# Hennepin County 2040 Bicycle Transportation Plan

**Appendix G.** Hennepin County crash analysis memo

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**To:** Bob Byers and Rose Ryan (Hennepin County) and Kelly Grissman (Three Rivers Park District)

**From:** Tony Hull, Bob Spaulding, Hannah Remtema

**Project:** Hennepin County Bicycle Plan

**Re:** Bicycle Crash Analysis

**MEMORANDUM**

This memorandum summarizes the draft crash analysis prepared as part of the Hennepin County Bicycle Plan Project. This crash analysis is only a summary of the crash data provided, and should not be considered a full safety analysis. Since bicycle traffic volume data is not readily available, only crash frequencies are summarized. A higher crash frequency for a particular group or location may be a function of exposure than a specific safety issue.

## Data Set and Methodology

Bicycle crash data for Hennepin County for the time period between January 2003 through October 2013 was obtained from the Minnesota Department of Transportation (MnDOT)'s MnCMAT crash database in November 2013. This dataset consists of 4,106 records, an average of 379 crashes per year. The initial data set provided included an additional 595 bicycle crash records for Scott and Carver counties, because of the presence of Three Rivers Park District (TRPD) trails in these counties. However, initial evaluation indicated that there were no crashes within 200 feet of a TRPD trail or trail crossing in either of these counties – all bicycle crashes occurred on other facilities. This data was not included in the following analysis.

## When Crashes Occurred

A larger frequency of crashes involving bicycles occurred during the summer months, with 59% of the crashes occurring between June and September (Figure 1). A small portion occurred during the winter months, indicating that there are cyclists riding year round in Hennepin County. The higher crash frequencies during the temperate months may be related to higher volumes of bicyclists on the road. For the month-to-month comparison, data from the 2013 partial year was not included.

The majority of bicycle crashes occurred during the weekday, and specifically during the evening commute hours (4:00 PM to 6:00 PM). As shown in Figure 2, weekdays were over-represented. This may be because there are more bicyclists *and* more motor vehicle traffic during the weekdays, especially the weekday PM peak period. There was also a small spike in crashes during the morning commute hours (7:00 AM to 9:00 AM)

