# ST. CROIX RIVER CROSSING PROJECT SUPPLEMENTAL DRAFT EIS
# CHAPTER 4
# TRANSPORTATION SYSTEMS AND IMPACTS

## 4.0 INTRODUCTION

This chapter describes the existing transportation systems/facilities within the project area, as well as, how these systems currently function from an operations and safety perspective. In addition, this chapter identifies future operations problems based on forecast traffic growth, and it will examine the impacts of the potential Stillwater Lift Bridge alternatives as they relate to traffic and transportation issues. The chapter also examines the impacts of the project on vehicular energy consumption.

Chapter 2 establishes measurable and qualitative transportation objectives for the St. Croix River Crossing Project (Section 2.3). Chapter 4 evaluates the existing conditions as well as the six studied alternatives based on these established objectives.

## 4.1 EXISTING TRANSPORTATION SYSTEM

The existing transportation system has been shaped by long-term development and settlement patterns that have been occurring for many decades as well as numerous physical constraints and limitations imposed by the scenic St. Croix River valley. While this setting provides scenic views and a setting that is unique to river towns, it also limits the ability to provide transportation connections due to elevations and topography.

The area's transportation system is made up of highways and alternate modes including transit/ridesharing, bicycle/pedestrian facilities, and navigational and recreational boating. The key regional highway facilities that support this area and surrounding communities include Trunk Highway (TH) 36, and TH 95 in Minnesota, and State Trunk Highway (STH) 35 and STH 64 in Wisconsin (Figure 4-1). In addition, facilities such as I-94, TH 243, and U.S. Highway (USH) 8 are included in this section because these facilities are the next viable, existing river crossing locations and as such are impacted by diverted traffic from the Stillwater Lift Bridge.

### 4.1.1 Main Highway Corridors

#### 4.1.1.1 Facility Descriptions

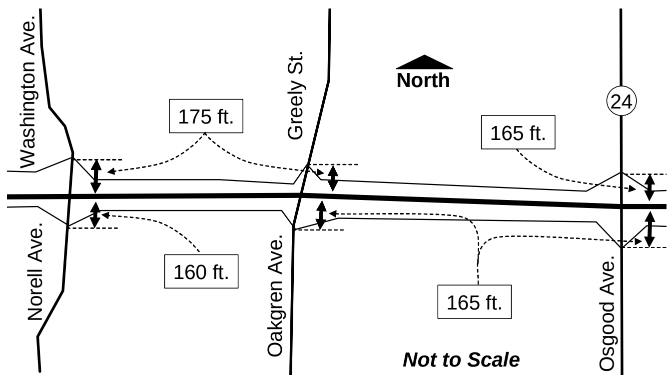
There are four major highway facilities that serve the study area. The following provides a general description of each facility.

**Trunk Highway 36** is primarily a four-lane divided expressway that connects the Twin Cities and its northern, St. Paul suburbs to the City of Stillwater and Oak Park Heights. Because of its prominent role in the transportation system, TH 36 is designated as a principal arterial, a National Highway System (NHS) route, and it is designated as one of Minnesota's Interregional

Corridors (IRC). These designations indicate the importance of this facility in serving the region's population and businesses, as well as providing linkages to recreational areas in Wisconsin.

As TH 36 enters Stillwater and Oak Park Heights from the west, it travels through one grade-separated interchange (TH 5) and three at-grade, signalized intersections: Osgood Avenue, Greely Street, and Washington/Norell Avenues. This area has higher volumes and speeds than roadways closer to downtown Stillwater. The corridor in this area has adequate mainline intersection geometry; however, the distance between the mainline and frontage road intersections is very short. Figure 4-2 shows the distance between the mainline TH 36/cross street intersections and the frontage road/ cross street intersections is from 160 to 175 feet. The Mn/DOT *Road Design Manual* recommends a minimum distance of 250 feet between the intersection of a highway and cross street and frontage road and cross street. To develop full left-turn bays on the cross street for both intersections, the Mn/DOT manual recommends a minimum of 500 feet between intersections. Figure 4-3 shows a photograph of the area. The south frontage road is in the foreground with TH 36 in the background.

**FIGURE 4-2**
**FRONTAGE ROAD INTERSECTION LOCATIONS**

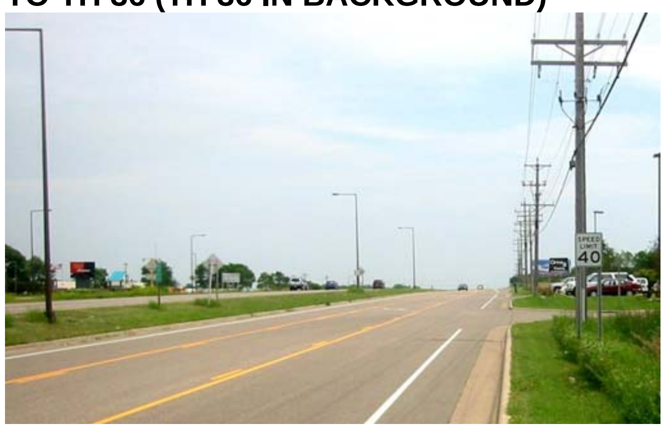



The proximity of the frontage road intersections to the mainline/cross-street intersections causes the following problems:

- <u>Limits the capacity of the frontage roads</u> and encourages short, local trips to travel on TH 36, unnecessarily occupying its capacity

- <u>Confusion and uncertainty with drivers</u> as to who has the right-of-way reducing the capacity of roadways approaching these intersections and creating safety issues. Reports have been given of motorists traveling the wrong way down TH 36 because they thought it was the frontage road.

**FIGURE 4-3**
**PROXIMITY OF FRONTAGE ROAD TO TH 36 (TH 36 IN BACKGROUND)**



- <u>Frontage road drivers have difficulty finding a gap</u> in oncoming traffic during peak periods, causing substantial delay and queuing. Long durations at stop-controlled intersections are

**Figure 4-1 – System Map (8.5x11 – color)**

BACK

particularly problematic. At signalized intersections, drivers are able to relax while waiting for a green. In contrast, drivers at stop-controlled intersections must stay alert at all times looking for a gap. This is stressful for drivers, can cause drivers to become impatient, which in turn can cause drivers to make unsafe, unpredictable maneuvers.

- Little space to store traffic. Traffic queues caused by left turners at the frontage road/cross street intersections can quickly spill into the TH 36 intersection resulting in inefficiencies and safety problems.

The nearby local street system configuration also influences the TH 36 corridor between TH 5 and Osgood Avenue. There are two critical links missing on the local street system between Oakgreen Avenue/Greeley Street and Osgood Avenue within the project area: 62nd Street on the north side of TH 36, and 58th/57th Street on the south side. Traffic traveling between these areas is easily diverted onto TH 36.

**FIGURE 4-4**
**LOOKING SOUTH ON TH 36 IN DOWNTOWN STILLWATER**

Near the river, TH 36 turns north and merges with TH 95, a north-south minor arterial. At this point, it narrows to a two-lane highway as it enters Stillwater's downtown Central Business District (CBD). Figure 4-4 shows the downtown area, where TH 36 takes on the character of low speed, urban collector street with at-grade, signalized intersections and on-street parking. Narrower streets and limited turning radii, generally limit traffic flow to one lane in each direction. This limits the effectiveness of signal operations and severely limits the ability of trucks, buses, and recreational vehicles to make turns at intersections. The Stillwater downtown CBD area is a very vibrant retail area with antique shops and restaurants. As such, this area generates a substantial amount of pedestrian traffic that conflicts with vehicle movements. At Main Street and Chestnut, TH 36 turns right and crosses the Lift Bridge to connect with STH 64 in Wisconsin.

**FIGURE 4-5**
**LOOKING NORTH ON TH 95**

**Trunk Highway 95** is a two-lane, north-south minor arterial highway that parallels the St. Croix River between Stillwater and I-94 to the south (Figure 4-5). It is primarily rural; however, it does have urban characteristics as it travels through communities such as Bayport and Stillwater. While this facility provides north-south continuity to the overall system, it is not viewed by planners and engineers as a route that will serve the long-term north-south travel needs for this part of the region. Manning Avenue, another minor arterial on the west side of Stillwater is anticipated to serve this function. It should be noted that the configuration of the TH 36/95 interchange does not provide direct access to or from TH 95 south of the interchange. This traffic is forced to travel a circuitous route on local streets or make a U-turn on TH 95/36 north of the interchange.

**State Trunk Highway 64** (STH 64) is a two-lane, east-west highway that traverses the entire state of Wisconsin. It is primarily a rural facility in the study area with few passing opportunities. State Trunk Highway 64 has a steep gradient (7 – 7.5 percent) from the eastern end of the Lift Bridge to Houlton, Wisconsin, limiting the speed of eastbound traffic, especially trucks. Two skewed STH 64 intersections are also located within the project area: the STH 64/County Trunk Highway (CTH) E intersection and the STH 35/64 intersection. This facility is designated as a principal arterial NHS route, as one of Wisconsin's Connector Routes in the Corridors 2020 State Highway Plan, and provides important east-west mobility in the project area. This facility is the primary connection to the Stillwater River crossing for communities such as Somerset and New Richmond.

**State Trunk Highway 35** (STH 35) is a two-lane, north-south highway that parallels the St. Croix River in Wisconsin. It provides connections between Houlton, Hudson and I-94. Interstate 94 is located approximately 7 miles to the south of the project area. STH 35 and STH 64 run concurrent from Houlton to Somerset, at which point they split with STH 35 going north and STH 64 going east.

#### 4.1.1.2 Traffic Volumes

Annual average daily traffic volumes (AADT) provide important usage information about highway facilities as well as provide a basis for identifying usage trends and patterns. Existing volumes at selected points on key project routes are shown on Figure 4-6.

Daily volumes are counted for most trunk highways every two years. Other volume data is available from special counts done as part of the overall St. Croix River crossing project and/or other transportation studies in the area. It is important to identify how these daily volumes change over time.

It should be noted that substantial development has occurred and continues to occur in the following areas:

- TH 36 between TH 5/Stillwater Boulevard and Osgood Avenue
- TH 5 in Oak Park Heights, south of TH 36
- Northwest side of Stillwater (Manning Avenue)
- St. Croix County, Wisconsin

Table 4-1 shows the growth trend in daily traffic volumes on roadways in the vicinity of the Lift Bridge and other key facilities connecting to the Lift Bridge. Between 1984 and 2000, traffic on TH 36 has grown 1.9 percent annually. From 1982 to 2000, traffic on STH 35/64 has grown an average of 2.2 percent per year. Both roadways show typical growth rates.

**Figure 4-6 – Existing 2000 Average Annual Daily Traffic on Area Roadways (8.5x11 – b/w)**

Growth rates should not be used alone as an indicator of an area's travel demand. Existing capacity can also heavily influence the growth rate. The TH 36 growth rate is one example; east of TH 5, its annual traffic growth rate has been decreasing in recent years (1984-1994: 3.8 percent per year; 1990-1998: 1.4 percent; 1994-2002: -0.4 percent). Taken alone, these values could be interpreted as showing decreasing demand. However, based on field observations, it is clear that growth is occurring and overall travel demand is increasing. But, because of limited capacity into and out of Stillwater, traffic is diverting to routes other than TH 36. This was also confirmed by an origin-destination study (Section 4.1.2.3).

**TABLE 4-1**
**TRAFFIC VOLUME GROWTH ON ROADWAYS IN THE PROJECT AREA**

| | Daily Volume[(1)] | | Annual Growth |
|---|---|---|---|
| **Minnesota** | **1984 vpd** | **2000 vpd** | **1984-2000 percent** |
| TH 95 North of TH 96 | 2,800 | 5,500 | 4.3 |
| TH 95 South of TH 36 | 9,500 | 11,700 | 1.3 |
| TH 36 East of TH 5 | 20,000 | 27,100 | 1.9 |
| **Wisconsin** | **1982 vpd** | **2000 vpd** | **1982-2000 percent** |
| STH 35/64 East of CTH V | 6,400 | 9,400 | 2.2 |
| STH 35 South of CTH V | 3,600 | 5,800 | 2.7 |
| CTH E East of CTH V | 1,100 | 2,900 | 5.5 |

[(1)] Average Annual Daily Traffic Volume (AADT) from state volume maps.

#### 4.1.1.3 Traffic Diversion

Traffic diverts locally within the project area. Local traffic diversion occurs when TH 36/95 is congested leading into and out of downtown Stillwater. The primary regional route into and out of downtown Stillwater is via TH 36 from the west to TH 95 north, which is also designated as Main Street (Figure 4-7). As TH 36 has become more congested, drivers minimize their delay and bypass queued traffic by traveling on alternate routes into and out of downtown Stillwater.

To document existing levels of congestion during the afternoon peak period, field studies were completed in July 2000 for the main routes into and out of downtown Stillwater. A detailed discussion of this study can be found in the technical memorandum entitled *Downtown Stillwater Traffic Operations Study*, December 29, 2000. These routes included trips over the Lift Bridge into Wisconsin as well as trips traveling north and south through downtown Stillwater. Studies included measuring the travel time of specific routes through the downtown Stillwater area, noting periods of delay at specific sites or intersections along those routes, and observing queue lengths occurring during periods when the Lift Bridge was raised.

**Figure 4-7 – Popular Routes for Locally Diverting TH 36 Traffic (8.5x11 – b/w)**

Travel times along the primary route (TH 36 to TH 95 to STH 64) varied from 7.3 minutes to 22.4 minutes for eastbound to northbound traffic (Minnesota to Wisconsin), and 6.4 minutes to 22.4 minutes for southbound to westbound traffic (Wisconsin to Minnesota). All eastbound travel runs experienced a minimum of 2.0 minutes of delay. Delays occurred primarily at the Nelson and Chestnut intersections. While there are limited alternative routes on the Wisconsin side of the river, Figure 4-7 shows popular routes for locally diverting traffic in Minnesota. Two of the more popular alternate routes into and out of downtown Stillwater and the Lift Bridge on the Minnesota side include the following:

- TH 36 to northbound Osgood Avenue (later Fourth Street), right on Churchill Street, left on Third Street, and right on Chestnut Street. Travel times along the route exiting TH 36 at Osgood Avenue and approaching the Lift Bridge from the west along Chestnut ranged from 7.9 minutes to 18.5 minutes eastbound to Wisconsin, and from 5.9 to 16.3 minutes westbound to Minnesota. Delays occurred primarily at the TH 36 and Osgood Avenue, Chestnut and Third, and Main and Chestnut intersections. Queues along this route during bridge raisings extended up Chestnut and along Third Street to Pine.

- TH 36 to northbound Greeley Avenue, right on Myrtle Street, right on Main Street and left on Chestnut Street. Travel times along the Greeley Avenue route, which approaches the Lift Bridge to the north of Chestnut along Myrtle, ranged from 7.2 to 16.4 minutes eastbound, and 6.5 to 21.6 minutes westbound. Bridge raising queues extended to Sixth Street along this route.

Local traffic diversion also occurs because there is no direct TH 36 access from TH 95 south of the TH 36/95 interchange. Drivers traveling to or from TH 95 south of the TH 36/95 interchange are forced to travel a circuitous route on local streets, or make a U-turn on TH 36/95 just north of the interchange.

### 4.1.2 Lift Bridge

#### 4.1.2.1 Facility Description

The Lift Bridge is an influential component in the area's transportation system. In the highway system, it spans the St. Croix River, linking TH 36 and Stillwater to STH 64 and Houlton. The Lift Bridge is a two-lane bridge with one lane of traffic in each direction. It is located 420 feet from the Main Street (TH 36/95)/Chestnut Street intersection. Limited lateral clearance caused by bridge trusses on both sides of the bridge encourages semi-trailer trucks and other large vehicles to crowd the centerline of the bridge to avoid hitting the bridge structure on the sides. The geometrics of the Lift Bridge limit the speed of traffic traveling across it and its ability to manage traffic after crashes/incidents on the bridge. If a crash or incident occurs on the Lift Bridge, one or both directions of travel are stopped while the incident is cleared.

