to the Phase I Environmental Site Assessment
Proposed TH 41 C-2 Alternative
Scott and Carver Counties
Jackson Township and Chaska, Minnesota

In February 2006, Braun Intertec Corporation (Braun Intertec) completed a Phase I environmental site assessment (Phase I ESA) of the referenced property (Corridor). The Phase I ESA had been prepared on behalf of and for use by SRF Consulting Group, Inc. (SRF). No other party has a right to rely on the contents of this Phase I ESA without the written authorization of Braun Intertec Corporation. Our report (dated February 2, 2006), which was titled *Phase I Environmental Site Assessment, Proposed TH 41 C-2 Alternative, Scott and Carver Counties, Jackson Township and Chaska, Minnesota* (Project BL-04-05681), describes the scope, methods and conclusions of our Phase I ESA. Since the time the Phase I ESA report was completed, SRF indicated that the proposed C-2 Corridor has expanded and an additional area not covered in the Phase I ESA was added. SRF authorized us to conduct a visual reconnaissance of the area not included in the original Corridor boundary (amended Corridor boundary) for the Phase I ESA. This letter summarizes our findings, amends, and should become a part of the Phase I ESA report.

Summary

According to Ms. Barbara Walther, SRF Consulting Group, Inc., the amended Corridor boundary was located on parcel number 6 and parcel 14 (parcel numbers assigned by SRF). In the Phase I ESA, it was our opinion that the occupant of parcel 6 (Lano Sand and Gravel) was considered a high environmental risk site set forth in the ranking criteria provided by Mn/DOT. We observed aboveground storage tanks near a shop for Lano Sand and Gravel located adjacent to and south of the amended Corridor boundary. The area of parcel 6 that consisted of the amended Corridor boundary was located on the western portion of the parcel west of the gravel pit through a wooded area that consisted of a ravine. At the time of our visual reconnaissance of parcel 6, old machinery and farming implements were observed along the tree line on the western portion of the parcel. A ravine, approximately 75 feet deep, was observed within wooded area. No debris was observed in the ravine within the amended Corridor boundary.

The area of parcel 14 that consisted of the amended Corridor boundary was located on the northern portion of the parcel through an undeveloped area. At the time of our visual reconnaissance of the amended Corridor boundary on parcel 14, debris was observed along a tree line near the eastern boundary. Debris that was observed included old farming implements and equipment, an old car, furniture cushions, rubber intertubes, tires, wood posts, and wood boards. The debris on the amended Corridor boundary of parcel 6 and parcel 14 that was visually observed appeared to be surficial in nature and not considered recognized environmental conditions.

General

If you have questions concerning the contents of this letter or the Phase I ESA report, please call Kevin Hoffman at 952.995.2458 or Mike Bratrud at 952.995.2430.

Sincerely,

Kevin J. Hoffman
Project Manager

Michael L. Bratrud, PG
Principal Scientist

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

EXECUTIVE SUMMARY

PHASE 1 CHARACTERIZATION SEMINARY FEN WETLAND COMPLEX

PREPARED FOR
SRF CONSULTING GROUP, INC.

MARCH 2006

PREPARED BY
PETERSON ENVIRONMENTAL CONSULTING, INC.

SRF NO: 0024590

1 Executive Summary

Peterson Environmental Consulting, Inc. (PEC) was retained by the SRF Consulting Group, Inc. (SRF) to perform a Phase 1 characterization of the Seminary Calcareous Fen in support of a Tier 1 EIS being prepared to evaluate alternatives proposed for a new river crossing at Trunk Highway 41 (TH 41). For the purposes of the Phase 1 characterization, the "Seminary Fen Wetland Complex" (SFWC), which consists of two units of extensive peatland spread across four sections of the Minnesota River Valley in Carver County, was distinguished from the five calcareous fen components (CFC) of the SFWC (CFC-SFWC) as mapped under the Minnesota Land Cover Classification System (MLCCS). The study focused on the MLCCS calcareous fen components but also addressed characteristics of the entire SFWC.

This Phase 1 characterization of the Seminary Calcareous Fen:

- Provides essential background information on calcareous fen regulation in Minnesota and on the hydrology, soil, water chemistry, and vegetation characteristics used to identify calcareous fens in Minnesota,
- Discusses impacts known to adversely affect calcareous fens, focusing on those impacts associated with bridge construction,
- Places the Seminary Fen in a local and regional hydrogeological context necessary to understand calcareous fen function and characteristics,
- Assesses historic land use impacts to the Seminary Fen,
- Quantifies hydrology, soils, water chemistry, and vegetation calcareous fen criteria in the mapped calcareous fen components of the SFWC, and
- Provides recommendations for a Phase 2 assessment of potential impacts of Alternative Alignments E-1A and E-2, which will include discussion of potential impacts of TH 41 Alternative Alignments E-1A and E-2 to the calcareous fen components of the SFWC and to the SFWC itself.

Calcareous Fen Regulation and Definition

Calcareous fens are peat-accumulating wetlands dominated by distinct groundwater inflows and having specific chemical characteristics. Discharging groundwater is characterized as circum-neutral to alkaline with high concentrations of calcium and low dissolved oxygen content. The chemistry provides environments for specific and often rare hydrophytic plants (MR 8420.1020). Calcareous fens are protected and potential impacts regulated under Minnesota Statutes and Rules 103G.223, 8420.1010 to 8420.1070 and MPCA Rule 7050. Calcareous fens are formally defined and delineated based on the presence of specific hydrology, water chemistry, soils, and vegetation indicator criteria (Berglund 1995; revisions proposed in Leete et al., 2005). The primary differences between the 1995 and proposed 2005 criteria relate to vegetation. Both sets of vegetation criteria were used in this study. The "Seminary Fen" is formally listed as a calcareous fen under Minnesota Rule 7050.0180 Sub. 6b, B Carver County, Seminary Fen. It is currently listed as the only calcareous fen in Carver County.

Hydrogeologic Setting of the SFWC

The SFWC exists as a large North Unit adjacent to the north bluff of the Minnesota River and a South Unit that lies south of existing TH 212. The two units are separated by an upland terrace consisting of coarse textured glacial outwash. Several bluff top wetlands exist north of the SFWC at elevations approximately 200 to300 feet higher than the SFWC that could provide the hydraulic gradient driving groundwater discharge to the areas on the valley floor that are adjacent to the bluff. CFC Areas 1 and 2 are associated with groundwater discharge focused at the base of the bluff. Groundwater discharge to CFC Areas 1 and 2 can be through quaternary sediments (e.g. sand stringers in the till) and/or discharge from bedrock subcrops near the bottom of the bluff. During our investigation of CFC Area 2 a distinctive plant community outside of the MLCCS-designated fen was observed that would meet all calcareous fen criteria. This zone extended from the north-central boundary of the MLCCS unit north to near the base of the bluff. This area was added to CFC Area 2 based on the presence of all of the calcareous fen criteria, and is indicated in the figures that apply to CFC Area 2 in this report.

