Belknap Street Corridor Study

May 2003

Prepared by the

DULUTH-SUPERIOR METROPOLITAN INTERSTATE COMMITTEE
MIC

Belknap Street Corridor Study

May 2003

Duluth and Superior urban area communities
cooperating in planning and development
through a joint venture of the
Arrowhead Regional Development Commission
and the
Northwest Regional Planning Commission

To view this plan online
or for more information
please visit **www.ardc.org**

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Minnesota Department of Transportation
Wisconsin Department of Transportation
Arrowhead Regional Development Commission
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Guiding the Future of Transportation and Planning for the Twin Ports Area

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Introduction

Belknap Street is the primary east-west thoroughfare through the heart of one of Superior's major commercial areas. It provides access to customers of local businesses, students and faculty at the University of Wisconsin – Superior and Indianhead Technical College as well as being a major through route for trucks and other traffic traveling between Northwest Wisconsin and Northeast Minnesota. There are numerous access points along this route which impede the efficient flow of traffic and makes the corridor problematic for bicyclists and pedestrians. The result of future redevelopment opportunities may be an exacerbation of these traffic flow issues.

The Metropolitan Interstate Committee (MIC) scheduled this study for its 2002-2003 work program. The objective is to examine the current and future deficiencies of the roadway and develop solutions for improved movement of goods and people.

Major Work Activities that were performed

- Investigated traffic movement in the corridor with a special focus on truck movements
- Identified all access points and recommended potential changes for specific points of ingress/egress
- Identified areas of inefficiencies for pedestrian and bicycle movements
- Identified land uses in the corridor and identified opportunities to improve its usage
- Documented Environmental Justice component
- Provided recommendations that include median treatments, shared access locations, parking solutions, signalization changes and options for traffic channelization

A special effort was undertaken in this planning process to address pedestrian issues in the corridor. This effort is supported by WisDOT. The agency completed its Wisconsin Pedestrian Policy Plan 2020 in 2002. In this plan, Objective 1.0 is "Working in partnership with local governments and other interested stakeholders, WisDOT will increase accommodations for pedestrian travel to the extent practicable along and across State Trunk Highways (STHs)."

Also, Action 2.4 states, "WisDOT will encourage MPOs and RPCs to consider pedestrian needs in their planning processes. MPOs and RPCs should include pedestrian transportation and other multimodal needs in their transportation studies, transportation project selections and advice in plans and studies."

Study Advisory Committee

This study was guided by an advisory committee consisting of planning and engineering representatives from the City of Superior and the Wisconsin Department of Transportation, as well as Superior's Business Improvement District.

Study Area
The study area is 2.7 miles of Belknap Street extending from Susquehanna Avenue on the west to Highway 53/East 2nd Street on the East. The boundaries of the study area are shown on Map 1.

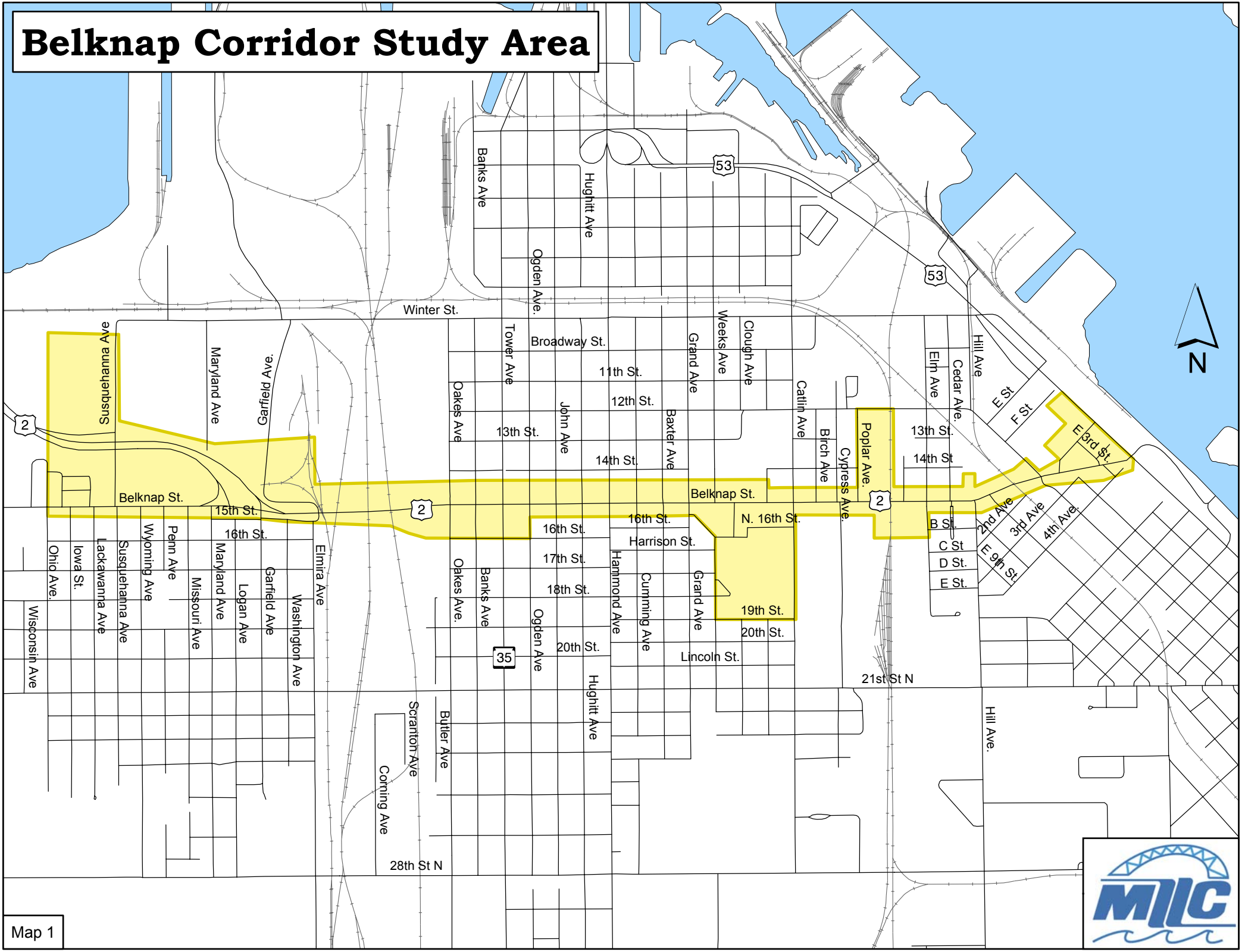
Data Collection
The following technical information was collected for use in this study:

Identification of Primary and Secondary Intersections
The Advisory Committee determined the intersections that should be analyzed for traffic impacts and counts. Those selected include all of the signalized intersections as well as a few others that were deemed important. It was also decided that since the issue of truck traffic will play a significant role in this study, truck traffic counts at the intersection of Tower Avenue and Winter Street should also be monitored because it is a truck route; these counts could be compared with truck counts on Belknap Street. Those intersections chosen for counts are listed below and displayed on Map 2.

- U.S. Highway 53
- East 5th Street
- Hill Avenue
- Mertz Mortorelli Memorial Drive
- Catlin Avenue
- Grand Avenue
- Hammond Avenue
- Ogden Avenue
- Tower Avenue
- Banks Avenue
- Garfield Avenue
- Susquehanna Avenue
- Winter Street & Tower Avenue (truck counts only)

Traffic Turning Movements
Traffic movement counts for these intersections were collected during peak hour times – between 7:00 AM and 8:30 AM and also between 4:00 PM and 5:30 PM on typical weekdays during September, 2002. A listing of the intersections and the data sheets can be found in the Appendix.

Belknap Corridor Study Area



Map 1

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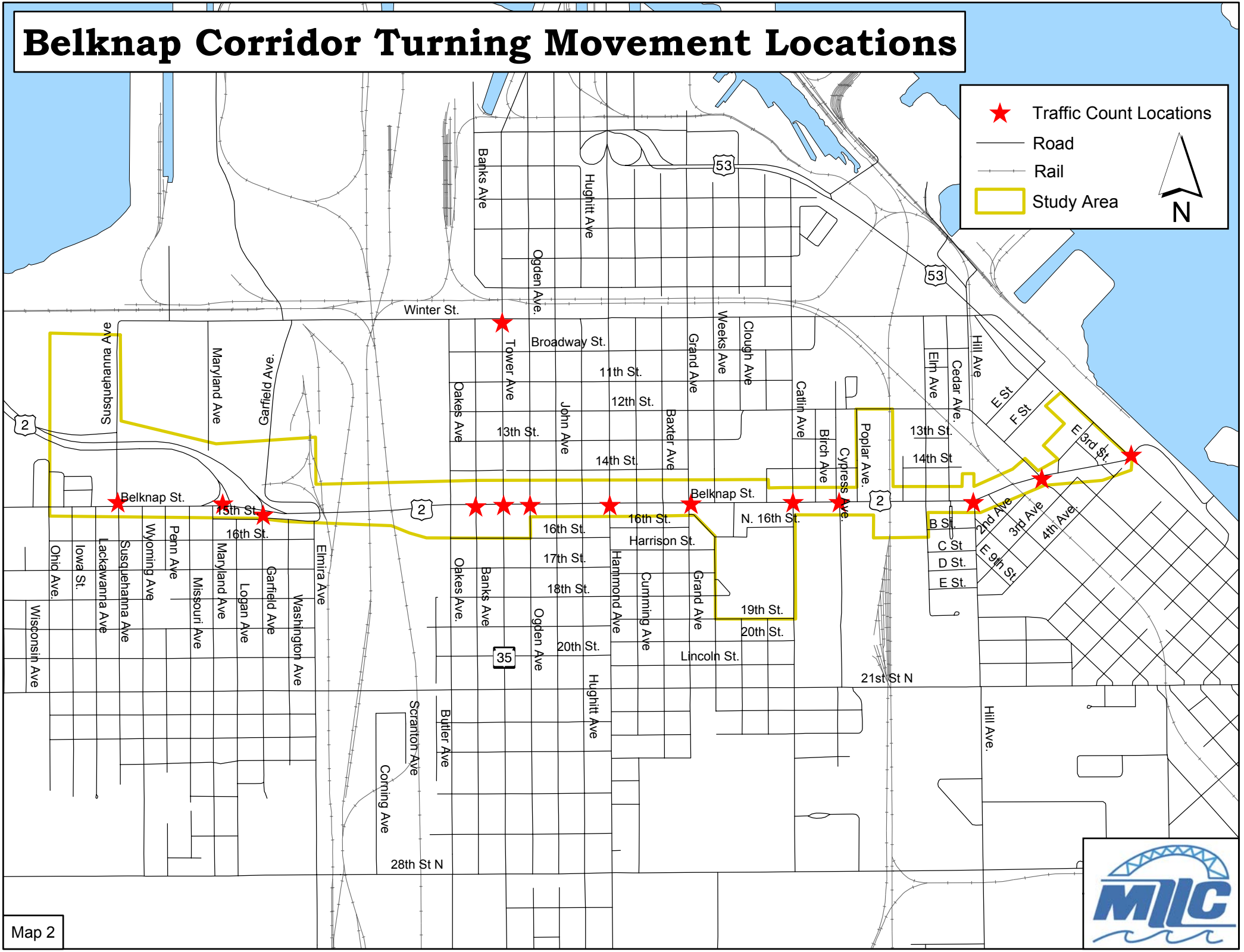
Belknap Corridor Turning Movement Locations



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Current Land Use, Zoning and Aerial Maps
These items were gathered to assist in the planning study process. Maps 3 and 4 depict current zoning and land use.

ADT Counts
Traffic counts along Belknap were conducted by WisDOT during the summer of 2002. These counts were compared with those conducted in 1999 and also with those collected by the MIC in 2002.

Projected ADT from the TRANPLAN Model
To get projected future traffic volumes, the results from the traffic modeling program TRANPLAN were used from the MIC's *Tomorrow's Transportation 2025*. TRANPLAN predicts region-wide traffic volumes and behaviors based on changes in housing, employment and population.

Truck, Bicycle and Pedestrian Counts
During the MIC's traffic counts in September, 2002, truck, bicycle and pedestrian counts were also included. In December, 2002, truck counts were taken between 12:30 PM and 2:30 PM at both ends of the corridor in order to determine the number of trucks that traveled through the area without making stops.

Accident Information
Accident rates at the primary intersections and along each mile segment were tabulated for the years 1997 through 2001. These rates were calculated in order to determine areas of unusually high accident rates.

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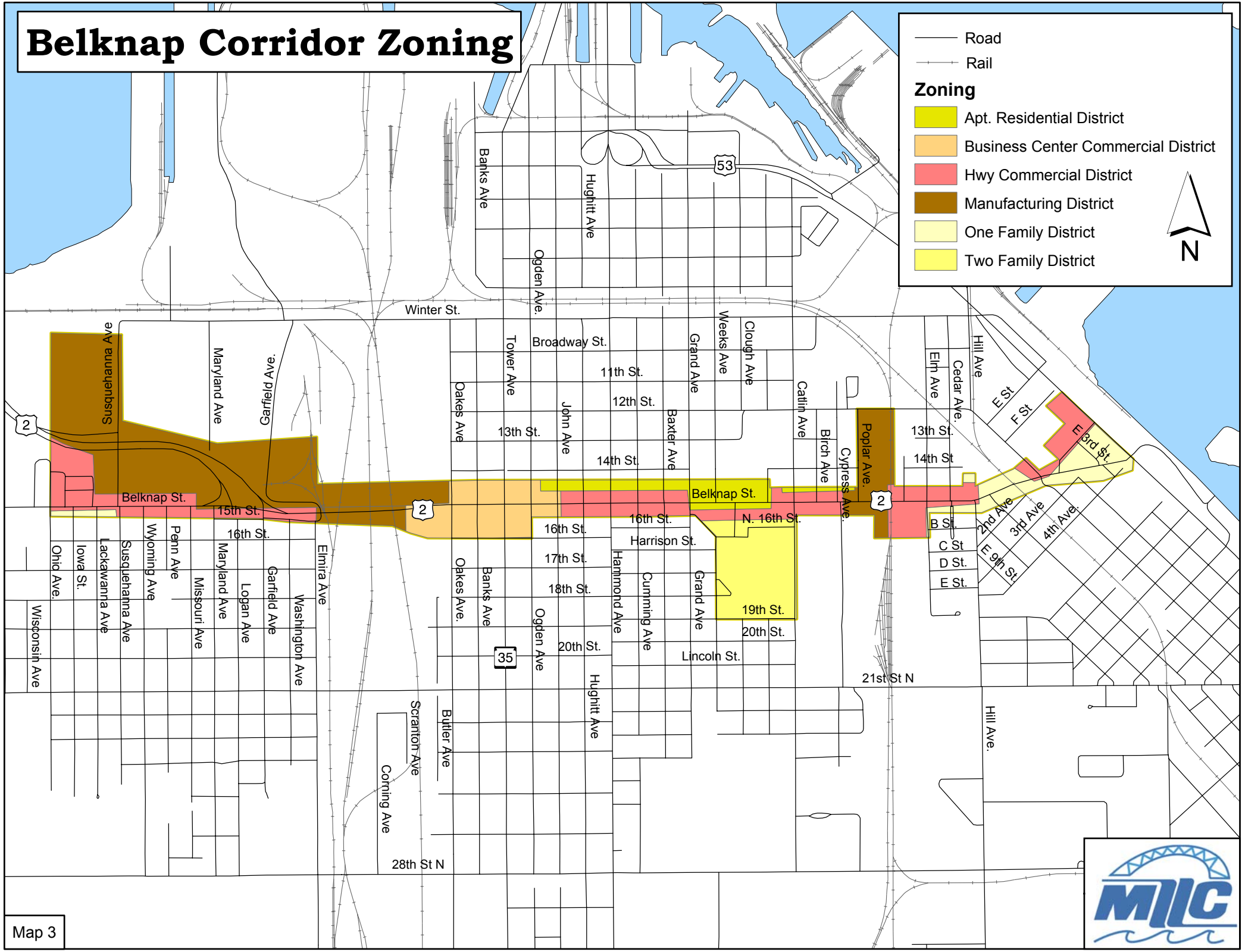
Belknap Corridor Zoning



Map 3

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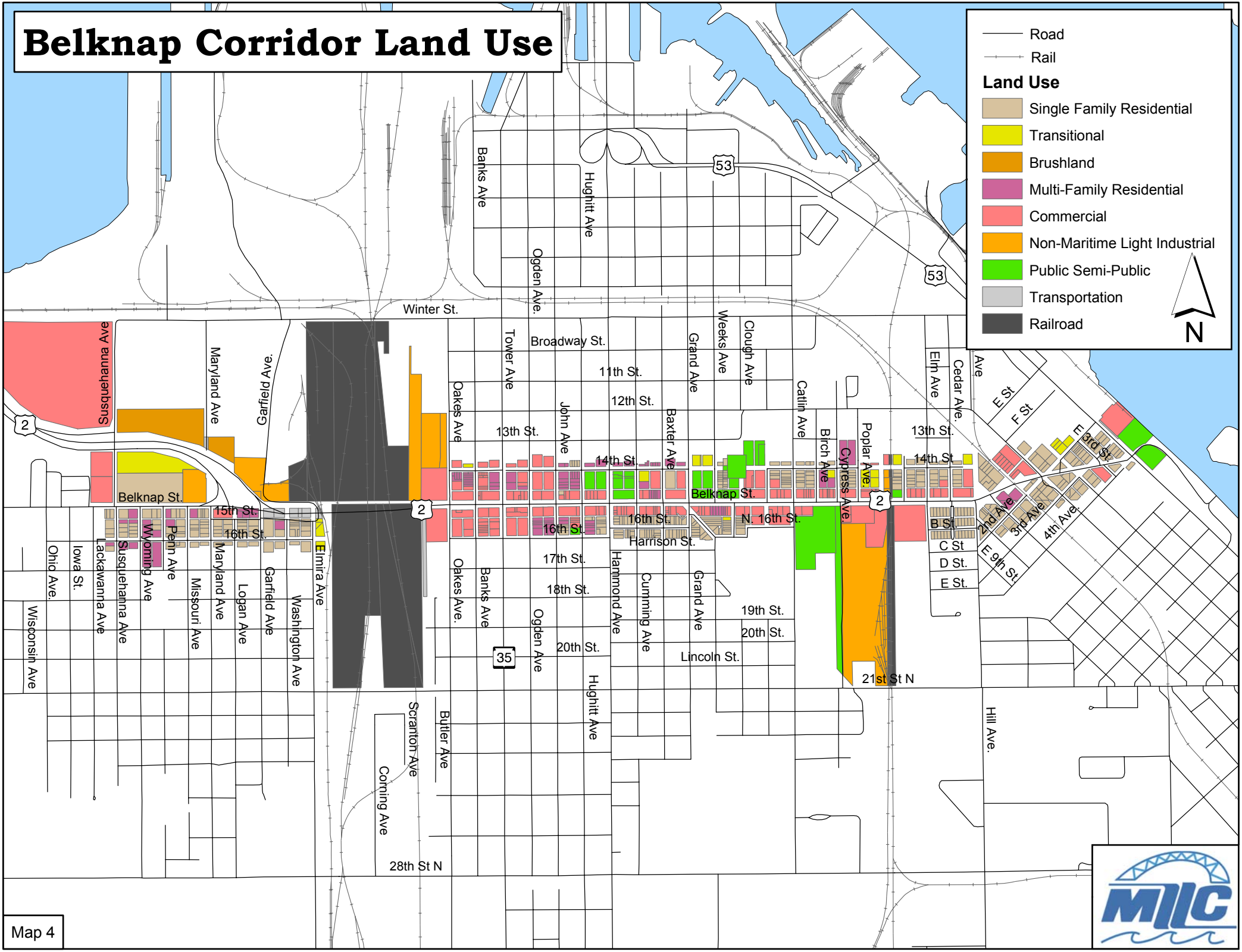
Belknap Corridor Land Use
Road
Rail
Land Use
Single Family Residential
Transitional
Brushland
Multi-Family Residential
Commercial
Non-Maritime Light Industrial
Public Semi-Public
Transportation
Railroad
N
Winter St.
Broadway St.
11th St.
12th St.
13th St.
14th St.
15th St.
16th St.
17th St.
18th St.
19th St.
20th St.
28th St N
Belknap St.
Harrison St.
Lincoln St.
21st St N
N. 16th St.
B St.
C St
D St.
E St.
E 9th St.
2nd Ave
3rd Ave
4th Ave
E St
F St
3rd St
Susquehanna Ave
Maryland Ave
Garfield Ave
Tower Ave
Oakes Ave
John Ave
Baxter Ave
Grand Ave
Weeks Ave
Clough Ave
Catlin Ave
Elm Ave
Cedar Ave.
Birch Ave
Cypress Ave.
Poplar Ave.
Banks Ave
Hughitt Ave
Ogden Ave.
Hammond Ave
Cumming Ave
Corning Ave
Scranton Ave
Butler Ave
Hill Ave.
Ohio Ave.
Wisconsin Ave
Iowa St.
Lackawanna Ave
Susquehanna Ave
Wyoming Ave
Penn Ave
Missouri Ave
Logan Ave
Washington Ave
Elmira Ave
53
2
35
Map 4

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Inventory of Existing Conditions

TRANPLAN Modeling

The MIC's TRANPLAN modeling predicts that traffic will increase in the corridor from 24 to 70 percent at various locations between 2000 and 2025. Table 1 displays this data. The TRANPLAN modeling process is based on a three-step process which includes trip generation, trip distribution and trip assignment.

Table 1

Belknap Traffic Estimates

Segment	2000 Base Year Level of Service ADT	2025 Level of Service Projected ADT	2000 - 2025 Percentage Increase	Capacity	Percent of Capacity in 2025
Bong to Banks	14,573	20,810	42.8	23,800	87.4
Banks to Tower	14,686	20,696	40.9	16,700	123.9
Tower to Ogden	12,652	18,097	43.0	21,800	83.0
Ogden to John	14,569	20,128	38.2	21,800	92.3
Hammond to Cumming	14,741	18,293	24.1	19,250	95.0
Grand to Hill	10,610	16,250	53.2	19,250	84.4
E. 5th to 53	6,659	11,333	70.2	19,250	58.9

Map 5 displays current and projected average annual daily traffic counts. The model examines socioeconomic changes such as housing and employment for several hundred zones in the Duluth-Superior area. It then relates those socioeconomic changes in traffic or trip generation. Subsequently, the model distributes these generated trips among the traffic zones. The zones with the highest traffic generators (major employment, retail and housing centers) receive the bulk of the traffic. This final step of trip assignment results in the 2025 traffic projections. Table 1 also shows the projected percent of capacity in 2025. The segment of Belknap Street between Tower Avenue and Banks Avenue is predicted to be over capacity. This is consistent with the MIC's Long Range Plan which shows the segment at Level of Service "E" by 2025. Table 1 shows daily traffic data for the Belknap Corridor.

Accident Data

Table 2 below shows the number of accidents that occurred along each block of Belknap Street from 1997 through 2001. Over those five years, a total of 316 accidents were recorded in the study corridor. In calculating the accident rate, as shown in the chart, the first step is to determine the average daily traffic (ADT) volume for each segment. The ADTs used were based on counts provided by WisDOT taken during the summer of 2002. That number is then multiplied by 365 to estimate the total traffic for one year. WisDOT's accident data along the corridor is utilized to determine the total number of accidents. The other component is the length of the corridor. The following equation was used to calculate the accident rate:

$$\frac{1{,}000{,}000 * \text{Accidents Along Corridor}}{\text{ADT} * 365 * \text{Number of Years of Accident Data} * \text{Length of Roadway}}$$

The accident rate is based on the number of accidents per million vehicle miles. A weighted average of the accident rates was used to arrive at the rate for the entire corridor. This overall accident rate is 4.94 accidents per million vehicle miles.

Table 2

Belknap Street Corridor Accident Rates 1997-2001

Segment	Average Daily Vehicles in Segment	Total Number of Accidents	Average Number of Annual Accidents	Length of Segment (miles)	Accident Rate
Highway 53 to East 5th Street	7,800	4	0.8	0.25	1.12
East 5th Street to Hill Avenue	7,800	21	4.2	0.19	7.76
Hill Avenue to Mortorelli Drive	15,500	32	6.4	0.36	3.14
Mortorelli Drive to Catlin Avenue	15,500	24	4.8	0.13	6.53
Catlin Avenue to Grand Avenue	19,900	34	6.8	0.28	3.34
Grand Avenue to Hammond Avenue	19,400	41	8.2	0.21	5.51
Hammond Avenue to Ogden Avenue	16,900	40	8.0	0.22	5.87
Ogden Avenue to Tower Avenue	16,600	38	7.6	0.07	17.92
Tower Avenue to Banks Avenue	16,700	45	9.0	0.07	21.09
Banks Avenue to Garfield Avenue	14,000	37	7.4	0.51	2.84
Garfield Avenue to Susquehanna Avenue	2,800	No data	NA	0.39	NA
TOTAL (excluding Garfield to Susquehanna)	**150,100**	**316**	**63.2**	**2.29**	**4.94**

Accident Rates at Intersections

Accident Rates were also prepared for the Belknap Corridor to display accident rates per intersection. This data is shown in Table 3.

Table 3

Belknap Street Intersection Accident Rates 1997-2001

Intersection	Average Daily Vehicles Entering Intersection	Total Number of Accidents	Average Number of Annual Accidents	Accident Rate
Highway 53	23,350	2	0.4	0.05
East 5th Street	13,500	4	0.8	0.16
Hill Avenue	14,150	4	0.8	0.15
Mortorelli Memorial Drive	18,750	6	1.2	0.18
Catlin Avenue	21,850	20	4.0	0.50
Grand Avenue	23,650	13	2.6	0.30
Hammond Avenue	27,600	5	1.0	0.10
Ogden Avenue	20,450	20	4.0	0.54
Tower Avenue	31,400	38	7.6	0.66
Banks Avenue	20,950	45	9.0	1.18
Garfield Avenue	19,350	9	1.8	0.25
Susquehanna Avenue	6,200	No data	NA	NA

Note: Accidents are within 50 feet of an intersection.

Existing Transit Network

Map 6 displays the existing Duluth Transit Authority (DTA) transit routes in Superior. The DTA provides bus service to the City of Superior on a contractual basis. The level of service is determined by the Superior City Council which has funding authority. Superior is represented on the DTA Board with one member that has full voting privileges.

The routes within Superior radiate outward from the central pulse point of 14th Street and Tower Avenue in the downtown area. There are three separate routes within the City of Superior as well as one intercity route that travels between Superior and downtown Duluth. The Monday through Saturday service periods are shown in Table 4.

Table 4

DTA Service Periods

Regular Routes	Weekday	Saturday	Sunday
Duluth/Superior	6:00 AM - 7:30 PM	6:35 AM - 7:00 PM	10:35 AM - 7:00 PM
City of Superior	5:30 AM - 6:40 PM	8:00 AM - 6:45 PM	10:00 AM - 5:45 PM

Ridership Activity

Table 5 compares ridership levels between 1993 and 2002.

Table 5

DTA Daily Weekday Ridership

Regular Routes	1993	2002	Percentage Change
Duluth/Superior	694	837	20.6
City of Superior	231	183	-20.8

The major issue in the development of an improved service model for Superior is the fact that the desired origins/destinations and current ridership activity are located in such a manner that serving these points with two bus routes inevitably creates circuitous services, according to the DTA Comprehensive Operations Analysis and Downtown Interaction Study, which was completed in 2003. A proposed service model was developed which maintained existing service and resource levels. Under this model, Superior passengers would be able to transfer between routes at two different locations, the Mariner Mall and the intersection of Grand Avenue and Belknap Street. The timed transfer would be scheduled at Grand and Belknap. The proposed routings for Superior services were as follows:

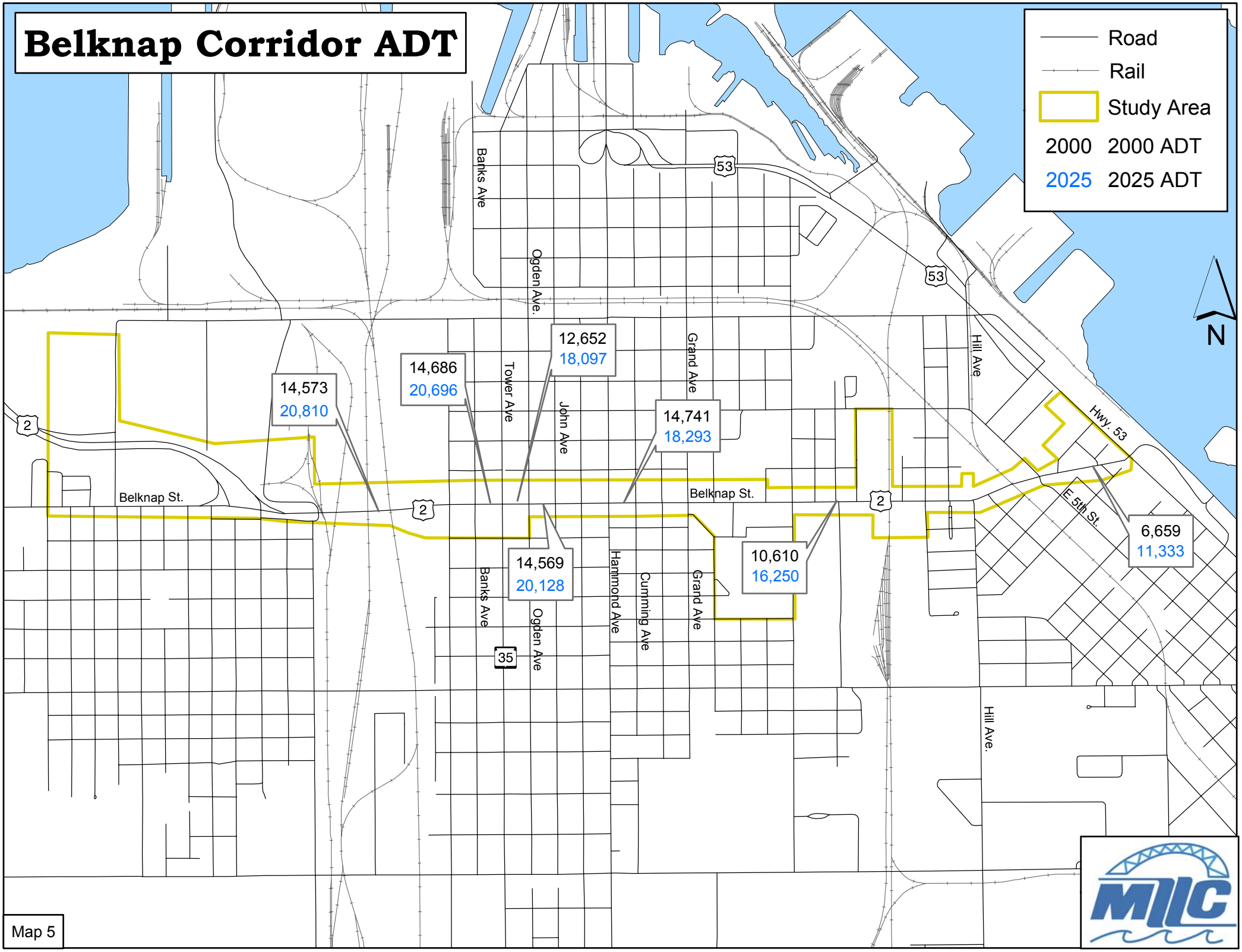
Route 16 – Duluth/Superior/Itasca – Under the proposed service model, Route 16 would be slightly modified to provide a more direct routing. After crossing the bridge into Superior, Route 16 would travel south along Hammond Avenue, east on Grand

Avenue, meet Route 17 at the intersection of Grand Avenue and Belknap Street, then travel along Belknap Street to Catlin Avenue where it would resume current routing.

Route 17 – Superior – This route would be redesigned to operate a three loop configuration. Each loop would serve the timed transfer point and the Mariner Mall. Each would have a 20-minute running time and would therefore provide hourly service along each leg. The first loop would operate between South Superior and the transfer point via Tower Avenue, 28th Street then Hill Avenue and Belknap Street. The second loop would begin at the Mariner Mall (as part of the first loop) and travel Hill Avenue, Belknap Street, New York Avenue, 21st Street, Tower Avenue, Belknap Street and Hill Avenue to the Mariner Mall. The third loop would begin at the Mariner Mall and travel Hill Avenue, Belknap Street, Tower Avenue, 5th Street, Catlin Avenue, Belknap Street and Hill Avenue to the Mall. The three loops would be designated with letters, i.e., 17A, 17B and 17C.

After extensive discussion between the consultant team and the DTA, it was decided that, given the existing resources, meaningful changes to the service model that would not create inconveniences for current riders are very difficult to identify. This is an issue, however, that should be revisited at a time when additional resources are available.

Another possibility to increase bus ridership that was not discussed in the recent DTA study was the possibility of extending the U-PASS program to UWS. This is a successful program that currently operates in connection with UMD. Ultimately, to bring this program to Superior would require the City and/or UWS to contribute the funding that would be necessary to make the program possible.


Belknap Corridor ADT
Road
Rail
Study Area
2000 2000 ADT
2025 2025 ADT
N
Banks Ave
Ogden Ave.
53
Grand Ave
Hill Ave
Tower Ave
John Ave
12,652
18,097
14,686
20,696
14,573
20,810
14,741
18,293
Hwy. 53
Belknap St.
2
E 5th St.
6,659
11,333
10,610
16,250
14,569
20,128
Hammond Ave
Cumming Ave
35
Hill Ave.
Map 5

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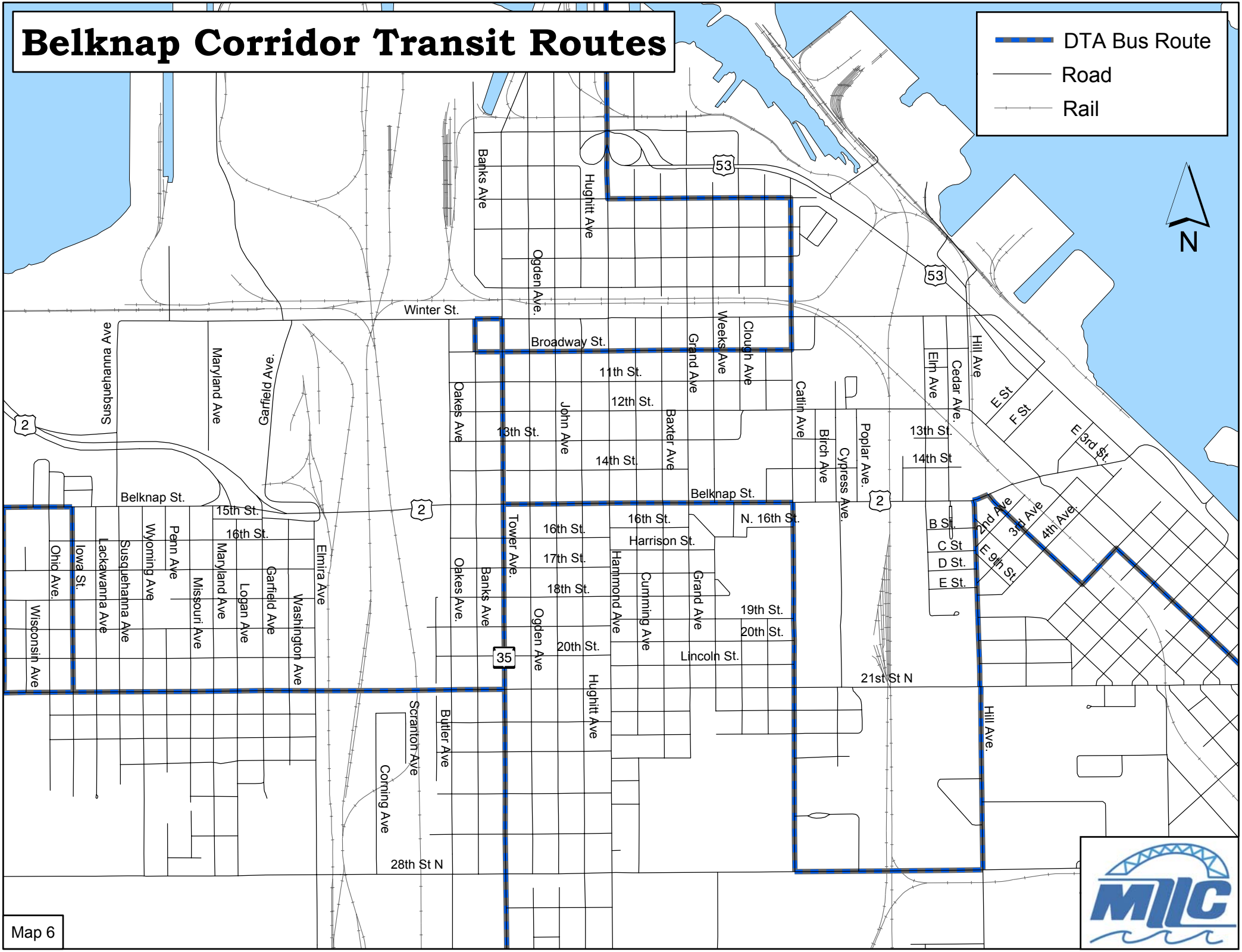
Belknap Corridor Transit Routes
DTA Bus Route
Road
Rail
N
Banks Ave
Hughitt Ave
Ogden Ave.
53
Winter St.
Broadway St.
Weeks Ave
Grand Ave
Clough Ave
Hill Ave
Elm Ave
Cedar Ave.
E St
F St
E 3rd St.
Susquehanna Ave
Maryland Ave
Garfield Ave
2
Oakes Ave
John Ave
Baxter Ave
Catlin Ave
Birch Ave
Cypress Ave.
Poplar Ave.
11th St.
12th St.
13th St.
14th St
Belknap St.
15th St.
16th St.
N. 16th St.
Harrison St.
17th St.
18th St.
19th St.
20th St.
Lincoln St.
21st St N
Tower Ave.
Banks Ave
Ogden Ave
Hammond Ave
Cumming Ave
Grand Ave
35
B St
C St
D St.
E St.
2nd Ave
3rd Ave
4th Ave.
E 9th St.
Ohio Ave.
Wisconsin Ave
Iowa St.
Lackawanna Ave
Susquehanna Ave
Wyoming Ave
Penn Ave
Missouri Ave
Maryland Ave
Logan Ave
Garfield Ave
Washington Ave
Elmira Ave
Scranton Ave
Corning Ave
Butler Ave
Hughitt Ave
28th St N
Hill Ave.
Map 6
MTC

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Pedestrian & Bicycle Facilities
Pedestrian and bicycle facilities are often overlooked, yet are important modes of transportation. On page 33 of Superior's 1997 Comprehensive Plan, the following Park and Recreation Policy is identified:

- *To provide or improve walking, biking and street connections between different neighborhoods and between neighborhoods and the waterfront.*

In general, pedestrian access is very good in the corridor. Sidewalks exist on both sides of the street for the entire Belknap Corridor, except for the portion west of Banks Avenue, where there is a sidewalk only on the south side of the street; and there is no sidewalk on the block between Missouri and Pennsylvania and at the northwest corner of the intersection of Belknap Street & Highway 53. However, access for crossing intersections could be improved in some areas.

Because of heavy traffic on Belknap and the fact that it does not provide shoulders, bicycle traffic is not recommended along the corridor. The MIC's 1994 Duluth-Superior Metropolitan Bikeways Plan does not identify Belknap Street as a bike route, except for a one block segment between Susquehanna and Wyoming to direct bicycles from the Bong Bridge toward 21st Street and 28th Street for connections to the east side of the City. Both 21st and 28th are designated bike routes for most of their lengths and approximately half the length of Winter Street is also a bike route. These three corridors are the recommended east-west connections for bicycles in Superior. There are also four north-south bicycle routes that cross Belknap. Map 7 displays the bicycle routes in the northern section of Superior. The existing conditions and recommendations for pedestrians and bicycles will be provided below.

Parking
On-street parking exists on Belknap Street intermittently from Banks Avenue to Weeks Avenue. These parking areas limit the amount of time for parking to 2 hours. The Downtown Superior Parking Study was completed earlier this year by the MIC. It listed the following recommendations concerning Belknap Street:

- Vigorously enforce the existing parking limits.
- The parking spaces near the Metro Center, including those on Belknap, are primarily used for employee parking rather than customer parking. The parking study found an occupancy rate of 96%. The study recommended that parking meters be installed on Belknap Street to increase parking turnover and provide needed parking areas for customers.
- A Commuters Choice program should be implemented for Metro Center employees and other Belknap businesses that would enable downtown employers to offer tax deductible transit benefits to employees which would give them discounts for using public transit. The installation of a bus shelter near the corner of Belknap and Hammond would make this program more attractive.

- Wayfinding signage should be installed along Belknap to direct motorists to the municipal parking lots in the downtown area.
- Signage could be considered to direct motorists to the parking lot for ShaDawns restaurant, which has no on-street parking in front of the building and the parking lot is only accessible from an alley.

Truck Movement Analysis

Through truck traffic, as with all types of traffic, adds to level of service problems in the Belknap Street corridor. It is estimated that a truck is equivalent to up to three automobiles in the space that it takes up on a roadway. To determine the impact of truck traffic along Belknap, MIC staff conducted a Truck Movement Analysis. For the purposes of this study, the term "truck" applies to all tractor-trailer combinations or trucks with trailers. Light trucks, tractors without trailers and buses were not counted.

Methodology

The survey was conducted on December 17, 2002. Trucks were observed from two locations within the corridor area simultaneously.

