

# Scott County Highway 21 Corridor Study

Prior Lake, Minnesota

June 2005



# **Final Report**

## ***Scott County Highway 21 Corridor Study***

Prior Lake, Minnesota

Prepared By:



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SEH No. A-SCOTT0304.00

June, 2005

# **Scott County Highway 21 Corridor Study**

## **Approved By:**

City of Prior Lake per City Council Resolution No. 05-69 on April 18, 2005

Scott County per County Board Resolution No. 2005-044 on May 3, 2005

Minnesota Department of Transportation letter of support dated May 5, 2005

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**RESOLUTION 05-69**

**RESOLUTION ACCEPTING THE  
SCOTT COUNTY HIGHWAY 21 CORRIDOR STUDY**

**MOTION BY: Zieska                      SECONDED BY: LeMair**

**WHEREAS,** the County and City identified the need for a long range concept plan for the County Highway 21 corridor between CH 82 and CH 87 within the City of Prior Lake, and the County contracted with a consultant to complete the study, and

**WHEREAS,** the Study identifies a recommended alternative for Highway 21 through Prior Lake (combination of Concepts W1 on the west end, D4 in the downtown area, and a general 4-lane concept and subalternative Concepts F5 and A1 on the east); and,

**WHEREAS,** the recommended alternative identified in the Study Report provides safety improvements for local and regional vehicular trips within the Highway 21 Corridor and enhances safety for pedestrians and bicyclists using local crosswalks and trails along Highways 21 and 13; and,

**WHEREAS,** the recommended alternative in the Study Report has received support as the best plan to serve the long-term transportation needs in Prior Lake.

**NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF PRIOR LAKE, MINNESOTA,** that

1. The recitals set forth above are incorporated herein.
2. The City Council hereby accepts the Study Report as submitted.

**Passed and adopted this 18th day of April, 2005.**

	YES		NO
Fleming	X	Fleming	
Haugen	X	Haugen	
LeMair	X	LeMair	
Petersen	X	Petersen	
Zieska	X	Zieska	

Seal}

  
 \_\_\_\_\_  
 Frank Boyles, City Manager

**BOARD OF COUNTY COMMISSIONERS  
SCOTT COUNTY, MINNESOTA**

<b>Date:</b>	May 3, 2005
<b>Resolution No.:</b>	2005-044
<b>Motion by Commissioner:</b>	Wagner
<b>Seconded by Commissioner:</b>	Marschall

**RESOLUTION NO. 2005-044; ACCEPTING THE CSAH 21 STUDY AND  
ESTABLISHING CORRIDORS FOR RIGHT OF WAY PRESERVATION**

WHEREAS, residential and commercial development is occurring within the City of Prior Lake as well as in surrounding communities; and

WHEREAS, it is the responsibility of the City of Prior Lake and Scott County to plan for and develop a transportation system that supports the anticipated development; and

WHEREAS, it is the responsibility of the City and County to evaluate the existing needs of the transportation system as well as plan for future transportation needs; and

WHEREAS, safety and operational issues in the area of the County Highway 21 and Trunk Highway 13 intersection prompted the need to develop a long-term plan for County Highway 21; and

WHEREAS, the County and City recognized that affected and interested parties should participate in a corridor study; and

WHEREAS, the intent of the study was to identify a vision for County Highway 21 from County Highway 82 to County Highway 87 that safely and efficiently provides access and mobility for the traveling public, minimizes environmental, cultural and historical area impacts, and coordinates best with existing and expected future land uses; and

WHEREAS, the public was asked to become involved in the study through three (3) open houses, four (4) targeted area workshops and many meetings with individuals and groups of property owners; and

WHEREAS, the Study Report identifies a vision for County Highway 21 through Prior Lake; and,

WHEREAS, the recommended alternative identified in the Study Report identifies a vision that will allow the City, County, and State to address existing and future operational and safety issues along the County Highway 21 Corridor ; and,

**BOARD OF COUNTY COMMISSIONERS  
SCOTT COUNTY, MINNESOTA**

Date:	May 3, 2005
Resolution No.:	2005-044
Motion by Commissioner:	Wagner
Seconded by Commissioner:	Marschall

WHEREAS, the recommended alternative in the Study Report was developed as the best plan to serve the long-term transportation needs in Prior Lake through input and participation from the following groups:

- A Project Management Team comprised of representatives from Scott County, the City of Prior Lake, Mn/DOT, and the Prior Lake-Spring Lake Watershed District;
- A Prior Lake Citizen's Advisory Committee; and,
- Those who live and work in the area of County Highway 21; and
- The general public.

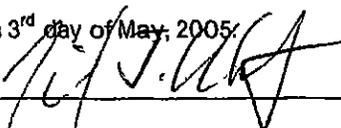
NOW THEREFORE BE IT RESOLVED by the Board of Commissioners in and for the County of Scott, that it hereby accepts the CH 21 Corridor Study and its recommendations.

COMMISSIONERS	VOTE			
Wagner	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Absent	<input type="checkbox"/> Abstain
Vogel	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Absent	<input type="checkbox"/> Abstain
Hennen	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Absent	<input type="checkbox"/> Abstain
Marschall	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Absent	<input type="checkbox"/> Abstain
Ulrich	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Absent	<input checked="" type="checkbox"/> Abstain

**State of Minnesota)  
County of Scott )**

I, David J. Unmacht, duly appointed qualified and County Administrator for the County of Scott, State of Minnesota, do hereby certify that I have compared the foregoing copy of a resolution with the original minutes of the proceedings of the Board of County Commissioners, Scott County, Minnesota, at their session held on the 3<sup>rd</sup> day of May, 2005 now on file in my office, and have found the same to be a true and correct copy thereof.

Witness my hand and official seal at Shakopee, Minnesota, this 3<sup>rd</sup> day of May, 2005.

  
\_\_\_\_\_

County Administrator  
Administrator's Designer



Minnesota Department of Transportation

Metropolitan Division

Waters Edge  
1500 West County Road B2  
Roseville, MN 55113

May 5, 2005

Lezlie Vermillion  
Scott County Public Works Director  
600 County Trail East  
Jordon, MN 55352-9339

Re: Mn/DOT Endorsement of Findings  
Scott County Highway 21 Corridor Study

Dear Lezlie,

We appreciate the opportunity given to Mn/DOT to provide input into this study as it relates to the intersection of Trunk Highway (TH) 13 and County State Aid Highway (CSAH) 21 in Prior Lake. The recommended changes will improve the safety and capacity of both CSAH 21 and the TH 13 connection. We would like to identify a few points in the study that we feel are key to the function of TH 13 at the intersection of CSAH 21 and at other nearby access points.

1. Forecast growth indicates that improvements to TH 13 will be needed, in terms of expansion to 4 lanes and dual left turn lanes at the intersection of CSAH 21. This is being shown as a need based on performance targets for this type of roadway in the Mn/DOT Metro District's Draft 2004 Transportation System Plan. However, given current levels of transportation funding, it is not being shown as a funded project in the fiscally constrained plan.
2. Considering the access challenges at this quadrant, MnDOT supports the access at Dakota Ave. remaining as right-in/right-out assuming that the CSAH 21/Main Street access is also reduced to right-in/right-out. This right-in/right out condition at Dakota Ave. could remain as long as a crash problem due to this access does not develop.
3. Mn/DOT supports the  $\frac{3}{4}$  access off of TH 13 at Pleasant St. while limiting the CSAH 21/Main St. access to right-in/right-out. However, we have concerns that the soils in this area may present challenges in constructing this access as proposed.

Again, we would like to thank you for taking the initiative to conduct this study, and allowing Mn/DOT to provide input into the needs for TH 13, while meeting the needs for the travelers on CSAH 21 and the citizens and businesses of Prior Lake.

Sincerely,

A handwritten signature in cursive script that reads "Lisa Freese".

Lisa J. Freese, AICP

Mn/DOT South Metro Area Manager

Cc: Bud Osmundson, Prior Lake  
Brian Sorenson, Scott County  
Scott County Highway 21 Project Management Team

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## Executive Summary

### Background and Purpose of Study

Scott County, in cooperation with the City of Prior Lake, initiated this study to address existing and future safety and operational issues on Scott County State Aid Highway 21 (“County Highway 21” or “CH 21”) from CH 82 to County Road (CR) 87, in Prior Lake. The goal of the study is to develop a long term vision, or plan, for CH 21 that defines long term right of way needs and establishes an access plan that provides safety and operational improvements simultaneously with reasonable accessibility for residents, businesses and their customers. Acceptance of the “plan” by the City and the County will allow the investment of public dollars for infrastructure improvements to be made, right of way within the corridor to be preserved, and will allow for private development initiatives with setbacks and accesses configured in accordance with the long term plan.

Scott County State Aid Highway 21 (“County Highway 21” or “CH 21”) is one of only a few east west minor arterial routes traversing central Scott County. As a minor arterial, CH 21’s “mobility” function is to serve trips between communities and to provide connections to other minor and principal arterial routes in the regional roadway network. While providing the “mobility” function, the minor arterial should also serve “access” needs of communities through the corridor. In practice, mobility and access often compete against one another. High levels of access, or poorly located access points tend to reduce safety and mobility. This conflict became the single most important issue addressed within the study area. Of specific concern is the desire to improve safety and traffic operations along CH 21 while maintaining a reasonable level of accessibility to Prior Lake’s central business district.

The study area extends 2.75 miles from Highland Avenue on the west to CR 87/Revere Way on the east. Throughout this area, CH 21 is currently a four lane undivided roadway without exclusive left or right turn lanes. Prior Lake’s central business district is situated near the mid-point of the study corridor adjacent to the intersection of CH 21 with Minnesota Trunk Highway 13 (TH 13). Posted speeds on CH 21 west of TH 13 range from 35 mph to 40 mph while posted speeds east of TH 13 are 50 mph. Left turn safety is a key concern throughout the study area. TH 13 is a two lane highway serving north-south traffic demands through the downtown area. Safety and capacity at the intersection of CH 21 and TH 13 is a key issue for the study area. Access to/from TH 13 at Dakota Avenue and Pleasant Avenue is also an important study issue.

Population, housing and employment growth forecasts through 2025 for Scott County and Prior Lake are expected to double the existing traffic demands through the study corridor. To serve the increasing demand, Scott County is planning for roadway capacity improvements on several roadway segments connecting to CH 21. CH 21 between CH 27 and I-35W is being expanded from two lanes to four lanes. CH 82 (intersects CH 21 near the north end of the study area) is planned for expansion from two lanes to four lanes between CH 21 and CH 17. CH 21 from CH 82 to CH 42 is a four lane divided roadway. Scott County is engaged in an EIS for potential extension of CH 21 from CH 42 to CH 18. The current undivided four lane configuration of CH 21 in Prior Lake is inconsistent with the planned divided four lane configuration of connecting roadway segments. This inconsistency may contribute to exacerbation of existing safety and operational issues within the corridor.

### Study Team and Public Involvement

The study process has been steered by a Project Management Team (PMT) which has been lead by Scott County, facilitated by their consultant, SEH, Inc., with active representation from the City of Prior Lake, Mn/DOT and the Prior-Lake Spring Lake Watershed District.

Public involvement for the study process was designed to reach out to the community to generate responses and to establish a continuous dialogue with representatives most concerned about potential changes. A Citizen’s Advisory Committee (CAC) was formed which included five downtown area business owners and two residential property owners. In addition, elected officials participated on the CAC including the Mayor of

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Prior Lake and the Scott County Commissioner representing the area. The role of the CAC was to identify study-related issues, comment on potential solutions brought forward by the PMT and to serve as liaisons to other property owners. Public involvement efforts beyond the CAC included three open houses, four targeted area workshops and many meetings with individual and groups of property owners. Meetings were held in the issue identification phase, the concept evaluation phase and the preferred alternative selection phase of the study process. Distinct issues arose related to proposed changes or impacts within the corridor based upon the roadway segment.

### **Corridor Issues and Findings**

The most important issues learned from the public or resulting from alternatives evaluation are described for each sub-area as follows:

#### **West End (Highland Avenue to Duluth Avenue)**

- Area is generally residential; neighbors expressed preferences to route traffic, especially trucks, elsewhere.
- Residents felt that actual vehicular speeds, especially through curves on CH 21, are too high. The posted speed limit is 35 mph. Warning signs are posted through the curves advising a 30 mph speed.
- Replacement of the 15 year old Wagon Bridge would be necessary to treat entire segment uniformly. Bridge replacement could be deferred until its condition warrants replacement.
- Multiple driveways provide access to the Wagon Bridge peninsula area. Most have sight line / safety issues making it desirable to combine accesses to safe locations.
- Limited parking opportunities near the DNR fishing pier and the bridge channel generate pedestrian crossings of CH 21 at multiple and unexpected locations.
- Some residential uses (driveways and garages) on Eagle Creek Boulevard west of Lakeside Avenue (frontage road paralleling CH 21) encroach in public right of way. Residents expressed concern for roadway widening and a desire to maintain a physical buffer from traffic. In addition, reducing the number of accesses along this segment is desirable for roadway safety.

#### **Downtown Area (Duluth Avenue to Franklin Trail)**

- The all-way stop at Main Avenue operates in close proximity to the traffic signal at TH 13. This situation affects the behavior of drivers in both directions on CH 21 generating unexpected stops, roll through stops, and other driver behaviors that result in vehicular conflicts that degrade intersection safety.
- Some downtown business owners fear that altering access at Main Avenue would negatively impact the viability of their business. Concern has been expressed for convenient vehicular access and for pedestrian crossing safety.
- Access from TH 13 to Dakota Street and Pleasant Street is highly valued by businesses served – especially those with highest visibility.
- Safety and capacity needs on CH 21 can be met without adding through-lanes. Turn lanes are desirable for safety and would add capacity by reducing delays at intersections.
- Forecast growth on TH 13 indicates the need for an additional through lane in each direction on TH 13. This is being shown as a need based on performance targets for this type of roadway in the

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Mn/DOT Metro District's 2004 Transportation System Plan. However, given current levels of transportation funding, it is not being shown as a funded project in their fiscally constrained plan.

- Double left turn lanes from CH 21 to TH 13 require that two lanes be provided on TH 13 going away from the CH 21 intersection in both directions. TH 13/CH 21 intersection operations require that two through-lanes be provided on all approaches to the intersection to reduce delays.
- The width of CH 21 needed at the TH 13 intersection impacts commercial property on the southwest corner of intersection and residential property in the northeast quadrant. Impacts to both quadrants cannot be avoided, but should be minimized to avoid total takes.
- CH 21 with a signalized access at Arcadia Avenue performs better in conjunction with the signal at TH 13 than does a situation with a signal at Main Avenue and at TH 13 providing the following advantages:
  - Lower vehicle delays on CH 21 and on TH 13 result in acceptable corridor level of service and a higher vehicular capacity.
  - Improved safety through longer spacing between full access intersections.
  - Shorter vehicle queues on Main Avenue. Fewer blockages of driveways, alleys or streets near CH 21.
  - Reduced interference with angle parking in front of businesses on Main Avenue.

#### **East End Area (Franklin Trail to CR 87/Revere Way)**

- Higher posted speeds (50 mph) east of TH 13 were raised as an issue by the public.
- Credit River Road residents west of Franklin Trail generally agree that loss of left turn access from CH 21 would be desirable compared to loss of homes that would be necessary to connect Credit River Road to Franklin Trail.
- The Franklin Trail intersection has experienced crashes that may be remedied with turn lanes and left turn arrows on CH 21.
- The Fish Point Road intersection should have left turn lanes to improve safety and a traffic signal to reduce delays.
- Access from CH 21 to Adelman Street to the south is important to businesses served (including Public Works facility). R/W impacts to provide similar access at Adelman to the north make full access undesirable as long as alternative access can be provided.
- 170<sup>th</sup> Street and CR 87/Revere Way are offset across CH 21. 170<sup>th</sup> Street should be realigned to match CR 87. Left turn lanes on CH 21 should be installed. As traffic conditions change, a traffic signal may need to be considered.

#### **Development and Evaluation and of Alternative Concepts**

The PMT developed and evaluated four major concept alternatives for the west end, four distinct alternatives in the downtown area, five east end sub-alternatives near Franklin Trail, three sub-alternatives near Adelman Street, and one sub-alternative each for the Fish Point Road and CR 87 (Revere Way)/170<sup>th</sup> Street intersections. The evaluation process acknowledged all relevant public input from open houses, workshops and included extensive consideration of CAC and downtown business owner concerns regarding access to downtown from both CH 21 and TH 13.

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## Recommended Alternative

The PMT assembled components from each sub-area into a recommended alternative for the entire corridor. The recommended alternatives are included in Appendix J as *Figures J1, J2, J3, and J4*.

- **West End PMT recommendation: Concept W1 and W3**

Concept W1 provides left turn access at major intersections and at minor intersections where reasonable alternative routes are not available. The center median and reduced number of access points reduces vehicular conflict points and improves safety. The 18 foot wide center median provides a pedestrian sanctuary allowing crossings of lanes from only one direction at a time. Concept W1 consolidates the south side access points serving parcels on the Wagon Bridge peninsula eliminating those that have inadequate sight distance. Full implementation of Concept W1 would require expensive replacement of Wagon Bridge. Overall width required from the outside edge of the walk or trail on each side is approximately 96 feet. Right of way widths required will need to be greater than 96 feet to accommodate utilities and to grade slopes appropriately.

Concept W3 retains the existing Wagon Bridge deferring up to \$1 million in cost until its condition requires replacement but still allows for a westbound left turn lane to the consolidated Wagon Bridge peninsula driveways including the Wagon Bridge Marina.

- **Downtown Area PMT recommendation: Concept D4:**

Downtown access from CH 21 is refocused from Main Avenue to the Arcadia Avenue intersection. Arcadia Avenue is re-opened to the south of CH 21. Main Avenue is restricted to right turns in and right turns out only. Realignment of Duluth Avenue from a common intersection with Arcadia could be planned in conjunction with redevelopment of the area.

A new access from northbound TH 13 to westbound Pleasant Street is provided to mitigate loss of access from westbound CH 21 to southbound Main Avenue. Existing right turn access to/from TH 13 at Dakota Street and Pleasant Street is retained.

- **East End Area PMT recommendations:**

Recommendations for the east end include a general concept plus three sub-alternative concepts with specific frontage road accesses, intersection configurations, and/or local street connections.

- **General Concept:** A four lane divided roadway with full access at Franklin Trail, Fish Point Road, and CH 87, and with full access to Adelman Avenue south of CH 21. The concept includes left turn lanes and right turn lanes at each intersection.
- **Sub-alternative Concept F5:** Frontage road and local street connections at Franklin Trail north of CH 21.
- **Sub-alternative Concept A1:** Frontage road and local street connections at Adelman Street north of CH 21. The frontage road would be extended to Fish Point Road and to 170<sup>th</sup> Street where full access to CH 21 would be provided.

The above described recommendations were shared with the CAC in July, 2004. Continued discussion with the CAC identified the need to explore interim operational measures to determine the viability of temporary signalization for access from CH 21 to the downtown area (at Main Avenue or at Arcadia Avenue) coupled with a long term plan to reconfigure the downtown access to be served at Arcadia Avenue. Short term analysis findings are described in the following section.

