CMAP

Village of Carpentersville Health Impact Assessment

Improvements to the Intersection of Main and Washington Streets

February 2016

Acknowledgements

This Health Impact Assessment was completed in partnership with Village of Carpentersville staff, the Chicago Metropolitan Agency for Planning (CMAP), and the Kane County Planning Cooperative. The project was administered through CMAP's Local Technical Assistance Program.

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In addition to the organizations represented on the project team, the following groups made valuable contributions to this report:

- Village of Carpentersville Police Department
- Community School Unit District 300
- Carpentersville Village Board

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Unless otherwise specified, all photos are by CMAP staff.

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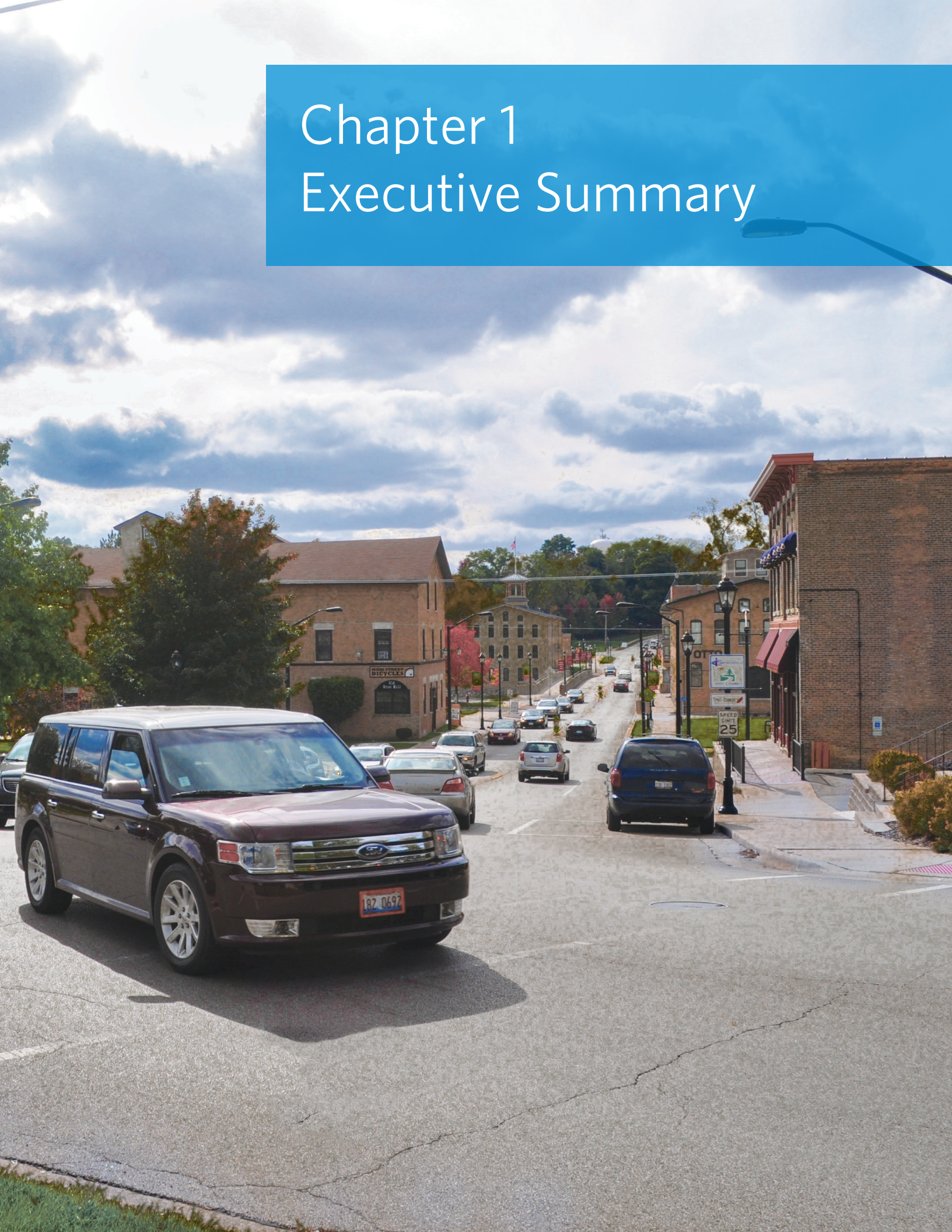


Located in Kane County, the Village of Carpentersville's Old Town area has many historic strengths and community assets that provide a high quality of life for its residents, shoppers, and employees. During peak hours, congestion near the intersection of Main Street and Washington Street in the Old Town Area causes traffic and safety problems for drivers, pedestrians, bicyclists, and nearby residents.

Project Overview

The Carpentersville Old Town Plan, which was adopted in 2012 as part of the Chicago Metropolitan Agency for Planning's (CMAP) Local Technical Assistance (LTA) program, recommended transportation improvements for this intersection. The Village has been investigating the feasibility and potential benefits of installing a single-lane roundabout at this intersection versus a conventional signalized intersection. Working with the Village, Kane County and CMAP have studied potential health impacts of installation of a single-lane roundabout at the intersection of Main and Washington to assist the Village in its broader assessment of potential policy options for the improvement of the intersection.

This study follows the model of a full "Health Impact Assessment" (HIA), a process which helps policy makers analyze potential health impacts by bringing together data, health expertise, and public input to identify the potential health effects of proposed laws, regulations, projects, and programs. A literature review on the potential positive and negative health impacts of roundabouts was conducted, guided by concerns raised by key stakeholders in the Village, such as trustees and other elected officials, Village staff, business owners, school district representatives, public safety personnel, community groups, and other residents of Carpentersville. Data from the Kane County Community Health Assessment provided a snapshot of current health conditions within the region that includes the project area. This report also provides a brief overview of potential health outcomes including impacts on safety, the environment, and quality of life.

Conclusions

Overall, the health impact of roundabouts on health and safety is positive. The safety of drivers dramatically increases when a signalized intersection or two-way stop is replaced with a roundabout. When converting a conventional signalized intersection to a roundabout, there is a 48 percent reduction in all crashes and a 78 percent reduction in severe crashes, including those that cause injury or death. Converting a two-way stop to a roundabout (as would be the case at the intersection of Main and Washington) on average yields a 44 percent crash reduction overall and an 82 percent reduction in severe crashes.

The safety of pedestrians and bicyclists also increases, though less so than for drivers. For these two user groups, the health impact greatly relies upon the individual design of the roundabout. Looking at vulnerable populations does yield mixed results, as roundabouts are significantly harder for visually- impaired pedestrians to navigate. In general, however, a single-lane roundabout (the type of roundabout under consideration by the Village of Carpentersville) is the safest intersection treatment for an at-grade intersection, providing the safest opportunity for travel for all users.

The impact of the roundabout on the environment can have many implications on health, particularly for nearby residents. In general, research shows that there are 20-30 percent less toxic emissions and 20-30 percent less greenhouse gases at roundabouts in comparison to conventional signalized intersections.[1] Reducing air pollution levels can help reduce the burden of disease, since as chronic exposure to airborne particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as lung cancer.

Finally, the impact of roundabouts on quality of life and livability of an area may also be significant, thought there are very few research studies that examine these outcomes. Roundabouts can potentially improve quality of life and decrease stress by reducing human fatalities and injuries, decreasing economic costs by reducing crash rates, and lowering fuel consumption. In addition, installing a roundabout and improving the walkability of an area can ultimately result in lower rates of disease and health care costs. Roundabouts can also improve the livability of an area through increased aesthetics of the intersection by way of more landscaping and less noise pollution, congestion, and delay.

Based on the report findings, it appears that the installation of a single-lane roundabout at the intersection of Main and Washington would have a positive impact on the health and safety of drivers, pedestrians, and bicyclists. Special consideration and attention will need to be given to the specific design of the intersection, as certain features will be essential in order to mitigate potentially negative impacts and maximize the positive impacts on health and safety for all users.

[1] Sides, Ken. The Green Intersection is Round. From the 2011 National Roundabout Conference. Retrieved from http://teachamerica.com/RAB11/index.html.

