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Grand Forks - East Grand Forks
Metropolitan Planning Organization

U.S. Highway 2 (Gateway Drive)

Access Management Study
FINAL REPORT

East Grand Forks, Minnesota

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Prepared for:

Grand Forks – East Grand Forks
Metropolitan Planning Organization
255 North 4th Street - P.O. Box 5200
Grand Forks, ND 58206-5200

Prepared by:

HDR Engineering, Inc.
6190 Golden Hills Drive
Minneapolis, MN 55416

and

Floan-Sanders, Inc.
1600 Central Avenue
East Grand Forks, MN 56721

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CHAPTER 1: INTRODUCTION

1.1 STUDY PURPOSE

In 1994, the Grand Forks – East Grand Forks Metropolitan Planning Organization (MPO) prepared a corridor study in anticipation of the planned reconstruction of a portion of this corridor within city limits in 1997. This study was developed cooperatively with Mn/DOT District 2 representatives and ultimately recommended ¼-mile spacing of access. However, prior to construction, the flood of 1997 occurred. Construction of the corridor was delayed as a result. In the meantime, Mn/DOT developed Access Management Guidelines that provide recommendations for spacing on the state highway system. In the process of developing these guidelines, the future recommendations were implemented in the design of the reconstruction of the corridor. Subsequently, some previously agreed to recommendations in the 1994 study were removed as part of the reconstruction project.

In 2002, Mn/DOT released the Access Management Guidelines. The designation of this portion of US Highway 2 (Gateway Drive) was placed as Urbanizing. The MPO discussed this designation with Mn/DOT District 2 and it was agreed to leave this designation and to work cooperatively on developing an alternative plan for this corridor as provided for as a Category 7 within the guidelines. Accordingly, the MPO included within their next Work Program (2005-2006) to do an Access Management Study to fulfill this agreement with Mn/DOT District 2.

For this purpose, the MPO cooperatively worked with District 2 in developing the RFP and the scope of work for this study. Through this process, the consulting team of HDR Engineering, Inc. and Floan-Sanders, Inc. was selected to prepare an updated access management plan to determine the most appropriate long-term highway access for this corridor. This study shall act as the Specific Access Management Plan to designate Gateway Drive 2 in East Grand Forks as a Category 7 and, thus, subject to the access guidelines dictated within this report.

The access guidelines for the Category 7 designation, inherent to this study, reviewed access needs as they relate to identified system deficiencies. There is a parcel of land on the south side of Gateway Drive, near the 2nd Avenue NE intersection, that will be reviewed. In addition, the capacity of Gateway Drive and Central Avenue are taxed during annual flood events that close River Road, necessitating the review of access considerations west of Central Avenue. These issues and others will be addressed within this study.

The limits of the study are from Reference Point 0.000+00 to 1.875+00, or more commonly known as the middle of the Kennedy Bridge over the Red River of the North to the east corporate limits of the City of East Grand Forks.

1.2 STUDY METHODOLOGY

This study is based on the principles of traffic operations and safety analyses. Wherever applicable, comparisons to traffic operations are rooted in the Highway Capacity Manual (HCM). These principles are reflected in Synchro, Mn/DOT's preferred analysis software.

The safety analysis is based on Mn/DOT guidance, standards, and averages where available. Wherever Mn/DOT data are not available, the sources have been cited in Federal documentation.

The overall administration of the study involved the consulting team taking direction from the MPO's pre-established Technical Advisory Committee (TAC). Under the direction of the TAC, input from the public was sought through two public input forums. The identification of alternatives was developed after the first public forum, which is documented in this report.

1.3 PRINCIPLES OF ACCESS MANAGEMENT

After nearly 25 years of safety research, many traffic professionals agree in the link between the density (and therefore management) of access and the safety of roadways. In 1998, Mn/DOT began an aggressive study concluding in Research Report No. 1998-27 entitled "Statistical Relationship between Vehicular Crashes and Highway Access."[1] This research analyzed a 766-mile sample of Mn/DOT's 12,000-mile trunk highway system and conducted statistically supported testing of crash data and field observations that for the first time documented the link between access and safety in Minnesota. The results of this report included:

- Documentation that, on average, Mn/DOT trunk highways have an access density of 8 accesses per mile in rural areas and 28 accesses per mile in urban areas.
- A definitive relationship between the crash rate and access density in 10 out of 11 categories studied.

In March 2002, Mn/DOT's Office of Investment Management released guidelines to aid roadway designers and government officials in determining the appropriate level of access spacing for trunk highways in Minnesota. This effort followed the Interregional Corridor (IRC) campaign that studied trunk highways throughout Minnesota as having various levels of importance for the commerce of the state.

Mn/DOT's Access Spacing Guidelines were applied to all trunk highways in Minnesota, and based these guidelines, it was determined that the limits of Gateway Drive within this study area would be classified as a "Category 2B" highway. However, recent discussions pertaining to

[1] Mn/DOT Research Report No. 1998-27. "Statistical Relationship between Vehicular Crashes and Highway Access."

additional access to the highway and modifications to the City's flood mitigation plan have raised the issue of modifying the access category of the highway; this modification would be to Category 7. More detail on these highway designations can be found in Section 2.2.

One of the fundamental elements of Mn/DOT's Access Spacing Guidelines is the inherent dissuasion of full access in lieu of partial access. Based on the same crash data samples that led to the documentation in Minnesota of higher access density having higher crash rates, Mn/DOT concluded that some intersection movements are more hazardous than others. For example, minor street crossing movements and left turns onto the major street were documented to be the most hazardous. Conversely, left turns from the major street are less hazardous and right turn movements in all directions are the least hazardous[2]. Supported further by FHWA[3], this basis of conflict points leading to potential crash locations concluded that preventing more hazardous movements at intersections will lower the crash rate.

[2] Mn/DOT Traffic Safety Fundamentals Handbook (2001) – Page C-05
[3] FHWA Publication FHWA-RD-91-048 (1991)

CHAPTER 2: EXISTING CONDITIONS

2.1 MN/DOT ACCESS SPACING GUIDELINES

In March 2002, Mn/DOT released "Access Category System and Spacing Guidelines" developed as an appendix to Technical Memorandum 02-10-IM-01. The focus was to provide a framework for access spacing criteria on the State Trunk Highway system as described in Section 1.3. The study segment of Gateway Drive was classified as Category 2B, which includes the following guidance, presented in Table 2.1.

Table 2.1
Mn/DOT Access Spacing Guidelines – Category 2B

Access Measure	Mn/DOT Category	Applicability to Study Area
Area Type	Urban/ Urbanizing	Considered between the urban core and the city limits, or the developing area of the city
Functional Classification	Principal Arterial	Gateway Drive is classified as a principal arterial by Mn/DOT and the MPO
Statewide Importance	Medium Priority IRC	Gateway Drive is a major interregional corridor between East Grand Forks and Duluth. Mobility and safety of through traffic is the highest priority
Posted Speeds	40-55 MPH	The corridor is posted between 35 and 65 MPH
Primary Full Movement Intersections	½ mile	Existing access spacing is already longer in some cases than Mn/DOT's guidelines. This does not suggest access should be added for the sake of spacing
Conditional Secondary Access	¼ mile	
Signal Spacing	Strongly Discouraged	Two signals are already in place (TH 220 and 5th Avenue NE). It is likely this measure is based on travel times more than safety
Private Access	By Exception Only	Private access should continue to be discouraged and reserved for extremely low volume cases where other access is not possible (i.e. substations, etc.)

With the 2002 guidelines, Mn/DOT established a method for local units of government to apply a more specific access management planning strategy. This process requires the responsible local unit of government to provide a study that is aimed at documenting the appropriate level of accessibility to the trunk highway. The process used to establish this new category is contained within this report.

If this access management plan is adopted by the Grand Forks – East Grand Forks MPO and is accepted by Mn/DOT, then it would provide a change in classification for Gateway Drive from Category 2B to Category 7 – "By Adopted Plan." Category 7, as referenced on page 2, supersedes any other classification category because it provides a more specific vision for access management. The details of the access management plan for Gateway Drive can be found in Chapter 8 of this report.

2.2 ROADWAY CHARACTERISTICS

U.S. Highway 2 is a four-lane divided highway throughout the study area. The nearly 1.9-mile segment of study area is part of one of the most famous highways in the northern United States. The "Hi Line" (Highway 2) connects the upper peninsula of Michigan with the State of Washington largely parallel to James J. Hill's original Great Northern Railroad. On a regional level, Highway 2 connects the regional centers of Grand Forks and East Grand Forks with other important centers of trade including Devil's Lake, Minot and Williston to the west, with Crookston, Bemidji, Grand Rapids and Duluth to the east. The four-lane section through the study area is nearly contiguous across all of North Dakota and northwestern Minnesota with the exception of some rural two-lane segments (east of Cass Lake) and urban one-way streets in Crookston.

In the study area, Gateway Drive is typically an urban section with raised medians in the western half of the area, from about 2nd Avenue NE to the western limit. The eastern segment is a rural section and is posted at 65 mph, compared to the 35 mph segment in the urban section.

Gateway Drive is a primary route for east-west truck operations, as it is the only four-lane bridge crossing between Grand Forks and East Grand Forks. Most notably is the use by truckers destined for the East Grand Forks sugar beet facility south of Gateway Drive on 5th Avenue NE.

2.2.1 Functional Classification

Gateway Drive is classified as a principal arterial by Mn/DOT and the MPO. Gateway Drive is the only east-west principal arterial in the City of East Grand Forks.

Mn/DOT has further classified Gateway Drive as a Medium Priority Interregional Corridor. This is due to its economic importance to the region and its connection with regional centers of trade. As such, this segment of roadway is currently classified as "Category 2B" of Mn/DOT's Access Spacing Guidelines.

2.2.2 Roadway Access

The Gateway Drive corridor has a number of access points within the designated study boundary, all of which are public roadway intersections and not access driveways to developments adjacent to the highway. From west to east along the corridor, these intersections (or access points) are as follows:

- River Road/4th Street NW/8th Street NW
- 5th Avenue NW
- Central Avenue (also Trunk Highway 220 to the north)

- 2nd Avenue NE
- 5th Avenue NE
- 7th Avenue NE
- 11th Avenue NE
- Substation access

Access control along Gateway Drive in East Grand Forks has been established by limiting access to only those city streets that carry a classification of Collector or higher. The only exception to this rule is that the city's power substation just east of town has its own access onto Gateway Drive. The access control along Gateway Drive generally follows the Category 2B access guidelines, with the exception of the spacing between Central Avenue and 2nd Avenue NE and between 5th Avenue NE and 7th Avenue NE; in both cases, the spacing is less than ¼-mile. Figure 2.1 illustrates the spacing between all accesses within the study area. Two intersections along Gateway Drive are signalized, including Central and 5th Avenue NE. It is logical that the Central Avenue intersection would be signalized as Central serves as the lone north-south arterial through town. The 5th Avenue NE intersection was signalized in 2003 to address safety concerns at this intersection.

The western most access is a controlled, grade-separated half-interchange with River Road/4th Street NW. This interchange has a westbound on-ramp and an eastbound off-ramp. The off-ramp, at its intersection with 4th Street NW, is under stop control. There is an off-ramp from westbound Gateway Drive near River Road/4th Street NW, but the ramp connects to 8th Avenue NW and provides circulation into the North neighborhood.

To the east, the next access is a right-in/right-out (RIRO) intersection with the south leg of 5th Avenue NW. There is a deceleration lane on Gateway Drive for the eastbound to southbound turning movement, effectively removing any vehicles that would be slowing to make a right turn from the through traffic on Gateway Drive. 5th Avenue NW is under STOP control at this intersection. The north leg of this street is not currently connected to Gateway Drive, but there is a westbound off-ramp (about 600 feet west of 5th Avenue NW) that connects directly to the frontage road on the north side of the highway and ultimately to River Road. Between Central Avenue and the River Road/4th Street half-interchange, this off-ramp is the only connection to the street network in the northwest part of the City as well as the last place to exit Gateway Drive before crossing over the river and entering Grand Forks.

Central Avenue (also know as TH 220 to the north) is a major signalized intersection in East Grand Forks and is essentially the dividing point of Gateway Drive; to the west of Central Avenue, the land use is primarily residential, while the land use to the east of this intersection is

primarily commercial/industrial. The majority of traffic in the East Grand Forks area is funneled through this intersection. Each approach of this intersection provides two through lanes and dedicated turn lanes for right and left turning vehicles.

2nd Avenue NE intersects Gateway Drive on the north, forming an unsignalized T-intersection. This is a ¾-movement intersection, which means that there are no minor street left-turns allowed; the southbound to eastbound movement is prohibited. All other turning movements (right turn from westbound Gateway Drive, left turn from eastbound Gateway Drive, and right turn from southbound 2nd Avenue) are allowed. There is no connection to the south. The parcel of land located there (adjacent to Gateway Drive) is partially vacant.

5th Avenue NE is a full-movement, signalized intersection. The minor legs (north- and southbound 5th Avenue) provide one shared lane for all movements (left-through-right). The eastbound approach provides two through lanes and separate left and right turn lanes. The westbound approach provides a left turn lane, a through lane and a shared through-right turn lane.

7th Avenue NE and 11th Avenue NE are full-movement, unsignalized intersections with the minor legs under stop control. The lane geometry at 7th Avenue NE is identical to that at 5th Avenue NE. At the 11th Avenue NE intersection, the eastbound and westbound approach geometrics are identical, providing a shared through-left turn lane and a shared through-right turn lane.

It is worth noting that the 7th Avenue NE and 11th Avenue NE intersections are flanked on the north and south by frontage road intersections that are very close to their respective intersections with Gateway Drive. In regards to existing conditions, the volumes in those areas are low.

Within the study area, no parcel of land adjacent to the highway has direct access to Gateway Drive. Every development along the corridor is serviced either by the frontage road (north or south frontage road) or by the local street network.

2.2.3 Roadway Geometry and Traffic Control

The existing roadway geometry and intersection traffic control is documented in Figure 2.1. Generally, major access points have left and right turn lanes. Two traffic signals are currently operating along the corridor: one at TH 220 (Central Avenue)/DeMers Avenue and one at 5th Avenue NE.

