

On-the-Road Bicycle Facilities Final Report

5/6/2016

Introduction

Overview

The purpose of the On-the-Road Bicycle Facilities Report is to assist Saint Cloud metropolitan cities and counties in identifying, planning and implementing their own on-the-road bicycle connections within their respective communities. Since the APO does not facilitate construction activities, the report is meant for informational and advisory purposes and is currently not tied to any future projects, improvements and funding. Additionally, the report is developed at the regional level to help facilitate bicycle traffic into and across the metropolitan area for average citizen bicycle use. While more advanced bicycle enthusiasts are welcome and encouraged to also make use of the report, it is primarily designed for everyday adult riders for uses such as commuting to and from work, going shopping, visiting friends, or riding recreationally. For safety reasons the APO does not recommend children ride on roadways, only adults.

Report background

This project was undertaken to improve the bicycle access and connectivity throughout the Saint Cloud area transportation system, in order to connect people with places across the road network without requiring a motorized vehicle. This report focuses on improving on-road bicycle amenities, taking into account existing on-road and off-road cycling infrastructure. Due to financial and physical limitations, the St. Cloud metropolitan area cannot build off-the-road facilities to accommodate all bicycle transportation connections and demands.

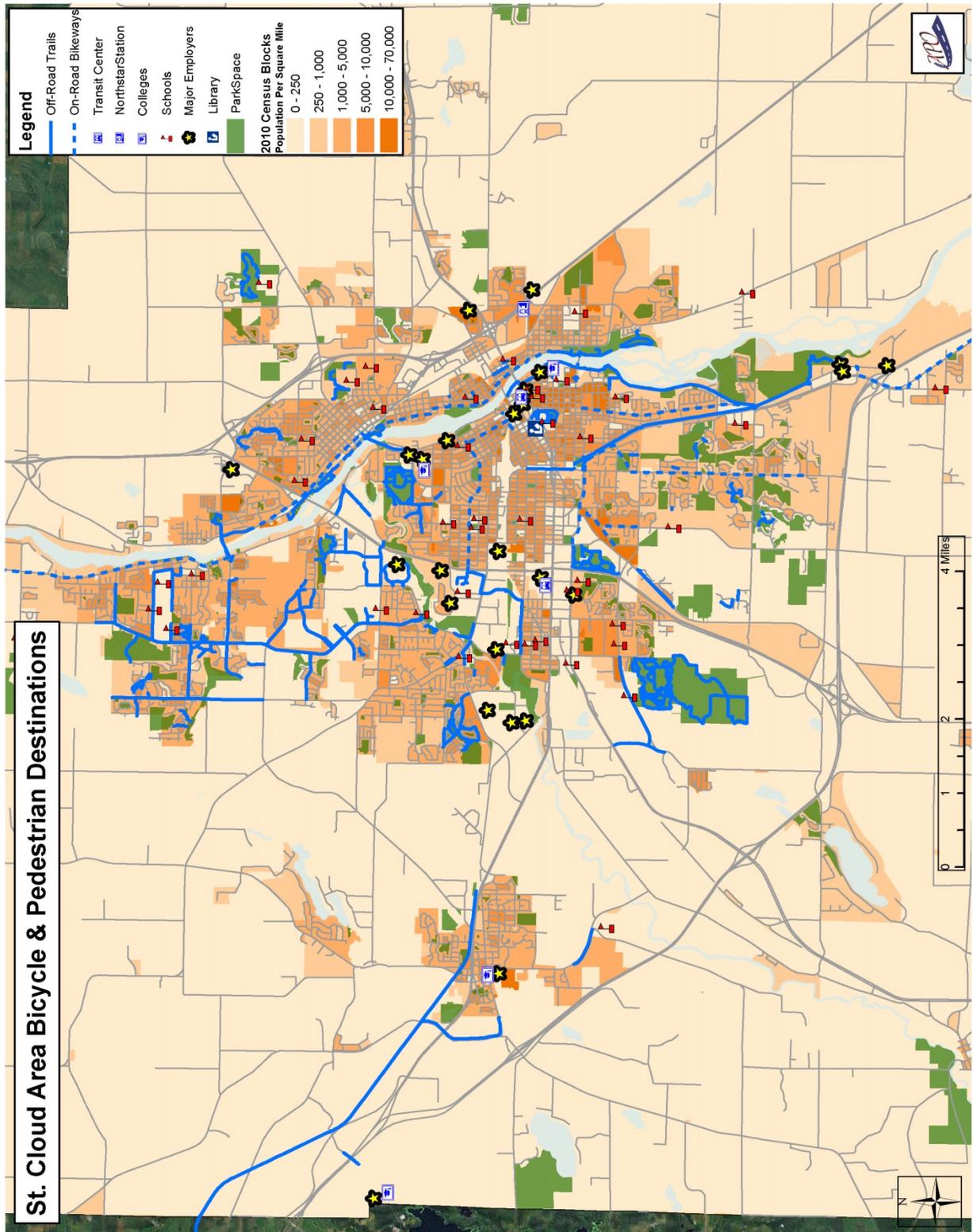
The report is meant to help APO member agencies identify where improvement projects can be done to encourage on-road bicycle travel with the assistance of the Bicycle Level of Service (BLOS) grade ratings.