CFC Areas 3, 4, and 5 in the South Unit of the SFWC are approximately 15-to-20 feet lower in elevation than the southern portions of the North Unit of the SFWC. The presence of extensive spring heads and spring runs associated with the toeslope positions of the terrace and their distance from the base of the Minnesota River bluff suggest that the source of the discharging groundwater originates as recharge from losing reaches of the portion of Assumption Creek that flows on the terrace and groundwater recharge occurring at the northern edge of the terrace feature. The location and elevation of the discharge areas suggests a complex hydrology where groundwater discharges at and near the bottom of the bluff, becomes channeled surface flow in spring runs, diffuse surface flows and subsurface throughflow across and within the sloping peat aprons in the North Unit SFWC, recharges the groundwater system underlying the coarse textured terrace feature, and then discharges again as spring heads and spring runs in the Southern Unit of the SFWC.

The postglacial hydrogeology of the SFWC is complicated. Diffuse and focused groundwater discharge has resulted in paludification (peat accretion), and the formation of a large peatland that has a gradual slope to the south from the toe-of-slope positions at the bluff edge to the terrace feature that separates the North Unit of the SFWC from the South Unit of the SFWC. Similarly, peatlands to the south of the terrace feature also present a gradual slope from the south of the terrace feature to the active floodplain of the Minnesota River.

It is possible that a shallow post-glacial lake existed in the area for a period following glaciation. Natural drainage of this shallow lake resulting from downcutting of Assumption Creek providing an outlet to the east would have initiated the paludification process over much of the area. The result is a complex stratigraphy of thin-to-thick peat deposits accreting over fine-to-coarse textured calcareous marl, fine textured lacustrine sediment in low areas of the shallow lake, and coarse textured outwash sediments in elevated areas of the undulating lake bottom as indicated by an analysis of peat depths in the CFC-SFWC. The presence of a pre-glacial shallow lake characterized by the general presence of calcareous marl deposits and calcareous peat would result in virtually the entire wetland system being saturated with respect to calcium carbonate. Groundwater discharge would be more intense nearer the toe-of-slope positions at the base of the bluff and the terrace feature, and in areas where peat and lacustrine deposits

are thin to the underlying sand. Groundwater discharge would be less intense in areas of thick peat over fine-textured lacustrine deposits. The distribution of the CFC-SFWC as highly calcareous fen features embedded in a surrounding carbonated wetland system could explain many of the calcareous fen features found in the SFWC.

Historic Land Use Impacts

Historic impacts to the SFWC were examined in aerial photos that date back to 1937. Because of their size and location in and near urbanizing areas, Minnesota Valley wetlands are particularly subject to various disturbances. While the CFC-SFWC are considered to be relatively pristine, the immediate area of the wetland and the adjacent bluffs have been impacted by fragmentation, municipal well withdrawals, bluff top urbanization and stormwater management, ditch and tile drainage, hydrologic alteration and surface water diversions, potential peat and/or mining of the underlying sediments, and limited industrial development. The Seminary Fen may, in fact, be maintained in the face of existing and historic disturbance by the sheer size of the wetland complex within which it is embedded, combined with the calcareous nature of the underlying sediments. Drainage impacts especially have affected the hydrology and plant community associated with a large, historic, calcareous-fen peat mound n CFC Area 1.

Groundwater Hydrology

The hydrology of the CFC SFWC was assessed through an interpretation of surface water features characteristic of groundwater discharge combined with an assessment of hydrologic gradients in nested water table wells and piezometers established in representative areas of the CFC SFWC. Based on our observations and well nest data, virtually all of the SFWC both within and outside of the CFC SFWC would meet the hydrology criterion for calcareous fens that requires evidence of stable, upward groundwater flow and the presence of peat soils (Histosols) or mineral soils with peat surfaces. Small to substantial upward groundwater flow was observed in all areas examined. However, the highest upward gradients (approximately 4 feet of difference between the water table well and the nested piezometer) were observed associated with a component of high-quality calcareous fen in the northern part of CFC Area 1 (Well Nest 1A). Other well nests exhibited upward gradients to lesser degrees. A well nest installed in the terrace portion of Assumption Creek exhibited strong downward gradient, indicating the losing nature of Assumption Creek in the terrace reach and confirming the hypothesis that the terrace feature is the source of water discharging to CFC Areas 3, 4, and 5 that are south of the terrace and TH 212.

Field observations and interpretations of hydrographs in nested water table well and piezometers provide a general working hypothesis of groundwater flow in and around the SFWC that explains many of the important hydrologic features of the area. Salient features of the SFWC groundwater-flow model include the following:

1. Groundwater recharge occurs on bluff-top wetlands and uplands north of the bluff escarpment. Head gradients are large and can drive downward groundwater movement through unconsolidated glacial sediment as well as the underlying bedrock. Recharge could also occur in distant areas to the north of the SFWC. The SFWC lies at the mouth of a buried pre-glacial bedrock valley that extends north under both lakes Waconia and Minnetonka. Exact groundwater recharge areas and locations are not

known at this time, and will be examined under a Phase 2 investigation of potential impacts of bridge construction.

2. Groundwater discharge is primarily associated with spring heads and diffuse seepage areas at toe-of-slope positions at the base of the bluff and associated alluvial fans. The majority of the spring heads and seepage areas at toe-of-slope position are the result of high hydraulic gradients at these locations. Hydraulic gradients would decrease further south into the relatively flat, sloping peatland of the North Unit SFWC.
3. Localized zones of groundwater discharge are also associated with areas further from the base of the bluff that are shallow to sand or that do not contain fine textured substrates. The sandy substrate under the peat likely has undulating relief. It is also possible that fine-textured lacustrine sediments overlie areas in the sandy outwash. Peat in the area of the SFWC varies in thickness and substrate type. Seepage areas are more likely where peat is thin and fine-textured substrates are absent.
4. Groundwater throughflow dominates in the middle portions of the SFWC that are sloping peatlands with a gradient to the south. However, at any given point upward gradients are also observed. Groundwater flow occurs in three dimensions. In sloping peatlands with topographic gradients to the south, both lateral (throughflow) and upward (discharge) components to the flow directions were observed.
5. Groundwater recharge likely occurs at the northern edge of the terrace feature and in losing reaches of Assumption Creek. Assumption Creek has very complex hydrology and has been substantially affected by historic diversions and channelization. In its current configuration Assumption Creek headwaters lie within the north unit of the SFWC, where it has two main tributaries originating to the west and to the east of CFC Area 2, respectively. North of the railroad embankment the tributaries were observed to be perennial throughout the field season. However, once the tributaries join and flow under the railroad embankment, the streams becomes intermittent and loses water to the groundwater system. The data and field observations suggest that most of the water recharged on and flowing through the terrace feature resurfaces as groundwater seeps and spring heads at the toe-of-slope positions at the terraces southern edge, including CFC Areas 3, 4, and 5.

