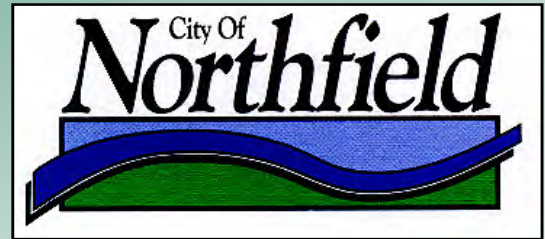
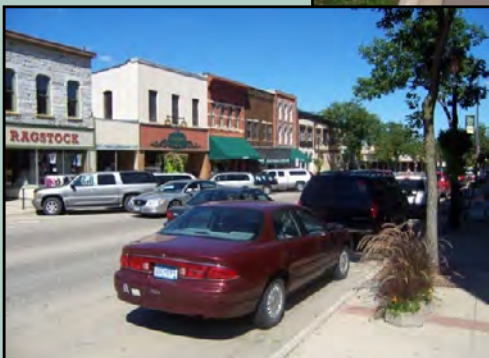


November 17, 2008

# City of Northfield



## *Comprehensive Transportation Plan Update*



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## ***1.0 PURPOSE OF THE TRANSPORTATION PLAN***

The purpose of this Transportation Plan is to evaluate existing and future transportation needs and provide the framework for decisions regarding the nature of infrastructure improvements necessary to achieve safety, accessibility, mobility, and performance of the existing and future transportation system. This Plan includes established local policies, standards, and guidelines to implement the future transportation system vision that is coordinated with respect to the City's land use plan, as well as county and state plans. The content of this plan intends to enhance quality economic and residential development opportunities within the City of Northfield, while maintaining the rich heritage, historic charm, and environmental stewardship the community embraces. This Transportation Plan integrates the fiber established in the Comprehensive Plan of context sensitive design, establishment of strong neighborhood qualities, and improved transportation choices and efficiency.

### **1.1 TRANSPORTATION ISSUES**

Like many communities across America, Northfield has struggled with transportation related issues for many years. Americans as a whole are traveling more than ever and are using personal vehicles more than any other form of ground transportation – 98 percent of all passenger miles were traveled in automobiles, motorcycles, and light duty trucks in 2001.<sup>1</sup> Our country is only beginning to realize the implications of this overreliance on public health and safety, infrastructure needs, and the environment.

Northfield is a bit different than most cities its size in Minnesota. While three-quarters of the population drive alone to work in other Minnesota Cities, only about half do in Northfield. In addition, more than one quarter of the work force in Northfield (2,446 out of 8,820) walk or bicycle to work, while less than one tenth do in other Minnesota Cities.<sup>2</sup> Perhaps it is the influence of two private colleges, the historic and vibrant downtown, or the appeal of the Cannon River. Whatever the reason, this community is extraordinary, right down to its transportation system.

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<sup>1</sup> Federal Highway Administration, *National Transportation Statistics*, 2002, April 2003.

<sup>2</sup> <http://www.city-data.com/housing/houses-Northfield-Minnesota.html> Retrieved on July 6, 2008.



## 1.2 TRANSPORTATION GOALS AND OBJECTIVES

To help set the course of the Transportation Plan development, a transportation advisory committee was commissioned to establish a clear statement of goals and objectives. This diverse group, comprised of City public works and community development staff, a planning commission member, chamber of commerce representation, a non-motorized task force member, and consultant staff, dissected the goals and objectives established by the 1998 Transportation Plan. The advisory committee refined the goals and objectives relative to current considerations and priorities. The Goals and Objectives for development of this Transportation Plan described below were adopted by the City Council on January 7, 2008, and are used to guide implementation of the Transportation Plan and day to day transportation related decision making.

### GOAL 1 – EFFECTIVELY MANAGE THE TRANSPORTATION NEEDS OF A VIBRANT, GROWING TOWN AND THE SURROUNDING AREA FOR RESIDENTS, BUSINESSES, AND VISITORS

Objective 1.1 – Develop and implement corridor design guidelines that enable safe and efficient travel for all modes of transportation within the context of the natural and developed environment.

Objective 1.2 – Ensure adequate access into the downtown area for vehicles, pedestrians, and bicycles to support public activities and events, private business uses, and residences.

Objective 1.3 – Maintain, and where possible improve, access to business concentrations that enable successful business practices, while managing safe traffic operations.

Objective 1.4 – Promote multi-modal transportation uses and principles throughout the City.

Objective 1.5 – Establish bicycling as a sustainable, safe, and convenient year-round mode of transportation in Northfield.

Objective 1.6 – Enhance and expand public transit services to ensure mobility for all residents and visitors.

Objective 1.7 – Require Local Street and trail connectivity between adjacent residential neighborhoods and other land uses for newly developing areas.

Objective 1.8 – Create opportunities to improve existing Local Street and trail connectivity between adjacent residential neighborhoods and other land uses.

## GOAL 2 – FACILITATE THE MOVEMENT OF PEOPLE, GOODS, AND SERVICES WITHIN AND THROUGH THE CITY ON A SAFE, CONVENIENT, COORDINATED, AND FISCALLY-RESPONSIBLE NETWORK OF ROUTES USING A VARIETY OF TRANSPORTATION MODES.

Objective 2.1 – Provide a transportation system for vehicles, bicycles, and pedestrians balancing safety and fiscal resources.

Objective 2.2 – Establish a balanced roadway network based on the principals of roadway functional classification.

Objective 2.3 – Provide adequate roadway and intersection capacity to accommodate anticipated growth of the community and resulting forecasted traffic volumes.

Objective 2.4 – Establish a pedestrian walkway system connecting residential, educational, commercial/retail, employment, and recreational destinations throughout the City.

Objective 2.5 – Establish trails and on-street bikeways for the use of bicycles as a year-round mode of transportation.

Objective 2.6 – Determine and enhance designated public service routes to provide priorities to emergency, civil, and transit services.

## GOAL 3 – BALANCE TRANSPORTATION NEEDS WITH THE LAND USE PRINCIPLES IDENTIFIED IN THE COMPREHENSIVE PLAN.

Objective 3.1 – Establish a transportation system vision to provide the necessary transportation network to support the density and type of existing and future land uses.

Objective 3.2 – Enhance the small town character of the City through multi-modal transportation choice and context-sensitive corridor design.

Objective 3.3 – Balance the transportation system needs with the potential impacts and affects upon the natural features of the community.

Objective 3.4 – Enhance the community by providing convenient access to natural features and opportunities to support active and healthy lifestyles.

Objective 3.5 – Encourage interconnected development patterns to create more convenient travel options for residents, foster a sense of neighborhood, and maintain acceptable traffic volume levels.

**GOAL 4 – IMPLEMENT THE TRANSPORTATION VISION THROUGH STRATEGIC FUNDING AND OBJECTIVE AND DEFINITIVE DECISION MAKING WITH THE COLLABORATION OF SURROUNDING JURISDICTIONS.**

Objective 4.1 – Establish concentrated and consistent support for local and regional political leadership to achieve components of the transportation system vision.

Objective 4.2 – Empower City staff to pursue state and federal transportation funding and evaluate non-traditional transportation funding mechanisms.

Objective 4.3 – Establish an area transportation advisory committee with the state, Rice and Dakota Counties, Dundas, and surrounding townships to coordinate and strategize regional transportation planning initiatives (e.g. TH 19 between Northfield and I-35, Cannon River Crossing/CSAH 1 Preservation, Northwest Corridor).

Objective 4.4 – Plan for and preserve opportunities for necessary transportation system improvements.

Objective 4.5 – Achieve necessary transportation system improvements in a cost-effective, timely fashion.

Objective 4.6 – Establish momentum in the pursuit of the transportation system vision by periodic recognition of basic accomplishments and celebration of milestone achievements.

Objective 4.7 – Encourage business owners, residents, and community groups to be active participants in seeking funding by contacting local, state, and federal decision makers in support of transportation funding.

### 1.3 RELATIONSHIP WITH OTHER PLANNING DOCUMENTS

This Transportation Plan is a standalone planning document for the City of Northfield, serving as the basis for the summary chapter provided in the City's 2008 Comprehensive Plan. This document is intended for planning and engineering staff use to help guide day-to-day decision making, and guide staff in making recommendations to the Planning Commission and City Council consistent with the overall plan. The City's Parks, Open Space, and Trail System Plan was developed in concert with this Plan and recommendations relative to transportation have been folded into this Plan.

The City of Northfield, Rice and Dakota Counties, Minnesota Department of Transportation (Mn/DOT), and various townships own and maintain roads within or adjacent to the City. This Plan recognizes these jurisdictional authorities, their roles in the planning, maintenance, funding, and implementation process, and the need for the City's transportation system to integrate with other jurisdictions' systems. The City also recognizes their responsibilities in implementing regional planning initiatives.

Several other transportation studies have been completed in and around the City of Northfield over the years by various entities. The planning process associated with the development of this Plan evaluated and considered the findings of those previous efforts. This Plan incorporates the relevant findings and conclusions from earlier studies that are substantiated by the comprehensive review of the transportation system as a whole and the overall direction provided in the City's 2008 Comprehensive Plan. Previous study findings relevant to this Plan are summarized in Section 3.5. As a result, this Transportation Plan, as may be amended over time, will be the sole document to guide future transportation decisions.



## **2.0    *TRANSPORTATION SYSTEM PRINCIPLES AND STANDARDS***

The transportation system principles and standards included in this Plan create the foundation for developing the transportation system, evaluating its effectiveness, determining future system needs, and implementing strategies to fulfill the goals and objectives identified in Section 1.2.

### **2.1    TRANSPORTATION MODES AND TRIP TYPES**

A primary aspect of achieving the City's transportation goals and objectives is to establish a better understanding for all transportation user needs, types of trips the system serves, and available modes of transportation. All trips, regardless of their purpose, begin with a trip origin and end with a trip destination. The origin and/or destination heavily influences the transportation mode selected for any given trip and the City of Northfield's ability to establish and maintain a system to serve those trips.

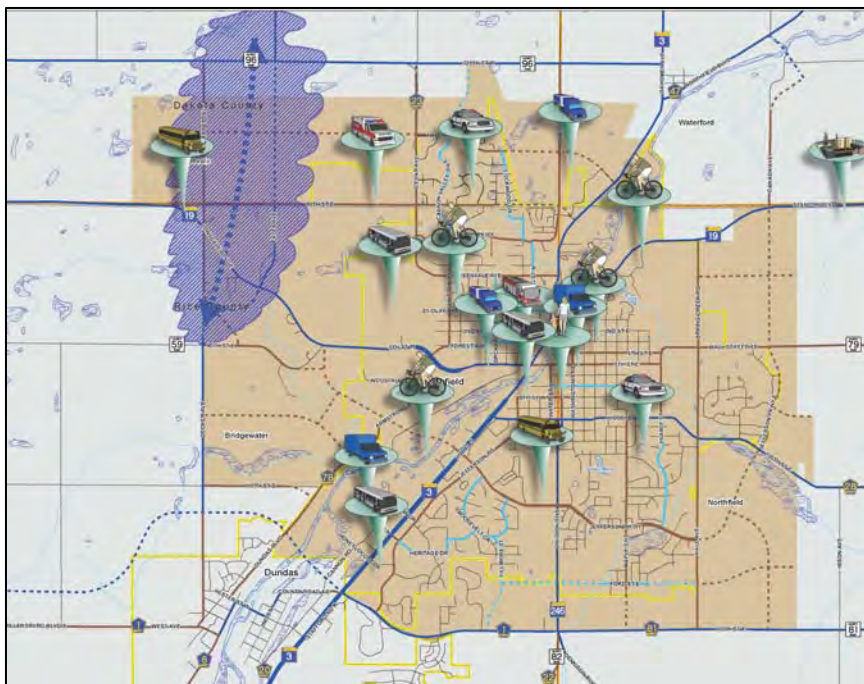
Three (3) primary trip types describe the location of any particular trip's origin and destination. An internal-to-internal (I-I) trip is one which both the origin and destination of the trip lies within the Northfield area. Through land use decisions and transportation investments, the City has the greatest potential to serve I-I trips and meet the goals and objectives of their Transportation Plan. An internal-to-external or external-to-internal (I-E/E-I) trip is one which includes either a trip origin or destination within the Northfield area, but not both. Finally, an external-to-external (E-E) trip is one which both the trip origin and destination are outside the Northfield area. The City of Northfield has the least potential to serve the E-E, or pass-through trips.

There are four (4) primary modes of transportation in the Northfield area including motorized, non-motorized, mass transit, and rail. Each serves various trip purposes and trip types. The table below summarizes the different transportation modes and trip types in the Northfield area.

TABLE 2.1-1 – TRANSPORTATION MODES AND TRIP TYPES

Mode\Trips	Internal to Internal	Internal to External	External to External
<b>Motorized</b>	Passenger Cars Commercial Vehicles Service Vehicles Emergency Vehicles	Passenger Cars Commercial Vehicles Service Vehicles Emergency Vehicles	Passenger Cars Commercial Vehicles Service Vehicles Emergency Vehicles
<b>Non-Motorized</b>	Bicycle Pedestrian	Bicycle	Bicycle
<b>Mass Transit</b>	Bus Carpool	Bus Van/Carpool Rail (future)	Bus Van/Carpool Rail (future)
<b>Rail</b>		Commercial/Freight	Commercial/Freight

Other modes of transportation exist and provide important transportation services to the Northfield area. Aviation, for example, provides passenger, freight, and emergency transportation services to the Northfield area. While these are important modes of transportation, they typically do not fall under the jurisdiction or authority of municipalities. The City of Northfield Transportation Plan focuses on areas of transportation which the City has jurisdictional authority and responsibility.



Examples of types of transportation users in Northfield.

## 2.2 ROADWAY FUNCTIONAL CLASSIFICATION AND JURISDICTION

It is recognized that individual roads and streets do not operate independently in any major way. Most travel involves movement through a network of roadways. It becomes necessary to determine how this travel can be channelized within the network in a logical and efficient manner. Functional classification defines the nature of this channelization process by defining the part that any particular road or street should play in serving the flow of trips through a roadway network. Functional classification is the process by which streets and highways are grouped into classes according to the character of service they are intended to provide. Functional classification involves determining what functions each roadway should perform prior to determining its design features, such as street widths, speed, and intersection control.

The functional classifications of roadways officially recognized by Mn/DOT in and around the City of Northfield are illustrated in Figure 2.2.1 – Existing Roadway Functional Classification. Mn/DOT has two sets of functional classification definitions, urban and rural, for out-state Minnesota. These urban and rural classifications have different characteristics relative to density and types of land use and travel patterns. Essentially, roadway classifications increase one level upon entering an urban area. Mn/DOT's urban functional classification definitions currently apply to the incorporated area of Northfield. Rural definitions currently apply to all permanently rural and/or unincorporated areas around Northfield outside of the planned urban growth boundary.

In the 7-County Twin Cities Metropolitan Area, functional classification is simplified to one set of designations. Rice County's Transportation Plan also reflects one set of descriptions in its recommended future roadway functional classification. Due to Northfield's proximity to the 7-County Twin Cities Metropolitan Area, maintaining consistency with the Rice County Transportation Plan, and the desire for simplified classifications, the City of Northfield's future roadway functional classification will be developed based on the following descriptions.

### 2.2.1 PRINCIPAL ARTERIALS

Roadways of this classification typically connect large urban areas to other large urban areas or they connect metro centers to regional business concentrations via a continuous roadway without stub connections. They are designed to accommodate the longest trips. Their emphasis is focused on mobility rather than access, and as such private access should not be allowed. They connect only with other Principal Arterials, interstate freeways, and select Minor Arterials and collector streets. Principal Arterials are responsible for accommodating thru-trips, as well as trips beginning or ending outside of the Northfield area.

Interstate (I) 35 is the primary Principal Arterial serving the Northfield area. This corridor, along with others, has been identified by the State of Minnesota as part of an Interregional Corridor system indicating its significance in serving the economic interests of the state. It connects the Twin Cities Metropolitan Area with other metropolitan areas such as Des Moines, Iowa and Kansas City, Missouri. TH 52 is also a Principal Arterial

serving the Northfield area. Both I-35 and Trunk Highway (TH) 52 are High Priority Interregional Corridors.

### 2.2.2 MINOR ARTERIALS

Roadways of this classification typically link urban areas and rural Principal Arterials to larger towns and other major traffic generators capable of attracting trips over similarly long distances. Minor Arterials service medium length trips, and their emphasis is on mobility as opposed to access in urban areas. They connect with Principal Arterials, other Minor Arterials, and collector streets. Connections to Local Streets should be avoided if possible, and private access should not be allowed. Minor Arterials are responsible for accommodating thru-trips, as well as trips beginning or ending outside the Northfield area. Minor Arterial roadways are typically spaced approximately 1 – 2 miles apart in urbanizing communities similar to Northfield. TH 3, TH 19, and TH 246 are examples of Minor Arterials that serve the Northfield area. TH 19, between Northfield and I-35, is designated as a Medium Priority Interregional Corridor.

### 2.2.3 MAJOR COLLECTORS

Roadways of this classification typically link neighborhoods together within a city or they link neighborhoods to business concentrations. In highly urban areas, they also provide connectivity between major traffic generators. A trip length of less than 5 miles is most common for Major Collector roadways. A balance between mobility and access is desired. Major Collector street connections are predominately to Minor Arterials, but they can be connected to any of the other four roadway functional classes. Local access to Major Collectors should be provided via public streets and individual property access should be avoided. Major Collector streets are predominantly responsible for providing circulation within a city such as Northfield, and are typically spaced approximately ½ to 1 mile apart in urbanizing areas. Jefferson Parkway, Armstrong Road, and Lincoln Parkway are examples of Major Collectors serving the Northfield area.

### 2.2.4 MINOR COLLECTORS

Roadways of this classification typically include city streets and rural township roadways, which facilitate the collection of local traffic and convey it to Major Collectors and Minor Arterials. Minor Collector streets serve short trips at relatively low speeds. Their emphasis is focused on access rather than mobility. Minor Collectors are responsible for providing connections between neighborhoods and the Major Collector/Minor Arterial roadways. These roadways should be designed to discourage short-cut trips through the neighborhood by creating jogs in the roadway (i.e. not direct, through routes). West 2nd Street, East 4th Street, and Roosevelt Drive currently function as Minor Collector streets in Northfield.



#### 2.2.5 LOCAL STREETS

Roadways of this classification typically include city streets and rural township roadways, which facilitate the collection of local traffic and convey it to collectors and Minor Arterials. Their emphasis is to provide direct property access.

#### 2.2.6 ROADWAY JURISDICTION

Roadway jurisdiction directly relates to functional classification of roadways. Generally, roadways with higher mobility functions (such as arterials) should fall under the jurisdiction of a regional level of government. In recognizing these roadways serve greater areas resulting in longer trips and higher volumes, jurisdiction of Principal Arterial and Minor Arterial roadways should fall under the jurisdiction of the state and county, respectively. Similarly, roadways with more emphasis on local circulation and access (such as collectors) should fall under the jurisdiction of the local government unit. These roadways serve more localized areas and result in shorter trip lengths and lower volumes. Major Collector, Minor Collector, and Local Streets should fall under the jurisdiction of the City of Northfield. As roadway segments are considered for turn-back to the City, efforts will be taken to evaluate the roadway features for conformance to current standards, structural integrity, functional classification, and safety. This effort will help the City develop short and long-range programs to assume the responsibilities of jurisdictional authority.

## 2.3 NON-MOTORIZED TRANSPORTATION SYSTEMS

Non-motorized transportation, such as pedestrians and bicyclists, are legitimate users of the transportation system and should be able to use the transportation infrastructure safely and without unreasonable delay. Unfortunately, motorized transportation, such as passenger cars and commercial vehicles, can often dominate the transportation infrastructure due to their disproportionate size and numbers. Astute planning and design of transportation infrastructure is one component necessary in achieving an integrated motorized and non-motorized transportation system that is relatively safe and efficient for all users.

Enabling motorized and non-motorized users to share the roadway environment safely and efficiently is not an easy task. The characteristics of these modes of travel are vastly different, and yet, they compete for the same space. The physical and behavior characteristics of pedestrians vary considerably. In addition to planning and designing for the average pedestrian, accommodation needs to be considered for children and the elderly, as well as those with physical, visual, or mental disabilities.

The City's Parks, Open Space, and Trails System Plan provides guidance and a vision for developing an integrated system of trails throughout the City. It includes a variety of trails, bikeways, and sidewalks defined under classifications that identify the trail's particular purpose in the community. The Parks, Open Space, and Trails System Plan should be used in concurrence with the Transportation Plan as guiding documents in establishing the City's Non-Motorized Transportation System. The purpose of the Transportation Plan in this affiliation is to provide additional guidance and vision for trails in the context of motorized and non-motorized transportation system integration.

Characteristics of the roadway, such as vehicle speed and volume, can influence the appropriate integration approaches for non-motorized users. As roadway characteristics vary, so do the effectiveness of pedestrian and bicycle facilities. The roadway functional classification defines the character of service any particular roadway is intended to provide and therefore, serves as a guide to non-motorized integration decisions. Below is a summary of the non-motorized integration approach for each roadway classification in the City of Northfield, as well as guidelines for determining roadway crossing treatments. Figure 4.8 in the Parks, Open Space, and Trails System Plan provides additional guidance for Bikeway Design Options for Roadways.

### 2.3.1 MINOR ARTERIAL ROADWAY CORRIDORS

These roadways are intended to carry high volumes of motorized traffic at relatively high speeds. Because they serve external to external trips and can serve relatively high commercial truck volumes, cautious integration of non-motorized users is necessary. Generally, pedestrians and bicycle facilities are recommended to be separated from roadways with vehicle speeds of 45 mph or greater. Sidewalks and/or multi-use trails are recommended to serve non-motorized transportation in Minor Arterial roadway corridors. In some cases where motorized speeds are 40 mph or lower, bike lanes may be

considered on the roadway, however sidewalks and/or multi-use trails would remain necessary to meet the various non-motorized transportation users.

Uncontrolled, at-grade crossings of Minor Arterial roadways are not recommended where motorized speeds are greater than 35 mph. Crossing of Minor Arterial roadways should only occur at controlled intersections (all-way stop, traffic signal, or roundabout) or grade-separated crossings (underpass or overpass). Grade-separated crossings are encouraged on Minor Arterial roadways at high pedestrian/bicycle crossing locations when feasible.

### 2.3.2 MAJOR COLLECTOR ROADWAY CORRIDORS

These roadways are intended to carry moderate motorized traffic volumes at moderate travel speeds. They tend to have lower commercial truck volumes and mainly serve trips with origins and/or destinations within the City. Integration of non-motorized users is encouraged by means of both on-street and off-street accommodations. Sidewalks and/or multi-use trails are recommended on both sides to serve non-motorized transportation along Major Collector roadway corridors. In addition, shoulders, wide curb lanes, and/or bike lanes are encouraged on Major Collectors with motorized speeds of 40 mph or lower.

Uncontrolled, at-grade crossing of Major Collector roadways may be considered where motorized speeds are 35 mph or less and a minimum of 20 pedestrian crossings occur during the peak hour on average weekdays. Like Minor Arterials, non-motorized users are encouraged to cross Major Collector roadways at controlled intersections. In some cases, mid-block uncontrolled crossings may be more effective in crossing pedestrians safely and efficiently than controlled intersections.

### 2.3.3 MINOR COLLECTOR ROADWAY CORRIDORS

These roadways are intended to carry low motorized traffic volumes at relatively low travel speeds. They tend to serve predominantly passenger car trips with an origin or destination in relative close proximity. Integration of non-motorized users are encouraged by means of both on-street and off-street accommodations. A sidewalk is recommended on both sides of Minor Collector roadways to serve pedestrians, including children and the elderly, as well as those with physical, visual, or mental disabilities. Motorized vehicles (e.g. passenger cars, service vehicles) and non-motorized vehicles (e.g. bicycles) are encouraged to share the travel way on Minor Collector roadways. In some cases, wide curb lanes or bike lanes may be necessary to effectively accommodate both motorized and non-motorized users. Generally, pedestrian crossings of Minor Collector roadways should be unproblematic due to relatively low motorized vehicle speeds and volumes.

#### 2.3.4 GUIDELINES FOR DETERMINING ROADWAY CROSSING TREATMENTS

A critical component in achieving an integrated motorized and non-motorized transportation system that is relatively safe and efficient for all users is the application of trail crossing treatments of the motorized travel way. General guidance is provided for each roadway classification and additional guidance is provided in Figure 4.15 in the Parks, Open Space, and Trails System Plan. Unfortunately, each situation is unique and requires an engineering study to determine the suitable roadway crossing treatment. This study is needed to evaluate the suitability of the proposed location relative to pedestrian volumes, vehicle speeds, sight distance, and vehicle types. Improper application of crossing treatments may result in a more hazardous situation than if no treatment was provided.

The City of Northfield receives numerous requests throughout the community for pedestrian crosswalks. Marked pedestrian crossings accomplish dual goals. They prepare drivers for the likelihood of encountering a pedestrian, and they create an atmosphere of walkability and accessibility for pedestrians. While crosswalks do provide guidance to motorists and pedestrians of crossing locations, it is important to recognize that according to the Minnesota State Statute governing pedestrian safety (Chapter 169.21) all intersections are legal crosswalks and drivers must yield the right-of-way to a pedestrian crossing the roadway within a marked crosswalk or at an intersection with no marked crosswalk in the absence of traffic control signals.

The Statute allows the local authority discretion to determine the location of crosswalks. Community guidelines for crosswalk identification are suggested to provide a process for determining appropriate crosswalk locations, markings, and signage. The purpose of the guidelines is to improve pedestrian and vehicular safety with a consistent standard that achieves safety objectives. The installation and maintenance of marked crosswalks on roadways within the City of Northfield will follow the most current version of the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD). The Crosswalk Installation Policies and Guidelines located in Appendix A establishes an objective, step by step procedure to evaluate the use of various pedestrian crossing treatments and provides a consistent standard for the City of Northfield to reply to crosswalk requests.

#### 2.3.5 PROMOTING AN INTEGRATED MOTORIZED & NON-MOTORIZED TRANSPORTATION SYSTEM

Planning and design of transportation infrastructure with both motorized and non-motorized users in mind is only one component of promoting an integrated system. Education and enforcement activities are also necessary components in achieving an effective and relatively safe system. Education of both motorized and non-motorized users is essential in increasing awareness of available facilities, state and local laws that promote and protect each mode of transportation, and individual user responsibilities. Likewise, enforcement of state and local laws is equally important to promote operational safety and demonstrate accountability for individual user actions.



Local public awareness initiatives that encourage capable individuals to use non-motorized transportation are also encouraged. The reliance on passenger cars as a primary mode of individual transportation contributes to congested roadways, which in turn increase air and noise pollutants, consumer costs due to increased product delivery times, and emergency response times. Examples of public awareness initiatives and promotions may include the following

- Civic organization pledges to not drive anywhere under ½ mile
- Annual “Walk to Work” promotion days
- International Walk to School Day
- Fundraising campaigns for specific, non-motorized infrastructure improvements
- Annual Non-Motorized Trail Summit

## 2.4 CORRIDOR DESIGN GUIDELINES

Roadway corridors are designed to provide the type of services and perform the functional duties necessary to fulfill their role in the transportation system. Design parameters are established and applied to achieve relatively safe and efficient operations, conformance with surrounding land uses, and sensitivity to the natural environment. To achieve and maintain a balanced transportation system that meets the needs of the various transportation users, special consideration is necessary to accommodate the different transportation modes and trip types.

The following guidelines are provided to establish a basis for corridor design in Northfield. These guidelines are established based on best practices to achieve a balanced transportation system and have their foundation in recognized, industry standards and guidelines. The following documents were used to establish corridor design guidelines in Northfield and are considered applicable reference material for corridor design in Northfield

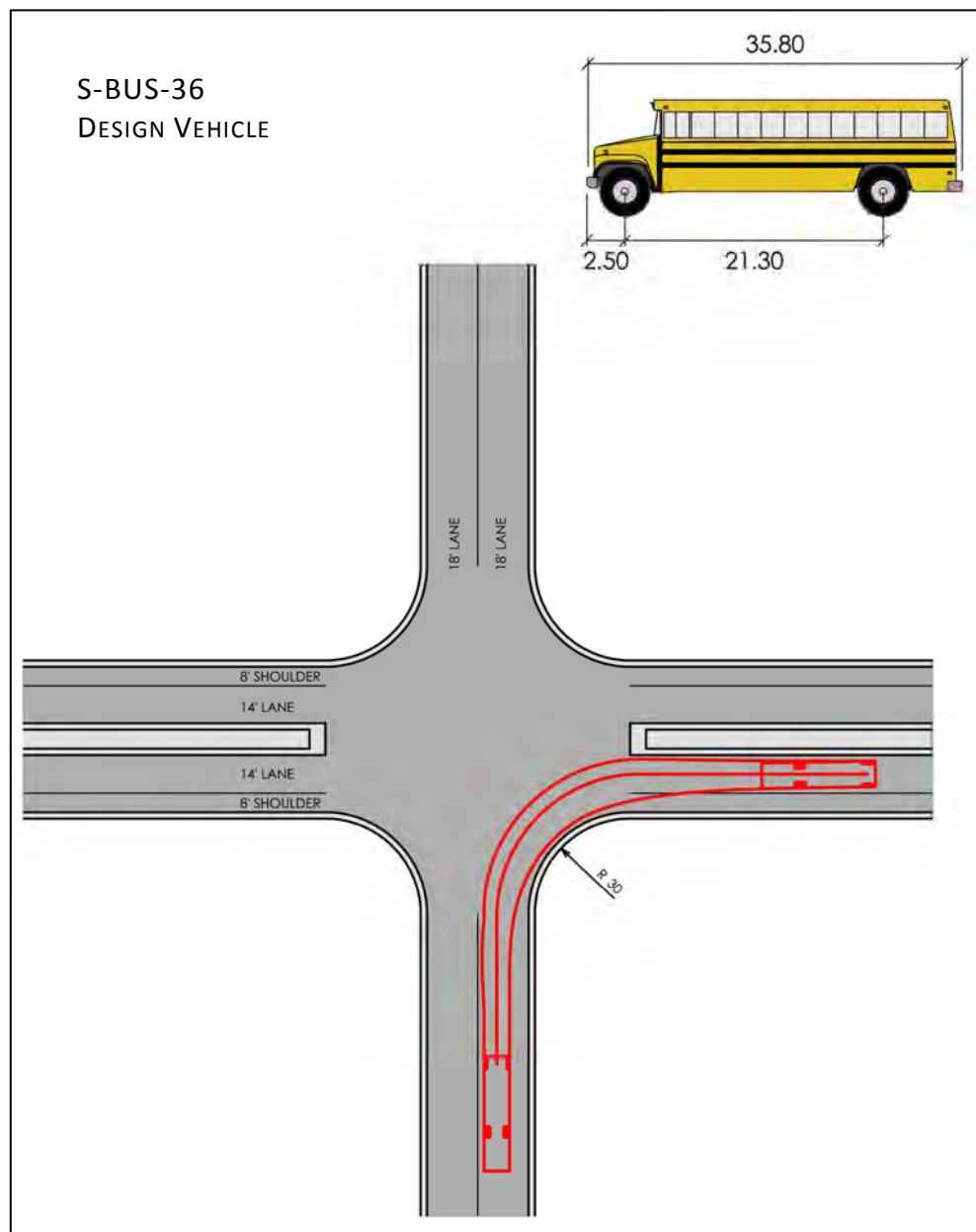
- State-Aid Operations, Chapter 8820; Minnesota Department of Transportation (Mn/DOT State Aid Standards)
- A Policy on Geometric Design of Highways and Streets; American Association of State Highway and Transportation Officials (AASHTO Green Book)
- Mn/DOT Bikeway Facility Design Manual; Minnesota Department of Transportation
- Minnesota Trail Planning, Design, and Development Guidelines; Minnesota Department of Natural Resources
- Guide for the Planning, Design, and Operations of Pedestrian Facilities; American Association of State Highway and Transportation Officials

### 2.4.1 DESIGN VEHICLE AND DESIGN SPEED

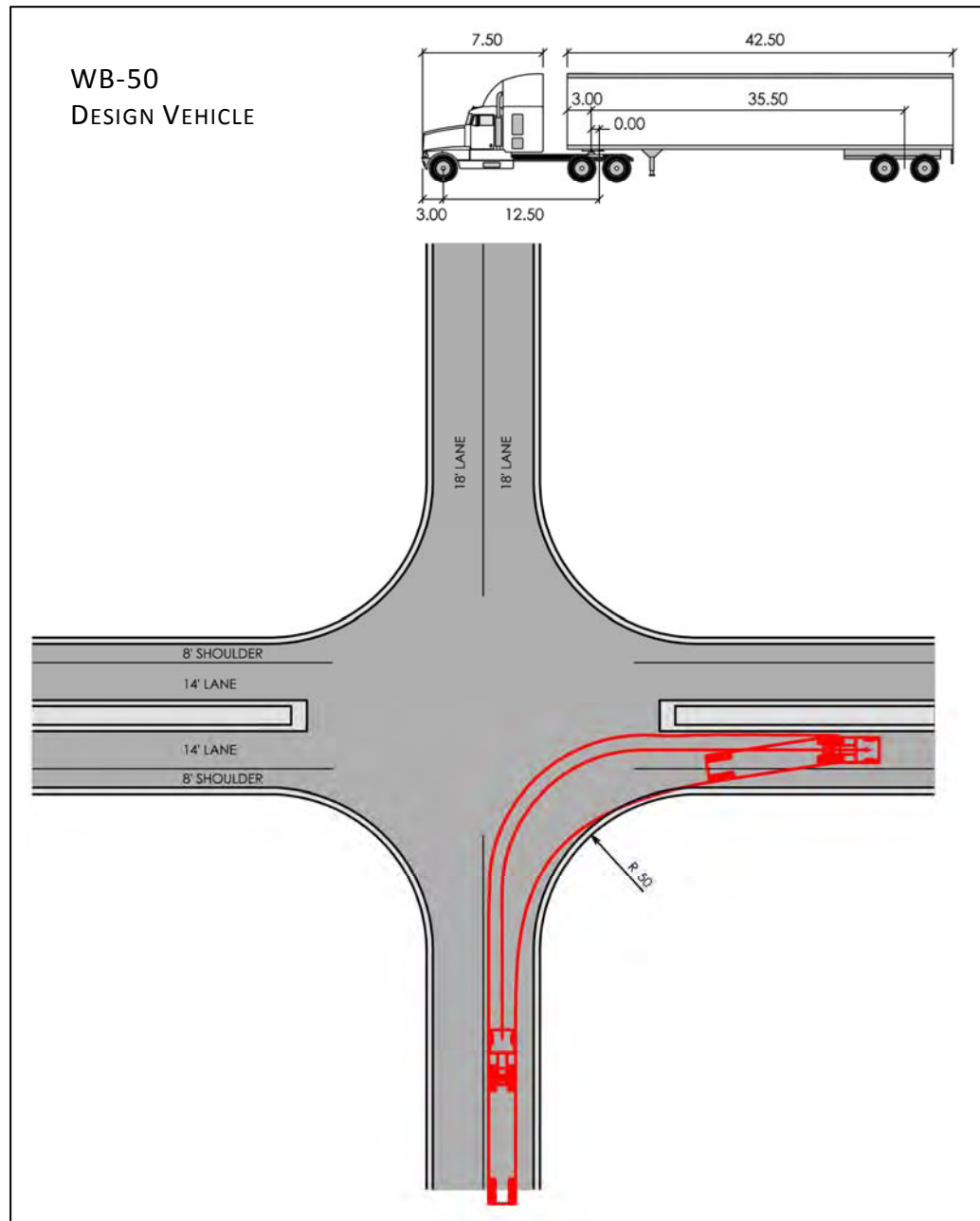
Roadway Functional Classification begins to define the design parameters of any particular roadway corridor in the network. As defined in Section 2.2, roadways serve different functions and are to be designed relative to the type of service they provide. Two primary design parameters that affect a roadway's ability to function as necessary include the *Design Vehicle* and *Design Speed*. Below is a summary of design vehicle and speed guidelines for the different roadway functional classifications in Northfield.

The *Design Vehicle* establishes the largest vehicle a roadway is designed to accommodate, without encroachment on opposing traffic. While vehicles come in all shapes and sizes, the design vehicle sets operational characteristics, such as turning radii, to which the roadway is designed. Generally, the design vehicle most affects the design of roadway intersections, but applies throughout the roadway corridor.

On all but Minor Arterial roadways, the recommended design vehicle for roadways under the jurisdiction of the City of Northfield is a conventional school bus. An illustration of the dimensions and turning characteristic of this vehicle (S-BUS-36) is also available in the AASHTO Green Book. The S-BUS-36 design vehicle results in a roadway that efficiently accommodates many vehicle types that are anticipated on Major Collectors, Minor Collectors, and Local Streets. In addition to passenger vehicles, bicycles, single-unit trucks, maintenance and transit vehicles, and emergency vehicles would be efficiently accommodated. Semi-trucks with trailers would also be accommodated, however would result in encroachment on opposing traffic to do so. In areas where significant truck traffic is expected, such as at an industrial park, a larger design vehicle should be considered.



Minor Arterial roadways are expected to accommodate a higher percentage of larger vehicles. The recommended design vehicle for Minor Arterial roadways, including intersections with other roadway classifications, is an intermediate semitrailer with a 50' wheel base. An illustration of the dimensions and turning characteristic of this vehicle (WB-50) is also available in the AASHTO Green Book. The WB-50 design vehicle results in a roadway that efficiently accommodates commercial vehicles that serve the Northfield area, as well as the southern Minnesota region.



The *Design Speed* establishes various geometric design features of a roadway with respect to topography, adjacent land use, and intended function of the roadway. Design features, such as curvature and sight distance, are directly related to and vary appreciably with design speed. The selected design speed should be consistent with the speeds that drivers are likely to expect on a given roadway corridor, relative to its intended function and physical limitations. A pertinent consideration in selecting design speeds is the average trip length. Since Minor Arterials and Major Collectors are expected to accommodate relatively longer trips at a higher degree of mobility, recommended design speeds are higher than those for Minor Collectors and Local Streets.

The recommended design speeds for roadways under the jurisdiction of the City of Northfield are presented in Table 2.4-1. These design parameters were selected relative to the functional classification of the roadways and the expectation of the majority of motorists using these corridors. These recommended design speeds are consistent with the topography of the Northfield area, as well as existing and anticipated land use patterns.

TABLE 2.4-1 – DESIGN VEHICLE AND DESIGN SPEED GUIDELINES

	<b>Design Vehicle</b>	<b>Design Speed</b>
Minor Arterial	WB-50	35-45 mph
Major Collector	S-BUS-36	30-40 mph
Minor Collector	S-BUS-36	30 mph
Local Street	S-BUS-36	25 mph

#### 2.4.2 STREET TYPES AND TYPICAL SECTIONS

The City's Comprehensive Plan recommends a set of development principles and a conceptual land use plan illustrating the form, pattern, and character of future development and redevelopment. Within the land use plan, City streets are guided to provide an attractive public realm that better connect places in the community, serve neighborhoods, and better serve non-motorized forms of transportation. Building upon the context established by the Comprehensive Plan, roadway design guidelines are provided to achieve the desired role of City streets within the community, as well as provide their intended function within the roadway network.

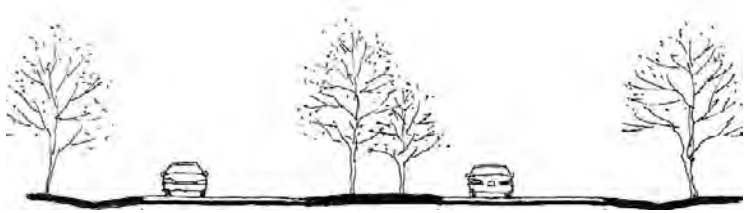
The Street Types, established by the Comprehensive Plan, set the context of the cross sectional view of particular roadways in the City of Northfield. The street types may be used for several classifications of roadways; however design parameters are established for each Street Type relative to its intended function and integration of multimodal components. The table below summarizes the applicability of the Street Types to each of the roadway functional classifications.

TABLE 2.4-2 – STREET TYPES BY ROADWAY FUNCTIONAL CLASSIFICATION

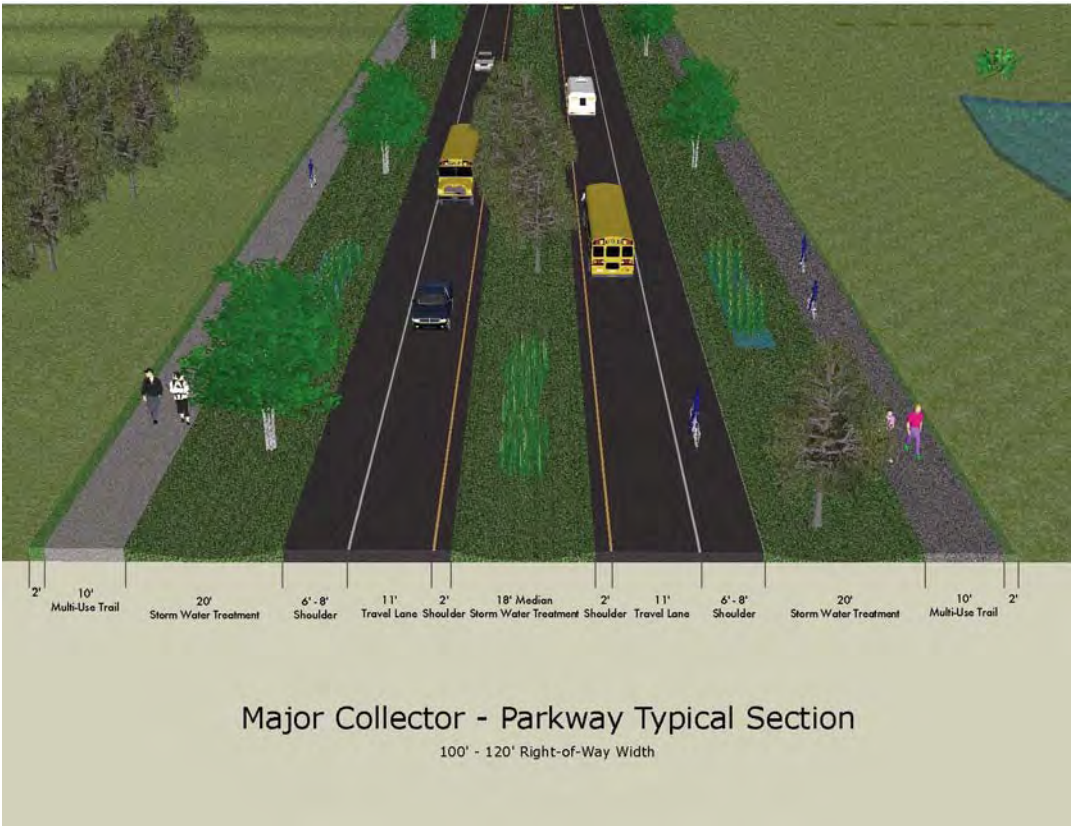
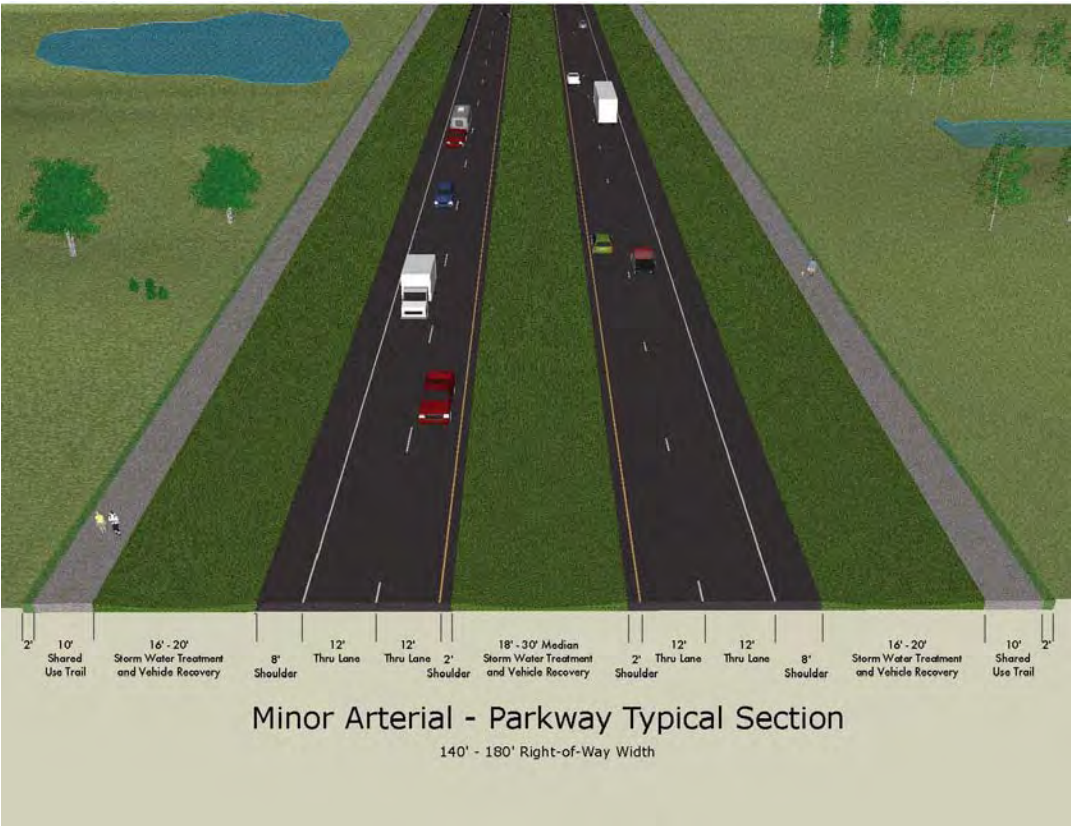
<b>Roadway Functional Classification</b>	<b>Parkway</b>	<b>Drive</b>	<b>Avenue</b>	<b>Road</b>	<b>Street</b>	<b>Main Street</b>
Minor Arterial	X		X			
Major Collector	X	X	X	X	X	X
Minor Collector				X	X	X
Local Street		X		X	X	

The Framework and Pattern Map (Map 4.5) of the Comprehensive Plan integrates the Street Types with the form and character of the existing and future land use and guides the pattern of development. Following are the Street Type descriptions and related typical sections.

# PARKWAY

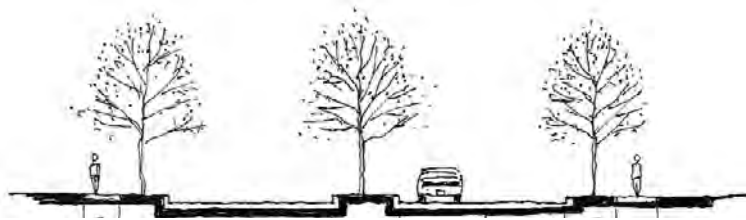


The Comprehensive Plan defines the Parkway design as a long distance thoroughfare designed with naturalistic landscaping including a median. It is intended to be used in environmentally significant areas, though can be applied in other developing areas of the community. As a Minor Arterial or Major Collector, the Parkway design offers an effective roadway section to accommodate longer trips at a higher degree of mobility, while fitting the context of the surrounding urbanizing or environmentally sensitive area. Recommended design parameters for the Parkway design for Minor Arterial and Major Collector roadways are illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses and natural environment.





# AVENUE

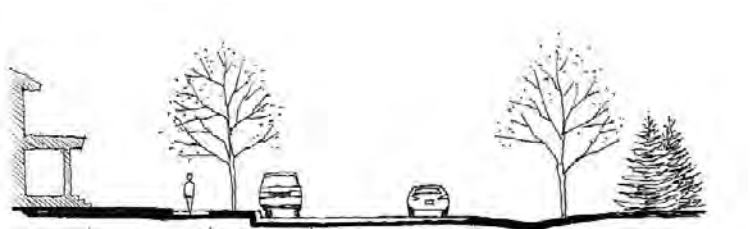


The Comprehensive Plan defines the Avenue design as a free-movement thoroughfare connecting civic locations in an urbanized area of finite length. It is intended to be used in growth areas, as well as core enhancement and neighborhood conservation areas of the community. As a Minor Arterial or Major Collector, the Avenue design offers an effective roadway section to accommodate longer trips at a higher degree of mobility, while fitting the context of the surrounding urban or urbanizing area. Recommended design parameters for the Avenue design for Minor Arterial and Major Collector roadways are illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses and natural environment.





# DRIVE



The Comprehensive Plan defines the Drive design as a thoroughfare along the boundary between an urbanized and natural condition. One side of the roadway has the urban character of a Street or Boulevard design with sidewalks and buildings, while the other has the qualities of a Road or Parkway with naturalistic plantings in a rural setting. It is intended to be limited to use on the fringe of developing areas of the community. As a Major Collector, the Drive design offers an effective roadway section to accommodate longer trips at a higher degree of mobility, while fitting the context of a transitional, urban-rural area. Recommended design parameters for the Drive design for a Major Collector roadway is illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses.





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# ROAD



The Comprehensive Plan defines the Road design as a local, slow-movement thoroughfare suitable for rural areas. It is intended to be used in developing areas which border or pass through natural or permanently rural areas. As a Major or Minor Collector, the Road design offers an effective roadway section to accommodate localized trips, while fitting the context of a rural area. Recommended design parameters for the Road design for Major and Minor Collector roadways are illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses. Design may include adjacent bioretention area, such as swales or rain gardens, to collect and treat storm water runoff.





# STREET



The Comprehensive Plan defines the Street design as a slow-movement thoroughfare for urban areas with higher density land uses. It is intended to be used in growth areas, as well as corridor redevelopment and neighborhood conservation areas of the community. As a Major or Minor Collector, the Street design offers an effective roadway section to accommodate localized trips, while fitting the context of an urban area. Recommended design parameters for the Street design for Major and Minor Collector roadways are illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses.



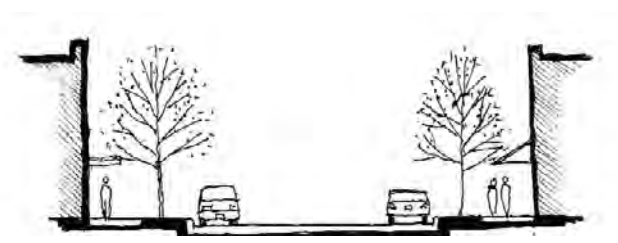








# MAIN STREET



The Comprehensive Plan defines the Main Street design as a local, slow-movement thoroughfare for urban areas with higher residential density and commercial land uses. It is intended to be used in growth areas, as well as corridor redevelopment and core enhancement areas of the community. As a Major or Minor Collector, the Main Street design offers an effective roadway section to accommodate localized trips, while fitting the context of an urban area. Recommended design parameters for the Main Street design for Major and Minor Collector roadways are illustrated below. The design parameters are necessary to achieve the intended function of the roadway, safely integrate non-motorized forms of transportation, and complement surrounding land uses.