The report's objectives are to improve the level of bicycle planning in the next APO Long Range Transportation Plan (this report's results should not be incorporated until the APO's next Long Range Transportation Plan) and offer assistance to partner agencies and their planning and engineering staffs.

Process

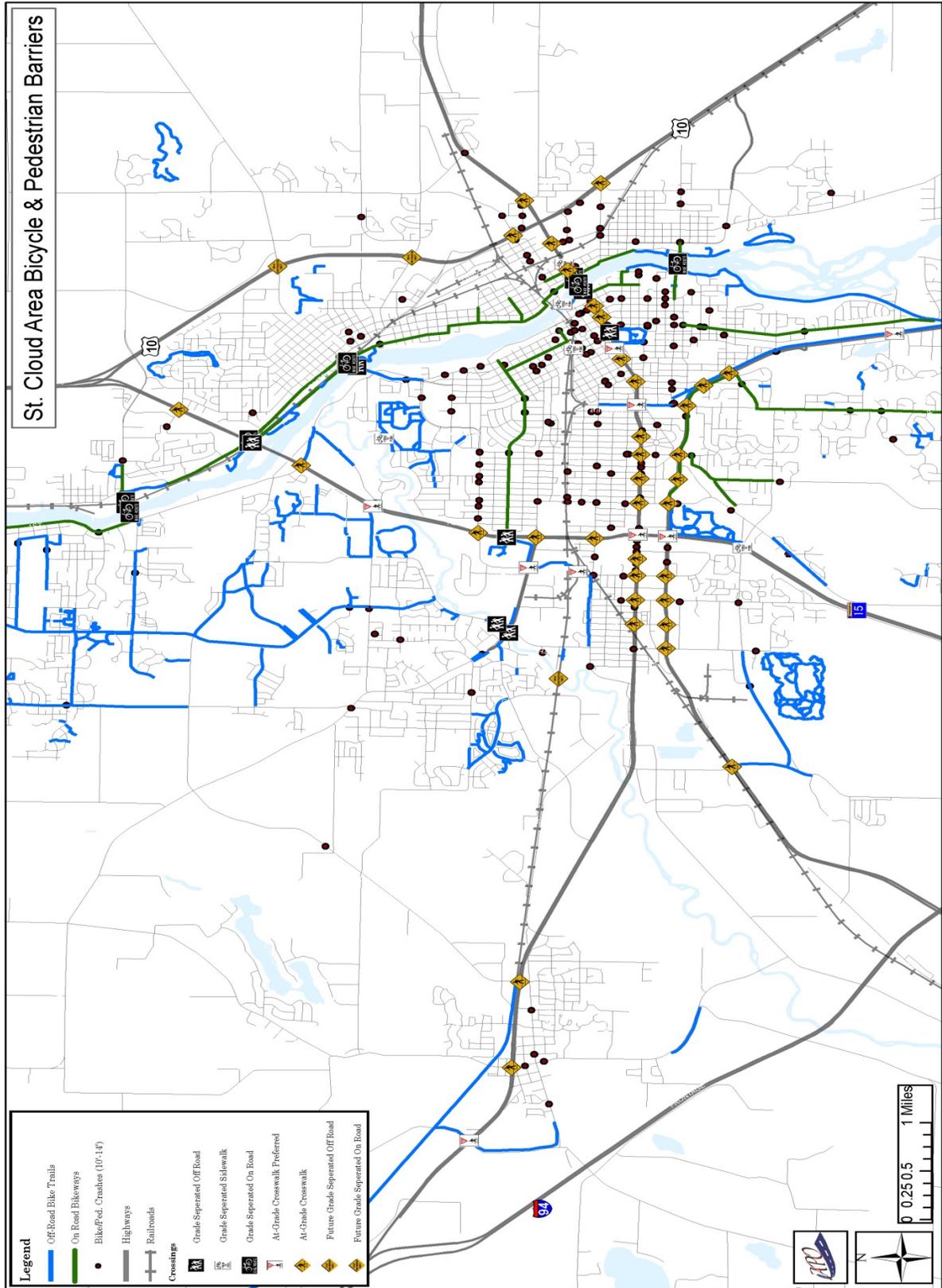
In order to develop this report, the APO had to take in account a variety of factors that would impact improvements for on-road bicycle facilities and infrastructure. First, the APO assessed the existing bicycle infrastructure (both on-road and off-road) and mapped existing on-road and off-road grade-separated trails. Second, the APO conducted an analysis of the region's trip-generating destinations (such as parks, schools and major employers) and bicycle travel barriers. These barriers and destinations are mapped and described below. Third, the APO went into the field and recorded various existing roadway measurements. These measurements were used for calculating the Bicycle Level of Service (BLOS). The calculations generate ratings for the suitability for cyclists to comfortably ride on that road, taking into account such factors as shoulder width, presence of designated bike lanes and average daily traffic volume. Once the BLOS scores were mapped and checked for accuracy, the maps were brought to the public for general review and for areas in need of improvement.