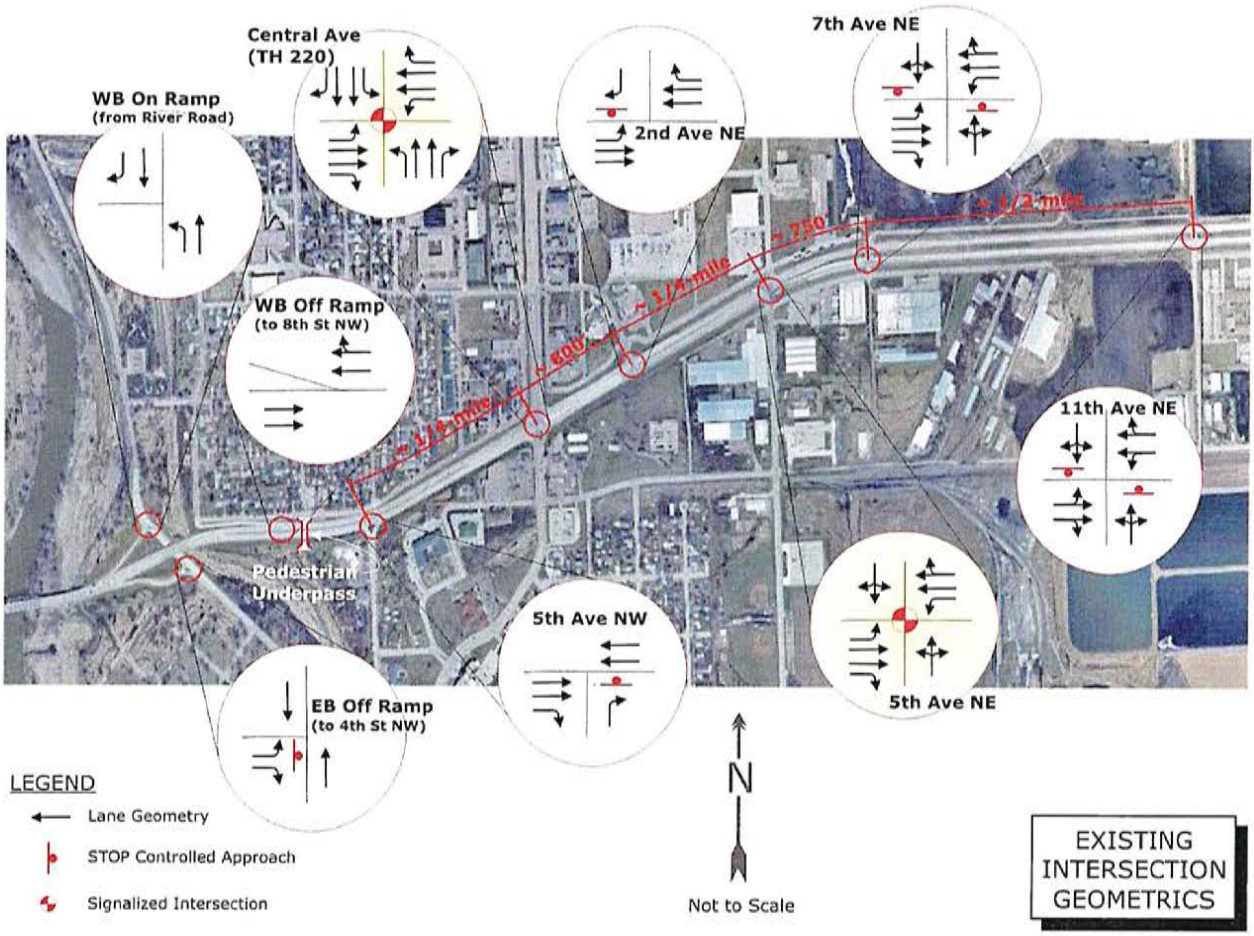
2.2.4 Pedestrian/Bicycle Accommodations

Mn/DOT designed and constructed a pedestrian underpass under Gateway Drive between River Road/4th Street NW and 5th Avenue NW. This underpass, shown in Figure 2.1, provides a grade-separated crossing of Gateway Drive that connects the residents, New Heights Elementary and the high school on the north side of Gateway Drive with the community pool, many parks, the library and the downtown shops and restaurants on the south side of Gateway Drive. Unfortunately, many pedestrians can still be seen crossing Gateway Drive at-grade, despite high speed and sometimes heavy traffic along Gateway Drive. Research into the limited use of this underpass has unearthed anecdotal evidence that pedestrians don't feel safe using it because it is poorly lighted and cyclists avoid using it due to the tight curves and resulting poor sight distance entering and exiting the underpass.

2.2.5 Effects of a Border City

It is important to note that the western project limits of this study lie in North Dakota and thus an entirely different access management standard. As it proceeds across the Kennedy Bridge into North Dakota, this corridor operates like an urban core, where each individual parcel has an individual private access and, in many cases, multiple accesses. This is noteworthy not to suggest that East Grand Forks should change its designation to Urban Core, but rather that deviations from the Urbanizing standards would not be out of character along this portion of the corridor.

Figure 2.1
Intersection Geometrics



2.3 TRAFFIC CHARACTERISTICS

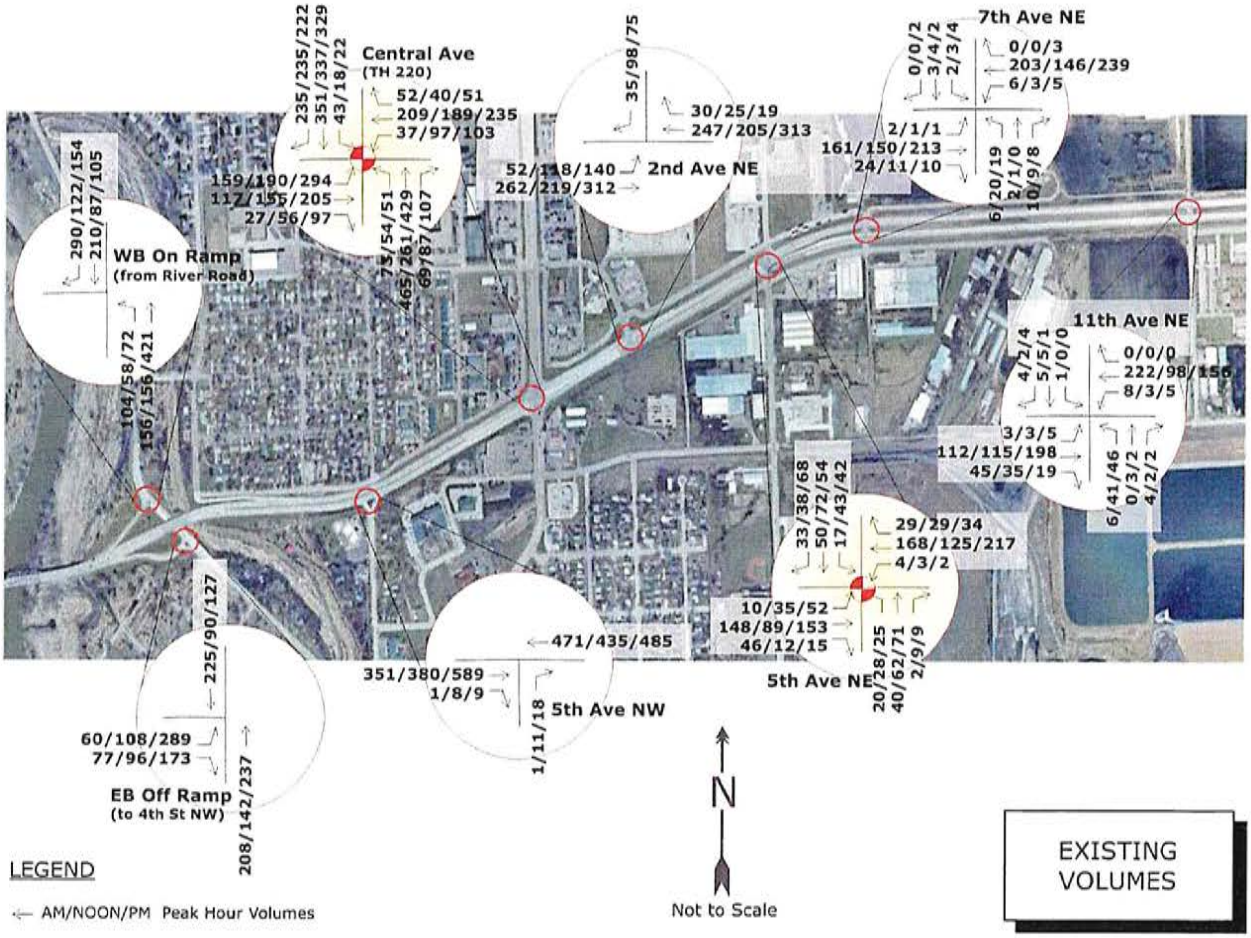
No inventory of vehicle type or fleet characterization data was collected as part of this study. However, based on a review of ADT data and observations from local representatives, the following generalities can be made of the traffic characteristics of the corridor:

- Large portions of the trips along Gateway Drive are local trips, especially on the west end of the study area. More than 21,000 vehicles per day cross the Red River of the North, whereas the ADT drops to more than 4,600 by the east end of the corridor.
- Commercial traffic is a major component and is largely tied to seasonal harvest. Truck traffic also uses Gateway Drive as a haul route between Gateway Drive20 and 5th Avenue NE. Truck traffic comprises between 8.5 and 9.5 percent of the traffic along Gateway Drive.

2.3.1 Existing Turning Movements

Existing traffic volumes along Gateway Drive, within the boundaries of this study, were collected by the MPO in April 2005. Peak period turning movement counts on the study corridor were conducted during the morning (AM), midday (MD) and evening (PM) peak periods at each of the six (6) mainline intersections, as well as the two (2) ramp terminals at the 4th Street NW/River Road interchange. AM peak period counts were collected between the hours of 7 AM and 9 AM, midday peak period counts were conducted between the hours of 11 AM and 1 PM, and the PM peak period counts were conducted between the hours of 4 PM and 6 PM. The raw data of these counts can be found in Appendix A. These times were chosen so that traffic volumes would be representative of "typical" peak hour traffic conditions in the corridor. The resulting peak hour volumes can be found in Figure 2.2.

Figure 2.2
Existing Volumes



2.3.2 Existing Average Annual Daily Traffic

In addition to the peak period turning movement counts, daily traffic volumes on Gateway Drive were also utilized in this study. These volumes were provided by the MPO, in the form of an average annual daily traffic (AADT) map for East Grand Forks. The volumes on the AADT map were recorded in 2001, although it was assumed that the daily volumes have not changed much since then and were, therefore, valid to use for a study of "existing" conditions. In cases where data was missing on the cross streets, the peak hour counts and the mainline AADT info was used to determine what percent of the AADT occurs during the peak hour on the mainline. Based on the minor street turning movements (as collected in April) and percentages, the AADTs on each of those streets were calculated. The 2001 ADT Map and calculations for other AADTs can be found in Appendix A.

As an IRC on Mn/DOT's trunk highway system, truck traffic along Gateway Drive is significant. Volumes provided by Mn/DOT indicate that truck traffic comprises between 8.5 and 9.5 percent of all traffic along Gateway Drive through East Grand Forks. These truck volumes can be found in Appendix A. Truck-volume percentages were used throughout this study's analysis, as will be discussed in detail later in this report.

2.4 LAND USE CHARACTERISTICS

The existing land use along the corridor transitions as it proceeds through the city. Starting at the western study limits, the land use consists of park & recreation. This area has expanded since the flood due to the buy out of residential homes that existed in low elevation areas. To the east of River Road on the north side of the roadway, single family residential homes line the roadway buffered by a frontage road. Just east of 5th Avenue NW, multi-family homes begin. On the south side of the roadway is the Sherlock Pool on the west side of 5th Avenue NW. Single-family homes line 5th Avenue NW on the east side of the roadway. Continuing to the east is Sunshine Terrace, which is an elderly housing complex. As we come to the Central Avenue corridor, commercial uses line the roadway to the north and south. The commercial land continues to the east of 5th Avenue NE on the north side of the corridor. On the south side of the corridor, industrial areas dominate the land use to the end of the study limits.

As can be seen on the first page of the existing land use plan sheets, the new flood protection dike is located just east of the overpass of Gateway Drive and River Road/4th Street NW. Because of the dike location, when the river rises past flood stage, the on and off ramps have to be closed because the water collects under the overpass. This means that, during flood conditions, the only access to the north end of East Grand Forks is Central Avenue.

2.4.1 Planning and Zoning

Many changes have occurred along this corridor because of the flood. As discussed earlier, residential neighborhoods have been removed in the western edge of the study area. In addition, after the flood, the city has focused on the redevelopment of the downtown commercial district. However, the flood also reduced the size of the downtown. This has resulted in the commercial areas expanding into a downtown fringe area along DeMers Avenue. Some of this expansion exists on the south side of the corridor to the west of the Central Avenue corridor. The city is now looking at just a few commercial areas remaining for development.

Future planning shows little change in the zoning around the corridor, with the exception that the area south of Gateway Drive, between Central Avenue and 5th Avenue NE, will redevelop from industrial to commercial. This site currently exists as old potato warehouses that are no longer in high demand with the recent market changes. With continued growth, the agricultural sections east of the City will likely change to industrial areas. Just east of Central Avenue on the south side of Gateway Drive, there is an area of industrial land use between two commercial areas. The City would like to redevelop this area into more commercial space in the hopes of enticing a "big box" retail store to the area. For this redevelopment, access to the property will likely be requested as part of the development. Access at 2nd Avenue NE would allow a frontage road to be constructed, allowing access to the entire property much like the frontage road on the north side of the Gateway Drive. With continued growth, the agricultural sections east of the city will redevelop to industrial uses.

Figures 2.3 and 2.4 graphically illustrate the current land use and zoning for properties along Gateway Drive and throughout parts of East Grand Forks. Figure 2.3 represents the section of Gateway Drive from the Kennedy Bridge to 5th Avenue NE, while Figure 2.4 depicts Gateway Drive from east of 5th Avenue NE to the substation.

2.5 PREVIOUS STUDIES AND RECOMMENDATIONS

In 1994, the MPO prepared a corridor study over this section of Gateway Drive. The 1994 study followed a similar methodology of this study and included the following recommendations:

- **Construct a full-access intersection at 5th Avenue NW.** This was based on the need for economic development and in 1994 did not serve a benefit for either safety or roadway mobility.
- **Construct a new intersection at 2nd Avenue NE.** The study indicated that retail land use along this segment of Gateway Drive would be best served by full access

between Gateway Drive20 and 5th Avenue NE. It should be noted that the north leg of this proposed intersection is identified as 3rd Avenue NE in the 1994 report.

- **Construct a signalized intersection at 5th Avenue NE.** This was accomplished in 2003 with a joint project between Mn/DOT and the City of East Grand Forks.
- **Remove the railroad grade crossing.** This spur track was abandoned in 1998 by the Burlington Northern Railroad, predecessor of today's BNSF Railway Company. The crossing was closed in 2002 and the rails and warning devices were removed.
- **Connect 15th Avenue NE to Highway 2.** This recommendation was based on the anticipated construction of a large grain elevator near 15th Avenue NE, expected to dramatically increase truck access to the highway. The proposed grain elevator was never constructed.
- **Reconstruct corridor to urban section.** The reconstruction of the corridor to an urban section was finished in 2003 from the Kennedy Bridge to 2nd Avenue NE.