### 2.4.3 CORRIDOR DESIGN FEATURES

Each of the design elements illustrated above enables the particular street type to provide the type of services intended. These design parameters are necessary to meet the needs of the various transportation users and accommodate the different transportation modes and trip types. Specific widths identified in the typical section are specifically tailored to the role each roadway plays in the overall roadway network and the needs of identified targeted users. Elimination or reduction in width of specific elements or compromising these guidelines will result in reduced public benefit and quality of service the corridor can provide. In areas with right-of-way limitations, City staff and council may need to make difficult choices between transportation services and right-of-way impacts. The importance of the design elements relative to the services they provide are described below.

**RIGHT-OF-WAY WIDTH** – Right-of-way width is directly related to the roadway's width and its ability to carry vehicular, bicycle, and pedestrian traffic in a safe and efficient manner. The corridor right-of-way widths identified in Section 2.4.2 are the minimum required for Major and Minor Collector streets, respectively. Right-of-way widths greater than 100' may be required on Major Collector roadways within commercial areas to accommodate the potential for higher traffic volumes and the need for additional lanes. All right-of-way requirements may be increased at the discretion of the City Engineer, with approval by the City Council. Please refer to Rice and Dakota Counties' right-of-way requirements for county roads in their current Transportation Plan. The City should obtain identified local, county, and state right-of-way through the platting process to accommodate long-term roadway and sidewalk/trail needs.

**TRAVEL LANES** – Roadway and travel lane widths are directly associated with a roadway's ability to carry vehicular traffic. Travel lane width greatly influences the safety and comfort of driving. Narrow lanes force drivers to travel closer to one another than they would normally desire. This discomfort can result in decreased mobility and level of service of the roadway. In addition to reducing capacity, the driver's resulting erratic operation has an undesirable effect on driver comfort and crash rates. The standards provided achieve desirable clearances between vehicles traveling in opposite directions.

On Major Collector and Minor Collector streets, an 11' lane is required for each direction of travel. The 22' total travel width is needed to accommodate anticipated two-way traffic volumes without delay. Roadway widths not meeting the geometric design guidelines will result in decreased performance of the particular roadway and additional travel demand on the adjacent roadway network components. For example, a sub-standard Major Collector roadway may result in additional travel demand on an adjacent Minor Collector street resulting in an overburden for adjacent landowners. Similarly, additional local circulation may result on an adjacent Minor Arterial resulting in reduced mobility for regional trips.

**MEDIANS** – By separating opposing directions of traffic, medians improve the safety and mobility characteristics of the roadway. Medians assist in accommodating significant vehicular volumes at acceptable travel speeds for adjacent land uses. They limit conflict points through the orderly management of cross traffic and reduce the potential for crashes. Medians also allow for more comfortable pedestrian crossings of Major Collector roadways by providing a safe haven for pedestrians to assess crossing opportunities one direction of vehicular travel at a time. While maintaining the travel lane widths required for traffic, the total pavement width is reduced, creating a more appealing and acceptable travel corridor. Trees and other landscaping can be included within medians along low-speed City roadways to provide aesthetic benefits, provided they do not interfere with traffic control devices. An additional benefit is their use in managing and treating storm water. Medians are recommended on Major Collector and Minor Arterial Parkways and Avenues. The minimum recommended median width is 18'. The Minor Arterial Parkway typical section recommends a range of 18-30' to accommodate left turn lanes and adequate separation of traffic on high speed roadways.

**BOULEVARDS** – A boulevard provides separation between motorized traffic and adjacent land uses, including sidewalks and off-street trails. Boulevards can provide areas for errant vehicle recovery, as well as snow storage. They provide areas for the placement of signage, lighting, and underground utilities. They also present opportunities for managing stormwater and improving aesthetics through the use of tree plantings and other landscaping treatments when placed in locations that don't impair drivers' sight distance. Minimum boulevard widths in Northfield are 7'.

**ON-STREET PARKING AREAS** – Similar to the benefits described below for bike lanes and paved shoulders for other modes of transportation, on-street parking provides an opportunity for transit, delivery vehicles, and emergency vehicles to pull over next to the curb out of the traffic stream.

The type of on-street parking should be carefully considered and depend on the specific function and width of the street, the adjacent land use, traffic volume, as well as existing and anticipated traffic operations. Angle parking presents special challenges because of the varying length of vehicles and the sight distance problems associated with vans and recreational vehicles. The extra length of such vehicles may interfere with the traveled way. Where on-street parallel parking is envisioned, a minimum 8' area outside of the travel way is required.

**SHOULDERS** – Roadway shoulders provide safety, mobility, and maintenance benefits. Relative to safety, shoulders provide benefits such as space for a driver to make evasive maneuvers (e.g. swerve to avoid an obstacle in the road), accommodate driver error, add a recovery area to regain control of a vehicle, provide space for disabled vehicles to stop or drive slowly, provide increased sight distance for vehicles on and entering the roadway, as well reduce passing conflicts between motor vehicles and bicyclists and pedestrians and make the crossing pedestrian more visible to motorists. Shoulders also provide an area for motorists to yield to emergency vehicles.



Paved shoulders also improve roadway capacity, because they allow for easier exiting from travel lanes to side streets and roads, provide more intersection and safe stopping sight distance, provide greater effective turning radius for trucks, provide space for off-tracking of truck's rear wheels in curved sections, provide space for disabled vehicles, mail delivery, and bus stops, and they provide space for bicyclists to ride at their own pace. From a maintenance perspective, shoulders allow for the discharge of water further from the travel lanes, reducing the undermining of the base and subgrade. They also provide space for maintenance operations and snow storage. On certain roadways in the City of Northfield, minimum shoulder widths of 6'-8' provide areas for bicycles when specific bike lanes are not designated on the roadway.

Paved shoulders also provide also benefit for other modes of transportation

- Transit – a place to pull over next to the curb out of the traffic stream
- Delivery vehicles (including postal service) – a place to stop out of the traffic stream
- Emergency vehicles – room to maneuver around stopped traffic, decreasing response time
- Bicyclists – greater acceptance of people bicycling on the road, as motorists are reminded that they are not the only roadway users
- Non-motorized modes – an increase in use, by increasing comfort to both pedestrians and bicyclists (this could leave more space for motorists driving and parking)

**BIKE LANES** – Bike lanes are only recommended on designated bikeways as identified in the City's Parks, Open Space, and Trails System Plan. They provide a designated location for bicycle mobility outside of the motor vehicle travel lanes. In addition to these mobility and safety benefits to the bicyclists, there are benefits to pedestrians and motorists. Pedestrians are benefitted by removing some bicycle traffic that may otherwise use an adjacent sidewalk. It also provides an area for people in wheelchairs to walk where there are no sidewalks, or where sidewalks are in poor repair or do not meet American with Disability Act standards. For motorists, there is a greater ease and more opportunities to exit from driveways due to improved sight distance. Bike lanes provide greater effective turning radius at corners and driveways, allowing large vehicles to turn into side streets without off-tracking onto curb. They can also provide a buffer for parked cars, making it easier for motorists to park, enter and exit vehicles safely and efficiently. This requires a wide enough bike lane so bicyclists aren't "doored." Bikeways of 4'-6' in width will provide adequate room for a bicyclist to comfortably travel outside of the motorized vehicle traffic lane.

**SIDEWALKS** – Sidewalks provide the opportunity to separate pedestrians from the motorized vehicle travel stream, increasing comfort and safety for both the pedestrian and the motorist. It also provides a location for young children to play or ride their bikes other than on the roadway and sidewalks contribute to the public realm by adding an element that is part of the development pattern of neighborhood.

For safe pedestrian mobility, sidewalks of 5-6' are recommended on both sides of all Arterials, Major and Minor Collector Streets, and Major Collector Roads within Northfield. Sidewalks on both sides of these types of streets will allow for pedestrian travel within the street corridor without introducing excessive crossing demand. On Major Collector Drives, a sidewalk is recommended on one side of the drive. Their purpose is to accommodate pedestrian, bicycle, and other non-motorized travel in a safe and comfortable manner on roadways that are expected to carry a significant amount of vehicular traffic where separation of travel modes is necessary. The sidewalks will safely accommodate pedestrian travel along this type of street corridor, as well as provide a comfortable link between lower volume residential streets and the other pedestrian facilities within the community.

Sidewalks on Local Streets provide an opportunity to enhance the public realm and neighborhood quality. The importance of sidewalks along local streets is related more to the desired development pattern and less focused on safety for the pedestrian and the motorist. The requirement to include sidewalks on both sides of Local Streets will occur as a result of a policy decision of the City Council and will ultimately be reflected in development regulations that may or may not require sidewalks on all sides of local streets.

The City may vary the location of trails and sidewalks in commercial and industrial areas to better accommodate pedestrian and non-motorized traffic providing connectivity according to the Parks, Open Space, and Trails System Plan.

**SHARED USE TRAILS** – Shared use trails allow pedestrians and bicyclists to move through an area without integrating into the motorized vehicle travel stream. They also provide safe, comfortable links between lower volume residential streets and the other facilities within the community. Along Major Collector Parkways and Avenues and Minor Arterials, a 10' bituminous or concrete shared use trail is recommended on both sides of the roadway. Similar to the type of travel on the adjacent roadway, the trail will accommodate higher volume and longer pedestrian and bicycle trips. A 10' width would better accommodate two-way travel safely.

#### 2.4.4 INTERSECTION CONTROL TYPES

The most complex locations within any street or highway system are at intersections. At intersections, vehicles from several different approaches and different movements (left, thru, right) seek to occupy the same physical space within the intersection area. In addition, these vehicles seek to occupy some of the same space being used by pedestrians. There are three fundamental levels of control that can be provided at intersections. This includes basic rules of the road, stop and yield control, and signal control.

TABLE 2.4.4-1 – LEVELS OF INTERSECTION CONTROL OPTIONS

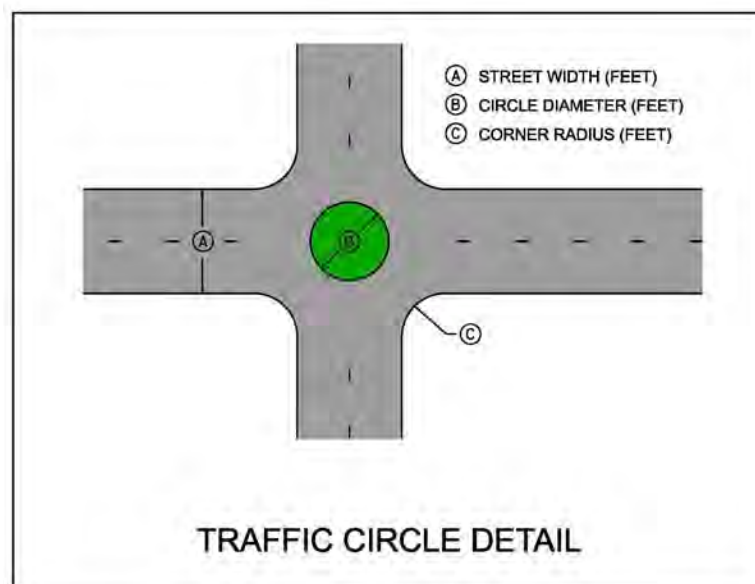
<b>Level 1</b> <b>Passive Control-Basic</b> <b>Rules of the Road Apply</b>	<b>Level 2</b> <b>Assignment of Right-of-</b> <b>Way (ROW) to Major</b> <b>Street or Rotational ROW</b>	<b>Level 3</b> <b>Positive Alternate</b> <b>Assignment of Exclusive</b> <b>ROW</b>
No Control /Uncontrolled	Yield Control	Traffic Signals
Guide Signs Only	Two-Way Stop Control (Thru-Stop)	Traffic Control Agent/Officer
Warning Signs With or Without Guide Signs	All-Way Stop Control	
Traffic Circles	Roundabouts	

UNCONTROLLED – Basic rules of the road apply to any intersection where right-of-way is not assigned to any of the traffic movements through the use of stop or yield signs, or a traffic signal, essentially an uncontrolled intersection. In the absence of traffic control devices, the driver must yield the right-of-way to the driver on the right when the vehicle on the right is approaching in a manner that may create an impending hazard to the vehicle on the left. The responsibility for avoiding conflicts falls to the driver on the left. An exception to these rules is when two vehicles approach an uncontrolled “T” intersection; the driver of the vehicle that is turning must yield to all cross traffic. Additionally, a driver who wishes to make a left turn must yield to vehicles approaching from the opposite direction when these vehicles are in the intersection or are near enough to pose the risk of a crash. In many low volume situations with no unusual history of intersection crashes, no control at the intersection is a cost effective strategy. Research suggests that at most locations, increasing the level of intersection control will not improve safety (see FHWA-RD-81-084 Stop, Yield and No Control at Intersections).

**TRAFFIC CIRCLES** – Traffic circles are a neighborhood traffic control device which is composed of a small circular island that is built in the middle of the intersection of Local Streets and the approaches to the intersection are usually uncontrolled. They are primarily used for traffic calming purposes and are effective at reducing vehicle speeds. They should be designed to accommodate the design vehicle, which is a bus (S-Bus-36), with sufficient space so that turning vehicles do not need to swing wide at the intersection to avoid the center and thus intrude into the pedestrian crossing area. Caution must be exercised when utilizing traffic circles, since many drivers tend to take the shortest path through a traffic circle, and when turning left, will turn before the circle, rather than going all the way around it. This creates an unexpected movement to crossing pedestrians and other motorists. It is best not to locate traffic circles at intersections where there are high volumes of traffic or high volumes of left-turning traffic. The following guidelines are provided to enable effective implementation of traffic circles on Local Streets in Northfield.

TABLE 2.4.4-2 – TRAFFIC CIRCLE DIAMETER VERSUS CORNER RADIUS

Street Width (feet)	Corner Radius (feet)	Circle Diameter (feet)
36	10	26
	15	27
	20	29
	25	33



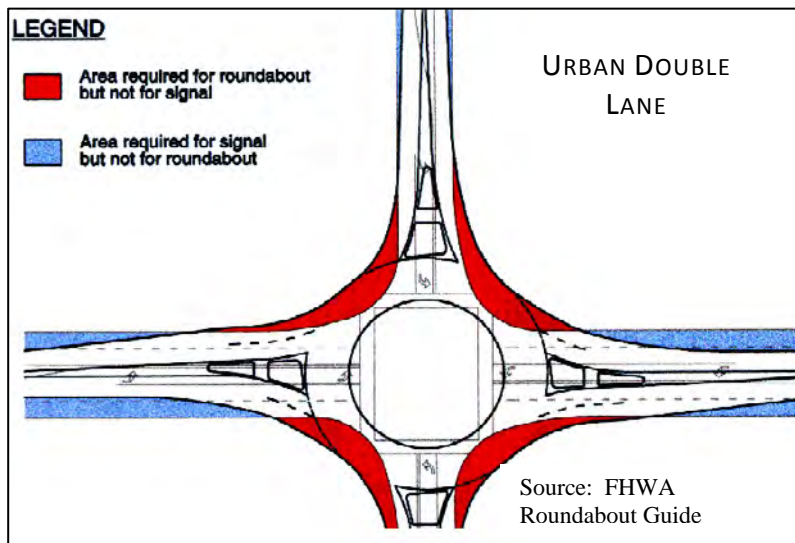
**THRU-STOP** – Stop signs are most commonly used in a two-way format (thru-stop). With this type of control, drivers on the minor street in both directions must come to a complete stop and right-of-way is clearly assigned to the vehicles on the major street. They must wait for a safe gap in the major street traffic stream to proceed. A yield sign is another type of intersection control that may be used in a similar format to a stop sign, except that it requires drivers to slow and yield the right-of-way to any vehicle approaching on the major street that would present a hazard to the minor street vehicle. In Northfield, yield signs should generally only be applied for use with roundabouts, for channelized right turns, and for merging traffic lanes. With thru-stop or yield control, the responsibility for avoiding conflicts is clearly assigned to the minor street motorists. A stop sign should not be installed on the major street unless justified by a traffic engineering study. The decision regarding the direction of traffic to stop when two streets with relatively the same volume, the same functional classification, and the same jurisdiction should be looked at closely in terms of the sight distances available, the operating speeds of the roadways, and the pedestrian activity nearby.

**ALL-WAY STOPS** – All-way stop signs are used at intersections where it may be difficult to determine which is the major street and which is the minor street, but where uncontrolled operation is considered unsafe. Vehicles on all approaches to the intersection are required to stop and the drivers on the right have the initial right-of-way to proceed. Right-of-way proceeds in a clockwise direction sequentially when there are vehicles waiting on all approaches. Caution must be applied in the placement of all-way stop control at intersections. The Minnesota Manual on Uniform Traffic Control Devices (MMUTCD) provides detailed warrants for the installation of all-way stop control. The improper placement of all-way stop control can easily frustrate drivers and create undue delay and safety issues if heavy traffic movements are stopped. Use and application guidelines, including a worksheet for the placement of all-way stop control on roadways functionally classified as Local Streets in Northfield is located within Appendix B.

**PARTIAL ACCESS** – Partial access is a type of intersection control in which one or more movements are restricted on the minor or major street at an intersection. This type of control is primarily used to increase mobility of the major street and increase the safety of traffic using the minor street as it intersects with the major street. Typical partial access intersection configurations physically limit how traffic on the minor street can access the major street (right-out only), and may limit how traffic on the major street can access the minor street (right and/or left, right-in only). Generally traffic is diverted to major intersections to make certain movements, which increases the safety and mobility of traffic along the roadway corridor. The minor street is usually controlled with a stop sign.

**TRAFFIC SIGNALS** – Signalization is the highest form of intersection control. Its use is called for where vehicular and pedestrian flow are at levels that make it difficult for drivers to select gaps in conflicting traffic streams through which to safely execute their desired maneuvers. Signal operations consist of two or more phases which alternatively assign right-of-way to all movements on a given street. This may include signalization of just the major street and the minor street separately, or it may include the signalization of left turns and pedestrians, in addition to the through movements. They provide for the orderly movement of traffic, they can increase the traffic handling capacity of the intersection, and they reduce the frequency and severity of right-angle crashes. The Minnesota Manual on Uniform Traffic Control Devices (MMUTCD) provides very detailed warrants for the installation of traffic signals. These warrants have been developed based on practical experience and federally sponsored research efforts. Placing traffic signals at intersections, even where traffic or conditions warrant the signal, can cause excessive delay, increased use of adjacent roads, and an increase in rear-end collisions.

**ROUNDAOBOUTS** – A roundabout is a circular intersection similar to a traffic circle, but it operates and is designed significantly different from a traffic circle. Roundabouts feature yield control of all entering traffic, channelized approaches, and geometric curvature to reduce speeds as traffic advances into the roundabout. Speeds are generally maintained between 20 and 30 miles per hour within the circle, and are known to have a slightly lower and less severe crash rate than other types of intersection control. Roundabouts should be considered at locations in Northfield where traffic conditions suggest all-way stop or signalization are necessary.



The size of a roundabout is typically based on its Inscribed Circular Diameter (ICD). The ICD of a typical roundabout is 110' to 150' for a single lane roundabout and 150' to 230' for a two lane roundabout. The size of a roundabout and the needed right-of-way is dependent upon multiple factors, including the design vehicle, traffic volume, turning movements, and local

condition factors including driveway locations, parking, speeds coming into the roundabout, pedestrian access, grades, angle of approach of the legs of the intersection, and sight lines. The right-of-way needed is typically 15' to 20' outside of the ICD to account for curbs, reaction area, and sidewalks or trails. Above is a graphic representation illustrating the right-of-way need for an urban single lane roundabout.

The use of roundabouts has increased within the United States in the past few years as an alternative to all-way stop or signalized intersection control. To effectively determine the proper intersection control alternative where multiple options exist, an engineering study should be completed. This will assure that the best intersection control option for safety and mobility is considered.

TABLE 2.4.4-3 – INTERSECTION CONTROL TYPES BY ROADWAY FUNCTIONAL CLASSIFICATION

<b>Roadway Functional Classification</b>	<b>Uncontrolled</b>	<b>Thru - Stop</b>	<b>Traffic Circle</b>	<b>All-Way Stop</b>	<b>Roundabout</b>	<b>Traffic Signal</b>	<b>Partial Access</b>
Minor Arterial		X			X	X	X
Major Collector		X		X	X	X	X
Minor Collector		X		X	X		X
Local Street	X	X	X		X		X

It is important to recognize that the major roadway is always considered to be the roadway with higher functional classification and jurisdiction. The type of intersection control that is allowed at an intersection is based on the functional classification of the intersecting roadways. This restriction assures that the correct type of intersection control is located where most drivers will react correctly and effectively to the intersection control. The appropriate traffic control options for each functionally classified roadway are shown above. The type of intersection control allowed at an intersection is driven by the highest functionally classed roadway.<sup>1</sup>

In addition to intersection traffic control, intersection sight distance is critical to the safety and efficiency of an intersection. An engineering study is necessary to assure adequate sight distance is provided at intersections relative to approach speeds and intersection traffic control. Visual obstructions caused by landscaping, vegetation, utilities, parked vehicles and/or other objects at intersections can compromise intersection sight distance and safety. In some cases, the elevation of the approaching roadways can obscure on-coming traffic. Parked vehicles in close proximity to the intersection can also compromise truck turning paths. As a result, parking should be restricted within 30 to 50 of all intersections, at the discretion of the City Engineer.

<sup>1</sup> Information within this Section was obtained from: the Traffic Engineering Textbook by McShane; the American Association of State and Highway Transportation Officials (AASHTO) Guide for Planning, Design, and Operation of Pedestrian Facilities; the Minnesota Manual on Uniform Traffic Control Devices; Roundabouts: An Informational Guide by FHWA Pub. No. FHWA-RD-00-067; and the FHWA/ITE Traffic Calming: State of the Practice by Ewing.

#### 2.4.5 ROADWAY CAPACITY

Capacities of roadway systems vary based on the roadway's functional classification and attributable design characteristics. From the Metropolitan Council Local Planning Handbook, roadway capacity per lane for divided arterials is 700 to 1,000 vehicles per hour and 600 to 900 vehicles per hour for undivided arterials. These values tend to be around 10% of the daily physical roadway capacity.

##### PRINCIPAL AND MINOR ARTERIALS

Based on the capacities noted above, a two lane arterial roadway has a daily capacity of 12,000 to 18,000 vehicles per day, a four-lane divided arterial street has a daily capacity of 28,000 to 40,000 vehicles per day, and a four-lane freeway has a daily capacity of approximately 70,000 vehicles per day. The variability in capacities are directly related to many roadway characteristics, including access spacing, traffic control, adjacent land uses, as well as traffic flow characteristics, such as percentage of trucks and number of turning vehicles. Therefore, it is important that the peak hour conditions are reviewed to determine the actual volume-to-capacity on roadway segments with average daily traffic volumes approaching these capacity values.

##### MAJOR COLLECTORS AND MINOR COLLECTOR STREETS

Major Collector and Minor Collector streets have physical capacities similar to those of a two-lane arterial street; however the acceptable level of traffic on a residential street is typically significantly less than the street's physical capacity. The acceptable level of traffic volumes on Major Collectors and Minor Collector streets vary based on housing densities and setbacks, locations of parks and schools, and overall resident perceptions. Typically, traffic levels on Major Collector streets in residential/educational areas are acceptable when they are at or below 50% of the roadway's physical capacity, resulting in an acceptable capacity of 6,000 to 9,000 vehicles per day. Acceptable traffic levels on Minor Collector streets are considerably less. Typically, a daily traffic volume of 1,000 to 1,500 vehicles per day is acceptable on Minor Collector streets in residential areas.

Table 2.4.5-1 – Roadway Types and Capacities, identifies various roadway types and the estimated daily capacities that the given roadway can accommodate.



TABLE 2.4.5-1 – ROADWAY TYPES AND CAPACITY

<b>Roadway Type</b>	<b>Daily Capacities</b>
Gravel Roadway	Up to 500
Minor Collector Street	Up to 1,000
Urban 2-Lane	7,500 – 12,000
Urban 3-Lane or 2-Lane Divided	12,000 – 18,000
Urban 4-Lane Undivided	Up to 20,000
Urban 4-Lane Divided	28,000 to 40,000
4-Lane Freeway	Up to 70,000

The capacity of a gravel road is physically greater than 500 vehicles per day, however on-going maintenance costs associated with dust control and surface grading for rideability typically exceed costs associated with paving the roadway. A study conducted on behalf of Minnesota counties concluded that it becomes cost effective to pave gravel roadways with an average daily traffic (ADT) volume over 500 is reached.

The capacity of a transportation facility reflects its ability to accommodate a moving stream of people or vehicles. It is a measure of a supply side of transportation facilities. Level of Service (LOS) is a measure of the quality of flow. The concept of LOS uses qualitative measures that characterize operational conditions with a traffic stream and their perception by motorists. Six LOS are defined for roadways. They are LOS A, B, C, D, E, and F. LOS A represents the best operating conditions and LOS F represents the worst. The LOS of a multilane roadway can be dictated by its volume-to-capacity (v/c) ratio. The LOS of a two-lane roadway is defined in terms of both percent time-spent-following and average travel speed. LOS F is determined when v/c ratio is over 1.00. The criteria for LOS and general v/c ratio for multilane highways and speed for two-lane highways are provided in Table 2.4.5-2 below.

TABLE 2.4.5-2 – HIGHWAY LEVEL OF SERVICE

Level of Service	Multilane v/c Ratio	Two-Lane Average Travel Speed (mph)
<b>A</b>	<0.28	>55
<b>B</b>	>0.28 – 0.45	>50-55
<b>C</b>	>0.45 – 0.65	>45-50
<b>D</b>	>0.65 – 0.86	>40-45
<b>E</b>	>0.86 – 1.00	≤40
<b>F</b>	> 1.00	v/c >1.00

For roadways in urban sections, the urban street class and average travel speed determine the LOS. This is generally similar to the LOS for two-lane highways, but takes into account the free flow speed of the facility (average speed achieved with no other vehicles present on roadway) and the addition of traffic control. This criterion is identified in Table 2.4.5-3 below.

TABLE 2.4.5-3 – URBAN STREET LEVEL OF SERVICE

Range of Free-Flow Speed (LOS)	Average Travel Speed (mph)			
	55 to 45	45 to 35	35 to 30	35 to 25
<b>A</b>	>42	>35	>30	>25
<b>B</b>	>34-42	>28-35	>24-30	>19-25
<b>C</b>	>27-34	>22-28	>18-24	>13-19
<b>D</b>	>21-27	>17-22	>14-18	>9-13
<b>E</b>	>16-21	>13-17	>10-14	>7-9
<b>F</b>	≤16	≤13	≤10	≤7

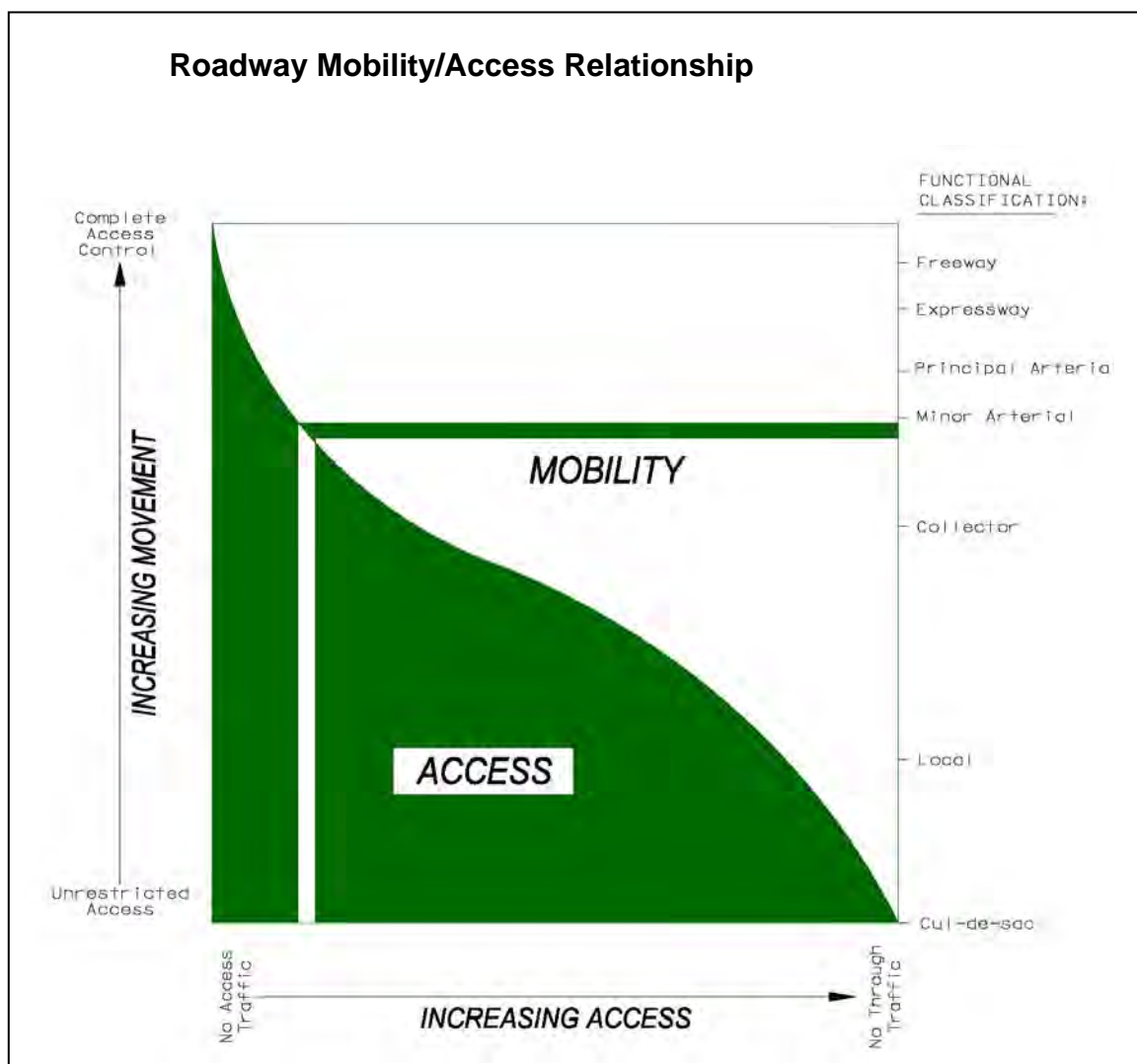
Generally, the City of Northfield should consider capacity improvements on roadways with a LOS D or worse and volume-to-capacity ratios over 0.75 during the peak hours.

#### 2.4.6 ACCESS MANAGEMENT

Access management guidelines are developed to maintain traffic flow on the network so each roadway can provide its functional duties, while providing adequate access for private properties to the transportation network. This harmonization of access and mobility is the keystone to effective access management.

*Mobility*, as defined for this Transportation Plan, is the ability to move people, goods, and services via a transportation system component from one place to another. The degree of mobility depends on a number of factors, including the ability of the roadway system to perform its functional duty, the capacity of the roadway, and the operational level of service on the roadway system.

*Access*, as applied to the roadway system in Northfield, is the relationship between local land use and the transportation system. There is an inverse relationship between the amount of access provided and the ability to move through-traffic on a roadway. As higher levels of access are provided, the ability to move traffic is reduced. The graphic below illustrates the relationship between access and mobility.



Each access location (i.e. driveway and/or intersection) creates a potential point of conflict between vehicles moving through an area and vehicles entering and exiting the roadway. These conflicts can result from the slowing effects of merging and weaving that takes place as vehicles accelerate from a stop turning onto the roadway, or deceleration to make a turn to leave the roadway. At signalized intersections, the potential for conflicts between vehicles is increased, because through-vehicles are required to stop at the signals. If the amount of traffic moving through an area on the roadway is high and/or the speed of traffic on the roadway is high, the number and nature of vehicle conflicts are also increased.

Accordingly, the safe speed of a road, the ability to move traffic on that road, and safe access to cross streets and properties adjacent to the roadway all diminish as the number of access points increase along a specific segment of roadway. Because of these effects, there must be a balance between the level of access provided and the desired function of the roadway.

In Northfield, access standards and spacing guidelines are recommended as a strategy to effectively manage existing ingress/egress onto City streets and to provide access controls for new development and redevelopment. The proposed access standards (driveway dimensions) are based on Mn/DOT State-Aid design standards. It should be noted that the City of Northfield has access authority for those roadways under their jurisdiction. Likewise, Rice and Dakota Counties and Mn/DOT have access authority for roadways under their jurisdiction. To further the relationship of access and mobility throughout the Northfield area, the City supports managing access consistent with the roadway mobility and access relationship figure above and supports the access spacing guidelines of other roadway jurisdictions. Tables 2.4.6-1 and 2.4.6-2 below present the proposed access standards and access spacing for the Northfield roadway network. Please refer to Rice and Dakota County minimum access spacing guidelines identified in their current Transportation Plans.

TABLE 2.4.6-1 – ROADWAY ACCESS STANDARDS

<b>Driveway Dimensions</b>	<b>Residential</b>	<b>Commercial or Industrial</b>
<b>Driveway Access Width</b>	11' – 22' (16' desired)	16' – 32' (32' desired)
<b>Minimum Distance Between Driveways</b>	20'	20'
<b>Minimum Corner Clearance from a Collector Street</b>	60'	80' <sup>(1)</sup>

<sup>(1)</sup> At the discretion of the City Engineer, 80' minimum

TABLE 2.4.6-2 – ACCESS SPACING GUIDELINES FOR COLLECTOR ROADWAYS IN NORTHFIELD<sup>(1)</sup>

Type of Access by Land Use Type	Major Collector	Minor Collector
<b>Low &amp; Medium Density Residential</b>		
Private Access	Not Permitted <sup>(2)</sup>	As Needed <sup>(3)</sup>
Minimum Corner Clearance from a Collector Street	660'	300'
<b>Commercial, Industrial or High Density Residential</b>		
Private Access	Not Permitted <sup>(2)</sup>	As Needed <sup>(3)</sup>
Minimum Corner Clearance from a Collector Street	660'	660'

<sup>(1)</sup> These guidelines apply to City streets only. Rice and Dakota Counties and Mn/DOT have access authority for roadways under their jurisdiction. Please refer to Rice and Dakota Counties' minimum access spacing guidelines identified in their current Transportation Plan.

<sup>(2)</sup> Access to Major Collectors is limited to public street access. Steps should be taken to redirect private accesses on Major Collectors to other local streets. New private access to Major Collectors is not permitted unless deemed necessary.

<sup>(3)</sup> Private access to Minor Collectors is to be evaluated by other factors. Whenever possible, residential access should be directed to non-continuous streets rather than Minor Collector roadways. Commercial/Industrial properties are encouraged to provide common accesses with adjacent properties when access is located on the Minor Collector system. Cross-traffic between adjacent compatible properties is to be accommodated when feasible. A minimum spacing between accesses of 660' in commercial, industrial, or high density residential areas is encouraged for the development of turn lanes and driver decision reaction areas.

## 2.5 TRANSIT

It is recognized that various methods of travel impact the economic vitality of a city, county, or broader region. The term transit applies to all forms of sharing rides, regardless of whether the service is provided by a public or private operator, organization, or individual vehicle owner, or whether the ridesharing arrangements are formal or informal. Most transit rides, however, are provided by formal transit systems, at least during the morning and afternoon peak travel periods.

Based on the needs of a community, transit systems may be established to accommodate trips that are internal within the city (internal to internal), trips that begin in the city and end somewhere outside of the city (internal to external), and/or trips that begin outside of the city and end within the city (external to internal). An example of an internal to internal trip may be a trip that begins at a home in Northfield and ends at a place of employment such as Malt-O-Meal. An internal to external trip may be a trip that begins at a home in Northfield and ends at the Rice County Government Center in Faribault. A trip that begins at a home in Burnsville and ends at Carleton College is an example of an external to internal trip.

Dial-a-ride, fixed route service by means of bus, bus rapid transit, and/or commuter rail, are just some of the transit system examples that are or could be provided within a city such as Northfield upon further analysis. Transit studies can evaluate current transit service performance and analyze the market to identify any unmet needs and to look for opportunities to enhance transit service. Generally communities with dial-a-ride as an initial service explore the feasibility of providing a fixed route schedule to connect residents with businesses, schools, places to shop, and employment centers.

## 2.6 AVIATION

Different types of airports provide an array of aviation services and transportation opportunities to a community, region, or even a broader geographical area, such as a state or nation. Services and benefits provided by airports vary widely. In Minnesota, there are commercial airports, general aviation airports, seaplane bases, and private airports. In addition to other forms of transportation, airports facilitate the movement of goods and people.

Aviation activities and their benefits extend beyond providing passenger air service at commercial airports. General aviation includes a diverse range of activities and services that are tailored for the speed and convenience of business and personal needs. In Minnesota, these services are provided at a network of 155 general aviation airports across the state. Some examples of general aviation activities include the following

- Business and recreational travel
- Air cargo delivery
- Aerial application to farmland to keep crops healthy
- Emergency medical evacuation and transportation of blood supplies and transplant organs
- Inspection trips to remote sites (e.g. wildlife surveys, map wetland losses and soil erosion, detect pipeline spills)
- Airborne law enforcement
- Fighting forest fires

## 2.7 RAIL

Rail transport is the conveyance of passengers and goods by means of wheeled vehicles specially designed to run along railways or railroads. Rail transport is part of the logistics chain, which facilitates international trade and economic growth.<sup>2</sup>

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<sup>2</sup> [http://en.wikipedia.org/wiki/Rail\\_transport](http://en.wikipedia.org/wiki/Rail_transport). Retrieved on July 6, 2008.

## 2.8 PAVEMENT MANAGEMENT

The City of Northfield uses a pavement condition index (PCI) to provide an indication as to the pavement surface condition of an individual road or the average condition of their overall roadway network. The PCI establishes a pavement condition value based upon a scale of 0 (worst) to 100 (new pavement). The condition is determined based on visual distresses, such as cracks, potholes, patches, ruts, etc. Pavement management software is used to predict the condition of pavement over time with respect to different management techniques.

The City's pavement management goals are to improve and prolong pavement life, maximize the performance of the network while keeping costs to a minimum, reduce assessment rates for property owners, and save money by completing the right improvements at the right time. The City's target PCI rating goal is 70. Using this PCI rating goal, the City can consider optimum maintenance and repair strategies during the annual capital improvement planning process to cost effectively maintain the City road system. Factors other than PCI identified by the City of Northfield that are considered when determining roadway candidates for reconstruction or renovation include

- Safety improvements (based on crash data)
- Curb and gutter, drainage improvements
- Base and subgrade conditions
- Need for underground utility work
- Development and/or expansion
- Business and community needs
- Traffic pattern and volume changes
- Geometry changes
- Ability to leverage financial contributions from federal, state, county, or other sources
- Incorporation of bikeways as identified in the Parks, Open Space, and Trail System Plan



### **3.0 EXISTING TRANSPORTATION SYSTEM EVALUATION**

The City of Northfield was founded in 1855 on the banks of the Cannon River.<sup>1</sup> The transportation system in the City has evolved over the years and several challenges with the current system exist. Some of the very things that make the City an attractive place to live and work, also make it challenge to move people, goods, and services around and through the City by walking, bicycling, or driving a motor vehicle. These challenges are due to the beautiful natural features in the area, the vital state highways and rail lines bisecting the community, the important educational institutions of St. Olaf and Carleton Colleges, as well as the evolution of the City's development pattern.

The Cannon River generally runs from the southwest to the northeast through the City, and there are four crossings of the river in Northfield at TH 3, 5th Street, Water Street, and 2nd Street. There are also drainage ways, wetland complexes, and topography ranging from rolling to steep slopes that present challenges for expanding transportation facilities. The extensive college land holdings also present some challenges for the extension of collector roadways to the west and northeast.

The rail lines and state highways provide vital links for people and goods; however they also represent challenges to providing safe mobility for all modes of travel. Pedestrians and bicyclists encounter challenges when maneuvering through and across the motorized vehicle traffic stream to access different parts of the City.

Additionally, the development pattern over the years in Northfield has occurred, to some extent, without a broader community wide transportation vision for all modes of travel. Development that has occurred in more recent years has been in a curvilinear street pattern and lacks connectivity between neighborhoods. As a result, there is a reliance on the arterial roadways of TH 3, TH 19, and CSAH 28 to provide much of the motorized vehicle mobility, and important local roadway connections were not extended to provide options for local traffic. These deficiencies ultimately impact the ability to move goods and services to market and provide efficient emergency, civil, and transit services. These connectivity challenges also impact pedestrian and bicycle mobility.

Public open house meetings and separate workshops with partnering transportation agencies, business owners, and transportation providers were held during the development of this Transportation Plan. The purpose of these forums was to listen to and understand the needs of the public and specific organizations with interest in the Northfield area transportation system. The open house and workshops focused on

- Presenting the City's process for updating the Transportation Plan
- Sharing preliminary information regarding existing average daily traffic volumes and congestion levels, 10-year crash history, and proposed roadway extensions
- Presenting and discussing known issues

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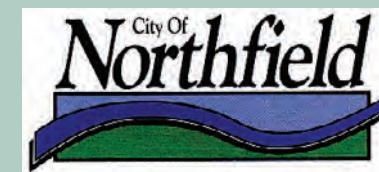
<sup>1</sup> <http://www.northfieldchamber.com/community/history.html>. Retrieved on June 9, 2008.

- Receiving and understanding the most important transportation issues or problems that the City of Northfield should consider

Figure 3.1-1 – Existing Transportation Issues Map summarizes the transportation challenges identified by stakeholders and the public during development of the Transportation Plan. Summaries of open house and stakeholder meetings can be found in Appendix C.

As population and business attractions grow, increases in traffic volumes have the potential to negatively impact the City by reducing pedestrian and bicycle mobility, increasing traffic congestion, and increasing parking problems. The City's ability to develop adequate Major Collector roadways is critical to maintain a satisfactory transportation system.





## TRANSPORTATION PLAN

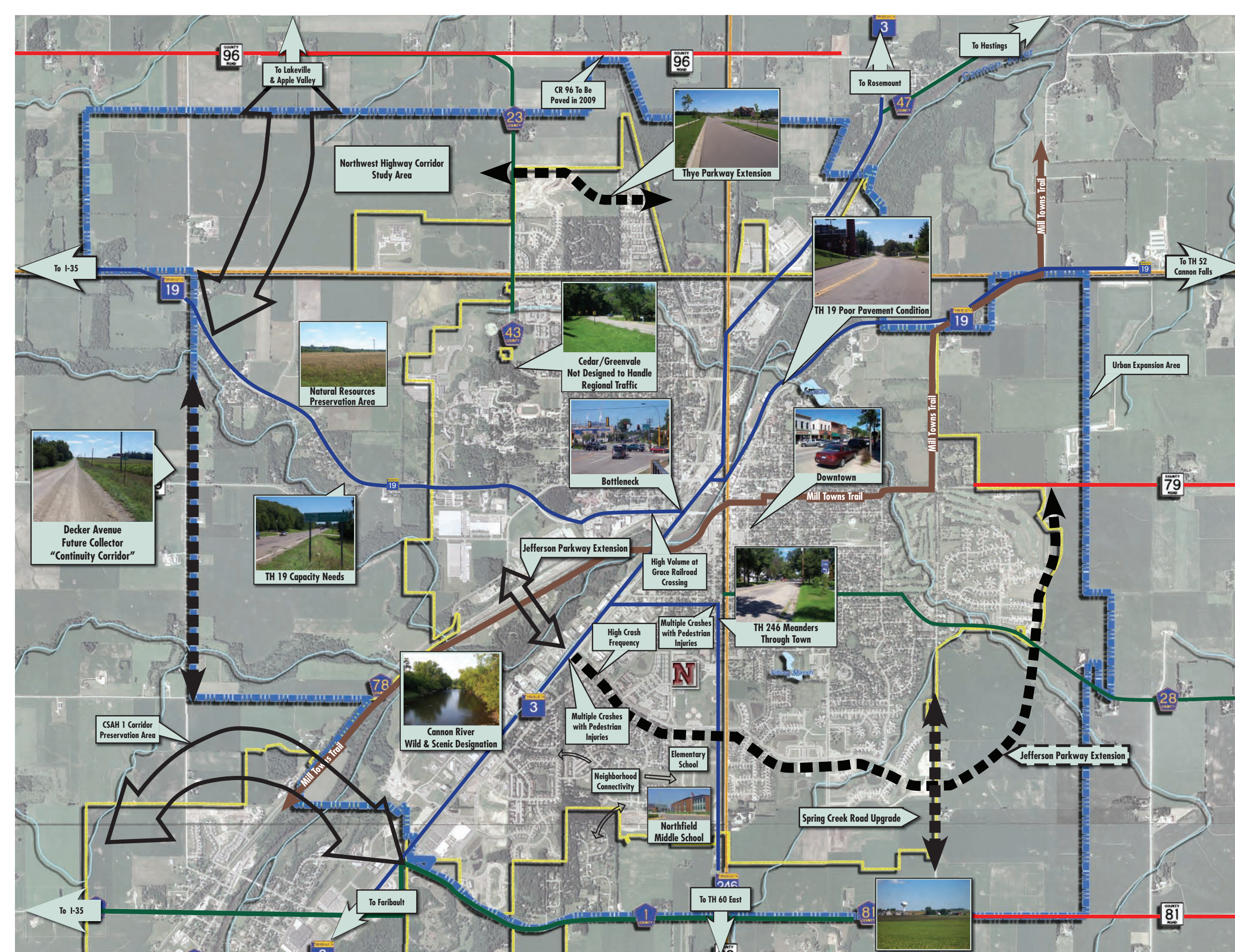


Existing Transportation  
Issues Map

Figure 3.1-1



2008





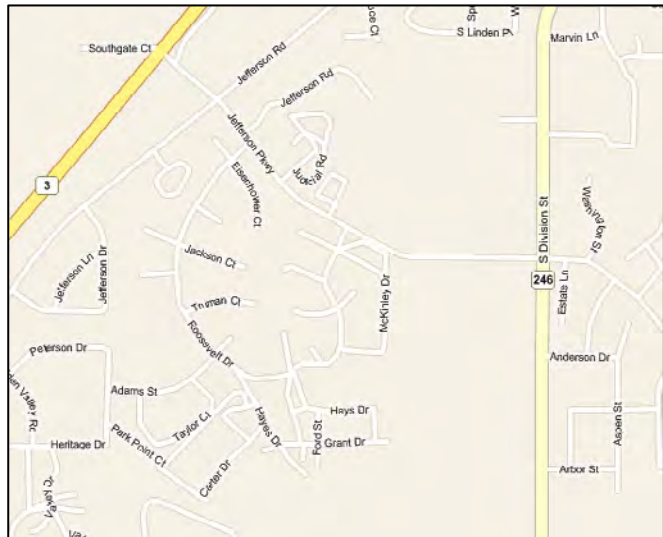
### 3.1 TRANSPORTATION SYSTEM CONNECTIVITY AND SERVICE ROUTES

The following provides an overview of the transportation system for all trip types in the City of Northfield, including accommodation of trucks, emergency, and civil service routes on the existing transportation system in the Northfield area.

#### 3.1.1 ROADWAY FUNCTIONAL CLASSIFICATION

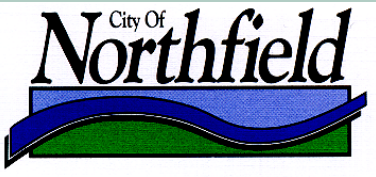
The existing functional classification of roadways in and around Northfield is illustrated in Figure 2.2-1. The roadway system lacks roads functioning as Minor Arterials, and TH 3 is the only continuous roadway through town. As outlined in Section 2.2.2, Minor Arterial roadways are recommended to be spaced 1 to 2 miles apart in urban/urbanizing communities. The lack of Minor Arterial roadways and roadway system continuity results in additional congestion on TH 3. This results in TH 3 serving both north-south and east-west travel. For example, part of TH 19 runs concurrently with TH 3. Additionally, there isn't a Minor Arterial roadway in the northwest corner of the City and CSAH 23/43 isn't designed to function as such. Section 3.5.3 describes the study underway to address this need.

Additional challenges relate to the lack of interconnected neighborhoods in some parts of the City. This is particularly evident in the area south of Jefferson Parkway. The extensive amount of cul-de-sacs results in an overreliance on Jefferson Parkway and TH 246/Division Street for all trips in the area. The colleges of St. Olaf and Carleton also represent some challenges for connecting neighborhoods and the Local and collector street system that serves them. This is due to their extensive land holdings and the challenges associated with extending corridors through their properties.



*Extensive cul-de-sacs result on an overreliance on Jefferson Parkway.*

The City has done a good job in obtaining right-of-way and constructing some Major Collector roadways. Jefferson Parkway and Thye Parkway are good examples of corridors providing connectivity across parts of the City.



TRANSPORTATION PLAN

Legend

Roadway Functional Classification

- Principal Arterial
- Minor Arterial
- Rural Major and Urban Collector
- Rural Minor Collector
- Local
- Wetlands
- Lakes
- Roads
- Parcels
- City Limits
- Township Boundaries
- County Boundary

Source: Rice County, Dakota County, MnDNR, Metropolitan Council-8/10/07, MnDOT-12/07



0 2,500 Feet

Existing Roadway Functional Classification

Figure 2.2-1

2008



Jefferson Parkway and Greenvale Avenue are examples of important Major Collector roadways with a current design that under serves existing traffic volumes and bicycle mobility. In addition, Jefferson Parkway from Jefferson Road to Division Street/TH 246 has as an inadequate design for school bus traffic.

### 3.1.2 TRAIL AND BICYCLE ROUTES

As noted in Section 1.1, more than one-quarter of Northfield's population walks or bikes to work. The Parks, Open Space, and Trail System Plan outlines trail and bicycle route deficiencies, including the following

- Trail on the east side of the river that traverses through Riverside Lions Park currently dead ends in a parking lot
- Lack of integration of the trails into the overall design for the greenway in newer developments
- Linking downtown Northfield with the overall trail system with existing street and parking challenges
- Challenges with retrofitting facilities into existing developed areas of the community

Another challenge in this area is the ability to move traffic safely across Minor Arterial routes, particularly TH 3 and TH 19, in a manner that conveniently links trip origin and destinations.