Water Chemistry

Our hypothesis of general calcareous groundwater discharge to the entire SFWC is confirmed by the chemical analyses of groundwater and surface water collected from water table wells, piezometers, spring heads, and spring runs. Virtually all surface water and groundwater samples satisfy the calcareous fen chemical criteria, and all of the SFWC water samples are saturated with respect to solid calcite. All samples are calcium-magnesium-bicarbonate dominated waters with neutral to alkaline pH values that are uniformly above pH 6.7. Total dissolved solids content is high ranging from 200 to 1200 mg/L, with the majority of the samples ranging from 500 to 1000 mg/L (Figure 4.16).

The data suggest that the discharging groundwater and surface flows originating as seeps, spring heads, and spring runs are saturated with respect to calcium carbonate, and remain saturated with respect to calcium carbonate as the water flows south through the system to the Minnesota River. As a result, the groundwater and surface water flows within the SFWC fulfill the water chemistry criteria for calcareous fens, and facilitate the presence of diverse, calciphile-dominated plant communities near points of focused groundwater discharge, and thinly distributed populations of calciphile plant communities in areas dominated by weak discharge and throughflow of calcareous groundwater.

A comparison of water chemistry between well nests indicates that the high-quality sloping fen adjacent to and south of he railroad embankment represented by Well Nest 1A had significantly different groundwater discharge chemistry when compared to all other sampling locations. The water collected from spring heads, spring runs, water table wells and piezometers associated with Well Nest 1A was higher in dissolved solids and had far greater concentrations of chloride, suggesting that the aquifer discharging to this location is different than the aquifers feeding the other CFC SFWC. The nature of this aquifer is unknown at this time, but may be the Franconia shale. Surface water and groundwater chemistry in the other areas examined were similar to each other in chemical constituents and carbonate chemistry and likely represent groundwater discharge from a different aquifer than that which discharges to the Well Nest 1A location.

Soils

The calcareous fen soil criteria were examined by describing representative soils within the CFC-SFWC and performing a loss-on-ignition laboratory analysis of the distribution of organic matter, calcium carbonate, and mineral material in samples collected incrementally from these representative soil profiles.

All of the soils collected within the CFC SFWC as well as all wetland soil profiles examined during walkover assessments of the SFWC would meet the calcareous fen soil criteria. All of the soils are histosols or have histic epipedons. Several profiles contain large quantities of marl (limnic sediments dominated by precipitated calcium carbonate) that represent calcite precipitation in spring heads and spring runs, and calcareous marl likely deposited during shallow-lake phases that may have occupied the area of the SFWC during early post-glaciation periods.

The majority of the SFWC soils were incorrectly mapped into the Blue Earth soil series (fine-silty, mixed, superactive, calcareous mesic Mollic Fluvaquents). Most of the soils examined would fall into the Houghton and Edwards soils series (euic, mesic Typic Haplosaprists and marly, euic, mesic Limnic Haplosaprists, respectively). Strongly expressed areas of calcareous fen consisting of dense and diverse populations of calciphiles were associated with Edwards soils that have strata of virtually pure calcium carbonate marl deposits interbedded with organic layers. Houghton soils consist of thick peat deposits that are neutral in pH and can have substantial amounts of calcium carbonate disseminated within the peat matrix, but lack marl/organic layer stratification. Calciphiles were observed in areas of Houghton soils, but were thinly distributed amongst the wetland plant communities.

A dynamic groundwater discharge/surface flow hydrologic system is indicated in areas with stratified marl/organic deposits (Edwards soils) that would be characterized by successive development and abandonment of spring heads, spring runs and flarks (broad, terrace-like surface flow features commonly associated with the flanks of sloping and mound-type calcareous fens). The Edwards soils associated with the high-quality calcareous fen plant communities in CFC Area 1 especially exhibit peat surfaces combined with complex stratification of marl and organic sediments in the sub-soil. An examination of the soils along a raised peat mound that is a significant physical feature of the entire SFWC indicated that the mound was historically high-quality calcareous fen that has been adversely affected by drainage. Edwards soils were observed along the flanks, with Houghton soils occupying the apex of the mound. The Houghton soils exhibited carbonate leaching in the soil surface that was likely the result of drainage

observed as drain tile discharge on the flanks of the mound. Surface water well hydrographs (Well Nest 1B) indicate water-table fluctuation suggestive of tile drainage.

With two exceptions, soils present in CFC Areas 2, 3, 4, and 5 were Houghton soils that are thought to be more representative of mixed throughflow and discharge with calcareous groundwater. Some profiles contained substantial amounts of calcium carbonate disseminated within the peat matrix, but generally lacked the stratification associated with the high-quality calcareous fen areas. One profile in CFC Area 3 and one profile in CFC Area 5 exhibited marl/organic horizon stratification in the subsoil. However, the presence of thick overlying peat deposits suggests that the hydrology that resulted in the stratification is no longer active.

Moreover, soils in CFC Areas 4 and 5 exhibited alluvial strata and high mineral content in the peat that represent periodic inundation by Minnesota River floodwater. Both areas are well within the 100-year floodplain of the Minnesota River. Periodic flooding retards or prevents calcareous fen development and maintenance by disturbance, sediment burial, and the introduction of elevated nutrient levels in the sediments that favor plant species adapted to disturbance and high nutrient levels. These areas were dominated by rank, high-stature vegetation and lacked sufficient quantities of calciphiles to met the calcareous fen vegetation criteria. These areas, while being high quality fen wetlands, are not calcareous fens and were likely miss-mapped, with mapping based on evidence of groundwater discharge and the presence of peat soils.