Figure 2.3
Existing Land Use (West)

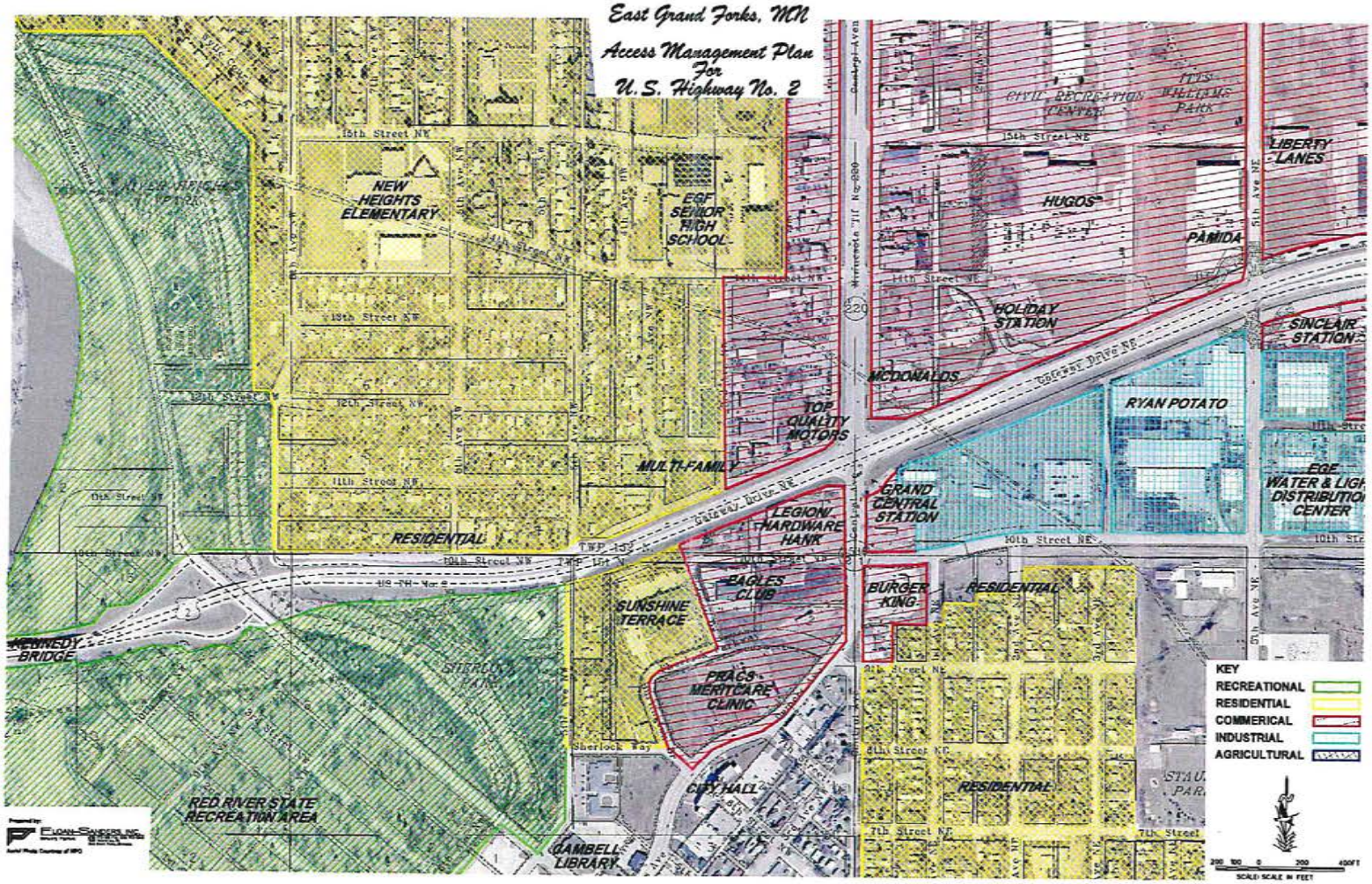
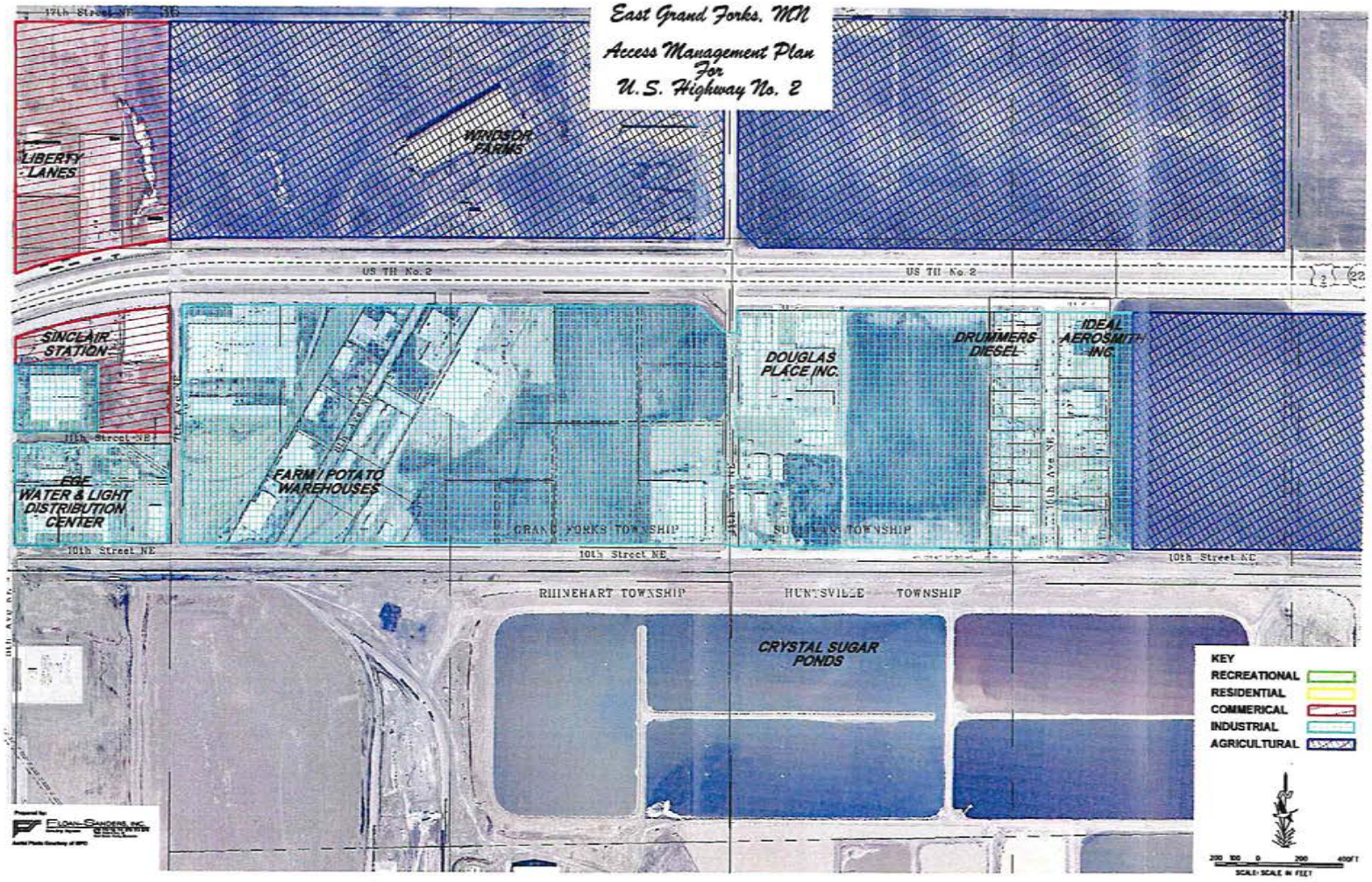


Figure 2.4
Existing Land Use (East)



CHAPTER 3: OPERATIONAL ANALYSIS

3.1 METHODOLOGY OF TRAFFIC OPERATIONS ANALYSIS

Observations of traffic volumes provide an understanding of the general nature of traffic but are insufficient to indicate either the ability of the street network to carry additional traffic or the quality of service provided by the street system. For this reason, the concept of Levels of Service (LOS) was developed to correlate numerical traffic operational data to subjective descriptions of traffic performance at intersections. Each lane of traffic has delay associated with it and, therefore, a correlating LOS. The weighted average delay for each of these lanes of traffic for a signalized intersection is the intersection LOS. These same levels of service measures also apply to an unsignalized intersection, although for different value ranges. For a two-way, stop-controlled intersection, an LOS determination is made for the one movement within the intersection that experiences the greatest level of delay; this is typically the minor-street left turn movement. LOS categories range from LOS "A" (best) to "F" (worst), as shown in Table 3.1.

Table 3.1
Level of Service Description

Level of Service	SIGNALIZED Intersection Control Delay (sec)	UNSIGNALIZED Intersection Control Delay (sec)	Intersection LOS Description
A	< 10.0	< 10.0	Free flow, insignificant delays.
B	10.1-20.0	10.1-15.0	Stable operation, minimal delays.
C	20.1-35.0	15.1-25.0	Stable operation, acceptable delays.
D	35.1-55.0	25.1-35.0	Restricted flow, regular delays.
E	55.1-80.0	35.1-50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80.0	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, 2000

The intersection capacity analyses were completed using Synchro 6.1 software. Synchro replicates the analysis procedures defined in the 2000 Highway Capacity Manual. This manual provides procedures for the analysis of signalized and unsignalized intersections. It should be noted that stop-controlled intersections are analyzed by identifying the amount of delay at each

approach that conflict with other intersection movements (i.e., all movements except the free flow through lanes), thus approach level of service is reported for unsignalized intersections.

In large urban centers, the LOS D/E boundary is defined as the minimum acceptable level of service for roadway facilities by Mn/DOT. The MPO's acceptable LOS is the C/D boundary. Minor approaches to thru/stop intersections, and more specifically privately owned approaches, are commonly allowed to operate at lower levels of service in lieu of impacts on mainline mobility.

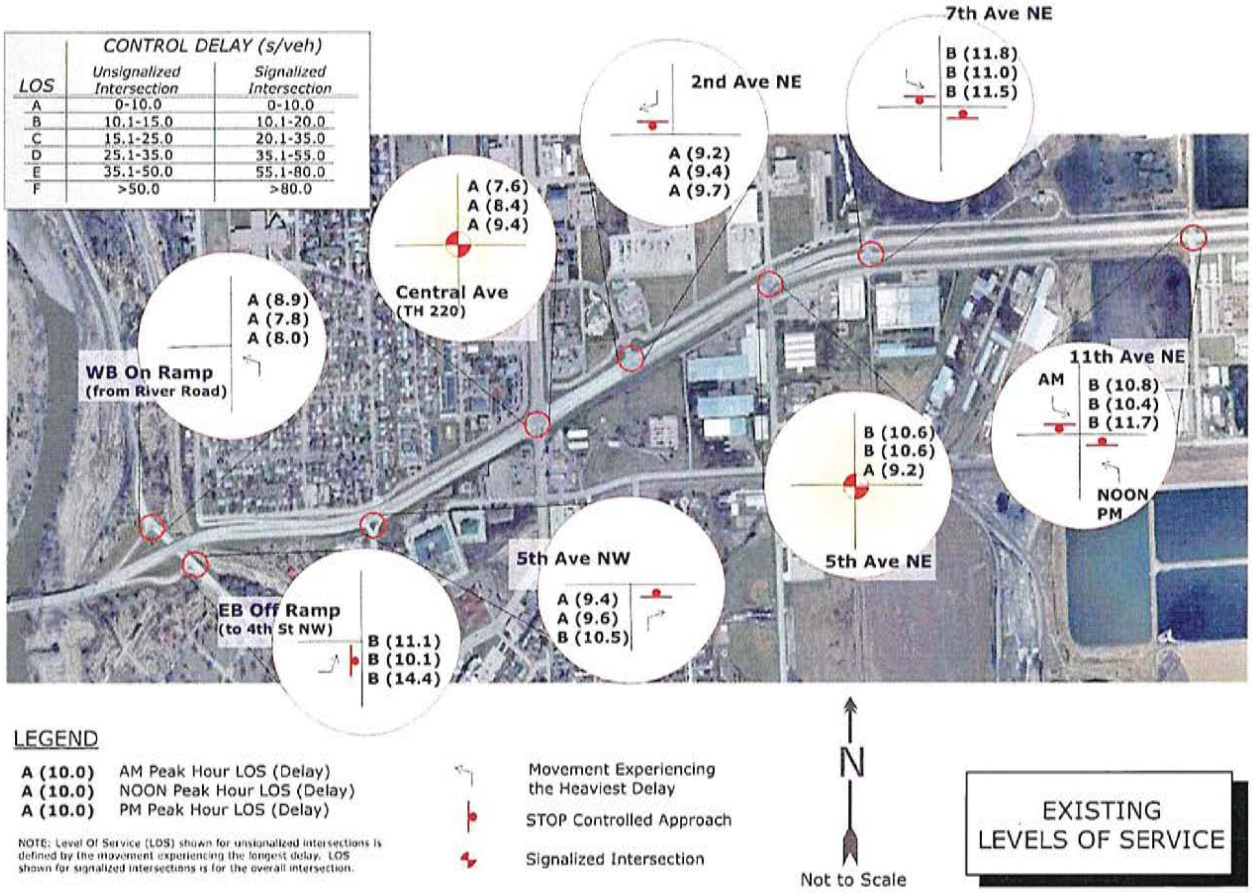
3.2 MODEL DEVELOPMENT

In order to assess the existing (as well as future) traffic operations within the study area, a model of the area was developed in Synchro using existing conditions. In general, the use of this software involves the development of a Synchro network using existing data, collected from the field and coding it into the software. This data includes traffic volumes, lane geometrics and traffic control conditions. Synchro is Mn/DOT's preferred traffic data manager and analysis tool for urban arterials like Gateway Drive. Using the peak hour turning movement counts collected in April of 2005, existing intersection geometrics and characteristics, along with Mn/DOT's signal timing and phasing data, an existing conditions traffic operations model was developed for the study area.

3.3 EXISTING PEAK HOUR MOBILITY

Figure 3.1 shows the existing level of service for each intersection in the study corridor. Based on current traffic volumes and intersection configurations, each intersection was found to be operating at an acceptable level for each peak hour of the day. These operations took into account the impact of truck traffic. The calculation sheets for the levels of service can be found in Appendix B.

Figure 3.1
Existing Levels of Service



3.4 FORECAST 2025 VOLUMES

Based on the long range travel demand model output provided by the MPO, HDR developed 2025 peak hour turning movements as a combination of existing travel patterns and forecast traffic growth. The model output produced estimated Average Annual Daily Traffic (AADT) volumes for several segments within the study area. These volumes were compared to the existing AADT's on the mainline and the percent increase between the two was calculated. The percent increase was used to forecast future AADT volumes for those segments that were not included in the MPO's long range travel demand model. The supporting documentation for these calculations can be found in Appendix C. It is important to point out that the model assumes a retail traffic generator for the parcel of land just south of the Gateway Drive and 2nd Avenue NE intersection. Access to this parcel is an issue that will be discussed in the alternatives section of this report.

Once the AADT's for each segment within the study area were determined, future turning movement volumes for the PM peak hour for each intersection were calculated. Only the PM peak was used because it was determined to be the most critical of the three studied during a review of existing conditions. When peak hour approach volumes were developed, (typically 10% of the overall AADT volume), turning movements at each approach were calculated based on the existing count data. For example, whatever the percent of left turning vehicles at a given approach under existing conditions was, a similar percentage was applied to the approach volumes for that intersection under 2025 conditions. These calculated turning movements along with the assumed future intersection geometrics and subsequent control measures, were input into the Synchro software and future year intersection operations were determined. The details related to these calculations can be found in Appendix C.

Turning movement volumes were adjusted accordingly based on each alternative. For example, the "no build" alternative assumes a higher volume of traffic at the Central Avenue intersection than Alternative #1, which assumes that a full movement, signalized intersection at 5th Avenue NW would draw some vehicles away from the Central Avenue intersection. The results of the Synchro Analysis for each alternative will be discussed in further detail in the following sections.

3.5 FORECAST 2025 MOBILITY – "NO-BUILD"

Under the No-Build condition for 2025, it is assumed that no improvements to any of the intersections within the study corridor (i.e. lane geometrics, intersection control, etc.) will be implemented; only an increase in traffic volumes would occur at each intersection. This condition is used as a "base case" scenario against which all other alternatives will be compared.