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## Short Term Operational Analysis Findings

The PMT reported findings of the interim operational concepts in October, 2004 to the CAC. Findings of significance are:

1. Perpetuation of the all-way stop condition at Main Avenue will increase delays and exacerbate existing operational issues on CH 21, TH 13 and on Main Avenue as traffic volumes grow.
2. Temporary signalization of the Main Avenue intersection does not provide operational or safety benefits superior to the all-way stop condition.
  - A temporary signal at Main Avenue would serve today's traffic demands but would increase delays and exacerbate existing operational issues on CH 21, TH 13 and on Main Avenue as traffic volumes grow. Level of Service failure (based upon vehicular delay) would occur within a three year period of traffic growth.
  - A temporary signal at Main Avenue would disrupt on-street parking on Main Avenue and will block access points on Main Avenue within approximately 200 feet of CH 21.
3. A temporary signal at Arcadia would be consistent with conditions that have been recommended as part of the long term solution. However, the following factors that make implementation of this change difficult would need to be considered:
  - Adding left turn lanes on CH 21 at Arcadia at the same time as signalization would be the most effective way to operate the intersection. This would require roadway widening that may not be practical as part of a short term solution.
  - Without left turn lanes on CH 21, a temporary signal at Arcadia would need to operate under "split phase" control serving eastbound and westbound movements independently. This type of operation would serve existing traffic demands and traffic growth but only through approximately 2010.
  - Main Avenue at CH 21 would be restricted to right in and right out only. Businesses in the southwest quadrant of TH 13 and CH 21 are opposed to access restrictions at Main Avenue unless a northbound left turn access from TH 13 to Pleasant can be provided simultaneously. The northbound access cannot be provided without widening on TH 13.
  - Arcadia Avenue south of CH 21 would be reopened to Colorado Street with two northbound lanes. Arcadia Avenue north of CH 21 would need to be widened to allow two southbound lanes approaching CH 21.

Short term or temporary measures considered to improve traffic operations and safety along CH 21 while maintaining acceptable access to the downtown area have not been found to be effective or affordable. Therefore, continued planning for implementation of the long term recommendation appears to be the most practical approach.

## Conclusion

Long term transportation needs in Prior Lake are best served by the recommended alternative for CH 21. The recommended plan provides safety improvements for local and regional vehicular trips within the corridor as well as enhances safety for pedestrians and bicyclists using trails along CH 21 or crossing CH 21 or TH 13.

The plan includes a center median with left turn lanes at major intersections and at minor intersections if reasonable alternative local routes are not available. To maintain safety and operational efficiency with the CH 21 corridor and also on TH 13, the center median would remove left turns to/from CH 21 at Main

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Avenue. The Arcadia intersection would be improved to provide an alternative signalized left turn access location from CH 21 to downtown areas both north and south of CH 21. Additional mitigation for loss of left turn access from CH 21 includes maintaining existing right-in/right-out access points from TH 13 at Dakota Street and at Pleasant Street and revising the intersection of TH 13/Pleasant Street to allow northbound to westbound left turns.

This approved transportation plan for CH 21 allows the City, County and State to be supportive of development proposals that are consistent with it in terms of access, site circulation and building setbacks. The City's 2020 Vision Plan can evolve in concert with implementation of this vision for CH 21.

City, County and State staff now have an agency endorsed plan to support solicitation of funding opportunities and program components of the corridor plan in future Capital Improvement Plans.

City, County and State representatives generally concur that funding constraints will defer the opportunity to implement recommendations made as a part of this study. The following opportunities and constraints related to funding or implementation planning have been identified:

- Improvements to CH 21 through the downtown area are not currently programmed. Unless funding becomes available from outside sources (i.e. Federal appropriation), improvements are not expected to occur prior to 2012.
- The recommended access changes in the downtown area must be implemented simultaneously. The NB access from TH 13 to Pleasant must be in place when left turn access at Main is restricted. Similarly, full access at Arcadia must be in place prior to changes at Main Avenue.
- Operating double left turn lanes from CH 21 would require that TH 13 be expanded near the CH 21 intersection to accept two lanes of turning traffic. Therefore improvements on CH 21 at TH13 should be made in concert with improvements on TH 13.
- Safety and operational improvements on CH 21 at Franklin Trail and at Fish Point Road should be a high priority. The City has included improvements at Fish Point Road in their 2006 - 2010 CIP. Scott County has included a project in their TIP and is actively pursuing avenues to secure a Federal appropriation. The earliest timeframe to deliver a project would be 2007 if funding efforts are successful.
- In recent years there has been roughly \$20 million of public and private investment in the downtown area in the form of new buildings, façade improvements and streetscape improvements. Continued vitality of the downtown requires a roadway system that will be safe and efficient in the long term. Planning recommendations made in the corridor study compliment the investment that has been made in the downtown. Future local investment decisions can be made knowing the future vision for the roadway system.

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# Final Report

## Scott County Highway 21 Corridor Study

Prepared for Scott County Public Works Division in cooperation with the City of Prior Lake

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### 1.0 Introduction

Scott County, in cooperation with the City of Prior Lake, initiated this planning study for Scott County State Aid Highway 21 (“County Highway 21” or “CH 21”) to address existing and future safety and operational issues through the corridor. The study area lies within the City of Prior Lake, shown in **Figure 1**, extending about 2.75 miles from County Highway 82 on the west to County Road 87 on the east.

A tremendous amount of development growth in Scott County is expected over the next twenty years. According to data available on Scott County's website, during the period from 2000 to 2020, Scott County's population is expected to double. Over the same period, the total vehicle miles traveled in the County is expected to grow from 800,000 miles to nearly 1.8 million miles annually. These trends are typical of those predicted in most growing counties in the Twin Cities Metropolitan area. This reality, coupled with known operational issues along CH 21 make it prudent to study this corridor to identify long term needs, preserve right of way and allow community development to occur with confidence that public and private investment will be protected.

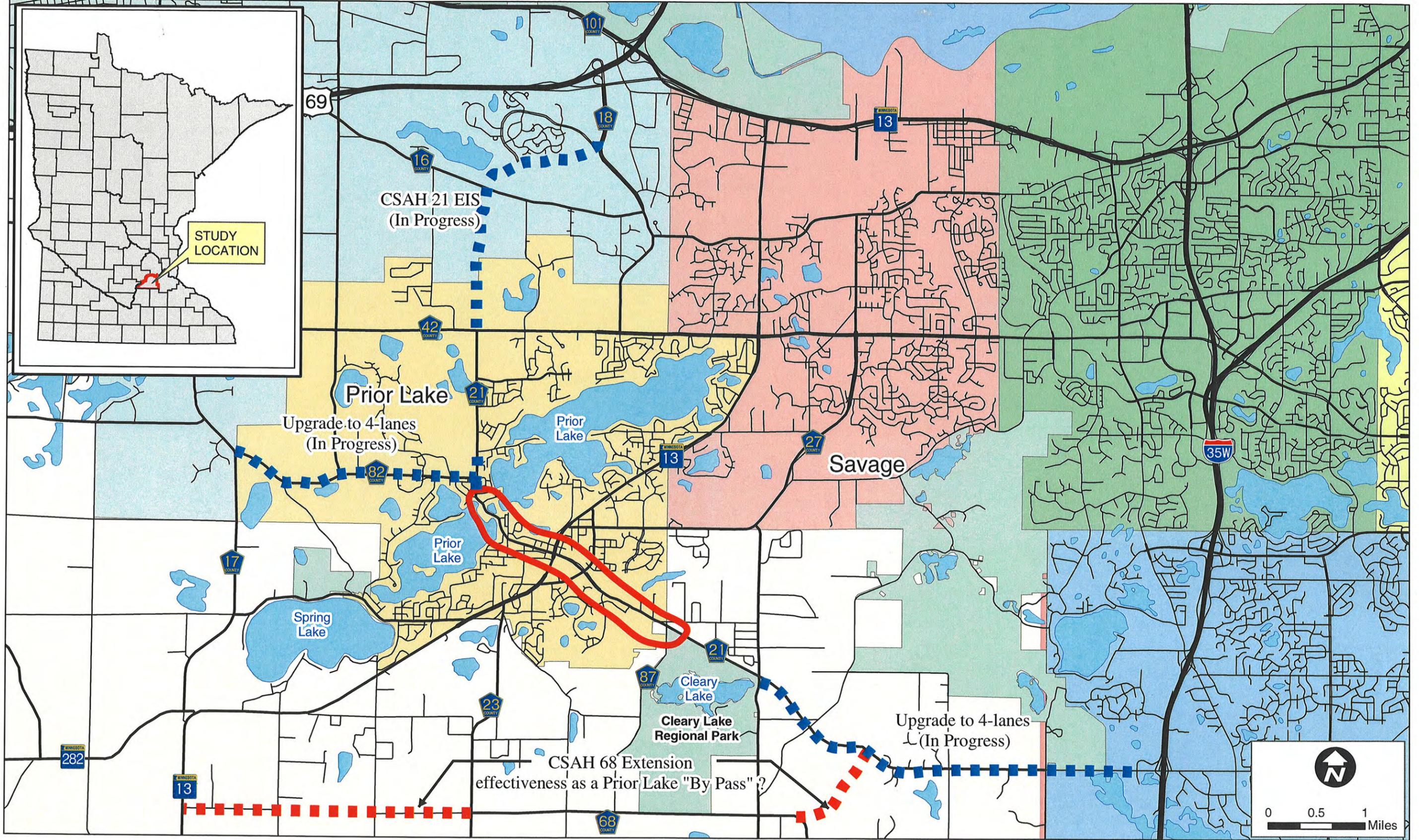
### 1.1 Study Purpose and Need

County Highway 21 is a key transportation corridor through the established Scott County community of Prior Lake. Although Prior and Spring Lakes enhance the desirability of the area for development and significantly add to the local quality of life, their diagonal length also limits the ability of the regional roadway system to function as efficiently as a grid system of arterials and properly spaced collectors would otherwise allow. County Highway 21 and State Trunk Highway 13 form the backbones of the arterial roadway system through Prior Lake, and also function to accommodate the majority of local trips. When mixed with regional traffic, the efficiency of the roadway network has become taxed and its ability to accommodate forecasted traffic growth is limited. In addition, the popularity of downtown Prior Lake as a Scott County regional destination creates the need to

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maximize the competing goals of enhancing a vibrant, thriving commercial core with appropriate capacity, safety and access associated with attracting trips to the area, in addition to managing the regional traffic growth demands and providing the appropriate capacity improvements.

Scott County has partnered with the City of Prior Lake and Mn/DOT to improve County Highway 21's capacity and safety, and better manage its access while being consistent with the City's Vision 2020 plan. The County commissioned SEH to prepare a corridor study to develop a solution for County Highway 21 that would achieve the goals of the study partners.



# C.H. 21 Corridor Study

- Study Area
- ■ ■ Reviewed as part of Study
- ■ ■ Related Projects (not part of this study)

Location Map

Figure 1

## 1.2 Regional Significance

CH 21 is classified in the Metropolitan Council’s Transportation Plan as a Minor Arterial roadway. The function of a minor arterial is to provide mobility for traffic with regional destinations, usually serving trips of several miles or more (i.e. community to community trips), and to provide access to/from collector streets within those communities to the regional roadway network. CH 21 provides this function, but also serves many local trips within the City of Prior Lake. Geographic constraints such as lakes, parks and densely developed areas in central Scott County limit the number of corridors that can effectively serve the regional traffic demand. Therefore, long term solutions for CH 21 will need to balance the access needs of the community with the transportation needs of the region. Figure 1 – Regional Map

Regional growth has been identified as a reality affecting long term transportation needs in community. Growth in Scott County and Prior Lake over the next 20 years is forecast to result in the following changes:

	<b>Prior Lake</b>		<b>Scott County</b>	
	<b>2000</b>	<b>2025*</b>	<b>2000</b>	<b>2025*</b>
Population	15,917	38,750	89,498	188,830
Housing Units	5,645	14,500	30,692	74,760
Employment	7,671	N/A	32,009	52,685
<i>Sources: City of Prior Lake and the Metropolitan Council’s “2030 Regional Development Framework”.</i> <i>*2025 values were derived through interpolation of the 2020 and 2030 City of Prior Lake/Metropolitan Council forecasts.</i>				

This development related growth will induce traffic volume growth throughout the area resulting in a near doubling traffic demands by 2025. Roadway operational issues that exist today will be amplified and new issues will develop unless roadway system planning and improvement efforts are able to keep pace with the growth.

## 1.3 Related Area Projects

Several recently completed projects, and other ongoing planning efforts, have been implemented to address local and regional growth in the area. These regional improvements will help local communities, Scott County, and Mn/DOT meet roadway infrastructure needs over a 20 year period, and are summarized below.

- TH 13 Improvements at CSAH 42 in Savage, Minnesota
- CSAH 21 Extension -- a planned four-lane extension from County Highway 42 to County Highway 18 in Shakopee;
- CSAH 21 Expansion at I-35 -- a four-lane expansion of County Highway 21 from I-35 west to County Highway 27; and,

- 
- CSAH 68 Extension -- a study planned to identify a east-west minor arterial connector between County Highway 21 and TH 13, south of Prior Lake.
  - CSAH 82 expansion from two-lanes to four-lanes between CH 21 and CSAH 17. Construction is planned for 2005.

In addition to the regional roadway system improvements, the City of Prior Lake has just completed street improvements in the downtown area and is currently reviewing a number of redevelopment projects that will help shape the future of the community. The importance of matching the appropriate future transportation system improvements for the long-term investments made in County Highway 21 with the City of Prior Lake's future vision for the community is a key component of the project.

The City of Prior Lake's 2020 Vision Plan (revised February 2, 2004) identifies several vision elements that relate (directly or indirectly) to issues explored in this study of CH 21. These include the following:

- Complete a redevelopment plan tying Downtown to the Lake
- Adopt and implement a plan to improve surface water quality
- Adopt a plan for required improvements to CSAH 21 intersections including Main, Fish Point, Duluth, Arcadia and CSAH 82
- Encourage the County to complete construction of 4 lanes on CSAH 21 to I-35 and to TH 169
- Adopt and implement pedestrian safety improvements to all major arterials connecting schools, neighborhoods, Downtown, parks and trails

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## 2.0 Project Guidance and Public Involvement Activities

An extensive project guidance and public involvement process was developed for the project to assist in developing and evaluating ideas and to facilitate the approval process for affected policymakers. A goal to maximize participation from affected interests and property owners was established. **Figure 2** summarizes each of the various guidance activities and the approach by which multi-levels of affected interests were engaged in the process.

## Scott County Highway 21 Corridor Study Public Involvement Process

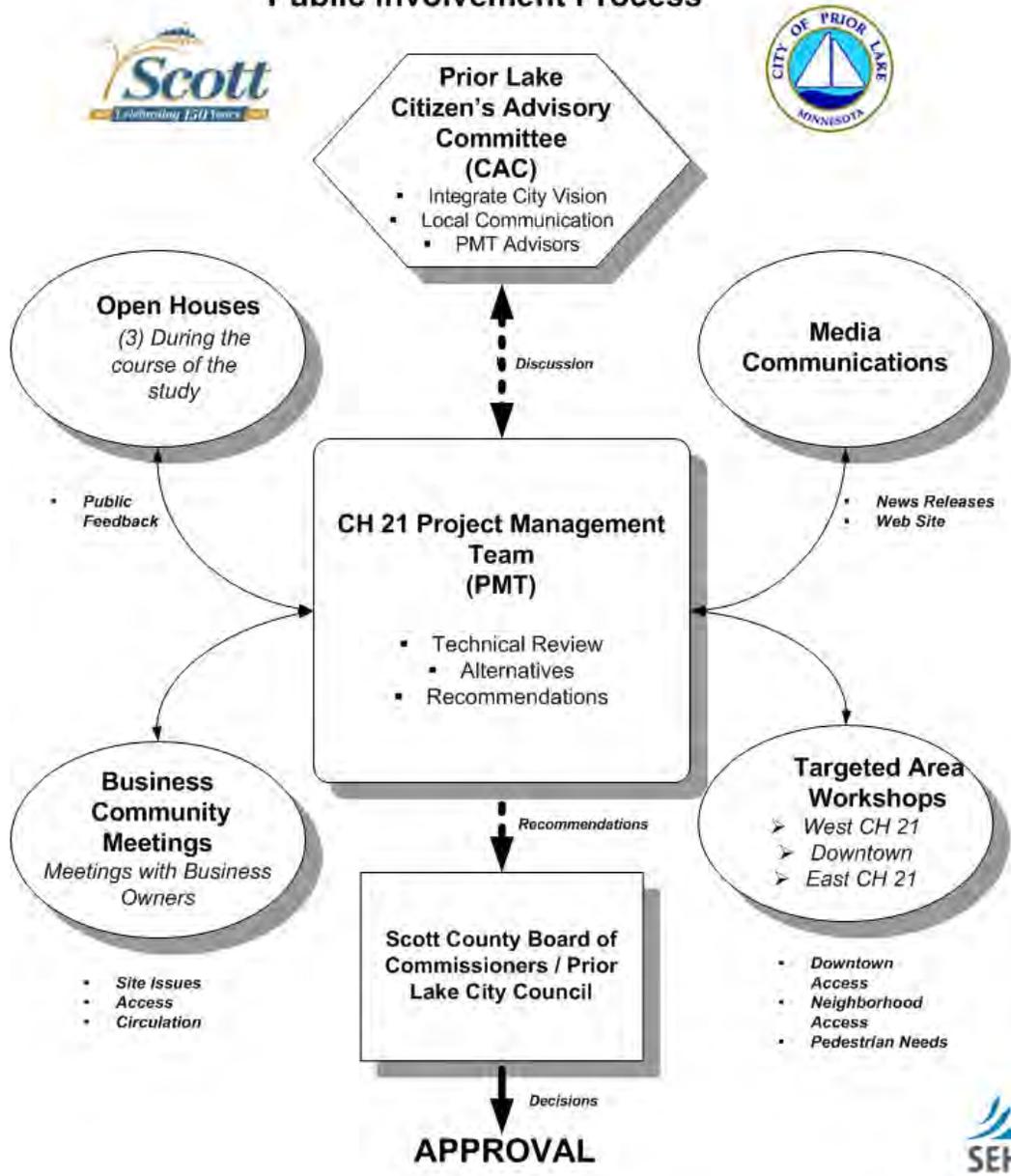


Figure 2 – Public Involvement Process

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## **2.1 Project Management Team**

A project management team (PMT) was organized in September 2003 with staff from the Scott County Highway Department, the City of Prior Lake, Mn/DOT, the Prior Lake/Spring Lake Watershed District and Credit River Township represented. The PMT was facilitated by staff from SEH. The primary purpose of the PMT was to provide technical review for issues and concerns, develop preliminary concepts, and recommend solutions to the Scott County Board of Commissioners and the Prior Lake City Council. The PMT also assisted in the interpretation of the project's Citizen Advisory Committee dialogues and staffed public involvement activities associated with the project. A list of PMT members is provided in *Appendix A*.

## **2.2 Citizen's Advisory Committee**

The Citizen's Advisory Committee (CAC) was comprised of business owners, residents and elected officials from Prior Lake. These individuals were engaged to represent local community interests and desires for the development of long-term solutions for County Highway 21. The CAC convened in October, 2004, and was staffed by the City, County and SEH. The CAC's primary duties were to identify project issues, respond to potential solutions, comment on accessibility and circulation issues associated with preliminary concepts and recommended solutions developed by the PMT and to act as project liaisons to other residents and business owners. A list of CAC members is provided in *Appendix A*.