Vegetation

Descriptions of vegetation were prepared from qualitative and quantitative surveys of the SFWC. Several rare and protected plant species, and species with a high affinity for calcareous fens have been previously documented. During the present study, the following species were observed: *Carex sterilis*, *Cladium mariscoides*, *Cypripedium candidum*, *Eleocharis rostellata*, *Scleria verticillata*, and *Triglochin palustris*.

Numerous locations of calcareous fen were found in Area 1. That area supports a diversity of different plant communities, many of which represent the variation possible in calcareous fen vegetation. Notably, short sedge calcareous fen communities on tufa (thin to thick deposits of calcium carbonate precipitated at the soil surface) and tall sedge calcareous fen communities on peat are both significantly present. Despite the presence of calcareous fen plant communities, the area has suffered extensive ecological disturbance. Without proper management, the unique fen habitats and associated species may be further degraded or lost. However, this disturbance presents many opportunities for restoration of calcareous fen habitats. Area 1 satisfied 1995 and proposed 2005 vegetation criteria using vascular plants and bryophytes. Invasive species such as *Phalaris arundinacea*, *Phragmites australis*, *Rhamnus cathartica*, and *Rhamnus frangula* all pose biotic threats to the fen communities. Erosion and past drainage post abiotic threats.

Area 2 satisfied calcareous fen criteria for both vascular plants and bryophytes. This area, however, does not support the diversity of calcareous fen plant species or communities as seen in Area 1. Tall sedge calcareous fen communities are found that intergrade into other wetland communities such as emergent marsh, shrub carr, and wet meadow. *Phragmites australis* and unchecked shrub growth poses an ecological threat in this area.

Area 3 is similar to Area 2 in satisfying vascular plant criteria for calcareous fens and supporting tall sedge fen communities. Short sedge fen communities are lacking as with Area 2. The area failed to meet the proposed bryophyte criteria for calcareous fens. Invasive species, shrub growth and anthropogenic disturbance (in the form of a radio tower and associate facilities) pose ongoing threats to the integrity of the plant communities.

Areas 4 and 5 failed to meet vascular plant criteria for calcareous fens. The plant communities resembled riparian forest and emergent marsh ecosystems more than calcareous fens. The sites are apparently subject to periodic flooding from the Minnesota River, and deposition of sediments and nutrients may prevent development of calcareous fen characteristics. Areas 4 and 5, in combination, did meet the proposed bryophyte criterion for calcareous fens, in contrast to the vascular plant results.

Potential Impacts of TH 41 Alternative Alignments E-1A and E-2

Both alternative alignments E-1A and E-2 are located to the west of the SFWC CFC Area 1, which is hydrologically separated from the alternatives by the railroad embankment. Because of the hydrologic separation produced by the railroad embankment, proximity of the calcareous fen to the bluff base that would be the focus of groundwater discharge, and the distance from both of the alternative alignments, it is our opinion that Phase 1 information indicates that it is unlikely that either alternative would have a substantial impact on CFC Area 1.

However, there is the potential for substantial direct impacts to CFC Area 2, and potential indirect impacts to CFC Areas 3, 4, and 5. CFC Area 2 is within 100 feet of alignment E-2. Alternative alignment E-1A is located within the western portion of the north unit of the SFWC and follows the bluff line where groundwater discharge results in spring heads and spring runs that flow to a confluence with the westerly flowing tributary of Assumption Creek to the north of the railroad embankment. Surface flows join to form Assumption Creek that subsequently flows across the terrace feature. The Assumption Creek piezometer data indicate that the losing portion of Assumption Creek provides much of the groundwater feeding CFC Area 3, 4, and 5.

Recommendations for Phase 2 Assessment of Potential Impacts

The Phase 2 assessment should concentrate on the overall regional hydrology of the SFWC to investigate potential impacts on all of the areas that meet the calcareous fen criteria in Leete et al. (2005). However, the Phase 1 assessment suggests that CFC Area 1 will not likely be affected by either alternative alignment E-1A or E-2.

1. A more detailed review of the western portion of the north unit SFWC needs to be performed to ensure that no outliers of calcareous fen exist in the area.

2. A detailed plant community inventory of ecotopes within a specific distance of the E-1A and E-2 alignments should be performed under Phase 2 (e.g. 500 feet either side of the applicable alternative).

3. Impacts need to be assessed in the context of specific construction procedures and proposed features of the alignments, including span width, length, construction methods, timing for specific procedures and total length of time expected for completion, location of staging areas, fill pads, pier placement and dewatering requirements, and erosion control methods.

4. An assessment of the location and environmental characteristics of the areas directly impacted that would need to be mitigated should be performed.

5. An assessment of temporary impacts will need to be evaluated in the context of the proposed construction methods.

6. The direct, long-term impacts of shading and winter salting need to be determined for post-construction road operation, especially on the portions of CFC Area 2 that are adjacent to proposed alignment E-2.

7. The potential for salt movement and impacts to plant communities should be assessed in a hydrogeologic context for the entire SFWC. Particular attention should be paid to potential effects on calciphile communities by road salt-contaminated groundwater that resurfaces at the numerous spring heads in Areas 3-5.

The direction the Phase 2 assessment takes will be dependent upon the availability of appropriate literature that can be applied to the specific setting of the SFWC and the proposed alternative alignments. The Phase 2 assessment should evaluate potential impacts based on the existing literature refined with additional field work applicable to the specific alignment alternative.

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

TECHNICAL MEMORANDUM

FOR

WATER RESOURCES

AUGUST 21, 2006

PREPARED BY
SRF CONSULTING GROUP, INC.

SRF NO: 0024590

SRF Comm. No. 0024590

MEMORANDUM

TO: Nancy Frick, Senior Associate
SRF Consulting Group, Inc.

FROM: Ryan Jones, P.E., Senior Engineer
Eric Roerish, P.E., Senior Engineer

DATE: August 21, 2006

SUBJECT: TH 41 CROSSING OVER THE MINNESOTA RIVER AT CHASKA, MN – WATER RESOURCES

Purpose/Background

The Minnesota Department of Transportation (Mn/DOT) is investigating alternatives to replace the existing Trunk Highway (TH) 41 Minnesota River crossing at Chaska. The new TH 41 Over the Minnesota River would connect TH 169 in Scott County and proposed TH 212 in Carver County, and bypass downtown Chaska.