Table 3.2 documents the intersection LOS for the No-Build alternative. It is important to note, however, that these levels of service reflect an unencumbered roadway network. Levels of service during the flood events that occur annually are not reflected in Table 3.2. The calculation sheets for these levels of service can be found in Appendix D.

Table 3.2
Forecast 2025 Peak Hour Intersection Level of Service for the "No-Build" Condition

Intersection	PM Level of Service
5th Avenue NW	C
Central Avenue	B
2nd Avenue NE (North leg)	B

Source: HDR Engineering, Inc. using information from Grand Forks – East Grand Forks MPO

3.6 IDENTIFICATION OF DEFICIENCIES

The study of future-year scenarios revealed that the existing roadway network could experience two primary deficiencies as traffic volumes increase and development increases in the East Grand Forks area. These deficiencies center on traffic operations during flood events and access to particular parcels of retail property.

As shown in Table 3.2, under the No-Build scenario, all intersections are expected to operate at acceptable levels of service. These operations, however, reflect conditions present when the roadway network does not experience any disruption in service. Annual flood events directly impact the ability of the existing roadway network to accommodate travel demand within East Grand Forks and between Grand Forks and East Grand Forks. These conditions will be described in detail in Section 4.3.

One of the primary inputs into the MPO's travel demand model is the land use assumption. For this study, this primarily speaks to the land use adjacent to Gateway Drive. It has been a long-standing expectation that the vacant land parcel just south of the Gateway Drive and 2nd Avenue NE intersection would one day develop as retail. To accommodate this change in land use, the 2nd Avenue NE intersection, which is currently a ¾-movement access to the north, would have to be modified to provide access to the south. This condition will be discussed in the alternatives section of this report.

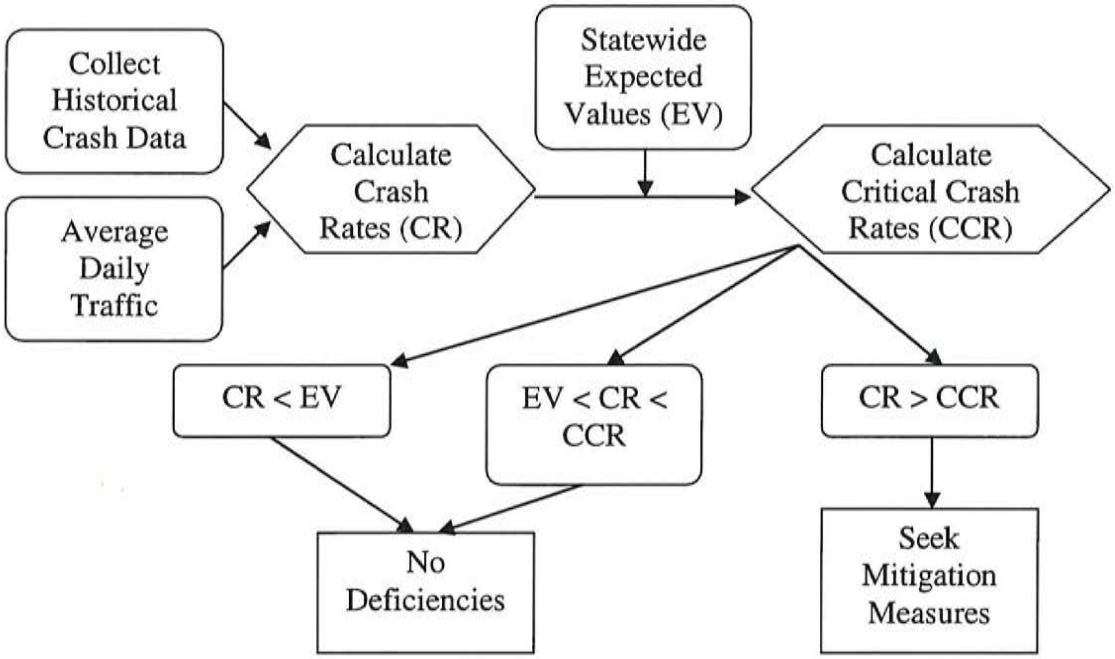
CHAPTER 4: SAFETY OBSERVATIONS

4.1 PRINCIPLES OF SAFETY ANALYSIS

Without deemphasizing the importance of commerce and high quality traffic operations, the most important element of access planning is safety. Although using Mn/DOT's average crash rates for similar corridors provides a reasonable approximation of expected safety characteristics of the corridor, the nature of statewide averages neglects unique local operations of the highway.

The statewide averages, however, play an extremely important role in benchmarking the local operating parameters of the highway. Comparison of the crash characteristics of Gateway Drive to other highways in East Grand Forks is not appropriate for two reasons: (1) there are not enough crashes in East Grand Forks alone to draw statistically valid conclusions and (2) the operating parameters of Gateway Drive are more similar to other highways in Minnesota than any other road in East Grand Forks. The safety analysis prepared for this study is based on a linear process, as documented in Figure 4.1.

Figure 4.1
Safety Analysis Diagram



The critical crash rate is a combination of the expected (average) crash rate throughout Minnesota on similar trunk highways with similar levels of intersection control. The comparison

to a critical crash rate is an important distinction between actual safety deficiencies and those simply higher than average (since theoretically 50% of all intersections have higher than average crash rates). Intersections with crash rates that exceed the critical crash rate are considered statistically deficient.

4.2 HISTORICAL CRASH DATA ANALYSIS

For this study, historical crash data were obtained from Mn/DOT for the five-year period from 2000 through 2004. This period is appropriate because it provides enough crashes from which to draw valid conclusions, but does not introduce so long a period such that geometric changes affect the crash rate. The raw crash data can be found in Appendix E.

The signalization of 5th Avenue NE was considered as a major change in the corridor safety operations of the corridor. Due to high crash frequencies at this intersection, the City of East Grand Forks and Mn/DOT installed a traffic signal at this intersection, which was turned on July 8, 2003. Since that date, no crashes have occurred at this intersection.[4]

4.2.1 Historical Corridor Crash Rates

The five years of accident data provided by Mn/DOT was reviewed to determine which, if any, of the proposed improvements along Gateway Drive might help to alleviate unsafe conditions that could have contributed to one or more crashes in the past several years. The first step was to summarize the data by location based on type, number and severity of crashes that occurred within the study corridor. Next, using Mn/DOT's *Traffic Safety Fundamentals Handbook*, a crash rate (CR) and a critical crash rate (CCR or R_c) for each intersection and roadway segment were determined. These rates help quantify the frequency of crashes per amount of exposure. A CR quantifies the relationship of the number of crashes that occur within a certain time period and at a given location, to the number of vehicles that pass through that location (intersection or roadway segment) on a daily basis (AADT volume). A CR is expressed in terms of "million entering vehicles" (MEV) for intersections and "million vehicle miles" (MVM) for roadway segments. As described in Section 4.1, the critical crash rate (CCR) for a given intersection is a function of the statewide average and vehicle exposure during a given study period. The CCR serves as a benchmark for comparison of the calculated CR for an intersection or roadway

[4] The operation of a traffic signal with no crashes for multiple years is extremely unusual. Regardless of the implementation of various other geometric modifications, the crash rate at this intersection is expected to increase to something other than zero in future years. Such operation is considered normal and an increase of crashes should not be considered deficient. Analysis of future conditions involving this intersection used the average crash rate for Mn/DOT for similar intersections, which is expected to more accurately reflect the expected future safety characteristics of this intersection.

segment. Intersections or segments with crash rates that exceed the critical crash rate are considered statistically deficient.

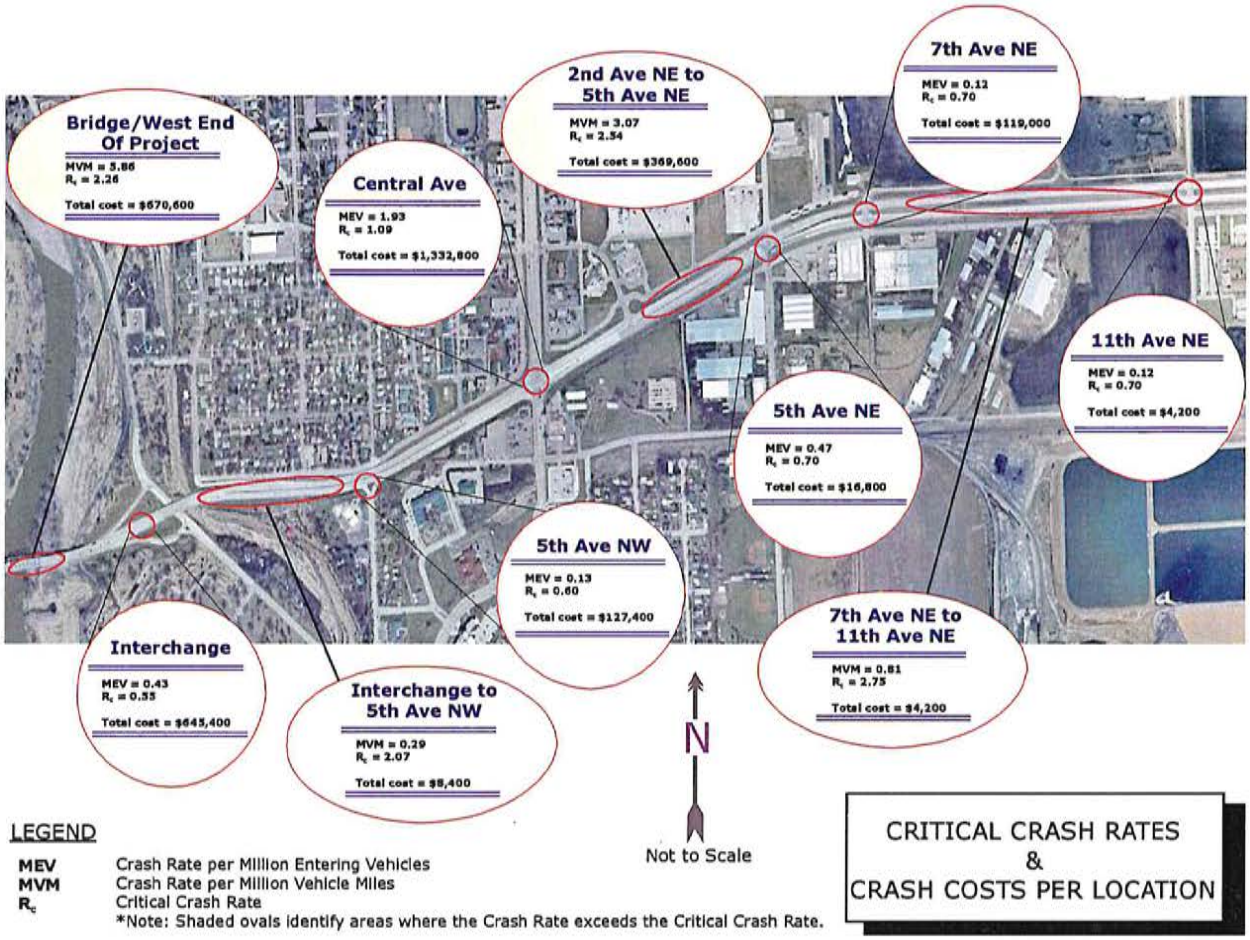
Historical crash rates within the Gateway Drive study corridor were calculated based on the five-year crash data provided by Mn/DOT and the methodology described above. When compared to the critical crash rates, three areas of the corridor were found to fall below the mark:

- The Kennedy Bridge (far west end of the study limits)
- Central Avenue Intersection
- The segment between 2nd Avenue NE and 5th Avenue NE

The crash analysis worksheet, which identifies the calculated crash rates and critical crash rates for each intersection/segment of the study corridor (as well as that of the overall corridor), can be found in Appendix E; a summary is provided in Figure 4.2, below.

It is worth noting that the number of crashes shown to have occurred on the Kennedy Bridge is suspect. The crash data showed that many crashes occurred at Milepost 00.00, which is at the center of the Kennedy Bridge. It is unlikely that a myriad of crashes occurred at the immediate center of the bridge, so perhaps the MP 00.00 moniker is often used as a "default" location for any crash that occurs on the bridge or even west of the River Road bridge. Regardless of precisely where these crashes occurred, this data would not impact this study because the study did not look at modifying access near the Kennedy Bridge or even west of River Road. Therefore, it was deemed that resolution of these coding errors was not necessary.

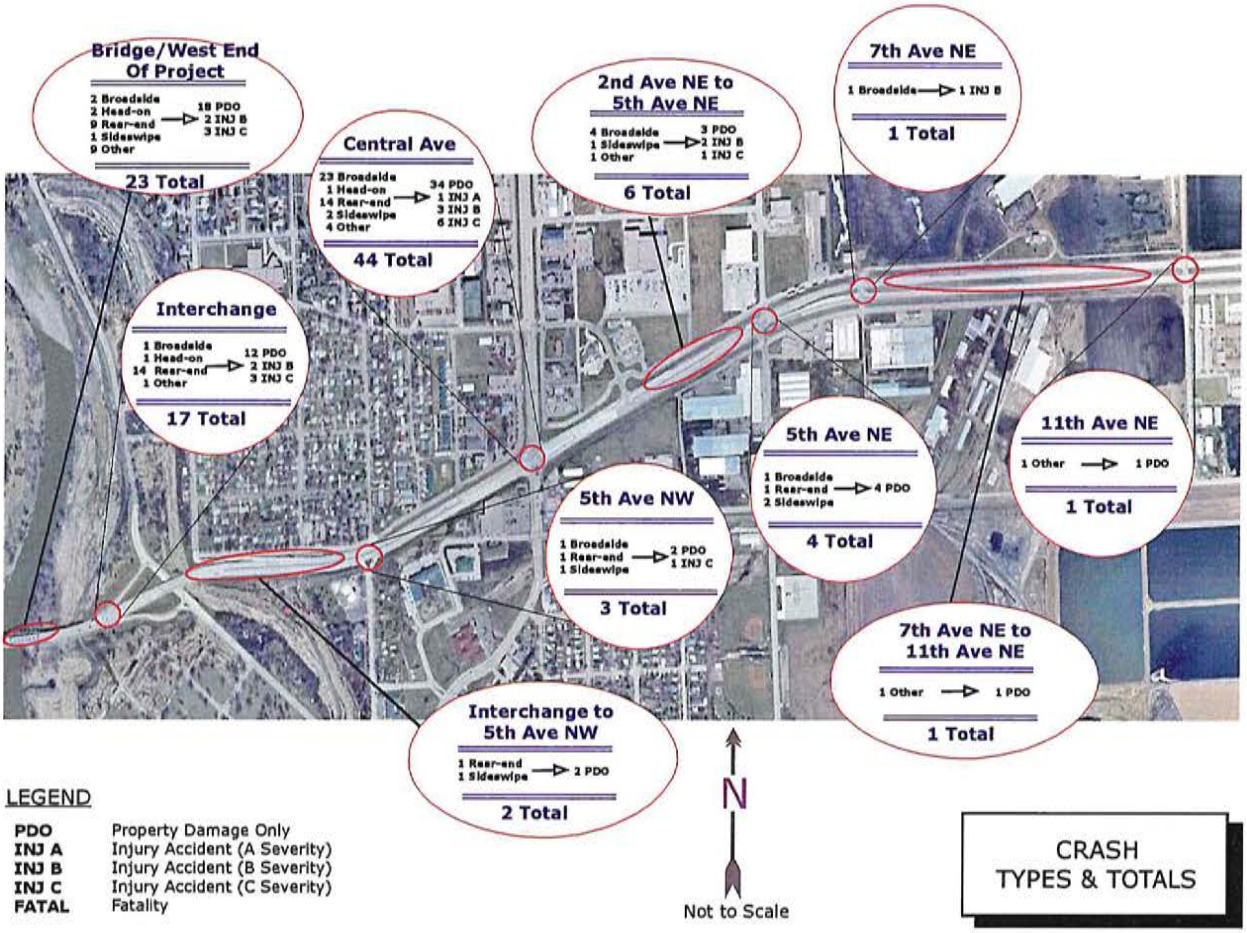
Figure 4.2
Critical Crash Rates & Crash Costs per Location



4.2.2 Crash Type Analysis

Beyond noting the frequency of crashes at any given location, it is equally important in any safety analysis to identify the type and severity of crashes that have occurred there. This helps to focus attention toward finding a solution to reduce and/or eliminate certain types of conflicts and further, utilizing Mn/DOT's Benefit/Cost based system, it associates a cost to society of each crash. This "monetization of crash costs" is explained in further detail in the next section. A summary of the crash types and severity within the study corridor (based on the 5-year historical data provided by Mn/DOT) is illustrated in Figure 4.3.