Key Recommendations

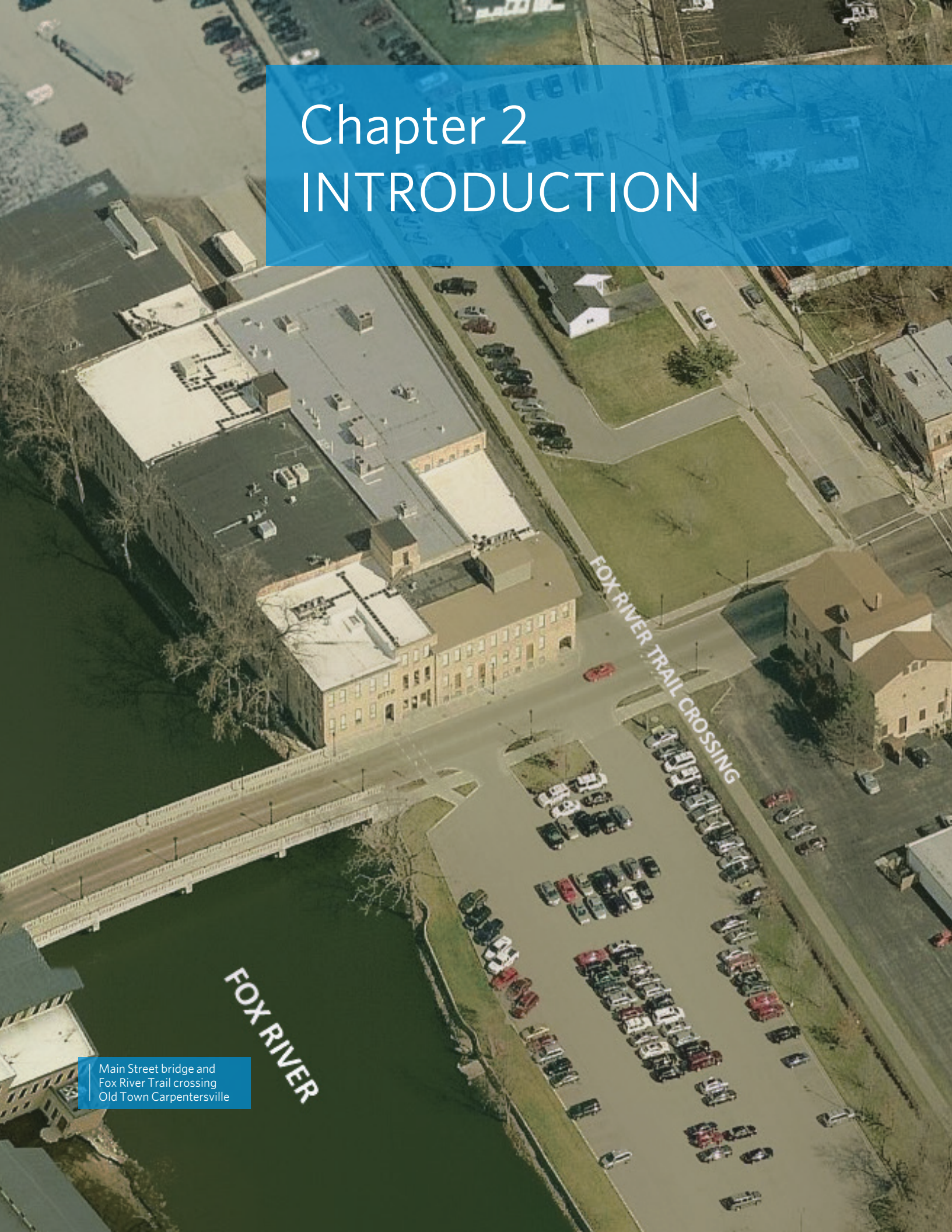
Primary Recommendation: Conversion to single-lane roundabout

A single-lane roundabout constructed at the intersection of Main St. and Washington St. would result in better health and safety outcomes for affected area stakeholders while fulfilling transportation and mobility needs.

Secondary Recommendations

- High-visibility pedestrian crossings
  - Installation of high visibility pavement markings (could include high-contrast pavement striping, brick pavers, or stamped pavement).
  - Installation of a flashing light to indicate pedestrians and/or cyclists in the Fox River Trail crosswalk.
- Speed controls on Main Street and Washington Street
  - Installation of a raised crosswalk for the Fox River Trail crossing.
  - To the extent that conditions within the Main St. right-of-way allow, bump-outs should be installed to manage traffic speeds and shield pedestrians and cyclists at the Fox River Trail crossing.
  - Posted speed limits should be clearly visible to vehicles approaching the project area along Main St. and Washington St.
- Enhance active transportation infrastructure
  - Pedestrian crossings serving the intersection of Main St. and Washington St. should incorporate a splitter island at each crossing.
  - The Village should consider the installation of directional signage or other wayfinding devices for the benefit of trail users and pedestrians/cyclists within the Old Town corridor.
  - The roundabout design and Fox River Trail crossing should include features to assist the visually impaired.

Chapter 2
INTRODUCTION



Main Street bridge and
Fox River Trail crossing
Old Town Carpentersville

Project Background

In 2013 Kane County completed a formal HIA on the subject of extending access to healthy and locally grown foods for county residents. Staff from the Departments of Health and Development participated in a training seminar facilitated by Human Impact Partners, a national organization that specializes in helping public agencies conduct health-based analyses. The training provided Kane County staff with a comprehensive overview of the HIA process as well as various exercises and resources for conducting a study.

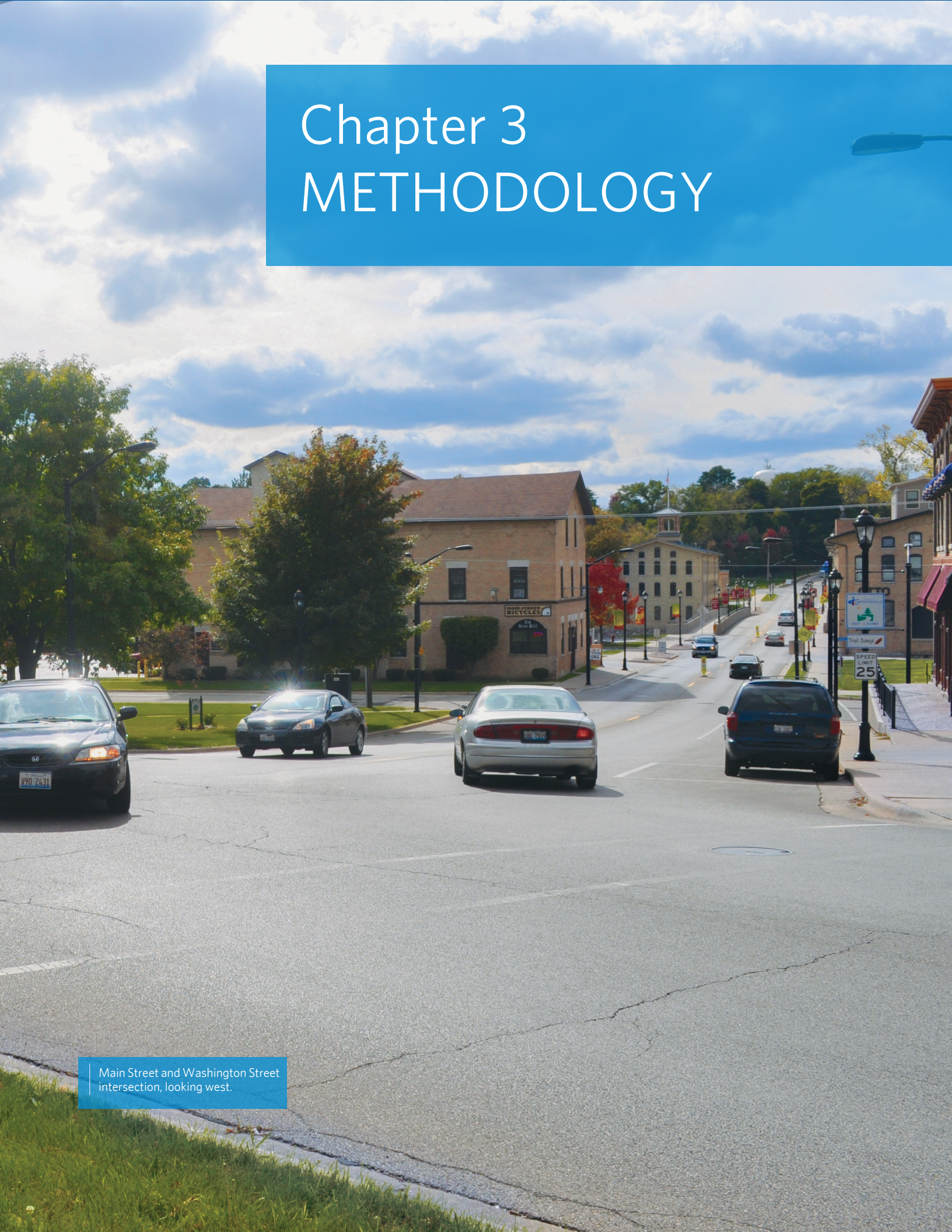
The Kane County Planning Cooperative (KCPC) — a project-focused network of planning staff representing Kane County's Departments of Development, Health and Transportation — and CMAP partnered to develop a proposal to assist a Kane County municipality conduct a Health Impact Assessment. In addition, the KCPC would also train CMAP staff and local officials in the use of health impact assessments as a tool for evaluating the health outcomes of local planning and policy decisions.

The Village of Carpentersville was awarded the project following a call for applications through CMAP's Local Technical Assistance (LTA) program. The Village requested that a health impact assessment be conducted to examine traffic and safety issues near the intersection of Washington and Main Street within the Old Town neighborhood corridor. Traffic analysis conducted by the village has indicated that traffic flow patterns range between slow/irregular to persistent backups. Given the project area's proximity to the Fox River Trail crossing at Main St., the village expressed concern as to how improvements to the intersection might impact trail users. Area residents, commuters, and other users have expressed safety concerns and could also be affected by changes to the street configuration.

Report Objective

This report will provide the Village of Carpentersville with a set of design recommendations for the intersection of Main and Washington and the Fox River Trail crossing that will maximize health and safety outcomes for drivers, cyclists, pedestrians, and community residents. Following an assessment of existing conditions within the site area, two design alternatives are the focus of evaluation: a single lane roundabout and a signalized intersection.

Chapter 3
METHODOLOGY



Main Street and Washington Street intersection, looking west.

Health Impact Assessment Overview

The HIA is an evaluation process used to better understand the effects of a project or policy on the health of a particular population before a decision is made. In addition to identifying specific health and safety, issues, a HIA also seeks to determine which, if any, population groups are disproportionately affected by those issues resulting from a proposed change. Decision-makers must frequently balance the provision of services and infrastructure with the health, safety and welfare of the public. The HIA is an effective tool for identifying and potentially mitigating negative health consequences during the early stages of project or policy implementation.

HIAs rely heavily upon the collection of evidence from a variety of different sources including but not limited to peer-reviewed literature, expert interviews, accepted best practices, and existing data sets. Community involvement and stakeholder engagement must play an active role throughout the process. Community members and affected stakeholder groups provide local perspective on the issue at hand and will help decision-makers to understand the direct consequences of a particular outcome. The assessment process follows a series of steps that include: screening, scoping, assessment and analysis, reporting and communication, and monitoring and evaluation.

Screening

The screening process is the initial step used to determine whether conducting a HIA is appropriate and would contribute value to a decision-making process. This phase precedes the final decision to conduct a HIA and is often guided by addressing a series of questions designed to assess the need for such a study. The length and depth of a screening process varies with the project or issue being considered, but generally involves developing a set of screening criteria used to determine an issue's appropriateness as the subject of a HIA.