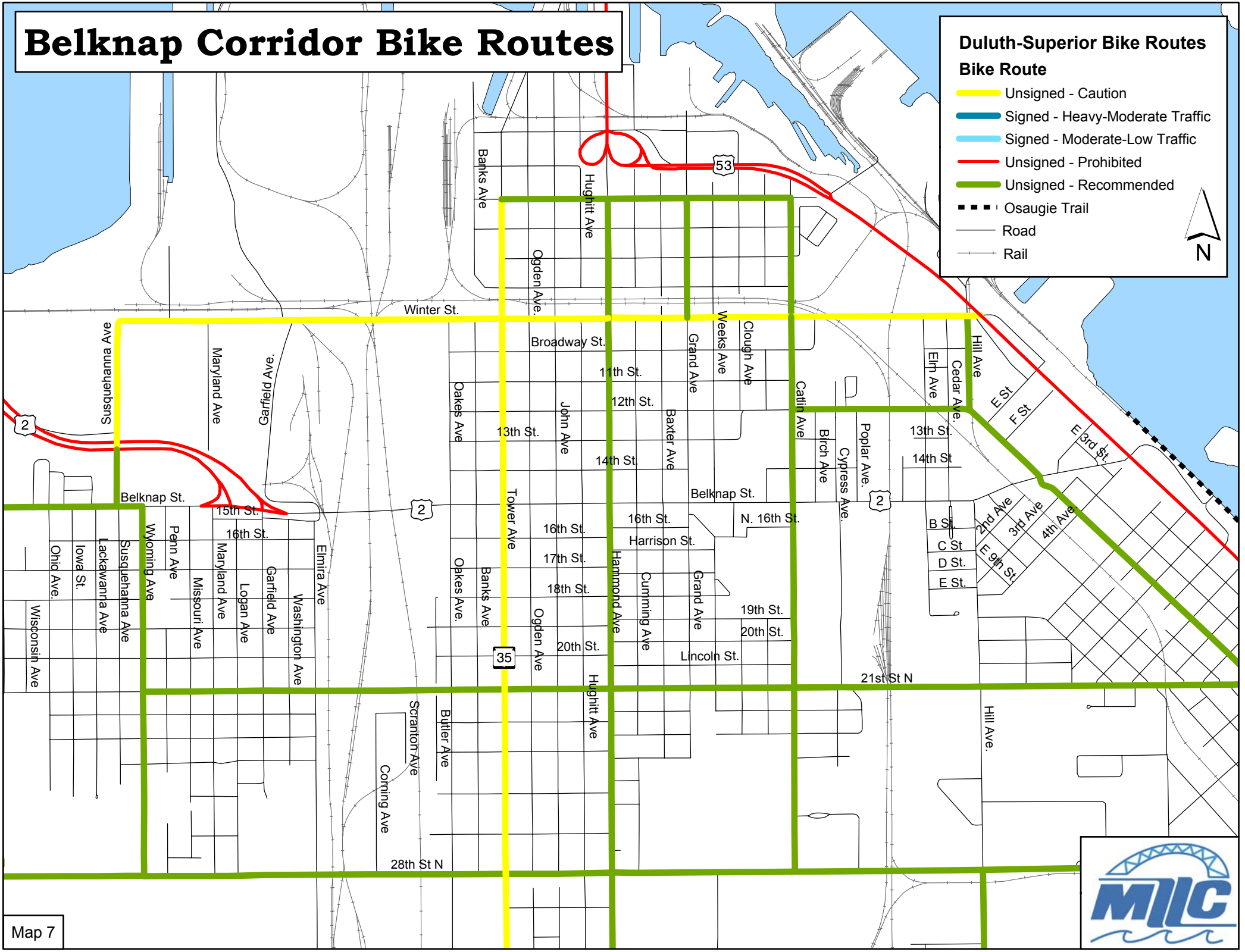
Station #1: Banks & Belknap
Station #2: Highway 53 & Belknap

The survey was taken from 12:30 PM to 2:30 PM. Trucks were also counted in September, 2002 during the morning and evening peak periods along with other modes of transportation at the previously mentioned intersections in order to compare the amount of truck traffic at different times of day. Winter Street, along with Belknap Street are the only two east-west truck routes in Superior. Truck traffic counts were also taken at the intersection of Tower Avenue and Winter Street in order to compare usage in the two corridors.

Survey takers recorded data on microcassettes as trucks passed their observation point. Individual trucks were identified using these criteria:

- Time
- Direction (in or out of corridor)
- Tractor/cab description (color, name, conventional or cab over)
- Trailer/cargo description (flatbed, box, tanker, name or other markings)
- Other features

The transcripts of each observation point were then compared and each truck was given an identification number that reflected how each individual truck traveled when entering the corridor.


Belknap Corridor Bike Routes
Duluth-Superior Bike Routes
Bike Route
Unsigned - Caution
Signed - Heavy-Moderate Traffic
Signed - Moderate-Low Traffic
Unsigned - Prohibited
Unsigned - Recommended
Osaugie Trail
Road
Rail
N
Winter St.
Broadway St.
Belknap St.
N. 16th St.
Harrison St.
Lincoln St.
21st St N
28th St N
Banks Ave
Hughitt Ave
Ogden Ave.
Weeks Ave
Grand Ave
Clough Ave
Oakes Ave
John Ave
Baxter Ave
Tower Ave
Hammond Ave
Cumming Ave
Catlin Ave
Elm Ave
Cedar Ave.
Hill Ave
Birch Ave
Cypress Ave.
Poplar Ave.
Susquehanna Ave
Maryland Ave
Garfield Ave
Wyoming Ave
Penn Ave
Ohio Ave.
Iowa St.
Lackawanna Ave
Missouri Ave
Logan Ave
Washington Ave
Elmira Ave
Scranton Ave
Corning Ave
Butler Ave
11th St.
12th St.
13th St.
14th St.
15th St.
16th St.
17th St.
18th St.
19th St.
20th St.
E St
F St
E 3rd St.
B St.
C St
D St.
E St.
2nd Ave
3rd Ave
4th Ave
E 9th St.
53
35
2
Map 7

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Truck Movement Analysis, continued

Results

Tables 6 and 7 show descriptions of through trucks and those that traveled through the corridor after making stops somewhere in the corridor.

Table 6

Through Trucks - December 17, 2002 - 12:30 to 2:30 PM

Station #1: Banks & Belknap
Station #2: Highway 53 & Belknap

DESCRIPTION	TIME	ORIGINATION	DESTINATION	NOTES	DIRECTION
Frank Brevick	12:39-12:44	Northbound 53	Bong Bridge	Lumber	Westbound
Jevick Trans. Inc	12:42-12:47	Northbound 53	Bong Bridge		Westbound
Blue auto carrier	12:52-12:58	Bong Bridge	Southbound 53	Empty	Eastbound
Yankee Transfer	1:00-1:06	Northbound 53	Bong Bridge		Westbound
Eagle Leasing - Kinserly Transport	1:03-1:09	Northbound 53	Bong Bridge		Westbound
Bob Johnson	1:13-1:21	Bong Bridge	Southbound 53	Hauling logs	Eastbound
J.S. Trucking	1:13-1:21	Bong Bridge	Southbound 53	Oversized Truck	Eastbound
Cenex Truck	1:22-1:27	Highway 53	Bong Bridge	Propane Truck	Westbound
Abrilla Timber	1:27-1:32	Northbound 53	Bong Bridge	Timber products	Westbound
Radford - Anderson Windows	1:35-1:41	Highway 53	Bong Bridge		Westbound
Phillip Olson & Sons Trucking	1:35-1:40	Bong Bridge	Southbound 53	Hauling logs	Eastbound
Walmart	1:49-1:55	Highway 53	Bong Bridge		Westbound
SMX	1:49-1:53	Bong Bridge	Southbound 53		Eastbound
Wild West Express	1:44-1:50	Bong Bridge	Southbound 53		Eastbound
Sam Hershey Truck	2:04-2:10	Highway 53	Bong Bridge	logging truck	Westbound
Coke	2:06-2:12	Northbound 53	Bong Bridge		Westbound
Wausau Supply Company	2:14-2:21	Bong Bridge	Highway 53		Eastbound

Table 7

Through Trucks that stopped in Superior - December 17, 2002 - 12:30 to 2:30 PM

Station #1: Banks & Belknap
Station #2: Highway 53 & Belknap

DESCRIPTION	TIME	ORIGINATION	DESTINATION	NOTES	DIRECTION
Roadway	12:41-12:56	Northbound 53	Bong Bridge	Local stop	Westbound
JSK Transport	1:41-2:01	Southbound 53	Southbound 53	Local stop-east of Banks	Both
Lake City Towing	1:00-1:24	Bong Bridge	Bong Bridge	Local stop	Both
PLM	1:07-1:26	Belknap or Tower	Billings Pk or W. Duluth	Local or W. Duluth	Both
Pelts Trucking	12:56-2:08	Belknap or Tower	Billings Pk or W. Duluth	Local or W. Duluth	Both
Koch & Sons	12:38-2:13	Bong Bridge	Southbound 53	Local stop	Eastbound

The findings of the survey indicate that only 18% of all inbound truck traffic is traveling through the study area and not stopping. This makes sense because it is much more advantageous for through trucks to use Interstate 535/Blatnik Bridge and Highway 53 in Superior than it is to use Highway 2/Bong Bridge. (This route is also designated as part of the national network of truck routes). The speed limit is 50% higher on Highway 53 as compared to Belknap and there are no traffic signals until reaching Belknap from Duluth along Highway 53. Some through trucks may also be using Winter Street, which is designated as a truck route. Most trucks that are using Belknap are only doing so if they must reach a local business.

By law, cities and counties cannot ban trucks from state-aid routes for any reason other than weight. However, trucks can be encouraged to use designated truck routes that would bypass the Belknap Corridor. Based on the findings of this survey, alternative truck bypasses were identified and can be seen in the recommendation section of this report.

The truck counts of this analysis were compared with the truck counts that were taken in September, 2002 in order to generally compare the early afternoon results from December with the morning and evening results from September. There are at least 3 facts that limit the reliability of the comparisons:

- A 3-month gap between the counts could lead to some error. In this time period, significant changes could occur. There could be new businesses in the area, closed business, changed private truck routes, etc.
- The September counts were taken over a 1.5-hour period; while the December counts were taken over a 2-hour period. In order to make the counts comparable, the December totals were multiplied by 0.75.
- The locations of the counts were slightly different. The September counts were taken at intersections; the December counts were taken at the ends of the corridor because the intent was to focus on trucks in the corridor, not at a certain intersection. The December counts used for comparison were the closest intersections to where the September counts were taken: the Banks and East 5th intersections with Belknap.

East 5th morning peak:	27	
East 5th Avenue evening peak:	26	
2 blocks east of Hill Avenue early afternoon peak:	36	(48 x 0.75)

Banks morning peak:	38	
Banks evening peak:	32	
Just west of Banks early afternoon peak:	51	(68 x 0.75)

Despite the limitations listed above, it is likely that there is more truck traffic in the early afternoon than in either the morning or evening, in general. However, because of the fact that 82% of the trucks in the corridor are conducting business in the area and that Belknap Street is a designated truck route, there are unlikely to be remedies that would significantly reduce the number of trucks on Belknap Street.

It is important to remember that even with the higher counts in the afternoon, it is likely that truck traffic in the corridor is significantly less than 5% (with the exception of the Highway 53 intersection, in which case most of the trucks enter the intersection on Highway 53 – a good situation because it keeps the trucks off of Belknap).

Environmental Justice

Federal Guidance
Environmental justice is the public policy goal of ensuring no government activities bring disproportionately high or negative impacts to bear on low-income or minority populations. MPOs are required to identify disproportionately high or adverse effects to these populations. Minority populations are defined as African Americans, Hispanics, Asian Americans, American Indians, and Alaskan Natives. Low-income populations are defined as median household incomes below the Department of Health and Human Services poverty guidelines.

Federal requirements encourage MPOs to aggressively "seek out and consider" the needs and interests of traditionally underserved people, groups and communities (23 CFR 450). This includes those people such as the disabled, low income and minorities that have been traditionally underserved by the transportation system (highway and transit), policies and investments. Underserved means they have not had comparable transportation access (to employment, recreation, goods and services to meet local residential needs) as other groups have. MPO plans must avoid excessive impacts on these groups. Additionally, underserved groups have not traditionally participated in transportation planning resulting from lack of representation on decision-making bodies.

Maps 8 and 9 shows areas of low income and minority concentrations along the Belknap Corridor.

Since low-income persons are more likely to not own their own vehicle than moderate or higher income persons, the transportation system in neighborhoods that have a significant low-income population should include adequate public transit and pedestrian facilities. As discussed earlier, the transit system in the Belknap Corridor serves the public adequately. The pedestrian environment, however, could use substantial improvements. Recommendations for improvements are discussed later in this report.

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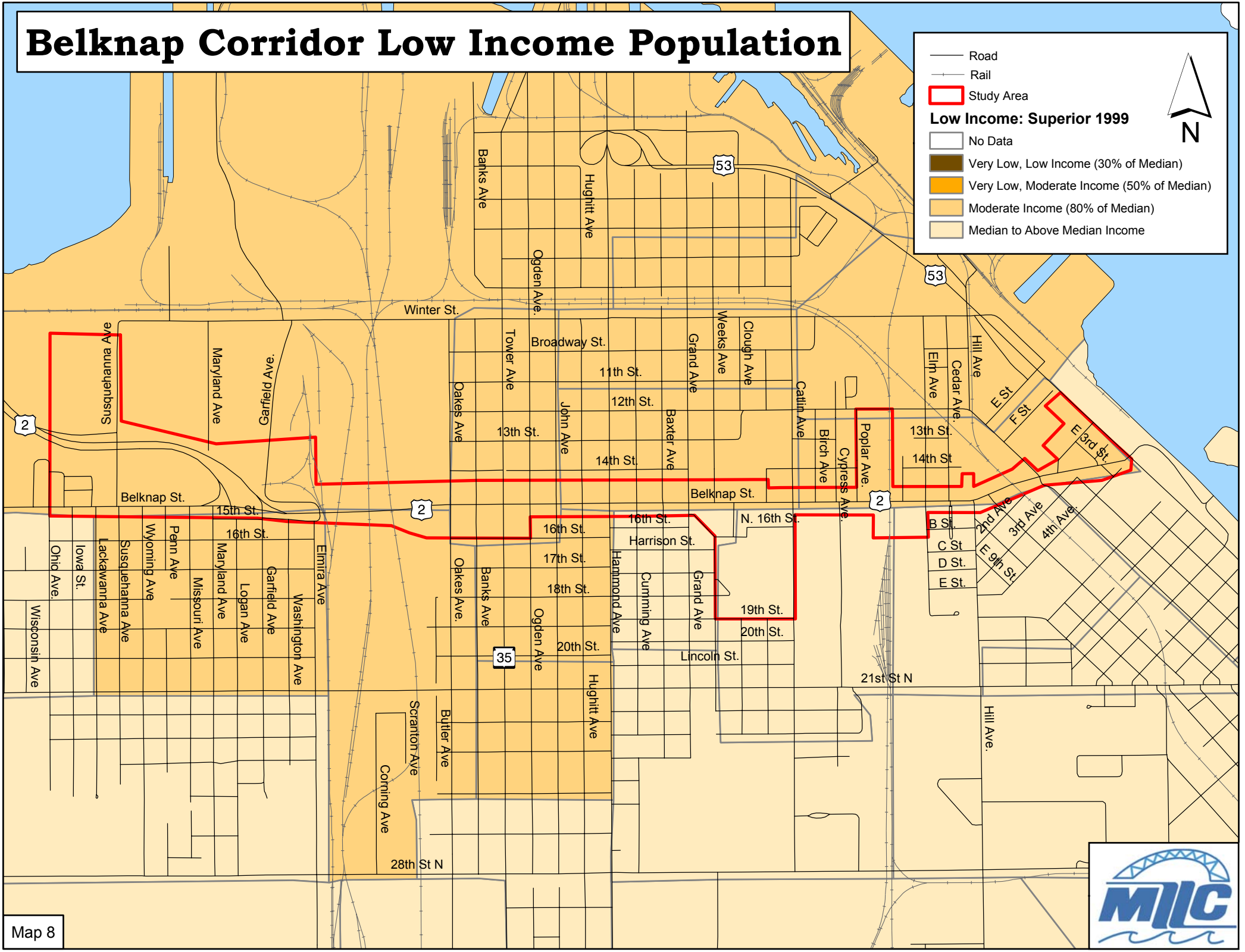
Belknap Corridor Low Income Population



Map 8

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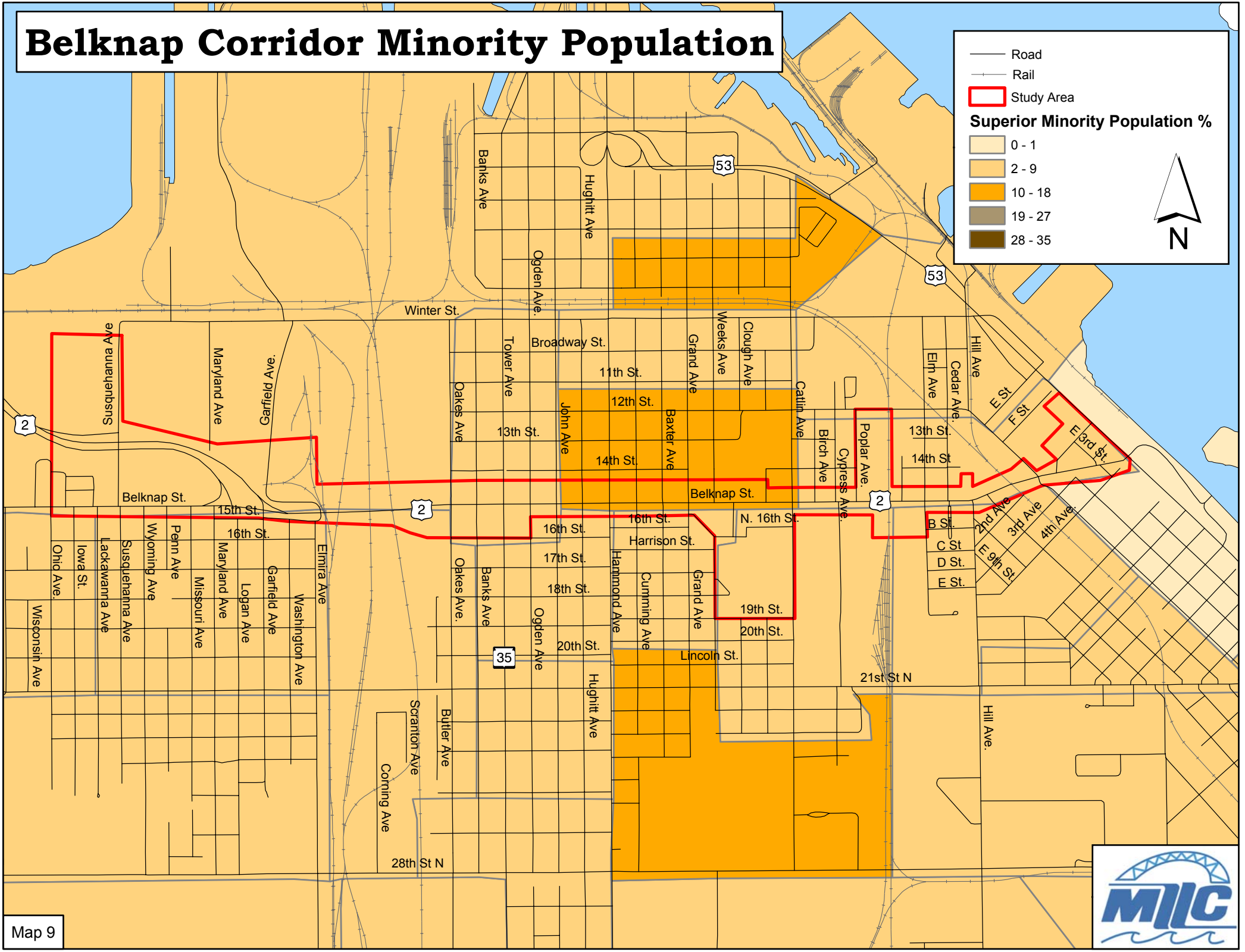
Belknap Corridor Minority Population
Road
Rail
Study Area
Superior Minority Population %
0 - 1
2 - 9
10 - 18
19 - 27
28 - 35
N
Winter St.
Broadway St.
11th St.
12th St.
13th St.
14th St.
Belknap St.
15th St.
16th St.
17th St.
18th St.
19th St.
20th St.
21st St N
28th St N
N. 16th St.
Harrison St.
Lincoln St.
Corning Ave
Banks Ave
Hughitt Ave
Ogden Ave.
Tower Ave
Oakes Ave.
John Ave
Grand Ave
Weeks Ave
Clough Ave
Catlin Ave
Birch Ave
Cypress Ave.
Poplar Ave.
Elm Ave
Cedar Ave.
Hill Ave
E St
F St
E 3rd St.
B St.
C St
D St.
E St.
E 6th St.
2nd Ave
3rd Ave
4th Ave
Hammond Ave
Cumming Ave
Scranton Ave
Butler Ave
Susquehanna Ave
Maryland Ave
Garfield Ave.
Ohio Ave.
Iowa St.
Lackawanna Ave
Wyoming Ave
Penn Ave
Missouri Ave
Logan Ave
Washington Ave
Elmira Ave
Wisconsin Ave
53
2
35
Map 9

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Corridor Functionality

There have been suggestions that in order to improve traffic flow on Belknap Street, signals should be timed so that one can travel the corridor without stopping. This technique can work well in areas that have a major corridor such as Belknap with little traffic on crossing streets. However, in this part of Superior there are several crossing streets that have significant amounts of traffic. In fact, at certain times, the traffic counts are higher on Tower Avenue than on Belknap Street.

For this reason, most intersections along Belknap that are signalized have pavement sensors to detect the number of vehicles waiting to proceed or turn onto another street. This situation prohibits the ability to time the signals together because the length of green time at each signal is not consistent. Through this procedure, traffic flow is not consistent on Belknap, but the flow is improved throughout the area. Also, the entire system is managed electronically to help improve traffic flow at different times of day and different times throughout the year.

There are concerns that pedestrian safety in the corridor could be improved. At some intersections, the walk time is not sufficient to cross Belknap Street for children, the elderly and the handicapped; some intersections with stoplights do not have walk signals; and at some intersections the equipment simply does not work. This section will document the conditions at each intersection that is listed in the introduction of this document with regard to traffic, pedestrian and bicyclist safety.

For each intersection, the following information will be provided:

- A general description of the intersection.
- The total number of vehicles, trucks, pedestrians and bicycles entering the intersection during the AM and PM peak periods. These counts were obtained by MIC staff in September, 2002 on normal weekdays from 7:00 AM to 8:30 AM and from 4:00 PM to 5:30 PM. (In some cases, the interval varied by 15 minutes). Full turning movement counts can be found in the appendix.
- Sidewalk conditions. This information is taken from the MIC's 1999 Superior Sidewalk Inventory. The study rated all segments of sidewalk in the City as either good, fair or poor. The sidewalks in general along Belknap are in good or fair condition, with the exception of several segments that are in poor condition on the west end of the study area and some of those that approach on the cross streets. The description in this study will refer to those at the selected intersections. Please see the Sidewalk Inventory for more detailed information.
- Traffic signal timings and pedestrian signal head timings
- A summary of issues

Intersection: Highway 53

General Description

This is a major intersection of Highway 2/Belknap Street & Highway 53/East 2nd Street on the eastern end of Belknap Street. Both roadways are functionally classified as principal arterials for their entire lengths through the City of Superior. Highway 2 approaches from the west while Highway 53 approaches at an angle from the northwest and southeast. Both roadways have four lanes of traffic and a median, however, Highway 53 also has left turn lanes. Approaching from the east is a two-lane roadway that serves as the entrance to Barker's Island; it is functionally classified as a collector. There is enough space to accommodate two vehicles side by side for westbound traffic at this intersection but it is not striped. Highway 53 is a designated bike route.

Total number of vehicles entering intersection:
AM Peak: 2,372
PM Peak: 2,901

Total number of trucks entering intersection:
AM Peak: 152
PM Peak: 149
Percentage of traffic that is trucks: 5.7%

Total number of pedestrians entering intersection:
AM Peak: 1
PM Peak: 3

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 5

Summary of Issues

This intersection has pavement sensors so all signal timings vary depending on the amount of traffic. The left turn signals on Highway 53 will vary depending on the number of vehicles that are queued. If there are no vehicles waitin,g the left arrows will not come on; otherwise, the arrows will remain lit until all queued vehicles have exited the lane.

In the morning 64% of the traffic entering the intersection approaches from the south on Highway 53; in the afternoon the approach counts were more balanced, however, 43% of the traffic entered from the north on Highway 53.

The counts of northbound and southbound trucks on Highway 53 were higher than at any intersection along Belknap Street. Trucks accounted for 5.7% of the traffic entering the intersection.

Sidewalks are discontinuous; none exist at the northwest intersection. The others are in either good or fair condition, however, it appears to be a relatively unsafe place for pedestrians. There are only two striped crosswalks, several crossing points do not have pedestrian signal heads, two signal heads do not work, the don't walk signal does not work in one location, there is insufficient time to cross Highway 53, and the aforementioned gaps in sidewalks. The median on Highway 53 could provide a refuge for pedestrians so that they

could cross in two cycles, however, all walk signals for crossing the highway either do not exist or are broken. The only completely functioning signal head in this location is for southbound pedestrians on the east side of Highway 53 crossing the entrance road to Barker's Island – an ironic situation because this street also has the least amount of traffic so it is the crossing point that has the lowest need for a signal head.

Intersection Timings – Highway 53

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	None	10 to 25	Same
West	None	10 to 25	Same
North	Varies	36 to 90	Same
South	Varies	23 to 90	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	Broken	Broken	None	23.25
East	*North*	None	None	None	23.25
West	*South*	Broken	Broken	None	23.25
West	*North*	None	None	None	23.25
South	*East*	10	Broken	10	15
South	*West*	None	None	None	25.75
North	*East*	10	10	20	15
North	*West*	None	None	None	25.75

Times listed are in seconds

Intersection: East 5th Street

General Description:
This is a two-lane street that intersects Belknap Street in the eastern end of the corridor; there is no traffic signal at this intersection. However, it is the main street in the commercial heart of the East End neighborhood of Superior and provides an important link to Belknap Street for that neighborhood's residents. Use of this street allows the traveler to avoid the heavier traffic of the parallel Highway 53. East 5th Street is functionally classified as a minor arterial south of Belknap and as a collector north of Belknap.

Total number of vehicles entering intersection:
AM Peak: 1,100
PM Peak: 1,660

Total number of trucks entering intersection:
AM Peak: 27
PM Peak: 26
Percentage of traffic that is trucks: 1.9%

Total number of pedestrians entering intersection:
AM Peak: 7
PM Peak: 5

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
This is one of four non-signalized intersections along Belknap that the Advisory Group held interest in getting turning movement counts. During the morning, 80% of traffic approaching the intersection does so along Belknap; 45% from the east and 35% from the west. The vast majority of this traffic travels through the intersection. In the afternoon, the situation is reversed, with 58% approaching from the west and 25% from the east.

This intersection appears to function adequately, even during peak periods. Since there is very little traffic that utilizes 5th Street north of Belknap, most of the time turning movements are limited to the southern portion of 5th. The one movement that can be difficult at times, especially during peak periods, is vehicles making a left turn onto Belknap from the south. Since the intersection is not signalized, vehicles must wait for a gap in traffic before turning. This produces some longer waiting periods, but does not appear to have a significant impact.

The sidewalks along Belknap are continuous at this intersection; there is a sidewalk on the east side of 5th but not on the west side. The sidewalks along Belknap and the sidewalk to the south were rated fair at this intersection, however, the sidewalk extending north along 5th was rated poor. At all four intersections that are not signalized, pedestrian signal heads were also not present. Obviously, it is safer for pedestrians to cross Belknap where a signal head exists. As there are no pedestrian generators in this area, it probably does not warrant installation of signal heads. East 5th Street, however, is designated as a Bike Route as it crosses Belknap.

Intersection: Hill Avenue

General Description:
Hill Avenue is a two-lane street that is functionally classified south of Belknap as a minor arterial. Northbound it is wide enough for two lanes of traffic at the intersection but is not striped. The street continues to the north for about one block before it ends at a business entrance. Hill Avenue is a major connection between Belknap and the Mariner Mall, schools on 21st Street and a primary connection between the east and south sides of the city.

Total number of vehicles entering intersection:
AM Peak: 1,447
PM Peak: 2,114

Total number of trucks entering intersection:
AM Peak: 28
PM Peak: 26
Percentage of traffic that is trucks: 1.5%

Total number of pedestrians entering intersection:
AM Peak: 4
PM Peak: 7

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
The length of green time is fixed at this intersection; 30 seconds along Belknap followed by 20 seconds along Hill. There are no turning signals at this intersection. The street north of Belknap is a dead-end, so very little traffic utilizes this street. In the morning 78% of the traffic entering the intersection is traveling along Belknap, with about half originating from the east. In the afternoon the numbers are almost exactly reversed. One constant movement is the left turns from Hill onto Belknap. During both times of day, about 70% of Hill Avenue traffic originating from the south turns left onto Belknap. This intersection functions rather well even without turn signals, mainly because the roadway to the north is seldom used. There are sidewalks along both sides of both streets; their condition is rated as fair. There are no pedestrian signal heads at this intersection. Because of the numerous left turning vehicles from Hill and right turns onto Hill from Belknap, it is difficult to know when it is safe to cross Belknap on the west and Hill on the south.

Intersection Timings –Hill Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	None	30	No walk signal
West	None	30	No walk signal
North	None	20	No walk signal
South	None	20	No walk signal

Intersection: Mortorelli Drive/Cypress Avenue

General Description:
Mortorelli and Cypress are classified as local streets. However, Mortorelli supports a larger number of vehicles than most local streets because it is the direct access route from the north to Wisconsin Indianhead Technical College. It also provides access to the University of Wisconsin-Superior (UWS) football field and parking areas. UWS no longer has a football team but the field is used each fall for youth football games. Cypress primarily provides access to a residential neighborhood north of Belknap. The two streets connect with Belknap slightly off center. The intersection is not signalized.

Total number of vehicles entering intersection:
AM Peak: 1,701
PM Peak: 2,543

Total number of trucks entering intersection:
AM Peak: 20
PM Peak: 20
Percentage of traffic that is trucks: 0.9%

Total number of pedestrians entering intersection:
AM Peak: 7
PM Peak: 20

Total number of bicycles entering intersection:
AM Peak: 2
PM Peak: 19

Summary of Issues:
Because the intersection is not aligned properly, there are potential safety hazards. In both the morning and evening peak periods, a significant number of cars attempt to cross Belknap and access the opposing street or make left turns onto Belknap. Because of the non-alignment, there seems to be confusion at times as to which car has the right-of-way. When staff measured turning movements at this intersection, there were several near collisions in the intersection. In the morning and evening, 89% of the traffic approaches the intersection on Belknap; a larger percentage from the east in the morning and vice-versa in the evening. However, despite the relatively fewer cars approaching on Mortorelli and Cypress, the aforementioned non-alignment and non-signalization poses a significant safety hazard. There are sidewalks along both sides of Belknap and Cypress, but none along Mortorelli at the intersection. The sidewalks at this intersection were rated as "good" or "fair." It is a difficult intersection for pedestrians to cross due to a lack of signal heads. Further research could be performed at this intersection in order to determine if traffic signals and pedestrian signals are warranted. Because of the presence of WITC and the nearby UWS and the football field, a sidewalk along Mortorelli would probably be heavily used.

Intersection: Catlin Avenue

General Description:
Catlin is a two-lane street that is classified as a minor arterial south of Belknap and a collector north of Belknap. Northbound Catlin has a left turn lane and a through/right turn lane. Southbound Catlin is wide enough for two lanes of traffic at the intersection but it is not striped. The street to the south is the main entrance to the UW-Superior campus. The street to the north is an important street through the north central neighborhood of Superior. The street is also identified as a bike route. It is the only bike route that provides direct access to UWS. This intersection is signalized and contains pedestrian signal heads. There are no turning signals at this intersection.

Total number of vehicles entering intersection:
AM Peak: 1,847
PM Peak: 2,894

Total number of trucks entering intersection:
AM Peak: 42
PM Peak: 37
Percentage of traffic that is trucks: 1.7%

Total number of pedestrians entering intersection:
AM Peak: 30
PM Peak: 32

Total number of bicycles entering intersection:
AM Peak: 19
PM Peak: 32

Summary of Issues:
The amount of green time at this intersection varies widely depending on the number of vehicles at the intersection. Those traveling Belknap received between 53 and 67 seconds of green time, while on Catlin it varied from 12 to 34 seconds. The amount of green time was typically at the higher end of this range on Catlin if the walk button was pushed. The walk signal is automatic on Belknap and does not appear to affect the signal time.

As elsewhere in the corridor, about 80% of the traffic entering the intersection did so on Belknap, with higher counts from the east in the morning and in the west in the afternoon. At certain times in the afternoon, apparently at the end of a significant number of classes, the traffic would back up leaving campus from the south. However, the green time on Catlin was longer at these times, which helped alleviate this situation. There did not seem to be a similar issue in the morning. In fact, almost 50% more cars traveled south on Mortorelli, which does not have traffic signals, in the morning than on Catlin. The counts were 293 on Mortorelli and 196 on Catlin.

There are sidewalks on both sides of both streets at this intersection; all were rated in fair or good condition. To cross Belknap, one must push the walk signal button. The walk signal is lit for 9 seconds and the don't walk signal flashes for 15 seconds. The result is a total crossing time of 24 seconds. The distance to traverse Belknap on the crosswalks is 74 feet. According to the Manual on Uniform Traffic Control Devices (MUTCD) of 2001 by the

Federal Highway Administration (FHWA), average walk speed time is 4 feet per minute, which would require 18.5 seconds to cross the roadway. Children, the elderly and the disabled would probably require more time to cross the street.

The signal heads that are in place for the purpose of crossing Catlin automatically turn to walk when the east and westbound signals turn green. The walk sign is displayed for 9 to 12 seconds; the don't walk sign flashes for 15 seconds for a total crossing time of 24 to 27 seconds. The crossing distance is 60 feet.

The signal button which must be pressed to get a walk signal in order to cross Belknap from the south is missing on the east side of Catlin. The signal head plastic covering is broken on the north side of Belknap for eastbound pedestrians that intend to cross Catlin.

Intersection Timings –Catlin Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	None	53 to 67	Same
West	None	53 to 67	Same
North	None	12 to 34	Same
South	None	12 to 34	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	9 to 12	15	24 to 27	15
East	*North*	9 to 12	15	24 to 27	15
West	*South*	9 to 12	15	24 to 27	15
West	*North*	9 to 12	15	24 to 27	15
South	*East*	Button missing	Button missing	None	18.5
South	*West*	9	15	24	18.5
North	*East*	9	15	24	18.5
North	*West*	9	15	24	18.5

Times listed are in seconds.

Intersection: Grand Avenue

General Description:
Grand Avenue is classified as a minor arterial north of Belknap and as a collector south of Belknap. It is a two-lane roadway that widens as it approaches Belknap. From the north there is one through lane and separate left and right turn lanes. The street widens from the south as well, but does not have separate lanes striped. Belknap Street has two through lanes and one left turn lane in each direction. There is a sign displayed for westbound traffic on Belknap that informs them that no right turn is permitted on red on school days. Grand Avenue is designated as an alternate bike route north of Belknap. Superior's existing junior high school is located at the northeast corner of this intersection, however, it is scheduled to close at the end of the 2002-2003 school year. A new junior high school will open in another part of the community in fall of 2003. The intersection is signalized and contains one turn signal on eastbound Belknap. The intersection also contains pedestrian signal heads.

Total number of vehicles entering intersection:
AM Peak: 1,880
PM Peak: 3,050

Total number of trucks entering intersection:
AM Peak: 33
PM Peak: 25
Percentage of traffic that is trucks: 1.2%

Total number of pedestrians entering intersection:
AM Peak: 117
PM Peak: 42

Total number of bicycles entering intersection:
AM Peak: 15
PM Peak: 38

Summary of Issues:
The amount of green time on Belknap at this intersection varies between 25 and 35 seconds depending on the number of vehicles at the intersection. Those traveling across Belknap received a consistent 14 seconds each cycle without the pedestrian signal crossing button activated. If this button were pushed, the green time increased to 22 seconds. There is one left turn signal at this intersection; it is for eastbound Belknap. During the time that staff was present at this intersection, this green arrow turned on automatically when the main signal turned green and it remained lit consistently for 6 seconds each cycle. However, at other times of day the timing of this signal could be different.

Continuing the trend stated earlier, about 80% of the traffic entering the intersection did so on Belknap, with higher counts from the east in the morning and in the west in the afternoon. There are sidewalks on both sides of both streets at this intersection; all were rated in fair or good condition. To cross Belknap, one must push the walk signal button. The walk signal is lit for 10 seconds and the don't walk signal flashes for 12 seconds. The result is a total crossing time of 22 seconds. The distance to traverse Belknap on the crosswalks is 86 feet, which requires 21.5 seconds to cross the roadway. Because many children cross this street in the morning and afternoon (as evidenced by the relatively high pedestrian and bicycle

counts), the crossing time is probably not sufficient immediately before and after school. However, as stated earlier, the school will be closing soon; any necessary changes will become apparent depending on the future land use of the site.

The signal heads that are in place for the purpose of crossing Grand automatically turn to walk when the east and westbound signals turn green. The walk sign is displayed for 10 seconds; the don't walk sign flashes for 15 seconds for a total crossing time of 25 seconds. The crossing distance is 72 feet on the north side of Belknap and 62 feet on the south side.

The signal button which must be pressed to get a walk signal in order to cross Belknap from the south does not work on the east side of Grand. At this location, the walk signal is never lit. There is a signal button to cross Grand on the south side of Belknap, but as stated earlier, the signal head comes on automatically so there is no need to press the button. The signal head plastic coverings is broken at this same location and also for southbound pedestrians crossing Belknap on the east side of Grand.

Intersection Timings –Grand Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	6	25 to 35	Same
West	None	25 to 35	Same
North	None	14	22
South	None	14	22

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	10	15	25	15.5
East	*North*	10	15	25	18
West	*South*	10	15	25	15.5
West	*North*	10	15	25	18
South	*East*	Broken	Broken	None	21.5
South	*West*	10	12	22	21.5
North	*East*	10	12	22	21.5
North	*West*	10	12	22	21.5

Times listed are in seconds.

Intersection: Hammond Avenue

General Description:
Hammond Avenue is classified as a minor arterial on both sides of Belknap. It is a primary artery connecting the City's south and north sides, as well as providing a direct connection to Duluth via the Bong Bridge. Hammond is classified as a bike route. The combined city-county building (still under construction as of March, 2003) is located at the northeast corner of this intersection, which is a major traffic generator. North of Belknap, Hammond is a three-lane roadway with one lane each for south and northbound traffic and one center turn lane. As it approaches Belknap from the north, it widens to four lanes; one lane northbound, one southbound, one for left turns and one for right turns or southbound. South of Belknap, Hammond is a four-lane roadway with two lanes each for south and northbound traffic. As it approaches Belknap from the south, the road widens to five lanes; two southbound, one northbound, one for left turns and one for right turns. Belknap Street has two through lanes and a left turn lane in each direction. The intersection is signalized and has pedestrian signal heads. There are left turn signals for traffic bound in all four directions.

Total number of vehicles entering intersection:
AM Peak: 2,175
PM Peak: 3,134

Total number of trucks entering intersection:
AM Peak: 25
PM Peak: 31
Percentage of traffic that is trucks: 1.1%

Total number of pedestrians entering intersection:
AM Peak: 55
PM Peak: 60

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
This is probably the most complicated intersection along Belknap Street concerning traffic timings. The east-west green time is consistent at 32 seconds. The north-south green time, however, varies substantially. It ranges between 20 and 44 seconds depending on the number of vehicles that are waiting to turn left. As opposing traffic waiting to make left turns increases, green time decreases. East and west left turn signal times vary between 8 and 12 seconds, depending on the number of vehicles queued. Northbound traffic had consistent 9 second left arrow time, while southbound traffic had consistent 12 second left arrow time.

From 70 to 80% of the traffic entering the intersection approaches on Belknap. However, unlike at intersections farther to the east, the percentages coming from the east and west are very similar in the morning and afternoon. Sidewalks are located on both sides of both streets and were rated in good or fair condition. Pedestrian crossing time is the same for all four directions; 7 seconds for the walk signal and 13 seconds for the flashing don't walk signal. For north and south pedestrian crossings, the signal button must be pushed. For east and west crossings, buttons are present but are not necessary because the walk signals

automatically appear when the traffic signal turns green. The distance for pedestrians to cross Hammond ranges from 72 to 76 feet, thus, the signal head times are sufficient. However the distance to cross Belknap ranges from 83 to 90 feet, which means 20.75 to 22.5 seconds are necessary to cross. The intersection appears to function relatively well considering the significant amount of traffic present during peak periods.

Intersection Timings –Hammond Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	8 to 12	32	Same
West	8 to 12	32	Same
North	9	20-44	Same
South	12	20-44	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	7	13	20	19
East	*North*	7	13	20	18
West	*South*	7	13	20	19
West	*North*	7	13	20	18
South	*East*	7	13	20	22.5
South	*West*	7	13	20	20.75
North	*East*	7	13	20	22.5
North	*West*	7	13	20	20.75

Times listed are in seconds.

Intersection: Ogden Avenue

General Description:
Ogden Avenue is classified as a minor arterial north of Belknap and as a collector south of Belknap. Ogden along with Banks Avenue to the west tend to serve as reliever routes for Tower Avenue in downtown Superior. These two roadways provide access to many of the parking areas for the businesses downtown that front on Tower Avenue. Ogden is a two-lane street with no separate turn lanes. Northbound Ogden is wide enough for two lanes but is not striped. There is a left turn lane for each direction on Belknap Street. The left turn lane for traffic approaching from the west has a dedicated left turn arrow. There are fully functional pedestrian signal heads at all 8 crossing points.

Total number of vehicles entering intersection:
AM Peak: 1,696
PM Peak: 2,705

Total number of trucks entering intersection:
AM Peak: 35
PM Peak: 17
Percentage of traffic that is trucks: 1.2%

Total number of pedestrians entering intersection:
AM Peak: 23
PM Peak: 53

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
The north-south green time is consistent at 17 seconds. The eastbound green time is consistent at 70 seconds. The westbound green time ranges from 60 to 70 seconds depending on whether the eastbound green arrow is on and the number of cars waiting to turn. The long green time on Belknap is appropriate because there is relatively little traffic on Ogden when compared to Belknap. Also, by having a long green time, it helps to alleviate congestion buildup at the Banks and Tower intersections with Belknap. When vehicles get through the Tower intersection, traffic does not continue to accumulate at Ogden because the light is usually green. The left turn signal time on Belknap varies from 7 to 10 seconds depending on the number of cars that are queued.