The Northfield Area Task Force on Non-Motorized Transportation (Report May 2008) identifies high priority infrastructure needs relative to bike routes, bike lanes, and linking trail, as well as additional ideas for infrastructure improvements relative to sidewalks, shared-use paths, bike lanes, roads, and bicycle parking.

### 3.1.3 PEDESTRIAN FACILITIES

The Parks, Open Space, and Trail System Plan indicates there is a need for improved pedestrian-level connections and flow through and around the downtown area. Other challenges identified include retrofitting sidewalks into existing developed areas of the City. Recognizing that trails are used for pedestrian mobility, as well as bicycle transportation and recreational uses, the findings noted in Section 3.1.2 also apply here.

### 3.1.4 TRANSIT SERVICES

Currently, Northfield Transit is the only transit service provider in Northfield. It provides curb-to-curb ride service opportunities within Northfield City limits as described below.



*Dial-A-Ride Service* is a curb-to-curb bus service between requested locations. Riders are given the first available time based on demand and other schedules. Buses are lift-equipped and drivers are trained and certified to assist passengers who need help getting on and off the bus. Two-hour advance reservation requests are required for general Dial-A-Ride Service, and 24 hours in advance for lift service.

*Ride-to-Work Service* offers dependable, pre-scheduled rides within the City of Northfield to and from a place of work, Monday-Friday, 7 AM - 5:30 PM.

*Summer Youth Service* is an unlimited ridership pass program providing rides within Northfield City limits to persons under the age of 18. This program is offered from 7 AM to 4 PM Monday through Friday during June, July, and August. Schedule requests to prearrange rides must be submitted seven days prior to activity start date for regularly scheduled events. For other trips, a 2-hour notice is requested.

*Jefferson Lines Connection* is a service provided to the Jefferson Lines Bus Depot at the Big Steer Travel Center. This service is provided Monday through Friday, twice each day. Reservations are required 24 hours prior to service. Pick-ups and drop-offs are made curbside within Northfield. In addition to providing connections to the Burnsville transit station, it also provides routes to various cities in the central part of the United States.

Jefferson Line Routes



### 3.1.5 TRUCK ROUTES

There are certain routes within the City of Northfield that trucks need to use to move goods and services to market and make deliveries to and from area businesses. Routes servicing higher amounts of truck traffic are necessary to meet the needs of the land uses they serve. Generally, truck routes follow municipal state aid, county state aid, or state highway designated corridors. During construction of new roadways or reconstruction of existing roadways, it is necessary for the roadway to be designed to accommodate the appropriate design vehicle.



### 3.1.6 EMERGENCY AND CIVIL SERVICES ROUTES

Maintaining mobility on select roadway corridors is necessary to provide effective public services. Similar to the needs of trucks to service area businesses, it is necessary for Major Collector and Minor Arterial roadways to be designed for emergency vehicles, such as fire trucks, to efficiently navigate the roadway system to reach their call locations. Equally important is the need for maintenance vehicles to be able to effectively maintain primary plow routes for preserving access to key areas of the City or to respond to important public facilities that are vital to the City health and well being such as the wastewater treatment plant, dam, and water treatment facilities.

### 3.1.7 RAIL

There are three rail lines in the Northfield area. According to Mn/DOT Office of Rail, the primary line is operated by Union Pacific and generally runs parallel to TH 3 through the City. It extends north out of the City to a junction in Rosemount and beyond. As of 2006, there were approximately 11 operations per day.

The line extending to the northwest near St. Olaf Avenue is operated by Progressive Rail. It extends to Air Lake in Lakeville. While the line continues to Savage, no trains are currently running west of I-35. There are approximately 7 operations a day on this line in the Northfield area.

The third line is also operated by Progressive Rail. This line extends east to Randolph and has approximately 2 operations a day.

### 3.1.8 AVIATION

Stanton Airport is the only aviation facility within the Northfield area. It is a private 2,550 x 200' grass runway providing taxi service, crop dusting, and glider opportunities. Airlake Airport in Lakeville and the Faribault Airport are the closest public airports to the City of Northfield. Airlake Airport is located approximately 17 miles northwest of Northfield, and Faribault's airport is approximately 14 miles to the southwest. These airports primarily serve private business travel and personal recreational travel needs. Broad assortments of international, domestic, and regional airlines fly from the Minneapolis-St. Paul International Airport.



### 3.2 EXISTING TRAFFIC VOLUMES AND CAPACITY

The existing traffic volumes within the area were collected from Mn/DOT, including recent counts by the City of Northfield, Rice County, and Dakota County, and are represented in Figure 3.2-1 – Existing Volume and Congestion. Capacity improvements are recommended on any roadway with a future level of service of D, E, or F, as defined in Section 2.4.5.

Roadway analysis indicates that the system operates well for several roadways within Northfield; however, some roadways are currently providing a Level of Service C or less. Roadways identified below as near congested (having a volume to capacity ratio between 0.75 and 1) or congested (having a volume to capacity ratio greater than 1) are recommended to be monitored and programmed for capacity improvements when necessary.

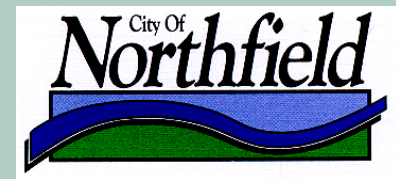
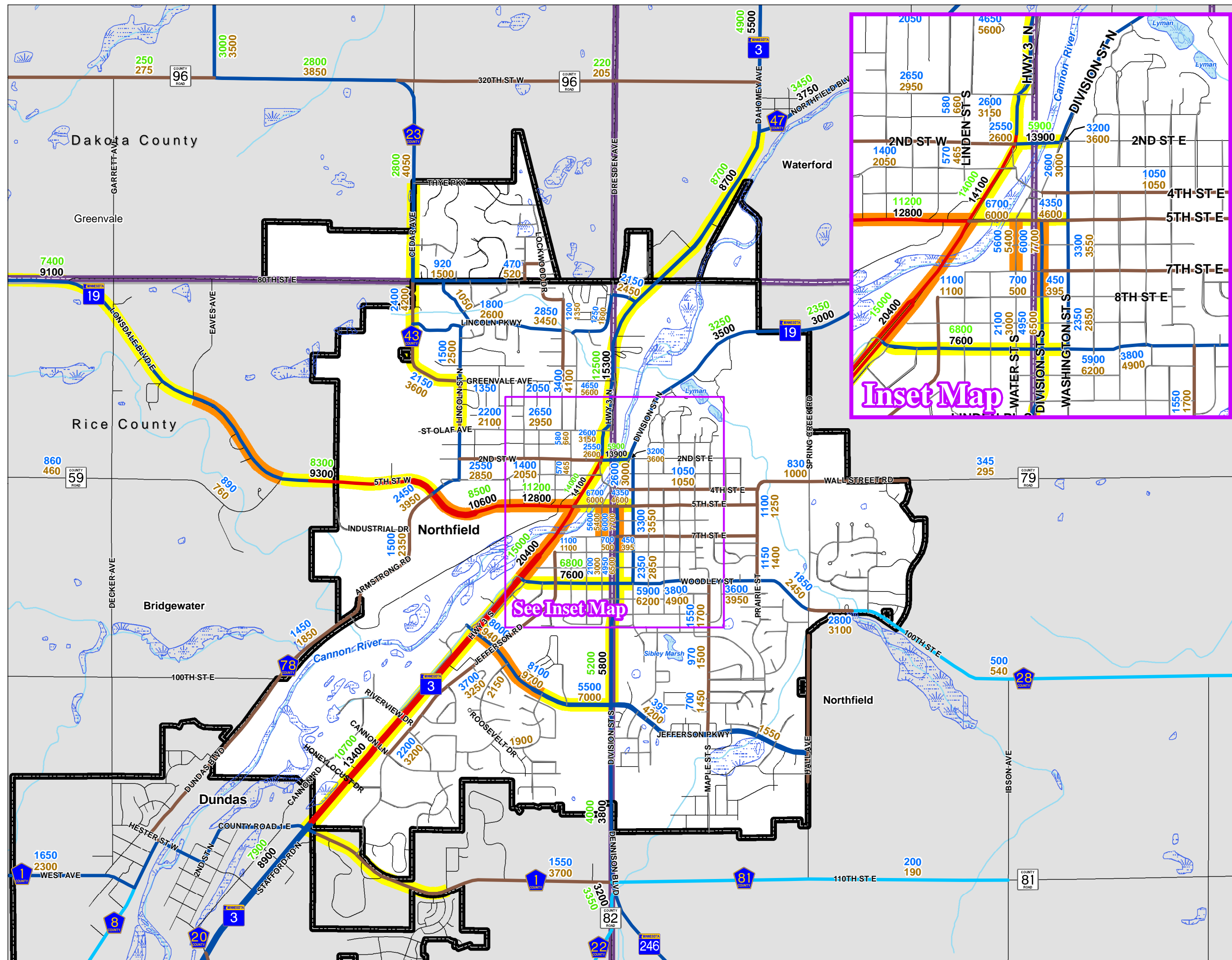
Roadways that are periodically congested (having a volume to capacity ratio between 0.5 and 0.75) are generally identified as providing an acceptable level of service. Following are the roadways that are currently periodically congested or near congested

#### NEAR CONGESTED

- TH 3 from Woodley Street to TH 19/5<sup>th</sup> Street
- TH 19 from Eaves Avenue to CR 59 and from CSAH 78 to TH 3
- Water Street from 5<sup>th</sup> Street to 7<sup>th</sup> Street
- Division Street from 5<sup>th</sup> Street to 8<sup>th</sup> Street
- Jefferson Parkway from TH 3 to the east leg of Roosevelt Drive

#### PERIODICALLY CONGESTED

- TH 3 from Woodley Street to CSAH 1 and from TH 19 to CSAH 47
- TH 19 from west of Garrett Avenue to Eaves Avenue and from CR 59 to CSAH 78
- Dakota County CSAH 23 / Rice County CSAH 43 from Thye Parkway to St. Olaf Avenue
- 5<sup>th</sup> Street from TH 3 to Washington Street
- Woodley Street from TH 3 to Washington Street
- Jefferson Parkway from the east leg of Roosevelt Drive to Division Street
- CSAH 1 from TH 3 to Farrell Avenue



## TRANSPORTATION PLAN

### Legend

#### Average Daily Traffic Volumes

XXXX 2000  
XXXX 2001  
XXXX 2005  
XXXX 2006

#### Volume To Capacity

Periodically Congested V/C=0.50 - 0.75  
Near Congested V/C=0.75 - 1.00

#### Roadway Functional Classification

Principal Arterial  
Minor Arterial  
Rural Major and Urban Collector  
Rural Minor Collector  
Local  
Wetlands  
Lakes  
Roads  
Parcels  
City Limits  
Township Boundaries  
County Boundary

Source: Rice County, Dakota County, MnDNR,  
Metropolitan Council-8/10/07, MnDOT-10/19/07



0 2,500  
Feet

Existing Volume  
And Congestion

Figure 3.2-1

2008



### 3.3 SAFETY ANALYSIS

A planning-level analysis of the existing transportation system in Northfield was completed and included evaluating crash records in the ten-year time period from January 1, 1997, through December 31, 2006. In an effort to determine trends, crashes were categorized by year and type, as well as crash severity. As described in Table 3.3-1, over the 10-year analysis period, there were a total of 1,475 crashes. The most common crash types were right angle and rear end crashes. The majority of crashes were non-injury (70%) and six crashes had fatalities.

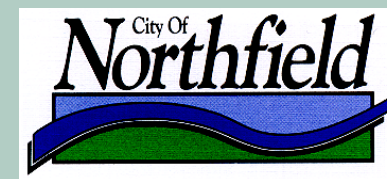
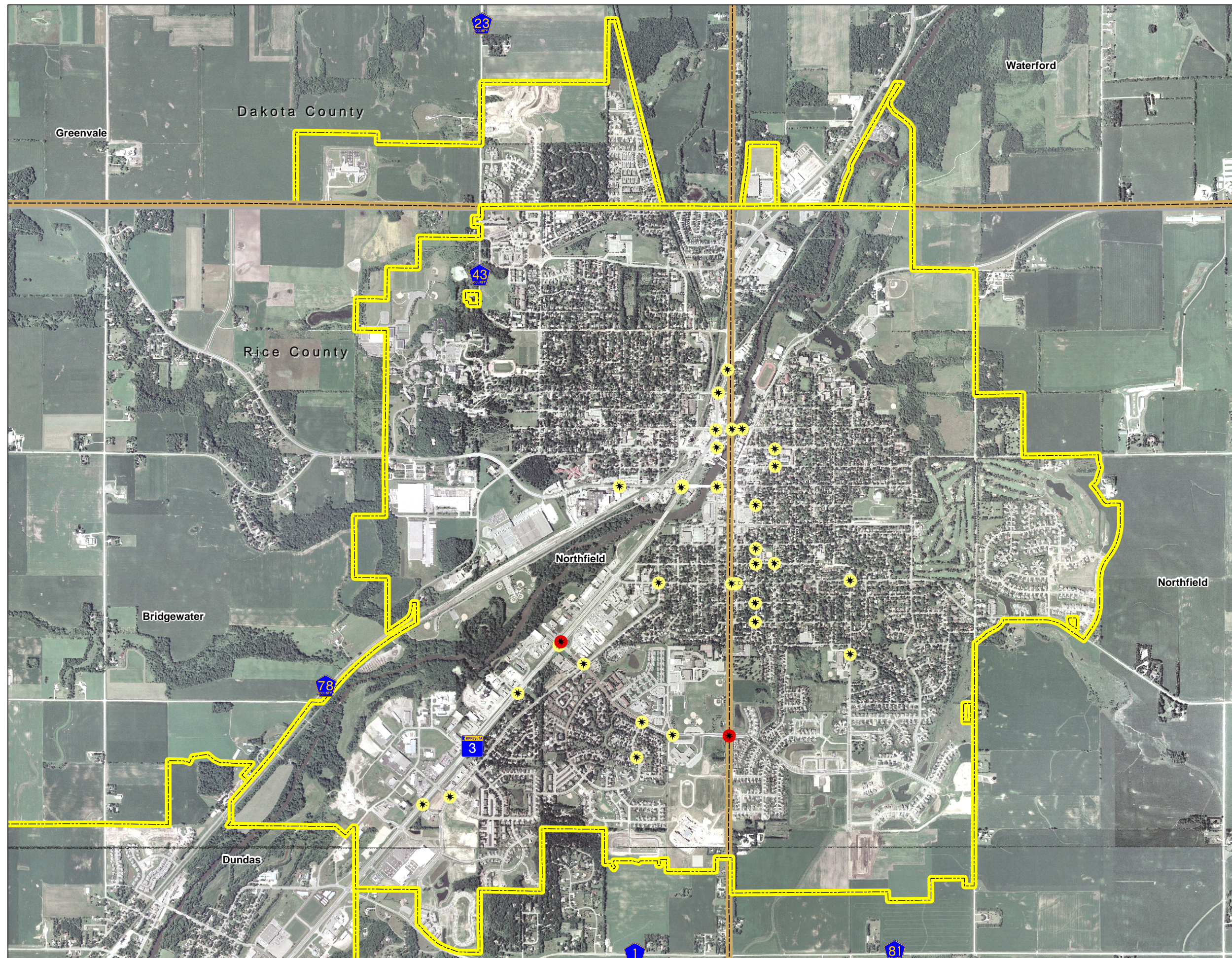
TABLE 3.3-1 – CRASH SEVERITY

<b>Crash Type</b>	<b>10 Year Total (1997 – 2006)</b>
Fatal	6
Injury – Incapacitating Injury	46
Injury – Non-Incapacitating Injury	133
Injury – Possible Injury	256
Property Damage - No Apparent Injury	1,034
Total	1,475

Source: Mn/DOT – Minnesota Crash Mapping Analysis Tool (MnCMAT)

Over the 10-year period, there were 35 crashes involving a bicyclist or pedestrian. Of the six fatal crashes, one involved a bicyclist and one involved a pedestrian. Both of these fatal crashes were at intersections experiencing a high crash frequency. Figure 3.3-1 indicates the locations of these bicyclist/pedestrian crashes, with the fatalities displayed in red. For comparison purposes, bicyclist/pedestrian crashes were evaluated for the same 10-year period in other similar cities to Northfield, including St. Cloud, Mankato, Winona, and Red Wing. This analysis revealed that Northfield has a relatively low number of bicyclist/pedestrian crashes compared to other cities, even when population and bike ridership are taken into account. Despite this finding, it is recommended that problem areas be studied and improvements be implemented to further reduce the number of crashes at problem intersections and roadway segments.





## TRANSPORTATION PLAN

**Legend**

**Crash Type**

- ★ Fatality
- ★ Injury Crash
- City Limits
- Township Boundaries
- County Boundary

Source: MNDOT TIS Crash Records  
Rice County, Dakota County, MnDNR



0 2,000  
Feet

### 1997-2006 Crashes Involving Pedestrians or Bicycles

Figure 3.3-1

2008





Crash data for the most recent five-year time period from January 1, 2002, through December 31, 2006, are displayed on Figure 3.3-2 to illustrate crash frequency. A five-year period of time was used for this analysis because it allows for a crash frequency pattern to be observed that is more meaningful in the current condition. With a longer period of time, there would be a chance for more significant design or traffic operational changes to have occurred that may misrepresent current problem locations. Locations with the highest crash frequency are

- TH 3 between Locust Drive and Heritage Drive
- TH 3 / Jefferson Pkwy
- TH 3 / TH 19 (West 5th Street)
- TH 3 / West 3rd Street
- TH 3 / TH 19 (West 2nd Street)
- Jefferson Pkwy / Jefferson Road
- TH 246 / Jefferson Pkwy
- TH 246 / Woodley Street

Most of these locations are on the State Trunk Highway System. Recent improvements have been made along TH 3 between TH 19 and Greenvale Avenue, including geometric improvements and the addition of left turn lanes, concrete medians, and bike lanes. These changes were made in 2005-2006.

The number of crashes for each year in the 10-year time period were graphed and a trend line was identified. The crash frequency trend is slightly negative, meaning crash frequency has remained fairly stable over the 10-year period. The same conclusion can be made for bicyclist/pedestrian crashes.

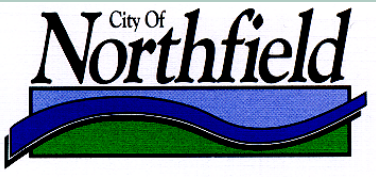
### 3.4 PAVEMENT CONDITIONS

As of May 2007, the City of Northfield pavement condition index (PCI) for their road network was identified as follows

- Good condition – 41 miles
- Fair condition – 10 miles
- Poor condition – 17 miles

The 2007 average network PCI was 71. As outlined in Section 2.8, this rating was just over the City's targeted PCI goal of 70. The City's predicted 2008 average network PCI rating is 64.





TRANSPORTATION PLAN

**Legend**

**Crash Frequency**

- 1 Crash
- 2-5 Crashes
- 6-12 Crashes
- 13-25 Crashes
- 26 or More Crashes

City Limits

Township Boundaries

County Boundary

Note: All Crash Frequency Ranges are Approximate

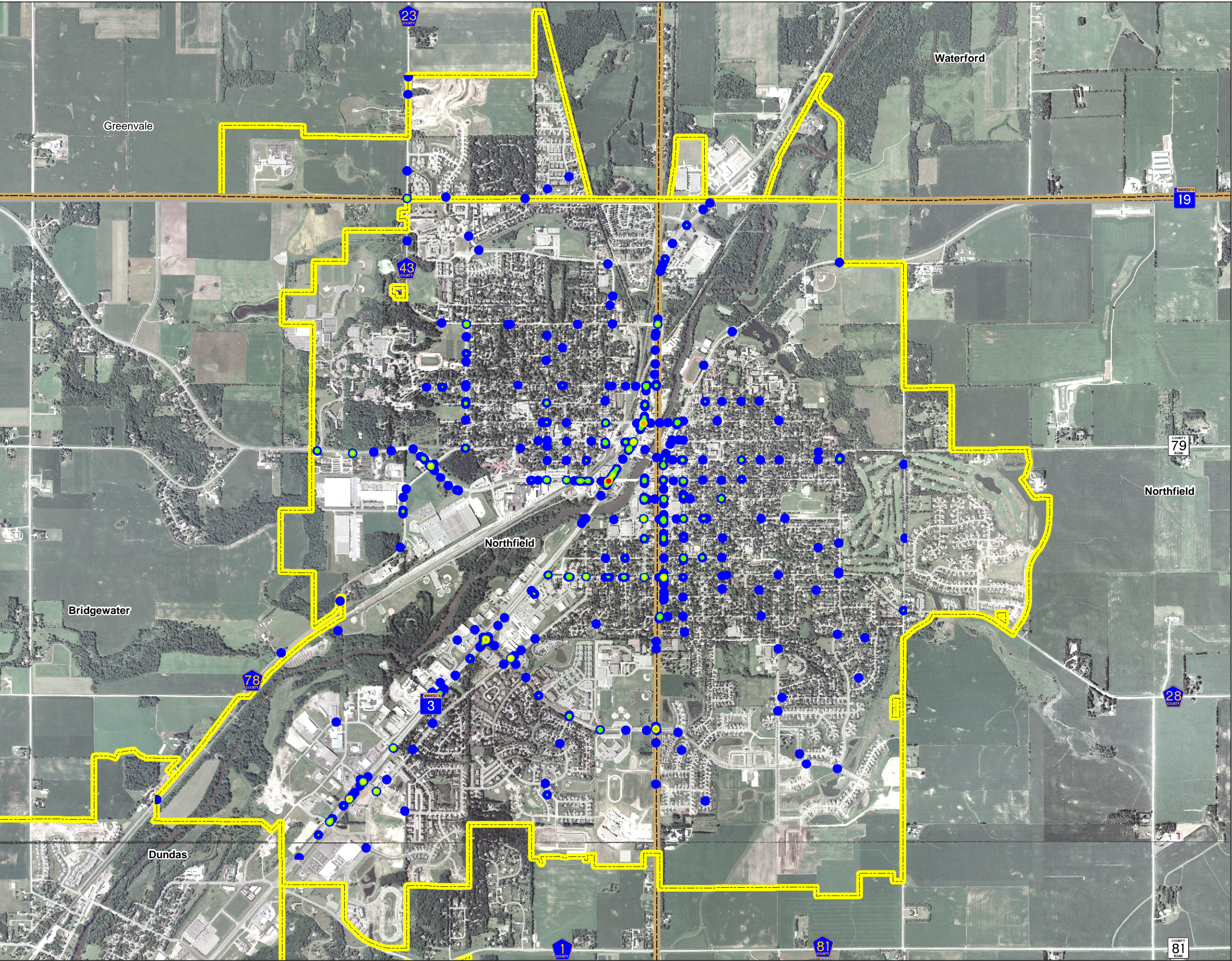
Source: MNDOT TIS Crash Records  
Rice County, Dakota County, MnDNR



0 2,000  
Feet

2002-2006  
Crash Frequency  
Figure 3.3-2

2008





### 3.5 REGIONAL TRANSPORTATION INITIATIVES

Following are the regional roadway or transit initiatives or studies completed or underway in and around the City of Northfield.

#### 3.5.1 TH 19 ACCESS MANAGEMENT AND SAFETY PLAN (IN PROGRESS)

Mn/DOT is currently working on an access management and safety plan for a section of Highway 19 for the area between TH 3 and I-35. The final plan is anticipated to include the locations for primary and secondary intersections, local road network improvements, and the process for implementing the plan.

#### 3.5.2 TH 19 SCOPING STUDY (STUDY ANTICIPATED TO BEGIN IN 2009-2010)

Mn/DOT is anticipating initiating an environmental and alignment scoping study in approximately 2009 or 2010. While the details of the study have not been finalized, the study is anticipated to include evaluating the current and possibly a revised TH 19 alignment north of Northfield. The study limits have been identified from Rice County CSAH 46, located west of I-35, to approximately 1.5 miles east of TH 56 in Goodhue County. Mn/DOT District 6's Long Range Transportation Plan does include some funding for TH 19 in 2015-2020. The Long Range Transportation Plan is currently being updated, which could impact funding for identified improvements.

#### 3.5.3 NORTHWEST NORTHFIELD HIGHWAY CORRIDOR STUDY (2008)

Building on the needs identified in the Dakota and Rice County 2025 Transportation Plans, Dakota County, in cooperation with the City of Northfield and Rice County, is completing a transportation study of areas north and west of the City of Northfield. The purpose of this study is to investigate arterial and collector roadway needs associated with future Northfield area growth. This study will be conducted as a system approach examining arterials and collectors in the area.

The goal of this study is to develop a plan for a future transportation network to link disconnected parts of the road system, thereby improving the mobility for those traveling in and through the northwest Northfield area. These changes are needed to adequately support the increased intensity of development and increased commuting levels expected as a result of population growth and land use changes through the year 2030. Upon completion, the route will provide continuity between CSAH 1 and Dakota County CSAH 23 for regional travel.

To achieve this goal, the existing transportation system will need to be enhanced from a system that was developed to support rural land uses, to a system that will support more urbanized land uses. These enhancements will result in a more dense, complete, connective, and continuous road network.<sup>2</sup>

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<sup>2</sup> Dakota County. 2008. Northfield Roadway Study.  
<http://www.co.dakota.mn.us/EnvironmentRoads/Reports/Road/NorthfieldRoadwayStudy.htm> . Accessed February 14, 2008.

### 3.5.4 CSAH 1 CORRIDOR PRESERVATION STUDY (2008)

CSAH 1 provides east–west travel through northern Rice County. The study purpose was to coordinate necessary planning for a continuous CSAH 1 Minor Arterial corridor with other roadway and land use planning activities in Dundas and southern Northfield, so a long–term sustainable roadway network could be achieved. The study recognized the efforts previously evaluated by the City of Northfield for the extension of Jefferson Parkway. It explains that this river crossing option would remain open until an environmental review can be completed to determine an appropriate Cannon River bridge location in the Northfield/Dundas area. The preferred planning alignment identified to be preserved for further planning, preservation, and environmental analysis was selected based on its ability to best accommodate the needs of the regional transportation system, local land use, and local transportation, while minimizing impacts on environmental and cultural resources. The preferred route selected is identified below.



*CSAH 1 Preferred Planning Alignment*

### 3.5.5 NORTHFIELD INDUSTRIAL CORPORATION (NIC) STUDY (2000)

The NIC Transportation Task Force comprised of local business leaders and school officials focused on twelve roadway segments, most of which had been considered in previous transportation studies. Some of the Task Force’s conclusions were similar to previous studies, in other cases they were different or additional elements were added. The study notes that areas were evaluated based on safety, access, and effect on quality of life in Northfield. Study area conclusions are summarized as follows

- Area #1 Future TH 19 Bypass – Agrees with current City Council approach asking Mn/DOT to prepare a corridor study. Supports 320th Street option if handled carefully in Waterford area.
- Area #2 Proposed Cedar Avenue Extension (320th Street to North Avenue) – Supports currently planned direct extension of Cedar Avenue south from 320th/Cedar west intersection.
- Area #3 North Avenue (TH 19 to Cedar Avenue) – Supports currently planned upgrade.



- Area #4 Thye Parkway (Cedar Avenue Extension to TH 3) – Supports currently planned development.
- Area #5 North Avenue (Zanmiller Drive to TH 3) – Proposes extending North Avenue to TH 3 as originally conceived in 1965.
- Area #6 Proposed Cedar Avenue Extension (North Avenue to TH 19) – Supports current plan. Suggests addition of sidewalks and bikeways.
- Area #7 Jefferson Parkway Extension (TH 19 to Armstrong Road) – Supports and suggests two alternative routes.
- Area #8 Jefferson Parkway Extension (Armstrong Road to TH 3 across Cannon River) – Supports strongly. Discussion of alternative crossing locations.
- Area #9 Jefferson Parkway Link (Sibley View Lane to Lake Drive and Michigan Drive East to Spring Creek Road) – Supports immediate completion of this missing link.
- Area #10 Jefferson Parkway Extension (Spring Creek Road to TH 19) – Supports completion as part of ring road to help relieve center city congestion.
- Area #11 Spring Creek Road (Jefferson Parkway to TH 19) – Supports full pavement to TH 19, sidewalks, and future upgrade south as area develops.
- Area #12 TH 19 and TH 3 Common Roadway Segment – Suggests reintroducing turning lanes eliminated at 2nd Street and 5th Street.

In addition, the Task Force recommended that the City Council immediately consider a 20 year plan to finance transportation needs and begin, in certain cases, early acquisition of future road right-of-way. The report also raises general concerns about control of development adjacent to new roadways, the development of reliever roads for south commercial development, the adequacy of pedestrian and bicycle transportation infrastructure and public transportation, and how transportation plans can become reality.

The findings and recommendations from the NIC study are generally consistent with what has been implemented since the study was completed, are currently under study, and/or are included in this Transportation Plan. The one exception is Area #1 – Future TH 19 Bypass. This recommendation was not carried forward since current traffic volume data does not appear to support a TH 19 bypass. cursory review of traffic volume data on the east side and west side of Northfield indicates less than 10 percent of traffic on TH 19, west of TH 3 would be diverted to a bypass route. The vast majority of traffic on this portion of TH 19 has a trip origin or destination within Northfield and would not be served by a northerly route at 320th Street. Rather, this Transportation Plan supports a balanced roadway network to better serve local and regional trips by

providing convenient choices for trip routes and transportation modes. The Northwest Northfield Corridor Study recommendations provides the framework for regional and local roadway connection, including alternative route choices for TH 19 west of town to/from TH 3 north of town.

### 3.5.6 RICE COUNTY TRANSPORTATION PLAN (2006)

The current Rice County Transportation Plan identifies existing limitations of the highway system in and around the Northfield area and identifies needs anticipated in 2025 based on anticipated growth in the County. Existing limitations include intersections with crash rates greater than the state average or more than twice the state average. Of the 7 intersections identified in Northfield listed below, 6 had crash rates of more than twice the state average

- TH 3 at TH 19 (north junction)
- TH 3 at TH 19 (south junction)
- TH 3 at Jefferson Parkway
- TH 3 at Jefferson Road
- TH 246 at Jefferson Parkway
- TH 246 at CSAH 1/CSAH 22/CR 81
- TH 246 at CSAH 29 (Woodley Street/Division Street)

The Plan also includes a future long-term continuity corridor vision improving regional, cross-county mobility options. In the Northfield area, new continuous corridor conceptual routes include CSAH 1 on the south, Decker Avenue to Dakota County CSAH 23 on the west, Jefferson Parkway on the east, and Dakota County Road 96 on the north. The Plan explains that specific studies are necessary to identify the specific route and feasibility prior to implementation.

Jurisdictional transfer candidates to align the jurisdiction of roadways with the unit of government best suited for its responsibility are included in the Plan. County Road 79, CSAH 43, and CSAH 78 are roadways identified as transfer candidates from Rice County to the City of Northfield. Decker Avenue was identified as a transfer candidate from Bridgewater Township to Rice County. The Plan does not include a specific timeframe for transfers to occur. Transfer candidates in the Northfield area may be dependent on the findings and implementation of the Northwest Northfield Highway Corridor Study and implementation of the CSAH 1 Corridor Preservation Study.

### 3.5.7 DAKOTA COUNTY 2025 TRANSPORTATION PLAN (2004)

The Dakota County Transportation Plan identifies goals to prioritize limited resources to the highest priority needs of the transportation system and preserve the existing system. In the Northfield area, a study of CSAH 23 to the south into Rice County was recommended and is currently underway as the Northwest Northfield Corridor Preservation Study. A project identified in the Capital Improvement Plan is the paving of CR 96 between CSAH 23 (Cedar Avenue) and TH 3 in 2008.

### 3.5.8 RICE COUNTY TRANSIT STUDY (2001)

The objective of the Rice County Transit Study was to conduct a transit service performance and market analysis of systems operating in the county to identify unmet needs and to look for opportunities to enhance transit service. Specific study recommendations for the Northfield area include the following

- Continue to manage the transit service within its urban area (City Service Option N2)
- Expand demand response service in terms of service hours and territory
- Provide service into the early evening on Monday through Saturday, operating between 6 AM to 8 PM
- Provide service on Sundays between 8:30 AM to 4:30 PM
- Provide service into Dundas and perhaps to other outlying areas surrounding Northfield
- Establish a link to Jefferson Lines service, with Northfield Transit operating a connecting route to the Big Steer Travel Center located at the junction of TH 19 and I-35 (service is currently provided)
- Review current marketing efforts. Revise and reprint Northfield Transit brochure to include information on any new services instituted, including the link to Jefferson Lines. Materials should be available in both English and Spanish language editions. Look to expand marketing to reach broader markets through media advertising, such as the local newspaper and radio station, and the City web site and local cable access channel
- Implement a computer aided dispatch system for trip reservations
- Rural service of one round trip per day be provided between Lonsdale and Northfield and between Faribault and Northfield<sup>3</sup>

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<sup>3</sup> Rice County Transit Study. 2001. SRF Consulting Group, Inc. Pages 1, 57-59.

### 3.5.9 DAKOTA COUNTY TRANSIT PLAN (IN PROGRESS)

Dakota County is currently in the process of seeking public input on their Draft Transit Plan. The purpose of the plan is to establish a long-term vision for transit services and facilities in Dakota County. The transit vision provides a framework for improving existing and future mobility needs within Dakota County. The Plan recognizes the most substantial current need facing the County is that of providing transit service to urbanizing communities into the regional service picture. It states that communities developing at the fringe of urbanized areas will soon approach levels of residents and jobs warranting inclusion in the regional transit service picture. Potential transit expansion areas identified include Lakeville, Farmington, and Hastings. The plan findings regarding out-of-county travel include

- Over 60 percent of all trips never cross the county border. However, this market has historically proven a difficult one for transit to serve, given traditionally low levels of population and employment density. County circulator service has been attempted in the past by a few transit providers. As the county continues to develop, and as communities proactively plan for transit-oriented development, this market may become increasingly viable for intra-county transit service.
- Out-of-county connections not oriented to Minneapolis or St. Paul include the I-494 strip, Scott County, and reverse commute services to Eagan. Few transit services to these areas currently exist. Of these services, the I-494 strip appears to be the strongest candidate in the short-term. Future travel trends indicate that both reverse commuting into Eagan and connections to Scott County will increase in importance.<sup>4</sup>

Responding to the draft plan, the City of Northfield approved Resolution 2007–131 requesting the following items be incorporated into the Dakota County Transit Plan

- Community service needs in the Northfield area that include intercity, regional, commuter and reverse commuter service, and service to the regional medical facility
- Transit connections to/from Northfield to existing public transit services in the metro area
- Recognition of the Northfield Transit multimodal hub as an opportunity to provide regional connections across county and city borders to enhance the transit network
- Partner with the City of Northfield to support the development of transit and transit-related infrastructure to provide integrated transit systems<sup>5</sup>

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<sup>4</sup> Dakota County. 2008. Draft Dakota County Transit Plan. Accessed February 14, 2008.  
<http://www.co.dakota.mn.us/EnvironmentRoads/Transit/PublicTransportation/Welcome.htm>

<sup>5</sup> City of Northfield. 2007. Northfield City Council Resolution 2007–131, December 17, 2007.

### 3.5.10 MILL TOWNS TRAIL

The Mill Towns Trail is a scenic recreational trail currently under development in Southern Minnesota. The trail will link existing trails: the Cannon Valley Trail from Cannon Falls to Red Wing, and the Sakatah Singing Hills Trails between Faribault and Mankato. The Mill Towns theme recognizes the historic mills that were once important to the economy of this area.

The Mill Towns State Trail will provide a connection between public and semi-public open spaces serving three counties and six communities. It is envisioned as a recreational investment that will link these communities in a way that will ensure their continued vitality. Goals for the trail include the following

1. Develop a Trail Route - develop a trail route that can be used for hiking, biking, and snowmobiling or skiing, which links Cannon Falls, Randolph, Waterford, Northfield, Dundas and Faribault
2. Provide a Permanent Link - provide a permanent trail right-of-way linking the Cannon Valley Trail at Cannon Falls and the Sakatah Singing Hills State Trail at Faribault
3. Establish a Recreational Facility - establish a recreational facility focused upon the communities along the proposed right-of-way
4. Create an Identity - create an individual identity for the Mill Towns State Trail that will distinguish it from both adjoining trails
5. Establish Loop Options - establish loop options for trail users in each of the communities along the trail
6. Provide Access - identify and provide access to public spaces, historic mill sites, and the cultural and natural features along the trail
7. Identify Trailheads - identify trailhead sites in each community to facilitate economic development
8. Promote Open Space - promote the trail as an integral element in the regional open space system
9. Promote Community Health - promote the trail as a vital facility for health in the community<sup>6</sup>

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<sup>6</sup> <http://www.milltownstrail.org/>. Retrieved on June 10, 2008.

## **4.0 FUTURE TRANSPORTATION SYSTEM**

The transportation system in the Northfield area has had generally steady growth over the past several decades, and growth is anticipated to continue into the future. As residential and non-residential growth continues to occur, it will be important for the City to develop a roadway system that is efficient and consistent with the transportation system principles and standards outlined in Section 2.

### **4.1 FUTURE CORRIDOR CONNECTIONS AND SERVICE ROUTES**

The following provides an overview of the planned future transportation system for all trip types in the City of Northfield.

#### **4.1.1 ROADWAY FUNCTIONAL CLASSIFICATION**

The Comprehensive Plan includes future land use designations for areas within the identified urban growth boundary. The supporting future road network vision has been developed in consideration of long-term growth in the area and is illustrated in Figure 4.1.1 – Recommended Future Roadway Functional Classification. This network has been developed in consideration of the proposed land uses, the Transportation System Principles and Standards outlined in Section 2, and regional transportation initiatives.

A suitable arterial-collector system is necessary to accommodate future development and traffic patterns in the growing community of Northfield. A balanced system of Minor Arterials, Major Collectors, and Minor Collector Streets is needed to provide acceptable motorized and non-motorized mobility and access to developing areas, as well as to enable the Principal Arterial and Minor Arterial roadways to serve longer, regional travel. It is not anticipated that all of the proposed roadways will be constructed by 2030; rather, these roadways should be constructed as development occurs. In particular, while two new Cannon River crossings are shown on the map, it is anticipated that one crossing will be constructed. This will be determined by the outcome of the environmental review for the corridor and bridge. As the urban growth boundary is amended over time, additional studies will be necessary to determine specific roadway alignments and intersection spacing.

The roadway corridors identified in Figure 4.1-1 are conceptual, based on network needs, and should be used as a guide for development of the County and City roadway systems. In most cases, actual roadway alignments are flexible to meet the needs of future development, at the discretion of the City Engineer. The re-designated roadways necessary to support the land uses identified in the Comprehensive Plan and future traffic growth, as well as meet the demands of emergency and civil service and accommodation of truck routes, are mentioned below.

#### FUTURE MINOR ARTERIAL CORRIDORS

As stated in Section 3.0, the Northfield area lacks a system of Minor Arterials to serve higher speed, regional motorized travel. TH 3 and TH 19 have limited capacity and expansion potential to handle growing traffic volumes. In urban and urbanizing areas, Minor Arterial corridors are recommended at 1 to 2 mile spacing depending on density of land uses. As a result, several new corridors will be necessary to regain a better balance of travel demand on the roadway system. The intent of these new corridors are to better serve E-E and I-E/E-I trips.

*Decker Avenue / Foliage Avenue* is a recommended future north-south Minor Arterial corridor on the western edge of the City's growth area. The alignment of this corridor was identified in the Northwest Northfield Corridor Study lead by Dakota County. The purpose of this corridor is to replace the existing Dakota CSAH 23/Rice CSAH 43 corridor on the Cedar Avenue alignment in Northfield, providing a more direct connection to TH 19. The corridor is proposed to extend southerly into Dundas to provide an alternative to TH 3 for north-south travel.

*320th Street / County Road 96* is a recommended east-west Minor Arterial corridor on the northern edge of the City's growth area. Dakota County intends to pave existing County Road 96 between CSAH 23 and TH 3 in 2009. Once complete, this direct and convenient connection will provide an alternative to Greenvale Avenue for east-west travel between CSAH 23 and TH 3. In the future, this corridor is recommended to be aligned around the north side of Waterford Village and connect with CSAH 47/Northfield Boulevard at Canada Avenue.

*County State Highway 1 / County Road 81* is a recommended east-west Minor Arterial corridor on the southern edge of the City's growth area. Rice County recently completed a Corridor Preservation Study for the existing alignment of CSAH 1 between TH 246 and TH 3, including a proposed new alignment across the Cannon River, west of TH 3. This corridor, once established, would provide the only continuous east-west corridor across the Northfield area. An alternative crossing location is Jefferson Parkway. The City supports the CSAH 1 crossing. If the corridor is selected during the environmental review as the crossing to be pursued, it will not alleviate the need for improvements to TH 19.

*Ibson Avenue* is a recommended future north-south Minor Arterial corridor located east of the City's eastern growth boundary. The purpose of this corridor would be to establish the next north-south arterial, providing an alternative to TH 246 and TH 3 for north-south travel through Northfield. This corridor is recommended to be aligned around the east side of the Carlton College Arboretum and cross the Cannon River at the existing Canada Avenue bridge. While this corridor is entirely outside the City's anticipated growth boundary, it is important to begin preserving it for long-term transportation needs.

The following existing Minor Arterial corridors are to be managed consistent with state and county standards

- State Highway 3
- State Highway 19
- State Highway 246
- County State Aid Highway 28/Woodley Street

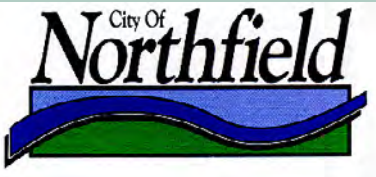
#### MAJOR COLLECTORS

The City of Northfield has a mix of Major Collector corridors to serve City-wide travel and circulation. Some existing Major Collectors, such as Jefferson Parkway east of TH 246 and Lincoln Parkway, perform their function very well. They have adequate right-of-way to enable applicable design standards and are suitable with the adjacent land uses. Others, such as Greenvale Avenue are not serving their intended function due to inadequate design and conflicts with adjacent land uses. Continued development of the Major Collector corridors is necessary to continue pursuit of balance in the roadway network. In urban and urbanizing areas, Major Collectors are recommended at ½ mile to 1 mile spacing depending on density of land uses. As a result, several new corridors and improvements to existing corridors will be necessary to maintain the corridors as viable Major Collector routes. The intent of the Major Collector corridors is to better serve I-I and I-E/E-I trips. New Major Collector Roadways within the Urban Growth Boundary are identified below and displayed in Figure 4.1-1.

#### EAST-WEST CORRIDORS

- Thye Parkway – The City of Northfield has constructed a portion of this east-west corridor. Upon its completion, this route will provide important connectivity for local traffic between the future Decker Avenue / Foliage Avenue Minor Arterial and TH 3 at Sheldahl Road.
- North Avenue/80<sup>th</sup> Street – Similar to the role of Thye Parkway, this corridor will provide connectivity between the future Decker Avenue / Foliage Avenue Minor Arterial and TH 3. It's envisioned that North Avenue would intersect with TH 3 at Fremouw Avenue. Challenges exist in achieving this corridor due to potential property and environmental impacts, and the City will need to lead design and construction of a portion of the corridor.
- Lincoln Parkway – This roadway provides continuity for local traffic between CSAH 43 and Dresden Avenue, and extends past Greenvale Park Elementary School. This corridor has well maintained access spacing and continuity across the Progressive Rail railroad tracks to Dresden Avenue.





TRANSPORTATION PLAN

- Legend**
- Functional Classification**
- Minor Arterial
  - Proposed Minor Arterial
  - Major Collector
  - Proposed Major Collector
  - Minor Collector
  - Proposed Minor Collector
  - Urban Expansion Area
  - Wetlands
  - Lakes
  - Roads
  - Parcels
  - City Limits
  - Township Boundaries
  - County Boundary

**Note:**  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd.



0 2,500 Feet

Future Functional Classification

Figure 4.1-1

2008



**Note:**  
The intent is to have one new river crossing at either Jefferson Parkway or CSAH 1. The specific location will be determined during the environmental review associated with the crossing.



- Greenvale Avenue – Greenvale Avenue’s western limit begins south of Lashbrook Park and extends east to TH 3. It provides important continuity for land uses in northwest Northfield, including travel to and from the hospital located along North Avenue, out to TH 3 to access other parts of the City. This road has an at-grade crossing of the Progressive Rail railroad tracks and a grade separated crossing of Union Pacific railroad tracks.

A future Major Collector is envisioned for local traffic in northeast Northfield along the Greenvale Avenue alignment between Spring Creek Road and the future extension of Ibson Avenue.

- 4<sup>th</sup> Street – For local travel in northeast Northfield, this corridor provides east-west continuity between Division Street and Prairie Street. It also provides connectivity to downtown Northfield.
- 5th Street (also known as Wall Street Road east of Hall Avenue)/County Road 79 – This corridor’s role is similar to 4<sup>th</sup> Street in that it connects other areas of the City to the downtown. However, it also includes a crossing over the Cannon River and is aligned with TH 19 west of TH 3. This route also provides continuity to areas east of Northfield by means of CR 79.
- Jefferson Parkway/Canada Avenue – These roads provide important options for local travel in eastern Northfield. As described in Section 3.5.4, if the Jefferson Parkway alignment is identified as the next Cannon River crossing, this corridor would extend west of TH 3 and provide connectivity to western Northfield. It’s envisioned that the corridor would extend to TH 19 at approximately the CR 59 intersection. For this roadway to function in the role it is intended to provide, careful implementation of the design standards identified in Sections 2.4.1 and 2.4.2 will be necessary.
- Ford Street (West of Hall Avenue) & Heywood Road Easterly Extension - Future Major Collectors are envisioned in southeast Northfield. The extension of Ford Street east of Hall Avenue and the extension of Heywood Road east of Jefferson Parkway will provide important alternatives to CR 79, CSAH 28, and CR 81 for local traffic to reach the future north/south Minor Arterial roadway at Ibson Avenue.
- 90<sup>th</sup> Street, Future 95<sup>th</sup> Street, and 100<sup>th</sup> Street – These corridors are envisioned to provide important local roadway connectivity within southwest Northfield between Decker Avenue, a future Minor Arterial Corridor, and CSAH 78.

#### NORTH-SOUTH CORRIDORS

- Garrett Avenue – Garrett Avenue will provide an important route for local traffic west of the future Minor Arterial in northwest Northfield. This route will help preserve the future Minor Arterial to better serve E-E and I-E/E-I trips.
- Cedar Avenue/County Road 43/Lincoln Street/Armstrong Boulevard/County Road 78 – The combination of these corridors create a link across western Northfield between the future Minor Arterial roadways of Dakota County CSAH 23/Foliage Avenue and Rice County CSAH 1. These routes will serve local traffic and help preserve mobility on TH 3.
- Dresden Avenue – This route begins at Lincoln Parkway and extends north out of Northfield. This route provides a link for local traffic between CR 96 and Lincoln Parkway or TH 3.
- Jefferson Road/8<sup>th</sup> Street – This route provides a link for local traffic to access more intensive land uses located in downtown Northfield and on the east side of TH 3. It also helps preserve mobility on TH 3.
- Water Street (between Woodley Street and 5<sup>th</sup> Street), Division Street & Washington Street (between Woodley Street and 2<sup>nd</sup> Street) – These routes provide connectivity to downtown Northfield and access across the Cannon River at 5<sup>th</sup> Street and 2<sup>nd</sup> Street. Division Street and Water Street tend to serve business directly, while Washington Street provides alternative access to the downtown area which is not complicated by the business activity.
- Maple Street – This road provides a link for local residential traffic to the Minor Arterial roadways of Woodley Street and CSAH 1/CSAH 81. It also provides connectivity to Jefferson Parkway.
- Prairie Street – North of Woodley Street this corridor connects with Wall Street Road/CR 79, allowing residential areas on the east side of town to access east-west corridors linking with downtown and TH 3.
- Spring Creek Road/Hall Avenue – This corridor provides connectivity through future residential areas in eastern Northfield between the Minor Arterial roadways of CSAH 81 and TH 19. Part of the gravel corridor was overlaid with a bituminous surface, but was never reconstructed. It provides the longest north-south route in the City at nearly 3 miles.
- Future Canada Avenue between Jefferson Parkway and 110<sup>th</sup> Street – This future corridor will provide connectivity for local traffic between CR 81 and Jefferson Parkway.

## MINOR COLLECTORS

Astute land use planning and subdivision plat review are key to ensuring an adequate local roadway network is developed and future local street traffic issues are avoided. Minor Collector streets are designed to carry traffic to higher-level roadways. They typically do not carry trips through an area; rather they connect non-continuous local streets and provide individual property access.

One of the primary issues facing developing communities is a perception of excess traffic on “local” streets. The physical ability of these streets to carry traffic typically far exceeds the acceptable traffic levels for those property owners along the street. Minor Collector streets in residential areas should be identified during the preliminary platting process and design measures taken to provide acceptable conditions for the future owners of the adjacent lots. As a rule of thumb, one Minor Collector street connection to a Major Collector roadway is needed for each 100 housing units. For example, a developing area with a capacity of 400 homes should have at least four Minor Collector connections to the Major Collector network. If evenly distributed, these connections will ensure the Minor Collector streets will not be required to carry an unacceptable level of traffic. These Minor Collector streets should be continuous through multiple developments, but not necessarily continuous between Major Collectors. Direct, continuous Minor Collectors that connect between Major Collectors should be discouraged, as they are often used as short cuts for travelers and tend to result in traffic volume levels unacceptable to the affected neighborhoods.

### 4.1.2 ON-ROAD BIKEWAYS

The Parks, Open Space, Trail System Plan identifies on-road bikeways as including bike lanes and bike routes. A bike lane is a designated portion of the roadway defined by striping, signing, and pavement markings. A bike route is described as a shared portion of the roadway that provides some separation between motor vehicles and bicyclists. According to this plan, primary users are transportation and fitness users, provided the design standards identified in Section 2.4.2 are met. The purpose of these routes is to serve fitness and transportation bicyclists and in-line skaters, as well as recreationalists with a higher skill and comfort level being around automobiles.

