



City of Bloomington
1800 West Old Shakopee Road • Bloomington, MN 55431-3027

TRAFFIC Study

August 14, 2013

Indian Mounds Neighborhood

*City of Bloomington
Hennepin County, Minnesota*

WSB Project No. 2175-00



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Indian Mounds Neighborhood Traffic Study

For:



**City of Bloomington
1700 West 98th Street
Bloomington, MN 55431**

August 14, 2013

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Introduction / Background

The City of Bloomington was seeking to develop a program to work with neighborhoods in addressing persistent but infrequent crashes at neighborhood intersections over the long term without creating other neighborhood traffic issues such as speeding, cut-through traffic, safety or pollution issues.

The Indian Mounds Neighborhood Traffic Study is intended to serve as the prototype for this process. The Indian Mounds Neighborhood is typical of the residential neighborhoods on the east side of Bloomington which were laid out in a grid pattern and where many of the 3 and 4-legged intersections remain in an un-controlled state. Most of these intersections do not have issues but there are some intersections that have persistent but infrequent crashes.

The purpose of the study was to evaluate the existing traffic conditions and recommend possible solutions for the Indian Mounds Neighborhood and, to develop a process that identifies and provides implementation guidelines for low impact, low cost improvements for typical neighborhood traffic issues.

The evaluation process focused on determining whether traffic issues or problems existed that could be improved or eliminated by the application of intersection controls such as warning signs, stop signs or yield signs. The Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD) was used as the base line for the evaluation guidelines. The steps in the process included:

- 1) Documenting that a problem exists such as excessive speeds or crashes
- 2) Determine the frequency or recurring nature of the problem and that it is not a random or isolated event.
- 3) Identifying potential measures that would improve or eliminate the problem. This includes intersection controls and/or addressing other conditions at the problem locations
- 4) Identifying the follow up study necessary to determine whether the proposed solution was effective.

The recommendations for intersection control changes in the Indian Mounds Neighborhood kept the following goals in mind:

- Improvement to intersection safety,
- Application of least restrictive control type possible,

- Consistency of intersection controls within the neighborhood,
- Would not promote cut-through or diversion of traffic to other streets in the neighborhood
- Would not promote speeding on streets within the neighborhood.

The Indian Mounds Neighborhood for the purposes of this study was bounded by the area between Portland Avenue S and 11th Avenue S and between E Old Shakopee Road/ E 98th Street and the Minnesota River bluffs. The Study Area is shown in **Figure 1**.



Indian Mounds
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Figure 1. Study Area

Public Input

Public input is a critical element in the identification of issues and concerns in the neighborhood. For the Indian Mounds Neighborhood Study, two public open houses have been held.

Public Open House #1

This meeting was held on January 24, 2013 at the Indian Mounds Elementary School, located just east of the study area. There were 38 residents that signed in at the meeting. The primary purpose of the open house was to provide information to residents of the neighborhood on the purpose of the study and to gather input on concerns and traffic issues.

Public Open House #2

This meeting was held on April 25, 2013 again at the Indian Mounds Elementary School. There were 15 residents that signed in at the meeting. The purpose of this open house was to update the residents on the data collection, discuss the identified issues and concerns, outline the potential opportunities and initial recommendations, and, to receive input on the issues and recommendations.

Copies of the meeting notices, handouts, sign-in sheets and presentation materials included in the ***Appendix***. In addition a summary of all comments received at the two Open House meetings, comment cards mailed to the City and phone/email comments received have been documented and are attached in the ***Appendix***.

Existing Traffic Characteristics

In order to evaluate the current safety and operational conditions in the Indian Mounds Neighborhood, the existing traffic characteristics were collected. This included:

- Daily traffic volumes
- Crash history
- Vehicle speeds
- Current traffic control (signing, pavement markings, sidewalks, etc.).

Daily Traffic Volumes

Daily traffic volumes were collected at several locations within the neighborhood between 2010 and 2012. To supplement this data, based on input at the Neighborhood Open House, WSB and Associates collected additional data the week of March 18, 2013. In general, the counts show that the volumes in the neighborhood are at those of typical residential neighborhood streets. Typical residential streets will have traffic volumes up to 1200 vehicles per day (vpd). **Figure 2** shows the Daily Traffic Volumes in the Indian Mounds Neighborhood.