Nearly 90% of traffic entering the intersection approaches on Belknap, however, this drops to 80% in the afternoon. The westbound traffic counts were higher than the eastbound counts in the morning and evening, however, the evening difference was quite small. Sidewalks are located on both sides of both streets and were rated in good condition except for the sidewalk along the east side of Ogden and south of Belknap, which was rated poor. A signal button must be pushed in all 8 directions in order to activate the walk signal. The walk signal is lit for 7 seconds to cross Belknap and the don't walk flashes for 10 seconds for a total crossing time of 17 seconds. The walk signal is lit for 12 seconds and the don't walk flashes for 19 seconds to cross Ogden for a total crossing time of 31 seconds. The distance for pedestrians

to cross Belknap is 75 feet, thus, those signal head times are sufficient, however, the distance to cross Ogden is 71 feet, which means 17.75 seconds are necessary to cross.

Intersection Timings –Ogden Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	None	60 to 70	Same
West	7 to 10	70	Same
North	None	17	Same
South	None	17	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	7	10	17	17.75
East	*North*	7	10	17	17.75
West	*South*	7	10	17	17.75
West	*North*	7	10	17	17.75
South	*East*	12	19	31	18.75
South	*West*	12	19	31	18.75
North	*East*	12	19	31	18.75
North	*West*	12	19	31	18.75

Times listed are in seconds.

Intersection: Tower Avenue

General Description:
This is the busiest and most congested intersection along the Belknap Corridor. The counts at this intersection are 38% higher than at the second busiest intersection, Hammond Avenue. There are two through lanes and a left turn lane in each direction. The intersection and turn lanes are signalized. Pedestrian signal heads are present for all 8 crossing points. Both Belknap Street/Trunk Highway 2 and Tower Avenue/Trunk Highway 35 are classified as principal arterials.

Total number of vehicles entering intersection:
AM Peak: 2,862
PM Peak: 4,480

Total number of trucks entering intersection:
AM Peak: 54
PM Peak: 34
Percentage of traffic that is trucks: 1.2%

Total number of trucks entering Tower/Winter intersection:
AM Peak: 46
PM Peak: 32

Total number of pedestrians entering intersection:
AM Peak: 32
PM Peak: 79

Total number of bicycles entering intersection:
AM Peak: 3
PM Peak: 13

Summary of Issues:
During the afternoon peak period this intersection is particularly congested. Traffic frequently backs up on southbound Tower for about 2 blocks. It backs up on eastbound Belknap for about one block, which at times prevents vehicles from crossing Banks when they have a green light. Unfortunately, the signalization is already configured in a way that allows the maximum amount of traffic movements without significantly delaying traffic.

First of all, if cars are not present in a turn lane, the green arrow will not come on. During our turning movement counts, however, there were very few times when a left turn lane was empty. Especially in the afternoon, many times the entire queue is not empty by the time the green arrow has run through its cycle. If there are vehicles waiting to turn onto Tower, the left arrows on Belknap will run a cycle of 12 seconds and through traffic will get 32 seconds after the turn cycles. If vehicles are not waiting to turn, traffic from the opposing direction will get a through cycle of 44 seconds.

The system is set up the same way for traffic on Tower, except that the turn cycle for traffic turning onto westbound Belknap is 15 seconds and for traffic turning onto eastbound Belknap the cycle is 20 seconds. This situation reduces the through cycle to 29 seconds and 24 seconds, respectively. In the afternoon, the fact that southbound traffic usually gets 5

seconds less than northbound traffic and 8 seconds less than traffic on Belknap, along with the fact that more cars are traveling southbound than in any other direction explains the reason why traffic backs up for 2 blocks. However, if the turn cycle were shorter for traffic turning left from northbound Tower, the turn queue would back up traffic into the left through lane for at least one block because this is the largest left turning movement. This situation would dramatically decrease the capacity of northbound Tower. So the timing scheme is set up in a way that makes the best of a bad situation.

This situation is exacerbated by the fact that the percentages of traffic entering the intersection are almost identical between Belknap and Tower. In the morning 50% approach on each roadway while in the afternoon the split is 51 to 49 in favor of Tower. If this difference was larger, the signals could be reconfigured in a way that would support the street with the higher counts.

Sidewalks are located on both sides of both streets and were rated in good or fair condition. A signal button must be pushed in all 8 directions in order to activate the walk signal. The walk signal is lit for 6 seconds and the don't walk signal flashes for 10 seconds in all locations for a total of 16 seconds to cross, except on the east side of Tower for crossing Belknap in each direction. The don't walk signals do not function so, in these locations, the walk signal is on for 6 seconds and then the signal head goes blank. The 16 second crossing time is not adequate for an average person to cross at any of the 8 locations. In order to cross Tower, 20.25 seconds are needed; to cross Belknap, 22.5 seconds are needed.

Although the number of trucks at the Tower/Belknap intersection is 13% higher than at the Tower/Winter intersection, the counts were 242% higher at the Belknap/53 intersection than the Tower/Belknap intersection. This suggests that most trucks use the Blatnik Bridge as a through route rather than the Bong, precisely because it is quicker and a less congested route. As stated earlier in the truck movement analysis, only 18% of the trucks were traveling through the corridor without stopping. Most of them using Belknap had business along the corridor or were using it to access Tower Avenue. Some improvements could be made, such as installing national truck route signs along Highway 53 in Wisconsin and along Interstate 35 in Minnesota; and improving truck route signage for Winter Street. These suggestions will be further discussed in the recommendations section.

Intersection Timings –Tower Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	12	32 to 44	Same
West	12	32 to 44	Same
North	15	29 to 44	Same
South	20	24 to 44	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	6	Broken	6	20.25
East	*North*	6	Broken	6	20.25
West	*South*	6	10	16	20.25
West	*North*	6	10	16	20.25
South	*East*	6	10	16	22.5
South	*West*	6	10	16	22.5
North	*East*	6	10	16	22.5
North	*West*	6	10	16	22.5

Times listed are in seconds.

Intersection: Banks Avenue

General Description:
Banks Avenue is classified as a minor arterial north of Belknap Street and as a local street south of Belknap. Banks along with Ogden to the east tend to serve as reliever routes for Tower Avenue in downtown Superior. These two roadways provide access to many of the parking areas for the businesses downtown that front on Tower Avenue. Banks is a two-lane street with a left turn lane and a right turn lane from the north. The right turn lane is set up in a way that traffic can merge onto Belknap rather than having to stop first. Northbound Banks is wide enough for two lanes but is not striped. Belknap has a left turn lane from the east; left turns are not permitted from the west. Pedestrian signal heads are present for 6 of the 8 crossing points; one of the 6 is broken.

Total number of vehicles entering intersection:
AM Peak: 1,830
PM Peak: 3,495

Total number of trucks entering intersection:
AM Peak: 38
PM Peak: 32
Percentage of traffic that is trucks: 1.3%

Total number of pedestrians entering intersection:
AM Peak: 16
PM Peak: 43

Total number of bicycles entering intersection:
AM Peak: 13
PM Peak: 0

Summary of Issues:
The north-south green time is consistent at 30 seconds. The eastbound green time is consistent at 59 seconds. The westbound green time ranges from 49 to 59 seconds depending on whether the eastbound green arrow is on and the number of cars waiting to turn. This intersection functions similar to the Ogden intersection. It has a long green time on Belknap which is appropriate because there is significantly less traffic on Banks then on Belknap. Also, by having a long green time, it helps to alleviate congestion buildup at the Tower intersection with Belknap. When vehicles get through the Tower intersection, traffic does not continue to accumulate at Banks because the light is usually green. During the time staff was present at this intersection, the left turn signal time on Belknap illuminated only if cars were present in the left turn lane. The green time was 9 seconds. However, at other times of day the timing of this signal could be different.

About 83% of traffic entering the intersection approaches on Belknap in the morning; it decreases to 71% in the afternoon, however, the counts are significantly higher in the afternoon. The counts are more than 200% higher on Banks in the afternoon, probably because of the presence of a large grocery store that generates a lot of traffic. There are other commercial uses on each corner of this intersection which also contribute to the afternoon increase. Sidewalks are located on both sides of both streets except at the northwest corner

of the intersection extending to the west. Both sidewalks along Banks extending south of Belknap were rated in poor condition. All other sidewalks were good or fair.

A signal button must be pushed in order to activate the walk signals for crossing Banks. The walk signal is lit for 10 seconds to cross Banks from the east and the don't walk flashes for 16 seconds for a total crossing time of 26 seconds. From the west, the walk signal is lit for 15 seconds and the don't walk flashes for 11 seconds, also for a total crossing time of 26 seconds. There are no pedestrian signal heads for crossing Belknap on the west side, although there is a crosswalk striped across the roadway. On the east side of Banks, approaching from the north, there is a signal button to activate the walk signal. The walk signal is lit for 10 seconds; the don't walk then flashes for 10 seconds for a total crossing time of 20 seconds. The signal button for crossing Belknap on the east side from the south is broken; the walk signal does not appear. In the one place for crossing Belknap where there is a functioning signal head, the time is not adequate for crossing the street. The amount of time for crossing Banks is sufficient in all locations.

Intersection Timings –Banks Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	9	59	Same
West	None	49 to 59	Same
North	None	30	Same
South	None	30	Same

PEDESTRIAN TIMINGS

Source Direction	Side of Street	Walk Time	Flashing Don't Walk Time	Total Crossing Time	Time Needed to Cross for Average Person
East	*South*	10	16	26	22.5
East	*North*	10	16	26	11.25
West	*South*	15	11	26	22.5
West	*North*	15	11	26	11.25
South	*East*	Broken	Broken	None	21.5
South	*West*	None	None	None	22.5
North	*East*	10	10	20	21.5
North	*West*	None	None	None	22.5

Times listed are in seconds.

Intersection: Garfield Avenue

General Description:
This is the general location of where Highway 2 leaves Belknap Street, curves to the north and takes traffic over the Bong Bridge to Duluth. There is no northbound street at this location. Highway 2/Bong Bridge is classified as a principal arterial. Belknap Street is a collector west of this area and a principal arterial to the east. The access point to Belknap from the Bong Bridge is further to the west of this intersection. From the east there is one through lane on Belknap and two lanes for approaching the Bong Bridge along with a left turn lane at Garfield. From the west there are two through lanes. Garfield is a two-lane street south of Belknap and is classified as a local street. The intersection is not signalized.

Total number of vehicles entering intersection:
AM Peak: 1,914
PM Peak: 2,926

Total number of trucks entering intersection:
AM Peak: 52
PM Peak: 41
Percentage of traffic that is trucks: 1.9%

Total number of pedestrians entering intersection:
AM Peak: 1
PM Peak: 8

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
More than 85% of the traffic that enters the intersection does so along Belknap. Most of the traffic approaching from the west has come from Duluth over the Bong Bridge. Interestingly, the traffic counts were higher from the west than from the east in both the morning and afternoon. There are no pedestrian signal heads, one sidewalk on the south side of Belknap and one sidewalk on the west side of Garfield extending to the south. Both sidewalks were rated in good condition. There is a traffic signal just to the west for traffic originating from the Bong Bridge. The signal timings are shown below.

Intersection Timings –Garfield Avenue

TRAFFIC TIMINGS

Source Direction	Left Arrow Time	Total Green Time	Green Time With Walk Signal Activated
East	None	15 to 23	No walk signal
West	None	15 to 23	No walk signal
North	None	None	No walk signal
South	None	17 to 57	No walk signal

Intersection: Susquehanna Avenue

General Description:
Belknap Street is classified as a collector at this intersection; Susquehanna is classified as a collector to the north of Belknap and as a local street to the south. Susquehanna is also part of the Winter Street truck route. The bike route that connects Duluth and Superior is designated as the Bong Bridge and then turns south on Susquehanna. At the Belknap intersection, bikers would take a left onto Belknap for one block before turning south on Wyoming Avenue. Both streets are two-lane streets in this location and the intersection is not signalized.

Total number of vehicles entering intersection:
AM Peak: 643
PM Peak: 906

Total number of trucks entering intersection:
AM Peak: 30
PM Peak: 16
Percentage of traffic that is trucks: 3.0%

Total number of pedestrians entering intersection:
AM Peak: 5
PM Peak: 13

Total number of bicycles entering intersection:
AM Peak: 0
PM Peak: 0

Summary of Issues:
This intersection had the least amount of traffic in the corridor, however, it had the second highest percentage of truck traffic. This indicates that, although not in large numbers, the Winter Street truck route is being utilized. About 85% of the traffic entering the intersection do so from Belknap Street. The largest movements in the morning are vehicles turning north onto Susquehanna, presumably to access jobs and businesses in the northern Superior industrial area. The counts in the afternoon approaching from the north on Susquehanna were not nearly as high as the opposite counts in the morning, which suggests that people were not staying in this area all day or used an alternate route home from work. There are no pedestrian signal heads at this intersection and a sidewalk only on the south side of Belknap. This sidewalk was rated in poor condition.

The City of Superior and WisDOT are considering a plan that would see the installation of a cloverleaf style exit from the Bong Bridge directly onto Susquehanna, primarily to ease access for trucks to the Winter Street truck route and the industrial sites of the north end of the City. This could potentially affect the bicycle route that is present in this area.

Recommendations

Short Term Recommendations

Improve Pedestrian Control Features

As stated in the introduction, a special effort was undertaken in this planning process to address pedestrian issues in the corridor. This effort is supported by WisDOT. The agency completed its Wisconsin Pedestrian Policy Plan 2020 in 2002. In this plan, Objective 1.0 is "Working in partnership with local governments and other interested stakeholders, WisDOT will increase accommodations for pedestrian travel to the extent practicable along and across State Trunk Highways (STHs)."

Also, Action 2.4 states, "WisDOT will encourage MPOs and RPCs to consider pedestrian needs in their planning processes. MPOs and RPCs should include pedestrian transportation and other multimodal needs in their transportation studies, transportation project selections and advice in plans and studies."

The painted crosswalks along the corridor are in poor condition, however, this happens every year from the effects of rain and snow. Each spring, the crosswalks are repainted.

The normal walking speed for an average person is 4 feet per second, according to the MUTCD. Many of the pedestrian signal heads in the Belknap Corridor do not allow for sufficient time to cross streets (especially to cross Belknap). Some of the following recommendations discuss increasing the walk time at certain locations. In addition, children, the elderly and handicap persons may walk at slower than normal rates. Rather than increasing walk times to the point where traffic flow could be severely impaired, "passive pedestrian detection equipment" could be installed at select locations. According to the MUTCD,

> Passive pedestrian detection equipment, which can detect pedestrians who need more time to complete their crossing and can extend the length of the pedestrian clearance time for that particular cycle, may be used in order to avoid using a lower walking speed to determine the pedestrian clearance time. (page 4E-13)

This equipment may function automatically, such as installing sensors that detect that a pedestrian has not completed the journey across the street by the end of the walk cycle, thus the opposing traffic's green light would be delayed until the pedestrian's trip is complete; or the equipment can function manually, that is, a pedestrian would press a certain button to get a longer crossing cycle.

Truck Route Signage

There are two issues regarding truck route signage in the Belknap Corridor. The first involves truck access. Trucks use Poplar Avenue to access an industrial area just to the north of Belknap Street. When departing these businesses, trucks attempt to make a left turn on Belknap in order to head east to reach Highway 53. Because of the size

of the trucks and frequent traffic, it often takes quite a while before there is a sufficient size gap for the trucks to enter the roadway. At times, trucks will simply pull into the intersection even if the gap is not sufficient, creating a safety hazard.

Poplar Avenue is shown as a truck route in the MIC's Duluth-Superior Truck Route Study of 2001. Dichotomously, one block south of Belknap Street, Poplar Avenue has a sign stating "No Trucks." However, the sign is not apparent until a driver has already committed to drive this way and there is not sufficient space to turn a truck around. However, there is an alternate access for trucks to reach these businesses much easier from the east. Map 10 shows the location of this route. Trucks would follow the access point to the Winter Avenue truck route that begins just north of Belknap, travel underneath Highway 53 and then south on Hill Avenue. They would then make a right turn onto 12th Street and travel until they reached the business area. If it is adequately signed, this route would allow trucks to avoid Belknap Street completely without traveling through a residential area.

Currently, E Street is designated as a truck route on the MIC's truck route map which provides access to the aforementioned industrial area. E Street travels through a heavily populated neighborhood. Although it is a slightly longer route, the utilization of Hill Avenue is preferred from a community standpoint because there would be no truck travel through a residential area as there is when using E Street. Signage should be installed that encourages trucks to utilize Hill Avenue.

Upon discussion of the Poplar/E Street situation with City of Superior staff, it was determined that the MIC's truck route map and the City's approved truck route map are not consistent. The City's map does not display the Poplar/E Street area as a truck route. The MIC and City of Superior should work to amend one or both maps to ensure that they are consistent. Map 11 shows the MIC's truck route map.

The second issue is regarding truck route signage in general. The National Network of Truck Routes through the region is shown on Map 12. Signs that designate these routes (shown below) should be installed on Interstate 35 in Duluth and Highway 53 in Superior. These signs would guide trucks throughout the area without using Belknap Street.

Also, the signage for the Winter Street truck route and the E Street truck route connection needs to be improved. Specifically a sign should alert northbound drivers on Highway 53 of the availability of the Winter Street route before they reach Belknap Street so that they have the opportunity to decide which route to take.

Belknap Street is the designated oversize truck route through the region (shown on Map 13). It is most likely Belknap instead of Highway 53 either because of weight restrictions on the Blatnik Bridge or the tight turning radius for trucks exiting the Blatnik on Highway 53.

Business Route Signage

Belknap Street and Tower Avenue are designated as the Highway 53 Business Route. There are several areas where signage needs to be installed. There were probably signs in these locations at one time, but have disappeared over time and not been replaced. The following improvements should be implemented:

- Northbound Highway 53, south of Belknap Street – install a Business Highway 53 sign that informs the traveler to turn left at Belknap Street.

- Westbound Belknap Street, east of Tower Avenue – install a Business Highway 53 sign that informs the traveler to turn right at Tower Avenue.

- Southbound Interstate 535/Highway 53 (Blatnik Bridge) – install a Business Highway 53 sign that informs the traveler to exit onto Tower Avenue.

- Southbound Highway 35 – install a Business Highway 53 sign at a point just after vehicles have exited the Blatnik Bridge.

- Southbound Highway 35 – a Highway 53 sign exists at a point just north of Belknap Street, however, a left arrow and the "business" part of the sign should be installed.

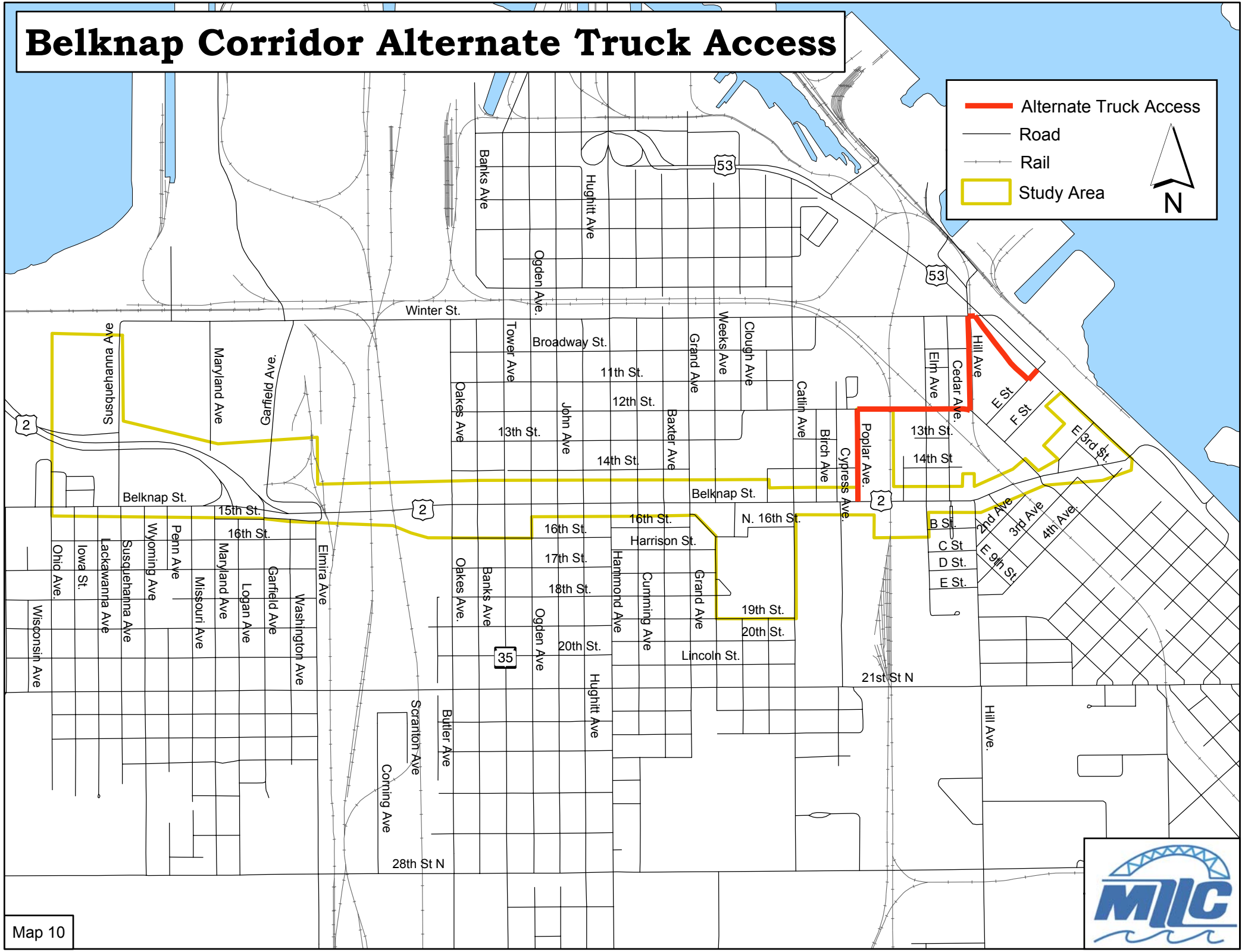
Railroad crossings

There are currently two at-grade railroad crossings on Belknap Street. The crossing between East 7th Street and East 5th Street currently has not only flashing signals but also crossing gates. The crossing between Pine Avenue and Poplar Avenue, however, currently has only flashing signals. Crossing gates should be added in this location in order to improve safety. This recommendation was also included in Superior's 1997 Comprehensive Plan as a transportation strategy (page 70).

Land Use and Zoning

The largest foreseeable land use changes at this time concern the closing of two schools. Both Central junior high school and Blaine elementary school will be closing at the end of the 2002-2003 school year. The students will be relocated to locations farther south. The Superior school district currently has Requests for Proposals distributed for potential purchase and reuse of the buildings. At this time, it is not clear if there is a market for either of the buildings in their current condition. There is a possibility that they could be razed with new buildings being constructed on site. The properties are currently zoned residential but could be rezoned depending on proposals. The future uses of these sites will ultimately determine if traffic levels will change appreciably in the corridor.

Belknap Corridor Alternate Truck Access



Map 10

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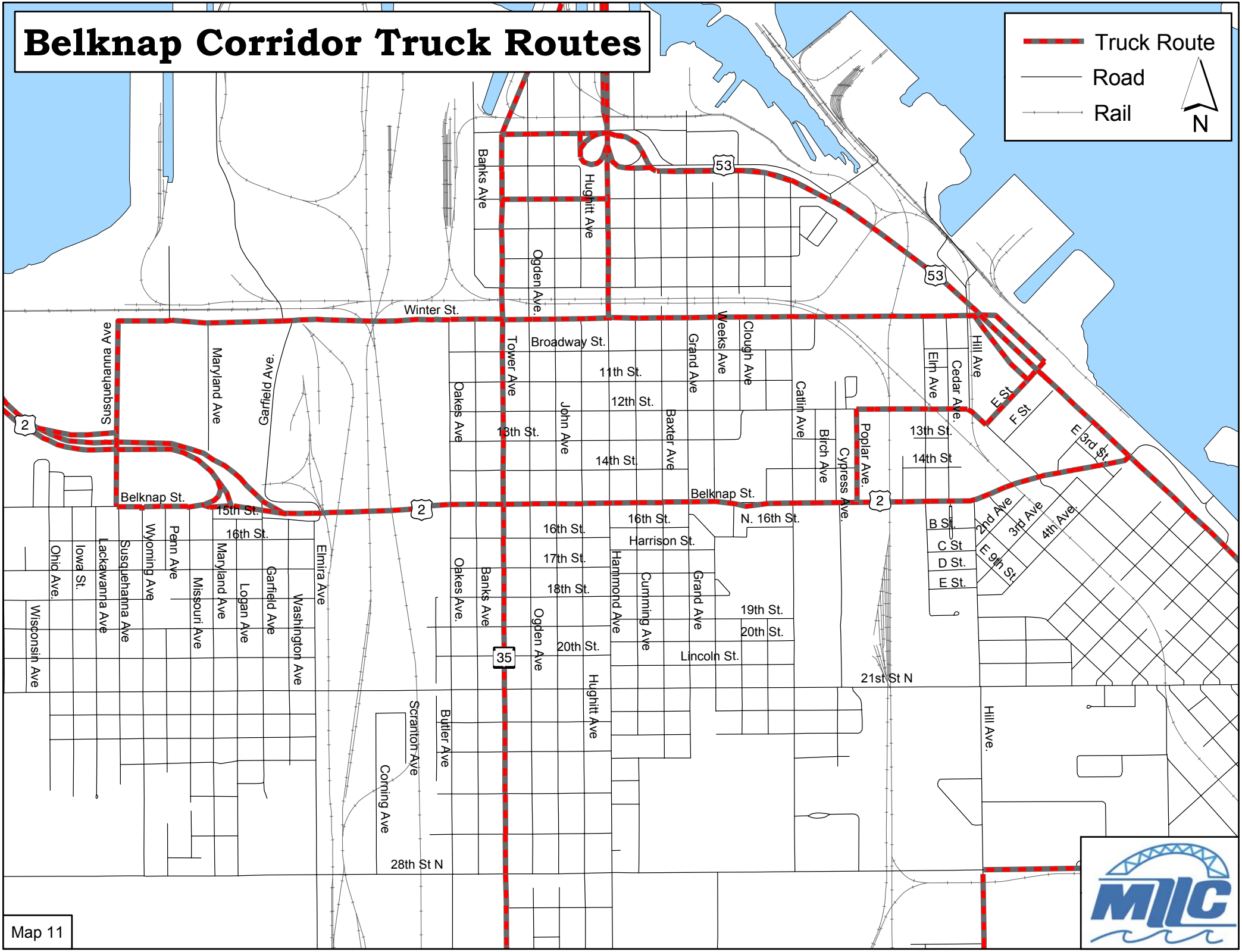
Belknap Corridor Truck Routes



Map 11

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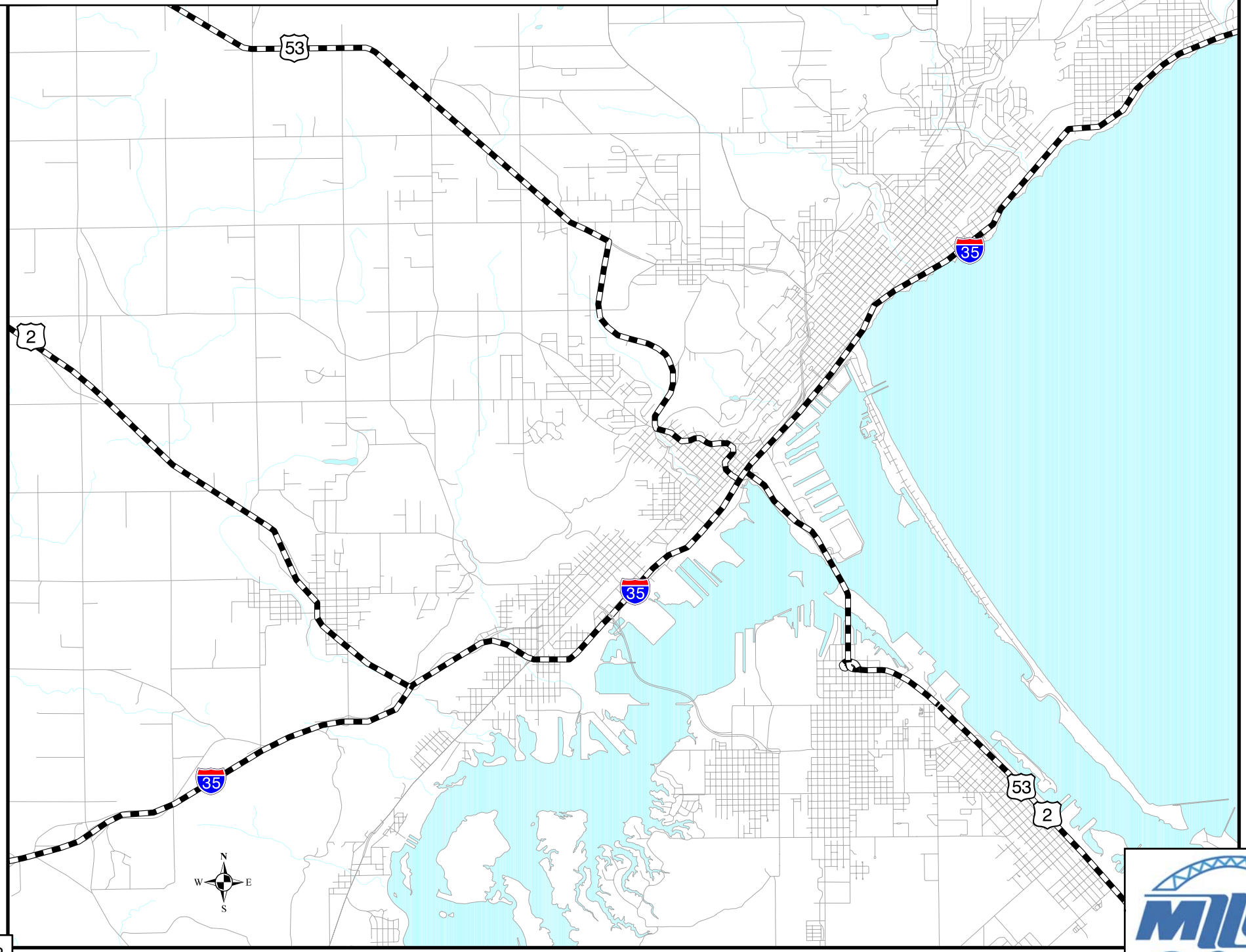
Duluth-Superior National Network of Trucks



Map 12

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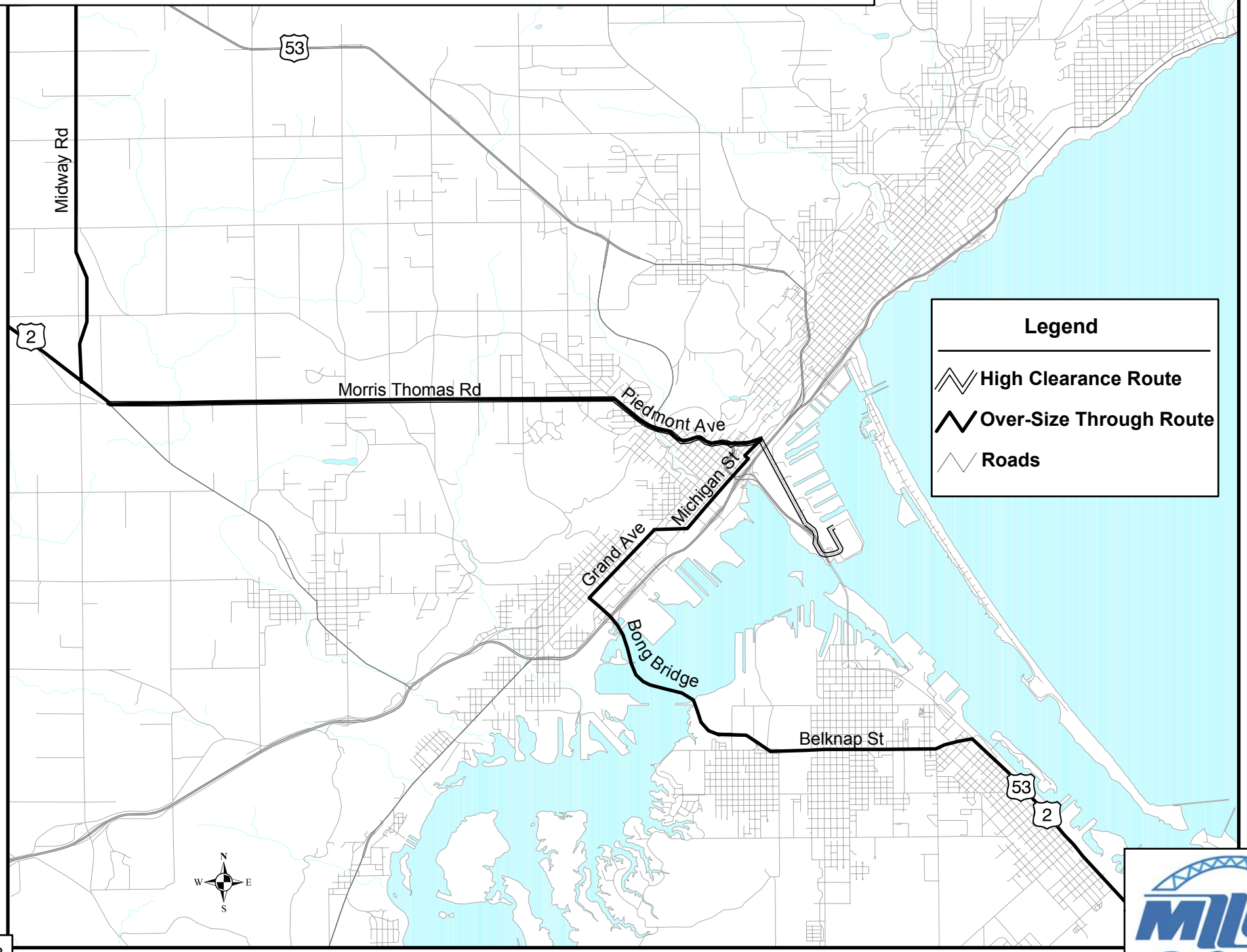
Belknap Corridor Over-Size Truck Routes



Map 13

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Specific Intersection Recommendations

At the time of completion of this plan, the City of Superior's Public Works Department was in the process of making improvements to some of the pedestrian control features in the Belknap Street Corridor. Therefore, some of the following recommendations may have already taken place at the time of adoption of this plan.

Highway 53

- Repair pedestrian signal heads in the following locations:
  - Westbound, south side of street
  - Eastbound, south side of street
  - Northbound, east side of street
- Install pedestrian signal heads in the following locations:
  - Westbound, north side of street
  - Eastbound, north side of street
  - Northbound, west side of street
  - Southbound, west side of street
- There are two options for ensuring that pedestrians have enough time to cross the street. The first is to ensure that crossing times are at least equal to those that are shown as needed in the Pedestrian Timings table for Highway 53 in the existing conditions section.
- The other option is to decrease the crossing times somewhat, and encourage pedestrians to seek refuge in the center median of each street; thus, requiring two cycles to cross the street safely. This concept is encouraged in the MUTCD:

  > On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided. (page 4E-14)

- Install a sidewalk along the north side of Belknap Street and the west side of Highway 53. Also, ensure that a handicap accessible ramp is installed for crossing both streets in this location.

East 5th Street

- Replace the sidewalk that extends north along 5th Street.

Hill Avenue

- Install pedestrian signal heads at all 8 crossing points. The minimum crossing times should be 19 seconds for crossing Belknap and 15 seconds for crossing Hill. These crossing times will be easily implemented because the green times for crossing each street exceeds these numbers.
- Consider installing pavement sensors in order to control the length of the green time in each direction. This may not be necessary, however, because the quick cycles appear to handle traffic adequately without frustrating drivers with long wait times.

- Install larger "no trucks" signs. These signs should be installed further from the intersection so that southbound trucks will be better informed that trucks are not allowed on Hill before they reach the intersection.

Mortorelli Drive/Cypress Avenue

- A sidewalk connection should be added to the west side of Mortorelli near the existing football field. This connection is needed for pedestrians accessing the UWS campus and WITC from the north. There currently is a sidewalk on the west side of Mortorelli that extends from 21st Street north but terminates about 600 to 700 feet south of Belknap Street. This sidewalk should be extended to the north to meet Belknap Street.
- The approach of Mortorelli Drive toward Belknap Street from the south should be reconfigured, as shown on Map 14. (The existing configuration is shown with dotted lines). Approximately 400 square feet would need to be acquired from the UWS football field in order to provide the space for this reconfiguration. As mentioned earlier in this report, UWS no longer has a football team. Despite the fact that the field is used for youth football games in the fall, the university plans on removing the football field in the future and reusing it as playing fields for other sports. Discussions with UWS regarding this reconfiguration should be undertaken in the near future so that proper planning can take the changed use of this property into account when considering the future athletic fields.
- Monitor the intersection to determine if traffic signals and pedestrian signal heads are warranted for installation.

Catlin Avenue

- Replace the signal button for eastbound pedestrian traffic on the south side of Belknap.
- Repair the plastic covering on the signal head for eastbound pedestrian traffic on the north side of Belknap.

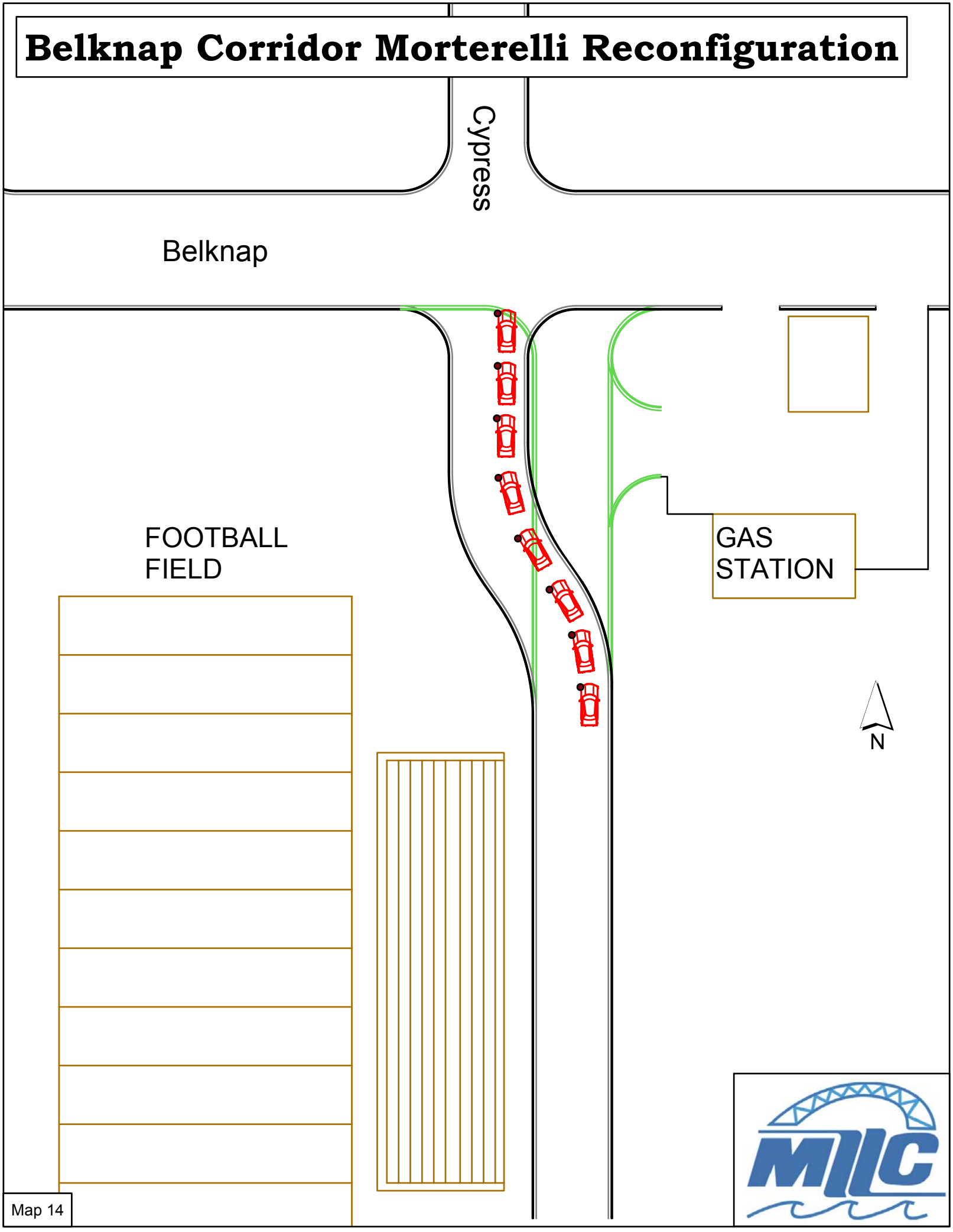
Grand Avenue

- Repair the signal button for northbound pedestrian traffic on the east side of Grand.
- Repair the plastic coverings on the signal heads for westbound pedestrians. Pedestrian traffic on the south side of Belknap, and also for southbound pedestrians crossing Belknap on the east side of Grand.

Hammond Avenue

- Increase the crossing time on Hammond and Belknap for pedestrians from 0.75 to 2.5 seconds, based on the timings listed in the Pedestrian Timings table. Because the length of green for the traffic signal timings for north and southbound traffic range from 20 to 44 seconds, these timings will need to be slightly adjusted so that the range is 22.5 to 44.

Belknap Corridor Morterelli Reconfiguration



Map 14

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Ogden Avenue

- Replace the sidewalk that extends south of Belknap on the east side of Ogden.
- Increase the signal crossing time from 17 to 18 seconds for all 4 pedestrian movements for crossing Belknap Street; also increase the green time for crossing Belknap from 17 to 18 seconds.