The project was initiated with the formation of a Steering Committee consisting of representatives from the Village of Carpentersville, the Kane County Planning Cooperative, and the Chicago Metropolitan Agency for Planning. The Steering Committee convened a project kickoff meeting on September 4, 2014 led by Kane County staff introducing the concept and methods of conducting a HIA.

The kickoff meeting concluded with a screening activity to assess the value of conducting a health impact assessment of infrastructure improvements to the intersection of Main and Washington. Meeting attendees each completed a screening worksheet to assess the extent to which key decision makers and stakeholders would buy into the process and that there were adequate resources available to complete the study. The screening exercise was followed by a brainstorming session among the Steering Committee members to identify the core stakeholder groups and public health issues likely to be impacted by proposed infrastructure improvements (see Appendix A). The Screening Worksheet and brainstorming discussion items can be found in Appendix B.

Scoping

The scoping process involves the development of a work plan which assigns responsibilities to members of the project team while also establishing a timeline of completion for the HIA. It is also during this phase that the project team identifies project partners and stakeholders who will ensure that the study focus is guided by the interests and concerns of the affected community.

CMAP prepared a scope plan identifying project partners and assigning responsibility for the completion of all major project deliverables. The plan also organized proposed project activities in accordance with the five phases of conducting a HIA (e.g. screening, scoping, assessment and analysis, reporting and communication, and monitoring and evaluation).

Multiple agency and community representatives were identified during the kickoff meeting to provide direct advisory support to the project Steering Committee. Officials representing the Carpentersville Police Department, Community Unit School District 300 and a local elected official joined the Steering Committee for a project meeting to discuss health and safety concerns within the project area. These discussions enhanced the project team's understanding of existing conditions within the project area and community concerns resulting from proposed improvements. Key highlights from these discussions and other project activities are summarized in Figure 1. These items are described at length within the Existing Conditions section of this report.

The scope of this project was refined to consider the health and safety outcomes of two design alternatives at the intersection of Main and Washington: a single-lane roundabout and a signalized intersection.

Figure 1. Major project activities

Source: Kane County.

Assessment and Analysis

It is during this phase that data is collected on existing conditions within the project area and potential health and safety impacts resulting from alternative outcomes are reviewed. An inventory of existing conditions involves consulting with affected stakeholders and experts knowledgeable of health and safety conditions within the project area.

While conducting the assessment and analysis phase of the study, the project team consulted published data and expert opinion to quantify existing health conditions in northern Kane County as well as safety concerns within the immediate vicinity of the project area. The primary data source for quantifying health conditions in the Carpentersville region was the 2014 Kane County Community Health Assessment.

Baseline data on safety and mobility conditions within the project area was obtained from various sources including representatives from the Village of Carpentersville Public Works Department, Carpentersville Police Department, Community Unit School District 300, area business operators, neighbors, and commuters. The project team reviewed reports and statistics referencing the project area published by the Illinois Department of Transportation and the CMAP which included the Old Town Plan and the Fox River Corridor Study Existing Conditions Report. The National Cooperative Highway Research Program Report 672 and Benton County Health Impact Assessment on roundabouts were also referenced in conducting the literature review for this study.

Reporting and Communication

Reporting and communication is the process of disseminating the findings and recommendations of a HIA through public presentations and distribution of the report document. This phase typically allows for the public and decision-makers to review and provide their input on the report findings, which may be modified to reflect specific concerns.

Upon completing the assessment and analysis phase of the study the project team presented their preliminary findings and recommendations to the Carpentersville Village Board on February 23, 2015. The final report is available at CMAP's online listing of LTA projects.

Monitoring and Evaluation

The purpose of establishing a monitoring protocol is to track the effects of the HIA on the decision-making process and the impacts of the decision on health determinants[2]. This phase provides accountability for the implementation of any actions and recommendations that emerge from a HIA report. Similarly, evaluation seeks to review the process resulting in completion of the HIA report. See the Monitoring and Evaluation Tasks section of this report for a list of actions and questions used to track the progress of implementation.

[2] Human Impact Partners. (2012). Health Impact Assessment Training. Human Impact Partners (publisher).

Main Street bridge.

Chapter 4
EXISTING CONDITIONS

Aerial view of intersection of Main Street and Washington Street, including nearby Fox River Trail crossing.

Photo Credit: Kane County

Project Area Description

The intersection of Main Street and Washington Street resides within Carpentersville's Old Town neighborhood corridor. The Old Town Plan describes the area as the historical center of the Village with "access to the scenic Fox River, a walkable land use pattern, and attractive historic architecture[3]." Immediately north of the corridor resides a residential neighborhood consisting largely of single-family homes. According to U.S. Census tract figures it is estimated that there are roughly 500 residents living within a 1/4 mile distance from the intersection of Main St. and Washington St. See Appendix C for a pedestrian area map with population estimates within 1/4 mile and 1/2 mile distances of the intersection.

Main St. is bisected by the Fox River Trail at a grade which runs along the east side of the Fox River. The cyclist and pedestrian trail is part of a larger network connecting Kane County Forest Preserve District lands and communities throughout the Fox River Valley. According to a report published by Trails for Illinois, the Fox River Trail in Carpentersville sees roughly 400 daily users during the summer and fall months. On weekends that number rises to about 600 users (see Figure 2). The report estimates 119,013 cyclists and pedestrians use the Fox River Trail in Carpentersville annually[4]. See Appendix D for the average hourly use statistics of the trail.

[3] Chicago Metropolitan Agency for Planning. (2012). Old Town Plan: Village of Carpentersville. Retrieved from http://www.cmap.illinois.gov/documents/10180/23221/FY13-0016+OLD+TOWN+CARPENTERSVILLE+LTA+PLAN_lowres.pdf/b0867282-e899-40a5-8ab2-cc23a1b6afcd.

[4] Trails for Illinois. (2012). Making Trails Count in Illinois. Retrieved from http://www.trailsforillinois.org/content/make-trails-count-illinois-download.

Main and Washington (facing west).

Main and Wisconsin (facing north).

Main and Fox River Trail (facing south).

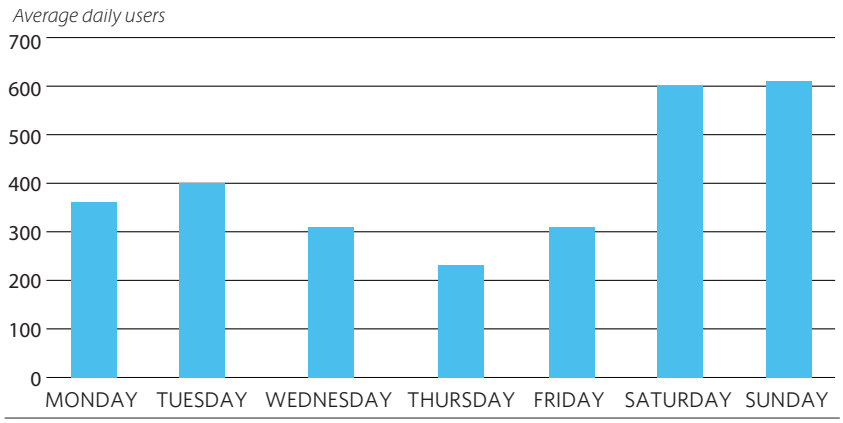
Main and Wisconsin (facing west).

The Fox River Corridor Study Existing Conditions Report calls for improvements to the Fox River Trail crossing at Main St. The street crossing lacks traffic signals and can only be distinguished by pavement striping and yellow caution signs[5].

Main St. is the only vehicular bridge crossing of the Fox River in Carpentersville and routinely experiences large volumes of traffic during peak travel times. Between Route 31 and Washington St., Main St. experiences an average daily traffic count of roughly 17,900 vehicles. Washington St. to the north of Main sees daily traffic counts of about 7,900 vehicles[6]. Community Unit School District 300 noted that the primary staging area for its fleet of buses is located about a half mile east of the project area. On school days the school district operates between 100 and 130 buses, which combine total over 200 bus trips — some of which pass through the project area.

Eastbound traffic on Main St. approaching Washington does not have a controlled stop at the intersection. Main St. transitions to a one-way street eastbound after it crosses Washington. Northbound and southbound vehicles on Washington St. make controlled stops at the intersection with Main St. See Figure 3 for a diagram of the intersection area and congestion locations.

Figure 2. Carpentersville's Fox River trail pedestrian and cyclist activity



Source: Trails for Illinois; July 17 – Oct. 15, 2012.

5 Chicago Metropolitan Agency for Planning. (2015). Fox River Corridor Study Existing Conditions Report. Retrieved from http://www.cmap.illinois.gov/documents/10180/292201/ECR%20for%20Fox%20River%20Corridor_Reduced/58f97540-7a38-40f1-8c65-b75ac290af3b.

6 Chicago Metropolitan Agency for Planning. (2012). Old Town Plan: Village of Carpentersville. Retrieved from http://www.cmap.illinois.gov/documents/10180/23221/FY13-0016+OLD+TOWN+CARPENTERSVILLE+LTA+PLAN_lowres.pdf/b0867282-e899-40a5-8ab2-cc23a1b6afcd.

Stakeholder Observations and Concerns

Community Outreach Workshop, October 21, 2014

Kane County hosted a public stakeholder engagement meeting and HIA training workshop on October 21, 2014 to discuss safety concerns and improvements to the intersection of Main St. and Washington St. A complete listing of identified site issues and suggested actions from the meeting are included in Appendix E. Attendees identified a number of safety and mobility concerns to be addressed by this report including:

- Driver safety
- Access to parks
- Impacts on community character
- Pedestrian and bicycle safety
- Signage improvements

Steering Committee Meeting, November 20, 2014

A project Steering Committee meeting was held on November 20, 2014 to gather key stakeholders to provide specialized input on conditions within the project area and the anticipated impact of changes to the intersection. The attendees included representatives from the Carpentersville Police Department, Community Unit School District 300, and a local elected official.