Approximately 7 miles of bike lanes and 10 miles of bike routes are envisioned. Existing and future on-street bike lane routes on several existing and future roadways are identified on the map on the next page. The routes shown on the plan generally follow main arteries through the City, create an on-street loop, and connect with the trail system in multiple locations. The routes were selected to enhance bicycle-based access to local schools, public facilities, and college campuses. The plan further explains that expansion of the on-road bikeway system may be warranted over time, depending on use patterns and public demand.<sup>1</sup>

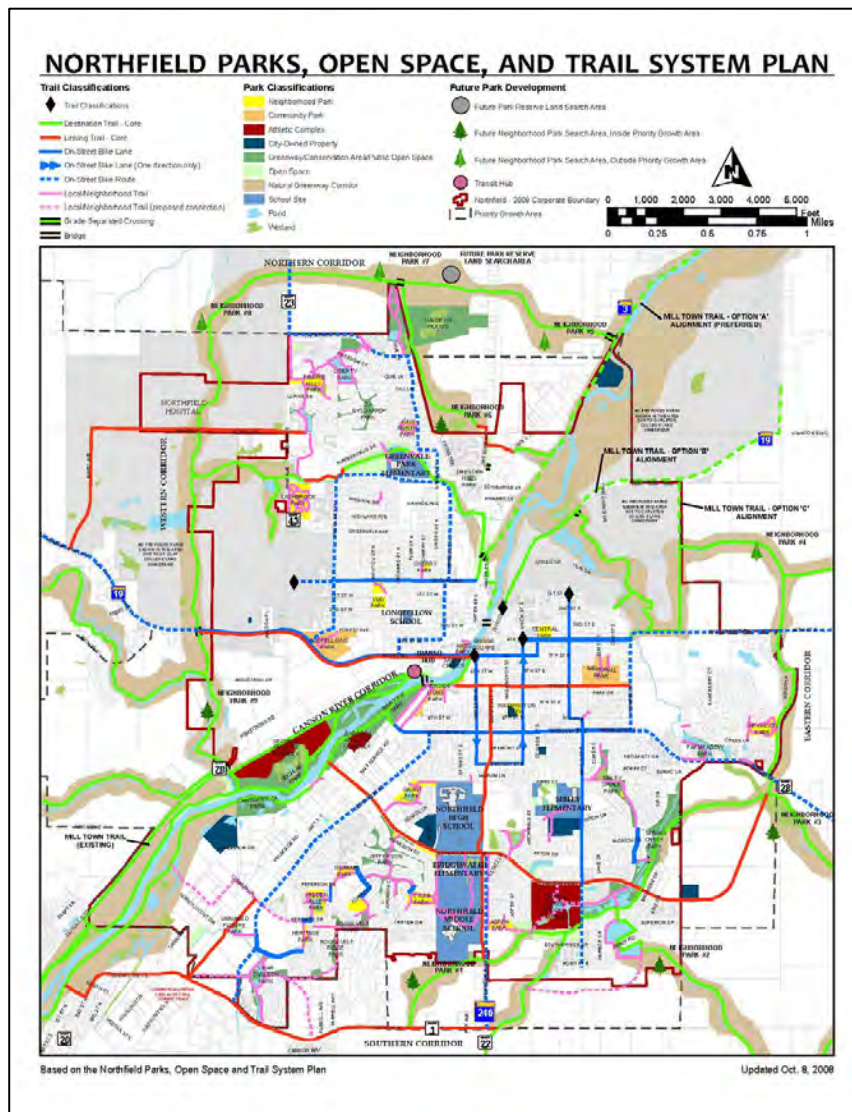
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<sup>1</sup> City of Northfield Parks, Open Space, and Trail System Plan. March 2008.

### 4.1.3 OFF-STREET TRAILS AND SIDEWALKS

In addition to the on-road bikeways described in Section 4.1.2, the Parks, Open Space, Trail System Plan describes four other types of trails, destination trails, linking trails, sidewalks, and natural trails. Planned off-street trails are illustrated on the map below. The function of these trails are as follows.

- Destination Trails – Destination trails are paved trails for walking, jogging, bicycling, and in-line skating located within a greenway, open space, park, parkway, or designated trail corridor. In Northfield, these trails will be the backbone of the greenway-based trail system that loops the City and connects to adjoin communities and college campuses. These types of trails are of moderate to high value to families, recreational, and fitness users. Transportation users also receive value, but to a lesser extent.



- Linking Trails – Linking trails emphasize safe travel for walking, jogging, bicycling, and in-line skating to/from parks and around the community. Linking trails are most often located within road rights-of-way or utility easements. In Northfield, linking trails will be primarily used as a means to connect neighborhoods and developed areas to the destination trail system, and provide safe routes to schools. They provide safe and often convenient travel for families, but recreational value diminishes as separation from traffic decreases and traffic volumes increase. If continuity is provided, they still have value to fitness and transportation users getting from one place to the next.

For a larger version of this map, please refer to the Parks, Open Space, and Trails Plan.

- Sidewalks – Sidewalks emphasize safe travel for walking and jogging within residential areas and business districts and to/from parks and around the community. Although biking and in-line skating are allowed on sidewalks, the narrower width and concrete surface limit their use for this purpose. Sidewalks are most often located within road rights-of-way of a Local Street. In Northfield, sidewalks work in concert with linking trails and are primarily used as a means to connect neighborhoods and developed areas together and to the destination trail system, as well as provide safe routes to schools. Families will use them to get to a park, a trail, or around the neighborhood, as is the case with recreational walkers. Sidewalks are generally less friendly to family bikers. Recreational bicyclists and in-line skaters will use streets to avoid sidewalks. Fitness and transportation users will use whichever is most convenient.
- Natural Trails – Nature trails are commonly used in areas where natural tread is desired and harmony with the natural environment is emphasized. Use is limited to hikers and joggers in Northfield. Natural trails will be primarily used in nature areas and as secondary connections to the destination trail system, especially within a preserved natural area or conservation easement.<sup>2</sup>

#### 4.1.4 TRANSIT SERVICES

Northfield Transit has developed a proposed concept for a transit hub/multimodal facility through the use of grant funds received from the Federal Transit Administration and a 20% local funding match provided by the City of Northfield. This hub is proposed to serve as a transit hub/transfer station, park & ride location, intercity hub, and trailhead. As of the development of this Transportation Plan, the project is proposed to be located in Laurel Court. This location is near the intersection of TH 3 and TH 19 in Northfield. The location provides connections to the Mill Towns State Trail, bike paths, and sidewalks providing interconnectivity throughout the community.<sup>3</sup> The location is also adjacent to the railroad line in Northfield, which may provide an opportunity for passenger rail service in the future. Existing and future planned transit services in Northfield are illustrated in Figure 4.1-2.

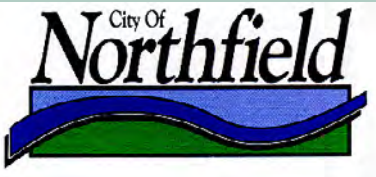
Section 3.5.8 – Rice County Transit and Section 3.5.9 – Dakota County Transit Plan Study describe study findings and potential opportunities that may be explored to enhance transit service within Northfield, as well as linking Northfield to areas outside of the City through internal to external and external to internal trips.

Building on Objective 9 – Improve Transportation Choices and Efficiency of the Land Use Section of the Draft Comprehensive Plan, the Transportation Plan recognizes that opportunities exist to improve the viability of transit service through land use planning and roadway planning initiatives. Strategies as described in the Dakota County Transit Plan to improve the ability to provide transit service may include

<sup>2</sup> See also City of Northfield Parks, Open Space, and Trail System Plan.

<sup>3</sup> City of Northfield. 2007. Northfield City Council Resolution 2007–130, December 17, 2007.





TRANSPORTATION PLAN

- Legend**
- Scheduled Stop Search Area
  - Transit Facility**
    - Scheduled Stop
    - Hub
    - Park & Ride Lot
    - Jefferson Lines Connection
  - Functional Classification**
    - Minor Arterial
    - Proposed Minor Arterial
    - Major Collector
    - Proposed Major Collector
    - Minor Collector
    - Proposed Minor Collector
    - Urban Expansion Area
    - Wetlands
    - Lakes
    - Roads
    - Parcels
    - City Limits
    - Township Boundaries
    - County Boundary

**Note:**  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

**Note:**  
Existing Scheduled Pick Up/Drop Off Service Location During College School Year

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd.



0 2,500 Feet

Existing & Future Transit Services

Figure 4.1-2

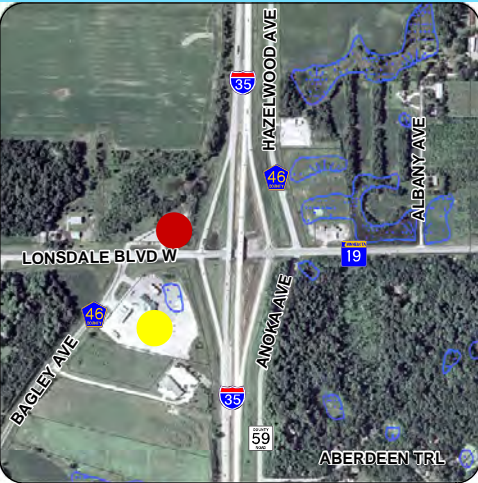
2008



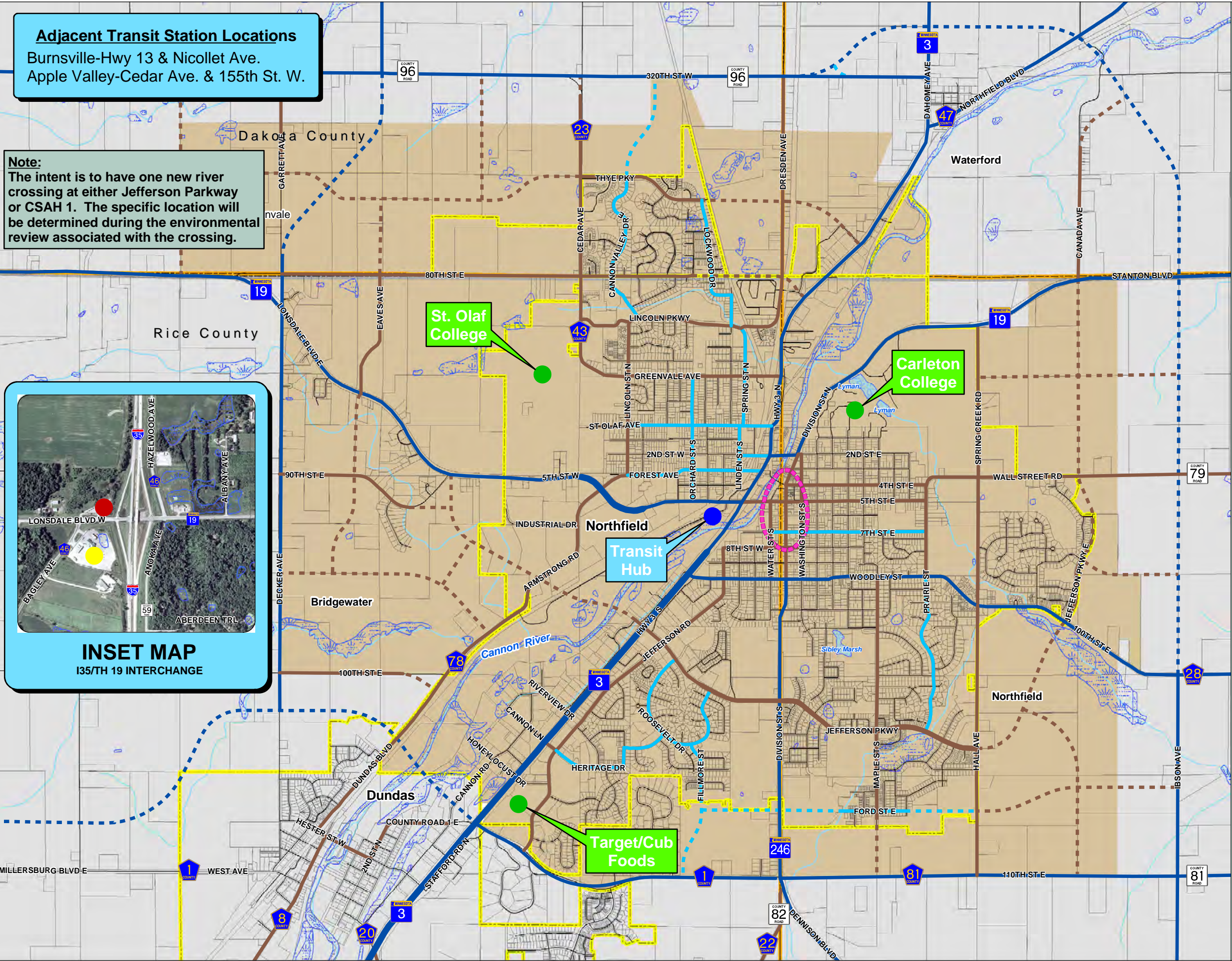
Adjacent Transit Station Locations

Burnsville-Hwy 13 & Nicollet Ave.  
Apple Valley-Cedar Ave. & 155th St. W.

**Note:**  
The intent is to have one new river crossing at either Jefferson Parkway or CSAH 1. The specific location will be determined during the environmental review associated with the crossing.



INSET MAP  
135/TH 19 INTERCHANGE





- Road-grid networks that allow for barrier-free transit access to, within, and through the development to ultimately enable the local transit agency to provide more efficient service
- Allow compact, vibrant, mixed-use development where transit and walking, rather than the automobile, are accommodated as primary modes of transportation
- Require development, through zoning, to be the most design and density intensive near transit stops or along established transit priority corridors. Such developments should include interconnected pedestrian/bikeway pathways that lead to interesting and varied first-floor uses. Specifically addressing residential developments, the Federal Transit Administration calls for density to be at least seven units per acre to support bus service every thirty minutes. At about thirty units per acre, bus service at every ten minutes becomes sustainable.
- Residential development should include pedestrian/bikeway pathways that are maintained year-round, are illuminated at night and visible from commercial and residential areas for safety and security

In the case of commercial, office, and governmental projects, the City of Northfield may require developments to support existing and future transit service by

- Ensuring that all roadway geometrics, such as turning radii, pavement depths, and road widths, accommodate the range of transit vehicles in operating service
- Locating transit stops/shelters or waiting areas near facility entrances that shelter transit users from heat, cold, and precipitation
- Providing passenger amenities such as lighting, benches, bicycle facilities, and attractive landscaping that buffer pedestrians from fast-moving traffic
- Linking developments from “door to door” with pedestrian/bikeway pathways
- Requiring automobile parking to be located in rear or side yards <sup>4</sup>

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<sup>4</sup> Draft Dakota County Transit Plan, <http://www.co.dakota.mn.us/EnvironmentRoads/Transit/PublicTransportation/Welcome.htm>. Retrieved on June 9, 2008.

## 4.2 FORECASTED TRAFFIC VOLUMES

Average annual daily traffic volumes were forecasted for Major Collector and Minor Arterial roadways for the year 2030 using industry accepted modeling methodology. As growth continues in the Northfield area, these travel demand forecasts serve as a basis to understand anticipated capacity and safety challenges, as well as pavement management needs.

### 4.2.1 TRAFFIC MODELING APPROACH

Travel Demand Forecasting is a process of estimating the future use of a transportation facility based on existing use and anticipated changes. The transportation modes that utilize the system may include passenger vehicles, trucks, transit, rail, and/or non-motorized transportation including, biking and walking. The anticipated changes that may impact the transportation system include changes in land use, transit service, transit or parking costs, roadway connections, and/or roadway capacity.

For the City of Northfield, the forecasts were developed using a forecasting model. The model used was based on the Collar-County Travel Demand Model developed by Mn/DOT. This Collar County model is based off the Metropolitan Council Travel Demand Model for the seven-county metropolitan area.

The Metropolitan Area Model is primarily used to develop transportation forecasts within the seven-county metropolitan area on roadways that had over 1,000 vehicles per day in the year 2000. While the Metropolitan Area Model provides accurate forecasts for the seven-county metropolitan area, it does not provide as much accuracy for adjacent counties.

The Collar County Model is primarily used to develop traffic projections on state highways for the 13 collar counties located outside of the seven-county metropolitan area. The Collar County Model expands the seven-county Metropolitan Area Model to include more accurate traffic and travel forecasts for the surrounding counties, including Rice County, while sacrificing accuracy within the seven-county metropolitan area.

The models provide a systematic procedure for forecasting volumes and take into account the projected changes in regional land use, socioeconomic data, and the regional transportation network. Both of the models reflect the regional pull of traffic to the Twin Cities Metropolitan Area. The transportation network in the models is composed of roadways, transitways, and passenger railways. Since Northfield is at the border of both the Metropolitan Area and Collar-County Models, the Collar-County Model was adapted and calibrated for Northfield itself, while ensuring accuracy into Dakota County to reflect travel patterns by traffic to and from Northfield and Rice County.

#### 4.2.1.1 FORECASTING PROCESS

Development of the models followed the standard four-step Urban Transportation Planning (UTP) modeling procedure. This procedure includes trip generation, trip distribution, mode choice, and route assignment.

Trip Generation is the process to develop the number of trips that will be coming into and out of a zone. The process uses income, household size, household location, vehicle availability, employment type, employment location, number of employees, travel times, and travel distance to develop the productions and attractions for use in trip distribution. These productions and attractions are also referred to as person trip ends. A person trip is a one-way journey between two addresses by one person. A trip end is the start point (production) and end point (attraction) of each trip. Consequently, one trip results in at least two trip ends.

Trip Distribution is the process to determine where a trip starts and where it ends. The process uses person trip productions, person trip attractions, travel times, travel costs, and scales of development activity to develop the trips and estimate where the trips will start and where trips will end. Where there is a higher activity of employment, more trips will be destined there. This is readily evident within the Twin Cities by looking at such examples as downtown Minneapolis or the I-494 corridor. This is also true when looking at residential development. There is a higher activity of trip productions in highly residential areas.

Mode Choice is the process of determining which mode of travel will be used to get from one point to another. The process uses distributed person trips, travel times, travel costs, income, auto ownership, and parking costs to develop estimates of which trips will use which mode. The modes include single occupant vehicle (SOV), high occupancy vehicle (HOV), transit, walk, and bike.

Route Assignment is the process of determining which routes people will use to get from one point to another. The process uses travel times and travel costs to develop assignments of SOV and HOV trips to road segments and transit trips to transit route segments. Walk and bike trips are assigned from one zone to another, but are not assigned to actual routes.

#### 4.2.1.2 BASE MODEL

The year 2000 model is the base model for traffic forecasting and evaluation. The Collar County and Metropolitan Area models are based off of collected data from the year 2000 Census, the 2000 Travel Behavior Inventory (TBI), and year 2000 employment information. This data was collected by Mn/DOT and the Metropolitan Council to develop the parameters used in the models.

#### CENSUS INFORMATION

The year 2000 Census information is available from the U.S. Census Bureau. The year 2000 Census provides a collection of data for all areas of the country based on

smaller zones (traffic analysis zones - TAZs). Within each zone are the number of households, the population, and the average income for the people living in the zone, in addition to ethnicity and many other factors. Further detailed data was also collected by the Census Bureau on a more limited basis such as income, place of work, journey to work, and vehicle availability.

#### TRAVEL BEHAVIOR INVENTORY

The year 2000 TBI was completed by the Metropolitan Council and is the most recent travel survey of the region. It included a home interview survey (HIS), external station traffic counts, an external station origin/destination survey, and a highway speed survey. The HIS collected information to measure person trips by motorized and non-motorized means (e.g. walking and bicycling) within the seven-county metropolitan area and within the 13 counties in Minnesota and Wisconsin that surround the seven-county area. The scope of the HIS involved the collection of 24-hour weekday travel characteristics and socioeconomic data from a sample of households in the study area. The data is primarily used for validation and/or recalibration of regional trip-generation, trip-distribution, and mode-choice models and the trip-assignment process. Data from the HIS are specifically used to describe the relationships between demographics and travel behavior.<sup>5</sup>

The 2000 TBI collected data from multiple surveys sent to individuals. It helped to determine traffic behavior and helped determine how people tend to travel within this area of Minnesota and where they do their shopping or where they work based on travel length and travel time. As traffic increases and travel times increase, people may find alternate routes, alternate modes of travel, or alternate locations to work or shop. Additionally, data on travel modes was collected including transit use, walking use and distances traveled, and other non-motorized travel uses and distances traveled.

Additional data was collected by Bolton & Menk to verify and expand the model for use by the City of Northfield. Traffic counts and roadway attributes (including roadway connections, traffic control, capacity, speed, and functional classification) were collected in the study area for the purpose of developing and validating the model.

Historical and current year traffic count data in the study area was collected from Mn/DOT and available traffic counts from Rice and Dakota Counties. This information included peak hour, as well as average daily traffic volumes. The model highway network was reviewed in detail for conformity to current conditions. This included a check of current roadway functional classification, speed limits, number of through lanes, and roadway capacity. This check was completed for Northfield and the area influencing the City of Northfield.

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<sup>5</sup> 2000 Travel Behavior Inventory, Metropolitan Council. August 2003.

#### 4.2.1.3 SOCIOECONOMIC DATA

The socioeconomic data outlines the existing and forecasted population, households, and employees within the City. This information helps to determine where people will travel to work or shopping based on the density of those uses within and outside of the City of Northfield.

##### BASE YEAR DATA

The year 2000 Census data was collected from the U.S. Census Bureau, while employment information for year 2000 was estimated by City staff to identify the trip attractions within the City. For areas outside of Northfield, the base socioeconomic data in the 2000 Collar-County Model was used.

##### FUTURE YEAR DATA

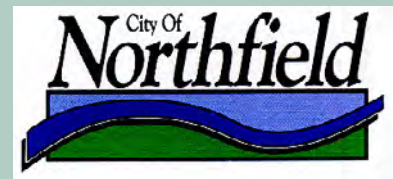
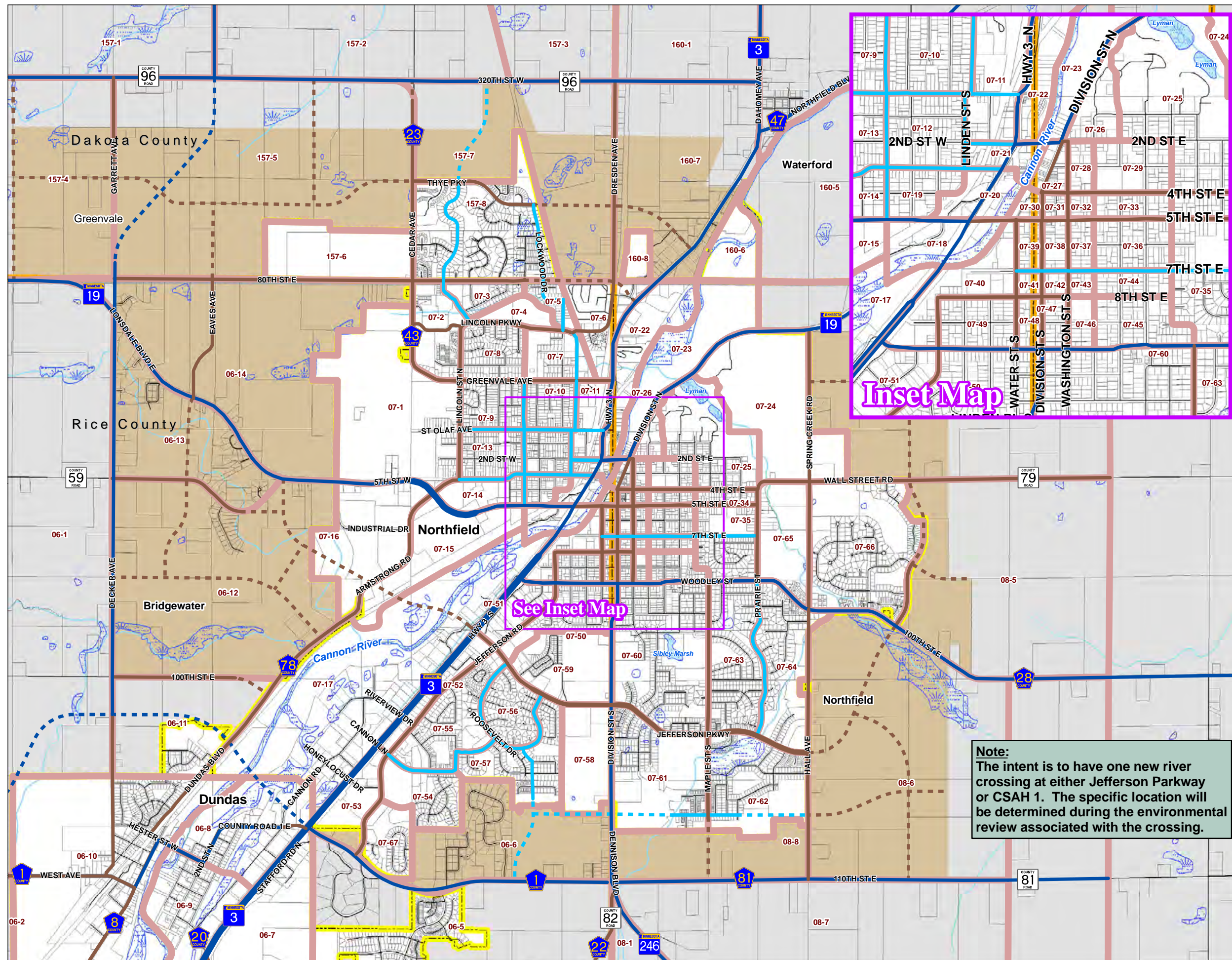
Land use data for year 2030 was received from the City of Northfield based on the future land use vision within the urban growth boundary identified in Map 4.5 – Framework and Pattern Map of the Land Use Section of the Draft Land Use Plan. The projected population, households, and employment data was aggregated into the TAZs as illustrated in Figure 4.2-1 for the 2030 traffic modeling scenario. For areas outside of Northfield, the base socioeconomic data in the 2030 Collar-County Model was used. Year 2000 and 2030 socioeconomic information by TAZ is displayed in Appendix E – Transportation Analysis Zone Forecasts.

#### 4.2.1.4 TRANSPORTATION ANALYSIS ZONES (TAZs)

The land area within the model is broken up into smaller zones, much like the Census data. These zones are designated TAZs in the model, but they provide the same information as the U.S. Census Traffic Analysis Zones. The collected socioeconomic information including population, households, and employment is assigned to these individual TAZs. The TAZs provide the trip ends that are used in the model process. The boundary of a TAZ is primarily based on the different land features that are located within the model study area. These features include roadways, land use data, and land features such as wetlands, waterways, bluffs, or railroads. The TAZ boundaries are illustrated in Figure 4.2-1. The original TAZs within the Collar County model were split into smaller zones for the Northfield model. This allows for forecasting traffic projections onto additional roadways other than those that are included within the Collar County model.

The TAZs for the City of Northfield are based on the Census blocks, land use, existing and future roadway network, and land features, including railroads and waterways. The zones identify how and where trips enter and exit from the roadway network. The center of a zone is defined as a centroid and how the zone connects to the roadway network is defined as a centroid connector. The zones include both the productions (households) and the attractions (employment).





## TRANSPORTATION PLAN

### Legend

Transportation Analysis Zones

### Functional Classification

- Minor Arterial
- Proposed Minor Arterial
- Major Collector
- Proposed Major Collector
- Minor Collector
- Proposed Minor Collector
- Urban Expansion Area
- Wetlands
- Lakes
- Roads
- Parcels
- City Limits
- Township Boundaries
- County Boundary

**Note:**  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, Metropolitan Council-8/10/07, MnDOT-10/19/07



0 2,500 Feet

**Note:**  
The intent is to have one new river crossing at either Jefferson Parkway or CSAH 1. The specific location will be determined during the environmental review associated with the crossing.

Transportation  
Analysis Zones

Figure 4.2-1

2008





#### 4.2.1.5 MODEL ADJUSTMENTS

Changes to the Collar County model were completed to provide specific transportation forecasts for the City of Northfield. County and other major local roadways were added to the roadway network. These include roads designated as Major Collectors and above within the City of Northfield (and some important Minor Collectors and Local roadways) and other important County Highways located outside of Northfield that traffic from the City uses to travel from one destination to another. The roadways were populated with the appropriate attributes based on regional model documentation to be consistent with the regional model parameters.

Because of the “regional” nature of the model, the roadways are categorized into a select number of functional classifications. Thus, roadways that have minor differences may have the same functional classification within the model. Some roadways in the study area were refined to reflect these minor differences. Specifically, Local and Minor Collector roadways were defined as collectors, but were adjusted with a lower capacity and speed than a typical Major Collector.

The Collar County Model was originally built with larger TAZs around Northfield. In total there were five zones for the area that included Northfield, Dundas, Northfield Township, and Bridgewater Township. These areas were broken down into approximately 100 smaller zones for the Northfield Model to provide more detailed output of the model at the city level. The socioeconomic information was distributed to each new TAZ based on information from the U.S. Census blocks, aerial photos, ground observations, and City staff input.

Model parameters were initially adjusted to take into account the non-motorized vehicle mode use in the City of Northfield. Non-Motorized mode data was collected for the City of Northfield and other cities within the Collar County and Metropolitan Area models. The differences in use of modes and percentage of users utilizing bike or walking was taken into consideration by adjusting model parameters to account for the larger percentage of non-motorized use in Northfield, as compared to the rest of the regional and collar county area.

The following table illustrates the increased use of non-motorized transportation modes within the City of Northfield compared to other cities in the region and the country for work based trips.



TABLE 4.2.1-1 – COMPARISON OF NON-MOTORIZED TRANSPORTATION MODES BY CITY

City/Area	Walk	Bike	Drive Alone	Carpool	Transit
Northfield, MN	28.5%	1.6%	58.6%	11.3%	0.0%
Faribault, MN	2.1%	1.1%	81.6%	15.3%	0.0%
Minneapolis, MN	6.3%	2.6%	64.9%	11.5%	14.7%
Saint Peter, MN	22.9%	0.0%	68.2%	8.9%	0.0%
Mankato, MN	8.9%	0.0%	78.1%	10.9%	2.1%
Winona, MN	11.0%	2.1%	78.5%	8.4%	0.0%
Hopkins, MN	3.1%	0.0%	79.6%	11.5%	5.8%
Saint Cloud, MN	5.2%	0.0%	81.2%	11.0%	2.6%
Red Wing, MN	4.1%	0.0%	83.9%	10.4%	1.6%
Belle Plaine, MN	3.7%	0.0%	85.3%	11.1%	0.0%
Hastings, MN	2.6%	0.0%	86.5%	10.9%	0.0%
Lakeville, MN	0.0%	0.0%	87.8%	10.6%	1.6%
Eden Prairie, MN	1.1%	0.0%	88.9%	7.4%	2.6%
Madison, WI	11.2%	1.6%	70.2%	10.1%	6.9%
Davis, CA	4.2%	15.8%	63.7%	9.5%	6.8%
Boulder, CO	9.7%	7.5%	64.0%	9.7%	9.1%
Portland, OR	5.9%	1.6%	67.6%	12.8%	12.2%

Source: City-Data.com. The percentages given depend of the number of respondents and may not be 100% accurate.

To account for the large percentage of non-motorized travel modes within Northfield for work trips (28.5% walk, 1.5% bike, 70% drive), the initial model parameters for the use of the transportation modes was adjusted from the default values within the Collar-County Model (0.5% walk, 0.5% bike, 99% drive).

#### 4.2.1.6 BASE MODEL VALIDATION

The Northfield model was applied for the base year to validate its projections against the observed traffic count information. The assigned volumes, peak hour factors, and distribution factors from the 2000 model were compared to the collected 2000 traffic counts. The model was also validated using the 2001 to 2006 traffic count data, aerial photos, and field observations. Adjustments were made to regional model parameters, centroid locations, and additional centroid connectors were added to help smooth volumes along individual roadways and more closely match ground counts. The parameters were adjusted multiple times to more accurately reflect the real-world traffic conditions in Northfield for year 2000. These parameters were then carried through to the 2030 Model.

#### 4.2.1.7 FUTURE YEAR MODEL

The future year model used the adjusted base model parameters to establish a no-build scenario. New roadways were added to provide additional connections throughout the City and planned improvements to existing roadways were included. Additionally, functional classifications, speeds, and capacities were adjusted based on the expected future roadway attributes. These improvements and new roadways provided the anticipated future roadway network to handle anticipated City growth. Anticipated improvements to the existing roadway system included the widening of TH 19 to a four-lane divided facility and the addition of the northwest corridor.

The model for the forecast year (2030) was run, taking into account the anticipated regional network changes, changes in socioeconomic data, and the adjustments made to the 2000 model run, to generate the projected volumes.

#### 4.2.1.8 REVIEW OF FORECASTS

The traffic forecasts were reviewed for reasonableness. As with any travel demand model, it would be inappropriate to rely solely on direct model output for design volumes. The modeled volumes were reviewed and adjusted based on existing and historic travel patterns and also through some additional selected link analysis of the model output. A series of selected link assignments were performed and the model estimated volumes were adjusted to more accurately reflect the existing and future traffic patterns within the study area. The checks for reasonableness on the projected volumes follow the procedures as outlined in the Mn/DOT Metro Model Output Checks for Reasonableness and Post Processing Adjustments (Revised 5 January, 2006). These include

- Peak Hour Percentage of Daily Traffic – peak hour percentages of daily traffic produced by the model for the forecast year were compared to existing/observed peak hour percentages within the project limits and on other routes nearby with the same functional classification

- Directional Split of Peak Hour Traffic – directional splits of peak hour traffic forecasts produced by the model for the forecast year were compared to existing/observed directional splits within the project limits and on other routes nearby with the same functional classification
- Capacity of Road Segments beyond Limits of Project – peak hour traffic forecast volumes assigned to road segments beyond the limits of the study area were studied to determine if the projected growth from the area affects the capacities of those road segments; on roadways outside of the study area with volume to capacity ratios over 1.00, the model results were compared to the regional model results from Metropolitan Council and Mn/DOT
- Daily Traffic Growth Factors – daily traffic forecasts from the model on the state roadways were compared with the historical daily volumes and with the regional model results from Metropolitan Council and Mn/DOT

#### 4.2.1.9 POST PROCESSING

The post-processing of the projected volumes follow some of the procedures as outlined in the Mn/DOT Metro Model Output Checks for Reasonableness and Post Processing Adjustments (Revised 5 January, 2006). The post processing includes

- Traffic forecast volumes were rounded to the closest 10 if less than 1,000 or to the nearest 100 if more than 1,000
- All products depicting the forecast numbers (maps, tables, layouts, etc.) contain a very visible caution that the forecast numbers depicted have a likely confidence range of plus or minus 15 percent
- Traffic smoothing and corridor diversion adjustments were accomplished using the procedures described in Chapter 9 of NCHRP Report 365, “Travel Estimation Techniques for Urban Planning”

#### 4.2.1.10 FUTURE MODEL ADJUSTMENTS

The travel demand model and post processing within the Northfield Transportation Plan provides an accurate level of forecasting to 2030. As the model is further refined in the future, model modifications are advised. The Northfield model is similar to the regional model in that the number of college students is allocated to the TAZs along with any Census population. While this may be accurate for colleges where a large number of students live off campus, St. Olaf and Carleton Colleges behave similarly to the University of Minnesota in relationship to determination of trips. This was accounted for during post processing of the model. Future modeling efforts should refine the socioeconomic data within the college TAZs. This would provide more consistent modeling results with how students actually travel to and from campus.

#### 4.2.2 FORECASTED TRAFFIC VOLUME RESULTS

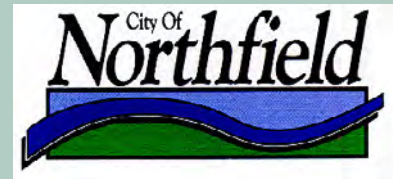
Based on the travel demand modeling approach described in Section 4.2.1., average annual daily traffic volumes were forecasted for Major Collector, Minor Arterial, and Principal Arterial roadways. The three travel demand scenarios evaluated and the figures displaying the 2030 forecasted traffic volumes results are as follows

- No new Cannon River bridge – Figure 4.2-2
- A new bridge at Jefferson Parkway – Figure 4.2-3
- A new bridge at a realigned CSAH 1 – Figure 4.2-4

The purpose of analyzing these three scenarios was to understand the differences in accommodating the motorized vehicle needs of northeast Rice County between the two bridge options identified in the CSAH 1 Corridor Preservation Study (see also Section 3.5.4), as well as the traffic implications of doing nothing. The figures display the differences in traffic volumes with each option and display how traffic disperses through the City based on preferred route, congestion, the new routes, and areas of development. The forecasted traffic volumes will serve as the basis for the City of Northfield to make decisions on roadway design features to accommodate long-term planned growth. Following is an overview of the findings overall and relating to differences between the scenarios

- There are minimal differences in forecasted 2030 traffic volumes between the CSAH 1 and Jefferson Parkway bridge options.
- The preferred route to/from the west, including I-35, is TH 19. Congestion on TH 19, even with the planned expansion of 19 to 4-lanes, shows the need for alternate routes from downtown Northfield to/from the west.
- The Northwest Corridor diverts traffic from CSAH 23/43, west of Lincoln Street and Greenvale Avenue.
- The extension of North Avenue to TH 3 provides an important alternate route for east-west traffic on the north side of the City.
- The three east-west routes of North Avenue, Lincoln Parkway, and Greenvale Avenue carry approximately the same volume of traffic. This is because they serve primarily local traffic, eliminating the need for traffic to be funneled to fewer Major Collector roadways. Thye Parkway carries less due to its location further north, closer to the fringe of planned growth in 2030. Without multiple east-west routes providing mobility consistent with the Major Collector design standards outlined in Section 2.4, the other routes will be fully congested.





## TRANSPORTATION PLAN

### NO BRIDGE

#### Legend

XXXX 2030 Forecasted Average Daily Traffic Volume

#### Volume To Capacity

- Periodically Congested V/C=0.50 - 0.75
- Near Congested V/C=0.75 - 1.00
- Congested V/C>1.00

#### Functional Classification

- Minor Arterial
- Proposed Minor Arterial
- Major Collector
- Proposed Major Collector
- Minor Collector
- Proposed Minor Collector
- Urban Expansion Area
- Wetlands
- Lakes
- Roads
- Parcels
- City Limits
- Township Boundaries
- County Boundary

Note:  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd., MnDOT Metropolitan Council

Traffic Forecast Volumes Rounded To:  
Nearest 10 If < 1000  
Nearest 100 If > 1000  
Forecast Volumes Have A Likely Confidence Range Of ±15%

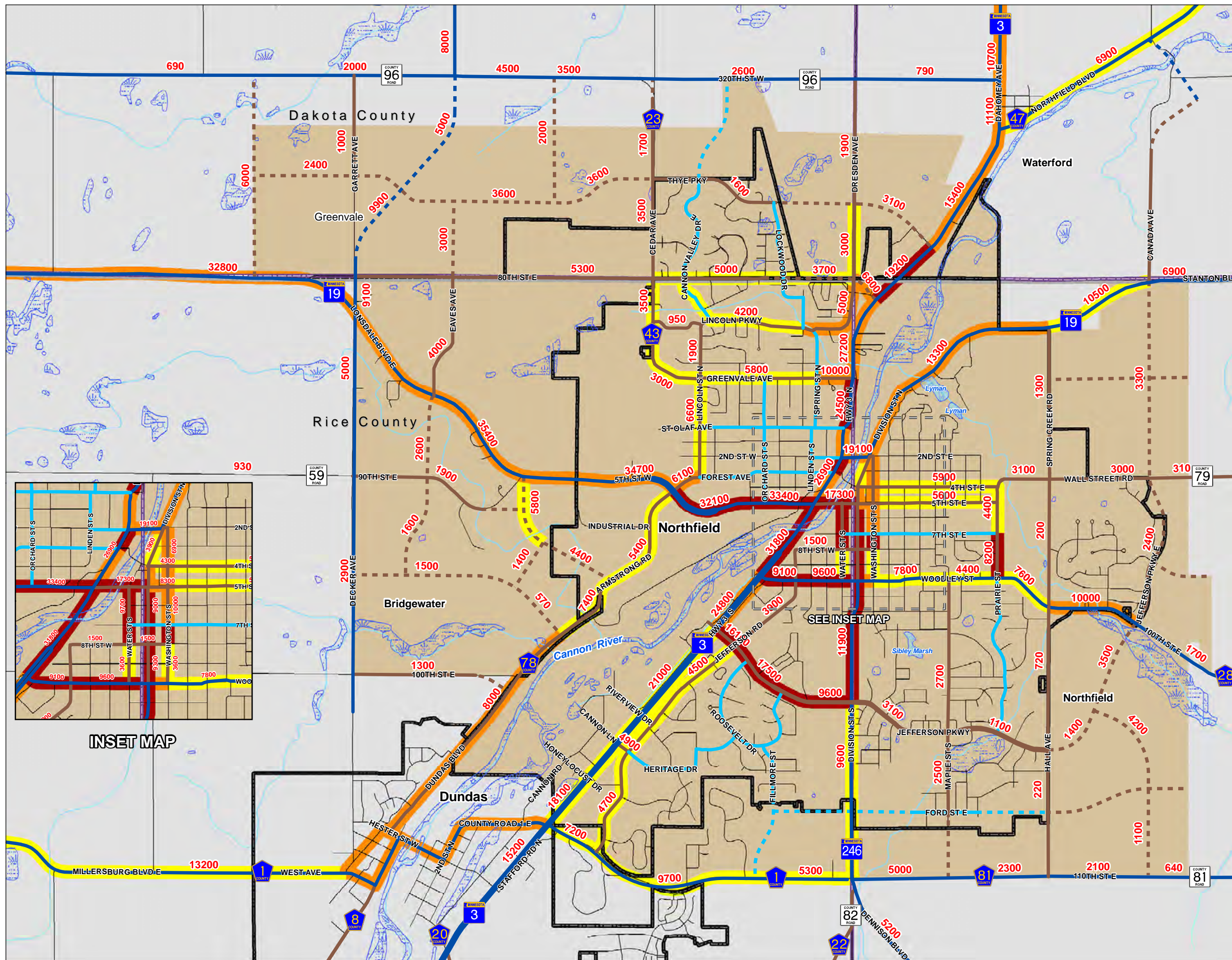


0 2,500 Feet

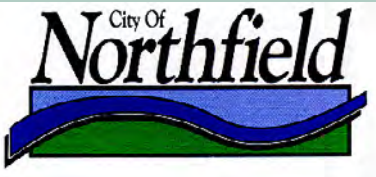
## 2030 Volume And Congestion

### Figure 4.2-2

2008







TRANSPORTATION PLAN

JEFFERSON PARKWAY BRIDGE

Legend

XXXX 2030 Forecasted Average Daily Traffic Volume

Volume To Capacity

- Periodically Congested V/C=0.50 - 0.75
- Near Congested V/C=0.75 - 1.00
- Congested V/C>1.00

Functional Classification

- Minor Arterial
- Proposed Minor Arterial
- Major Collector
- Proposed Major Collector
- Minor Collector
- Proposed Minor Collector
- Urban Expansion Area
- Wetlands
- Lakes
- Roads
- Parcels
- City Limits
- Township Boundaries
- County Boundary

Note:  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd., MnDOT Metropolitan Council

Traffic Forecast Volumes Rounded To:  
Nearest 10 If < 1000  
Nearest 100 If > 1000  
Forecast Volumes Have A Likely Confidence Range Of ±15%

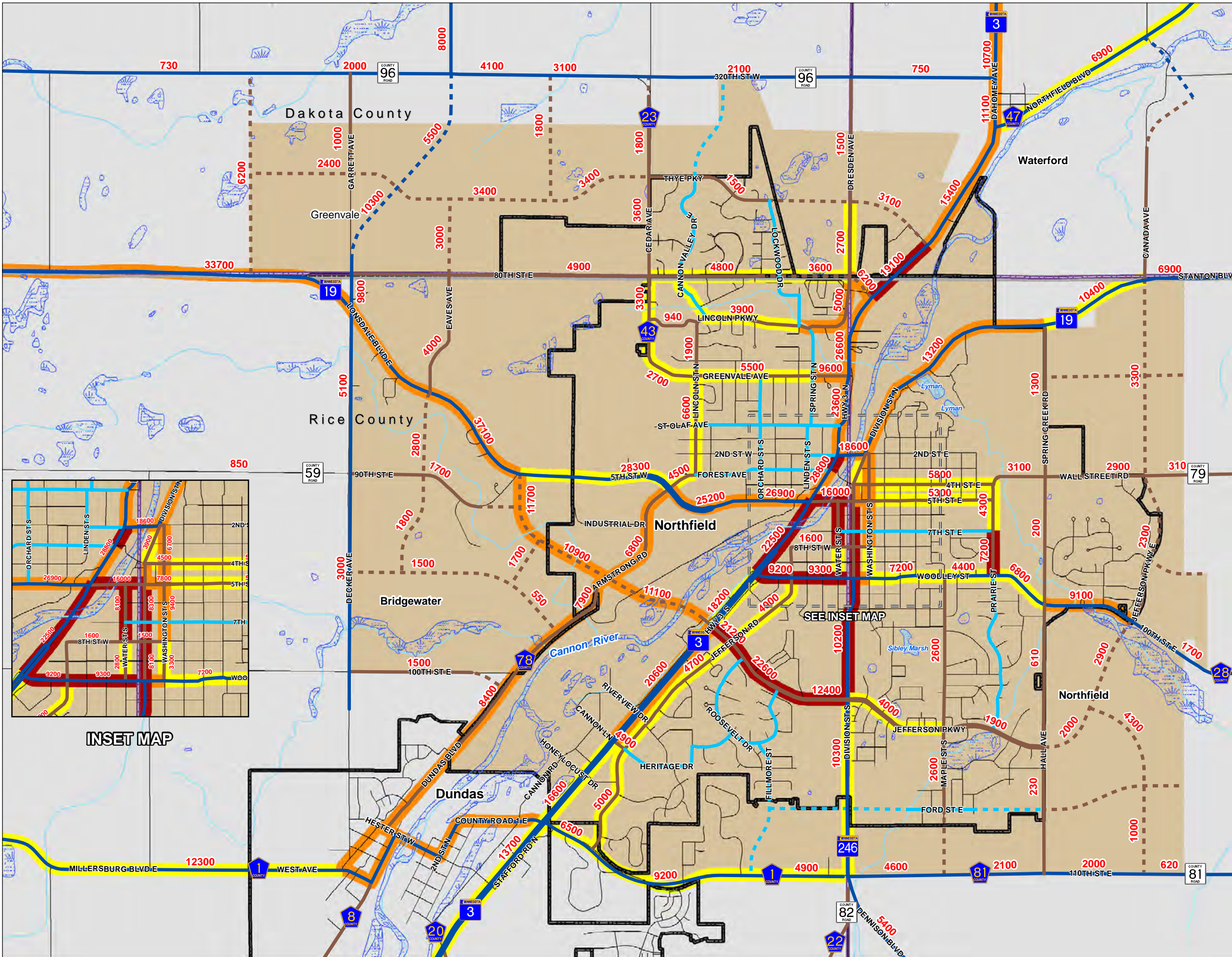


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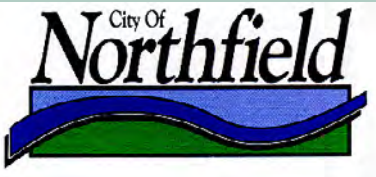
2030 Volume And Congestion

Figure 4.2-3

2008







TRANSPORTATION PLAN

CSAH 1 BRIDGE

Legend

XXXX 2030 Forecasted Average Daily Traffic Volume

Volume To Capacity

- Periodically Congested V/C=0.50 - 0.75
- Near Congested V/C=0.75 - 1.00
- Congested V/C>1.00

Functional Classification

- Minor Arterial
- Proposed Minor Arterial
- Major Collector
- Proposed Major Collector
- Minor Collector
- Proposed Minor Collector
- Urban Expansion Area
- Wetlands
- Lakes
- Roads
- Parcels
- City Limits
- Township Boundaries
- County Boundary

Note:  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd., MnDOT Metropolitan Council

Traffic Forecast Volumes Rounded To:  
Nearest 10 If < 1000  
Nearest 100 If > 1000  
Forecast Volumes Have A Likely Confidence Range Of ±15%

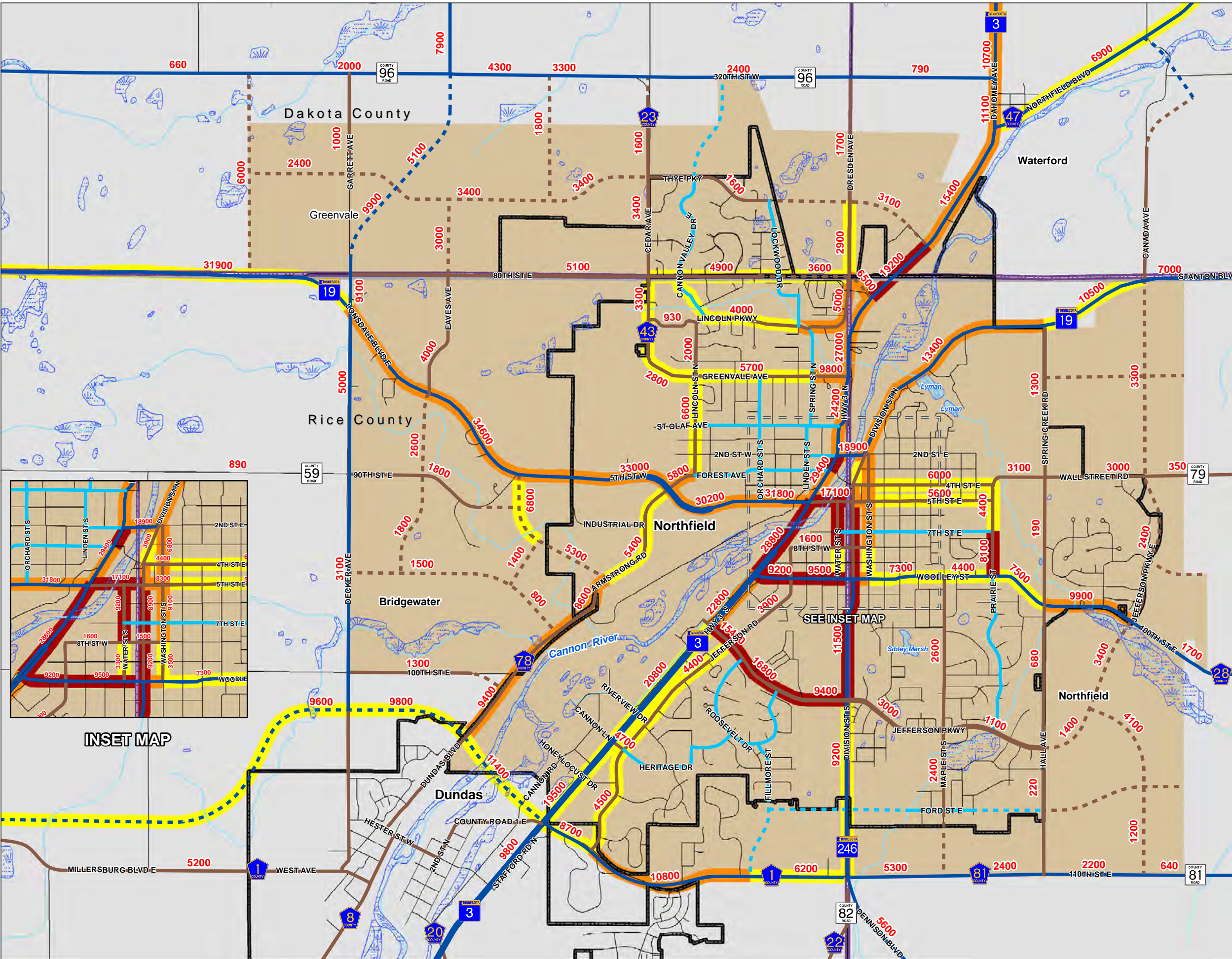


0 2,500 Feet

2030 Volume And Congestion

Figure 4.2-4

2008





- To avoid congestion on TH 3, including the intersection of TH 19 and 5<sup>th</sup> Street, traffic is forecasted to use the route of Greenvale Avenue to Lincoln Street to Forest Avenue to Armstrong Road to move between TH 3 and TH 19 and the southwest area of the City.
- Jefferson Parkway is forecasted to become very congested between TH 3 and TH 246 (Division Street) under all scenarios. If a bridge is constructed across the Cannon River at Jefferson Parkway, this segment is anticipated to have even higher congestion levels. With no mobility improvements to Jefferson Parkway, traffic is forecasted to divert along Division Street to Woodley Street and CSAH 1.