Figure 1. Crashes by Month

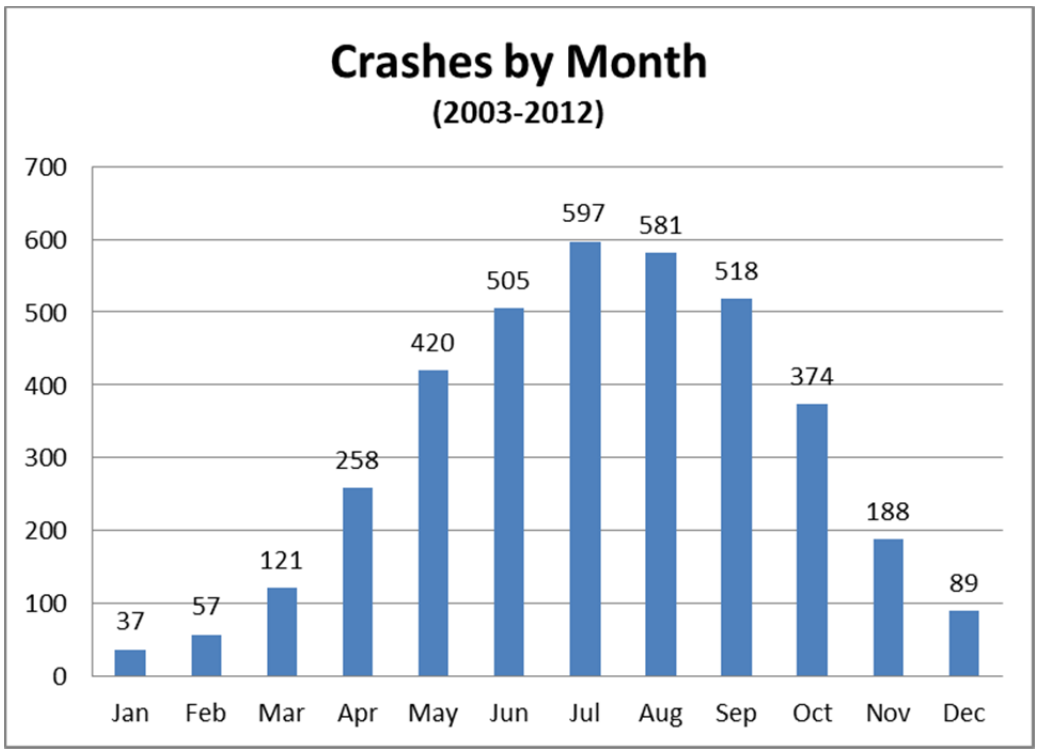



Figure 2. Crashes by Day of Week

