Regional Bicycle Barriers Study

Executive Summary

Background and Purpose

The *2040 Transportation Policy Plan* (TPP) sets policies for planning and investment direction in the transportation system in the Twin Cities region. In 2015, the Regional Bicycle Transportation Network (RBTN) was adopted into the TPP, establishing the bicycle transportation corridor and alignment priorities for regional planning and investment. The purpose of the Regional Bicycle Barriers Study (the Study) was to identify the major physical barriers to bicycle transportation in the region and to analyze and prioritize points along these barriers where there is the greatest potential need for new crossings (i.e., bridges and underpasses) or improved at-grade intersection crossings on planned bikeways. Barriers analyzed included the region's freeways and expressways, rivers and streams, and rail corridors.

Through coordination with city, county, state, and parks agency planning and engineering staff, and by incorporating input from the bicycling public, the Study resulted in a robust, data-driven approach to identify and prioritizing barrier crossing improvement opportunities. In addition to the regional bikeway corridors and alignments identified in the RBTN, this Study gave equal consideration to local bikeway networks and their related barrier crossing needs.

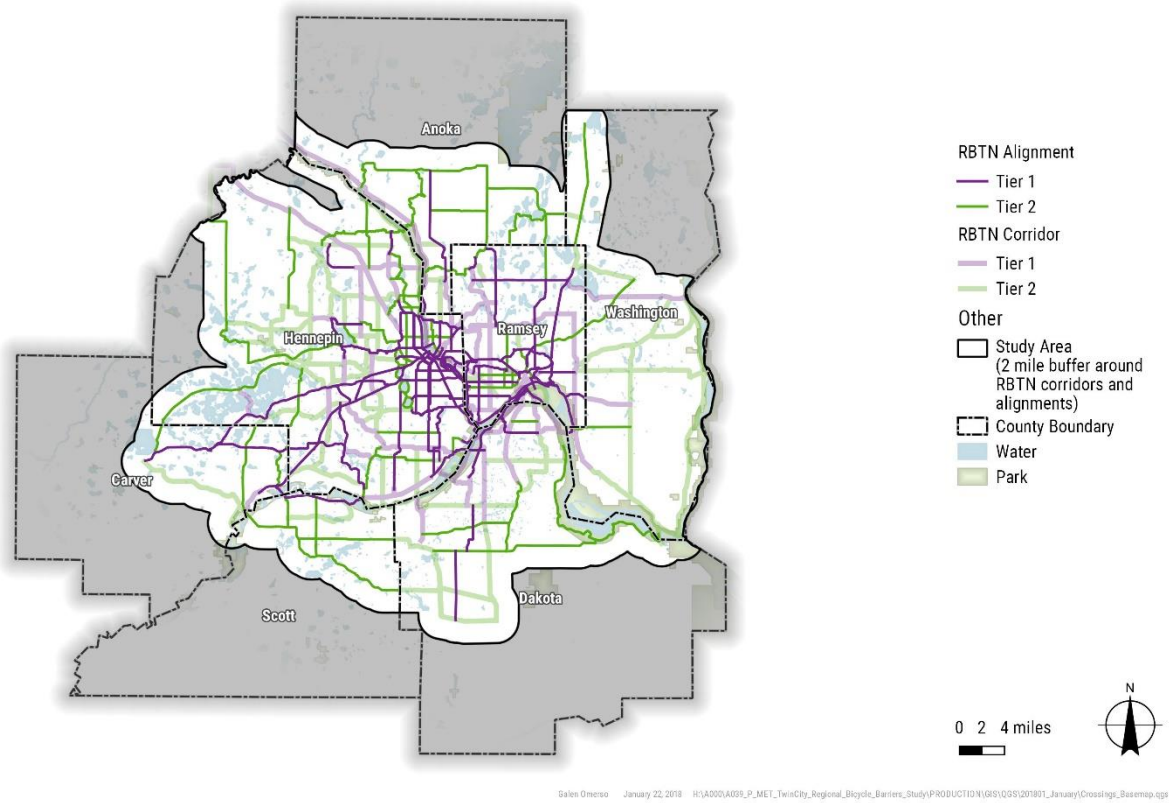
Stakeholders

Project stakeholders included a Technical Advisory Work Group (TAWG), a Project Management Team (PMT), participants in two bicyclist focus groups, and members of the general public who weighed in via an on-line WikiMap survey.