The Lift Bridge also plays a role in the river transportation system. The Lift Bridge is regulated by the U.S. Coast Guard. As the name implies, a portion of the bridge lifts to allow larger boats to pass through the river channel. Because of the substantial motor vehicle traffic volumes using the Lift Bridge, a deck lift schedule for the peak boating season, May 15th to October 15th, has been negotiated with the Coast Guard. During this peak season, the bridge is scheduled to lift 21 times daily between 8 A.M. and 10 P.M. weekdays and 22 times daily on weekends and holidays between 8 A.M. and midnight. In the off-season (October 16th – May 14th), the Lift Bridge is raised upon 24 hours notice. Figure 4-8 summarizes the negotiated Lift Bridge schedule. These schedules have been planned to minimize bridge deck lifts during peak traffic periods.

From May through October, two bridge deck lifts occur during each weekday P.M. peak traffic period. The bridge is closed to motor vehicle traffic during the deck lifts. Closures last an average of 6.6 minutes; however, closures lasting 10 minutes were observed during 1998 and 2000 field data collection studies. During the time the Lift Bridge deck is raised, vehicle queues accumulate on streets throughout downtown Stillwater and along STH 64 in Wisconsin. Figure 4-9 shows field observations made in July 2000 noted queues extending as far south as the TH 36/95 junction in Minnesota and north up the bluff and back through Houlton on the Wisconsin side of the river. Field observations showed it takes from 6 to 20 minutes to clear these traffic queues once the bridge is reopened to traffic. The average queue clearance time is 10 minutes.

If the total delay (attributable to deck lift and queue clearance) for each queued vehicle is summed, the total delay to clear a single peak hour Lift Bridge queue is about 50 vehicle-hours (assuming a traffic flow rate of 1,420 vehicles per hour across the Lift Bridge)[1]. These observations reflect typical weekday traffic patterns when the bridge lift is operating (May – October, at other times upon request). Conditions can be worse during peak summer boating times, resulting in longer Lift Bridge delays, and during special events with increased traffic volumes. Delay to boats is discussed in Section 4.1.3.5, Navigational and Recreational Boating.

The Lift Bridge has other defining characteristics in addition to its geometrics and deck lifting activity. These include being flood-prone and in poor physical condition. In terms of flooding, the Lift Bridge is affected by seasonal flooding and is closed because of flooding on average for 5-days per year[2]. The Lift Bridge is also in poor physical condition. Based on yearly inspections, the sufficiency rating of the Lift Bridge structure is four on a rating scale of 100, with 100 being the best condition. Sufficiency rating is reviewed on an annual basis and takes into account a bridge's structural integrity as well as its geometric deficiencies (e.g., narrow lanes, limited vertical clearance). Typically when a bridge sufficiency rating drops below 50 and is structurally deficient or functionally obsolete, it is eligible for replacement funds. To maintain the Lift Bridge's ability to carry vehicular traffic, frequent maintenance is performed. These maintenance activities periodically close the bridge to vehicular traffic, thereby forcing traffic to use alternate routes.

[1] This estimate includes only traffic crossing the river. Other traffic is affected by the queuing as well. This traffic is not included in the 50 vehicle-hour per lift estimate.

[2] Historical data on bridge closures is not well documented. The closure estimate is based on a review of limited data from Mn/DOT, the U.S. Coast Guard, and the U.S. Army Corps of Engineers. The 5-day per year estimate includes only days closed due to high water, the bridge may be closed for additional days for inspection and needed repairs following flood events. The 5-day per year estimate is documented in a memo from SRF Consulting Group, Inc, *Stillwater Lift Bridge Historical Closure Dates*, March 16, 2004.

**Figure 4-8 – Lift Bridge Operation Schedule (8.5x11 – b/w)**

**Figure 4-9 – Observed Traffic Queues During Lift Bridge Operation (8.5x11 – b/w)**

Due to its structural condition, Mn/DOT has planned major Lift Bridge repairs in 2005. Because of a lack of available funding, the 2005 repairs will not address all of the Lift Bridge's structural deficiencies. Because of the remaining deficiencies, major rehabilitation will be needed in the future if the bridge is to serve long-term as a vehicle crossing. This rehabilitation may be needed by 2020 and would result in closing the bridge to traffic for approximately two years[3].

#### 4.1.2.2 Lift Bridge Traffic Volumes

**Daily Traffic Volumes**

Daily traffic volumes were collected on the Lift Bridge in July and August of 1998. Figure 4-10 shows the daily volumes ranged from 14,400 to 19,300 vehicles per day with an average daily volume of 17,365 vehicles. These volumes correspond well to an annually adjusted average daily traffic (AADT) volume of 15,100 vehicles per day (adjustment for seasonal factors using a seasonal factor of 1.15 for July). The amount of traffic using the Lift Bridge has resulted in substantial traffic queues extending back through Stillwater and up STH 64 into Houlton. These queues were confirmed through field studies and operations modeling and are described in Section 4.1.2.1.

**Hourly Traffic Volumes**

Traffic volume tube counts revealed a morning peak period from 6:00 a.m. to 8:00 a.m. (westbound peak direction) and an evening peak period from 3:00 p.m. to 6:00 p.m. (eastbound peak direction) for an average weekday. The hourly distribution of traffic for Saturdays and Sundays does not identify morning or evening peak periods similar to those of an average weekday. Instead, there is a steady peak period from 10:00 a.m. to 6:00 p.m. on Saturday and from 9:00 a.m. to 6:00 p.m. on Sunday. The peak direction was in the westbound direction for both Saturday and Sunday.

The Lift Bridge carries almost 1,450 vehicles (950 vehicles in the eastbound direction) during the weekday peak hour from 5:15 p.m. - 6:15 p.m. The morning peak hour was substantially less (1,140 vehicles with nearly 800 in the westbound direction). The typical capacity of a two-lane, urban, signalized roadway is about 700 vehicles per lane per hour. Diversion of river crossing trips to other St. Croix River bridges and some peak spreading (increases in daily volume with marginal changes in peak hour volumes) suggests that the Lift Bridge has reached its practical capacity.

**Truck Volumes**

Truck volumes on the Lift Bridge are relatively low. The 2002 Mn/DOT Traffic Flow map indicates a Heavy Commercial truck percentage of 2.8 percent. This truck percentage is less than the river crossings at TH 10 at Prescott (4.3 percent), and USH 8 at Taylors Falls (5.5 percent). The low level of truck traffic is likely to be due to bridge weight posting, heavy congestion, narrow roadway widths within the downtown Stillwater area, narrow bridge width, and unreliable travel times through Stillwater. Weight limits (28 tons per vehicle) were posted in 1994 on the Stillwater Lift Bridge and permits for overweight vehicles are no longer issued for the bridge.

[3] Estimated closure duration is documented in a memo from SRF Consulting Group, Inc, *Stillwater Lift Bridge: Determination of Repairs/Replacements to Allow Continuation of Service for Vehicular Traffic Until 2055 and Beyond*, April 16, 2004.

**Figure 4-10 – Daily Traffic Variations on the Lift Bridge (8.5x11 – b/w)**

The truck percentages and volumes are substantially higher on the I-94 Bridge across the St. Croix River at Hudson (9.4 percent truck traffic from 2020 Mn/DOT Flow Maps). Interstate 94 serves a different function to the state and region than does TH 36. It provides the main highway-related freight connection between Chicago and the Twin Cities (it is in the highest freight tonnage and value categories of all roadways in Minnesota). As such, the operational aspects of I-94 are critical to the entire state and region. River crossing alternatives that would divert additional traffic to I-94 and result in more congestion on the I-94 river crossing at Hudson would negatively impact one of the most important freight corridors into and out of Minnesota and Wisconsin.

#### 4.1.2.3 Lift Bridge Traffic Patterns

**Origin-Destination**

Origin-destination (O-D) travel surveys were conducted near the Lift Bridge (July - August 1998) to obtain information regarding travel patterns of motorists using the Lift Bridge. Detailed results of the surveys are documented in the technical memorandum entitled *St. Croix River Crossing Study – Stillwater Bridge Origin-Destination Survey*, September 25, 1998 prepared as part of the Braun facilitation process (see Chapter 1). Survey results indicate the following travel patterns:

- The river crossing serves local communities[4]. Seventy-five percent of weekday trips on the bridge (65 percent of weekend trips) begin or end in the surrounding, local communities.

- Table 4-2 shows a substantial amount of Lift Bridge traffic has no local destination (regional-regional). Forty-five percent of weekend bridge trips begin and end outside the local area, and have no intermediate destination in the local area (30 percent on weekdays).

- Table 4-2 shows a trip is more likely to be regional-local on weekdays (60 percent of trips) than weekends (45 percent). The lower percentage on weekends is due to the recreational component of trips going to lake areas in Wisconsin on weekends.

- A trip is more likely to be regional-regional on weekends (45 percent of all trips) than weekdays (30 percent).

- Stillwater is the largest, single Minnesota area of origin/destination on both weekdays and weekends.

- Houlton, Somerset, and New Richmond are the largest Wisconsin areas of origin/destination on weekdays. Somerset is the largest single Wisconsin trip generator/attraction on weekends, reflecting its recreational nature.

**TABLE 4-2**
**SUMMARY OF STILLWATER BRIDGE ORIGIN-DESTINATION RESULTS**

[4] For the purposes of this study, "local" is defined as trips beginning or ending in Houlton, New Richmond, Somerset, Bayport, Oak Park Heights, or Stillwater. All other origins or destinations were defined as "regional."

| Trip Type[1] | Weekday Percent of Total Trips | Weekend Percent of Total Trips |
|---|---|---|
| Regional-Regional | 30 | 45 |
| Regional-Local | 60 | 45 |
| Local-Local | 10 | 10 |

(1) "Local" origins or destinations were defined to include trips beginning or ending in the communities of Stillwater, Oak Park Heights, Bayport, Houlton, Somerset, or New Richmond. All other origins or destinations were defined as "regional."

### Trip Purposes

The O-D survey also collected information on trip purpose. Results showed the following:

- On weekdays, Table 4-3 shows nearly half of all trips are work trips. Work trip ratios increase during weekday peak periods.
- On weekends, over half of all trips are social/recreational, followed by shopping trips.
- On weekdays and weekends, about 15 percent of travelers make intermediate stops in the communities near the Lift Bridge (Houlton, Stillwater, Bayport, and Oak Park Heights). Within this 15 percent, trip purposes include shopping (37 percent) and social/recreational trips (20 percent).

**TABLE 4-3**
**TRIP PURPOSES**

| Trip Type | Weekday | | Weekend |
|---|---|---|---|
| | Percent of Total Trips | Percent of total during peak periods | Percent of Total Trips |
| Work | 46 | 57 | NR[1] |
| Social/Recreational | 19 | NR[1] | 56 |
| Shopping | 14 | NR[1] | 22 |

(1) NR = Not Reported

These results are not substantially different than origin-destination statistics gathered for the 2000 Twin Cities Metro Area Travel Behavior Inventory.

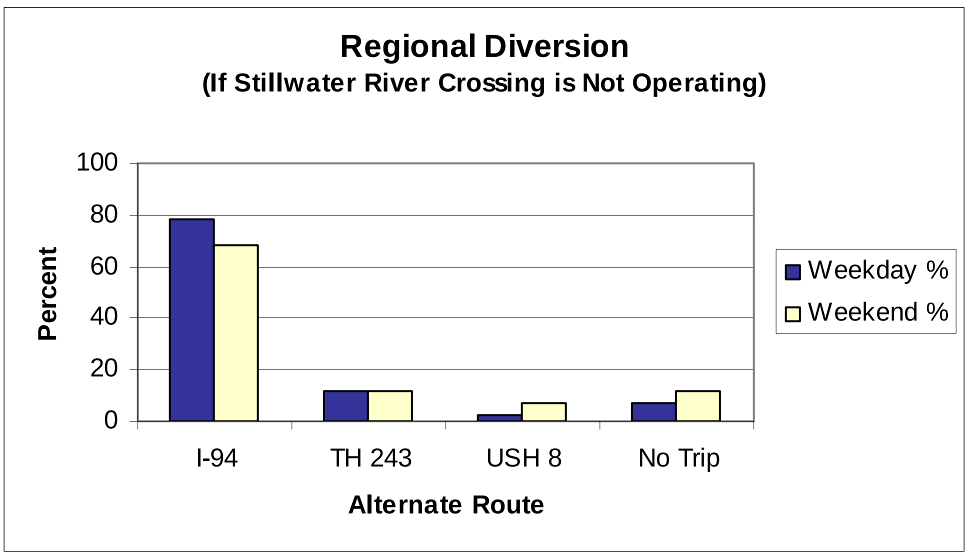
### 4.1.2.4 Regional Traffic Diversion

Traffic diverts both regionally and locally in the project area. Local traffic diversion is discussed in Section 4.1.1.3. Regional traffic diversion occurs during times when the Lift Bridge is out of operation for extended periods of time or severely congested. These times occur during crashes/incidents on the Lift Bridge or TH 36/95, seasonal flooding, maintenance activities, and summer during peak recreation times. At these times, drivers select alternate routes. Part of the O-D survey done in 1998 asked respondents what route they would use if the Stillwater river crossing were not operating. Survey results showed the following:

- Most drivers would make the trip and cross the river on Interstate 94 at Hudson (78 percent on weekdays, 68 percent on weekends)
- A smaller amount of drivers would divert to the TH 243 river crossing near Osceola (12 percent on both weekdays and weekends)
- A substantial amount of drivers would not make a trip (7 percent on weekdays, 12 percent on weekends)
- Some drivers would divert and cross the river on USH 8 at St. Croix Falls (2 percent on weekdays, 7 percent on weekends)

Figure 4-11 summarizes the results.

**Figure 4-11**
**Regional Traffic Diversion if Stillwater River Crossing is Not Operating**




The regional traffic diversion trend observed in the O-D study is supported by Mn/DOT April 2003 traffic counts. The Lift Bridge was closed for several weeks in April 2003 due to flooding. Traffic counts were done on the I-94 bridge both when the Lift Bridge was open and closed. Interstate 94 daily traffic volumes increased by 12,000 to 17,000 vehicles per day on weekdays (Monday through Friday) when the Lift Bridge was closed, as compared to weekdays when the Lift Bridge was open. It is likely that a substantial amount of the I-94 volume increase was caused by diverting TH36/STH 64 traffic.

Regional traffic diversion is a problem in the project area, especially for I-94. Interstate 94 provides the main highway-related freight connection between Chicago and the Twin Cities. It is the highest freight tonnage and value categories of all roadways in Minnesota. Each trip diverting from the TH 36/STH 64 corridor occupies valuable capacity on this important national trade corridor.

### 4.1.3 Alternate Modes

Transportation systems often include other modes that supplement highways and offer a transportation choice to users. These alternate mode systems include transit and taxis, ridesharing (park-and-ride and HOV facilities), bicycle/pedestrian travel, and navigational and recreational boating. Each alternate system is described as it exists today in the project area.

#### 4.1.3.1 Existing and Planned Transit Services

Transit service in the project area includes regular express and Dial-a-Ride bus service provided by Metro Transit and St. Croix Valley Transit. Metro Transit currently provides local and express service between Stillwater and downtown St. Paul. Route 294 provides express transit commuter service from 5:30 a.m. to 7:00 p.m., via TH 5, serving the Stillwater/Oak Park Heights, Bayport, Lake Elmo, Oakdale, 3M, and downtown St. Paul areas. Current ridership is approximately 300 passengers per day for the entire route with about 70 passengers per day traveling to and from the Stillwater area. Morning peak ridership for the entire route is about 70 passengers. As part of Metro Transit's *Transit 2020 Master Plan*, TH 36 west of TH 5 has been identified as a future, bus-only shoulders facility.