Six alternative alignments are currently being considered by Mn/DOT. SRF Consulting Group, Inc. (SRF) has conducted a preliminary analysis of the effects of the six alternatives on water resources. Three of the six alternatives contain both high and low profiles. Because the drainage patterns differ between the high and low option, analysis was required for both. This memorandum summarizes the approach and results of the water resources analysis, including:

- stormwater treatment volume requirements;
- viable sites, adverse site characteristics, and additional right of way required for stormwater treatment ponds;
- impacts to existing development due to pond placement; and
- impacts to the Minnesota River floodplain due to pond placement.

Water Quality

The main treatment area is designed to provide an area for settling of the fine to medium-size particles. The water quality volume is defined in terms of the effectiveness of the treatment on

an average annual basis. The effectiveness of particle removal is largely dependent on residence time in the pond. For this reason placement of treatment ponds in the floodway was avoided to the greatest extent possible, as the effectiveness of the ponds treatment is reduced as soon as inundation occurs.

Water Quality Analysis Methodology

A standardized water quality investigation technique was used to review each of the alignment alternatives. The following inputs and considerations were employed for pond sizing and site location.

Pond Locations

Pond locations and associated drainage areas were delineated for each alternative using available alignment profiles and project area topography. Gravitational flow was assumed for routing to all pond locations. In general, stormwater treatment ponds were placed at profile low points, up gradient of the Minnesota River bridge abutments, and at the edge of the Minnesota River's 100-year floodway. Ponds were placed within proposed rights-of-way where possible. Aerial photos and topographic survey information were used to determine the viability of pond locations outside proposed rights-of-way. Efforts were made to avoid placing ponds in existing developed areas; near wetlands, wooded areas, or steep grades; and in the floodway. Each of the alternatives included a low point on the Minnesota River Bridge, making it necessary to place at minimum one pond in the floodway. It was assumed for all pond locations that pond discharges could be routed to a suitable conveyance system.

Drainage Areas

Drainage areas and impervious fractions were computed by applying one of five typical cross-sections to each alignment. The five typical sections used were:

- Mainline 204 ft wide, 40% impervious
- Bridge 95 ft wide, 100% impervious
- Ramp 105 ft wide, 28% impervious
- Two-lane Ramp 117 ft wide, 35% impervious
- Auxiliary Lane 16 ft wide, 100% impervious

In computing drainage areas, it was assumed that water from both sides of the road would be routed to a single pond. Table 1 summarizes the treatment areas for each alternative.

Pond Sizing

There are two components to ponds sizing. The first is the dead pool, or permanent storage, sizing. The NURP guidelines were utilized for this project with a 2.5-inch rainfall event for the dead pool sizing. A 10-foot bench is included above the normal water level (NWL). Ponds are assumed to be 6' deep and have 3:1 sideslopes below the NWL. The NWL is assumed to be at existing ground level.

The second step in pond sizing involves rate control and the required active storage to achieve the desire discharge rates. The SRF active pool sizing worksheet was utilized for this task. The worksheet is intended to provide approximate active storage requirements needed to limit discharges from a site. It performs the following calculations:

a. Rational Method Coefficients. The total volume of runoff is equivalent to the drainage area, runoff coefficient, and design rainfall amount

b. Discharge Volumes. The total discharge from the site is equal to the allowable discharge rate determined from existing conditions for the design storm duration.

c. Required Storage Volume. The required storage volume is the difference between the runoff and discharge volumes. Note it looks at different storm durations to determine the worst case.

d. Time to Empty. Time to empty takes the required volume and divides it by the allowable discharge rate.

The proposed drainage area that was utilized to calculate the dead storage was also used to determine the existing conditions runoff rate. The proposed active storage needed to be designed so that the proposed runoff rates do not exceed the existing rates. By using the proposed drainage areas we assumed that the existing drainage patterns are the same as the proposed. Although this in not always a correct assumption, it will ensure that the overall proposed project discharge rates do not exceed the existing conditions.

The active pool storage is graded in at a 4:1 with a 10-foot width at the top of the berm, and is graded back to existing ground elevation at a 4:1 grade. An additional 1 foot of freeboard is also included in the pond area. On average, the upland ponds have 4 feet of bounce above the NWL, and the floodplain ponds have 5 feet of bounce above the NWL.

Water Quality Analysis Results

Results of the water quality analysis are summarized in the attached tables. Table 1 summarizes treatment areas and required pond treatment volumes for each alignment and profile. Table 2 lists pond locations as compared to proposed rights-of-way, and potential impacts for ponds located outside the right of way.

Alternative W-2

Alternative W-2, shown in Figure 1, is located in the western portion of the study area, northeast of the City of Carver. This alternative has a roadway alignment with a northwest-southeast orientation that would run between TH 169 approximately one mile southwest of existing TH 41, and TH 212 at the interchange with existing TH 212. This alignment corridor is the most undeveloped of any of the alternatives.

Nine potential pond treatment locations were identified for this alternative, of which four are situated within the right of way. As listed in Table 2, the five ponds located outside of the right

of way could be situated to avoid impacts to existing development, wetlands, and forested areas. One pond, with an approximate treatment volume of 3.5 ac-ft, would need to be located in the floodplain near the bridge sag point. This pond would be located inside the Minnesota Valley National Wildlife Refuge.

Alternative C-2

Alternative C-2, shown in Figure 2, is located in the central portion of the study area, southwest of downtown Chaska. This alternative has a roadway alignment with a northwest-southeast orientation that would run between TH 169 at existing TH 41, and TH 212 at the interchange with Existing TH 212. The alignment corridor generally avoids existing housing developments. The proposed interchange at TH 169 runs through an existing commercial area.

Twelve potential pond treatment locations were identified for this alternative, of which five are situated within the right of way. Of the seven ponds located outside the right of way, two would impact adjacent residential development. Because the TH 41 Bridge sag point for this alternative is located immediately above the Minnesota River, three stormwater treatment ponds would be required in the floodplain in order to minimize the amount of runoff collecting over the river. The approximate total treatment volume in the floodplain would be 4.4 ac-ft.

Alternative C-2A

Alternative C-2A, shown in Figure 3, is located in the central portion of the study area, southwest of downtown Chaska. This alternative has a roadway alignment with a northwest-southeast orientation that would run between TH 169 at existing TH 41, and new TH 212 at CSAH 10. The alignment corridor avoids existing housing developments, but would run through an existing commercial area at the proposed TH 169 interchange.

Eleven potential pond treatment locations were identified for this alternative, of which four are situated within the right of way. None of the ponds outside of the right of way would likely impact existing development. One pond near the TH 212 interchange would be located in a wetland area, due to the location of a ramp low point. One pond, with an approximate treatment volume of 4.1 ac-ft, would be located in the floodplain. The floodplain pond is required near the bridge sag point near Chaska Lake, inside the Minnesota Valley national Wildlife Refuge.