Figure 4.3
Crash Types and Totals



4.2.3 Monetization of Crash Costs

As documented by Mn/DOT's Office of Investment Management, specific costs associated with different types of crashes can be used for benefit-cost analyses. These typical values were developed for five classifications of crashes, including property damage only (PDO), injury crashes (classified as Injury A, Injury B, or Injury C) and fatal crashes. The gradation of injury crashes from A to C indicates varying levels of sustained injuries.

The typical values calculated by Mn/DOT include $4,400 for PDO crashes, $280,000 for Injury A crashes, $61,000 for Injury B crashes, $30,000 for Injury C crashes, and $3,600,000 for fatal crashes. These typical crash costs were applied to the number of crash types at each location, as noted in the figure above. These costs were compiled and are presented below in Table 4.1. The supporting detail behind these costs can be found in Appendix E.

Table 4.1
Monetized Crash Costs

Intersection/Roadway Segment	PDO	Injury	Fatality	Total Costs
Kennedy Bridge to River Road Interchange	$79,200	$212,000	-	**$291,200**
River Road Interchange	$52,800	$212,000	-	**$264,800**
River Road Interchange to 5th Avenue NW	$8,800	-	-	**$8,800**
5th Avenue NW	$8,800	$30,000	-	**$38,800**
Central Avenue	$149,600	$643,000	-	**$792,600**
2nd Avenue NE to 5th Avenue NE	$13,200	$152,000	-	**$165,200**
5th Avenue NE	$17,600	-	-	**$17,600**
7th Avenue NE	-	$61,000	-	**$61,000**
7th Avenue NE to 11th Avenue NE	$4,400	-	-	**$4,400**
11th Avenue NE	$4,400	-	-	**$4,400**

Source: HDR Engineering, Inc. using information from Grand Forks – East Grand Forks MPO

Note that the cost of crashes that occur at the Central Avenue intersection exceeds any other location within the study area by more than double. This is intuitive given that most of the traffic that traverses the study area passes through this intersection.

4.3 EMERGENCY SERVICES/FLOOD EVENTS

As discussed throughout this report, the flooding and road closures caused by the Red River of the North detrimentally impact traffic throughout the core of East Grand Forks and along Gateway Drive. This natural phenomenon occurs virtually every year, sometimes several times a year. This flooding has numerous impacts, from roadway capacity to the displacement of homes and businesses, as what occurred in 1997.

The "normal" annual flooding events typically close River Road, north of Gateway Drive, for a length of time ranging from just a few days to several weeks. Larger flood events can impact other roads as well, such as 4th Street NW, south of Gateway Drive, DeMers Avenue, and even the 12th Street NW bridge; the flood of 1997 also closed the Kennedy Bridge and Gateway Drive. These closures have significant impacts on the roadway system and emergency response. Table 4.2 displays how often these flood events have occurred since 1997 and how long associated road closures typically last. More detailed data can be found in Appendix F. The extent of flooding impacts is also depicted in Figure 4.4.

Table 4.2
Historical Flood Event Data (1997-2005)

Year	Number of Closures	Number of Days Of Closure †
1997	1	45*
1998	1	7
1999	1	24*
2000	1	5
2001	1	33*
2002	2	13
2003	0	0
2004	1	7
2005	2	19
Total Number of Days of Closure =>		151

Source: USGS website – flood data (via Floan-Sanders)
† Extrapolation techniques estimated some of this data
* Impacts extended beyond just River Road

Many East Grand Forks residents work in Grand Forks and many of these residents use Gateway Drive and the Kennedy Bridge as their primary conduit between work and home. Of those commuting East Grand Forks residents that live north of Gateway Drive, many use River Road to access Gateway Drive to travel to and from Grand Forks. River Road is closed during the annual flood events noted above, forcing these commuters to use the Gateway Drive and Central Avenue intersection. This added demand on the intersection causes significant capacity failure, particularly for the eastbound left turn movement during the PM peak hour when these commuters are returning home. During these flood events, the eastbound left turning traffic backs up into the through lanes of Gateway Drive, which detrimentally impacts the highway's ability to accommodate through traffic.

Another impact of the flood-related road closures is the ability for emergency equipment to respond to crashes and other emergencies. The City of East Grand Forks has two fire stations, both of which are located south of Gateway Drive. When responding to incidents on the north side of the highway, emergency responders often use River Road rather than the DeMers Avenue/Central Avenue corridor. River Road is selected either due to the proximity of the actual incident or to avoid the congestion along the DeMers/Central corridor. During a flood event, River Road is closed and all traffic traveling from one side of the highway to the other uses Central Avenue, causing increased congestion and delays; these delays are exasperated by the Gateway Drive conditions noted above. This congestion and the resultant delays can severely impact emergency response.

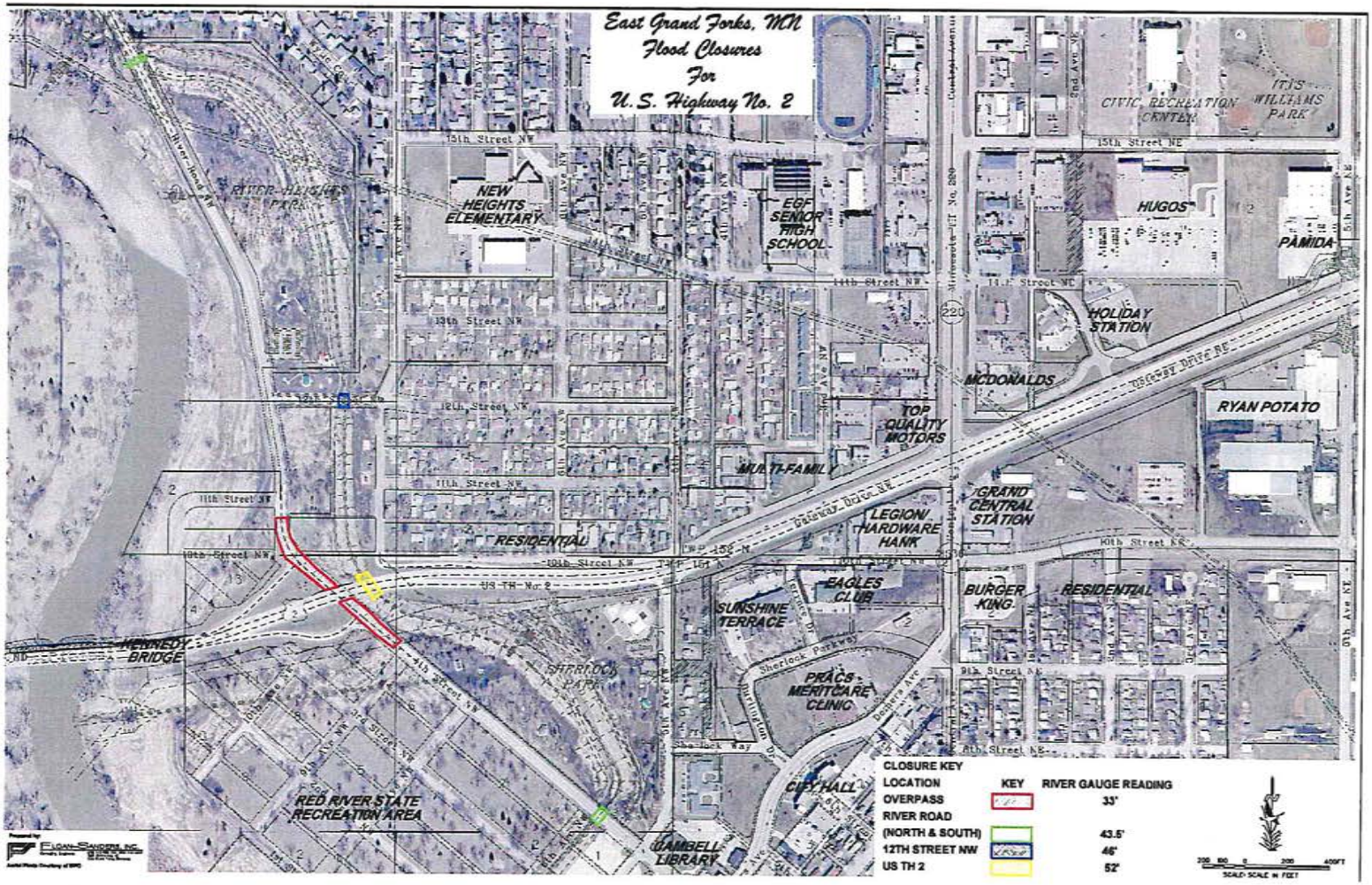
It is important to note that some of the data contained within Table 4.2 was extrapolated. Daily gage readings were not available from the USGS, so linear extrapolation was used to determine when the minimum flood gage reading was exceeded and River Road was flooded. More detail on this calculation can be found in Appendix F.

4.4 IDENTIFICATION OF DEFICIENCIES

As noted in Section 4.2.1, identified safety deficiencies along the corridor included two stretches of Gateway Drive and one intersection. The roadway segments that experience crash rates in excess of their respective critical crash rates include the stretch from the Kennedy Bridge to the River Road interchange and from 2nd Avenue NE to 5th Avenue NE. The intersection that experiences an excessive crash rate is the Gateway Drive & Central Avenue intersection.

During annual flood events, the River Road/4th Street NW corridor gets closed, forcing all of the traffic that commutes between Grand Forks and East Grand Forks through the Gateway Drive and Central Avenue intersection. The resultant traffic conditions cause significant delays along Gateway Drive and along Central Avenue, which is East Grand Forks' only north-south arterial. This can also have momentous impacts to emergency response, particularly to incidents that occur on the north side of Gateway Drive.

Figure 4.4
Flood Closures



CHAPTER 5: DEVELOPMENT AND EVALUATION OF ALTERNATIVES

5.1 ALTERNATIVE DEVELOPMENT

The inherent existing conditions of Gateway Drive throughout the study area led to a unique approach to developing access related alternatives in the corridor. The existing conditions leading to this included the presence of a corridor that was constructed with good access management practices. Therefore, significant changes toward reduced access, higher mobility or greater access and reduced mobility were not pursued. Instead, the alternatives that were developed for this project looked to maintain the existing balance between access and mobility.

The ensuing effort was far more complex than traditional access management studies. Unlike many circumstances associated with a study of this nature, this study analyzed a roadway network with deficiencies that are experienced only during the spring and summer months when flooding forces closure of certain roadways. The development of alternatives then focused on the input from the public and MPO's Technical Advisory Committee. These developed alternatives provided the basis for evaluation as ways to be responsive to local needs while measuring them against established statewide guidelines.

5.2 CORRIDOR ACCESS ALTERNATIVES

The following subsections describe and illustrate the proposed potential access alternatives. Mobility and safety analyses were performed for each alternative and the results were compared to the results of the "No-Build" alternative analysis. The No-Build alternative assumes that there will not be any access modifications along Gateway Drive within the study area.

5.2.1 Alternative "1"

As illustrated in Figure 5.1, this alternative would provide a new access across Gateway Drive by connecting the north and south legs of 5th Avenue NW and upgrading this RIRO access to a full movement intersection. This new connection would require signalization of the Gateway Drive & 5th Avenue NW intersection, removal of the westbound off-ramp (currently located roughly 600 feet to the west) and a realignment or closure of the north frontage road at 5th Avenue NW.

Upgrading this intersection would provide an additional connection between the north and south sides of town, making access easier and more convenient for residents and emergency response vehicles. Currently, River Road and Central Avenue are the only two routes that make this

connection. This condition can be problematic during the flood events that close River Road, bogging down traffic on Central Avenue and significantly increasing traffic delays.

5.2.2 Alternative "2"

This alternative would provide a new access across Gateway Drive by constructing a south leg of the 2nd Avenue NE intersection. The current alignment of 2nd Avenue NE intersects with Gateway Drive to the north at a ¾-movement intersection. This means that right-in, right-out, and left-in movements are allowed, but left turns out from 2nd Avenue NE, onto eastbound Gateway Drive, are not permitted. Making this a full movement connection would require signalizing the improved Gateway Drive & 2nd Avenue NE intersection and extending the frontage road system through the property.

In addition to creating a new point of connectivity between the north and south sides of the City, this alternative (as shown on Figure 5.2) would provide access from Gateway Drive to real estate on the south side of the highway that the City of East Grand Forks has long envisioned as the would-be home to retail space. Though the intent of this alternative is centered on connecting the north and south legs of 2nd Avenue NE, it also assumes that the connectivity between Gateway Drive and the current terminus of 2nd Avenue NE at 10th Street NE will be somewhat circuitous to discourage cut-through traffic to the residential area to the south.

5.2.3 Alternative "3"

This alternative would allow construction of a ¾-movement access at Gateway Drive to the south leg of 2nd Avenue NE. The primary difference between Alternatives "3" and "2" is that through traffic on 2nd Avenue NE, across Gateway Drive, would not be permitted; the new access to the south would mirror the existing access to the north. This scenario would not require installation of a traffic signal. In fact, these two intersections would be separated by a raised median and would be offset by at least 50 feet to prevent future political pressures to connect the two segments of 2nd Avenue NE and signalize the intersection. The median would also provide a location for snowplowing operations to place snow loads, which would be a benefit for winter maintenance. This alternative is illustrated in Figure 5.3. Similarly to Alternative "2", this alternative would require extension of the frontage road system through the property.

5.2.4 Alternative "4"

Alternative "4" involves an upgrade to the Substation Access at the far eastern limits of the Gateway Drive study corridor, just west of the "bend in the road." Currently, the Substation takes access to the south side of the highway via a private driveway. As shown on Figure 5.4,

this alternative would upgrade the existing T-intersection to a full intersection, with bulb-outs of the north and south frontage roads where they would intersect the Substation Access Road. The proposed extension of this Access Road would allow for more property access on the north and south sides of the corridor. This alternative does not propose additional turn lanes or a signal installation. Those upgrades should be reviewed in the future when development on that land progresses.

5.2.5 Additional Alternatives

Per Mn/DOT request, additional alternatives to signalizing the 5th Avenue NW intersection were reviewed. The primary identified purpose behind signalizing 5th Avenue NW is necessary additional capacity and emergency response alternatives during a flood event. The alternatives suggested by Mn/DOT aimed at satisfying these requirements without signalizing the intersection.