#### 4.2.3 ROADWAY SAFETY & CAPACITY NEEDS

The forecasted peak hour travel demands approach or exceed daily capacities on several corridors. Generally, the recommended Geometric Design Standards and associated right-of-way width requirements illustrated in Section 2.4 will provide sufficient capacity to accommodate the forecasted traffic volumes on the City's roadways; however, in certain locations a 4-lane corridor will be necessary. Table 2.4.4-1 – Roadway Types and Capacities identifies various roadway types and the daily capacities that the given roadway can accommodate. This information is a helpful guide to understand how much traffic a given roadway can accommodate on a daily basis. It does not, however, give a good indication as to how much traffic a given roadway can accommodate during the busiest travel periods of the day. Generally, the peak hours of travel are from 7:00-8:00 during the AM and from 5:30-6:30 during the PM. Detailed corridor and intersection analysis is needed to identify the roadway or intersection improvements necessary to provide reasonable mobility during the busiest travel periods of the day.

Figures 4.2-2, 4.2-3, and 4.2-4 identify the existing roadway segments where capacity improvements will be needed to accommodate the future traffic volumes forecasted during the peak hours. The tables found in Appendix D further describe historical and 2030 traffic volumes and capacities for each of the scenarios. Capacity improvements are recommended on any roadway with a future level of service of D, E, or F, as defined in Section 2.4.4. Roadways identified as near congested (having a volume to capacity ratio between 0.75 and 1) or congested (having a volume to capacity ratio greater than 1) are recommended to be monitored and programmed for capacity improvements when necessary. Roadways that are periodically congested (having a volume to capacity ratio between 0.5 and 0.75) are generally identified as providing an acceptable level of service. The development of the future roadway network illustrated in Figure 4.1-1 is necessary to provide alternatives to the routes recommended for capacity improvements. Corridors within the no bridge scenario recommended for capacity improvements and associated improvement strategies are summarized for several roadways with a volume to capacity ratio over 0.5.

## STATE ROADWAYS

*TH 3* north of CSAH 1 to Jefferson Parkway is forecasted to be periodically congested. The rest of *TH 3* in Northfield to north of CR 96 is forecasted to include segments that vary between near congested and congested levels. Challenges exist for making significant improvements to *TH 3* between Jefferson Parkway and 2<sup>nd</sup> Street due to the proximity of the Cannon River and adjacent land uses. Additional difficulties with expanding capacity along the corridor relate to the ability to improve the capacity of intersections along the corridor.



*The proximity of the Cannon River and adjacent land uses present challenges for improving mobility along TH 3.*

Together, these challenges on *TH 3* contribute to congestion on roadways that intersect with *TH 3*, such as Greenvale Avenue. While Greenvale Avenue could be improved to provide additional capacity between Spring Street and *TH 3*, the value added to Greenvale Avenue may be minimal if capacity isn't improved on *TH 3*. A comprehensive, detailed operational analysis study would be necessary between Jefferson Parkway and 2<sup>nd</sup> Street to evaluate improvement operations to *TH 3*. North of 2<sup>nd</sup> Street to Fremouw Avenue, it may be possible to expand *TH 3* to a 4-lane divided roadway. This study would need to consider how these improvements would impact the corridor south of 2<sup>nd</sup> Street.

Evaluating improvements to the *TH 3*/*TH 19*/5<sup>th</sup> Street intersection to include additional turn lanes and an additional through lane on *TH 19*/5<sup>th</sup> Street would help improve mobility on *TH 3*. The 5<sup>th</sup> Street bridge would need to be reviewed to determine if a solution could be implemented without replacing the bridge.

*TH 19* West of *TH 3* is forecasted to be congested from *TH 3* west to CSAH 78/Armstrong Road, and near congested west to I-35 with the future 4-lane divided highway improvements planned to occur after 2015. The intersection improvement noted above in the *TH 3* discussion would also help improve mobility of *TH 19*. Construction of an additional Cannon River crossing would also improve congestion on this corridor.

*TH 19* East of *TH 3* is forecasted to be near congested from *TH 3* to Spring Creek Road. On the 2<sup>nd</sup> Street alignment, contributors to congestion include the intersection with *TH 3*, width of the bridge across the Cannon River, and proximity of the Division Street and Washington Street intersections. A new configuration of the 2<sup>nd</sup> Street, Division Street, and Washington Street intersection may help mobility on the corridor.

TH 246 north of Jefferson Parkway along Division Street and west on Woodley Street to TH 3 is forecasted to be congested. South of Jefferson Parkway, the corridor is forecasted to be periodically congested to CSAH 1. It provides access to destinations in downtown Northfield. TH 246 and CSAH 1 are being used to avoid congestion on Jefferson Parkway west of Division Street. There is limited expansion potential north of Jefferson Parkway and on Woodley Street west of Division Street without significant impacts to adjacent land uses due to limited right-of-way and the proximity of structures to the street. Expansion and improved capacity of Jefferson Parkway would reduce congestion on TH 246.

#### COUNTY ROADWAYS

Most County roadways in the Northfield area are forecasted to be periodically congested or near congested during the peak travel hours as development increases and travelers seek alternative routes to access downtown Northfield or avoid TH 3 and TH 19. The City will need to work with Rice and Dakota Counties to preserve right-of-way, review and monitor traffic volumes and intersection operations, obtain additional right-of-way, as well as stage and fund improvement strategies that will become necessary as development occurs. Following is an overview of the levels of congestion forecasted for County roadways.

- The *Northwest Corridor* between TH 19 and 80<sup>th</sup> Street and north of CR 96 is anticipated to be periodically congested if designed with a two-lane roadway. The segment between 80<sup>th</sup> Street and the extension of Thye Parkway is forecasted to be near congested approaching 10,000 vehicles per day. When this corridor is designed and ultimately constructed, it will be necessary to consider an urban 3-lane or 2-lane divided corridor design.
- *CSAH 43* is anticipated to experience congestion levels in 2030 similar to those experienced today and be periodically congested. This is due to the new Northwest Corridor's ability to more efficiently accommodate trips to future development in northwest Northfield.
- *CSAH 78* is forecasted to be near congested south of the future Major Collector roadway following the 95<sup>th</sup> Street alignment. North of this alignment, the corridor is anticipated to be periodically congested. This congestion is due to travelers seeking options to traveling on TH 3 and new growth in southwest Northfield and western Dundas. New Major Collector roadways west of CSAH 78 help provide options for travelers to access TH 19.
- *CSAH 1* is anticipated to be near congested through downtown Dundas and periodically congested west of Decker Avenue and east of TH 3. Congestion east of TH 3 relates in part to congestion on Jefferson Parkway west of TH 246. West of Decker Avenue, congestion on CSAH 1 is due to travelers seeking access to I-35.



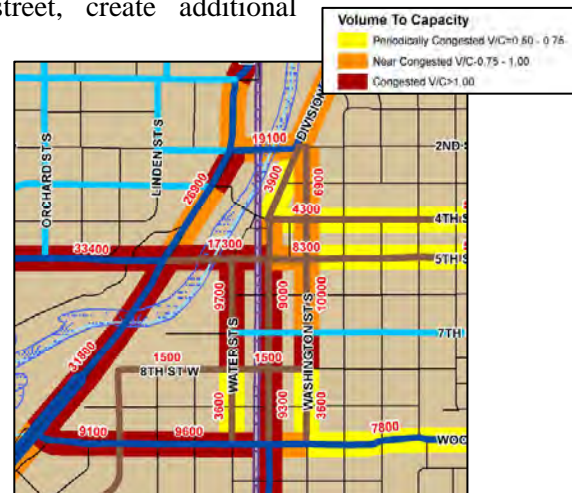
- *CSAH 47* is forecasted to be periodically congested. This is result of overall growth in the region and a desire for traffic to access northeast Dakota County and the TH 61 Mississippi River crossing located in the City of Hastings.
- *CSAH 28* is forecasted to be periodically congested from Hall Avenue to TH 246/Division Street. Between Hall Avenue and Jefferson Parkway and between Washington Street and Division Street, the corridor is anticipated to be near congested with volumes increasing from 3,100 in 2005 to 10,000 vehicles per day in 2030. These increases are a result of additional residential development anticipated in eastern Northfield and improved mobility provided on Jefferson Parkway between CSAH 28 and TH 246. Improvement options to Woodley Street west of Hall Avenue are limited, as noted above in the TH 246 discussion, due to anticipated right-of-way impacts.

#### LOCAL ROADWAYS

Several roadways are anticipated to be periodically congested in Northfield, and some segments of these roadways are forecasted to be near congested. Following is an overview

- *Lincoln Parkway, and Greenvale Avenue* are forecasted to be periodically congested west of Spring Street and near congested between Spring Street and TH 3. *North Avenue* is forecasted to be periodically congested west of Dresden Avenue and near congested between Dresden Avenue and TH 3. As noted in Section 4.2.2, these three east-west routes carry approximately the same volume of traffic. Thye Parkway carries less due to its location further north. Without multiple east-west routes providing mobility consistent with the Major Collector design standards outlined in Section 2.4, the other routes will be fully congested. *Dresden Avenue* is anticipated to be periodically congested between Thye Parkway and North Avenue due to new development's desire to access TH 3. Congestion on TH 3 and TH 19 contribute to increased traffic volumes on these roadways due to travelers' desire to seek alternatives to those routes. As noted in the TH 3 discussion, benefits to improve near congested segments may be limited due to congestion along TH 3.
- A segment of a *new Major Collector corridor west of CSAH 78* is forecasted to be periodically congested. This is a result of future residential areas in southwest Northfield seeking alternatives to access TH 19 to reach I-35.
- *Jefferson Road* is forecasted to be periodically congested. This is due to congestion on TH 3 and travelers' desire to access land uses along the corridor.

- *4<sup>th</sup> Street* from Division Street to Prairie Street is anticipated to be periodically congested. This is a result of developing areas desire to access downtown Northfield, TH 3, and TH 19. Improvement options may result in right-of-way impacts to adjacent properties. Although 7<sup>th</sup> Street was not modeled, it is anticipated that congestion on the roadway would be similar to that on 4<sup>th</sup> Street, since it serves much the same trip purposes.
- *5<sup>th</sup> Street* from TH 3 to Prairie Street is forecasted to range from congested on the west to periodically congested on the east. Similar to 4<sup>th</sup> Street, this is a result of developing areas desire to access downtown Northfield, TH 3, and TH 19. Improvement options may result in right-of-way impacts to adjacent properties.
- *Water Street, Division Street, and Washington Street* are anticipated to have congestion levels ranging from periodically congested to congested between Woodley Street and 2<sup>nd</sup> Street as illustrated in the adjacent graphic. This is primarily a result of downtown Northfield being an important destination due to its commercial, retail, and civic land uses. Pedestrian and bicycle activity, along with truck deliveries in the street, create additional challenges. A study to consider the merits of one-way directional traffic may conclude that additional capacity can be provided without significant right-of-way impacts. An option to improve mobility may include converting the on-street angle parking to parallel parking to improve safety and avoid delays with vehicles backing up into the travel lane. This would also improve the safety of bicycle traffic. As properties redevelop, orientation of delivery access to the rear of the property may also assist in improving mobility.



*Forecasted traffic volumes and levels of congestion anticipated in 2030 based on planned land uses.*

- *Prairie Street* between Woodley Street and 7<sup>th</sup> Street is forecasted to be congested and periodically congested between 4<sup>th</sup> and 7<sup>th</sup> Streets. This is a result of traffic avoiding congestion on other busy streets in downtown Northfield. Improving the mobility on Woodley Street and Washington Street would likely decrease congestion levels on Prairie Street.

## SAFETY

As traffic volumes increase on roadways, safety is consequently decreased if necessary improvements are not made. As roadway improvements are made to increase capacity, it is important that they also increase safety for motorized and non-motorized traffic. Crashes throughout the City should be monitored for patterns. A safety study should be completed for those areas to comprehensively look into issues, possible needs, and correctable solutions.

## INTERSECTIONS

Existing and proposed intersection locations may have inadequate sight distances. Sight lines at these locations may be obstructed due to horizontal and/or vertical curvature of the roadways, as well as other roadside obstructions. As future intersections are established or new land use developments route additional traffic to existing intersections, an engineering study will be required to determine the appropriate measures needed to achieve adequate intersection sight distances. These may include reconstruction of a portion of the existing through roadway, relocating the intersection, or other means to remove the sight obstruction. To accommodate necessary turn lanes, additional right-of-way may be required at the intersection.

Figure 4.3-1 identifies several potential locations that may require an intersection control evaluation. These intersections are prioritized as to which studies should be initiated in the short, mid, and long-term. The intersection control evaluation will identify the traffic control option (e.g. all way stop, roundabout, possible signalization) and capacity improvements (e.g. turn lanes) necessary to accommodate the traffic volumes in a safe and efficient manner. Intersections should be designed to properly handle the anticipated motorized and non-motorized traffic through the use of turn lanes, pedestrian crossings, and/or alternate traffic control (e.g. all way stop, roundabout, possible signalization) at intersections. Access management, as outlined in Section 2.4.4, will be an important tool in maintaining mobility on these roadways. Right-of-way should be acquired as properties in the area develop or redevelop.

## 4.3 PAVEMENT MANAGEMENT NEEDS

The City of Northfield's pavement management software is a tool that the City uses to establish a pavement condition index (PCI) rating goal. The information from this software is used to develop optimum maintenance and repair strategies during the annual capital improvement planning process to cost effectively maintain the City road system. The City's target PCI rating goal is 70. Factors other than PCI identified by the City of Northfield that will be considered when determining roadway candidates for reconstruction or renovation are outlined in Section 2.8. This strategy provides the City with a systematic approach to plan for and prioritize pavement management that is consistent over time. Developing and preserving a consistent funding source will be imperative to effectively manage future overall pavement maintenance costs, because inconsistent funding levels can result in increased costs and declining pavement conditions.



## 4.4 ROADWAY JURISDICTION

The future roadway network and functional classification identified in Section 4.1, together with the guidelines for jurisdictional designation identified in Section 2.2, were used to identify roadways candidates for jurisdictional transfer. While this Plan recommends a number of potential transfers, it is understood that not every candidate will actually be transferred as proposed in this Plan and that some revisions in the Plan may be made in the future based on changing needs and situations.

As identified in Rice County's Transportation Plan, the Northwest Corridor, including Decker Avenue from CSAH 1 to CSAH 23 in Dakota County, is identified as a transfer candidate to the County. The corridor would serve regional travel and as a Minor Arterial roadway will be designed to provide regional mobility through northeast Dakota County. Upon completion of this corridor, CSAH 43 and CSAH 78 are identified as being candidates for transfer from Rice County to the Cities of Northfield in Dundas since they will primarily serve local travel between the cities. While not identified in the Dakota County Transportation Plan, it would be reasonable for Dakota County CSAH 23 to transfer to the City of Northfield and Greenvale Township upon completion of the Northwest Corridor.

CR 79 is identified for turnback from Rice County to the City of Northfield and Northfield Township in the County's Transportation Plan. Traffic using this route is local and does not extend beyond the immediate properties it serves. CSAH 28 provides for regional travel in this area of the County.

Ibson Avenue/Canada Avenue is identified in the County's Plan as being part of a future continuity corridor through eastern Rice County. Discussions will be necessary with the County to determine when a transfer of jurisdiction would be appropriate

TH 246 north of CSAH 1 is identified as a corridor study necessary with Mn/DOT and Rice County to discuss a potential jurisdictional transfer from the state to the City, or possibly the County. Despite the challenges of expanding this corridor to provide more mobility, transferring the corridor to the City could allow the City to prioritize and complete necessary improvements in a timeline that would likely occur sooner than Mn/DOT would prioritize the corridor for improvements. The study may need to consider how a potential jurisdictional transfer would impact CSAH 28. County state aid eligibility requirements state that designated corridors need to begin or end at either a state highway or other county state aid route.

Mn/DOT has a turnback fund for improvements to corridors being transferred to another jurisdiction, however, like most transportation funding, the turnback account is limited as well. In Mn/DOT District 6, much of the turnback funding has been or is being used for realignment/new alignment associated with high priority interregional corridors. Following is Mn/DOT's guidance relative to turnbacks<sup>6</sup>

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<sup>6</sup> Mn/DOT. <http://www.dot.state.mn.us/stateaid/manual/sam07/chapter4/4-4.html> . Accessed July 23, 2008.

1. A county, city, or Mn/DOT may initiate turnback discussions. The Mn/DOT contact person is typically the District State Aid Engineer. A common reason a county or city may initiate a trunk highway turnback is that the city or county is interested in improving the roadway. A route on the trunk highway system may play a significant local role, but may be a minor regional or inter-regional transportation route. Turning the road over to the appropriate jurisdiction allows the city or county to control improvements. In some cases, Mn/DOT may initiate an exchange of minor trunk highway segments for higher functioning segments of a city or county system.
2. Eligibility for Turnback Funds: Turnback funds may only be used on released trunk highway routes that have been added to a county's or municipality's State Aid system. After the route has been released from the Trunk Highway system, it is no longer eligible for Trunk Highway funding. Turnback funds may pay for any costs that are eligible for regular state aid funding, such as road or bridge construction, right of way, engineering, utility relocation, railroad adjustment, and locally furnished materials or labor.
3. Eligibility Time Frame: State Aid Operations Rules Chapter 8820.2900 states "approval of plans for the construction of a turnback project is limited to a period of 15 years from the date of reversion. Each approved project must be advanced to construction status within one year after notification to the county or urban municipality that sufficient funds are available for constructing the project. Payment for repair and restoration or reconstruction and improvement of a section terminates eligibility for repair and restoration or reconstruction and improvement of that section with turnback funds."
4. Lump Sum Payment: State Aid Operations Rules Chapter 8820.2300; Subp. 6a states "In lieu of contracting work or force account work, the commissioner, with concurrence of the receiving agency, may enter into an agreement to pay a lump sum payment from the turnback account to the receiving agency's road and bridge account equal to the net value of eligible turnback costs for a project to be constructed within 20 years of the release date".

This allows the receiving agency the option to use the additional funds to construct some other state aid route that may be in greater need than the route turned back. This way the receiving agencies road system reconstruction priorities may be managed in the best possible way regardless of which account gas tax funds come from.

5. Turnback Maintenance Funds: Counties and cities that include a trunk highway turnback receive annual maintenance funds until turnback funds are expended on the route. The annual maintenance payments may continue up to a maximum of 15 years if no turnback construction project is started. The turnback maintenance payment is made each January.

For counties, maintenance is based on average daily traffic (ADT) and lane miles as follows:

<u>Existing ADT</u>	<u>Turnback Maintenance/Lane Mile/Lane</u>
0 – 999 .....	Current lane mileage apportionment/lane (\$1,592)
1,000 – 4,999 .....	2 X current lane mileage apportionment/lane
for each add'l 5,000 .....	Add current lane mileage apportionment/lane
(for example: 6,000 ADT would get 3 times the current lane mileage apportionment/lane)	

For cities, maintenance is based on a fixed amount of \$7,200 per mile.

6. Drawing Needs in Lieu of a Construction Project: State Aid Operations Rules require that turnback projects begin within 15 years of the date of release of the roadway to the city or county. In cases where a road will not need a major repair within the 15 year limit, the city or county may simply add it to their system as a normal State Aid road instead of receiving turnback funds for a construction project. In these cases, no turnback maintenance funds would be included in their apportionment.
7. Long Term Maintenance: The city or county is responsible for the ongoing maintenance of the routes.



## 5.0 IMPLEMENTATION PRIORITIES AND APPROACH

The City of Northfield has identified priorities in the areas of connectivity, capacity and safety, modal integration, development driven initiatives, and regional transportation initiatives. The purpose of these priorities is to

- Ensure adequate infrastructure is available for existing and future pedestrians, bicyclists, and motorists
- Support planned residential and non-residential growth and economic development initiatives
- Provide a system of roadways that allow for efficient emergency and civil service accessibility throughout the City
- Identify potential funding sources for completing necessary improvements

For each priority area, recommendations are provided for initiating the study or improvement in the short, mid, or long-term. Short-term improvements are recommended to be included in the City's capital improvement planning (CIP) within the next 5 years (2008 – 2013 years). Mid-term improvements are recommended to be programmed for improvement in 2014 to 2018, and long-term improvements are recommended to be programmed for improvement thereafter (2019 – 2030).

Transportation improvement costs vary, but for planning purposes, Table 5.0-1 provides average planning level cost estimates for the year 2008 for various transportation improvements.

TABLE 5.0-1 – 2008 PLANNING LEVEL COST ESTIMATES

Improvement	Cost Estimate
10' Bituminous Trail	\$150,000 per mile
2-Lane/3-Lane Urban Street	\$1.8 to \$2.2 million per mile
4-Lane Urban Street/Highway	\$2.2 to \$3.0 million per mile
Right Turn Lane	\$25,000 each
Left Turn Lanes	\$250,000 per pair
Traffic Signal	\$250,000 to \$300,000 per intersection (signal only)
Roundabout Intersection	\$600,000 to \$900,000 per intersection
Bridges	\$100 to \$115/sq ft of deck
Retaining Walls	\$30 to \$50/sq ft of face

Following is a summary of the recommended short-term, mid-term, and long-term, and development driven improvements

#### SHORT TERM (2008 – 2013) PRIORITY RECOMMENDATIONS

- TH 19 Scoping Study – I-35 to TH 56 (Mn/DOT lead, City participate)
- Safe Route to School Improvements Feasibility Study (City initiated)
- Pavement Preservation Projects in City's Capital Improvement Plan (CIP)
- Intersection Control Evaluations (City initiated)
  - TH 246 at CSAH 28 (Division Street & Woodley Street)
  - TH 246 at Jefferson Parkway
  - Division Street at TH 19/2<sup>nd</sup> Street
- Jefferson Parkway Expansion Feasibility Study – TH 3 to TH 246 (City initiated)
- TH 246 Jurisdictional Transfer Discussions (City initiated)
  - Pavement Rehabilitation
  - Bikeway Integration
  - Intersection Improvements
- CSAH 1/Cannon River Bridge Environmental Review – (Rice County lead, City participate)
- TH 19/TH 3 Modal Integration Subarea Study (City initiated)
- Jefferson Parkway Extension between Hall Avenue and CSAH 28 (development driven)
- Northwest Highway Corridor between TH 19 and CSAH 23 (development driven)

#### MID TERM (2014 – 2018) PRIORITY RECOMMENDATIONS

- TH 19 Improvements – I-35 to TH 3
- Pavement Preservation Projects in City's Capital Improvement Plan (CIP)
- Downtown Modal Integration Subarea Study
- Intersection Control Evaluations
  - 80<sup>th</sup> Street/North Avenue at CSAH 23/43 and at Dresden Avenue
  - Lincoln Parkway/Lockwood Drive
  - Greenvale Avenue and Spring Street
  - 4<sup>th</sup> Street at Division Street and at Washington Street
  - 5<sup>th</sup> Street at Water Street, at Division Street, and at Washington Street
  - Woodley Street/TH 246 at Jefferson Road and at Water Street
  - Woodley Street/CSAH 28 at Washington Street
  - Jefferson Parkway at Jefferson Road
- Hall Avenue/Spring Creek Road Improvement Feasibility Study
- Local and Commuter Transit Needs Study (City initiated)
- Thye Parkway Extension between Lockwood Drive and TH 3 (development driven)
- Ford Street Extension between Fillmore Street and Hall Avenue (development driven)

#### LONG TERM (2019 - 2030) PRIORITY RECOMMENDATIONS

- Pavement Preservation Projects in City's Capital Improvement Plan (CIP)
- Future Intersection Control Needs
  - CSAH 43 at Greenvale Avenue and at Forest Avenue
  - CSAH 78 at 2 Future Major Collector Roadways Located between 100<sup>th</sup> Street and TH 19
  - CSAH 28/Prairie Street
  - Jefferson Road/Cannon Lane
  - CSAH 1 at Jefferson Road and at TH 246
- CSAH 1/Cannon River Bridge

## 5.1 CONNECTIVITY, CAPACITY, AND SAFETY PRIORITIES

Recommendations for improved roadway connectivity, capacity expansion, and safety improvements are provided for the City street system. The recommendations are based on needs identified in the transportation planning process to support existing and future development. These improvements will not be completed as growth occurs. Rather, the City of Northfield will need to program necessary improvements in their capital improvement plan and champion these projects. Additional studies will be necessary to determine the feasibility of these improvements.

### 5.1.1 NORTH AVENUE EXTENSION FEASIBILITY STUDY (ZANMILLER DRIVE TO TH 3)

North Avenue is constructed to Zanmiller Drive on the east. As this corridor extends west into Bridgewater Township it is known as 80th Street. Right-of-way 70' in width for the corridor was platted in the area between Zanmiller Drive and the Progressive Rail railroad line, but was vacated by the City Council back in 1993. It is recommended that this corridor be extended east across the railroad tracks to TH 3 by means of Fremouw Avenue as illustrated below.



Completion of this corridor is important to distribute local traffic through the northwest part of the City. Without the corridor's extension to TH 3, additional traffic and travel demand on Lincoln Parkway and Greenvale Avenue would be expected. A feasibility study should be initiated by the City of Northfield. This feasibility study would determine design elements, project costs, environmental and property impacts, the specific corridor alignment necessary to be preserved for the construction of North Avenue, as well as public acceptance for a future corridor. As development in the area is proposed, right-of-way should be obtained and the road constructed. For the area between Zanmiller Drive and the Progressive Rail railroad line, the City will need to lead right-of-way acquisition, design, and construction of the roadway segment. Given the current traffic concerns in the Greenvale neighborhood and the anticipated concerns of adjacent property owners, a feasibility study is recommended. The challenges of extending the corridor through the existing developed area will require careful consideration to prioritize the study at the appropriate time.



### 5.1.2 JEFFERSON PARKWAY FEASIBILITY STUDY (TH 3 TO TH 246)

Jefferson Parkway is an example of a Major Collector roadway corridor that the City of Northfield has done a good job in obtaining right-of-way and constructing a continuous roadway. This corridor provides a continuous route on the southeast side of the City and provides access to and from schools, the community center, and homes in the area.

A challenge with the current design of Jefferson Parkway west of TH 246/Division Street is that it under serves existing traffic volumes and bicycle mobility and has an inadequate design for school bus traffic. As a result, the corridor is currently near congested. Additionally, the TH 3/Jefferson Parkway intersection has been identified as one of the highest crash frequency locations in the City.

By 2030, Jefferson Parkway is forecasted to become very congested between TH 3 and TH 246/Division Street. If a bridge is constructed across the Cannon River at Jefferson Parkway, this corridor segment is anticipated to have even higher congestion levels. With no mobility improvements to Jefferson Parkway from TH 3 to TH 246/Division Street, traffic is forecasted to divert along Division Street to Woodley Street and CSAH 1. Without improvements to CSAH 1 and TH 246, demand will be such that a 4-lane divided roadway segment will be necessary to provide safe and efficient mobility.

For this roadway to function in the role it is intended to provide as a Major Collector, design operational and safety improvements will be necessary. Given the importance of this corridor in accommodating school traffic and accessibility to and from residential areas on the east side of the City, improving this corridor is recommended to be considered in the short term. Improvements should be designed to accommodate the design vehicle, a school bus, include a linking trail, and meet the standards identified in Sections 2.4.1 and 2.4.2 for a Major Collector roadway.



### 5.1.3 HALL AVENUE/SPRING CREEK ROAD IMPROVEMENT FEASIBILITY STUDY

Hall Avenue/Spring Creek Road is identified as a Major Collector roadway. It provides the opportunity for north-south travel through eastern Northfield between TH 19 on the north and CSAH 81 on the south. Part of the area adjacent to the corridor has converted from agricultural to urban and recreational land uses. Some of the corridor has been overlaid with bituminous, while some of the corridor remains a gravel surface. The City will need to lead initiatives to reconstruct the corridor with a typical section identified in Section 2.4 that is compatible with the surrounding land uses and environment so vehicles, pedestrians, and bicycles can travel safely through the area. This study is recommended to be completed in the short-term.

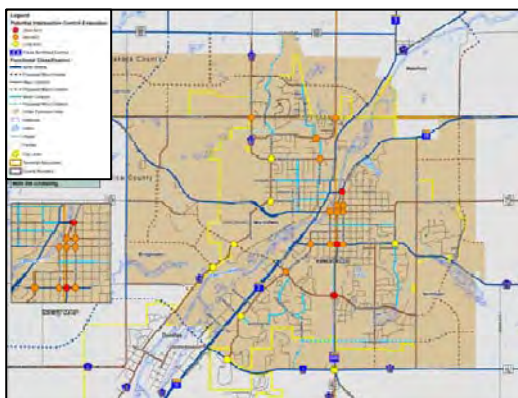


Hall Avenue/Spring Road

### 5.1.4 FUTURE INTERSECTION CONTROL NEEDS

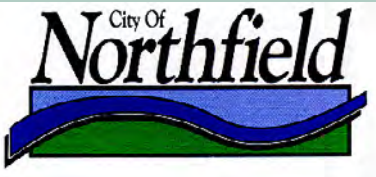
The traffic control and lane arrangements at roadway intersections are controlling factors for roadway system capacity and safety. Based on estimated vehicular traffic volumes, several intersections have been identified for future study of traffic control and lane needs. In nearly all cases, these intersections are in primarily developed areas.

Figure 4.3-1 identifies intersections that are recommended to have intersection control evaluation studies completed. The purpose of the study would be to identify the safety, capacity, and traffic control needs necessary to provide safe and efficient operation on the intersecting roadways.



Study areas were identified based on known existing problem areas and where through-stop conditions are likely to not function well based on forecasted traffic volumes on the roadways approaching the intersection. Intersections were prioritized as to which are recommended to be completed in the short term, mid-term, and long-term. Three intersections are recommended to be studied in the short term, including Division Street/2<sup>nd</sup> Street (TH 19)/Washington Street, Woodley Street/Division Street (TH 246/CSAH 28), and Jefferson Parkway/Division Street (TH 246).





TRANSPORTATION PLAN

- Legend**
- Potential Intersection Control Evaluation**
- Short-term
  - Mid-term
  - Long-term

- Functional Classification**
- Minor Arterial
  - Proposed Minor Arterial
  - Major Collector
  - Proposed Major Collector
  - Minor Collector
  - Proposed Minor Collector
  - Urban Expansion Area
  - Wetlands
  - Lakes
  - Roads
  - Parcels
  - City Limits
  - Township Boundaries
  - County Boundary

**Note:**  
Please refer to Comprehensive Plan for Urban Expansion Area land use designations

Source: Rice County, Dakota County, MnDNR, ACP Visioning & Planning, Ltd.



0 2,500 Feet

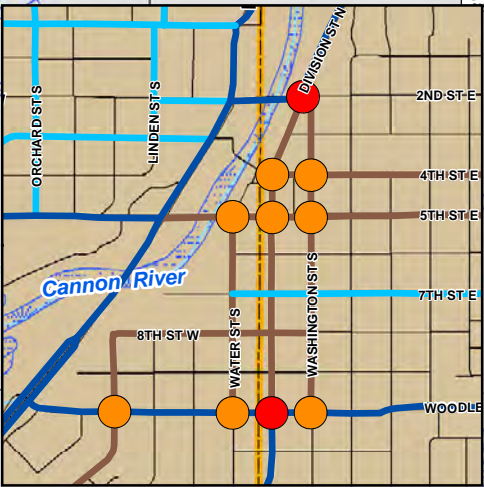
Intersection Control Evaluation Needs

Figure 4.3-1

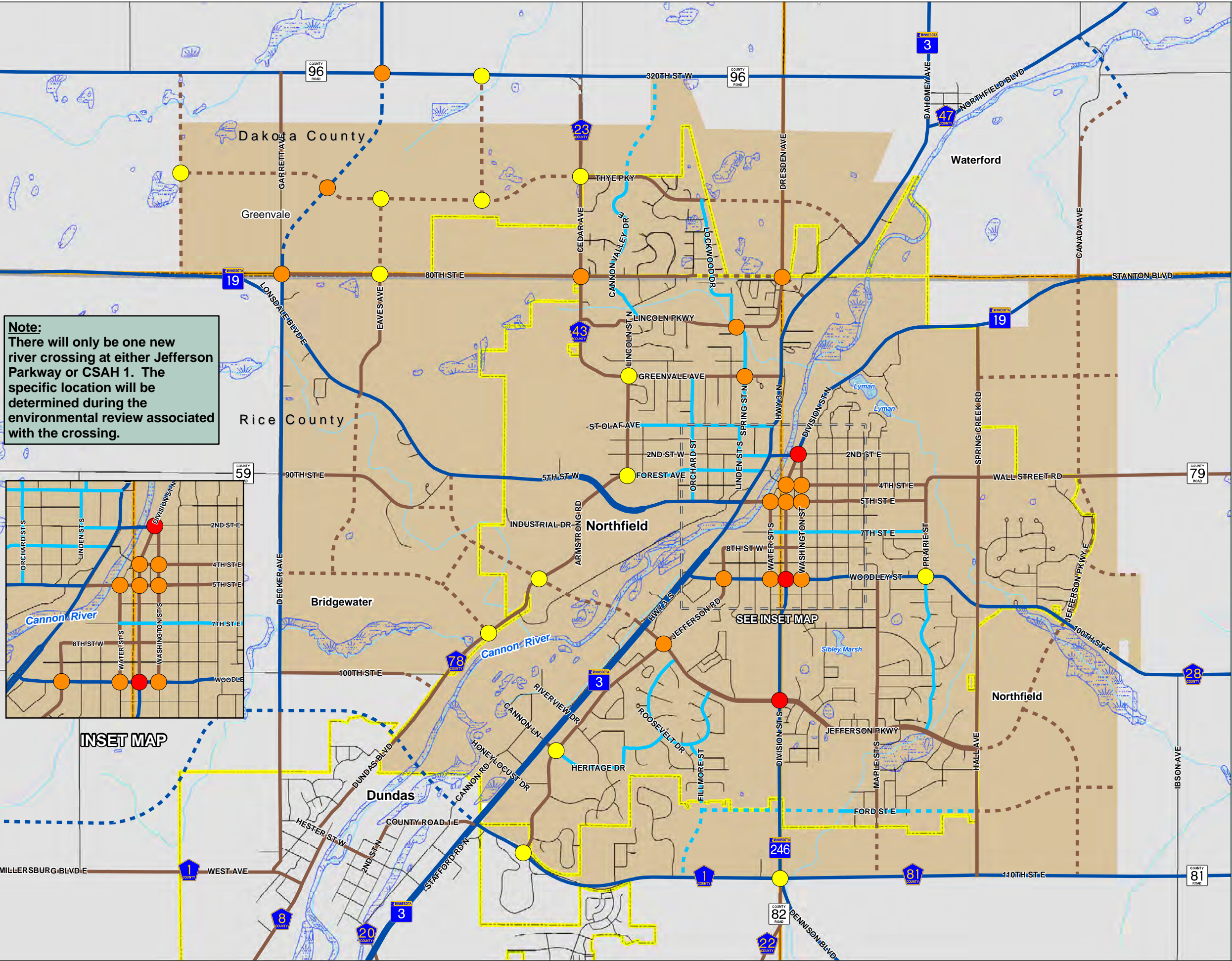
2008



**Note:**  
There will only be one new river crossing at either Jefferson Parkway or CSAH 1. The specific location will be determined during the environmental review associated with the crossing.



INSET MAP





Division Street at TH 19//2<sup>nd</sup> Street has unusual geometry that leads to user confusion and hesitation due to the intersection skew/angle, through movement of TH 19, and the close proximity of Washington Street. This intersection provides important connectivity between downtown and Carlton College. Congestion levels at this intersection are expected to become unacceptable in the short-term.

TH 246 at CSAH 28 (Division Street and Woodley Street) is currently an all-way stop intersection with periodic congestion. Levels of congestion in this area are expected to become unacceptable in the short-term. This intersection is particularly important relative to providing connectivity to the downtown, public school campus, and rural agricultural areas east of town. While there is very limited right-of-way in this area, potential future improvements need to better accommodate pedestrians, bikes, and the design vehicle.

TH 246 at Jefferson Parkway is currently an all-way stop intersection with periodic congestion. This intersection provides accessibility to the public school campus and rural agricultural areas south and east of town. There has been a history of pedestrian safety issues in proximity of the intersection and the design vehicle needs to be accommodated. Levels of congestion in this location are expected to become unacceptable in the short-term.

Other intersections identified for future study of traffic control and lane needs in the mid and long-term include

#### MID TERM (2014-2018)

- 80th Street/North Avenue at CSAH 23/43 and at Dresden Avenue
- Lincoln Parkway/Lockwood Drive
- Greenvale Avenue and Spring Street
- 4th Street at Division Street and at Washington Street
- 5th Street at Water Street, at Division Street, and at Washington Street
- Woodley Street/TH 246 at Jefferson Road and at Water Street
- Woodley Street/CSAH 28 at Washington Street
- Jefferson Parkway at Jefferson Road

#### LONG TERM (2019 - 2030)

- CSAH 43 at Greenvale Avenue and at Forest Avenue
- CSAH 78 at 2 Future Major Collector Roadways Located between 100th Street and TH 19
- CSAH 28/Prairie Street
- Jefferson Road/Cannon Lane
- CSAH 1 at Jefferson Road and at TH 246

Based on the jurisdictional authority of the intersecting roadways, Rice County, Dakota County, and Mn/DOT may also need to be study participants.



#### 5.1.5 PAVEMENT PRESERVATION PROJECTS IN CITY'S CAPITAL IMPROVEMENT PLAN

The City of Northfield will be prioritizing roadway candidates for reconstruction or renovation to be completed in the short, mid, and long-term. Priorities will be based on the City's targeted roadway pavement condition index rating goal of 70, together with other factors outlined in Section 2.8. This strategy provides a systematic approach to plan for and prioritize pavement management that is consistent over time. Developing and preserving a consistent funding source will be imperative to effectively manage future overall pavement maintenance costs, because inconsistent funding levels can result in increased costs and declining pavement conditions. Specific projects will be identified in the City's annual capital improvement planning process.

## 5.2 MODAL INTEGRATION PRIORITIES

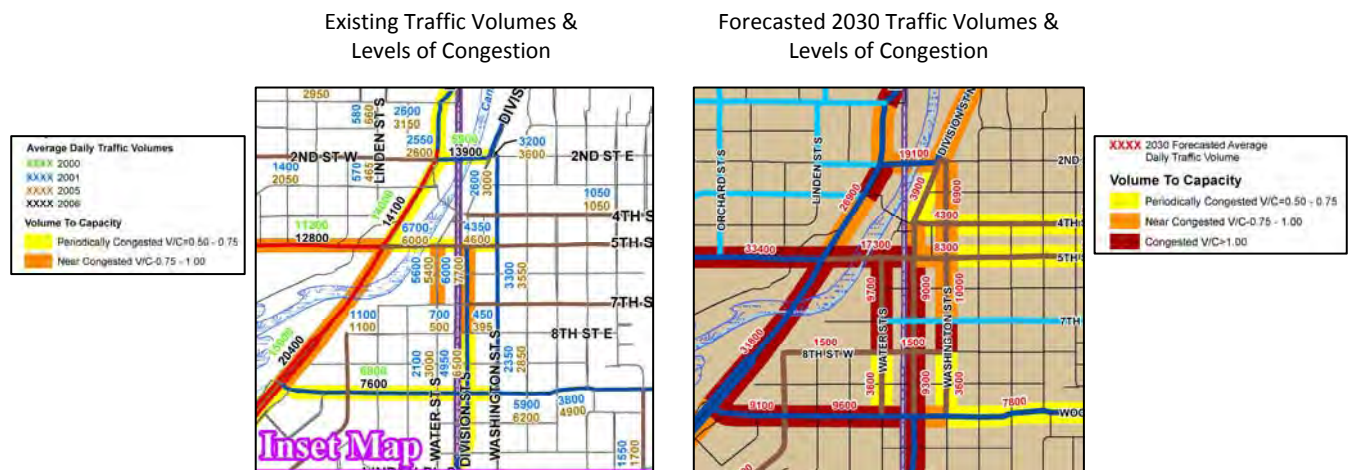
Enabling motorized and non-motorized users to share the roadway environment safely and efficiently is not an easy task. The characteristics of these modes of travel are vastly different, and yet, they compete for the same space. Unfortunately, motorized transportation, such as passenger cars and commercial vehicles, can often dominate the transportation infrastructure due to their disproportionate size and numbers.

Modal integration priority projects must comprehensively consider the problems and improvement options relative to all modes of transportation and types of transportation users. This approach is imperative to avoid identifying a solution for one mode or user, at the sacrifice or to the detriment of another mode or user. This approach should integrate the needs of bicyclists, pedestrians, delivery vehicles, consider routes for emergency vehicles and transit, and provide for convenient downtown parking opportunities. Astute planning and design of transportation infrastructure are important components that are necessary to achieve an integrated motorized and non-motorized transportation system that is relatively safe and efficient for all users.

Two critical areas are recommended for more detailed planning of modal integration. These include a Downtown Subarea Study and TH 3/TH 19 Subarea Study.

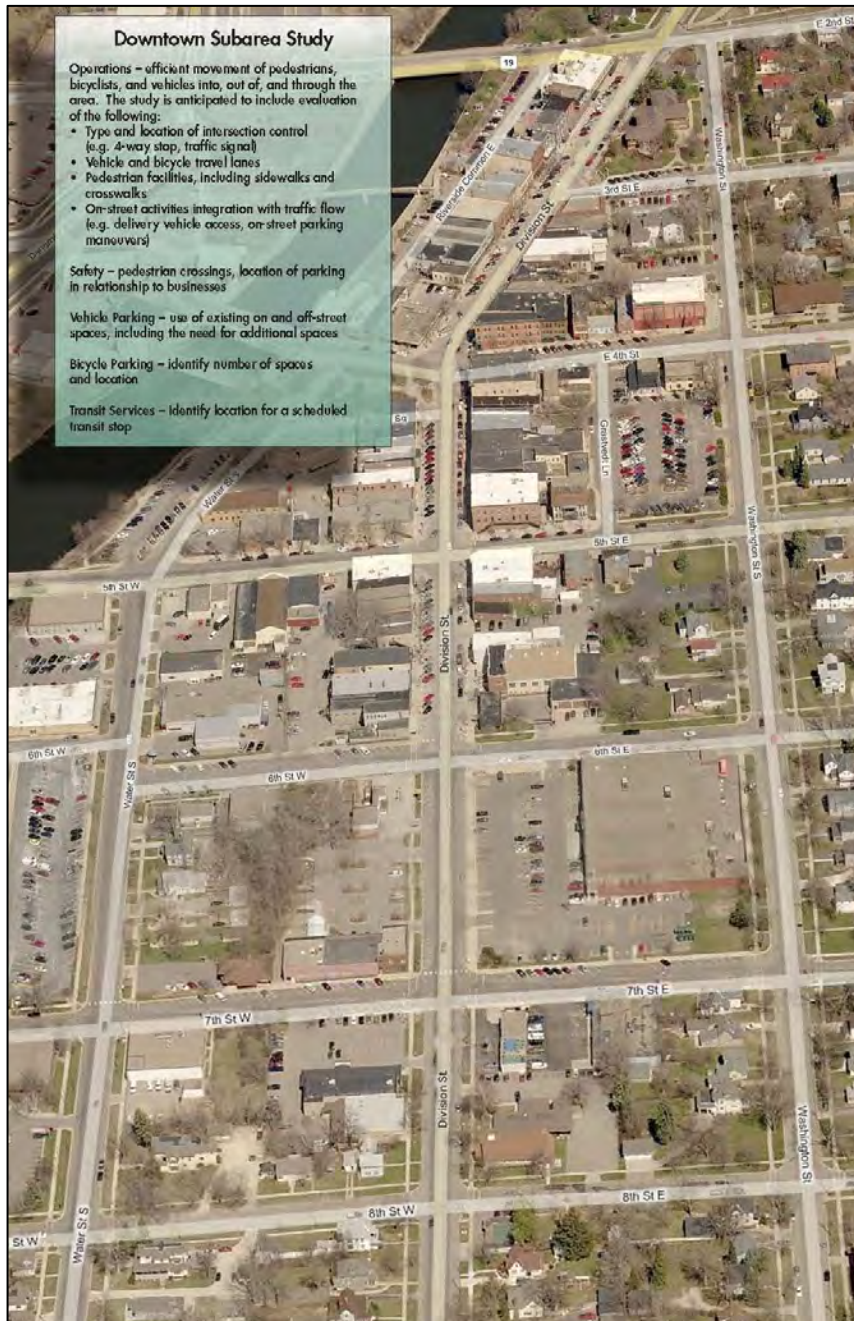
### 5.2.1 DOWNTOWN MODAL INTEGRATION SUBAREA STUDY

Downtown Northfield provides a thriving commercial and retail environment in a setting with historic charm. Vehicles, bicycles, and pedestrians bustle through the area. Trucks stopping in the travel lane to make a delivery are not uncommon and contribute to congestion. As the community grows and residents desire to access important destinations downtown or reach TH 3 or TH 19, congestion in the downtown will continue to grow. This congestion will detract from the area and has the potential to divert traffic to other adjacent residential roadways, such as Union Street. The graphics below display the changes in traffic volumes and levels of congestion that are forecasted between current and 2030 conditions.



*Important downtown destinations, together with planned growth in the City, will contribute to increased congestion in downtown Northfield.*

Several challenges exist to manage traffic volumes and congestion, without deteriorating the charm that makes the area so attractive. These challenges relate to all modes of traffic in the downtown area as described in Section 5.2, and include traffic operations and safety components. Existing land uses are close to the right-of-way, and improvement options may result in right-of-way impacts to adjacent properties.

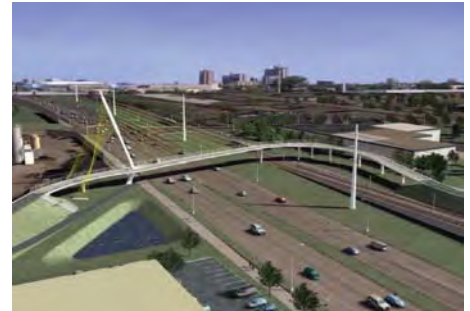


When considering modifying one transportation aspect of downtown Northfield, it is necessary to consider the potential influence a given solution may have on other modes of transportation. Due to the multi-faceted, interconnected nature of downtown Northfield, the scope of a downtown subarea study should include an analysis of pedestrian, bicycle, and vehicle operations, pedestrian crossings, delivery vehicle accessibility, vehicle and bicycle parking, and include identification of a transit stop location. It is anticipated that this initiative will need to be completed in the mid-term.



### 5.2.2 TH 19/TH 3 MODAL INTEGRATION SUBAREA STUDY

TH 19 and TH 3 present various transportation challenges to travelers in the Northfield area. The expanse of the highways and speed of vehicles moving through the area create obstacles in connecting pedestrians and bicyclists to and from different parts of the City. In particular, non-motorized mobility needs to be improved to connect northwest Northfield and St. Olaf to the downtown, as well as across TH 19. Given the traffic volumes and width of highway to cross, a grade-separated, non-motorized crossing is recommended. To the right is an example of a grade separated crossing for the use of pedestrians and bicyclists.<sup>1</sup>



*Example of a grade separated crossing for the use of pedestrians and bicyclists.*



Additionally, the north and south junction intersections of TH 19 and TH 3 are currently near congested or congested during the morning and evening peak travel periods of the day and are forecasted to be congested in the future. The City is planning for a future transit hub to be potentially located near the southwest quadrant of the south junction intersection to be in close proximity to the Mill Towns Trail and existing rail line. The study will need to carefully consider how all modes of traffic and transportation users will be able to safely and

efficiently access TH 19 from the future transit station. This is especially important given the high traffic volumes on TH 19, short distance between the railroad tracks and the TH 19/TH 3 intersection, and heavy truck traffic in the area. Additional challenges for moving all modes of traffic around and through this area include the proximity of the Union Pacific railroad line and Cannon River.

A multifaceted study considering the challenges and potential solutions relative to the needs of all travel modes and transportation users should be initiated prior to or part of the initial investment in the transit hub. This study is anticipated in the short term.

### 5.2.3 BIKEWAY DEVELOPMENT

It is anticipated that bikeways identified on the City's Parks, Open Space, and Trails System Plan would be achieved when pavement rehabilitation occurs on existing corridors, or as new development is proposed. Specific bikeway improvements will be prioritized based on pavement management needs.

<sup>1</sup> City of Minneapolis, MN, Midtown Greenway Brochure.  
<http://www.ci.minneapolis.mn.us/bicycles/MidtownGreenwayBrochure.pdf> . Accessed June 13, 2008.