Alternative E-1

Alternative E-1 is located in the eastern portion of the study area, northeast of downtown Chaska. This alternative has a roadway alignment with a north-south orientation that would run between TH 169 at CSAH 69, and new TH 212 at CSAH 17. The alignment corridor runs through existing developed areas along CSAH 17, north of the Minnesota River.

Two sub-alternatives are being considered for the proposed alignment: E-1 High and E-1 Low, in which ramps from TH 41 travel over or under new TH 212, respectively.

E-1 High

As shown in Figure 4, eight potential pond treatment locations were identified for this sub-alternative, of which one is situated within the right of way. One pond located outside of the right of way (Pond E1H-6) would likely impact an existing residential property. Pond E1H-7, which treats runoff from an area between the TH 212 interchange and the northern bridge abutment, was placed adjacent to the bridge beyond the abutment. It was assumed that the relatively shallow grade running down the bluff along CSAH 17 would allow runoff to flow to the pond in ditches or storm sewer. One pond, with an approximate treatment volume of 5.0 ac-ft, would be located in the floodplain.

E-1 Low

Figure 5 shows the eight potential pond treatment locations that were identified for this sub-alternative, of which three are situated within the right of way. None of the ponds outside of the right of way would likely impact existing development. Pond E1L-7 was placed in a manner similar to E1H-7, with runoff routed along existing CSAH 17 to a location adjacent to the bridge. One pond, with an approximate treatment volume of 5.0 ac-ft, would be located in the floodplain.

Alternative E-1 (Ponds E1H-7 and E1L-7) are placed in an undeveloped area alongside the bridge, several hundred feet south of the abutment. The alignment corridor for E-1 has a more gradual slope, and it was assumed that stormwater could be routed to this location through ditches or culverts.

<u>Alternative E-1A</u>

Alternative E-1A is located in the eastern portion of the study area, northeast of downtown Chaska. This alternative has a roadway alignment with a north-south orientation that would run between TH 169 at CSAH 69, and new TH 212 east of CSAH 17. The alignment corridor runs through existing developed areas between the Minnesota River and the new TH 212 interchange, veering east from CSAH 17 to avoid existing residential developments.
Two sub-alternatives are being considered for the proposed alignment: E-1A High and E-1A Low, in which ramps from TH 41 travel over or under new TH 212, respectively.

E-1A High

Figure 6 shows the ten potential pond treatment locations that were identified for this sub-alternative, of which one is situated within the right of way. One pond located outside of the right of way would likely impact an existing residential property. One pond, with an approximate treatment volume of 3.9 ac-ft, would be located in the floodplain. The ponds near the north abutment would be located in an adjacent existing residential area, prior to the steep bluff that leads to the river valley.

E-1A Low

Figure 7 shows the ten potential pond treatment locations that were identified for this sub-alternative, of which two are situated within the right of way. One pond located outside of the right of way would likely impact an existing residential property. One pond, with an approximate treatment volume of 3.9 ac-ft, would be located in the floodplain. The ponds near the north abutment would be located in an adjacent existing residential area, prior to the steep bluff that leads to the river valley.

Alternative E-2

Alternative E-2 is located in the eastern portion of the study area, northeast of downtown Chaska. This alternative has a roadway alignment with a north-south orientation that would run between TH 169 at CSAH 69, and TH 212 east of CSAH 17. The alignment corridor runs through existing developed areas at the proposed TH 169 interchange, and immediately north of the Minnesota River. The alignment veers east to avoid residential developments along CSAH 17.

Two sub-alternatives are being considered for the roadway alignment: E-2 High and E-2 Low, in which ramps from TH 41 travel over or under new TH 212, respectively.

E-2 High

Figure 8 shows the eleven potential pond treatment locations that were identified for this sub-alternative, of which two are situated within the right of way. One pond located outside of the right of way would likely impact an existing residential property. One pond, with an approximate treatment volume of 4.4 ac-ft, would be located in the floodplain. The ponds near the north abutment would be located in an adjacent existing residential area, prior to the steep bluff that leads to the river valley.

E-2 Low

As shown in Figure 9, eleven potential pond treatment locations were identified for this sub-alternative, of which three are situated within the right of way. Three ponds located outside of the right of way would likely impact existing residential properties. One pond, with an approximate treatment volume of 4.4 ac-ft, would be located in the floodplain. The ponds near the north abutment would be located in an adjacent existing residential area, prior to the steep bluff that leads to the river valley.

Water Quality Analysis Summary

All of the alternatives will require a stormwater treatment pond in the Minnesota River floodplain, due to the sag point on the proposed bridge. The preliminary required pond treatment volumes in the floodplain range from 3.5 ac-ft for Alternative W-2, to 5.0 ac-ft for Alternative E-1. Floodplain treatment volume could be reduced for Alternatives C-2A, E-1,

E-1A and E-2 by adding a pond between the southern TH 41 bridge abutment and the southern floodplain boundary.

In most instances, ponds in the floodplain could be situated to avoid impacts to wetlands or forested areas. The exception is Alternative C-2, where two of the three ponds in the floodplain would impact forested areas, and another would encroach upon an existing developed area. Placing stormwater treatment ponds beneath the proposed Minnesota River Bridge would reduce the need for additional right of way, and lessen impacts to the floodplain.

All alternatives will require stormwater treatment ponds located outside the proposed right of way. In many cases, ponds could be situated between interchange ramps and proposed frontage roads, avoiding impacts to existing development. Alternatives E-1, E-1A and E-2 travel through developed areas on the east side of Chaska, increasing the likelihood that ponds located outside the right of way would impact existing residential or commercial properties. For these three corridors, the "low" sub-alternatives would allow for better placement of ponds within the right of way at the TH 41/TH 212 interchange, as compared to the "high" sub-alternatives.

Ponds were placed near the abutments for the proposed TH 41 Bridge. For Alternatives E-1A and E-2, the ponds near the north abutment would be located in an adjacent existing residential area, prior to the steep bluff that leads to the river valley. In contrast, the north bridge abutment ponds for Alternative E-1 (Ponds E1H-7 and E1L-7) are placed in an undeveloped area alongside the bridge, several hundred feet south of the abutment. The alignment corridor for E-1 has a more gradual slope, and it was assumed that stormwater could be routed to this location through ditches or culverts.

