CMAP

City of Crystal Lake Transportation Plan

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Unless otherwise specified, all photos are by CMAP staff.

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Chapter 1
INTRODUCTION

The City of Crystal Lake's transportation system has been developed over time to serve residents, businesses, and visitors. Crystal Lake has created this Transportation Master Plan (the Plan) to augment the City's 2040 Comprehensive Plan and help coordinate future investments. The Plan builds upon the community's vision outlined in the 2030 Comprehensive Plan, which aims to provide a comprehensive transportation system to safely and efficiently serve current and future land uses, considering travel by road, rail, public transportation, bicycle, and foot. The Plan was designed with a similar time horizon to the Comprehensive Plan, 2040 and is focused on improvements within the municipality (Figure 1.1).

Informed by a local steering committee, a public outreach process, and an analysis of existing conditions, this Plan identifies key areas for improvement and outlines a set of strategies to guide how the transportation system can be enhanced in the future. Recognizing the importance of coordinating land use and transportation decisions, the Plan not only identifies network improvements and updates to facility design, but also makes recommendations for the surrounding land use context to enhance Crystal Lake's built environment. In addition, the plan includes a chapter outlining an approach to implementing the recommendations.

The process to create the City's Plan included multiple steps and opportunities for public input. The City of Crystal Lake applied to the Chicago Metropolitan Agency for Planning (CMAP) for technical assistance to develop the plan. CMAP staff developed a work plan which included critical community engagement activities to receive the input of city residents, business owners, and others on the transportation issues facing the City. The final product was crafted with assistance from City staff and reviewed by a local steering committee. Details on the public outreach process and the existing conditions analysis are included in Appendix A: Existing Conditions.

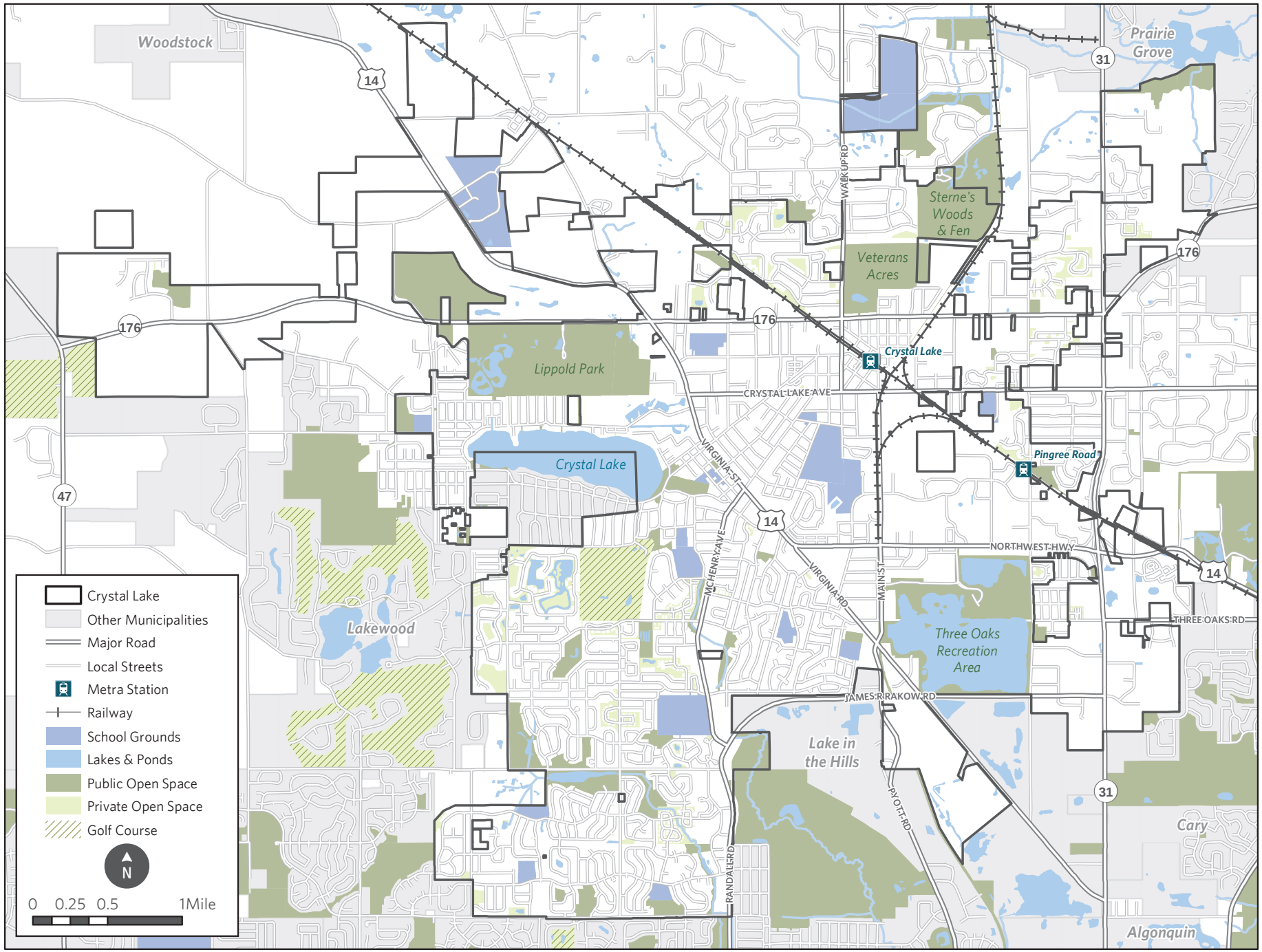
Vision Statement and Plan Goals

The following vision statement and goals are designed to serve as the foundation of the plan recommendations and were crafted with help from the local steering committee, stakeholders participating in the visioning process, and City Staff.

Vision Statement

The City of Crystal Lake envisions a transportation system that corresponds to adjacent land uses and increases community safety, reduces congestion, and decreases environmental impact by providing safe and convenient travel along and across streets through a comprehensive, integrated transportation network for pedestrians, bicyclists, public transportation riders and drivers, and people of all ages and abilities.

Figure 1.1. Regional Context.



Source: Chicago Metropolitan Agency for Planning, 2015

Vision Statement and Plan Goals

Goals

The goals of the Plan are organized around five major topic areas; the same organization was used for the chapters of the plan.

Transportation Network

Existing components of Crystal Lake's transportation network should be improved in order to better accommodate the different users of the system.

1. **Improve traffic flow along major thoroughfares.**
2. **Enhance sidewalk network.**
3. **Expand bicycle network.**
4. **Make public transportation an interconnected part of the transportation network.**

Planning and Design Standards and Practices

Accommodate all transportation modes in development and street design standards.

5. **Enhance the ecological function of streets.**
6. **Broaden bicycle facility standards to accommodate a range of users.**
7. **Strengthen pedestrian facility standards to improve walkability.**
8. **Update development standards to create pedestrian-friendly places in key areas.**
9. **Expand opportunities for mixed use and transit-supportive land uses to increase travel efficiency.**
10. **Establish standards for transportation improvements based on land use pattern.**

Education, Encouragement, and Enforcement

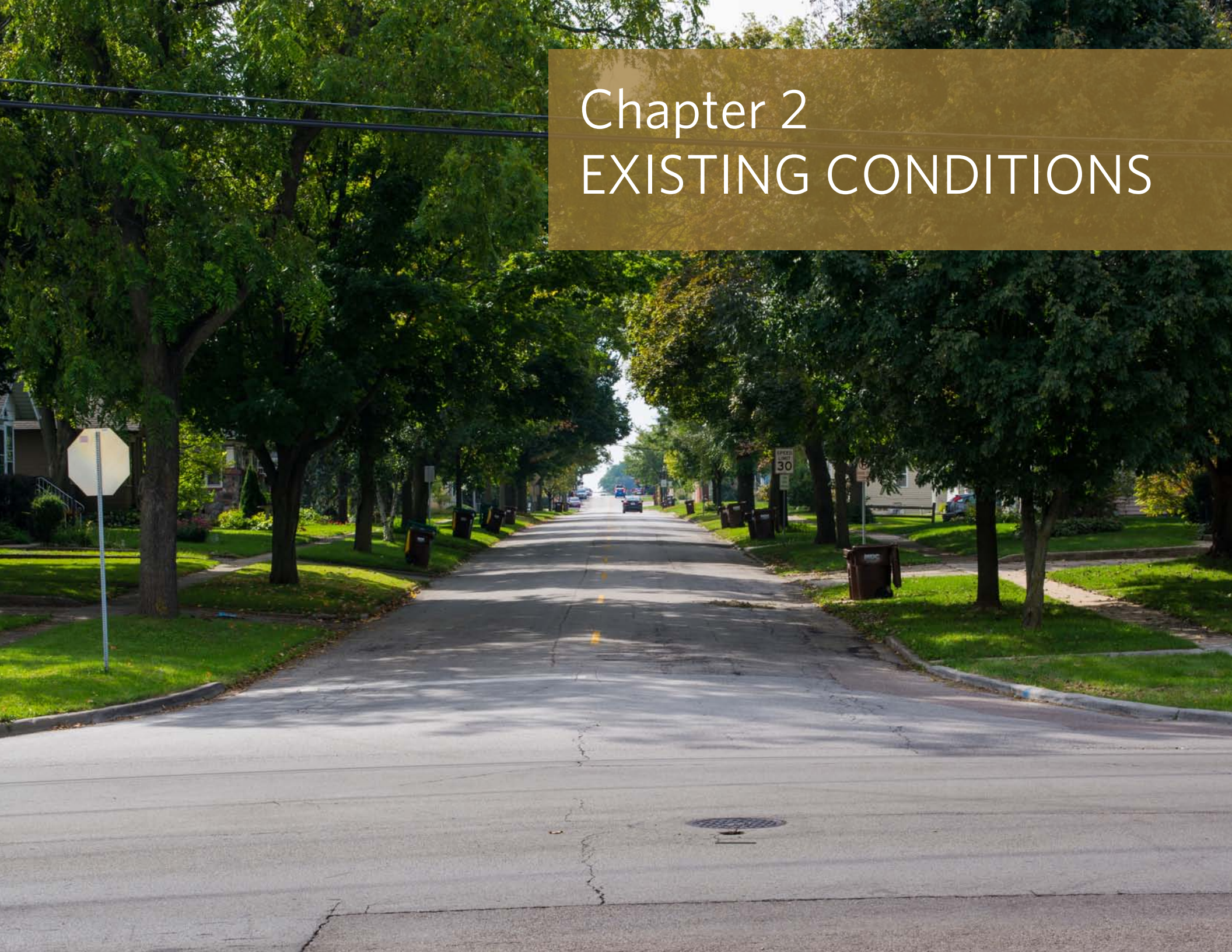
11. **Promote transportation safety.**
12. **Promote alternative transportation.**

Implementation

13. **Integrate improvements for all travel modes into the design process.**
14. **Include network improvements into capital planning.**
15. **Coordinate with partner agencies.**
16. **Track progress.**

Organization of the Plan

The Crystal Lake Transportation Master Plan provides recommendations for a number of topic areas and geographic locations. Chapter 2 briefly summarizes the existing community context, travel behavior, infrastructure conditions, and current design standards. Chapter 3 provides specific recommendations for improving the transportation network. Chapter 4 provides recommended updates to planning and design standards to better integrate the transportation and development context. Chapter 5 outlines education and encouragement strategies as well as updates to enforcement. Chapter 6 is focused on implementation and includes a description of actions to be undertaken by the community after Plan adoption.



Chapter 2
EXISTING CONDITIONS

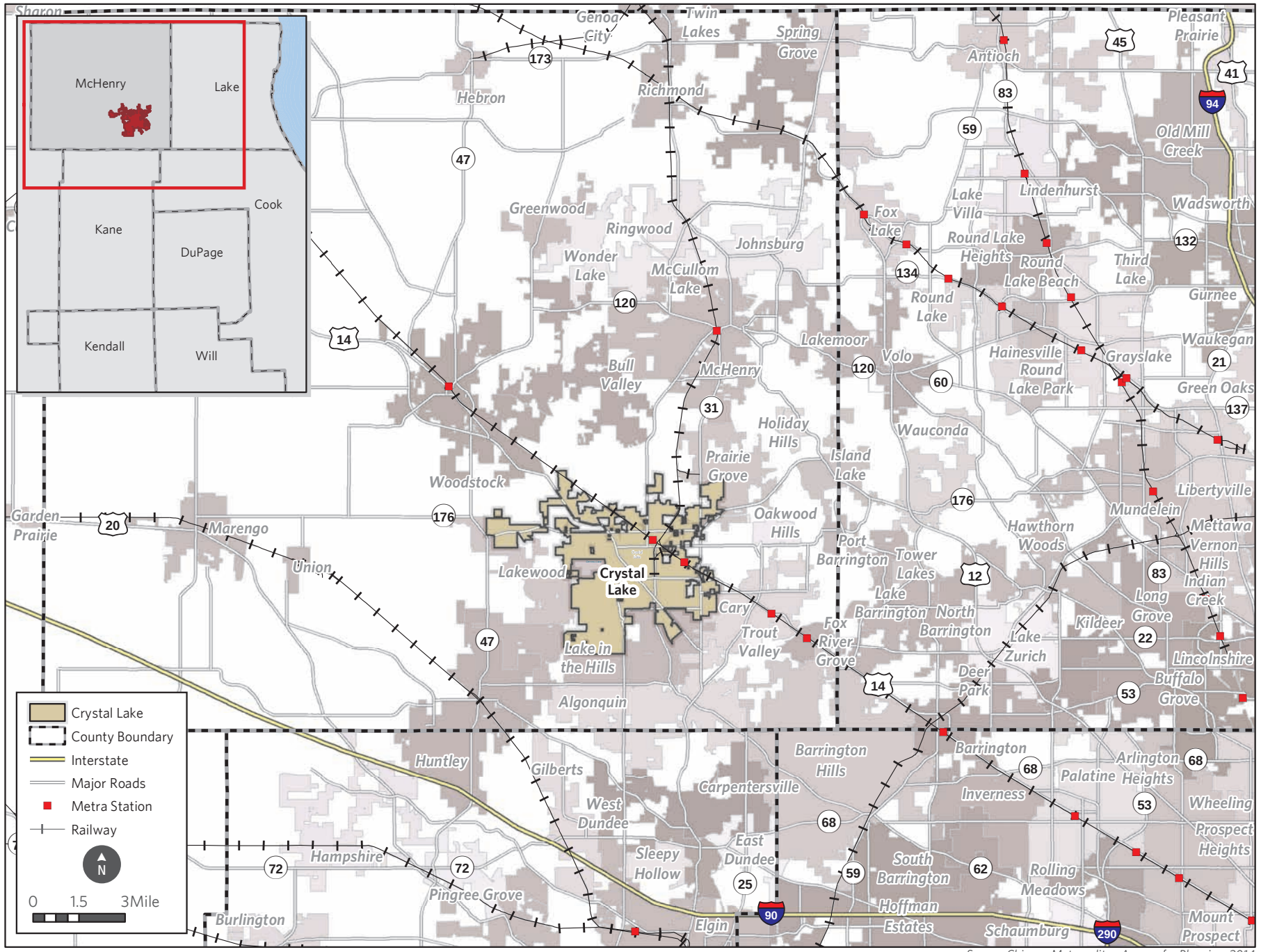
Crystal Lake is located in McHenry County, approximately 48 miles northwest of downtown Chicago. Illinois Route 31 (IL 31) roughly forms the eastern border of the community, while James R. Rakow Road, Randall Road, and Miller Road roughly form the southern boundary. The Villages of Prairie Grove, Cary, Lake in the Hills, and Lakewood, as well as unincorporated McHenry County surround the City (Figure 2.1). With IL 31 and US Highway 14 (US 14), as well as the Metra Union Pacific Northwest Line, Crystal Lake is situated within the heart of some of the larger transportation hubs and corridors in McHenry County. Interstate 90 in Kane County is twelve miles due south and US Highway 12 (US 12) in Lake County is located 11 miles to the east. Pace suburban buses provide service within the city and connect it to Woodstock, McHenry, and Elgin. In addition to IL 31 and US 14, IL 176 and Randall Road are important arterials, connecting the community with nearby municipalities and moving large volumes of traffic along these main commercial streets within the community.

An analysis of existing conditions is a critical component of the planning process. It provides an overview of the current conditions in Crystal Lake and a starting point for drafting plan recommendations. Understanding demographic trends, employment information, and travel behavior, as well as the existing land use patterns and locations of community destinations is critical to enhancing the transportation system in a way that supports the daily lives of Crystal Lake residents and businesses. Details about the existing transportation infrastructure system itself – the facility types, jurisdiction, and condition of the streets, transit, and pedestrian and bicycle infrastructure – are also necessary. In order to understand how future development, redevelopment, and reconstruction of existing right-of-ways will contribute to the City's transportation network, an analysis of Crystal Lake's Unified Development Ordinance was important. The standards were evaluated based on the City's 2030 Comprehensive Plan goals with particular attention paid to standards that could impact the pedestrian, since designing a community for the most vulnerable of users has shown improved safety results for all users.

The rest of this chapter summarizes the key findings of the existing conditions analysis and is organized into three main topic areas: community context and behavior, transportation infrastructure, and design standards. The full analysis is summarized in Appendix A: Existing Conditions.[1]

[1] Appendix A: Existing Conditions can be found here: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

Figure 2.1. Regional Context.



Source: Chicago Metropolitan Agency for Planning, 2014

Community Context and Behavior

Crystal Lake's sizeable older population, with 28 percent at or near retirement age and a median age of 37, may seek smaller homes in walkable neighborhoods as they age. National trends indicate that the Baby Boom generation is changing their housing and neighborhood preferences after retirement. National preference surveys show a growing desire for senior-oriented housing and neighborhood options, which include smaller and/or attached homes on smaller lots and walkable neighborhoods with daily destinations within a short distance.[2] In Crystal Lake, the majority of community destinations are located along major streets, making access management as well as pedestrian and biking improvements along these roads particularly important. Often residential homes are separated from commercial or civic destinations by long distances (Figure 2.2).

The vast majority of Crystal Lake residents drive alone when traveling to work, (Table 2.1). Higher driving rates may be influenced by a number of factors. The City's development patterns are spread out, and although transit options do exist, service is limited or not time effective for residents. Most residents work in locations that are difficult to access via transit. The same is true of Crystal Lake employees, who largely live in other McHenry County communities. However, a sizeable portion of residents work in Crystal Lake (16 percent) and some of these short trips could be shifted to other travel modes, such as walking and biking.[3]

Crystal Lake is home to extensive natural resources and the City has identified conservation areas, private open spaces, oak stands, important wetlands, and unique groundwater recharge areas in a Green Infrastructure Plan (Figure 2.3). Given the City's dependence on groundwater aquifers for its drinking water supply and its location within a sensitive aquifer recharge area, these water resources are of specific concern given projected groundwater shortages in the future and their susceptibility to contamination.[4] Stormwater runoff in Crystal Lake eventually makes its way into the City's streams, lakes, wetlands, and aquifers carrying pollutants picked up from the landscape, especially streets. The City has already incorporated green infrastructure goals in the 2040 Comprehensive Plan.

Table 2.1. Mode Share, as Percentage of Work Trips

	Crystal Lake		McHenry County		Region	
	Count	Percent	Count	Percent	Count	Percent
Work at Home*	1,219	N/A	8,493	N/A	183,368	N/A
Drive Alone	17,536	87.1%	127,297	87.3%	2,783,650	72.6%
Carpool	1,413	7%	11,279	7.7%	333,064	8.7%
Public Transit	832	4.1%	4,476	3.1%	515,377	13.4%
Walk or Bike	245	1.2%	1,728	1.2%	160,132	4.2%
Other	96	0.5%	1,097	0.8%	43,951	1.1%
Total Commuters	20,122	100.0%	145,877	100.0%	3,836,174	100.0%

*Not included in "total commuters."

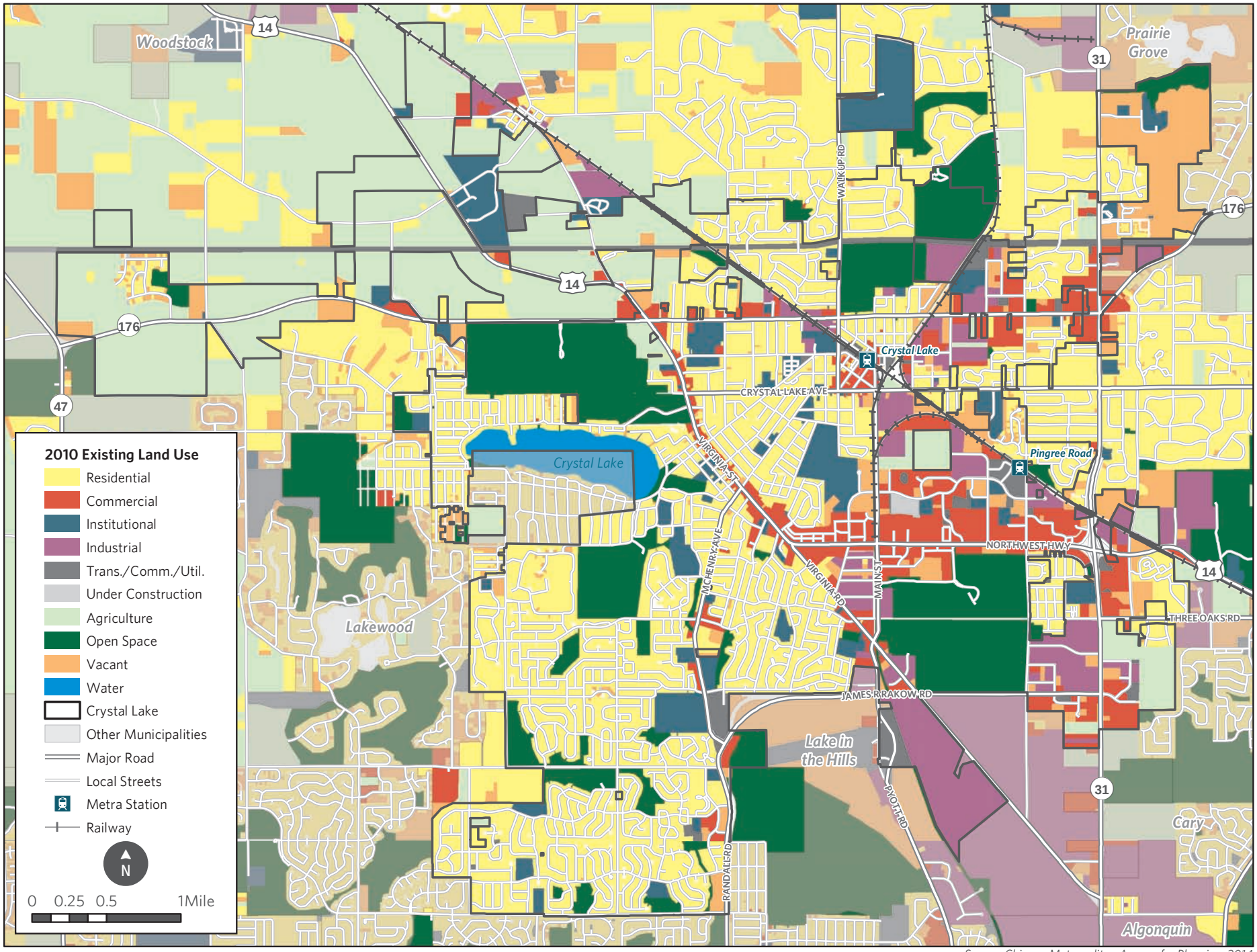
Source: 2015 American Community Survey five-year estimates, U.S. Census Bureau.

[2] Nelson, Arthur C. Reshaping Metropolitan America: Development Trends and Opportunities to 2030. 2013. Island Press: Washington D.C.