Study Area

The Study area focuses on the Regional Bicycle Transportation Network coverage area, which includes parts of all seven counties. The Study defined physical bicycle barriers to include second- and third-order rivers and streams, rail line corridors, and freeways and expressways (Figure A).

Figure A: Study Area

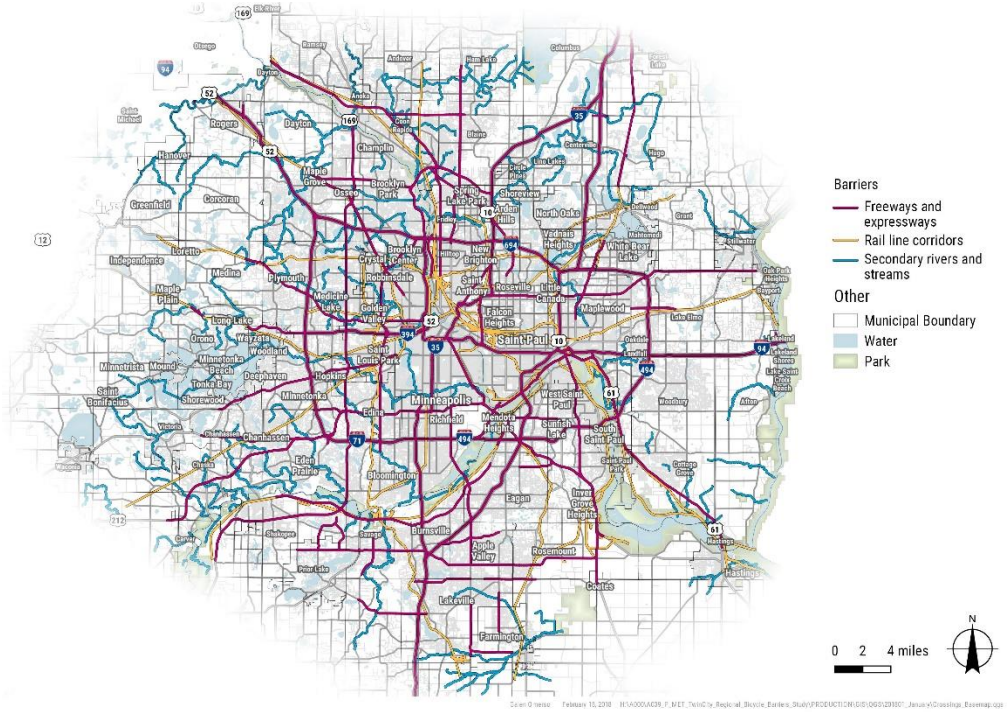


Regional Barriers Identified

The Study defined physical bicycle barriers to include freeways and expressways, rail line corridors, and second- and third-order rivers and streams. For the purpose of this study, expressways were defined to include the region's non-freeway principal arterials consisting of at least four lanes and divided by a median. Some higher-speed minor arterial highway segments that shared these characteristics were also included. Expressways differ from freeways in that they have cross-road intersections with traffic signals and some partial stop sign-controlled intersections with right-turn-in/out-only access.

The composite of all regional bicycle barriers included in the Study is shown in Figure B.

Figure B: Regional Bicycle Barriers



Barrier Crossing Analysis Points

Barrier crossing analysis points were identified by reviewing local and regional plans, and by applying spacing criteria developed to reflect desired barrier crossing frequencies.

PLAN-BASED POINT IDENTIFICATION

The prioritization analysis included barrier intersections with local planned bikeways, RBTN corridors/alignments, and collector roadways. Existing bikeway crossings (as identified in the Metropolitan Council's regional bicycle system inventory compiled from city and county data throughout the region) were not included in the analysis. At-grade intersections with barriers on minor or principal arterials were analyzed if they were a part of a local or regional *planned* bikeway. Additional barrier crossing opportunity locations were identified based on input from the public and the TAWG's iterative reviews.