Destinations



Destinations are places a bicycle rider would like to travel, either for recreation or purposeful journeys (such as commuting). Typically, bicyclists are willing to travel beyond the distance that most pedestrians would walk, with distances of up to three miles being comfortable bicycling range. The most common trip generating areas include schools, transit stops, government buildings, retail centers, and park and recreation areas. Most major employers are located either around the periphery of the City of St. Cloud, or in the downtown core. The more established K-12 schools are located in and around long-existing residential areas, with newer schools located along the outer residential areas. Other major trip generating destinations include the St. Cloud Public Library in downtown St. Cloud, and institutions of higher education, such as St. Cloud State University, St. Cloud Technical College and the College of St. Benedict and St. John's University. There are two major public transit centers in St. Cloud; one in downtown St. Cloud and the other at the Crossroads shopping mall. The St. Cloud Amtrak station on the east side of the city could potentially be a major destination, especially if the Northstar Commuter Rail train was extended from its current Big Lake terminus to St. Cloud.

Barriers



Barriers to bicyclists are locations or existing physical objects that either completely prevent cycling or provide challenges or hazards to riders. Barriers include heavily trafficked roads, (such as Division Street (MN 23), 2nd Street South, University Drive South, MN 15, US 10 and I-94) railroad tracks and the Mississippi River. While pedestrians and bicyclists can use many of these roadways (such as 2nd Street South) doing so could be considered highly risky. The St. Cloud area has several major railroad lines that pass through the area, causing limited options for people to move north and south. There are three primary sites where cyclists can safely cross tracks from north to south: 9th Ave, 25th Ave and 33rd Ave. The Mississippi River creates a natural barrier between the east and west sides of the St. Cloud region. The only locations for cyclists to cross the river are University Dr. S., Division Street (MN 23) and East St. Germain Street in St. Cloud, 9th Ave N into Sauk Rapids and 1st St NE in Sartell.

In mapping and analyzing barriers, there are several areas that have a higher occurrence for pedestrian/bicyclist versus car crashes. Collision clusters include along Division Street (MN 23) near the MN 15 intersection, 33rd Street, 13th Street North, the streets around St. Cloud State University, and the downtown core of St. Cloud which experience higher bicycle traffic.

To best avoid these collisions between motorized and non-motorized traffic, the APO identified street crossings that would allow for the safest interaction of pedestrian/bicyclist and automotive traffic when non-motorized individuals need to cross a street (most collisions occur when bicyclist and pedestrians need to cross a street and a motorist does not see or recognize them). Safer, preferred crossings identified include the pedestrian bridge over MN Highway 15 near Apollo High School and the HAWK crossing outside the St. Cloud Public Library.

BLOS

Description

Bicycle Level of Service (BLOS) is a model used to estimate bicyclists' average perception towards the service quality for a section of roadway. This model calculates on-road bicycle facilities by using the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the model clearly reflects the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths, traffic volume, pavement surface conditions, motor vehicles speed and type, and on-street parking.

The Bicycle Level of Service model is based on the proven research documented in Transportation Research Record 1578 published by the Transportation Research Board of the National Academy of Sciences. It was developed with a background of over 250,000 miles of evaluated urban, suburban, and rural roads and streets across North America. For the purpose of this report the APO used the Bicycle Level of Service calculator form, from The League of Illinois Bicyclists (LIB) website (<http://www.bikelib.org>), which was developed by Sprinkle Consulting. Many urbanized area planning agencies and state highway departments are using this established method of evaluating their roadway networks. These include metropolitan areas across North America such as Birmingham AL, San Antonio TX, Buffalo NY and Tampa FL as well as state departments of transportation such as New York State Department of Transportation (NYDOT) and others.

The Bicycle Level of Service model has six distinct grades that a road may be scored as, running from A to F, similar to an academic report card. If the grade is 'C', the road is considered to be average and suitable for most adult bicyclists. If the road is graded a 'B' or an 'A', it is considered to be above average, or extremely above average in quality, and any adult bicyclist should feel safe and comfortable riding on it. If a road is given a grade of a 'D', 'E' or an 'F', it is considered to be below average, very low or extremely low in quality and should be avoided by bicyclists due to major safety hazards and ride comfort concerns. Only the most experienced bicyclists should even consider riding roads with grades of 'D', 'E' or 'F'; even then, the APO recommends that such poorly scored roads be avoided by all bicyclists if possible.