The alternative suggested by Mn/DOT included extension of the eastbound left turn bay at Central Avenue, adjustment of the signal timing of the Central Avenue intersection during flood events, and reconstruction of the 5th Avenue NW intersection to provide for full time right-in/right-out access to the north and opening of the median only during flood events; this alternative would also require temporary signalization of the intersection.

The first alternative that was reviewed was the extension of the eastbound left turn lane at the Central Avenue intersection. The anticipated benefit of this alternative would be additional left turn storage capacity necessary during flood events, thereby removing queued turning traffic from the through lanes. Existing conditions show that this queuing can extend back to the Kennedy Bridge, likely requiring a very lengthy left turn bay. This condition would not increase the capacity of the left turn movement, although the alternative of adjusting signal timing at the Central Avenue intersection could. The analysis of existing conditions shows that the length of the queue associated with left turning traffic extends more than 1,000 feet and the volume-to-capacity ratio of the left turn exceeds 3.0. Therefore, the left turn bay would have to be extended almost to 5th Avenue NW and the signal timing adjusted to more than triple the left turn time. The signal timing adjustments seem counterproductive to emergency response along Central Avenue and to westbound traffic flow along Gateway Drive.

The other alternative that was reviewed is the proposed modification and temporary signalization of the 5th Avenue NW intersection. This proposal includes adding a right-in/right-out access to the north, mirroring what exists on the south side, and providing some level of infrastructure, be it technological or otherwise, to allow the intersection to be full movement during flood events. While this alternative seems to fulfill the capacity needs during annual flood events without the

daily impact to Gateway Drive, its implementation provides challenges. Eastbound and westbound left turn lanes would have to be provided that would somehow be closed during non-flood event times. Another challenge would be the implementation of the temporary traffic signal. Portable traffic signals could be maintained by the City, but storage, maintenance and installation would be troublesome. The other alternative would be to install the signal permanently but have it function only during flood events. As noted in Mn/DOT's comments, signal warrants would have to be met during non-flood event times for this signal to be in place. Without those warrants being met, the State would incur the liability of any crash that would occur at this intersection, due to the presence of an unwarranted liability. Recent tort liability cases have made this issue critical for any state or local entity with such conditions.

These alternatives were presented to the team after the second public meeting and, thus, were not part of the formal evaluation of the alternatives that were carried forward from the first public meeting and early TAC meetings.

Figure 5.1
Alternative 1

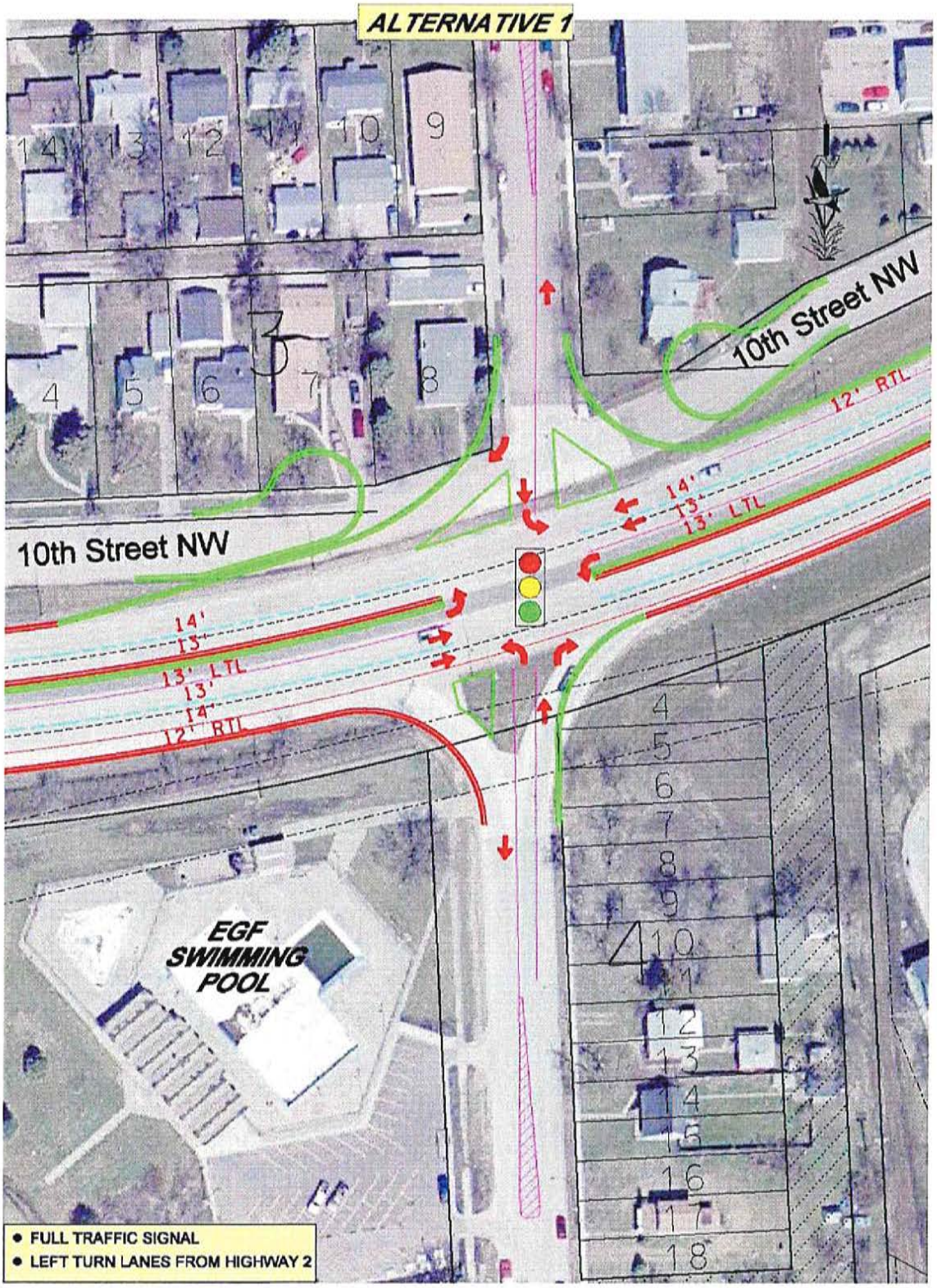


Figure 5.2
Alternative 2

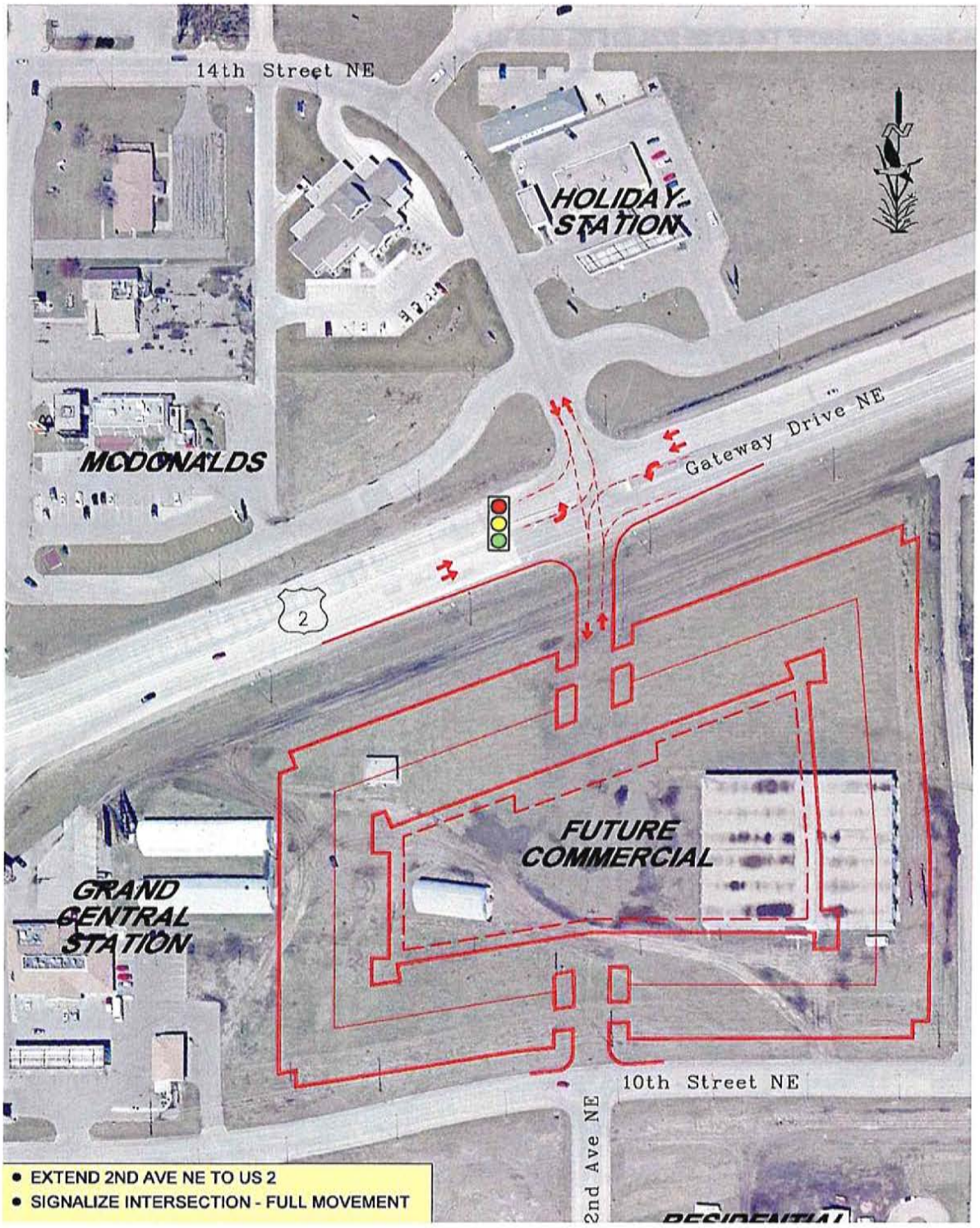


Figure 5.3
Alternative 3

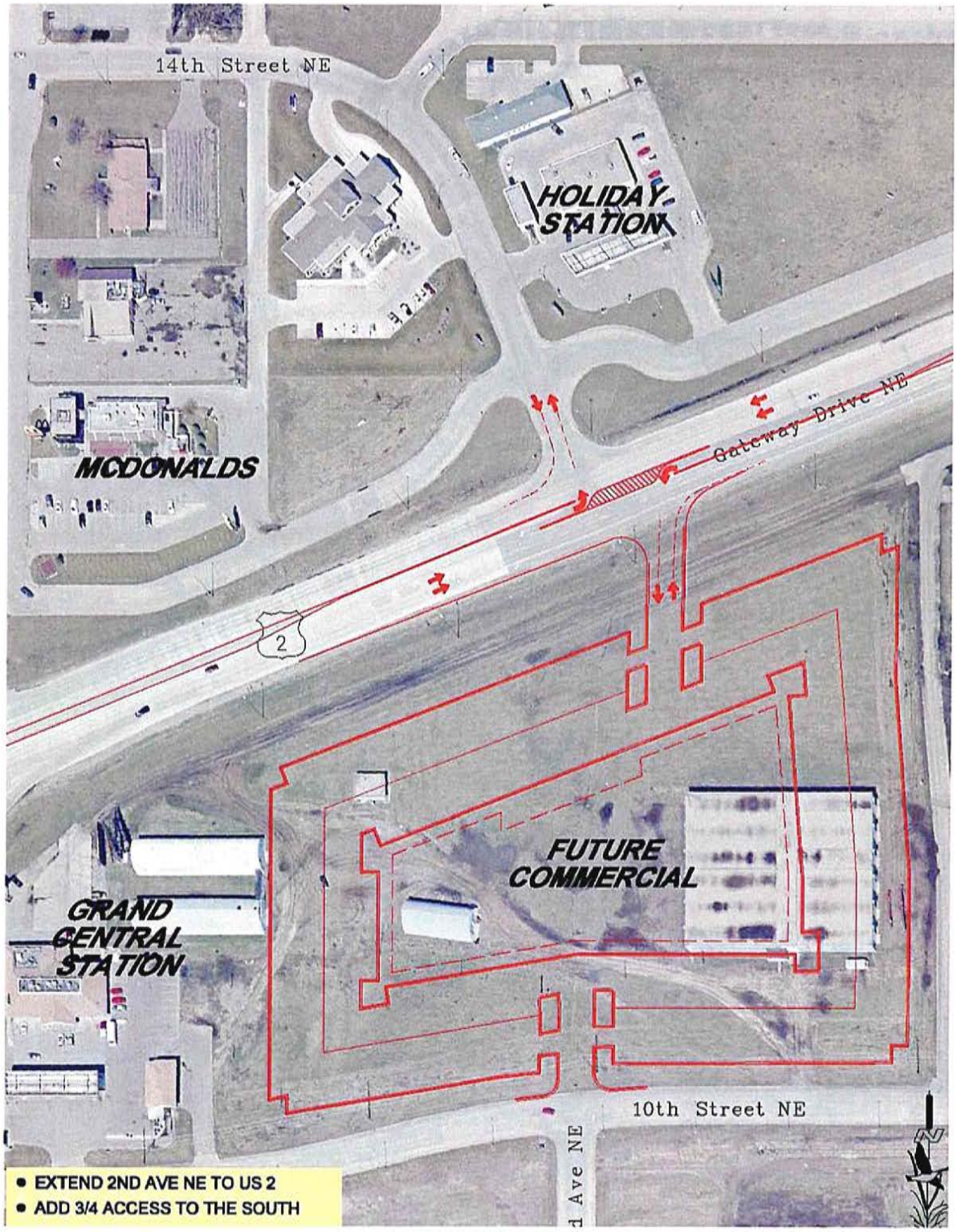
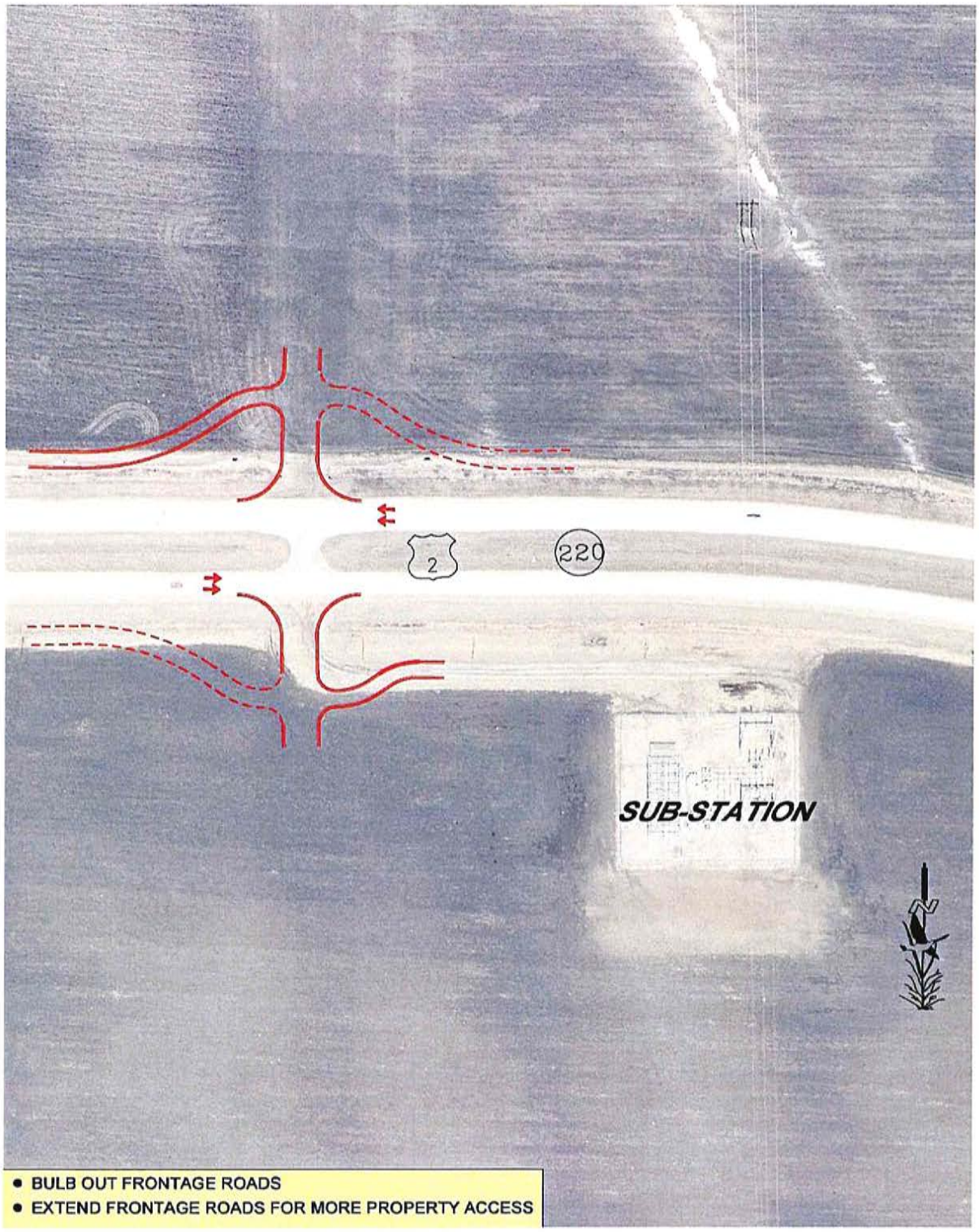