SPACING CRITERIA-BASED POINT IDENTIFICATION

Existing or planned barrier crossing opportunities identified through local and regional plans were, in some instances, spaced too far apart to achieve direct and well-connected bicycle networks. Bicyclist expectations and transportation networks vary with land use and density; therefore, preferred crossing frequencies differ according to sub-regional context (just as spacing of minor arterials and roadway bridges vary across the region). Based on these realities, preferred barrier crossing maximum spacing criteria were developed by *Thrive MSP 2040* Community Designation, as shown in Table A.

Table A: Maximum Spacing of Barrier Crossing Opportunities by *Thrive MSP 2040* Community Designation

Thrive Community Designations	Preferred Maximum Spacing	Example Cities
Urban Center	½-mile	Minneapolis, Saint Paul, Richfield, Hopkins, South St. Paul
Urban	¾-mile	Golden Valley, Roseville, Maplewood, Crystal, Edina
Suburban, Suburban Edge, Emerging Suburban Edge	1 mile	Blaine, Woodbury, Maple Grove, Eagan, Lakeville
Diversified Rural, Rural Residential, Agricultural	2 miles	Grant, Afton, Ham Lake, Lake Elmo, Independence

Analysis Method

FACTORS

Based on input from the two cyclist focus groups and discussions with the TAWG, four evaluation factors were selected for application in the prioritization analysis. These included:

- Social equity
- Network connectivity
- Bicycling demand
- Safety/existing conditions

FACTOR WEIGHTS

Factor weights for the Study were determined through input generated at the two cyclist focus groups and subsequent discussions with the TAWG and PMT. After the factors had been selected, the TAWG voted on priorities via a live poll to establish the factor weights shown in Table B.

Table B: Factor Weights

Factor	Weight (0 to 10 scale)
Network Connectivity	4.825
Bicycling Demand	2.425
Safety/Existing Conditions	1.525
Social Equity	1.225

FACTOR MEASURES

Multiple measures were chosen for each evaluation factor. The outputs of these measures, or variables, were averaged to determine a composite factor score which was then weighted according to TableB.

Network Connectivity

The following measures were averaged to produce connectivity scores:

1. Proximity to existing local bikeways
2. Proximity to planned local bikeways
3. Proximity to RBTN corridor centerline or alignment
4. Proximity to existing or planned regional trail
5. Route distance to nearest barrier crossing

Bicycling Demand

The following measures were averaged to produce demand scores:

1. Point-type score
2. Population density (2040)
3. Employment density (2040)
4. Transit ridership
5. Proximity to schools
6. Proximity to colleges and universities
7. Proximity to regional parks
8. Suggested new crossings from WikiMap

Safety/Existing Conditions

The following measures were averaged to produce safety/exiting conditions scores:

1. Proximity to bicycle or pedestrian crashes
2. Bicycle or pedestrian mode share
3. Existing population density (2014)
4. Existing employment density
5. Problem locations identified through WikiMap input

Social Equity

The following measures were averaged to produce equity scores:

1. Areas of concentrated poverty
2. Areas of concentrated poverty with more than 50% people of color
3. Population under 15 years old
4. Population 65 years and older
5. Zero-car households
6. People of color
7. WikiMap input from females
8. WikiMap input from participants self-identifying as any race other than white

Results

As described in the study report, and with the help of agency stakeholders represented by the TAWG and PMT, an initial set of nearly 1,200 barrier crossing analysis points were refined through the Study process and winnowed down to about 675 crossing points for the final analysis.

The final study analysis resulted in 450 ranked points representing crossing improvement areas along regional bicycle barriers. These areas are displayed as circles and grouped into three equally distributed priority tiers in the maps of freeway/expressway and railroad corridor/ stream barriers shown in Figures C and D. The area circle diameters shown in these maps vary by aggregated Thrive community designation and correspond to the preferred maximum spacing criteria from Table A. The circle diameters represent the actual barrier segments where a future crossing improvement project may be desired.

Each of the seven counties have multiple barrier crossing opportunities in the top 450 ranked locations. Hennepin County had the most crossing opportunity locations, followed by Ramsey County. The most common barriers with high scoring barrier crossing improvement locations were rail corridor and freeway/expressway barriers. Potential crossing points along the river and stream barriers did not rise to the top as priority locations for crossing improvements.