Purpose

The primary objective of the current study was to incorporate a methodology for deriving a bicycle compatibility index (BCI) such as BLOS that could be used by local planners and engineers to evaluate the capability of specific roadways to accommodate both motorists and bicyclists. BLOS was developed for urban and suburban roadway segments such as midblock locations that are exclusive of major intersections of a roadway and is primarily intended for use on "through streets." Subsequently the ratings do not account for major intersections along the route where the bicyclist may encounter a stop sign or traffic signal. BLOS designations provide roadway designers the capability to assess the roadways with respect to compatibility for shared-use operations by motorists and bicyclists and to plan for and design roadways that are bicycle compatible.

Rider Types

When considering the BLOS, it is crucial to understand that these scores advocate for the average adult bicyclist. There are four different skill level categories that every rider falls within. First is the strong and fearless rider. These are advanced and experienced riders who are very comfortable riding “regardless of roadway conditions”. They are very comfortable riding without bicycle lanes and in non-residential streets. They primarily use bicycling to get to a destination, use the bike as a motor vehicle and they ride with vehicles for speed and for convenience. The second type of rider is enthused and confident cyclists that are comfortable riding on-road with automobiles, but “prefer to do so operating on their own facilities” and appreciate efforts made to improve the bikeway infrastructure. They are very comfortable on non-residential streets with bike lanes along with residential streets with low average daily traffic (ADT). The third type of rider is interested but concerned about cycling. They are “curious about bicycling,” they overall like to ride, but are afraid to do so and therefore do not regularly ride and “will not venture out onto the arterials.” This type of rider is not very comfortable bicycling on residential streets with bike lanes and may or may not be interested in biking more for transportation or leisure. The fourth type is the no way, no how. This group for reasons of topography, inability, or lack of interest chooses not to be interested in bicycling.

This report is intended for the enthused and confident cyclists along with helping the interested and concerned riders feel more comfortable riding on safe routes. Strong and fearless riders ride all LOS routes, though ‘D’, ‘E’ and ‘F’ routes are not recommended, they have the ability and experience to do so. The enthused and confident riders along with the interested and concerned riders can ride A, B, or C routes. It is also advised that children only cycle on grade separated paths, local streets with low ADT or on sidewalks; safety is the number one concern.

Collection

All of the BLOS data was collected by APO staff in the field from June to August 2015. The APO reviewed 156 roadway segments. The staff selected each of these segments based on input from the APO Bicycle and Pedestrian Advisory Committee (BPAC) and Technical Advisory Committee (TAC). The routes which presented the possibility of creating regional links between the St. Cloud area communities were reviewed primarily while others were added with the ambition of connecting the off-road gaps in the network.

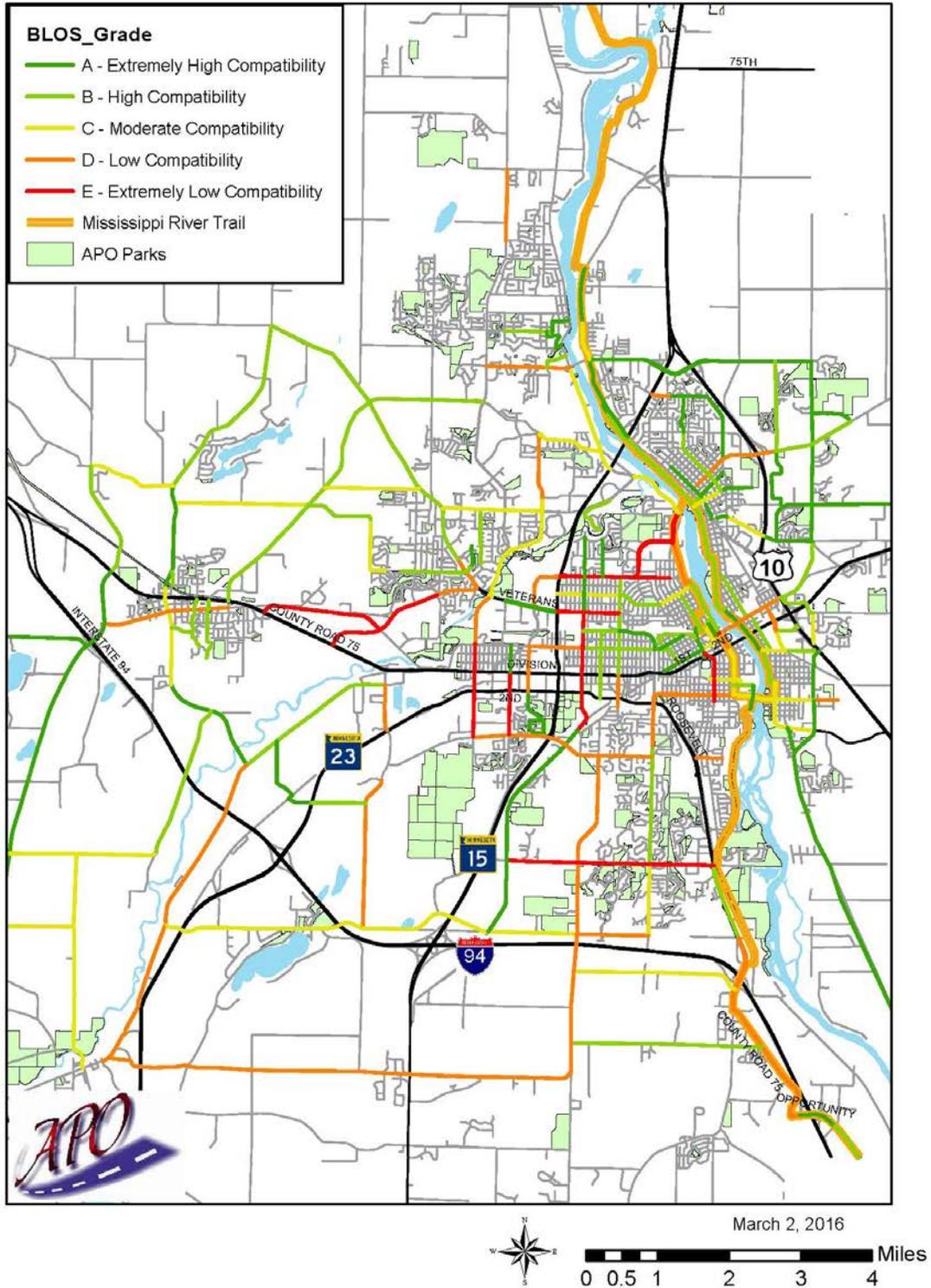
When staff visited each route, if the segment was inconsistent and factors changed, staff occasionally needed to split the routes up into smaller segments. For example, if pavement condition changed, lane widths widened or shrunk, parking was discontinued,