Tower Avenue

- Install 6-foot wide medians on both Tower and Belknap. In order to provide pedestrians with enough time to cross this wide intersection in any direction, signal timings would have to increase at some points more than 40%. This is not feasible because the intersection is the busiest in the Belknap Corridor. Increasing the pedestrian times at all would have an unacceptable effect on traffic at peak times. There is, however, enough space in the corridor to install 6-foot wide medians on both Tower and Belknap. This would require removing part of the width of the sidewalks – an acceptable situation because the sidewalks in this location are wider than normal. This installation will provide pedestrian refuge for those that cannot safely make it across the intersection in one cycle. The current pedestrian time provided should be enough time to safely cross in two cycles.
- Repair the signal buttons on the east side of Tower for crossing Belknap in each direction.

Banks Avenue

- Investigate the effectiveness of the no left turn sign on eastbound Belknap. Consider the feasibility of installing a left turn lane in this location so that turns can be allowed. During staff time at the intersection, there were numerous instances of violation of this rule.
- Install pedestrian signal heads for northbound and southbound pedestrians on the west side of Banks.
- Repair the pedestrian signal head for northbound pedestrians on the east side of Banks.
- Increase the crossing time for all north and southbound pedestrians from 20 to 23 seconds. This increase will not affect the green time for through traffic on Belknap.

Garfield Avenue

- There are no suggested changes to this intersection. The one potential deficiency regarding pedestrians is that there is no sidewalk located on the north side of Belknap. However, the north side of the street is generally unsafe for pedestrians because most of the traffic is entering a high-speed stretch of roadway that travels over the Bong Bridge.

Susquehanna Avenue

- Replace the sidewalk on the south side of Belknap.
- If the City of Superior/WisDOT decide to implement the cloverleaf concept for easier access to the Winter Street truck route and the industrial businesses of the north end, revisions may be needed in the MIC's Metropolitan Bikeways Plan for this area because of potential safety impacts on bicyclists.

Long Term Recommendations

Access Management

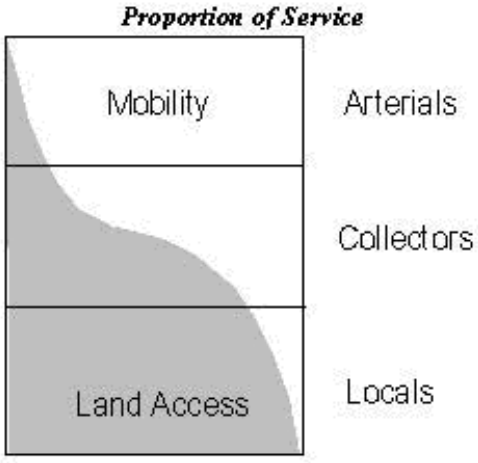
Access management is the planning, design and implementation of land use and transportation strategies that maintain a safe flow of traffic while accommodating the access needs of adjacent development.

Too many driveways, intersections and closely spaced traffic signals along major roads cause problems:

- Crashes increase as vehicles cross and turn along the road in an uncoordinated manner
- Stop and go conditions frustrate commuters and local residents
- Adjacent businesses suffer when customers have trouble turning into their sites
- Freight and delivery trucks lose time and money stuck in traffic
- Pedestrians cannot find a safe spot to cross the road
- Overall community livability suffers

Effective access management can provide the following benefits:

- Reduce congestion and crashes
- Preserve road capacity and postpone the need for roadway widening
- Improve travel times for the delivery of goods and services
- Ease movement between destinations
- Support local economic development



U.S. Highway 2/Belknap Street is classified as a Principal Arterial. As shown in the Proportion of Service figure, the function of arterials is to provide a high level of mobility while having a low amount of land access. Currently, the number of access points on Belknap Street exceeds the amount that a principal arterial should provide. While this

number of access points will probably never decrease to the point that it should to function effectively as an arterial, a significant number of them could be removed while still providing adequate access to local businesses.

It is not feasible to suddenly close off a significant number of access points simultaneously. Therefore, the recommended closings should occur when the roadway is reconstructed or as land uses change before reconstruction. Map 15 displays 38 access points that, conservatively, could be eliminated. Many DOT access management guidelines state that only one access point per parcel should be provided. For example, in MnDOT's Access Category System and Spacing Guidelines it is stated that "Only one entrance per parcel should be provided. An additional entrance may be permitted if it is determined that the property cannot otherwise be reasonably developed or utilized and that such additional access will not negatively impact the safety and operations of the roadway." In most cases, for those properties that currently are served by more than two access points, it has been recommended that they be reduced to two points, rather than the recommended one access point.

One idea that was suggested during the discussion of this project was the possibility of eliminating access to some cross streets. This idea was not well received by most of those on the advisory committee. In WisDOT's Facilities Development Model, it is stated that for controlling access along intersection streets "a distance of 250 feet can be used as a guide…" Almost all of the blocks along Belknap exceed this standard in the current configuration. Also, eliminating access points could slow the response of emergency vehicles.

Landscaped Median/Bike Route

The reconstruction of Belknap Street is currently not listed in the MIC's long range transportation plan, however, it estimated that Belknap Street will be reconstructed in 7 to 10 years. Whenever this project is undertaken, consideration should be given to reconfiguring the paved width. Currently this width is 60 feet. Figure 1 shows the existing cross section and two possible alternative cross sections. The first alternate shows the corridor with an 8-foot wide landscaped median. The second alternative maintains the existing median and adds bicycle lanes in each direction.

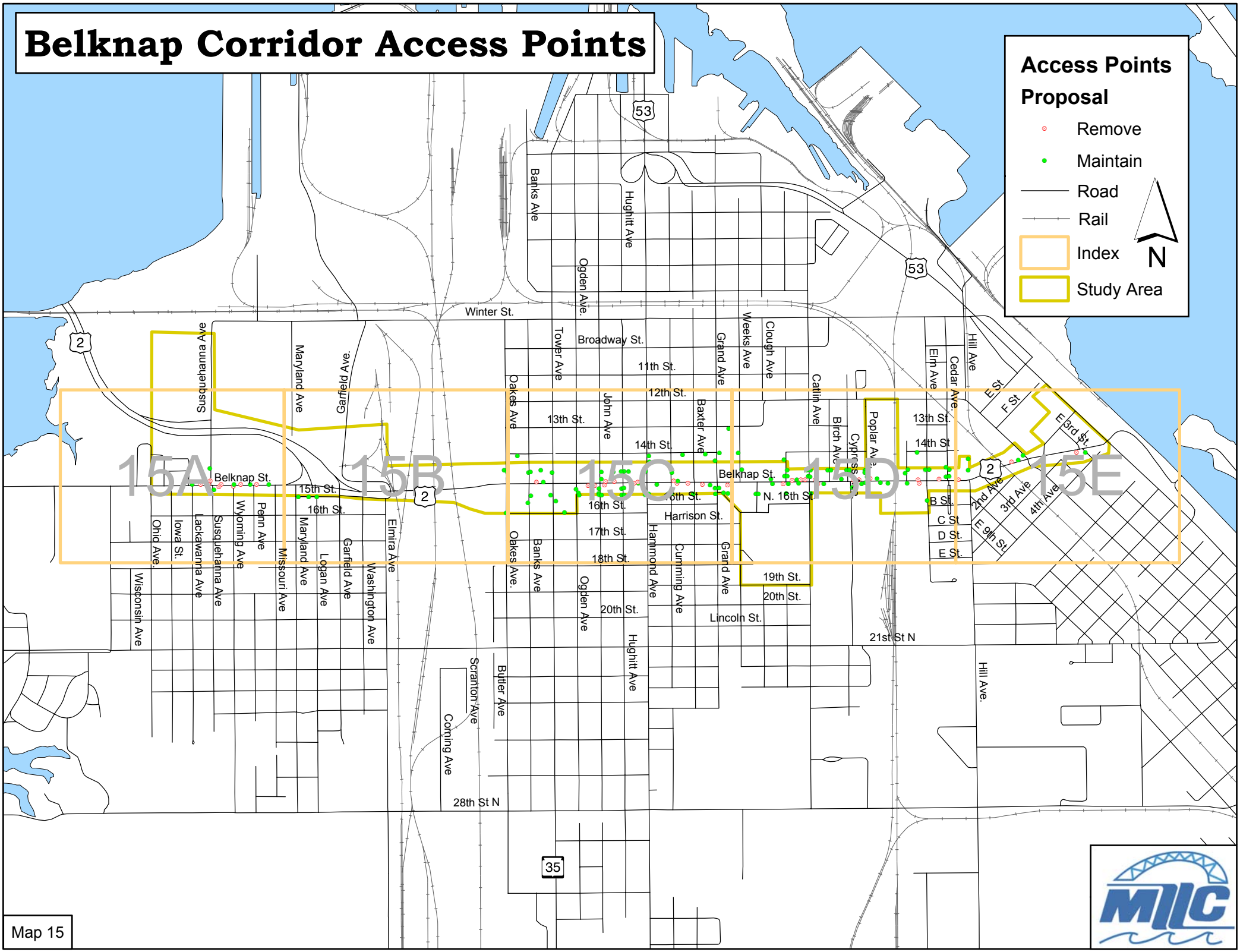
Adding an 8-foot wide landscaped median could increase safety in the corridor by physically separating opposing traffic. This option would be accomplished by decreasing the width of the right through lanes by 2 feet each and adding this additional width to the existing 4 foot wide median. The corridor could be planned in a way that would decrease the width of the median in certain locations, such as when turn lanes are provided. It could also improve the aesthetic character of the corridor.

Adding bicycle lanes would be more difficult to implement, especially in the central part of the corridor near Tower Avenue. However, with some creativity it may be possible. Nevertheless, the cross section shows a bicycle lane in each direction 5' 6" in width. This would be accomplished by decreasing the width of the right through

lanes by 4 feet and increasing the total width of the paved surface from 60 to 63 feet. This may or may not require the acquisition of right-of-way.

Also, upon reconstruction, streetscape improvements could be made to the pedestrian environment along the sidewalks such as adding street furniture, decorative light fixtures and landscaping.

Belknap Corridor Access Points



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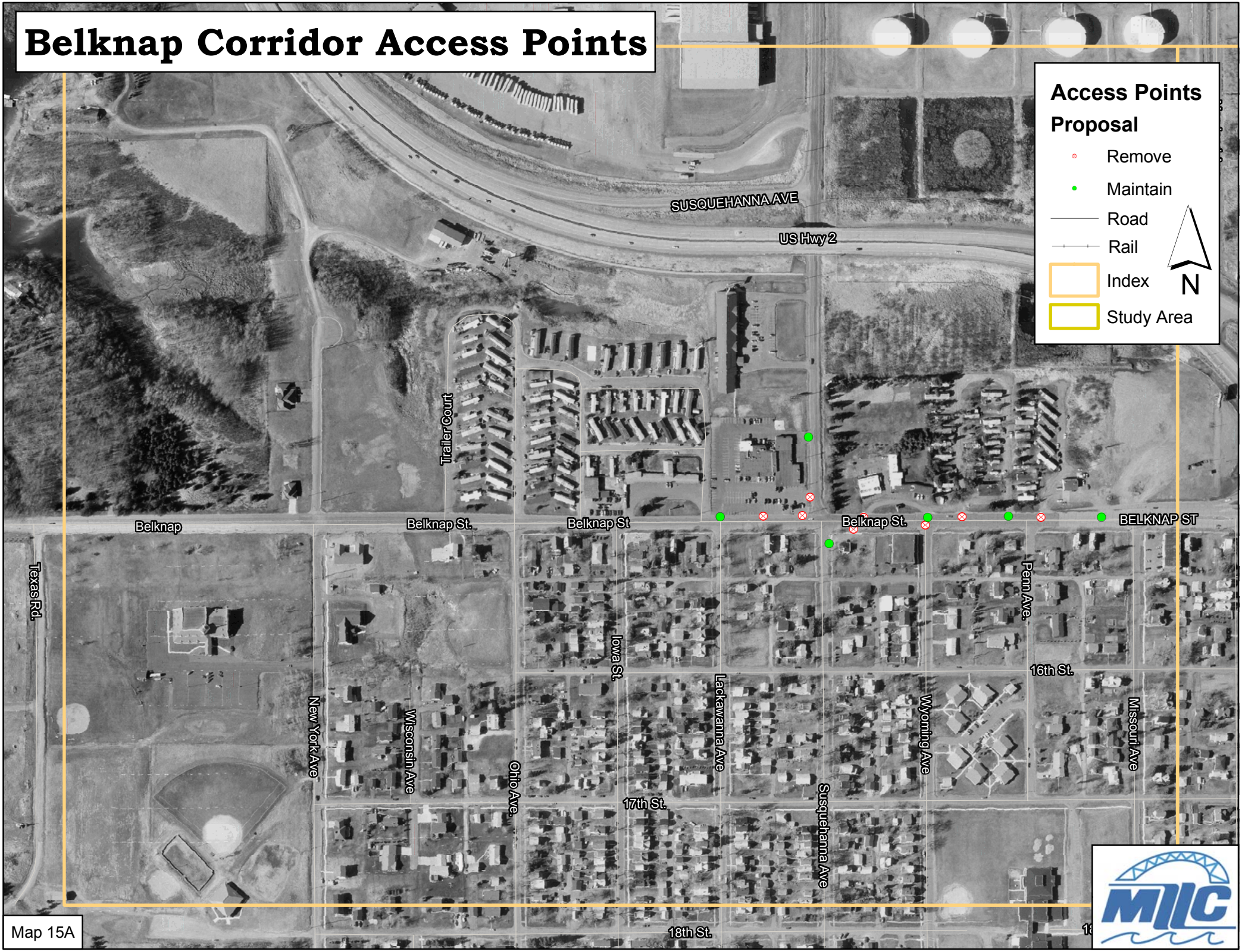
Belknap Corridor Access Points



Map 15A

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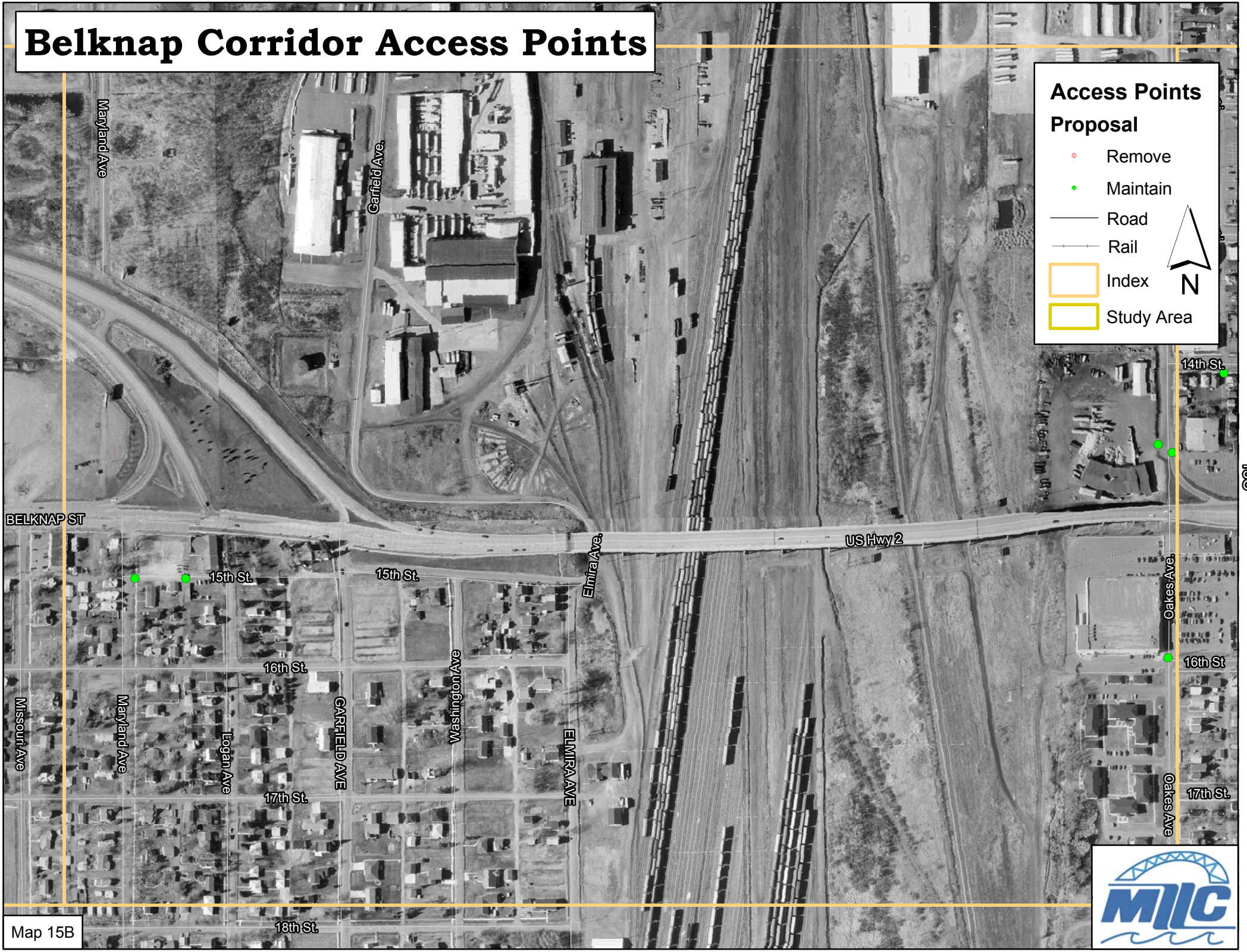
Belknap Corridor Access Points



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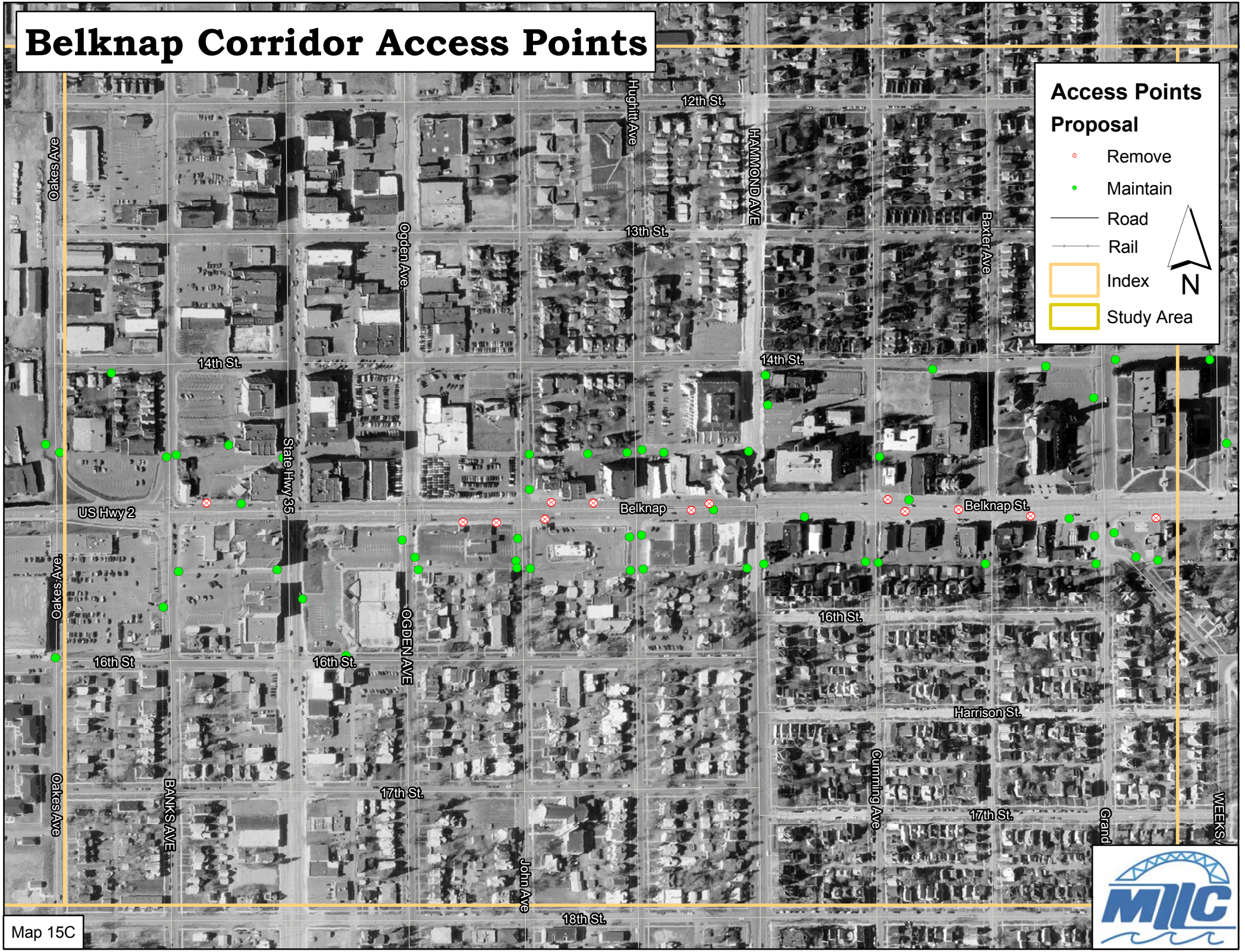
Belknap Corridor Access Points



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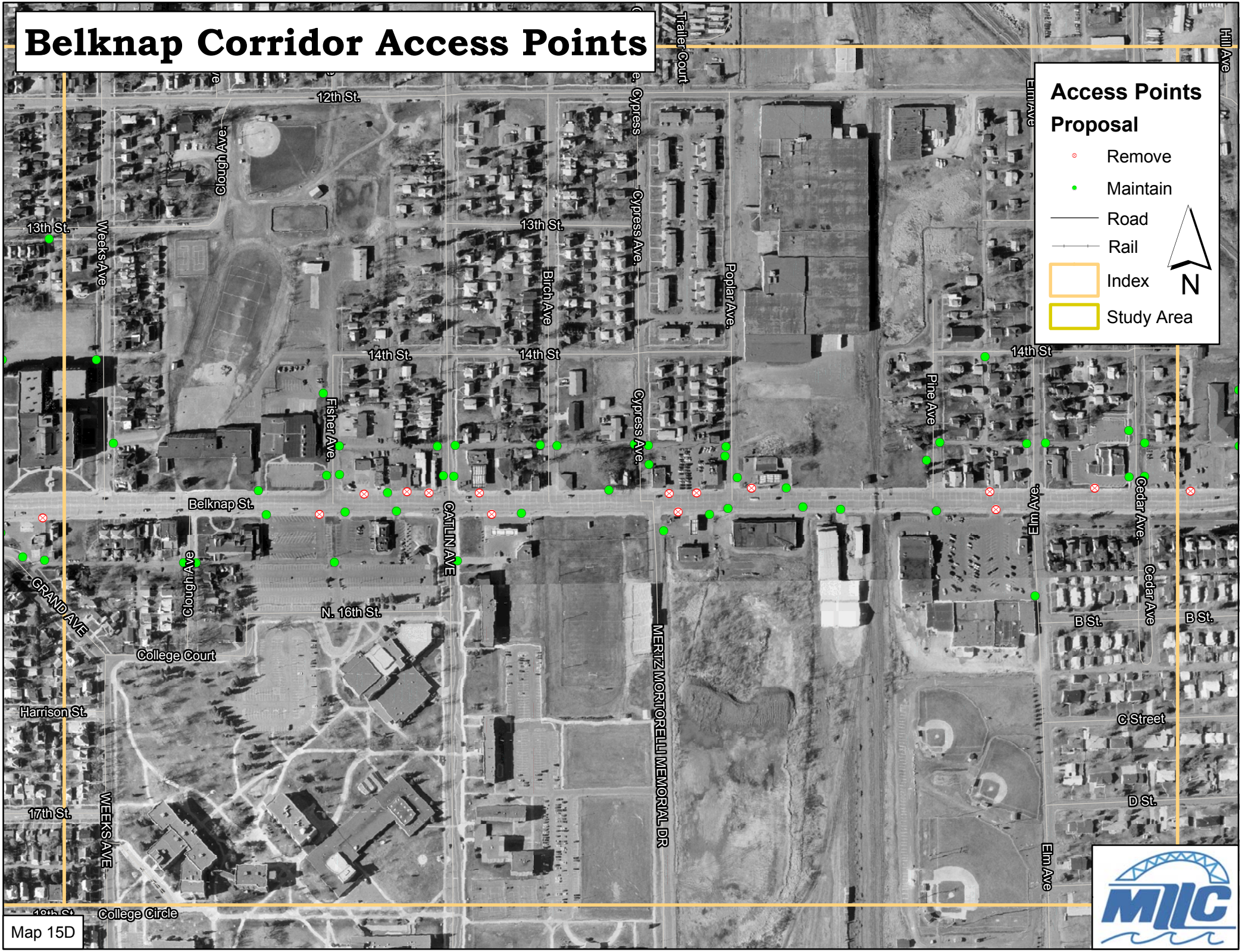

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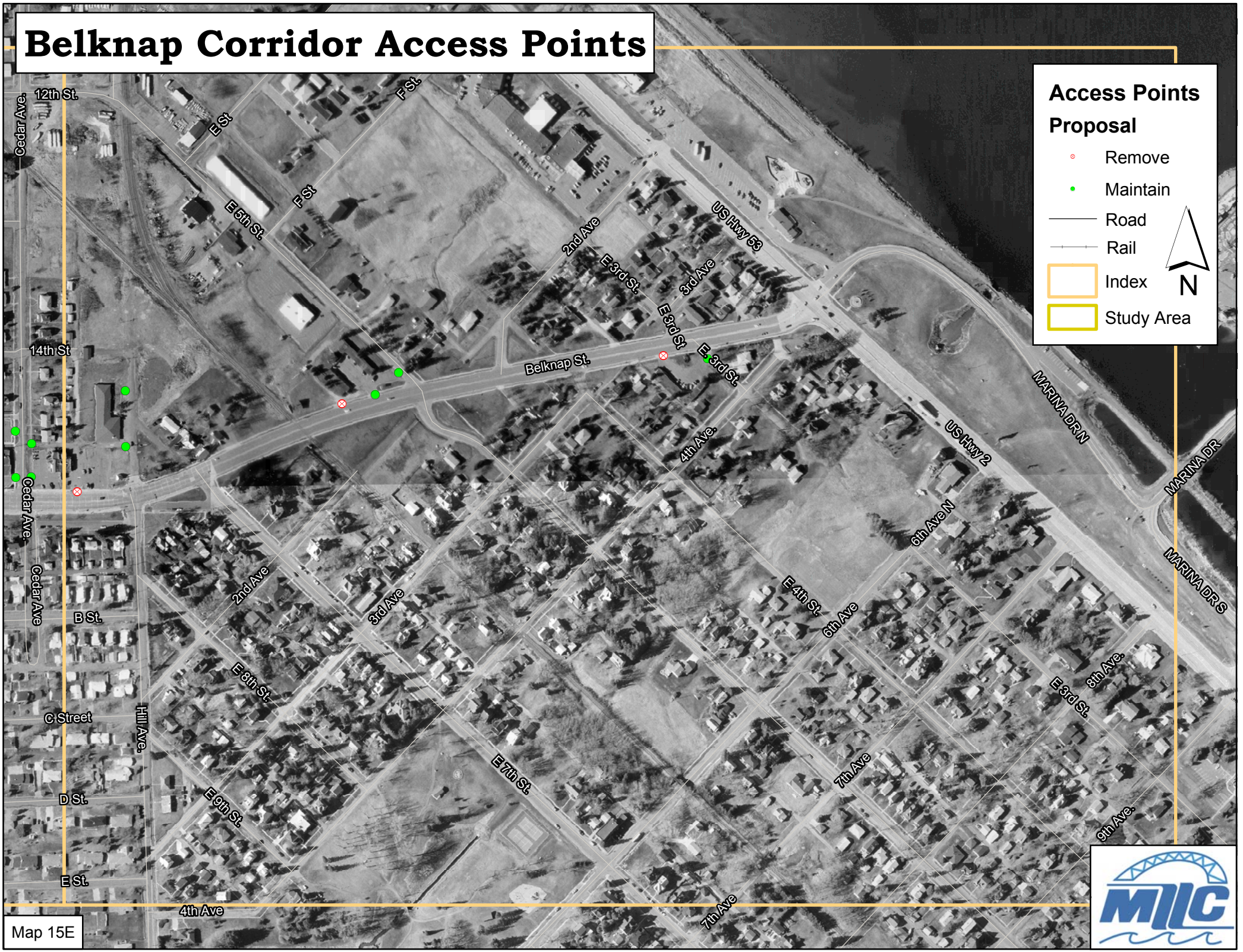
Belknap Corridor Access Points



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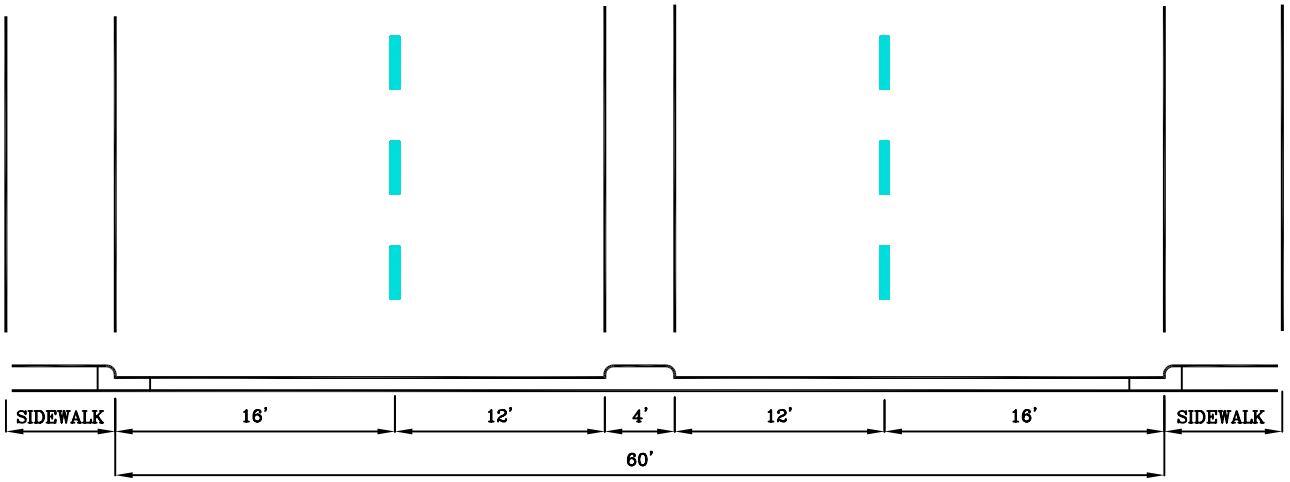
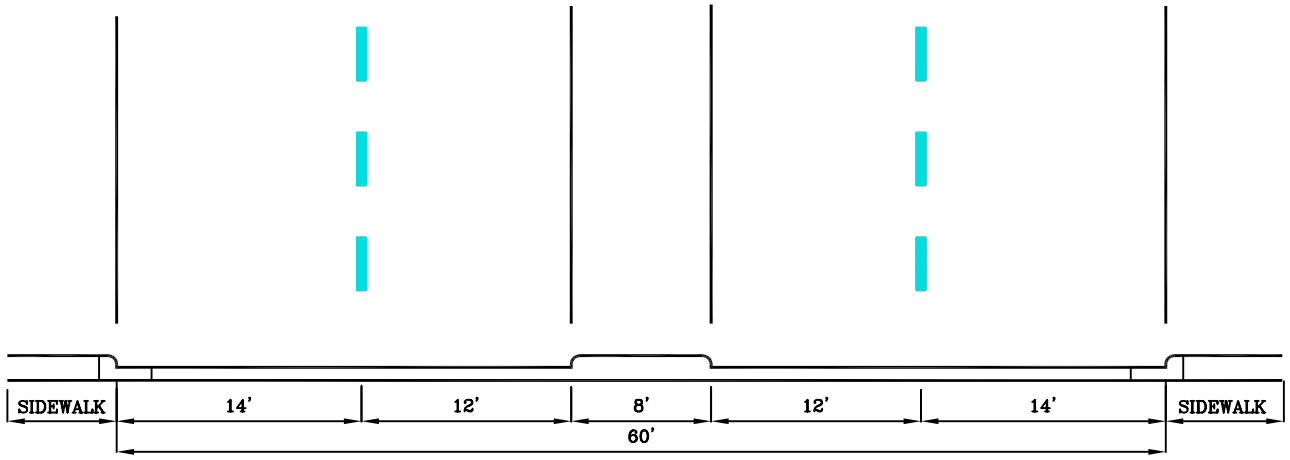


EXISTING CROSS SECTION – BELKNAP ST.

SCALE: 10' =



OPTIONAL CROSS SECTION – BELKNAP ST.

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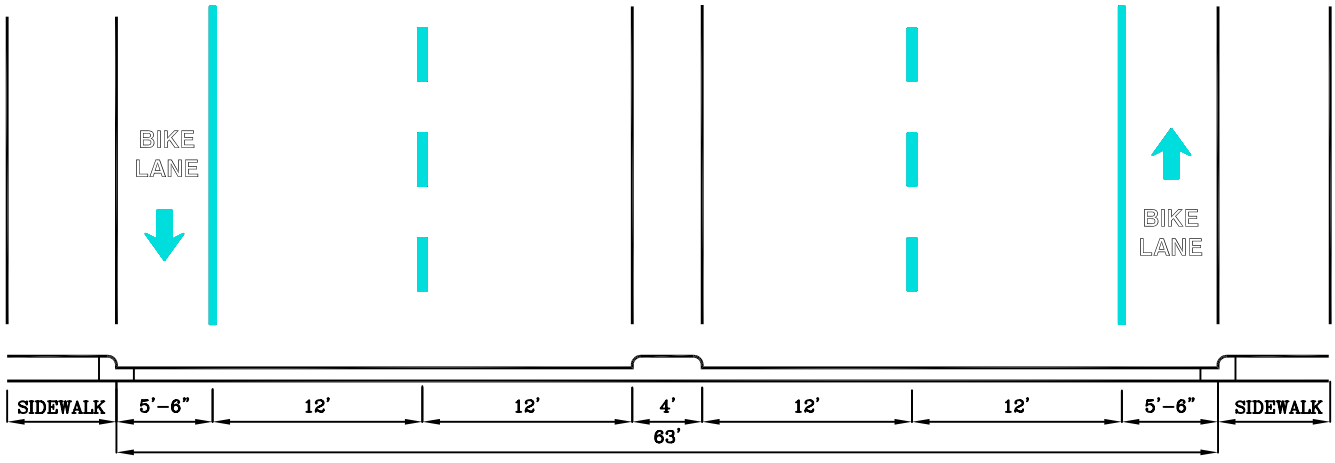

OPTIONAL CROSS SECTION w/ BIKE LANE – BELKNAP ST.

SCALE: 10' =

Figure 1

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Conclusion

The Belknap Street corridor functions relatively well considering its importance in Superior and the levels of traffic that it supports. It is realized that most of the recommendations in this report are regarding the improvement of pedestrian safety. This was not necessarily the intent when beginning the project. However, a large part of the project was designed to investigate pedestrian issues. After spending a lot of time on foot in the corridor, it is obvious that it does not feel like a safe place to be as a pedestrian, especially when crossing Belknap Street. It is important to remember that all of us are pedestrians at some point, even if it is just walking from a building to your car, so pedestrian safety should be important to everyone.

It would be difficult to make large changes to the roadway, such as the addition of right turn lanes, in order to improve traffic movement because of the narrow width of the corridor. Also, the narrowest parts of the corridor happen to be just where traffic is the heaviest. Over time, the removal of the recommended 38 access points should make a significant improvement in traffic flow.

The final recommendation of the plan is intended to improve safety and the aesthetics of the corridor and possibly provide another route for bicycle traffic.

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Appendix

Turning Movement Counts: Page 90

Sources of Information: Page 142

North/South Leg: ***HWY 53*** **Date:** 9/10/02

East/West Leg: ***BELKNAP*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	HWY 53 From North				BELKNAP From East				HWY 53 From South				BELKNAP From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	4	73	1	0	3	3	0	0	1	179	53	0	19	3	22	0	**361**
7:15 AM	6	56	5	0	3	2	0	0	0	223	50	0	15	0	17	0	**377**
7:30 AM	5	48	0	0	5	3	0	0	0	281	93	0	24	1	47	0	**507**
7:45 AM	9	88	6	0	5	1	0	0	0	187	77	0	28	5	30	0	**436**
8:00 AM	4	64	4	0	7	3	0	0	1	154	66	1	23	4	18	0	**348**
8:15 AM	6	113	1	0	2	2	0	0	0	119	45	0	27	1	27	0	**343**
TOTAL	**34**	**442**	**17**	**0**	**25**	**14**	**0**	**0**	**2**	**1143**	**384**	**1**	**136**	**14**	**161**	**0**	**2372**

Total Peds: **1**

HWY 53 From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	78	16%				% of Total		
7:15 AM	67	14%			% of LEG	INTERSECTION		
7:30 AM	53	11%						
7:45 AM	103	21%	Total Right:	34	6.9%	1.4%		
8:00 AM	72	15%	Total Thru:	442	89.7%	18.6%	Exiting North:	1329
8:15 AM	120	24%	Total Left:	17	3.4%	0.7%	Intersection Total:	2372
	493			**493**	100%	**20.8%**		**56%**

BELKNAP From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	6	15%				% of Total		
7:15 AM	5	13%			% of LEG	INTERSECTION		
7:30 AM	8	21%						
7:45 AM	6	15%	Total Right:	25	64.1%	1.1%		
8:00 AM	10	26%	Total Thru:	14	35.9%	0.6%	Exiting East:	33
8:15 AM	4	10%	Total Left:	0	0.0%	0.0%	Intersection Total:	2372
	39			**39**	100%	**1.6%**		**1%**

HWY 53 From South

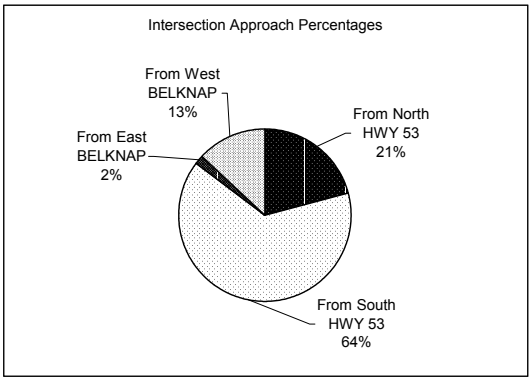
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	233	15%				% of Total		
7:15 AM	273	18%			% of LEG	INTERSECTION		
7:30 AM	374	24%						
7:45 AM	264	17%	Total Right:	2	0.1%	0.1%		
8:00 AM	221	14%	Total Thru:	1143	74.8%	48.2%	Exiting South:	578
8:15 AM	164	11%	Total Left:	384	25.1%	16.2%	Intersection Total:	2372
	1529			**1529**	100%	**64.5%**		**24%**

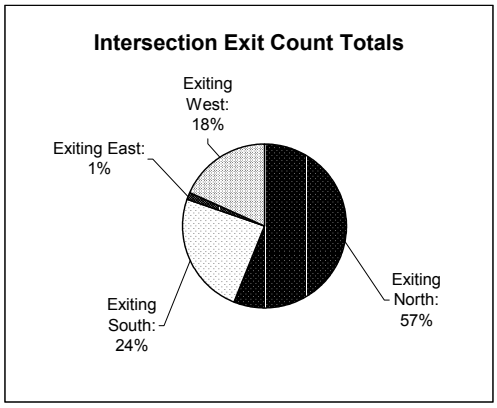
BELKNAP From West

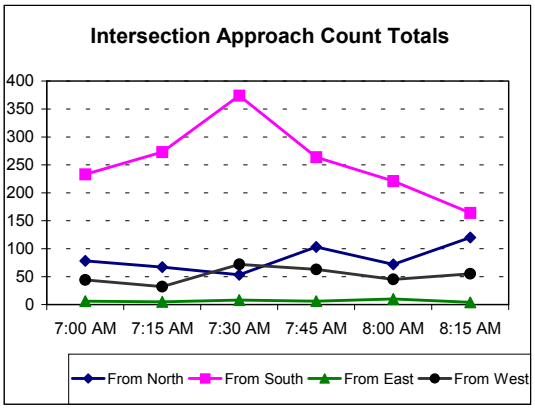
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	44	14%				% of Total		
7:15 AM	32	10%			% of LEG	INTERSECTION		
7:30 AM	72	23%						
7:45 AM	63	20%	Total Right:	136	43.7%	5.7%		
8:00 AM	45	14%	Total Thru:	14	4.5%	0.6%	Exiting West:	432
8:15 AM	55	18%	Total Left:	161	51.8%	6.8%	Intersection Total:	2372
	311			**311**	100%	**13.1%**		**18%**

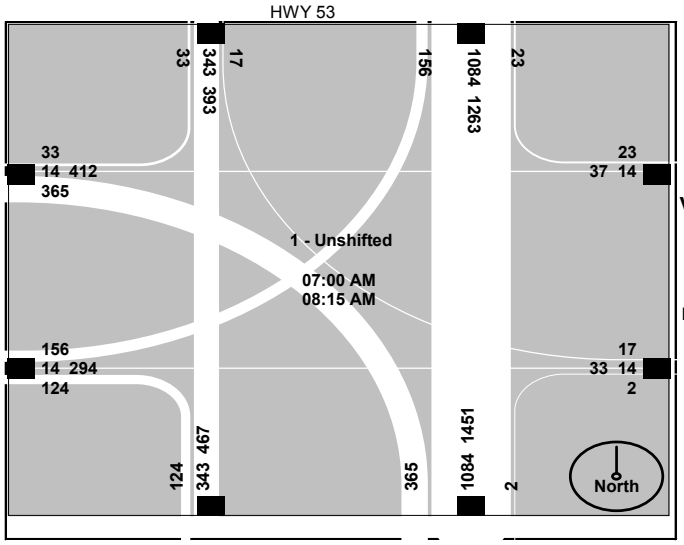
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
HWY 53 From North	476	17	493	20%	1%	21%
HWY 53 From South	1145	384	1529	48%	16%	64%
BELKNAP From East	39	0	39	2%	0%	2%
BELKNAP From West	150	161	311	6%	7%	13%
	1810	**562**	**2372**	**76%**	**24%**	**100%**