St. Croix Valley Transit currently provides a Dial-a-Ride transit service, known as the St. Croix Circulator, in the cities of Bayport, and portions of Stillwater and Oak Park Heights. It provides service to St. Croix Mall and the Target/Cub Foods shopping area. Riders can also transfer to Metro Transit Route #294 providing service into downtown St. Paul. Service hours are Monday through Friday from 8:00 a.m. to 5:00 p.m. with a base fare of $1.75. There are no eligibility requirements for this service; anyone needing service can ride. You must call to make a reservation at least two hours in advance of travel. Prior to September 2003, St. Croix Valley Transit had operated fixed-route transit service in this area, but this was discontinued due to budget constraints, low ridership, and high subsidies. Long-range plans are to continue to match service with changing needs of area residents and businesses.

There is no bus service currently provided in the Wisconsin portion of the project area, although the cities of New Richmond and River Falls do provide shared-ride taxi service operating within and just outside their city limits. Special transportation service for the elderly and the handicapped in St. Croix County is coordinated through the St. Croix County Department on Aging. St. Croix County's *Development Management Plan* does reference the desirability of investigating commuter transit options into the Minneapolis-St. Paul metropolitan area.

#### 4.1.3.2 Park-and-Ride Lots

Bus use, carpooling, and vanpooling are encouraged with park-and-ride lots provided in the Stillwater area. Park-and-ride lots provide commuters with direct access to express bus services. Park-and-pool lots provide a meeting place for those commuters interested in carpooling or vanpooling to a common destination. Figure 4-1 shows two park-and-ride lots are located in

Stillwater: 1) at the St. Croix Valley Recreation Center on Market Drive between Orleans and Curve Crest Boulevard, and 2) at St. Mary's Church at the corner of 5th and Pine Streets. According to Metro Transit, the lot at 5th and Pine will operate until the end of 2004, but, because of underutilization, will be shut down after that time.

There are no existing park-and-ride lots in the Wisconsin portion of the project area (served by bus service); there is one park-and-pool lot (for carpooling) located off the I-94 north frontage road in Hudson. Figure 4-1 shows its location. Other park-and-pool lots are located in western Wisconsin outside of the project area. Along I-94, lots exist at the interchanges in or near Roberts, Baldwin, and Elk Mound, and in River Falls (existing interchange and at the I-94/old STH 35 south interchange). On STH 64, one lot exists near New Richmond and other lots are planned along STH 64 when it is reconstructed[5].

#### 4.1.3.3 HOV Facilities

A High Occupancy Vehicle (HOV) facility typically consists of a highway lane, separated from the main flow of traffic by a median, a concrete barrier, or pavement markings, intended for use by two or more persons driving in a vehicle. Currently, there are no HOV facilities in the project area.

#### 4.1.3.4 Pedestrian and Bicycle Systems

**Facility Descriptions**

There are limited bicycle and pedestrian trail facilities for recreational or commuter use in the project area. On the Wisconsin side, there are no separate bicycle or pedestrian facilities in the project area. Figure 4-12 shows CTH E is the area's only designated bicycle route with users being forced to travel on the existing roadway over substantial grades (13 to 14 percent) through the Wisconsin bluff area. Figure 4-12 shows there are some trails on the Minnesota side, however they do not provide sufficient capacity and community connection. For example, there is a 5-foot sidewalk on the south side of the Lift Bridge. This sidewalk is inadequate for pedestrian and bicycle traffic needs. The AASHTO *Guide for the Development of Bicycle Facilities* states that a sidewalk is unsatisfactory as a shared use path for a variety of reasons, including differing design speeds for pedestrians and bicycles, motorists not being prepared to look for bicycles in crosswalks, and often impaired sight distances. In addition, the sidewalk ends on the Wisconsin side of the Lift Bridge, forcing users to travel on the roadway or on a dirt path alongside the road. For pedestrians, sidewalks are present along most downtown Stillwater streets.

Community connection is an issue for area bicyclists and pedestrians. There are few routes or trails that connect the upper bluff areas in Stillwater with the downtown area. Once in the upper bluff area, most residents feel that TH 36 creates a barrier for bicycles and pedestrians because the at-grade intersections with close frontage roads along TH 36 are not conducive for bicycle/pedestrian crossings between TH 95 and TH 5.

[5] Source: Memorandum from SRF Consulting Group, Inc., *Existing TSM/TDM Measures: St. Croix River Crossing Study*, September 28, 1998.

**Figure 4-12 – Existing Bicycle System (8.5x11 – b/w)**

**Pedestrian Volumes**

Downtown Stillwater is a popular retail and entertainment area with high levels of pedestrian activity. Pedestrian counts were collected at the intersection of Main Street and Chestnut Street on a weekday and weekend (August 1998). Over 1,200 pedestrians crossed the Main Street and Chestnut Street intersections during the peak weekend hour. About 400 pedestrians crossed this intersection during the weekday P.M. peak hour. During seasons with high pedestrian volumes, the interaction between vehicles and pedestrians not only creates a serious safety problem, but also reduces the capacity and operating efficiency of the intersection. High pedestrian volumes at the Main Street intersection substantially reduce opportunities for TH 95 motorists to turn right on red.

During the weekday origin-destination study (see Section 4.1.2.3), the study team observed numerous pedestrian violations of the traffic signal “Don’t Walk”, causing substantial disruption to traffic flow. Pedestrian traffic violating the “Don’t Walk” phase conflicts with the green time for vehicular traffic. In addition to violations at crosswalks, Pedestrians also cross Main Street at mid-block in downtown Stillwater. Mid-block crossings have been shown to be less safe than crossings at intersections as motorists are not expecting pedestrian conflicts at mid-block locations.

There are no counts of pedestrians crossing TH 36 in the upper bluff area between TH 5 and TH 95. There are, however, paths worn in the grassy median revealing where pedestrians regularly cross TH 36. TH 36 bisects residential, retail, and educational (high school) land uses. In comments given at local meetings, citizens, businesses, and public officials expressed safety concerns on TH 36 in the upper bluff area. TH 36 is viewed as unfriendly to bicyclists and pedestrians due to high traffic volumes, confusing traffic movements, and roadway width.

### 4.1.3.5 Navigational and Recreational Boating

The St. Croix River is actively used for both navigational and recreational boating. Recreational boating studies were conducted by the former Minnesota-Wisconsin Boundary Area Commission (MWBAC) since 1983 through biennial aerial surveys. The 1997 Recreational Boating Study provides the most recent information on trends in recreational boating use on the riverway. The riverway study area was divided into 17 use zones. The Stillwater Lift Bridge is located at the boundary of Zone 11 (south of the Lift Bridge) and Zone 12 (north of the Lift Bridge). The Build Alternatives’ bridges would be located in Zone 11. Both zones are located in the state-administered area of the Lower St. Croix National Scenic Riverway. The study results below indicate the popularity of recreational boating in the riverway and in Zone 11 (south of the Lift Bridge) in particular:

- Between 1989 and 1997, an estimated average of 310,600 people in 129,400 boats used the riverway from Memorial Day weekend through Labor Day weekend for recreational purposes annually.

- The percent distribution of *all* watercraft (active and beached) recorded in studies from 1983 to 1997 indicated that Zone 11 averaged 9.2 percent of the boats using the riverway and Zone 12 averaged 4.3 percent of the boats.

- The percent distribution of *active* watercraft recorded in studies from 1983 to 1997 indicated that Zone 11 averaged 11.8 percent of the boats and Zone 12 averaged 3.1 percent of the boats.

- Zone 11 is one of the four river zones where most of the weekend and holiday peak use was found. In 1997, Zone 11 had the third-highest proportion of active watercraft on the Lower St. Croix. During many of the previous survey years, Zone 11 had the second-highest proportion of active watercraft.

With the Lift Bridge, the low clearance and earthen causeway connecting the bridge to the Wisconsin shore result in some navigational obstruction. Many of the larger boats traveling between points north and south of Stillwater, currently experience an inconvenience or delay due to scheduled raising of the Lift Bridge. Under typical conditions, the Lift Bridge would raise its deck on demand. However, because of substantial motor vehicle traffic volumes using the Lift Bridge, a deck raising schedule has been negotiated.

#### 4.1.3.6 Employer Promotion of Alternate Modes

Two of the area's major employers promote use of alternate travel modes: 3M and Andersen Windows. Both companies have had, for many years, extensive ridesharing and transit programs for employees[5].

### 4.1.4 Existing Service and Operations

#### 4.1.4.1 Analysis Methodology and Background

A traffic operations analysis was conducted for existing P.M. peak hour conditions at each of the corridor's key intersections to determine how traffic currently operates within the project area. Signalized and unsignalized intersections were analyzed using the Synchro/SimTraffic software. Capacity analysis results correlate to 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 is 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 P.M. peak hour was chosen for this analysis because these volumes are substantially higher than those occurring during the A.M. peak hour. This analysis represents the worst-case existing condition. The analysis uses turning movement volumes counted at individual intersections over the past four years. Older counts were factored using comparisons to AADTs or newer counts to represent a 2002 base year. These counts were then balanced to represent the entire river crossing segment from Manning Avenue to Wisconsin STH 64 at 150th Avenue. In addition to vehicle turning movement volumes, pedestrian volumes were included for the downtown Stillwater area. The pedestrian crossing activities in downtown Stillwater cause substantial interruptions in traffic flow and increase the delays to vehicle movements. The traffic models incorporated current signal timing and phasing, and the calibration of the models were done based on visual inspection of the traffic queues in comparison to the field observations.

#### 4.1.4.2 Existing Levels of Service

Using current peak hour turning movement volumes, an operations analysis was completed for twenty-seven intersections in the study area. The level of service for all analyzed intersections is shown in Table 4-4. These results include one bridge deck lift during the analysis period. For unsignalized intersections the overall intersection level of service is shown followed by the level of service for the worst approach. Figure 4-13 shows the location of the reported intersections.

For all intersections and main roadways in the analysis area, the current roadway geometry, including number of through and turn lanes, was included in the operations model. A detailed discussion of the analysis methodology and results can be found in the technical memorandum entitled *St. Croix River Crossing Project 2004 Supplemental Draft Environmental Impact Statement (SDEIS) Traffic Operations Analysis*, May 21, 2004.

Two separate operations analysis were completed for the existing conditions, one including Lift Bridge activity (raising the deck once during the analysis period), and one scenario excluding it. The operation of the Lift Bridge creates a 10-minute closing of the bridge to accommodate larger vessels/boats using the river. Table 4-5 shows a level of service comparison of key intersections near the Lift Bridge with and without a bridge deck lift. As shown by the results, the bridge deck lift causes substantial level of service problems which causes traffic queues, backups, and local traffic diversions. The Lift Bridge operates regularly during peak traffic hours from May through October and by request at other times of the year.

The operations analyses show substantial operational issues including the following:

- <u>Failing Levels of Service at frontage road intersections</u> indicating they are operating at or over capacity.

- <u>Failing Level of Service at downtown intersections</u> under the bridge deck lift scenario. Analysis confirms the observed queuing problems (Section 4.1.2.1). This also indicates that it is likely that the area experiences lengthened peak hours. Limited capacity restricts the number of drivers able to cross the Lift Bridge during one hour. This does not substantially reduce travel demand. Instead, some drivers react to the capacity limits by staggering themselves before or after the peak hour. The staggering effect increases the duration of congested conditions. The Lift Bridge currently operates under congested conditions for about 3 hours per day.

- <u>Delayed emergency response</u>. The project area's capacity problems affect emergency response. Lakeview Hospital, the Washington County Sheriff's Department, and the Stillwater Fire Department are all located within the project area. Congested traffic conditions slow the response times for these emergency services, especially for Lakeview Hospital patients coming across the Lift Bridge from Wisconsin.

## TABLE 4-4
## EXISTING (2002) INTERSECTION OPERATIONS – P.M. PEAK HOUR[7]

| | Map No. [1] | Traffic Control [2] [3] | Intersection | Delay per Vehicle [4] (seconds) | Level of Service [5] [6] |
|---|---|---|---|---|---|
| TH 36 Commercial Area | 2 | Signal | CR 5 and Curve Crest Blvd | 27 | C |
| | 3 | Signal | TH 36 North Ramps and CR 5/Stillwater Blvd | 14 | B |
| | 4 | Signal | TH 36 South Ramps and TH 5/Stillwater Blvd | 19 | B |
| | 5 | Signal | TH 5 and 58th Street | 20 | B |
| | 6 | Signal | TH 36 and Norell Avenue/Washington Avenue | 31 | C |
| | 7 | Unsig | TH 36 N Frontage Road and Norell Ave./Washington Avenue | 30 | D/F WB |
| | 8 | Unsig | TH 36 S Frontage Road and Norell Ave./Washington Avenue | 15 | C/F EB |
| | 9 | Signal | TH 36 and Oakgreen Avenue/Greeley Street | 34 | C |
| | 10 | Unsig | TH 36 N Frontage Road and Oakgreen Ave/Greeley Street | **80** | **F/F WB** |
| | 11 | Unsig | TH 36 S Frontage Road and Oakgreen Avenue/Greeley Street | **98** | **F/F EB** |
| | 12 | Signal | TH 36 and Osgood Avenue/County Road 24 | 40 | D |
| | 13 | Unsig | TH 36 N Frontage Road and Osgood Avenue/County Road 24 | **>300** | **F/F WB** |
| | 14 | Unsig | TH 36 S Frontage Road and Osgood Avenue/County Road 24 | 12 | B/F WB |
| TH 95 | 15 | Unsig | TH 36 WB On Ramp and Beach Road | 5 | A/A NB |
| | 16 | Unsig | TH 36 EB Off Ramp and Beach Road | 3 | A/B EB |
| | 17 | Unsig | TH 95 and 56th Street | 6 | A/B EB |
| Downtown Stillwater | 18 | Signal | Main Street and Nelson Street | **82** | **F** |
| | 19 | Unsig | Main Street and Olive Street | **36** | **E/F EB** |
| | 20 | Signal | Main Street and Chestnut Street | 53 | D[8] |
| | 21 | Signal | Main Street and Myrtle Street | **122** | **F** |
| | 22 | Unsig | 3rd Street and Olive Street | **>300** | **F/F WB** |
| | 23 | Unsig | 3rd Street and Chestnut Street | **141** | **F/F SB** |
| | 24 | Unsig | 3rd Street and Myrtle Street | **>300** | **F/F EB** |
| Wisconsin | 25 | Unsig | STH 64 and CTH E | 28 | D/F WB |
| | 26 | Unsig | STH 64 and STH 35 | 6 | A/C WB |
| | 27 | Unsig | STH 35 and CTH E | 4 | A/A EB |

(1) See Figure 4-13 for Location Map
(2) Signal = Traffic Signal Controlled Intersection
(3) Unsig = Unsignalized Intersection with Stop Sign Control
(4) Intersection delay estimates (in seconds).
(5) Level of Service for Signalized intersection is shown as overall intersection LOS.
(6) Level of Service for Unsignalized intersections is shown as overall intersection = LOS X/LOS X NB for the worst approach.
(7) Includes one bridge deck lift during the analysis period.
(8) LOS D reflects the presence of a metering effect at the Main/Nelson Street and Main/Myrtle Street intersections. The adjacent intersections limit the traffic volume reaching the Main/Chestnut Street intersection; yielding better LOS results than anticipated. Refer to the traffic operations technical memorandum for additional information.