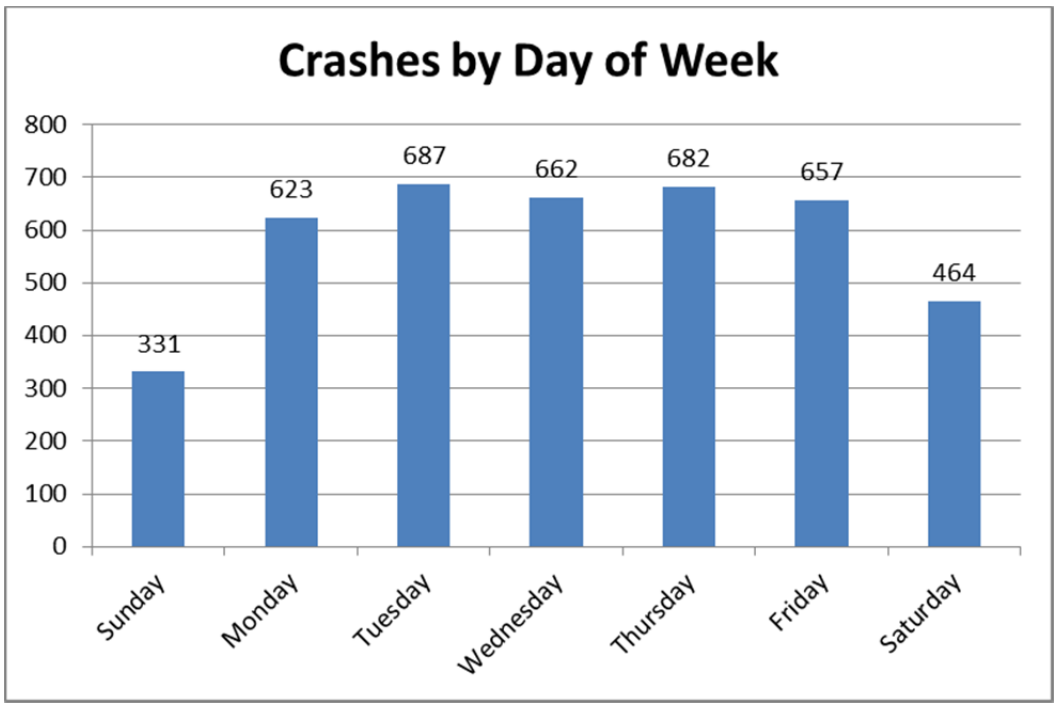
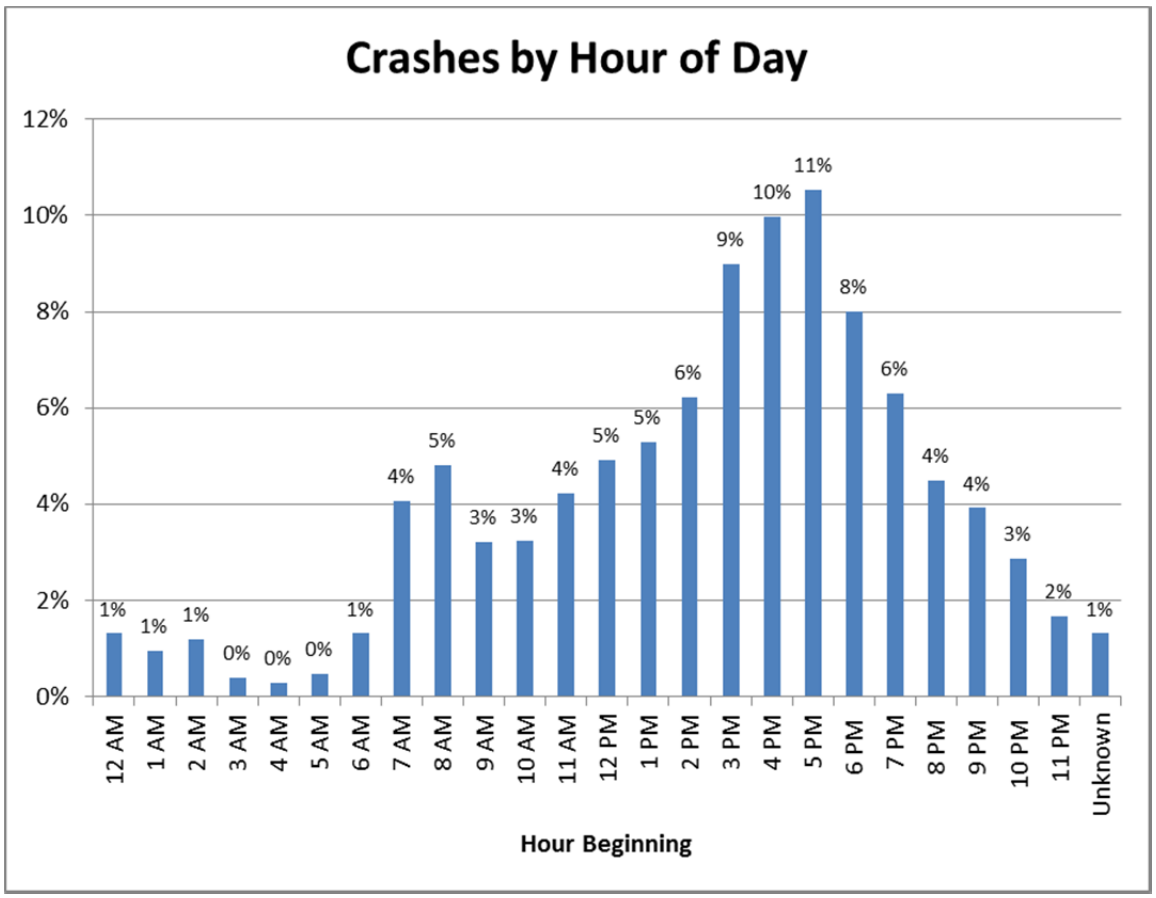