[3] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 54: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

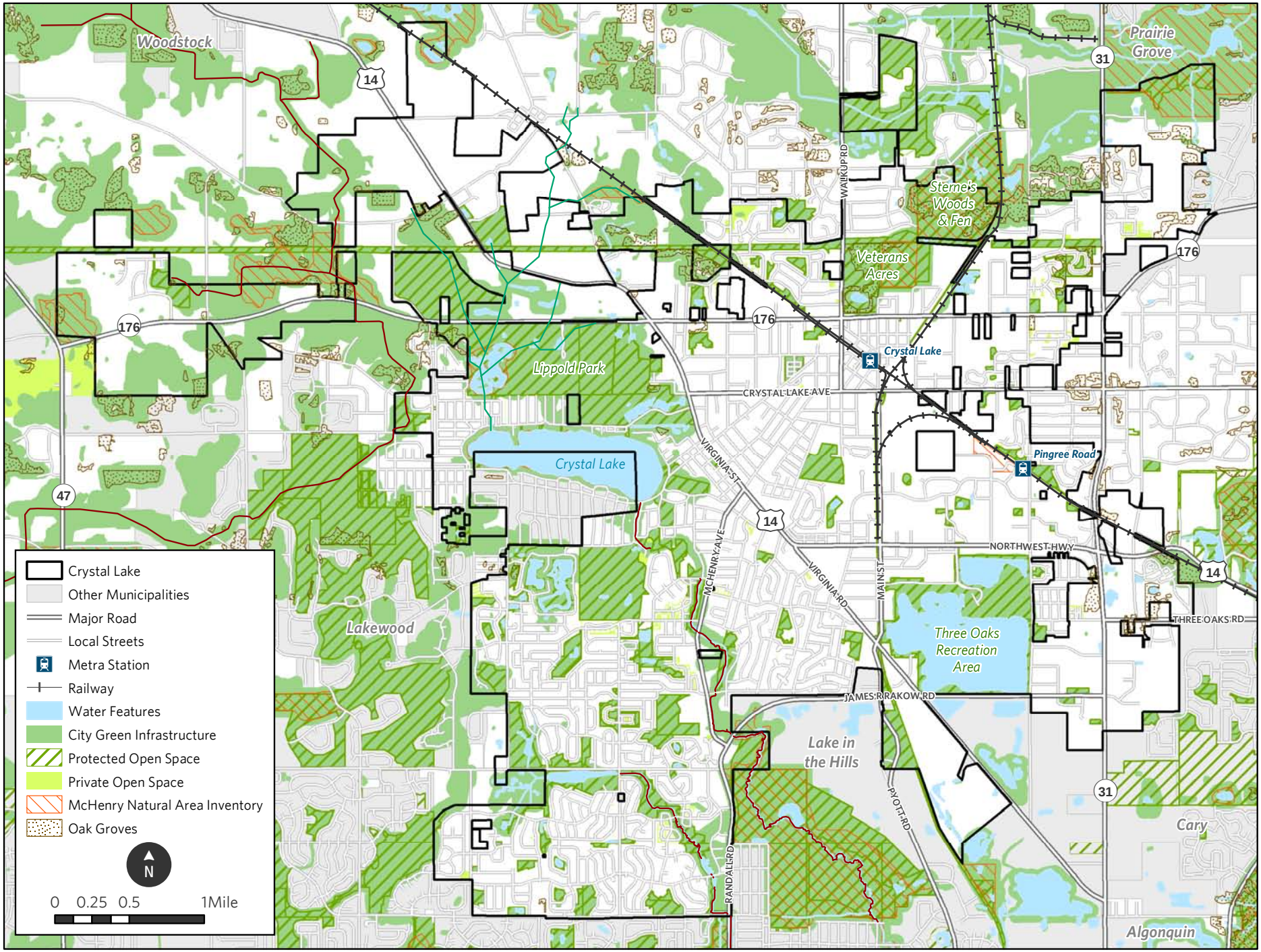
[4] Chicago Metropolitan Agency for Planning, "Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan," 2010. See www.cmap.illinois.gov/livability/water/supply-planning/water-2050.

Figure 2.2. Existing land uses in Crystal Lake, 2010.



Source: Chicago Metropolitan Agency for Planning, 2014

Figure 2.3. Green infrastructure in Crystal Lake.

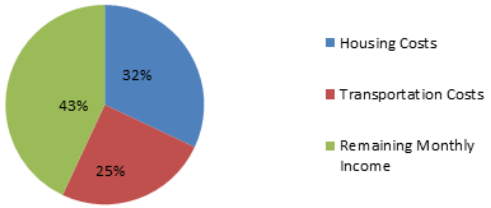


Source: Chicago Metropolitan Agency for Planning, 2016

Transportation Infrastructure

Crystal Lake households are spending a large portion of their incomes on transportation. On average, Crystal Lake households spend $1,580 on housing and $1,250 on transportation each month. Overall, a Crystal Lake household with the region's median income would spend 57 percent of their income on housing and transportation, (Figure 2.4). While the combined cost of housing and transportation in Crystal Lake is slightly lower than in other McHenry County communities, it is considerably higher than the regional average and is likely due to the higher automobile commuting rate of Crystal Lake residents and lower access to regional employment opportunities.[5]

Figure 2.4. Housing and Transportation Costs in Crystal Lake, as percentage of region's median income.



Source: CMAP calculations of Center for Neighborhood Technology's "H+T Affordability Index." The CNT H+T Index is based on the region's Area Median income of $60,289, while the median household income of Crystal Lake is $78,311.

Crystal Lake's network of arterials is heavily traveled. Traffic volumes have been relatively stable over the last eight years and Crystal Lake streets are performing relatively well, but increased traffic volumes and corresponding congestion is possible if existing travel behaviors continue.[6] Desires to have low traffic volumes on residential streets, as well as restrictions on intersection placement on arterials, have led to lower street connectivity.[7] This may be forcing short, local trips onto main thoroughfares and make it difficult to walk or bike to local destinations. Most of the City's main streets are owned by partner agencies – including McHenry County Division of Transportation (MCDOT), Illinois Department of Transportation (IDOT), and nearby townships (Figure 2.5). These arterials are how most people experience the City; influencing the design and character requires coordination with these partners. Most of the arterials in Crystal Lake are in good condition and the City conducts an annual evaluation of surface condition of all City maintained streets. The City is working systematically to resurface streets and now 74 percent are estimated to be in excellent or good condition as of 2016.[8]

Crystal Lake is served by Metra's Union Pacific Northwest Line and Pace bus routes (550, 806, 808) that provide connections to nearby communities as well as downtown Chicago. Pace bus service runs infrequently with low ridership, routes 806 and 808 together provide 20,500 trips per year along the entirety of both routes (including Harvard, Woodstock, Crystal Lake, McHenry, and Johnsburg.

[5] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 58: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

[6] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 72: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

[7] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 79: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

[8] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 66: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

[9] The American Public Transportation Association (APTA) has found that at least seven dwelling units per acre are required to support basic bus transit service. This is the residential density that Pace endorses as well, see Pace Transit Supportive Guidelines available at: http://pacebus.com/guidelines/06b_transit-supportive_land_use.asp.

Many factors contribute to low ridership including low residential densities along existing routes.[9] The MCRide Dial-a-Ride service is McHenry County's shared-ride, curb-to-curb service covering the communities of Crystal Lake, McHenry, and Woodstock. In 2016, over 28,000 total trips originated within the City of Crystal Lake – making it the most utilized transit service after Metra.

Metra service, on the other hand, is well utilized with room to accommodate additional riders. The City's two Metra stations, one downtown and another at Pingree Road, allow residents to travel relatively quickly across the region and serve as catalysts for economic development in the surrounding areas. While most people drive to the Metra stations, several other modes are used to get to the station, (Table 2.2). The parking lots serving the two stations are well utilized with space to accommodate more riders.

Crystal Lake currently has a large bicycle network. The off-street Prairie Trail provides the main north-south connection. While the current network has a large focus on providing bicycle facilities for recreation, the City has been adding on-street bicycle lanes, shared lanes, and posted routes in recent years to accommodate everyday trips.[10] Most neighborhood streets in Crystal Lake are fairly comfortable to bike along given low traffic volumes. However, in order to effectively use bicycling as a viable transportation option, bicyclists will likely have to cross or use some of the larger, busier collectors or arterials. While this may be fine for some of the "strong and fearless" cyclists, these conditions may keep the majority of residents who would like to try bicycling (the "interested but concerned") off the street.[11]

The City's sidewalk network is extensive with many streets having sidewalks on one or both sides of the street. However, there are several areas that lack sidewalks, largely due to the nearby development patterns (Figure 2.6). Gaps in the sidewalk network are most prevalent along IL 176 and the Northwest Highway. In addition, signalized intersections without crosswalks are present throughout the community. The City has been installing pedestrian beacons as well as upgrading signals in recent years. Safety remains a concern. Automobile crashes are higher along the main arterials, which may indicate access management issues. Automobile crashes involving bicyclists or pedestrians occur throughout the community but are concentrated along Virginia Street and the Downtown District, which are generally more conducive to these travel modes.[12]

Table 2.2. Metra Weekday Boardings (2016) and Mode of Access (2014) in Crystal Lake

STATION	WEEKDAY BOARDINGS	WALKED	DROVE ALONE	DROPPED OFF	CAR-POOL	BUS	BIKE	OTHER
Crystal Lake	1,199	10.2%	58.9%	19.4%	8.1%	1.3%	1.8%	0.3%
Pingree Road	751	3.8%	79.8%	11.8%	3.5%	0%	0.8%	0.5%

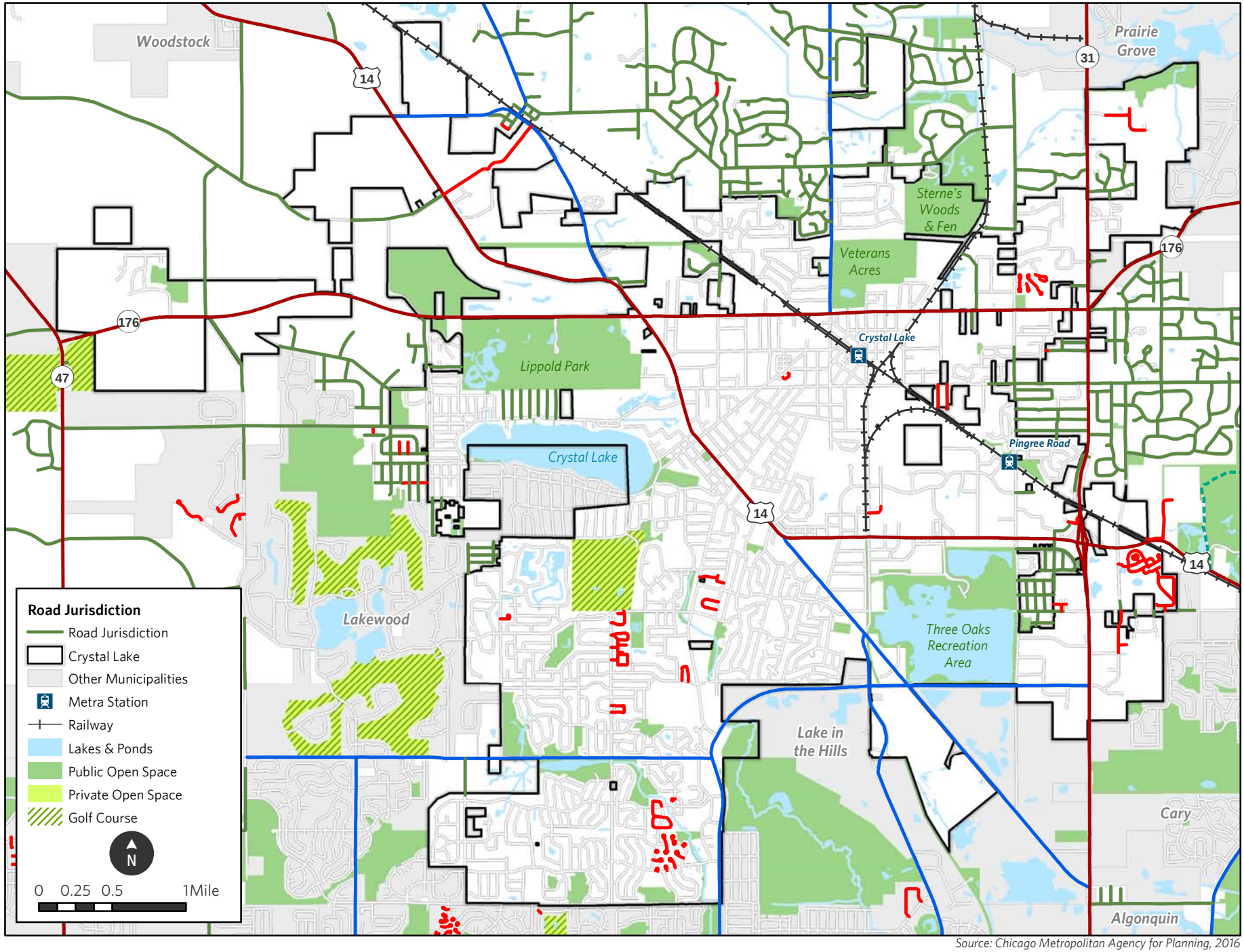
Source: Metra 2016 Station Boarding/Alighting Counts; Metra 2014 Origin-Destination Survey.

[10] Crystal Lake Transportation Plan Appendix A: Existing Condition, page 89: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

[11] Geller, Roger. Four Types of Cyclists. Available at: https://www.portlandoregon.gov/transportation/44597?a=237507.

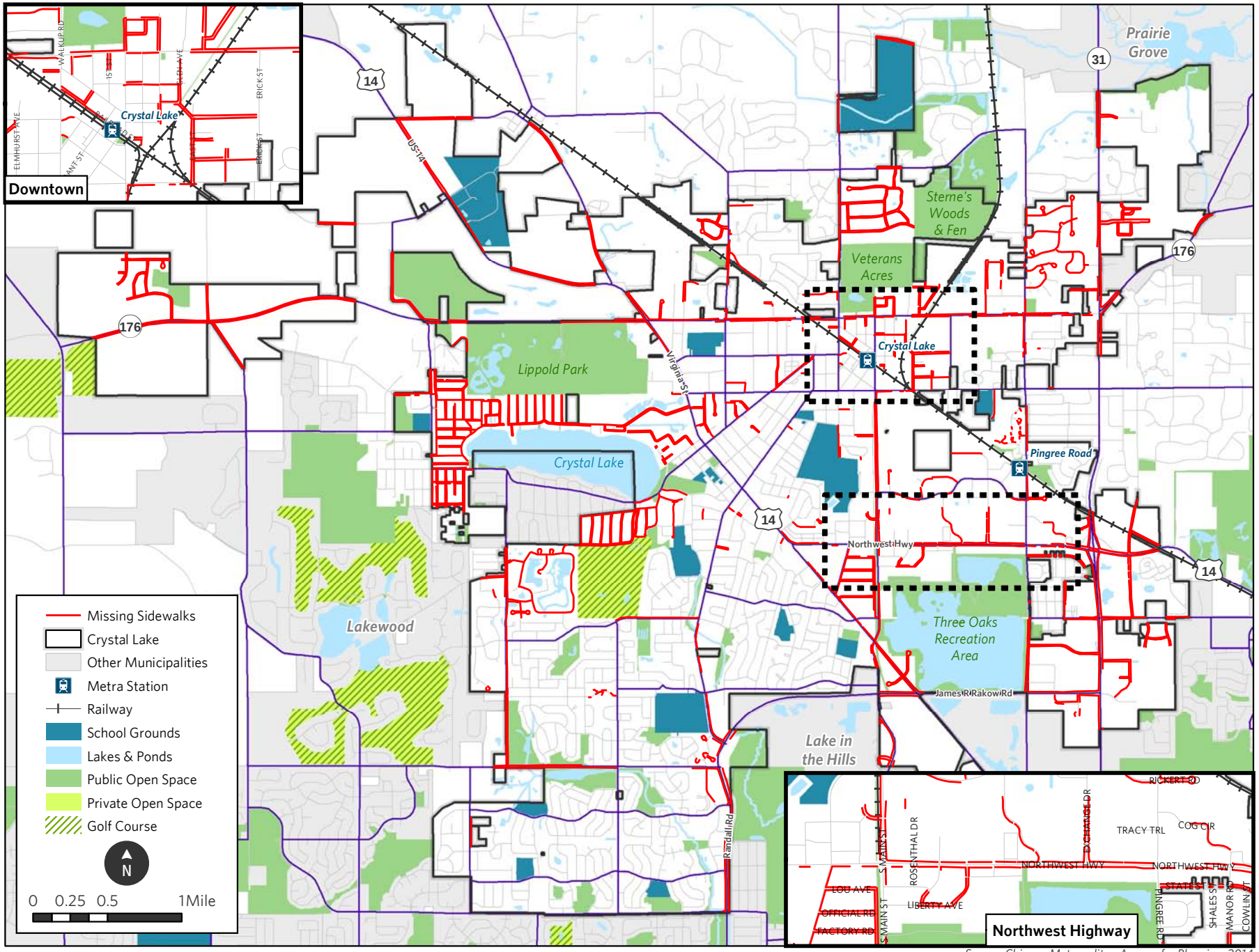
[12] Crystal Lake Transportation Plan Appendix A: Existing Condition, Figure X on page X: www.cmap.illinois.gov/programs-and-resources/lta/crystal-lake.

Figure 2.5. Street jurisdiction.



Source: Chicago Metropolitan Agency for Planning, 2016

Figure 2.6. Missing sidewalks in Crystal Lake, 2016.



Source: Chicago Metropolitan Agency for Planning, 2014

Development Standards

The design of new construction and streets is governed by standards outlined in the City's Unified Development Ordinance (UDO) (Table 2.3). A UDO is a local policy instrument that combines traditional zoning and subdivision regulations, along with other desired city regulations, such as design guidelines, sign regulations, and parking standards, into one document. While Crystal Lake is a largely developed community, the Northwest Sub-Area identified in the City's 2030 Comprehensive Plan for conservation design, is the last large area where new streets could be constructed. In addition, the City's UDO calls for narrower streets and other stormwater best management practices that have the potential to decrease the impact of development on natural resources in this area.

Resurfaced and reconstructed streets as well as infill development represent the largest opportunity to advance the goals outlined in the Transportation Plan. While the existing residential neighborhoods are largely separated from commercial businesses, both the City's Future Land Use Plan and current zoning district map encourage mixed uses in specific areas of the community. This designation is particularly important south of Downtown, in the Northwest Sub-Area, and the Crystal Court Shopping Center as these represent large development and redevelopment sites in the community and could bring residents within closer proximity to destinations.

The UDO establishes street types, which are mapped and illustrated in cross-section diagrams outlining the dimensions of different amenities within the right-of-way (Table 2.3). The existing standards could be further tailored to better accommodate the demands on a street and complement the surrounding land uses. For example, streets accessing residential areas are largely designed the same as those servicing industrial areas. Distinguishing between these two contexts may help improve the pedestrian-friendliness of neighborhood streets and remove barriers to large truck movements for industrial areas. In addition, current combinations of street dimensions with zoning district setbacks and height restrictions limit the sense of enclosure that creates a pedestrian-friendly environment.

Similarly, existing standards pertaining to intersections, driveways, and building design may be limiting the pedestrian- and bicycle-friendliness of new streets and buildings. Wide intersections and lengthy crosswalks, frequent driveways, and buildings designed to face parking lots can make walking or bicycling an unappealing proposition. In addition, bicycle facility design has been rapidly evolving and the City's standards could be updated to accommodate users who are part of the "interested but concerned" subset of the population.

Table 2.3. Existing Thoroughfare Classification and Street Standards

STREET TYPE	RIGHT-OF-WAY WIDTH	CURB-TO-CURB WIDTH	MEDIAN / TURN LANE	NUMBER OF TRAVEL LANES	TRAVEL LANE WIDTH	ON-STREET PARKING	DRIVEWAY ACCESS
Major Arterial	120 – 170 ft.	-	Yes	4	-	No	-
Minor Arterial	100 - 120 ft.	-	Yes	2 - 4	-	No	-
Major Collector	80 ft.	39 - 43 ft.	Allowed if off-street bicycle facility is provided, 12 ft.	2	12 - 18 ft.	8 ft.	Direct residential driveway access generally not permitted
Minor Collector	70 ft.	33 - 41 ft.	Allowed if off-street bicycle facility is provided, 12 ft.	2	11 - 17 ft.	8 ft.	allowed
Local Street	60 ft.	28 ft.	No	2	12.5 ft.	Yes	allowed*
Alley	50 ft.	-	N/A	N/A	N/A	N/A	-

* Implied but not directly specified.

Source: UDO Article 4: Development and Design Standards, Section 4-100 Street Standards and Appendix Section A-500.

Chapter 3 TRANSPORTATION NETWORK

This chapter presents improvements to Crystal Lake's transportation network to create a more interconnected and robust system for all transportation modes – bicycle, pedestrian, transit, and vehicle. Improvements were identified based upon public input received during the planning process, recommendations developed by transportation planners at Gewalt Hamilton Associates, Inc.,[13] priorities identified by City staff, future land use considerations, opportunities to leverage planned investments, and field reconnaissance.

The public outreach process provided opportunities for community input through two public meetings and an interactive online tool, see Appendix A for more details. Participants identified improvement areas for each transportation mode which were subsequently reviewed and synthesized by CMAP to highlight network issues that impact multiple users. To clearly illustrate their location and extent, improvements were mapped by mode and include planning-level recommendations. Each improvement area will require more detailed analysis to determine the most appropriate design based upon such factors as adjacent land uses, traffic volumes, traffic speeds, and width of right-of-way. For descriptions of possible improvement types, refer to Chapter 4.

The timeframe to implement these network improvements will vary based on a variety of factors, including street jurisdiction, project complexity, nearby development, and funding. There are several projects that could be undertaken in the short term that tend to require less coordination, on-going maintenance, or external funding. Examples of short-term improvements include the installation of high-visibility crosswalks, rectangular rapid flash beacons (RRFB), or bike route signage. Over the long-term, improvements should be designed to include complementary bicycle, pedestrian, and/or transit design solutions. Long-term improvements may depend on future land development, require regular maintenance, or be tied to the availability of external funding. Examples of long-term improvements include shared use path installation or significant intersection improvements.

Transportation Network Goals

Existing components of Crystal Lake's transportation network should be improved in order to better accommodate the different users of the system.

1. **Improve traffic flow along major thoroughfares.**
2. **Enhance sidewalk network.**
3. **Expand bicycle network.**
4. **Make public transportation an interconnected part of the transportation network.**

[13] As part of this plan, Gewalt Hamilton Associates was contracted to evaluate the existing street network for congestion mitigation opportunities and to evaluate the proposed street connectivity in the Northwest sub-area for congestion relief and new network opportunities.

3.1 Pedestrian and Transit Improvements

Priority improvements to the pedestrian and transit network focus on creating a safe and convenient system which connects residents with key community destinations, such as schools, shopping, employment, public transit, parks, and community services. Most improvements are located along arterial and collector streets since they provide pedestrians with the most direct route to destinations and can often act as barriers if they are difficult to cross or unpleasant to walk along. Pedestrian improvements can help provide access to existing Pace bus routes as well as for the future route proposed along IL 31 that will terminate in Downtown Crystal Lake.

Proposed projects will complete gaps in the sidewalk network, improve intersections to reduce conflict between pedestrians and vehicles, and expand the City's network of off-street pedestrian and bicycle facilities (Figure 3.1). Each improvement is identified on the map with a numbering system (P1, P2, etc.) Improvements can be designed to accommodate multiple modes of transportation; each description identifies the primary modes to consider when improving these locations (P for pedestrian, B for bicyclist, T for transit rider, and V for vehicle driver).

Several improvement areas provide opportunities for the City to continue to coordinate with Pace to include adequate facilities for transit riders at key destinations. See Chapter 4 Sections 4.2 and 4.3 for more information on potential improvement types.