**Figure 4-13 – Intersections Analyzed for Existing and 2030 No-Build Conditions (8.5x11 – b/w)**

## TABLE 4-5
## EFFECTS OF BRIDGE DECK LIFT – 2002 PM PEAK HOUR

| | Map No. (1) | Traffic Control (2) (3) | Intersection | Level of Service with NO Bridge Deck Lift (4) (5) | Level of Service WITH Bridge Deck Lift (4) (5) |
|---|---|---|---|---|---|
| Downtown Stillwater | 18 | Signal | Main Street and Nelson Street | D | **F** |
| | 19 | Unsig | Main Street and Olive Street | A/C EB | **E/F EB** |
| | 20 | Signal | Main Street and Chestnut Street | C | D(6) |
| | 21 | Signal | Main Street and Myrtle Street | C | **F** |
| | 22 | Unsig | 3rd Street and Olive Street | B/C NB | **F/F WB** |
| | 23 | Unsig | 3rd Street and Chestnut Street | C/D NB | **F/F SB** |
| | 24 | Unsig | 3rd Street and Myrtle Street | **F/F EB** | **F/F EB** |
| Wisconsin | 25 | Unsig | STH 64 and CTH E | A/C WB | D/F WB |
| | 26 | Unsig | STH 64 and STH 35 | A/A WB | A/C WB |
| | 27 | Unsig | STH 35 and CTH E | A/A SB | A/A EB |

(1) See Figure 4-13 for Location Map
(2) Signal = Traffic Signal Controlled Intersection
(3) Unsig = Unsignalized Intersection with Stop Sign Control
(4) Level of Service for Signalized intersection is shown as overall intersection LOS.
(5) Level of Service for Unsignalized intersections is shown as overall intersection = LOS X/LOS X NB for the worst approach.
(6) LOS D reflects the presence of a metering effect at the Main/Nelson Street and Main/Myrtle Street intersections. The adjacent intersections limit the traffic volume reaching the Main/Chestnut Street intersection; yielding better LOS results than anticipated. Refer to the traffic operations technical memorandum for additional information.

### 4.1.4.3 Safety

Safety is another important element within the project area. The safety analysis broke the corridor into two areas: the Lift Bridge and regional approach roadways, and the TH 36 frontage roads.

**Lift Bridge and Regional Approach Roadways**

Motor vehicle crash data for the years 2000 to 2002 were analyzed for the Lift Bridge and several roadway segments in the vicinity of the bridge. The crash rates calculated in the analysis are summarized in Table 4-6. These rates include only those crashes occurring on the mainline. For example, on TH 36, the crash rate stated in Table 4-6 does not include crashes occurring on the nearby frontage roads.

Two sections of the project corridor have higher than average mainline crash rates. Segments that have substantially higher crash and/or severity rates as compared to peer groups should be noted; they can indicate roadway and operational deficiencies contributing to unsafe conditions. The crash rate for TH 36 between the south junction of TH 36/TH 95 and the east end of the Lift Bridge is about 90 percent higher than the average crash rate for two-lane urban trunk highways in Minnesota. (Frontage Road Crash Data Requested from Mn/DOT.) In Wisconsin, the crash rate for STH 64 is about 50 percent higher than the average crash rate for two-lane rural roadways in Wisconsin. Problem STH 64 areas include the skewed STH 64/CTH E intersection and skewed STH 35/64 intersection. The crash rate at these intersections is 70 percent higher than the statewide average for comparable intersections (a rate of 0.68 as compared to a statewide average of 0.4)[6]. The skews of the intersections make attempts to enter or exit STH 64 difficult and dangerous during peak traffic periods.

The crash rate for the segment of TH 36 between TH 5 and TH 95 is near the average for urban expressways in Minnesota.

## TABLE 4-6
## STH 64/TH 36 CRASH RATES

| Segment | | Crash Rate[(1)] | Severity Rate |
|---|---|---|---|
| | | Existing/(Average) | Existing/(Average) |
| **Wisconsin[(2)]** | | | |
| STH 64 | (Stillwater Bridge to 150th Avenue) | 1.7/1.1 | 0.64/(0.44)[(4)] |
| **Minnesota[(3)]** | | | |
| TH 36 | (TH 5 to TH 95) | 1.8/(1.9) | 2.6/(2.9) [(5)] |
| TH 36/TH 95 | (South Jct. TH 95 – Stillwater Bridge) | 4.4/(2.3) | 5.6/(3.4) [(5)] |

(1) Crash rate per million vehicle miles traveled. Mainline crashes only; frontage road crashes not included.
(2) 2000 – 2002 Wis/DOT data
(3) 2000 – 2002 Mn/DOT data
(4) Non-fatal Injury crash rate
(5) Severity rate per million vehicle miles traveled. Helps identify locations that experience a high or low percentage of injury or fatal crashes. ((# of fatalities * 10) + (# of injuries * 4) + (# of property damage only * 1) * 10^6)/VMT

The 2002 TH 36 Partnership Study identified other safety issues on the TH 36 corridor between TH 5 and TH 95. Analysis completed during the study found an average of 53 crashes per year at the three at-grade intersections on that segment of TH 36 over the previous five years.[7] About 43 percent of the crashes occurred at TH 36/Osgood Avenue intersections, with the remaining crashes distributed evenly between the other two intersections. The study also found that when considering the frontage roads with the main TH 36 intersections (due to close proximity), the area's crash rate was between two and three times the statewide average.

[6] The STH 64 intersection crash rates were compared to statewide crash rates for comparable intersections in Minnesota. This data was not available in Wisconsin. Minnesota rates are acceptable comparisons because of the intersections' proximity to Minnesota.
[7] Source: memo from SRF Consulting Group, Inc., *TH 36 IRC Partnership Study: Summary of Findings To-Date*, February 6, 2002.

## TH 36 Frontage Roads

The TH 36 frontage road intersections at major TH 36 cross streets (Washington/Norell, Oakgreen/Greeley, and Osgood) are a safety concern. The frontage road geometrics, the frontage road/cross street intersection traffic control, and the close spacing between frontage road/cross street and TH 36/cross street intersections contribute to the safety situation in the following ways:

- The frontage roads curve as they approach the cross streets. The curved approaches make it difficult for drivers to understand the appropriate path to cross the intersection.

- The frontage roads are stop controlled and the cross streets are freeflow at the frontage road/cross street intersections. Frontage road drivers are therefore required to simultaneously judge when there is adequate time to enter the intersection (find a gap in the oncoming, freeflow, cross street traffic) and navigate the difficult intersection geometrics.

- The frontage road/cross street intersections are 160 to 175 feet from the TH 36/cross street intersections (see Section 4.1.1.1). With this intersection spacing, frontage road drivers making a left turn onto the cross street are not able to perceive the traffic coming from TH 36 and complete the turn before TH 36 traffic arrives at the frontage road/cross street intersections. Cross street traffic coming from TH 36 arrives at the frontage road/cross street intersections in 5.5 to 6 seconds. Left turns typically require 7 seconds for a complete turn. At the cross street intersections, frontage road drivers are required to simultaneously deal with finding or forcing a gap in the oncoming, freeflow, cross street traffic, anticipating oncoming vehicle paths that may be turning off TH 36 less than 200 feet away, and navigating the difficult intersection geometrics.

- The situation is exacerbated during high volume traffic periods. In addition to the three factors described above, cross street queues beginning at TH 36 spill back through the frontage road intersections during high volume traffic periods, adding to the driver confusion at the frontage road intersections, sight problems, and vehicle conflicts. Queuing on both the cross streets and frontage roads during the peak traffic periods causes delays which make drivers impatient, and more inclined to take risks.

Crash data shows the frontage road/cross street intersections are difficult for drivers. Table 4-7 shows results from tallying crash records for these intersections.

### TABLE 4-7
### TH 36 FRONTAGE ROAD INTERSECTION CRASHES[(1)]

| | North Frontage Road Intersection @ | | | South Frontage Road Intersection @ | | |
|---|---|---|---|---|---|---|
| **Year** | **Washington Avenue** | **Greeley Street** | **Osgood Avenue** | **Norell Avenue** | **Oakgreen Avenue** | **Osgood Avenue** |
| **2001** | 8 | 9 | 2 | 0 | 1 | 8 |
| **2002** | 5 | 3 | 2 | 0 | 1 | 5 |
| **2003** | 0 | 4 | 3 | 0 | 2 | 4 |
| **Annual Average[(1)]** | **6.5** | **5.3** | **2.3** | **0** | **1.3** | **5.7** |

(1) Crash rates were not computed as reliable average annual daily traffic volumes for the frontage roads were not available.

According to the Minnesota Manual on Uniform Traffic Control Devices (MUTCD), traffic control alternatives (e.g. signals) should be considered at unsignalized intersections like these when five or more reportable crashes occur at the intersection with 12 months. This frequency, along with other factors like crash types and traffic volumes, begins to indicate action may be needed. Three of the six frontage road/cross street intersections have frequencies of five or more crashes per year between 2001 and 2003.

Although the MUTCD guidelines suggest traffic signals should be considered, signals or other traffic control alternatives such as roundabouts are not feasible given the frontage road intersection proximities to TH 36. The proximities hinder signal coordination and vehicle storage opportunities (space for vehicle queuing) that adequately address mainline, cross street, and frontage road traffic movements.

Ancillary safety problems gathered at public meetings support the safety issues identified through the crash data. Discussed problems include:

- Close proximity of frontage road intersections to TH 36 intersections: Drivers have difficulty anticipating other driver's intent and there is little separation of conflicting movements.
- High-volume, signalized intersections on a high-speed roadway: High volumes and high speeds (50 mph) on TH 36 between Washington Avenue/Norell Avenue and CR 24/Osgood Avenue contribute to a high number of rear-end type crashes as well as pedestrian and bicycle crossing problems.
- Driver frustration with long queues/delays: Level of service problems in the downtown area cause substantial queues. This results in diversion of traffic to local collector and arterial streets that have substantially more access points and potential intersection conflicts. A number of studies have demonstrated a direct relationship between the number of full access points and the rate of crashes, including FHWA Access Research Report No. FHWA-RD-91-044. As the number of access points per mile increases, so do crash rates.
- Pedestrian/vehicle conflicts in downtown Stillwater
- Lack of dedicated bicycle/pedestrian facilities

### 4.1.5 Summary of Issues Affecting Existing Transportation System Operations

The existing project corridor does not provide adequate transportation service and traffic operations during peak periods and recurring events like bridge lifts. At these times, traffic volumes exceed capacity and cause substantial operational and safety problems.

Figure 4-14 summarizes the key transportation issues in the study area. The main issues are described below.

- Two-lane, substandard Lift Bridge that has substantial structural deficiencies, cannot accommodate existing or future traffic volumes, and does not provide capacity for incident management. Based on its condition, it is estimated that a major rehabilitation would be needed by 2020 if the bridge is to continue to serve motor vehicle traffic; this would close the bridge for approximately two years. The Lift Bridge is also flood prone and is closed an average of 5 days per year.

**Figure 4-14 – Transportation Issues Map (11x17 – b/w)**

BACK

Lift Bridge deck lifts cause substantial queuing throughout downtown Stillwater and up the bluff on the Wisconsin side. Long queues result in poor intersection level of service throughout downtown Stillwater. Summer 2000 field studies observed a 20-minute recovery time for the street network to return to normal traffic operations after a bridge deck lift.

- In seasons with high pedestrian volumes, the interaction between vehicles and pedestrians reduce the capacity and operating efficiency of intersections and roadways where they cross.
- Traffic diverts to local collector and arterial streets in seeking to minimize delay when traveling through Stillwater.
- Volumes on TH 36 in the upper bluff area are approaching capacity. Safety problems have been identified at signalized intersections. The close proximity of frontage road intersections to TH 36 intersections results in driver confusion. There are too many conflict points within a short distance, causing driver expectancy problems. In addition, Figure 4-14 shows there are two critical links missing between Oakgreen Avenue/Greeley Street and Osgood Avenue within the project area: 62nd Street on the north side of TH 36, and 58th/57th Street on the south side. Traffic traveling between these areas is easily diverted onto TH 36, occupying valuable capacity.
- Crash rates are high in several areas caused by insufficient roadway and intersection geometrics.
- It is difficult for bicycles and pedestrians to cross TH 36 in the upper bluff area. TH 36 forms a bicycle/pedestrian barrier in this area because of its heavy traffic flows, high speeds, congestion, and the presence of continuous traffic movement at its intersections.
- Scheduled Lift Bridge deck raisings cause substantial delay to river traffic. Under uncongested conditions, the bridge deck would raise on demand from river traffic. However, because of substantial motor vehicle traffic volumes using the Lift Bridge, a deck lift schedule has been negotiated.

## 4.2 ALTERNATIVES

Chapter 3, Description of Alternatives, gives detailed descriptions of the alternatives being studied. Those explanations will not be repeated here. Instead, this section focuses on emphasizing the main characteristics of the transportation system in each alternative: No-Build, Alternative B-$1_a$, Alternative B-$1_b$, Alternative C, Alternative D, and Alternative E.

### 4.2.1 Highway System

#### 4.2.1.1 No-Build

The No-Build Alternative does not change the capacity or geometrics of the existing highway transportation system. Instead, it includes maintenance activities necessary for the highway system to continue carrying vehicular traffic. These maintenance activities include:

- Annual Maintenance – including snow plowing, mowing, etc.

- Major Maintenance – including pavement resurfacing using mill and overlay techniques

- Lift Bridge Rehabilitation – Due to its structural condition, the DOTs have planned major Lift Bridge repairs in 2005. The 2005 repairs will not address all of the Lift Bridge's structural deficiencies because of available funding limitations. Because of the remaining deficiencies, major rehabilitation will be needed in the future if the bridge is to serve long-term as a vehicle crossing. The Lift Bridge would need to undergo major rehabilitation by 2020 for it to continue to carry vehicular traffic.

#### 4.2.1.2 Alternative B-1$_a$

Alternative B-1$_a$ changes the existing transportation system as it relates to the St. Croix River crossing. The following highway components are substantially changed:

- TH 36 from TH 5 to the river crossing is converted to an access-controlled freeway. Button-hook interchanges are added for frontage road access. Cross streets pass over TH 36.

- A full access TH 36/95 interchange is constructed.

- The river crossing is a four-lane, divided freeway located south of downtown Stillwater.

- TH 36 is no longer routed through downtown Stillwater.

- The Lift Bridge would not carry vehicle traffic, but may be converted to a bicycle/pedestrian facility. The deck of the Lift Bridge would continue to lift to accommodate river traffic.

- STH 35/64 are realigned and no longer travel through Houlton. STH 64 is converted to a four-lane freeway from the river crossing to 150th Avenue, the beginning of the existing four-lane, divided section.

#### 4.2.1.3 Alternative B-1$_b$

Alternative B-1$_b$ is the same as B-1$_a$ except for the use of the Lift Bridge. In Alternative B-1$_b$, the Lift Bridge continues to carry local vehicular traffic. TH 36 is still converted to an access-controlled freeway from TH 5 to TH 95 and rerouted out of downtown Stillwater, a new four-lane river crossing is constructed, and STH 64 and STH 35 are realigned outside of Houlton.

#### 4.2.1.4 Alternative C

Alternative C has the same components as Alternative B-1$_a$. The new river crossing alignment differs between the two alternatives. In Alternative C, the new, four-lane bridge is located north of where it is proposed for Alternative B-1, but still south of downtown Stillwater. TH 36 is still converted to an access-controlled freeway from TH 5 to TH 95 and STH 64 and STH 35 are realigned outside of Houlton. Note that continued use of the Lift Bridge for local vehicular traffic is also possible in Alternative C. Local vehicle use has not been analyzed in the SDEIS because results are anticipated to be similar to those found for Alternative B-1$_b$.