Crash History

Using the State of Minnesota Crash Mapping Analysis Tool (CMAT), crash data from the past 10 years (2003 – 2012) was documented. In addition, supplemental data from the City of Bloomington was used to verify the state data and was included where necessary. The data shows that two intersections, Columbus Avenue S at E 100th Street and Chicago Avenue S at E 100th Street have a higher number of crashes than other similar intersections in the area. **Table 1** and **Table 2** show the crash data by year for both intersections. **Figure 3** shows the number of crashes from 2003 – 2012 in Indian Mounds Neighborhood. The **Appendix** includes the crash diagrams, showing the crash details for each intersection.

Table 1 – Crash Summary – E 100th St at Chicago Ave

E 100th St and Chicago Ave S (2003-2012)												
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Severity	K - Fatal	0	0	0	0	0	0	0	0	0	0	0
	A - Incapacitating Injury	0	0	0	0	0	0	0	0	0	0	0
	B - Non-Incapacitating Injury	0	1	0	0	0	0	0	0	0	0	1
	C - Possible Injury	0	0	0	0	1	0	0	0	1	1	3
	N - Property Damage Only	0	0	0	0	1	0	0	1	1	0	3
	Total	0	1	0	0	2	0	0	1	2	1	7
Diagram	01 - Rear End	0	0	0	0	0	0	0	0	0	0	0
	02 - Sideswipe (Same Direction)	0	0	0	0	0	0	0	0	0	0	0
	03 - Left Turn	0	0	0	0	0	0	0	0	0	0	0
	04 - Ran Off Road - Left Side	0	0	0	0	0	0	0	0	0	0	0
	05 - Right Angle	0	1	0	0	1	0	0	1	2	1	6
	06 - Right Turn	0	0	0	0	0	0	0	0	0	0	0
	07 - Ran Off Road - Right Side	0	0	0	0	0	0	0	0	0	0	0
	08 - Head On	0	0	0	0	0	0	0	0	0	0	0
	09 - Sideswipe (Opposing Direction)	0	0	0	0	0	0	0	0	0	0	0
	Other/Blank/Unknown	0	0	0	0	1	0	0	0	0	0	1
	Total	0	1	0	0	2	0	0	1	2	1	7
Type	01 - Collision with Motor Vehicle in Transport	0	1	0	0	1	0	0	1	2	1	6
	04 - Collision with Other Roadway Equipment	0	0	0	0	1	0	0	0	0	0	1
	Total	0	1	0	0	2	0	0	1	2	1	7

Table 2 – Crash Summary E 100th St at Columbus Ave S

E 100th St and Columbus Ave S (2003-2012)												
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Severity	K - Fatal	0	0	0	0	0	0	0	0	0	0	0
	A - Incapacitating Injury	0	0	1	0	0	0	0	0	0	0	1
	B - Non-Incapacitating Injury	0	0	0	0	0	1	0	0	0	0	1
	C - Possible Injury	0	0	0	0	0	0	0	0	0	0	0
	N - Property Damage Only	0	0	0	0	1	1	1	0	0	1	4
	Total	0	0	1	0	1	2	1	0	0	1	6
Diagram	01 - Rear End	0	0	0	0	0	0	0	0	0	0	0
	02 - Sideswipe (Same Direction)	0	0	0	0	0	0	0	0	0	0	0
	03 - Left Turn	0	0	0	0	0	0	0	0	0	0	0
	04 - Ran Off Road - Left Side	0	0	0	0	0	0	0	0	0	0	0
	05 - Right Angle	0	0	1	0	1	1	1	0	0	1	5
	06 - Right Turn	0	0	0	0	0	0	0	0	0	0	0
	07 - Ran Off Road - Right Side	0	0	0	0	0	0	0	0	0	0	0
	08 - Head On	0	0	0	0	0	0	0	0	0	0	0
	09 - Sideswipe (Opposing Direction)	0	0	0	0	0	1	0	0	0	0	1
	Other/Blank/Unknown	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	1	0	1	2	1	0	0	1	6
Type	01 - Collision with Motor Vehicle in Transport	0	0	1	0	1	2	1	0	0	1	6
	Total	0	0	1	0	1	2	1	0	0	1	6

Vehicle Speeds

In conjunction with the daily traffic counts, vehicle speeds were also collected. Vehicle speed data is typically given as the 85% speed. The 85% speed represents the speed at which 85% percent of the counted vehicles are traveling at or below. Research indicates that this value is where most drivers will operate their vehicle in a reasonable manor.