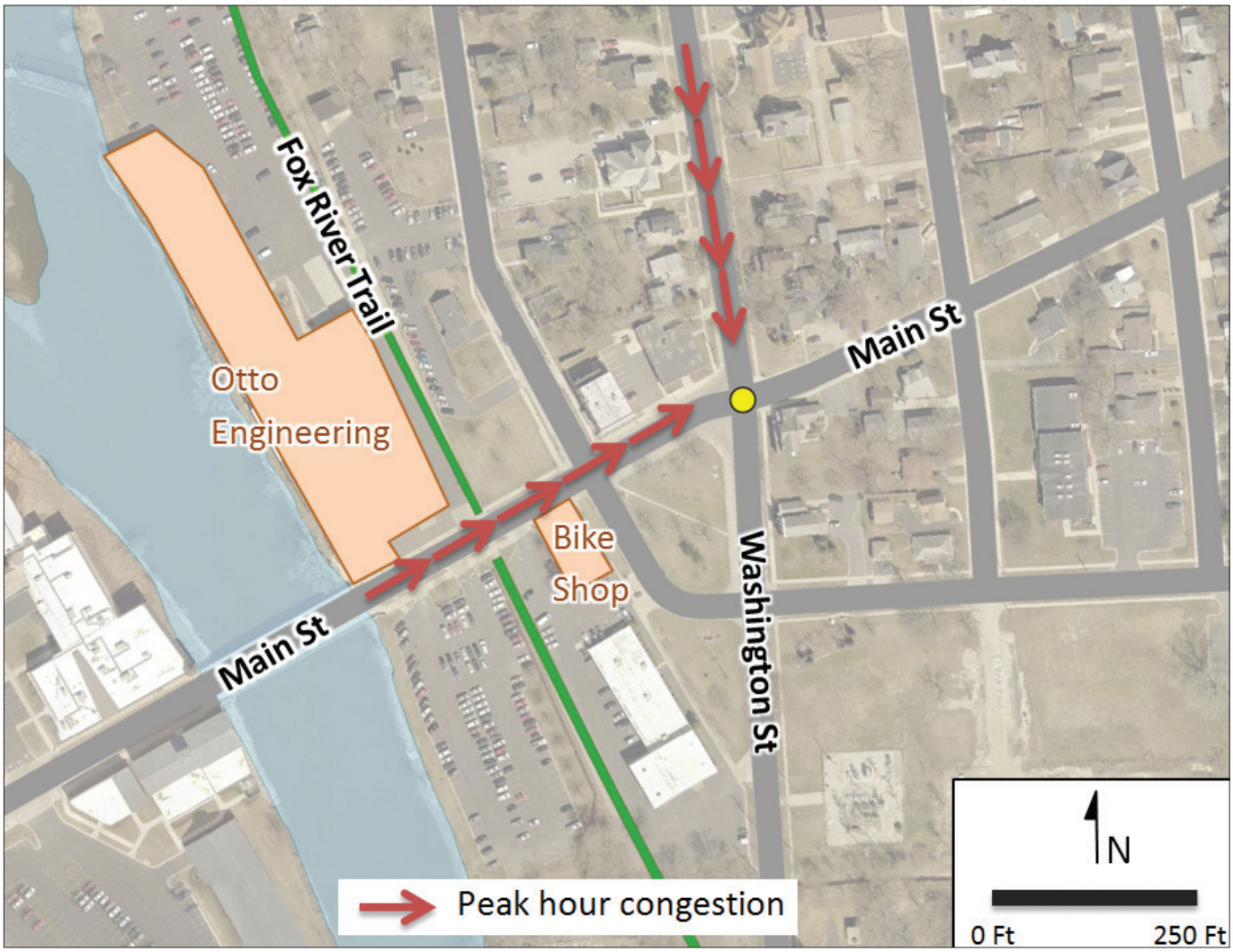
Pedestrian safety was the recurring theme of discussion with additional attention for driver safety and mobility concerns. Within the last five years it was noted that there was only one crash involving an injured pedestrian within the project area; and this occurred west of the intersection on Main St. near the Otto Engineering building. The Carpentersville Police Department indicated that most crashes that occur near the intersection are caused by slow-moving traffic resulting in rear-end collisions.

Police and Fire Department mobility through the project area is not anticipated to be negatively affected by improvements that could include either a signalized intersection or a roundabout. However, the Department specifically advised against the use of a police officer as a traffic management solution.

Community Unit School District 300 identified bus mobility as a consideration for design improvements to the intersection. It was estimated that during the school year, busses make between four and six trips through the intersection each day. Once completed, the Longmeadow Parkway would not be anticipated to divert bus traffic away from the project area via new routes. The District also recommended that consideration be given for busses, which require more time to start and stop than most vehicles.

Carpentersville officials emphasized that the safety of users crossing Main St. at the Fox River Trail and near the Otto Engineering building should be prioritized. Drivers have limited warning of these crossings on Main St. and are typically surprised by pedestrians and cyclists that cross the road in front of them. The trail sees higher volumes of pedestrians and cyclists on weekends, but the crossing that connects Otto Engineering employees with a parking lot on the south side of Main St. sees greater use on weekdays. Cyclist and pedestrian traffic along the Fox River Trail and throughout the Old Town corridor is expected to increase in coming years.

Figure 3. Project area and congestion locations



Source: Kane County.

Town Hall Meeting, December 10, 2014

The Village of Carpentersville staff facilitated a town hall meeting to discuss the community impacts of design improvements to the intersection of Main St. and Washington St. Attendees of the town hall meeting represented various community groups including neighborhood residents, local business owners, drivers, pedestrians, cyclists and trail users. A variety of concerns were expressed and are summarized in Figure 4. A summary of comments from the town hall meeting is provided in Appendix F.

Figure 4. Town Hall meeting: community group concerns.

COMMUNITY GROUP	CONCERNS
Local business owners	• Reductions of street parking
Neighborhood residents	• Intersection backups causing traffic/safety concerns on side streets • Vehicle speeds on residential streets
Pedestrians / trail users	• Pedestrian and vehicle conflicts near the Fox River Trail crossing and Main and Washington • Access to recreational uses
Cyclists	• Safely sharing the road
Drivers	• Intersection traffic flow • Pedestrians crossing Main Street • Entry/exit of area parking lots • Confusing route configurations

Baseline Health Conditions

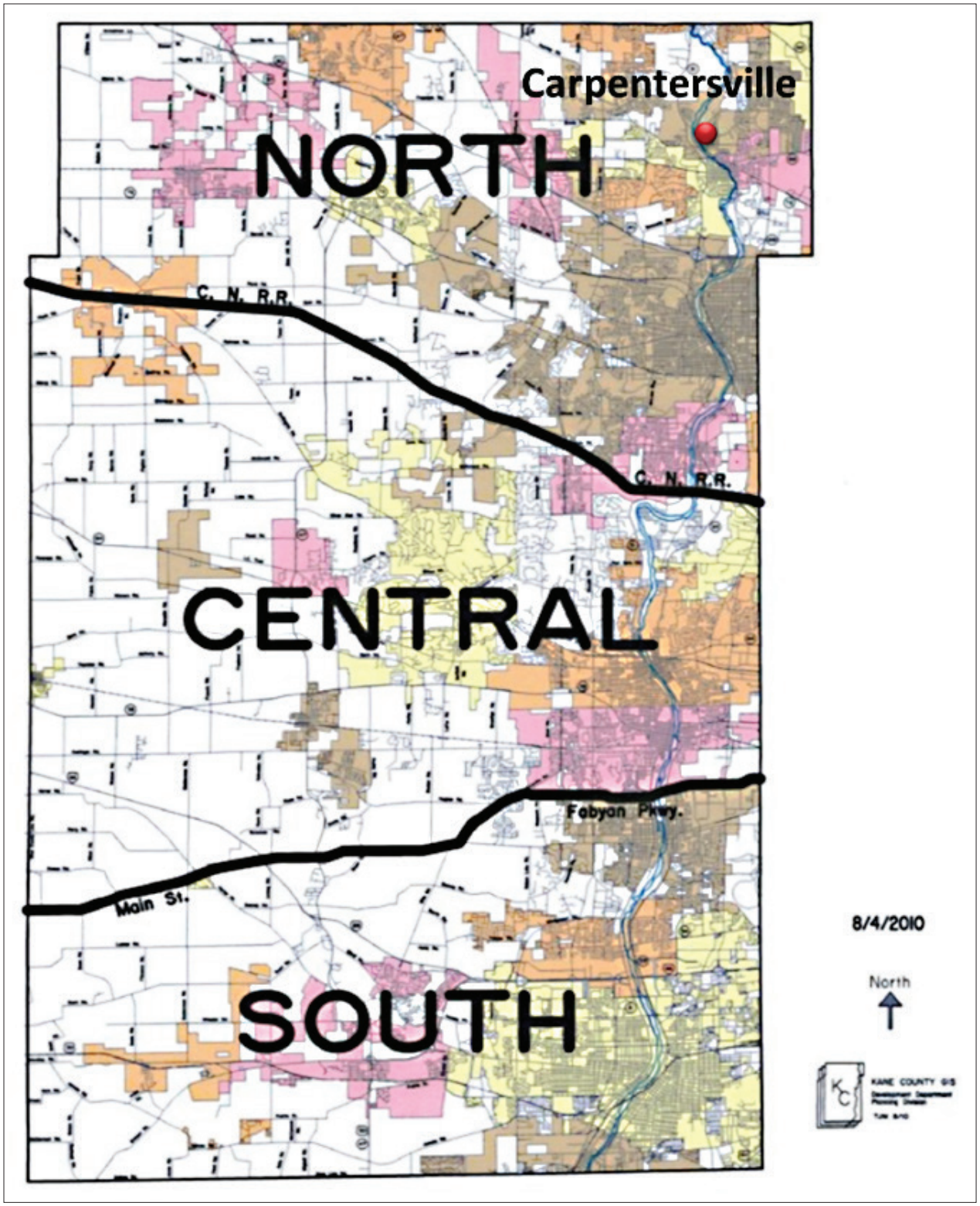
Information on health conditions in the project area and surrounding region was obtained from Kane County Community Health Assessment data. In Illinois, counties are required to complete health assessments every five years which involve detailed population surveys on various health factors. The assessment results were segregated geographically in relation to three separate Kane County Planning Areas (see Figure 5). The Village of Carpentersville and the project area of this study fall within Kane County's North Planning Area.