#### 4.2.1.5 Alternative D

Alternative D has the same components as Alternative B-$1_a$, including in the TH 36 area between TH 5 and TH 95. Its unique characteristics focus on the following:

- The new bridge is located just south of the Lift Bridge.
- The Lift Bridge is converted to a bicycle/pedestrian facility.
- STH 64 continues to pass through Houlton. STH 64 is still converted to a four-lane freeway from the river crossing to 150th Avenue and STH 35 is again realigned to intersect STH 64 outside of Houlton.

#### 4.2.1.6 Alternative E

Like Alternative D, Alternative E has the same characteristics in the TH 36 area between TH 5 and TH 95. Alternative E's unique characteristics focus on Stillwater and the river crossing. Alternative E adds a second bridge and converts the river crossing to a one-way pair system having the following characteristics:

- The new bridge is a two-lane facility for eastbound traffic located just south of the Lift Bridge. When the Lift Bridge is closed for an extended period of time, the new bridge would carry one lane of traffic in each direction.
- The Lift Bridge continues to be a two-lane facility carrying westbound vehicular traffic through downtown Stillwater.
- Stillwater Main Street is converted to accommodate two southbound traffic lanes and one northbound lane from the Lift Bridge to the new bridge.

### 4.2.2 Alternate Modes

The studied alternatives would impact the infrastructure of the bicycle/pedestrian system and navigational and recreational boating systems in the project area. All other alternate mode system infrastructures remain unchanged from the existing conditions.

#### 4.2.2.1 Bicycle/Pedestrian System

Changes to the bicycle/pedestrian system consist of the following:

- No pedestrian/bicycle trails are planned under No-Build conditions.
- Under Build Alternatives B-$1_a$, B-$1_b$, C, and E, Figure 4-15 shows multi-use paths are added along the TH 36 frontage road system, along TH 95, on the north side of the new bridge, and connecting the new bridge to STH 35 in Wisconsin. A loop trail system would be created between the Lift Bridge and the new river crossing. The loop trail system would also be part of a larger regional trail system.

**Figure 4-15 – Bicycle System Alternatives (8.5x11 – b/w)**

- Under Build Alternative D no pedestrian/bicycle facilities would be included on the new bridge. The Lift Bridge would be converted to a bicycle/pedestrian facility. Paths along the TH 36 frontage roads, TH 95, and paths connecting the Lift Bridge to STH 35 in Wisconsin are proposed.

Chapter 3 gives more detailed explanations of the bicycle/pedestrian improvements for each alternative. As a separate project, a future pedestrian/bicycle trail along STH 35 has been identified in the "St. Croix County Bicycle Transportation Plan."

#### 4.2.2.2 Navigational and Recreational Boating

Under all Build Alternatives (B-1, C, D, and E) and the No-Build Alternative the Lift Bridge would remain in place; however, there are differences in the way the Lift Bridge would function. Under No-Build conditions, Alternative B-$1_b$, and Alternative E, the Lift Bridge would remain open to motorized transportation. Under Alternative B-$1_a$, C, and D conditions, the Lift Bridge and its causeway would remain in place; only non-motorized (bicycle and pedestrian) traffic would be allowed on the Lift Bridge[8]. Reduced vehicular Lift Bridge use in these alternatives may result in changes to the deck lift schedule.

## 4.3 ALTERNATIVES ANALYSIS AND EVALUATION

Six alternatives (No-Build, Alternative B-$1_a$, B-$1_b$, C, D, and E) were analyzed from a transportation perspective. Note that continued use of the Lift Bridge for local vehicular traffic is also possible in Alternative C. Local vehicle use has not been analyzed in the SDEIS because results are anticipated to be similar to those found for Alternative B-$1_{b.}$ The six studied alternatives were evaluated in the following eight areas:

- Travel demand forecasts
- Traffic operations
- Safety
- Benefit/cost
- Access and local road connectivity
- Vehicular energy consumption
- Alternate mode systems
- Compatibility with regional plans

Each component plays an important role in the analysis. The methodology and results for each component are described in the following section.

[8] Note that continued use of the Lift Bridge for local vehicular traffic is also possible in Alternative C. The Lift Bridge would then affect boating like Alternative B-$1_b$.

### 4.3.1 Roadway Travel Demand Forecasts

Travel demand forecasts for this project were based on a modified Twin Cities Regional travel demand model. This model estimates the amount of travel on transportation facilities based on demographic forecasts and documented travel behavior in the Twin Cities region. The model is also calibrated to the 2000 U.S. Census data and current traffic counts to reflect conditions and trends in the study area. The forecast provides some 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[9] of travel. All aspects of the forecasting process are described in more detail in the technical memorandum, *St. Croix River Crossing Project 2004 Supplemental Draft Environmental Impact Statement (SDEIS) Travel Demand Forecasts*, June 17, 2004.

#### 4.3.1.1 Methodology

Daily and A.M. and P.M. peak hour travel demand forecasts were generated using the Twin Cities Regional Model (developed for the seven county area by the Metropolitan Council) expanded to include southern Chisago County in Minnesota, and St. Croix County, southern Polk County, and the portion of River Falls in Pierce County in Wisconsin. All freeways, expressways, and major arterial roadways in the Twin Cities area are included in the region's highway system model. In addition, most minor arterials, many collector roads, and many other streets are included. The attributes of the roadways are described in terms of area type, facility type, length, free-flow speed, number of lanes, and capacity.

A Peer Review Panel consisting of national travel demand experts reviewed the travel demand methodology and assumptions to provide broader perspectives regarding the methodology, calibration, and the forecast process. Panel recommendations are described in the forecasting technical memorandum.

At the time these forecasts were prepared, Wisconsin Department of Administration had not yet published year 2030 demographic forecasts for counties in Wisconsin. The study team therefore estimated year 2030 data for the Wisconsin counties based on the following:

- Historic growth between 1970 and 2000
- 2020 estimates from the county development plans
- Other secondary sources (Woods & Poole, Inc.)

The growth rates used by the county plans for 2000 to 2020 were applied to the year 2000 census data. The imputed rate from 2000 to 2030 is slightly lower than historic rates, reflecting the maturing development patterns in the counties beyond 2020. Historic and estimated population totals are presented in the forecasting technical memorandum.

Numerous alternatives were tested as part of the analysis, including forecasts for the draft and final scoping decision documents.

[9] The terms "vehicle miles" and "vehicle hours" refer to the distance or time, respectively, that a vehicle – car, bus, truck or motorcycle – travels on the roadway network. When totaled, these measures account for all distance traveled, or time spent traveling, on the roadway network.

Daily results were used in comparing the alternatives and the benefit/cost analysis. Peak hour traffic volume forecasts were incorporated into traffic operations analyses. Sections 4.3.2 and 4.3.4 respectively describe the traffic operations analyses and benefit/cost analyses.

#### 4.3.1.2 Regional Forecasts

**Daily River Crossing Volumes**

Table 4-8 summarizes daily traffic volumes forecasted for the river crossings in the region including TH 36/STH 64, USH 8, TH 243, and I-94. With the No-Build condition, the number of vehicles crossing the St. Croix River at TH 36/STH 64 is expected to increase from the current count of 16,300 vehicles per day to 21,700 vehicles per day. The increase in volume would occur mostly in off-peak hours and in the off-peak direction due to capacity limitations.

Forecasted traffic for the new TH 36/STH 64 crossing for Alternatives B-1, C, and D exceeds 50,000 vehicles per day, with Alternative B-$1_b$ splitting the volumes between a new four-lane bridge and the Lift Bridge. Because the Build Alternatives provide increased river crossing capacity, new capacity exceeds 60,000 vehicles per day, these alternatives represent an unconstrained demand level. Furthermore, the reduced volumes at the I-94 crossing with these alternatives suggest that with constrained conditions at TH 36/STH 64, vehicles are currently diverting to the I-94 crossing to avoid congestion at the Stillwater crossing.

The reduction of volumes on TH 36/STH 64 with Alternative E below the volumes indicated for Alternatives B-1, C and D suggests that this alternative provides a somewhat constrained condition, yet it does provide more vehicle capacity than the No-Build Alternative. Again, the parallel increase in volumes at I-94 suggests that vehicles would divert to the I-94 crossing with the constrained conditions of Alternative E.

Similar total volumes crossing the St. Croix River for all alternatives indicate that river crossing trips are not substantially increased with any of the alternatives. Rather, capacity constraints and subsequent congestion affect only the location chosen to make the river crossing.

Key findings shown in Table 4-8 are as follows:

- There is a substantial increase in river crossings from 2002 to 2030 (near doubling).

- There is a substantial difference in volumes between some alternatives on TH 36. Volumes range from a low forecast of 21,700 vehicles per day (No-Build on the Lift Bridge) to a high value of 52,400 vehicles per day for Alternative C (on the new river crossing). Likewise, there are some substantial differences in volume on I-94 (Hudson): low volume of 119,000 vehicles per day (Alternative D) to a high of 140,700 vehicles per day (No-Build).

- Other river crossings (USH 8 and TH 243) are less affected by different alternatives.

**TABLE 4-8**
**2030 DAILY VEHICLE CROSSINGS FOR TWIN CITIES REGION**
**ST. CROIX RIVER CROSSINGS**

| Alternative | USH 8 - Taylors Falls vpd[1] | TH 243 - Osceola vpd[1] | TH 36/STH 64 - Stillwater | | I-94 - Hudson vpd[1] | TOTAL vpd[1] |
|---|---|---|---|---|---|---|
| | | | Lift Bridge vpd[1] | New Bridge vpd[1] | | |
| Existing (2002) | 14,900 | 4,700 | 16,300 | 0[2] | 77,000 | 112,900 |
| 2030 No-Build | 23,500 | 9,500 | 21,700 | 0[2] | 140,700 | 195,400 |
| 2030 Alt B-$1_a$ | 21,700 | 6,600 | 0[3] | 50,100 | 120,200 | 198,600 |
| 2030 Alt B-$1_b$ | 21,600 | 6,400 | 8,300 | 43,300 | 119,300 | 198,900 |
| 2030 Alt C | 21,300 | 6,400 | 0[3] [4] | 52,400 | 119,400 | 199,500 |
| 2030 Alt D | 21,300 | 6,200 | 0[3] | 51,000 | 119,000 | 197,500 |
| 2030 Alt E | 22,800 | 8,000 | 12,000 | 22,000 | 131,600 | 196,400 |

(1) vpd = vehicles per day
(2) There is no new bridge in the existing condition or 2030 No-Build Alternative.
(3) The Lift Bridge is not used to carry motor vehicular traffic in these alternatives.
(4) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

## P.M. Peak Hour River Crossing Volumes and Capacity

A comparison of forecasted 2030 Lift Bridge volumes and available river crossing capacity is an indicator of congestion and delay. Table 4-9 summarizes existing and forecasted eastbound 2030 P.M. peak hour traffic volumes for the St. Croix River crossing and compares them to available lane capacity with the resulting number of daily hours of congestion. Based on these forecasts, growth in the Twin Cities region and western Wisconsin is expected to increase traffic demand volumes on the existing Lift Bridge to 1,235 vehicle trips per lane per hour by the year 2030. This growth in traffic would cause congestion to spread to at least six hours per day for the No-Build Alternative. This spread of congestion is also called peak hour spreading.

It should be noted that the current Lift Bridge deck lift schedule has been negotiated with the U.S. Coast Guard to minimize deck lifts during peak traffic periods. Currently, the deck lifts once every 1.5 hours during the p.m. peak period; a deck lift cannot be avoided during the peak traffic period due to the peak's long duration. Under 2030 No-Build conditions, as the peak hour spreads, additional bridge lifts would occur during peak periods.

**TABLE 4-9**
**DAILY HOURS OF CONGESTION BY ALTERNATIVE**
**ST. CROIX RIVER CROSSING (1)**

| Alternative | EB PM Peak Hour[(1)] veh/ln/hr[(3)] | Capacity[(2)] veh/ln/hr[(3)] | Daily Hours of Congestion[(4)] |
|---|---|---|---|
| Existing (2002) | 960 | 600 | 3+ |
| 2030 No-Build | 1,235 | 600 | 6+ |
| 2030 Alternative B-$1_a$ | 1,875 | 1,950 | 0 |
| 2030 Alternative B-$1_b$ | | | |
| New Bridge | 1,655 | 1,950 | 0 |
| Lift Bridge | 595 | 600 | <1 |
| 2030 Alternative C[(5)] | 1,930 | 1,950 | <1 |
| 2030 Alternative D | 1,925 | 1,950 | <1 |
| 2030 Alternative E | | | |
| New Bridge | 1,540 | 1,950 | <1 |

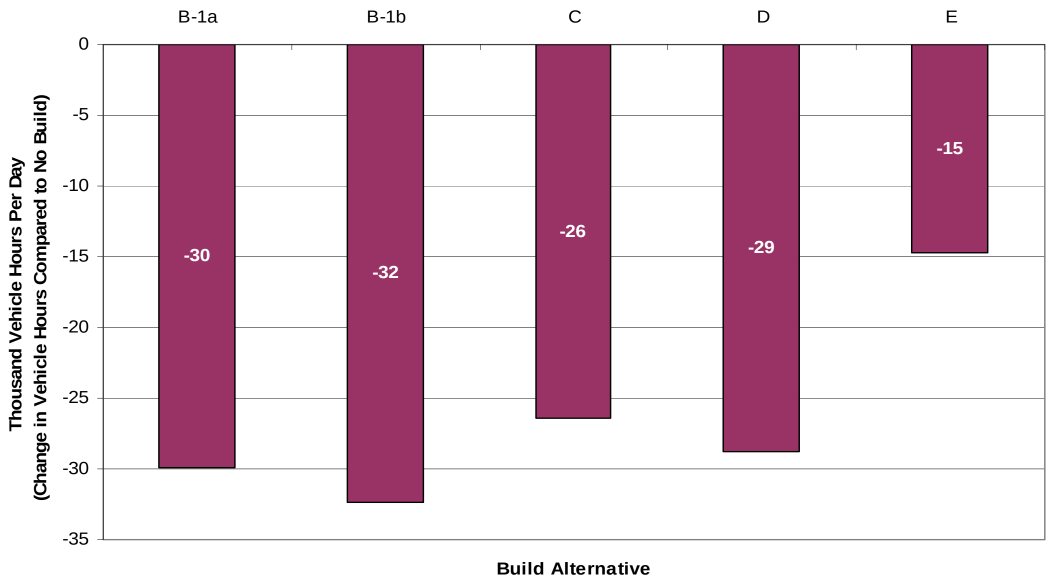
(1) Eastbound (EB) volumes only
(2) Capacity is defined as daily volume with minimal congestion on bridge.
(3) Vehicles per lane per hour (veh/ln/hr)
(4) Due to geometric constraints, such as steep grades, slow-moving trucks may cause increased congestion not represented in this analysis; also does not include congestion caused when Lift Bridge is raised.
(5) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

The four-lane Build Alternatives show higher 2030 travel demands on the river crossing links. Alternatives B-$1_a$, C, and D show demands of more than 1,850 vehicle trips per lane per hour during the P.M. peak hour. Alternative B-$1_b$ shows a demand of 1,655 on the new bridge, with the Lift Bridge carrying about 595 eastbound vehicle trips per lane per hour. Alternative E projects 1,540 eastbound vehicle trips per lane per hour (all westbound traffic travels on the Lift Bridge). The Build Alternative river crossings would have sufficient capacity to accommodate forecasted 2030 demands with minimal congestion on the river crossing links. However, some alternatives put greater traffic demands on downtown Stillwater intersections which result in congestion problems in the downtown Stillwater central business district.

## 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 an indication of the overall system efficiency of a potential alternative as compared to the No-Build Alternative. Figure 4-16 shows Alternatives B-1, C, and D reduce vehicles hours traveled by over 25,000 vehicle hours per day. Results for Alternative E reflect a reduction of approximately 15,000 vehicle hours traveled, a smaller reduction than Alternatives B-1, C, and D, but still substantial.