number of thru lanes changed or speed limit changed. This created a more accurate depiction of the route instead of generalizing the whole roadway's segment length. Some roadways have various BLOS ratings because of these different factors, and in some cases a route can go from an A to an F, largely due to roadway design. The calculated grades are inputted into ArcGIS software program and assigned colors. They represent the bicycle infrastructure network in the St. Cloud area that connects the communities. Off-road routes and grade separated trails are represented on the map as well.

The staff did not visit every road in the APO planning area. The APO did not rate Minnesota State Highway 23, MN State Highway 15, Interstate 94 and US Route 10. For safety reasons the APO does not recommend riding on any highways or interstates due to a large amount of vehicles and high speed limits. It should be noted that state law prohibits bicycles along interstate highways and all highway interchanges. Additionally, most local roadways were not included as part of the study.

Results

Draft St. Cloud Area On-Road BLOS Ratings



The APO's analysis of the BLOS scores for the regional road network found a few patterns. Some of the best, most safe and comfortable roads for bicyclist to ride on are in the western side of the region, from western St. Cloud outward towards St. Joseph. Also, the central neighborhoods nearest downtown St. Cloud, as well as south-east St. Cloud and most of Sauk Rapids scored well. Major roadways such as Division St., University Avenue and 2nd Street South scored poorly, especially due to their heavy ADT volume. The southern half of St. Cloud as well as multiple major north-south streets scored poorly and would be strong candidates for bicycle facility improvements.