Figure 4 shows the 85% vehicle speed on the streets within the Indian Mounds Neighborhood.

Traffic Control

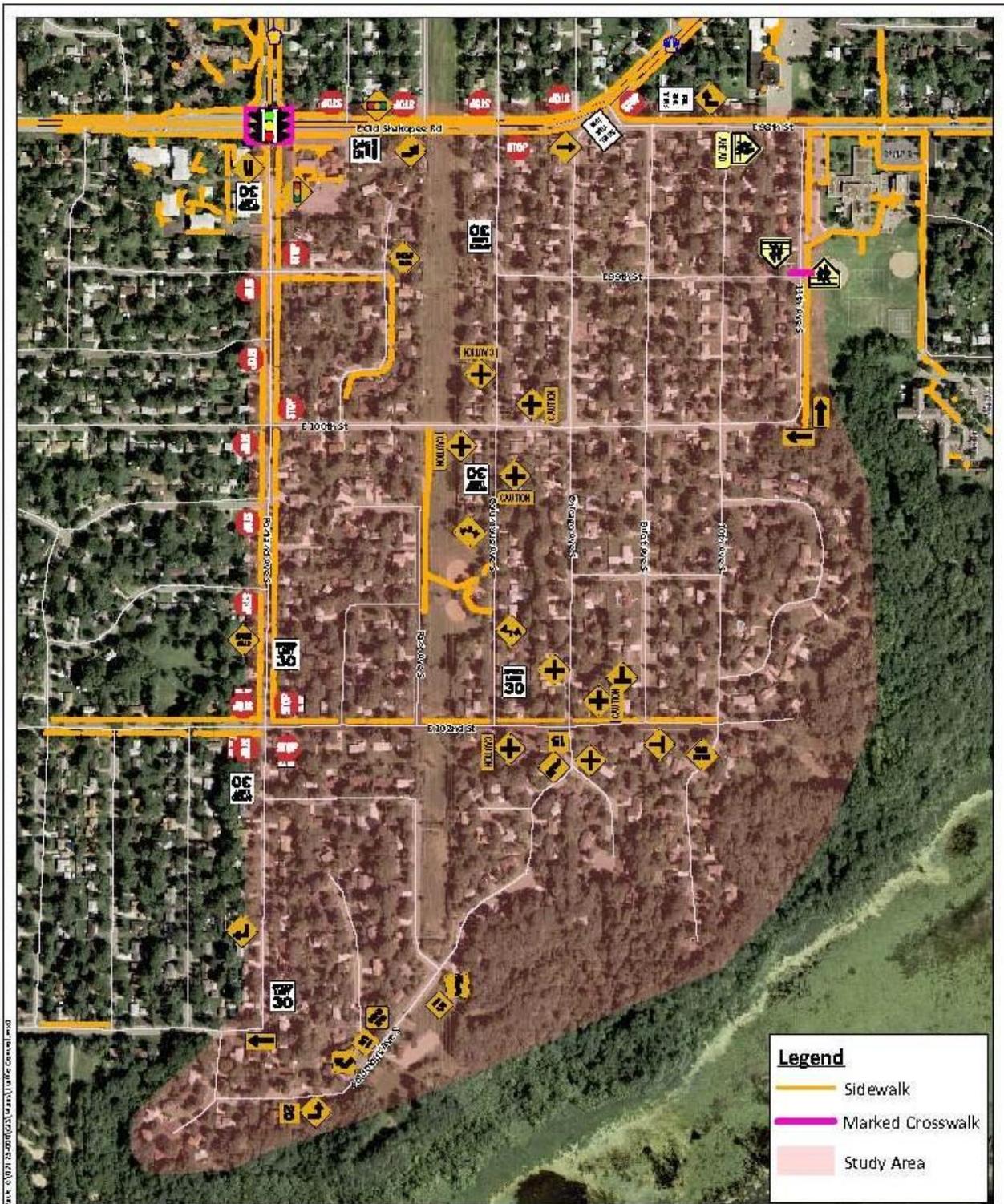
The existing traffic control was documented within the study area. This included location of: warning signs, stop signs, speed limit signs, pedestrian crosswalks and sidewalks.