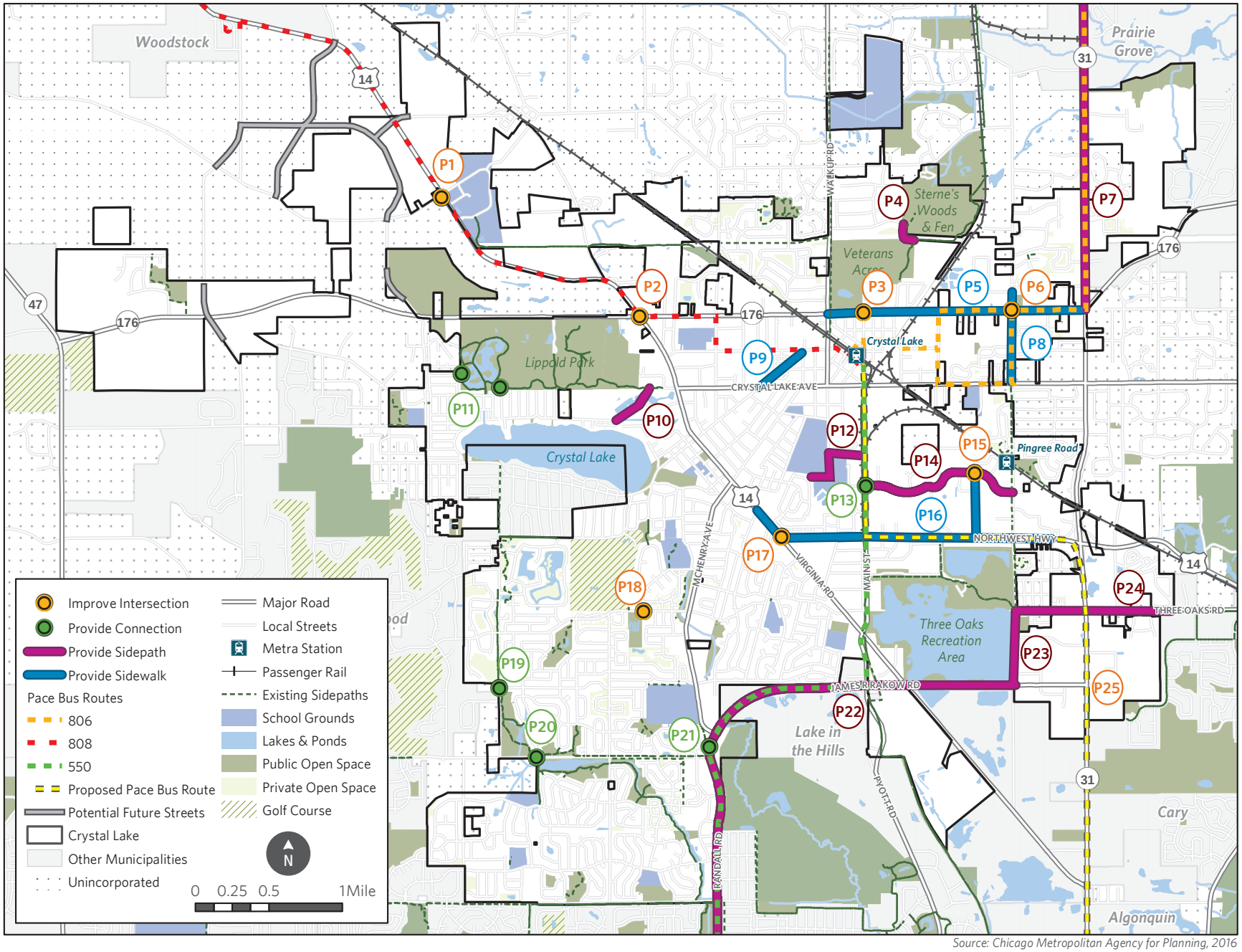
P1. Improve intersection of US 14 and Tartan Drive/Lucas Road for pedestrians. This intersection should be designed to accommodate pedestrians on all approaches in conjunction with future developmnt given the proximity of McHenry County College, existing Pace bus route 808, and the Ridgefield Trace shared use path. A crosswalk to accommodate both pedestrians and bicyclists was installed on the northeast side of the intersection as part of IDOT's roadway improvement project and shared use path on US 14. [P,B,T]

P2. Improve pedestrian facilities at US 14 and IL 176 intersection. Install crosswalks and sidewalks, where needed, to provide access to nearby commercial businesses and Pace bus route 808. Coordinate improvements with the US 14 signal optimization project and potential development on the southwest and northwest side of the intersection (recommendation V7). [P,T]

P3. Improve intersection of IL 176 and Main Street to enhance vehicular and pedestrian circulation. Install traffic signal and pedestrian facilities. Project is currently in the Phase I design stage. [P,V]

P4. Complete shared use path from Burning Bush Trail to Sterne's Woods and Fen trails, to the east, and Ridgefield Trace trail, to the west. Improvement is part of the Prairie Trail reroute project which is programmed and anticipating completion in 2017. [P,B]

Figure 3.1. Pedestrian and transit improvements.



Source: Chicago Metropolitan Agency for Planning, 2016

P5. Continue to assess the pedestrian network on IL 176, between Walkup Road and IL 31, to determine the feasibility of installing sidewalks where gaps exist. Coordinate pedestrian improvements with recommendation P3 and P6, Pace and IDOT to incorporate transit stops into sidewalk improvements between Erick Street and IL 31, and with potential bicycle facilities connecting IL 31 and the Prairie Trail. [P,T,V]

P6. Incorporate pedestrian improvements, such as high-visibility crosswalks and pedestrian signal heads, into future intersection improvement at IL 176 and Terra Cotta Road. Coordinate facility improvements with future development opportunities, planned bicycle lanes nearby, and work with Pace to address transit needs. This is a long-term project that is dependent on future development. [P,B,T,V]

P7. Support IDOT and MCDOT-led shared use path on IL 31 as identified in the McHenry County 2040 Long Range Transportation Plan. Identify opportunities to connect this shared use path with the existing Prairie Trail. [P,B]

P8. Address sidewalk gaps for pedestrians on Terra Cotta/Pingree Road, from just north of IL 176 to Crystal Lake Avenue, to improve connectivity to the Pingree Road Metra station and Pace Route 806. [P,T]

P9. Increase walkability in and around the Downtown District. Complete sidewalk gaps on Woodstock Avenue, east of Walkup Avenue, and on Dole Avenue from Woodstock Street to Crystal Lake Avenue. The City should also investigate the feasibility of completing the sidewalk network in the neighborhood north of downtown in a manner that minimizes impacts to the street tree canopy. [P]

P10. Utilize existing right of way to connect North Shore Drive with Lippold Park shared use path. Restripe or expand the shoulder on North Shore Drive to provide pedestrian access and improve the trailhead connection at Crystal Lake Avenue with signage. Design should also accommodate bicycles (recommendation B8). This is a long-term project. [P,B]

P11. Provide more formal pedestrian connections to Lippold Park from the west and the south. Informal gravel path connections exist on Clover Drive between Cottonwood Lane and Teakwood Lane, and at the terminus of Edgewood, Sunnyside, Lakewood, and East End Avenues. It is recommended that at least one of these connections be ADA accessible, particularly at Edgewood Avenue, to complete a route around the lake. Design should also accommodate bicycles (recommendation B6). [P,B]

P12. Increase pedestrian connectivity between Walkup Avenue, Teckler Boulevard, and Mary Lane Court. Work with Central High School and Immanuel Lutheran church to extend a shared use path through the properties. Coordinate with future land development between Pathway Court and the Prairie Trail to make an east-west connection. [P,B]

P13. Connect Congress Parkway and Teckler Boulevard at Main Street to enhance connectivity between Crystal Lake shopping center, the Prairie Trail, and Pingree Metra station. This new connection should accommodate all modes and is discussed in recommendations V8 and B14. Coordinate with the MCCD and the Union Pacific Railroad to create a safe railroad crossing at this location which would remove the conflict point between Prairie Trail users and vehicles using the back entrance of the shopping center by rerouting vehicles on Teckler Boulevard. If crossing the railroad is unfeasible, extend the sidewalk on the east side of Main Street south to Northwest Highway and improve the visibility of the Prairie Trail crossing at the shopping center back entrance. Coordinate intersection improvements with the Congress Parkway shared use path (recommendation P14). [P,B,T,V]

P14. Widen sidewalk to create a shared use path on the north side of Congress Parkway to improve access to Pingree Metra station, medical facilities, and other destinations. The shared use path should be coordinated with bicycle improvements and designed to provide adequate visibility where it intersects with curb cuts (recommendation B13). Coordinate development to minimize the creation of additional curb cuts through the use of shared driveways. [P,B]

P15. Improve intersection of Congress Parkway and Exchange Drive by installing high-visibility crosswalks to improve access to commercial uses and Pingree Road Metra Station. Complete sidewalk gaps on Exchange Drive and coordinate with sidewalk improvements on Northwest Highway (recommendation P16). [P]

P16. Address sidewalk gaps and provide more frequent crossings along US 14, from Keith Avenue to Cog Circle, to increase pedestrian access to commercial destinations and Three Oaks Recreation Area. Crosswalks exist at Teckler Boulevard and Pingree Road, but should be improved for visibility. Coordinate with Pace and IDOT to incorporate transit stops into sidewalk improvements at key destinations between Main Street and IL 31 in coordination with the proposed future transit route (recommendation P25). [P,T,V]

P17. Improve intersection of US 14 and Virginia Road by providing safe crossings for pedestrians. Coordinate improvements with sidewalk improvements (recommendation P16) and future signal equipment upgrade (recommendation V7). [P,V]

P18. Upgrade crosswalk at Barlina Road and St. Andrews Lane to improve connection to nearby institutions and other destinations. Coordinate with recommendation B15 to improve connection in bicycle lane. [P,B]

P19. Continue to work with McHenry County and Crystal Lake Park District to complete the gap on the Huntley Road trail at Waterford Cut and provide a high-visibility crossing. Coordinate with bicycle improvements proposed for this crossing (recommendation B17) [P,B]

P20. Continue to work with MCDOT to improve the trail crossing at Ackman Road and Willow's Edge subdivision by installing a rectangular rapid flash beacon. Coordinate with bicycle improvements proposed for this crossing (recommendation B18) [P,B]

P21. Work with MCDOT to improve the pedestrian crossings across Randall Road between McHenry Avenue and Ackman Road, due to the existing long crossing distance and connection to potential shared use path on Randall and Rakow Roads (recommendation P22). Potential strategies could include at-grade crossings with pedestrian safety islands to reduce pedestrian exposure to multiple travel lanes or a grade-separated crossing. Coordinate with Pace and MCDOT to incorporate transit improvements to improve access to Pace bus route 550. [P,B,T]

P22. Support the MCDOT-led effort to construct a shared use path using the existing land along the east side of Randall Road and the south side of Rakow Road. Coordinate the construction of the shared use path with future land development at Rakow Road and Virginia Road and improve pedestrian circulation at the intersection of McHenry Avenue, Ackman Road, and Miller Road. Coordinate with Pace and MCDOT to incorporate transit improvements for Pace bus route 550 at Miller Road and the potential McHenry/Ackman grade-separated crossing (recommendation P27). [P,B,T]

P23. Utilize existing land to create a shared use path on the west side of Pingree Road from Three Oaks Road to Rakow Road. Coordinate with the Rakow Road and Three Oaks Road shared use paths to provide a continuous pedestrian route (recommendations P22 and P24). [P,B]

P24. Improve pedestrian access on Three Oaks Road. In coordination with Algonquin Township, address sidewalk gaps on the north side between Pingree Road and Manor Road and extend a shared use path on the south side from Pingree Road to just east of Monticello Way. These improvements will increase access to Three Oaks Recreation Area, Sage YMCA, future development east of IL 31, and the proposed Pace bus route on IL 31 (recommendation P25). [P,B,T]

P25. Support proposed Pace bus route. Coordinate with Pace and IDOT to incorporate transit improvements for a future bus route, as identified in the McHenry County 2040 Long Range Transportation Plan. Work with these partners to ensure route provides residents with easier access to the service and serves important community destinations [P,T]

3.2 Bicycle Improvements

Priority improvements to the bicycle network are informed by the draft Bicycle Master Plan, Bike to Metra Guide, and public input, and aim to create a safe and interconnected system of bicycle facilities that link to the regional greenway system, as well as connect bicyclists in the community to local shopping, institutions, recreation, transit, other neighborhoods, and neighboring communities. Proposed improvements will complete critical gaps in the existing bicycle network, improve intersections to reduce conflict between bicyclists and vehicles, create a network of north-south and east-west bikeways, and guide the expansion of the network in the northwest sub-area. Wayfinding signage should complement proposed improvements to familiarize users with the bicycle network, identify preferred routes to destinations, and indicate to motorists when they are driving along a bicycle route and should use caution.

Figure 3.2 provides an overall vision of the future bicycle network and specifically calls out key north-south and east-west corridors to build a robust system of bicycle routes. Figure 3.3 identifies priority improvements to create this larger network. Bikeways can be classified as either off-street, on-street, or marked route. Off-street sidepaths are recommended to improve cross-town bicycle circulation along well-traveled arterial and collector streets and to provide connections to adjoining bicycle facilities. On-street facilities or marked routes are recommended along key collector streets that provide connectivity between residential neighborhoods, serve as alternate routes, and direct bicyclists to safe intersections.

Each improvement is identified on the map with a numbering system (B1, B2, etc), which then links back to a description. Further study will be required to determine the final design of the bikeway and intersection improvements. Bicycle routes identified for the northwest sub-area will be implemented as part of future development agreements. For more information on potential improvement types, see Chapter 4 Sections 4.2 and 4.3.

B1. Create a bicycle connection between Crystal Lake, Lippold Park, McHenry County College and Ridgefield Trace trail via Lucas Road and Briarwood Road. Further study is required to determine the exact location of this new bicycle route. Coordinate with intersection improvement and potential development in the northwest sub-area (recommendation B2). [B]

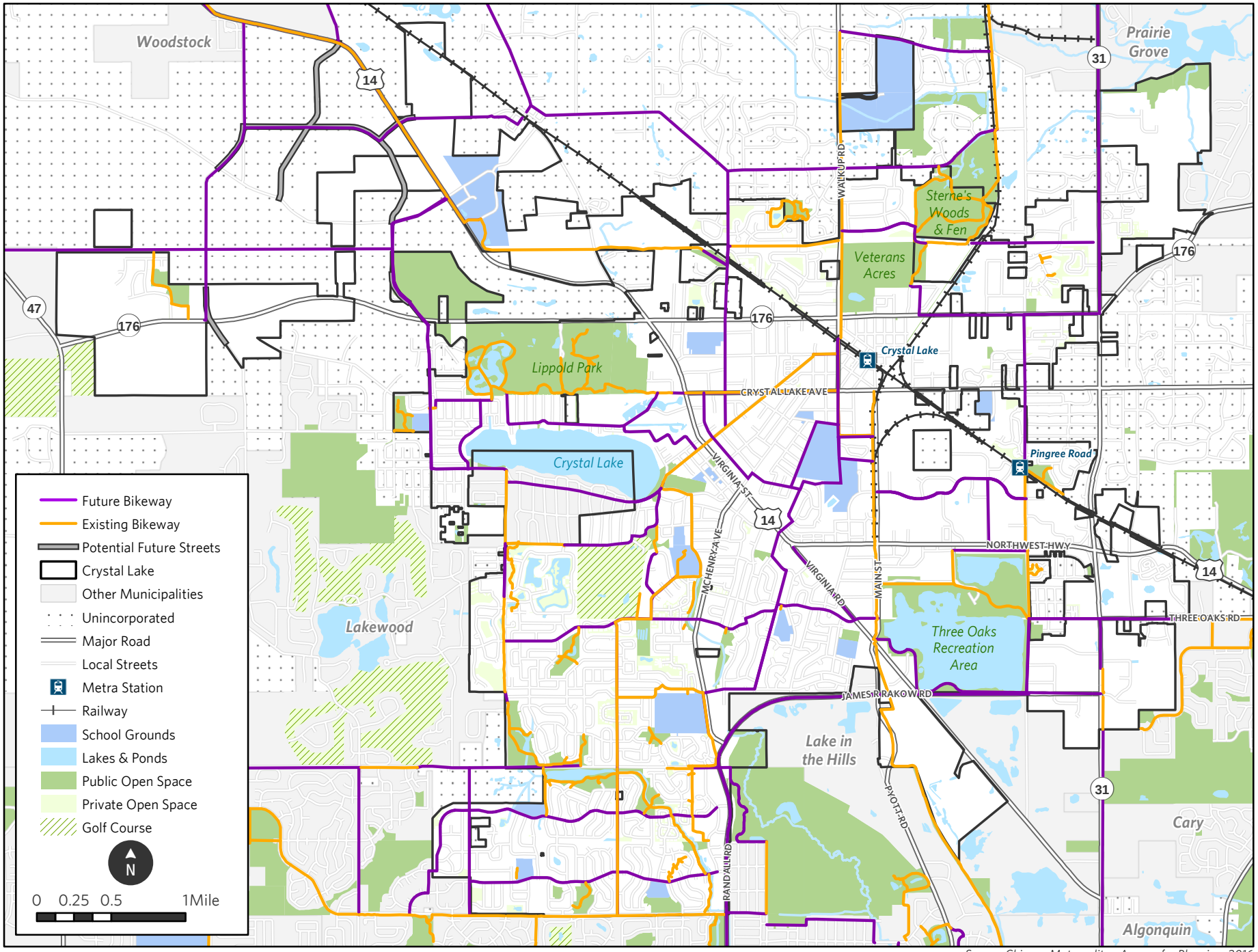
B2. Improve intersection of US 14 and Tartan Drive/Lucas Road to accommodate bicyclists crossing the road to access Ridgefield Trace trail. A crosswalk to accommodate both pedestrians and bicyclists was installed on the northeast side of the intersection as part of IDOT's roadway improvement project and shared use path on US 14. [P,B]

B3. Complete on-street bicycle facility and shared use path from Burning Bush Trail to Sterne's Woods and Fen trails, to the east, and Ridgefield Trace trail, to the west. Improvement is part of the Prairie Trail reroute project which is programmed and anticipating completion in 2017. [P,B]

B4. Support IDOT and MCDOT-led shared use path on IL 31 as identified in the McHenry County 2040 Long Range Transportation Plan. If completed, identify opportunities to connect this shared use path with the existing Prairie Trail. [P,B]

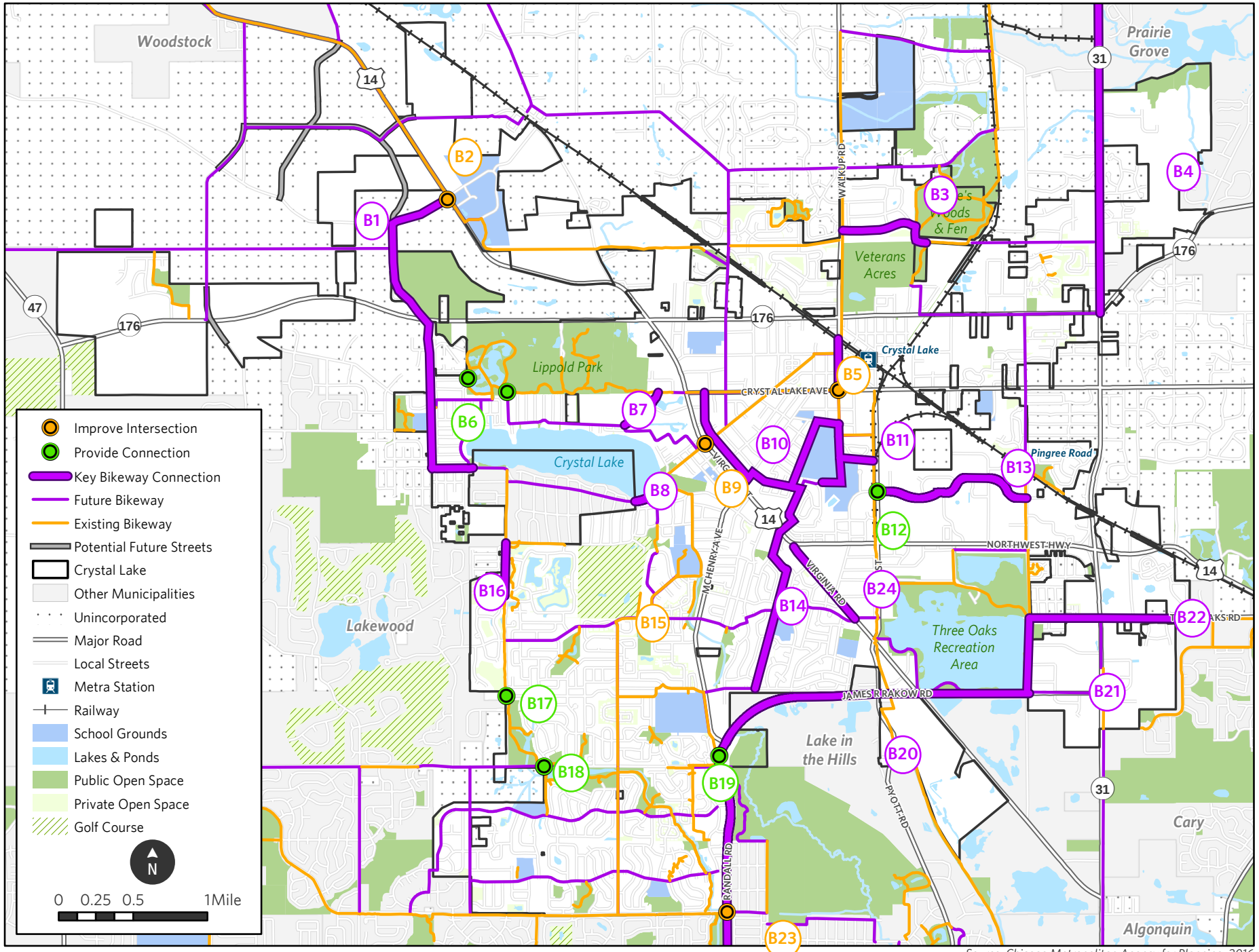
B5. Coordinate with intersection improvement at Walkup Avenue, Crystal Lake Avenue, and Grant Street to improve access to the Downtown District via Grant Street. In the future, consider extending shared use path south to Crystal Lake Avenue to provide a separated bicycle facility given the higher traffic volumes on Walkup Road. [P,B,V]

Figure 3.2. Future bicycle network.



Source: Chicago Metropolitan Agency for Planning, 2016

Figure 3.3. Bicycle network improvements.