Figure 5.4
Alternative 4



5.3 MOBILITY EVALUATION OF ALTERNATIVES

Evaluating future mobility within the study corridor involved a comparison of each proposed alternative to the No-Build (or base case) scenario using the Synchro-generated LOS ratings. This analysis reviewed individual intersections and the corridor as a whole. The corridor analysis process was augmented by the inclusion of how well the alternatives would operate under normal conditions and during a flood event. The flood event was analyzed due to the regularity of its occurrence and the need to determine the alternative that would function with optimal performance during such events.

5.3.1 Intersection Analysis – Non Flood Event

The 2025 volumes developed for the Gateway Drive corridor (as described in Section 3.4) were utilized along with the expected future intersection geometrics to obtain intersection Level of Service. These ratings are based on PM peak volumes, since this is typically the most critical peak period of the day. A quick look at the results of the future analyses, as shown in Table 5.1, reveals that the intersection functionality of the corridor would not be compromised regardless of which alternative is ultimately selected. The calculation sheets for these levels of service can be found in Appendix G. It is interesting to note, though, that the 5th Avenue NW intersection could be expected to operate at a lower LOS in the future if it remains a Right-in-Right-out (RIRO) than it would if it were upgraded to a full-movement, signalized intersection, as proposed under the Alternative #1 scenario. This could be attributed to a couple of things: (1) increased volume on both roadways, and (2) a subsequent lack of adequate gaps in eastbound traffic on Gateway Drive for 5th Avenue NW vehicles to safely enter into the stream of vehicles.

Table 5.1
Forecast 2025 PM Peak Hour Intersection Level of Service

Intersection	No-Build	Alternative #1	Alternative #2	Alternative #3
5th Avenue NW	C	A	-	-
Central Avenue	B	B	B	B
2nd Avenue NE (North leg)	B	-	-	A
2nd Ave NE (Full intersection)	-	-	A	-
2nd Avenue NE (South leg)	-	-	-	B
5th Avenue NE	A	-	A	A

Source: HDR Engineering, Inc. using information from Grand Forks – East Grand Forks MPO

5.3.2 Corridor Analysis – Non Flood Event versus Flood Event

The Synchro models that were developed for the intersection analyses were analyzed using Synchro's software analysis companion, SimTraffic. SimTraffic is a microscopic analysis tool

that uses simulation techniques to emulate real-world conditions and to generate arterial levels of service. The primary metrics for corridor operations that SimTraffic provides include average travel time, average travel speeds and overall Vehicle Hours of Travel (VHT).

Two of the Synchro models were used in this analysis, including the No-Build model and the Build model; the Build model includes the signal at 5th Avenue NW and the addition of a ¾-movement access at 2nd Avenue NE. These two models were developed for "normal' conditions, which means during non flood event times. The volumes in each of these models were augmented to generate volumes during flood events, which, for this analysis, were defined as those flood events that close River Road and 4th Street NW. The results of these four models, as presented in Table 5.2, provide a comparison of corridor operations in the No-Build versus the Build, given non flood event times and during a flood event. The calculation sheets for these corridor operations can be found in Appendix H.

Table 5.2
Forecast 2025 Corridor Operations

	Non-Flood		Flood Event				Non-Flood	
	No-Build		No-Build		Build		Build	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Average Travel Times (seconds)								
Eastbound	212.0	101.8	1,007.8	898.1	225.4	114.0	221.7	110.5
Westbound	218.7	98.2	222.5	97.0	229.2	104.1	228.0	103.6
Average Travel Speeds (mph)								
Eastbound	35.9	28.9	7.5	3.3	33.7	25.8	34.3	26.7
Westbound	34.8	30.0	34.2	30.4	33.2	28.3	33.3	28.4
Vehicle Hours of Travel (VHT)	121.7		451.6		151.2		130.5	

Source: HDR Engineering, Inc. using information from Grand Forks – East Grand Forks MPO
(1) – Indicates travel times, speeds along the entire corridor
(2) – Indicates travel times, speeds between the Kennedy Bridge and Central Avenue
VHT is presented as a bi-directional value, indicating overall travel time along the corridor

As indicated by the footnotes, the table presents average travel times and average travel speeds for each direction of travel and overall vehicle hours of travel (VHT) for both directions. The columns denoted by (1) indicate average travel times and speeds for each direction of the entire corridor, while the columns denoted by (2) indicate these values for that stretch of the corridor between the Kennedy Bridge and Central Avenue; the values in the (2) columns are a subset of the values in the (1) columns. The VHT values represent the amount of time that all vehicles spend within the limits of the study area. An increase in VHT is typically an indication of increased delay, slower travel speeds, increased fuel consumption and increased congestion.

Anecdotal evidence gathered during public meetings and from various local officials indicates that, during recent annual flood events, excessive queuing occurs along Gateway Drive, particularly for the eastbound approach to Central Avenue. As discussed earlier in this report, these flood events close the River Road/4th Street NW interchange, which funnels additional traffic to the Central Avenue intersection, particularly the eastbound left turn. This causes significant queuing that fills the eastbound left turn lane and extends into the through lane along eastbound Gateway Drive, often extending back onto the Kennedy Bridge; this queuing into the through lane has detrimental impacts to traffic flow along Gateway Drive. The data in Table 5.2 projects that these same conditions would be present in 2025 if no improvements are made along the highway.

The data in the table also illustrates that, during a flood event, traffic flow along the highway would be much improved with the implementation of the proposed improvements. Comparing the No-Build, Non Flood Event data to the No-Build Flood Event data provides a dramatic understanding of the detrimental impact imposed on Gateway Drive during a flood event; eastbound traffic flow experiences a precipitous drop in travel speeds and a significant increase in travel times. Equally as dramatic is the improvement in traffic flow during a flood event, given the installation of the proposed improvements. This is due primarily to the relief that the extension of 5th Avenue NW and the signalization of the Gateway Drive intersection would provide to the eastbound left turn at Central.

5.4 SAFETY EVALUATION OF ALTERNATIVES

The methodology used to evaluate the safety of each alternative involved an estimation of crash occurrence and a calculation of the costs of those crashes.

The first step in this evaluation was the estimation of crash occurrence. This estimation was performed using the historical crash data that was detailed in Section 4.2 and the average crash rates provided by the Mn/DOT *Traffic Safety Fundamental Handbook*. For example, the crash occurrence at the Central Avenue intersection was assumed to change in accordance with the change in traffic volumes through the intersection. Also, the crash occurrence for the new signal at the 5th Avenue NW intersection (Alternative 1) was calculated using the average crash rate at a signalized intersection, as provided by the Mn/DOT *Traffic Safety Fundamental Handbook*. The detailed results of this crash estimation can be found in Appendix I.

As noted earlier in this report, Mn/DOT's Office of Investment Management has documented costs associated with different types of crashes (PDO, injury and fatal). These typical values were used in the analysis of 2025 crash costs, although the study did not incorporate inflation,

discount rates or, in general, the time value of money. Although 2025 values were used, the calculated dollar amounts do not imply an expected dollar cost in 2025 but, rather, are a comparison tool between the No-Build and the Build alternatives.

The estimated monetary crash costs of each of the alternatives are documented in Table 5.3. These costs were derived by multiplying the estimated number of crashes at each location by the incremental crash cost of each crash type. This exercise was performed for the No-Build and Build alternatives. The details of these calculations can be found in Appendix I.

Table 5.3
Monetized Costs of Projected Crashes

Intersection	Monetized Crash Costs		
	Existing	No-Build	Build
5th Avenue NW	$38,800	$46,800	$139,600
Central Avenue	$792,600	$992,300	$729,800
2nd Avenue NE (North leg)	-	$43,400	$43,400
2nd Avenue NE (Full intersection)	-	-	$231,200
2nd Avenue NE (South leg)	-	-	$43,400
5th Avenue NE	$17,600	$144,700	$123,200
Total (these six alternatives only) =>	**$849,000**	**$1,227,200**	**$1.19-$1.33 million**

Source: Mn/DOT Traffic Safety Fundamentals Handbook, April 2001

The costs for the No-Build alternative depict values that exceed existing crash costs by a factor that is similar to the rate of traffic growth through each intersection.

It is also worth noting that the No-Build costs at the Central Avenue intersection and the 5th Avenue NE intersection are less than they are for the Build alternatives. The reason for this incidence is decreased traffic volumes through these intersections as a result of the increased connectivity across Gateway Drive (5th Avenue NW and 2nd Avenue NE). Also, the crash costs for the No-Build at the north leg of 2nd Avenue NE increased from existing. This increase is due to an assumption that crashes would occur at this location in the future, even though the data from the study period for the existing analysis did not reflect any crashes at this location.

It is also worth noting that there is potential that the crash costs for the Build alternative could be less than that of the No-Build alternative. This condition would be reflected if the signal were installed at 5th Avenue NW and the ¾-movement access to the south leg of the 2nd Avenue NE intersection were constructed. Including the signal at 2nd Avenue NE would cause the crash costs of the Build alternative to exceed the crash costs of the No-Build alternative.

The analysis shows that implementation of Alternative #1 could result in an increase in crash costs of approximately $93,000 per year at the 5th Avenue NW intersection. This is because signalized intersections typically have a much higher rate of crashes than right-in/right-out intersections. Therefore, converting this intersection from RIRO to signalized will subsequently increase the potential for crashes to occur at 5th Avenue NW. However, implementation of Alternative #1 also has the potential to decrease the occurrence of crashes (and subsequent cost) at Central Avenue. If 5th Avenue NW becomes a full-access intersection in the future, a number of vehicles currently utilizing Central Avenue may be diverted to the new connection, thereby reducing the volume of traffic at the Gateway Drive/Central Avenue intersection and resulting in decreased crash costs of more than $260,000 at that location. It is important to note that this cost savings is also contingent upon selection of Alternative #2, which proposes a somewhat circuitous extension of the south leg of 2nd Avenue NE (from 10th Street to Gateway Drive), further relieving the traffic demand at Central Avenue.

Alternative #2 would be expected to increase crash costs to approximately $231,000 at 2nd Avenue NE due to the expectation of a higher number of crashes at a signalized intersection. Similarly, Alternative #3 would increase costs at 2nd Avenue NE by $43,400, representing a lower cost scenario than a traffic signal but still higher than the No-Build due to the presence of a new access.

CHAPTER 6: PUBLIC AND AGENCY INPUT

6.1 APPROACH TO PUBLIC AND AGENCY INPUT

Consistent with the function of the MPO, this planning study was rooted in input from the public and involved agencies. The MPO's Technical Advisory Committee (TAC) served as the steering committee for this study and ultimately approved this document.

6.2 PUBLIC FORUMS

Two public forums were held as part of this study. The purposes and results of those two forums are described below.

6.2.1 Public Forum #1

A public information meeting was held on August 17, 2005 at 5:00 PM at East Grand Forks City Hall to discuss the Gateway Drive (Gateway Drive) Access Management Study. The purpose of this meeting was to serve as a kick-off meeting for residents and interested parties to offer input for the development of alternatives and identification of deficiencies within the study area.

Following presentations made by Ryan Brooks (MPO), Craig Rasmussen (HDR), and Greg Boppre (Floan-Sanders), several citizens commented on items within the study. In general, the comments focused on:

- Access at Gateway Drive & 2nd Avenue NE – The public expressed that new access to the south at this location would provide an entrance to prime retail development area but, if it were made as a direct connection to 10th Street, could also result in increased traffic along 2nd Avenue NE adjacent to existing residential development. Questions arose over the potential signalization of this intersection, as well as excitement surrounding the potential for a "big box" retailer to redevelop the parcel between Central Avenue and 5th Avenue NE to the south of Gateway Drive.
- A connection at 5th Avenue NW – Many at the public meeting believed that full access at 5th Avenue NW was necessary for emergency response reasons as well as a relief for DeMers and Central Avenues during flooding events. Concerns as well as opportunities for right-of-way acquisition were expressed at the meeting.
- Industrial site access at 11th Avenue NE – A brief question was asked about frontage road access requirements into the industrial area south of Gateway Drive near the east side of the City.

6.2.2 Public Forum #2

A second public information meeting was held on January 10, 2006 at 5:00 PM at East Grand Forks City Hall to discuss the progress of this study. The purposes of this meeting were to present to the public the alternatives analysis and draft recommended plan, answer any questions about the process that took the project through the analysis and to the recommended plan, and to obtain their input on that process and final recommendations.

Following presentations made by Ryan Brooks (MPO) and John Seyer (HDR), several citizens commented on the recommended plan. Below is a summary of those comments noted during the meeting, organized by alternative:

- A connection at 5th Avenue NW – The bulk of public comment was made in reference to this alternative. The public generally supported connecting 5th Avenue NW to Gateway Drive and signalizing the intersection. This support included the two land owners that were present whose properties would be detrimentally impacted by this alternative. Some residents noted that they would like to see this connection made to help alleviate congestion along the Central/DeMers corridor, particularly in reference to those times of the year when flooding closes River Road.
- Access at Gateway Drive & 2nd Avenue NE – Comments regarding this connection were minimal. The public expressed their recognition of the land parcel south of the access as prime retail development and this connection was seen as being favorable. Questions that were raised at the first public meeting about connecting 2nd Avenue NE directly from Gateway Drive to 10th Street were evidently answered with the configuration of the proposed alternative.
- Industrial site access at 11th Avenue NE – The public did not comment or question this alternative.