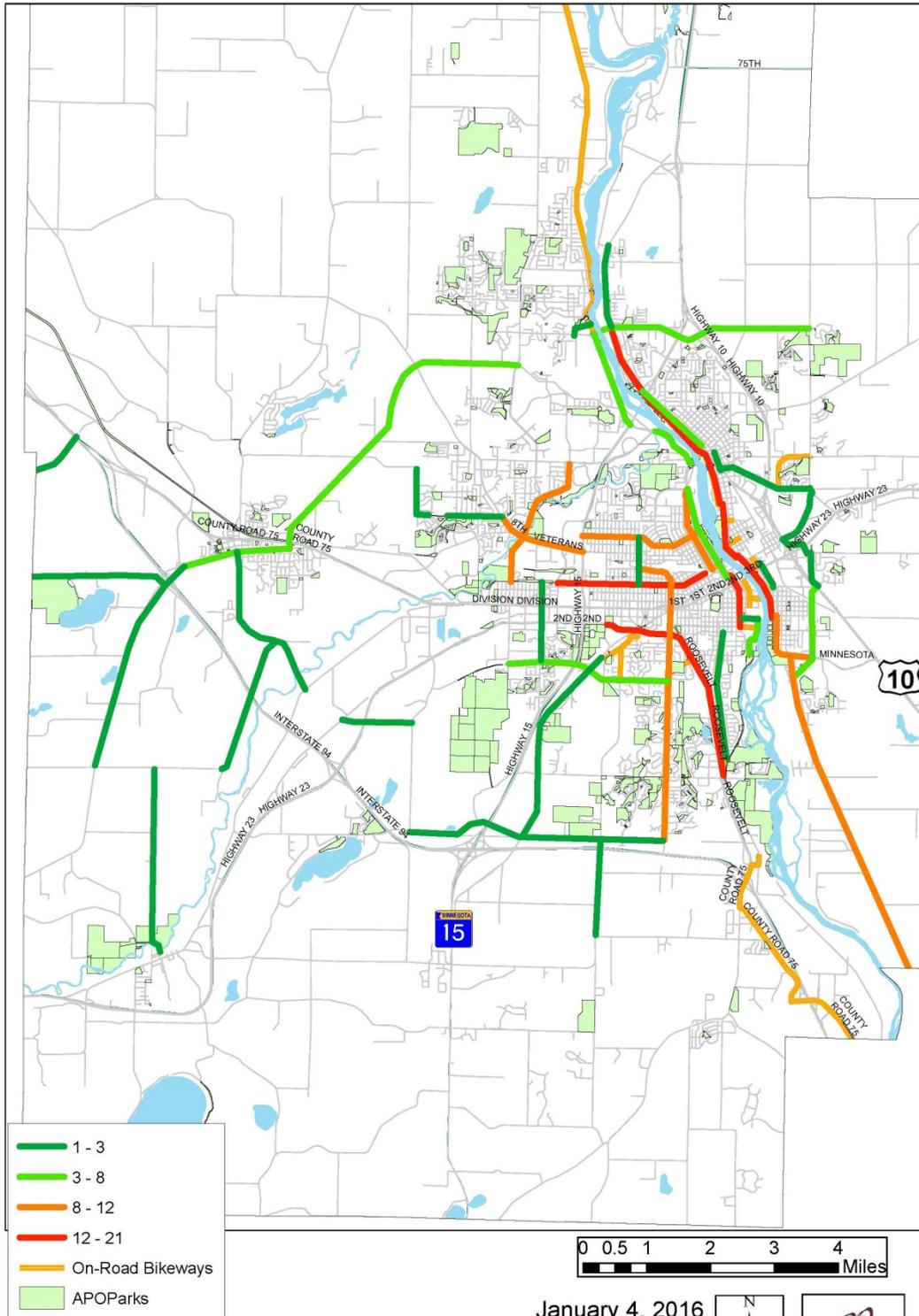
Public Input

Summary

The APO held several meetings to gather input and information to help improve on-the-road amenities. These included meetings with the APO Bicycle-Pedestrian Advisory Committee (BPAC) and the St. Cloud regional Technical Advisory Committee (TAC). The BPAC is a citizen advisory committee to the St. Cloud APO composed of local community members who are interested in improving pedestrian and bicycle facilities and encourage more people to use these transportation methods. The BPAC meets generally every 3-5 months. The TAC is a committee of local city and county transportation professionals (urban planners and civil engineers) who meet once a month to discuss various transportation plans and issues. For both of these groups, the APO presented the destination and barrier maps to solicit feedback about the findings. Later, the APO presented the BLOS maps to both committees for feedback and review of accuracy.

Several open-house meetings were also held at community locations (such as a coffee shop, university classes and public library) as well as at neighborhood groups. At each of these open houses, the APO displayed several large format BLOS maps, broken down into three sub-regions of St. Cloud for enhanced detail, and described the project with those in attendance. Audience members were invited to place up to six stickers or write notes on the maps to indicate roads they would prefer to utilize and ride or would like to see improvements made upon.

Public Outreach Route Scores - St. Cloud Region



Map is not for navigable purposes and is strictly for informational uses. Routes shown are suggested and do not guarantee conditions or bike-ability. Routes are for adult riders only. Before cycling on-the-road an individual is encouraged to check and verify their equipment is in proper working order and take all safety precautions. Riders must be aware of their own abilities, traffic conditions and weather conditions. All on-the-road cycling is dangerous and the APO's proposed network does not indicate that a cyclist will be completely free of danger or harm. Bicyclists assume all responsibility and risks.



The stickers and notes placed on the BLOS maps from the various BPAC and other public outreach events were tallied up, mapped and analyzed. Almost 300 stickers and notes were placed on the map. The most popular routes indicated included 3rd St. N., University Dr. SE, CR 75/Roosevelt/2nd St. S., and 5th Ave. S. It should be noted even though the public outreach events targeted discussion towards on-the-road amenities, questions and interest into the Lake Woebegon Trail extension into St. Cloud remained high.