Source: Chicago Metropolitan Agency for Planning, 2016

B6. Provide a formal bicycle connection to Lippold Park at Edgewood Avenue to connect park shared use paths with the planned bikeway and enhance connectivity around Crystal Lake. [P,B]

B7. Utilize an existing shelf to connect North Shore Drive with Lippold Park shared use path. Restripe or expand the shoulder on North Shore Drive to provide bicycle access and improve the trailhead connection at Crystal Lake Avenue with signage and marked shared lanes, or sharrows. This is a long-term project that should be coordinated with the planned bikeway on North Shore Drive. [P,B]

B8. Complete future bicycle gap on Lake Avenue and North Avenue. Lakewood will be adding bike lanes along Lake Avenue and North Avenue, within its jurisdiction. Once the Lakewood portion is complete, extend bike lanes through the City between Briarwood Road and Edgewater Drive and from just west of Riverside Drive to Main Beach to improve access to and connectivity around Crystal Lake. [B]

B9. Widen Dole Avenue on either side of the US 14 intersection to allow for bike lanes to be extended through on Dole Avenue. Coordinate with IDOT to determine the feasibility of incorporating other features, such as bike boxes, within the intersection to increase bicyclist safety. [B,V]

B10. Create an alternate bikeway parallel to the Virginia Street Corridor via Oriole Trail. This street is identified as a preferred on-road bike route in the Bike to Metra Guide and would connect Crystal Lake Avenue, Dole Avenue, and the alternate bikeway to the east of McHenry Avenue (recommendation B14). Improve the unsignalized intersection at McHenry Avenue to ensure bicyclists can safely cross the street. [B]

B11. Increase bicycle connectivity between Walkup Avenue, Teckler Boulevard, and Mary Lane Court. Work with Central High School and Immanuel Lutheran to extend a path through the properties. Coordinate with future land development between Pathway Court and the Prairie Trail to make an east-west connection. [P,B]

B12. Connect Congress Parkway and Teckler Boulevard at Main Street to provide access between Crystal Lake shopping center, the Prairie Trail, and Pingree Metra station. Project would remove conflict point between Prairie Trail users and vehicles using the back entrance of the shopping center by rerouting vehicles on Teckler Boulevard. Coordinate intersection improvements with improvements along Congress Parkway (recommendation B13). If crossing the railroad is unfeasible, improve the visibility of the Prairie Trail crossing at the shopping center back entrance. [P,B,T,V]

B13. Widen sidewalk to create a shared use path on the north side of Congress Parkway to create an alternate east-west bikeway that parallels Northwest Highway and connects to the Prairie Trail and Pingree Metra station. Design the shared use path to be highly visible where it intersects with driveway curb cuts. [P,B]

B14. Provide a north-south alternate bikeway to the east of McHenry Avenue via Wallace Avenue, Union Street, Keith Avenue, Devonshire Lane, Lincolnshire Drive, and Nottingham Lane, from north to south. Improve intersection at US 14 and Devonshire Lane/Keith Avenue for bicyclists and coordinate improvements with signal optimization project (V7). Possibly include sharrows through the intersection and provide other features, such as bike boxes, to increase bicyclist safety. [B]

B15. Improve bicycle route connection in coordination with upgrades at the crosswalk at Barlina Road and St. Andrews Lane (recommendation P18). [P,B]

B16. Complete bicycle gap on Huntley Road between Chicago Avenue and Boneset Drive. Install bike lanes from Chicago Avenue to Bard Road to connect with Lakewood bike lanes to the north. Extend the existing side path on the west side of Huntley Road from Boneset Drive to Bard Road in conjunction with future development and provide a smooth transition between the off-street shared use path and the on-street bike lanes. [B]

B17. Continue to work with MCDOT and Crystal Lake Park District to complete the gap on Huntley Road trail at Waterford Cut and provide a high-visibility crossing. [P,B]

B18. Continue to work with MCDOT to improve the trail crossing at Ackman Road and Willow's Edge subdivision by installing a rectangular rapid flash beacon. [P,B]

B19. Work with MCDOT to assess the feasibility of improving the crossings along Randall Road between McHenry Avenue and Ackman Road, given the long crossing distance and connection to future shared use paths. Coordinate with Pace and MCDOT to incorporate transit improvements. [P,B,T]

B20. Support the MCDOT-led effort to construct a shared use path using the existing right-of-way along the east side of Randall Road and the south side of Rakow Road. Coordinate the construction of the shared use path with future land development opportunities at Rakow Road and Virginia Road and provide bicycle connections at the intersection of McHenry Avenue, Ackman Road, Miller Road, and the Prairie Trail. This side path would provide an east-west route on the south side of Crystal Lake and connect southwest neighborhoods to the Prairie Trail, Three Oaks Recreation Area, and other destinations. [P,B,T]

B21. Utilize existing shelf to create a shared use path on the west side of Pingree Road from Three Oaks Road to Rakow Road. Coordinate with the Rakow Road and Three Oaks Road shared use paths to provide a continuous regional bicycle route (recommendations B20 and B22). [P,B]

B22. Coordinate with Algonquin Township to provide a shared use path between Three Oaks Recreation Area and Cary via Three Oaks Road. Connect to an existing shared use path along the south side of the street just east of Monticello Way. [P,B]

B23. Work with the MCDOT to improve signalized intersection at Miller Road to enhance bicycle using the Randall Road shared use path. Potential strategies include additional crosswalks and pedestrian signals (recommendation B20). [P,B]

B24. Work with MCDOT to provide an on-street bicycle facility on Virginia Road between US 14 and Main Street. A bicycle connection along this street would connect neighborhoods to the Prairie Trail and the Three Oaks Recreation Area. [B]

3.3 Vehicle Improvements

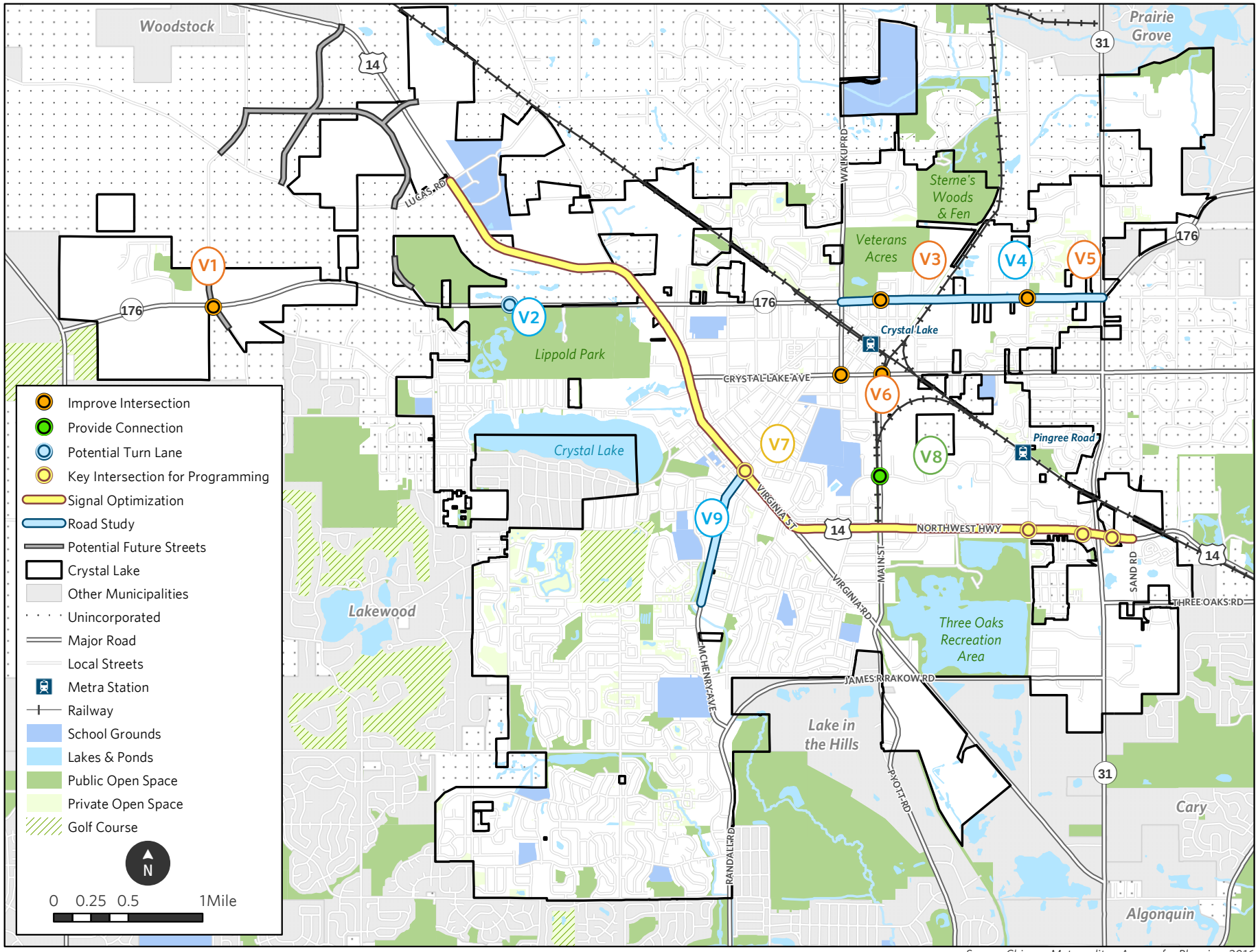
Priority improvements to the vehicle network focus on creating an efficient and integrated system that improves traffic flow along major thoroughfares, balances competing transportation modes, and decreases environmental impact. Proposed improvements will enhance traffic signals along major corridors, provide better access management, and improve intersections to facilitate multi-modal circulation (Figure 3.4). The improvements are primarily located along major and minor arterials including US 14, IL 176, Crystal Lake Avenue, Main Street, and McHenry Avenue. For more information on potential improvement types for these locations as well as for local streets, see Chapter 4 Sections 4.1 through 4.3.

V1. Realign Haligus Road and Mt. Thabor Road intersections with IL 176 to join at one intersection. The project will increase safety and create a more continuous roadway network. This IDOT project is included in the Transportation Improvement Program (TIP) with completion estimated in 2019.

V2. Coordinate with IDOT to provide a turn lane at the west entrance to Lippold Park on IL 176 to ease congestion when visitors are arriving for or departing from games and other park activities.

V3. Improve intersection of IL 176 and Main Street to enhance vehicular and pedestrian circulation. Install traffic signal and pedestrian facilities. Project is currently in the Phase I design stage. [P,V]

Figure 3.4. Vehicle network improvements.



Source: Chicago Metropolitan Agency for Planning, 2016

V4. Coordinate with IDOT to develop an access management plan on IL 176 from Erick Street to IL 31. . Opportunities may include connecting Mistwood Lane and Reiland Drive or extending Knaack Boulevard south of IL 176. [P,B,T,V]

V5. Incorporate compact design standards into future intersection improvement at IL 176 and Terra Cotta Road to balance multiple transportation modes. Coordinate intersection improvements with pedestrian amenities and work with Pace to address transit needs for Route 806. [P,T,V]

V6. Provide traffic calming at key intersections along Crystal Lake Avenue on the south edge of downtown, including at Main Street and at the five-point intersection at Walkup Avenue and Grant Street (B9). Study these intersections to determine measures to improve circulation for all transportation modes. Upgrading the Main Street intersection is a planned City project. [P,B,T,V]

V7. Coordinate with IDOT to optimize traffic signals along US 14 from Lucas Road to Sands Road. A full optimization of the corridor could increase the cycle length and adjust the portion of time allocated to each phase at an intersection for current traffic. These changes could improve the flow of traffic through the corridor and reduce side street back-ups. The cycle should be consistent with posted speeds to discourage speeding through the corridor. There are several key intersections where programming can alleviate congestion and reduce vehicle speed.

a. The northbound left turn lane and southbound movement at the intersection with McHenry Avenue experiences backups. Programming can also create planned stops along the corridor to slow vehicles down through the Virginia Street corridor.

b. Programming at Dole Avenue can create a planned stop at the edge of the Virginia Street corridor.

c. The northbound left turn lane at the intersection with Pingree Road experiences backups.

d. The eastbound left turn queue from US 14 onto IL IL 31 ramps experiences backups from the east ramp through the signal at the west ramp.

V8. Connect Congress Parkway and Teckler Boulevard at Main Street to reduce vehicle congestion on Main Street and Northwest Highway and create an alternate east-west route between Crystal Lake Shopping Center and Pingree Road Metra station. Coordinate intersection improvements with pedestrian and bicycle improvements along Congress Parkway (recommendations P13, P14, P15, and B13). [P,B,T,V]

V9. Develop a roadway plan to address vehicle circulation on McHenry Avenue from Virginia Street to Barlina Road and Buckingham Drive. Study intersections at Buckingham Drive, Monterey Drive, Lake Street, and Nash Road to determine appropriate traffic calming measures to assist with making left turns and reducing traffic speed. [V]

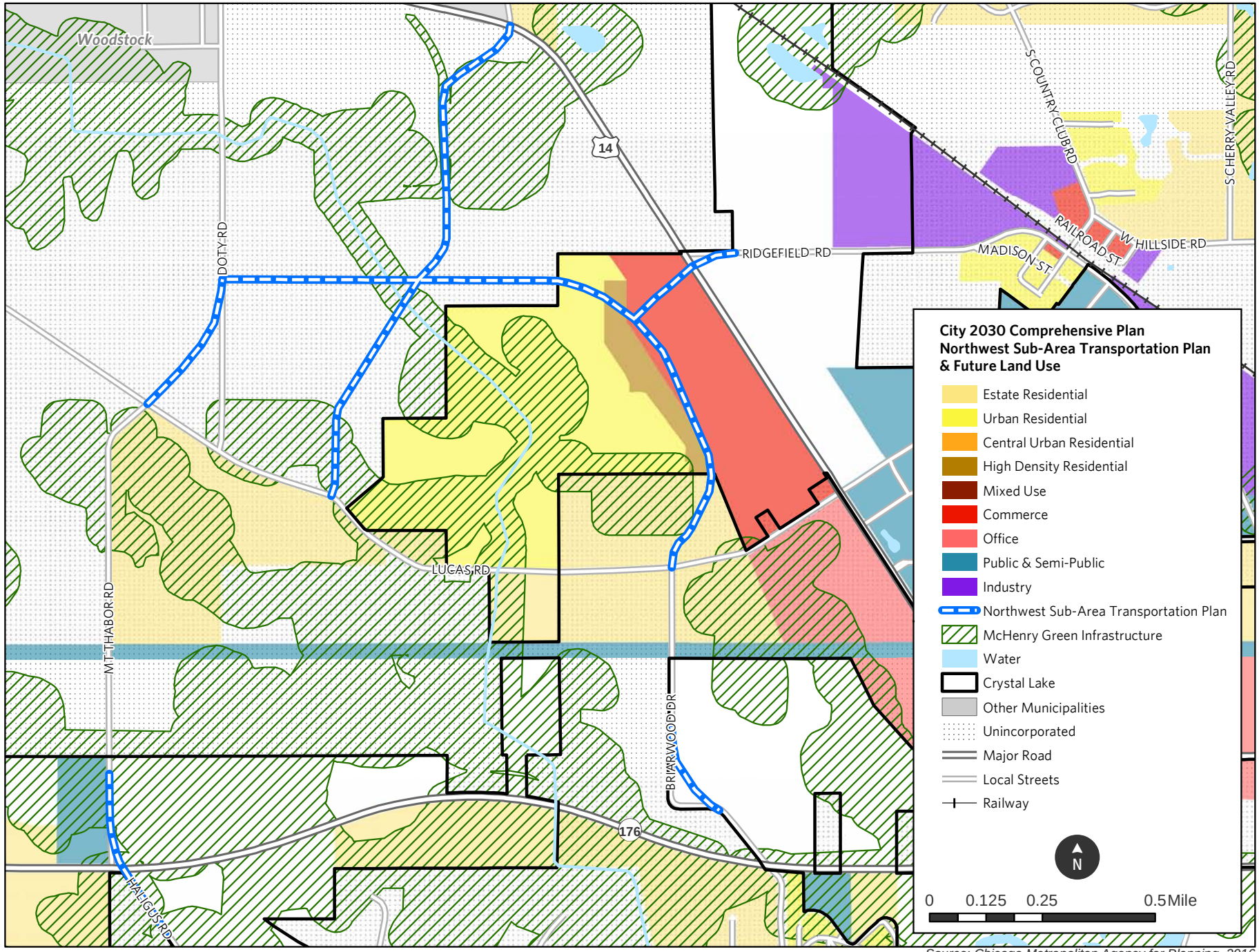
Northwest sub-area

The northwest sub-area, located to the north of IL 176 and west of US 14, is the last large area of Crystal Lake that remains in agricultural use and/or contains extensive natural resources. The City's 2030 Comprehensive Plan recommends that development in the northwest sub-area be designed to minimize impact on the valuable natural resources in this area, such as woodlands, marshes, meadows, prairies, wetlands, and the Kishwaukee River, as well as the sensitive groundwater recharge area for the City's namesake lake.

As part of this planning process, a revised street network for the northwest sub-area was developed in light of the transportation and sustainable development goals, as well as the recent reconstruction of US 14 and the extension of a shared use path north to Woodstock (Figure 3.5). The proposed street network avoids sensitive environmental features and connects to existing roads like Briarwood Drive, Lily Pond Road, Mt. Thabor Road, and Ridgefield Road which increases road connectivity and limits the creation of new intersections on US 14 and IL 176. If this area is developed, the ultimate street network will depend on detailed engineering and may change upon further investigation. The Institute of Transportation Engineers has detailed a set of network design principles that can be used to ensure that development accounts for all travel modes in this area.[14] Future of development in this area could increase or change transit service needs; the City should work with Pace to review options.

[14] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 3: Network and Corridor Planning, p30.

Figure 3.5. Proposed street network for northwest sub-area.



Source: Chicago Metropolitan Agency for Planning, 2016

Chapter 4
PLANNING AND DESIGN STANDARDS AND PRACTICES

Planning and design facilitate the creation of a complete streets network by building safe and inviting environments for all users to walk, bicycle, use public transportation, and drive. The Plan recommends the following updates to current planning and design standards and practices to better accommodate all transportation modes. Regarding street design, these recommendations seek to enhance the ecological function of new and existing streets, broaden bicycle facility standards to accommodate a range of users, and strengthen pedestrian facility standards to improve walkability. In terms of planning, the recommendations are intended to enhance the connection between the built environment and the street as well as between complementary land uses.

This section provides recommendations for updating the City's planning and design standards, articulated through the City's 2030 Comprehensive Plan's Future Land Use Map and the City's Unified Development Ordinance (UDO). Particular attention was paid to creating a safe and pleasant environment for the pedestrian, because designing a community for the most vulnerable of users often results in improved safety for other transportation modes. In addition, at some point of every trip, each traveler is a pedestrian. This chapter can be used as a guide to inform the design of the network improvements identified in Chapter 3 as well as further updates to municipal policy outlined in Chapter 6. If updates are recommended to a specific section of the UDO or the Comprehensive Plan, the location of the corresponding section in the UDO or Comprehensive Plan is identified.

Planning and Design Goals

Accommodate all transportation modes in development and street design standards.

1. **Enhance the ecological function of streets.**
2. **Broaden bicycle facility standards to accommodate a range of users.**
3. **Strengthen pedestrian facility standards to improve walkability.**
4. **Update development standards to create pedestrian-friendly places in key areas.**
5. **Expand opportunities for mixed use and transit-supportive land uses to increase travel efficiency.**
6. **Establish standards for transportation improvements based on land use pattern.**

4.1 Street Connectivity

Street connectivity is an important feature of making a neighborhood walkable and bike-friendly. Interconnected streets are also essential for emergency response, giving emergency vehicles several direct routes, shortening response times, and potentially providing service to more buildings per station. With a connected street grid, local streets can be narrower without compromising emergency access.

Update block standards and external connectivity requirements

While the City's UDO does limit the construction of cul-de-sacs, further improvements can be made to improve the walkability of new neighborhoods. Establishing a maximum block length of 800 feet on one side and a preferred length of 300 feet to 600 feet for residential subdivisions is recommended.[15] Alternatively, the City could establish a minimum street intersection density to ensure connectivity. For example, LEED for Neighborhood Development's Walkable Streets Prerequisite requires projects to have an internal connectivity of at least 140 intersections per square mile (Article 4-900 A).

External connectivity standards provide a mechanism for new streets to connect to surrounding streets with regular frequency. Currently, the UDO has no external connectivity requirements for regular subdivisions. However, it does state that for conservation developments, interconnection of internal streets and street connections to adjoining land parcels should be provided to create opportunities for future connectivity.

This requirement could be expanded to cover all new major subdivisions. The City could consider adding quantitative criteria to this requirement to ensure future connections at regular intervals (Article 5-300 E2).

Enhance street layout and alignment standards

The City's UDO outlines general principles for street layout and alignment, such as encouraging the use of rectilinear or grid patterns to interconnect streets as well as a mix of street types. The UDO could be updated to minimize the encroachment of streets into sensitive natural resources such as wetlands, designated natural areas, woodlands, significant tree stands, and wildlife habitats. This is currently a requirement of subdivisions following the conservation design process, which could be used as a model for all subdivisions that require a new street network. This is particularly important for the Northwest sub-area, which is recognized for its high value natural resources in the City's 2030 Comprehensive Plan, and could see the addition of development and streets in the coming years (Article 5-300 E2).

Promote access management

Access management is the control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to improve arterial and collector traffic flow.

[15] City of Crystal Lake Comprehensive Plan and Ordinance Assessment: An Implementation Step of the Silver Creek and Sleepy Hollow Creek Watershed Action Plan. November 2013. Available at: http://www.cmap.illinois.gov/programs-and-resources/lta/silver-creek-sleepy-hollow-watershed.

Each access point creates potential conflicts between through traffic and traffic using that access, which in turn can lead to traffic congestion and reduce safety. There is a balance to access management; streets need to provide mobility as well as sufficient access to nearby properties. Businesses gravitate to arterials since these locations offer higher visibility and may have concerns about restricting specific turning movements. However, given how access management can reduce travel delay, it can also help increase a business's market area as potential customers can travel to the location more easily.

Crystal Lake's commercial corridors, primarily Virginia Street, IL 176, and Northwest Highway, experience large vehicle volumes as well as some traffic congestion. While these streets are already built out, a number of retrofit techniques could increase the mobility of these primary arterials. The biggest opportunity here is through the consolidation and relocation of driveways. Allowing adjacent properties to share access can reduce the number of driveways. Ideally, access points should be relocated as far away from existing intersections as possible. Restricting left turns to specific points, either through medians with designated markings or raised medians, is an important access management technique that is already in use on the Northwest Highway and could be used in other locations in Crystal Lake.

During the subdivision process, the City's UDO outlines potential design elements that could be used to ensure good access management, including the use of lower level public streets to provide secondary access and guidance on driveway placement (UDO Appendix A-400). Developing a connected local street network of side streets and parallel roads is also a helpful technique, as explained in the recommendations above. The UDO supports the use of shared access to minimize the number of driveways along arterials and collectors and facilitate traffic flow between parcels (UDO Appendix A-400 D2). Encouraging the use of alleys could also assist in reducing the need for driveways in residential areas, which could be particularly effective on residential collectors. More information on driveways and their impact on pedestrians are included in Section 4.2.

Principles of Access Management

The Transportation Research Board (TRB), a division of the National Research Council, states that access management should limit and consolidate access along major roadways, while promoting a supporting street system and unified access and circulation systems for development. TRB has outlined ten principles of access management:

- **Provide a specialized roadway system.**
- **Limit direct access to major roads.**
- **Promote intersection hierarchy.**
- **Locate signals to favor through movements.**
- **Preserve the functional areas of intersections and interchanges.**
- **Limit the number of conflict points.**
- **Separate conflict areas.**
- **Remove turning vehicles from through-traffic lanes.**
- **Use non-traversable medians to manage left-turn movements.**
- **Provide a supporting street and circulation system.**

Source: TRB. 2003. Access Management Manual. Available www.accessmanagement.info/Presentation/10-principles

4.2 Travel Way

The geometric design of streets is integral to the behavior of motorists, bicyclists, pedestrians, and other street users. The width of the right-of-way will determine what design elements can fit within the given space, such as the position of vehicles, on-street parking, landscaped medians, bicycle lanes, bioswales, and sidewalks. In addition, the width of the street, including the number of lanes and the width of those lanes, plays a large role in the feel and function of a street and whether it complements the surrounding land uses and corresponding activities.

This section outlines best practices and recommended changes to the UDO vehicle way, bicycle way, and sidewalk standards. Many of these changes could be accomplished through an update to the thoroughfare classifications outlined in UDO Article 4-100 C and illustrated in Appendix A-500 as well as by updating the design process to include all transportation modes (Section 6.3). In addition, the thoroughfare classification map, which designates specific street purposes and cross-sections spatially within the community, could be updated to better serve the surrounding land uses, as described below (UDO Appendix A-1700).

The following recommended changes to the thoroughfare classification system are designed to help tailor the design of the street to the surrounding land use conditions:

- **Create a local street classification designed to service industrial areas:** Tailor standards to accommodate larger vehicles, but also provide for bicyclists and pedestrians as these are locations of employment.
- **Update standard local street classification to match common vehicle type:** With the creation of a local street type designed to service industrial areas with larger vehicles, the standard local street dimensions could be better tailored to match the most common vehicle type (automobile) and incorporate specific pedestrian and bicycle design options, including narrower lane widths, bicycle amenities, and pedestrian safety features, to enhance the walkability of neighborhood streets.
- **Integrate existing conservation design strategies into a local narrow neighborhood street:** The UDO identifies the benefits of narrower street types and recommends their use in the Watershed Zoning District. Other streets within the community could also be designed in a similar manner given their existing narrow right-of-way and their location in sensitive environmental areas. These standards should be integrated with the rest of the streets described in UDO Article 4-100 C and Appendix A-500.

Vehicle Way

In order to better accommodate all users of a street, the design approach should generally encourage narrower vehicle lanes and street widths, where possible and appropriate, to create a safer street network and reduce impervious surfaces. Wide streets and vehicle lanes typically encourage high vehicle speeds, which subsequently increases the severity of crashes when they occur. Crossing wide roads with multiple lanes and traveling alongside fast moving vehicle traffic creates real and perceived dangers for pedestrians and bicyclists. The Institute of Transportation Engineers (ITE) recognizes that wide streets, such as those greater than 60 feet, can create barriers for pedestrians and encourage higher vehicular speeds.[16]

Designing for all modes requires a balanced approach. In fact, accommodating all modes in a given right-of-way may result in an un-walkable street as the width of the street increases to accommodate the full range of facilities. In these cases, a well-connected surrounding street network can help accommodate pedestrians on parallel routes.

Speed, lane width, and parking are three important factors in designing the vehicle way. In addition, turning lanes, medians, and speed control elements play a role. The City of Crystal Lake has an opportunity to update several of the design standards, outlined in UDO Article 4-100 C and illustrated in Appendix A-500, to better reflect the overall goal of accommodating all transportation modes.