### 5.3 DEVELOPMENT DRIVEN PRIORITIES

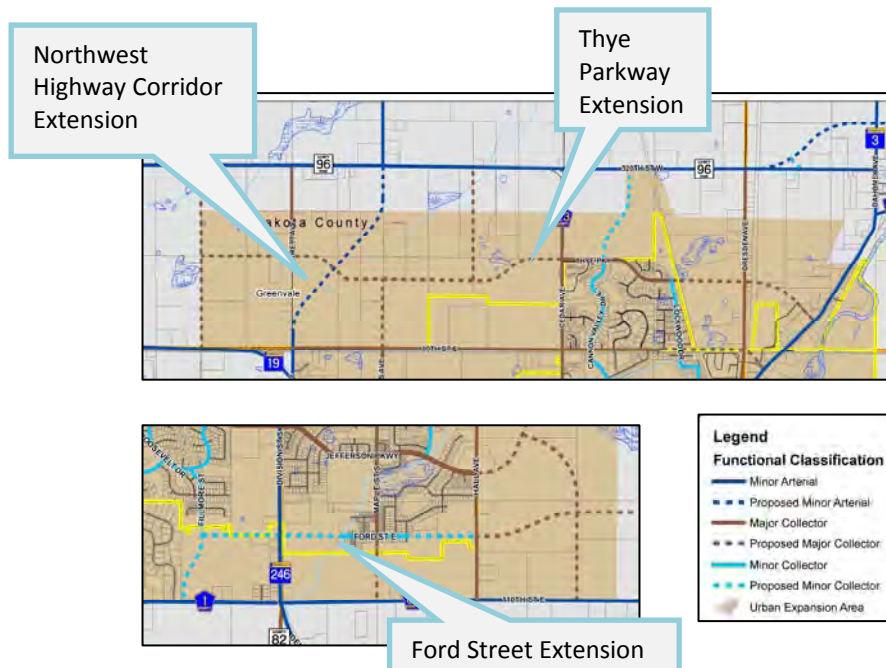
As the City of Northfield continues to grow, so does its transportation needs. Through cooperation with land owners and land developers, the City can achieve many of its transportation goals, while creating attractive neighborhoods and thriving business areas. By coordinating land use and transportation system development, community values can be attained and integrated into development and redevelopment plans with limited public investment.

Changes in land use are key opportunities to integrate transportation improvements resulting from the demand associated with the new development, as well as address additional deficiencies in a manner that results in a win-win situation for the developer and the community. Public and private partnerships in the development of local roadways, trails, and transit facilities results in growth helping to pay for itself.

This is particularly important as governments and private entities work to prioritize and make the most of their financial investments. Without growth driving the need for additional facilities and those facilities being constructed at the time of development, it is unlikely that the City would have the financial resources to prioritize these improvements. As a result, development is a partner in achieving the overall multimodal transportation vision.



*In addition to Local streets and trails, Northfield plans to continue to develop Major Collector street corridors in developing areas. An example of the extension of a Major Collector corridor is Jefferson Parkway between Hall Avenue and CSAH 28/100<sup>th</sup> Street.*



*As existing land uses change with the demand for urban growth, the Northwest Highway Corridor (between TH 19 and Dakota County CSAH 23), Thye Parkway (between Lockwood Drive and TH 3), and Ford Street (between Fillmore Street and Hall Avenue) are anticipated to be achieved through development driven initiatives.*

### 5.3.1 STRATEGIES FOR REVIEWING DEVELOPMENT & REDEVELOPMENT PROPOSALS

Various strategies can be utilized to ensure proper transportation improvements are made to provide and protect the City's investment in transportation infrastructure. Astute land use planning, site plan review, and subdivision plat review are key to ensuring the long-term multimodal transportation vision is developed and future transportation issues are avoided. To accomplish this, each development proposal (e.g. redevelopment of a single parcel, plat review, change of land use, expansion of a business or operation, etc.) should be evaluated for consistency with the following policies/standards.

1. Work with property owners and/or developers to remove and/or relocate existing driveway and field approaches off non-local roads.
2. Provide road and trail connectivity between adjacent neighborhoods and retail areas through Minor Collector and select Local roadways consistent with access spacing standards identified in Section 2.4.
3. Review/require access spacing that is consistent with this Transportation Plan.
4. Connect residential and non-residential areas.
5. Require turn lane on non-Local roads impacted by new development, including those that are not immediately adjacent.
6. Require off-site improvements, including those in other jurisdictions, where the existing transportation network will be directly impacted by new development, including where the development is not immediately adjacent. This could include but is not limited to paving roads, repairing surfaces, fixing sub-standard drainage, improving sight distances, etc.
7. Require the dedication of right-of-way for all required future transportation improvements identified in this Transportation Plan including trails, roads, bridges, transit facilities, drainage, utilities, and any other related improvement requiring use of a corridor/location.
8. Require the equitable participation in the construction of collector and arterial roads.
9. Review probable neighborhood traffic patterns, areas where excessive speed is possible, and the potential for pedestrian conflicts.
10. Require Minor Collector and select Local roadways to be constructed to property lines, or the corresponding amounts of money be escrowed, where stub streets are proposed to adjacent properties, but are not immediately warranted.

11. Require fees, construction participation, and/or cost participation proportionately to future required infrastructure such as overpasses, roundabouts, traffic signals, and other local, county, and/or state responsibilities as afforded by law and justifiable.
12. Require traffic impact studies, including the analysis of intersections to determine the need for and contribution to intersection improvements.
13. Incorporate into local ordinances land use and access strategies of the TH 19 Safety and Access Management Plan.

### 5.3.2 STRATEGIES FOR ENCOURAGING TRANSIT ORIENTATED DEVELOPMENT

Several principles, objectives, and strategies identified in the Land Use Chapter of the Northfield Comprehensive Plan provide an interrelated web of relationships between creating the City's desired land use pattern and offering transportation choices and efficiency. This guidance includes encouraging a compact development pattern (Objective 3), creating residential areas with strong neighborhood qualities (Objective 4), guiding new commercial retail and office developments in a mixed use pattern (Objective 5), and improving transportation choices and efficiency (Objective 9). Goal 2 of the Transportation Plan states "Facilitate the movement of people goods, and services within and through the City on a safe, convenient, coordinated, and fiscally responsible network of routes using a variety of transportation modes." These guiding documents together provide a framework to promote a transit-oriented development (TOD) pattern and ultimately a more efficient and cost effective transit system.

To achieve the vision identified, it is recommended that the City pursue a study to identify specific criteria to guide development and evaluate if a proposed development meets transit-supportive criteria (e.g. density, road design, access, etc.). Criteria should be oriented toward the future, but based in reality and financially feasible, responsive to City goals and market forces, while reflective of TOD principles.

It is recommended that a study be conducted to identify and develop specific TOD development criteria. This study should include the partnership of Northfield Transit, as well as transit representatives from Mn/DOT and Rice and Dakota Counties.

## 5.4 REGIONAL TRANSPORTATION INITIATIVES

Over the years, the City of Northfield has partnered with other transportation agencies on several regional transportation initiatives. Each of these initiatives is vital to the transportation system in Northfield and the region. It is recognized that the City of Northfield has a role in contributing to identifying and potentially participating in funding solutions, and that the City cannot independently address these opportunities and challenges. The following are the regional roadway, transit, and trail transportation initiatives or studies that should be undertaken in and around the City of Northfield in the upcoming years.

### 5.4.1 TH 19 SCOPING STUDY & TH 19 IMPROVEMENTS

As described in Section 3.5.2, a scoping study to evaluate corridor alignment options and environmental considerations is anticipated be initiated by Mn/DOT in approximately 2009 between approximately Rice County CSAH 46 and 1.5 miles east of TH 56 in Goodhue County.

Local representatives continue to have ongoing discussions with legislators to raise awareness of this priority at the state level. While some funding is identified in Mn/DOT's Transportation Plan, it is not anticipated to meet the needs that will be identified in the study to be initiated in 2009/2010. Alternative forms of funding may be necessary to achieve the study findings and needed improvements in the Northfield area.

The City's role will be to continue to raise awareness of TH 19's condition and the need for improvements to the corridor from TH 3 to I-35, participate in the study, and incorporate findings as may be necessary. Additionally, it would be anticipated that future development and/or redevelopment along the corridor would be completed consistent with the approved study.

### 5.4.2 TH 246 JURISDICTIONAL TRANSFER

TH 246 north of CSAH 1 is identified in Section 4.2.4 as a corridor study that should be conducted with Mn/DOT and Rice County to discuss a potential jurisdictional transfer. This roadway is significant locally and perhaps for western Goodhue and eastern Rice County, but due to its lack of continuity it is not significant statewide. There is also local need and desire for multimodal infrastructure and urban design elements, both of which are not consistent with the rural highway design that currently exists. The proximity of adjacent residential land uses and schools present challenges to expand this corridor to provide more mobility. However, transferring the corridor to the City could allow the City to prioritize and complete necessary and desired improvements in a timeline that would likely occur sooner than Mn/DOT could prioritize the corridor for improvements. These types of improvements could include pavement rehabilitation, bikeway integration, and intersection improvements. It could also address other City priorities of improving multimodal accessibility between the school campuses, downtown, and residential areas. The study may need to consider how a potential jurisdictional transfer would impact county state aid rules and system continuity.



#### 5.4.3 SAFE ROUTES TO SCHOOL IMPROVEMENTS FEASIBILITY STUDY

The City of Northfield has received a Safe Routes to School grant to develop a range of activities to improve the safety of children who walk and bike to three kindergarten through grade 5 schools and one middle school in Northfield and to introduce more children to get to school in those ways. The four schools targeted are the Northfield Middle, Greenvale Elementary, Sibley Elementary, and Bridgewater Elementary schools. The grant will assist in planning and developing improvements to existing facilities such as crosswalks and bike paths, identifying possible alternative facilities such as crossings at other locations, filling in gaps in the sidewalk/path network, and identifying other necessary improvements. Non-infrastructure activities will include strategies relating to enforcement, engineering, education, encouragement, and evaluation.

#### 5.4.4 NORTHWEST NORTHFIELD HIGHWAY CORRIDOR BETWEEN TH 19 AND CSAH 23

This study is described in Section 3.5.3. It is anticipated that, at a minimum, the City's role will be to acquire right-of-way for the corridor through the platting process, manage access consistent with Minor Arterial standards, and require construction of roadway segments as development occurs. As outlined in Section 4.2.4, it is expected that upon completion of construction, Dakota County CSAH 23, between 320<sup>th</sup> and 80<sup>th</sup> Streets, and Rice County CSAH 43, between 80<sup>th</sup> Street and Forest Avenue, would transfer to the City's jurisdiction. The northwest corridor would become Rice and Dakota Counties' jurisdictional responsibility upon completion of construction.

#### 5.4.5 LOCAL AND COMMUTER TRANSIT NEEDS STUDY

To achieve expanded transit service in the City of Northfield, including bus or potential future commuter rail, the City will need to lead the initiative to study and identify unmet local and commuter rider needs.

As described in Section 3.5.4, Dakota County's Draft Transit Plan does not envision extending transit service into the City of Northfield. The City will continue to work with the County to explore opportunities to expand routes to link with existing services to the north. Additionally, the City of Northfield approved Resolution 2007-131 requesting the following items be incorporated into the Dakota County Transit Plan

- Community service needs in the Northfield area that include intercity, regional, commuter and reverse commuter service, and service to the regional medical facility
- Transit connections to/from Northfield to existing public transit services in the metro area
- Recognition of the Northfield Transit multimodal hub as an opportunity to provide regional connections across county and city borders to enhance the transit network

- Partner with the City of Northfield to support the development of transit and transit-related infrastructure to provide integrated transit systems<sup>2</sup>

The Rice County Transit Study summarized in Section 3.5.7 describes the following study recommendations for the Northfield area

- Continue to manage the transit service within its urban area (City Service Option N2)
- Expand demand response service in terms of service hours and territory
- Provide service into the early evening on Monday through Saturday, operating between 6 AM to 8 PM
- Provide service on Sundays between 8:30 AM to 4:30 PM
- Provide service into Dundas and perhaps to other outlying areas surrounding Northfield
- Establish a link to Jefferson Lines service, with Northfield Transit operating a connecting route to the Big Steer Travel Center located at the junction of TH 19 and I-35 (service is currently provided)
- Review current marketing efforts. Revise and reprint Northfield Transit brochure to include information on any new services instituted, including the link to Jefferson Lines. Materials should be available in both English and Spanish language editions. Look to expand marketing to reach broader markets through media advertising, such as the local newspaper and radio station, and the City web site and local cable access channel
- Implement a computer aided dispatch system for trip reservations
- Rural service of one round trip per day be provided between Lonsdale and Northfield and between Faribault and Northfield<sup>3</sup>

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<sup>2</sup> City of Northfield. 2007. Northfield City Council Resolution 2007-131, December 17, 2007.

<sup>3</sup> Rice County Transit Study. 2001. SRF Consulting Group, Inc. Pages 1, 57-59.

#### 5.4.6 CSAH 1/NEW CANNON RIVER BRIDGE ENVIRONMENTAL REVIEW

This Transportation Plan identifies two potential Cannon River crossing locations consistent with the CSAH 1 Corridor Preservation Study described in Section 3.5.4. One alternative is located at Jefferson Parkway and the other alternative follows the east leg of CSAH 1 at approximately 110<sup>th</sup> Street. The future environmental review to be completed for the corridor will identify one alignment to be pursued based on having the least impacts and being the most feasible to achieve. Prior to completion of the environmental review, the City will preserve right-of-way along both corridors. It is also anticipated that the City will have a role in participating in the funding of the design and construction of the bridge and some improvements.

#### 5.4.7 MILL TOWNS TRAIL

The City's role in completing the Mill Towns Trail includes incorporating the trail into area development or redevelopment plans. Additionally, the Mill Towns Trail website states that the trail will be a gateway into the downtown so travelers have the option to experience the arts, cuisine, and shops before they pass on through. Dundas currently connects to Northfield with a city trail that runs along Armstrong Road/CSAH 78 and ends at Laurel Court.

From Laurel Court, the route passes over the Cannon River and under TH 3 along the east bank to the Fifth Street bridge and Water Street intersection. The City of Northfield will be constructing a transit station in 2009. The design will incorporate elements for the trailhead, including parking, bathroom facilities, and drinking fountain.

To assist trail users through town, "Share the Road" street signage will mark three blocks along Fifth Street between Water Street and Union Streets and along Union Street for one block between Fifth and Fourth Streets. Bike lanes have been painted on Fourth Street between Union and Prairie Streets."<sup>4</sup>

The City's Parks, Open Space, and Trail System Plan discusses that a significant planning issue will be identifying the most advantageous alignment for the trail through Northfield. Currently, the adopted alignment includes use of a bike lane/sidewalk from the downtown east along 4<sup>th</sup> Street. Given the perceived safety and lower recreational value of this segment, an alternate alignment providing the highest quality experience through the City was recommended to be explored. Three alternate alignment options are illustrated in the Parks, Open Space, and Trail System Plan. A preferred alignment is identified following the existing Union Pacific railroad line on the west side of the Cannon River, if it were ever abandoned, or locating the trail between the tracks and river.<sup>5</sup>

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<sup>4</sup> <http://www.milltownstrail.org/>. Retrieved on June 10, 2008.

<sup>5</sup> Northfield Parks, Open Space, and Trail System Plan, 2008. Brauer & Associates, LTD. Page 4.18-4.19.

## 5.5 EDUCATION AND ENFORCEMENT

The City of Northfield receives regular requests to address transportation issues. While the City has a responsibility to provide transportation infrastructure and enforce traffic laws, it may not be feasible to accommodate every request. With limited financial resources, the City has a responsibility to its citizens to prioritize transportation investments relative to the benefit they provide. In addition, many transportation issues can not be addressed through infrastructure improvements. Issues such as motorist inattentiveness, disregard for traffic laws, and lack of awareness for pedestrian and bicycle user rights and responsibilities are some examples of issues the City is not able to engineer solution to resolve.

Education of the user is a key component to a successful transportation system. Drivers, bicyclists, pedestrians have a personal responsibility to make informed decisions while traveling on public infrastructure. All users are responsible for maintaining their alertness, exercising good judgment, and managing various situations within the roadway corridor. While each traveler has an objective to reach a certain destination safely and efficiently, they also have the responsibility to respect other travelers by obeying traffic laws and using transportation infrastructure as it was intended.

The City has a limited role in education of the transportation users. Individual traveler education has historically been the responsibility of individual user. Basic driver education required to become a licensed driver is available the Northfield Public Schools Community Education. More advanced driver education is available privately. Expansion of education opportunities through Community Education or other organizations is encouraged to build awareness for and better integrate the various transportation users.

The City does have a responsibility to provide reasonable enforcement of traffic laws. Enforcement is an effective method of encouraging safe travel for all modes of transportation. In addition, the City has a responsibility to provide reasonable traffic signing as a means to better communicate the type of service the corridor is intended to provide. A comprehensive traffic signing review is recommended to identify signing needs, confirm compliance with the MMUTCD, and remove conflicting and/or confusing signing.

The Northfield Area Task Force on Non-Motorized Transportation is a valuable volunteer organization that can be used to help promote and achieve many of the non-motorize transportation priorities. Building awareness, creating and providing educational materials and maps, and organizing non-motorized transportation events are all examples of the task force's on-going role in the community. City engineering and planning staff should work with the taskforce to identify annual goals that can be accomplished through a staff-task force partnership. Examples may include

- Obtain a "Bicycle Friendly Community" designation from the League of American Bicycles
- Organize an annual fundraiser to build awareness for and raise funds for necessary infrastructure improvements that enable non-motorized transportation (i.e., Share the Road signs, sidewalk extensions, bicycle parking/lockers)



## 5.6 POTENTIAL TRANSPORTATION FUNDING SOURCES

It is recommended in the short-term that the City of Northfield conduct a study to estimate funding contributions to complete identified improvements. This information could be used for capital improvement planning or assigning a development's proportionate fair share of roadway infrastructure improvement costs through an annexation agreement and/or development agreement.

Additionally, there are a number of various funding mechanisms available to support transportation projects these include the following.

1. **Federal Funding.** Northfield may apply for federal funds for highways through the Surface Transportation Program of the Federal Highway Trust Fund, through Mn/DOT's Areas Transportation Partnership (ATP). Solicitation occurs approximately every two years, with federal funding covering 80% of a project's cost. Types of projects funded include highway reconstruction, safety projects, trails which are part of projects, transit and park-and-ride projects. Obtaining this funding is highly competitive and selections are based on project costs and benefits provided.
2. **MSAS System.** The State of Minnesota, through the gas tax and license fees, collects funds to be used to construct and maintain the State's transportation system. Most of the funds collected are distributed for use on the State's Trunk Highway (TH) system, the County State Aid Highway (CSAH) system and the Municipal State Aid Street (MSAS) system. Of the funds available they are distributed 62% TH, 29% CSAH and 9% MSAS. Cities with a population above 5,000 are eligible to receive a portion of the MSAS funding.
3. **Mn/DOT Cooperative Funds.** The State of Minnesota has funds available to assist locally initiated cooperative projects that improve regional safety and mobility. Solicitations are due in September for project requests located in Dakota County and Mn/DOT Metro District of each year for construction the following year. For project requests located in Rice County and Mn/DOT District 6, the City is encouraged to set up a meeting with District 6 staff early in the planning process to discuss the potential project, including anticipated costs, proposed cost share split, and benefits to the state highway system.
4. **Minnesota Railroad-Highway Grade Crossing Safety Improvement Program.** This program is available to increase the safety at at-grade railroad crossings. Funds may be used for the installation of warning devices, signal installation and upgrades, signs and pavement markings, crossing closures, roadway relocations, lighting, crossing alignments and grade improvements and grade separations.

5. Minnesota Department of Natural Resources Grants. Various federal and state grants are available for the development or reconstruction of trails. Typically grants require a 50% match and illustration that the trail is not only of local importance but also of regional significance. Grant programs through the DNR for trail projects include the Federal Recreational Trail Grant Program, Regional Trail Grant Program, Outdoor Recreation Grant Program, and Local Trail Connections Program.
6. Collector and Local Streets. Developers may be required to fund the entire cost of Minor and Major Collector Roadways, as well as local streets as a part of their development fees.

## ***APPENDIX A***

### ***CITY OF NORTHFIELD CROSSWALK INSTALLATION***

#### ***POLICIES AND GUIDELINES***

The City of Northfield receives numerous requests throughout the community for pedestrian crosswalks. Marked pedestrian crossings accomplish dual goals. They prepare drivers for the likelihood of encountering a pedestrian, and they create an atmosphere of walkability and accessibility for pedestrians. While crosswalks do provide guidance to motorists and pedestrians of crossing locations, it is important to recognize that according to the Minnesota State Statute governing pedestrian safety (Chapter 169.21) all intersections are legal crosswalks and drivers must yield the right-of-way to a pedestrian crossing the roadway within a marked crosswalk or at an intersection with no marked crosswalk in the absence of traffic control signals. The driver must remain stopped until the pedestrian has passed the lane in which the vehicle is stopped and no pedestrian shall suddenly leave a curb or other place of safety and walk or run into the path of a vehicle which is so close that it is impossible for the driver to yield.

The Statute allows the local authority discretion to determine the location of crosswalks, but does not clearly identify criteria to guide local decision makers. Community guidelines for crosswalk identification are suggested to provide a process for determining appropriate crosswalk locations, markings, and signage. The purpose of the guidelines is to improve pedestrian and vehicular safety with a consistent standard that achieves safety objectives.

This document establishes a consistent standard to reply to crosswalk requests through a policy for the installation of crosswalks at signalized intersections, marked crosswalks at school crossing locations, and crosswalks at intersections controlled by a stop sign.

#### **A. RESEARCH**

Several studies have been conducted to analyze pedestrian crash rates at marked and unmarked crosswalks. The placement of crosswalks should not be expected to be equally effective or appropriate under all roadway conditions. Federal Highway Administration (FHWA) Report HRT-04-100 “Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations” recommends that pedestrian crossing problems and needs should be identified on a routine basis before deciding where to mark or not mark crosswalks. According to research studies of the safety effects of marked versus unmarked crossings, pedestrian safety is not necessarily improved by providing a crosswalk. The FHWA report and other studies conclude that a marked crosswalk does not necessarily provide a measure of safety without signage or other crossing improvements. A major contributing factor is the often unsafe

behavior of pedestrians and speeding or inattentive motorists, pointing to the need for pedestrian safety education as well.

The research is clear that determining where and how to apply crosswalks to achieve improved safety requires a varying approach depending upon the location, the amount of vehicular and pedestrian traffic and typical behaviors. The FHWA Report is a comprehensive report on the relative safety of marked and unmarked crossings. This document presents a variety of special treatment options to mitigate safety, visibility, or operational concerns at specific locations. The flowchart on p. 12 outlines the steps in identifying candidate locations for crosswalks based on the findings of the 2005 FHWA Study.



TABLE 1 – 2005 FHWA RECOMMENDATIONS FOR CONSIDERING MARKED CROSSWALKS AND OTHER NEEDED PEDESTRIAN IMPROVEMENTS AT UNCONTROLLED LOCATIONS

	≤ 9,000 ADT			> 9,000 to ≤ 12,000 ADT			> 12,000 to ≤ 15,000 ADT			> 15,000 ADT		
	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph
<b>2 Lanes</b>												
<b>3 Lanes</b>												
<b>++4 Lanes Raised Median <sup>c</sup></b>												
<b>++4 Lanes No Median</b>												

KEY



Candidate sites for marked crosswalks. Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to determine whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites. It is recommended that a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk alone.



Possible candidate sites for marked crosswalks. Potential increase in pedestrian crash risk may occur if marked crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and may be considered for enhancements as feasible.



Marked crosswalks alone are insufficient, since pedestrian crash risk may be increased due to providing marked crosswalks alone. Consider using other treatments, such as traffic-calming treatments, traffic signals with pedestrian signals where warranted, or other substantial crossing improvement to improve crossing safety for pedestrians.

- a. These guidelines include intersection and midblock locations with no traffic signals or stop signs on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will not make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions), as needed, to improve the safety of the crossing. These are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.
- b. Where the posted speed limit or 85th percentile speed exceeds 40 mph, marked crosswalks alone should not be used at uncontrolled locations.
- c. The raised median or refuge island must be at least 4 ft. (1.2 m) wide and 6 ft. (1.8 m) long to adequately serve as a refuge area for pedestrians.

## B. CROSSWALK INSTALLATION GUIDELINES

These guidelines are developed based off of the City of Stockton, CA “Pedestrian Safety and Crosswalk Installation Guidelines,” FHWA Report HRT-04-100, and the Minnesota Department of Transportation (Mn/DOT) “Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways.” The guidelines are intended to supplement the most current Minnesota Manual on Uniform Traffic Control Devices (MMUTCD).

The design and planning of all pedestrian facilities should be consistent with the following manuals and guides.

- Minnesota Manual on Uniform Traffic Control Devices (MMUTCD)
- FHWA Oversight Role in Accessibility: *Memorandum to attention of HCR-1-HIF-1*
- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, American Association of State Highway and Transportation Officials (AASHTO) July 2004.
- The Federal Highway Administration's Pedestrian Safety Information *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines*, September 2005, FHWA HRT-04-100
- Minnesota State Aid for Local Transportation Guidelines and State Aid Rules  
Pedestrian facilities that use state-aid funding are required to follow Minnesota State Aid design standards.
- *Mn/DOT Bikeway Facility Design Manual*, March 2007
- The United States Access Board Guidance on how to design and construct accessible pedestrian facilities.
- *Pedestrian Access to Roundabouts : Assessment of Motorists' Yielding to Visually Impaired Pedestrians and Potential Treatments to Improve Access*, May 2006, FHWA HRT-05-080
- *FHWA Designing Sidewalks and Trails for Access*, September 2001  
Part 1: Review of Existing Guidelines and Practices  
Part 2: Best Practices Design Guide
- Environmental Justice
- *Characteristics of Emerging Road and Trail Users and their Safety*, September 2004, FHWA HRT-04-104
- *Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways*, Mn/DOT, October 2005

## C. IDENTIFYING CROSSWALK LOCATIONS

The first step in identifying candidate crosswalk locations is to identify the places people would like to access through walking. This is directly related to local land uses (homes, schools, parks, commercial establishments, etc.) and the location of transit stops. This information forms a basis for identifying pedestrian crossing improvement areas and prioritizing such improvements, thereby creating a convenient, connective, and continuous walking environment. The second step is identifying where it is safest for people to cross. Of all road users, pedestrians have the highest risk because they are the least protected. Pedestrian collisions occur most often when a pedestrian is attempting to cross the street at an intersection or mid-block location.

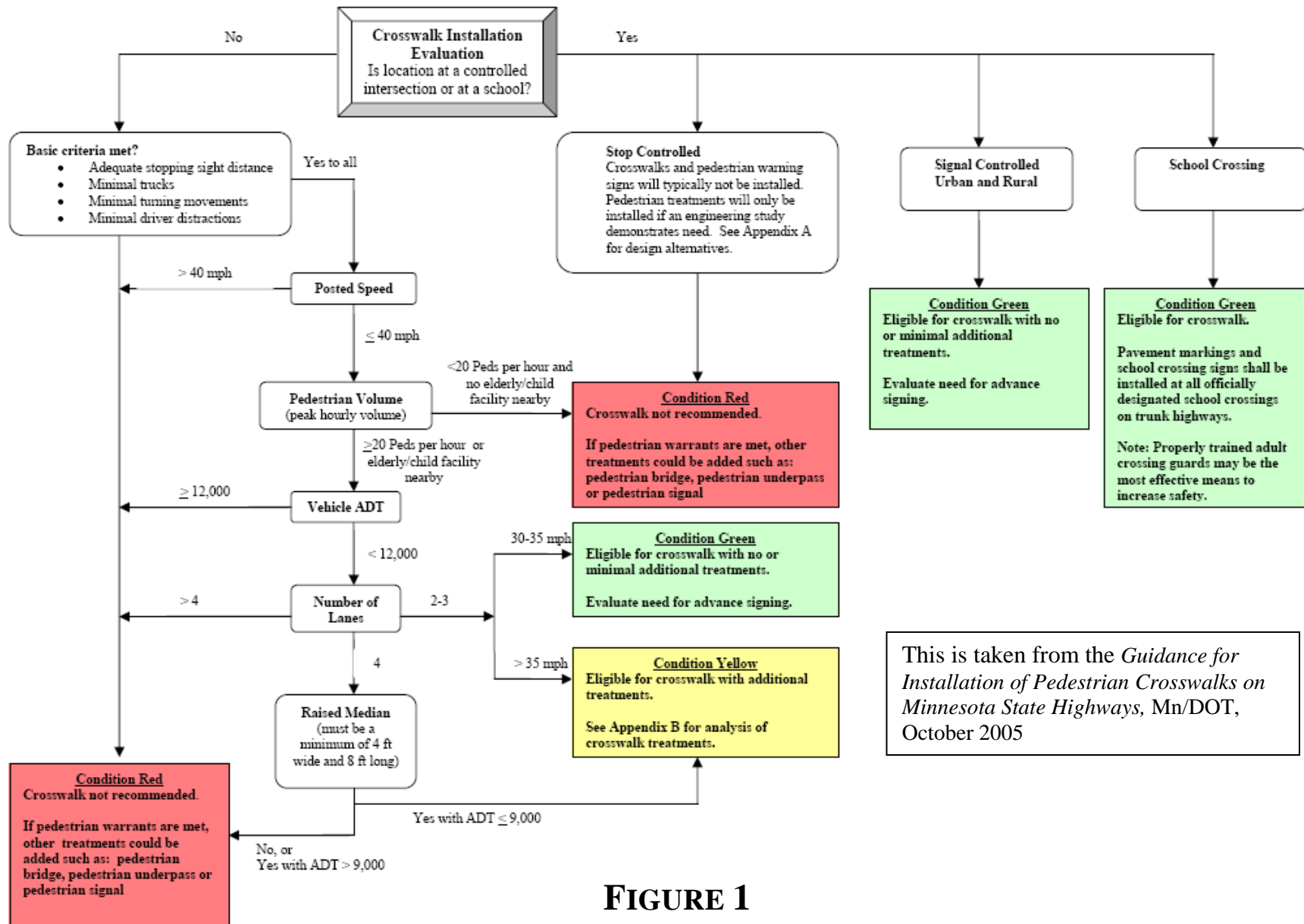
## D. DECISION-MAKING PROCESS

The objective of the decision-making process is to determine where marked pedestrian crosswalks are appropriate and when additional treatments should be used. An engineering study should be used to determine the necessity of a pedestrian crosswalk and should include the following detailed information.

- Geometrics
- Motorist sight distance
- Traffic volume data
- Pedestrian volume data
- Site characteristics and observations
- Posted speed limits
- Crash history

Mn/DOT has developed a flowchart (see Figure 1) to help decision makers determine whether or not a crosswalk is warranted. The following conditions must be met at all potential pedestrian crosswalk locations.

- Adequate stopping sight distance for motorists
- Minimal truck traffic
- Minimal vehicle turning movements
- Minimal driver distractions



**FIGURE 1**



## E. MARKED CROSSWALK STANDARDS

The following are the standards for consideration and installation of marked crosswalks within the City of Northfield. The sections following provide additional detail and options.

- Where marked crosswalks are installed at controlled intersections, transverse markings should be used except as noted below.

### Exceptions

- At school crossing locations, longitudinal (zebra) markings should be used with appropriate signing as according to the MMUTCD.
  - In the downtown areas, longitudinal (zebra) markings should be used with minimal to no additional signing.
- Where marked crosswalks are installed at uncontrolled intersections, longitudinal (zebra) markings should be used.
  - The maintenance cost for crosswalks shall be weighed against the frequency of use and associated risk. Engineering judgment should be used in determining where the marked crosswalks are installed. If the pedestrian crossing traffic is minimal or the number of conflicting vehicles is minimal, consideration should be made for not installing the marked crosswalk. The general rule is to not install marked crosswalks at stop controlled crossings in residential neighborhoods unless they are known to be significant pedestrian routes.
  - Crosswalks should be placed on minor street approaches onto higher functional classified streets with higher traffic volumes and also in downtown areas with higher pedestrian activity.
  - Consideration should be made to not provide marked crosswalks on approaches that do not have adequate pedestrian facilities, (ie. sidewalk, bike path).
  - Where marked crosswalks are installed at controlled intersections, stop bars shall be installed in advance of the crosswalk.
  - Marked crosswalks shall be installed at crossing guard locations.
  - Where the accident data or observations of conflicts identify a crosswalk of particular concern, consider special treatments.
  - The width for marked crosswalks should not be less than 6 ft.
  - The crosswalk lines should extend the full length of the crossing.

- Transverse crosswalk line markings shall consist of solid lines 12 inches wide unless otherwise directed by City staff. The markings shall not be less than 6 inches wide nor greater than 2 ft wide.
- Longitudinal markings should be 1 to 2 ft wide and spaces 1 to 5 ft apart.
- All crosswalk markings shall be white, per the MMUTCD.

## F. CONTROLLED LOCATIONS

The following represents the best practices and special treatments.

### 1. BEST PRACTICES

The following is the recommended, or best practice, for pedestrian treatments in crosswalks at signalized intersections or stop-controlled approaches (i.e., vehicles stop at approach in question).

- Pedestrian signals should be timed for a pedestrian travel speed of 3 to 3.5 feet per second. If there are special land uses such as senior centers or schools within 100 feet of the intersection, slower walking speeds (2.5 feet per second) may be considered.

The following two situations are exceptions to the policy of marking crosswalks on all approaches.

- Crossing locations with heavy right- or left-turn volumes that occur during the same signal phase as the conflicting pedestrian movement where protected signal phasing for the heavy movement or other solutions are infeasible.
- Intersections with inadequate sight distance of pedestrians. Elimination of crosswalks in these instances should only occur after other solutions have been deemed infeasible.

### 2. SPECIAL TREATMENTS

There are a number of innovative treatments for pedestrians at signalized intersections, mostly related to pedestrian signals. At locations with high pedestrian volumes and pedestrian-vehicle conflicts, the following measures are means to enhance the safety of pedestrian crossings.

## 2.1 HIGH NUMBERS OF TURNING VEHICLES

The Animated Eye Light Emitting Diode (LED) Signal is a tool for reminding pedestrians to watch for turning vehicles. It would normally be used at intersections with large numbers of turning vehicles (vehicles turning left or right into the crosswalk).

Early Release or pedestrian lead-time, allows pedestrians to establish themselves in the crosswalk, reducing conflicts between pedestrians and turning vehicles.

Special Pavement stencils such as “Pedestrians Look Left” or “Watch Turning Vehicles” stencil are used in Salt Lake City, Halifax, N.S., Canada, and the UK to remind pedestrians to be watchful. These stencils, used in conjunction with special signage, significantly reduced the number of pedestrians not looking for threats at intersections. Additionally, high-visibility crosswalks help channelize pedestrians.

Other special treatments include “Yield to Pedestrians” signs, and reduced corner radii to slow the speeds of right-turning vehicles. The curb radius should accommodate the expected amount and type of traffic for safe turning speeds. As the curb radius increases, incomplete stops become more frequent and drivers make turns at higher speeds.

Whenever possible, especially at locations adjacent to pedestrian generators, intersections should be designed without “free rights” for vehicles unless the operations necessitate the inclusion of “free rights.”. When “free rights” are necessary, the standards set forth by the American Association of State Highway and Transportation Officials (AASHTO) for the recommended design will be followed.

## 2.2 HIGH NUMBERS OF PEDESTRIANS

Pedestrian “scramble” phases, so called because pedestrians have a walk signal in every direction while vehicles have a red light on all approaches. This treatment may be considered in central business districts where pedestrian volumes are exceptionally high.

“No Right Turn on Red” restrictions for vehicles reduce pedestrian-vehicle conflicts at locations with high numbers of pedestrians, but make vehicle circulation less convenient and may cause traffic diversions. This type of treatment needs to be considered on a case-by-case basis. Traffic signal service levels need to remain at acceptable levels.

Advance stop lines or yield lines are stop or yield bars placed four feet in advance of the crosswalk. Advance stop lines or yield bars should be considered based on pedestrian volumes, generators and safety concerns relevant to a specific crossing.

## 2.3 WIDE INTERSECTIONS

Countdown signals are to be used at all new signalized locations where pedestrian activity is maintained. The countdown signal effectively communicates the amount of time left to cross the street. At wide streets with medians, there should be adequate crossing time for the pedestrian to traverse the entire distance.

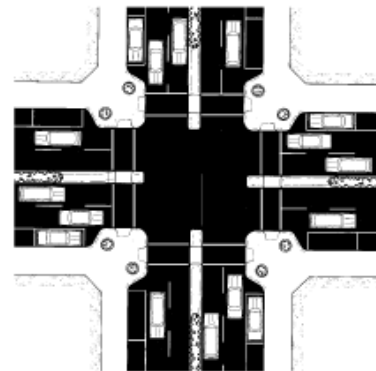
Pedestrian Refuge Islands should extend through the crosswalk, with a curb cut for wheelchair accessibility. Refuge islands should be clear of obstructions and have adequate drainage. They should be at least 6 feet long or the width of the crosswalk (whichever is greater) and 60 feet square. At actuated pedestrian signals, an accessible pedestrian push button should also be located in the median. Recommended refuge island widths are as follows.

TABLE 2 – RECOMMENDED REFUGE ISLAND WIDTHS

Speed	Minimum Width*
25-30 mph	5 feet
30-35 mph	6 feet
35-45 mph	8 feet

\* Where bikes are expected to use the crosswalk, medians should be at least six feet wide, the length of an average bike.

Curb Extensions/Bulbouts are appropriate at locations with usable space next to the curb. Consider bulbouts at intersections of three or more lanes. Bulbouts should not extend further than six feet into the street adjacent to parallel parking, or 12 feet adjacent to diagonal parking. At locations with no on-street parking, bulbouts should not impede bicycle travel.



*Medians and bulbouts create short pedestrian crossings*



## 2.4 PEDESTRIAN ACTUATED SIGNALS

At pre-timed signals, pedestrians get the signal to walk on every crossing, in every signal cycle. However, many signals are not pre-timed, meaning vehicles activate them. These signals have pedestrian push-buttons, which pedestrians must push in order to get a walk signal and adequate time to cross the street.

- At locations where pedestrian activation is registered for greater than 75 percent of the peak hour signal cycles, signals could be set to accommodate pedestrian crossings in every peak period cycle.
- At locations that are not on a direct path to a generator with low side-street volumes, signals should be partially-actuated, meaning that pedestrians crossing the side streets get a WALK signal on every cycle, but pedestrians crossing the main street must use the pedestrian push button.
- At locations that do not satisfy the location warrants above, where peak hour vehicle congestion and high vehicle volumes occur on all approaches, signals should be fully-actuated.



When pedestrian push buttons are used, they should be well-marked, visible, and accessible to all pedestrians from a flat surface, consistent with the Minnesota MUTCD and recommendations from the U.S. Department of Transportation's Designing Sidewalks and Trails for Access.

## G. UNCONTROLLED LOCATIONS

This section describes best practices for considering the installation of crosswalks at uncontrolled intersections and mid-block locations, safety considerations, and special treatments in locations where special consideration is recommended.

### 1. WHEN TO INSTALL CROSSWALKS AT UNCONTROLLED INTERSECTIONS

The following is the recommended or best practice, for pedestrian treatments at uncontrolled approaches to intersections that are not controlled by traffic signals or stop signs (the most common crosswalk of this type will be at intersections where a minor side street has a stop sign and a major street is uncontrolled).

Crossings should be marked where all of the following occur.

- Sufficient demand exists to justify the installation of a crosswalk (see Demand Considerations below)
- The location is 300 feet or more from a controlled crossing location
- The location has sufficient sight distance (sight distance in feet should be greater than 10 times the speed limit), and/or sight distance will be improved prior to crosswalk marking
- Safety considerations do not preclude a crosswalk (see Safety Considerations at Uncontrolled Locations below)

Uncontrolled crossings should be identified as a candidate for marking if there is a demonstrated need for a crosswalk. Need can be demonstrated by

- 20 pedestrians per hour during the peak hour or 60 pedestrians total for the highest consecutive four hour period
- or:
- The crossing is on a direct route to or from a pedestrian generator, such as a school, library, senior center, shopping center, park, or employment center

## 2. WHEN TO INSTALL CROSSWALKS AT MID-BLOCK LOCATIONS

Mid-block crossings should be marked where the following occur.

- Sufficient demand exists to justify the installation of a crosswalk (see Demand Considerations below)
- The mid-block location is 300 feet or more from another crossing location (most of the downtown area has blocks that are 300 feet in length)
- The mid-block location has sufficient sight distance (sight distance in feet should be greater than ten (10) times the speed limit)
- Provision of a crossing would channelize potential jay-walkers to a suitable crossing location
- Safety considerations do not preclude a crosswalk (see below, Safety Considerations at Uncontrolled Locations)

Where mid-block crosswalks are installed, the default design should be with high-visibility pavement treatments. The installation of mid-block crosswalks requires approval of the City Council. Candidate locations for marked pedestrian crossings at mid-block locations should meet one of the following criteria:

- 40 pedestrians during a one-hour period or 25/hour for four consecutive hours
- A pedestrian generator is less than 300 feet away at a location mid-way between signal or stop-controlled intersections, or there are significant pedestrian trip generators on both sides of the street

### 3. SAFETY CONSIDERATIONS AT UNCONTROLLED LOCATIONS

The flowchart on p. 13 and corresponding tables on p. 14-17 should be used to determine if special treatments are needed to ensure safe crossing at uncontrolled locations (see below for examples of special treatments). Where safety concerns would continue even with special treatments, pedestrian signal warrants, established in the current Minnesota Manual on Uniform Traffic Control Devices (MMUTCD), should be tested to determine whether the crossing warrants a signal. In the event that a signal is determined to be inappropriate, the crosswalk should not be marked.

At all uncontrolled intersections where marked crosswalks are installed at intersections or mid-block, appropriate signing as identified in the current MMUTCD shall be installed. The current 2005 MMUTCD suggests a W11-2 sign in advance of the crosswalk and a W11-2 sign with a down arrow plaque to be installed at the crosswalk.

A crosswalk should not be installed if sight distance in feet is less than ten times the speed limit. For example, if an intersection has an approach speed of 25 miles per hour, the unrestricted view of pedestrians by motorists should be at least 250 feet.

### 4. SPECIAL TREATMENTS FOR UNCONTROLLED LOCATIONS

Where marking a crosswalk is deemed appropriate at an uncontrolled crossing location on either a multi-lane street (three or more lanes) or on two-lane streets with ADT greater than 12,000 or where the posted speed limit exceeds 30 miles per hour then the crossing should be a high-visibility style. This may include such options as additional lighting, in pavement reflectors, or higher reflectivity markings.

Additional special treatments can be considered at areas with heightened safety concerns. See the noted manuals on page 13 for guidance on choosing crosswalk treatments for different street types, with crosswalk treatments chosen from level one, two and three devices outlined below.

## 4.1 LEVEL ONE

Median installation - On multi-lane streets with ADT of less than 15,000 and 85th percentile speeds of less than 35 miles per hour, the FHWA research described earlier in these guidelines concludes that provision of a median can address safety concerns.

Split Pedestrian Crossover (SPXO) – The SPXO is a pedestrian refuge that channels pedestrians, using railings, to cross one half of the street; enter the island at one end; walk towards the flow of traffic; and exit at the other end to cross the second half of the street. SPXOs can improve pedestrian safety on streets with ADTs below 45,000, with advance yield markings (triangles 16 inches wide by 24 inches long separated by 9 inches located 30 to 50 feet in advance of the crossing), “Yield to Pedestrians” signage, and good visibility, especially at night. This special treatment is primarily used at mid-block locations.

Curb Extensions/Bulbouts (intersection crossing) – Each corner of the intersection is extended into the intersection by approximately seven to eight feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.

Curb Extensions/Bulbouts (mid-block crossing) – Curbs are extended into the street by approximately seven to eight feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.

## 4.2 LEVEL TWO

Overhead signs and flashing beacons – Various signs showing the universal pedestrian symbol, including both standard yellow, fluorescent yellow, and LED displays, hang from a mast arm that extends over the street.

In-pavement flashers – Installed with a flashing sign at the crosswalk and advanced flashing sign. Installed with audible warning, advance signs, rumble strips, and single sided indication, per MMUTCD requirements.

## 4.3 LEVEL THREE

Pedestrian- actuated signal at locations where pedestrian volumes warrant a signal.



## H. TRAIL CROSSINGS

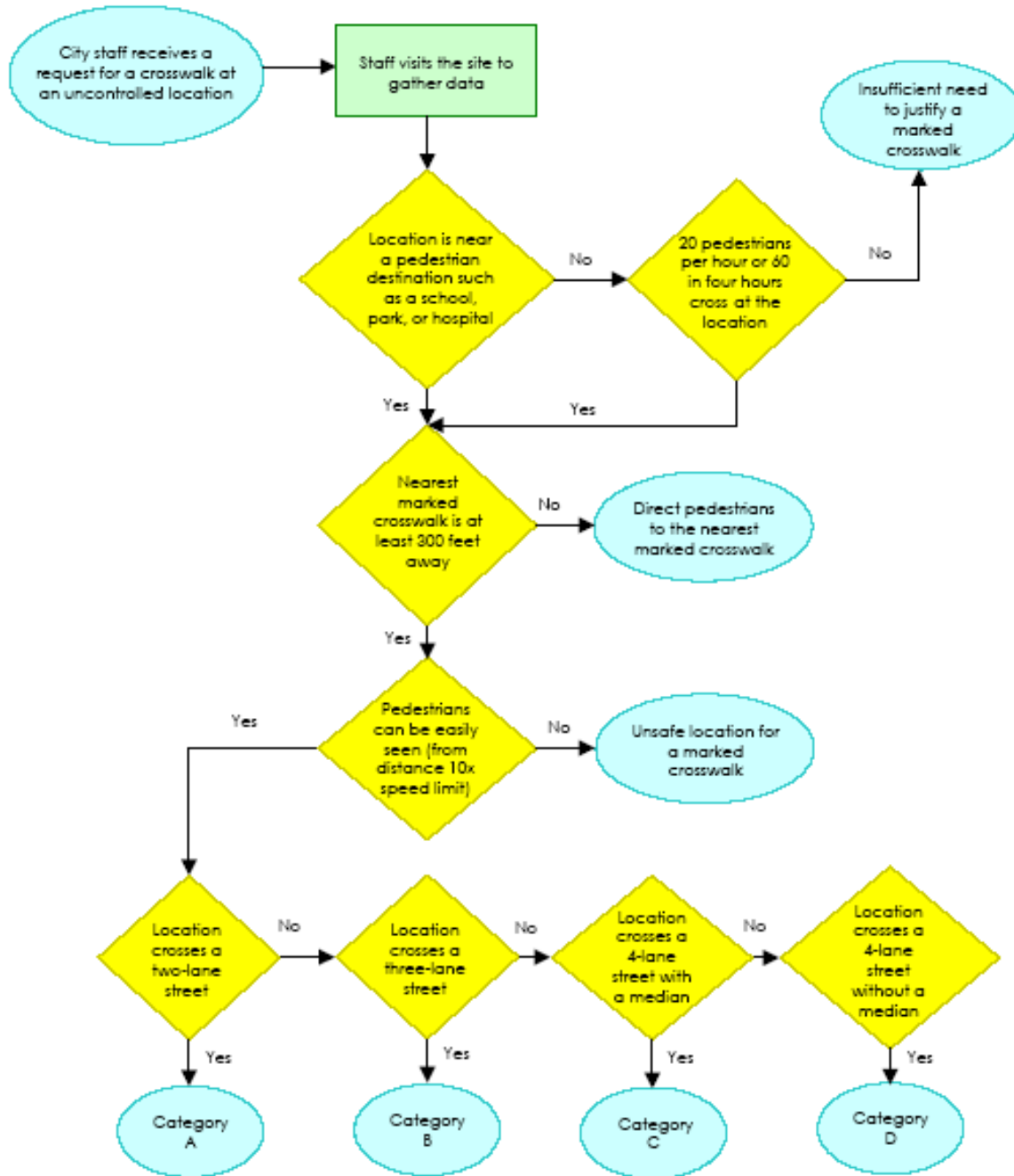
At locations where a multi-use trail crosses a street, the location of the crossing (mid-block or intersection) should determine what type of safety considerations are used to determine whether or not to mark a crosswalk. The standards set in the Mn/DOT Bikeway Facility Design Manual will be followed as needed.

Trail crossings should be well-lit and well-signed. At all uncontrolled at-grade trail crossings, traffic calming and signage within 150 to 200 feet of the crossing should be considered. Warning signs should be installed within 30 to 50 feet of the crossing.

If the crossing does not meet the demand or safety considerations for installation of a marked crosswalk and the nearest signalized crossing location is: 300 feet or more away on an arterial street; 200 feet or more away on a collector street; or 100 feet or more away on a local street, signage and landscaping should be used to direct both cyclists and pedestrians to the adjacent signalized crossing. However, if the nearest signalized crossing is greater than 150 feet away and the location does not meet safety considerations for a marked crosswalk, and other at-grade treatments are infeasible, a grade-separated bicycle-pedestrian crossing should be considered.

The flowchart on p. 13 and corresponding tables on p. 14-17 provide guidelines for choosing appropriate treatment options for pedestrian crossings at uncontrolled locations, based on number of travel lanes, average daily traffic (ADT) and other factors.

# CROSSWALK PLACEMENT FLOWCHART FOR UNCONTROLLED LOCATIONS



**FIGURE 2**

Source: This is taken from the City of Stockton, CA “Pedestrian Safety and Crosswalk Installation Guidelines”

The following charts summarize the type of crossing treatments appropriate for uncontrolled crossing locations within each category

TABLE 3 – CATEGORY A: TWO-LANE STREETS

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	Standard Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000			
12,000 to 15,000	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or bridge
15,000 or more			

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

TABLE 4 – CATEGORY B: THREE-LANE STREETS\*

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000		High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or bridge	Pedestrian signal (Level 3 device) or bridge
15,000 or more			

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

\* Refers to streets with one lane in each direction and a center two-way left-turn lane.

TABLE 5 –CATEGORY C: FOUR OR MORE LANES WITH A RAISED MEDIAN

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000		High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices		Pedestrian signal (Level 3 device) or bridge
15,000 or more	Pedestrian signal (Level 3 device) or bridge	Pedestrian signal (Level 3 device) or bridge	

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"



TABLE 6 – CATEGORY D: FOUR OR MORE LANES WITHOUT A RAISED MEDIAN

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge or other Level 1 device	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000	High Visibility Crosswalk plus a pedestrian refuge or other Level 1 device	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or pedestrian bridge
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices		
15,000 or more	Pedestrian signal (Level 3 device) or pedestrian bridge	Pedestrian signal (Level 3 device) or pedestrian bridge	

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

## I. CURB RAMPS

The State of Minnesota maintains definitions and standards for curb ramp installation. Curb ramps provide street and sidewalk access to pedestrians using wheelchairs. The current standards require a minimum of a single curb ramp at each corner and the use of truncated domes. Dual ramps are preferable to a single ramp design and should be provided as right-of-way and crosswalks allow. Dual ramps are desirable to direct pedestrians to the correct alignment of the crosswalk, and where feasible, opposing curb ramps should align.