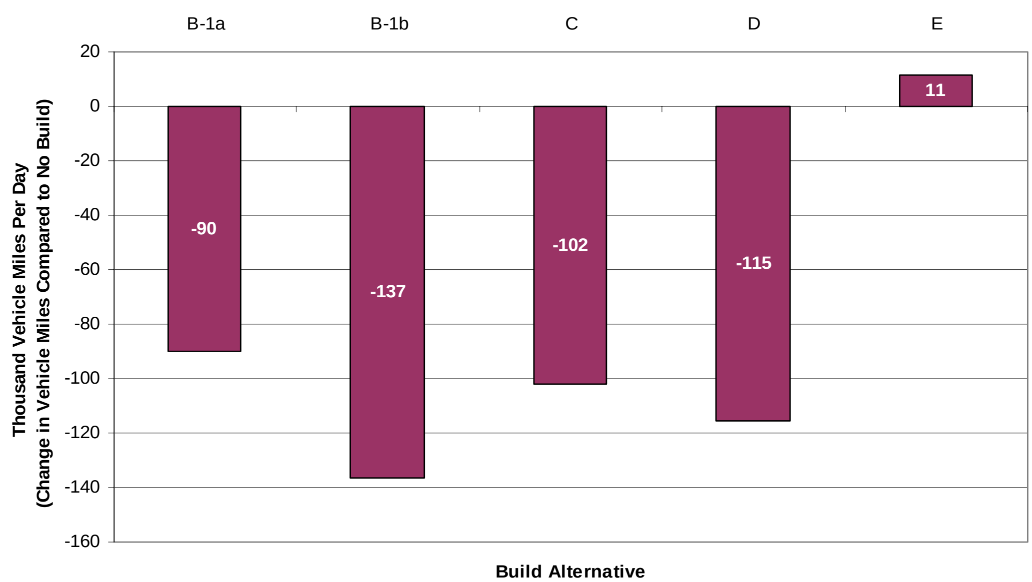
## FIGURE 4-16
## REDUCTION IN 2030 REGIONAL DAILY VEHICLE HOURS TRAVELED COMPARED WITH NO-BUILD[(1)]




(1) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

Figure 4-17 shows the results of an analysis of change in vehicle miles traveled. In these results, similar to the results of the analysis of reduction of vehicle hours traveled and delay, substantial reductions are evident for Alternatives B-1, C and D. Results for Alternative E indicate a slight (approximately 11,000) increase in vehicle miles traveled.

## FIGURE 4-17
## DIFFERENCE IN 2030 REGIONAL DAILY VEHICLE MILES TRAVELED COMPARED WITH NO-BUILD[(1)]




(1) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

These results indicate the following:

- Each Build Alternative substantially reduces regional congestion (based on VHT results)
- Alternatives B-1, C and D substantially reduce regional traffic diversion (based on VMT results)

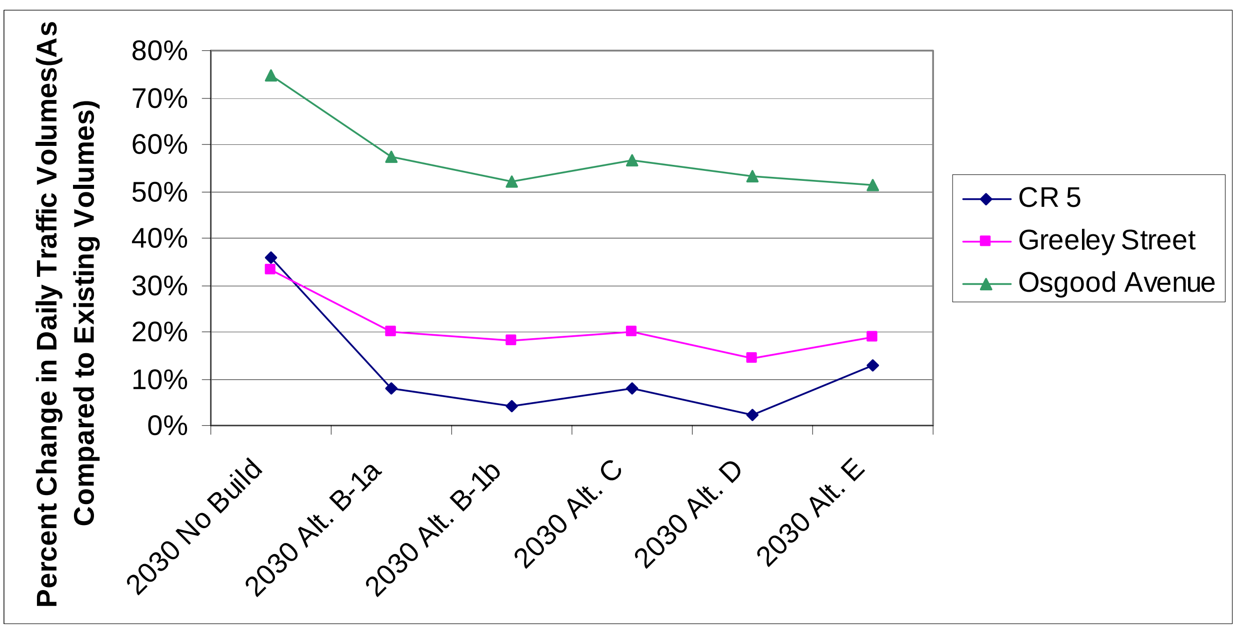
Both the VMT and VHT results were used to evaluate the alternatives as part of a benefit/cost analysis. The benefit/cost analysis and results are discussed in Section 4.3.4.

#### 4.3.1.3 Local Forecasts

Traffic volume forecasts were also made for the local project area. Forecasted volumes are different for each studied alternative. These differences were already evident when examining forecasted traffic volumes from the regional perspective, and are again evident locally on CR 5 (Stillwater Boulevard), Greeley Street and Osgood Avenue.

Daily volumes on CR 5, Greeley Street, and Osgood Avenue were examined as indicators of each alternative's ability to reduce local traffic diversion in Stillwater. Figure 4-18 shows modeling projected 2030 traffic volumes to increase by over 30 percent on CR 5 and Greeley Street and by over 70 percent on Osgood Avenue in the No-Build condition. However, Alternatives B-1, C, and D keep volume changes below 10 percent on CR 5; Alternative E keeps them below 15 percent. The Build Alternatives keep traffic increase to below 20 percent on Greeley Street and below 60 percent on Osgood Avenue.

**FIGURE 4-18**
**CHANGE IN 2030 LOCAL STILLWATER TRAFFIC VOLUMES COMPARED WITH EXISTING VOLUMES**[(1)]




[(1)] Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

Figure 4-18 introduces several key points:

- Traffic volumes are forecasted to increase on these roadways in the future
- The Build Alternatives would yield lesser increases than the No-Build scenario

Figure 4-18 also shows that volumes on Greeley Street and Osgood Avenue would increase as development in the region and along TH 36 increases.

### 4.3.2 Local Traffic Operations Analysis

Traffic operations analysis gives more detailed results for the studied alternatives. Traffic operations analyses incorporate peak hour traffic volumes generated by travel demand forecasting to analyze the level of service at individual intersections. Level of Service (LOS) indicates the quality of traffic flow through an intersection. Section 4.1.4.1 and the technical memorandum entitled *St. Croix River Crossing Project 2004 Supplemental Draft Environmental Impact Statement (SDEIS) Traffic Operations Analysis*, May 21, 2004 provide additional detail on traffic operations analyses conducted for this project. This section summarizes the results of the analysis and makes comparison between each alternative.

#### 4.3.2.1 Intersection Operations

Similar to the analysis for the existing conditions, Synchro/SimTraffic was used to analyze traffic operations. The P.M. peak hour was again chosen for this analysis because these volumes are substantially higher than those occurring during the A.M. peak hour. This analysis represents the worst-case condition. In addition to vehicle turning movement volumes, pedestrian volumes were included for the downtown Stillwater area.

Using the P.M. peak hour turning movement volumes forecasted for year 2030, an operations analysis was conducted for the six alternatives. Table 4-10 summarizes the level of service results for study area intersections analyzed for the No-Build Alternative; traffic operations substantially worsen under the No-Build Alternative as compared to the existing condition (Table 4-4 in Section 4.1.4.2). Table 4-11 then shows that 20 of the 26 intersections analyzed were at LOS E or F as compared to nine under existing conditions. In addition, the operations model would not operate unless stop signs were added on the following frontage road intersection approaches:

- North frontage road and southbound Washington Avenue, Greeley Street, and Osgood Avenue
- South frontage road and northbound Norell Avenue, Oakgreen Avenue, and Osgood Avenue

## TABLE 4-10
## 2030 NO-BUILD INTERSECTION OPERATIONS – P.M. PEAK HOUR

| | Map No. (1) | Traffic Control (2) (3) | Intersection | Delay per Vehicle (4) (seconds) | Level of Service (5) (6) |
|---|---|---|---|---|---|
| TH 36 Commercial Area | 2 | Signal | CR 5 and Curve Crest Blvd | **98** | **F** |
| | 3 | Signal | TH 36 North Ramps and CR 5/Stillwater Blvd | 22 | C |
| | 4 | Signal | TH 36 South Ramps and TH 5/Stillwater Blvd | 21 | C |
| | 5 | Signal | TH 5 and 58th Street | **>300** | **F** |
| | 6 | Signal | TH 36 and Norell Avenue/Washington Avenue | **133** | **F** |
| | 7 | Unsig | TH 36 N Frontage Road and Norell Ave./Washington Avenue | **>300** | **F/F WB** |
| | 8 | Unsig | TH 36 S Frontage Road and Norell Ave./Washington Avenue | **>300** | **F/F EB** |
| | 9 | Signal | TH 36 and Oakgreen Avenue/Greeley Street | 36 | D |
| | 10 | Unsig | TH 36 N Frontage Road and Oakgreen Ave/Greeley Street | **>300** | **F/F WB** |
| | 11 | Unsig | TH 36 S Frontage Road and Oakgreen Avenue/Greeley Street | **>300** | **F/F EB** |
| | 12 | Signal | TH 36 and Osgood Avenue/County Road 24 | 47 | D |
| | 13 | Unsig | TH 36 N Frontage Road and Osgood Avenue/County Road 24 | **>300** | **F/F WB** |
| | 14 | Unsig | TH 36 S Frontage Road and Osgood Avenue/County Road 24 | **196** | **F/F EB** |
| TH 95 | 15 | Unsig | TH 36 WB On Ramp and Beach Road | 20 | B/B NB |
| | 16 | Unsig | TH 36 EB Off Ramp and Beach Road | 7 | A/C EB |
| | 17 | Unsig | TH 95 and 56th Street | **>300** | **F/F EB** |
| Downtown Stillwater | 18 | Signal | Main Street and Nelson Street | **>300** | **F** |
| | 19 | Unsig | Main Street and Olive Street | **>300** | **F/F EB** |
| | 20 | Signal | Main Street and Chestnut Street | **>300** | **F** |
| | 21 | Signal | Main Street and Myrtle Street | **>300** | **F** |
| | 22 | Signal | 3rd Street and Olive Street | **>300** | **F** |
| | 23 | Unsig | 3rd Street and Chestnut Street | **>300** | **F/F WB** |
| | 24 | Signal | 3rd Street and Myrtle Street | **>300** | **F** |
| Wisconsin | 25 | Unsig | STH 64 and CTH E | **>300** | **F/F WB** |
| | 26 | Unsig | STH 64 and STH 35 | **165** | **F/F WB** |
| | 27 | Unsig | STH 35 and CTH E | **>300** | **F/F WB** |

(1) See Figure 4-13 in Section 4.1.4.2 for Location Map
(2) Signal = Traffic Signal Controlled Intersection
(3) Unsig = Unsignalized Intersection with Stop Sign Control
(4) Intersection delay estimates (in seconds).
(5) Level of Service for Signalized intersection is shown as overall intersection LOS.
(6) Level of Service for Unsignalized intersections is shown as overall intersection = LOS X/LOS X NB for the worst approach.

## TABLE 4-11
## ANALYSIS OF OVER-CAPACITY INTERSECTIONS

| | | Number of Analyzed Intersections | Number of Over-Capacity Intersections[1] | Problem Area or Intersection |
|---|---|---|---|---|
| | Existing (2000) | 26 | 9 | • TH 36 N. Frontage Rd./ Oakgreen Avenue/Greeley Street<br>• TH 36 S. Frontage Rd./Oakgreen Ave./Greeley Street<br>• TH 36 N. Frontage Rd./Osgood Ave./CR 24<br>• Downtown Stillwater |
| 2030 Alternative | No-Build | 26 | 20 | • Throughout Network |
| | B-1a | 30 | 3 | • Downtown Stillwater 3rd St. Intersections |
| | B-1b | 30 | 11 | • CR 5 (Stillwater Blvd.)/Curve Crest<br>• TH 36 S. Frontage Rd./Norell Ave.<br>• Downtown Stillwater<br>• Old STH 64/Old CTH E<br>• Old STH 35/Old CTH E |
| | C[2] | 29 | 1 | • 3rd St./Myrtle St. |
| | D | 29 | 6 | • CR 5 (Stillwater Blvd.)/Curve Crest<br>• TH 95<br>• Downtown Stillwater 3rd St. Intersections |
| | E | 30 | 8 | • CR 5 (Stillwater Blvd.)/Curve Crest<br>• TH 36 N. Frontage Rd./Washington Ave.<br>• TH 36 S. Frontage Rd./Oakgreen Ave.<br>• Main St./Nelson St.<br>• Main St./Myrtle St.<br>• Downtown Stillwater 3rd St. Intersections |

(1) LOS E and F indicate intersections are at or nearly over capacity.

(2) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to those shown for Alternative B-$1_b$.

Traffic operations improve for the Build Alternatives. Table 4-11 shows Alternatives B-$1_a$ and C have the fewest number of over-capacity intersections (3 and 1 respectively). Alternatives D and E have more over-capacity intersections although they provide a substantial improvement over No-Build conditions. Alternative B-$1_b$ has the highest number of over-capacity intersections of the Build Alternatives, still substantially fewer than in No-Build conditions. The number of analyzed intersections differs between the alternatives because the alternatives are configured differently. For example, TH 36 operates as an expressway with at-grade intersections in the No-Build scenario, but as an access-controlled freeway in the Build Alternatives. Downtown Stillwater is another example; all TH 36 traffic travels through downtown Stillwater in the No-Build Alternative, but only portions of it could with the Build Alternatives.

#### 4.3.2.2 Freeway Operations

Because most of the Build Alternatives operate as short sections of freeway, a freeway operations analysis was done to assess potential operational issues associated with merge/diverge and weaving. A merge movement occurs when traffic from a ramp attempts to enter moving, mainline traffic. A diverge movement occurs when traffic attempts to exit the moving, mainline traffic onto a ramp. Weaving occurs when both merge and diverge movements occur within a short distance of one another. A merge/diverge/weave analysis considers speed and traffic density on a freeway and reports a level of service for the merge, diverge, or weave movements. As speed decreases and density increases, level of service decreases. The study team used 2030 P.M. peak hour traffic in Highway Capacity Software (HCS) based on the *Highway Capacity Manual* to complete the analysis.

The No-Build Alternative has very few merge/diverge movements and no weave movements (it has only the one TH 36/95 interchange). All of the merge/diverge movements operate at acceptable levels of service (LOS D or above). The Build Alternatives add sections of freeway in both Minnesota (TH 36 from TH 5 to the river crossing) and Wisconsin (STH 64 from the river crossing to 150th Avenue). Alternatives B-1 and E also show acceptable levels of service for all merge/diverge/weave movements. In Alternative C, there are two movements on the verge of being problematic (LOS D, approaching LOS E): the merge movement at the Washington Avenue buttonhook interchange on-ramp, and the diverge movement for TH 36 traffic taking the TH 95 off-ramp. Alternative D shows problematic merge movements (LOS E) for the north and south TH 95 on-ramps at the TH 36/95 interchange. Additional information on these analyses is discussed in the traffic operations analysis technical memorandum.