The water quality analysis did not consider the feasibility of conveying water from the proposed pond locations to potential receiving waters. It was assumed for all pond locations that pond discharges could be routed to a suitable conveyance system. The number of ponds could be reduced if storm sewers were used to convey runoff against grade to more advantageous locations.

Hydraulic/Floodway Impacts

Hydraulic floodplain/floodway impact analysis was limited to the Minnesota River. It was assumed that bridges crossing Chaska Creek, Bluff Creek, or East Creek would be designed to span the entire floodplain.

Floodplain/Floodway

The Minnesota River floodplain is comprised of close to 100 percent floodway throughout the reach containing the six alignments. Per FEMA regulations, fill in floodways is prohibited. Any potential ponding locations in the floodway will consist of excavated volume only. Pond embankments and fill materials above the existing ground line are not allowed.

The bridges for each of the alignments span the entire Minnesota floodway. The western abutment is typically up on the bluff and the eastern abutment is generally located behind the

Union Pacific Railroad. The only structural features for the preliminary alignments that are required in the floodway are the piers. The sag points for the bridge decks are generally in the area of 25 feet to 30 feet above the 100-year flood elevation.

Hydraulic Modeling

One dimensional hydraulic analysis was completed for the alternatives using a HEC-RAS model received from the DNR that was completed in 2004 for Scott County. The model was created with the intention of Scott County incorporating the results into their mapping in 2006.

The six bridge alternatives were incorporated individually into unique models. Pier spacing was modeled at 300 feet on center for each alternative and was comprised of seven foot wide piers. The longitudinal length of the bridge piers (length along the flow path) was modeled as 137 feet. Pier spacing was adjusted in some instances to account for the bridge skew to the river, however, the pier widths were left constant. Skew consideration resulted in tighter pier spacing. Pier placement in the main channel was avoided.

Hydraulic Modeling Results

Hydraulically, the impacts in the base flood (100-year) water surface elevation caused by the alignment alternatives are in the range of 0.00 feet to 0.02 feet. Refinement of pier shape, pier alignment, and pier spacing may be able to eliminate the 0.02 feet increase. The lack of impact is primarily due to the expansive floodplain width, the high flow capacity, and the extremely low flow velocities. The preliminary hydraulic impacts of the alternatives are as follows:

W-2 = 0.00 feet	E-1 = 0.02 feet
C-2A = 0.01 feet	E-1A = 0.02 feet
C-2 = 0.01 feet	E-2 = 0.00 feet

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TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

MANAGEMENT SUMMARY

PHASE I AND II ARCHAEOLOGICAL INVESTIGATIONS

PREPARED FOR
MN/DOT

JUNE 2006

PREPARED BY
THE LOUIS BERGER GROUP, INC.

SRF NO: 0024590

PHASE I AND II ARCHAEOLOGICAL INVESTIGATIONS OF ALTERNAIVE ROUTE CORRIDORS FOR TRUNK HIGHWAY 41 NEAR CHASKA

CARVER AND SCOTT COUNTIES, MINNESOTA

MnDOT Agreement No. 86982
S.P. No. 1008-60
OSA License No. 04-066 and 06-010

Authorized and Sponsored by:

Minnesota Department of Transportation
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MANAGEMENT SUMMARY

The Louis Berger Group, Inc. (Berger) has completed Phase I geomorphological assessment and Phase I and II archaeological investigations within eleven route alternative corridors for proposed improvements to Trunk Highway (TH) 41 across the Minnesota River near Chaska in Carver and Scott Counties, Minnesota. This work was performed under contract with the Minnesota Department of Transportation (Mn/DOT), St. Paul, Minnesota as part of S.P. 1006-60. The work was done to for Mn/DOT and the Federal Highway Administration (FHWA) to comply with the Section 106 process. The Phase I archaeological field work was completed in three segments (October 25 to November 19, 2004; June 7 to 17, 2005; and October 17 to 28, 2005). Phase II National Register evaluation of Site 21CR141 was performed May 1 to 15, 2006. All of the archaeological work was completed under the direction of Senior Archaeologist Christopher Schoen, Principal Investigator. The geomorphological assessment was performed by Dr. Michael Kolb, Strata Morph Geoexploration, Inc., between November 4 and December 10, 2004 and March 1 to 3, 2005. An architectural survey of structures erected before 1964 within the broader Area of Potential Effect (APE), which included the City of Carver, the City of Chaska, and the adjacent Minnesota River Valley west of Shakopee, also was completed by Berger and is described in a separate report (Deiber 2006).

The APE for the archaeological and geomorphological work was confined to fourteen alternative route corridors. Each corridor was 1,000 feet wide. The five original alternative corridors were labeled A through E from southwest to northeast by Berger. The proposed alternative corridors were refined, resulting in six other alternative corridors, which were labeled C-2, C-2A, E-1, E-1A, E-2, and W-2 (SRF 2005). Associated with these corridors were three additional interchange corridors near TH 169, which Berger labeled F, G, and H. The alternative corridors had a combined length of approximately 45.8 miles and included an estimated total of 5,552 acres.

The geomorphological assessment within the original five corridors by Strata Morph Geoexploration, Inc. was made to identify areas of high, moderate, and low potential for archaeological deposits. The archaeological survey examined areas of high and moderate potential for archaeological deposits as identified by Mn/Model and the results of the geomorphological assessment and also sampled areas considered to have low archaeological potential to test the accuracy of this identification.

Three archaeological sites were identified by Berger during the course of the Phase I investigation. Site 21CR140 is composed of a small area (approximately 30 meters in diameter) of historic artifacts in the plowzone and top of the B horizon at the north end of Alternative E in Parcel E-62, which is located near the intersection of Pioneer Trail and Bluff Creek Road. Site 21CR142 consists of a scatter of chipped stone and fire-cracked rock in the plowzone at the north end of Alternative A in Parcel A-57, which is situated west of the intersection of current TH 212 and CR 40. Site 21CR142 encompasses an area measuring approximately 40 meters north to south by 80 meters east to west. Neither Site 21CR140 nor Site21CR142 are eligible for listing in the National Register of Historic Places.

Site 21CR141 is a multi-component pre-contact site on an alluvial fan in Alternative E in Parcel E-67. Mn/DOT contracted with Berger to perform a Phase II site evaluation. Berger found that the deeply buried archaeological deposits near the base of the fan in the 5Ab horizon have integrity and potential to yield significant information regarding the occupation of the area during the Archaic Period. Thus, the site is eligible for listing in the National Register based on Criterion D. No other archaeological resources were identified in the project area. Berger recommends no additional archaeological investigations within the fourteen proposed alternative route corridors as they are currently delineated, for which Berger was able to obtain access. Should access be obtained for unsurveyed parcels, Berger recommends survey to identity archaeological sites. This recommendation does not necessarily reflect the determination of the Mn/DOT Cultural Resources Unit (CRU).