According to 2014 Kane County Community Health Assessment data, 54 percent of adults in the North Planning Area meet CDC-recommended levels of physical activity. Among Kane County residents overall, 56 percent of adults meet the recommended levels for physical activity. In the North Planning Area 64 percent of adults are reported overweight or obese and 8 percent of adults currently suffer from asthma*. Among low-income residents countywide, the rate of asthma among adults is 11.4 percent whereas the rate among mid to high income residents is 6.5 percent.[7]

* Note: 25 percent of adults in the North Planning Area are obese (BMI of 30 or more) and 39 percent of adults are overweight (BMI of 25 to 29).

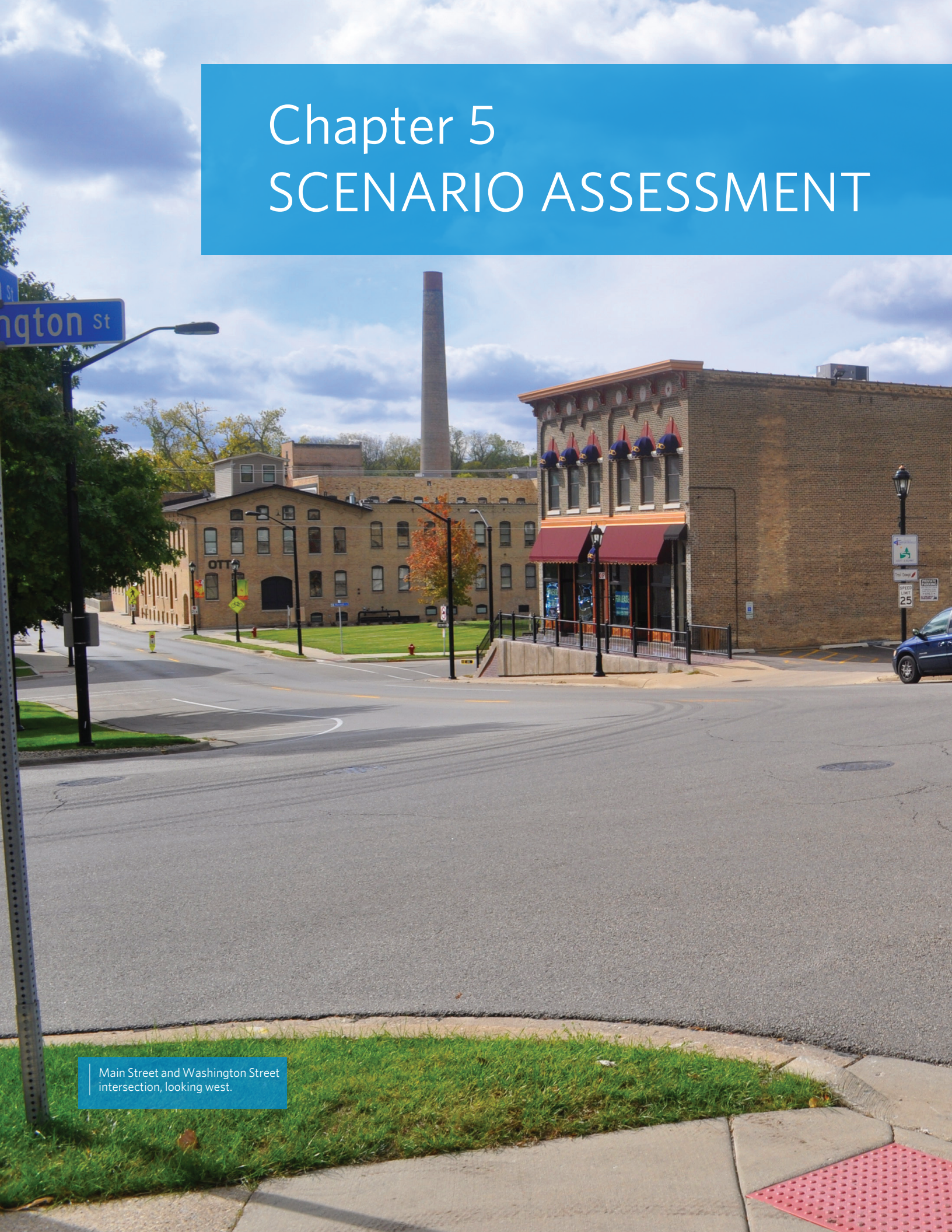
[7] Kane County Health Department. (2014). Kane County Community Health Assessment. Retrieved from http://kanehealth.com/PDFs/CHIP/KaneCHNADatabook.pdf.

Figure 5. Kane County planning areas



Source: Kane County.

Chapter 5
SCENARIO ASSESSMENT



Main Street and Washington Street intersection, looking west.

For the purpose of this study, two design alternatives were considered for possible changes to health and safety conditions within the vicinity of the project area: a single-lane roundabout and a signalized intersection. Findings obtained through stakeholder outreach activities and a literature review were used by the project team to generate a pathway diagram of potential changes and health impacts affected by the proposed design alternatives (see Appendix G). The literature review also identified measureable health and safety outcomes based on specific design elements associated with each intersection alternative.

Health and Safety Issues

Injury

According to the Federal Highway Administration, intersections account for roughly 21 percent of fatalities and 50 percent of serious injuries resulting from motor vehicle crashes[8]. For pedestrians in particular, vehicle speed is a critical determinant of whether a collision will result in fatal injury. At 30 mph a pedestrian is eight times more likely to die from a collision than if they were struck at 20 mph[9]. The frequency of crashes between vehicles and pedestrians is also tied to the number of conflict points within an intersection (e.g. points within the intersection where cars or cars and pedestrians may diverge, merge, or cross paths).

Neighborhood residents and stakeholders have expressed concerns about current safety conditions as well as conditions resulting from future intersection improvements. According to collision records for the project area, there has only been one documented vehicle crash resulting in the injury of a pedestrian within recent years. However, given the consistency of pedestrian crossings in close proximity to vehicles on Main St., the perception of diminished safety persists. If roadway improvements lead to more stable traffic flows and increased vehicle speeds through the intersection, pedestrian safety could be further diminished in the absence of additional safety control measures. This is of particular concern for pedestrians crossing Main St. from the Fox River Trail.

Chronic Disease / Obesity

A number of health organizations, advocacy groups, and published studies have acknowledged reductions in the rates of chronic disease (such as diabetes) and obesity among active transportation users (walking and bicycling). In a published review of all 50 states and 47 of the 50 largest cities in the U.S. it was determined that higher rates of walking and bicycling correlated with a greater percentage of adults meeting recommended levels of physical activity and lower rates of adults with obesity and diabetes[10].

There are several features of the Old Town corridor that encourage active transportation uses within the project area. The trail provides a linkage between neighborhoods along the Fox River Valley and Old Town for pedestrians and cyclists. Within the Old Town corridor, blocks and sidewalks are relatively short making for easy travel between nearby destinations. Sections of sidewalk along Main St. are widened with brick pavers and defined by pedestrian-scale buildings that maintain their orientation to the sidewalks. This infrastructure network also provides connections to neighborhood recreational amenities such as Carpenter Park east of the project area.

[8] U.S. Department of Transportation Federal Highway Administration. (2014). Intersection Safety. Retrieved from http://safety.fhwa.dot.gov/intersection/.

[9] Transportation Research Board of the National Academies. (2010). NCHRP Report 672: Roundabouts: An Informational Guide, Second Edition. Retrieved from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf.

[10] Pucher J, Buehler R, Bassett DR, et al. (2010) Walking and Cycling to Health: A Comparative Analysis of City, State, and International Data. American Journal of Public Health. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2937005/.

According to WalkScore.com the Old Town corridor is among the most pedestrian friendly areas within the Village of Carpentersville with scores ranging between 47 and 63 on a scale of 100. Improvements to the intersection of Main St. and Washington should preserve or strengthen these mobility assets.

Asthma / Respiratory Illness

Vehicle emissions include compounds that can contribute to or exacerbate existing respiratory illnesses. According to the U.S. Environmental Protection Agency (U.S. EPA), nitrogen dioxide, a gas commonly found in vehicle exhaust, can cause lung irritation, and even lower a person's immunity to respiratory infections. Other forms of particulate matter released through the combustion of diesel engines can contribute to damage of lung tissue and cancer[11].

A vehicle that idles during a trip will produce more emissions than a vehicle traveling with less frequent or shorter duration stops. Because the intersection of Main St. and Washington St. experiences frequent backups, it will experience a larger volume of idling vehicles producing more exhaust than intersections of similar volume that maintain continuous traffic flows. Of course, there are likely airborne emissions present within the project area that originated elsewhere. Further analysis would be needed to determine the extent to which vehicle emissions within the project area are affecting overall air quality for the neighboring community.

[11] U.S. EPA. (2015). Health Effects of Air Pollution. Retrieved from http://www.epa.gov/region7/air/quality/health.htm.

Design Outcomes

The Transportation Research Board has conducted thorough analyses on the conversion of both signalized and sign-controlled intersections to roundabout intersections. Additional consideration is also given for the complicating impacts that may result from the Fox River Trail crossing just west of the intersection.

Speed

A roundabout is designed to reduce the speed of vehicles approaching an intersection from all directions simultaneously. Conversely, a signalized intersection will alternate between maintaining roadway speeds and signaling controlled stops for approaching vehicles. Vehicles that pass through a roundabout must typically reduce their speed to 15-20 mph. Not only does the reduced speed give drivers more time to recognize conflicts while passing through the intersection, but also greatly diminishes the chances of fatality when collisions do occur. The reduction also lowers vehicle speeds to more closely match the speeds of cyclists that choose to circulate with traffic through the roundabout. On-road cyclists typically travel at speeds ranging from 12-20mph.