Variable Width Plot

North/South Leg: ***HWY 53 PM*** **Date:** 9/10/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	HWY 53 PM From North				Belknap From East				HWY 53 PM From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
4:00 PM	10	166	4	0	10	6	1	0	3	112	49	0	91	5	25	0	**482**
4:15 PM	11	158	4	0	3	3	2	0	0	101	40	0	77	8	24	0	**431**
4:30 PM	6	205	8	0	6	13	3	0	1	96	37	0	96	8	25	0	**504**
4:45 PM	10	192	12	0	7	9	1	0	1	86	46	0	91	11	24	0	**490**
5:00 PM	13	203	13	0	7	5	1	0	0	97	29	0	86	12	21	0	**487**
5:15 PM	13	220	8	0	6	2	0	0	0	97	46	0	84	5	26	3	**507**
TOTAL	**63**	**1144**	**49**	**0**	**39**	**38**	**8**	**0**	**5**	**589**	**247**	**0**	**525**	**49**	**145**	**3**	**2901**

Total Peds: **3**

HWY 53 PM From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	180	14%				% of Total		
4:15 PM	173	14%			% of LEG	INTERSECTION		
4:30 PM	219	17%						
4:45 PM	214	17%	Total Right:	63	5.0%	2.2%		
5:00 PM	229	18%	Total Thru:	1144	91.1%	39.4%	Exiting North:	773
5:15 PM	241	19%	Total Left:	49	3.9%	1.7%	Intersection Total:	2901
	1256			**1256**	100%	**43.3%**		**27%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	17	20%				% of Total		
4:15 PM	8	9%			% of LEG	INTERSECTION		
4:30 PM	22	26%						
4:45 PM	17	20%	Total Right:	39	45.9%	1.3%		
5:00 PM	13	15%	Total Thru:	38	44.7%	1.3%	Exiting East:	103
5:15 PM	8	9%	Total Left:	8	9.4%	0.3%	Intersection Total:	2901
	85			**85**	100%	**2.9%**		**4%**

HWY 53 PM From South

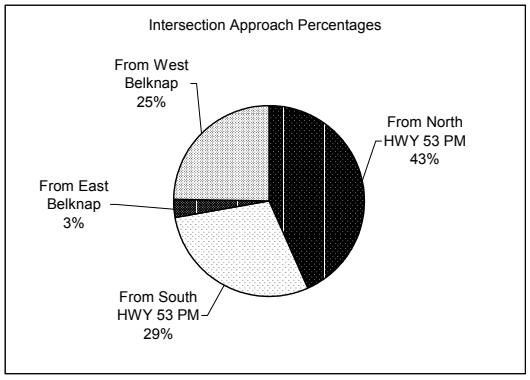
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	164	20%				% of Total		
4:15 PM	141	17%			% of LEG	INTERSECTION		
4:30 PM	134	16%						
4:45 PM	133	16%	Total Right:	5	0.6%	0.2%		
5:00 PM	126	15%	Total Thru:	589	70.0%	20.3%	Exiting South:	1677
5:15 PM	143	17%	Total Left:	247	29.4%	8.5%	Intersection Total:	2901
	841			**841**	100%	**29.0%**		**58%**

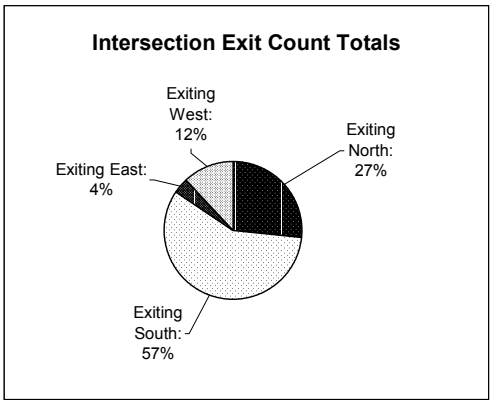
Belknap From West

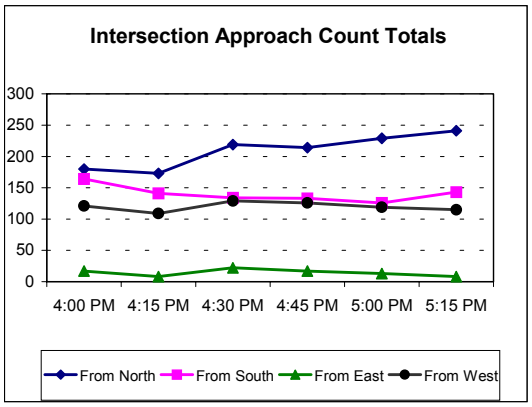
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	121	17%				% of Total		
4:15 PM	109	15%			% of LEG	INTERSECTION		
4:30 PM	129	18%						
4:45 PM	126	18%	Total Right:	525	73.0%	18.1%		
5:00 PM	119	17%	Total Thru:	49	6.8%	1.7%	Exiting West:	348
5:15 PM	115	16%	Total Left:	145	20.2%	5.0%	Intersection Total:	2901
	719			**719**	100%	**24.8%**		**12%**

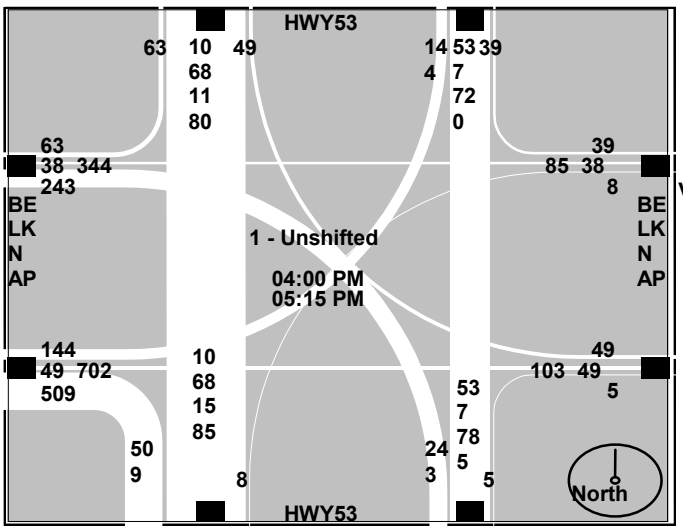
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
HWY 53 PM From North	1207	49	1256	42%	2%	43%
HWY 53 PM From South	594	247	841	20%	9%	29%
Belknap From East	77	8	85	3%	0%	3%
Belknap From West	574	145	719	20%	5%	25%
	2452	**449**	**2901**	**85%**	**15%**	**100%**









Variable Width Plot

North/South Leg: ***5th*** **Date:** 9/5/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	5th From North				Belknap From East				5th From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	1	4	0	0	1	77	1	1	2	3	22	0	20	42	3	0	**176**
7:15 AM	2	7	1	0	3	75	2	0	0	4	19	0	19	49	6	0	**187**
7:30 AM	3	6	1	0	1	98	7	0	3	6	16	0	21	54	2	1	**218**
7:45 AM	5	9	2	0	2	71	3	1	3	3	20	1	26	43	5	0	**192**
8:00 AM	3	15	3	1	4	69	3	0	4	3	15	0	15	39	1	2	**174**
8:15 AM	5	5	2	0	2	74	1	0	2	6	12	0	13	28	3	0	**153**
TOTAL	**19**	**46**	**9**	**1**	**13**	**464**	**17**	**2**	**14**	**25**	**104**	**1**	**114**	**255**	**20**	**3**	**1100**

Total Peds: **7**

5th From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	5	7%				% of Total		
7:15 AM	10	14%			% of LEG	INTERSECTION		
7:30 AM	10	14%						
7:45 AM	16	22%	Total Right:	19	25.7%	1.7%		
8:00 AM	21	28%	Total Thru:	46	62.2%	4.2%	Exiting North:	58
8:15 AM	12	16%	Total Left:	9	12.2%	0.8%	Intersection Total:	1100
	74			**74**	100%	**6.7%**		**5%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	79	16%				% of Total		
7:15 AM	80	16%			% of LEG	INTERSECTION		
7:30 AM	106	21%						
7:45 AM	76	15%	Total Right:	13	2.6%	1.2%		
8:00 AM	76	15%	Total Thru:	464	93.9%	42.2%	Exiting East:	278
8:15 AM	77	16%	Total Left:	17	3.4%	1.5%	Intersection Total:	1100
	494			**494**	100%	**44.9%**		**25%**

5th From South

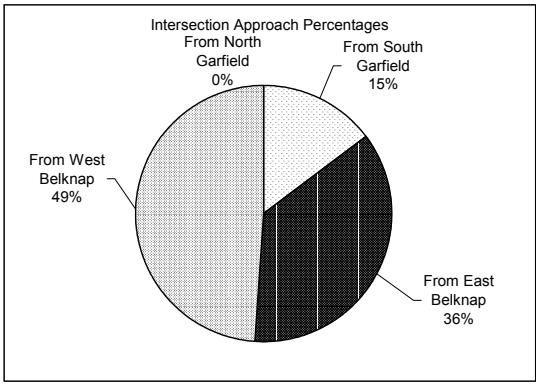
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	27	19%				% of Total		
7:15 AM	23	16%			% of LEG	INTERSECTION		
7:30 AM	25	17%						
7:45 AM	26	18%	Total Right:	14	9.8%	1.3%		
8:00 AM	22	15%	Total Thru:	25	17.5%	2.3%	Exiting South:	177
8:15 AM	20	14%	Total Left:	104	72.7%	9.5%	Intersection Total:	1100
	143			**143**	100%	**13.0%**		**16%**

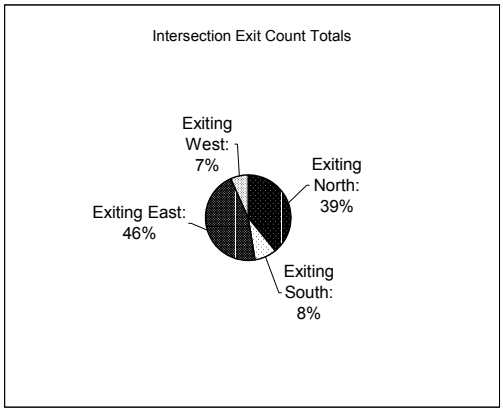
Belknap From West

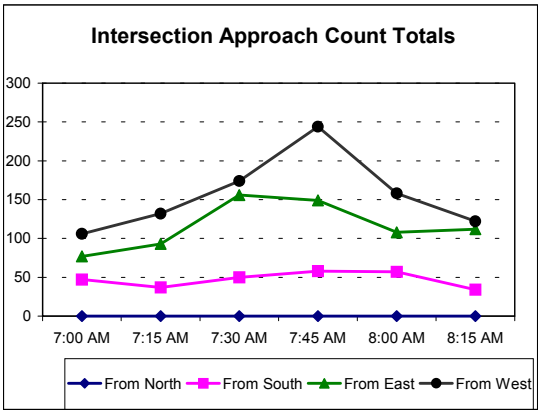
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	65	17%				% of Total		
7:15 AM	74	19%			% of LEG	INTERSECTION		
7:30 AM	77	20%						
7:45 AM	74	19%	Total Right:	114	29.3%	10.4%		
8:00 AM	55	14%	Total Thru:	255	65.6%	23.2%	Exiting West:	587
8:15 AM	44	11%	Total Left:	20	5.1%	1.8%	Intersection Total:	1100
	389			**389**	100%	**35.4%**		**53%**

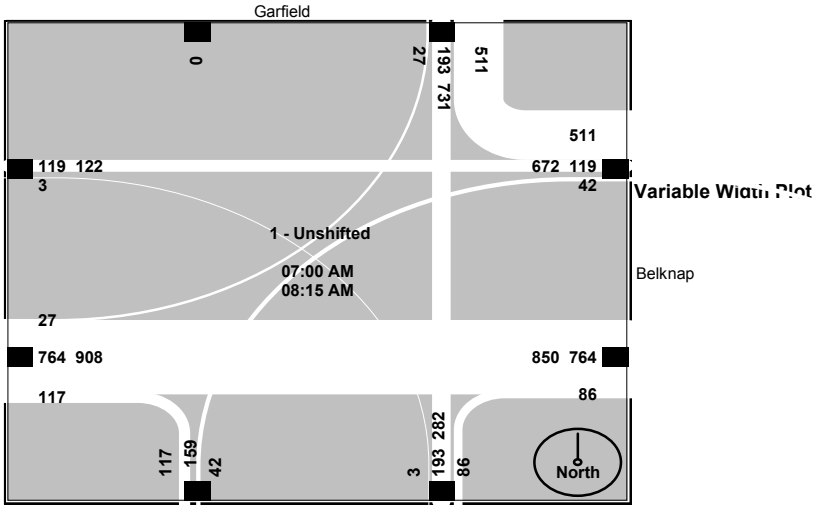
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
5th From North	65	9	74	6%	1%	7%
5th From South	39	104	143	4%	9%	13%
Belknap From East	477	17	494	43%	2%	45%
Belknap From West	369	20	389	34%	2%	35%
	950	**150**	**1100**	**86%**	**14%**	**100%**


Intersection Approach Percentages
From North Garfield 0%
From South Garfield 15%
From West Belknap 49%
From East Belknap 36%


Intersection Exit Count Totals
Exiting West: 7%
Exiting North: 39%
Exiting East: 46%
Exiting South: 8%


Intersection Approach Count Totals
300
250
200
150
100
50
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
From North
From South
From East
From West


Garfield
0
27
193 731
511
511
119 122
3
672 119
42
Variable Width Plot
1 - Unshifted
07:00 AM
08:15 AM
Belknap
27
764 908
850 764
117
86
117
159
42
3
193 282
86
North

North/South Leg: ***5th*** **Date:** 9/5/02

East/West Leg: ***Belknap*** **Start Time:** 4:15 PM **End Time:** 5:45 PM

TURNING MOVEMENTS

	5th From North				Belknap From East				5th From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
4:15 PM	1	8	2	0	2	64	0	0	3	4	26	0	30	133	4	0	**277**
4:30 PM	2	12	3	0	5	62	1	0	1	2	22	0	28	139	5	2	**282**
4:45 PM	5	13	1	1	1	78	4	1	5	7	18	0	31	136	3	0	**302**
5:00 PM	6	12	4	0	3	60	1	0	4	4	22	0	38	111	7	0	**272**
5:15 PM	5	24	8	0	5	59	2	0	4	3	19	0	23	130	0	1	**282**
5:30 PM	5	6	2	0	2	62	2	0	4	7	14	0	27	112	2	0	**245**
TOTAL	**24**	**75**	**20**	**1**	**18**	**385**	**10**	**1**	**21**	**27**	**121**	**0**	**177**	**761**	**21**	**3**	**1660**

Total Peds: **5**

5th From North

			% Breakdown for each Movement				Exiting to the North	
4:15 PM	11	9%				% of Total		
4:30 PM	17	14%			% of LEG	INTERSECTION		
4:45 PM	19	16%						
5:00 PM	22	18%	Total Right:	24	20.2%	1.4%		
5:15 PM	37	31%	Total Thru:	75	63.0%	4.5%	Exiting North:	66
5:30 PM	13	11%	Total Left:	20	16.8%	1.2%	Intersection Total:	1660
	119			**119**	100%	**7.2%**		**4%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:15 PM	66	16%				% of Total		
4:30 PM	68	16%			% of LEG	INTERSECTION		
4:45 PM	83	20%						
5:00 PM	64	15%	Total Right:	18	4.4%	1.1%		
5:15 PM	66	16%	Total Thru:	385	93.2%	23.2%	Exiting East:	802
5:30 PM	66	16%	Total Left:	10	2.4%	0.6%	Intersection Total:	1660
	413			**413**	100%	**24.9%**		**48%**

5th From South

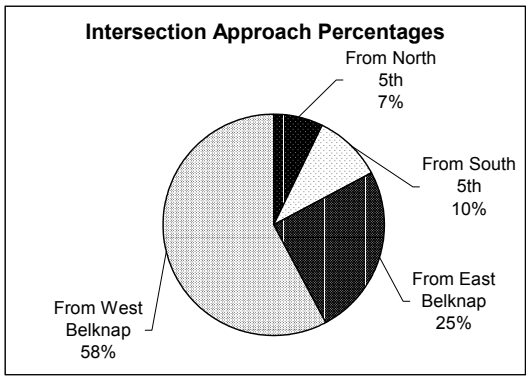
			% Breakdown for each Movement				Exiting to the South	
4:15 PM	33	20%				% of Total		
4:30 PM	25	15%			% of LEG	INTERSECTION		
4:45 PM	30	18%						
5:00 PM	30	18%	Total Right:	21	12.4%	1.3%		
5:15 PM	26	15%	Total Thru:	27	16.0%	1.6%	Exiting South:	262
5:30 PM	25	15%	Total Left:	121	71.6%	7.3%	Intersection Total:	1660
	169			**169**	100%	**10.2%**		**16%**

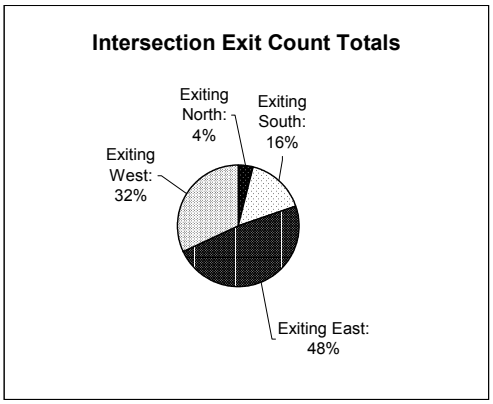
Belknap From West

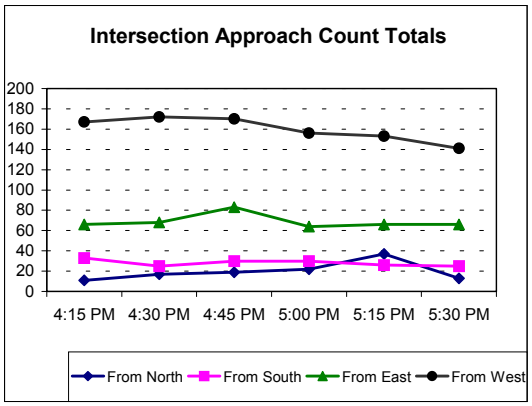
			% Breakdown for each Movement				Exiting to the West	
4:15 PM	167	17%				% of Total		
4:30 PM	172	18%			% of LEG	INTERSECTION		
4:45 PM	170	18%						
5:00 PM	156	16%	Total Right:	177	18.5%	10.7%		
5:15 PM	153	16%	Total Thru:	761	79.4%	45.8%	Exiting West:	530
5:30 PM	141	15%	Total Left:	21	2.2%	1.3%	Intersection Total:	1660
	959			**959**	100%	**57.8%**		**32%**

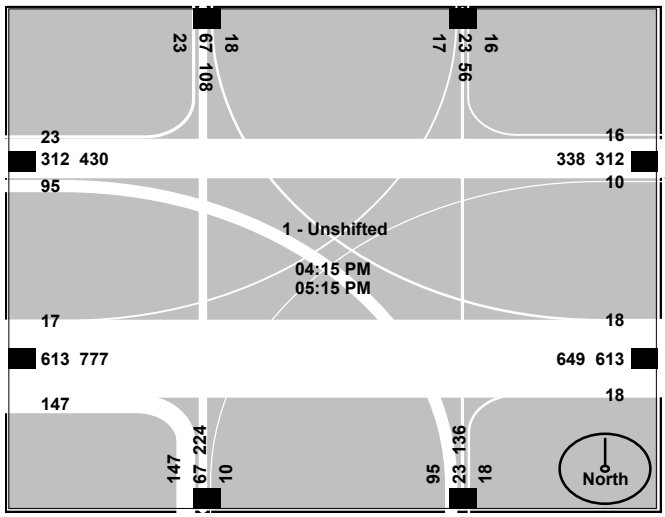
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
5th From North	99	20	119	6%	1%	7%
5th From South	48	121	169	3%	7%	10%
Belknap From East	403	10	413	24%	1%	25%
Belknap From West	938	21	959	57%	1%	58%
	1488	**172**	**1660**	**90%**	**10%**	**100%**









Variable Width Plot

North/South Leg: ***Hill*** **Date:** 9/3/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Hill From North				Belknap From East				Hill From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	1	0	0	1	0	67	8	1	12	1	18	0	17	41	0	1	**165**
7:15 AM	0	0	1	0	1	93	13	0	12	0	35	0	19	22	0	1	**196**
7:30 AM	0	0	0	0	1	134	11	0	25	0	39	0	22	48	0	0	**280**
7:45 AM	0	0	0	0	2	124	26	0	14	0	44	0	42	51	1	0	**304**
8:00 AM	2	0	0	0	1	121	13	0	11	1	36	0	35	48	0	0	**268**
8:15 AM	0	0	0	0	0	89	11	0	15	2	41	0	25	51	0	0	**234**
TOTAL	**3**	**0**	**1**	**1**	**5**	**628**	**82**	**1**	**89**	**4**	**213**	**0**	**160**	**261**	**1**	**2**	**1447**

Total Peds: **4**

Hill From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	1	25%				% of Total		
7:15 AM	1	25%			% of LEG	INTERSECTION		
7:30 AM	0	0%						
7:45 AM	0	0%	Total Right:	3	75.0%	0.2%		
8:00 AM	2	50%	Total Thru:	0	0.0%	0.0%	Exiting North:	10
8:15 AM	0	0%	Total Left:	1	25.0%	0.1%	Intersection Total:	1447
	4			**4**	100%	**0.3%**		**1%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	75	10%				% of Total		
7:15 AM	107	15%			% of LEG	INTERSECTION		
7:30 AM	146	20%						
7:45 AM	152	21%	Total Right:	5	0.7%	0.3%		
8:00 AM	135	19%	Total Thru:	628	87.8%	43.4%	Exiting East:	351
8:15 AM	100	14%	Total Left:	82	11.5%	5.7%	Intersection Total:	1447
	715			**715**	100%	**49.4%**		**24%**

Hill From South

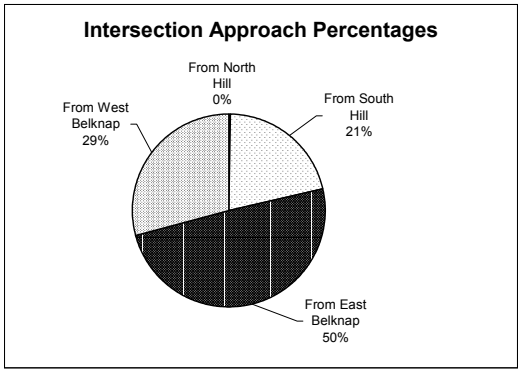
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	31	10%				% of Total		
7:15 AM	47	15%			% of LEG	INTERSECTION		
7:30 AM	64	21%						
7:45 AM	58	19%	Total Right:	89	29.1%	6.2%		
8:00 AM	48	16%	Total Thru:	4	1.3%	0.3%	Exiting South:	242
8:15 AM	58	19%	Total Left:	213	69.6%	14.7%	Intersection Total:	1447
	306			**306**	100%	**21.1%**		**17%**

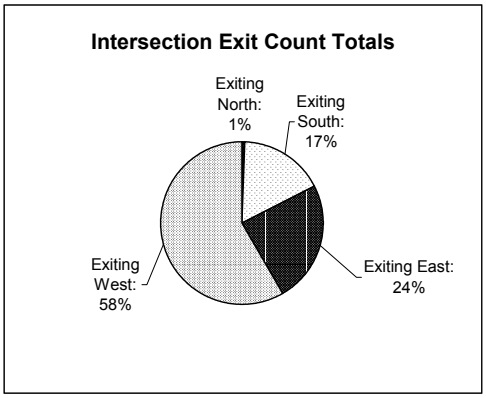
Belknap From West

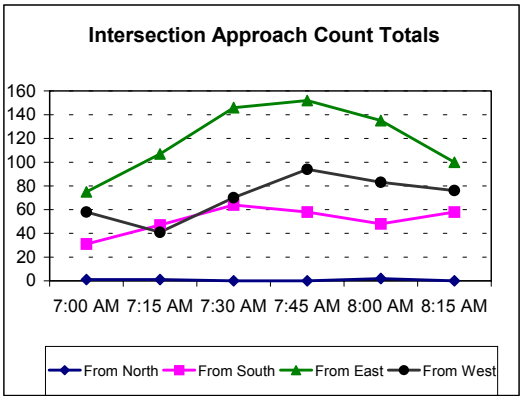
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	58	14%				% of Total		
7:15 AM	41	10%			% of LEG	INTERSECTION		
7:30 AM	70	17%						
7:45 AM	94	22%	Total Right:	160	37.9%	11.1%		
8:00 AM	83	20%	Total Thru:	261	61.8%	18.0%	Exiting West:	844
8:15 AM	76	18%	Total Left:	1	0.2%	0.1%	Intersection Total:	1447
	422			**422**	100%	**29.2%**		**58%**

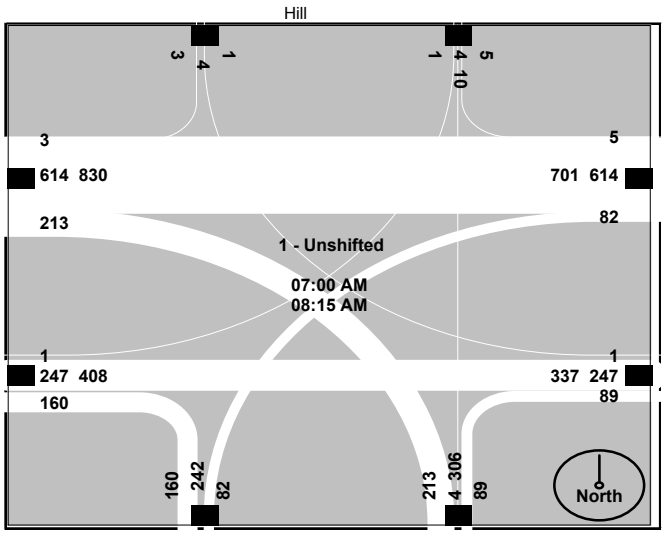
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Hill From North	3	1	4	0%	0%	0%
Hill From South	93	213	306	6%	15%	21%
Belknap From East	633	82	715	44%	6%	49%
Belknap From West	421	1	422	29%	0%	29%
	1150	**297**	**1447**	**79%**	**21%**	**100%**









ariable Width Plot

North/South Leg: ***Hill*** **Date:** 9/3/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Hill From North				Belknap From East				Hill From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
4:00 PM	1	3	3	1	2	86	11	1	19	0	45	0	40	136	0	0	**346**
4:15 PM	0	1	1	0	3	101	12	1	19	1	49	1	48	144	1	1	**380**
4:30 PM	0	2	1	0	1	83	6	0	24	1	38	0	40	125	0	2	**321**
4:45 PM	1	1	0	0	0	90	5	0	18	1	42	0	50	158	0	0	**366**
5:00 PM	1	4	0	0	0	75	14	0	15	1	42	0	51	133	0	0	**336**
5:15 PM	0	1	0	0	1	77	6	0	17	0	42	0	59	162	0	0	**365**
TOTAL	**3**	**12**	**5**	**1**	**7**	**512**	**54**	**2**	**112**	**4**	**258**	**1**	**288**	**858**	**1**	**3**	**2114**

Total Peds: **7**

Hill From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	7	35%				% of Total		
4:15 PM	2	10%			% of LEG	INTERSECTION		
4:30 PM	3	15%						
4:45 PM	2	10%	Total Right:	3	15.0%	0.1%		
5:00 PM	5	25%	Total Thru:	12	60.0%	0.6%	Exiting North:	12
5:15 PM	1	5%	Total Left:	5	25.0%	0.2%	Intersection Total:	2114
	20			**20**	100%	**0.9%**		**1%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	99	17%				% of Total		
4:15 PM	116	20%			% of LEG	INTERSECTION		
4:30 PM	90	16%						
4:45 PM	95	17%	Total Right:	7	1.2%	0.3%		
5:00 PM	89	16%	Total Thru:	512	89.4%	24.2%	Exiting East:	975
5:15 PM	84	15%	Total Left:	54	9.4%	2.6%	Intersection Total:	2114
	573			**573**	100%	**27.1%**		**46%**

Hill From South

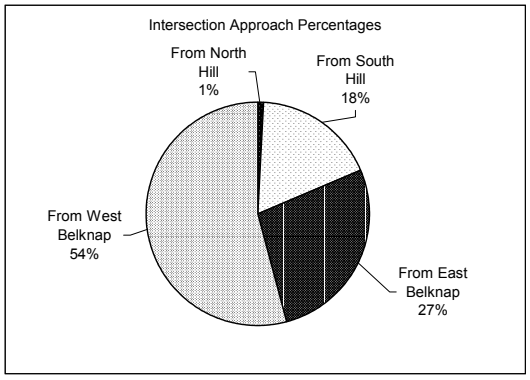
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	64	17%				% of Total		
4:15 PM	69	18%			% of LEG	INTERSECTION		
4:30 PM	63	17%						
4:45 PM	61	16%	Total Right:	112	29.9%	5.3%		
5:00 PM	58	16%	Total Thru:	4	1.1%	0.2%	Exiting South:	354
5:15 PM	59	16%	Total Left:	258	69.0%	12.2%	Intersection Total:	2114
	374			**374**	100%	**17.7%**		**17%**

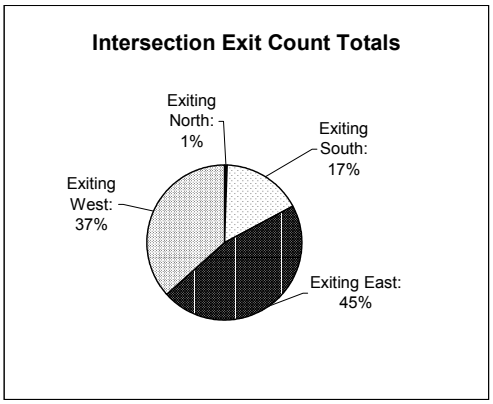
Belknap From West

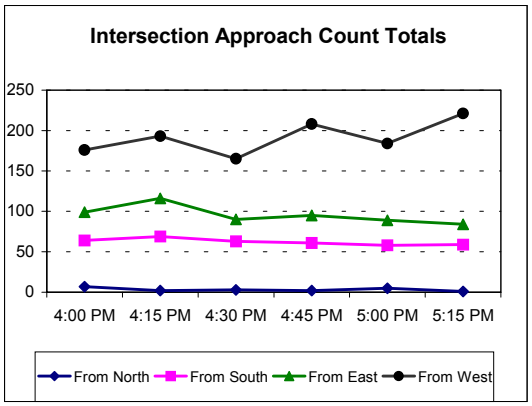
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	176	15%				% of Total		
4:15 PM	193	17%			% of LEG	INTERSECTION		
4:30 PM	165	14%						
4:45 PM	208	18%	Total Right:	288	25.1%	13.6%		
5:00 PM	184	16%	Total Thru:	858	74.8%	40.6%	Exiting West:	773
5:15 PM	221	19%	Total Left:	1	0.1%	0.0%	Intersection Total:	2114
	1147			**1147**	100%	**54.3%**		**37%**

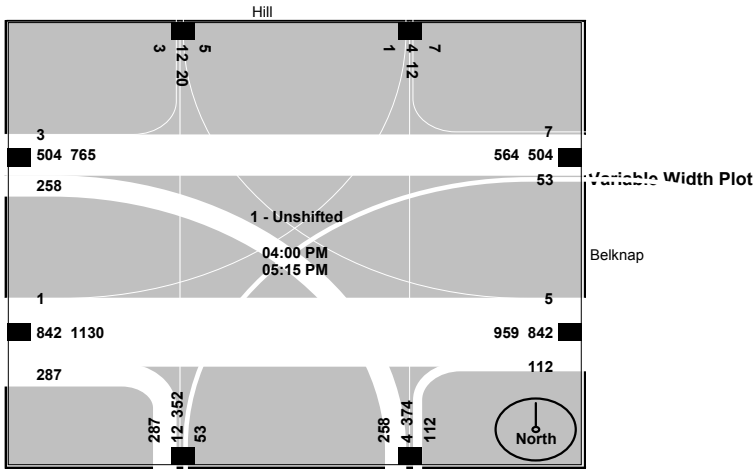
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Hill From North	15	5	20	1%	0%	1%
Hill From South	116	258	374	5%	12%	18%
Belknap From East	519	54	573	25%	3%	27%
Belknap From West	1146	1	1147	54%	0%	54%
	1796	**318**	**2114**	**85%**	**15%**	**100%**


Intersection Approach Percentages
From North Hill 1%
From South Hill 18%
From West Belknap 54%
From East Belknap 27%


Intersection Exit Count Totals
Exiting North: 1%
Exiting South: 17%
Exiting West: 37%
Exiting East: 45%


Intersection Approach Count Totals
250
200
150
100
50
0
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
From North
From South
From East
From West


Hill
3
12
20
5
1
4
12
7
3
504 765
7
564 504
258
53
1 - Unshifted
04:00 PM
05:15 PM
Belknap
1
842 1130
5
959 842
287
112
287
12
352
53
258
4
374
112
North

North/South Leg: ***Morterelli*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Morterelli From North				Belknap From East				Morterelli From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	3	4	0	0	1	93	6	0	7	2	13	0	32	39	1	0	**201**
7:15 AM	5	2	1	1	0	141	13	0	8	1	26	0	38	59	0	0	**294**
7:30 AM	7	4	0	0	2	219	11	1	5	4	17	1	43	80	1	0	**393**
7:45 AM	1	2	1	1	2	139	6	0	0	0	8	0	30	91	1	0	**281**
8:00 AM	3	3	1	0	0	101	11	1	7	2	14	0	44	78	1	0	**265**
8:15 AM	3	2	3	1	0	121	10	1	4	1	12	0	32	78	1	0	**267**
TOTAL	**22**	**17**	**6**	**3**	**5**	**814**	**57**	**3**	**31**	**10**	**90**	**1**	**219**	**425**	**5**	**0**	**1701**
																Total Peds:	**7**

Morterelli From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	7	16%				% of Total		
7:15 AM	8	18%			% of LEG	INTERSECTION		
7:30 AM	11	24%						
7:45 AM	4	9%	Total Right:	22	48.9%	1.3%		
8:00 AM	7	16%	Total Thru:	17	37.8%	1.0%	Exiting North:	20
8:15 AM	8	18%	Total Left:	6	13.3%	0.4%	Intersection Total:	1701
	45			**45**	100%	**2.6%**		**1%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	100	11%				% of Total		
7:15 AM	154	18%			% of LEG	INTERSECTION		
7:30 AM	232	26%						
7:45 AM	147	17%	Total Right:	5	0.6%	0.3%		
8:00 AM	112	13%	Total Thru:	814	92.9%	47.9%	Exiting East:	462
8:15 AM	131	15%	Total Left:	57	6.5%	3.4%	Intersection Total:	1701
	876			**876**	100%	**51.5%**		**27%**

Morterelli From South

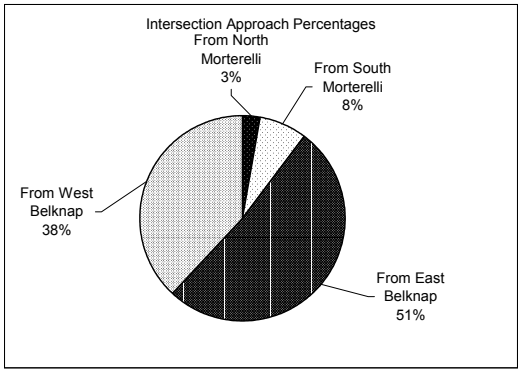
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	22	17%				% of Total		
7:15 AM	35	27%			% of LEG	INTERSECTION		
7:30 AM	26	20%						
7:45 AM	8	6%	Total Right:	31	23.7%	1.8%		
8:00 AM	23	18%	Total Thru:	10	7.6%	0.6%	Exiting South:	293
8:15 AM	17	13%	Total Left:	90	68.7%	5.3%	Intersection Total:	1701
	131			**131**	100%	**7.7%**		**17%**

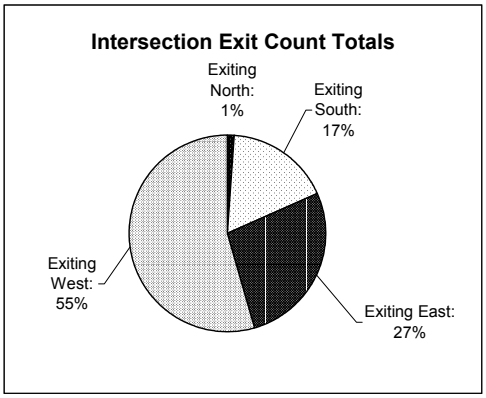
Belknap From West

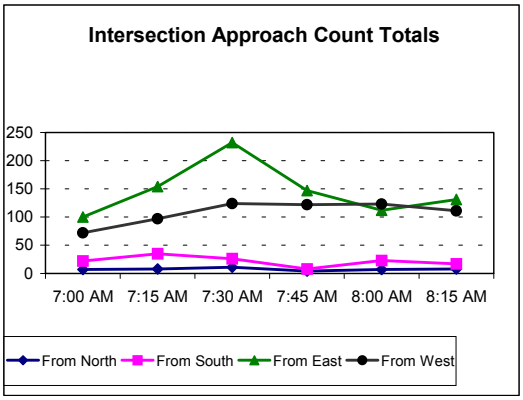
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	72	11%				% of Total		
7:15 AM	97	15%			% of LEG	INTERSECTION		
7:30 AM	124	19%						
7:45 AM	122	19%	Total Right:	219	33.7%	12.9%		
8:00 AM	123	19%	Total Thru:	425	65.5%	25.0%	Exiting West:	926
8:15 AM	111	17%	Total Left:	5	0.8%	0.3%	Intersection Total:	1701
	649			**649**	100%	**38.2%**		**54%**

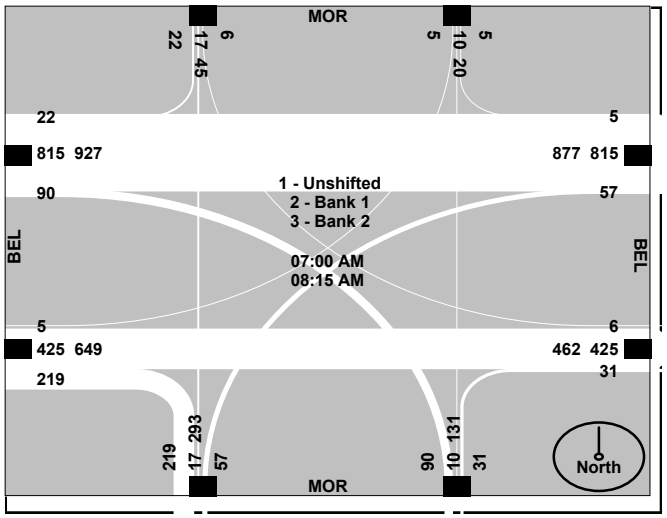
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Morterelli From North	39	6	45	2%	0%	3%
Morterelli From South	41	90	131	2%	5%	8%
Belknap From East	819	57	876	48%	3%	51%
Belknap From West	644	5	649	38%	0%	38%
	1543	**158**	**1701**	**91%**	**9%**	**100%**









Variable Width Plot

North/South Leg: ***Morterelli*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Morterelli From North				Belknap From East				Morterelli From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
4:00 PM	5	1	0	1	0	165	4	1	18	2	26	0	27	191	6	2	**445**
4:15 PM	2	1	0	0	2	143	8	0	16	0	34	2	20	196	4	2	**426**
4:30 PM	3	1	0	0	0	147	5	0	13	1	26	2	24	194	3	1	**417**
4:45 PM	3	1	1	0	1	141	6	0	19	2	23	0	30	231	0	2	**458**
5:00 PM	4	2	0	5	2	122	8	0	15	2	22	0	27	206	2	1	**412**
5:15 PM	1	2	2	0	0	128	10	0	13	1	14	1	30	179	5	0	**385**
TOTAL	**18**	**8**	**3**	**6**	**5**	**846**	**41**	**1**	**94**	**8**	**145**	**5**	**158**	**1197**	**20**	**8**	**2543**

Total Peds: **20**

Morterelli From North

			% Breakdown for each Movement			
					% of Total	
4:00 PM	6	21%		% of LEG	INTERSECTION	
4:15 PM	3	10%				
4:30 PM	4	14%				
4:45 PM	5	17%	Total Right:	18	62.1%	0.7%
5:00 PM	6	21%	Total Thru:	8	27.6%	0.3%
5:15 PM	5	17%	Total Left:	3	10.3%	0.1%
	29			**29**	100%	**1.1%**

Exiting to the North

Exiting North:	33
Intersection Total:	2543
	1%

Belknap From East

			% Breakdown for each Movement			
					% of Total	
4:00 PM	169	19%		% of LEG	INTERSECTION	
4:15 PM	153	17%				
4:30 PM	152	17%				
4:45 PM	148	17%	Total Right:	5	0.6%	0.2%
5:00 PM	132	15%	Total Thru:	846	94.8%	33.3%
5:15 PM	138	15%	Total Left:	41	4.6%	1.6%
	892			**892**	100%	**35.1%**

Exiting to the East

Exiting East:	1294
Intersection Total:	2543
	51%

Morterelli From South

			% Breakdown for each Movement			
					% of Total	
4:00 PM	46	19%		% of LEG	INTERSECTION	
4:15 PM	50	20%				
4:30 PM	40	16%				
4:45 PM	44	18%	Total Right:	94	38.1%	3.7%
5:00 PM	39	16%	Total Thru:	8	3.2%	0.3%
5:15 PM	28	11%	Total Left:	145	58.7%	5.7%
	247			**247**	100%	**9.7%**

Exiting to the South

Exiting South:	207
Intersection Total:	2543
	8%

Belknap From West

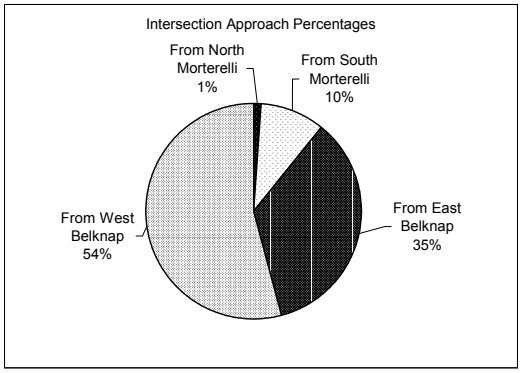
			% Breakdown for each Movement			
					% of Total	
4:00 PM	224	16%		% of LEG	INTERSECTION	
4:15 PM	220	16%				
4:30 PM	221	16%				
4:45 PM	261	19%	Total Right:	158	11.5%	6.2%
5:00 PM	235	17%	Total Thru:	1197	87.1%	47.1%
5:15 PM	214	16%	Total Left:	20	1.5%	0.8%
	1375			**1375**	100%	**54.1%**