## **2.3 Workshops and Public Meetings**

Three public open houses and three targeted area workshops were held for the project during the issue identification and concept development phases of the study. The purpose of the three workshops and first two open house meetings was to engage members of the public in identifying issues along the CH 21 Corridor and developing potential solutions. The third open house was held to share study findings and solicit public comment to the PMT's recommended design and implementation solutions.

### **2.3.1 Public Meetings**

#### **2.3.1.1 Open House Number 1**

The first Open House was held on October 8, 2003 from 4:30 – 7:00 p.m. at the Prior Lake Council Chambers (Fire Station). Scott County and the City of Prior Lake had just started the study and were interested in giving the public an opportunity to: 1) assist in identifying existing issues along the corridor, 2) assist in developing potential solutions to existing and future problems along the corridor, and 3) become familiar with the study schedule and process.

A summary of the areas of concern identified at the first Open House follow. Detailed comments and prepared responses appear in *Appendix B*.

#### **Open House Number 1 – Issues and Concerns**

- Eau Claire and CH 21
- Highland and CH 21 Intersection

- 
- Grainwood Circle
  - Wagon Bridge Area
  - Lakeside Avenue (service road parallel to CH 21)
  - Sidewalk and Pedestrian Crossings at Quincy Street
  - CH 21 near Duluth Avenue
  - CH 21 and Duluth Avenue Intersection
  - Main Street and CH 21 Intersection
  - Franklin Trail and CH 21 Intersection
  - Fish Point Road and CH 21 Intersection
  - 170<sup>th</sup> Street and CH 21 intersection
  - Downtown Access
  - Speeds
  - Trucks and Alternate Routes
  - CR 87 and CH 21
  - Carriage Hills
  - Sun Fish Lake Boulevard and CH 21
  - Increasing Traffic
  - Noise
  - General – Design & Development Issues

#### 2.3.1.2 Open House Number 2

A second Open House was held on February 26, 2004 from 4:30 – 7:00 p.m. at the Prior Lake Library Meeting Room. The public was invited to review issues that were identified along the corridor and provide feedback on potential solutions to address deficiencies and long-term needs. Study concepts presented were prepared using input received from the project's first Open House and feedback from the CAC. Concepts were made available for informal review at the Open House.

A summary of the areas of concern identified at the Second Open House follow. Detailed comments and prepared responses appear in ***Appendix B***.

#### Open House Number 2 – Issues and Concerns

- Access concerns regarding the concept with a continuous median on the west end of the corridor
- Should include pedestrian facilities
- Should realign Highland and CH 21 intersection
- Should save the Wagon Bridge
- Marina access concerns

- 
- Lakeside Avenue (service road parallel to CH 21) access concerns
  - Speed concerns throughout the corridor
  - Preference to support alternative routes
  - Downtown area access concerns
  - Alignment concerns near TH 13 (related to r/w impacts)
  - Should improve trail connections crossing TH 13
  - Fish Point Road intersection safety concerns

#### 2.3.1.3 Open House Number 3

A third Open House was held on November 16, 2004 from 5:00 – 7:30 p.m. at the Prior Lake Fire Station. The public was invited to review and comment on the preferred roadway concept recommended by the PMT for the study area. The concept recommended was selected because it best addressed long term operational needs for CH 21 and TH 13 through the study area. The PMT recommended concept integrated many goals and objectives provided by the public. Some of the features incorporated into the recommended concept based upon public input previously received include:

##### Design Elements Included Based upon Public Input

- Low design speed through downtown and around the lake
- Center median for traffic safety
- Center median for pedestrian sanctuary
- Left turn lanes
- Right turn lanes on east end of study area
- Avoid taking homes
- Avoid taking businesses
- Sidewalk or trail on each side
- Safety improvements at Franklin Trail
- Left turn lanes and future signal at Fish Point Road
- Realign 170<sup>th</sup> Street and plan for a future signal at County Road 87
- Retain right-in and right-out accesses to TH 13 at Dakota Street and at Pleasant Avenue
- Allow northbound left turns from TH 13 to Pleasant Avenue
- Trail connection under TH 13 south of CH 21

##### Open House Number 3 – Issues and Concerns

Comments to the recommended concept received at the open house include the following concerns:

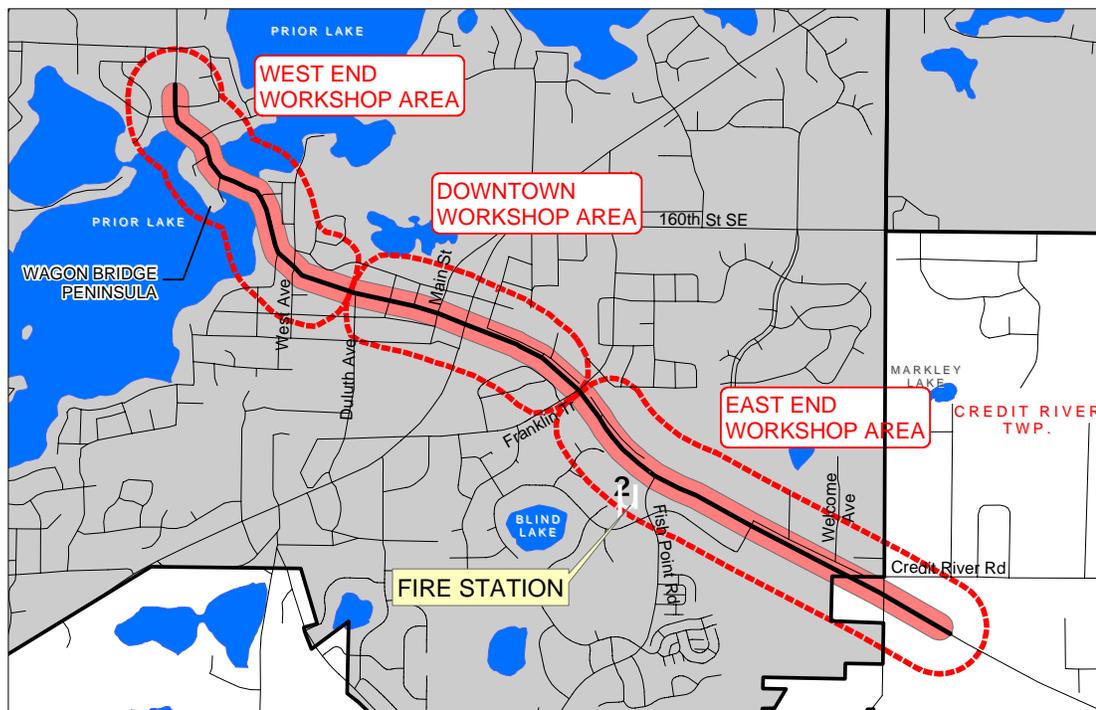
- Lakeside Avenue (service road parallel to CH 21) access concerns

- Speed concerns throughout the corridor
- Preference to support alternative routes
- Downtown area access concerns

Written comments received at each open house are summarized in *Appendix B*.

### 2.3.2 Targeted Area Workshops

Targeted area workshops (TAW's) were held and focused on three distinct sub-districts of the CH 21 Corridor: the West End, Downtown Prior Lake, and the East End. These areas are illustrated **Figure 3** and were selected for sub-area study because of distinct needs and issues.



**Figure 3 – Targeted Area Workshops**

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Mailing lists of potentially affected properties were compiled and invitations sent to property owners and tenants to attend an informal workshop to review study design concepts, share ideas and discuss concerns for future improvements to CH 21 through Prior Lake. Each workshop was designed to address issues of specific concern for each of three areas, and were held during the period of April 27 - May 4, 2004 at the Prior Lake City Council Chambers in the Fire Station. Each workshop included an Open House-type format conducted for the first 20 minutes to answer questions one-on-one, and then a presentation was given that covered the following topics:

- Purpose of Study (5 minutes)
- General Overview of study area (5 minutes)
- Issues – specific to targeted area (10 minutes)
- Concepts developed (10 minutes)
- Evaluation of alternatives (10 minutes)

Discussion issues raised at each of the workshop is summarized as follows and compiled in detail in *Appendix B*

#### 2.3.2.1 Downtown Targeted Area Workshop

The issue of downtown access was discussed at length in addition to the following:

- Keeping Main Avenue open is important to the businesses.
- There is current pedestrian demand across CSAH 21 at Main Ave. Crossing without a controlled crosswalk will be difficult.
- Overall, the general consensus was that **if** access opportunities at Main Avenue were to be reduced, the Arcadia Street access would be preferred over the Duluth Street access to serve downtown needs.
- Mn/DOT's 1997 access plan for TH 13 shows accesses at both Pleasant and Duluth being closed in the future. This was of concern to the business owners present.
- There was recognition that access closures (Duluth, Pleasant, or Main) would put more traffic through the TH 13/CSAH 21 signal.
- Overall corridor width and the trade-off between impacts to the southwest quadrant of TH 13/CH 21 businesses and the NE quadrant homes. There was a desire to keep the businesses in operation, but also to minimize the impact the homes along Credit River Road.
- Value of improving CSAH 21 through Prior Lake versus making improvements in a corridor to carry traffic around town. This project is intended to address existing and future forecasted traffic and safety issues. It is part of a larger system that is also being looked at.

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### 2.3.2.2 East End Targeted Area Workshop

East end issues related to intersection design, traffic control and continuity of frontage roads and connections to the local streets system but also included the following concerns:

- Value of improving CSAH 21 through Prior Lake versus making an improvement in a corridor around town.
- A suggestion was made that if the number of lanes were reduced on CSAH 21, traffic would go elsewhere. This project is intended to address existing and forecasted traffic and safety issues. It is part of a larger system that is also being looked at. The purpose of CSAH 21 as a minor arterial on the regional system was discussed.
- The group felt that a lower speed on CSAH 21 would contribute to a safer roadway. Discussion focused on the determination of speed limit and factors that influence speed.
- At Franklin Trail, attendees generally felt that options for access that did not take houses were better. They would be willing to travel farther for access to avoid taking property. Options such as no access, i.e., cul-de-sac at the end with no access to Franklin Trail, or leave the existing access to CSAH 21 as a right-in, right-out should be considered.
- Two short term improvements were suggested at the East End TAW:
  - Split phase the existing Franklin Trail signal similar to what was recently done at TH 13. It was felt this would improve the Franklin Trail access.
  - Fish Point Road – consider a temporary signal in this location.
- At Adelman, the feeling was that the no access alternative that impacted the adjacent properties less should be workable (although no one from the north side businesses or church were in attendance).
- The realignment of Revere Way to align with CSAH 87 was generally accepted as a good idea. One attendee noted that the concept as drawn may impact the business access into the building at the corner.

### 2.3.2.3 West End Workshop

West end issues related to safety and accessibility to CH 21 roadway especially through the curves around the lakeshore but also included discussion of the following issues:

- Value of improving CSAH 21 through Prior Lake versus making an improvement in a corridor around town. This project is intended to address existing and forecasted traffic and safety issues. It is part of a larger system also being studied.
- The group felt that a lower speed on CSAH 21 would contribute to a safer roadway. Discussion focused on the determination of speed limit and factors that influence speed.

- 
- West end alternatives were reviewed and their relationship to bridge replacement was discussed. Left turn access opportunities, u-turns, and other traffic patterns and safety related issues were also discussed.
  - Potential redevelopment of lakeshore area near the fishing pier. Many obstacles appear to make this a very difficult/expensive proposal to accomplish.
  - Pedestrian crossing issues for fishermen parking along West Avenue.
  - Design constraints along the service drive parallel to CH 21 west of West Avenue. Garages and driveways appear to be encroaching in public right of way. Discussed use of available public right way for retaining wall on north side of CH 21, sidewalk/trails with boulevards on both sides of CH 21, 4 travel lanes, median, berm area between roadways and width of access road. Discussed two-way operation versus one-way operation. No conclusion was drawn as to the best solution. Only a few residents affected were present.
  - Different access alternatives to Wagon Bridge Marina and neighboring residential sites. Since no owners from these sites were in attendance, it was determined that another workshop was needed in order to address these issues.

#### 2.3.2.4 Wagon Bridge Peninsula Access Workshop

This workshop was added to the original set of TAW's, and was an offshoot of the West End TAW. Issues specific to the Wagon Bridge Peninsula were discussed. The conversation centered on the following items:

- The curving roadway alignment for CH 21 combined with off street obstructions (trees, parking, retaining walls, railing, etc.) create sight distance restrictions at nearly all existing driveway locations that serve parcels on the Wagon Bridge Peninsula south of CH 21.
- Suggested that closure of unsafe driveways and combination of driveways to safe locations along CH 21 be part of the long term plan. One full access location, serving right and left turns in both directions, and one partial access location, serving right turns from CH 21 only, are available. Internal roadways and driveways should be reconfigured to route traffic to these locations.
- The internal roadways on the peninsula are all private drives. Many parcels have deeded easements for access across neighboring parcels. Changing driveway locations as suggested will require cooperation of many property owners on the peninsula.

It is important to note that although many significant issues were discussed at these workshops and suggestions for useful refinements were received, no new alternatives for further study emerged from the discussion.

## 2.4 **Property Owner Meetings**

In addition to Open Houses and targeted area workshops, affected property and business owners were contacted. Some owners were not available for

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the other involvement activities or may not have otherwise participated in the process. Staff from SEH met with individuals and also with groups having common interests by appointment at the Prior Lake Library for several hours on May 12 and May 18, 2004. (Additional business owner meetings were held as the field of alternatives was narrowed and impacts to adjacent property owners became better understood).

Nearly all of the discussion with the business owners related to the following topics:

- Individuals questioned the need for any improvement to CH 21. If speed limits were enforced there would be no safety issues.
- Support for alternatives that keep full access at Main Avenue. Suggestions that a signal, synchronized with the signal at TH 13, should replace the all-way stop.
- Support for alternatives that keep right-in right-out accesses from TH 13 to/from Dakota and Pleasant Streets.
- Concern for loss of business for any alternative that changed traffic patterns or reduced accessibility to downtown.

Comments received at the business owner meetings are compiled in *Appendix B*.

## **2.5 Public Agency Coordination**

Contacts were made with public agencies to determine potential issues and concerns with land acquisition, environmental impacts, and effects of other transportation and land use planning activities in the area that could be affected by the CH 21 project.

The study area includes roadways under city, county and state jurisdiction. Therefore, City Prior Lake, Scott County and Mn/DOT Planning and Traffic Engineering staff members have been directly and continuously involved in the PMT and CAC process.

Additional contact was made with Mn/DOT Cultural Resources Unit (CRU) staff for a preliminary identification of cultural resource issues that may arise due to long-term effects of solutions for CH 21 and for TH 13. This issue is of particular importance if federal funds are allocated to implement any recommended concept that evolves from this study process. Since no Federal monies had yet been allocated, Mn/DOT's CRU representative advised that they were unable to perform the cultural resource assessment. This assessment would need to be made if Federal funds are allocated in the future.

The Prior Lake Spring Lake Watershed District (PLSLWD) has been involved throughout the study process. The PLSLWD desires to minimize impacts that transportation solutions may have on water quality and management of storm water runoff. Recommendations for minimizing water quality impacts are included as part of this study report.

Credit River Township has been kept informed of study issues. Of particular interest to the township are any study findings that would affect extension or

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expansion of roadways within the township, especially if routes other than CH 21 are affected. (For instance, extension of CR 68 to the west to intersect with TH 13 has been discussed as alternative route that might decrease traffic demands on CH 21 and TH 13 in Prior Lake).

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### **3.0 Problem Definition**

#### **3.1 Data Collection**

To begin the CH 21 Corridor Study and preliminary design process and determine how the proposed project would evolve into the community's long-range strategic planning process (termed "Prior Lake Vision 2020 Plan"), data were collected from several sources to establish baseline conditions and obtain a clear understanding of needs and desires for the highway's future. A summary of the information sources used to develop concepts for further study as provided by local and regional agencies and field resources collected and assembled by SEH is as follows.

##### **3.1.1 Planning Information**

- Scott County Transportation Plan
- Prior Lake Vision 2020 Plan
- Prior Lake Spring Lake Watershed District Rules
- Mn/DOT Access Management Plan for TH 13 (1997)

##### **3.1.2 Traffic Volume Data**

Scott County Supplied Information

- Historical daily traffic volume data
- Traffic operations analysis report assessing 4-way stop versus signalization for Main Avenue at CSAH 21

Metropolitan Council's Regional Travel Demand Forecast Model (RTDFM)

- Raw RTDFM Outputs for 2000
- Raw RTDFM Outputs for 2025
- Adjusted RTDFM Outputs for 2025
- Select Link Data for CSAH 21 east of project limits from 2025 RTD

Field data Collection by SEH in October 2003.

- Access inventory
- AM and PM peak period intersection turning movement counts
  - CH 21 & West Avenue
  - CH 21 & Duluth Avenue
  - CH 21 & Arcadia Avenue
  - CH 21 & Main Avenue
  - CH 21 & TH 13
  - CH 44 & TH 13
  - Main Avenue/Ridgemont Avenue/TH13
  - CH 21 & Franklin Trail
  - CH 21 & Fish Point Road

- 
- CH 21 & Adelman Street
  - CH 21 & CR 87/170th Street
  - TH 13 & Dakota (Right-in/Right-out Tube Count)
  - 48 Hour Tube Counts – Intersection Approach Volumes
    - CH 21 & Duluth Avenue
    - CH 21 & Arcadia Avenue
    - CH 21 and Main Avenue
    - CH 21 & Fish Point Road
    - CH 21 & Adelman Street

### **3.1.3 Crash Data**

- Mn/DOT - 3 year crash history
- Historical crash rates for differing facilities

### **3.1.4 Mapping Information**

- Aerials
- Planimetric mapping
- Parcel Mapping
- Traffic Signal Plans and timing
- As-built Plans

### **3.1.5 Public Involvement**

- PMT Membership
- CAC Membership
- Open House Mailing List
- Business Owner's in Prior Lake

## **3.2 2025 Traffic Forecasts**

Development of future traffic forecasts for the CH 21 corridor provided the basis for understanding the traffic issues that are anticipated over the 20-year planning horizon of this study. The results of the forecasting process are described in the following sections. The forecasting methodology is documented in Appendix C.

### **3.2.1 Average Daily Traffic Volumes**

Existing (2002) and forecast ADT's in the study area are shown in Table 2.

**Table 2**  
**Existing and Forecast ADT**

Roadway	Location	2002 ADT	2025 ADT
CH 21	West of TH 13	11,700	23,400
CH 21	East of TH 13	11,700	23,400
TH 13	North of CH 21	13,500	27,100
TH 13	South of CH 21	14,500	29,100

The annual growth rate represented by these forecasts is 4.37% per year.