Conflict Points

Conflict points are locations within an intersection where vehicles or vehicles and pedestrians/cyclists may merge, diverge, or cross paths. The frequency of crashes within an intersection commonly increases with the number of conflict points present within the intersection. A single-lane roundabout will have fewer vehicle-to-vehicle and vehicle-to-pedestrian conflict points than a signalized two-way intersection (see Appendix H)[12]. Roundabouts also commonly feature a splitter island which safely enables pedestrians and cyclists to cross lanes of traffic individually as opposed to multiple lanes at a time with a conventional intersection (see Figure 6). Multi-lane roundabouts will have more conflict points than single-lane roundabouts due to the presence of additional entry and exit lanes.

Air Quality

On average roundabouts produce 20-30 percent lower volumes of vehicle emissions than signalized intersections (including toxic pollutants and greenhouse gasses)[13]. This is largely due to a reduction in the amount of time that vehicles spend idling as they pass through a roundabout intersection.

[12] Transportation Research Board of the National Academies. (2010). NCHRP Report 672: Roundabouts: An Informational Guide, Second Edition. Retrieved from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf.

[13] Sides, K. (2011). The New Green Intersection is Round. The 2011 National Roundabout Conference. Retrieved from http://teachamerica.com/RAB11/RAB1114Sides/player.htm.

Signalized or stop-controlled intersections will always force vehicles to stop, extending the duration and volume of vehicle emissions released. Occasionally, large vehicle backups occurring at roundabout intersections will result in emission volumes similar to those experienced at a signalized intersection. However, it is uncommon for roundabouts to experience this level of congestion.

Fox River Trail Crossing

The Fox River Trail crossing at Main St. presents a unique challenge for improvements to the project area intersection to the east. It is conceivable that either project alternative — a signalized intersection or a roundabout — would increase the speed of traffic along Main St. during periods of peak travel demand. This would require the installation additional design features and signage to manage approach speeds and increase driver awareness of the trail crossing and its users.

Figure 6. Roundabout with pedestrian splitter

Source: U.S. DOT Federal Highway Administration.

Project Profile: Carmel Arts District Roundabout

The Carmel Arts District in Carmel, IN features a highly active pedestrian environment within a vibrant downtown corridor. Main Street is the primary vehicular thoroughfare serving the arts district and experiences consistently high volumes of traffic. A single-lane roundabout defines the district's western gateway. Less than 200 yards to the east of the roundabout, the Monon Trail crosses Main St. at grade. The Monon Trail links Indianapolis with its northern suburbs and sees thousands of pedestrian and cyclist users each day. There are no controlled stops for vehicles on Main St. between the trail and roundabout. However, the Monon Trail crossing at Main St. utilizes several design elements to enhance the visibility of the trail and promote the safety of its users including:

- Brick pavers covering a raised crosswalk with chevrons
- Curb bump-outs shortening the crosswalk length
- Pavement markings for approaching vehicles
- Signage warning of the trail crossing

Monon trail at Main St. – Carmel, IN

Main St. roundabout – Carmel, IN

Chapter 6
RECOMMENDATIONS

The recommendations contained in this report were generated to maximize health and safety outcomes for affected stakeholders within the project area. Further analysis by transportation engineers shall be required to determine the functional feasibility of specific design attributes identified below. Village officials must also weigh the capital costs of design alternatives for the intersection with priorities for infrastructure projects throughout the village. These are factors that fall outside the scope of this study.

Primary Recommendation: Conversion to single-lane roundabout

A single-lane roundabout constructed at the intersection of Main St. and Washington St. would result in better health and safety outcomes for affected area stakeholders while fulfilling transportation and mobility needs. This design would lower vehicle speeds in proximity to pedestrians and cyclists while reducing the number of conflict points between vehicles and pedestrians. A roundabout would be least likely to inhibit active transportation use if appropriate pedestrian design considerations are made. Crosswalks at roundabouts provide the added benefit of having shorter wait times for crossing pedestrians than other intersection designs. Cyclists retain the option to circulate through the roundabout with vehicle traffic or to use the pedestrian crosswalks.

Secondary Recommendations

1. **High-visibility pedestrian crossings**
   Pedestrian crosswalks at the intersection of Main St. and Washington and Fox Trail crossing should be designed with features that are highly visible to motorists and pedestrians.
   - Installation of high visibility pavement markings (could include high-contrast pavement striping, brick pavers or stamped pavement). Vehicles approaching a roundabout intersection will be forced to reduce speeds, but additional safety controls will be required for the Fox River Trail crossing which sits 100 yards to the west of the intersection of Main St. and Washington St.
   - Installation of a Rectangular Rapid Flashing Beacon (RRFB) to warn of pedestrians in the Fox River Trail crosswalk. RRFB or similar pedestrian notification light could be integrated with the existing neon caution signage to alert vehicles of pedestrians and cyclists at the trail crossing.

2. **Speed controls on Main Street and Washington Street**
   In anticipation of increased vehicle speeds along Main St. and Washington St., additional speed control measures should be considered for pedestrian safety.
   - Installation of a raised crosswalk for the Fox River Trail crossing. This will increase the visibility of the crosswalk for approaching motorists while also acting as a speed hump.
   - To the extent that conditions within the Main St. right-of-way allow, bump-outs should be installed to manage traffic speeds and shield pedestrians at the Fox River Trail crossing. Bump-outs are traffic calming devices that serve two functions: 1) Reduce the speed of approaching vehicles by narrowing the roadway. 2) Shorten the crosswalk distance a pedestrian must travel by partially extending a curbed sidewalk into the roadway.
   - Posted speed limits should be clearly visible to vehicles approaching the project area along Main St. and Washington St. Speed limit signs may also be used in tandem with signs warning of an approaching roundabout. Approach speeds should not exceed 25 mph; intersection speeds for the roundabout should be restricted to 15-20 mph.

3. **Enhance active transportation infrastructure**
   Improvements to the intersection and Fox Trail crossing should encourage active mobility by enhancing the transportation experience for pedestrians and cyclists within the project area.
   - Pedestrian and cyclist crossings serving the intersection of Main St. and Washington St. should incorporate a splitter island at each crossing. This will allow pedestrians and cyclists to cross each street one lane at a time, reducing the likelihood of vehicle to pedestrian/cyclist conflicts. The splitter island also reduces the amount of time that users must wait to cross the street.
   - The Village should consider the installation of directional signage or other wayfinding devices for the benefit of trail users and pedestrians within the Old Town corridor. These features would enhance the mobility experience of active transportation users, directing them to recreational assets and retail institutions (e.g. Carpenter Park, Main St. Bicycles, the Fox River Trail, etc.) within or near the corridor.
   - The roundabout design and Fox River Trail crossing should be fully Americans with Disabilities Act compliant and include features to assist the visually impaired. Detectable and directional surfaces along with landscaping features can help guide visually impaired persons to a roundabout crossing.

Monitoring and Evaluation

This section outlines a series of questions and tasks used to track the implementation of this report's recommendations and their effect on health and safety conditions within the project area. Following the adoption of this report, CMAP will provide monitoring and implementation assistance to the Village of Carpentersville for a period of two years.

The following questions should be used to assess the HIA process and overall impact of the study.

1. **Was the HIA accepted by Carpentersville village officials, community members and affected stakeholder?**
   - Tasks
     - Allow for public review of the draft proposal.
     - Adoption of the report by the Carpentersville Village Board.

2. **To what extent were the recommended actions and design elements incorporated with infrastructure improvements to the project area?**
   - Tasks
     - Identify obstacles to implementing the recommendations and develop remedies where appropriate.

3. **What are the effects of the study recommendations (real and perceived) on the health and safety of individuals within the project area?**
   - Tasks
     - Interviews and/or surveys of pedestrians, cyclists, drivers, community residents and other project area stakeholders.
     - Collect and review vehicle and pedestrian/cyclist safety data for the project area obtained from Carpentersville Police records and user testimonials.
     - Monitor changes in the level of pedestrian and cyclist activity within the project area. Data sources might include Trails for Illinois or an independent review of active transportation users before and after implementation.

4. **Were there unintended consequences or unforeseen issues which arose during the implementation of this report?**
   - Tasks
     - Amend the existing report to reflect any changes in baseline conditions, stakeholder observations or technical expertise.
     - Review the impact of new findings on proposed recommendations.