TRUNK HIGHWAY 41 MINNESOTA RIVER CROSSING:
A FUTURE US 169/US 212 REGIONAL FREEWAY CONNECTION

MANAGEMENT SUMMARY

PHASE I/II ARCHITECTURE/HISTORY INVESTIGATION

PREPARED FOR
MN/DOT

JUNE 2006

PREPARED BY
THE LOUIS BERGER GROUP, INC.

SRF NO: 0024590

PHASE I/II ARCHITECTURE/HISTORY INVESTIGATION FOR FIVE PROPOSED ALTERNATIVE ROUTE CORRIDORS FOR TRUNK HIGHWAY 41 NEAR CHASKA CARVER AND SCOTT COUNTIES, MINNESOTA

S.P. No. 1008-60
Mn/DOT Agreement No. 86982

Authorized and Sponsored by:
Minnesota Department of Transportation
and the Federal Highway Administration

Prepared by:

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June 2006

I. MANAGEMENT SUMMARY

The Louis Berger Group, Inc. completed a combined Phase I/II architecture/history survey for five route alternative corridors to Trunk Highway 41 across the Minnesota River near Chaska in Carver and Scott Counties, Minnesota. This work was performed under contract with the Minnesota Department of Transportation (Mn/DOT), St. Paul, Minnesota as part of S.P. 1008-60. The road construction project will receive funding from the Federal Highway Administration (FHWA); therefore, the project must be in compliance with Section 106 of the National Historic Preservation Act (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470f). The Area of Potential Effect (APE) is located within and adjacent to the Minnesota River Valley at Carver and Chaska in eastern Carver County and western Scott County, Minnesota (Figure 1). In July 2005, new alternatives were added; however, no additional architectural survey was conducted as those areas had been previously investigated (Schoen 2006).

The Phase I survey was completed between November 29 and December 3, 2004 under the direction of Architectural Historian Camilla Deiber, Principal Investigator, with assistance from Architectural Historian Phillip Pendleton. The survey identified 619 properties constructed before 1964. Berger recommended that Phase II evaluations be completed for nine properties. Another seventeen properties located on Oak Street between Second and Fourth Streets in Chaska adjacent to the Walnut Street Historic District were identified as being potentially eligible under NRHP under Criterion B and were also recommended for Phase II evaluation. Upon examination of the list of properties in Carver Historic District, it was found that both the Carver School and Carver Water Tower were included within the boundaries of the Carver Historic District. Several properties on the boundary delineation map were located incorrectly and a school (assumed to be the Carver School) was shown on the map just north of the district boundary.

The Phase II survey was conducted by Architectural Historian Camilla Deiber March 6-17, 2006. Berger concluded that seven (7) properties were eligible for inclusion in the National Register of Historic Places (NRHP) (Table 1). All of the other properties within the APE are not eligible for inclusion the NRHP.

TABLE 1
PROPERTIES LISTED OR ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER

SITE NO.	PROPERTY NAME	NREG STATUS/CRITERIA	BRIEF SIGNIFICANCE STATEMENT
CR-CKC-174	H. Oesterreich House	C	The Oesterreich House is recommended eligible for inclusion in the NRHP as a significant example of a Chaska brick residence constructed in the Queen Anne style.
CR-CKC-009	Riedele House	B, C	The Riedele House is recommended eligible under Criterion B for its association with Andreas [Andrew] Riedele, one of Chaska's prominent brick manufacturers and under Criterion C as a significant example of the cross-wing type of Chaska brick residence utilized in an urban area.

Site No.	Property Name	NREG Status/Criteria	Brief Significance Statement
CR-CKC-293	Crystal Sugar Beet Factory Office	A, C	The Crystal Sugar Beet Factory Office is recommended eligible under Criteria A for its association with the sugar beet industry in Chaska and under Criteria C as a significant example of a commercial Chaska brick building.
CR-CKC-007	George A. DuToit House	C	The George A. DuToit house is recommended eligible under Criteria C as a significant example of a Queen Anne style Chaska brick house.
CR-CKC-006	Guardian Angels Catholic Church and Rectory	C	The Guardian Angels Catholic Church and Rectory is recommended eligible under Criteria C as it is a significant example of a Gothic Revival church built with Chaska brick.
CR-CKC-021	Lyman W. Noble/John Sutheimer House	C	The Noble/Sutheimer House is recommended eligible under Criterion C as an early, significant example of a Chaska brick residence constructed in 1858 in Chaska, Minnesota.
CR-CKC-002	Frederick E. DuToit House	NRHP-Listed	Victorian vernacular, c 1870
CR-CKC-004	Eder-Baer House	NRHP-Listed	Queen Anne, c 1900
CR-CKC-005	E. H. Lewis House	NRHP-Listed	Victorian vernacular, c 1870
CR-CKC-011	Brinkhaus Saloon Livery Barn	NRHP-Listed	Livery barn, c 1872
CR-CKC-012	Courthouse Saloon	NRHP-Listed	Commercial building & livery barn, 1888
CR-CKC-015	Herald Block	NRHP-Listed	Commercial building, 1871
CR-CKC-022	Frederick Greiner House	NRHP-Listed	Victorian vernacular, c 1870
CR-CKC-055	Walnut Street Historic District	NRHP-Listed	Includes 200-500th Block of Walnut Street, the Public Square, and E. 2nd Street between Walnut and Chestnut Sts. Twenty-nine properties total are in the district; twenty-one of which are contributing. A prehistoric burial ground (21-CR-2) is located in the Public Square.
CR-CKC-057	Chaska Historical Marker	Eligible (DOE)	Commemorative roadside marker, 1938
CR-CKC-059	Conrad Fink House	Eligible (CEF)	Victorian vernacular, c 1900
CR-CVC-104	Carver Historic District	NRHP-Listed	Roughly bounded by Fifth Street, County Highway 40, Hickory Street, and the levee. Ninety-seven properties are in the district; eighty-six of which are contributing.
CR-CVC-146 CR-CKC-623 CR-CHC-035	Minneapolis & St. Louis Railroad	A	The Minneapolis and St. Louis Railroad in Carver County is recommended eligible under Criterion A for its association with the development of several key industries in Chaska including the Carver County Sugar Beet Factory, the numerous Chaska brick yards and manufacturers, and the Chaska Flour Mill.