Figure 5 shows the existing traffic control devices in the Indian Mounds Neighborhood.



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Figure 2. Daily Traffic Volumes



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Figure 5. Existing Traffic Control

Identified Issues

Issues were identified based on two primary sources including neighborhood input and the data collected. In most instances, the input from the neighborhood was validated by the data collection.

Neighborhood Input/Comments

Issues and concerns identified by the neighborhood included:

1. Intersection Safety – Columbus Avenue at E 100th Street, 10th Avenue S at E 100th Street, Chicago Avenue S at E 102nd Street and E 98th Street at E Old Shakopee Road.
2. Speed – Columbus Avenue S, Chicago Avenue S, Elliot Avenue S, 10th Avenue S, E 100th Street and E 102nd Street.
3. Pedestrian Accommodations – Need for sidewalks, crosswalks and improved school access.
4. Cut-through Traffic – Concerns with traffic from the “Manor” cutting through the neighborhood.
5. Study Area – The study area should have included the area east of 11th Avenue S.

Issues Identified Based on Data

Based on the data collected three primary issues were identified including, safety, speed and cut-through traffic. In order to determine the magnitude of the issues and the level of improvements needed, screening criteria was developed.

Safety

The safety of an intersection is defined by the number, frequency and type of crashes at an intersection. An intersection is not considered to have a safety issue if there have only been one or two crashes during any multiyear analysis period. However, if there have been more than two crashes at an intersection the following criteria should be used to trigger further study of the intersection.

- One (1) crash per year for three or more years, or
- More than three (3) crashes in one year.

Based on these criteria, two intersections in the Indian Mounds study area were identified for additional study. All other intersections had two crashes or less in the 10 year period.

1. Columbus Avenue S at E 100th Street – 6 crashes
2. Chicago Avenue S at E 100th Street – 7 crashes

Speed

The 85% speed is used as the primary measure of the speed on a segment of street. If the 85% speed is greater than the posted (30mph) speed limit then the street segment should be further studied. Based on this criterion, seven (7) street segments in the Indian Mounds study area have an 85% speed greater than 30 mph.

1. Columbus Avenue S, south of E 100th Street – 35.5 mph
2. Columbus Avenue S, north of E 100th Street – 31.5 mph
3. Chicago Avenue S, south of E 100th Street – 34.5 mph / 31 mph
4. Chicago Avenue S, north of E 100th Street – 30.5 mph
5. 10th Avenue S, south E 100th Street – 31.5 mph
6. 10th Avenue S, north E 100th Street – 30.5 mph
7. E 102nd Street, 10th Avenue S to Columbus Avenue S – 32 mph / 32.5 mph

Cut-Through Traffic

The potential for cut-through traffic was evaluated for the Indian Mounds neighborhood. The study area is fairly captive with a limited number of street accesses in and out. By using standard Institute of Transportation (ITE) trip generation factors for residential homes the number of estimated daily trips for the area was determined to be 4100 vehicles per day (vpd). Comparing this to a total screen line count of 3900 trips from all the streets in and out of the area, it can be concluded that the level of traffic entering or exiting the area does not indicate a cut-through issue.

Along with the traffic data review, a travel time analysis was also conducted. This analysis evaluated two routes, one using the primary collector street system and one traveling through the Indian Mounds neighborhood. For both routes the beginning and ending points were the same, starting on E Old Shakopee Road at E 98th Street and ending on Lyndale Avenue S at E 102nd Street. The primary collector street route followed E Old Shakopee Road to Lyndale Avenue S to E 102nd Street. The neighborhood route followed E Old Shakopee Road, turning onto Columbus Avenue S to E 102nd Street to Lyndale Avenue S.

Several travel time runs were made along both routes, calculating the time it took from beginning to end. Based on the travel time calculations it was found that a vehicle could potentially save approximately one minute by traveling through the neighborhood and not following primary collector route along E Old Shakopee Road to Lyndale Avenue S. This appears to be primarily a result of traffic signal delays on E Old Shakopee Road. However, it should be noted that when vehicles on E Old Shakopee Road have sufficient green time, there would not be any time saving or advantage traveling through the neighborhood.