APPENDICES

Appendix A

Carpentersville HIA / LTA Kickoff Meeting, September 4, 2014

Brainstorming and Discussion Points

Stakeholder Groups Identified

- Business owners / employees
- Chamber of Commerce
- School District 300
- Park District and Forest Preserve
- Cyclists
- Emergency Responders
- Churches
- Hispanic community
- Bus drivers
- Elected Officials
  - Kane County Board
  - Village Board
  - Parks and Business Development Committees (Village Board members)

Potential Core Stakeholders

- Elected Official(s)
- Public Safety Director (representing emergency responders)
- School District 300 Assistant Superintendent

Public Health Issues

- Air quality
- Access to parks / open space
- Increase physical activity
- Emergency vehicle mobility
- Mental wellbeing / lost time
- Pedestrian and bike safety
- Economic impacts
- Traffic flow
- Area employee / customer safety
- Future senior housing residents
- Noise pollution
- Child / student safety

Appendix B

Screening Worksheet Carpentersville HIA Project

TENDENCY TO DO AN HIA	TO YOUR KNOWLEDGE:	TENDENCY NOT TO DO AN HIA
Yes	Are there potential positive and/or negative health impacts of the policy, program, or project to be assessed that need further investigation?	No/maybe
No/maybe	Are there any major political obstacles/barriers to successfully completing a health impact assessment on this policy, program or project?	Yes
Yes/maybe	Are the individuals and organizations with a stake in this policy, program or project likely to buy into the HIA process?	No
Yes	Is your organization willing to act as the lead agency in conducting the health impact assessment on this policy, program or project, OR have you contacted another organization that will?	No
Yes	Are the combined resources of the lead agency and its partners likely to be sufficient to complete an HIA on this policy, program or project, or can resources be accessed?	No
Yes	Can a health impact assessment on this policy, program, or project be completed within a time frame that is useful for influencing decision-making? What is your sense of the likelihood that the health impacts of this policy, program or project might be intensified for vulnerable populations?	No
High	Positive health impacts	Moderate/low
High	Negative health impacts	Moderate/low
Yes/maybe	Is the decision-making process open to the HIA and/or recommendations for changes to design, mitigations, and/or alternatives?	
Yes/maybe	Is the decision-making process open to the HIA and/or recommendations for changes to design, mitigations, and/or alternatives?	No
Yes/maybe	Is there already some discussion (a "buzz") at the community level about potential (or suspected) health impacts of this policy, program or project?	No
Yes/maybe	Is there some reason to suspect that health issues not considered in the planning process of this policy, project or program might become more visible by doing an HIA?	No
No	Is there already so much evidence, data, or experience out there regarding this policy, program or project that an HIA might be a waste of resources?	Yes
No	Is there so little evidence, data, or experience regarding this policy, program or project that an HIA might not be possible?	Yes

Brainstorming

1. Please think of a few of the health impacts that you intuitively sense may occur as a result of the policy, program, or project. Do not worry about specific details or evidence of these suspected impacts — those will be explored in depth in the Assessment step.
2. Stakeholder engagement is an important part of the HIA process because their input adds value to each step. They can provide concerns or ideas that you may have not considered. Stakeholders provide a broad perspective on the project, ensuring your decision makers have what they need to make the most informed decision. Without the expertise and opinions of the stakeholders, decision makers may not take into consideration your report and recommendations. Think about those who may not realize they are stakeholders (neighbors, businesses, commuters).

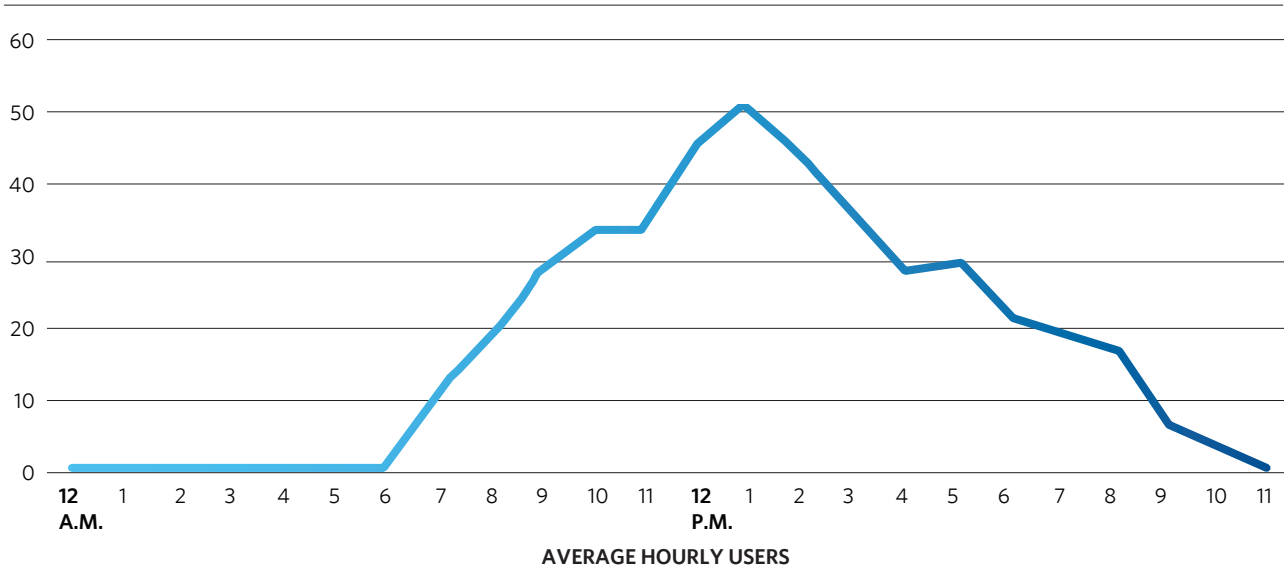
Appendix C

Pedestrian area population estimates

Source: Kane County.

Appendix D

Carpentersville Fox River trail



Source: Trails for Illinois; July 17 – Oct 15, 2012.

Appendix E

Stakeholders Attending:

- Residents
- Developers
- Other communities
- Para transit operators
- Chamber of Commerce
- Sports enthusiasts (water-related, canoe, kayak, fishing)
- Other industrial businesses along Maple

All Measures:

- Pedestrian/Bicycle Safety
- Vehicle Safety
- Driver Safety
- Congestion Mitigation
- Pros and Cons: Traffic Light vs. Traffic Circle
- Emergency responders – access, response time
- Access to parks
- Impacts on community character, specifically Old Town
- Impact on school bus routes
- Look at other best practices
- Pollution impacts
- Impacts on neighborhood residents and their ability to drive in the area

- Involve Otto Engineering
- Improve traffic flow in/out of nearby parking lots
- How can the bicycle traffic move safely (along Washington?)
- How has pedestrian/bike traffic increased south on Washington and how it crosses the busy street?
- Departure from Otto Engineering and impact of flow
- Effect of Longmeadow Parkway on traffic : 2000 study includes projection for 2010
- Bridge traffic: Existing 20k + 1 day, Capacity 12k 1 day
- Relation to Route 31 and Lincoln (expected in 2016) projects and other future projects
- Restrict hours for turning
- Install stop signs for each direction (why was a stop sign removed)
- Add a crossing guard @ intersection and near Otto Engineering
- What is the traffic count per hour?
- Otto Engineering Employees: How many employees travel east vs. west
- Alternative to physical traffic improvements: would it be possible to have a traffic cop/personnel to solve traffic issues at intersection? Is this option more cost-effective?
- Bridge: feasibility of
- Move parking to shift workers to the backside of Otto Engineering
- Shift the bike path so that it's integrated into traffic (in flow)
- Redirecting one-way street configurations: POSSIBILITIES: Washington –N, Washington –S
- Have one way streets at specific times
- How can drivers be trained to adjust to this change
- Signage
- Study the truck routes: What times do they travel? What direction are they traveling?
- Stress-health outcome - how can we measure this? Count hand gestures??

Proposed for HIA (open for discussion)

- Pedestrian/Bicycle Safety
- Emergency responders – access, response time
- Vehicle emissions/ Pollution impacts

Appendix F

Carpentersville Town Hall Meeting: Intersection of Main and Washington Streets

December 10, 2014 (5:30pm)
Carpentersville Public Works Building

The town hall meeting was facilitated by Village of Carpentersville staff. It was also attended by various community members and representatives from the engineering firm providing technical services for the Phase I engineering study.

The subjects below received considerable attention throughout the meeting.

Otto Facilities and Employees

- One area resident contended that traffic generated by Otto Engineering employees was competing for space with busses traversing the area. Some residents disagreed, stating that bus traffic was not much of a contributing factor to congestion issues within the site area. It was generally acknowledged that Otto employees exiting onto Main Street contribute to traffic backups.
- A safety issue raised was the blind intersection where the Otto building driveway, running along the west side of the bike trail, intersects with Main Street. A resident stated that it was dangerous for pedestrians and bikers, and even witnessed one bicyclist get clipped by an automobile.

Bike and Pedestrian Trail

- Several attendees expressed concern for the safety of bikers and pedestrians using the bike trail at the Main Street crossing.
- Traffic is frequently slowed by drivers who reduce speeds approaching the trail crossing in anticipation of pedestrians and bicyclists crossing (regardless of whether they are actually present).
- One attendee suggested the possibility of rerouting the trail to pass beneath the Main Street bridge as a way to reduce pedestrian and vehicle conflicts. In follow up discussions it was questioned whether the bridge would be high enough to accommodate such a configuration.

Vehicular Mobility

- A few attendees indicated that the current street configuration is confusing to drivers, particularly for truck drivers that do not routinely travel the area. Drivers must often turn around and drive back through the intersection to make a course correction.
- It was pointed out that on Google Maps, Cottage Ave. is shows as a street that intersects with Main, when in fact it is merely the driveway for Otto Engineering — a possible source of confusion.
- One area resident was concerned with the high speeds of vehicles traveling down Wisconsin Street and believed that it was caused by people trying to navigate around backups initiated at Main and Washington. She felt this posed a safety concern for children in the neighborhood.
- Some residents noted that drivers do not abide by the posted speed limits. It was suggested that the speed limit could be further lowered, but there was skepticism as to whether this would influence driver behavior. Staff also pointed out that state law may prevent a further reduction of the speed limit.

- School bus traffic was generally regarded as a minor issue for the area, but may contribute to larger sources of congestion. Commuters and parents picking up / dropping off kids at school were acknowledged to be the primary sources of traffic.

- It was suggested that signage could be added to prevent certain turns through the intersection for specified times during the day. This was seen by some as a low-cost option to improve traffic flows through the site area and could be implemented as a pilot program.

- One attendee asked if adjusting the timing for the signalized intersection at Huntley and Route 31 could improve traffic flows through the site area. Village staff indicated that adjustments in light timing often causes traffic shifting that does not result in net improvements to traffic flows.

- It was noted that one of the primary sources of congestion is caused by vehicles on Washington St. forced to yield the right-of-way to eastbound traffic on Main St. The addition of turn lanes was suggested as a possible remedy.

Area Considerations

- According to the engineering consultant, infrastructure improvements are planned for a section of Huntley Road west of the site area during the fall or winter of 2016.

- The engineering consultant indicated that the Longmeadow Parkway addition would provide a connection further north but did not expect to see considerable changes in flow volumes through the Main St./Huntley Rd. and Route 31 corridor.