Crystal Lake should re-evaluate several of the existing standards relating to street and lane width as an opportunity for traffic calming and for better accommodating walking and bicycling.

Lane Width

The amount of space allocated for automobiles, buses, and trucks is a sensitive and crucial aspect of street design. Lane widths should ultimately be based on four key considerations – target speed, design vehicle, right-of-way, and the width of adjacent bicycle and parking lanes.[17] AASHTO has highlighted the benefits of narrower (10 to 11 feet) travel lanes on lower-speed streets because they can reduce the pedestrian crossing distance, allow more elements within a constrained right-of-way, and lower construction and maintenance costs. While wider lanes were once thought to be safer, narrower streets in urban and suburban contexts help promote slower driving speeds which, in turn, reduce the severity of crashes. Narrower streets have other benefits as well, including reduced crossing distances, shorter signal cycles, decreased stormwater runoff, and less infrastructure material to build and maintain.

Lane widths can vary to reflect the ultimate goals of the street, such as providing calm, low-speed residential streets or providing access for larger vehicles, such as trucks and buses. As the City updates the thoroughfare classification and corresponding cross-sections, lane widths can be tailored to the different uses and potential users of the street.

[16] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 9: Traveled Way Design Guidelines, p. 136.

[17] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 9: Traveled Way Design Guidelines, p. 138.

In addition, during the design process, lane widths could change within the cross-section of a given street to serve all needs, including safety islands, bike lanes, and sidewalks.

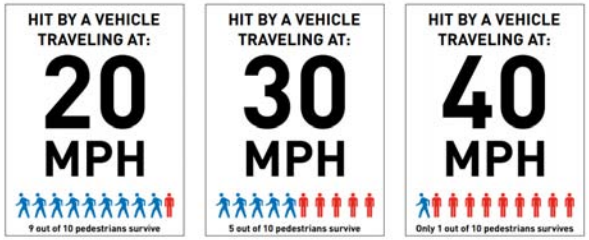
Speed

Streets should be designed for their target speed, or the highest speed at which vehicles should operate on a street within a given context, consistent with the existing or desired corresponding multi-modal activities. Instead of designing the speed to be as high as practical, the target speed – which is based on the City's classification system and surrounding land uses – should become the primary control for determining the speed.

Currently, most local streets in Crystal Lake have speed limits of 30 miles per hour by ordinance; some are specifically posted with speed limits of 25 miles per hour. Most of the arterials and collectors are posted with speed limits between 30 and 35 miles per hour. Some notable exceptions include Miller Road and Main Street, between Crystal Lake Avenue and Northwest Highway, with a speed limit of 40 miles per hour, and Rakow Road with a speed limit of 50 miles per hour. The City may want to re-evaluate the speed limits on specific streets or a group of local streets as speed plays a critical role in the cause and severity of crashes. For non-local streets, Crystal Lake will need to coordinate with IDOT, MCDOT, and townships. Figure 4.1 demonstrates the direct correlation between higher speeds, crash risk, and the severity of injuries.

A series of studies have shown that the risk to pedestrians increases slowly until impact speeds of around 30 mph, at which point the likelihood of surviving the impact rapidly decreases.[18]

Table 4.1. Driving speed and pedestrian fatality risk



Source: City of Seattle's Vision Zero Plan, available: www.seattle.gov/Documents/Departments/beSuperSafe/VisionZeroPlan.pdf.

Parking Lanes

On-street parking can create a buffer between moving vehicles on the street and pedestrians on the sidewalk. It can also reduce the need for off-street parking, which consumes buildable land, and necessitates driveways, which interrupt sidewalks. The City's UDO currently identifies an eight foot wide parking lane as an option on local streets, as well as major and minor collectors, but it is unclear when a parking lane is required. The UDO should be updated to reflect where on-street parking should be provided and prohibit parking in specific locations, such as within a certain distance of intersections and driveways.

[18] Richards, D.C. 2010. Relationship between Speed and Risk of Fatal Injury: Pedestrians and Car Occupants. Department of Transport, Road Safety Web Publication No. 16. See http://nacto.org/docs/usdg/relationship_between_speed_risk_fatal_injury_pedestrians_and_car_occupants_richards.pdf.

Medians

Medians can perform a critical role in access management. In addition, landscaped medians can aesthetically improve a wide street by using vegetation to break up large areas of concrete and can also provide stormwater management. The City's UDO could be updated to outline design standards for medians. Currently, the standards outline a minimum dimension for striped medians on some, but not all of the street cross-sections, and they do not contain standards for raised medians. Guidance on how to incorporate raised medians with stormwater management components as well as options for other street types to improve access management should be added to the City's UDO.

Traffic Calming

There are several ways to design streets to encourage slower vehicle travel. In addition to narrower lane widths and curb radius reductions, road diets, mini traffic circles, raised intersections, and diverters could be used to discourage speeding. Road diets can be done by either removing a travel lane (from four to three with a center median) or narrowing an existing travel lane, which often provides space for other amenities on the roadway such as bicycle lanes. Mini traffic circles, or raised circular islands, can be constructed in the center of residential local street intersections to slow down vehicles entering the intersection. If local streets are being inappropriately used as a cut through, a diverter, which prevents certain turning movements, could be utilized. However, diverters impact traffic flow for local residents and other strategies may be just as effective. straight residential streets with infrequent intersections and no other visual cues.

Safety and lane width

Standard arterial lane widths have been set at 12 feet with safety being the reason asserted for the minimum width. However, engineers have identified many safety benefits of reallocating space from 12 foot lanes to other urban and suburban cross-section needs, such as medians, bicycle lanes, curb parking, sidewalks, pedestrian buffers, and clear zones. In 2009, CMAP performed a review of safety research and found that a nuanced approach to lane widths is necessary. For rural roads, crash rates are higher for nine- and ten-foot-wide lanes than for 11- and 12-foot-wide lanes. But for suburban and urban roads, research is scarce about the relationship between lane width and crash rates. However, in 2007, a study of crashes and lane widths found no indication that the use of lanes narrower than 12 feet on urban and suburban arterials increases crash frequencies.[19]

ITE adopted a recommended practice for lane widths for major urban thoroughfares, outlined in their guidance, Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.[20] The guidance recognizes that, in urban and suburban contexts, right-of-way is limited and should be allocated to accommodate all users at the site, rather than just vehicular traffic. The proposed practice recommends consideration of ten-foot lanes for design speeds of 30 miles per hour or less, and 11-12-foot lanes at design speeds of 35-40 miles per hour.

Pace recommends using 12-foot lanes for streets along bus routes, but recognizes that in areas with constrained right-of-way and high levels of pedestrians, 11-foot lanes can be more appropriate to accommodate the different users on the street.[21]

[19] Potts, Harwood, Richard. Relationship of Lane Width to Safety for Urban and Suburban Arterials. 2007. Transportation Research Record 2023. Washington: Transportation Research Board. p. 81.

[20] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 8: Streetside Design Guidelines, p. 120.

[21] Pace. 2014. Transit Supportive Guidelines for the Chicagoland Region. See http://pacebus.com/guidelines/index.asp.

Bicycle way

Design guidance for bicycle facilities has been evolving in recent years as municipalities have tried new facility designs to accommodate the growing demand for bicycling. Selecting the appropriate bicycle facility should take the land use context, motor vehicle speed, and traffic volumes into account. As a general rule, separation between vehicles and bicycles should increase as vehicle speed and volume increase, though on-street bicycle facilities can, themselves, function as a traffic calming measure. The selection of bicycle facilities will also depend on the dimensions of the existing right-of-way and may require other changes in vehicle lane width in order to accommodate the most appropriate bicycle facility.

Crystal Lake should update their bicycle facility standards outlined in Article 4-100 3 and integrate these common bicycle facilities into the thoroughfare classifications outlined in UDO Article 4-100 C. In addition, these facility types should be integrated into the street cross-sections illustrated in Appendix A-500. The following facility descriptions were informed by two key resources—CMAP's Complete Streets Toolkit[22] and National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide.[23]

Signed routes

Bike route signs help to identify the best bicycling routes to destinations and visually indicate to motorists that they are driving along a bicycle route and should use caution. It also familiarizes the community with the bicycle network. There are generally three types of wayfinding signs – confirmation signs, turn signs, and decision signs (Figure 4.2). Signs should be placed at key decision points leading to and along bicycle routes. Recommended practice is to locate a sign at the intersection of two or more bikeways and every 1/4- to 1/2-mile on off-street facilities and every two to three blocks along on-street bicycle facilities. Confirmation signs should be placed soon after turns to confirm the route. Pavement markings can also act as confirmation that a bicyclist is on a preferred route, and should be considered given that they are often more visible than posted signs.[24]

[22] CMAP. 2015. Complete Streets Toolkit, See www.cmap.illinois.gov/programs-and-resources/local-ordinances-toolkits/complete-streets.

[23] NACTO 2013. Urban Bikeway Design Guide, See http://nacto.org/publication/urban-bikeway-design-guide.

[24] NACTO 2013. Urban Bikeway Design Guide. Bike Route Wayfinding, Signage, and markings. See http://nacto.org/publication/urban-bikeway-design-guide/bikeway-signing-marking/bike-route-wayfinding-signage-and-markings-system.

Figure 4.2. Examples of signed routes

Source: Paul Lippens, MoBikeFed, Flickr; sfbike, Flickr; District of Columbia Department of Transportation, Flickr.

Figure 4.3. Examples of shared lanes

Sources: Laura Sandt, NACTO Bikeway Design Guide; Dan Burden; NACTO Bikeway Design Guide

Shared lanes

Streets with typically low traffic volumes and speeds, like most local residential streets in Crystal Lake, are appropriate for shared lanes. Shared lanes do not require on-street bicycle markings or signs but can be reinforced with a bicycle-and-chevron stencil marking (called a "sharrow," see information on marked shared lanes) and/or bike route signage to better communicate a community's acceptance and encouragement of bicycling (Figure 4.3). Shared lanes are best used in situations where the speed differential between a bicyclist and a motorist is very low. Recommended practice states that streets with posted speeds equal to or greater than 35 miles per hour or streets with motor vehicle volumes higher than 3,000 cars a day should be treated with other facility types, not shared lanes.

Marked shared lanes

Marked shared lanes use a sharrow marking in a travel lane to alert drivers to the presence of bicyclists and to encourage safe bicycle use. Chevron symbols direct bicyclists to ride in the safest location within the lane and can strengthen connections in a bicycle network (Figure 4.4). Generally, marked shared lanes are a low-cost treatment suitable for lightly traveled collectors and arterials when speeds are lower than 30 or 35 mph. They are also appropriate, when there is not room for bike lanes, for high-volume, low-speed corridors, typically with on-street parking, when there is not room for a designated bike lane. It is recommended that the sharrow marking is centered 11 feet off the curb if on-street parking is present or four feet off the curb without on-street parking. The sharrow marking should be placed every 50 to 100 feet, with a maximum of every 250 feet on low volume roadways.[25]

Figure 4.4. Example of a marked shared lane

Source: Heather Bowden, pedbikeimages.org

Bike lanes

Bike lanes are appropriate on streets with heavy traffic and along major bikeway corridors; primarily because they enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions. By providing a designated space, bike lanes also facilitate predictable behavior and movements between bicyclists and motorists.

At a minimum, bike lanes should be 5-feet wide. Where possible, and especially when adjacent to parked cars, 6-foot wide lanes are preferred as they allow cyclists to ride further away from cars and avoid the "door zone" of parked cars (Figure 4.5). When no on-street parking is allowed, bike lanes can be four feet wide (excluding the gutter pan). The City UDO Article 4-100 C should be updated to reflect these dimensions. Bike lanes are marked by a solid line separating the bike lane from the motor vehicle travel lane. Various designs and treatments exist for bike lanes as they approach an intersection (Section 4.3). Bicycle lanes can also be used to narrow a wide roadway, which helps to reduce vehicle speeds and increase the sense of safety for cyclists.

[25] Active Transportation Alliance. 2012. Complete Streets Complete Networks: A Manual for the Design of Active Transportation. Chapter 3 Geometrics, Table 3B, p 105. See www.atpolicy.org/Design.

Figure 4.5. Examples of bike lanes

Sources: Active Transportation Alliance, Greg Griffin; NACTO Bike Design Guide; City of Crystal Lake.

Currently, recommended practice calls for on-street bicycle lanes on streets with more than 3,000 motor vehicles on an average day, which is generally experienced on Crystal Lakes' major collectors and minor arterials.[26] Bicycle lanes are most helpful on streets with a posted speed that is greater than 25 miles per hour. Streets with higher traffic volumes, regular truck traffic, and posted speeds greater than 35 miles per hour, may require alternative facilities, such as buffered or protected bicycle lanes, to provide a greater separation between bicycles and vehicle traffic.

[26] NACTO 2013. Urban Bikeway Design Guide. Conventional Bike Lanes. See http://nacto.org/cities-for-cycling/design-guide/bike-lanes/conventional-bike-lanes.

Buffered bike lanes

Buffered bike lanes use a painted (striped) buffer area to separate the vehicle travel or parking lane from the bike lane (Figure 4.5). This buffer, usually two to three feet wide, can provide sufficient separation to improve cyclists' comfort and safety on heavily traveled arterial corridors and encourage them to ride outside of the door zone when on-street parking is present. Where there is sufficient space within the curb-to-curb area, buffered bike lanes could be applied anywhere a standard bike lane is being considered. Buffered bike lanes provide a more affordable solution than a shared-use path. This practice is not currently identified in the City's UDO and could be added as an option in Article 4-100 C.

Figure 4.6. Example of a buffered bike lane

Source: Active Transportation Alliance

Shared-use paths

Shared-use paths are off-street facilities shared between pedestrians and bicyclists (Figure 4.6). When closely connected with a roadway corridor, they are often called sidepaths, which look and function like a sidewalk but are wide enough to accommodate bicyclists and other users simultaneously. These paths are a good option for high-speed, high-volume corridors with wider block spacing, and they provide access for users who are not comfortable bicycling in heavy traffic. Shared-use paths should be at least 8-feet wide; widths of 12 to 14 feet are preferred and could be added as options to the City's UDO Article 4-100 C. Special care should be taken to design driveway and intersection crossings to reduce potential conflicts.[27]

Figure 4.7. Example of a shared use path in Crystal Lake

Source: CMAP

[27] Federal Highway Administration. Designing Sidewalks and Trails for Access. Available at https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks214.cfm.

Railroad crossings and grates

Additional measures should be taken to ensure that bicycles do not encounter hazards associated with railroad crossings and storm grates. Ideally, storm grates should be designed in a way that is compatible with bicycle use and should not feature bars parallel to the direction of travel or located within potential bicycle lanes. Similarly, railroad crossings also have the potential of trapping the front wheel of bicycles. Given the orientation of the railroads in Crystal Lake, there are multiple opportunities where the bicycle lane or path crosses the railroad at dangerous angles, which makes it difficult for bicyclists to make a perpendicular crossing. Where possible, measures should be taken to encourage a more perpendicular approach to encourage safe traveling behavior.

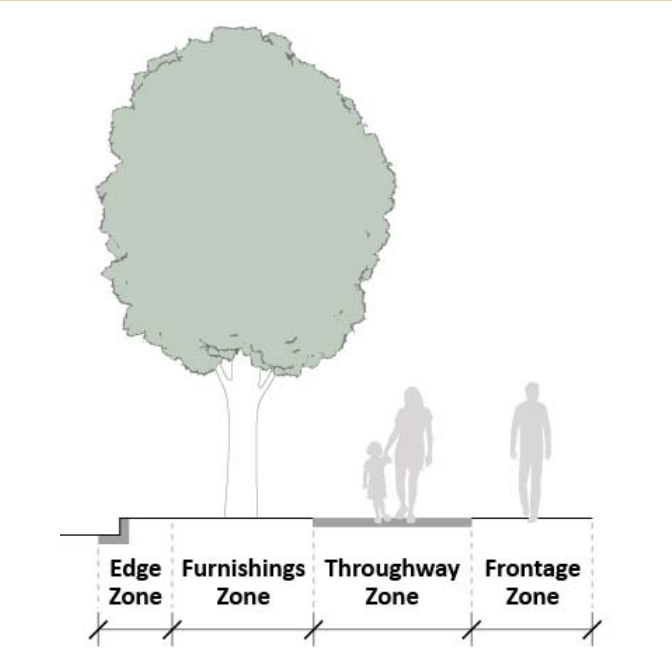
Sidewalk

The decision to walk is influenced by many factors, including distance, perceived safety and comfort, convenience, and visual interest along the way.[28] For design purposes, the sidewalk is often divided into four distinct zones – edge, furnishings, throughway, and frontage– to ensure that the combined components provide adequate space, safe conditions, and meet Americans with Disabilities Act (ADA) requirements for a continuous, smooth, and level walkway free of obstructions (Figure 4.8).

Crystal Lake's UDO establishes general standards for sidewalks throughout the community; these standards could be updated to better accommodate anticipated users and activities associated with different land uses, incorporate stormwater best management practices, and improve pedestrian safety (Article 4-100 D2). The plan recommends updating design standards within the parkway and pedestrian zone, as well as with driveway crossings.

[28] American Association of State Highway and Transportation Officials. 2004b. Guide for the Planning, Design and Operation of Pedestrian Facilities. Washington, DC: AASHTO.

Figure 4.8. Sidewalk zone system



Edge zone: Curbed area between the sidewalk and the vehicle ways; usually includes drain inlets.

Furnishings zone: Area of the sidewalk where refuse receptacles, benches, utilities, and other objects are best placed. Also can include a narrow parkway providing access to/from cars parked along the curb.

Throughway zone: Area of the sidewalk that should be clear for walking. The minimum continuous and unobstructed clear width of a pedestrian access route is 4 feet, exclusive of the width of the curb, though additional width may be needed in specific contexts.

Frontage zone: Area of the sidewalk that transitions to adjacent buildings and land uses; commonly used for quasi-public activities, such as outdoor cafes and sidewalk sales. The frontage zone also provides room for building access (opening doors) and window shopping.

Furnishings zone

The furnishings zone provides a key buffer between the walking area and the vehicle travel way. Along major thoroughfares, pedestrians feel exposed and vulnerable when walking directly adjacent to a high-speed travel lane. Vehicle noise, exhaust, and the sensation of passing vehicles reduce pedestrian comfort. In walkable urban environments, like many areas within Downtown Crystal Lake, a buffer zone that improves pedestrian comfort can be achieved with the width of the edge and furnishings zones, landscaping, and on-street parking. In residential areas, parkways, and the corresponding street trees, help to define these neighborhoods. Crystal Lake currently requires parkways with a minimum width of six feet (Article 4-100 Table C1-C3); this could be expanded to provide adequate room for street trees as well as adaptable space in more commercial environments.

The furnishings zone also provides space for a number of other features essential to the street. Street trees, planting strips, street furniture, utility poles, signal poles, signal and electrical cabinets, telephones, traffic signal cabinets, signs, fire hydrants, bicycle racks and bus transit stops and shelters should be consolidated in this zone to keep them from becoming obstacles in the throughway zone. With all of these features, the City should create clear guidelines on how these elements should be located. This plan makes a number of recommendations regarding stormwater management, bicycle parking, bus stops, and street furniture.

Stormwater management

Composed of concrete and asphalt, streets are large areas of impervious surface that prevent rainwater infiltration and generate stormwater runoff. However, there are opportunities to capture and clean rainwater before it flows to Crystal Lake and other important waterbodies in the community. The following standards should be updated or added to the City's UDO.

Bioswales, flow-through planters, and permeable pavement. Stormwater management practices have been evolving in recent years. Instead of trying to move rainwater from a site as quickly as possible, designers are now trying to capture water closer to the source in order to improve water quality, reduce stormwater volumes, and relieve the burden on the municipal drainage system (Figure 4.9). The City of Crystal Lake has been deploying many of these new practices throughout the community, including a rain garden at City Hall, as it works to protect the area's waterways from pollution.

The UDO could be updated to establish specific design standards that have been found effective both within the City as well as the Chicago region. Bioswales, which are shallow, landscaped depressions that capture, treat, and infiltrate stormwater runoff, could be incorporated into parkway designs as well as other locations within the street right-of-way (see medians and curb extensions). Flow-through planters are similar facilities but can be more appropriate in locations with more pedestrian traffic.

Figure 4.9. Examples of bioswales in the Chicago region

Surface runoff near Holy Angels School in Aurora, IL, is delivered to a series of rain gardens.

Source: Center for Neighborhood Technology

One neighborhood of Hinsdale, IL, contains curb cuts that allow stormwater to easily drain into rain gardens and bioswales. With dense vegetation, absorbent soils, and underground storage capacity, these installations help treat the stormwater and prevent flooding of homes and streets.

Source: Center for Neighborhood Technology

Delta Institute's new guide book, Green Infrastructure Design: Scalable Solutions to Local Challenges, is a good resource and provides design templates for five green infrastructure treatments, with accompanying technical drawings (also in CAD), construction notes, and cost and maintenance information.[29] These free materials could be adapted to fit the context of Crystal Lake and should be informed by what City staff have learned from existing stormwater management treatments. A number of other resources are available to help guide the update of the UDO and incorporation of these design elements in the standard street cross-sections.[30]

Street trees. Tree-lined streets not only enhance the pedestrian environment; they have been shown to discourage excessive vehicle speeds, increase property values, and, on retail streets, increase sales. Their role in stormwater management is well documented. Best practice suggests that street trees be placed on both sides of the street at intervals averaging 40 feet or less. The City's UDO requires that street trees be planted with 35 to 50 feet of space between trunks and 40 feet on-center spacing (depending on species), alternatively spaced along a street, rather than opposite one another. Street trees are currently not permitted along streets where there is less than eight feet of space exists between curb and sidewalk. As stated above, the minimum parkway width should be updated to better accommodate street trees. In some areas, such as Downtown and the Virginia Street corridor, tree wells or pits are required and should be detailed to promote healthy tree development.[31]

Bicycle parking

Sidewalk bike racks should be placed in the furnishings zone so that locked bicycles do not interfere with the throughway zone or frontage zone. Inverted-U or ring designs are preferred as they maximize the potential locking area and can be placed in a way that prevents bicycles from blocking pedestrian traffic. The Association of Pedestrian and Bicycle Professionals (APBP) has outlined installation and quantity guidelines in two key documents: Essentials for Bike Parking: Selecting and Installing Bike Parking that Works[32] and Bicycle Parking Guidelines, 2nd Edition.[33]

[29] Morton Arboretum. Northern Illinois Tree Species List. See www.mortonarb.org/files/14CT_NorthernIllinoisTreeSpeciesList.pdf. Alliance for Community Trees. Tree Ordinances and Design Standards. See http://actrees.org/files/Events/bbls39_resourcelist.pdf.

[30] Delta Institute, 2015. "Green Infrastructure Designs: Scalable Solutions to Local Challenges." Available at http://delta-institute.org/2015/09/delta-releases-green-infrastructure-toolkit-for-property-owners-and-municipalities.

[31] There are a number of good design resources available for updating the UDO: NACTO's Urban Street Design Guide details several stormwater management facilities including bioswales, flow-through planters, pervious strips, and pervious pavement. Available at: http://nacto.org/publication/urban-street-design-guide/street-design-elements/stormwater-management. In addition, the Metropolitan Water Reclamation District of Greater Chicago has updated its Technical Guidance Manual to help communities comply with the recently updated Watershed Management Ordinance. The ordinance establishes uniform, minimum stormwater management regulations in Cook County that include volume control. The new volume control standards and specifications will help streamline the use of green infrastructure such as bioswales, green roofs, rain cisterns, and permeable pavers.

[32] APBP, 2015. Essentials for Bike Parking: Selecting and Installing Bike Parking that Works. See http://c.ymcdn.com/sites/www.apbp.org/resource/resmgr/Bicycle_Parking/EssentialsofBikeParking_FINA.pdf.

[33] APBP, 2010. Bicycle Parking Guidelines, 2nd Edition. See https://apbp.site-ym.com/store/ViewProduct.aspx?id=502098.

Bus stops and shelters

Bus stops are an integral component of the transit system in Crystal Lake and should be accommodated in the furnishings zone. While the frequency and placement of the bus stops will be done in coordination with Pace, the City can incorporate some of the design features for bus stops within the UDO to make this process easier. Several of these design features, such as far side bus stops and boarding facilities, can reduce the time it takes to board or get off the bus and improve bus reliability. Pace has created a useful manual, Transit Supportive Guidelines for the Chicagoland Region, which can inform the ordinance update.[34] Developers and engineers can consult with Pace during initial development planning stages to identify potential bus stop locations and coordinate the placement of Pace signs.