Figure 3. Crashes by Time of Day

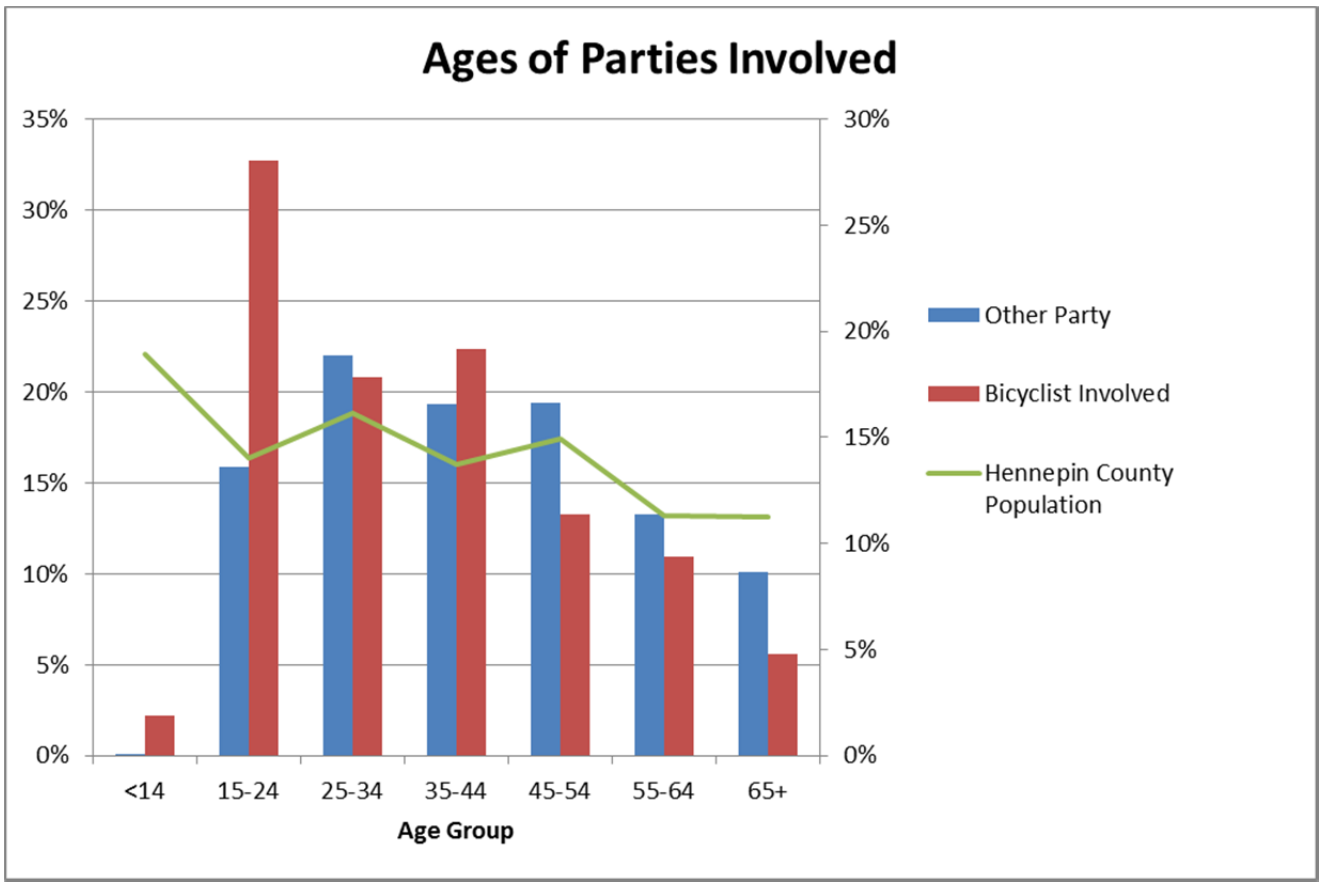



## Driver and Rider Characteristics

The age of people involved in bicycle crashes, whether motorists, bicyclists, or pedestrians, had a slightly different distribution than the age distribution of Hennepin County as a whole. County demographic information was taken from most recent American Community Survey. In the 4,106 crash records provided, there were 8,142 parties invovled (slighly less than 2 people per incident). Approximately 11% of these parties involved had an unknown age reported. Figure 4 show the age distribution of the remaining 7,255 individuals.

The largest group of bicyclists involved in crashes was the 15-24 year old group, which was represented in 33% of crashes. This group was significantly over-represented compared to the county population of only 14%. Bicylists and others involved in the 25-34 year old and 35-44 year old groups were also over-represtented compared to their county populations, but not as distinctly.

Figure 4. Age Distribution of People Involved in Crashes




As shown in Table 1, men were much more frequently involved in bicycle crashes than women regardless of their mode.

Table 1. Gender by All Parties and Cyclist Involved

| Gender | Other Party Involved | Bicyclists Involved |
|---|---|---|
| **Female** | 38% | 25% |
| **Male** | 51% | 69% |
| **Unknown** | 11% | 8% |

Chemical impairment was very infrequently a part of the crashes. Only 77 of the 8,142 parties involved in crashes (0.9%) were determined to be under the influence of drugs or alcohol at the time of the crash.

## Crash Type

Out of 4,106 crashes, 16% were either of an unidentified type or categorized as "other" by the recording office. Of the remaining 3,414 crash records, the large majority were right-angle crashes (59%) – also known as broadside or "T-bone" crashes, as shown in Table 4.

Table 2. Crashes by Type

| Crash Type | Count | Percentage |
|---|---|---|
| **Rear End** | 158 | 5% |
| **Sideswipe - same** | 280 | 8% |
| **Left turn** | 333 | 10% |
| **Ran off road - left side** | 6 | 0% |
| **Right Angle** | 2,000 | 59% |
| **Right turn** | 305 | 9% |
| **Ran off road - right side** | 24 | 1% |
| **Head on** | 203 | 6% |
| **Sideswipe – opposing** | 105 | 3% |
| **Subtotal** | 3,414 | 100% |