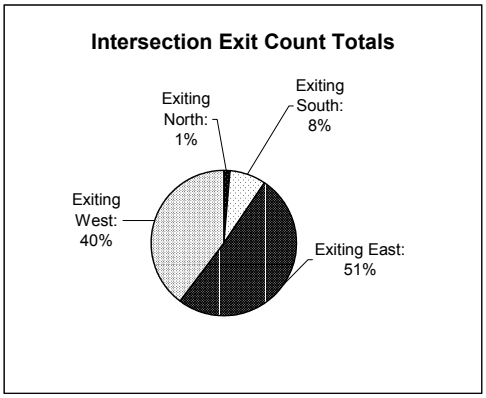
Exiting to the West

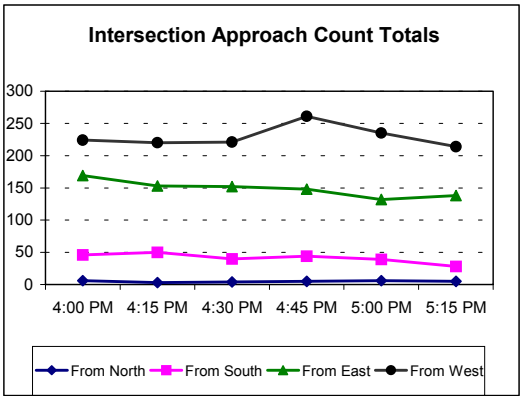
Exiting West:	1009
Intersection Total:	2543
	40%

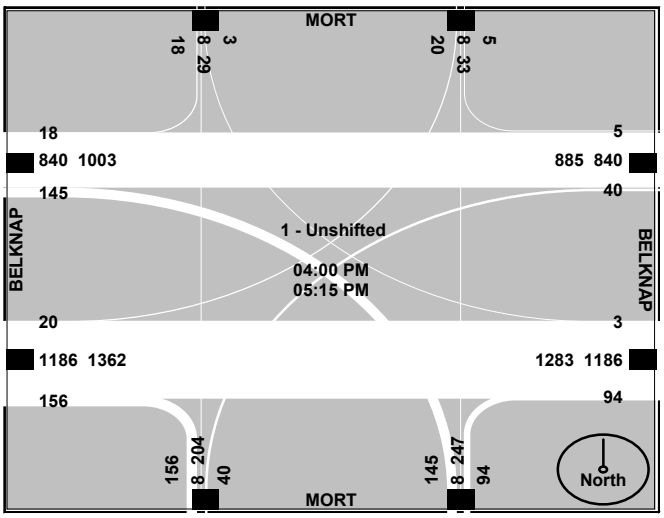
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Morterelli From North	26	3	29	1%	0%	1%
Morterelli From South	102	145	247	4%	6%	10%
Belknap From East	851	41	892	33%	2%	35%
Belknap From West	1355	20	1375	53%	1%	54%
	2334	**209**	**2543**	**92%**	**8%**	**100%**









Variable Width Plot

North/South Leg: ***Catlin*** **Date:** 9/3/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Catlin From North				Belknap From East				Catlin From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	7	4	11	0	12	79	3	0	3	2	0	0	2	62	5	1	**190**
7:15 AM	8	5	24	3	11	120	4	2	2	1	0	1	7	55	8	2	**245**
7:30 AM	12	18	24	1	16	149	14	2	4	2	1	1	10	92	6	2	**348**
7:45 AM	10	16	23	4	12	171	12	4	6	8	1	1	12	111	6	0	**388**
8:00 AM	18	16	25	0	9	117	14	2	6	3	2	2	20	99	7	0	**336**
8:15 AM	19	22	32	0	20	132	5	0	5	3	3	1	12	84	3	1	**340**
TOTAL	**74**	**81**	**139**	**8**	**80**	**768**	**52**	**10**	**26**	**19**	**7**	**6**	**63**	**503**	**35**	**6**	**1847**

Total Peds: **30**

Catlin From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	22	7%				% of Total		
7:15 AM	37	13%			% of LEG	INTERSECTION		
7:30 AM	54	18%						
7:45 AM	49	17%	Total Right:	74	25.2%	4.0%		
8:00 AM	59	20%	Total Thru:	81	27.6%	4.4%	Exiting North:	134
8:15 AM	73	25%	Total Left:	139	47.3%	7.5%	Intersection Total:	1847
	294			**294**	100%	**15.9%**		**7%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	94	10%				% of Total		
7:15 AM	135	15%			% of LEG	INTERSECTION		
7:30 AM	179	20%						
7:45 AM	195	22%	Total Right:	80	8.9%	4.3%		
8:00 AM	140	16%	Total Thru:	768	85.3%	41.6%	Exiting East:	668
8:15 AM	157	17%	Total Left:	52	5.8%	2.8%	Intersection Total:	1847
	900			**900**	100%	**48.7%**		**36%**

Catlin From South

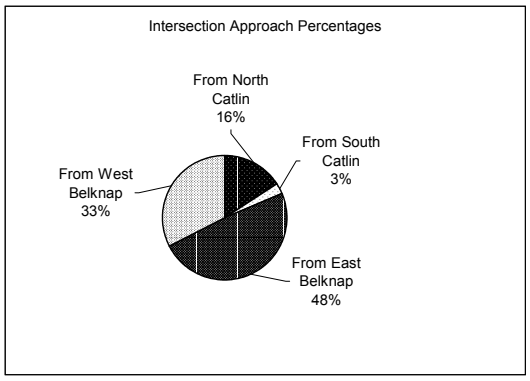
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	5	10%				% of Total		
7:15 AM	3	6%			% of LEG	INTERSECTION		
7:30 AM	7	13%						
7:45 AM	15	29%	Total Right:	26	50.0%	1.4%		
8:00 AM	11	21%	Total Thru:	19	36.5%	1.0%	Exiting South:	196
8:15 AM	11	21%	Total Left:	7	13.5%	0.4%	Intersection Total:	1847
	52			**52**	100%	**2.8%**		**11%**

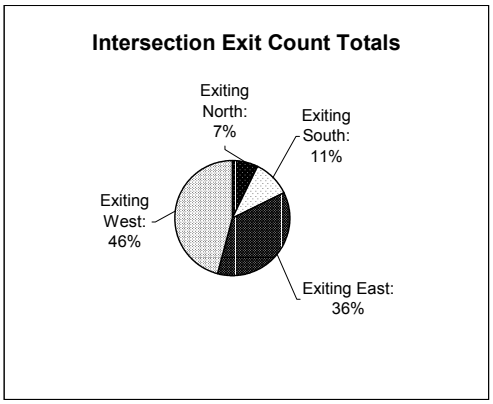
Belknap From West

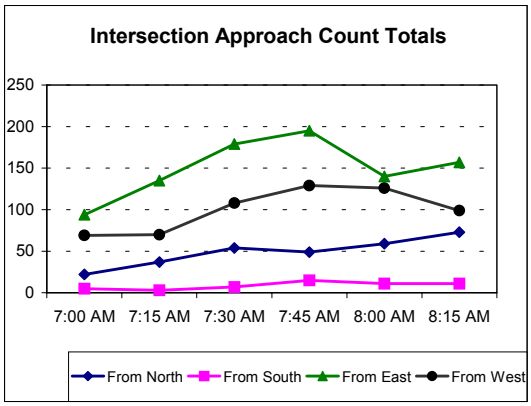
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	69	11%				% of Total		
7:15 AM	70	12%			% of LEG	INTERSECTION		
7:30 AM	108	18%						
7:45 AM	129	21%	Total Right:	63	10.5%	3.4%		
8:00 AM	126	21%	Total Thru:	503	83.7%	27.2%	Exiting West:	849
8:15 AM	99	16%	Total Left:	35	5.8%	1.9%	Intersection Total:	1847
	601			**601**	100%	**32.5%**		**46%**

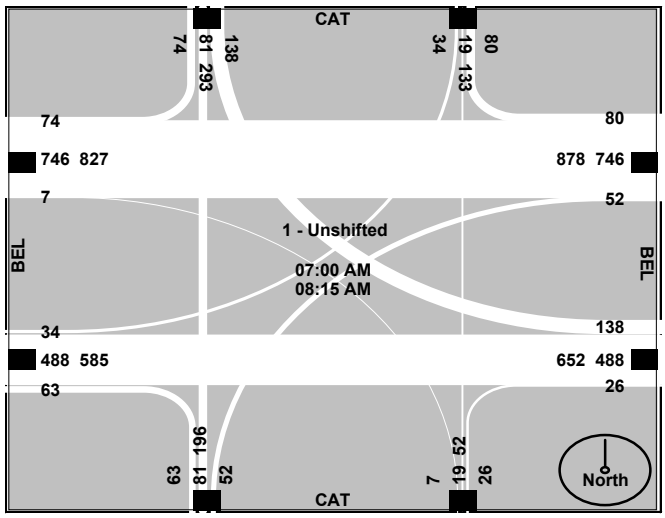
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Catlin From North	155	139	294	8%	8%	16%
Catlin From South	45	7	52	2%	0%	3%
Belknap From East	848	52	900	46%	3%	49%
Belknap From West	566	35	601	31%	2%	33%
	1614	**233**	**1847**	**87%**	**13%**	**100%**









ariable Width Plot

North/South Leg: ***Catlin*** **Date:** 9/3/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Catlin From North				Belknap From East				Catlin From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
4:00 PM	12	3	29	0	23	140	13	0	12	12	9	5	9	173	13	2	**448**
4:15 PM	21	8	43	0	29	155	6	0	9	7	9	2	7	181	10	1	**485**
4:30 PM	28	2	47	2	32	160	2	1	17	7	11	6	7	174	7	8	**494**
4:45 PM	23	5	64	0	18	150	10	0	14	11	4	0	10	188	17	2	**514**
5:00 PM	24	6	52	1	12	154	10	0	16	7	6	0	14	194	13	0	**508**
5:15 PM	17	5	43	0	19	137	3	1	10	7	7	1	10	178	9	0	**445**
TOTAL	**125**	**29**	**278**	**3**	**133**	**896**	**44**	**2**	**78**	**51**	**46**	**14**	**57**	**1088**	**69**	**13**	**2894**

Total Peds: **32**

Catlin From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	44	10%				% of Total		
4:15 PM	72	17%			% of LEG	INTERSECTION		
4:30 PM	77	18%						
4:45 PM	92	21%	Total Right:	125	28.9%	4.3%		
5:00 PM	82	19%	Total Thru:	29	6.7%	1.0%	Exiting North:	253
5:15 PM	65	15%	Total Left:	278	64.4%	9.6%	Intersection Total:	2894
	432			**432**	100%	**14.9%**		**9%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	176	16%				% of Total		
4:15 PM	190	18%			% of LEG	INTERSECTION		
4:30 PM	194	18%						
4:45 PM	178	17%	Total Right:	133	12.4%	4.6%		
5:00 PM	176	16%	Total Thru:	896	83.5%	31.0%	Exiting East:	1444
5:15 PM	159	15%	Total Left:	44	4.1%	1.5%	Intersection Total:	2894
	1073			**1073**	100%	**37.1%**		**50%**

Catlin From South

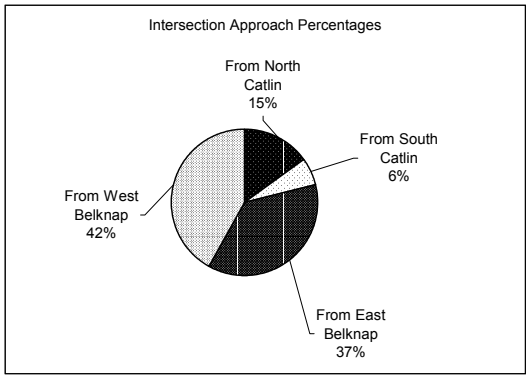
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	33	19%				% of Total		
4:15 PM	25	14%			% of LEG	INTERSECTION		
4:30 PM	35	20%						
4:45 PM	29	17%	Total Right:	78	44.6%	2.7%		
5:00 PM	29	17%	Total Thru:	51	29.1%	1.8%	Exiting South:	130
5:15 PM	24	14%	Total Left:	46	26.3%	1.6%	Intersection Total:	2894
	175			**175**	100%	**6.0%**		**4%**

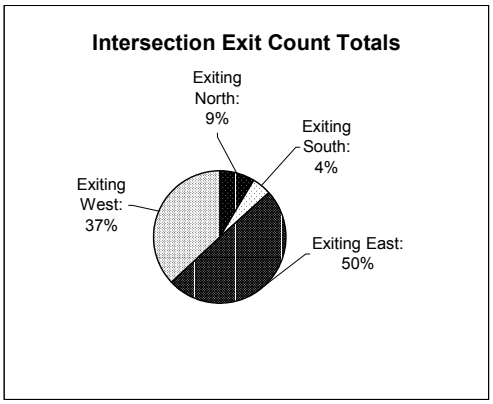
Belknap From West

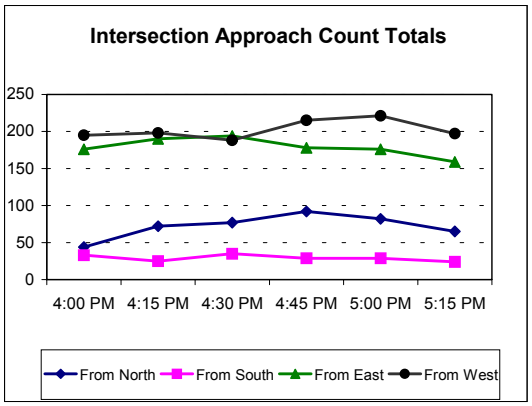
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	195	16%				% of Total		
4:15 PM	198	16%			% of LEG	INTERSECTION		
4:30 PM	188	15%						
4:45 PM	215	18%	Total Right:	57	4.7%	2.0%		
5:00 PM	221	18%	Total Thru:	1088	89.6%	37.6%	Exiting West:	1067
5:15 PM	197	16%	Total Left:	69	5.7%	2.4%	Intersection Total:	2894
	1214			**1214**	100%	**41.9%**		**37%**

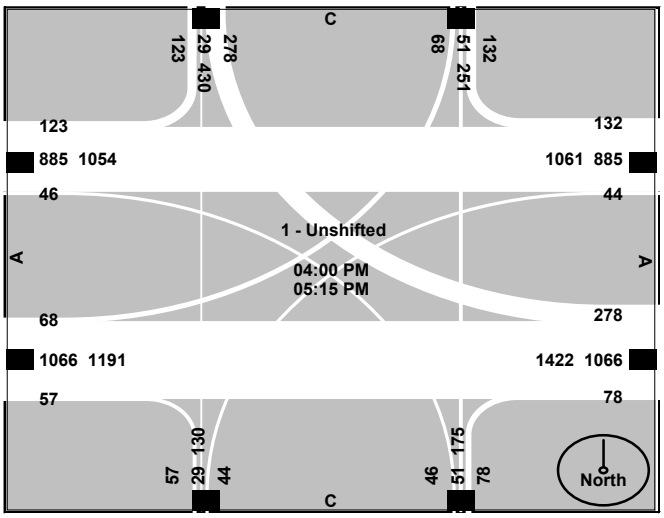
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Catlin From North	154	278	432	5%	10%	15%
Catlin From South	129	46	175	4%	2%	6%
Belknap From East	1029	44	1073	36%	2%	37%
Belknap From West	1145	69	1214	40%	2%	42%
	2457	**437**	**2894**	**85%**	**15%**	**100%**









ariable Width Plot

North/South Leg: ***Grand Ave*** **Date:** 9/3/02 Page 1

East/West Leg: ***Belknap*** **Start Time:** 6:45 AM **End Time:** 8:15 AM

TURNING MOVEMENTS

	Grand Ave From North				Belknap From East				Grand Ave From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
6:45 AM	5	5	4	4	4	75	0	0	2	4	3	0	3	59	7	0	**171**
7:00 AM	6	6	8	1	6	64	3	0	4	10	4	1	5	58	10	0	**184**
7:15 AM	15	15	11	2	6	94	4	0	3	27	11	4	4	77	18	0	**285**
7:30 AM	22	22	18	2	7	140	4	2	10	46	16	2	10	84	33	2	**412**
7:45 AM	28	19	28	8	9	170	6	1	4	15	7	24	16	102	21	15	**425**
8:00 AM	36	25	20	4	8	114	13	0	8	17	5	38	11	99	47	7	**403**
TOTAL	**112**	**92**	**89**	**21**	**40**	**657**	**30**	**3**	**31**	**119**	**46**	**69**	**49**	**479**	**136**	**24**	**1880**

Total Peds: **117**

Grand Ave From North

			% Breakdown for each Movement				Exiting to the North	
6:45 AM	14	5%				% of Total		
7:00 AM	20	7%			% of LEG	INTERSECTION		
7:15 AM	41	14%						
7:30 AM	62	21%	Total Right:	112	38.2%	6.0%		
7:45 AM	75	26%	Total Thru:	92	31.4%	4.9%	Exiting North:	295
8:00 AM	81	28%	Total Left:	89	30.4%	4.7%	Intersection Total:	1880
	293			**293**	100%	**15.6%**		**16%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
6:45 AM	79	11%				% of Total		
7:00 AM	73	10%			% of LEG	INTERSECTION		
7:15 AM	104	14%						
7:30 AM	151	21%	Total Right:	40	5.5%	2.1%		
7:45 AM	185	25%	Total Thru:	657	90.4%	34.9%	Exiting East:	599
8:00 AM	135	19%	Total Left:	30	4.1%	1.6%	Intersection Total:	1880
	727			**727**	100%	**38.7%**		**32%**

Grand Ave From South

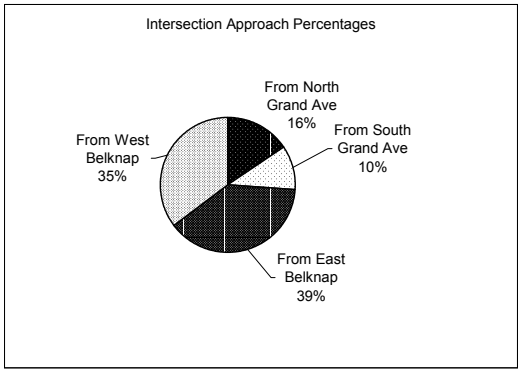
			% Breakdown for each Movement				Exiting to the South	
6:45 AM	9	5%				% of Total		
7:00 AM	18	9%			% of LEG	INTERSECTION		
7:15 AM	41	21%						
7:30 AM	72	37%	Total Right:	31	15.8%	1.6%		
7:45 AM	26	13%	Total Thru:	119	60.7%	6.3%	Exiting South:	171
8:00 AM	30	15%	Total Left:	46	23.5%	2.4%	Intersection Total:	1880
	196			**196**	100%	**10.4%**		**9%**

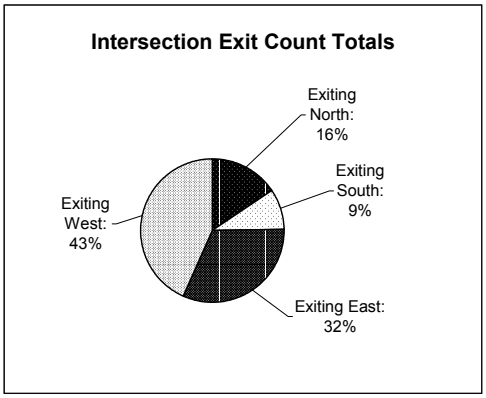
Belknap From West

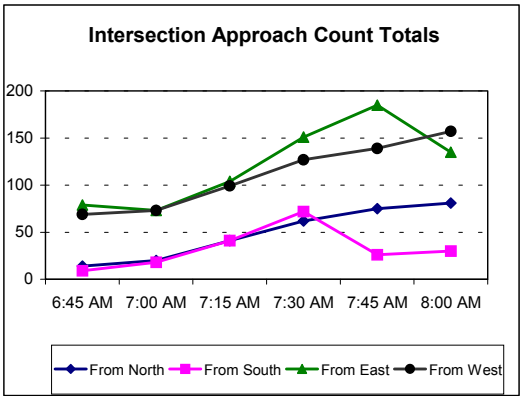
			% Breakdown for each Movement				Exiting to the West	
6:45 AM	69	10%				% of Total		
7:00 AM	73	11%			% of LEG	INTERSECTION		
7:15 AM	99	15%						
7:30 AM	127	19%	Total Right:	49	7.4%	2.6%		
7:45 AM	139	21%	Total Thru:	479	72.1%	25.5%	Exiting West:	815
8:00 AM	157	24%	Total Left:	136	20.5%	7.2%	Intersection Total:	1880
	664			**664**	100%	**35.3%**		**43%**

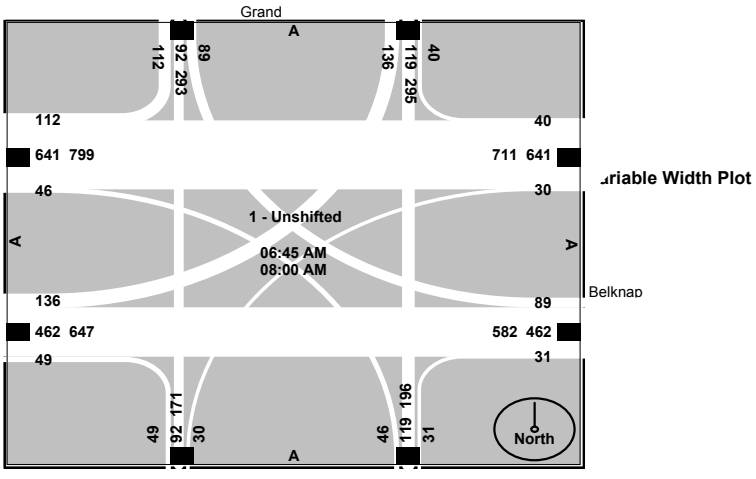
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Grand Ave From North	204	89	293	11%	5%	16%
Grand Ave From South	150	46	196	8%	2%	10%
Belknap From East	697	30	727	37%	2%	39%
Belknap From West	528	136	664	28%	7%	35%
	1579	**301**	**1880**	**84%**	**16%**	**100%**


Intersection Approach Percentages
From North Grand Ave 16%
From South Grand Ave 10%
From East Belknap 39%
From West Belknap 35%


Intersection Exit Count Totals
Exiting North: 16%
Exiting South: 9%
Exiting East: 32%
Exiting West: 43%


Intersection Approach Count Totals
200
150
100
50
0
6:45 AM
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
From North
From South
From East
From West


Grand
A
112
92 293
89
136
119 295
40
112
40
641 799
711 641
46
30
1 - Unshifted
06:45 AM
08:00 AM
A
A
136
89
462 647
582 462
49
31
49
92 171
30
46
119 196
31
A
North
Belknap

North/South Leg: ***Grand PM*** **Date:** 9/5/02

East/West Leg: ***Belknap*** **Start Time:** 3:45 PM **End Time:** 5:15 PM

TURNING MOVEMENTS

	Grand PM From North				Belknap From East				Grand PM From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
3:45 PM	25	21	19	1	10	159	7	1	7	18	15	2	10	159	14	1	**464**
4:00 PM	23	28	28	1	7	159	9	4	14	14	20	1	7	203	13	3	**525**
4:15 PM	22	21	28	0	4	176	11	3	11	18	13	2	17	242	11	3	**574**
4:30 PM	21	29	21	0	8	170	8	4	17	17	25	2	9	209	8	3	**542**
4:45 PM	22	27	14	0	4	126	13	0	16	10	12	1	10	185	17	3	**456**
5:00 PM	23	15	10	0	6	154	10	4	6	17	11	1	13	220	4	2	**489**
TOTAL	**136**	**141**	**120**	**2**	**39**	**944**	**58**	**16**	**71**	**94**	**96**	**9**	**66**	**1218**	**67**	**15**	**3050**

Total Peds: **42**

Grand PM From North

			% Breakdown for each Movement				Exiting to the North	
3:45 PM	65	16%				% of Total		
4:00 PM	79	20%			% of LEG	INTERSECTION		
4:15 PM	71	18%						
4:30 PM	71	18%	Total Right:	136	34.3%	4.5%		
4:45 PM	63	16%	Total Thru:	141	35.5%	4.6%	Exiting North:	200
5:00 PM	48	12%	Total Left:	120	30.2%	3.9%	Intersection Total:	3050
	397			**397**	100%	**13.0%**		**7%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
3:45 PM	176	17%				% of Total		
4:00 PM	175	17%			% of LEG	INTERSECTION		
4:15 PM	191	18%						
4:30 PM	186	18%	Total Right:	39	3.7%	1.3%		
4:45 PM	143	14%	Total Thru:	944	90.7%	31.0%	Exiting East:	1409
5:00 PM	170	16%	Total Left:	58	5.6%	1.9%	Intersection Total:	3050
	1041			**1041**	100%	**34.1%**		**46%**

Grand PM From South

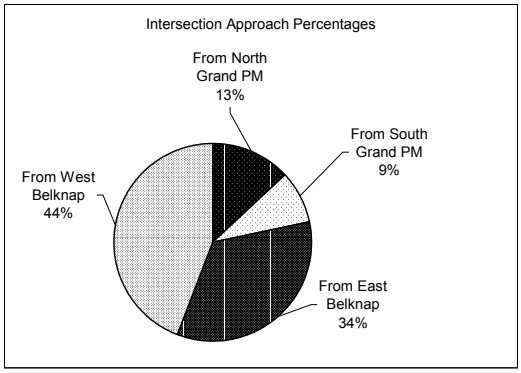
			% Breakdown for each Movement				Exiting to the South	
3:45 PM	40	15%				% of Total		
4:00 PM	48	18%			% of LEG	INTERSECTION		
4:15 PM	42	16%						
4:30 PM	59	23%	Total Right:	71	27.2%	2.3%		
4:45 PM	38	15%	Total Thru:	94	36.0%	3.1%	Exiting South:	265
5:00 PM	34	13%	Total Left:	96	36.8%	3.1%	Intersection Total:	3050
	261			**261**	100%	**8.6%**		**9%**

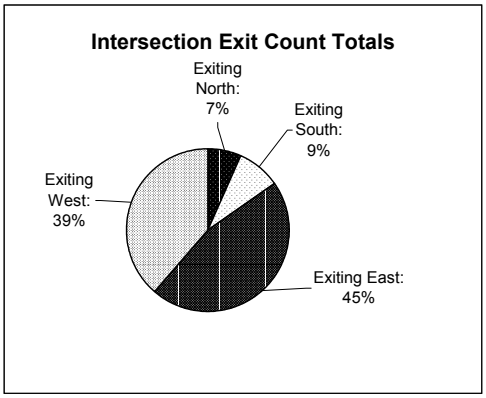
Belknap From West

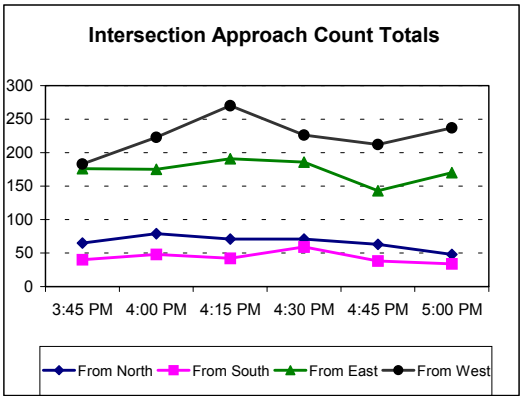
			% Breakdown for each Movement				Exiting to the West	
3:45 PM	183	14%				% of Total		
4:00 PM	223	17%			% of LEG	INTERSECTION		
4:15 PM	270	20%						
4:30 PM	226	17%	Total Right:	66	4.9%	2.2%		
4:45 PM	212	16%	Total Thru:	1218	90.2%	39.9%	Exiting West:	1176
5:00 PM	237	18%	Total Left:	67	5.0%	2.2%	Intersection Total:	3050
	1351			**1351**	100%	**44.3%**		**39%**

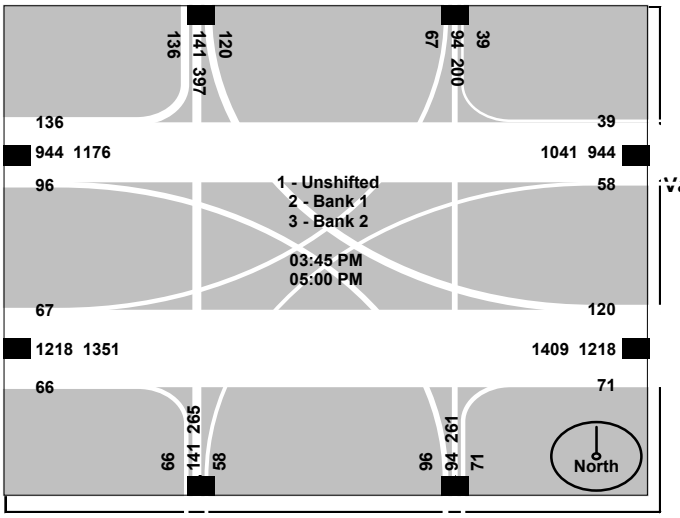
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Grand PM From North	277	120	397	9%	4%	13%
Grand PM From South	165	96	261	5%	3%	9%
Belknap From East	983	58	1041	32%	2%	34%
Belknap From West	1284	67	1351	42%	2%	44%
	2709	**341**	**3050**	**89%**	**11%**	**100%**









Variable Width Plot

North/South Leg: ***Hammond*** **Date:** 9/9/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Hammond From North				Belknap From East				Hammond From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	3	8	4	3	6	63	7	0	14	27	7	0	3	48	6	0	**196**
7:15 AM	3	14	6	4	9	79	12	1	34	42	11	0	5	89	9	1	**313**
7:30 AM	12	16	2	6	12	121	21	0	60	42	18	0	7	134	21	1	**466**
7:45 AM	10	17	8	3	17	130	21	3	41	40	19	4	9	139	10	10	**461**
8:00 AM	2	15	9	4	12	111	27	1	29	23	7	0	9	113	10	3	**367**
8:15 AM	6	16	8	2	11	122	22	4	25	28	6	5	8	106	14	0	**372**
TOTAL	**36**	**86**	**37**	**22**	**67**	**626**	**110**	**9**	**203**	**202**	**68**	**9**	**41**	**629**	**70**	**15**	**2175**

Total Peds: **55**

Hammond From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	15	9%				% of Total		
7:15 AM	23	14%			% of LEG	INTERSECTION		
7:30 AM	30	19%						
7:45 AM	35	22%	Total Right:	36	22.6%	1.7%		
8:00 AM	26	16%	Total Thru:	86	54.1%	4.0%	Exiting North:	339
8:15 AM	30	19%	Total Left:	37	23.3%	1.7%	Intersection Total:	2175
	159			**159**	100%	**7.3%**		**16%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	76	9%				% of Total		
7:15 AM	100	12%			% of LEG	INTERSECTION		
7:30 AM	154	19%						
7:45 AM	168	21%	Total Right:	67	8.3%	3.1%		
8:00 AM	150	19%	Total Thru:	626	78.0%	28.8%	Exiting East:	869
8:15 AM	155	19%	Total Left:	110	13.7%	5.1%	Intersection Total:	2175
	803			**803**	100%	**36.9%**		**40%**

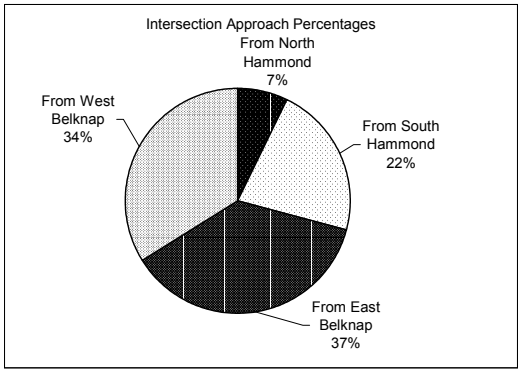
Hammond From South

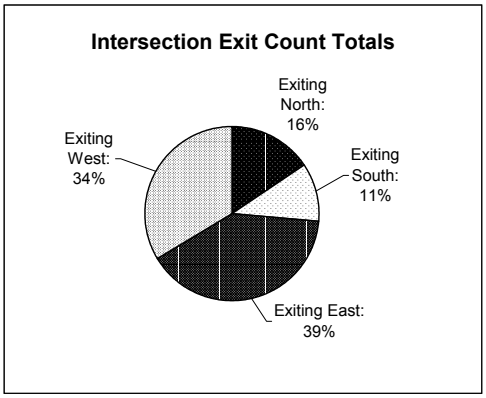
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	48	10%				% of Total		
7:15 AM	87	18%			% of LEG	INTERSECTION		
7:30 AM	120	25%						
7:45 AM	100	21%	Total Right:	203	42.9%	9.3%		
8:00 AM	59	12%	Total Thru:	202	42.7%	9.3%	Exiting South:	237
8:15 AM	59	12%	Total Left:	68	14.4%	3.1%	Intersection Total:	2175
	473			**473**	100%	**21.7%**		**11%**

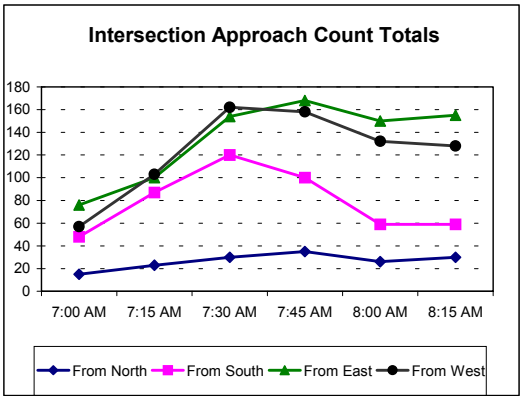
Belknap From West

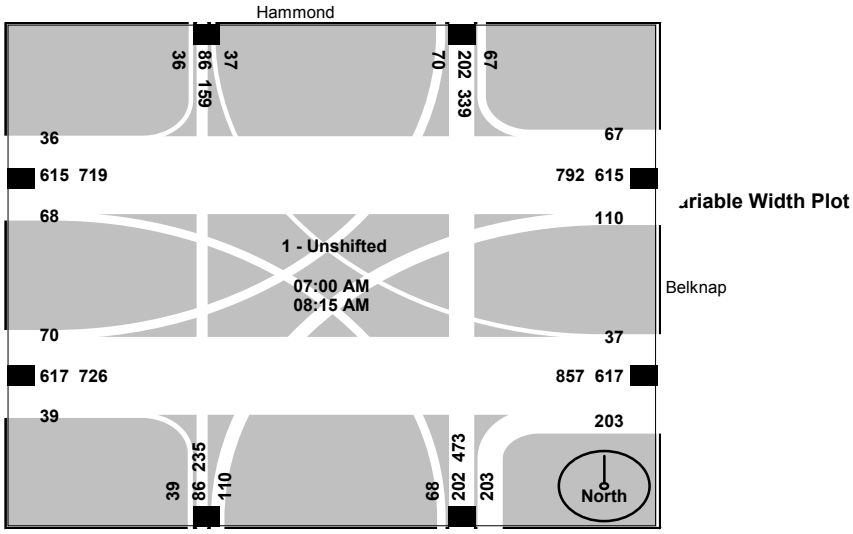
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	57	8%				% of Total		
7:15 AM	103	14%			% of LEG	INTERSECTION		
7:30 AM	162	22%						
7:45 AM	158	21%	Total Right:	41	5.5%	1.9%		
8:00 AM	132	18%	Total Thru:	629	85.0%	28.9%	Exiting West:	730
8:15 AM	128	17%	Total Left:	70	9.5%	3.2%	Intersection Total:	2175
	740			**740**	100%	**34.0%**		**34%**

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Hammond From North	122	37	159	6%	2%	7%
Hammond From South	405	68	473	19%	3%	22%
Belknap From East	693	110	803	32%	5%	37%
Belknap From West	670	70	740	31%	3%	34%
	1890	**285**	**2175**	**87%**	**13%**	**100%**









…riable Width Plot

North/South Leg: ***Hammond*** **Date:** 9/9/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Hammond From North				Belknap From East				Hammond From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
4:00 PM	13	16	16	2	12	160	27	5	13	25	18	1	8	182	10	0	**500**
4:15 PM	15	27	14	0	7	163	28	3	29	25	13	5	15	191	12	1	**539**
4:30 PM	13	26	28	4	12	158	32	4	29	25	17	2	14	179	9	4	**542**
4:45 PM	3	36	18	3	15	185	31	5	26	28	16	1	14	182	11	2	**565**
5:00 PM	10	24	15	1	7	173	33	2	25	35	15	0	29	199	12	2	**577**
5:15 PM	7	20	12	2	7	113	19	4	21	22	12	5	19	145	14	2	**411**
TOTAL	**61**	**149**	**103**	**12**	**60**	**952**	**170**	**23**	**143**	**160**	**91**	**14**	**99**	**1078**	**68**	**11**	**3134**

Total Peds: **60**

Hammond From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	45	14%				% of Total		
4:15 PM	56	18%			% of LEG	INTERSECTION		
4:30 PM	67	21%						
4:45 PM	57	18%	Total Right:	61	19.5%	1.9%		
5:00 PM	49	16%	Total Thru:	149	47.6%	4.8%	Exiting North:	288
5:15 PM	39	12%	Total Left:	103	32.9%	3.3%	Intersection Total:	3134
	313			**313**	100%	**10.0%**		**9%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	199	17%				% of Total		
4:15 PM	198	17%			% of LEG	INTERSECTION		
4:30 PM	202	17%						
4:45 PM	231	20%	Total Right:	60	5.1%	1.9%		
5:00 PM	213	18%	Total Thru:	952	80.5%	30.4%	Exiting East:	1324
5:15 PM	139	12%	Total Left:	170	14.4%	5.4%	Intersection Total:	3134
	1182			**1182**	100%	**37.7%**		**42%**

Hammond From South

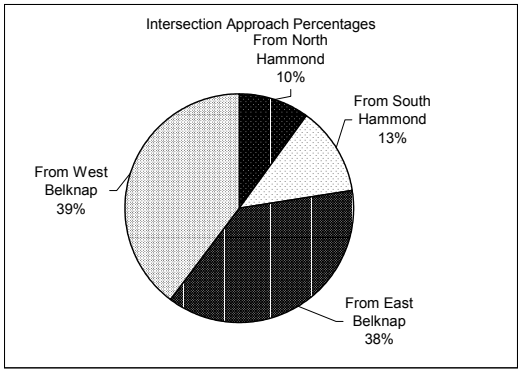
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	56	14%				% of Total		
4:15 PM	67	17%			% of LEG	INTERSECTION		
4:30 PM	71	18%						
4:45 PM	70	18%	Total Right:	143	36.3%	4.6%		
5:00 PM	75	19%	Total Thru:	160	40.6%	5.1%	Exiting South:	418
5:15 PM	55	14%	Total Left:	91	23.1%	2.9%	Intersection Total:	3134
	394			**394**	100%	**12.6%**		**13%**

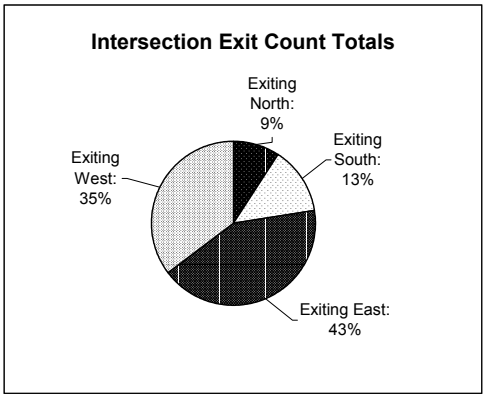
Belknap From West

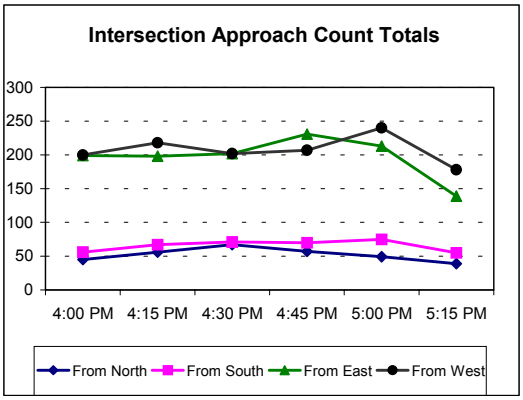
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	200	16%				% of Total		
4:15 PM	218	18%			% of LEG	INTERSECTION		
4:30 PM	202	16%						
4:45 PM	207	17%	Total Right:	99	8.0%	3.2%		
5:00 PM	240	19%	Total Thru:	1078	86.6%	34.4%	Exiting West:	1104
5:15 PM	178	14%	Total Left:	68	5.5%	2.2%	Intersection Total:	3134
	1245			**1245**	100%	**39.7%**		**35%**