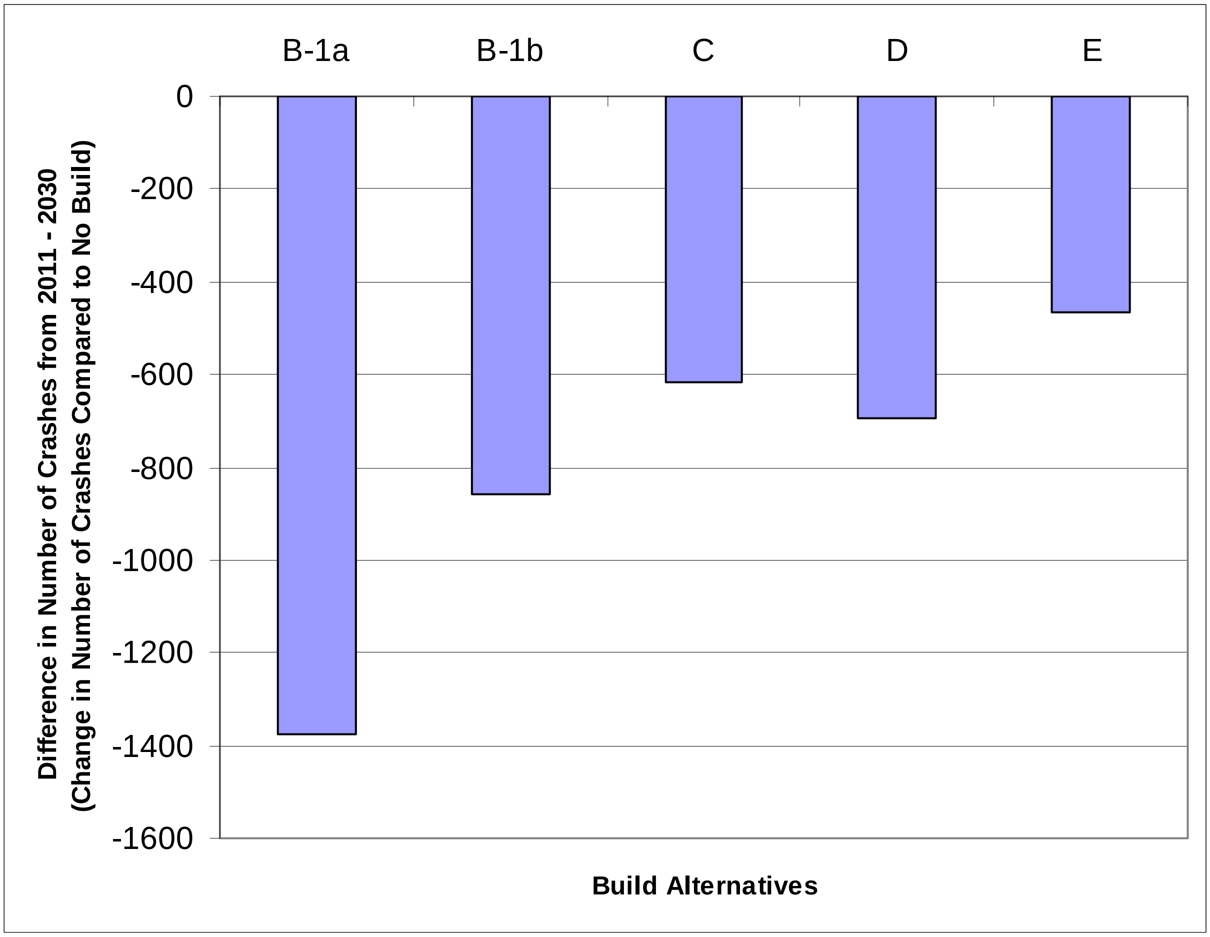
### 4.3.3 Safety

#### 4.3.3.1 Crashes

Traffic safety throughout the region and project area would be affected differently in the studied alternatives. Freeway facilities have lower crash rates than non-freeway facilities. For the years 2000 – 2002, urban freeway facilities (like that proposed in the Build Alternatives) had crash rates of 1.2 crashes per million vehicle miles. Urban expressways (like the No-Build Alternative) had a rate of 2.2, nearly twice that of the urban freeways. Freeway type facilities generally also have lower severity rates (types of injury are less severe). This is due to very limited number of conflicts (low number of access points) and the fact that conflicting movements are low severity types (merging/weaving).

Attracting traffic off non-freeway facilities onto freeways lowers the overall number of crashes occurring. Figure 4-19 shows for the 20-year period from 2011 to 2030, the estimated number of crashes decreases by more than 1,300 crashes for Alternatives B-$1_a$ when compared to No-Build, by more than 600 crashes for Alternatives B-$1_b$, C, and D, and by more than 400 crashes for Alternative E. The change in number of crashes was used to evaluate the alternatives as part of the benefit-cost analysis. The benefit/cost analysis and results are discussed in Section 4.3.4.

**FIGURE 4-19**
**DIFFERENCE IN NUMBER OF CRASHES FROM 2011 - 2030 COMPARED WITH NO-BUILD[(1)(2)]**




(1) Includes the Lift Bridge being closed for two years (2020 and 2021) for rehabilitation in the No-Build Alternative, Alternative B-1b, and Alternative E.

(2) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to the trend for Alternative B-1.

The local level would also see safety benefits. Figure 4-18 in Section 4.3.1.3 shows traffic diversion decreases in all Build Alternatives as compared to No-Build conditions. By encouraging more traffic to remain on a safer facility (the freeway), the overall number of crashes in the area can be expected to decrease.

The Build Alternatives address other safety concerns through the following improvements:

- Improving mainline TH 36/frontage road intersection spacing and separation of key conflict points
- Removing signalized intersections from TH 36
- Reducing long queues/delays
- Reducing potential bicycle/pedestrian conflict with motor vehicles in downtown Stillwater (reducing forecasted traffic volumes)
- Provision for dedicated bicycle/pedestrian facilities in the TH 36 Partnership area, the river valley, and developing a regional system.

#### 4.3.3.2 Incident Management and Emergency Response

Both incident management and emergency response are affected by the studied alternatives, e.g., delay, queuing, diversion, and others. Incident management refers to the clearing of crashes and management of traffic during that time. Emergency response relates to medical, fire, and police services, among others. The No-Build Alternative does not address any of the service issues previously identified. Conditions would worsen when the Lift Bridge is closed for two years for rehabilitation; this closure would substantially affect emergency response times in Wisconsin. Conditions are substantially improved due to new river crossings in Alternatives B-1, C, and D, and to a lesser extent in Alternative E. (Traffic is still affected by Lift Bridge closures for flooding and bridge maintenance, repairs, and rehabilitation.)

### 4.3.4 Benefit/Cost Analysis

A benefit/cost analysis was completed to compare the five 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, and remaining capital value. Travel time, miles traveled, and crashes were discussed above.

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. 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. Additional detail on the benefit/cost analysis can be found in the May 2004 memorandum entitled *St. Croix River Crossing Benefit-Cost Analysis Memorandum*.

This benefit/cost analysis evaluated the marginal difference in transportation user costs between the No-Build and Build Alternatives. The results of the benefit/cost analysis are included in

Table 4-12. These results show all of the Build Alternatives are beneficial from an economic viewpoint (as compared to the No-Build Alternative), as the marginal benefit/cost ratios are greater than 1.0.

**TABLE 4-12**
**SUMMARY OF MARGINAL BENEFIT/COST RESULTS (1)**

| Alternative | Anticipated Project Cost(2),(3), (4), (5) (mil. $)(6) | Benefit/Cost Ratio(1) |
|---|---|---|
| Alternative B-$1_a$ (Lift Bridge as Bicycle/Pedestrian Facility) | \$230 to \$355 | 6.0 |
| Alternative B-$1_b$ (Lift Bridge as Vehicular Facility – Local Traffic Only) | \$230 to \$355 | 6.0 |
| Alternative C(7) | \$230 to \$285 | 7.4 |
| Alternative D | \$245 to \$310 | 7.3 |
| Alternative E(8) | \$230 to \$275 | 3.1 |

(1)Ratio is based on marginal difference when compared to the No-Build Alternative. Refer to SRF Consulting Group, Inc. technical memorandum, *St. Croix River Crossing: Benefit-Cost Analysis Memorandum*, May 5, 2004, for information on methodology and detailed results.
(2)Includes costs for construction of the TH 36 Partnership Study Area (all Build Alternatives [see Section 3.2]), TH 36/95 interchange (Oak Park Heights [all Build Alternatives]), TH 36/95 interchange (Stillwater [Alternative D]), TH 36/95 intersection (Stillwater [Alternative E]), and STH 35/64 interchange (all Build Alternatives).
(3) Does not include dollars spent on property acquisition in Minnesota and Wisconsin as part of the 1995 Final EIS Preferred Alternative.
(4) The mitigation cost estimate acknowledges there would be costs associated with mitigation items across all Build Alternatives. Specific costs for potential mitigation items will be developed prior to the release of the SFEIS.
(5) Minnesota and Wisconsin will pay for their own approach and right-of-way costs. The bridge and related mitigation items are assumed to be split 50/50 between the two states.
(6) In 2004 dollars.
(7) Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Results are anticipated to be similar to the trend for Alternative B-1.
(8) Does not include costs for replacement or future repair costs for the Lift Bridge.

### 4.3.5 Access and Local Road Connectivity

This section describes potential impacts to access and local road connectivity. Access management, for both Mn/DOT and Wis/DOT, is guided by expressed access management policies. All decisions regarding access to state highways are guided by the state access management policies.

Under the No-Build Alternative, existing access and roadway connectivity does not change geometrically; however from the user standpoint, both access and connectivity would diminish as traffic volumes rise and congestion levels increase. In downtown Stillwater, this would mean congestion spreading to more hours of the day and the need to consider traffic signals or other traffic control changes at 3rd Street/Myrtle Street, 3rd Street/Olive Street, and TH 95/Pickett Avenue North. In the TH 36 commercial area, it would mean continued degradation of operations at all at-grade intersections along TH 36 and continued problems with crossing TH 36 and accessing frontage roads.

The Build Alternatives, with the exception of Alternative E, change the main corridor from an expressway and urban arterial to a freeway-type facility. Alternative E provides a freeway-type facility for a majority of the corridor, but maintains a portion of the urban arterial through downtown Stillwater for westbound TH 36 traffic. There are substantial access changes as a result of the freeway conversion; the changes are both geometric and operational. Geometrically, access to properties along TH 36 would be more circuitous. Operationally, travel times in the TH 36 area would remain the same or improve as compared to existing conditions. The access changes can therefore be viewed as a trade off between direct access with poor traffic operations and more circuitous access with good traffic operations. These changes are further described in the following paragraphs.

#### 4.3.5.1 TH 36 Partnership Study Area (TH 5 to Osgood)

All of the Build Alternatives have the same configuration in the TH 36 Partnership Area (from TH 5 to Osgood Avenue). This section of TH 36 is upgraded from an expressway to an access-controlled freeway. One effect of this improvement is that the cross streets (Washington Avenue/Norell Avenue, Oakgreen Avenue/Greeley Street, and Osgood Avenue) no longer have direct access to TH 36. Instead, cross street access is provided through button-hook interchanges and a substantially improved frontage road system on both the north and south sides of TH 36. Frontage road improvements include realignments moving frontage road/cross street intersections farther away from TH 36 and adding traffic signals at the button-hook interchange/frontage road intersections and frontage road/cross street intersections. Specific access changes include:

- <u>Closure of the right-in/right-out access points</u> on both the north and south sides of TH 36 between Oakgreen Avenue/Greeley Street and Osgood Avenue. Interchanges are proposed for both east- and westbound traffic in this section of TH 36.

- <u>Closure of Beach Road access from TH 36.</u> Beach Road is converted to an overpass and realigned to the west, intersecting with the south frontage road at a T-intersection. The south frontage road would be extended to the east along the north end of the existing Xcel Energy landfill to Stagecoach Trail. Residential streets east of the landfill would be realigned to intersect with Stagecoach Trail at T-intersections;

- <u>Reconstruction of Lookout Trail as a cul-de-sac</u> north of the St. Croix Overlook.

Chapter 3 includes more detailed discussion and several figures showing the interchange locations and frontage road alignments in the Build Alternatives.

The TH 36 freeway conversion and all its associated changes are expected to have a positive long-term impact on access because it would allow the area to better accommodate increased growth and the associated traffic volume increases. This conclusion is supported by travel time estimates made for this area as part of the TH 36 Partnership Study (discussed in Chapter 1). In addition to travel time benefits, the proposed build configuration would provide safer access (see Section 4.3.3.1).

The improved frontage road system also improves local street connectivity. Section 4.1.5 briefly discussed that two critical local street links are missing within the project area between Oakgreen Avenue/Greeley Street and Osgood Avenue:  62nd Street on the north side of TH 36, and 57th Street on the south side. The frontage road configuration in the Build Alternatives would improve local connectivity and capture many of the short, local trips now traveling on TH 36 because of the missing links. In addition, the proposed design improves local north-south connectivity across TH 36 through construction of overpasses.

#### 4.3.5.2 TH 95 and 56th Street (CSAH 21)/Pickett Avenue (CSAH 28)

Access changes on TH 95 and in the 56th Street (CSAH 21)/Pickett Avenue (CSAH 28) area serve the same purpose for all Build Alternatives, although they differ in specifics. Each of the changes improves traffic operations in the area and allows for the construction of the full access TH 36/95 interchange (see Section 4.3.5.3).  The access changes are summarized below for each Build Alternative.  Figures illustrating the area and more detailed descriptions can be found in Chapter 3.

**Alternative B-1**

Improvements in Alternative B-1 in this area create continuous local street corridors parallel to the state's TH 36/TH 95 corridors.  The local street corridors include the frontage road on the south side of TH 36 (which becomes Stage Coach Trail as it approaches TH 95) and 56th Street (CSAH 21).  The improvements also consolidate the number of driveways on TH 95 and improve the access they provide by adding features like turn lanes or traffic signals.

- Entrances are relocated for Sunnyside Marina and Condominiums, the Metropolitan Council Environmental Services (MCES) water treatment plant, and the Dahl-Tech property. Access would continue to be off TH 95 and 14-foot wide right- (northbound traffic) and left-turn lanes (southbound traffic) would be added.  Dahl Tech would access TH 95 at the TH95/Pickett Avenue intersection;

- Construction of a left-turn lane and right-turn lane from both north- and southbound TH 95 at the Pickett Avenue (CSAH 28) intersection.  A signal would be included at the TH 95/Pickett Avenue intersection;

- Construction of Stagecoach Trail as a T-intersection with CSAH 21;

- Realignment of Pickett Avenue to the south of its existing alignment across from the King Power Plant main entrance;

- Removal of the 56th Street "slip ramp" and intersection with TH 95.

**Alternative C**

Improvements in Alternative C in this area focus on consolidating the number of driveways on TH 95 and improving the access they provide by adding features like turn lanes or traffic signals.

- Access changes are like those described for Alternative B-1 with the one exception being that the entrance to the Stillwater Municipal Barge Facility is relocated along with the others mentioned for B-1.

**Alternatives D and E**

Improvements in Alternatives D and E in this area focus on consolidating the number of driveways on TH 95 and improving the access they provide by adding features like turn lanes or traffic signals.