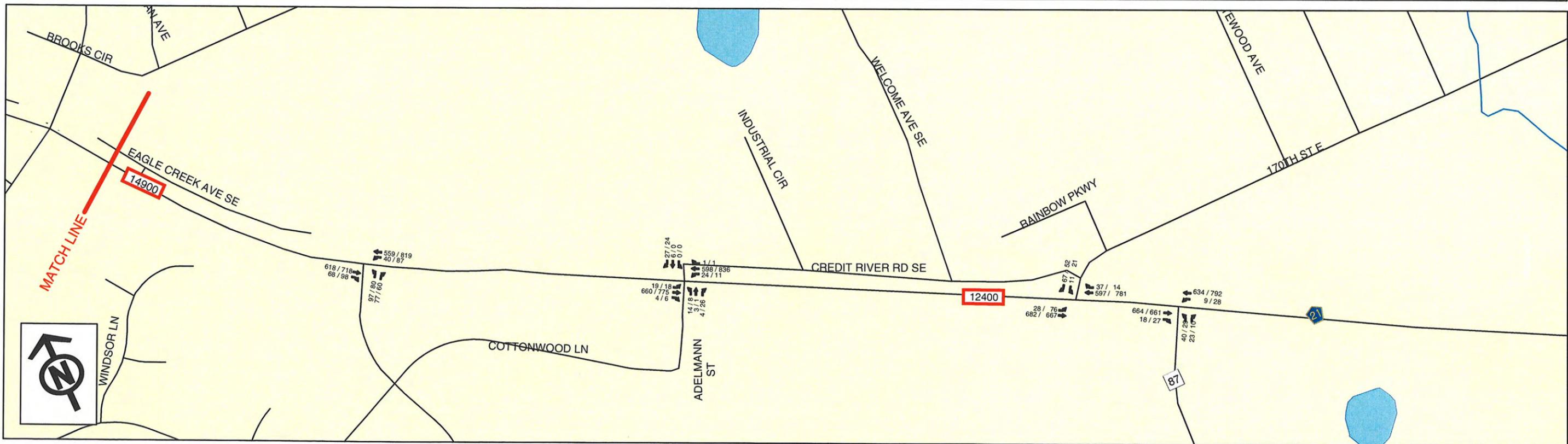
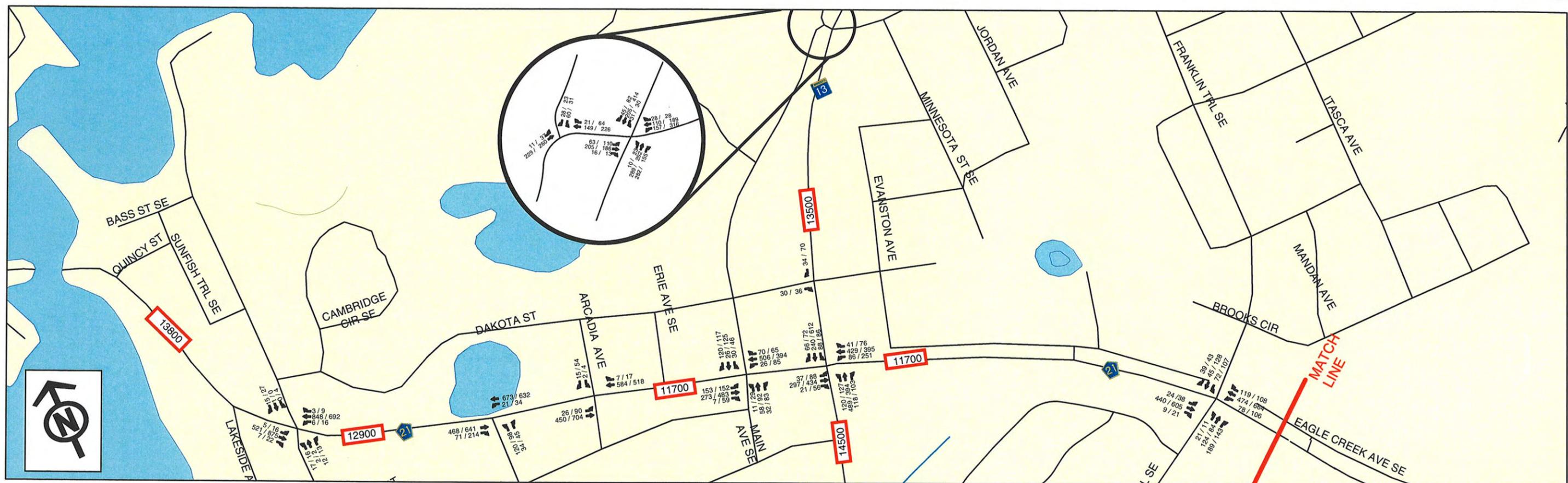
### 3.2.2 Peak Hour Forecasts

Peak hour (AM and PM) turning movement forecasts were derived in a similar manner to the 2025 ADT forecasts in that the average annual growth rate of 4.37 percent was added to the existing turning movements to produce a base turning movement forecast. However, the base peak hour turning movement forecasts needed to be further refined in order to account for specific planned future development and roadway connections along the CH 21 corridor. Growth rates applied to local street traffic volumes were decreased to 2.19% to recognize maturity of development in some areas and reduce the effects of double counting growth added due to specific developments areas and background growth. These specific planned future development and roadway connections along the CH 21 corridor include the following:

- Deerfield development (123 homes plus 850,000 square feet of mixed office, retail and light industrial parcels currently under development on the south side of CH 21 between Fish Point Road and Adelman Street)
- Fish Point Road connection (New collector roadway completing the connection from CH 21 north to CR 144)
- Residential development of the vacant parcels adjacent to the Fish Point Road connection (72 acres of undeveloped property zoned medium density residential)

The existing (2002) average daily traffic volumes (ADT) and existing (2003) peak hour traffic volumes are shown in Figure 4.

Future (2025) ADT's and intersection turning movement forecasts are shown in Figure 5.

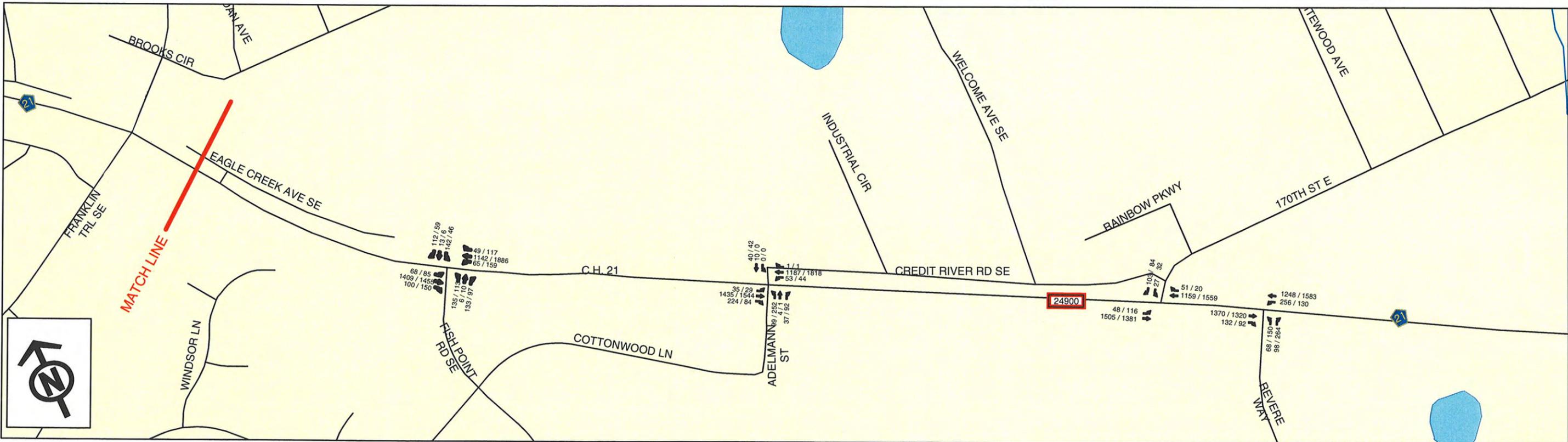


# C.H. 21 Corridor Study

XXXXX Average Daily Traffic (ADT)  
 XX / YY AM Peak / PM Peak Hourly Volumes  
 Note: ADT's are 2002 volumes  
 Peak Hour Volumes are October 2003

Existing ADT and Peak Hour Volumes

Figure 4



# C.H. 21 Corridor Study

XXXXX 2025 Average Daily Traffic (ADT)  
 XX / YY 2025 AM Peak / PM Peak  
 Hourly Volumes

2025 Forecast ADT  
 and Peak Hour Volumes

Figure 5

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### **3.2.3 Safety**

Evaluation of safety related issues addressed in this section include: Analysis of historical crash data by crash types, locations, rates and severity; evaluation of pedestrian needs; discussion of the relationship between access density and safety, and discussion of speed relative to safety.

### **3.2.4 Crash History and Analysis**

The analysis of vehicular crashes is an important part of any study aimed at improving safety along a given roadway segment. A review of the vehicular crashes over a three year period along the CH 21 study segment was conducted in order to identify potential problem areas which may be in need of improvements. A summary of historic crashes, a breakdown of the vehicular crashes by location and type, a comparison of crash rates, and a discussion of the conclusions that can be made from the crash history are presented in the following four sections. Additional crash data and collisions diagrams are included in Appendix D.

#### **3.2.4.1 Historical Crash History**

Historical crash data was obtained from Mn/DOT for the three-year period from January 1, 2000 through December 31, 2002. A review of the vehicular crashes over this three-year period found that a total of 65 crashes were reported along the CH 21 study segment from Highland Avenue to CR 87. Of these 65 reported crashes, 40 were personal injury crashes and 25 involved property damage only crashes.

#### **3.2.4.2 Breakdown by Location and Crash Type**

The historical crash data was further summarized by type and location along the CH 21 corridor. As shown in Table 3, the three predominate crash types involved left-turning vehicles (17 of the 65 reported crashes, or approximately 26 percent), followed by right-angle crashes (14 of the 65 reported crashes, or approximately 22 percent), and rear-end crashes (13 of the 65 reported crashes, or approximately 20 percent).

Table 3 also shows that four locations experienced more than 5 crashes during the three-year period from January 1, 2000 through December 31, 2002. These locations include the CH 21 intersections with TH 13 (16 reported crashes), Franklin Trail (14 reported crashes), Main Avenue (9 reported crashes), and Duluth Avenue (8 reported crashes).

It should be noted that Mn/DOT revised the signal timing in 2003 at the CH 21 intersection with TH 13 to provide split phasing on the east- and westbound CH 21 approaches to the intersection. This revision was installed, in part, to address the large number of crashes at the intersection which involved left-turning and opposing vehicles on the CH 21 approaches. Prior to the signal phasing in 2003, 8 of the 16 crashes at the intersection (or 50 percent) involved left-turning and opposing vehicles on the CH 21 approach. While the split phasing should significantly reduce these types of crashes, the crash data for the time period after the 2003 signal timing revisions is not currently available.

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### 3.2.4.3 Crash Rates

Crash rates are often considered a better indicator of traffic safety risks at a given location or along a corridor rather than just looking at the total number (or frequency) of crashes alone, since crash rates account for the differences in traffic volumes, and therefore considers exposure to potential crashes. Mn/DOT typically expresses crash rates for roadway segments in terms of crashes per million vehicle-miles of travel.

Table 4 summarizes the CH 21 corridor crash rates for the three-year period analyzed. As shown, the crash rate along the CH 21 study segment from Highland Avenue to CR 87 is approximately 1.85 crashes per million vehicle-miles of travel. The average crash rate for suburban four-lane undivided roadways in the State of Minnesota from January 1, 2000 through December 31, 2002 was 1.3 crashes per million vehicle-miles of travel. Therefore, the crash rate along the existing CH 21 corridor is higher than similar roadways during the same time period.

Another way of identifying high hazard locations is looking at the severity rate of a given roadway segment. Severity rates applies a weight value to the different types of crashes; giving greater weight to injury and fatal accidents. Mn/DOT typically applies a weight-value of one (1) to property damage only crashes, a weight-value of four (4) for injury crashes, and a weight-value of ten (10) for fatal crashes.

Table 4 also shows the severity rate along the CH 21 study segment for the three-year period from January 1, 2000 through December 31, 2002. The severity rate along the CH 21 study segment is approximately 3.79 crashes per million vehicle-miles of travel. The average severity rate for suburban four-lane undivided roadways in the State of Minnesota for the same three-year period was 1.9 crashes per million vehicle-miles of travel. Therefore, the crash rate along the existing CH 21 corridor is almost twice as high as similar roadways during the same time period.

It should be noted that the City of Prior Lake Police Department only reports crashes that involve injuries to Mn/DOT (in other words, they do not report property damage only crashes). As a result, the actual crash rate along the CH 21 study segment may in fact be higher than the 1.85 crashes per million vehicle-miles traveled through the corridor. Conversely, the severity rate along the CH 21 study segment may in fact be slightly lower than the calculated 3.79 crashes per million vehicle-miles of travel.

**Table 3**  
**Scott CH 21**  
**Intersection Related Crash Types**  
**2000 - 2002**

Location	Rear End	Sideswipe - same direction	Left turn	Ran off road - left side	Right Angle	Right Turn	Ran off Road - Right Side	Head On	Sideswipe Opposing	Other / Unknown	Total	Fatalities	Personal Injury	Property Damage
GRAINWOOD CIR M-92 RT	0	0	0	0	0	0	1	0	0	0	1	0	0	1
GRAINWOOD TRL M-98 LT	0	0	0	0	0	0	1	0	0	0	1	0	1	0
WAGON BRIDGE CIR M-229 LT	0	0	0	0	0	0	0	0	0	1	1	0	0	1
QUINCY ST M-89 RT	0	0	0	0	0	0	1	1	0	1	3	0	2	1
WEST AVE M-87 X-ING	1	0	0	0	0	0	0	0	0	0	1	0	1	0
DULUTH AVE MSAS-101 LT	1	0	3	0	1	0	1	0	0	2	8	0	7	1
MAIN AVE MSAS-119 X-ING	1	0	0	0	5	0	0	0	0	3	9	0	4	5
MNTH-13 X-ING	5	0	8	0	2	1	0	0	0	0	16	1	5	10
FRANKLIN TRL CSAH-39 X-ING	2	1	5	0	3	0	0	0	1	2	14	0	11	3
CS-60 M-291 RT	0	0	0	0	0	0	0	0	0	1	1	0	0	1
NON-EXISTENT MSAS-105 RT FISH POINT RD M-312 LT	2	0	1	0	0	0	0	0	0	1	4	0	3	1
ADELMANN RD M-309 LT	0	0	0	0	1	0	0	0	0	1	2	0	1	1
CR-87 LT T-512 RT, E CL PRIOR LAKE, E URB BDRY	1	0	0	0	2	0	0	1	0	0	4	0	4	0
<b>Total</b>	<b>13</b>	<b>1</b>	<b>17</b>	<b>0</b>	<b>14</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>12</b>	<b>65</b>	<b>1</b>	<b>39</b>	<b>25</b>

X:\S\Scott\030400\Reports - Draft\crash tables for report.xls\Intersections

**Table 4  
Scott CH 21  
Corridor Crash Rates  
2000 - 2002**

Description		Mile point		Length (miles)	Segment ADT (2002)	3-year MVMT	FAT	INJ			PD	Total	Crash Rate	Severity Rate
From	To	Begin	End					A	B	C				
HIGHLAND AVE M-177 LT	MAIN AVE MSAS-119 X-ING	6.981	5.915	1.066	12,979	15.15	0	1	7	8	10	26	1.72	3.37
MNTH-13 X-ING	CR-87 LT T-512 RT, E CL PRIOR LAKE, E URB BDRY	5.915	4.540	1.375	12,869	19.38	1	2	10	12	13	38	1.96	4.13
HIGHLAND AVE M-177 LT	CR-87 LT T-512 RT, E CL PRIOR LAKE, E URB BDRY	6.981	4.54	2.441	12,917	34.53	1	3	17	20	23	64	1.85	3.79

*Note: CH 21 crash and severity rates only included crashes along the corridor that involved a vehicle traveling on CH 21. If a crash involved only vehicles traveling on a side street, they were not included in the crash rate and severity calculations.*

Crash and Severity for Suburban Roadways (data from 1/1/00 - 12/31/02)		
Roadway Type	Crash Rate	Severity Rate
2-lane undivided	2.6	3.8
3-lane (2 lane + CTWCLTL)	3.1	4.8
4-lane undivided	1.3	1.9
4-lane plus painted left turn lanes*	3.1	5.1
4-lane plus raised center median and channelized left turn lanes	2.1	3.1

Source of data = MnDOT TIS

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#### 3.2.4.4 Crash Occurrence Conclusions

Based on the review of the available crash data from the three-year period from January 1, 2000 to December 31, 2002, both the crash rate and the severity rate along the CH 21 study segment are above the Mn/DOT statewide averages for suburban four-lane undivided roadways.

Improvements to the CH 21 study segments such as upgrading CH 21 from the existing four-lane undivided roadway to a 4-lane divided roadway, consolidating access points whenever possible, and limiting full-access to selected locations has the potential of improving roadway safety by reducing the frequency of crashes involving head-on vehicles, turning vehicles on and off of CH 21, and rear-end crashes on CH 21. These types of accidents accounted for 22 (or approximately 34 percent) of the 65 reported crashes.

Providing turn lanes on CH 21 at full access locations has the potential of reducing the number of rear-end and sideswipe crashes by separating turning traffic from through traffic. These types of crashes accounted for an additional 6 (or approximately 9 percent) of the reported 65 crashes.

Revisions to the existing traffic signal phasing to provide protected left-turn signal phasing on CH 21 has the potential of reducing the number of left-turn/opposing crashes. These types of crashes accounted for an additional 10 (or approximately 15 percent) of the 65 reported crashes. (Signal revisions for split phase operation were made in 2003 to resolve left turn safety issues on CH 21 at TH13. These changes have been an effective crash reduction measure).

In total, the addition of center medians, left turn lanes and exclusive left turn signal phasing would have the potential to reduce up to 38 (or approximately 58%) of the 65 crashes reported during 2000 and 2002.

#### 3.2.5 **Pedestrian Needs and Safety**

Through public input, the study team has been informed of pedestrian demands in the study area. The need for trails or walks on both sides of, and parallel to CH 21 has been identified. A continuous trail is in place along the south side of CH 21 from CH 82 around the lake, through the downtown area and into Cleary Lake Regional Park east of CR 87. Similarly, a continuous sidewalk is in place on the north side of CH 21 from the west end of the study area to Franklin Trail. These trails and walks are intended to be perpetuated in the long term concepts.

Pedestrian crossing of CH 21 or of TH 13 has generated discussion at many of the meetings and workshops held with the public. Although rigorous pedestrian origin and demand studies have not been performed as part of the CH 21 corridor study, local knowledge and casual observation has generated the following ideas related to pedestrian crossing demands:

- Use pedestrian islands (medians) as pedestrian sanctuaries in the center of the roadway. This allows pedestrians to cross one direction of traffic lanes at a time.
- Consider a trail tunnel under TH 13 south of CH 21 so trail users can cross TH 13 at a location other than the CH 21 traffic signal.

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- Pedestrian crossings of CH 21 at Main Avenue currently cross under the all-way stop operation. A signal is perceived to be needed to perpetuate safe crossings at this location.
  - Use of the DNR fishing pier and shoreline fishing near the Wagon Bridge generate pedestrian demand. Parking near the pier and bridge area is not allowed except for two handicapped parking stalls accessible from Quincy Avenue immediately north of CH 21. Anglers typically drop off their fishing partners near the Wagon Bridge, park on West Avenue north and south of CH 21, then walk a few blocks back to the lake, crossing CH 21 when and where they can, based upon availability of gaps in traffic. Additional public parking spaces near the DNR pier would relieve much of this demand.