The correct placement and design of the curb ramps shall be based on the requirements located within the American Disabilities Act, the MMUTCD, and the Minnesota Department of Transportation standard plates 7036F1: Pedestrian Curb Ramp for the Handicapped and 7036F2: Detectable Warning Detail for the Handicapped.

***APPENDIX B – CITY OF NORTHFIELD  
USE AND APPLICATION GUIDELINES FOR THE  
RESIDENTIAL ALL-WAY STOP CONTROL JUSTIFICATION WORKSHEET***

The residential all-way stop control justification worksheet was developed in order to respond to increasing requests by residents for all-way stop control to address safety concerns in their neighborhoods. In following the intent of the recommended policy and procedures for residential all-way stop control; this worksheet was developed to evaluate the speed, volume, site distance, traffic accident, and pedestrian activity criteria for the subject intersection request.

This policy and procedure is intended only for local/residential neighborhood street intersections with speed limits of 30 mph. Higher functional classification streets such as major collector or arterial streets are not applicable to this Policy Procedure and the standard All-Way Stop Control Warrants in the Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) apply.

Following are directions for completing the worksheet.

**Functional Classification Review**

The first step in this process is to review the current City Transportation Plan to verify that the subject intersection is not on a designated major collector or arterial street. If the subject intersection is on a major collector or arterial street the MnMUTCD supersedes this procedure and the MnMUTCD warrants for All-Way Stop Control shall be applied.

**Residents Petition**

Once the petition for residential all-way stop control has been submitted to the City, a review is made of the number of “households” within 300 feet of the intersection that have signed the petition. Either through the site survey or by use of appropriate mapping, the “total” number of households is determined within 300 feet from the center of the subject intersection and along the streets that would be affected by the AWSC. From the number of households (not the number of residents) signed on the petition and the total number of households within 300 feet of the subject intersection, the percent of households signing the petition is made. At least 51 percent of the total number of households within 300 feet of the subject intersection must have signed the petition.

## **Approach Speeds**

Based on the speed data collected for the uncontrolled approaches to the subject intersection enter these speeds in the blanks on the worksheet and mark two boxes on the worksheet, one for the highest 85th percentile speed and one for the highest recorded speed group with 2 or more observations.

## **Traffic Volumes**

Based on the average daily approach traffic volumes collected at the subject intersection, enter the approach traffic volumes in the blanks on the worksheet and mark two boxes on the worksheet, one for the major street “total” approach volume (both approaches) and one for the highest minor street approach volume (doubled or times two).

## **Sight Distance**

Based on the site survey, determine if the available site distance on each uncontrolled approach to the subject intersection is adequate. This can be done by driving or walking those uncontrolled approaches and stopping at a “point” 300 feet and also at 450 feet from the subject intersection. At each of these locations look to see if some feature on the controlled approach like a car, curb, sign or other appropriate feature is visible from that location. Measure the distance between a “point” at 300 feet and also at 450 feet from the center of the subject intersection using either a vehicle installed distance measuring instrument (DMI) or measuring wheel.

Mark the box and score 60 points on the worksheet if the sight distance is less than 300 feet (unsafe condition). Where the controlled approach is not visible from the 300 foot point.

Mark the box and score 10 points if the sight distance is greater than 300 feet but less than 450 feet (uncomfortable condition). Where the controlled approach is visible at the 300 foot point but not at the 450 foot location.

## **Other Conditions**

Based on traffic accidents recorded by the City police for the last 12 month period enter the number of accidents (not number of vehicles or persons involved) in the blank space. Multiply this number of accidents by 10 points and enter the score in the adjacent box.

Based on the site survey and other available information mark the box and score 20 points if there is significant pedestrian activity crossing the subject intersection caused by a nearby school, park, bus stop or other pedestrian generator.

## **Worksheet Results**

Total the points scored for each category box marked or the points for accident history and enter that total in the total points box. If the total point score is greater than or equal to 120, all-way stop control may be justified at the subject intersection. The final recommendation to install All-Way Stop Control at the subject intersection will be made based on the results of this worksheet and the professional judgment of the City Staff.



**CITY OF NORTHFIELD DEPARTMENT OF PUBLIC SERVICES**  
**RESIDENTIAL ALL-WAY STOP CONTROL REQUEST POLICY/PROCEDURES**

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Due to the increasing number of requests for all-way stop control and to address concerns for vehicle speed and safety in residential neighborhoods, the City established this traffic all-way stop control policy.

This policy provides a procedure to respond to requests for all-way stop control in residential neighborhoods and to address the safety and quality of life issues related to these concerns. It is the intent of this policy to address the need for a review, screening and justification procedure for the installation of all-way stop control in residential neighborhoods.

The Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) establishes “warrants” for all-way stop control. However, these warrants are not intended to address the conditions present on residential neighborhood/local streets. These Mn/MUTCD warrants are intended to address the conditions present on higher functional classification roadways such as major collector and arterial streets.

The City of Northfield residential all-way stop control policy recognizes that there are conditions that may justify all-way stop control at local residential street intersections. These predominant causes or conditions are related to vehicle speed, traffic volume, sight distance, pedestrian activity and traffic accident history. It also recognizes that there must be a method to screen requests for all-way stop control in order to reduce the indiscriminate use of all-way stop control where it is not justified.

Upon receiving an initial request for all-way stop control the city will provide the interested party with an informational flyer describing the policy and procedure and specific information concerning all-way stop control, what it can and cannot do for the neighborhood, what the likely side effects of all-way stop control are, what cautions should be considered, and who they should contact at the city should they choose to go forward with their request for all-way stop control. Along with this flyer, a petition form and instructions for use will be attached in order to obtain support in the form of signatures from the neighborhood.

Should the neighborhood decide to go forward with their all-way stop control request, they should complete the attached petition form and submit this petition to the City of Northfield Engineering Division, 801 Washington Street, Northfield, MN. Once this signed petition has been received by the Engineering Division a site survey and traffic data collection will be scheduled for the subject intersection. This site survey and data collection can be done only from May through October due to weather related conditions.

This site survey will include traffic volume counts on all intersection legs and an approach speed survey on the uncontrolled approaches. A review of sight distance, pedestrian use and traffic accident history for the past 12 months will also be completed.

When the site survey/traffic data collection has been completed, the subject site will be evaluated based on a worksheet system where points are scored for the various speed, volume, sight distance, traffic accident history and pedestrian use criteria. When a minimum point threshold is reached or exceeded the all-way stop control may be justified. The final recommendation to install all-way stop control will be made based on this evaluation and the professional judgment of the appropriate city staff. The site evaluation, data collection, and staff recommendation will be completed within 60 days of receipt of the submitted petition.

Once the final recommendation to install all-way stop control has been given, for the subject intersection the appropriate Resolution for City Council action will be prepared and included in the agenda for the next available City Council meeting. The neighborhood will also be notified of this action.

If the final recommendation for the subject site is not to install all-way stop control, the neighborhood will be notified of that decision and provided additional materials relative to their case and what other actions or measures could be considered.

## **Is All-Way Stop Control the right prescription for your residential neighborhood street intersection?**

- Symptoms--speeding vehicles, higher traffic volumes, concern for child and adult safety. It is reasonable that neighborhoods be concerned for speeding vehicles and safety issues and general neighborhood wellness
- All-Way Stop Control--is it effective in treating your neighborhoods safety concern? AWSC has been shown to be effective in diverting or redistributing high “through” traffic volumes. But the data show that they are not very effective in reducing overall travel speeds or increasing safety in typical residential neighborhoods.
- Side Effects--negative side effects from the installation of an All-Way Stop, like increased rate of stop sign violators, plus increased acceleration/deceleration, noise, auto emissions, fuel consumption and travel delay.
- Cautions: Don’t allow a false sense of security to develop. The street should not be considered a safe area to play in or along side under any circumstances even with an all-way stop in place. Over use of AWSC can lead to contempt and non-compliance of this important traffic control.
- Schedule an appointment--submit a request for all-way stop control with a petition signed by neighbors in favor of the all-way stop.
- Physical Examination-- taking the pulse of your neighborhood intersection. The city will schedule traffic data collection and site survey of your intersection after they receives the petition/request for AWSC. This activity includes traffic counts, speed measurement and site survey. This site survey and data collection activity can only be done from May through October due to weather conditions.
- Diagnosis and Treatment--based on the traffic data collected and conditions present at your neighborhood intersection the city will determine if all-way stop control is justified and would be an appropriate form of treatment in your case. If not, some other form of treatment may be indicated.
- Other treatments available--increased traffic law enforcement, “neighborhood watch,” and neighborhood communication and education programs.
- To proceed with your request for all-way stop control please circulate a petition for this All-Way Stop Control through the neighborhood (all residents within 300 feet from the subject intersection and along the affected streets). When the neighborhood residents have signed this petition please submit this petition to the Engineering Division at City Hall, 801 Washington Street, Northfield, MN, (507) 645-3020.

# CITY OF NORTHFIELD

DEPARTMENT OF PUBLIC SERVICES

## RESIDENTIAL STREET ALL-WAY STOP CONTROL JUSTIFICATION WORKSHEET

INTERSECTION LOCATION: \_\_\_\_\_

EXISTING TRAFFIC CONTROL: \_\_\_\_\_

DATE: \_\_\_\_\_

This Residential Street All-Way Stop Control Justification Worksheet is applicable only to intersections of residential streets with speed limits of 30 miles per hour. This procedure is "not" to be applied to the intersection of a local residential street with a major collector or arterial street as identified in the City's Transportation Plan.

### RESIDENTS' PETITION

A petition has been submitted to the City which has been signed by more than 50% of the residents within 300 feet of the subject intersection and who live on the streets that would be affected by the requested All-way Stop Control.

SUBMITTED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

### APPROACH SPEEDS

**1** **2**

Uncontrolled approach speed. Check two boxes, one for the 85th percentile approach speed group and one for the highest recorded speed group with two or more observations.

27.5 miles per hour or less

0 points

☐ ☐

27.6 to 32.5 miles per hour

10 points

☐ ☐

32.6 to 37.5 miles per hour

20 points

☐ ☐

37.6 to 42.5 miles per hour

30 points

☐ ☐

42.6 to 47.5 miles per hour

40 points

☐ ☐

47.6 to 52.5 miles per hour

50 points

☐ ☐

52.6 miles per hour or more

60 points

☐ ☐

**1** = 85th percentile approach speed (highest approach).

**2** = highest recorded speed group with two or more observations.

### TRAFFIC VOLUMES

**1** **2**

Intersection approach daily traffic volume. Check two boxes, one for the total major street approach volume and one for the highest minor street leg.

Less than 250 vehicles per day

0 points

☐ ☐

250 to 450 vehicles per day

10 points

☐ ☐

450 to 700 vehicles per day

20 points

☐ ☐

700 to 1000 vehicles per day

30 points

☐ ☐

More than 1000 vehicles per day

40 points

☐ ☐

**1** = total daily traffic volume for both major street approaches.

**2** = highest minor street approach daily traffic volume (times two).

### SIGHT DISTANCE RESTRICTION

The safe stopping sight distance on any uncontrolled approach is restricted to less than 300 feet by horizontal and/or vertical roadway alignment, or by other "permanent" obstructions to sight distance.

60 points

☐

The safe stopping sight distance on any uncontrolled approach is greater than 300 feet but less than 450 feet due to horizontal and/or vertical roadway alignment, or other "permanent" obstructions to sight distance.

10 points

☐

### OTHER CONDITIONS

The number of reported traffic accidents at the subject intersection within the past 12 months = \_\_\_\_\_

x (times)

10 points = \_\_\_\_\_

School, park, bus stop or other major pedestrian generator causing many pedestrians to cross the subject intersection.

10 points

☐

PREPARED BY: \_\_\_\_\_

Total Points

If the worksheet point total is greater than or equal to 120, all-way stop control may be "justified" at the subject intersection. See the reverse side of this worksheet for an explanation of the results of this review and the status of this request.



# CITY OF NORTHFIELD

DEPARTMENT OF PUBLIC SERVICES

## RESIDENTIAL STREET ALL-WAY STOP CONTROL JUSTIFICATION WORKSHEET

### RESULTS AND STATUS OF THIS RESIDENTIAL STREET ALL-WAY STOP CONTROL REVIEW

<u>Total Points</u>	<u>Results and Status</u>
120 +	Conditions at the subject intersection may "justify" installation of residential street all-way stop control. After further review, a final City staff recommendation will be made based on the results of this worksheet and professional judgement. If the recommendation is to install All-way Stop Control a City Council Resolution will be prepared and submitted for Council action on the next available City Council agenda. Once the City Council has approved this Resolution the all-way stop control will be installed as soon as work schedules permit.
100-120	Conditions at the subject intersection "do not" justify installation of residential street all-way stop control at this time. However, conditions do warrant further future review. In approximately 12 months the City staff will initiate contact with the neighborhood to verify continued interest in all-way stop control installation at this intersection. If so, traffic data collected will be updated and the intersection re-evaluated. After one re-evaluation that results in 90 points or less the neighborhood will be required to submit a new petition at such time that they feel conditions have changed significantly and continue to want All-way Stop Control.
< 100	Conditions at the subject intersection "do not" justify installation of residential street all-way stop control at this time. However, further review may be justified at some future time. After two or more years, or after the neighborhood feels there has been a significant change in conditions, the neighborhood can submit a new petition for residential street all-way stop control at this intersection.

Should there be any questions or comments concerning this review please contact the Engineering Division at 507-645-3020.

# CITY OF NORTHFIELD

DEPARTMENT OF PUBLIC SERVICES

**RESIDENTS' PETITION FOR RESIDENTIAL STREET ALL-WAY STOP CONTROL REVIEW****INTERSECTION LOCATION:**

**Neighborhood Representative:**

Date: \_\_\_\_\_

**Representative's Address:****Phone:**

We, the undersigned residents of the neighborhood within 300 feet of the above referenced intersection and residing on the subject streets, petition the City of Northfield to undertake a review of conditions at this intersection in consideration of installation of Residential Street All-way Stop Control. This Petition is submitted to the City in response to concern for safety and well being in the neighborhood. Specific concerns identified for each household are listed as follows (choose one or two most important):

### 1. Speeding Traffic

## 2. Traffic Volume

### 3. Through Traffic

#### 4. Sight Distance

## 5. Traffic Accidents

6.  
Other  
(state)

**HOUSEHOLD ADDRESS**

**HOUSEHOLD SIGNATURE**

**CONCERN #**[illegible][illegible][illegible]

# **CITY OF NORTHFIELD TRANSPORTATION PLAN UPDATE**

## **PARTNERING AGENCY STAKEHOLDER WORKSHOP**

Thursday, November 15, 2007  
9:00 – 10:30 AM  
City Hall – Council Chambers

### **INVITED**

John McCarthy, City of Dundas  
John Dudley, Waterford Township  
Richard Moore, Greenvale Township  
Mike Groth, Northfield Township  
Gary Ebling, Bridgewater Township  
Greg Paulson, P.E., Mn/DOT District 6 – Rochester  
Lynn Clarkowski, P.E., Mn/DOT Metro District – South Area  
Dennis Luebbe, P.E., Rice County Highway Department  
Mark Krebsbach, P.E., Dakota County Transportation Department  
Joel Wager, Mn/DNR Trails and Waterways

### **PARTICIPANTS**

John Dudley, Waterford Township  
Scott Peters, Dakota County  
Dennis Luebbe, Rice County (input received by email)  
Chris Moates, Mn/DOT (input received by email)  
Katy Gehler-Hess, City of Northfield  
Joel Walinski, City of Northfield

**FACILITATORS:** Bolton & Menk, Inc. – Chris Chromy, Gina Mitchell, Bryan Nemeth

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**Workshop Purpose:** Provide a forum for other public agencies to express how their needs and challenges, as well as potential solutions, fit into the context of the transportation system in and around Northfield. Each agency was asked to summarize their top 3 priorities they would like the City of Northfield to consider as the City updates its Transportation Plan.

Written comments regarding each participant's top 3 priorities are attached to this summary. Below is a summary of priorities identified within discussion of the meeting participants.

### Summary of Priorities

*Roadway Connectivity Needs* – Several developing areas were identified as lacking roadway connectivity and the need for new roadway corridors including:

- North-South between TH 19 and CSAH 23 (NW Corridor Study Area)
- East-West between developing areas east of the Cannon River and I-35 (Cannon River Bridge)
- North-South, west of the Cannon River, south of TH 19
- East-West between CSAH 23 and TH 3

*Existing and Anticipated Roadway Deficiencies*

- TH 19 capacity and pavement conditions between City and I-35
- County Road 96 between CSAH 23 and TH 3; Once paved, there is concern for new issues on TH 3 and CSAH 47.
- Lack of Connectivity between neighborhoods results in higher traffic volumes on collector and arterial roadways

*Agency Partnerships* – The established and developing partnerships were identified as necessary components in solving complex transportation issues facing Northfield. Partnerships established for the TH 19 Access Management Study, CSAH 1 Corridor Preservation Study, and Northwest Corridor Study should be maintained and further developed.



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# CITY OF NORTHFIELD

## TRANSPORTATION PLAN UPDATE

### BUSINESSES STAKEHOLDER WORKSHOP

Thursday, November 15, 2007  
1:00 – 2:30 PM  
Northfield Community Resource Center, Rm 103

**INVITED**

Northfield Area Chamber of Commerce  
Northfield Downtown Development Committee  
Holden Farms, Inc.  
Malt-O-Meal Company, Inc.  
McLane Company, Inc.  
Multek, Inc.  
Target/Cub Foods

**PARTICIPATED**

Jerry Anderson  
Jim Gleason  
Rob Taylor  
Larry Larson, Land Vista  
David Ludescher, Chamber  
Chris Sawyer, College City Beverage  
Joseph Kuchinka, Insurance Brokers of MN  
Rick Risberg, Frandseu Bank & Trust  
Mark DuChene, I&S Engineers and Architects  
Nancy Johnson, Northfield Lines Inc. Benjamin Bus Inc.  
Roy Barwelt, Multer  
John McCarthy, City of Dundas  
Tom McMahon, City of Dundas  
Kathy Filsllerieqqe, Northfield Chamber of Commerce  
Charlene Covlonbe Fiore, EDA Office  
Mary Quinn Ceou, Northfield Hospital  
Andrew Yurek, Northfield Hospital, EMS  
Katy Ciehler-Hess, City of Northfield  
Robert Bierman, Furniture & Flooring  
Marilyn Maas, Kwik Trip

**FACILITATORS:** Bolton & Menk, Inc. – Chris Chromy, Gina Mitchell, Bryan Nemeth

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Workshop Purpose: Provide a forum for roadway users to identify their needs and current challenges, as well as potential solutions. Each participant was asked to summarize their top 3 priorities they would like the City of Northfield to consider as the City updates its Transportation Plan.

Written comments regarding each participant's top 3 priorities are attached to this summary. Below is a summary of priorities identified by small group discussions.

### Summary of Priorities

*Roadway Connectivity Needs* – Several developing areas were identified as lacking roadway connectivity and the need for new roadway corridors including:

- North-South between TH 19 and CSAH 23 (NW Corridor Study Area), including second access to hospital from CSAH 23
- East-West between developing areas east of the Cannon River and I-35 (Cannon River Bridge)
- East-West between CSAH 23 and TH 3 (Thye Parkway, 320<sup>th</sup> Street)
- Ring Road concept and establishing a grid of roadways to help alleviate travel demand on TH 3 and TH 19
- Improving continuity of CSAH 23
- Need to integrate east-west & north-south corridor links now and stop pushing out further to the edges; needed internal and external to the city

### *Accommodating All Roadway Users*

- Roadways need to be designed to better accommodate buses, trucks, emergency vehicles, and other large vehicles, especially at intersections. Turn lanes are necessary.
- Collector streets need to be designed as collector streets, not residential streets
- Bicycle facilities should be included on some, but not all roads
- Connections need to be provided between different modes of transportation (i.e. sidewalks to access bus stops)
- Safety of pedestrian and bicyclists needs to be considered

### *Growth and Development Concerns*

- Growth should be encouraged on the north and west sides of the city so it can easily access I-35 and the metro area. Growth should be discouraged on the south and east sides of the city until sufficient corridors can be established
- Lack of connections between neighborhoods results in higher traffic volumes and congestion on collector and arterial roadways (i.e. Jefferson Parkway and TH 246)
- Maintaining accessibility to business districts along TH 19
- Future business park in northwest part of city would require improvements to Garrett/Decker Avenue, intersection with TH 19
- TH 246 and County Road intersections need improvements
- Paving of CR 96 may impact needed improvements to connect with CSAH 47

### *Existing Roadway Deficiencies*

- Woodley Street and Division Street Intersection needs turn lanes
- Woodley Street is too narrow and needs sidewalks
- Cedar Avenue needs sidewalks
- Jefferson Parkway, congested and portions do not accommodate buses or bicycles
- Emergency vehicles are held up by traffic signals, need preemption equipment
- Lack of Connectivity between neighborhoods results in higher traffic volumes on collector and arterial roadways
- CSAH 1 from between TH 246 & TH 3 intersection needs capacity and realignment improvements
- TH 19 & Laurel Court intersection needs improvements to accommodate turning movements
- New railroad crossings necessary to reduce congestion and allow for emergency vehicle access
- Lack of collector roadways with adequate mobility (roadway capacity and design speed) for responding vehicles to efficiently travel between emergency site and hospital
- TH 19 has safety and congestion problems, need additional lanes
- TH 3 transition from 4 lanes to 2 lanes

### *Implementation*

- Be proactive rather than reactive
- Lost opportunities due to political indecision is not acceptable
- Regional vision (Northfield, Dundas, Rice County, Dakota County & adjacent townships) to support improvements on CSAH 1, TH 19, and Northwest Corridor are necessary
- Acquire necessary right-of-way to meet long term needs
- Need a plan with timeframe to complete CSAH 1 & TH 19 corridor improvements
- Identify priorities in the transportation plan and establish community “buy-in” for correct engineering solution to transportation problem; focus on common good for the transportation system and not the vocal minority neighborhood interest
- Need to establish expertise to bring stakeholders together
- Need city staff person to be given directive to go out and obtain funding for identified priorities
- Many small scale, less expensive problem areas could be addressed versus a do nothing approach

# **CITY OF NORTHFIELD**

## **TRANSPORTATION PLAN UPDATE**

### **TRANSPORTATION PROVIDERS STAKEHOLDER WORKSHOP**

Thursday, November 15, 2007  
4:00 – 5:30 PM  
Northfield Community Resource Center, Rm 103

**INVITED**

Northfield Fire Department  
Northfield Police Department  
Northfield Hospital EMS  
State Highway Patrol  
Benjamin Bus, Inc.  
Deb Little, Northfield Transit  
Alice Sather, A & R Taxi, Inc.  
Tom Stringer, Northfield School District  
Perkins Specialized Transportation  
Taylor Truck Line, Inc.  
St. Olaf College  
Carlton College

**PARTICIPANTED**

Nancy Johnson, Northfield Lines Inc. Benjamin Bus Inc.  
Alice Thomas, Planning Committee  
Jared Welund, City of Northfield  
T.J. Heianicy, City of Northfield  
Deb Ritter, City of Northfield  
Alice Sutter, Taxi (A & R)

**FACILITATORS:** Bolton & Menk, Inc. – Chris Chromy, Gina Mitchell, Bryan Nemeth

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**Workshop Purpose:** Provide a forum for transportation providers to identify their needs and current challenges, as well as potential solutions. Each participant was asked to summarize their top 3 priorities they would like the City of Northfield to consider as the City updates its Transportation Plan.

Written comments regarding each participant's top 3 priorities are attached to this summary. Below is a summary of priorities identified by small group discussions.

### Summary of Priorities

*Roadway Connectivity Needs* – Several developing areas were identified as lacking roadway connectivity and the need for new roadway corridors including:

- North-South between TH 19 and CSAH 23 (NW Corridor Study Area), including second access to hospital from CSAH 23
- East-West between developing areas east of the Cannon River and I-35 (Cannon River Bridge)
- East-West between CSAH 23 and TH 3 (Thye Parkway, 320<sup>th</sup> Street)
- Ring Road concept and establishing a grid of roadways to help alleviate travel demand on TH 3 and TH 19
- Need to integrate east-west & north-south corridor links with an emphasis on mobility that are both internal and external to the city

### *Accommodating All Roadway Users*

- Connections need to be provided between different modes of transportation (i.e. sidewalks to access bus stops)
- Safety of pedestrian and bicyclists needs to be considered
- Need to consider locations for accessible helicopter landing areas for emergencies
- Bicycle facilities and public transit need to be better connected
- Connect transit facilities with south Twin Cities Metropolitan Area and Rice County
- Incorporate transit studies and plans into overall multimodal approach and include in transportation plan
- Options for pedestrian accessibility needs to be improved by better developing the system to provide for mobility and safe walking areas
- Consider relationship between stop signs and where park areas are accessed so children can safely cross streets

### *Growth and Development Concerns*

- Access to the downtown area is difficult, especially from the west; needs to be a balance between vehicle and pedestrian access; do not reduce parking

### *Existing Roadway Deficiencies*

- Roads need to be designed to an appropriate width to accommodate emergency vehicles and buses (e.g. leaving community center campus buses have to drive over curb because road is too narrow, fire trucks can't get into some cul-de-sacs)
- Roadways divided with a median do not allow school buses to stop traffic for children to cross to the other side of the street
- Develop and hold firm to accepted engineering design standards for collector and minor arterial roadways



- Private street standards can make areas difficult to access with emergency vehicles
- TH 3/Greenvale intersection – difficult to find gap to access TH 3 and make turning movement
- Greenvale, Jefferson Parkway (TH 3 to Division), North Avenue, and CSAH 1 are inadequate to serve their role as collector/arterial roadways; need to be improved to provide more mobility
- Signal needed at TH 3 and 3<sup>rd</sup> Street
- Greenvale has good access in an emergency to avoid conflicts with the railroad tracks, but street is narrow and hard to get through
- TH 19 has safety and congestion problems, need additional lanes

#### *Implementation*

- Need to push Mn/DOT to fund TH 19 improvements
- Don't use duplicative street names where the ending is the only difference (e.g. Cannon Road & Cannon Lane, etc.)
- Enforce traffic violations downtown after 10 PM
- Street signage placement and reflectivity need to be evaluated and improved
- Define emergency routes to access parts of the city

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# **CITY OF NORTHFIELD**

## **TRANSPORTATION PLAN UPDATE**

### **PUBLIC INFORMATION MEETING SUMMARY**

Thursday, November 15, 2007  
6:00 – 8:00 PM  
Northfield Community Resource Center, Rm. 103

**SIGNED-IN**

Dusty Budd  
Paul Caine  
Brian O'Connell  
Charlie Stark  
Shirley Falck  
James Crow  
Bruce Anderson  
Bill & Penny Cupp  
Adam Smith  
Philip Spensley  
Bill Ostrem  
Kris Vohs

Tracy Davis  
Lance Heisler  
Ron Griffith  
VMF Summ II  
Dixon Bond  
Betsey Buckheit  
Greg Colby  
Dorothea Hlossouc Holden  
Kathee Hanscom  
Erica Zweifel  
Lois Stratmoen  
Dan Hudson

**FACILITATORS:** Bolton & Menk, Inc. – Chris Chromy, Gina Mitchell, Bryan Nemeth

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**Open House Purpose:**

- Present the City's process for updating the Transportation Plan,
- Share preliminary information regarding existing average daily traffic volumes and congestion levels, 10-year crash history, and proposed roadway extensions,
- Present and discuss known issues,
- Receive and understand the public's most important transportation issues or problems that they would like the City of Northfield to consider

A general overview of the comments received during the meeting follow. Written comments received are attached to this summary.

*Roadway Connectivity Needs* – Several developing areas were identified as lacking roadway connectivity and the need for new roadway corridors including:

- North-South between TH 19 and CSAH 23 (NW Corridor Study Area), including second access to hospital from CSAH 23
- East-West between developing areas east of the Cannon River and I-35 (Cannon River Bridge)
- East-West between CSAH 23 and TH 3 (Thye Parkway, 320<sup>th</sup> Street)
- Ring Road concept and establishing a grid of roadways to help alleviate travel demand on TH 3 and TH 19

*Accommodating All Roadway Users*

- Collector streets need to be designed as collector streets, not residential streets
- Safety and mobility of motorized, non-motorized, commuter, and recreational users needs to be considered

*Growth and Development Concerns*

- Lack of connections between neighborhoods results in higher traffic volumes and congestion on collector and arterial roadways (i.e. Jefferson Parkway and TH 246)
- Carefully consider growth area; don't allow a significant amount of agricultural land to be converted to urban land uses, because area thrives based on its agricultural base
- Coordinate growth so roads and land use go hand in hand

*Existing Roadway Deficiencies*

- Lack of Connectivity between neighborhoods results in higher traffic volumes on collector and arterial roadways (e.g. North Avenue)
- TH 19 has safety and congestion problems, need additional lanes

*Implementation*

- Be proactive rather than reactive
- Regional vision (Northfield, Dundas, Rice County, Dakota County & adjacent townships) to support improvements on CSAH 1, TH 19, and Northwest Corridor are necessary
- Identify priorities in the transportation plan and establish community “buy-in” for correct engineering solution to transportation problem
- Evaluate goals and identify why they were outlined in the existing plan
- Integrate the transportation plan with the Comprehensive Plan
- Define the roles various roadways are to play in the overall roadway network

# **CITY OF NORTHFIELD TRANSPORTATION PLAN UPDATE PUBLIC INFORMATION MEETING SUMMARY**

Thursday, May 1, 2008  
6:00 – 8:00 PM  
Northfield City Hall

**SIGNED-IN**

See Attached Sign-In Sheets

**FACILITATORS:** Bolton & Menk, Inc. – Chris Chromy, Bryan Nemeth

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**Open House Purpose**

- Present the Transportation Plan elements for review and comment,
- Share information regarding existing and 2030 average daily traffic volumes and congestion levels with each of the three (3) bridge alternatives, 10-year crash history, proposed roadway extensions, roadway cross-sections, plan elements,
- Present and discuss known issues,
- Ensure that the public's most important transportation issues or problems are considered

A general overview of the comments received during the meeting follow.

1. A few comments that residents could see how the different bridge options affect the Northfield area, could see how CSAH 1 bridge would serve the overall needs of the community to get to I-35
2. No other significant issues with the presented information

### Three Written Comments

1. No transit system, it is too expensive and inefficient. Don't believe me? Take a look at the losses of the MSP system. NO NEW TAXES
2. What are the plans for a safe crossing of Hwy 3, north of 2<sup>nd</sup> Street. I see that trails cross it, but how will you make it safe? More safety for bikers and walkers.
3. First comment related to Northwest Corridor:
  - a. Prefer Option 1
  - b. 2<sup>nd</sup> Choice Option 2
  - c. 3<sup>rd</sup> Choice Option 3
  - d. Do not like Options 4 and 5
4. Question location of transportation hub west of Hwy 3 and south of Hwy 19
  - a. Poor accessibility

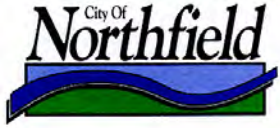




## Northfield Open House Meeting: May 1, 2008

TP = Transportation Plan  
 NW = Northwest Corridor Study  
 19 = Highway 19 Access Management Study

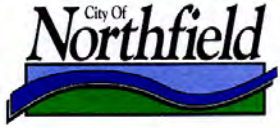
Name (PLEASE PRINT)	Address (PLEASE PRINT)	Interest in Plan (landowner, motorist, developer, elected official, etc.)	Meeting Attending (✓)		
			TP	NW	19
Victor Summa	812 St. Olaf				
Kate Lahti	1304 Cannon Valley Dr.	Former NW Area Trans. Task Force & Home Owner		X	
Kathleen Doran-Norton	10825 Farrel Ct.				
John Dudley	2418 320 <sup>th</sup> Street West	Northfield			
Gregory Langer	7050 320 <sup>th</sup> Street				
David and Susie Lorence	28625 Foliage Avenue				
Bev Wirtzfeld	7505 320 <sup>th</sup> Street West	landowner		X	
Alice Thomas	418 College Street	Planning Commission			
Dixon Bond	16 Fareway Drive	Co. Bd.	X	X	
Jim Brown		Co. Bd.			
Peg Prowe	619 East 9 <sup>th</sup>	Bike Connections	X	X	
Gloria J. Kiester	8400 Falk Avenue	owner			
Marcia R. Widman	212 North Lincoln Street	landowner			
Brenda Huntington	7171 300 <sup>th</sup> Street West	owner			



## Northfield Open House Meeting: May 1, 2008

TP = Transportation Plan  
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Name (PLEASE PRINT)	Address (PLEASE PRINT)	Interest in Plan (landowner, motorist, developer, elected official, etc.)	Meeting Attending (✓)		
			TP	NW	19
Edith Wirth	188 Spruce Drive, Apple Valley	landowner			
William Neil	1217 Hawthorne Ct.	landowner			
Arlene Fossum	1217 Hawthorne Ct.	landowner			
Robert and Sarah Entenmann	8945 Decker Avenue	owner			
Kathleen Hanson	5052 E. Lonsdale Blvd.	landowner			
Bill and Nicole Mueller	28650 Foliage Avenue	landowner			
Eric Dee	14000 Cannon Valley	motorist			
Dorthea Hrossowyc	8620 Wall Street Road	Landowner, long-time citizen			
Peter and Pamela Millin	900 Abbey Road	landowner			
Jenni Munnings	1400 Woodley East	Citizen, commuter, homeowner			
Bruce Morlan	Bridgewater Township	Dundas PC, BWTR TWP			
Richard Balke	8385 Dixon Avenue	Hwy 19			
Lorie and Becky Kjergaard	1736 Quie Lane	Hwy 19			
John Price	1212 Greenvale	Landowner			



## Northfield Open House Meeting: May 1, 2008

TP = Transportation Plan  
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Name (PLEASE PRINT)	Address (PLEASE PRINT)	Interest in Plan (landowner, motorist, developer, elected official, etc.)	Meeting Attending (✓)		
			TP	NW	19
Edith Nelson	29242 Isle	Greenvale Twp.			
Charlene Coulombe Fiore	1340 Heritage	EDA			
Brian O'Connell	City of Northfield	Comm. Dev.	X	X	X
Sarah Moore	290 <sup>th</sup> Street West	Landowner	X	X	X
Bob and Linda Gugerson	29075 Foliage Avenue	Landowner		X	
Alan Norton	10825 Farrel Ct.	Northfield			
John van der Linden	1500 St. Olaf Avenue	Student at St. Olaf		X	
Bruce Anderson	501 St. Olaf Avenue				
Edric Lysne	7559 330 <sup>th</sup> Street West	Northfield			
Shawn Lorence	28556 Foliage Avenue	Northfield			
Colleen M. Bucher	917 Cannon Valley Drive West			X	X
Philip Spensley	505 Lincoln Street North	Resident	X	X	X
Gretchen Baune	1511 Independence Drive	Resident	X	X	X
Dick Johnson	1304 Blue Phlox Ct.	Resident		X	X



## Northfield Open House Meeting: May 1, 2008

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Name (PLEASE PRINT)	Address (PLEASE PRINT)	Interest in Plan (landowner, motorist, developer, elected official, etc.)	Meeting Attending (✓)		
			TP	NW	19
Chuck Frame	4466 320 <sup>th</sup> Street West	Resident			
Ron Griffith	1412 Blue Flag Ct.	Resident			
Daryl and Sally Robinson	6525 280 <sup>th</sup> Street West	Landowner			
Erica Zweifel	406 Highland Avenue	Resident, bicycler	X		
Jeff Otto	25580 Dodd Blvd, Lakeville	Eureka Town Board			
Elise Eslinger	803 Thye Pkwy	Homeowner			
Richard Nasby	610 Thye Ct.	Homeowner, landowner		X	
Alice Nasby	610 Thye Ct.	Homeowner, landowner		X	
Rick Esterman	10541 Ibson Avenue	Resident			
Ann Occhiato	28351 Foliage Avenue	landowner	X	X	

# Appendix A

## Crosswalk Installation Policies & Guidelines



# Appendix B

Use & Application Guidelines for the  
Residential All-Way Stop Control  
Justification Worksheet

# Appendix C

## Stakeholder & Open House Meeting Summaries

# Appendix D

## Existing & Forecasted Traffic Volumes & Capacity Analysis

(No Bridge Option,  
Jefferson Parkway Bridge Option  
& CSAH 1 Bridge Option)

# Appendix E

Transportation Analysis Zone Forecasts

**Appendix D1 - Existing and Forecasted Traffic Volumes and Capacity Analysis - No Bridge Option**  
Major Collectors and Above  
City of Northfield

Roadway			Existing Characteristics					Historical Traffic										Forecasted Traffic									
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
TH	3	South of CSAH 1	MiA	4	yes	Divided	45	7,900		9,200		9,400		8,900	2.01%	0.673	0.121	0.40	MiA	4	yes	Divided	15,200	2.26%	0.547	0.112	0.49
		CSAH 1 to Cannon Lane	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.669	0.121	0.60	MiA	4	yes	Divided	18,100	1.26%	0.584	0.118	0.65
		Cannon Lane to Jefferson Parkway	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.609	0.115	0.52	MiA	4	yes	Divided	21,000	1.89%	0.560	0.115	0.71
		Jefferson Parkway to TH 246/Woodley Street	PA	4	yes	Divided	35	10,700		12,500		13,600		13,400	3.82%	0.582	0.123	0.59	MiA	4	yes	Divided	24,800	2.60%	0.575	0.119	1.00
		TH 246/Woodley Street to TH 19/5th Street	PA	4	yes	Divided	35	15,000		17,400		20,900		20,400	5.26%	0.572	0.122	0.88	MiA	4	yes	Divided	31,800	1.87%	0.598	0.123	1.38
		TH 19/5th Street to 3rd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.555	0.123	0.60	MiA	4	yes	Divided	26,900	2.73%	0.586	0.104	0.96
		3rd Street to TH 19/2nd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.546	0.125	0.60	MiA	4	yes	Divided	29,500	3.12%	0.558	0.105	1.02
		TH 19/2nd Street to Saint Olaf Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.580	0.114	0.67	MiA	4	yes	Undivided	24,500	1.98%	0.577	0.112	0.96
		Saint Olaf Avenue to Greenvale Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.577	0.116	0.68	MiA	4	yes	Undivided	24,200	1.93%	0.592	0.117	1.01
		Greenvale Avenue to Fremouw Avenue	MiA	4	yes	Undivided	45	12,500		14,500		15,300		15,300	3.43%	0.594	0.122	0.65	MiA	4	yes	Undivided	27,200	2.43%	0.581	0.113	0.95
		Fremouw Avenue to Sheldahl Road	MiA	2	yes	Undivided	45	8,700		9,900		9,700		8,700	0.00%	0.580	0.124	0.74	MiA	2	yes	Undivided	19,200	3.35%	0.565	0.100	1.15
		Sheldahl Road to CSAH 47	MiA	2	no	Undivided	55	8,700		9,900		9,700		8,700	0.00%	0.610	0.123	0.70	MiA	2	no	Undivided	15,400	2.41%	0.511	0.109	0.95
		CSAH 47 to CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.571	0.123	0.39	MiA	2	no	Undivided	11,100	2.97%	0.559	0.118	0.81
		North of CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.566	0.123	0.39	MiA	2	no	Undivided	10,700	2.81%	0.569	0.113	0.76
TH	19	West of Garrett Avenue	MiA	2	no	Undivided	55	7,400		8,700		9,400		9,100	3.51%	0.667	0.107	0.66	MiA	4	yes	Divided	32,800	5.49%	0.514	0.089	0.76
		Garrett Avenue to Eaves Avenue	MiA	2	no	Undivided	55	8,300		10,000		10,500		9,300	1.91%	0.692	0.105	0.72	MiA	4	yes	Divided	26,300	4.43%	0.598	0.074	0.58
		Eaves Avenue to CR 59/90th Street	MiA	2	yes	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.700	0.104	0.80	MiA	4	yes	Divided	35,400	5.73%	0.516	0.088	0.84
		CR 59/90th Street to Armstrong Road/Forest Avenue	PA	2	no	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.657	0.104	0.68	MiA	4	yes	Divided	34,700	5.64%	0.505	0.090	0.83
		Armstrong Road/Forest Avenue to Orchard Street	PA	2	no	Divided	45	8,500		10,100		11,100		10,600	3.75%	0.568	0.115	0.82	MiA	4	yes	Divided	32,100	4.72%	0.588	0.090	1.00
	(5th Street)	Orchard Street to TH 3	PA	2	no	Undivided	35	11,200		12,300		13,200		12,800	2.25%	0.558	0.110	0.95	MiA	4	yes	Divided	33,400	4.08%	0.583	0.093	1.06
	(2nd Street)	TH 3 to Division Street	MiA	4	yes	Undivided	35	5,900		7,600		8,500		13,700	15.07%	0.585	0.124	0.66	MiA	4	yes	Undivided	19,100	1.39%	0.571	0.095	0.63
	(Division Street)	2nd Street to Hall Avenue	MiA	2	no	Undivided	45	3,250		9,900		3,900		3,500	1.24%	0.616	0.122	0.28	MiA	2	no	Undivided	13,300	5.72%	0.558	0.099	0.87
	(Stanton Boulevard)	Hall Avenue to Canada Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.614	0.124	0.23	MiA	2	no	Undivided	10,500	5.36%	0.510	0.101	0.60
		Canada Avenue to Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	6,900	3.53%	0.583	0.101	0.45
		East of Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	6,900	3.53%	0.583	0.101	0.45
TH	246	South of CSAH 22	MiA	2	no	Undivided	55	2,350		2,600		2,500		2,400	0.35%	0.599	0.121	0.18	MiA	2	no	Undivided	5,200	3.27%	0.521	0.107	0.32
		CSAH 22 to CSAH 1	MiA	2	no	Undivided	55	3,350		3,200		3,650		3,200	-0.76%	0.574	0.120	0.22	MiA	2	no	Undivided	7,800	3.78%	0.523	0.119	0.54
	(Division Street)	CSAH 1 to Ford Street	MiA	2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.723	0.119	0.35	MiA	2	no	Undivided	5,600	1.63%	0.603	0.120	0.48
		Ford Street to Jefferson Parkway	MiA	2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.617	0.122	0.31	MiA	2	no	Undivided	9,600	3.94%	0.611	0.101	0.70
		Jefferson Parkway to Woodley Street	MiA	2	no	Undivided	30	5,200		6,200		6,600		5,800	1.84%	0.612	0.121	0.60	MiA	2	no	Undivided	11,900	3.04%	0.607	0.099	1.11
	(Woodley Street)	Division Street to Water Street	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.585	0.114	0.71	MiA	2	no	Undivided	9,600	0.98%	0.607	0.112	1.01
		Water Street to Poplar Street	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.579	0.121	0.74	MiA	2	no	Undivided	8,200	0.32%	0.657	0.130	1.08
		Poplar Street to TH 3	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.593	0.108	0.59	MiA	2	no	Undivided	9,100	0.75%	0.604	0.139	1.02
CSAH	1	West of Dundas	MiA	2	no	Undivided	55		1,650				2,300		8.66%	0.679	0.119	0.19	MiA	2	no	Undivided	13,200	7.24%	0.505	0.101	0.75
	Realigned	West of Decker Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	Realigned	Decker Avenue to Dundas Boulevard	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	Realigned	Dundas Boulevard to TH 3	New												-	-	-	-									



Roadway			Existing Characteristics					Historical Traffic										Forecasted Traffic									
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
CR	96 (320th Street)	West of Garrett Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	690	3.75%	0.583	0.178	0.08
		Garrett Avenue to CSAH 23/Foliage Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	710	3.87%	0.608	0.190	0.10
		CSAH 23/Eveleth Avenue to Cannon Valley Drive	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,600	10.70%	0.528	0.156	0.25
		Cannon Valley Drive to Dresden Avenue	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,600	10.70%	0.528	0.156	0.25
		Dresden Avenue to TH 3	MC	2	no	Undivided	55	220			220		205		-1.40%	0.689	0.163	0.04	MiA	2	no	Undivided	790	5.54%	0.510	0.191	0.09
	NW Corridor	Major Collector to CR 59/90th Street	New												-	-	-	-	MiA	2	no	Undivided	5,000	NA	0.658	0.143	0.55
		CR 59/90th Street to 95th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,700	NA	0.726	0.181	0.42
		95th Street to 100th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,900	NA	0.730	0.177	0.43
		100th Street to CSAH 1	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,900	NA	0.730	0.177	0.44
		CR 96/320th Street to Thye Parkway	New												-	-	-	-	MiA	2	no	Undivided	5,000	NA	0.597	0.104	0.36
		Thye Parkway to North Avenue	New												-	-	-	-	MiA	2	no	Undivided	9,900	NA	0.564	0.105	0.79
		North Avenue to TH 19	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	9,100	NA	0.575	0.105	0.73
		TH 19 to Major Collector	New												-	-	-	-	MiA	2	no	Undivided	4,800	NA	0.578	0.122	0.40
Lincoln Street		Lincoln Parkway to Greenvale Avenue	MiA	2	no	Undivided	30		1,500				2,500		13.62%	0.609	0.121	0.22	MC	2	no	Undivided	1,900	-1.09%	0.619	0.116	0.27
Dresden Avenue		CR 96/320th Street to Thye Parkway	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	1,900	NA	0.544	0.148	0.28
		Thye Parkway to Fremouw Avenue	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	3,000	NA	0.667	0.142	0.57
		Fremouw Avenue to Lincoln Parkway	MiA	2	no	Undivided	30		4,250				4,600		2.00%	0.591	0.128	0.42	MC	2	no	Undivided	5,000	0.33%	0.674	0.129	0.88
Poplar Street		8th Street to Woodley Street	MC	2	no	Undivided	30		1,100				1,100		0.00%	0.623	0.105	0.15	MC	2	no	Undivided	1,600	1.51%	0.555	0.150	0.30
Jefferson Road		TH 246/Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.524	0.109	0.34	MC	2	no	Undivided	3,900	0.73%	0.545	0.122	0.52
		Jefferson Parkway to Cannon Lane/Heritage Drive	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.651	0.126	0.48	MC	2	no	Undivided	4,500	1.31%	0.575	0.119	0.62
		Cannon Lane/Heritage Drive to CSAH 1	MC	2	no	Undivided	30		2,200				3,200		9.82%	0.679	0.118	0.42	MC	2	no	Undivided	4,700	1.55%	0.666	0.113	0.65
Water Street		5th Street to 7th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.586	0.108	0.78	MC	2	no	Undivided	9,700	2.37%	0.585	0.087	1.24
		7th Street to 8th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.673	0.123	1.01	MC	2	no	Undivided	7,200	1.16%	0.609	0.103	1.14
		8th Street to Woodley Street	MC	2	no	Undivided	30		2,100				3,000		9.33%	0.670	0.122	0.50	MC	2	no	Undivided	3,600	0.73%	0.623	0.089	0.44
Division Street		2nd Street to 4th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	3,900	NA	0.622	0.103	0.63
		4th Street to 5th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	5,800	NA	0.589	0.103	0.88
		5th Street to 7th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.582	0.122	0.83	MC	2	no	Undivided	9,000	0.63%	0.601	0.110	1.48
		7th Street to 8th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.655	0.118	0.90	MC	2	no	Undivided	9,200	0.71%	0.603	0.097	1.35
		8th Street to Woodley Street	MiA	2	no	Undivided	30		4,750				6,500		8.16%	0.624	0.115	0.65	MC	2	no	Undivided	9,300	1.44%	0.610	0.096	1.22
Washington Street		2nd Street to 4th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.612	0.125	0.35	MC	2	no	Undivided	6,900	3.39%	0.592	0.087	0.89
		4th Street to 5th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.593	0.122	0.26	MC	2	no	Undivided	7,100	3.51%	0.581	0.117	0.96
		5th Street to 7th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.668	0.123	0.35	MC	2	no	Undivided	10,000	4.23%	0.561	0.083	0.92
		7th Street to 8th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.655	0.121	0.39	MC	2	no	Undivided	7,900	3.25%	0.580	0.103	1.05
		8th Street to Woodley Street	MiA	2	no	Undivided	30		2,350				2,850		4.94%	0.652	0.122	0.32	MC	2	no	Undivided	3,600	0.94%	0.614	0.117	0.57
Maple Street		Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		1,550				1,700		2.34%	0.660	0.122	0.25	MC	2	no	Undivided	2,700	1.87%	0.697	0.144	0.54
		Jefferson Parkway to Ford Street	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	1,900	NA	0.700	0.142	0.39
		Ford Street to CSAH 81	New												-	-	-	-	MC	2	no	Undivided	2,500	NA	0.619	0.123	0.38
Prairie Street		4th Street to 5th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.667	0.153	0.23	MC	2	no	Undivided	4,400	5.16%	0.614	0.110	0.60
		5th Street to 7th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.657	0.151	0.23	MC	2	no	Undivided	4,400	5.16%	0.616	0.110	0.59
		7th Street to Woodley Street	MC	2	no	Undivided	30		1,150				1,400		5.04%	0.679	0.120	0.21	MC	2	no	Undivided	8,200	7.33%	0.694	0.099	1.13
Hall Avenue		TH 19 to 85th Street	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	990	NA	0.710	0.152	0.19
		85th Street to Wall Street Road	Local	2	no	Undivided	55			</																	