Street furniture

In downtown or on blocks featuring retail and mixed-uses, street furniture placed along a sidewalk can be an amenity that encourages walking (Figure 4.10). Street furniture—such as seating, trash receptacles, and drinking fountains— can make the area more inviting and also conveys to other users that pedestrians are likely to be present. While the City's Virginia Street Design Standards provides guidance on signage, the UDO could be updated to include some basic design parameters to ensure that items do not obstruct the pedestrian throughway, access to curb ramps, or sight distance at crossing locations.[35]

Figure 4.10. Examples of street furniture in Crystal Lake

Sources: City of Crystal Lake

[34] Pace, 2014. Transit Supportive Guidelines for the Chicagoland Region. Available at http://pacebus.com/guidelines/index.asp.

[35] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 8: Streetside Design Guidelines, p. 126.

Throughway zone

Crystal Lake's UDO requires sidewalks whenever any new development is built (Article 4-100 and Appendix A-500). Sidewalks are required to be five feet wide, with two main exceptions: when meeting an existing sidewalk, the new sidewalk should match that new dimension but shall not be less than four feet, and where the sidewalk is adjacent to the travel lane, it shall not be less than six feet.

The City should continue to use the minimum width of five feet in residential areas and should consider wider sidewalks in areas where the community would expect more pedestrians, such as on retail or mixed-use blocks. The U.S. Green Building Council's LEED rating system for Neighborhood Development recommends that new sidewalks adjacent to retail or mixed-use blocks be at least eight feet wide. If the sidewalk is also being used as a bicycle route, the design should match the standards outlined for shared-use paths, see above. The Active Transportation Alliance's Complete Streets Complete Networks Design Manual can provide additional guidance on space allocations[36] and the U.S. Access Board Public Rights-of Way Accessibility Guidelines (PROWAG) offers guidance on selecting practices for accessibility.[37]

Driveways

The frequency and design of driveways can impact the pedestrian-friendliness of a street. Given how driveways interrupt the pedestrian experience and present a safety hazard, best practice recommends setting a maximum amount of street frontage that can be dedicated to garage and service bay openings to 20 percent. While clearly difficult to achieve when not developing or redeveloping a whole block, encouraging new development to reduce sidewalk interruption is recommended as described below.

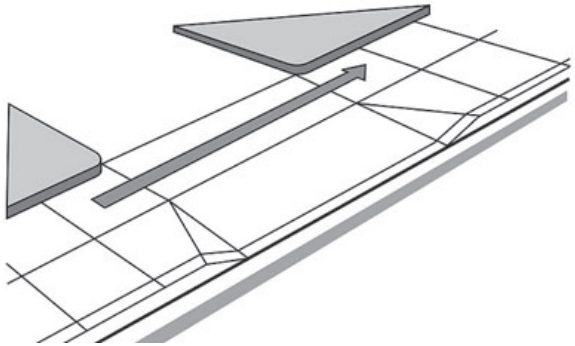
Currently, the City's UDO Article 4-100 D states that all sidewalks are required to extend through driveways and that they are constructed in a manner so as to provide access for handicapped persons. This should be updated to require that the driveway crossing should maintain the same elevation as the rest of the sidewalk and that the driveway aprons do not extend into the throughway zone, (Figure 4.11).[38] The UDO's maximum width for driveways should not exceed 24 feet unless a specific frequent design vehicle requires a wider dimension. Some driveway volumes warrant two lanes in each direction. In these cases, the City could consider requiring a median between directions to separate opposing traffic and provide a pedestrian refuge if feasible. In addition, the corner radii standards for driveways should be reduced to better protect pedestrians from vehicles turning into and out of driveways, see corner radii discussion below.

[36] Active Transportation Alliance. 2012. Complete Streets Complete Networks: A Manual for the Design of Active Transportation. Chapter 3a Pedestrian Ways. See www.atpolicy.org/Design.

[37] United States Access Board, 2013. Accessibilty Guidelines for Pedestrian Facilities in the Public Right-of-Way, see www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines.

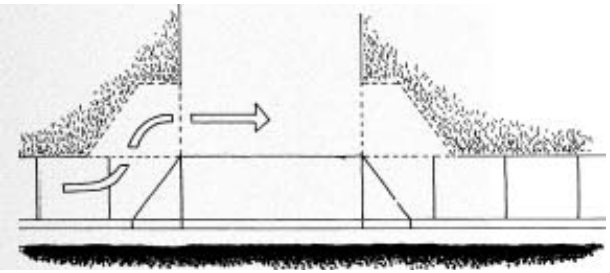
[38] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 9: Traveled Way Design Guidelines, p. 136.

Figure 4.11. Accessible driveway design



Preferred accessible designs for driveway and alley crossings.

Source: ITE



Alternate design for locations with space constraintes.

Source: FHWA, available: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks204.cfm

Sidewalk design principles

The following set of principles should be incorporated into the design of sidewalks in Crystal Lake. These are particularly relevant in the Downtown and Virginia Street, as well as near schools, parks, and other locations where walking is prevalent and/or encouraged.

- **The streetside should have well-defined zones so that the pedestrian throughway is clearly demarcated.**
- **Sidewalks should be provided on both sides of the street. In a small number of conditions, a sidewalk on only one side of the street is appropriate when unusual land uses exist and people do not have a need to access that side of the street.**
- **Care should be given where driveways and alleys cross sidewalks. At these locations there is a potential for conflict between drivers and pedestrians and an increased possibility that pedestrian safety will be compromised. Crossings of driveways, garage accesses, alleys and such should maintain the elevation of the sidewalk and may be considered for special materials, colors, textures, and markings alerting motorists that they are traversing a pedestrian area.**
- **Utilities should not interfere with pedestrian circulation or block entrances to buildings or curb cuts or interfere with sight distance triangles.**
- **Space requirements for, and access to, transit facilities (such as bus shelters) should be included in the design of the streetside but must be outside of the clear pedestrian travel way.**
- **Sidewalks must provide convenient connections between building entries and transit facilities.**
- **Designers should coordinate with utility providers regarding the location of utility elements such as poles, cabinets, vaults, grates, and manholes.**
- **Sidewalks should be as straight and direct as possible except to avoid mature trees or unavoidable obstacles. Pedestrians in urban and suburban contexts have a desire to walk a straight course.**

Source: Adapted from ITE's Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.

Designing intersections for all users

Successful multimodal intersection design is based on several fundamental geometric design and operational principles. These principles include:

- Accommodate all modes with the appropriate levels of service for pedestrians, bicyclists, transit and motorists given the recommended speed, volume and expected mix of traffic.
- Avoid elimination of any travel modes due to intersection design.
- Intersection widening for additional turn lanes to relieve traffic congestion should be balanced against impacts to pedestrians, bicyclists, and transit.
- Provide good driver and non-driver visibility through proper sight distance triangles and geometric features that increase visibility, such as curb extensions.
- Minimize conflicts between modes.
- Minimize pedestrian exposure to moving traffic. Keep crossing distances as short as practical and use operational techniques (protected left-turn signal phasing and prohibited right turn on red) to separate pedestrians and traffic as much as possible.
- Provide crosswalks on all approaches.
- Design for slow speeds at critical pedestrian-vehicle conflict points, such as corners, by using smaller curb return radii or low-speed channelized right-turn lanes.
- Avoid extreme intersection angles and break up complex intersections with pedestrian refuge islands. Keep intersections easily and fully comprehensible for all users.
- Ensure intersections are fully accessible to the disabled and hearing and sight impaired. Provide flush access to crossings, visual and audio information about walk/don't walk phases and detectable warnings underfoot to distinguish pedestrian from vehicular areas.

Source: Adapted from ITE's Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.

4.3 Intersections

Conflicts between all transportation modes can occur at intersections, and their design plays a large role in the performance of a transportation network. Drivers, pedestrians, and bicyclists expect to safely pass through intersections with minimal delay and few conflicts. The design of the immediate intersection is important, but the approach, medians, sidewalks, and driveways, as well as adjacent land uses also play a role

Compact design

Compact intersections reduce the amount of time a pedestrian is in the conflict zone. They also tend to increase safety by slowing vehicular traffic down and increase the visibility for all users. Compact intersections can be achieved using a number of design features identified in this section, including limiting the addition of dedicated turn lanes, reducing curb radii, and adding curb extensions. The pressure to add vehicle lanes to increase the vehicular capacity of an intersection should be balanced against the increase in pedestrian exposure, which can often discourage pedestrian activity and bicycle use. Other solutions, such as interconnecting streets in the network and using parallel routes, should be considered before increasing the number of lanes beyond that which is identified in the UDO street type standards.[39]

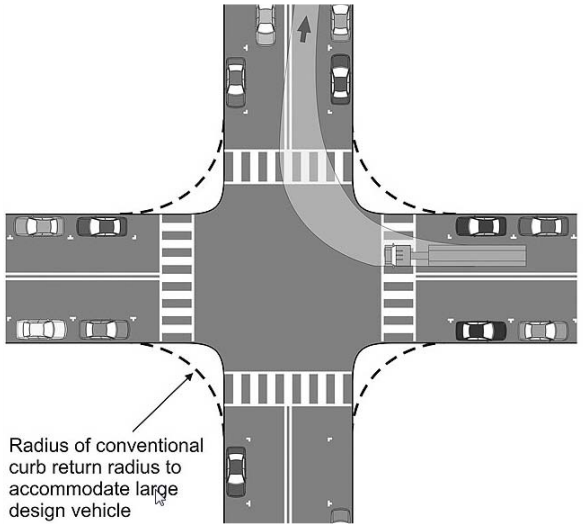
Crystal Lake's UDO establishes a number of standards to ensure that treets line up properly, covering street jogs, curve radii, and street gradients (Article 4-100 D1c); this section could be updated to promote compact designs. The City should update UDO Article 4-100 C, which establishes that the width of the right-of-way should increase by 10 feet for a specified distance from an intersection with a collector or arterial street. This standard widens local streets and is in place irrespective of location within the community as well as on-street parking guidelines. This requirement could be removed or applied only when additional criteria necessitate a wider approach to an intersection. Limiting on-street parking within a certain distance of the intersection may be sufficient to accommodating right turn movements.

Curve radii

Corner radii impact the speed at which vehicles take turns and the distance pedestrians have to cross the street. Crystal Lake's UDO states that all curb corners shall have radii of not less than 25 feet and, at intersections, not less than 30 feet (as measured from back of curb) (Article 4-100 D1h). These corner radii standards are large and do not provide flexibility based on location or intersecting street types. A curb radius of 10-15 feet should be used instead; for local street intersections a smaller curb radius could be used (Figure 4.12). There are a number of benefits associated with using smaller corner radii standards, including increasing motorist visibility of pedestrians waiting to cross the street, reducing pedestrian crossing distance (which also benefits vehicles with a shorter cycle length at signalized intersections), and reducing the speed of turning vehicles and severity of crashes if they do occur.[40]

Larger corner radii are often put in place due to concerns about the turning movements of larger vehicles. But many of the streets in Crystal Lake do not experience high volumes of large vehicles; larger corner radii should be reserved for the local streets serving industrial areas. In addition, there are other design elements that could be used to accommodate infrequent large vehicles. For streets with frequent large vehicle traffic, large corner radii may be necessary and should be set at the effective turning radius (not the corner radius) which accounts for parking and bicycle lanes.

Figure 4.12. Diagram of reduced curb radii



Source: ITE

[39] NACTO. 2014. Urban Street Design Guide, Intersection Design Principles, see http://nacto.org/usdg/intersections/intersection-design-principles.

[40] ITE. 2010. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, an ITE Recommended Practice. Chapter 10: Intersection Design Guidelines, p. 184.

Sight triangles

Crystal Lake's UDO establishes standards on clear sight triangles for every street intersection (Article 4-100 D1c). Proper sight triangles help provide drivers and non-drivers good visibility of what is happening at an intersection. Crystal Lake's UDO determines the dimensions of the triangle by the type of traffic control (all-way or partial stop-controlled) at the intersection and the posted speed limit (Table 4-100 D1). In urban and suburban areas, it can be difficult to balance the need to maintain adequate sight distance while also accommodating features that are common ingredients of a commercial corridor, such as buildings, shrubs, hedges, walls, fences, and parked vehicles. Where recommended sight triangles cannot be achieved, target speed, intersection traffic control types, and other design elements could change to ensure a safer design.

Curb extensions

Curb extensions extend the curb into the street at the intersection in order to increase pedestrian visibility and reduce the distance and time that it takes pedestrians to cross (Figure 4.13). Appropriate for streets with on-street parking lanes, curb extensions also have the added benefit of creating additional sidewalk or landscaping space, which could be used for stormwater management. In addition, the extensions can prevent drivers from parking too close to a crosswalk (see above section on sight triangles). Streets with existing or desired pedestrian traffic and large curve radii are prime candidates for adding curb extensions. Curb extensions can also act as a gateway element, identifying a particular area of the community as distinct from another.

Figure 4.13. Examples of curb extensions

Sources: City of Crystal Lake; Dan Burden, pedbikeimages.org.

Marked crosswalks

Local streets with one or two travel lanes, low traffic volumes (less than 3,000 ADT), and low speeds (less than 20 mph) may not need marked crosswalks, though they are recommended near schools, parks, senior centers, bus stops, or other community destinations. Marked crosswalks on all four sides of the intersection should be installed on streets with higher volumes, higher speeds, or more than two travel lanes. There are a range of techniques to encourage pedestrian use of desired crossings as well as highlight to drivers the presence of pedestrians, (Figure 4.14). Crosswalks that are highly visible to drivers include the use of longitudinal, or "continental" style, pavement markings. Other improvements, such as signage, lighting, and stop or signal control, are often necessary to make a safe crossing. The City has successfully used rectangular rapid flash beacons in locations where a full signal is not warranted.

Pedestrians have a tendency to want to walk along the most direct route and may decide to cross at an unmarked crossing if it takes more than 3 minutes to walk to the nearby marked crosswalk. Discouraging pedestrian crossings by leaving uncontrolled crossings unmarked is not a valid safety measure.[41]

Figure 4.14. Examples of high visibility crosswalks

Sources: Dan Burden, pedbikeimages.org; City of Crystal Lake

[41] Pedestrian and Bicycle Information Center White Paper "An Overview and Recommendations of High-Visibility Crosswalk Marking Styles" (August 2013) http://www.pedbikeinfo.org/cms/downloads/PBIC_WhitePaper_Crosswalks.pdf.

Curb ramps

A curb ramp is a short ramp cutting through a curb and should be designed to provide an accessible route that people with disabilities can use to safely transition from a roadway to a curbed sidewalk. Crystal Lake already requires that ADA compliant curb cuts be incorporated into the design of new or redeveloped streets at all intersections in accordance with federal law. There are an array of design options that can be used to accommodate accessible curb ramps in existing rights-of-way and a number of resources and techniques for providing an accessible transition from the sidewalk to street crossings.[42] The City is currently beginning a review of their compliance with ADA and will identify improvements through that process, if needed.

Pedestrian safety islands

Crystal Lake has several intersections with a large number of travel lanes. Pedestrian safety islands are recommended if a pedestrian must cross three lanes of traffic in one direction.[43] Ideally, the island would be eight to 10 feet wide, but a six-foot wide median could work as well. The crosswalk should cut through the island at a consistent elevation (Figure 4.15). The island should feature a nose that extends past the crosswalk to protect waiting pedestrians from turning vehicles.

Figure 4.15. Example of a pedestrian safety island

Source: NACTO

Modern Roundabouts

Modern roundabouts are circular intersections with yield-control for all entering traffic, channelized approaches and counter-clockwise circulation designed for travel speeds for less than 30 mph. The addition of roundabouts could be considered within Crystal Lake.

[42] ADA Best Practices Toolkit for State and Local Governments, Chapter 6: http://www.ada.gov/pcatoolkit/chap6toolkit.htm.

[43] NACTO. 2014. Urban Street Design Guide, Intersection Design Elements, see http://nacto.org/publication/urban-street-design-guide/intersection-design-elements/crosswalks-and-crossings/pedestrian-safety-islands/.

Grade-separated crossing

Some intersections may warrant complete separation of pedestrian and bicyclists from vehicles due to particularly wide, high volume, and high speed streets. While the benefits of eliminating the potential conflict with vehicle traffic are clear, this type of facility is not without challenges. A grade separated crossing is substantially more expensive, may raise security concerns, and some travelers may attempt to cross directly instead of taking the potentially longer route to access the crossing structure.

Right turn slip-lanes

Channelized right turn lanes often reduce pedestrian safety for similar reasons to large curb radii – they allow motorists to maintain higher speeds during a turn at precisely the location of highest risk to pedestrians. Some communities are restricting their use in areas with high existing or desired pedestrian traffic. If necessary, Crystal Lake should consider providing a raised island with curb ramps or cut-throughs between the right turn lane and the rest of the intersection (Figure 4.16). This divides the crossing distance into shorter lengths and balances the need for larger turning radii with pedestrian safety.

Figure 4.17. Examples of through-intersection bikeway markings

Sources: Combined bike lane/turn lane, Vancouver, Richard Drdle; NACTO; Bike box in Chicago, IL, Active Transportation Alliance.

Through-intersection bikeway markings

When bikeways cross intersections, markings can help guide bicyclists along the way and also increase driver awareness of the presence of bicyclists. Markings, such as dashing, sharrows, and/or green paint can highlight this conflict zone (Figure 4.17).

Shared right-turn lanes

This can be particularly helpful with right-turn only lanes preceding an intersection. A dashed line with shared lane markings can indicate where a right-turn-only lane requires motor vehicles to cross a bike lane and help bicyclists remain in the proper location.

Bike boxes

Bike boxes, which are wide, marked, or colored areas of pavement, are placed in front of automobiles queuing during the red signal phase at signalized intersections. With the vehicle stop bar placed behind the bike box, bicyclists are given priority in crossing the intersection and greater visibility.

Signal timing & operations

Signal timing impacts all transportation modes and requires a balance between users. Pedestrians need enough time in the signal to comfortably cross the street while at the same time, not too much delay as it could cause users to violate the signal. NACTO has established six general principles for signal timing, which are particularly relevant in areas where pedestrians are present or are encouraged.

- **Shorten signal cycles to increase turnover.** Short signal cycle lengths minimizes wait time in all directions and creates crossing opportunities in more frequent intervals.
- **Prioritize walking, bicycling, and transit.** Consider using signal priority tools, such as leading pedestrian intervals, synchronized signals for bicycles, and transit signal priority.
- **Keep the number of signal phases to a minimum.** While separating traffic through signal phasing may have safety benefits, additional phases increase wait times for everyone by increasing the overall length of the signal cycle.
- **Time signals to the speed you intent traffic to go.** Synchronize signals at or below the target speed to maintain safe travel speeds.
- **Adjust timing for peak and off-peak volumes.** Signal timing may be adjusted to meet different levels of activity throughout the day.
- **Use fixed time signals as opposed to actuated or push button signals.** Actuated signals prioritize movement along the primary corridor and can present obstacles to cross traffic and pedestrians if timed to prioritize vehicle movements only.

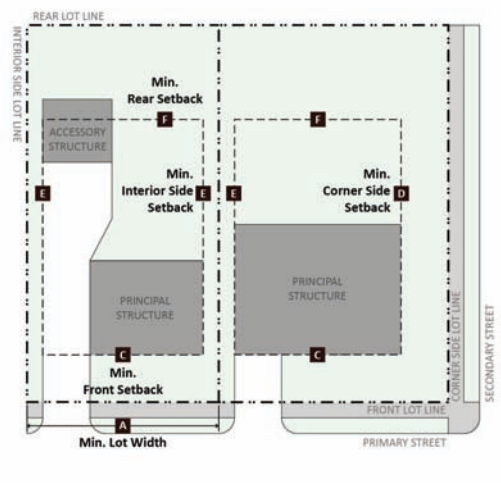
Figure 4.18. Signalized intersections in Crystal Lake

Sources: City of Crystal Lake; CMAP

4.4 Site Layout and Building Orientation

Site layout and building orientation affects how buildings relate to the street and the relative ease with which people can access the property. Crystal Lake outlines dimensional standards for new development in UDO Article 3-200 through a series of illustrations for each of the zoning districts. Each district has corresponding standards outlining minimum front, side, and rear setbacks. Additional development standards that may apply for that zoning district are also identified by section. Many of the illustrations could be updated to incorporate the broader context and additional development standards. For example, the requirements for the sidewalk, principal entrance location, driveway width, and transparency could be shown directly in the dimensional diagrams (Figure 4.19). In addition to updating the legibility of the standards, the City should consider a number of practices that can help residents and visitors access a building regardless of their mode of transportation.

Figure 4.19. Example of a UDO dimensional standard with street context shown.



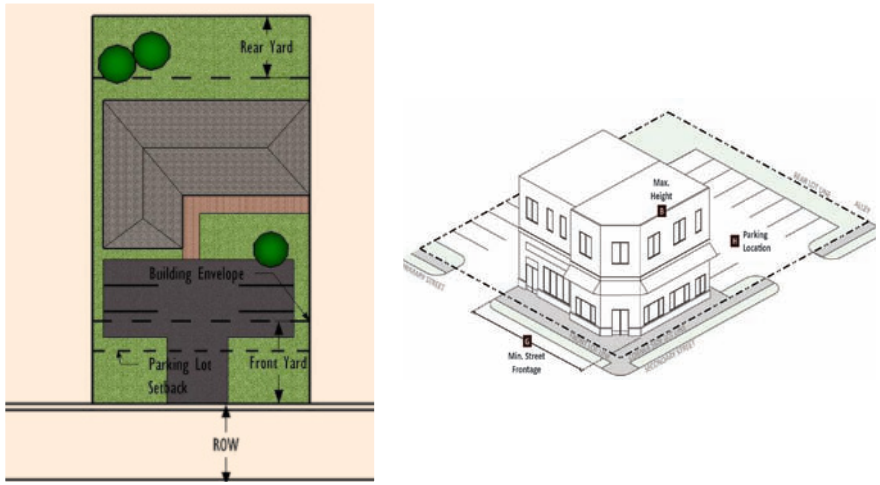
Source: CMAP.

Off-street parking

Real or perceived parking availability can be a key determinant in how residents and visitors choose which travel mode to use. Off-street parking, which consumes buildable land, necessitates driveways, interrupts sidewalks, and often increases the distances between destinations, reduces the pedestrian-friendliness of an area. However, off-street parking may be necessary, and where provided, it is ideally at the side or rear of buildings, allowing buildings to be adjacent to the sidewalk and street.

Crystal Lake's UDO requires all buildings, structures, and land uses to have accessory off-street parking or loading facilities. The UDO also outlines basic design parameters of off-street parking lots, including some limited guidelines on location, cross-access, and bicycle and pedestrian connections. Off-street parking is currently allowed between the building and the street and there are very few requirements to provide a pedestrian path from the sidewalk to the building through the parking area, (Figure 4.20). The main locational requirement relates to setbacks, where the setback distance is determined by the number of parking stalls and the depth of the lot itself. Off-street parking areas are permitted within the front setback provided that they meet the 20-foot parking setback requirements. Larger parking areas, with more than 200 spaces, are required to have larger setbacks based on the depth of the lot itself. The reason for this is unclear, as the sidewalk experience will largely be the same regardless of the depth of the lot; in addition, this requirement makes these destinations even farther away from the sidewalk. Updating these layout standards or providing additional options with parking located to the side with clear walkways to the front of the building can help improve the pedestrian-friendliness of new development.

Figure 4.20. Comparison of UDO parking placement for commercial buildings



Left: Crystal Lake's UDO dimensional diagram shows the parking lot between the sidewalk (not shown) and the building. Right: Park Forest's UDO dimensional diagram places the neighborhood commercial close to the sidewalk for easy access by walking residents, parking is located in back or to the side.

Sources: Crystal Lake, CMAP.

Reducing the amount of parking required is also a key step to a more balanced transportation system. The City's UDO already has a number of provisions to reduce parking and the City will continue to look for additional techniques to continue this goal. A recent report, City of Crystal Lake Comprehensive Plan and Ordinance Assessment,[44] identifies a number of strategies for reducing the quantity of parking and improving the design to meet water quality objectives. These strategies include providing exemptions for small non-residential lots, giving credits for on-street parking spaces located either directly adjacent to the property line or within a certain distance, updating minimum parking ratios, and allowing more opportunities for shared parking.