- Access to the Stillwater Municipal Barge Facility property, the Sunnyside property, the MCES water treatment plant, the north end of the King Power Plant (for Alternative D only), and the Dahl-Tech property would be from a frontage road constructed along the existing TH 95 roadway alignment. This frontage road would be accessible from an intersection with the ramps from the modified single point interchange with TH 36 and TH 95. Additional full movement access to the Stillwater Municipal Barge Facility property to the north is not feasible because of the TH 36/95 interchange location.

### 4.3.5.3 TH 36/95 Interchange

The Build Alternatives also improve the access provided at the TH 36/95 interchange. Section 4.1.1.1 describes how TH 95 south of the existing TH 36/95 interchange does not have direct access to or from TH 36. All of the Build Alternatives add this access. Traffic signals are also anticipated to be justified on TH 95 at the interchange ramp terminals.

### 4.3.5.4 Downtown Stillwater

Physical access changes in downtown Stillwater focus on use of the Lift Bridge. Alternatives B-$1_a$, C and D propose using the Lift Bridge as a dedicated bicycle/pedestrian facility[10]. If this were done, direct access would no longer exist between downtown Stillwater and the Town of St. Joseph. Instead, access would be provided via the new river crossing. The Lift Bridge in Alternative B-$1_b$ would continue to provide this access to local traffic; however, the Lift Bridge would no longer directly access STH 64. The Lift Bridge in Alternative E would provide a direct link for westbound STH 64 traffic only between the Town of St. Joseph and downtown Stillwater. This alternative would have some impacts to local circulation patterns and would require removal of parking on one side of the street in the downtown area.

Although the physical infrastructure of downtown Stillwater would not change aside from use of the Lift Bridge and added traffic signals, businesses and residents may perceive a loss of direct access to TH 36 because of the route changes proposed in the Build Alternatives. Chapter 5 discusses the economic effects of this change on downtown Stillwater.

### 4.3.5.5 Wisconsin Approach Roadways

[10] Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Access in downtown Stillwater would be similar to that described for Alternative B-$1_b$.

Like the TH 95 area, access changes on the Wisconsin approach roadways serve the same purpose for all Build Alternatives, although they differ in specifics. The purpose of the Wisconsin improvements is to safely separate high-speed, regional traffic traveling through the area from lower-speed, locally-oriented traffic. This area is characterized by agricultural/rural residential development. Access to STH 64 and STH 35 is important for the area; however, direct access is less important because of its agricultural/rural residential character. Each Build Alternative includes realigning STH 64 and converting it to an access-controlled freeway, adding a STH 35/64 interchange, and creating a parallel, local street system for local access. The specific access effects and configurations of each alternative are summarized below. Figures illustrating the area and more detailed descriptions can be found in Chapter 3.

**Alternatives B-1 and C–Option 1**

Alternatives B-1 and C-Option 1 have the same specific effects on access. Two options have been studied for the Wisconsin approach roadway alignment in Alternative C. Chapter 3 describes the two alignment options in detail. The essential difference is that C-Option 1 includes curves that give the alignment a north-south orientation, while the C-Option 2 alignment has minor curves and is oriented northeast-southwest. Access changes in Alternatives B-1 and C-Option 1 include the following:

- STH 64 is realigned south and east of Houlton and converted to an access controlled freeway;
- A STH 35/STH 64 diamond interchange is constructed. Traffic signals or a roundabout are included at the ramp terminals;
- STH 35 is rerouted on a realigned portion of CTH E. A new two-lane roadway would be constructed between the existing CTH E and the relocated STH 35/CTH E across from Houlton Elementary School. The existing CTH E would be constructed as a cul-de-sac east of the school;
- A traffic signal or roundabout would be installed at the intersection of STH 35 and STH 35/CTH E. The existing STH 35 roadway north of the intersection into Houlton would be converted to a local road;
- Where the proposed STH 35/64 roadway returns to the existing alignment, the former STH 35/64 roadway would be continued to the east as a new frontage road paralleling STH 35/64 and terminating as a cul-de-sac north of 20th Street. The former STH 35/64 roadway would be converted to a frontage road south of STH 35/64 to provide local access between 13th Street and 20th Street;
- Local access to private property would be provided by these local roads; no access to private property would be allowed on the new STH 35/64; restricted access would be allowed on the reconstructed portions of STH 35 and CTH E.

**Alternative C-Option 2**

Generally, the access changes in Alternative C-Option 2 are similar to C-Option 1. Changes unique to C-Option 2 include the following:

- The STH 35/STH 64 interchange has the configuration of a folded diamond interchange located at STH 35. Traffic signals or a roundabout are included at the ramp terminals;
- The new STH 35/64 overpasses the existing CTH E;
- Existing STH 64 is removed from the Lift Bridge to STH 35;
- The far end of CTH E at its intersection with STH 64 to State Street would be removed and reconstructed like B-1.

**Alternatives D and E**

Alternatives D and E have the same specific access configuration in Wisconsin. Access changes in these alternatives include:

- A diamond interchange is constructed at realigned STH 35 northeast of Houlton. Traffic signals or a roundabout are included at the ramp terminals;
- STH 35 is realigned east of Houlton with an at-grade intersection with CTH E;
- A local road connection is added from the interchange north to the existing STH 35/64 roadway;
- Existing STH 35 is converted to a local road, forming a T-intersection with the STH 35 bypass and realigned to pass over the new STH 64 in Houlton;
- STH 64 is reconstructed as an access controlled freeway;
- CTH E would be removed from STH 64 to State Street. A connection between CTH E and State Street would be constructed;
- Frontage roads would be constructed along STH 35/64 northeast of Houlton for local access as described for Alternative B-1. Local access to private property would be provided by these local roads. No access to private property would be allowed on the new STH 35/64 roadway; restricted access would be allowed on the reconstructed portion of STH 35.

### 4.3.6 Vehicular Energy Consumption

Roadway projects consume energy both directly and indirectly. Energy is directly consumed by vehicles traveling the roadway as well as fuel that would be consumed by vehicles using alternate routes in the corridor. Indirect impacts are defined as the energy required to construct and maintain the roadway, the energy required to manufacture and maintain vehicles using the roadway, and the energy required to convert land to transportation use.

The Build Alternatives are expected to generate shifts in traffic patterns between the I-94 and TH 36 crossings of the St. Croix River. Potential transportation energy consumption impacts on the Build Alternatives and on the No-Build Alternative were compared by estimating consumption based on results from regional traffic forecasting.

Regional energy consumption would be reduced for the Build Alternatives as compared to No-Build. This energy decrease would result from fewer vehicle miles of travel overall; traffic would use a less circuitous route for river crossings (i.e., TH 36 instead of I-94) as compared to No-Build conditions. In other words, the energy savings that would result from decreased use of circuitous routes would outweigh the increased energy by the increase in traffic drawn back to the improved roadway.

Although the Build Alternatives would result in indirect energy use (e.g., from new construction) that would not result from the No-Build Alternative (maintenance only), this energy use would be offset by the direct (operational) energy savings from the Build Alternatives. Operational savings result from fewer vehicle hours and/or fewer vehicle miles being traveled under Build conditions as compared to No Build (see Figures 4-16 and 4-17). As a result, the Build Alternatives are expected to result in long-term net indirect energy savings over the life of the project when compared to the No-Build Alternative.

### 4.3.7 Alternate Mode Systems

#### 4.3.7.1 Transit

As discussed earlier, the studied alternatives include no direct changes to the transit system. However, the transit system does operate on the roadways; roadway infrastructure and congestion have effects on transit. Infrastructure, delays, and congestion in the No-Build Alternative would adversely affect the efficiency of the transit system. The Build Alternatives substantially improve traffic flow and congestion, thereby providing favorable roadway conditions for transit. Although the Build Alternatives design does not include bus-only shoulders on TH 36, the design also does not preclude construction at such time that demand warrants. Additional study of transit issues will be completed as part of the St. Croix Valley Transit Feasibility Study to be conducted in Summer 2004.

#### 4.3.7.2 Bicycle/Pedestrian System

The bicycle/pedestrian-oriented infrastructure associated with each alternative is described in Section 4.2.2.1. The No-Build Alternative does nothing to change this infrastructure. Bicyclists and pedestrians would continue to be forced to deal with large volumes of high-speed traffic in the TH 36 Partnership Study Area. They would also be forced to continue dealing with large volumes of frustrated motorists in downtown Stillwater.

The Build Alternatives have different effects on bicycle/pedestrian facilities. All Build Alternatives improve bicycle/pedestrian infrastructure in the TH 36 partnership area and create a loop system providing regional connections. However, effects differ for downtown Stillwater. Alternatives $B\text{-}1_a$, C, and D route TH 36 outside of downtown Stillwater, decreasing traffic volumes as compared to the No-Build Alternative[11]. The potential for pedestrian/vehicle conflict

[11] Note that continued use of the Lift Bridge for local motor vehicular traffic is also possible in Alternative C. Effects would be similar to those described for Alternative $B\text{-}1_b$.

decreases correspondingly. Alternatives B-$1_b$ and E continue to route substantial amounts of traffic through downtown Stillwater. Although the downtown traffic volumes are higher than for the other Build Alternatives, they are lower than those forecasted for the No-Build Alternative.

All of the Build Alternatives improve bicycle/pedestrian safety in the area of the Houlton Elementary School on the Wisconsin side of the project.

#### 4.3.7.3 Navigational and Recreational Boating

Under all Build Alternatives (B-1, C, D, and E) and the No-Build Alternative the Lift Bridge would remain in place; however, there are differences in the way the Lift Bridge would function. Under No-Build conditions, Alternative B-$1_b$, and Alternative E, the Lift Bridge would remain open to motorized transportation. As such, the Lift Bridge would continue to operate in much the way it does presently in terms of posing a navigational obstruction, i.e., it would remain lowered primarily and be opened to allow boats to pass beneath it. It is likely that the deck lifts would continue to occur at scheduled times during the day for the No Build Alternative and Alternative E; the deck may lift on demand in Alternative B-$1_b$ and C if used for local traffic.

Under Alternative B-$1_a$, C, and D conditions, the Lift Bridge and its causeway would remain in place, affording a connection between Minnesota and Wisconsin. However, under these alternatives, only non-motorized (bicycle and pedestrian) traffic would be allowed on the Lift Bridge[12]. There may be an opportunity, under theses conditions, to modify the U.S. Corps of Engineers operating permit to afford greater opportunities for boats to pass (possible lift on demand).

Impacts on navigation during construction of the Build Alternatives would be minimized by maintaining an open channel for boat traffic at all times during the navigation season, in coordination with U.S. Coast Guard and any other affected agencies. Construction equipment in the river and other potential impediments to navigation would be equipped with required safety markings (e.g., lights, reflective devices, etc.).

### 4.3.8 Compatibility with Regional Transportation Plans

#### 4.3.8.1 Roadways

The different alternatives were reviewed with respect to their compatibility with established regional transportation plans. TH 36 is a principal arterial on the National Highway System (NHS) route and a medium priority interregional corridor (IRC) in the Minnesota Interregional Corridor system. The portion of STH 64 that is within the project area is designated as a principal arterial NHS route and a Connector Route in the Wisconsin 2020 State Highway Plan, indicating it plays an important role in connecting key local communities and regional economic centers to the main highway system.

Each of the roadway designations includes performance criteria. According to the American Association of State Highway and Transportation Officials (AASHTO), traffic traveling on principal arterials shall do so at a minimum of 45 miles per hour (mph). According to the Minnesota Interregional Corridor plan, traffic traveling on medium priority IRCs shall do so at

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[12] See note number 8.

average speeds of 55+ mph. And, according to the Wis/DOT Corridors 2020 Plan, *"The highest level of service thresholds are applied to the Corridors 2020 system in recognition of its importance from a mobility and economic development perspective. On Corridors 2020 routes, only 'minimal' congestion is allowed, except on Connectors within urbanized areas, where slightly higher levels are permitted."*

The No-Build Alternative is less consistent with these goals and objectives. Under No-Build conditions, TH 36 would have difficulty in meeting Minnesota performance targets (Mn/DOT and AASHTO) and STH 64 would not comply with Wisconsin's Corridors 2020 performance standards. Traffic traveling on TH 36 in the project area would likely have problems with achieving the 45 mph operational speed set by AASHTO, although speeds on the TH 36 corridor from I-694 to the St. Croix River crossing may or may not average 55 mph (Mn/DOT's medium priority IRC target, depending on improvements made in other parts of the corridor). Intersection operations analysis showed STH 64 intersections would operate at LOS E in 2030 under No-Build conditions, indicating substantial congestion in this ***rural*** area.

Alternatives B-1, C, and D are more compatible with regional transportation plans, with Alternative E complying, but to a lesser extent (because of westbound TH 36 traffic continuing to travel through downtown Stillwater).

Mn/DOT anticipates updating the TH 36 IRC Management Plan for the corridor (I-694 to the St. Croix River Crossing) after the completion of the St. Croix River Crossing Project.

#### 4.3.8.2 Alternate Modes

The No-Build Alternative is not compatible with some regional transportation plans for alternate modes of transportation, but the Build Alternatives are compatible with them. Specifically, the No-Build Alternative is not compatible with bicycle/pedestrian facilities called out for TH 36 in the City of Stillwater 1995 Comprehensive Plan. The plan shows a City Pathway/Bikeway located parallel to TH 36. The close proximity of TH 36 and its frontage roads, the high speeds and traffic volumes, and the confusing cross street intersections make construction of a city bikeway within the TH 36 corridor impractical in the No-Build condition.

### 4.3.9 Summary of Effects

The studied alternatives have varied effects on the different components of the area's transportation system. Table 4-13 summarizes the effects on analyzed components from the transportation perspective. The transportation components were collectively evaluated and a rating of good/fair/poor assigned based on each alternative's performance in comparison to accepted standards of performance and professional judgment where standards are not available.

**TABLE 4-13**
**SUMMARY OF 2030 TRANSPORTATION ANALYSIS**

| Attributes | Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | No-Build | B-$1_a$ | B-$1_b$ | C[(1)] | D | E |
| *Traffic Operations* | | | | | | |
| Regional River Crossings | Poor | Good | Good | Good | Good | Fair |
| Local Intersections | Poor | Good | Fair | Good | Fair | Fair |
| Local Freeway | N/A | Good | Good | Fair | Poor | Good |
| *Safety* | | | | | | |
| Crashes | Poor | Good | Fair | Fair | Fair | Fair |
| Incident Management/Emergency Response | Poor | Good | Fair | Good | Fair | Fair |
| *Benefit-Cost Analysis* | N/A | Good | Good | Good | Good | Fair |
| *Access and Local Road Connectivity* | Poor | Good | Good | Good | Good | Fair |
| *Vehicular Energy Consumption* | Poor | Good | Good | Good | Good | Fair |
| *Alternate Mode Systems* | | | | | | |
| Transit | Poor | Good | Good | Good | Good | Good |
| Bicycle/Pedestrian | Poor | Good | Fair | Good | Good | Fair |
| Navigational and Recreational Boating | Poor | Good | Fair | Good | Good | Poor |
| *Compatibility with Regional Plans* | Poor | Good | Good | Good | Good | Fair |

(1) Results for Alternative C including use of the Lift Bridge for motor vehicle traffic are anticipated to be like the results shown for Alternative B-$1_b$.

● Good
⊙ Fair
○ Poor

## 4.4 MITIGATION OF IMPACTS ON TRANSPORTATION SYSTEM

Potential mitigation items applicable to all Build Alternatives are described in Chapter 14. Upon identification of a Preferred Alternative, a mitigation package, appropriate to the level of impacts, will be identified by the lead agencies from the list of mitigation items as well as additional mitigation items identified by agencies or the public during the SDEIS comment period. Additional potential impacts associated with the mitigation package items for the Preferred Alternative will be presented in the Supplemental Final EIS.