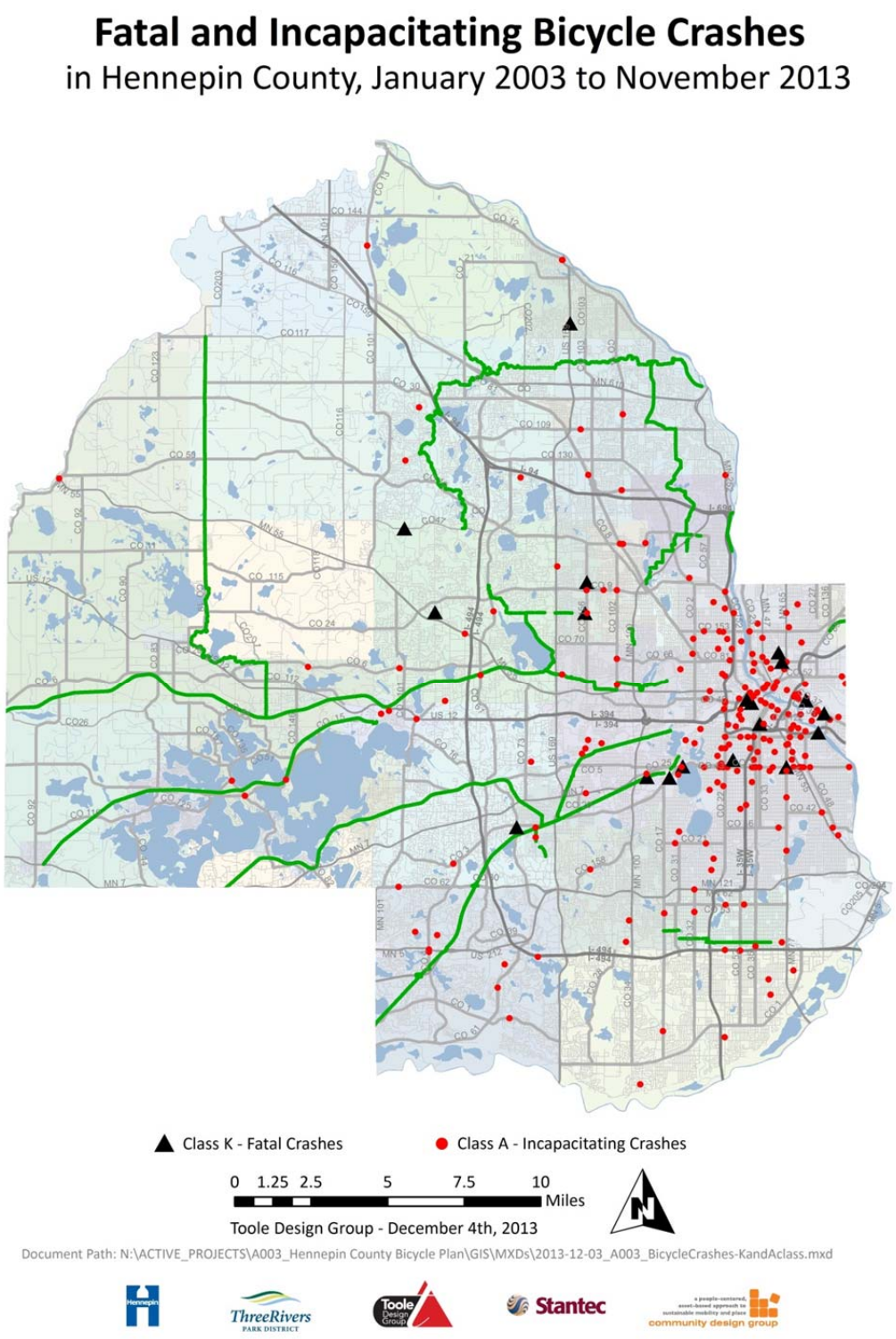
## Severity

In crashes involving only motor vehicles, property-damage only (PDO) crashes are the most common. Crashes involving bicycles, however, are more likely to involve an injury or fatality. According to the National Highway Traffic Safety Administration, in 2011, 71% of motor vehicle crashes were PDO crashes. By contrast, only 4.5% of crashes involving bicycles in Hennepin County were PDO crashes (Table 2). There were 19 crashes involving fatalities and 232 involving incapacitating injuries, which are mapped in Figure 5. Because 59% of crashes were right angle crashes, crash severity did not vary greatly by type of crash.

Table 3. Crash Severity

| Crash Severity | | Count | Percentage |
|---|---|---|---|
| **Type Code** | **Description** | | |
| **K** | Fatality | 19 | 0.5% |
| **A** | Incapacitating | 232 | 5.7% |
| **B** | Non-incapacitating | 1,335 | 32.7% |
| **C** | Not visible | 2,336 | 57.2% |
| **PDO** | No Injury / Property Damage Only | 184 | 4.5% |
| | Total | 4,106 | |

Figure 5. Fatal and Incapacitating Bicycle Crashes in Hennepin County



## Crash Locations

Crashes within a 100-foot radius of an intersection were considered to be “intersection-related crashes”. Of the 4,601 records, 86% of the bicycle crashes were within 100 feet of an intersection. Of those intersection crashes, crashes were evenly split between signalized and unsignalized intersections – although there are a much larger number of unsignalized intersections in the county. 14% of bicycle crashes happened outside of the 100-foot intersection area.