Gap Analysis

Intro

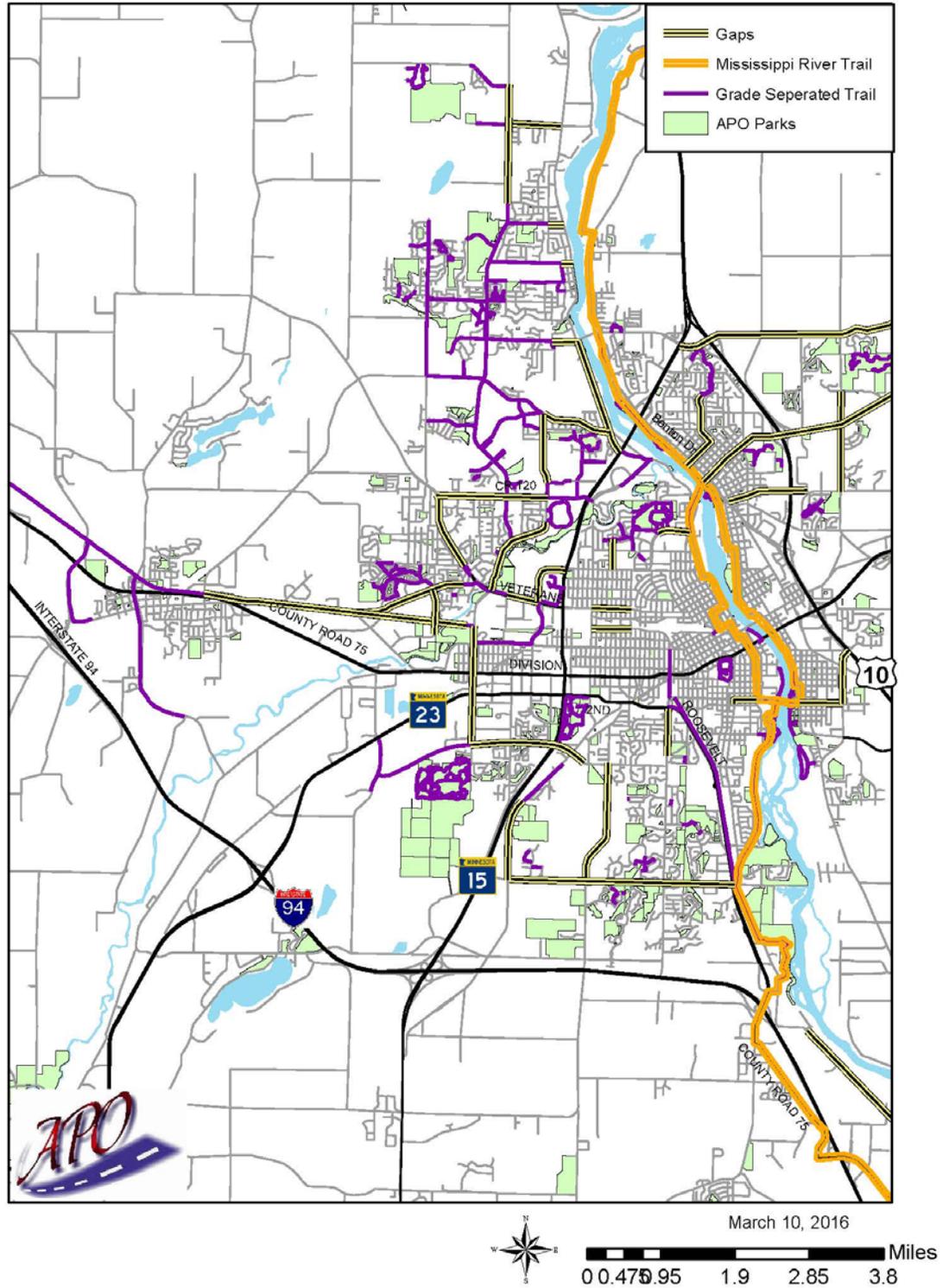
To better understand where on-road bicycle infrastructure should be built, a gap analysis was conducted with the assistance of the TAC. This way, gaps in the current available bicycle infrastructure could be identified and used as guidance for improvement locations. This would help ensure greater mobility and access for bicyclists to ride within the St. Cloud region. For the purposes of this study a gap is defined as any distance between two or more existing off-road or trail facility. A gap could also exist between an existing off road facility and an on-road facility. Additionally, a gap was recognized by the TAC members as the space or distance between and any existing facility, of any type, and a destination, such as a school, that cyclists may need to utilize.

Process

After TAC approval of the BLOS ratings, members were charged with the task of determining the location of gaps in the bicycle infrastructure system for the St. Cloud region. For this analysis activity the APO provided large format maps showing the off-road bicycle facilities (i.e., bike trails) and regional roads (with the BLOS ratings removed) to the TAC. The TAC broke into small groups that each examined and identified where they thought the biggest gaps in the bicycle system both based on their own knowledge and previous public input and requests. The results of the activity are described below.

Identification of Gaps

Draft St. Cloud Area On-Road BLOS Ratings and Gap Analysis



Following the TAC gap analysis activity, the APO compiled the results into a single map. The results displayed several common patterns were found, including the need to connect the Lake Wobegone Trail into the City of Waite Park, extending bicycle facilities on 33rd St S, University Avenue and Golden Spike Road. These were all seen as important places for bicycle facility improvements by multiple TAC members.