[44] City of Crystal Lake, 2013. Comprehensive Plan and Ordinance Assessment: An Implementation Step of the Silver Creek and Sleepy Hollow Creek Watershed Action Plan. See www.cmap.illinois.gov/programs-and-resources/lta/silver-creek-sleepy-hollow-watershed.

Bicycle parking

Similar to bicycle facility design, bicycle parking requirements have been evolving in recent years to better accommodate both short-term and long-term parking needs. Many municipalities have identified the need to provide short-term parking within the furnishing zone of the sidewalk (Section 4.2) or within close proximity to entrances. These bicycle parking spots are designed to serve bicyclists needing to store their bike for two to four hours and should be located within clear view of a destination's entrance and preferably no further than the closest motor vehicle parking space.[45] Requirements for longer term bicycle parking spaces for employees and residents are also being incorporated into development standards. These can be located within the structure or through exterior bike lockers or protected corrals.

Figure 4.21. Examples of bicycle parking in Crystal Lake

Source: City of Crystal Lake.

Currently, Crystal Lake's UDO requires bicycle racks when a large off-street parking lot is constructed, but this might not be meeting the parking needs at locations that are likely to draw bicyclists. The Association of Pedestrian and Bicycle Professionals (APBP) has outlined installation and quantity guidelines in two key documents: Essentials for Bike Parking: Selecting and Installing Bike Parking that Works[46] and Bicycle Parking Guidelines, 2nd Edition.[47] In addition to adding bicycle parking at key locations (Chapter 5), the City could require short- and long-term bicycle parking for new development or significant renovations for most land uses.

Facades and functional entries

Buildings that can be accessed directly by pedestrians from a sidewalk present a more pedestrian-friendly atmosphere and are an important ingredient to making a walkable place. Crystal Lake has several examples of this, including much of the development in the downtown. Buildings that are entered through parking lots and driveways may discourage pedestrians from walking across these areas. Best practice recommends that a building's principal functional entry on the front façade faces a public space, such as a street, square, park, or plaza, but not a parking lot, and that the entry be connected to sidewalks or equivalent provisions for walking. A view through glass into shops and other non-residential ground-floor building space also makes walking more interesting and can provide a sense of comfort and safety.

[45] Active Transportation Alliance. 2012. Complete Streets Complete Networks: A Manual for the Design of Active Transportation. Chapter 4B Furnishings, Bike Parking, p 159. See www.atpolicy.org/Design.

[46] APBP, 2015. Essentials for Bike Parking: Selecting and Installing Bike Parking that Works. See http://c.ymcdn.com/sites/www.apbp.org/resource/resmgr/Bicycle_Parking/EssentialsofBikeParking_FINA.pdf.

[47] APBP, 2010. Bicycle Parking Guidelines, 2nd Edition. See https://apbp.site-ym.com/store/ViewProduct.aspx?id=502098.

The City's UDO articulates many of these design principles (UDO Articles 3-200 and 4-900), but could be further updated to promote more pedestrian-friendly designs. Many of the more historic buildings in the community can be used as local precedent. The design standards discourage blank walls, but could establish specific definitions or requirements. The Virginia Street Corridor guidelines state that facades facing the street must be permeable; at least 30 percent of the facade area should consist of windows and doors. Best practice recommends that ground-level retail, service, and trade uses have a transparent façade, typically in the form of clear glass for 60 percent of the façade between three to eight feet above grade. In addition, the Virginia Street Corridor guidelines recommend that building entries must be accessible from a sidewalk, they do not directly discourage it from facing a parking lot. This could be added for specific districts where pedestrians are anticipated or encouraged (UDO Articles 3-200 and 4-900).

Building height to street centerline

Walkable streets are often defined by the sense of enclosure that is created between the building frontages and the street. Buildings that are too low or are set back far from the street can fail to create a pedestrian-friendly street wall. Streets can also be too wide for their context, where the development potential calls for one to two-story buildings, yet the wide street keeps them from creating an inviting public realm. Enclosed streets extend benefits to vehicles as well; research has shown that the surrounding land use context influences driving behavior.[48] Best practices for creating a pedestrian-friendly environment suggest that, at a minimum, the building height to street centerline width should achieve a ratio of 1:1.5, one foot of building height for every 1.5 feet of street width measured façade to the street centerline.

The City's UDO was evaluated to assess what ratio would be achieved in new development based on existing standards. The Downtown Business District regulations allow a building height to street centerline ratio that meets recommended practice; the new guidelines for the Virginia Street Corridor are close to meeting this best practice. Reducing the minimum front setback on this corridor or allowing taller buildings could help achieve this sense of enclosure. Street trees can also play an instrumental role when larger land use change is difficult to achieve.

[48] Dumbaugh et al., "Safe Urban Form: Revisiting the Relationship Between Community Design and Traffic Safety," Journal of the American Planning Association, Vol. 75, No. 3, Summer 2009.

4.5 Mixed use and transit-supportive land uses

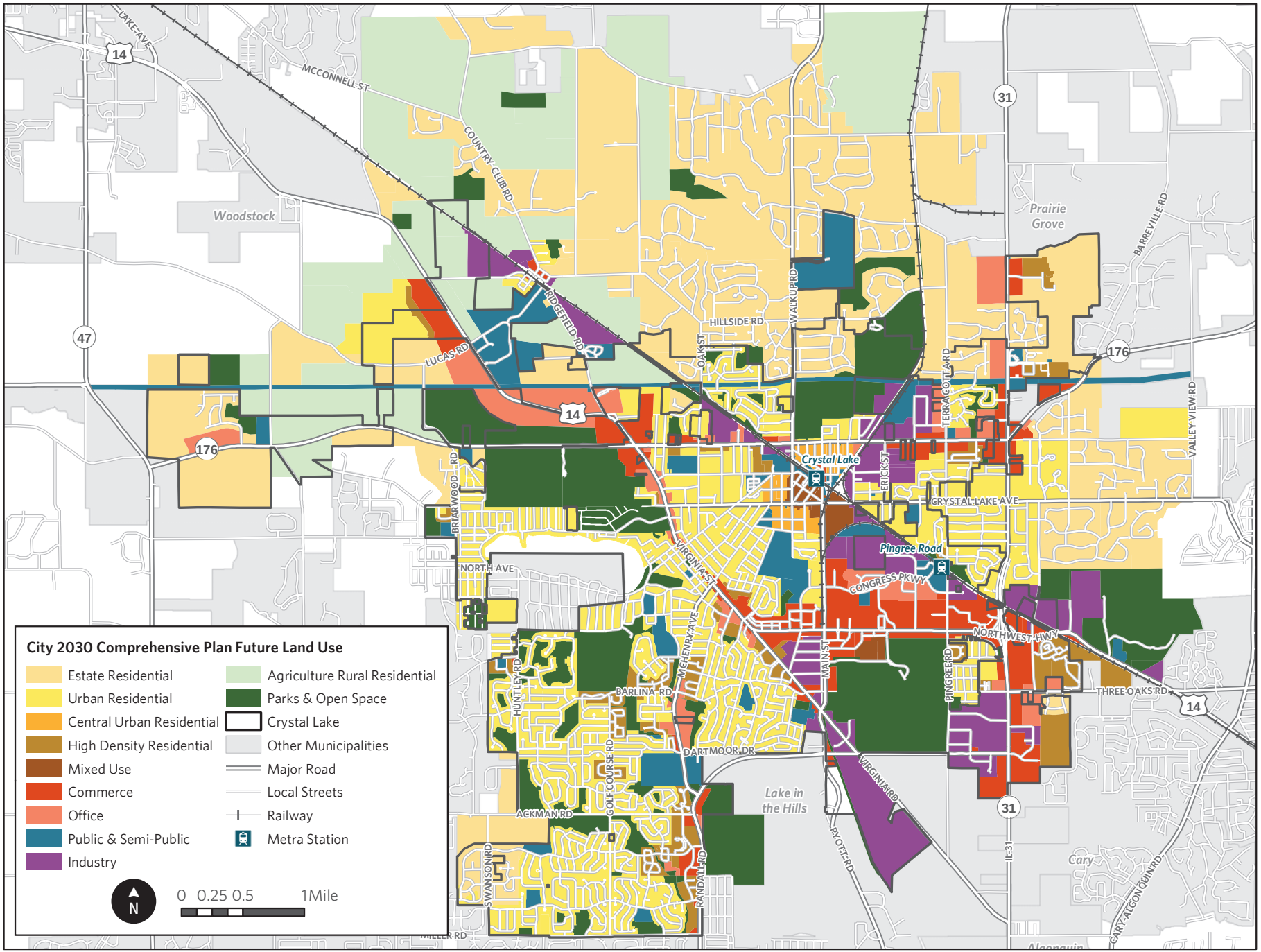
Building a community so that it is easy for residents to walk, bike, take transit, or drive depends on having everyday destinations within close proximity of residential areas and employment centers. Street design plays a large role, but the land use composition is often the determining force given that reaching destinations is the predominant motivator for travel. For example, having the local store within walking distance of a home is just as important as having a sidewalk to get there. Driving trips can also be easier, as the distance to the store can be shorter and if multiple destinations are nearby, the driver can park once to access several locations. In addition, better bus service largely depends on having more homes and destinations within walking distance of service routes.

Given the pattern of development within Crystal Lake, most of the residential areas are largely separated from commercial businesses. There are exceptions, including those residential neighborhoods surrounding the Downtown District and the Virginia Street Corridor. However, there are few residential areas that meet the minimum threshold of seven dwelling units per acre to support basic bus transit service. Currently, the R-3B Multi-Family Residential District is the only residential district that follows this minimum and, while it is zoned for areas in close proximity to the new bus route on Randall Road, it does not comprise a large portion of land. Further opportunities to increase residential density may exist at key locations and could also help meet the demand for a more diversified housing stock as the community ages.

The City currently promotes mixed uses and has identified several redevelopment locations that could further opportunities to bring destinations and residential neighborhoods in closer proximity. As identified in the 2030 Comprehensive Plan, creating walkable, vibrant neighborhoods around the existing rail transit stations is an important step (Figure 4.22). This mix of uses and pedestrian and bicycle facilities will provide opportunities to reduce the frequency or length of automobile trips. As already identified in the future land use map for the 2030 Comprehensive Plan, additional opportunities for more compact, mixed use redevelopment exists at the intersection of Main Street and Crystal Lake Avenue and Crystal Court Shopping Center. In the future, Crystal Lake may want to update the future land use map for the Northwest Sub-Area to create a more traditional town center node at the intersection of US 14 and Lucas Road. Given the limited access requirements of the newly redesigned US 14, office and commercial uses lining the roadway may be better oriented as a mixed-use center that builds on its proximity to McHenry County College.

[49] Pace Transit Supportive Guidelines. Available at: http://pacebus.com/guidelines/06b_transit-supportive_land_use.asp.

Figure 4.22. Crystal Lake's Future Land Use Plan, 2012



Source: Chicago Metropolitan Agency for Planning, 2014

Chapter 5
EDUCATION, ENCOURAGEMENT, AND ENFORCEMENT

Programs, events, and activities that foster alternative transportation and transportation safety can help strengthen the culture for bicycle use, transit use, and walking within Crystal Lake. While continuing to build a safe network of transportation options, supporting education, encouragement, and enforcement can make walking, bicycling, and taking transit safer, more accessible, and enjoyable, and can enhance the health and well-being of community members. The plan recommends that the City continue to work with partner agencies and local organizations to augment existing activities and increase opportunities to promote safe interactions between street users.

This section provides recommendations for enhancing or expanding education, encouragement, and enforcement activities that target transportation safety and alternative transportation. These recommendations were informed by public input obtained during the planning process, the draft Crystal Lake Bike Master Plan, and the feedback on the City's spring 2014 Bicycle Friendly Community (BFC) application to the League of American Bicyclists. By promoting the City as a bicycle- and pedestrian-friendly community, and adopting plans that bolster non-motorized transportation, Crystal Lake will help create a supportive environment. Prioritizing BFC recommendations will also bring Crystal Lake one step closer to becoming a Bicycle Friendly Community certified by the League of American Bicyclists.[50] The City can coordinate with the Sustainability Committee, or other resident advisory committee, to help implement the following education, encouragement, and enforcement activities in Crystal Lake.

[50] The League of American Bicyclists. Becoming a Bicycle Friendly Community. See www.bikeleague.org/community.

Education, Encouragement, and Enforcement Goals

Accommodate all transportation modes in development and street design standards.

1. Promote transportation safety.

2. Promote alternative transportation.

5.1 Education

Educating children, teens, and adults about the rules of the road and how to interact with other non-motorized modes is essential for safe travel, regardless of which mode is chosen. Campaigns and curricula can convey the positive impacts that walking, bicycling, and taking transit have on community health and the environment. The City can carry these out on its own or in collaboration with other entities, including police and fire departments, park and school districts, transportation agencies, MCCD, MCC, the Active Transportation Alliance, private companies, non-profit organizations, and other stakeholder groups interested in promoting sustainable and active transportation.

Expand public education campaign

The City could expand its existing local communications with residents to promote the "share the road" message to ensure motorists, bicyclists, and pedestrians are aware of their rights and responsibilities. The City can utilize several educational resources, such as Ride Illinois' online bike safety quizzes and other bike safety tips for children, adult bicyclists, and motorists.[51] The City can also distribute bicycle and pedestrian safety educational material or add a short quiz to the vehicle sticker renewal to raise awareness about the rules of the road. For example, to educate Chicago drivers about safe driving and tips for sharing the road, CDOT included a pamphlet to car owners with registration renewal papers.[52]

The City could also educate residents on the importance of reporting crashes to the Police Department to help target enforcement efforts to high crash locations. Community meetings, local media publications, and social media networks are examples of ways to get the word out.

Support education and training opportunities for students and adults

Programs aimed at increasing the knowledge, visibility of, or enthusiasm for walking or riding bicycles emphasize changing the travel behavior of individuals. Partnering with the School Districts and Park District could expand current efforts to incorporate bicycle and pedestrian safety curricula into primary and secondary education programming and provide classes to all-age groups for bicycle maintenance and traffic skills classes. Classes could be designed for different experience levels ranging from beginner to experienced bicyclists who want to refine their skills. For more ideas on youth and teen bicycle and pedestrian education programs, see National Center for Safe Routes to School's list of resources for curricula[53] and also Wheeling's Active Transportation Plan.[54] The City can also partner with bicycle and pedestrian instructors, through organizations such as Ride Illinois or Active Transportation Alliance, local bicycle advocacy groups, or bike shops to provide education and outreach at community events or recreation programs.

[51] Ride Illinois' online resources, see http://rideillinois.org/safety.

[52] For a sample pamphlet, see http://1.usa.gov/1BmUBDe.

[53] Walk Bike to School Curricula. See www.walkbiketoschool.org/keep-going/ongoing-activities/classroom-curricula.

[54] Active Transportation Alliance. 2013. Active Transportation Plan for Wheeling. See page 71: www.cmap.illinois.gov/programs-and-resources/lta/wheeling.

5.2 Encouragement

While driving will continue to be the primary mode of transportation for most, small increases in other modes – like walking, bicycling, and transit – could make up a greater share of trips in the future, and would help to ease traffic congestion, improve air quality, and enhance the quality of life for community members. More strategic programming of events and activities, particularly in coordination with schools, local bicycle groups, and other institutions or organizations, can help to increase the use of bicycle, pedestrian, and transit facilities. Ideally, a staff person would be assigned to promote healthy transportation and commuting options to City residents, businesses, and institutions.

Encourage students (and adults) to walk, bike, or take transit to school (or work)

Crystal Lake could host special events that encourage walking and biking for all age groups and levels of mobility. Suggestions for encouraging walking and biking in Crystal Lake include participating in "bike to work week" and "walk/ride to school days." International Walk to School Day is the first Wednesday in October and Bike to School Day is in early May. The National Center for Safe Routes to School has an array of resources designed to encourage walking and biking to school.[55]

The Crystal Lake community, including the City, school districts, interested parents, and local bicycle groups, could expand the existing Safe Routes to School (SRTS) program. A specific SRTS activity that might be applicable for Crystal Lake is a Walking School Bus. A walking school bus is a group of children walking to school with one or more adults. The walking school bus can be as simple as two families taking turns walking children to school or more structured with routes, schedules, and meeting points.[56] The bicycle train, where a group of interested students rides bikes to school in an organized and safe way, could be another activity for Crystal Lake residents. The National Center for Safe Routes to School has published a planning guide to form a Bicycle Train.[57] Additional resources are available, including the National Highway Traffic Safety Administration's Safe Routes to School Toolkit[58] and an array of guides and information through the National Center for Safe Routes to School.[59]

With the completion of the US 14 shared use path, MCC will be accessible from Woodstock as well as Crystal Lake via the Ridgefield Trace trail and other communities connected via the Prairie Trail. To promote bicycling to students, staff, and faculty, MCC could seek recognition through the Bicycle Friendly University program.[60] Similar to the Bicycle Friendly Community process, the League of American Bicyclists provides resources on programs, policies, and projects that can help MCC plan for biking whether or not certification is pursued. For help organizing these activities, the City and MCC can partner with the MCCD, Police Department, Park District, School Districts, and/or local bicycle groups.

[55] National Center for Safe Routes to School, Walk Bike to School Resources, see www.walkbiketoschool.org.

[56] For additional resources and a guide to starting a walking school bus program, see www.walkingschoolbus.org.

[57] National Center for Safe Routes to School. Bicycling to School Together: A Bike Train Planning Guide. See www.walkbiketoschool.org/sites/default/files/SRTS_BikeTrain_final.pdf.

[58] National Highway Traffic Safety Administration. 2002. Safe Routes to School Toolkit. See www.nhtsa.gov/people/injury/pedbimot/bike/Safe-Routes-2002.

[59] National Center for Safe Routes to School, see www.saferoutesinfo.org.

[60] The League of American Bicyclists, Becoming a Bicycle Friendly University, see http://bikeleague.org/content/universities.

Continue to hold community biking and walking events

Existing community events are excellent opportunities to promote walking and biking throughout the year. Crystal Lake can partner with event organizers to encourage residents to walk or bike to the event by offering discounts or providing free bike valet parking. In the past, bike valet parking has been offered by Wheel Werks at the Tour de Crystal Lake. Other events where alternative transportation could be emphasized include the Lakeside Festival, Johnny Appleseed Festival, and the Farmers Market. Partnerships can help support the programming of new events. Crystal Lake could collaborate with a nearby health clinic to host walking events and provide informational material about the health benefits of walking and bicycling. Another activity that the City could host is an Open Streets type event that closes off a major street to vehicles and offers the space to bicyclists and pedestrians. This could complement ongoing activities or be organized as a standalone event.

Promote pedestrian, bicycle, and transit-friendly destinations

Biking and walking maps, safety pamphlets, school walking routes, and transit information could all be designed and provided by the City to community members. This material could include information on pedestrian safety tips, safe cycling and walking routes, bikes on transit, and relevant state and city laws. The City should continue to promote the Crystal Lake Bike to Metra guide and supplement it with bike and pedestrian maps that include bicycle-friendly destinations, bike parking, and walking distance time on downtown maps.[61] This information can be distributed at school assemblies and to local businesses and agencies, preferably by a bicycle/pedestrian ambassador. To help promote bike-friendly businesses, the League of American Bicyclists has developed a program to help businesses identifies ways to become bicycle friendly.[62] The City could work with businesses and the Park District to identify key locations for bicycle parking to help residents and visitors access destinations.

The City could also partner with Pace to develop an Adopt-a-Shelter program to provide maintenance support to bus stops and encourage transit use, especially for new bus routes.[63] This program should be coordinated with recommended transit improvements along Pace bus routes and could particularly target businesses along the proposed bus service on Northwest Highway and Main Street. The program would allow businesses or local groups to showcase their support for sustainable and active transportation, while passively advertising their organization.

[61] City of Crystal Lake, 2010. Bike to Metra Guide, see http://rideillinois.org/wp-content/uploads/2015/10/BTMCrystalLake.pdf.

[62] The League of American Bicyclists, Becoming a Bicycle Friendly Business, see http://bikeleague.org/business.

[63] Pace. Adopt-a-Shelter application, see www.pacebus.com/pdf/adopt_a_shelter_application.pdf.

Partner with transit service agencies to expand outreach and improve service

Crystal Lake should continue to work with Metra, Pace, and MCRide Dial-a-Ride services on a range of projects to help educate residents and employees on transit availability as well as make improvements to transit amenities and service. The City should help promote Pace services and McHenry County's MCRide Dial-a-Ride service to ensure residents and employers are aware of the transit amenities that currently exist within the community. Promotional steps could include a range of activities, including discussions in business forums, joint marketing projects, and signage assistance. Crystal Lake should work with transit agencies and MCCD to add wayfinding signage to existing services as well as bicycle facilities to cross promote these important transportation assets.

Pace is currently in the process of converting all of its bus routes to a posted-stops-only operation, in which riders would be able to get on and off only at posted bus stop signs. Pace bus route 550 already operates this way, Pace bus routes 806 and 808 will be converted in the future. The City should work with Pace to identify logical bus stop locations along these routes.

As MCDOT updates the County's Transit Plan and new bus routes are proposed or existing bus routes are re-evaluated, the City should work with Pace to enhance resident and employee access to transit service and improve ridership. Ideally, bus service should travel through areas that are currently or are anticipated to be locations where riders are getting on and off. There are a number of methods for evaluating this, including transit-supportive densities present along the route and historical data on MCRide and Pace trips.

Investigate adding a bicycle sharing system

A bicycle-sharing system is a service in which bicycles are made available for shared use to individuals on a very short-term basis. Such programs have been gaining popularity in recent years due to recent technological advancements that make the program easier to manage and use. Bicycle-sharing programs can be viewed as an extension of transit service, allowing residents and employees to bicycle to Metra stations and Pace Bus Routes to complete longer trips. Currently, several communities in the Chicago region already have bicycle sharing programs (Figure 5.1) and a few municipalities in McHenry County are are beginning to explore the option. Crystal Lake could explore the value of bicycle share and consider partnering with nearby municipalities on a joint bicycle share program to gain efficiencies of scale.

Figure 5.1. Divvy Bike Share in Oak Park

Source: Brian Crawford.

5.3 Enforcement

Designing streets to naturally calm traffic, rather than issuing hard penalties, is the best way to reduce vehicle speeds. However, providing police officer training on illegal motorist behaviors that endanger pedestrians and bicyclists paired with targeted enforcement can also help build a safer community.

Improve enforcement around school zones

The City's Police Department and School Districts should continue to work to ensure drivers obey posted speed limits, yield to pedestrians in crosswalks near schools and other priority locations, and do not use handheld devices while driving. Officers can also reward children for displaying good walking and biking behaviors. Targeted enforcement will not only help to keep community members safe, but it will also reinforce a safe environment for walking and bicycling throughout Crystal Lake. To monitor program effectiveness, the City should review enforcement efforts and results on an annual basis and work with the School Districts to identify intersections that require engineering improvements as described in Chapter 4.

Offering bicycle and pedestrian enforcement training for officers, as part of annual professional development activities, can improve interactions between all street users and increase safety. Officers should be trained on common causes of bicycle and pedestrian crashes, dangerous bicycling behavior, how to handle bike and pedestrian crash investigations, and the rules of the road for all transportation modes. The Police Department can request a bicycle safety training video from the National Highway Traffic Safety Administration Training[64] and reference training course materials developed by the Wisconsin Department of Transportation.[65] In addition to training programs, having some officers patrol by bicycle can help improve officer understanding of local travel conditions and foster friendly interaction between residents and officers, while giving officers a healthy form of exercise.

[64] National Highway Traffic Safety Administration. Enhancing Bicycle Safety: Law Enforcement's Role. See www.nhtsa.gov/Driving+Safety/Bicycles/Enhancing+Bicycle+Safety:+Law+Enforcement's+Role.

[65] Wisconsin Department of Transportation. Traffic Safety Education. See www.dot.wisconsin.gov/safety/vehicle/bicycle/education.htm.