Improvement Opportunities

For each of the identified issues there are several low cost, low impact improvement opportunities that can be implemented depending on further analysis of the conditions and data. Discussed below are some of the possible improvement opportunities and the proposed criteria for implementations.

Safety Improvements

Safety improvements include items that could provide potential benefits by reducing the number of crashes. These improvements would include:

1. **Removing obstructions** – When the analysis indicates that a sight line issue is present at an intersection; where possible the sight line triangle should be cleared of obstructions. Based on a typical 30 mph city street the sight triangle is a distance between 30’ and 50’ (depending on right of way width) measured along the right of way line at the intersection. This distance should be based on calculations from the AASHTO “A Policy on Geometric Design of Highways and Streets” Green Book. If clearing the obstruction is not possible, further consideration to other intersection control should be explored.

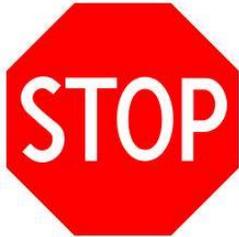
2. **Advance warning signs** – Advance warning signs could include “Stop Ahead”, “Intersection Ahead”, etc. These signs would be installed where intersection control is typically in place and/or crashes indicate that sight lines to the intersection may be an issue.



3. **“Blinker” signs** – Blinker signs are typically used where vehicles need additional warning or in extreme cases with limited sight distance and higher traffic volumes. They can be used on either warning signs (advanced signs) or regulatory signs (stop or yield signs).

4. **Pavement markings** – This could include either center line or edge line markings. They would typically be used where crashes indicate issues with vehicles staying in their own lane.
5. **Lighting** – Intersection lighting could be used to clearly locate an intersection at night. Typically lighting could be installed where there are a significant number of crashes occurring at night.

6. **Yield signs** – Yield signs are typically used in locations where there is confusion on which vehicle approaching the intersection has the right of way. These signs can be used to help clearly assign the right-of-way at an intersection with a balanced traffic flow on all approaches.



7. **Stop signs** – The Minnesota Manual on Uniform Traffic Control Devices outlines warrants for the installation of stop signs. These warrants include criteria for installation of both all-way or 2-way stops. In addition stop signs could be considered where sight distance cannot be improved.

Speed

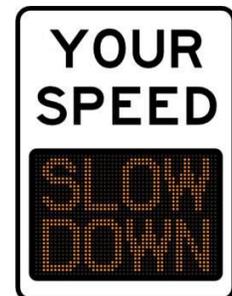
Speed improvements include items that would provide potential benefits by reducing speeding in the neighborhood. These improvements would include:

1. **Additional enforcement** – Based on the traffic speed data collected if the 85% speed is between 30 mph and 33 mph, consideration should be given to requesting additional police enforcement.



2. **Speed limit signs** – In locations where the ADT volume is over 750 vehicles per day and there is currently not a posted speed limit sign and the 85% speed is over 30 mph, consideration should be given to installing speed limit signs.

3. **Driver feed-back (dynamic) speed signs** – Driver feed-back signs are signs that display the actual speed of a vehicle as it drives by the location. On neighborhood streets where the 85% speed is determined to be greater than 33 mph, a driver feed-back sign could be used to warn the driver that they are speeding.



Cut-Through Traffic

Improvements to limit the potential cut-through traffic would include:

1. **Documented issue** – In situation where there is a documented cut-through traffic issue, the City has established a guideline “Traffic Calming for Bloomington Neighborhood Local Streets”, that can be used to determine what type improvements would be warranted.

Issue Analysis / Conclusions

Based on the identified issues and the criteria discussed above for each improvement opportunity, the following analysis conclusions were made:

- The intersection of Columbus Avenue S at E 100th Street has a higher number of crashes than other similar intersections in the area, over the analysis period. The majority of the intersection crashes are right angle or left turn type. There are no other trends such as time of day or day or week or time of year. The traffic volumes on each approach of the intersection are somewhat balanced. Based on this balanced approach and the primary type of crashes is right angle, it can be concluded that one of the factors for the high crash numbers could be drivers not obeying standard right-of-way rules.
- Similar to the Columbus Avenue S intersection, the intersection of Chicago Avenue S at E 100th Street has the same crash and traffic volume characteristics, therefore it can also be concluded that one of the factors for the higher crash numbers at this intersection could be drivers not obeying standard right-of-way rules.
- The consistency along a corridor should be considered when evaluating specific intersection traffic control. This consideration should include not only the type and location of traffic control but the flow of traffic and crash history. Along the E 100th Street corridor the Columbus Avenue S and Chicago Avenue S intersections have higher crash rates, higher speeds and a more balanced approach traffic flow. While the intersections at Elliot Avenue S and 10th Avenue S does not have a crash history and have lower unbalanced traffic volumes. Therefore, it is not anticipated that improvements would be necessary at these intersections. Although these intersections should be monitored to insure that issues do not arise in the future.
- The intersections on E 102nd Street at Columbus Avenue S and Chicago Avenue S do not have a crash history. Both of the intersections function as t-intersections with traffic approaching E 102nd Street, in most cases, needing to slow down to turn, which provides for a de-facto yield condition.
- As indicated by the neighborhood comments and verified with the collected data, the speed of traffic through the neighborhood on several street segments has an 85% speed at or over 30 mph.
- There appears to be a correlation between the higher documented speeds on Columbus Avenue S and Chicago Avenue S and the number of crashes at the E 100th Street intersection. In both cases the speeds on Columbus Avenue S or Chicago Avenue S approaching E 100th Street are at or above the 30 mph, 85% speed.

- Although the traffic volumes entering or exiting the Indian Mounds area do not indicate that there is a cut-through issue, the magnitude of the volume on E 102nd Street east of Portland Avenue S appears to be higher than the other volumes in the area.
- Although pedestrian data was not collected, the City has been studying the pedestrian needs in relation to the Safe Routes to School project for the Indian Mounds Elementary School.

Recommendations

Based on the issues analysis and the analysis conclusions, the following low impact, low cost improvements are recommended in the Indian Mounds Neighborhood Study Area. *Figure 6* shows the location for the proposed improvements.

Safety Improvements

1. Install Yield signs on both approaches to E 100th Street at Columbus Avenue S.
2. Install Yield signs on both approaches to E 100th Street at Chicago Avenue S.
3. Monitor the following intersections to insure that crashes do not increase as a result of the improvements:
 - a. Elliot Avenue S at E 100th Street
 - b. 10th Avenue S at E 100th Street
 - c. Columbus Avenue S at E 102nd Street
 - d. Chicago Avenue S at E 102nd Street

Speed Improvements

1. Request additional police enforcement on the following roadway segments:
 - a. Columbus Avenue S, north of E 100th Street
 - b. 10th Avenue S, south of E 100th Street
 - c. E 102nd Street, 10th Avenue S to Portland Avenue S
 - d. E 100th Street, west of Columbus Avenue S
2. Install new 30 mph Speed limit signs at the following locations:
 - a. E 102nd Street eastbound after Portland Avenue S
 - b. E 102nd Street westbound west of Columbus Avenue S
3. Install new Driver feed-back signs in both directions at the following locations:
 - a. Columbus Avenue S, south of E 100th Street
 - b. Chicago Avenue S, south of E 100th Street

Cut-Through Improvements

1. Request that Hennepin County revise the existing signal system at E Old Shakopee Road and Portland Avenue S. This could include requesting that revisions to the signal phasing be made to provide additional green time for the through movement on E Old Shakopee Road. Consideration should be given to using a “Flashing Yellow Arrow” left turn phasing.

Pedestrian Improvements

1. Support the proposed Safe Route to School recommendations for the Indian Mounds School area including:
 - a. Addition of sidewalk on E 100th Street, Portland Avenue S to 11th Avenue S
 - b. Addition of sidewalk on the south side of E 98th Street, Columbus Avenue S to 11th Avenue S.
 - c. Install pedestrian curb ramps on 11th Avenue S at E 99th Street

These improvements would not be constructed at the time the other recommendations outlined in this study go into place, but will be added to a prioritized list for sidewalk segments around schools.