- One suggested course of action was to wait until the Longmeadow Parkway was completed to see what effect it might have before proceeding with major infrastructure improvements to the Main and Washington intersection.

Intersection Design

- There was some concern among attendees that Carpentersville staff and partners were already making a commitment to a roundabout design. Carpentersville staff indicated that they did not currently have a design preference and were considering various alternatives. Staff did indicate that roundabouts typically receive favorable consideration as a project candidate for the Congestion Mitigation and Air Quality Improvement program grant. But it was clarified that non-roundabout designs are also eligible for consideration through the grant program.

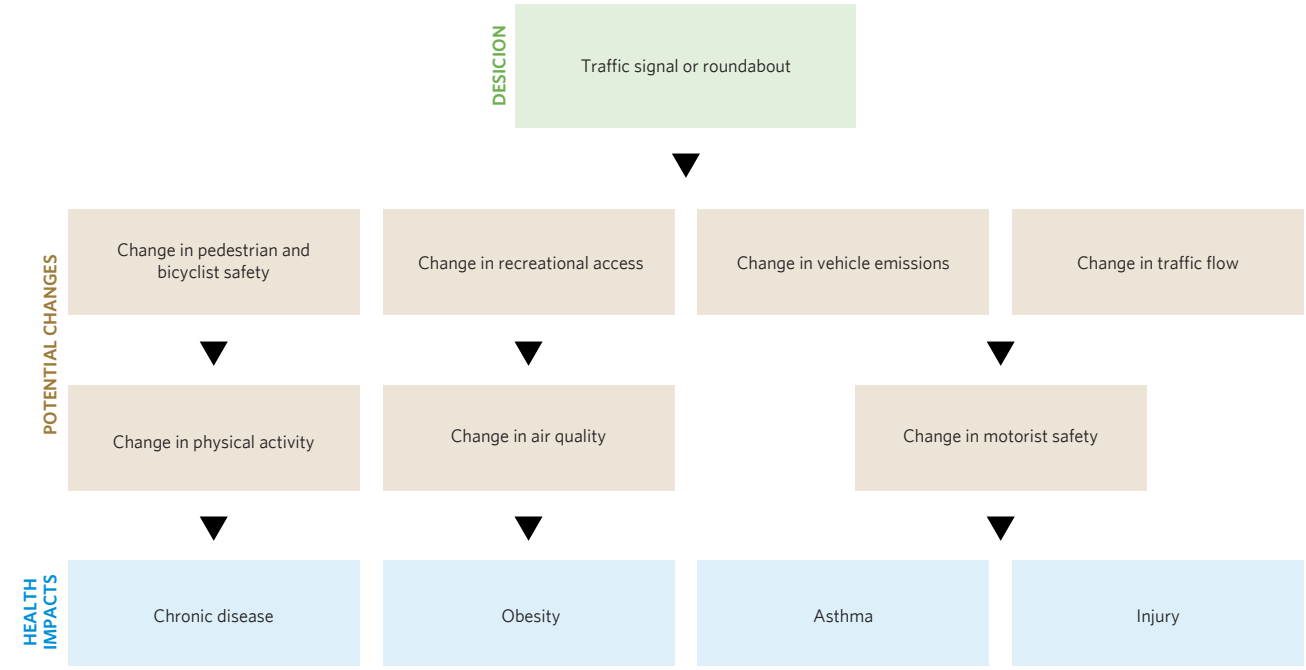
- It was noted that if a roundabout was added, it would do little to reduce congestion due to pedestrians crossing Main Street. The heightened traffic flow could in fact pose a greater danger to pedestrians than exists currently.

- If constructed, the roundabout would be situated on a sloped grade and could create safety issues for making turns in wintery conditions.

- Some area property owners expressed concern that a roundabout would reduce street parking and be detrimental to their businesses.

Appendix G

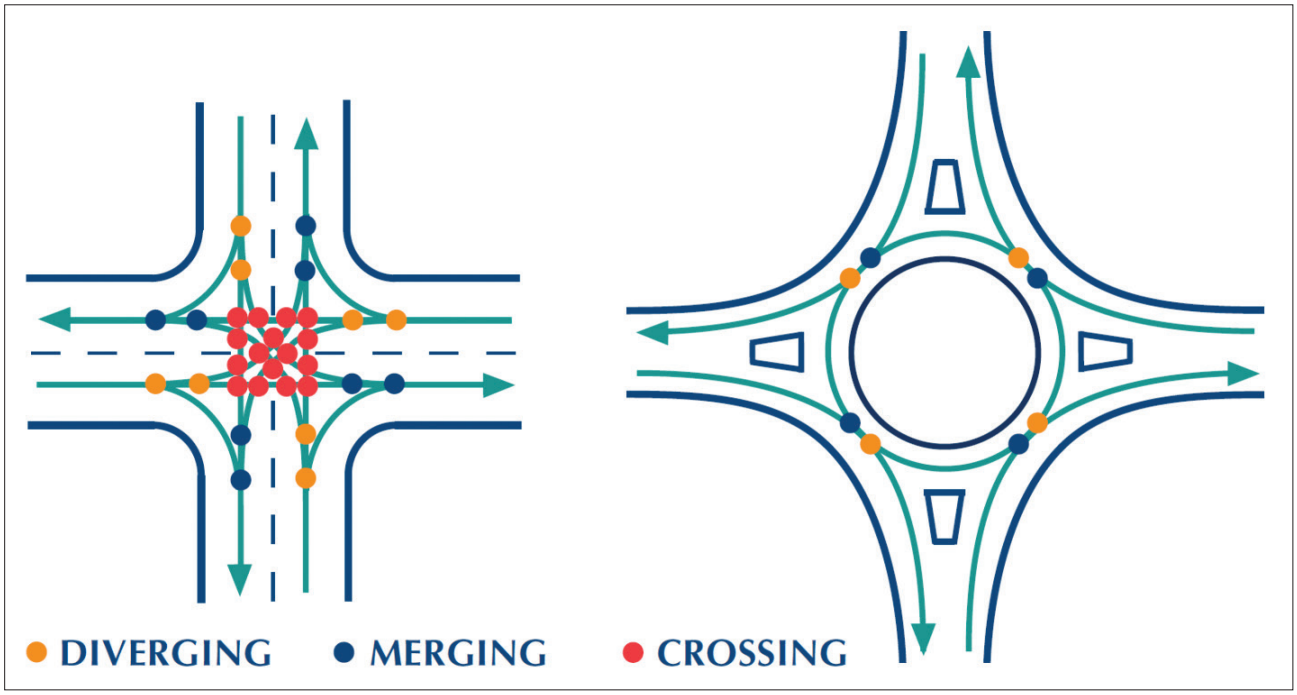
Carpentersville health impact assessment pathway diagram



Source: Kane County.

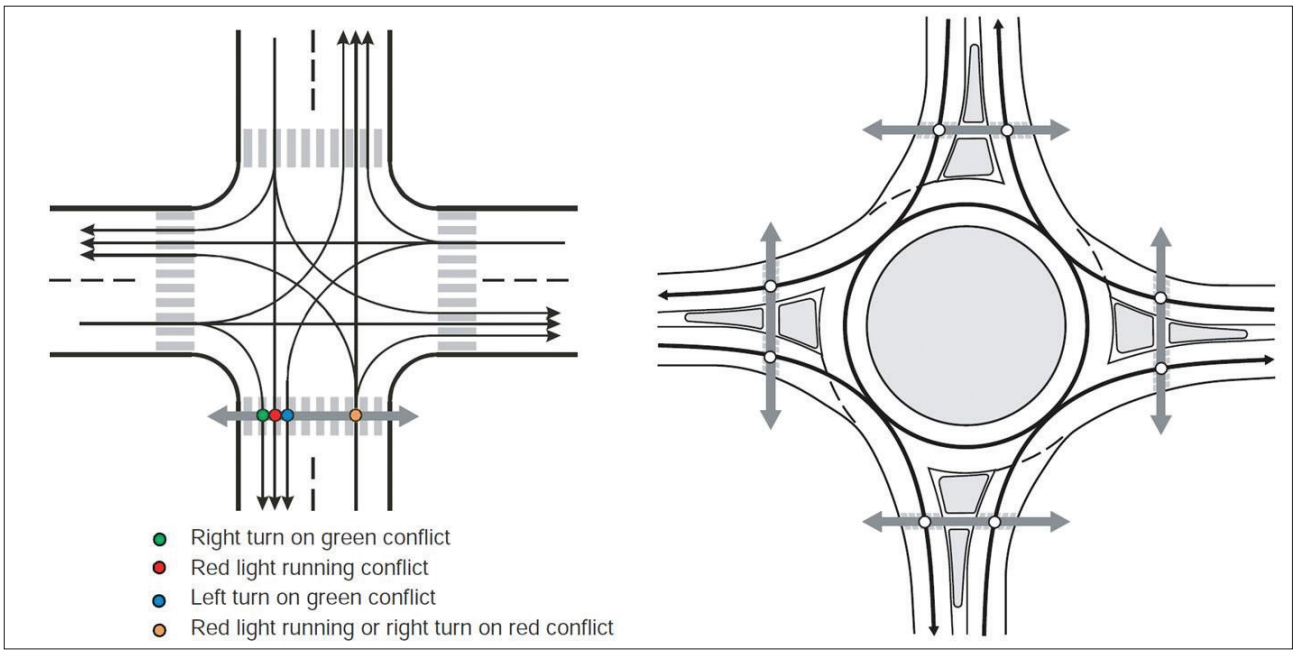
Appendix H

Driver-to-driver conflict points



Source: Department of Public Works, City of Lacey, WA. Driving Modern Roundabouts. Retrieved from http://www.ci.lacey.wa.us/city-government/city-departments/public-works/engineering-division/driving-modern-roundabouts.

Driver-to-pedestrian conflict points



Source: Transportation Research Board of the National Academies. (2010). NCHRP Report 672: Roundabouts: An Informational Guide, Second Edition. Retrieved from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf.

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