A Federal Highway Administration sponsored study (November, 2000) evaluated the safety of uncontrolled crosswalk locations on roadways of varying traffic demand, speed and width. This study was based upon five years of actual crash history for 2,000 uncontrolled pedestrian crossings at both marked and unmarked locations. Results indicate that high volume, high speed and/or multi-lane pedestrian crossing that are marked with crosswalk paint and warning signs may generate a higher risk for pedestrians than crossing at the same location without pavement markings and warning signs. In these situations, markings should not be installed unless accompanied by other traffic control treatments (e.g., a traffic signal). Installation of a traffic signal is typically not be considered unless pedestrian crossing demands and vehicle demands exceed the signal warrant thresholds defined in the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD). Pedestrian demand alone in the CH 21 corridor is not sufficient to warrant a signalized crosswalk unless cross street vehicular demands are high enough to warrant a signal. If so, then pedestrian crossing signals are routinely included in the operation of the traffic signal system.

### **3.2.6 Roadway Access and Safety**

All private driveways and public street intersections along CH 21 are referred to as access points. Access points typically allow vehicles to turn on or off the roadway. All access points create opportunities for vehicular conflicts that tend to degrade the safety of the roadway. A four legged intersection that allows all traffic movements typically has 32 conflict points (points that vehicle paths cross, merge or diverge).

A considerable amount of research has been done in recent years that relate roadway access to roadway safety. Results of this research are widely accepted but can be summarized in a two general statements:

- Reducing the number of access points along a roadway will tend to make the roadway safer.
- Reducing the number of conflict points at any intersection will make that access point safer.

The Access Analysis section of this report (Section 3.5) reviews existing access densities along the CH 21 corridor, makes a comparison to Scott

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County Access Spacing Guidelines and describes access issues to be addressed in the alternatives analysis section.

### 3.2.7 Vehicular Speeds

Vehicular speed, as it relates to safety has been a hot button during discussions at nearly all open houses and workshops. The public's perception is that generally, drivers do not obey the speed limits now, and that any roadway improvement project considered can only increase the speed at which drivers are willing to travel. The perception is, that increased enforcement will be adequate means to reduce speeds and increase safety.

Public perception is accurate, in that generally, many drivers do tend to exceed posted speed limits. However, there is not hard evidence to support the perception that increased travel speeds decrease safety. Mn/DOT has prepared an informational flyer regarding speeds and speed limits (the flyer, entitled "SPEED LIMIT?, Here's Your Answer", is accessible at [www.dot.state.mn.us/speed](http://www.dot.state.mn.us/speed)). Excerpts from the information flyer are quoted as follows:

Question: Will lowering the speed limit reduce speeds?

Answer: No. Studies show that there is little change in the speed pattern after the posting of a speed limit. The driver is much more influenced by the roadway conditions and environment.

Question: Will lowering the speed limit reduce crash frequency?

Answer: No. Although lowering the speed limit is often seen as a cure-all in preventing crashes, this is not the case. Crashes are more often the result of driver inattention and driver error. However, if a posted speed limit is unrealistically low, it creates a greater speed variance (i.e. some drivers follow the speed limit while most drive the reasonable speed). This speed variance can contribute to crashes.

The focus of this study for CH 21 is to identify a long term plan for the configuration of CH 21 and to determine access points that should be perpetuated and also to define those that should be planned for reduction or elimination due to safety or other operational considerations. Speed is considered, but only to the extent that it relates to horizontal and vertical alignment to allow safe travel through the corridor, safe sight distance at intersections, and the desirability to separate right turning vehicles from through lanes on high speed segments of the study corridor.

One speed issue that has been repeatedly raised in discussions with the public relates to the transition from a high speed (50 mph) zone on CH 21 generally east of TH 13 and low speed (35 mph) west of TH 13. The speed limit transition area occurs between TH 13 and Franklin Trail where, in the westbound direction, speed is reduced from 50 to 40 mph between Franklin Trail and TH 13, then to 35 mph west of TH 13. In contrast, eastbound CH 21 is posted at 35mph up to TH 13, then at 50 mph immediately east of TH 13.

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### **3.3 Traffic Conflict Study – CH 21 at Main Avenue**

During the initial stages of the CH 21 Corridor Study, local concerns were raised regarding the operation of the existing all-way stop-controlled intersection of CH 21 and Main Avenue. The County and City had received requests from the public for alternative traffic control treatments. A review of the crash history did not provide evidence that additional traffic control or advance warning treatments were appropriate. Therefore, a traffic conflict study was conducted at the intersection of CH 21 and Main Avenue in order to identify and gain a better understanding of operational concerns at the intersection, and also to determine if any issue identified may have the potential to be resolved through the deployment of additional traffic control and/or advance warning devices. Of specific interest are vehicular conflict patterns that may be related to the all-way stop-controlled operation at the CH 21/Main Avenue intersection and the close proximity to the signalized CH 21/TH 13 intersection.

The traffic conflict study is summarized below. A full version of the CH 21 & Main Avenue Conflict Study Memorandum is included in Appendix E.

#### **3.3.1 Traffic Conflict Process**

A traffic conflict study involves field observations during which traffic conflicts are recorded and then analyzed in order to assist in the determination of the potential reasons that may be contributing to the conflicts between vehicles at the intersection. A conflict occurs any time two roadway users approach the same point in time and space, and at least one successfully completes an evasive maneuver to avoid a collision. Evasive actions include swerving, severe braking, severe acceleration, and any combination thereof.

The goal of the traffic conflict study is to determine the existing conditions that are contributing to the safety issues at the intersection, and to develop a set of potential countermeasures that will address the identified issues.

Based on the existing traffic volumes at the intersection of CH 21 and Main Avenue, the three peak periods for observation were determined to be 7:00 a.m. to 8:00 a.m. (am peak hour), 12:00 p.m. to 1:00 p.m. (midday peak hour), and 4:30 p.m. to 5:30 p.m. (pm peak hour).

Conflicts were recorded as defined by the Traffic Conflict Procedure Manual, 2nd Edition (November 1996) prepared by Hamilton Associates for the Insurance Corporation of British Columbia. A conflict diagram depicting the conflicts observed is included as part of the study memorandum in Appendix E.

#### **3.3.2 Conflict Analysis Results**

A total of thirteen conflicts occurred at the intersection during the three observational periods. One of these conflicts was during the am peak period, four in the midday peak period, and eight occurred in the pm peak period. Traffic was significantly heavier at the intersection in the pm peak hour, resulting in occasional queuing from the TH 13/CH 21 signal back to the Main Avenue intersection. Westbound CH 21 queuing was also observed back to TH 13 a couple of times during the observation period. These queues

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added some confusion for drivers at the all way stop intersection. Eastbound vehicles in the queue from the signal inhibited others from taking their turn moving through the all way stop. This situation appears to be a contributing factor resulting in a higher number of conflicts in the pm peak period.

Additional analysis relationships related to the results of the conflict observation are defined in the Traffic Conflict Procedure Manual and are further described in the Appendix E. These relationships provide a means to help assess the conflict risk and regularity at the intersection.

### **3.3.3 Traffic Conflict Study Conclusions**

The conflicts observed at the intersection of CH 21 and Main Avenue are consistent with the types of conflicts that might be expected to occur at a 4-way stop controlled intersection in any other location. Conflicts due to driver behavior responding to the adjacent signalized intersection were not prevalent with the exception of left turn opposing conflicts that occurred in conjunction with roll-through stops. In these cases, the roll through driver did not anticipate that the opposing vehicle intended to turn left. In some of these cases the left turning vehicle failed to use its turn indicator. This type of conflict occurred in both directions, seemingly independent of the presence of a signal at the adjacent intersection.

Of the 13 conflicts at the intersection, 10 were related to assignment of right-of-way. These include Left Turn Opposing and Crossing/Right Angle types of conflicts. Potential solutions should only be considered that might more effectively assign right of way to users of the intersection.

Advance warning devices, stop sign beacons, larger stop signs or other visibility treatments are not devices that will improve assignment of right of way at the intersection and should not be considered with the intent of solving conflict issues at this intersection. Considering that the intersection currently operates under all-way stop control, the only conventional traffic control device that could provide a higher level of control related to assignment of right-of-way is a traffic signal. According to an Accident Reduction Factors chart produced by Mn/DOT, adding a new signal without making any other geometric change is likely to result in a 450% increase in Left Turn type accidents and a 41% increase in Right Angle type accidents. Consideration of signalization with left turn channelization has the potential to reduce the number of conflicts of the types that occur under all way stop control. Signalization would result in a higher frequency of other types of conflicts primarily of the Rear end type.

Physical intersection changes could also be considered to reduce assignment of right of way conflicts. Potential treatments that would be effective include elimination of conflicting movements by construction of a center median through the Main Avenue intersection. These types of treatments are outside of the range of solutions deemed practical based upon conflict occurrence alone and the severe impact that the treatment would have on accessibility in the downtown area.

As part of this CH 21 Corridor Study, potential geometric improvement concepts for CH 21 through the Main Avenue and TH 13 intersections are

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being considered (recommendations are made in the “Evaluation and Selection of Concepts Solutions by Study Area” section of this report). Left turn channelization and potential signalization of the Main Avenue intersection have been studied along with other alternative concepts. If the preferred alternative selected were to include signalization of the Main Avenue intersection, coordination of the two signal systems would be necessary to minimize unexpected stops between the intersections. In addition, design features that minimize misinterpretation of signal indications should be considered. Optically programmed overhead signal heads indications should be considered to limit visibility of the downstream signal until vehicles pass through the first intersection encountered.

### **3.4 Access Analysis**

Access and mobility are often competing forces on a roadway system. The challenge of any roadway system is to adequately balance the access and mobility needs. The degree to which a roadway is planned to provide for access and mobility helps to determine a roadway’s functional classification. Freeways and principal arterials provide for the lowest level of access and the highest degree of mobility, while local streets provide for the greatest level of access and lowest degree of mobility. Collector roadways tend to provide equal levels of access and mobility. An integrated system of arterials, collectors, and local streets are needed to satisfy the access and mobility needs of the traveling public.

The competition of access and mobility often creates public safety concerns. Access along a roadway creates conflict points that can lead to an increase in the potential for crashes. The Mn/DOT study entitled “The Statistical Relationship Between Vehicular Crashes and Highway Access” documents the direct correlation between the density of access and crash rates for various roadway types. One of the study’s primary findings was that higher levels of access density resulted in higher crash rates.

As the traffic volumes on CH 21 continue to increase, so too will the number of conflicts at the existing access locations. Therefore, it is important to conduct an analysis of access along the CH 21 to identify if there are potential locations where access management might help to improve the safety along the corridor.

#### **3.4.1 Existing Access Inventory**

In order to identify the location and type of access currently provided along the CH 21 study segment, an inventory of the existing access was completed. This inventory, shown in Figure 6, revealed that a total of 31 accesses are currently provided along the CH 21 study segment. Of these 31 access locations, 20 were identified as public street accesses, 9 were identified as private residential accesses, 1 was identified as a commercial access, and 1 access location was identified in the “other” category (field and/or abandoned access). The 31 accesses result in an access density of 11.3 accesses per mile along the CH 21 study segment.

#### **3.4.2 Access Spacing Guidelines**

Scott County has guidelines for the minimum spacing of accesses on the County roadway system. The recommended access spacing guidelines for

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four-lane undivided roadways serving less than 15,000 vehicles per day are shown in Figure 6. These guidelines are published in the 2001 Scott County Transportation Plan. The recommended guidelines incorporate functional classification, and reflect both urban and rural settings due to the unique characteristics of each.

The Minnesota Department of Transportation also has a Long Term Access and Development Plan for the TH 13 corridor that includes the intersection of TH 13 and CH 21. This plan, which was adopted in 1996, addresses every existing roadway connection with TH 13, and will need to be considered when applying potential access management alternatives along the CH 21 corridor.

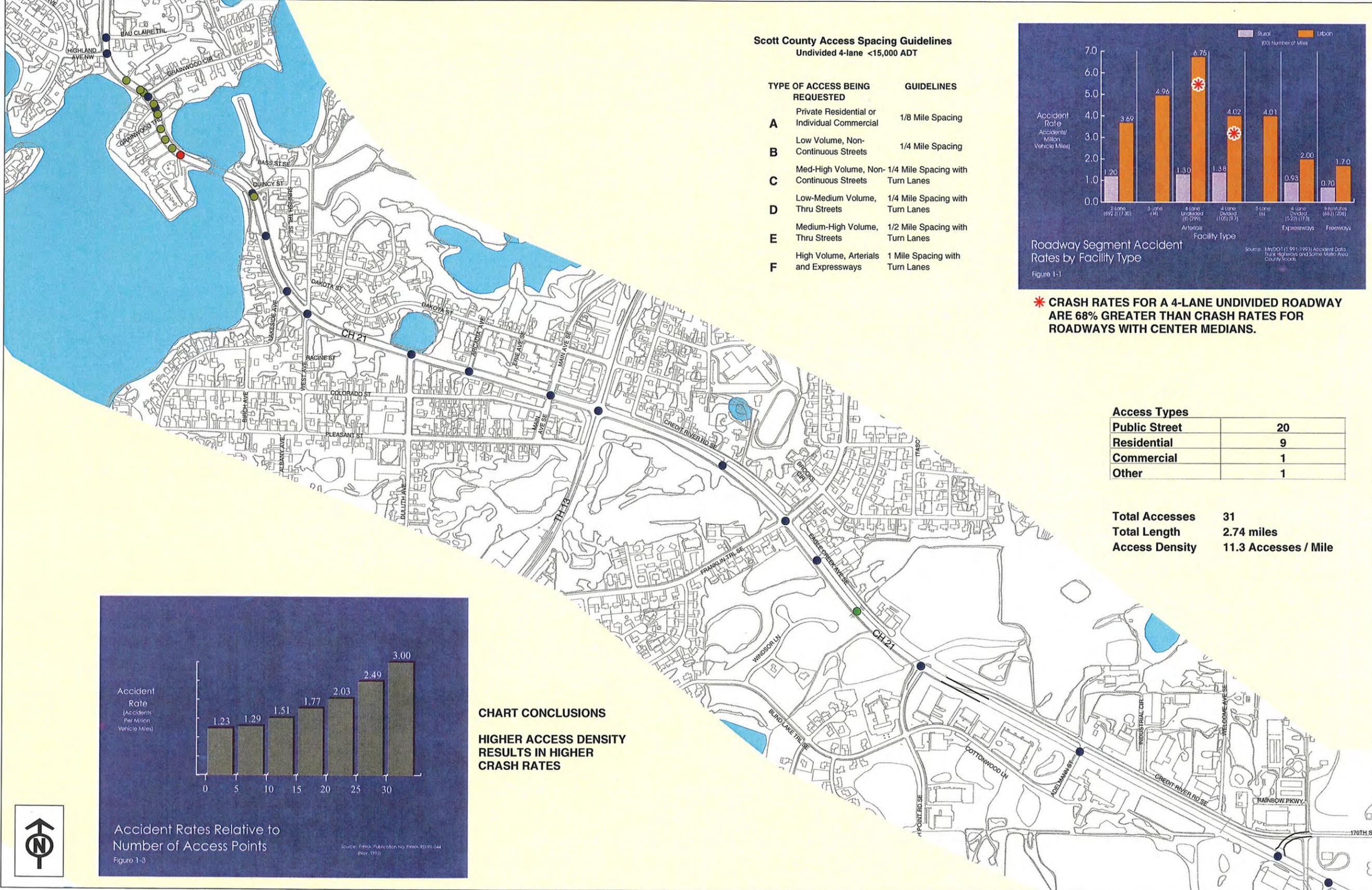
### **3.4.3 Access Evaluation and Application to Existing Corridor**

County Highway 21 is currently a 4-lane undivided roadway with an average daily traffic volume under 15,000 vehicles per day. Based on the Scott County Minimum Access Spacing Guidelines shown in Figure 6, private residential or individual commercial access points should ideally be limited to a minimum of 1/8 mile spacing. Low volume non-continuous streets, medium-high non-continuous streets, and low-medium volume thru streets should be limited to 1/4 mile spacing. Medium-high volume thru streets should be limited to 1/2 mile spacing, and high volume arterials and expressways should be limited to 1 mile spacing.

As illustrated in Figure 6, the western portion of the CH 21 corridor experiences the highest density of accesses. Based on the County access spacing guidelines, the 8 closely spaced private residential access points in the Wagon Bridge Peninsula area, combined with the Grainwood Trail and Circle public street accesses, give the section of CH 21 from Highland Avenue to the Wagon Bridge the highest density of access points per mile. The average spacing of the 12 accesses in this 1,440 foot section of CH 21 is 120 feet, resulting in an equivalent access density of 44 accesses per mile.

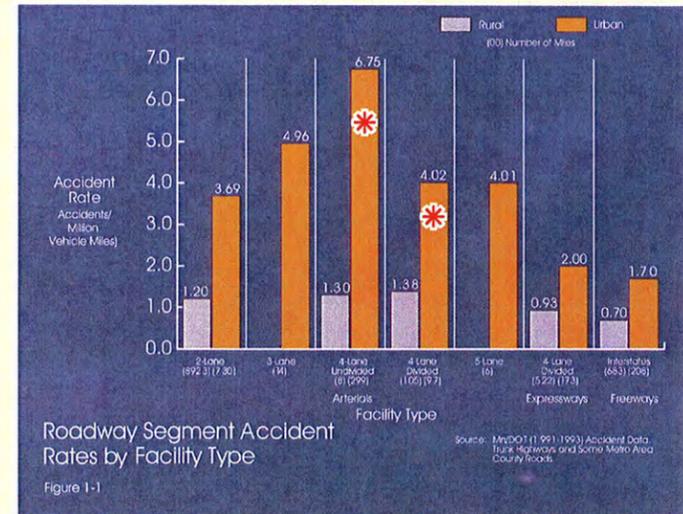
Traveling to the east along the CH 21 corridor, from the Wagon Bridge, access points are primarily limited to public street accesses spaced at intervals that range from approximately 250 feet (Lakeside Avenue and West Avenue) to approximately 1,950 feet (Adelmann Street to 170th Street).

Other problematic areas along the CH 21 corridor where the existing access locations are either closely spaced (Main Avenue and TH 13 intersections), or locations where the other factors such as restricted sight distance causes access concerns (Lakeside and West Avenue intersections with CH 21). The intersection access spacing of Main Avenue and TH 13 along CH 21 is the subject of extensive traffic analysis reported in the Alternatives Evaluation section of this report.