### Signalized Intersections

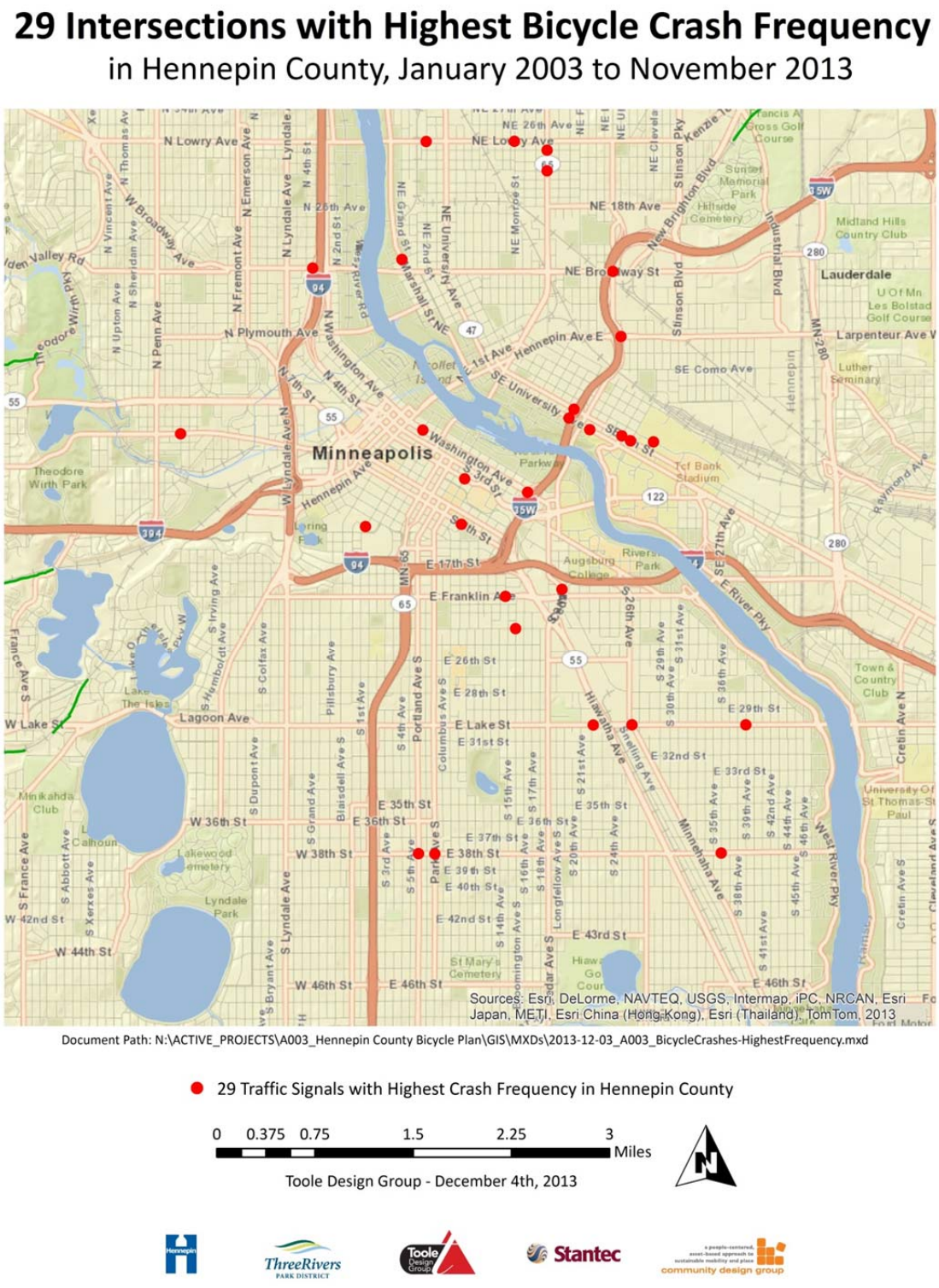
Crashes at signalized intersections were evaluated in more detail, since these tend to be locations with higher concentrations of crashes than unsignalized intersections and are easily identified based on information provided by the City of Minneapolis, Hennepin County, and MnDOT. On average, at the signals evaluated, there were 2.3 bicycle crashes over the 10 year period. Intersections with 8 or more crashes per year (two standard deviations away from the average) are shown in Table 5. All of the highest crash locations were in the City of Minneapolis. There were 19 crashes at the intersection of Nicollet Avenue and Franklin Avenue over the study period, which averages to 1.75 crashes per year.