Figure C: Regional Barrier Crossing Improvement Areas - Freeways and Expressways

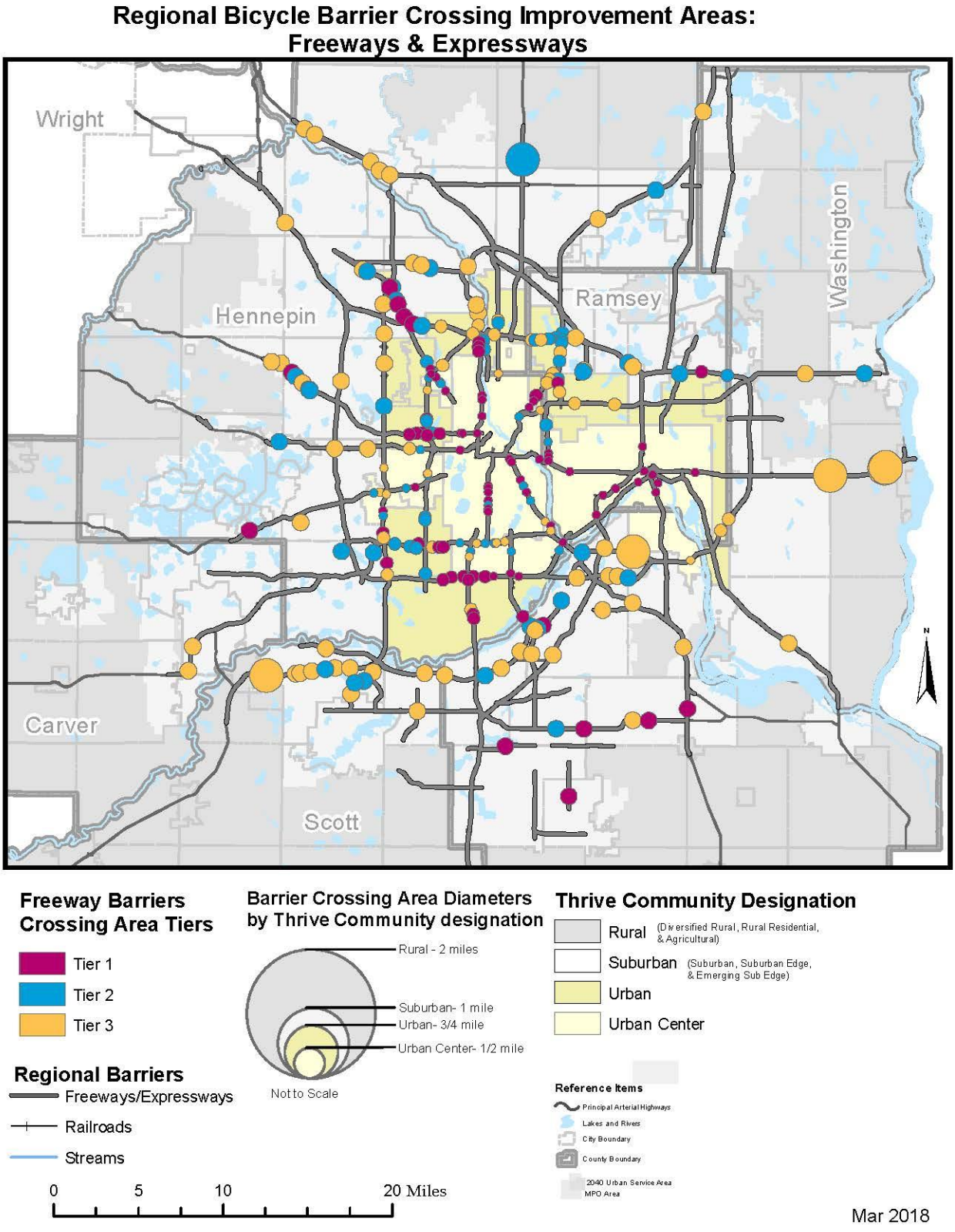


Figure D: Regional Barrier Crossing Improvement Areas - Railroads and Streams