**Scott County Access Spacing Guidelines**  
Undivided 4-lane <15,000 ADT

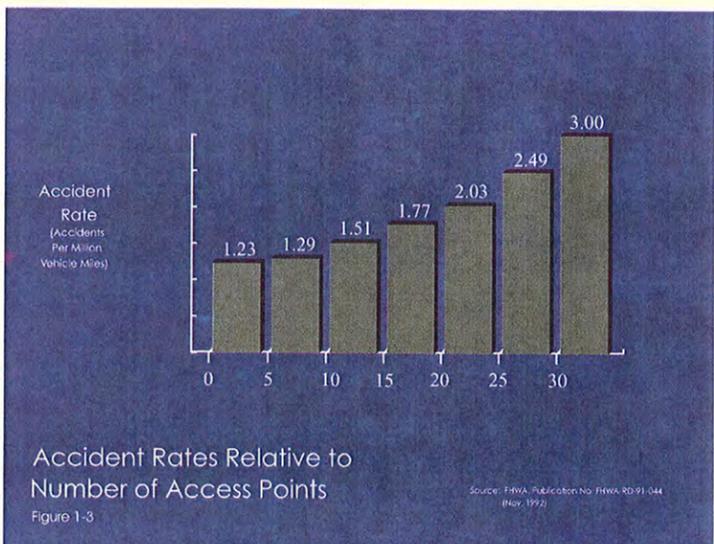
TYPE OF ACCESS BEING REQUESTED	GUIDELINES
<b>A</b> Private Residential or Individual Commercial	1/8 Mile Spacing
<b>B</b> Low Volume, Non-Continuous Streets	1/4 Mile Spacing
<b>C</b> Med-High Volume, Non-Continuous Streets	1/4 Mile Spacing with Turn Lanes
<b>D</b> Low-Medium Volume, Thru Streets	1/4 Mile Spacing with Turn Lanes
<b>E</b> Medium-High Volume, Thru Streets	1/2 Mile Spacing with Turn Lanes
<b>F</b> High Volume, Arterials and Expressways	1 Mile Spacing with Turn Lanes



**\* CRASH RATES FOR A 4-LANE UNDIVIDED ROADWAY ARE 68% GREATER THAN CRASH RATES FOR ROADWAYS WITH CENTER MEDIANS.**

Access Types	
Public Street	20
Residential	9
Commercial	1
Other	1

Total Accesses	31
Total Length	2.74 miles
Access Density	11.3 Accesses / Mile



**CHART CONCLUSIONS**  
**HIGHER ACCESS DENSITY RESULTS IN HIGHER CRASH RATES**



**C.H. 21 Corridor Study**

- Types of Access**
- Commercial
  - Other
  - Public Street
  - Residential

**CH 21 Access Inventory Spacing Guidelines and Safety Relationships**

**Figure 6**

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### **3.5 Transit Needs**

Three regional providers operate transit service in Scott County -- Scott County Transit, Shakopee Transit, and the Prior Lake Local Laker Link. In Prior Lake, transit is provided by circulator and shopping buses and dial-a-ride services. Routes are provided for transit patrons to the community's local shopping areas and to Burnsville Center. Dial-a-ride shared ride transit service is also offered by reservation. Scott County's transit services provide connections to other major bus and transit services in the Metro area through the Burnsville Transit Station. Services offered provide alternative transit choices to address the evident needs of all segments of the local traveling population.

#### **3.5.1 Transit Routes and Facility Service Area**

Prior Lake Route 491 is a fixed route circulator bus service that links residential, school, and commercial areas with Downtown Prior Lake. Route 491, known as the Local Laker Link, is presently seasonal and will operate between June 7 and August 27, 2004. The route encircles Prior Lake and provides 12 stops along County Highways 21, 42, 12, 18, 27, and 44 as well as TH 13. A spur to the Southbridge retail area in Shakopee links Route 491 with Scott County Transit's commuter routes and other transit providers operating along TH 169 and TH 13.

#### **3.5.2 Park and Rides**

There are two officially recognized park and ride lots located in downtown Prior Lake. The largest facility is located on Colorado Avenue one block south of CH 21 and west of TH 13, and is a terminus of Transit Route 491. This facility currently provides 62 parking spaces, offers local street access for vehicles and buses, good on-site circulation and adequate use of available space for vehicle parking. A smaller park and ride lot is located adjacent to and east of TH 13 and south of Dakota Street. This facility is unpaved, does not maintain an on-site bus connection, and is owned by the Mn/DOT. Each of these facilities appear to have adequate capacity to accommodate additional users. As an unimproved lot, the Mn/DOT site, in particular, has the potential to accommodate additional users with the installation of site improvements. However, capacity improvements at the TH 13/CH 21 intersection will require widening of TH 13 into Mn/DOT's site that may effect its ability to function as a park and ride lot after roadway improvements are made.

#### **3.5.3 Planned Service Changes**

Scott County's transit services were recently reevaluated and route/service adjustments were made effective in June 2004. No major service area changes are proposed at this time; however, with the completion of regional transportation system improvements and to avoid potential future gaps in service, Scott County Transit will continue to assess its transit system provider services to match the needs of its patrons. As roadway improvements are planned and constructed, it will consider changes and also monitor the effects of transit services in adjacent counties and local communities. The CH 21 proposed improvements are also viewed by Scott County Transit as an opportunity to provide better accessibility to the

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community's civic, retail, and employment travel demand generators and a means to promote local transit service usage and growth.

### **3.6 Storm Water Management Planning**

Managing surface water quality, erosion control and lake level management are important to protecting the natural lakes and wetlands within the area and ensuring maximum enjoyment from these resources in years to come for area residents and visitors.

CH 21 is located within the Prior Lake-Spring Lake Watershed District (PLSLWD). As this segment of CH 21's physical deficiencies are corrected, presently and in the future, it is likely there will be an increase in impervious surface as well continued development in the project area. The PLSLWD has adopted a water resources management plan pursuant to Minnesota Watershed Act and Metropolitan Surface Water Management Act. Those two Acts allow the PLSLWD the power to accomplish its statutory purpose, which is to conserve, protect and manage water resources within the boundaries of the PLSLWD. As part of the Plan, Rules have been put in place to implement the Plan's principles and objectives.

Construction or reconstruction activities associated with CH 21 will require a permit from the PLSLWD that incorporates and approves a storm water management plan and erosion and sedimentation plan(s). Land altering activities that may require filling of floodplains and/or wetlands cannot do without first obtaining a permit from the PLSLWD, and in the case of wetlands, an approved wetland replacement plan from the local government unit with jurisdiction over wetlands. In the event construction activities associated with CH 21 will affect drainage in a way that it will obstruct or redirect natural flow of a watercourse, a permit is required from the PLSLWD.

Providing storm water detention ponds is one effective measure for managing water quality issues. Preservation of right of way in locations that would be effective to be used as storm water detention ponds, or other treatment strategies is important to the long term planning for the roadway itself. The City of Prior Lake Engineering staff has reviewed potential sites along the corridor as candidates for ponding. Results of this review are included in Appendix K.

### **3.7 Summary of Study Issues**

Over the course of the public meetings and open houses, a number of issues were identified along the CH 21 corridor for further study. These issues were broken down into the three targeted study areas along the CH 21 corridor, and are summarized in the following three sections.

#### **3.7.1 West End**

A total of nine main issues were identified within the West End of the CH 21 corridor, from Highland Avenue to West Avenue:

- Difficulty of left turn access
- Sight distance around curves

- 
- Speed
  - Pedestrian crossing safety
  - Many private and public street accesses
  - Width of existing Wagon Bridge
  - Width issues and access to Lakeside Avenue
  - Right of way needs
  - Shoreline impacts and water quality

### **3.7.2 Downtown Area**

A total of four main issues were identified within the Downtown Area of the CH 21 corridor, from Duluth Street to TH 13:

- Desire to maintain full access to downtown area
- All way stop operation at Main Avenue
- TH 13/CH 21 intersection operation
- Right of way needs for potential roadway solutions

### **3.7.3 East End**

A total of seven main issues were identified within the East End of the CH 21 corridor, from just east of TH 13 to CH 87:

- Discontinuous frontage roads
- Need for left turn lanes on CH 21
- Need for a traffic signal at Fish Point Road
- Future Fish Point Road street connection to the north
- Commercial and residential development
- Offset intersection at CH 87 & 170th Street
- Higher posted speeds on east of CH 21

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## **4.0 Development and Evaluation of Project Alternatives**

### **4.1 Design Features to be Accommodated**

Design features have been assembled into alternative concepts for further public input and technical analysis. Applying these general design features to the CH 21 corridor has resulted in multiple concepts to be considered along with addressing the need for continued access to businesses and residences in Prior Lake. A general design concept for CH 21 that employs all of the design features identified in appropriate locations is described as follows:

*A four lane divided roadway with channelized left-turn lanes at full access intersections, right-turn lanes on high speed segments or where otherwise needed for intersection capacity, with sidewalks or trails on both sides and boulevard space where possible.*

This general design concept is comprised of the seven (7) design features summarized in the following sections.

#### **4.1.1 Through Lanes**

The existing CH 21 roadway has two through lanes in each way through the study area. Concepts will be developed to serve traffic demands through 2025. Forecasts indicate that two through lanes in each way be retained. Forecasts for TH 13 also indicate the need to plan for two through lanes in each direction.

#### **4.1.2 Center Median**

A center median serves as a safety feature by:

- Physically separating vehicles traveling in opposite directions.
- Provides a pedestrian sanctuary allowing crossings of the roadway to occur half at a time. Crossings can be safely achieved during a much smaller gap in traffic than required for crossing four lanes. Gaps of an adequate duration occur much more frequently.
- Reduces traffic conflicts caused by left turning vehicles. The median island can be used to prohibit left turns to and from the roadway when reasonable alternative routes are available.

#### **4.1.3 Left-turn Lanes**

Left-turn lanes improve safety and capacity:

- Left-turn lanes allow left-turning vehicles to wait for gaps in the opposing through lanes without blocking a through lane in the same direction improving safety and capacity.
- Allow improved visibility of oncoming vehicles around opposing left-turning vehicle.

#### **4.1.4 Right-turn Lanes**

Right-turn lanes improve safety and capacity:

- Right-turn lanes allow turning vehicles to decelerate with minimal disruption to traffic in the through lane

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- Right-turning vehicles are not impeded by vehicles waiting in the through lane

#### **4.1.5 Sidewalks and Trails**

Sidewalks and Trails - Pedestrian facilities are planned for both sides of CH 21 to:

- Provide safe place for pedestrians and bicyclists to travel separated from traffic lanes
- Allow movements along the corridor to controlled crossing points
- Complement the City and County Trail System Plan
- A trail connection under TH 13, south of CH 21 has been identified as a desirable improvement that decreases the demand to cross TH 13 at grade at the CH 21 signalized crosswalk.

#### **4.1.6 Boulevards**

Boulevard or berm areas along the roadway create:

- Buffer area between sidewalks and roadway
- Snow storage area
- Traffic signs, signal poles and street light pole locations
- Green space

#### **4.1.7 Traffic Signals**

Traffic signals can be very effective tools for managing traffic demands at intersections serving high vehicular and/or pedestrian volumes. The use of signals on arterial corridors like CH 21 should be planned to serve traffic demands on the intersecting roadways and local access needs, but this should be done simultaneously with observing spacing guidelines intended to maintain uniform traffic flow and enhance corridor safety. Concept drawings have been developed (see Section 4.2) that depict potential future traffic signals at some intersections. The locations shown in the alternative drawings would be likely candidates for future signalization under future traffic demands. It should not be assumed that traffic signals would be immediately warranted at the time of roadway reconstruction. The term "warrant" infers that traffic demands or flow conditions satisfy accepted volume and safety thresholds that indicate that a signal may be beneficial to the public. Justification of new traffic signal installations requires a review of this criteria for each location at the time it is being considered.

Temporary signal systems are tools that can be considered to solve serious operational problems in advance of permanent reconstruction. Use of temporary signals is typically limited to those locations that satisfy traffic signal warrants and are justified based upon the range of possible solutions to the problem identified including consideration of the status (time frame) for the permanent solution. When construction of a permanent solution is programmed (part of a governmental Capital Improvement Budget) it is often

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difficult to justify expenditures for temporary signalization unless the need is dire and alternative routes are not available.

## **4.2 Alternative Concept Solutions by Study Area**

Alternative concepts were developed to address existing and future transportation system needs, serve local access needs and address other issues identified in the discovery stage of the CH 21 Corridor Study.

### **4.2.1 West End**

As stated previously in the Summary of Study issues section of this report, there are several issues that need to be addressed by potential West End concepts, including: difficulty of left turn access; sight distance around curves; speed; pedestrian crossing safety; many private and public street accesses; width of existing Wagon Bridge; and width issues and access to Lakeside Avenue. A total of four concepts were developed in the attempt to address these West End issues. A comparison table and drawings for each of the West End Concepts are included in *Appendix F*.

**Concept W1** – Four-lane divided roadway with median and channelized left turn lanes.

**Concept W2** – Four-lane divided roadway with non-continuous center median for pedestrian refuge and painted left turn lanes.

**Concept W3** – Retains existing Wagon Bridge. The concept could be applied to any of the other west end concepts.

**Concept W4** – Four-lane divided roadway with a continuous median between the intersections of Highland Trail on the west and West Avenue on the east. Left turn lanes are provided at the Highland and West intersections only.

### **4.2.2 Downtown Area**

General issues within the Downtown Area that need to be addressed by the concepts include: desire to maintain full access to downtown area; all-way stop operation at Main Avenue; TH 13/CH 21 intersection operation; and right-of-way needs for potential roadway solutions. A total of six concepts were developed in the attempt to address these Downtown Area issues. A comparison table and drawings for each of the Downtown Area Concepts are included in *Appendix G*.

**Concept D1** – Maintains full signalized access on CH 21 at Main Avenue. Access at Arcadia and Duluth is also maintained.

**Concept D1A** – Provides a full signalized access on CH 21 at Main Avenue but eliminates right – in/right – out access to/from TH 13 at Dakota Avenue and at Pleasant Avenue.

**Concept D2** – Median closure on CH 21 at Main Avenue; NB left turn lane from TH 13 to Pleasant is provided. Duluth Avenue is realigned to form a signalized access point west of the pond. Duluth is extended to the north of CH 21 to connect with Dakota.

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**Concept D3** – Median closure on CH 21 at Main Avenue. NB left turn lane from TH 13 to Pleasant is provided. Duluth Avenue and Arcadia Avenue are realigned to form a signalized access point east of the pond.

**Concept D4a** – Median closure on CH 21 at Main Avenue. NB left turn lane from TH 13 to Pleasant is provided. Duluth Avenue at CH 21 becomes a right in/right out. Arcadia Avenue is reopened south of CH 21 for downtown access. This concept could be considered as a 1<sup>st</sup> stage of implementation towards Concept D4b.

**Concept D4b** – Same as D4a except that Duluth Avenue is realigned to access CH 21 at Arcadia Avenue intersection in conjunction with downtown expansion towards the Lake.

All downtown area concepts were developed to provide needed capacity at the intersection of TH 13 and CH 21. Right turn lanes, two through lanes, and two left turn lanes were determined to be necessary on each approach to the intersection to serve long term traffic demands (See Traffic Analysis Section for greater detail). If implemented, the added width will have right of way impacts near TH 13. The alignment for each of these concepts has been positioned to balance right of way needs adjacent to CH 21 west of TH 13 (affecting commercial properties in the south west quadrant of the intersection) compared to right of way impacts to residential properties in the northeast quadrant of the intersection. Balancing the right of way impacts to homes east of TH 13 against the impacts to businesses west of TH 13, made it necessary to consider the downtown area extended to Franklin Trail east of TH 13 during our open houses and workshops.

Evaluation of downtown alternatives against one another is dependent upon traffic operations, safety and access to the downtown area. So, for the purposes of this study report, the downtown concepts will be compared against one another assuming that the alignment impacts to the homes east of TH 13 and vice versa is understood. Similarly, the Franklin Trail and Credit River Road access concepts east of TH 13 will be compared to one another on their merits related to neighborhood accessibility and right-of-way impacts to residences while knowing that any shift in alignment has an impact to the businesses west of TH 13.

#### **4.2.3 East End**

The alternative concept solutions in the East End study area of the CH 21 corridor are broken down in four separate areas: Franklin Trail, Fish Point Road, Adelman Street, and Revere Way.

The relationship between east end concepts near Franklin Trail/Credit River Road and the downtown area right of way needs has been previously discussed (See Downtown Area Concepts).

#### **Franklin Trail Concepts**

The frontage road on the north side of CH 21 does not connect to Franklin Trail. Closure of the access from the frontage road to CH 21 is desirable for safety purposes. A total of five concepts have been developed in the attempt

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to address this Franklin Trail issue. A comparison table and drawings for each of the Franklin Trail area concepts is included in *Appendix H*.

**Concept F1** – Connects frontage road to Franklin Trail, approximately 150 feet north of CH 21.

**Concept F2** – Connects frontage road to Franklin Trail via new street connection to Brooks Circle. Treatment could be repeated for frontage roads east and west of Franklin Trail

**Concept F3** – Connects frontage road west of Franklin Trail to Brooks Circle by extension westerly from the end of the Brooks Circle cul-de-sac, following the south edge of the school property until it can curve to the south to intersect with Credit River Road approximately 600 feet west of Franklin Trail.

**Concept F4** – Eliminates the access from Credit River Road to CH 21 west of Franklin resulting in a long cul-de-sac with access provided by its intersection with Dakota Street near TH 13.

**Concept F5** – Provides access from CH 21 to Credit River Road via a right in – right – out access only. This concept includes a right turn lane on CH 21.

#### **Fish Point Road Concept**

Fish Point Road does not currently connect with CH 21 on the north side. A large tract of residentially zoned land remains undeveloped in this area. Fish Point Road is planned for extension through this area as a collector street. Other local street and frontage road connections have not yet been defined by local development. One concept has been developed to address issues in the Fish Point Road area.

**Concept FP1** – Extend Fish Point Road to CH 21. Local streets and frontage road connections should be constructed in conjunction with future development of this area. Concept FP1 is included in *Appendix H*.

#### **Adelmann Street Concepts**

Adelmann Street provides access from to/from CH 21 to commercial and light industrial land uses to the south including the new Deerfield Development area. Access spacing along CH 21 is adequate to plan for permanent access to the south to be retained in the long term. Traffic forecasts do not indicate that a traffic signal will be warranted at this location in the future. Local street connectivity is provided to allow signalized access from the area to Fish Point Road and CR 87 intersections with CH 21 which are candidates for future signalization. The frontage road on north side of CH 21 currently operates with access to CH 21 at Adelmann Street. However, it is not set back far enough to effectively operate this way in the long term. Three concepts have been developed to address these access and connectivity issues in the vicinity of Adelmann Street. A comparison table and drawings for each of the Adelmann Street area concepts is included in *Appendix H*

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**Concept A1** – Eliminate access to CH 21 on the north side at Adelman Street. Extend frontage road to Fish Point Road to provide CH 21 access at a signalized location.

**Concept A2** – Realign the frontage road near Adelman Street to develop better offset from the CH 21 intersection to allow the north side access to CH 21 to be retained. The realigned frontage road has a significant right of way impact on the church property.

**Concept A3** – Realign the frontage road near Adelman Street as a backage road routed behind the church allowing the north side access to CH 21 to be retained.

### **Revere Way Concept**

Currently, 170<sup>th</sup> Street intersects CH 21 several hundred feet westerly of Revere Way/CR 87. A concept has been developed to realign 170<sup>th</sup> street to form a common intersection with CR 87 at CH 21.

**Concept R1** – Realign 170<sup>th</sup> Street to create a full access intersection that has the potential for future signalization. Concept R1 is included in *Appendix H*.

## **4.3 Evaluation and Selection of Concept Solutions by Study Area**

Evaluation of alternatives has been performed within each sub-area (west end, downtown and east end).

### **4.3.1 Corridor Performance Objectives**

Performance objectives for traffic operations were identified prior to evaluation of alternatives. These objectives were shared with the Citizens Advisory Committee in September, 2003. Additional objectives for each sub-area were identified as issues unique to each area became clear through the public involvement process.