Roadway			Existing Characteristics					Historical Traffic								Forecasted Traffic											
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
	85th Street	Hall Avenue to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	490	NA	0.707	0.156	0.11
		Jefferson Parkway to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	95th Street	Decker Avenue to Split	New												-	-	-	-	MC	2	no	Undivided	1,500	NA	0.619	0.095	0.17
		Split to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	1,400	NA	0.603	0.126	0.22
		Split to Dundas Boulevard	New												-	-	-	-	MC	2	no	Undivided	570	NA	0.770	0.177	0.16
	100th Street	Decker Avenue to Dundas Boulevard	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	1,300	NA	0.741	0.145	0.28
	Heritage Drive	TH 3 to Jefferson Road	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	4,900	NA	0.619	0.117	0.71
	Ford Street East	Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	no	Undivided	120	NA	0.590	0.180	0.02
		Heywood Road to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	Jefferson Parkway	TH 19 to 90th Street	New												-	-	-	-	MC	2	no	Undivided	5,800	NA	0.551	0.092	0.59
		90th Street to 95th Street	New												-	-	-	-	MC	2	no	Undivided	5,600	NA	0.529	0.090	0.54
		95th Street to Armstrong Drive	New												-	-	-	-	MC	2	no	Undivided	4,400	NA	0.546	0.081	0.36
		Armstrong Drive to TH 3	New												-	-	-	-	New	-	-	-	-	-	-	-	-
		TH 3 to Jefferson Road	MiA	2	yes	Undivided	30		8,000				9,400		4.11%	0.574	0.110	0.79	MC	2	yes	Undivided	16,100	2.18%	0.582	0.117	2.00
		Jefferson Road to Roosevelt Drive	MiA	2	yes	Undivided	30		8,100				9,700		4.61%	0.600	0.101	0.78	MC	2	yes	Undivided	17,500	2.39%	0.590	0.116	2.17
		Roosevelt Drive to Roosevelt Drive	MiA	2	no	Undivided	30		8,100				9,700		4.61%	0.671	0.097	0.76	MC	2	no	Undivided	17,300	2.34%	0.592	0.112	2.28
		Roosevelt Drive to TH 246/Division Street	MiA	2	yes	Divided	30		5,500				7,000		6.21%	0.591	0.101	0.52	MC	2	yes	Divided	9,600	1.27%	0.594	0.120	1.13
		TH 246/Division Street to Maple Street	MiA	2	yes	Divided	30		395				4,200		80.58%	0.604	0.118	0.33	MC	2	yes	Divided	3,100	-1.21%	0.689	0.127	0.45
		Maple Street to Prairie Street	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,100	-1.36%	0.670	0.123	0.15
		Prairie Street to Hall Avenue	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,000	-1.74%	0.595	0.124	0.13
		Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	yes	Divided	1,400	NA	0.717	0.150	0.25
		Heywood Road to Woodley Street	New												-	-	-	-	MC	2	yes	Divided	3,500	NA	0.662	0.125	0.48
		Woodley Street to Heywood Road	Local	2	yes	Divided	30								-	-	-	-	MC	2	yes	Divided	1,600	NA	0.512	0.119	0.16
		Heywood Road to 90th Street	New												-	-	-	-	MC	2	yes	Divided	2,400	NA	0.698	0.123	0.34
		90th Street to 85th Street	New												-	-	-	-	MC	2	yes	Divided	910	NA	0.718	0.149	0.16
		85th Street to TH 19	New												-	-	-	-	MC	2	yes	Divided	3,300	NA	0.620	0.100	0.34

PA: Principal Arterial  
MiA: Minor Arterial  
MC: Major Collector  
MiC: Minor Collector  
Local: Local Collector (Existing Gravel or Paved Road, or Unknown Designation)  
New: New Roadway that Currently Does Not Exist

Appendix D2 - Existing and Forecasted Traffic Volumes and Capacity Analysis - Jefferson Parkway Bridge

Major Collectors and Above  
City of Northfield

Roadway			Existing Characteristics					Historical Traffic										Forecasted Traffic												
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio			
TH	3	South of CSAH 1	MiA	4	yes	Divided	45	7,900		9,200		9,400		8,900	2.01%	0.673	0.121	0.40	MiA	4	yes	Divided	13,700	1.81%	0.568	0.124	0.50			
		CSAH 1 to Cannon Lane	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.669	0.121	0.60	MiA	4	yes	Divided	16,600	0.90%	0.581	0.120	0.61			
		Cannon Lane to Jefferson Parkway	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.609	0.115	0.52	MiA	4	yes	Divided	20,600	1.81%	0.586	0.121	0.77			
		Jefferson Parkway to TH 246/Woodley Street	PA	4	yes	Divided	35	10,700		12,500		13,600		13,400	3.82%	0.582	0.123	0.59	MiA	4	yes	Divided	18,200	1.28%	0.579	0.119	0.74			
		TH 246/Woodley Street to TH 19/5th Street	PA	4	yes	Divided	35	15,000		17,400		20,900		20,400	5.26%	0.572	0.122	0.88	MiA	4	yes	Divided	22,500	0.41%	0.616	0.126	1.03			
		TH 19/5th Street to 3rd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.555	0.123	0.60	MiA	4	yes	Divided	28,300	2.95%	0.575	0.104	0.99			
		3rd Street to TH 19/2nd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.546	0.125	0.60	MiA	4	yes	Divided	28,800	3.02%	0.562	0.107	1.02			
		TH 19/2nd Street to Saint Olaf Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.580	0.114	0.67	MiA	4	yes	Undivided	23,600	1.82%	0.581	0.113	0.94			
		Saint Olaf Avenue to Greenvale Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.577	0.116	0.68	MiA	4	yes	Undivided	23,300	1.77%	0.597	0.117	0.99			
		Greenvale Avenue to Fremouw Avenue	MiA	4	yes	Undivided	45	12,500		14,500		15,300		15,300	3.43%	0.594	0.122	0.65	MiA	4	yes	Undivided	26,600	2.33%	0.587	0.112	0.94			
		Fremouw Avenue to Sheldahl Road	MiA	2	yes	Undivided	45	8,700		9,900		9,700		8,700	0.00%	0.580	0.124	0.74	MiA	2	yes	Undivided	19,100	3.33%	0.563	0.099	1.14			
		Sheldahl Road to CSAH 47	MiA	2	no	Undivided	55	8,700		9,900		9,700		8,700	0.00%	0.610	0.123	0.70	MiA	2	no	Undivided	15,400	2.41%	0.504	0.110	0.94			
		CSAH 47 to CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.571	0.123	0.39	MiA	2	no	Undivided	11,000	2.93%	0.559	0.118	0.80			
		North of CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.566	0.123	0.39	MiA	2	no	Undivided	10,700	2.81%	0.570	0.114	0.77			
TH	19	West of Garrett Avenue	MiA	2	no	Undivided	55	7,400		8,700		9,400		9,100	3.51%	0.667	0.107	0.66	MiA	4	yes	Divided	33,700	5.61%	0.514	0.088	0.77			
		Garrett Avenue to Eaves Avenue	MiA	2	no	Undivided	55	8,300		10,000		10,500		9,300	1.91%	0.692	0.105	0.72	MiA	4	yes	Divided	27,300	4.59%	0.596	0.073	0.60			
		Eaves Avenue to CR 59/90th Street	MiA	2	yes	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.700	0.104	0.80	MiA	4	yes	Divided	37,100	5.93%	0.515	0.089	0.90			
		CR 59/90th Street to Armstrong Road/Forest Avenue	PA	2	no	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.657	0.104	0.68	MiA	4	yes	Divided	28,300	4.75%	0.502	0.090	0.67			
		Armstrong Road/Forest Avenue to Orchard Street	PA	2	no	Divided	45	8,500		10,100		11,100		10,600	3.75%	0.568	0.115	0.82	MiA	4	yes	Divided	25,200	3.67%	0.594	0.094	0.83			
		(5th Street) Orchard Street to TH 3	PA	2	no	Undivided	35	11,200		12,300		13,200		12,800	2.25%	0.558	0.110	0.95	MiA	4	yes	Divided	26,900	3.14%	0.591	0.098	0.92			
		(2nd Street) TH 3 to Division Street	MiA	4	yes	Undivided	35	5,900		7,600		8,500		13,700	15.07%	0.585	0.124	0.66	MiA	4	yes	Undivided	18,600	1.28%	0.570	0.095	0.62			
		(Division Street) 2nd Street to Hall Avenue	MiA	2	no	Undivided	45	3,250		9,900		3,900		3,500	1.24%	0.616	0.122	0.28	MiA	2	no	Undivided	13,200	5.69%	0.559	0.099	0.86			
		(Stanton Boulevard) Hall Avenue to Canada Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.614	0.124	0.23	MiA	2	no	Undivided	10,400	5.32%	0.510	0.102	0.60			
		Canada Avenue to Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	6,900	3.53%	0.583	0.100	0.45			
		East of Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	6,900	3.53%	0.583	0.100	0.45			
		TH	246	South of CSAH 22	MiA	2	no	Undivided	55	2,350		2,600		2,500		2,400	0.35%	0.599	0.121	0.18	MiA	2	no	Undivided	5,400	3.44%	0.518	0.106	0.33	
				CSAH 22 to CSAH 1	MiA	2	no	Undivided	55	3,350		3,200		3,650		3,200	-0.76%	0.574	0.120	0.22	MiA	2	no	Undivided	8,100	3.95%	0.521	0.119	0.56	
				(Division Street) CSAH 1 to Ford Street	MiA	2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.723	0.119	0.35	MiA	2	no	Undivided	5,900	1.85%	0.600	0.119	0.50	
Ford Street to Jefferson Parkway	MiA			2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.617	0.122	0.31	MiA	2	no	Undivided	10,300	4.24%	0.610	0.100	0.74			
Jefferson Parkway to Woodley Street	MiA			2	no	Undivided	30	5,200		6,200		6,600		5,800	1.84%	0.612	0.121	0.60	MiA	2	no	Undivided	10,200	2.38%	0.616	0.119	1.15			
(Woodley Street) Division Street to Water Street	MiA			2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.585	0.114	0.71	MiA	2	no	Undivided	9,300	0.84%	0.617	0.121	1.07			
Water Street to Poplar Street	MiA			2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.579	0.121	0.74	MiA	2	no	Undivided	8,300	0.37%	0.671	0.140	1.20			
Poplar Street to TH 3	MiA			2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.593	0.108	0.59	MiA	2	no	Undivided	9,200	0.80%	0.616	0.145	1.09			
CSAH	1			West of Dundas	MiA	2	no	Undivided	55		1,650				2,300		8.66%	0.679	0.119	0.19	MiA	2	no	Undivided	12,300	6.94%	0.503	0.105	0.72	
				Realigned West of Decker Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-	
				Realigned Decker Avenue to Dundas Boulevard	New													-	-	-	-	New	-	-	-	-	-	-	-	-
CSAH	23			Realigned Dundas Boulevard to TH 3	New													-	-	-	-	New	-	-	-	-	-	-	-	-
				TH 3 to Jefferson Road	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.673	0.121	0.50	MiA	2	no	Undivided	6,500	2.28%	0.553	0.114	0.55	
				Jefferson Road to Filmore Street	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.674	0.124	0.51	MiA	2	no	Undivided	9,200	3.71%	0.596	0.112	0.72	
		Filmore Street to TH 246/Division Street	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.715	0.123	0.49	MiA	2	no	Undivided	4,900	1.13%	0.530	0.118	0.41			
		(Foliage Avenue) North of CR 96/320th Street	MiA	2	no	Undivided	55	3,000			3,450		3,500		3.13%	0.583	0.118	0.24	MiA	2	no	Undivided	8,000	3.36%	0.532	0.122	0.58			
		(320th Street) Foliage Avenue to Eveleth Avenue	MiA	2	no	Undivided	55	2,800			3,500		3,850		6.58%	0.577	0.115	0.26	MiA	2	no	Undivided	3,100	-0.86%	0.580					



Roadway			Existing Characteristics					Historical Traffic										Forecasted Traffic									
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
CR	96 (320th Street)	West of Garrett Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	730	3.98%	0.588	0.173	0.09
		Garrett Avenue to CSAH 23/Foliage Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	770	4.20%	0.653	0.187	0.11
		CSAH 23/Eveleth Avenue to Cannon Valley Drive	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,100	9.75%	0.517	0.156	0.20
		Cannon Valley Drive to Dresden Avenue	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,100	9.75%	0.517	0.156	0.20
		Dresden Avenue to TH 3	MC	2	no	Undivided	55	220			220		205		-1.40%	0.689	0.163	0.04	MiA	2	no	Undivided	750	5.33%	0.528	0.186	0.09
	NW Corridor	Major Collector to CR 59/90th Street	New												-	-	-	-	MiA	2	no	Undivided	5,100	NA	0.659	0.141	0.56
		CR 59/90th Street to 95th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,900	NA	0.711	0.169	0.40
		95th Street to 100th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	3,000	NA	0.715	0.167	0.42
		100th Street to CSAH 1	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	3,000	NA	0.714	0.167	0.42
		CR 96/320th Street to Thye Parkway	New												-	-	-	-	MiA	2	no	Undivided	5,500	NA	0.593	0.104	0.40
		Thye Parkway to North Avenue	New												-	-	-	-	MiA	2	no	Undivided	10,300	NA	0.550	0.105	0.80
		North Avenue to TH 19	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	9,800	NA	0.583	0.102	0.78
		TH 19 to Major Collector	New												-	-	-	-	MiA	2	no	Undivided	4,800	NA	0.575	0.119	0.39
	Lincoln Street	Lincoln Parkway to Greenvale Avenue	MiA	2	no	Undivided	30		1,500				2,500		13.62%	0.609	0.121	0.22	MC	2	no	Undivided	1,900	-1.09%	0.621	0.114	0.27
	Dresden Avenue	CR 96/320th Street to Thye Parkway	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	1,500	NA	0.542	0.147	0.22
		Thye Parkway to Fremouw Avenue	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	2,700	NA	0.687	0.150	0.55
		Fremouw Avenue to Lincoln Parkway	MiA	2	no	Undivided	30		4,250				4,600		2.00%	0.591	0.128	0.42	MC	2	no	Undivided	5,000	0.33%	0.668	0.126	0.85
	Poplar Street	8th Street to Woodley Street	MC	2	no	Undivided	30		1,100				1,100		0.00%	0.623	0.105	0.15	MC	2	no	Undivided	1,700	1.76%	0.537	0.153	0.31
	Jefferson Road	TH 246/Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.524	0.109	0.34	MC	2	no	Undivided	4,000	0.83%	0.547	0.118	0.52
		Jefferson Parkway to Cannon Lane/Heritage Drive	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.651	0.126	0.48	MC	2	no	Undivided	4,700	1.49%	0.561	0.121	0.64
		Cannon Lane/Heritage Drive to CSAH 1	MC	2	no	Undivided	30		2,200				3,200		9.82%	0.679	0.118	0.42	MC	2	no	Undivided	5,000	1.80%	0.667	0.113	0.68
	Water Street	5th Street to 7th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.586	0.108	0.78	MC	2	no	Undivided	8,100	1.64%	0.593	0.096	1.14
		7th Street to 8th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.673	0.123	1.01	MC	2	no	Undivided	6,700	0.87%	0.613	0.114	1.16
		8th Street to Woodley Street	MC	2	no	Undivided	30		2,100				3,000		9.33%	0.670	0.122	0.50	MC	2	no	Undivided	2,800	-0.28%	0.671	0.098	0.41
	Division Street	2nd Street to 4th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	3,900	NA	0.619	0.104	0.63
		4th Street to 5th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	5,000	NA	0.572	0.107	0.77
		5th Street to 7th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.582	0.122	0.83	MC	2	no	Undivided	8,300	0.30%	0.594	0.115	1.41
		7th Street to 8th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.655	0.118	0.90	MC	2	no	Undivided	8,300	0.30%	0.608	0.105	1.32
		8th Street to Woodley Street	MiA	2	no	Undivided	30		4,750				6,500		8.16%	0.624	0.115	0.65	MC	2	no	Undivided	8,100	0.88%	0.612	0.101	1.11
	Washington Street	2nd Street to 4th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.612	0.125	0.35	MC	2	no	Undivided	6,700	3.27%	0.592	0.083	0.82
		4th Street to 5th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.593	0.122	0.26	MC	2	no	Undivided	7,000	3.45%	0.583	0.118	0.97
		5th Street to 7th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.668	0.123	0.35	MC	2	no	Undivided	9,400	3.97%	0.538	0.085	0.86
		7th Street to 8th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.655	0.121	0.39	MC	2	no	Undivided	7,300	2.93%	0.597	0.101	0.98
		8th Street to Woodley Street	MiA	2	no	Undivided	30		2,350				2,850		4.94%	0.652	0.122	0.32	MC	2	no	Undivided	3,300	0.59%	0.613	0.120	0.53
	Maple Street	Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		1,550				1,700		2.34%	0.660	0.122	0.25	MC	2	no	Undivided	2,600	1.71%	0.704	0.147	0.54
		Jefferson Parkway to Ford Street	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	2,000	NA	0.686	0.143	0.39
		Ford Street to CSAH 81	New												-	-	-	-	MC	2	no	Undivided	2,600	NA	0.607	0.124	0.39
	Prairie Street	4th Street to 5th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.667	0.153	0.23	MC	2	no	Undivided	4,300	5.07%	0.616	0.110	0.59
		5th Street to 7th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.657	0.151	0.23	MC	2	no	Undivided	4,300	5.07%	0.617	0.111	0.58
		7th Street to Woodley Street	MC	2	no	Undivided	30		1,150				1,400		5.04%	0.679	0.120	0.21	MC	2	no	Undivided	7,200	6.77%	0.664	0.119	1.13
	Hall Avenue	TH 19 to 85th Street	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	980	NA	0.712	0.152	0.19
		85th Street to Wall Street Road	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	1,300	NA	0.614	0.120	0.18
		Woodley Street to Jefferson Parkway	MC	2	no	Undivided	55						475		-	0.679	0.125	0.07	MC	2	no	Undivided	610	1.01%	0.755	0.173	0.16
		Jefferson Parkway to Ford Street	MC	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	230	NA	0.592	0.171	0.05
		Ford Street to CSAH 81	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	120	NA			

Roadway			Existing Characteristics					Historical Traffic								Forecasted Traffic											
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
	85th Street	Hall Avenue to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	480	NA	0.701	0.153	0.10
		Jefferson Parkway to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	95th Street	Decker Avenue to Split	New												-	-	-	-	MC	2	no	Undivided	1,500	NA	0.653	0.097	0.19
		Split to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	1,700	NA	0.509	0.124	0.22
		Split to Dundas Boulevard	New												-	-	-	-	MC	2	no	Undivided	550	NA	0.672	0.180	0.13
	100th Street	Decker Avenue to Dundas Boulevard	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	1,500	NA	0.566	0.138	0.23
	Heritage Drive	TH 3 to Jefferson Road	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	4,900	NA	0.653	0.116	0.73
	Ford Street East	Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	no	Undivided	120	NA	0.675	0.161	0.03
		Heywood Road to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	Jefferson Parkway	TH 19 to 90th Street	New												-	-	-	-	MC	2	no	Undivided	11,700	NA	0.543	0.078	0.99
		90th Street to 95th Street	New												-	-	-	-	MC	2	no	Undivided	11,600	NA	0.543	0.079	0.99
		95th Street to Armstrong Drive	New												-	-	-	-	MC	2	no	Undivided	10,900	NA	0.545	0.075	0.81
		Armstrong Drive to TH 3	New												-	-	-	-	MC	2	no	Undivided	11,100	NA	0.571	0.086	0.99
		TH 3 to Jefferson Road	MiA	2	yes	Undivided	30		8,000				9,400		4.11%	0.574	0.110	0.79	MC	2	yes	Undivided	21,200	3.31%	0.589	0.098	2.24
		Jefferson Road to Roosevelt Drive	MiA	2	yes	Undivided	30		8,100				9,700		4.61%	0.600	0.101	0.78	MC	2	yes	Undivided	22,400	3.40%	0.581	0.096	2.28
		Roosevelt Drive to Roosevelt Drive	MiA	2	no	Undivided	30		8,100				9,700		4.61%	0.671	0.097	0.76	MC	2	no	Undivided	22,600	3.44%	0.580	0.091	2.38
		Roosevelt Drive to TH 246/Division Street	MiA	2	yes	Divided	30		5,500				7,000		6.21%	0.591	0.101	0.52	MC	2	yes	Divided	12,400	2.31%	0.576	0.093	1.11
		TH 246/Division Street to Maple Street	MiA	2	yes	Divided	30		395				4,200		80.58%	0.604	0.118	0.33	MC	2	yes	Divided	4,000	-0.19%	0.672	0.121	0.54
		Maple Street to Prairie Street	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,900	0.82%	0.676	0.112	0.24
		Prairie Street to Hall Avenue	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,900	0.82%	0.620	0.119	0.23
		Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	yes	Divided	2,000	NA	0.692	0.123	0.29
		Heywood Road to Woodley Street	New												-	-	-	-	MC	2	yes	Divided	2,900	NA	0.676	0.127	0.41
		Woodley Street to Heywood Road	Local	2	yes	Divided	30								-	-	-	-	MC	2	yes	Divided	1,600	NA	0.522	0.120	0.17
		Heywood Road to 90th Street	New												-	-	-	-	MC	2	yes	Divided	2,300	NA	0.699	0.123	0.33
		90th Street to 85th Street	New												-	-	-	-	MC	2	yes	Divided	890	NA	0.717	0.150	0.16
		85th Street to TH 19	New												-	-	-	-	MC	2	yes	Divided	3,300	NA	0.621	0.101	0.35

PA: Principal Arterial  
MiA: Minor Arterial  
MC: Major Collector  
MiC: Minor Collector  
Local: Local Collector (Existing Gravel or Paved Road, or Unknown Designation)  
New: New Roadway that Currently Does Not Exist



Appendix D3 - Existing and Forecasted Traffic Volumes and Capacity Analysis - CSAH 1 Bridge

Major Collectors and Above  
City of Northfield

Roadway			Existing Characteristics					Historical Traffic								Forecasted Traffic												
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio	
TH	3	South of CSAH 1	MiA	4	yes	Divided	45	7,900		9,200		9,400		8,900	2.01%	0.673	0.121	0.40	MiA	4	yes	Divided	9,800	0.40%	0.584	0.124	0.37	
		CSAH 1 to Cannon Lane	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.669	0.121	0.60	MiA	4	yes	Divided	19,500	1.58%	0.582	0.120	0.71	
		Cannon Lane to Jefferson Parkway	PA	4	yes	Divided	45	10,700		12,500		13,600		13,400	3.82%	0.609	0.115	0.52	MiA	4	yes	Divided	20,800	1.85%	0.570	0.114	0.71	
		Jefferson Parkway to TH 246/Woodley Street	PA	4	yes	Divided	35	10,700		12,500		13,600		13,400	3.82%	0.582	0.123	0.59	MiA	4	yes	Divided	22,800	2.24%	0.581	0.124	0.97	
		TH 246/Woodley Street to TH 19/5th Street	PA	4	yes	Divided	35	15,000		17,400		20,900		20,400	5.26%	0.572	0.122	0.88	MiA	4	yes	Divided	28,800	1.45%	0.604	0.120	1.23	
		TH 19/5th Street to 3rd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.555	0.123	0.60	MiA	4	yes	Divided	27,500	2.82%	0.584	0.104	0.98	
		3rd Street to TH 19/2nd Street	PA	4	yes	Divided	35	14,000		15,900		14,600		14,100	0.12%	0.546	0.125	0.60	MiA	4	yes	Divided	29,400	3.11%	0.558	0.106	1.03	
		TH 19/2nd Street to Saint Olaf Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.580	0.114	0.67	MiA	4	yes	Undivided	24,200	1.93%	0.578	0.111	0.94	
		Saint Olaf Avenue to Greenvale Avenue	MiA	4	yes	Undivided	35	12,500		14,500		15,300		15,300	3.43%	0.577	0.116	0.68	MiA	4	yes	Undivided	23,900	1.88%	0.590	0.116	0.99	
		Greenvale Avenue to Fremouw Avenue	MiA	4	yes	Undivided	45	12,500		14,500		15,300		15,300	3.43%	0.594	0.122	0.65	MiA	4	yes	Undivided	27,000	2.39%	0.582	0.112	0.94	
		Fremouw Avenue to Sheldahl Road	MiA	2	yes	Undivided	45	8,700		9,900		9,700		8,700	0.00%	0.580	0.124	0.74	MiA	2	yes	Undivided	19,200	3.35%	0.563	0.100	1.16	
		Sheldahl Road to CSAH 47	MiA	2	no	Undivided	55	8,700		9,900		9,700		8,700	0.00%	0.610	0.123	0.70	MiA	2	no	Undivided	15,400	2.41%	0.510	0.109	0.95	
		CSAH 47 to CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.571	0.123	0.39	MiA	2	no	Undivided	11,000	2.93%	0.560	0.117	0.80	
		North of CR 96	MiA	2	no	Undivided	55	4,900		6,200		5,900		5,500	1.94%	0.566	0.123	0.39	MiA	2	no	Undivided	10,700	2.81%	0.573	0.113	0.77	
		West of Garrett Avenue	MiA	2	no	Undivided	55	7,400		8,700		9,400		9,100	3.51%	0.667	0.107	0.66	MiA	4	yes	Divided	31,900	5.37%	0.514	0.090	0.74	
		Garrett Avenue to Eaves Avenue	MiA	2	no	Undivided	55	8,300		10,000		10,500		9,300	1.91%	0.692	0.105	0.72	MiA	4	yes	Divided	25,300	4.26%	0.605	0.074	0.56	
		Eaves Avenue to CR 59/90th Street	MiA	2	yes	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.700	0.104	0.80	MiA	4	yes	Divided	34,600	5.63%	0.523	0.088	0.84	
		CR 59/90th Street to Armstrong Road/Forest Avenue	PA	2	no	Undivided	45	8,300		10,000		10,500		9,300	1.91%	0.657	0.104	0.68	MiA	4	yes	Divided	33,000	5.42%	0.501	0.090	0.79	
		Armstrong Road/Forest Avenue to Orchard Street	PA	2	no	Divided	45	8,500		10,100		11,100		10,600	3.75%	0.568	0.115	0.82	MiA	4	yes	Divided	30,200	4.46%	0.589	0.089	0.93	
	(5th Street)	Orchard Street to TH 3	PA	2	no	Undivided	35	11,200		12,300		13,200		12,800	2.25%	0.558	0.110	0.95	MiA	4	yes	Divided	31,800	3.86%	0.587	0.091	1.00	
		(2nd Street)	TH 3 to Division Street	MiA	4	yes	Undivided	35	5,900		7,600		8,500		13,700	15.07%	0.585	0.124	0.66	MiA	4	yes	Undivided	18,900	1.35%	0.567	0.095	0.62
		(Division Street)	2nd Street to Hall Avenue	MiA	2	no	Undivided	45	3,250		9,900		3,900		3,500	1.24%	0.616	0.122	0.28	MiA	2	no	Undivided	13,400	5.75%	0.558	0.099	0.99
		(Stanton Boulevard)	Hall Avenue to Canada Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.614	0.124	0.23	MiA	2	no	Undivided	10,500	5.36%	0.507	0.102	0.60
			Canada Avenue to Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	7,000	3.59%	0.579	0.100	0.45
			East of Ibson Avenue	MiA	2	no	Undivided	55	2,350		2,950		2,950		3,000	4.15%	0.656	0.124	0.25	MiA	2	no	Undivided	7,000	3.59%	0.579	0.100	0.45
	TH	246	South of CSAH 22	MiA	2	no	Undivided	55	2,350		2,600		2,500		2,400	0.35%	0.599	0.121	0.18	MiA	2	no	Undivided	5,600	3.59%	0.513	0.110	0.35
			CSAH 22 to CSAH 1	MiA	2	no	Undivided	55	3,350		3,200		3,650		3,200	-0.76%	0.574	0.120	0.22	MiA	2	no	Undivided	8,200	4.00%	0.504	0.120	0.55
		(Division Street)	CSAH 1 to Ford Street	MiA	2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.723	0.119	0.35	MiA	2	no	Undivided	5,300	1.40%	0.602	0.122	0.46
			Ford Street to Jefferson Parkway	MiA	2	no	Undivided	45	4,000		4,300		4,750		3,800	-0.85%	0.617	0.122	0.31	MiA	2	no	Undivided	9,200	3.75%	0.617	0.104	0.69
			Jefferson Parkway to Woodley Street	MiA	2	no	Undivided	30	5,200		6,200		6,600		5,800	1.84%	0.612	0.121	0.60	MiA	2	no	Undivided	11,500	2.89%	0.609	0.100	1.07
		(Woodley Street)	Division Street to Water Street	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.585	0.114	0.71	MiA	2	no	Undivided	9,500	0.93%	0.609	0.111	0.99
			Water Street to Poplar Street	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.579	0.121	0.74	MiA	2	no	Undivided	8,200	0.32%	0.657	0.128	1.06
			Poplar Street to TH 3	MiA	2	no	Undivided	30	6,800		7,900		7,700		7,600	1.87%	0.593	0.108	0.59	MiA	2	no	Undivided	9,200	0.80%	0.594	0.130	0.95
CSAH	1	West of Dundas	MiA	2	no	Undivided	55		1,650				2,300		8.66%	0.679	0.119	0.19	MiA	2	no	Undivided	14,000	7.49%	0.532	0.097	0.81	
		West of Dundas/Existing Alignment	MiA	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	5,200	NA	0.545	0.107	0.34	
		Realigned West of Decker Avenue	New												-	-	-	-	MiA	2	no	Undivided	9,600	NA	0.544	0.096	0.55	
		Realigned Decker Avenue to Dundas Boulevard	New												-	-	-	-	MiA	2	no	Undivided	9,800	NA	0.522	0.103	0.71	
		Realigned Dundas Boulevard to TH 3	New												-	-	-	-	MiA	2	no	Undivided	11,400	NA	0.504	0.104	0.70	
		TH 3 to Jefferson Road	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.673	0.121	0.50	MiA	2	no	Undivided	8,700	3.48%	0.565	0.112	0.74	
		Jefferson Road to Filmore Street	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.674	0.124	0.51	MiA	2	no	Undivided	10,800	4.38%	0.587	0.111	0.83	
CSAH	23 (Foliage Avenue)	Filmore Street to TH 246/Division Street	MC	2	no	Undivided	45		1,550				3,700		24.30%	0.715	0.123	0.49	MiA	2	no	Undivided	6,200	2.09%	0.516	0.111	0.47	
		North of CR 96/320th Street	MiA	2	no	Undivided	55	3,000			3,450		3,500	</														

Roadway			Existing Characteristics					Historical Traffic										Forecasted Traffic									
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
CR	96 (320th Street)	West of Garrett Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	660	3.56%	0.587	0.170	0.08
		Garrett Avenue to CSAH 23/Foliage Avenue	MC	2	no	Undivided	55	250			290		275		1.92%	0.681	0.163	0.05	MiA	2	no	Undivided	700	3.81%	0.616	0.186	0.09
		CSAH 23/Eveleth Avenue to Cannon Valley Drive	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,400	10.34%	0.521	0.153	0.23
		Cannon Valley Drive to Dresden Avenue	MC	2	no	Undivided	55	220			220		205		-1.40%	0.599	0.148	0.03	MiA	2	no	Undivided	2,400	10.34%	0.521	0.153	0.23
		Dresden Avenue to TH 3	MC	2	no	Undivided	55	220			220		205		-1.40%	0.689	0.163	0.04	MiA	2	no	Undivided	790	5.54%	0.536	0.185	0.09
	NW Corridor	Major Collector to CR 59/90th Street	New												-	-	-	-	MiA	2	no	Undivided	5,000	NA	0.672	0.148	0.58
		CR 59/90th Street to 95th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,700	NA	0.735	0.190	0.45
		95th Street to 100th Street	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	2,900	NA	0.741	0.189	0.48
		100th Street to CSAH 1	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	3,100	NA	0.713	0.183	0.48
		CR 96/320th Street to Thye Parkway	New												-	-	-	-	MiA	2	no	Undivided	5,100	NA	0.578	0.108	0.37
		Thye Parkway to North Avenue	New												-	-	-	-	MiA	2	no	Undivided	9,900	NA	0.561	0.107	0.79
		North Avenue to TH 19	Local	2	no	Undivided	55								-	-	-	-	MiA	2	no	Undivided	9,100	NA	0.576	0.107	0.75
		TH 19 to Major Collector	New												-	-	-	-	MiA	2	no	Undivided	4,700	NA	0.590	0.124	0.40
Lincoln Street		Lincoln Parkway to Greenvale Avenue	MiA	2	no	Undivided	30		1,500				2,500		13.62%	0.609	0.121	0.22	MC	2	no	Undivided	2,000	-0.89%	0.609	0.115	0.28
Dresden Avenue		CR 96/320th Street to Thye Parkway	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	1,700	NA	0.549	0.146	0.25
		Thye Parkway to Fremouw Avenue	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	2,900	NA	0.678	0.145	0.56
		Fremouw Avenue to Lincoln Parkway	MiA	2	no	Undivided	30		4,250				4,600		2.00%	0.591	0.128	0.42	MC	2	no	Undivided	5,000	0.33%	0.671	0.128	0.86
Poplar Street		8th Street to Woodley Street	MC	2	no	Undivided	30		1,100				1,100		0.00%	0.623	0.105	0.15	MC	2	no	Undivided	1,700	1.76%	0.514	0.148	0.28
Jefferson Road		TH 246/Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.524	0.109	0.34	MC	2	no	Undivided	3,900	0.73%	0.505	0.120	0.47
		Jefferson Parkway to Cannon Lane/Heritage Drive	MC	2	no	Undivided	30		3,700				3,250		-3.19%	0.651	0.126	0.48	MC	2	no	Undivided	4,400	1.22%	0.574	0.120	0.61
		Cannon Lane/Heritage Drive to CSAH 1	MC	2	no	Undivided	30		2,200				3,200		9.82%	0.679	0.118	0.42	MC	2	no	Undivided	4,500	1.37%	0.588	0.113	0.54
Water Street		5th Street to 7th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.586	0.108	0.78	MC	2	no	Undivided	9,200	2.15%	0.585	0.087	1.17
		7th Street to 8th Street	MC	2	no	Undivided	30		5,600				5,400		-0.91%	0.673	0.123	1.01	MC	2	no	Undivided	7,100	1.10%	0.613	0.105	1.14
		8th Street to Woodley Street	MC	2	no	Undivided	30		2,100				3,000		9.33%	0.670	0.122	0.50	MC	2	no	Undivided	3,300	0.38%	0.618	0.089	0.40
Division Street		2nd Street to 4th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	3,900	NA	0.618	0.104	0.63
		4th Street to 5th Street	MC	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	5,600	NA	0.589	0.102	0.85
		5th Street to 7th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.582	0.122	0.83	MC	2	no	Undivided	8,900	0.58%	0.602	0.108	1.45
		7th Street to 8th Street	MiA	2	no	Undivided	30		6,000				7,700		6.44%	0.655	0.118	0.90	MC	2	no	Undivided	9,000	0.63%	0.611	0.102	1.41
		8th Street to Woodley Street	MiA	2	no	Undivided	30		4,750				6,500		8.16%	0.624	0.115	0.65	MC	2	no	Undivided	9,200	1.40%	0.609	0.098	1.22
Washington Street		2nd Street to 4th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.612	0.125	0.35	MC	2	no	Undivided	6,800	3.33%	0.596	0.085	0.86
		4th Street to 5th Street	MiA	2	no	Undivided	30		2,600				3,000		3.64%	0.593	0.122	0.26	MC	2	no	Undivided	7,100	3.51%	0.582	0.116	0.95
		5th Street to 7th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.668	0.123	0.35	MC	2	no	Undivided	9,900	4.19%	0.539	0.084	0.89
		7th Street to 8th Street	MiA	2	no	Undivided	30		3,300				3,550		1.84%	0.655	0.121	0.39	MC	2	no	Undivided	7,800	3.20%	0.585	0.097	0.98
		8th Street to Woodley Street	MiA	2	no	Undivided	30		2,350				2,850		4.94%	0.652	0.122	0.32	MC	2	no	Undivided	3,500	0.83%	0.612	0.118	0.56
Maple Street		Woodley Street to Jefferson Parkway	MC	2	no	Undivided	30		1,550				1,700		2.34%	0.660	0.122	0.25	MC	2	no	Undivided	2,600	1.71%	0.691	0.140	0.51
		Jefferson Parkway to Ford Street	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	1,800	NA	0.701	0.140	0.35
		Ford Street to CSAH 81	New												-	-	-	-	MC	2	no	Undivided	2,400	NA	0.618	0.125	0.37
Prairie Street		4th Street to 5th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.667	0.153	0.23	MC	2	no	Undivided	4,400	5.16%	0.616	0.111	0.60
		5th Street to 7th Street	MC	2	no	Undivided	30		1,100				1,250		3.25%	0.657	0.151	0.23	MC	2	no	Undivided	4,400	5.16%	0.619	0.111	0.60
		7th Street to Woodley Street	MC	2	no	Undivided	30		1,150				1,400		5.04%	0.679	0.120	0.21	MC	2	no	Undivided	8,100	7.27%	0.692	0.098	1.10
Hall Avenue		TH 19 to 85th Street	Local	2	no	Undivided	55								-	-	-	-	MC	2	no	Undivided	990	NA	0.713	0.155	0.20
		85th Street to Wall Street Road	Local	2	no	Undivided	55			</																	

Roadway			Existing Characteristics					Historical Traffic								Forecasted Traffic											
SYS	NUM	ROADWAY SEGMENT	Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	Posted Speed	2000 ADT	2001 ADT	2002 ADT	2003 ADT	2004 ADT	2005 ADT	2006 ADT	Annual Growth	Existing D-Factor	Existing K-Factor	2005-6 V/C Ratio	Proposed Functional Class	Lanes	Left Turn Lanes or Metered?	Roadway Type	2030 ADT	Annual Growth	Forecasted D-Factor	Forecasted K-Factor	2030 V/C Ratio
	85th Street	Hall Avenue to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	490	NA	0.707	0.156	0.11
		Jefferson Parkway to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	95th Street	Decker Avenue to Split	New												-	-	-	-	MC	2	no	Undivided	1,500	NA	0.577	0.108	0.19
		Split to Jefferson Parkway	New												-	-	-	-	MC	2	no	Undivided	1,400	NA	0.664	0.130	0.25
		Split to Dundas Boulevard	New												-	-	-	-	MC	2	no	Undivided	800	NA	0.764	0.158	0.19
	100th Street	Decker Avenue to Dundas Boulevard	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	1,300	NA	0.764	0.177	0.36
	Heritage Drive	TH 3 to Jefferson Road	Local	2	no	Undivided	30								-	-	-	-	MC	2	no	Undivided	4,700	NA	0.607	0.118	0.68
	Ford Street East	Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	no	Undivided	120	NA	0.590	0.174	0.02
		Heywood Road to Ibson Avenue	New												-	-	-	-	New	-	-	-	-	-	-	-	-
	Jefferson Parkway	TH 19 to 90th Street	New												-	-	-	-	MC	2	no	Undivided	6,800	NA	0.530	0.093	0.67
		90th Street to 95th Street	New												-	-	-	-	MC	2	no	Undivided	6,600	NA	0.520	0.093	0.64
		95th Street to Armstrong Drive	New												-	-	-	-	MC	2	no	Undivided	5,300	NA	0.583	0.081	0.45
		Armstrong Drive to TH 3	New												-	-	-	-	New	-	-	-	-	-	-	-	-
		TH 3 to Jefferson Road	MiA	2	yes	Undivided	30		8,000				9,400		4.11%	0.574	0.110	0.79	MC	2	yes	Undivided	15,400	1.99%	0.585	0.118	1.93
		Jefferson Road to Roosevelt Drive	MiA	2	yes	Undivided	30		8,100				9,700		4.61%	0.600	0.101	0.78	MC	2	yes	Undivided	16,800	2.22%	0.593	0.116	2.09
		Roosevelt Drive to Roosevelt Drive	MiA	2	no	Undivided	30		8,100				9,700		4.61%	0.671	0.097	0.76	MC	2	no	Undivided	16,700	2.20%	0.578	0.113	2.19
		Roosevelt Drive to TH 246/Division Street	MiA	2	yes	Divided	30		5,500				7,000		6.21%	0.591	0.101	0.52	MC	2	yes	Divided	9,400	1.19%	0.599	0.121	1.14
		TH 246/Division Street to Maple Street	MiA	2	yes	Divided	30		395				4,200		80.58%	0.604	0.118	0.33	MC	2	yes	Divided	3,000	-1.34%	0.692	0.127	0.44
		Maple Street to Prairie Street	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,100	-1.36%	0.671	0.123	0.15
		Prairie Street to Hall Avenue	MiA	2	yes	Divided	30						1,550		-	0.604	0.118	0.12	MC	2	yes	Divided	1,100	-1.36%	0.598	0.124	0.13
		Hall Avenue to Heywood Road	New												-	-	-	-	MC	2	yes	Divided	1,400	NA	0.718	0.150	0.25
		Heywood Road to Woodley Street	New												-	-	-	-	MC	2	yes	Divided	3,400	NA	0.666	0.123	0.47
		Woodley Street to Heywood Road	Local	2	yes	Divided	30								-	-	-	-	MC	2	yes	Divided	1,600	NA	0.517	0.119	0.17
		Heywood Road to 90th Street	New												-	-	-	-	MC	2	yes	Divided	2,400	NA	0.699	0.123	0.34
		90th Street to 85th Street	New												-	-	-	-	MC	2	yes	Divided	900	NA	0.717	0.149	0.16
		85th Street to TH 19	New												-	-	-	-	MC	2	yes	Divided	3,300	NA	0.619	0.099	0.34

PA: Principal Arterial  
MiA: Minor Arterial  
MC: Major Collector  
MiC: Minor Collector  
Local: Local Collector (Existing Gravel or Paved Road, or Unknown Designation)  
New: New Roadway that Currently Does Not Exist

**APPENDIX E - Transportation Analysis Zone Forecasts**  
**Year 2000 Information and 2030 Forecasts**  
**City of Northfield 2030 Transportation Plan**

**Minnesota Transportation Analysis Zone Data - For Information Only**

TAZ #	Area (Sq. Mi.)	2000 Information				2030 Forecasts			
		Population	Households	Retail	Non-Retail	Population	Households	Retail	Non-Retail
157	29.92	1241	443	0	68	2030	840	0	190
160	29.78	802	285	100	461	1070	430	120	330
RI06	37.95	2475	860	100	385	3669	1364	266	1418
RI07	6.20	16555	4700	735	10110	23059	8571	1672	8915
RI08	39.26	810	260	20	100	857	318	62	332
<b>Total</b>	<b>143.11</b>	<b>21,883</b>	<b>6,548</b>	<b>955</b>	<b>11,124</b>	<b>30,685</b>	<b>11,523</b>	<b>2,120</b>	<b>11,185</b>

**TAZ Data: Within Northfield Growth Boundary**

TAZ #	Area (Sq. Mi.)	2000 Information				2030 Forecasts			
		Population	Households	Retail	Non-Retail	Population	Households	Retail	Non-Retail
157-4 A	0.39	5	2	0	0	506	200	92	1749
157-5 A	0.93	5	1	0	0	1720	680	154	2054
157-6	0.21	0	0	0	340	759	300	71	376
157-7 A	0.43	13	5	0	0	31	12	0	0
157-8	0.36	557	216	0	7	630	217	0	546
160-6	0.11	0	0	0	10	0	0	0	20
160-7 A	0.33	76	33	0	70	111	48	81	1606
160-8	0.03	0	0	0	430	0	0	0	490
RI06-6	0.41	302	94	0	0	921	364	0	0
RI06-12	0.98	89	29	0	0	89	29	0	472
RI06-13	0.36	217	72	0	0	203	70	0	0
RI06-14 A	0.83	76	25	0	0	0	0	0	590
RI07-1	0.48	2737	30	0	840	2737	30	0	860
RI07-2	0.10	567	175	0	96	1047	361	0	0
RI07-3	0.05	311	162	0	40	478	165	0	40
RI07-4	0.04	0	0	0	35	0	0	0	78
RI07-5	0.04	181	50	0	0	181	50	0	0
RI07-6	0.11	812	220	0	15	812	220	0	0
RI07-7	0.08	200	85	0	5	336	133	0	0
RI07-8	0.09	407	142	0	0	427	146	0	0
RI07-9	0.08	351	132	0	0	328	113	0	0
RI07-10	0.06	329	132	0	0	360	124	0	0
RI07-11	0.07	221	128	0	40	221	128	0	57
RI07-12	0.05	275	108	0	20	320	110	0	45
RI07-13	0.08	388	132	0	552	402	138	0	0
RI07-14	0.06	274	116	0	0	705	243	0	180
RI07-15	0.14	0	0	0	906	0	0	0	1000
RI07-16	0.29	10	3	0	570	3	1	0	1238
RI07-17	0.82	9	4	88	720	0	0	132	1033
RI07-18	0.04	2	1	29	14	0	0	18	9
RI07-19	0.03	121	42	0	0	114	39	0	0
RI07-20	0.03	14	8	49	128	0	0	49	128
RI07-21	0.02	8	5	37	29	0	0	37	29
RI07-22	0.16	291	93	0	104	304	120	0	450
RI07-23	0.19	55	3	0	0	55	3	25	25
RI07-24	0.30	14	1	0	0	3	1	0	0
RI07-25	0.23	900	89	0	640	1665	165	0	660
RI07-26	0.02	770	6	0	0	493	5	0	130
RI07-27	0.02	65	33	110	86	65	33	216	86
RI07-28	0.01	66	19	0	30	48	17	30	0

RI07-29	0.04	186	37	0	0	94	32	33	0
RI07-30	0.01	42	22	49	63	42	22	49	63
RI07-31	0.01	29	18	49	63	29	18	49	63
RI07-32	0.01	52	19	0	0	55	19	0	0
RI07-33	0.02	115	45	0	0	131	45	0	0
RI07-34	0.02	125	42	0	0	122	42	0	0
RI07-35	0.11	369	141	0	0	436	150	0	9
RI07-36	0.04	207	68	0	0	207	71	0	0
RI07-37	0.01	65	31	0	0	95	33	0	0
RI07-38	0.01	21	8	146	52	23	8	160	52
RI07-39	0.01	20	14	146	52	41	14	232	52
RI07-40	0.06	110	66	263	128	583	201	164	80
RI07-41	0.01	20	10	73	26	29	10	116	26
RI07-42	0.01	15	4	73	26	12	4	116	26
RI07-43	0.01	35	16	0	0	47	16	0	0
RI07-44	0.02	88	35	0	0	103	36	0	0
RI07-45	0.04	158	56	0	61	165	57	0	12
RI07-46	0.01	44	13	0	61	38	13	0	61
RI07-47	0.01	69	25	0	0	73	25	0	0
RI07-48	0.01	73	24	0	0	70	24	0	10
RI07-49	0.04	177	68	0	0	197	68	0	0
RI07-50	0.10	675	259	0	39	752	259	0	0
RI07-51	0.06	8	3	146	100	6	2	160	110
RI07-52	0.06	47	20	0	185	56	19	86	254
RI07-53	0.07	0	0	211	0	0	0	272	0
RI07-54	0.09	212	104	0	0	452	179	18	0
RI07-55	0.17	984	495	0	0	984	495	0	116
RI07-56	0.08	359	118	0	0	342	118	0	0
RI07-57	0.16	312	106	0	0	398	137	0	0
RI07-58	0.12	0	0	0	50	0	0	0	195
RI07-59	0.15	176	69	0	350	572	197	0	150
RI07-60	0.34	795	284	0	47	795	284	0	75
RI07-61	0.25	290	98	0	3	1297	447	0	0
RI07-62	0.23	3	1	0	0	897	309	0	0
RI07-63	0.21	530	173	0	0	732	252	0	0
RI07-64	0.18	363	129	0	0	545	188	0	0
RI07-65	0.14	50	23	0	20	102	35	0	20
RI07-66	0.35	398	134	0	0	398	134	0	0
RI07-67	0.41	302	94	0	0	412	163	0	0
RI08-4 A	0.56	12	4	0	0	253	100	0	0
RI08-5 A	0.18	3	1	0	0	797	315	0	0
RI08-6 A	0.88	30	8	0	0	2865	988	0	0
RI08-8	0.23	5	2	0	0	1872	740	0	0
<b>Total</b>	<b>14.59</b>	<b>18,292</b>	<b>5,283</b>	<b>1,469</b>	<b>7,053</b>	<b>33,193</b>	<b>10,534</b>	<b>2,360</b>	<b>15,325</b>

**TAZ Data: Outside of Northfield Growth Boundary**

TAZ #	Area (Sq. Mi.)	2000 Information				2030 Forecasts			
		Population	Households	Retail	Non-Retail	Population	Households	Retail	Non_Retail
157-1	16.52	461	154	0	0	754	292	0	0
157-2	2.87	79	23	0	0	129	44	0	0
157-3	4.50	62	20	0	0	101	38	0	0
157-4 B	3.14	54	20	0	0	88	38	0	0
157-5 B	0.36	0	0	0	0	0	0	0	0
157-7 B	0.19	5	2	0	0	8	4	0	0
160-1	8.09	172	61	0	0	229	92	0	0
160-2	7.60	163	52	0	0	217	78	0	0



160-3	3.31	173	60	0	30	231	91	0	21
160-4	9.29	183	64	0	0	244	97	0	0
160-5	0.76	0	0	0	0	0	0	0	0
160-7 B	0.25	35	15	0	21	47	23	0	15
RI06-1	9.65	229	74	6	34	1444	514	248	284
RI06-2	4.65	125	45	6	38	255	96	12	225
RI06-3	10.14	250	92	0	7	273	105	0	8
RI06-4	8.00	498	163	0	6	1501	335	0	3
RI06-5	0.77	92	28	0	0	1401	297	0	0
RI06-7	0.25	9	2	26	68	424	157	158	413
RI06-8	0.25	102	38	47	36	84	31	75	57
RI06-9	0.22	164	64	24	33	273	101	485	666
RI06-10	0.81	272	109	33	87	1734	617	31	81
RI06-11	0.31	16	5	0	0	1223	428	0	0
RI06-14 B	0.03	0	0	0	0	0	0	0	0
RI08-1	15.75	336	113	0	44	389	142	0	44
RI08-2	9.99	151	51	0	94	298	107	0	94
RI08-3	3.70	82	26	0	0	150	48	0	0
RI08-4 B	2.67	50	17	0	13	250	80	0	13
RI08-5 B	2.26	40	14	0	0	464	152	0	0
RI08-6 B	0.32	7	2	0	0	273	98	0	0
RI08-7	2.05	67	19	0	30	59	22	0	30
<b>Total</b>	<b>128.70</b>	<b>3,877</b>	<b>1,333</b>	<b>142</b>	<b>541</b>	<b>12,543</b>	<b>4,127</b>	<b>1,009</b>	<b>1,954</b>

### Transportation Analysis Zone Totals

TAZ #	Area (Sq. Mi.)	2000 Information				2030 Forecasts			
		Population	Households	Retail	Non-Retail	Population	Households	Retail	Non_Retail
157	29.90	1241	443	0	347	4726	1825	317	4725
160	29.77	802	285	0	561	1079	429	81	2152
RI06	37.66	2441	840	142	309	9825	3144	1009	2799
RI07	7.37	16902	4791	1469	6196	22436	6471	1962	7422
RI08	38.59	783	257	0	181	7670	2792	0	181
<b>Total</b>	<b>143.29</b>	<b>22,169</b>	<b>6,616</b>	<b>1,611</b>	<b>7,594</b>	<b>45,736</b>	<b>14,661</b>	<b>3,369</b>	<b>17,279</b>