6.3 MPO TECHNICAL ADVISORY COMMITTEE

The MPO's Technical Advisory Committee (TAC) served as the guiding committee for the preparation of this study. The TAC is comprised of representatives from federal entities, state agencies, and local municipalities, as detailed in Table 6.1.

Table 6.1
Grand Forks-East Grand Forks MPO Technical Advisory Committee

Representative	Agency
Earl Haugen, Chair	Grand Forks-East Grand Forks MPO Staff
Mark Johnson	FHWA, ND Division
Paul Benning	NDDOT
Lynne Bly	Mn/DOT
Dean Wieland	East Grand Forks, City Engineering
Greg Boppre	East Grand Forks, City Engineering
Les Noehre	NDDOT – Grand Forks
Wayde Swenson	NDDOT – Grand Forks
J.T. Anderson	Mn/DOT – Bemidji
Kent Ehrenstrom	Mn/DOT – Bemidji
Richard Onstad	Grand Forks, County Engineering
Rich Sanders	Polk County Engineering
Nancy Ellis	Polk County Planning
Lane Magnuson	Grand Forks County Planning
Wayne Lembke	Grand Forks, City Engineering
Cindy Voigt	Grand Forks, City Engineering
Brad Gengler	Grand Forks, City Planning
Ryan Brooks	East Grand Forks, City Planning
Roger Foster	Grand Forks Transit

Source: Grand Forks-East Grand Forks MPO

This table lists J.T. Anderson as one of the Mn/DOT representatives. Mr. Anderson was not part of the TAC at the outset of this project, as Mr. Mike Kamnikar filled that role at the time. For the sake of consistency, Mr. Kamnikar remained involved throughout the process, including attendance at the two public meetings identified above.

Regularly scheduled TAC meetings were used to present project progress and technical findings, discuss public input, and receive approval for alternatives evaluation, preferred alternative selection, and this document. These efforts culminated with the request for approval of the document at the February 8, 2006 TAC meeting. The TAC voted unanimously to approve the document and, thus, it governs the access priorities along Gateway Drive within the corporate limits of the City of East Grand Forks.

CHAPTER 7: CONCLUSIONS

7.1 CONCLUSIONS FROM TRAFFIC ANALYSIS

An investigation of the traffic analyses of the existing conditions and 2025 access alternatives established the following conclusions:

- Intersection levels of service at existing intersections is acceptable (LOS D or better for Mn/DOT standards, and LOS C or better by MPO standards)
- Safety conditions at the Central Avenue intersection and along two stretches of TH 2 experienced crash rates that exceed their respective critical crash rates
- Intersection levels of service for 2025 conditions should be acceptable for the No-Build condition and all analyzed Build conditions, except during flood events
- Corridor operations along Gateway Drive suffer significant impacts during annual flood events, as a result of the closure of River Road; proposed improvements would greatly improve this condition
- The monetization analysis of 2025 No-Build and Build safety conditions revealed that the increased costs at locations where access would expand would be offset by the reduced costs at locations where the access would not change; it is likely that crash costs would actually decrease in the Build condition versus the No-Build condition

The review of intersection levels of service and corridor operations shows that there would not be any incentive to modify access at any location along the corridor. This would be due primarily to the fact that intersection levels of service, average travel speeds and average travel times would be acceptable under the No-Build and Build conditions. However, this condition would not apply during flood events. During flood events that occur at least once annually, traffic operations at the Central Avenue intersection, at the 5th Avenue NW intersection, and along Gateway Drive, from the Kennedy Bridge to Central, would suffer significant delays and congestion under the No-Build condition. The Build condition would result in vastly improved traffic operations during these flood events and would perform very well during times of non flood events.

The review of the safety analyses showed that some accesses would experience elevated crash costs due to the expanded access, while other locations would experience a decrease in crash costs. The reduction in crash costs would be attributed to a reduction in traffic volumes through these locations (most notably, Central Avenue), which is a direct result of expanded access.

7.2 CONCLUSIONS FROM PUBLIC INPUT

The input from the first public forum centered around two themes: (1) Gateway Drive is an east-west barrier for north-south travel and (2) future retail/commercial development is expected to occur along Gateway Drive before other areas of the city. The public was interested in obtaining full access at 5th Avenue NW due mostly to emergency response and flooding issues. Access between Gateway Drive20 and 5th Avenue NE was sought for reasons of economic development.

The input from the second public forum was concentrated on the connection of 5th Avenue NW to Gateway Drive and subsequent signalization of the intersection. The public was generally pleased with this alternative, particularly due to the promise of alleviating traffic congestion during annual flood events that close River Road. The public was generally accepting of the recommended plan in its entirety, including the ¾-movement access at 2nd Avenue NE and the reconfiguration of the City's substation access.

7.3 CONCLUSIONS FROM AGENCY INPUT

Comments and questions were provided by multiple members of the TAC, but the bulk of agency comment came from representatives of Mn/DOT. The element of this study that drew the most debate centered on the proposed extension of 5th Avenue NW and the subsequent signalization of the intersection. This debate included the impacts to traffic flow along Gateway Drive, impacts to area residents, right-of-way acquisition required to make this alternative feasible, and the perceived benefits of such a connection. The alternative that would modify the Gateway Drive and 2nd Avenue NE intersection also stimulated some discussion, including the pros and cons of allowing north-south through movements and signalizing the intersection, connecting 2nd Avenue NE to 10th Street, and extending the frontage road system through the supposed retail property on the south side of Gateway Drive at 2nd Avenue NE.

There were identified deficiencies with the alternatives that were presented for analysis as well as those that were included in the draft version of the recommended plan. Several rounds of comments and opportunities for open discussion between the consultant team, MPO and affected parties resulted in a recommended plan that was acceptable to the members of the TAC, Mn/DOT and the public.

CHAPTER 8: RECOMMENDED ACCESS PLAN

8.1 RECOMMENDED PLAN

In consideration of the future growth of the City of East Grand Forks, the forward vision of the MPO, and the current conditions within the limits of the study corridor, it is recommended that alternatives "1" and "3" be implemented on Gateway Drive. These two alternatives provide the best balance between safety (of the traveling public) and the appropriate level of access control (to support local commerce). The recommended plan can be found in Figure 8.1.

Alternative 1 would extend 5th Avenue NW across Gateway Drive and signalize this intersection. The highway forms a logical barrier between the north and south sides of the City of East Grand Forks. The proposed north/south connection at 5th Avenue NW will provide an additional link between residential and commercial areas, promoting easier access between the two land uses. Though the crash costs at 5th Avenue NW may increase with the recommended intersection upgrade, this can be offset by the reduced crash costs at Central Avenue and by the benefit of having an additional connection between the north and south, which will help reduce emergency response times; this is especially critical during times of flood events when the optional north/south routes are reduced and more congested. It is also worth noting that the eastbound and westbound approaches to 5th Avenue NW would operate at LOS A in the No-Build condition and in the Build condition. This is due, primarily, to the fact that the east and west legs of the intersection would likely consume the greatest share of available green time, which would keep traffic moving along Gateway Drive.

If not timed properly, additional traffic signals can have a detrimental impact to traffic flow along a corridor. This is inherent with the installation of a traffic signal because of the introduction of interrupted flow at a location where traffic flow was previously uninterrupted. These impacts to Gateway Drive could be largely mitigated, though, by coordinating the new signal with the existing signals at Central Avenue and 5th Avenue NE. Signal coordination can greatly reduce travel times by dramatically reducing the number of stops along a corridor, which would be particularly beneficial for truck traffic.

Alternative 3 would provide a ¾-movement access at Gateway Drive to the south leg of 2nd Avenue NE. The connection at 2nd Avenue NE may also help to reduce future congestion on Central Avenue by diverting vehicles destined for the would-be retail area just south and west of the Central Avenue intersection. This ¾-movement access would provide the necessary access to this prime real estate, yet would not encourage additional traffic in the surrounding residential areas. This new connection would primarily service pass-by vehicles on Gateway Drive wishing

to access the future retail site. It will be possible to tie this extension of 2nd Avenue NE in to its current terminus at 10th Street NE, but only by routing it around a parking lot. This "rear access" to the development is necessary for emergency response purposes but will not be a desirable travel route for through traffic.

8.1.1 Compatibility with Previous Planning Efforts

It is important to lend credence to previous planning efforts that have occurred along Gateway Drive, specifically, the access management study performed by the MPO in 1994. This study reviewed potential modifications to Gateway Drive and made several recommendations. Those recommendations, which were detailed in Section 2.5, and how they compare to this document are described below:

- 5th Avenue NW – The 1994 study concluded that the legs of 5th Avenue NW, north of Gateway Drive and south of Gateway Drive, should be connect and intersect Gateway Drive at a signalized intersection.
- 2nd Avenue NE – The 1994 study concluded that 2nd Avenue NE should be extended from 10th Street north to Gateway Drive and the Gateway Drive and 2nd Avenue NE intersection should be signalized.
- 5th Avenue NE – The 1994 study concluded that the Gateway Drive and 5th Avenue NE intersection should be signalized.
- 15th Avenue NE – The 1994 study concluded that 15th Avenue NE should connect to Gateway Drive at a full-movement, unsignalized intersection.

The extension of 5th Avenue NW from the north and the signalization of its intersection with Gateway Drive is a recommendation in both studies. The benefits of this connection, particularly during flood events and how it would help alleviate congestion along Gateway Drive, were noted in both studies.

This study also recommends modifying the Gateway Drive and 2nd Avenue NE intersection, but it concedes to a lesser access than that proposed by the 1994 study. This study showed that installing a ¾-movement access to the south, essentially mirroring what exists to 2nd Avenue NE to the north, would provide adequate retail access opportunities to the south side of Gateway Drive without imposing the safety detriments of a full-movement, signalized intersection.

The intersection at 5th Avenue NE was signalized back in 2003. The 1994 study made this recommendation and this study did not look to augment that access.

The 15th Avenue NE connection was not reviewed as a part of this study. The 1994 study recommended this connection to accommodate a grain elevator that was proposed near 15th

Avenue NE. This land use modification did not come to fruition, nullifying the benefits of adding this access to the highway.

8.2 IMPLEMENTATION STRATEGY

This section outlines an implementation strategy for the recommended plan that is detailed in the previous section of this report. This implementation strategy speaks to the probable capital costs of each proposed improvement, the timing of construction of each improvement, and it identifies those parties that will likely be responsible for the design and construction of each improvement.

The proposed improvements are very similar in nature to those that were proposed in the 1994 study. The 1994 study estimates for these proposed improvements included:

- 5th Avenue NW – Extension of north leg and signalization of Gateway Drive intersection

  $421,000

- 2nd Avenue NE – Construction of ¾-movement access (the 1994 study developed this alternative for the north side of Gateway Drive)

  $347,000

- 15th Avenue NE – Construction of full-movement, unsignalized access and subsequent realignment of the frontage roads

  $130,000

The 2nd Avenue NE alternative from the 1994 study differs from this study's recommendation only in that the access would be on the south side of Gateway Drive instead of the north side. The 15th Avenue NE alternative from the 1994 study was deemed to be comparable to that of the improvement to the substation access because the nature of the improvements are the same, including construction of a full-movement, unsignalized intersection at Gateway Drive and the subsequent realignment of the frontage roads.

The costs associated with the 5th Avenue NW alternative were calculated based on unit costs from the 2003 pedestrian underpass project and from other relevant work performed in the area. Detail on this cost estimate can be found in Appendix J. The costs associated with the other two alternatives were calculated by applying an inflation rate to the costs from the 1994 study. The inflation rate that was used to factor the 1994 cost estimates to current year was 27.65%, which is fairly in line with national averages. The City of East Grand Forks was fortunate that the financial impacts of the 1997 flood did not result in inflation that was drastically divergent from other parts of the country. The current-year costs for these alternatives can be found in Table

8.1. It should be noted that the costs of these improvements are planning-level estimates. Once preliminary and final design plans have been developed for these alternatives, a more refined cost estimate for each will be established. Given that each of these improvements would be located along a state highway, design review and final approvals will go through Mn/DOT.

The timing of the proposed improvements is unique to each improvement. The extension of 5th Avenue NW and the signalization of the intersection is an improvement that should be made as soon as possible. The construction of the ¾-movement access at 2nd Avenue NE would be constructed concurrently with the development of the retail parcel on the south side of Gateway Drive. The construction of the improved access to the substation should be done when warranted by industrial park expansion. The first phase would be to connect the frontage road on the south side once the current industrial park expands to the east. The opening to the north should not occur until industrial land is developed to the north of Gateway Drive.

The responsible party for each improvement listed in the recommended plan is as diverse as the timing of each improvement. The corridor meets current and future performance measures as identified for a Mn/DOT medium priority IRC. Mn/DOT's record of addressing segments and intersections that experience crash rates in excess of their respective critical crash rates is well documented. The need for the ¾-movement access at 2nd Avenue NE would be driven by the development of the retail parcel on the south side of the highway, so the developer would be the responsible party for this improvement. Because the City owns the substation, the responsibility of the improvement to the substation access would rest solely on the City.

The estimated capital costs of each improvement, the likely timing of each improvement, and the anticipated responsible party for each improvement are displayed in Table 8.1.

Table 8.1
Recommended Plan Implementation Strategy

Proposed Improvement	Estimated Capital Cost	Estimated Timing of Improvement	Anticipated Responsible Party
Alternative 1 – Extension of 5th Avenue NW and Signalization of Gateway Drive Intersection	$1 million	As soon as funds become available	City
Alternative 3 – Extension of 2nd Avenue NE and ¾-Movement Access	$443,000	To be constructed concurrent with retail development	Developer
Alternative 4 – Improvement of Substation Access	$166,000	As soon as funds become available	City

Source: Capital costs for Alternatives 3 and 4 were taken from the 1994 study and increased by an inflation factor germane to East Grand Forks

8.3 OTHER POTENTIAL ACCESS MODIFICATIONS

This document has detailed a recommended plan that involves changes to the 5th Avenue NW intersection, additional access at 2nd Avenue NE, and changes at the City's substation access. While it's safe to say that this plan covers any and all access changes along Gateway Drive, west of 5th Avenue NE, there is the potential for ambiguity related to access along Gateway Drive, east of 5th Avenue NE. As the City of East Grand Forks develops to the east, it is conceivable that property owner and developer pressures could result in requests for additional access to Gateway Drive, east of 5th Avenue NE. This section of the report provides specificity to the potential for access modifications along Gateway Drive, east of 5th Avenue NE.

The spacing between the two existing traffic signals along Gateway Drive, at Central Avenue and at 5th Avenue NE, is approximately one-half mile. It is logical to expect that another signal could be installed one-half mile east of 5th Avenue NE. Given the existing roadway network, it is logical to expect that this signal would be installed at the Gateway Drive and 11th Avenue NE intersection. The large horizontal curve on the east end of town precludes the potential for any other access to Gateway Drive, east of 11th Avenue NE. In keeping with the desire to hold mobility paramount along this stretch of Gateway Drive, a signal at 11th Avenue NE would supersede the potential for other access to Gateway Drive, east of 5th Avenue NE. In accordance with this condition, the installation of a signal at 11th Avenue NE would also require the closure of the existing full-movement intersection at 7th Avenue NE, relegating this access to right-in/right-out.

Figure 8.1
Recommended Access Changes