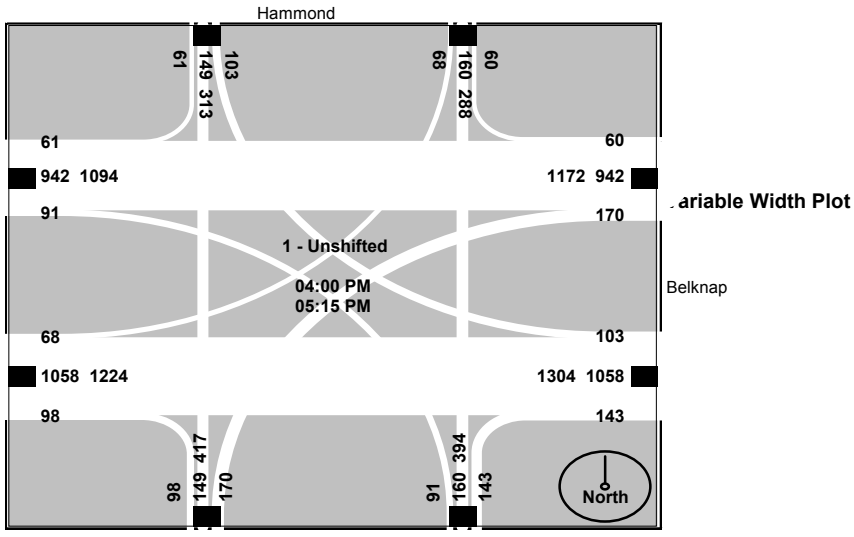
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Hammond From North	210	103	313	7%	3%	10%
Hammond From South	303	91	394	10%	3%	13%
Belknap From East	1012	170	1182	32%	5%	38%
Belknap From West	1177	68	1245	38%	2%	40%
	2702	**432**	**3134**	**86%**	**14%**	**100%**









ariable Width Plot

North/South Leg: ***Ogden*** **Date:** 9/9/02 Page 1

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Ogden From North				Belknap From East				Ogden From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	6	0	4	0	5	59	1	0	3	7	1	1	1	67	4	0	**158**
7:15 AM	2	2	0	0	18	76	0	0	5	7	1	0	0	94	8	0	**213**
7:30 AM	2	1	4	1	24	118	2	2	10	14	6	4	3	151	10	4	**345**
7:45 AM	4	3	2	1	35	144	2	1	13	10	6	1	2	152	25	4	**398**
8:00 AM	4	1	4	0	20	105	4	0	8	3	2	0	4	114	14	1	**283**
8:15 AM	8	4	5	1	22	112	2	2	11	12	2	1	0	108	13	0	**299**
TOTAL	**20**	**11**	**15**	**3**	**119**	**555**	**10**	**5**	**47**	**46**	**17**	**6**	**9**	**619**	**70**	**9**	**1696**

Total Peds: **23**

Ogden From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	10	18%			% of LEG	% of Total INTERSECTION		
7:15 AM	4	7%						
7:30 AM	7	13%						
7:45 AM	9	16%	Total Right:	20	43.5%	1.2%		
8:00 AM	9	16%	Total Thru:	11	23.9%	0.6%	Exiting North:	235
8:15 AM	17	30%	Total Left:	15	32.6%	0.9%	Intersection Total:	1696
	56			**46**	100%	**2.7%**		**14%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	65	9%			% of LEG	% of Total INTERSECTION		
7:15 AM	94	13%						
7:30 AM	144	19%						
7:45 AM	181	24%	Total Right:	119	17.4%	7.0%		
8:00 AM	129	17%	Total Thru:	555	81.1%	32.7%	Exiting East:	681
8:15 AM	136	18%	Total Left:	10	1.5%	0.6%	Intersection Total:	1696
	749			**684**	100%	**40.3%**		**40%**

Ogden From South

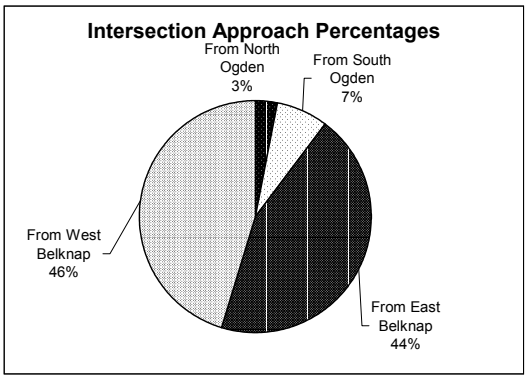
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	11	9%			% of LEG	% of Total INTERSECTION		
7:15 AM	13	11%						
7:30 AM	30	25%						
7:45 AM	29	24%	Total Right:	47	42.7%	2.8%		
8:00 AM	13	11%	Total Thru:	46	41.8%	2.7%	Exiting South:	30
8:15 AM	25	21%	Total Left:	17	15.5%	1.0%	Intersection Total:	1696
	121			**110**	100%	**6.5%**		**2%**

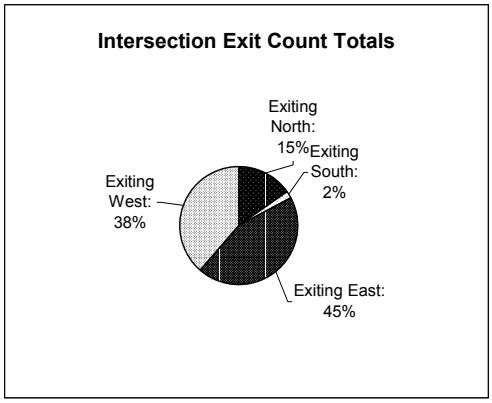
Belknap From West

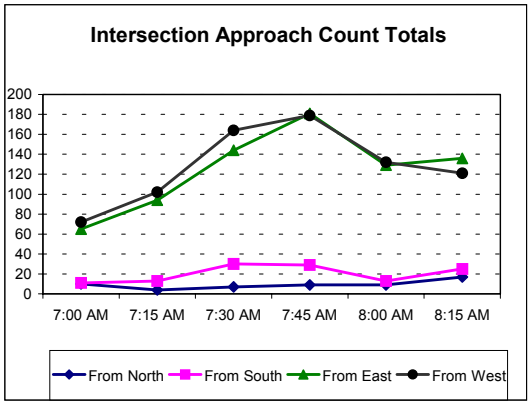
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	72	9%			% of LEG	% of Total INTERSECTION		
7:15 AM	102	13%						
7:30 AM	164	21%						
7:45 AM	179	23%	Total Right:	9	1.3%	0.5%		
8:00 AM	132	17%	Total Thru:	619	88.7%	36.5%	Exiting West:	592
8:15 AM	121	16%	Total Left:	70	10.0%	4.1%	Intersection Total:	1696
	770			**698**	100%	**41.2%**		**35%**

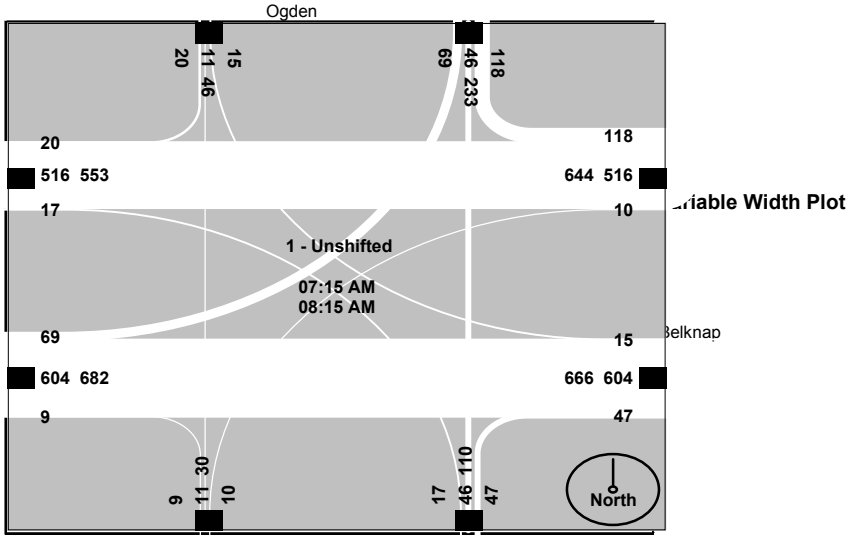
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Ogden From North	31	15	46	2%	1%	3%
Ogden From South	93	17	110	6%	1%	7%
Belknap From East	674	10	684	44%	1%	44%
Belknap From West	628	70	698	41%	5%	45%
	1426	**112**	**1538**	**93%**	**7%**	**100%**









riable Width Plot

Belknap

North/South Leg: ***Ogden*** **Date:** 9/12/02

East/West Leg: ***Belknap*** **Start Time:** 3:45 PM **End Time:** 5:15 PM

TURNING MOVEMENTS

	Ogden From North				Belknap From East				Ogden From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
3:45 PM	27	7	21	1	24	145	6	1	12	23	9	2	12	187	18	3	**491**
4:00 PM	18	9	11	0	21	143	3	0	16	11	9	6	3	161	13	4	**418**
4:15 PM	31	12	23	2	19	140	8	1	15	10	7	2	10	182	13	5	**470**
4:30 PM	28	6	30	3	16	158	6	0	16	15	7	3	3	189	19	1	**493**
4:45 PM	21	9	25	0	16	127	5	5	22	13	11	7	5	175	10	1	**439**
5:00 PM	17	3	19	4	16	115	6	0	13	6	5	0	1	178	15	2	**394**
TOTAL	**142**	**46**	**129**	**10**	**112**	**828**	**34**	**7**	**94**	**78**	**48**	**20**	**34**	**1072**	**88**	**16**	**2705**

Total Peds: **53**

Ogden From North

			% Breakdown for each Movement				Exiting to the North	
3:45 PM	55	17%				% of Total		
4:00 PM	38	12%			% of LEG	INTERSECTION		
4:15 PM	66	21%						
4:30 PM	64	20%	Total Right:	142	44.8%	5.2%		
4:45 PM	55	17%	Total Thru:	46	14.5%	1.7%	Exiting North:	278
5:00 PM	39	12%	Total Left:	129	40.7%	4.8%	Intersection Total:	2705
	317			**317**	100%	**11.7%**		**10%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
3:45 PM	175	18%				% of Total		
4:00 PM	167	17%			% of LEG	INTERSECTION		
4:15 PM	167	17%						
4:30 PM	180	18%	Total Right:	112	11.5%	4.1%		
4:45 PM	148	15%	Total Thru:	828	85.0%	30.6%	Exiting East:	1295
5:00 PM	137	14%	Total Left:	34	3.5%	1.3%	Intersection Total:	2705
	974			**974**	100%	**36.0%**		**48%**

Ogden From South

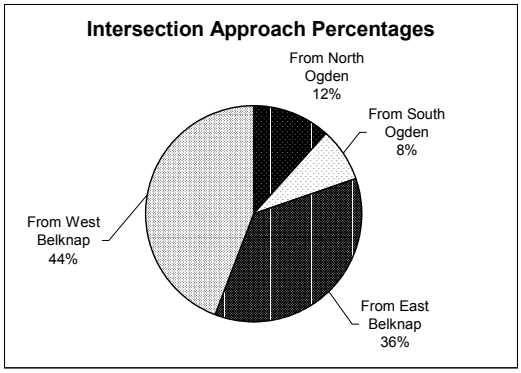
			% Breakdown for each Movement				Exiting to the South	
3:45 PM	44	20%				% of Total		
4:00 PM	36	16%			% of LEG	INTERSECTION		
4:15 PM	32	15%						
4:30 PM	38	17%	Total Right:	94	42.7%	3.5%		
4:45 PM	46	21%	Total Thru:	78	35.5%	2.9%	Exiting South:	114
5:00 PM	24	11%	Total Left:	48	21.8%	1.8%	Intersection Total:	2705
	220			**220**	100%	**8.1%**		**4%**

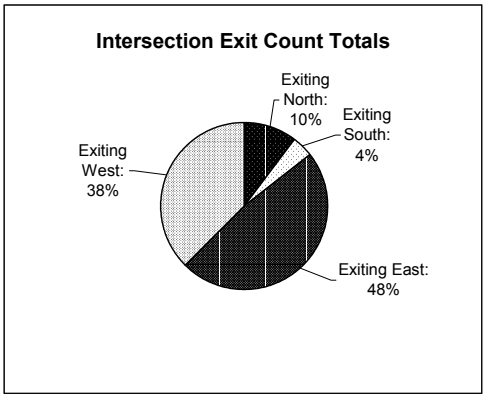
Belknap From West

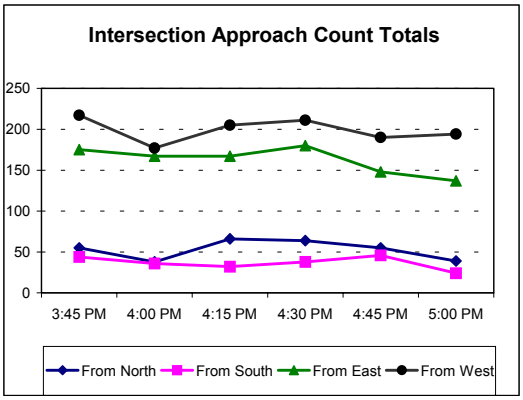
			% Breakdown for each Movement				Exiting to the West	
3:45 PM	217	18%				% of Total		
4:00 PM	177	15%			% of LEG	INTERSECTION		
4:15 PM	205	17%						
4:30 PM	211	18%	Total Right:	34	2.8%	1.3%		
4:45 PM	190	16%	Total Thru:	1072	89.8%	39.6%	Exiting West:	1018
5:00 PM	194	16%	Total Left:	88	7.4%	3.3%	Intersection Total:	2705
	1194			**1194**	100%	**44.1%**		**38%**

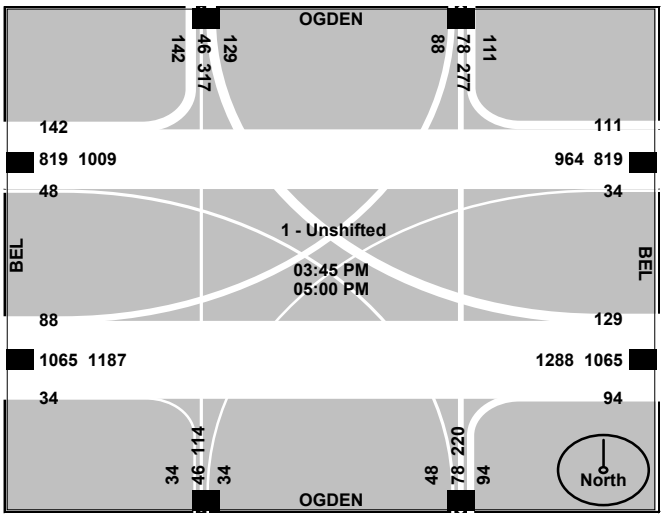
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Ogden From North	188	129	317	7%	5%	12%
Ogden From South	172	48	220	6%	2%	8%
Belknap From East	940	34	974	35%	1%	36%
Belknap From West	1106	88	1194	41%	3%	44%
	2406	**299**	**2705**	**89%**	**11%**	**100%**









Variable Width Plot

North/South Leg: ***Tower*** **Date:** 9/9/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Tower From North				Belknap From East				Tower From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	1	25	12	0	7	50	7	5	22	76	34	0	15	44	16	0	**309**
7:15 AM	2	37	5	0	15	59	13	0	28	109	50	5	13	78	17	1	**426**
7:30 AM	9	50	13	3	25	77	20	2	40	150	64	2	16	142	34	4	**640**
7:45 AM	6	51	13	0	16	66	39	0	34	119	42	1	24	115	37	2	**562**
8:00 AM	7	55	7	0	18	71	26	0	29	78	29	1	20	88	19	0	**447**
8:15 AM	7	64	18	1	27	64	19	2	33	76	44	3	21	82	23	0	**478**
TOTAL	**32**	**282**	**68**	**4**	**108**	**387**	**124**	**9**	**186**	**608**	**263**	**12**	**109**	**549**	**146**	**7**	**2862**

Total Peds: **32**

Tower From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	38	10%				% of Total		
7:15 AM	44	12%			% of LEG	INTERSECTION		
7:30 AM	72	19%						
7:45 AM	70	18%	Total Right:	32	8.4%	1.1%		
8:00 AM	69	18%	Total Thru:	282	73.8%	9.9%	Exiting North:	862
8:15 AM	89	23%	Total Left:	68	17.8%	2.4%	Intersection Total:	2862
	382			**382**	100%	**13.3%**		**30%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	64	10%				% of Total		
7:15 AM	87	14%			% of LEG	INTERSECTION		
7:30 AM	122	20%						
7:45 AM	121	20%	Total Right:	108	17.4%	3.8%		
8:00 AM	115	19%	Total Thru:	387	62.5%	13.5%	Exiting East:	803
8:15 AM	110	18%	Total Left:	124	20.0%	4.3%	Intersection Total:	2862
	619			**619**	100%	**21.6%**		**28%**

Tower From South

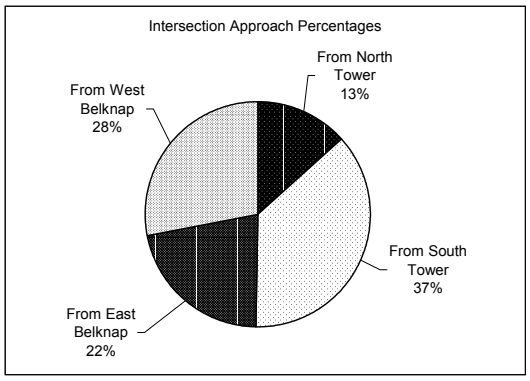
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	132	12%				% of Total		
7:15 AM	187	18%			% of LEG	INTERSECTION		
7:30 AM	254	24%						
7:45 AM	195	18%	Total Right:	186	17.6%	6.5%		
8:00 AM	136	13%	Total Thru:	608	57.5%	21.2%	Exiting South:	515
8:15 AM	153	14%	Total Left:	263	24.9%	9.2%	Intersection Total:	2862
	1057			**1057**	100%	**36.9%**		**18%**

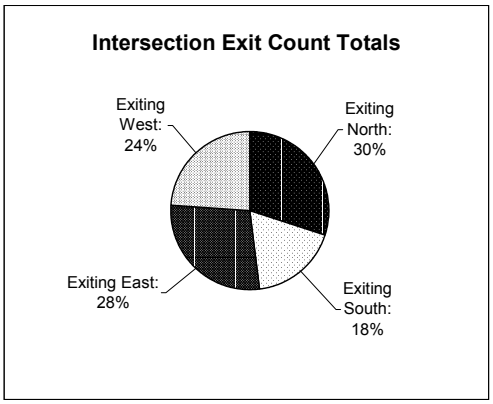
Belknap From West

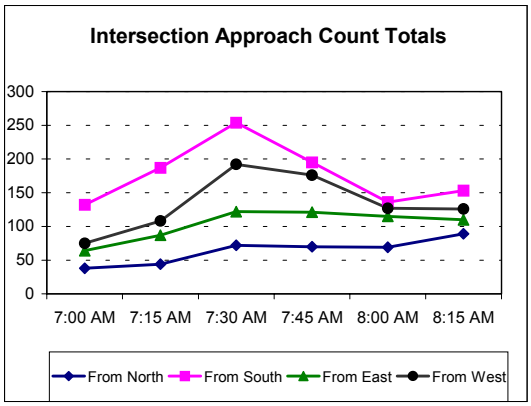
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	75	9%				% of Total		
7:15 AM	108	13%			% of LEG	INTERSECTION		
7:30 AM	192	24%						
7:45 AM	176	22%	Total Right:	109	13.6%	3.8%		
8:00 AM	127	16%	Total Thru:	549	68.3%	19.2%	Exiting West:	682
8:15 AM	126	16%	Total Left:	146	18.2%	5.1%	Intersection Total:	2862
	804			**804**	100%	**28.1%**		**24%**

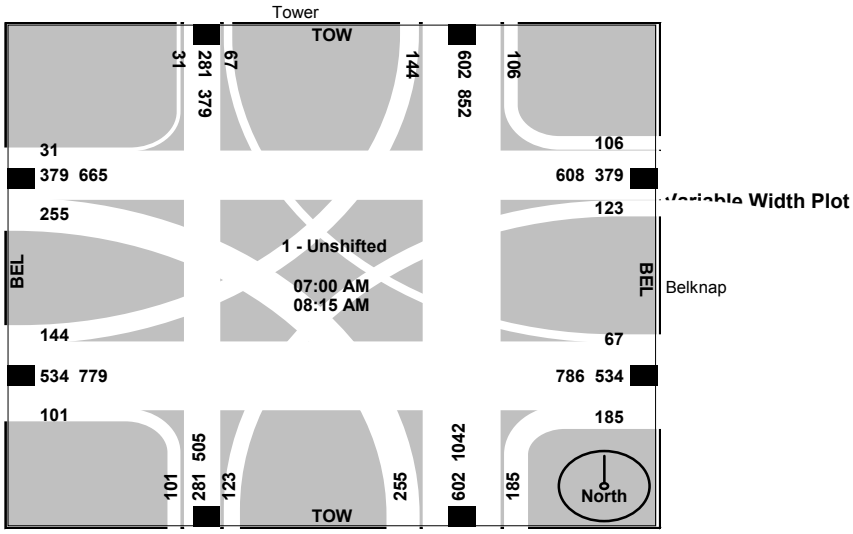
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Tower From North	314	68	382	11%	2%	13%
Tower From South	794	263	1057	28%	9%	37%
Belknap From East	495	124	619	17%	4%	22%
Belknap From West	658	146	804	23%	5%	28%
	2261	**601**	**2862**	**79%**	**21%**	**100%**


Intersection Approach Percentages
From North Tower 13%
From West Belknap 28%
From South Tower 37%
From East Belknap 22%


Intersection Exit Count Totals
Exiting West: 24%
Exiting North: 30%
Exiting East: 28%
Exiting South: 18%


Intersection Approach Count Totals
300
250
200
150
100
50
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
From North
From South
From East
From West


Tower
TOW
31
281 379
67
144
602 852
106
31
379 665
106
608 379
255
123
1 - Unshifted
07:00 AM
08:15 AM
BEL
BEL
Belknap
144
67
534 779
786 534
101
185
101
281 505
123
255
602 1042
185
North
TOW

North/South Leg: ***Tower*** **Date:** 9/9/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Tower From North				Belknap From East				Tower From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
4:00 PM	17	134	42	2	28	116	48	6	31	81	47	3	23	128	28	1	**723**
4:15 PM	27	137	33	2	31	98	47	2	52	88	64	0	42	118	31	2	**768**
4:30 PM	17	135	35	3	23	115	59	3	43	83	71	5	36	116	41	1	**774**
4:45 PM	13	151	37	9	28	135	57	5	46	80	49	6	44	120	23	4	**783**
5:00 PM	12	151	33	3	15	111	60	0	48	97	61	4	43	118	29	2	**778**
5:15 PM	11	144	24	2	18	92	33	6	38	84	60	6	33	100	17	2	**654**
TOTAL	**97**	**852**	**204**	**21**	**143**	**667**	**304**	**22**	**258**	**513**	**352**	**24**	**221**	**700**	**169**	**12**	**4480**

Total Peds: **79**

Tower From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	193	17%				% of Total		
4:15 PM	197	17%			% of LEG	INTERSECTION		
4:30 PM	187	16%						
4:45 PM	201	17%	Total Right:	97	8.4%	2.2%		
5:00 PM	196	17%	Total Thru:	852	73.9%	19.0%	Exiting North:	825
5:15 PM	179	16%	Total Left:	204	17.7%	4.6%	Intersection Total:	4480
	1153			**1153**	100%	**25.7%**		**18%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	192	17%				% of Total		
4:15 PM	176	16%			% of LEG	INTERSECTION		
4:30 PM	197	18%						
4:45 PM	220	20%	Total Right:	143	12.8%	3.2%		
5:00 PM	186	17%	Total Thru:	667	59.9%	14.9%	Exiting East:	1162
5:15 PM	143	13%	Total Left:	304	27.3%	6.8%	Intersection Total:	4480
	1114			**1114**	100%	**24.9%**		**26%**

Tower From South

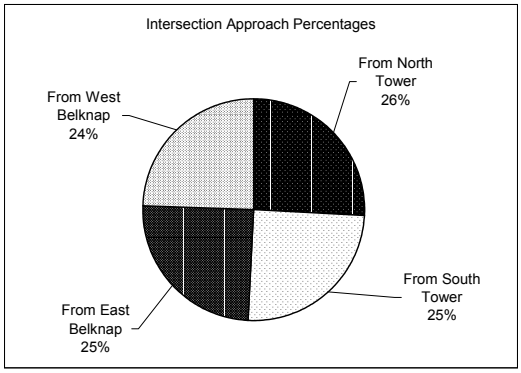
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	159	14%				% of Total		
4:15 PM	204	18%			% of LEG	INTERSECTION		
4:30 PM	197	18%						
4:45 PM	175	16%	Total Right:	258	23.0%	5.8%		
5:00 PM	206	18%	Total Thru:	513	45.7%	11.5%	Exiting South:	1377
5:15 PM	182	16%	Total Left:	352	31.3%	7.9%	Intersection Total:	4480
	1123			**1123**	100%	**25.1%**		**31%**

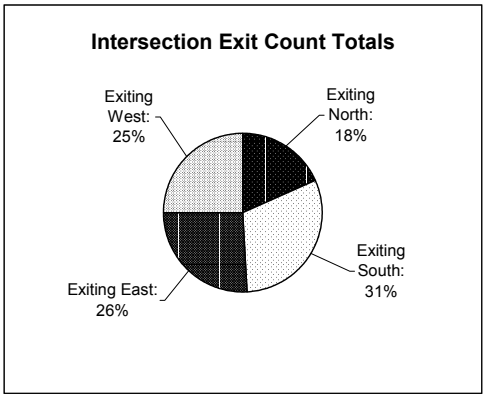
Belknap From West

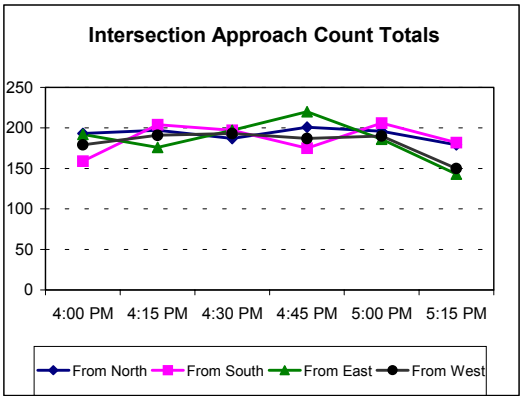
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	179	16%				% of Total		
4:15 PM	191	18%			% of LEG	INTERSECTION		
4:30 PM	193	18%						
4:45 PM	187	17%	Total Right:	221	20.3%	4.9%		
5:00 PM	190	17%	Total Thru:	700	64.2%	15.6%	Exiting West:	1116
5:15 PM	150	14%	Total Left:	169	15.5%	3.8%	Intersection Total:	4480
	1090			**1090**	100%	**24.3%**		**25%**

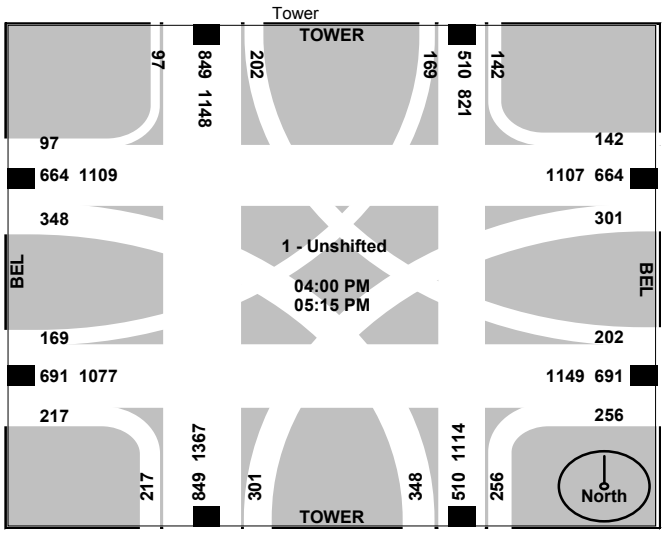
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Tower From North	949	204	1153	21%	5%	26%
Tower From South	771	352	1123	17%	8%	25%
Belknap From East	810	304	1114	18%	7%	25%
Belknap From West	921	169	1090	21%	4%	24%
	3451	**1029**	**4480**	**77%**	**23%**	**100%**









Variable Width Plot

North/South Leg: ***Banks*** **Date:** 9/12/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Banks From North				Belknap From East				Banks From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
7:00 AM	9	3	0	0	0	69	4	0	2	2	9	1	20	79	0	3	**197**
7:15 AM	7	4	1	0	3	90	3	0	10	3	6	1	9	91	0	0	**227**
7:30 AM	6	14	1	1	5	126	8	0	7	6	16	0	20	120	0	0	**329**
7:45 AM	19	14	4	0	12	113	9	0	11	10	8	0	38	181	1	1	**420**
8:00 AM	13	14	4	1	2	95	13	0	16	11	13	1	21	146	0	1	**348**
8:15 AM	15	6	2	2	6	98	11	3	9	8	11	0	23	120	0	1	**309**
TOTAL	**69**	**55**	**12**	**4**	**28**	**591**	**48**	**3**	**55**	**40**	**63**	**3**	**131**	**737**	**1**	**6**	**1830**

Total Peds: **16**

Banks From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	12	9%				% of Total		
7:15 AM	12	9%			% of LEG	INTERSECTION		
7:30 AM	21	15%						
7:45 AM	37	27%	Total Right:	69	50.7%	3.8%		
8:00 AM	31	23%	Total Thru:	55	40.4%	3.0%	Exiting North:	69
8:15 AM	23	17%	Total Left:	12	8.8%	0.7%	Intersection Total:	1830
	136			**136**	100%	**7.4%**		**4%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	73	11%				% of Total		
7:15 AM	96	14%			% of LEG	INTERSECTION		
7:30 AM	139	21%						
7:45 AM	134	20%	Total Right:	28	4.2%	1.5%		
8:00 AM	110	16%	Total Thru:	591	88.6%	32.3%	Exiting East:	804
8:15 AM	115	17%	Total Left:	48	7.2%	2.6%	Intersection Total:	1830
	667			**667**	100%	**36.4%**		**44%**

Banks From South

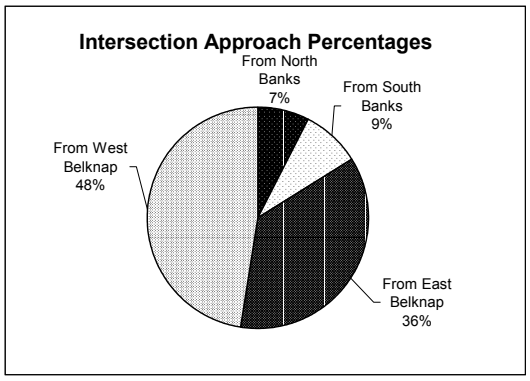
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	13	8%				% of Total		
7:15 AM	19	12%			% of LEG	INTERSECTION		
7:30 AM	29	18%						
7:45 AM	29	18%	Total Right:	55	34.8%	3.0%		
8:00 AM	40	25%	Total Thru:	40	25.3%	2.2%	Exiting South:	234
8:15 AM	28	18%	Total Left:	63	39.9%	3.4%	Intersection Total:	1830
	158			**158**	100%	**8.6%**		**13%**

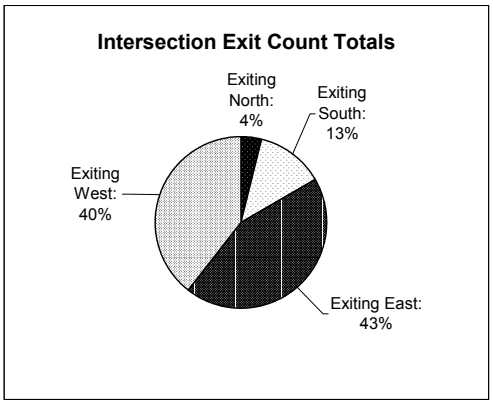
Belknap From West

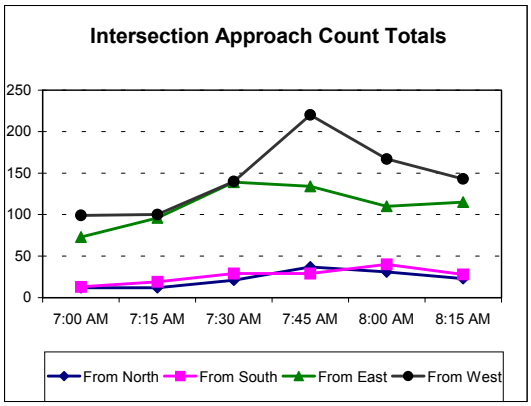
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	99	11%				% of Total		
7:15 AM	100	12%			% of LEG	INTERSECTION		
7:30 AM	140	16%						
7:45 AM	220	25%	Total Right:	131	15.1%	7.2%		
8:00 AM	167	19%	Total Thru:	737	84.8%	40.3%	Exiting West:	723
8:15 AM	143	16%	Total Left:	1	0.1%	0.1%	Intersection Total:	1830
	869			**869**	100%	**47.5%**		**40%**

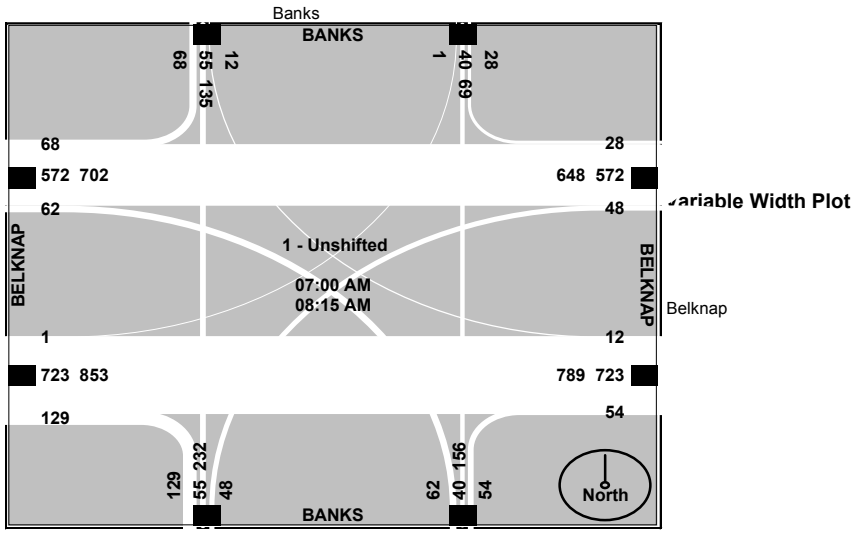
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Banks From North	124	12	136	7%	1%	7%
Banks From South	95	63	158	5%	3%	9%
Belknap From East	619	48	667	34%	3%	36%
Belknap From West	868	1	869	47%	0%	47%
	1706	**124**	**1830**	**93%**	**7%**	**100%**


Intersection Approach Percentages
From North Banks 7%
From South Banks 9%
From West Belknap 48%
From East Belknap 36%


Intersection Exit Count Totals
Exiting North: 4%
Exiting South: 13%
Exiting West: 40%
Exiting East: 43%


Intersection Approach Count Totals
250
200
150
100
50
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
From North
From South
From East
From West


Banks
BANKS
68
55
135
12
1
40
69
28
68
28
572
702
648
572
62
48
BELKNAP
1 - Unshifted
07:00 AM
08:15 AM
BELKNAP
1
12
723
853
789
723
129
54
129
55
232
48
62
40
156
54
BANKS
North
Variable Width Plot
Belknap

North/South Leg: ***Banks*** **Date:** 9/5/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Banks From North				Belknap From East				Banks From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
4:00 PM	49	30	9	0	21	131	40	0	17	22	25	4	62	181	2	2	**589**
4:15 PM	31	27	13	1	8	144	42	2	32	10	20	2	47	153	1	6	**528**
4:30 PM	57	50	14	3	3	174	42	0	34	8	28	1	56	180	1	5	**647**
4:45 PM	39	48	17	1	8	175	38	1	27	11	39	0	52	149	0	2	**603**
5:00 PM	52	64	15	2	11	127	29	1	33	12	22	4	52	161	1	2	**579**
5:15 PM	41	45	8	1	2	150	33	0	33	10	34	1	43	149	1	2	**549**
TOTAL	**269**	**264**	**76**	**8**	**53**	**901**	**224**	**4**	**176**	**73**	**168**	**12**	**312**	**973**	**6**	**19**	**3495**

Total Peds: **43**

Banks From North

			% Breakdown for each Movement			
					% of Total	Exiting to the North
4:00 PM	88	14%		% of LEG	INTERSECTION	
4:15 PM	71	12%				
4:30 PM	121	20%				
4:45 PM	104	17%	Total Right:	269	44.2%	7.7%
5:00 PM	131	22%	Total Thru:	264	43.3%	7.6%
5:15 PM	94	15%	Total Left:	76	12.5%	2.2%
	609			**609**	100%	**17.4%**

Exiting North: 132
Intersection Total: 3495
4%

Belknap From East

			% Breakdown for each Movement			
					% of Total	Exiting to the East
4:00 PM	192	16%		% of LEG	INTERSECTION	
4:15 PM	194	16%				
4:30 PM	219	19%				
4:45 PM	221	19%	Total Right:	53	4.5%	1.5%
5:00 PM	167	14%	Total Thru:	901	76.5%	25.8%
5:15 PM	185	16%	Total Left:	224	19.0%	6.4%
	1178			**1178**	100%	**33.7%**

Exiting East: 1225
Intersection Total: 3495
35%

Banks From South

			% Breakdown for each Movement			
					% of Total	Exiting to the South
4:00 PM	64	15%		% of LEG	INTERSECTION	
4:15 PM	62	15%				
4:30 PM	70	17%				
4:45 PM	77	18%	Total Right:	176	42.2%	5.0%
5:00 PM	67	16%	Total Thru:	73	17.5%	2.1%
5:15 PM	77	18%	Total Left:	168	40.3%	4.8%
	417			**417**	100%	**11.9%**

Exiting South: 800
Intersection Total: 3495
23%

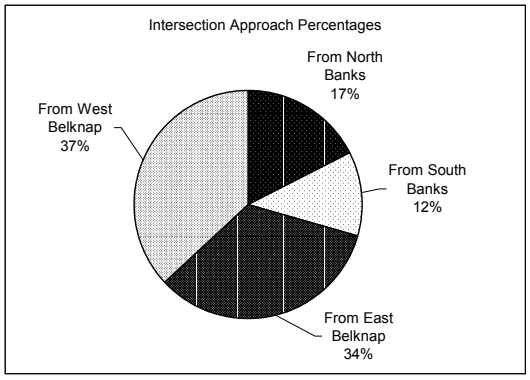
Belknap From West

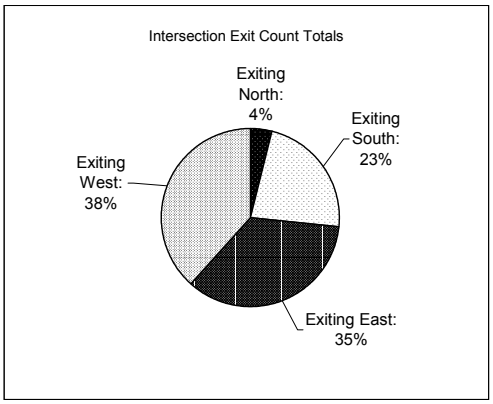
			% Breakdown for each Movement			
					% of Total	Exiting to the West
4:00 PM	245	19%		% of LEG	INTERSECTION	
4:15 PM	201	16%				
4:30 PM	237	18%				
4:45 PM	201	16%	Total Right:	312	24.2%	8.9%
5:00 PM	214	17%	Total Thru:	973	75.4%	27.8%
5:15 PM	193	15%	Total Left:	6	0.5%	0.2%
	1291			**1291**	100%	**36.9%**

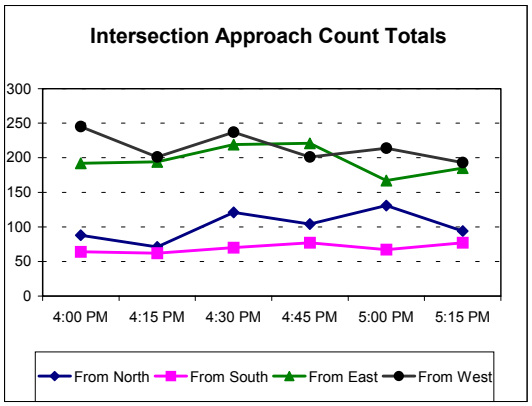
Exiting West: 1338
Intersection Total: 3495
38%

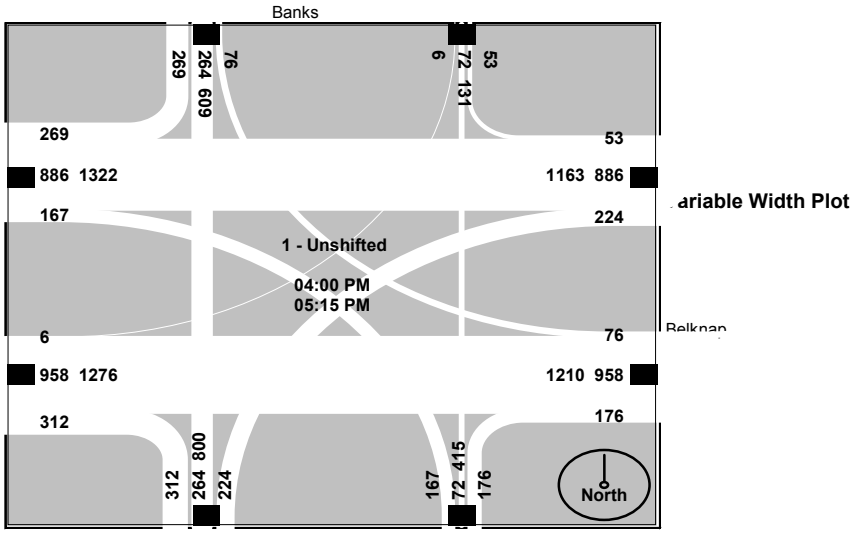
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Banks From North	533	76	609	15%	2%	17%
Banks From South	249	168	417	7%	5%	12%
Belknap From East	954	224	1178	27%	6%	34%
Belknap From West	1285	6	1291	37%	0%	37%
	3021	**474**	**3495**	**86%**	**14%**	**100%**


Intersection Approach Percentages
From North Banks 17%
From South Banks 12%
From East Belknap 34%
From West Belknap 37%


Intersection Exit Count Totals
Exiting North: 4%
Exiting South: 23%
Exiting East: 35%
Exiting West: 38%


Intersection Approach Count Totals
300
250
200
150
100
50
0
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
5:15 PM
From North
From South
From East
From West


Banks
269
264 609
76
6
72 131
53
269
886 1322
53
1163 886
ariable Width Plot
167
1 - Unshifted
04:00 PM
05:15 PM
224
6
76
Belknap
958 1276
1210 958
312
176
312
264 800
224
167
72 415
176
North