Other bicycle improvements were identified on:

- 7th Ave. S. in Waite Park between 10th Ave S and W. St. Germain Street
- County Road 120 in Sartell between CR4 and Lendor Ave
- Mayhew Lake NE Road between 15th St NE and Osauka Road NE

Possible Gap Solutions

The following solutions menu provides options to help agencies select and design safe on-road bikeways in the identified gaps. On-road bikeways include bicycle lanes, shared lanes, shoulders, and wide outside lanes, while off-road facilities mainly focuses on shared use-paths. On-road bikeways must be considered at the same time as other elements of the roadway in all projects during scoping, preliminary and final design. Many of the same factors that are used to determine appropriate roadway design in new construction, reconstruction and rehabilitation are also used to determine appropriate bikeway design. Decisions regarding bikeways will potentially affect major project elements including roadway cross section, grading, drainage, right-of-way requirements, signs, striping, traffic barriers, lighting and signals, as well as operation and maintenance.

Bikeways can also be retrofitted onto existing streets and roads without construction by making reasonable changes with signs, painted striping, lighting, traffic signals, operation, and maintenance. Not every solution or facility will be suitable for every roadway; local factors must be considered for each roadway.

Table (A) provides a general overview of the available improvements for bicycle facilities. This table can be used as a basis for selecting the appropriate bikeway design methods based on rural and urban factors. Not every bikeway design selection will work in every situation; these are a selection of the possibilities and final decisions should be made on previously stated contributing factors and public input.

Table (A)Solutions Menu

Category	Description	Pros	Cons	Typical Application
Paved Shoulders	Edge or border of roadway that is on the same level as the regular car lanes.	Accommodates existing roadway with higher speeds or traffic volumes, reduces edge deterioration and provides space for troubled motorists to pull over	Some shoulders are too narrow to safely ride in and encourage dangerously close passing from motorists.	Found most often on rural roadways.
Conventional Bike Lanes	Pavement markings between roadway traffic and curb or parking lane.	Creates separation between bicyclists and motorists.	Some bike lanes are too narrow to safely ride in and encourage dangerously close passing from motorists.	Most often found on streets with less than 3000 ADT and a speed-limit greater than or equal to 25 mph.
Cycle Tracks	An exclusive bike facility running parallel to regular car lanes that has a physical barrier separating motor traffic and bicyclists.	Dedicates and protects space for bicyclists in order to improve perceived comfort and safety for riders.	Increased cost to implement. Additional space requirements. Added maintenance required for the buffer striping.	Streets where many bicyclists feel unsafe due to factors such as high traffic volumes, high speed traffic, and high demand for street parking and high parking turnover. Often used on urban roadways.
Buffered Bike Lane	Conventional bicycle lanes paired with a designated buffer space (often painted, not physical) separating bicyclist from the adjacent motor traffic.	Encourages bicycling by improving the perception of increased city. Creates defined, separate spaces for bicyclists and motor traffic. Increases the space between cars and bicyclists.	Additional space requirements. Added maintenance required for the buffer striping.	Streets where many bicyclists feel unsafe due to factors such as high traffic volumes, high speed traffic, and high demand for street parking and high parking turnover. Often used on urban or suburban roadways.
Shared Roadway	Bicycle lanes marked with paint within the primary motor traffic lane – directly shares space between bicyclists and motor traffic.	Helps riders position themselves properly in traffic lanes too narrow for a bicyclist and vehicle to travel side-by-side. Encourages both bicyclists and motor traffic to share the roadway safely. No extra roadway needed.	Less attractive to both basic/average bicyclists and car drivers.	Often used to cover short gaps between bike lanes or for streets with moderate to low traffic volumes which have constrained right-of-way.
Shared Use Path	Grade-separated bike trails that are usable by bicyclists as well as pedestrians.	Provide a paved pathway for bicyclists and pedestrians to travel between destinations safely without interacting with standard motor traffic.	Users must be aware of one another and navigate the path accordingly. Also, expensive to acquire right-of-way.	Used in urban, suburban and rural areas in areas where there either are scenic natural areas or there are no roads connecting an area.

Report Findings

The APO analyzed the results of the BLOS model, TAC gap findings and the public outreach results to determine if there were any corridors that were broadly recognized as in need of bicycle infrastructure improvements. Several corridors stood out in the analysis as needing attention for improvements. Corridors are not listed in any priority order.

Highlighted Corridors

- Veterans Dr from Ridgewood Dr to MN 15 – Current BLOS score: A
- County Road 134 from Veterans Dr to County Road 120 – Current BLOS score: C
- 35th St NE from MN 15 to Mayhew Lake Rd NE – Current BLOS score: A
- College Ave S from County Road 75 to County Rd 138 – Current BLOS score: C
- 33rd St S from County Road 74 to Roosevelt Rd – Current BLOS score: E
- County Rd 74 from 33rd St S to 22nd St S – Current BLOS score: A