Support and enforce ordinances and laws that protect pedestrians and bicyclists

Throughout the planning process, a number of residents expressed the need for improved sidewalk maintenance in and around the downtown area. City ordinance requires businesses in the downtown business area to keep sidewalks clear from snow or ice to maintain the sidewalk in safe conditions for pedestrians.[66] The City should work with the local non-profit Downtown Crystal Lake/Main Street, individual businesses, and the Police Department to improve enforcement and compliance of the code. For residential neighborhoods, the city and neighborhood groups can encourage removal of snow and ice from sidewalks in newsletters and during community events.

The City should also support and enforce laws that protect bicyclists. Some ways to enforce existing law include implementing penalties for motorists who 'door' a bicyclist or fail to yield to a cyclist making a turn. The City could also pass ordinances to protect all vulnerable road users and make it illegal to harass a bicyclist. ChangeLab Solutions developed a guide, Getting the Wheels Rolling, that outlines policies communities can adopt and implement to make it safer to travel by bicycle.[67]

[66] City of Crystal Lake, IL. City Code, Chapter 451: Snow Removal. See http://ecode360.com/13346577.

[67] ChangeLab Solutions. 2013. Getting the Wheels Rolling: A Guide to Using Policy to Create Bicycle Friendly Communities. See www.changelabsolutions.org/sites/default/files/Getting_the_Wheels_Rolling_Toolkit-FINAL_20130823_0.pdf.

Chapter 6
IMPLEMENTATION

The success of Crystal Lake's Transportation Plan is the combined responsibility of the City leadership, City staff, businesses, community organizations, and residents. This chapter provides a prioritized list of steps that should be undertaken within the next two years to begin implementation of the Plan. Financing the Plan is an essential component and this chapter also includes a summary of currently available grant programs.

Implementation Goals

1. **Integrate improvements for all travel modes into the design process.**
2. **Include network improvements into capital planning.**
3. **Coordinate with partner agencies.**
4. **Track progress.**

6.1 Establish a transportation-focused steering committee

An advisory committee could help provide guidance on transportation improvements and ensure that future transportation investments are aligned with the goals of this plan. These duties could be performed by Sustainability Committee or a new committee established for this purpose. This committee could be involved at critical steps of the complete streets design process, contribute to the update of the design standards identified in Section 6.2, and assist with the implementation of key education, enforcement, and encouragement programming. The new committee should meet quarterly to discuss strategies, successes, and priorities to implement the plan's recommendations, as well as to provide a consistent voice to the City on automobile, transit, bicycle, and pedestrian issues.

6.2 Update policies and design standards

Aligning current policies and design standards with the goals of this transportation plan is a key step in implementation. The City of Crystal Lake can use these updated policies and standards to ensure that when improvements are made within the right-of-way or new development occurs, the changes will reflect the vision of a comprehensive, integrated transportation network for pedestrians, bicyclists, public transportation riders and drivers, and people of all ages and abilities.

Adopt a Complete Streets policy

A Complete Streets policy formalizes the commitment of the City to include consideration for bicyclists, pedestrians, and transit users within street design activities. The City should adopt a Complete Streets policy that references this Plan and indicates the intent of the City to use Complete Streets principles whenever relevant. CMAP recommends that the Complete Streets policy itself be relatively simple, using references to the Plan rather than newly developed language to express the City's priorities. There are a number of resources available to help craft a complete streets policy, such as CMAP's Complete Streets Toolkit.[68] In addition, the National Complete Streets Coalition has identified national leaders in complete streets policy and implementation.[68]

[68] CMAP, 2014.Complete Streets Toolkit: Policy Development and Adoption. See www.cmap.illinois.gov/programs-and-resources/local-ordinances-toolkits/complete-streets.

[69] National Complete Streets Coalition, see www.smartgrowthamerica.org/complete-streets.

Update the UDO thoroughfare classifications, map, and cross-sections

Section 4.2 and 4.3 provides recommendations for updating several design standards within the street right-of-way. Many of these changes could be accomplished through a comprehensive update to the thoroughfare classifications outlined in UDO Article 4-100 C and illustrated in Appendix A-500. In addition, the thoroughfare classification map, which designates specific street purposes and cross-sections spatially within the community, could be updated to better serve the surrounding land uses (UDO Appendix A-1700).

A cohesive update of these standards will help ensure that new development follows the design principles outlined in this Plan. Updated street cross-sections could also be used by City staff when reconstructing or resurfacing existing streets.

Update the UDO dimensional standards and guidelines

Section 4.4 provides recommendations for updating several planning and design standards of the UDO that pertain to how new development and redevelopment relate to the street. Many of the changes could be accomplished through a review and update of UDO Article 3-200.

Update future land use and zoning map

Section 4.5 reviews the importance of mixed-use and transit supportive land uses in building a community that is easy for residents to walk, bike, take transit, and drive. Crystal Lake already supports mixed uses near existing transit stations and the City's 2030 Comprehensive Plan identifies several redevelopment locations that could bring destinations and residential neighborhoods in closer proximity. Further opportunities should be discussed and included in the next update of the City's Future Land Use Map and corresponding zoning districts.

6.3 Update design process

Accommodating all transportation modes in future transportation projects will require an updated approach to the design process. Creating an overall document that steps through the existing process for city projects will help city staff identify ways that the design process can better account for the existing and planned context and desired transportation modes.

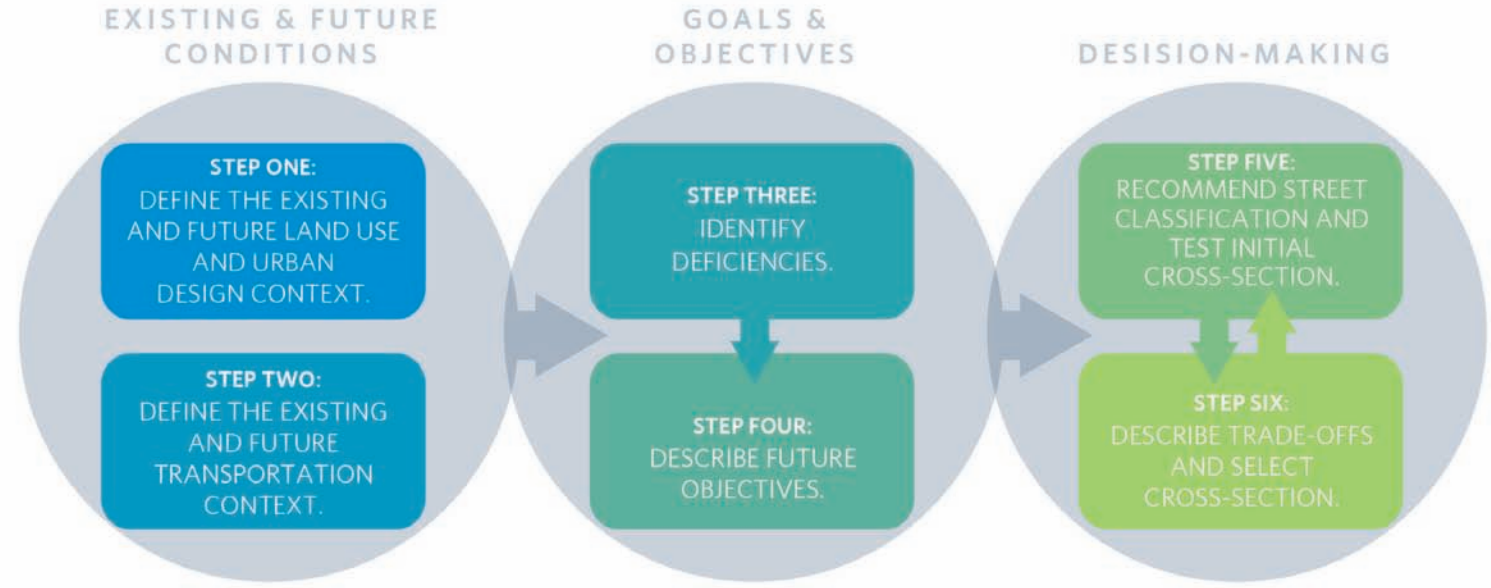
Once the existing design process is outlined, City staff should look for opportunities to incorporate goals of this plan and develop an updated approach. CMAP's Complete Streets Toolkit[70] identifies a six-step process to account for the land use context and the different ways residents can use the new facility within the design process. (Figure 6.1). Ideally, the approach will be tailored to fit the City's departmental structure and identify the key areas for interdepartmental coordination. It could also identify the stages where involvement from the resident advisory committee or other commissions would be appropriate. City staff should document and adopt the process so that it is clear and transparent for those involved.

The City may also consider the use of a Complete Streets checklist, which provides a process for transportation staff to plan and review projects so that they are designed with the existing and planned land use, mode, and roadway conditions, help support a shift to other modes, and determine if the design meets the goals outlined by the community. The Active Transportation Alliance has created a template checklist that Crystal Lake could use.[71]

[70] CMAP, 2014.Complete Streets Toolkit: Policy Implementatin. See www.cmap.illinois.gov/programs-and-resources/local-ordinances-toolkits/complete-streets.

[71] Active Transportation Alliance, YEAR. Complete Streets Complete Networks: Chapter 5: Process. See http://atpolicy.org/resources/design-guides/complete-streets-complete-networks-design-guide.

Figure 6.1. Six-step project development process.



Source: CMAP.

6.4 Coordinate with partners

Most of the City's main arterial streets are owned by MCDOT or IDOT and are the primary travel routes within and through the community. Through this planning process, many street segments or intersections identified in the priority network improvements (Chapter 3) are for areas that the City does not directly control. However, given the prominent nature of these streets, implementing these improvements will be essential to reaching the vision of the plan.

Influencing the design and character of these key streets requires coordination with MCDOT and IDOT. City staff can use this Plan to begin conversations about both short-term and long-term projects that both Crystal Lake and the County or State are interested in. Sharing the community vision for these areas in advance of Phase I engineering will be ideal, as it gets harder to fully design a complete street halfway through the process. The City should stay up to date with future County and State planning work and advocate for community concerns.

6.5 Capital planning

Chapter 3 presents improvements to Crystal Lake's transportation network to create a more interconnected and robust system for all transportation modes – bicycle, pedestrian, transit, and vehicle. However, a limited number of projects can be implemented in any given year based on City resources, partners, and external funding. Tables 6.1 - 3 prioritizes the list of improvements into three broad categories – short-term, mid-term, and long-term. Opportunities may arise to address specific locations more immediately and this list should be revised to reflect changing conditions.

Table 6.1. Priority network improvements for short-term implementation (0 - 5 years)

NUMBER	DESCRIPTION	JURISDICTION	MODE	POTENTIAL COORDINATION	POTENTIAL DESIGN FEATURES
V7	Optimize traffic signals	IDOT	V, P	Coordinate with pedestrian and bicycle improvements along Virginia Street (B9, P16, P17)	4.3: Intersections - Signal timing & operations
P3, V3	Improve IL 176 and Main Street intersection	IDOT, City	P	Coordinate with pedestrian improvements along IL 176 from Walkup Road to IL31 (P5)	4.3: Intersections - Compact design, curve radii, marked crosswalks
V5, P6	Improve IL 176 and Terra Cotta Road intersection	IDOT, City	P, T, V	Coordinate with nearby pedestrian improvements (P5, P8) and transit amenities associated with Pace Route 806	4.3: Intersections - Compact design, curve radii, marked crosswalks
B17, P19	Complete gap on Huntley Road trail at Waterford Cut	City, MCDOT	P, B	Crystal Lake Park District	4.2: Travel Way - Shared-use paths, 4.3: Intersections - Through-intersection bikeway markings
B8	Complete bicycle route between Lake and North Avenue	City	B	This project has been completed	4.2: Travel Way - Bicycle way, 4.3: Intersections - Through-intersection bikeway markings
P15	Improve Congress Parkway and Exchange Drive intersection	City	P	Coordinate with pedestrian and bicycle improvements along Congress Parkway from Main Street to Pingree Road (B13, P14)	4.3: Intersections - Compact design, curve radii, marked crosswalks
P4, B3	Complete shared use path; improvement is part of the Prairie Trail reroute project.	City	B, P	Connection to Ridgefield Trace Trail. Coordinate with McHenry County Conservation District and Crystal Lake Park District.	4.2: Travel Way - Shared-use paths
P17	Improve US 14 and Virginia Road intersection	IDOT, MCDOT	P, V	Other pedestrian improvements along US 14 (P16) and signal timing optimization (V7)	4.3: Intersections - Compact design, curve radii, marked crosswalks
P20, B18	Provide trail crossing at Ackman Road and Willow's Edge subdivision	MCDOT, Park District	P, B		4.2: Travel Way - Shared-use paths, 4.3: Intersections - Through-intersection bikeway markings
V1	Realign Haligus Road and Mt. Thabor Road intersections with IL 176	IDOT, Dorr Township	V	Coordinate with potential bikeway in Northwest Sub-Area	4.3: Intersections - Compact design, curve radii, marked crosswalks
B24	Virginia Road Bicycle Facilities	MCDOT	B	Work with MCDOT to provide on-street bicycle facility on Virgnia Road between US 14 and Main Street	4.2: Travel Way - Bicycle way, 4.3: Intersections - Through-intersection bikeway markings

Table 6.2 Priority network improvements for mid-term implementation (5 - 10 years)

NUMBER	DESCRIPTION	JURISDICTION	MODE	POTENTIAL COORDINATION	POTENTIAL DESIGN FEATURES
P12, B11	Extend shared use path between Walkup Avenue, Teckler Boulevard, and Mary Lane Court	City	P, B	Central High School, Immanuel Lutheran church	4.2: Travel Way - Shared-use paths
B16	Complete bicycle gap on Huntley Road near Bard Road	City	B	Coordinate with private landowners	4.2: Travel Way - Bicycle way
P9	Complete sidewalk gaps on Woodstock Avenue	City	P		4.2: Travel Way - Sidewalks, Throughway zone, Driveways
B5	Improve Walkup Avenue, Crystal Lake Avenue, and Grant Street intersection	City	P, B, V	Consider extending shared use path south to Crystal Lake Avenue	4.3: Intersections - through-intersection bikeway markings
P24, B22	Provide shared use path on Three Oaks Road	Algonquin Township	P, B	Coordinate with other pedestrian and bicycle improvements in accessing Three Oaks Recreation Area (B21)	4.2: Travel Way - Shared-use paths
V6	Provide traffic calming along Crystal Lake Avenue	City	P, B, T, V	Coordinate with intersection improvements at Main Street as well as Walkup Avenue and Grant Street (B5)	4.1: Street Connectivity - Access management; 4.2: Travel Way - Lane widths, Speed, Medians, Traffic calming
P16	Address sidewalk gaps along US 14	IDOT, City	P	Coordinate with intersection improvements at US 14 and Virginia Road (P17) as well as expanded transit service (P25)	4.2: Travel Way - Sidewalks, Throughway zone, Driveways
B10	Create alternate bikeway parallel to Virginia Street Corridor	City	B	Coordinate with intersection improvements at US 14 and Dole Avenue (B9), existing Dole Avenue Bikeway, and proposed north-south bikeway east of McHenry (B14)	4.2: Travel Way - Bicycle way, 4.3: Intersections - through-intersection bikeway markings
V2	Add left turn lane to Lippold Park on IL 176	IDOT	V	Crystal Lake Park District	4.2: Travel Way - Vehicle way, Lane width, speed, medians
B6, P11	Provide bicycle connection to Lippold Park at Edgewood Avenue	Dorr Township	P, B	Coordinate with Crystal Lake Park District and proposed bicycle route on Briarwood Road (B1)	4.2: Travel Way - Bicycle way, 4.3: Intersections - through-intersection bikeway markings
P14, B13	Create shared use path on Congress Parkway	City	P, B	Intersection improvements at Congress Parkway and Main Street (P13, B12, V8)	4.2: Travel Way - Shared-use paths

Table 6.3. Priority network improvements for long-term implementation (10 - 15 years)

NUMBER	DESCRIPTION	JURISDICTION	MODE	POTENTIAL COORDINATION	POTENTIAL DESIGN FEATURES
V4	Develop access management plan for IL 176	IDOT	P, B, T, V	Coordinate with pedestrian improvements (P3, P5, P6) and Pace Route 806	4.1: Street Connectivity - Access management; 4.2: Travel Way - Lane widths, speed
P13, B12, V8	Connect Congress Parkway and Teckler Boulevard at Main Street	City, Union Pacific Railroad	P, B, V	Other pedestrian and bicycle improvements along Congress Parkway from Main Street to Pingree Road (B13, P14)	4.1: Street Connectivity, 4.3: Intersections
B21, P23	Create shared-use path on Pingree Road	City, Algonquin Township, County	P, B	Coordinate with proposed shared use paths along Rakow Road (P22, B20) and Three Oaks Road (P24, B22)	4.2: Travel Way - Shared-use paths
B9	Add bicycle lanes at US 14 and Dole Avenue intersection	City, IDOT	B	Coordinate with alternate bikeway parallel to Virginia Street Corridor	4.2: Travel Way - Bicycle way, 4.3: Intersections - Through-intersection bikeway markings
V9	Develop circulation plan for McHenry Avenue	City	V		4.2: Travel Way - Lane widths, Speed, Medians, Traffic calming
P5	Address sidewalk gaps along IL 176	IDOT, City	P	Coordinate with nearby pedestrian improvements (P3, P6, P8) and transit amenities associated with Pace Route 806	4.2: Travel Way - Sidewalk, Throughway zone, Driveways
P21, B19	Improve pedestrian and bicycle crossing near Rakow Road, McHenry Avenue, and Miller Road	MCDOT	P, B	Other pedestrian and bicycle improvements along Rakow Road (P22, B20)	4.3: Intersections - Compact design, curve radii, marked crosswalks
P22, B20	Support MCDOT-led effort to create shared use path along Rakow Road	MCDOT	P, B	Intersection improvements near Rackow Road, McHenry Avenue, and Miller Road (P21, B19)	4.2: Travel Way - Shared-use paths

Table 6.3. (continued) Priority network improvements for long-term implementation (10 - 15 years)

NUMBER	DESCRIPTION	JURISDICTION	MODE	POTENTIAL COORDINATION	POTENTIAL DESIGN FEATURES
B23	Improve Miller Road and Randall Road intersection	MCDOT	P, B	Coordinate with Randall Road shared use path (P22, B20) and transit amenities associated with Pace Route 550	4.3: Intersections - Compact design, curve radii, curb extensions, crosswalks, through-intersection bikeway markings
P2	Improve US 14 and IL 176 intersection	IDOT	P	Coordinate with US 14 signal optimization (V7)	4.3: Intersections - Compact design, curve radii, marked crosswalks
P8	Address sidewalk gaps on Terra Cotta/ Pingree Road	Nunda Township	P	Coordinate with transit amenities associated with Pace Route 806	4.2: Travel Way - Sidewalk, Throughway zone, Driveways
P18, B15	Upgrade crosswalk and bicycle connection at Barlina Road and St. Andrews Lane	City	P, B		4.3: Intersections - Marked crosswalks, Through-intersection bikeway markings
P10, B7	Provide pedestrian and bicycle connection on North Shore Drive	City	P, B	Coordinate with existing bikeways connecting to Lippold Park	4.2: Travel Way - Shared-use paths
B4, P7	Support IDOT and MCDOT-led shared use path on IL 31	IDOT, Nunda Township	P, B	Connection to Ridgefield Trace Trail	4.2: Travel Way - Shared-use paths
P25	Support proposed Pace Bus Route	Pace, IDOT	P	Coordinate on route to provide best service potential and work to include pedestrian improvements along route (P16, P24, P13)	4.2: Travel Way - Sidewalk, Furnishings zone
B14	Create alternate bikeway parallel to McHenry Avenue	City, IDOT	B	Coordinate with intersection improvements at US 14 and Devonshire Lane/Keith Avenue (V7)	4.2: Travel Way - Bicycle way, 4.3: Intersections - through-intersection bikeway markings
B1	Create bicycle facilities on Lucas Road and Briarwood Road	City, Dorr Township, Grafton Township	B	Coordinate with potential development in the Northwest Sub-Area and intersection improvement (B2)	4.2: Travel Way - Bicycle way, 4.3: Intersections - through-intersection bikeway markings
B2, P1	Improve US 14 and Tartan Drive/Lucas Road intersection	IDOT, Grafton Township	P, B	Coordinate with proposed bikeway on Lucas Road (B1), existing Ridgefield Trace Trail and Pace Bus Route 808	4.3: Intersections - Compact design, curve radii, marked crosswalks, through-intersection bikeway markings

6.6 Funding

In addition to integrating the design principles into policy and coordinating with partners, maintaining and improving Crystal Lake's transportation system will depend on funding. Support for implementing the network improvements identified in this plan will likely come from several public sources including city, county, state, and federal programs, as well as from private sector development and community partnerships. A compilation of potential funding sources is included in this section.

Crystal Lake

Integrating the plan strategies into the City's capital Improvements plan will be essential. Crystal Lake typically funds transportation projects from a variety of revenue funds including the general fund, home rule tax fund, the road/vehicle license fund, the motor fuel tax fund, construction funds, and the capital & equipment replacement fund. While the City may secure external funding from the programs listed below, these sources often require a local match or do not cover all design phases of a project.

Surface Transportation Program (STP)

The Federal STP provides funding to municipalities for projects on the Federal-Aid Highway System, streets classified as collector or above by IDOT. Eligible projects include street reconstruction, rehabilitation, resurfacing and operational improvements, intersection improvements, capital costs for transit projects, and bicycle and pedestrian facilities including bicycle lanes, shared use paths, sidewalks, crosswalks, grade-separated bridge structures, bicycle racks, and directional signs.

The McHenry County Council of Mayors (Council) is responsible for programming the funds for transportation improvements within the county. The Council typically releases a new call for projects every two to three years. McHenry County Council of Mayors has a methodology for submitting and selecting local projects to be programed in the STP, which provides funding for only the construction phase, including construction engineering.

The City of Crystal Lake would be responsible for Phase I and Phase II engineering, as well as right-of-way acquisition.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The CMAQ program funds transportation projects to help the Chicagoland region meet the requirements of the Clean Air Act Amendments of 1990, specifically bicycle, pedestrian, transit, and congestion relief projects. It prioritizes projects that have substantial air quality benefits by reducing single occupancy vehicle use. Numerous strategies in this plan are eligible for funding from the CMAQ program. Per CMAQ rules, pedestrian improvements are limited to those that directly promote safe access to transit facilities. The federal participation amount for CMAQ projects is 80 percent with a 20 percent local match. CMAQ funds are administered by CMAP. CMAP typically has a call for project applications in December of each year.

Highway Safety Improvement Program (HSIP)

The HSIP program is a federal-aid funding program administered by IDOT with the goal of achieving a significant reduction in traffic fatalities and serious injuries on all public roads. Highway safety improvement projects correct or improve a hazardous road location or feature, or address a highway safety problem. Examples include intersection channelization, signing and pavement markings, or other similar elements. Priority is typically given to projects having a higher total number of fatalities and serious injuries affected. All phases of safety improvement projects are eligible for reimbursement, including preliminary engineering, land acquisition, construction, and construction engineering. The federal funding level is a maximum of 90 percent of the total improvement cost with the local agency responsible for the 10 percent matching funds.

Transportation Alternatives Program (TAP)

The Transportation Alternatives Program (TAP) is a federally-funded competitive program that promotes alternative means of transportation. TAP provides funding for community based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of transportation infrastructure. The City may receive up to 80 percent reimbursement for eligible project costs.

Grade Crossing Protection Fund

This fund, administered by the Illinois Commerce Commission, assists local governments to pay for improvements at highway-railroad crossings. Eligible uses include pedestrian gates, pedestrian signals, and grade separations.

Illinois Pedestrian and Bicycle Safety Program

This fund, administered by IDOT, is designed to assist education and enforcement activities that improve bicycle and pedestrian safety. Grant categories include enforcement efforts, educational efforts, and research and training.

Injury Prevention Program

This fund, administered by IDOT, is designed to fund pedestrian and bicycle safety education programs and project in order to reduce fatalities and injuries sustained in traffic crashes.

PeopleforBikes Community Grant Program

This fund, administered by PeopleforBikes, provides funding for projects that leverage federal funding and build momentum for bicycling. Eligible projects include bikeways, shared-use paths, and large-scale bicycle advocacy initiatives.

Truck Access Route Program

This fund, administered by IDOT, assists local governments to pay for road upgrades to better accommodate 80,000 pound truck loads. If eligible, program can provide $45,000 per land mile and $22,000 per eligible intersection for selected projects. State participation will not exceed 50 percent of the total construction costs or $900,000, whichever is less.

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