Because bicycle traffic volume data is not available, only crash frequencies can be evaluated. Intersections with higher crash frequency may have higher bicycle traffic volumes leading to higher exposure. A large frequency of crashes does not necessarily indicate a safety issue.

Table 4. Signalized Intersections with Highest Crash Frequency

| Intersection | Total Crashes (Jan 2003 to Oct 2013) | Annual Frequency (crashes per year) |
|---|---|---|
| Nicollet Ave S and Franklin Ave E/W | 19 | 1.75 |
| Franklin Ave E and Cedar Ave S | 18 | 1.66 |
| University Ave SE and 10th Ave SE | 15 | 1.38 |
| 26th St E and Hiawatha Ave S | 14 | 1.29 |
| 4th Street SE and 10th Ave SE | 13 | 1.20 |
| Franklin Ave E and 3rd Ave S | 13 | 1.20 |
| Franklin Ave W, Lyndale Ave S | 13 | 1.20 |
| Hennepin Ave S and 7th St N/S | 13 | 1.20 |
| Lake St W and Lyndale Ave S | 13 | 1.20 |
| Hennepin Ave S and 3rd St N/S | 12 | 1.11 |
| Franklin Ave E and Chicago Ave S | 11 | 1.02 |
| Nicollet Ave S / Nicollet Mall S and Grand St E/W | 11 | 1.02 |
| University Ave SE and Church Street SE | 10 | 0.92 |
| Lake St E and Hiawatha Ave S (LRT Trail Bike Path) | 10 | 0.92 |
| Franklin Ave E and Bloomington Ave S | 10 | 0.92 |
| Washington Ave S, 3rd Ave S | 10 | 0.92 |
| 15th Ave SE and 5th Street SE | 9 | 0.83 |
| University Ave SE and 15th Ave SE | 9 | 0.83 |
| Hennepin Ave S and 1st St N/S | 9 | 0.83 |
| 26th St E and Cedar Ave | 9 | 0.83 |
| 24th St W and Lyndale Ave S | 9 | 0.83 |
| Lake St E and Snelling Ave S | 9 | 0.83 |
| Washington Ave SE and Church St SE | 8 | 0.74 |
| Franklin Ave E and 26th Ave S | 8 | 0.74 |
| Lake St E and 2nd Ave S | 8 | 0.74 |
| Lake St E and 26th Ave S / Minnehaha Ave S | 8 | 0.74 |
| Lake St W and Bryant Ave S | 8 | 0.74 |

Figure 6. Signalized Intersections with Highest Crash Frequency



In addition to evaluating signalized intersections based on the frequency of crashes, other areas of potential conflict were evaluated.