North/South Leg: ***Garfield*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Garfield From North				Belknap From East				Garfield From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	0	0	0	0	60	11	6	0	11	35	1	0	25	80	1	0	**230**
7:15 AM	0	0	0	0	68	24	1	0	8	28	1	0	16	112	4	0	**262**
7:30 AM	0	0	0	0	135	16	5	0	13	36	1	0	23	140	11	1	**380**
7:45 AM	0	0	0	0	110	27	12	0	18	40	0	0	25	213	6	0	**451**
8:00 AM	0	0	0	0	77	19	12	0	24	33	0	0	20	135	3	0	**323**
8:15 AM	0	0	0	0	79	27	6	0	12	22	0	0	8	111	3	0	**268**
TOTAL	**0**	**0**	**0**	**0**	**529**	**124**	**42**	**0**	**86**	**194**	**3**	**0**	**117**	**791**	**28**	**1**	**1914**

Total Peds: **1**

Garfield From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	0	#DIV/0!				% of Total		
7:15 AM	0	#DIV/0!			% of LEG	INTERSECTION		
7:30 AM	0	#DIV/0!						
7:45 AM	0	#DIV/0!	Total Right:	0	#DIV/0!	0.0%		
8:00 AM	0	#DIV/0!	Total Thru:	0	#DIV/0!	0.0%	Exiting North:	751
8:15 AM	0	#DIV/0!	Total Left:	0	#DIV/0!	0.0%	Intersection Total:	1914
	0			**0**	#DIV/0!	**0.0%**		**39%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	77	11%				% of Total		
7:15 AM	93	13%			% of LEG	INTERSECTION		
7:30 AM	156	22%						
7:45 AM	149	21%	Total Right:	529	76.1%	27.6%		
8:00 AM	108	16%	Total Thru:	124	17.8%	6.5%	Exiting East:	877
8:15 AM	112	16%	Total Left:	42	6.0%	2.2%	Intersection Total:	1914
	695			**695**	100%	**36.3%**		**46%**

Garfield From South

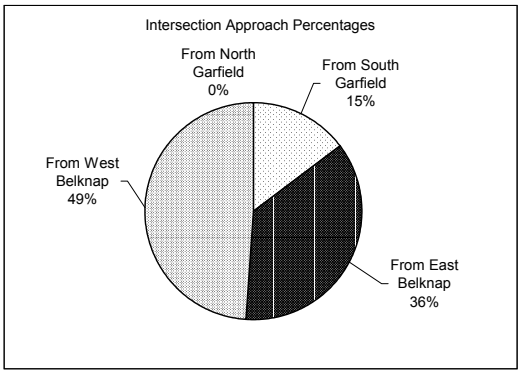
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	47	17%				% of Total		
7:15 AM	37	13%			% of LEG	INTERSECTION		
7:30 AM	50	18%						
7:45 AM	58	20%	Total Right:	86	30.4%	4.5%		
8:00 AM	57	20%	Total Thru:	194	68.6%	10.1%	Exiting South:	159
8:15 AM	34	12%	Total Left:	3	1.1%	0.2%	Intersection Total:	1914
	283			**283**	100%	**14.8%**		**8%**

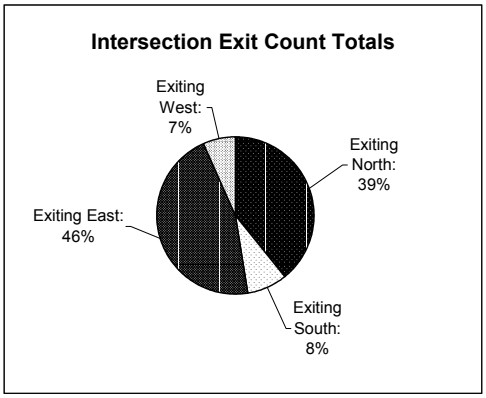
Belknap From West

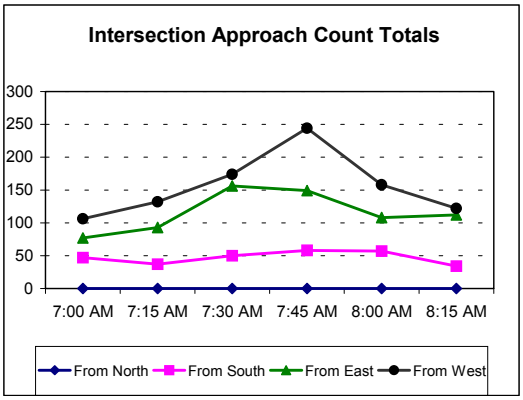
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	106	11%				% of Total		
7:15 AM	132	14%			% of LEG	INTERSECTION		
7:30 AM	174	19%						
7:45 AM	244	26%	Total Right:	117	12.5%	6.1%		
8:00 AM	158	17%	Total Thru:	791	84.5%	41.3%	Exiting West:	127
8:15 AM	122	13%	Total Left:	28	3.0%	1.5%	Intersection Total:	1914
	936			**936**	100%	**48.9%**		**7%**

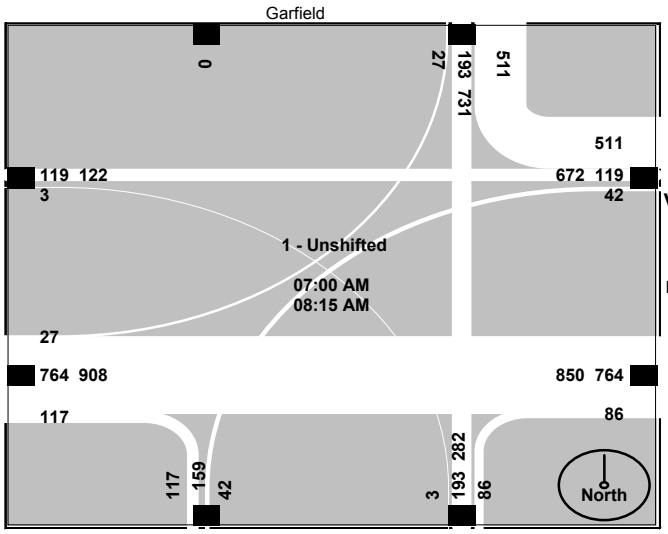
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Garfield From North	0	0	0	0%	0%	0%
Garfield From South	280	3	283	15%	0%	15%
Belknap From East	653	42	695	34%	2%	36%
Belknap From West	908	28	936	47%	1%	49%
	1841	**73**	**1914**	**96%**	**4%**	**100%**









Variable Width Plot

North/South Leg: ***Garfield*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Garfield From North				Belknap From East				Garfield From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
4:00 PM	0	0	0	0	145	45	10	3	9	18	0	0	42	191	5	1	**465**
4:15 PM	0	0	0	0	146	48	18	1	7	25	0	0	31	184	11	0	**470**
4:30 PM	0	0	0	0	165	38	16	0	19	20	0	0	54	208	3	1	**523**
4:45 PM	0	0	0	0	141	46	14	0	17	22	0	0	63	212	5	1	**520**
5:00 PM	0	0	0	0	182	51	12	0	9	20	0	0	60	147	8	1	**489**
5:15 PM	0	0	0	0	143	34	13	0	12	22	1	0	42	185	7	0	**459**
TOTAL	**0**	**0**	**0**	**0**	**922**	**262**	**83**	**4**	**73**	**127**	**1**	**0**	**292**	**1127**	**39**	**4**	**2926**

Total Peds: **8**

Garfield From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	0	#DIV/0!				% of Total		
4:15 PM	0	#DIV/0!			% of LEG	INTERSECTION		
4:30 PM	0	#DIV/0!						
4:45 PM	0	#DIV/0!	Total Right:	0	#DIV/0!	0.0%		
5:00 PM	0	#DIV/0!	Total Thru:	0	#DIV/0!	0.0%	Exiting North:	1088
5:15 PM	0	#DIV/0!	Total Left:	0	#DIV/0!	0.0%	Intersection Total:	2926
	0			**0**	#DIV/0!	**0.0%**		**37%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	200	16%				% of Total		
4:15 PM	212	17%			% of LEG	INTERSECTION		
4:30 PM	219	17%						
4:45 PM	201	16%	Total Right:	922	72.8%	31.5%		
5:00 PM	245	19%	Total Thru:	262	20.7%	9.0%	Exiting East:	1200
5:15 PM	190	15%	Total Left:	83	6.6%	2.8%	Intersection Total:	2926
	1267			**1267**	100%	**43.3%**		**41%**

Garfield From South

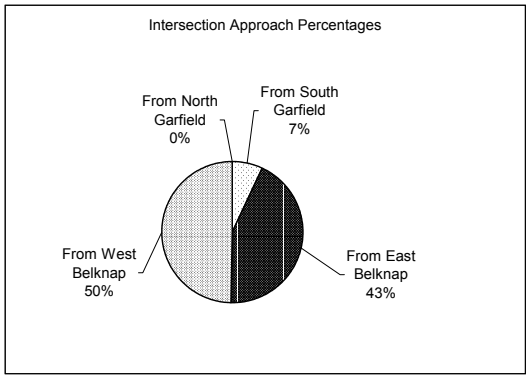
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	27	13%				% of Total		
4:15 PM	32	16%			% of LEG	INTERSECTION		
4:30 PM	39	19%						
4:45 PM	39	19%	Total Right:	73	36.3%	2.5%		
5:00 PM	29	14%	Total Thru:	127	63.2%	4.3%	Exiting South:	375
5:15 PM	35	17%	Total Left:	1	0.5%	0.0%	Intersection Total:	2926
	201			**201**	100%	**6.9%**		**13%**

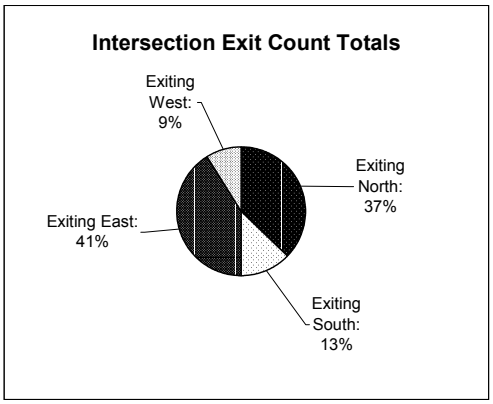
Belknap From West

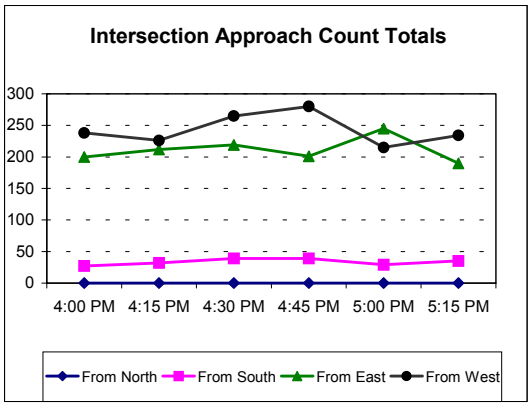
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	238	16%				% of Total		
4:15 PM	226	16%			% of LEG	INTERSECTION		
4:30 PM	265	18%						
4:45 PM	280	19%	Total Right:	292	20.0%	10.0%		
5:00 PM	215	15%	Total Thru:	1127	77.3%	38.5%	Exiting West:	263
5:15 PM	234	16%	Total Left:	39	2.7%	1.3%	Intersection Total:	2926
	1458			**1458**	100%	**49.8%**		**9%**

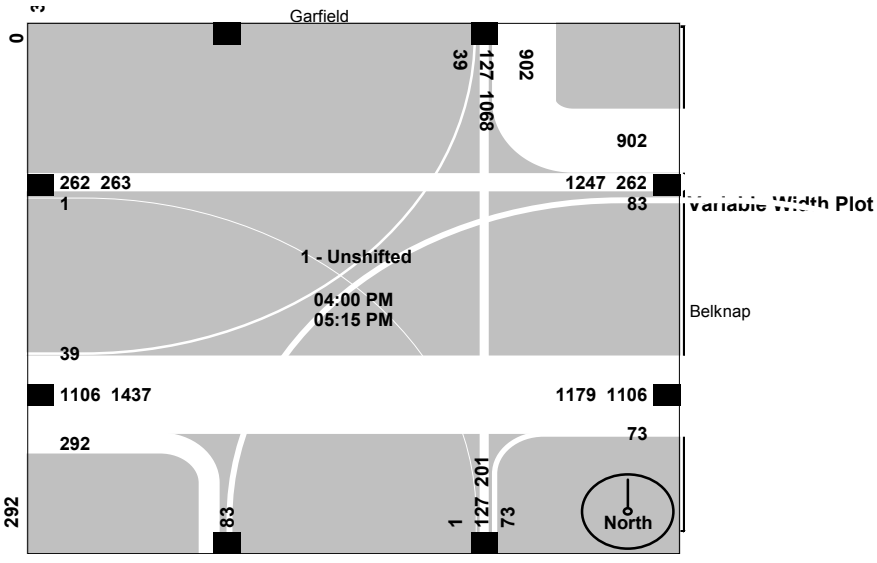
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Garfield From North	0	0	0	0%	0%	0%
Garfield From South	200	1	201	7%	0%	7%
Belknap From East	1184	83	1267	40%	3%	43%
Belknap From West	1419	39	1458	48%	1%	50%
	2803	**123**	**2926**	**96%**	**4%**	**100%**


Intersection Approach Percentages
From North Garfield 0%
From South Garfield 7%
From West Belknap 50%
From East Belknap 43%


Intersection Exit Count Totals
Exiting West: 9%
Exiting North: 37%
Exiting East: 41%
Exiting South: 13%


Intersection Approach Count Totals
300
250
200
150
100
50
0
4:00 PM 4:15 PM 4:30 PM 4:45 PM 5:00 PM 5:15 PM
From North From South From East From West


Garfield
0
39
127
1068
902
902
262 263
1
1247 262
83
1 - Unshifted
04:00 PM
05:15 PM
Belknap
39
1106 1437
1179 1106
292
73
292
83
1
127
201
73
North

North/South Leg: ***Susquehanna*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 7:00 AM **End Time:** 8:30 AM

TURNING MOVEMENTS

	Susquehanna From North				Belknap From East				Susquehanna From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
7:00 AM	0	1	2	0	22	9	0	0	2	7	0	0	0	12	22	0	**77**
7:15 AM	3	0	3	2	28	14	1	0	2	10	1	0	1	11	26	1	**100**
7:30 AM	6	0	2	0	43	9	1	0	1	9	0	0	1	32	35	0	**139**
7:45 AM	4	0	3	0	53	27	6	0	7	6	1	0	0	33	28	1	**168**
8:00 AM	5	0	2	0	23	19	0	0	2	7	1	0	2	14	16	0	**91**
8:15 AM	3	1	3	0	17	15	0	0	1	3	0	0	0	17	8	1	**68**
TOTAL	**21**	**2**	**15**	**2**	**186**	**93**	**8**	**0**	**15**	**42**	**3**	**0**	**4**	**119**	**135**	**3**	**643**

Total Peds: **5**

Susquehanna From North

			% Breakdown for each Movement				Exiting to the North	
7:00 AM	3	8%				% of Total		
7:15 AM	6	16%			% of LEG	INTERSECTION		
7:30 AM	8	21%						
7:45 AM	7	18%	Total Right:	21	55.3%	3.3%		
8:00 AM	7	18%	Total Thru:	2	5.3%	0.3%	Exiting North:	363
8:15 AM	7	18%	Total Left:	15	39.5%	2.3%	Intersection Total:	643
	38			**38**	100%	**5.9%**		**56%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
7:00 AM	31	11%				% of Total		
7:15 AM	43	15%			% of LEG	INTERSECTION		
7:30 AM	53	18%						
7:45 AM	86	30%	Total Right:	186	64.8%	28.9%		
8:00 AM	42	15%	Total Thru:	93	32.4%	14.5%	Exiting East:	149
8:15 AM	32	11%	Total Left:	8	2.8%	1.2%	Intersection Total:	643
	287			**287**	100%	**44.6%**		**23%**

Susquehanna From South

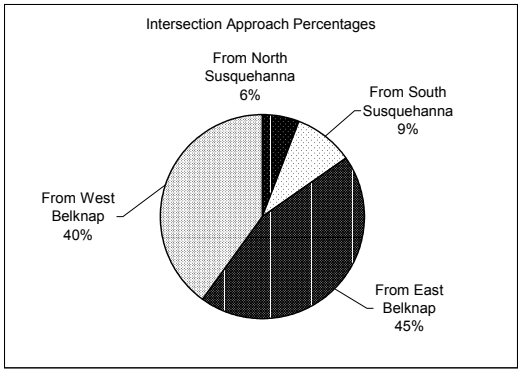
			% Breakdown for each Movement				Exiting to the South	
7:00 AM	9	15%				% of Total		
7:15 AM	13	22%			% of LEG	INTERSECTION		
7:30 AM	10	17%						
7:45 AM	14	23%	Total Right:	15	25.0%	2.3%		
8:00 AM	10	17%	Total Thru:	42	70.0%	6.5%	Exiting South:	14
8:15 AM	4	7%	Total Left:	3	5.0%	0.5%	Intersection Total:	643
	60			**60**	100%	**9.3%**		**2%**

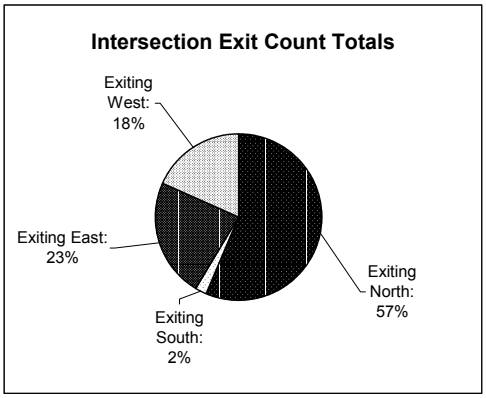
Belknap From West

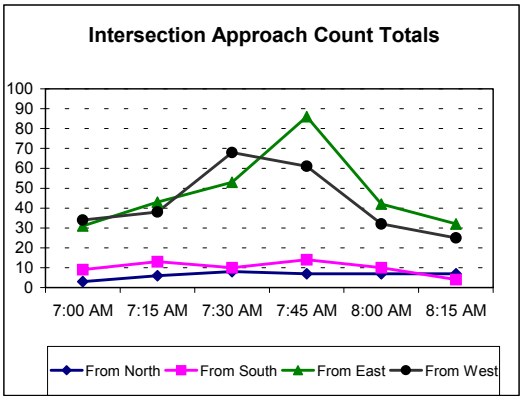
			% Breakdown for each Movement				Exiting to the West	
7:00 AM	34	13%				% of Total		
7:15 AM	38	15%			% of LEG	INTERSECTION		
7:30 AM	68	26%						
7:45 AM	61	24%	Total Right:	4	1.6%	0.6%		
8:00 AM	32	12%	Total Thru:	119	46.1%	18.5%	Exiting West:	117
8:15 AM	25	10%	Total Left:	135	52.3%	21.0%	Intersection Total:	643
	258			**258**	100%	**40.1%**		**18%**

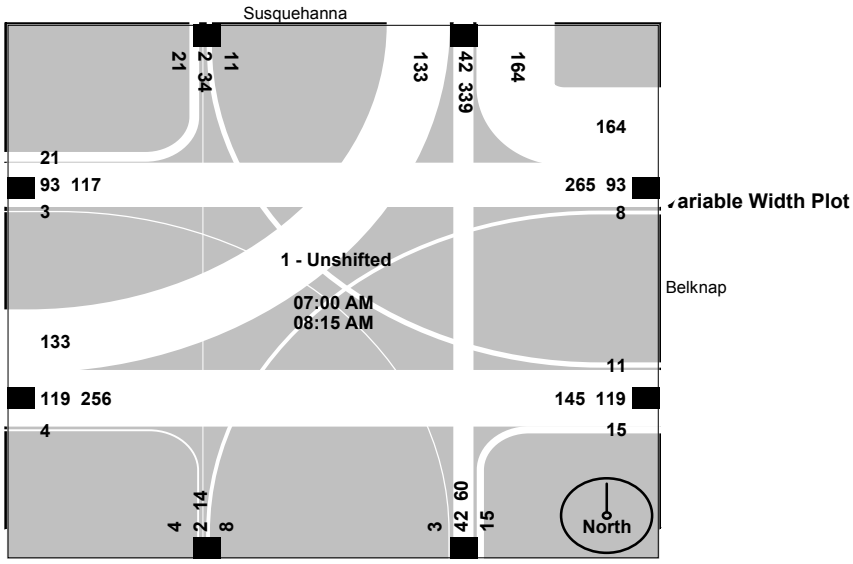
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Susquehanna From North	23	15	38	4%	2%	6%
Susquehanna From South	57	3	60	9%	0%	9%
Belknap From East	279	8	287	43%	1%	45%
Belknap From West	123	135	258	19%	21%	40%
	482	**161**	**643**	**75%**	**25%**	**100%**


Intersection Approach Percentages
From North Susquehanna 6%
From South Susquehanna 9%
From West Belknap 40%
From East Belknap 45%


Intersection Exit Count Totals
Exiting West: 18%
Exiting East: 23%
Exiting North: 57%
Exiting South: 2%


Intersection Approach Count Totals
100
90
80
70
60
50
40
30
20
10
0
7:00 AM
7:15 AM
7:30 AM
7:45 AM
8:00 AM
8:15 AM
From North
From South
From East
From West


Susquehanna
21
2 34
11
133
42 339
164
164
21
93 117
3
265 93
8
ariable Width Plot
1 - Unshifted
07:00 AM
08:15 AM
Belknap
133
11
119 256
4
145 119
15
4
14
2
8
3
60
24
15
North

North/South Leg: ***Susquehanna*** **Date:** 9/4/02

East/West Leg: ***Belknap*** **Start Time:** 4:00 PM **End Time:** 5:30 PM

TURNING MOVEMENTS

	Susquehanna From North				Belknap From East				Susquehanna From South				Belknap From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
4:00 PM	7	4	19	1	25	54	12	1	5	3	0	0	2	24	14	0	**169**
4:15 PM	9	2	5	0	25	44	7	0	4	5	1	0	0	33	26	1	**161**
4:30 PM	6	0	13	0	29	48	4	2	1	4	0	1	4	36	14	2	**159**
4:45 PM	5	0	7	0	23	52	7	0	2	5	1	1	0	27	14	1	**143**
5:00 PM	7	0	3	0	31	58	2	1	2	3	0	0	1	26	13	2	**146**
5:15 PM	7	0	5	0	16	48	4	0	1	6	0	0	0	27	14	0	**128**
TOTAL	**41**	**6**	**52**	**1**	**149**	**304**	**36**	**4**	**15**	**26**	**2**	**2**	**7**	**173**	**95**	**6**	**906**

Total Peds: **13**

Susquehanna From North

			% Breakdown for each Movement				Exiting to the North	
4:00 PM	30	30%				% of Total		
4:15 PM	16	16%			% of LEG	INTERSECTION		
4:30 PM	19	19%						
4:45 PM	12	12%	Total Right:	41	41.4%	4.5%		
5:00 PM	10	10%	Total Thru:	6	6.1%	0.7%	Exiting North:	270
5:15 PM	12	12%	Total Left:	52	52.5%	5.7%	Intersection Total:	906
	99			**99**	100%	**10.9%**		**30%**

Belknap From East

			% Breakdown for each Movement				Exiting to the East	
4:00 PM	91	19%				% of Total		
4:15 PM	76	16%			% of LEG	INTERSECTION		
4:30 PM	81	17%						
4:45 PM	82	17%	Total Right:	149	30.5%	16.4%		
5:00 PM	91	19%	Total Thru:	304	62.2%	33.6%	Exiting East:	240
5:15 PM	68	14%	Total Left:	36	7.4%	4.0%	Intersection Total:	906
	489			**489**	100%	**54.0%**		**26%**

Susquehanna From South

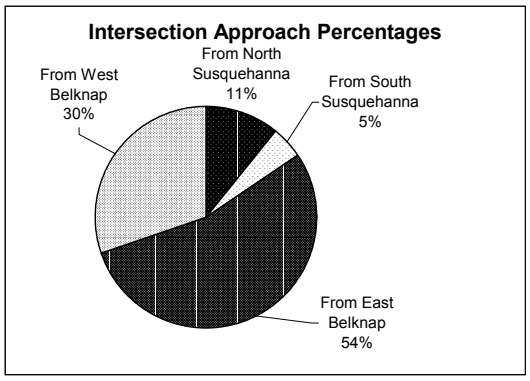
			% Breakdown for each Movement				Exiting to the South	
4:00 PM	8	19%				% of Total		
4:15 PM	10	23%			% of LEG	INTERSECTION		
4:30 PM	5	12%						
4:45 PM	8	19%	Total Right:	15	34.9%	1.7%		
5:00 PM	5	12%	Total Thru:	26	60.5%	2.9%	Exiting South:	49
5:15 PM	7	16%	Total Left:	2	4.7%	0.2%	Intersection Total:	906
	43			**43**	100%	**4.7%**		**5%**

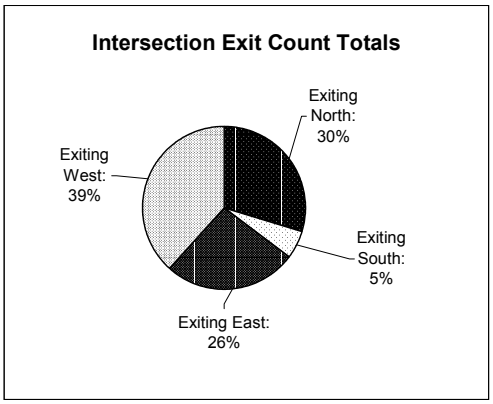
Belknap From West

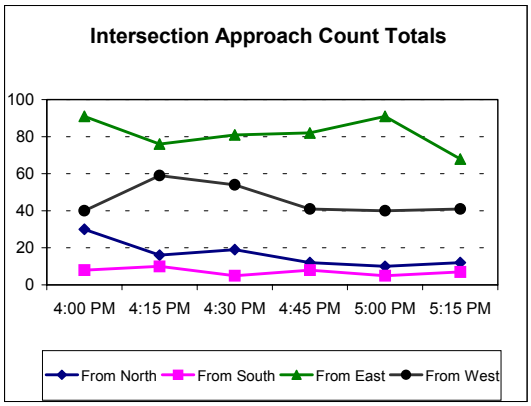
			% Breakdown for each Movement				Exiting to the West	
4:00 PM	40	15%				% of Total		
4:15 PM	59	21%			% of LEG	INTERSECTION		
4:30 PM	54	20%						
4:45 PM	41	15%	Total Right:	7	2.5%	0.8%		
5:00 PM	40	15%	Total Thru:	173	62.9%	19.1%	Exiting West:	347
5:15 PM	41	15%	Total Left:	95	34.5%	10.5%	Intersection Total:	906
	275			**275**	100%	**30.4%**		**38%**

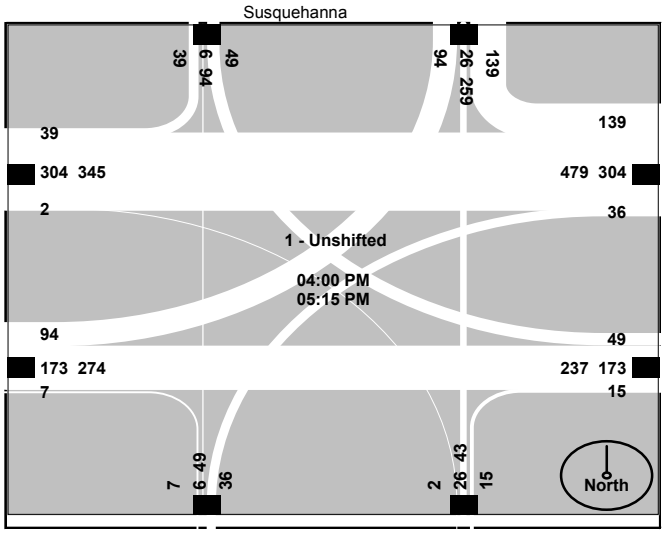
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Susquehanna From North	47	52	99	5%	6%	11%
Susquehanna From South	41	2	43	5%	0%	5%
Belknap From East	453	36	489	50%	4%	54%
Belknap From West	180	95	275	20%	10%	30%
	721	**185**	**906**	**80%**	**20%**	**100%**









ariable Width Plot

North/South Leg: ***Tower*** **Date:** 9/3/02

East/West Leg: ***Winter*** **Start Time:** 12:00 PM **End Time:** 1:30 PM

TURNING MOVEMENTS

	Tower From North				Winter From East				Tower From South				Winter From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	**Total**
12:00 PM	0	1	0	0	0	0	2	0	0	1	0	0	0	1	0	0	**5**
12:15 PM	2	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	**6**
12:30 PM	0	1	0	0	0	0	1	0	0	3	0	0	0	0	0	0	**5**
12:45 PM	4	0	1	0	1	1	1	0	0	1	0	0	0	1	0	0	**10**
1:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	**2**
1:15 PM	3	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	**7**
TOTAL	**9**	**4**	**1**	**0**	**1**	**2**	**7**	**0**	**0**	**8**	**1**	**0**	**0**	**2**	**0**	**0**	**35**

Total Peds: **0**

Tower From North

			% Breakdown for each Movement				Exiting to the North	
12:00 PM	1	7%				% of Total		
12:15 PM	4	29%			% of LEG	INTERSECTION		
12:30 PM	1	7%						
12:45 PM	5	36%	Total Right:	9	64.3%	25.7%		
1:00 PM	0	0%	Total Thru:	4	28.6%	11.4%	Exiting North:	9
1:15 PM	3	21%	Total Left:	1	7.1%	2.9%	Intersection Total:	35
	14			**14**	100%	**40.0%**		**26%**

Winter From East

			% Breakdown for each Movement				Exiting to the East	
12:00 PM	2	20%				% of Total		
12:15 PM	1	10%			% of LEG	INTERSECTION		
12:30 PM	1	10%						
12:45 PM	3	30%	Total Right:	1	10.0%	2.9%		
1:00 PM	0	0%	Total Thru:	2	20.0%	5.7%	Exiting East:	3
1:15 PM	3	30%	Total Left:	7	70.0%	20.0%	Intersection Total:	35
	10			**10**	100%	**28.6%**		**9%**

Tower From South

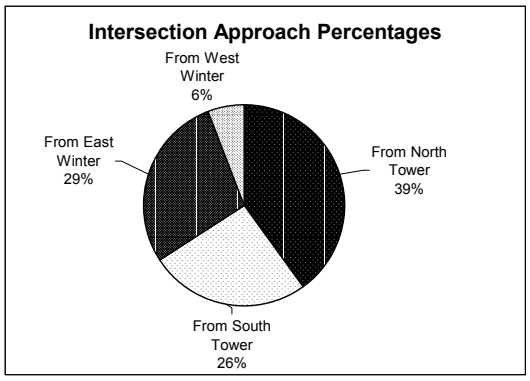
			% Breakdown for each Movement				Exiting to the South	
12:00 PM	1	11%				% of Total		
12:15 PM	1	11%			% of LEG	INTERSECTION		
12:30 PM	3	33%						
12:45 PM	1	11%	Total Right:	0	0.0%	0.0%		
1:00 PM	2	22%	Total Thru:	8	88.9%	22.9%	Exiting South:	11
1:15 PM	1	11%	Total Left:	1	11.1%	2.9%	Intersection Total:	35
	9			**9**	100%	**25.7%**		**31%**

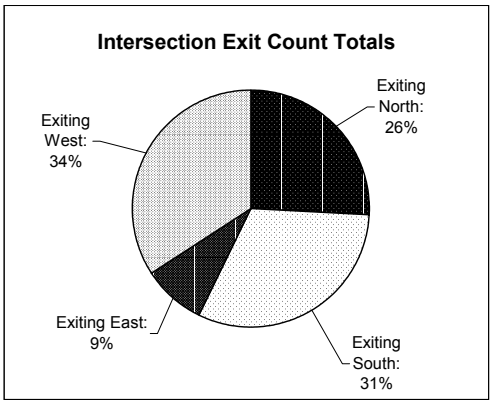
Winter From West

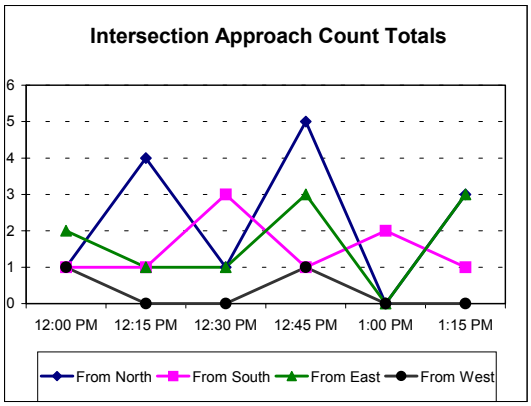
			% Breakdown for each Movement				Exiting to the West	
12:00 PM	1	50%				% of Total		
12:15 PM	0	0%			% of LEG	INTERSECTION		
12:30 PM	0	0%						
12:45 PM	1	50%	Total Right:	0	0.0%	0.0%		
1:00 PM	0	0%	Total Thru:	2	100.0%	5.7%	Exiting West:	12
1:15 PM	0	0%	Total Left:	0	0.0%	0.0%	Intersection Total:	35
	2			**2**	100%	**5.7%**		**34%**

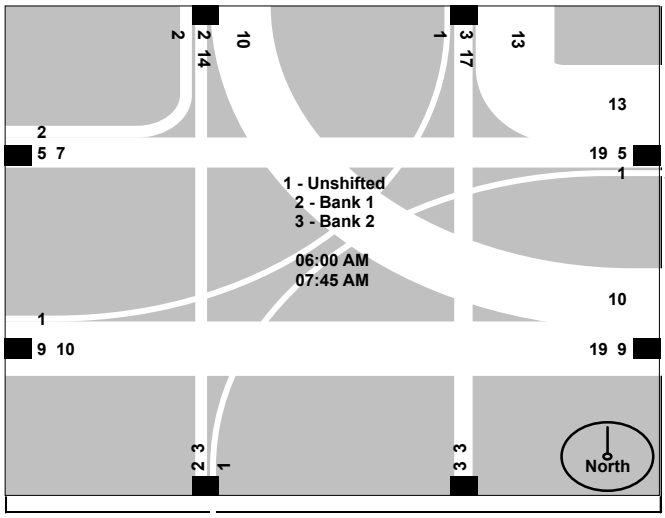
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Tower From North	13	1	14	37%	3%	40%
Tower From South	8	1	9	23%	3%	26%
Winter From East	3	7	10	9%	20%	29%
Winter From West	2	0	2	6%	0%	6%
	26	**9**	**35**	**74%**	**26%**	**100%**









Variable Width Plot

North/South Leg: ***Tower*** **Date:** 9/11/02

East/West Leg: ***Winter*** **Start Time:** 3:45 PM **End Time:** 5:15 PM

TURNING MOVEMENTS

	Tower From North				Winter From East				Tower From South				Winter From West				
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Total
3:45 PM	1	0	0	0	0	0	1	0	0	2	0	0	1	0	1	0	**6**
4:00 PM	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	**6**
4:15 PM	2	0	0	0	0	1	0	0	1	0	0	0	0	2	1	0	**7**
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	**4**
4:45 PM	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	**4**
5:00 PM	1	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	**5**
TOTAL	**10**	**1**	**1**	**0**	**0**	**2**	**1**	**0**	**1**	**3**	**0**	**0**	**1**	**8**	**4**	**0**	**32**

Total Peds: **0**

Tower From North

			% Breakdown for each Movement				Exiting to the North	
3:45 PM	1	8%			% of LEG	% of Total INTERSECTION		
4:00 PM	4	33%						
4:15 PM	2	17%						
4:30 PM	1	8%	Total Right:	10	83.3%	31.3%		
4:45 PM	2	17%	Total Thru:	1	8.3%	3.1%	Exiting North:	7
5:00 PM	2	17%	Total Left:	1	8.3%	3.1%	Intersection Total:	32
	12			**12**	100%	**37.5%**		**22%**

Winter From East

			% Breakdown for each Movement				Exiting to the East	
3:45 PM	1	33%			% of LEG	% of Total INTERSECTION		
4:00 PM	0	0%						
4:15 PM	1	33%						
4:30 PM	1	33%	Total Right:	0	0.0%	0.0%		
4:45 PM	0	0%	Total Thru:	2	66.7%	6.3%	Exiting East:	10
5:00 PM	0	0%	Total Left:	1	33.3%	3.1%	Intersection Total:	32
	3			**3**	100%	**9.4%**		**31%**

Tower From South

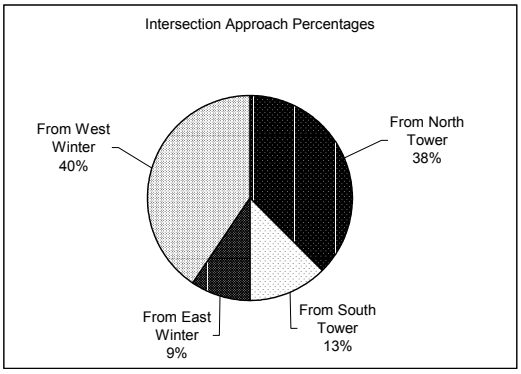
			% Breakdown for each Movement				Exiting to the South	
3:45 PM	2	50%			% of LEG	% of Total INTERSECTION		
4:00 PM	0	0%						
4:15 PM	1	25%						
4:30 PM	0	0%	Total Right:	1	25.0%	3.1%		
4:45 PM	1	25%	Total Thru:	3	75.0%	9.4%	Exiting South:	3
5:00 PM	0	0%	Total Left:	0	0.0%	0.0%	Intersection Total:	32
	4			**4**	100%	**12.5%**		**9%**

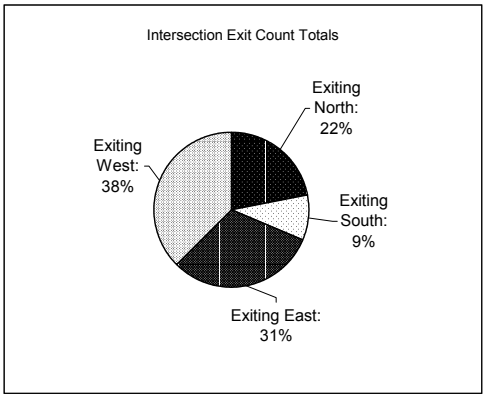
Winter From West

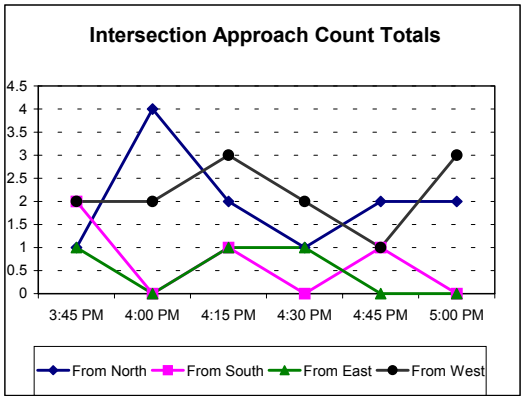
			% Breakdown for each Movement				Exiting to the West	
3:45 PM	2	15%			% of LEG	% of Total INTERSECTION		
4:00 PM	2	15%						
4:15 PM	3	23%						
4:30 PM	2	15%	Total Right:	1	7.7%	3.1%		
4:45 PM	1	8%	Total Thru:	8	61.5%	25.0%	Exiting West:	12
5:00 PM	3	23%	Total Left:	4	30.8%	12.5%	Intersection Total:	32
	13			**13**	100%	**40.6%**		**38%**

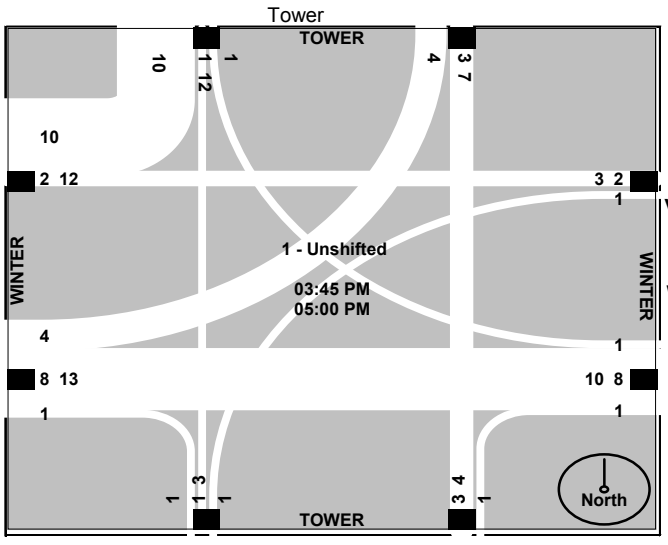
SUMMARY

	Traffic			Traffic Percentage		
	R/Thru	Left	Total	R/Thru	Left	Total
Tower From North	11	1	12	34%	3%	38%
Tower From South	4	0	4	13%	0%	13%
Winter From East	2	1	3	6%	3%	9%
Winter From West	9	4	13	28%	13%	41%
	26	**6**	**32**	**81%**	**19%**	**100%**


Intersection Approach Percentages
From West Winter 40%
From North Tower 38%
From East Winter 9%
From South Tower 13%


Intersection Exit Count Totals
Exiting North: 22%
Exiting West: 38%
Exiting South: 9%
Exiting East: 31%


Intersection Approach Count Totals
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3:45 PM
4:00 PM
4:15 PM
4:30 PM
4:45 PM
5:00 PM
From North
From South
From East
From West


Tower
TOWER
WINTER
WINTER
1 - Unshifted
03:45 PM
05:00 PM
TOWER
North
Winter

Sources of Information

Tomorrow's Transportation 2025 – MIC, 2001

Transit Vision – MIC & DTA, 1996

DTA Comprehensive Operations Analysis and Downtown Interaction Study, 2003

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Wisconsin State Pedestrian Policy Plan 2020 - WisDOT

Miller Hill Corridor Traffic Study – MIC, 1995

Trunk Highway 53/194 Hermantown Access Management Plan – MIC, 1999

Miller Trunk Highway Implementation Plan – MnDOT, SEH, MIC, City of Duluth, City of Hermantown, St. Louis County, 2003

City of Superior Thoroughfare Plan – MIC, 1999

Duluth – Superior Truck Route Study – MIC, 2001

Superior Sidewalk Inventory Appendix – Buffer Analysis of Key Preservation Areas – MIC, 2002

Duluth – Superior Metropolitan Bikeways Plan – MIC, 1994

Lake Avenue Transportation Plan – MIC, 2003

Downtown Superior Parking Study – MIC, 2003

Public Involvement Plan – MIC, 2002

Manual on Uniform Traffic Control Devices – Federal Highway Administration, 2001