#### **Intersection Level of Service**

Level of Service (LOS) is a qualitative measurement of intersection performance. For intersections, LOS is based upon the amount of delay experienced by the average vehicle entering the intersection. LOS is typically evaluated for the busiest times of the day, usually the AM or PM peak hour. For CH 21 and TH 13 in Prior Lake, these peaks occur between 6:30 and 8:30 AM or 4:00 PM and 6:00 PM. LOS grades, A through F are defined with A indicating a low delay and F a high delay. For planning purposes, the operational goal for intersections is LOS D or better under future traffic demands. The LOS D threshold corresponds to an average delay of 55 seconds per vehicle.

#### **Intersection Operations - Storage and Queuing**

Intersection performance should also be evaluated based upon its ability to serve traffic demands without creating lines of vehicles that spill over into adjacent lanes or block adjacent intersections. These problems can occur when turn lanes are not long enough or when intersections are closely spaced

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together. In our study area, storage and intersection spacing issues will need to be resolved for CH 21 intersections with TH 13 and with Main Avenue.

### **Average Speed**

Average speed is a corridor performance criterion that considers the total travel time, including congestion and intersection delay, over the length of the study area. LOS grades are assigned for each type of roadway considered based upon a comparison to the expected free flow speeds for the roadway. The character of CH 21 varies through the study area. Posted speed limits and free flow speeds also vary. Speed performance goals for roadways with a LOS D free flow speed of 50 mph would be 21 – 27 mph. Speed performance goals for roadways with a free flow speed of 30 mph would be 9 – 13 mph. A combination of these goals, or ranges, will be established for the CH 21 corridor.

### **Safety**

Pedestrian safety is a performance objective that will be considered along CH 21. Recent findings by the Federal Highway Administration will be used as a guide to consider the safety of crosswalk locations within the study area based upon the type of roadway (4 –lane, 4 lane divided, etc) and traffic control (pavement markings, signs, signals, etc) provided to serve pedestrian and vehicular needs.

Vehicular safety is a performance objective that will be measured based upon a historical evaluation of crashes that have occurred along the corridor. An evaluation of crash types (rear end, left turn, etc) and crash severity (fatality, personal injury or property damage) will be performed. Crash issues are expressed in terms of crash rates (crashes per million vehicle miles traveled) and severity rates (crash rates weighted based upon severity). These rates will be compared to average rates for similar roadway facilities as an indicator of safety issues that may currently exist.

Roadway design concepts will be developed that respond to safety issues identified. The relative safety of each concept considered will be assessed based upon crash rates typically experienced on similar roadways.

### **Access Spacing Guidelines**

Roadway mobility and access density are related as indicated in the attached graphic. Typically, when access density is high, as in many urban areas, mobility is reduced due to the higher number of vehicular conflicts created by traffic turning on and off the roadway. In contrast, on freeways, access density is low while mobility is very high.

CH 21 is a Minor Arterial in the regional roadway system. As such, the need to protect mobility must be balanced against local need for accessibility. Scott County has established access management guidelines that will be used as a benchmark for evaluating current and future access conditions in the study area.

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#### **4.3.2 West End Alternative Evaluation**

West End area concept drawings and a comparison Table are included in Appendix F. An evaluation matrix that qualitatively identifies how well each improvement concept addresses specific needs is shown as Figure 7. This evaluation tool was used at the West End Targeted Area Workshop and was generally understood and supported by those in attendance

Concept W4 provides the highest level of safety at the lowest cost but has access implications that are unacceptable to the Wagon Bridge peninsula properties (no left turn movements allowed).

Concept W1 is shown to have the highest potential to address the safety and access needs defined in this sub-area of the corridor. Concept W3 could be coupled with W1 and would allow replacement of the Wagon Bridge to be deferred until its age and condition requires replacement. The wider median (18 feet) allows a left turn lane to be provided to the Wagon Bridge peninsula area and provides a higher degree of pedestrian crossing safety but does require the greatest amount of right of way.



**Figure 7  
Scott County Highway 21  
Improvement Concept Comparisons**

Downtown Improvement Needs	How Well Does the Improvement Concept Address the Need?			
	Concept W1	Concept W2	Concept W3	Concept W4
<b>Safer Left Turn Access</b>		Inconsistent with driver expectations / may create undesirable driver reactions	Cannot serve left turns to marina without moving marina driveway	Right in, right out accesses but will create need for U turns
	++	+	++	+
<b>Curves in Road Made Safer</b>	Medians except at designated access points	No medians in places	No median on bridge	Continuous median separates oncoming traffic
	++	-	+	++
<b>Sight Distances Improved</b>				Conflicts from only one direction
	●	●	●	+
<b>Safer Pedestrian Crossings</b>	Yes – 18 ft. median for pedestrian refuge and improved bridge underpass opportunity	Yes – 12 ft. median for pedestrian refuge and improved bridge underpass opportunity	No pedestrian refuge in bridge area	Yes – 6 ft. median for pedestrian refuge and improved bridge underpass opportunity
	++	+	+	+
<b>Access To Properties</b>	Some Right-in / Right-out created	Some Right-in / Right-out created	Some Right-in / Right-out created	Majority Right-in / Right-out created
	-	-	-	--
<b>Minimizes Right Of Way impacts</b>	Widest roadway section			Narrowest roadway section
	--	+	-	++
<b>Minimizes Water Resource Impacts</b>	More runoff Wetland /Shore land Management Issues?	More runoff Wetland /Shore land Management Issues?	Impacts deferred due to bridge replacement	More runoff Wetland /Shore land Management Issues?
	-	-	●	-
<b>Best Value (Function and Cost)</b>	+	-	+	-

**Legend:**

- ++ Addresses Need**
- + Somewhat Addresses Need**
- Neutral**
- Leaves Some Needs Unattended**
- Works Against the Need**

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### **4.3.3 Downtown Area Alternative Evaluation**

#### **4.3.3.1 Downtown Area Traffic Analysis (2025 Needs)**

Serving forecast traffic demands on CH 21 through the downtown area of Prior Lake is dependent upon the capacity of the CH 21 and TH 13 intersection. Traffic operations analysis work performed for the CH 21 and TH 13 corridors was performed based upon PM peak hour traffic demands forecasted for 2025. Critical findings regarding the need for increased capacity on TH 13 and the effect of closely spaced signals are reported in the following sections. These results were reported to the CAC on July 6, 2004. Detailed analyses results and measures of effectiveness are included in Appendix I.

##### **4.3.3.1.1 *Long Term Needs on TH 13***

Daily traffic demands on TH 13 are forecast to grow from 13,500 vehicles per day (2002 count) to 27,000 vehicles per day in 2025. A demand volume of this magnitude suggests that TH 13 should be planned as a four lane roadway, although an expansion project is not expected to be programmed by Mn/DOT within the next 20 years given current funding levels assumed for their fiscally constrained plan as shown in the Metro District's Draft 2004 Transportation System Plan. However, it will remain on Mn/DOT's "wish list" of projects that could be programmed should funding levels change. Future traffic operations analyses on CH 21 through Prior Lake (including the TH 13 intersection) have been performed based upon the PM peak hour forecast (which is also expected to double by 2025). The operation and safety of TH 13 is influenced by the number of access points and the spacing of traffic signals on TH 13 and on CH 21. The need for double left turn lanes at the intersection of TH 13 and CH 21 has been identified.

*TH 13 Conclusion: Double left turn lanes from CH 21 to TH 13 require that two lanes be provided on TH 13 going away from the CH 21 intersection in both directions. TH 13/CH 21 intersection operations require that 2 through lanes be provided on all approaches to the intersection. Therefore, the CH 21 concept layout should add and drop lanes on TH 13 north of Dakota Avenue and south of Pleasant Avenue to achieve the effectiveness of a four lane highway without continuous expansion of TH 13 from 2 lanes to four lanes over a longer segment of TH 13.*

##### **4.3.3.1.2 *CH 21 Analyses – Spacing of Access Points***

Access from CH 21 to downtown Prior Lake via Main Avenue (as represented in Concept D1) versus Arcadia Avenue (Concept D4) is the central issue for the traffic operations analysis. Mn/DOT, as part of the PMT, has shared their experiences with many other closely spaced signal systems at other locations in the Twin Cities that routinely suffer from safety and congestion related problems due to the closely spaced intersections and signals. (A few examples are: TH 51 (Snelling) at County Road C, TH 36 at Rice Street, and I-35E at County Road 96). Safety studies have identified a direct relationship between access density and crash frequency.

Analysis of CH 21 has been performed to compare the effectiveness of signals on CH 21 at TH 13 plus another signal to the west at Main Avenue versus Arcadia Avenue. A sensitivity analysis was performed to identify the

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comparative strengths and weaknesses of the two access alternatives being considered. The sensitivity analysis was based upon varying the traffic volume demands to see how well each concept performed under a traffic demands varying from the base year forecast. Results indicate that Concept D4 is superior to D1 based upon Average Speed and Arterial Delay on CH 21, Average Speed and Arterial Delay on TH 13, Intersection Level of Service, vehicle storage and queuing problems. Intersection queuing for operational concepts D1 and D4 are graphically displayed as Figure 4 of 5 and Figure 5 of 5 in Appendix I. These figures depict average and maximum vehicle queues delayed by traffic signals. The impacts that vehicle queues would have on downtown street operations is apparent from these figures. Concept D1 (signal at Main) will create vehicle queues on Main Avenue that will impede downtown traffic circulation, block access to on-street parking and will block access to parking lots, alleys and driveways. Concept D4 has queues of similar length on Arcadia Avenue, but land uses on Arcadia are less dependent upon access to parking as those on Main Avenue.

*CH 21 Signal Spacing Conclusion: Concept D4 (CH 21 signalized access at Arcadia) will more effectively and safely serve long term traffic demands than will Concept D1 (signalized access at Main Avenue) based upon operational analysis results, safety implications and impacts to on and off street parking.*

#### 4.3.3.2 Downtown Area Traffic Analysis (Needs through 2010)

This section summarizes sensitivity analysis work done to evaluate potential interim projects for implementation prior to full reconstruction of the preferred alternative. Three conditions have been evaluated under existing traffic demands (2003 counts) and forecast traffic demands in 2006, 2008, and 2010. The three alternatives are:

- All – Way Stop at Main Avenue (existing condition)
- Temporary signal at Main Avenue (no change at Arcadia)
- Temporary signal at Arcadia Avenue with right-in/right-out only at Main.

##### 4.3.3.2.1 *All-Way Stop at Main Avenue*

Existing traffic control and lane use conditions serve existing volumes at LOS D or better (Level of service is based upon intersection delay; LOS D or better is considered acceptable). The TH 13 intersection operates at LOS D (54 seconds average delay per vehicle). The All way stop at Main operates at LOS B (10 seconds average delay per vehicle).

Delays increase as volumes increase. By 2006, delays at Main Avenue are 83 sec/veh (LOS F) while delays at TH 13 average 134 sec/veh (LOS F). The short distance between the Main and TH 13 intersection fills up with EB vehicles while the EB signal at TH 13 is red. EB vehicles continue to stack up from the Main Avenue stop sign resulting in queues 500 – 700 feet in length (20 – 30 cars in length)

Delays and queues with 2008 and 2010 forecast volumes compound from those described for 2006. This exercise shows that a 13% growth in traffic

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demand will result in operational conditions that will be intolerable, based upon delay. Average and maximum queue lengths for the pm peak hour in 2010 are graphically depicted on Figure 1 of 5 in Appendix I. As shown on the graphic, EB CH 21 traffic backs up from TH 13 through the Main Avenue and Arcadia Avenue intersections. Traffic queues on Main Avenue block intersections and on-street parking stalls up to 200 feet away from the stop sign at CH 21.

*Conclusion: Perpetuation of the all-way stop condition at Main Avenue will degrade traffic operations on CH 21, TH 13 and on Main Avenue as traffic volumes grow.*

#### 4.3.3.2.2 *Temporary signal at Main Avenue*

Under existing traffic demands, a temporary signal at Main Avenue would generate more delay at Main Avenue than would the all-way stop under existing traffic demands (25 sec/veh or LOS C). The flow of EB vehicles through the Main Avenue intersection could be coordinated with the EB movement through the TH 13 intersection so queues would be routinely served within one signal cycle. The TH 13 intersection would operate at LOS E (70 sec/veh), slightly worse than conditions with the all way stop at Main.

By 2006 average delays at Main Avenue will increase to 63 sec/veh (LOS E) with delays at TH 13 of 152 sec/veh (LOS F). By 2008, signal delays at both TH 13 and Main Avenue result in LOS F. Average and maximum queues for 2010 conditions are depicted on Figure 2 of 5 (see Appendix I) of the exhibits provided. EB traffic backs up from the TH 13 signal, through the Main Avenue intersection and through the Arcadia intersection. Traffic queues on Main Avenue block intersections and on-street parking stalls up to 200 feet away from the stop sign at CH 21.

*Conclusion: A temporary signal at Main Avenue would serve today's traffic demands but would degrade traffic operations on CH 21, TH 13 and on Main Avenue as traffic volumes grow. A temporary signal at Main Avenue would not be more effective than the existing all-way stop.*

#### 4.3.3.2.3 *Temporary signal at Arcadia Avenue*

This alternative assumes that Arcadia Avenue is opened to Colorado south of CH 21 and that the NB and SB Arcadia are widened to allow two lanes of traffic to approach the intersection. The increased distance between Arcadia and TH 13 greatly reduce the effect that queuing between intersections has on the operation of the adjacent intersection. Traffic demands in 2006, 2008 and 2010 result in average delays representative of LOS F at the TH 13 intersection. This would be the true regardless of the traffic control provided at Main or Arcadia. However, a signal at Arcadia operates at LOS D or better through 2010. EB queues from TH 13 back up to the Main Avenue intersection but never far enough to affect the efficiency of the Arcadia signal operation. Queues representative of 2010 conditions are shown in Figure 3 of 5 (See Appendix I). Traffic queues on Main Avenue block are considerably shorter and less disruptive to local traffic circulation and on-street parking than those experienced under all-way stop or signalized operation at Main Avenue.

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*Conclusion: A temporary signal at Arcadia with right-in/right-out movements allowed at Main Avenue would serve traffic demands through 2010 without degradation of traffic flow on TH 13 or disruption of on-street parking on Main Avenue.*

#### 4.3.3.2.4 *Conclusion of 2010 Traffic Analysis*

Temporary signalization of the Main Avenue intersection does not provide operational or safety benefits superior to the all-way stop condition. As traffic volumes grow, both the all-way stop and the temporary signal considered at Main Avenue would result in degradation of traffic flow on CH 21, on TH 13 and will disrupt on-street parking on Main Avenue and will block access points on Main Avenue within approximately 200 feet of CH 21.

A temporary signal at Arcadia is a viable short term operational change that will provide acceptable level of service on CH 21, will not disrupt traffic flow on TH 13, and will not disrupt on-street parking and access along Main Avenue in the downtown business district.

A temporary signal at Arcadia would require opening of Arcadia to Colorado south of CH 21 and widening of Arcadia north of CH 21 is consistent with the PMT recommended long term plan. Therefore, if short term access and/or traffic control changes are programmed for CH 21 in downtown Prior Lake, a temporary signal at Arcadia combined with turn restrictions on CH 21 at Main Avenue should be considered.

Serving forecast traffic demands on CH 21 through the downtown area of Prior Lake is dependent upon the capacity of the CH 21 and TH 13 intersection. Traffic operations analysis work performed for the CH 21 and TH 13 corridors was performed based upon PM peak hour traffic demands forecasted for 2025. Critical findings regarding the need for increased capacity on TH 13 and the effect of closely spaced signals are reported in the following sections. Analyses results are included in Appendix I.

#### 4.3.3.3 Downtown Concept Evaluation

Downtown area concept drawings and a comparison Table are included in Appendix G. An evaluation matrix that qualitatively identifies how well each improvement concept addresses specific needs is shown as Figure 8. Concept D4 is shown to have the highest potential to address the needs defined as part of this corridor study. This evaluation tool was used at the Downtown Area Targeted Area Workshop and was generally understood and supported by those in attendance. Several CAC members and other downtown business owners have expressed concerns regarding these findings. The primary reason for concern is loss of customers due to shifted access points and perceived less convenient traffic patterns.



**Figure 8  
Scott County Highway 21  
Improvement Concept Comparisons**

Downtown Improvement Needs	How Well Does the Improvement Concept Address the Need?				
	Concept		Concept	Concept	Concept
	D1	D1A	D2	D3	D4
Maintains Convenient Access for Downtown	All existing access maintained but creates congestion  +	Closes access from TH 13 to Dakota and Pleasant  -	Main Avenue is Right in / Right out Left turns at Duluth  -	Main Avenue is Right in / Right out Left turns at Duluth  -	Main Avenue is Right in / Right out Left turns at Arcadia, but Relieves congestion  +
Improves All-Way Stop at Main Avenue	Stop sign issues vs. Signal issues  -	Stop sign issues vs. Signal issues  -	Median closures at Main Ave.  ++	Median closures at Main Ave.  ++	Median closures at Main Ave.  ++
Improves Traffic Flow on TH 13	Dakota, Pleasant and Main Ave. issues  --	Main Ave. Issues only  -	  +	  +	  +
Improves Traffic Flow on CH 21	Signals at Duluth, Main and TH 13  --	Signals at Duluth, Main and TH 13  --	Signals at Duluth and TH 13  +	Signals at Duluth and TH 13  +	Signals at Arcadia and TH 13  ++
Consistent with 2020 Vision	  ●	  ●	  -	  -	Supports Downtown Growth to the west  +
Improves Safety	Most signals and access  --	  -	  +	  +	  +
Minimizes Right Of Way impacts	●	●	--	--	●
Minimizes Water Resource Impacts	●	●	--	--	-
Best Value (Function and Cost)	-	-	-	-	+

- Legend:**
- ++ Addresses Need
  - + Somewhat Addresses Need
  - Neutral
  - Leaves Some Needs Unattended
  - Works Against the Need

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#### **4.3.4 East End Alternative Evaluation**

East End area concept drawings and a comparison Table are included in Appendix H. An evaluation matrix that qualitatively identifies how well each improvement concept addresses specific needs is shown as Figure 9.

Concept F5 is shown to have the highest potential to address the needs defined as part of this corridor study for the Franklin Trail intersection and access configuration to residences on Credit River Road. Similarly, Concept FP1, A1, and R1 are shown as best able to serve needs for Fish Point Road, Adelman Street, and Revere Way intersections respectively.

This evaluation tool was used at the East End Targeted Area Workshop and was generally understood and supported by those in attendance. (Concepts F4 and F5 were added to the matrix as a result of discussion at the workshop).