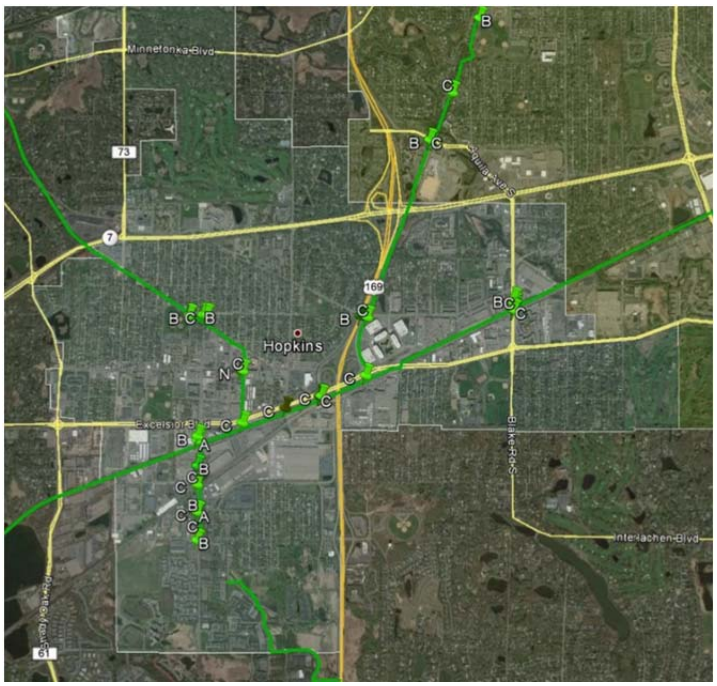
## Crashes at Trail Crossings

There were 96 crashes within 250 feet of a Three Rivers Park District (TRPD) Trail crossings in Hennepin County. There were no crashes within 250 feet of a TRPD trail or trail crossing in Scott or Carver counties so data from these counties was not included in the evaluation. Because the crash data set for trail-related crashes was small, a larger radius was used to define the set.

### Hopkins, MN

There were 56 crashes in the City of Hopkins, MI where a number of TRPD trails intersect with roadways. Of these, 22 (39%) were within 250 feet of a trail crossing. The confluence of trails in the four square mile town has resulted in higher bicycle volumes than might be expected other suburbs of its size, so the number of crashes may be an issue of exposure rather than a particular safety deficiency. Severity of these 22 crashes was approximately the same as the larger data set, with 54% of the crashes resulting in a C-type injury compared to 57% for the county. The highest crash location was at the crossing of Cedar Lake Trail and Blake Road North resulting in four B-type or C-type injuries.

Figure 7. Trail Related Crashes in Hopkins, MN




### Cedar Lake Trail in St. Louis Park

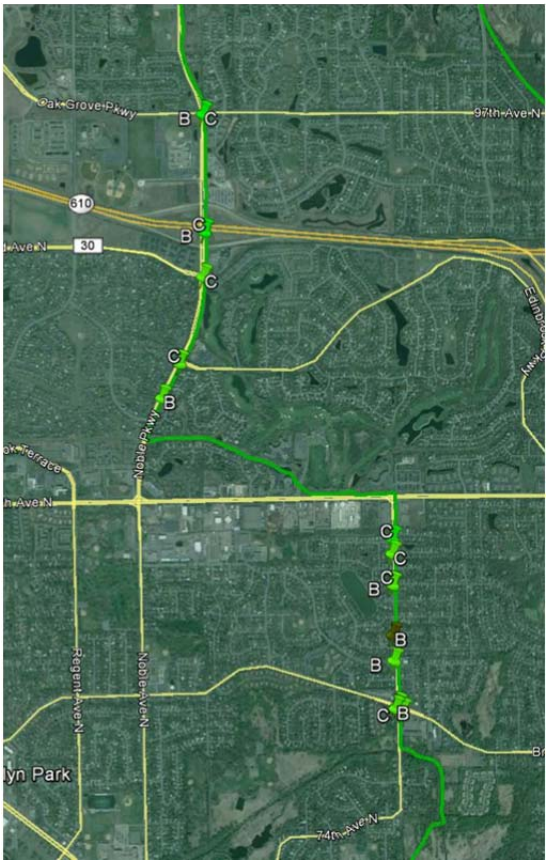
Crashes were clustered at two trail crossings in St. Louis Park, as summarized below.

- Cedar Lake Trail and Wooddale Avenue South (3 crashes) – Figure 8
  - B- and C-type injuries
  - Six crashes at the former intersection of Wooddale Avenue and Minnesota 7
  - One crash at the intersection of Wooddale Avenue and West 36th Street
- Cedar Lake Trail and Beltline Boulevard (4 crashes)
  - One fatality, B- and C-type injuries
  - Three crashes at the intersection of Beltline Boulevard and Park Glen Road
  - Two crashes at the intersection of Beltline Boulevard and Minnesota 7

In both cases, clusters of crashes at nearby intersections indicate that in addition to using the off-road facility, bicyclists need to safely access it.

Figure 9. Cedar Lake Trail at Wooddale Avenue in St. Louis Park

Figure 8 Shingle Creek Trail in Brooklyn Park




## Shingle Creek Trail in Brooklyn Park

As shown in Figure 9, there are two one-mile stretches of the Shingle Creek Trail in Brooklyn Park that have a string of crashes at road crossings. In particular, there were three crashes at the intersection of Brookdale Drive and Xerxes Avenue North.

## Luce Line in Golden Valley

The intersection of the Luce Line Trail and Winnetka Avenue in Golden Valley had four crashes with B- and C-type injuries.

Figure 10. 10th Avenue and Winnetka Avenue in Golden Valley