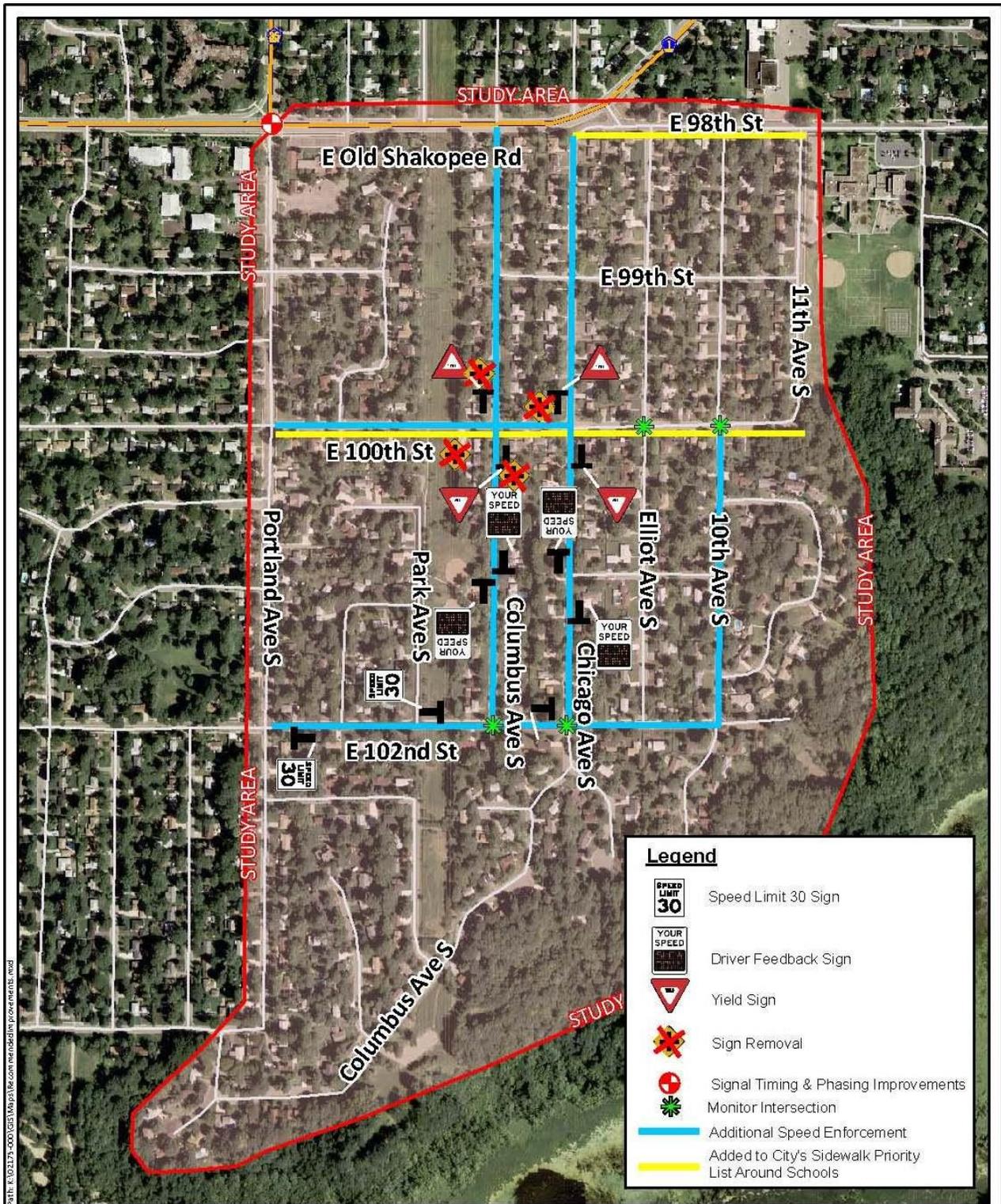
Removals

1. As a result of the installation of the recommended signs and other devices, four in place signs will need to be removed. They include:
 - a. The advance “Intersection Ahead” signs on each approach of Columbus Avenue S to E 100th Street.
 - b. The advance “Intersection Ahead” signs on each approach of E 100th Street to Columbus Avenue S.

No other in place signs or pavement markings are recommended for removal.

General

1. Observation of driver behaviors, after implementation of the recommended plan, will be completed after one year and a follow-up of the traffic data will be completed in three years.
2. If issues still persist the City’s “Traffic Calming for Bloomington Neighborhood Local Streets” policy and procedures would be the next step in review of the neighborhood traffic issues.



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Figure 6
Recommended Improvements