**Figure 9  
Scott County Highway 21  
Improvement Concept Comparisons**

Downtown Improvement Needs	How Well Does the Improvement Concept Address the Need?									
	Franklin Trail Concepts					Fish Point Road	Adelmann Street Concepts			Revere Way Concept
	F1	F2	F3	F4	F5	FP1	A1	A2	A3	R1
Provides Continuous Frontage Roads	-	+	+	-	-	+	+	+	+	+
Access for Commercial/ Residential Development	Median closures at Franklin; Credit River Road cul-de-sac E. of Franklin		Credit River Road Cul-de-sac E. of Franklin	No CH 21 Access to Credit River Road	Right-in Right-out Access to Credit River Road	Allows Fish Point Road to be connected to the north	No access on north side at Adelmann St.			
	-	+	●	-	--	+	-	+	+	+
CH 21 Safety & Mobility (Access Closures)										
	+	+	+	+	+	+	+	+	+	++
Improve offset intersection at CH 87 and 170th Street	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	++
CH 21 Signals and Turn Lanes							Turn Lanes Only	Turn Lanes Only	Turn Lanes Only	
	++	++	++	++	++	++	+	+	+	++
Minimizes Right Of Way impacts	--	--	-	+	+	+	+	-	-	-
Best Value (Function and Cost)	-	-	-	-	+	+	+	-	-	++

**Legend:**  
 ++ Addresses Need  
 + Somewhat Addresses Need  
 ● Neutral  
 - Leaves Some Needs Unattended  
 -- Works Against the Need

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#### 4.4 Preferred Alternative (and Public Reaction)

The PMT considered all alternative concepts, technical evaluation, CAC discussions, open house comments, workshop discussions and business owner input. PMT recommendations made as a direct result of input from the public involvement process include the following:

- Low design speed through downtown and around the lake
- Center median for traffic safety
- Center median for pedestrian sanctuary (allows crossing ½ at a time)
- Left turn lanes
- Right turn lanes on east end of study area
- Avoid taking homes
- Avoid taking businesses
- Sidewalk or trail on each side
- Safety improvements at Franklin Trail
- Left turn lanes and future signal at Fish Point Road
- Realign 170<sup>th</sup> Street and plan for a future signal at County Road 87
- Retain right-in and right out accesses to TH 13 at Dakota and Pleasant
- Allow northbound left turns from TH 13 to Pleasant Street
- Plan for a trail connection under TH 13 south of CH 21

##### Preferred Alternative

Preferred alternative drawings, assembled from West End Concept W1, Downtown Area Concept D4, and East End Concepts F5, FP-1, A-3, and R-1 are included as Figures J1, J2, J3 and J4 in *Appendix J*. The preferred alternative reflects the basic concept selected from each sub-area plus refinements that have evolved through other discussion or evaluation. For instance, Figure J1 depicts the original west end Concept W1 but has a different internal roadway configuration on the Wagon Bridge peninsula based upon work done to address issues specific to that location.

##### CAC Discussion

In October, 2004, PMT recommendations were reiterated to the CAC. General findings and conclusions that apply throughout the study area were discussed. These findings conclude that CH 21, as part of a regional transportation system, will experience growth that will exacerbate any existing capacity or safety issues. This situation leads to the conclusion that doing nothing is not a prudent course of action. Access management is an accepted and effective approach to resolving safety and operational issues.

**Downtown Access and Traffic Operations** - Discussion of downtown access was a key topic of interest for the CAC. The PMT recommended that full access to downtown Prior Lake should be served by a traffic signal on CH 21 at Arcadia in the long term and that the Main Avenue intersection should be planned to serve right-in/right-out access only.

The need for pedestrian crossing treatments at Main Avenue without a signal but with a median closure was discussed. The proposed median allows pedestrians to cross one direction of traffic flow at a time. Typically, crossings at intersection corners, such as Main Avenue and CH 21, are

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legally allowed without a signal. Crossings during peak traffic periods or by individuals uncomfortable with an uncontrolled crossing even during the off-peak would be served at adjacent signalized intersections even though it may be a less convenient route.

Many downtown business representatives prefer to plan for a signal at Main Avenue despite the technical findings being reported by the PMT that a signal at Main creates operational problems on CH 21, on TH 13 and on Main Avenue.

Many downtown business representatives adamantly maintain that a median closure at Main Avenue would be detrimental to their ability to run successful businesses downtown.

**Discussion of other findings** - The balance of the study findings discussed identified the need for capacity improvements on TH 13, even though Mn/DOT does not have funding in their long-range plan for these improvements. It was also discussed that continued signalization is necessary on CH 21 at TH 13 and at Franklin Trail, and that new signals will likely be needed on CH 21 at Fish Point Road and at CR 87. Regarding speed - low speeds are appropriate on CH 21 west of TH 13 and that, comparatively higher speeds are appropriate east of CH 21. The need to preserve right of way for storm water treatment ponds is also identified as a finding.

**Wagon Bridge Peninsula Access** - The primary issue discussed was safe access to and from the Wagon Bridge Marina and neighboring residential properties on the peninsula. Over 20 properties currently share six access points to CH 21. The curving roadway and roadside obstacles (i.e., trees, retaining walls, etc.) restrict sight lines from most of the existing driveways onto CH 21. Planning to reduce the number of accesses to only those that safely fit with the recommended alternative is the PMT's goal. A sight distance analysis was performed that lead to one full access location near the existing marina access and one partial access location at the west end being identified by the PMT as the only access points that meet acceptable sight distance requirements. A recommended peninsula access plan is shown in the recommended concept drawings.

#### **Open House Reaction to Preferred Alternative**

An open house was held to solicit public reaction to the preferred alternative. A full set of recommended drawings was on display for discussion. Several comments were received objected to proposed reduction of access at Main Avenue. Concern for access changes near Lakeside Avenue were also expressed as were general comments that encourage development of alternative routes in lieu of improvements on CH 21. A summary of all open house comments and responses is included in Appendix B.

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#### 4.5 Preferred Solution Cost

A preliminary cost estimate was prepared to identify cost associated with various elements of the study area. Detailed cost information is provided in Appendix L. A summary of major costs by roadway jurisdiction is provided as follows:

<u>Roadway Improvement</u>	<u>Cost</u>
CH 21*	\$15,800,000
TH 13**	\$1,500,000
Local Streets ***	<u>\$4,100,000</u>
Total	\$21,400,000

\* 2.75 miles of roadway between Highland Avenue and CR 87

\*\* Approximately 1000 feet north and 1000 feet south of CH 21

\*\*\* Local street and frontage road connections

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## **5.0 Plan Approvals and Next Steps**

### **5.1 Agency Approval**

#### **5.1.1 Prior Lake City Council**

The Prior Lake City Council approved the findings of the corridor study and concept plan on April 18, 2005 per City Council Resolution No. 05-69.

#### **5.1.2 Scott County Board**

The Scott County Board of Commissioners approved the findings of the corridor study and concept plan on May 3, 2005 by adopting County Board Resolution No. 2005-044.

#### **5.1.3 Mn/DOT**

Mn/DOT Metropolitan Division staff participated on the Project Management Team. This participation led to an understanding of how local access needs are balanced against operational and safety benefits related to more restrictive access management practices prescribed in DOT guidelines. Mn/DOT does support the findings of this study and concept plan. This support is documented in a letter signed by Mn/DOT's South Metro Area Manager, dated May 5, 2005. Considering the challenges of maintaining access to downtown Prior Lake, Mn/DOT endorses the concept plan which maintains right turn access to/from TH 13 at Dakota and Pleasant Streets. This support is subject to reconsideration by the DOT if an access related crash problem were ever to develop at these intersections. Mn/DOT also supports a new access from northbound TH 13 to westbound Pleasant Avenue in conjunction with the primary CH 21 access to downtown being shifted from Main Avenue to Arcadia Avenue with Main Avenue intersection operated to serve right turns only.

### **5.2 Funding and Programming**

Approval of the of the corridor study by the City, County and State, provides staff from each agency with the latitude to explore funding opportunities to consider/recommend components of the corridor plan in future Capital Improvement Plans in accordance with the plan based upon their normal practices.

### **5.3 Preliminary Design and Environmental Documentation**

Preliminary design activities should be planned to take the preferred alternative concept to a greater level of detail. Preliminary plans should be developed for any component, or group of components desired to advance for construction.

The use of federal funding to construct the proposed project improvements will require the completion of the proper environmental project reporting documents that identify the purpose and need for the proposed project, project alternatives, social, economic, and environmental impacts and any proposed mitigation required by local, metro, state, and/or federal agencies. All environmental documentation reporting requirements must be concluded (signed) before right-of-way acquisition (using federal funds) can begin.

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#### **5.4 Final Design, Right-of-Way Acquisition, and Construction**

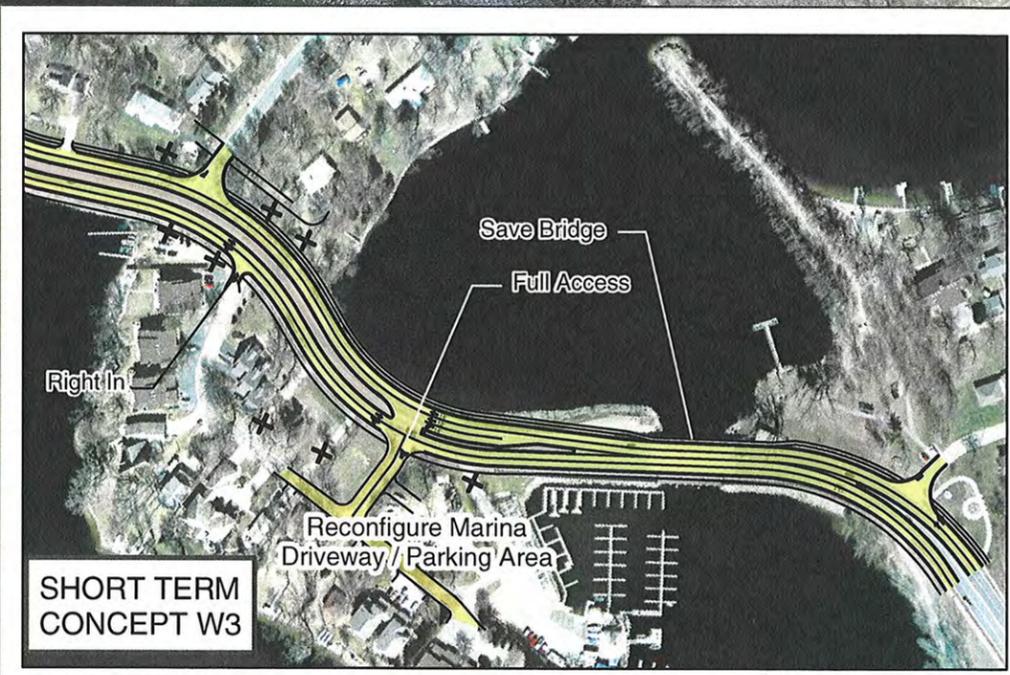
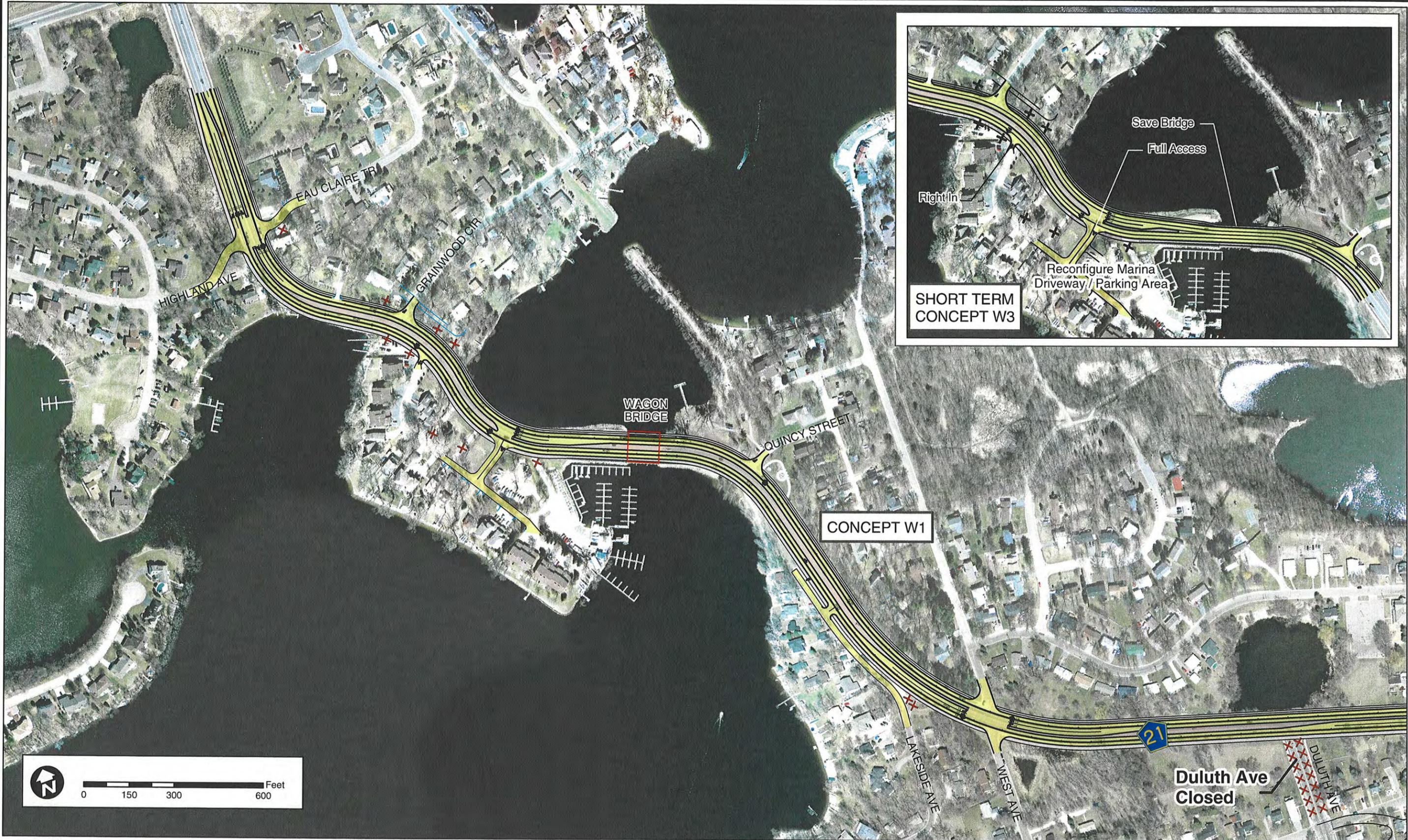
Right-of-way acquisition for the proposed project will need to be coordinated with the City of Prior Lake and completed in conformance with Scott County policies and Mn/DOT's Office of State Aid. The use of federal funds to construct the project will require all right-of-way and relocation impacts to be conducted in conformance with the *Uniform Relocation Assistance and Real Property Acquisition Act of 1970*, as amended by the Surface Transportation Assistance Act of 1987 and 49 Code of Federal Regulations, Part 24, effective April 1989.

Project components selected for implementation should be developed and scheduled in accordance with Mn/DOT State Aid and/or Highway Project Development Processes. Federally funded projects must adhere to sunset dates associated with the specific funding appropriation.

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## **Appendix J**

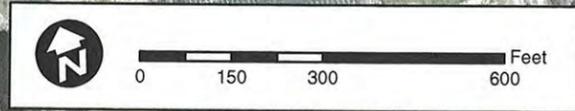
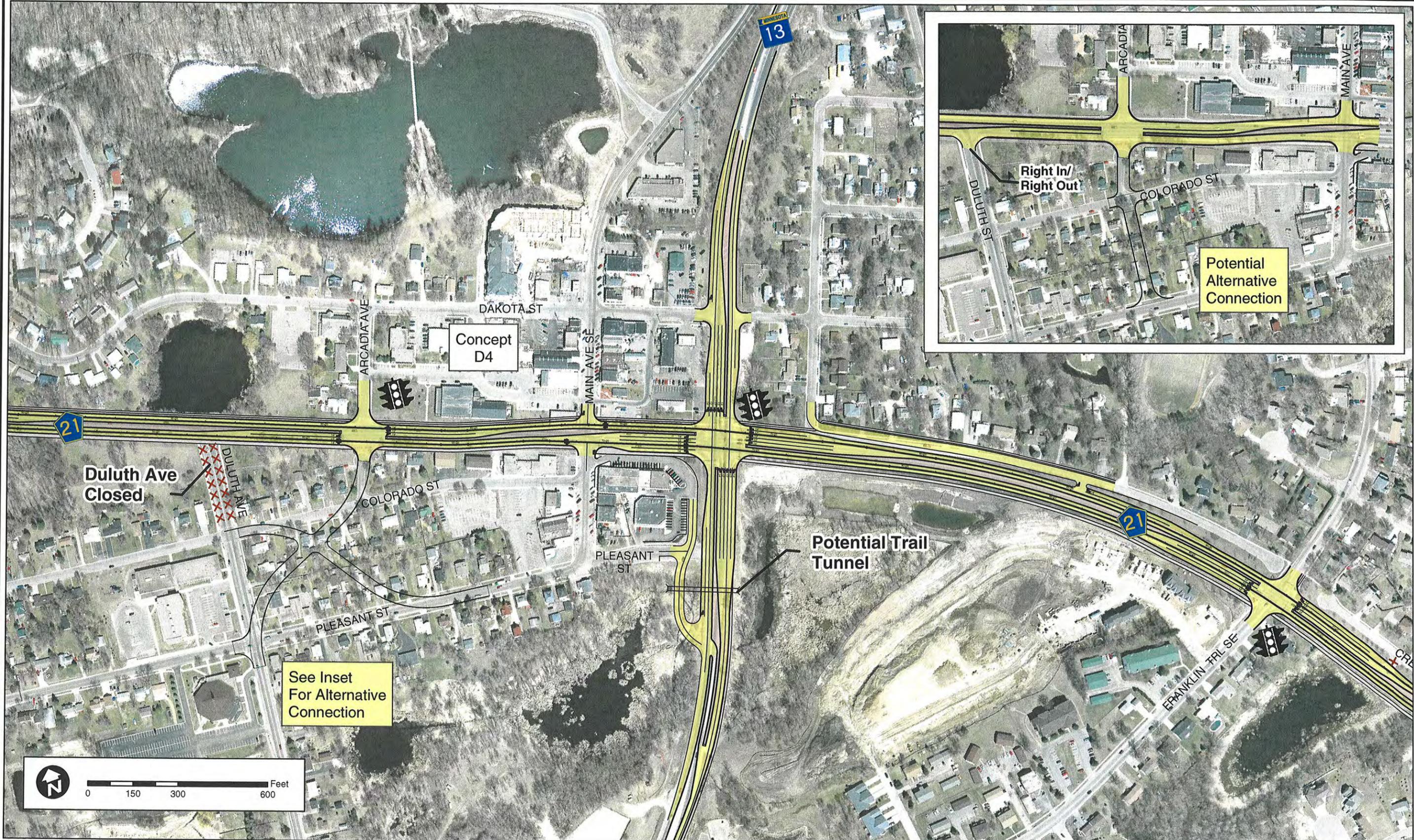
Preferred Alternative Concept Drawing



# C.H. 21 Corridor Study

Recommended  
Concept - West End

Figure J1

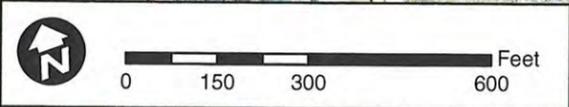


# C.H. 21 Corridor Study

Recommended  
Concept - Downtown  
Figure J2



Local Street Configuration  
to be Determined as  
this area is Developed



# C.H. 21 Corridor Study

Recommended  
Concept - East End

Figure J3



# C.H. 21 Corridor Study

Recommended  
Concept - East End

Figure J4