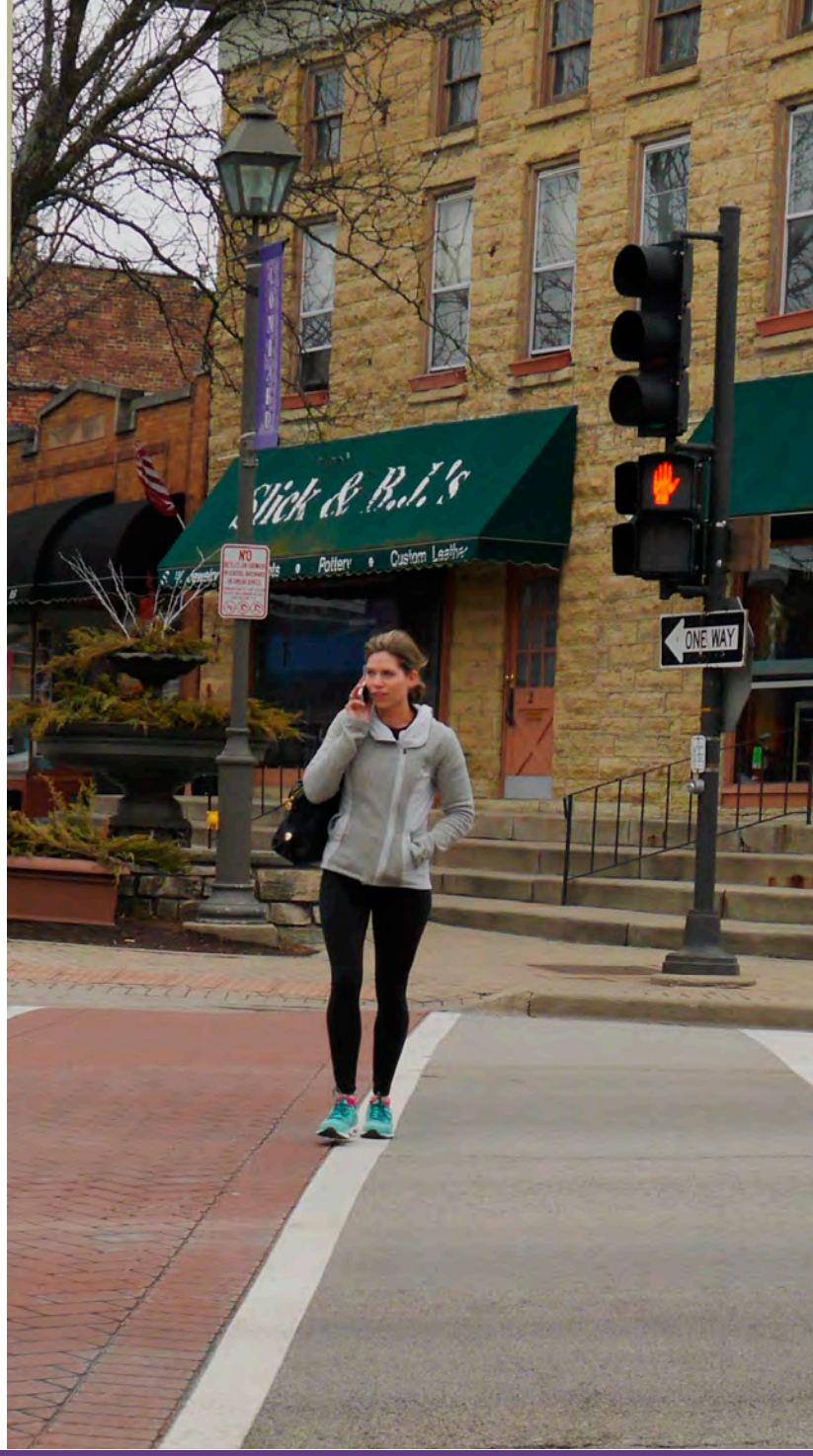

Lombard Village-wide Bicycle and Pedestrian Master Plan

Village of Lombard, Illinois
2016

PREPARED BY:
Alta Planning + Design &
Active Transportation Alliance

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Note: Unless otherwise noted, all aerial photos contained in this plan were produced using ArcMap 10.2. Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Table of Contents


CoPilot

Existing Conditions

Lombard is a peaceful, mostly residential suburban community that more than 43,000 people call home. Known for its annual Lilac Festival, the Village has established a strong identity rooted in this spring tradition.

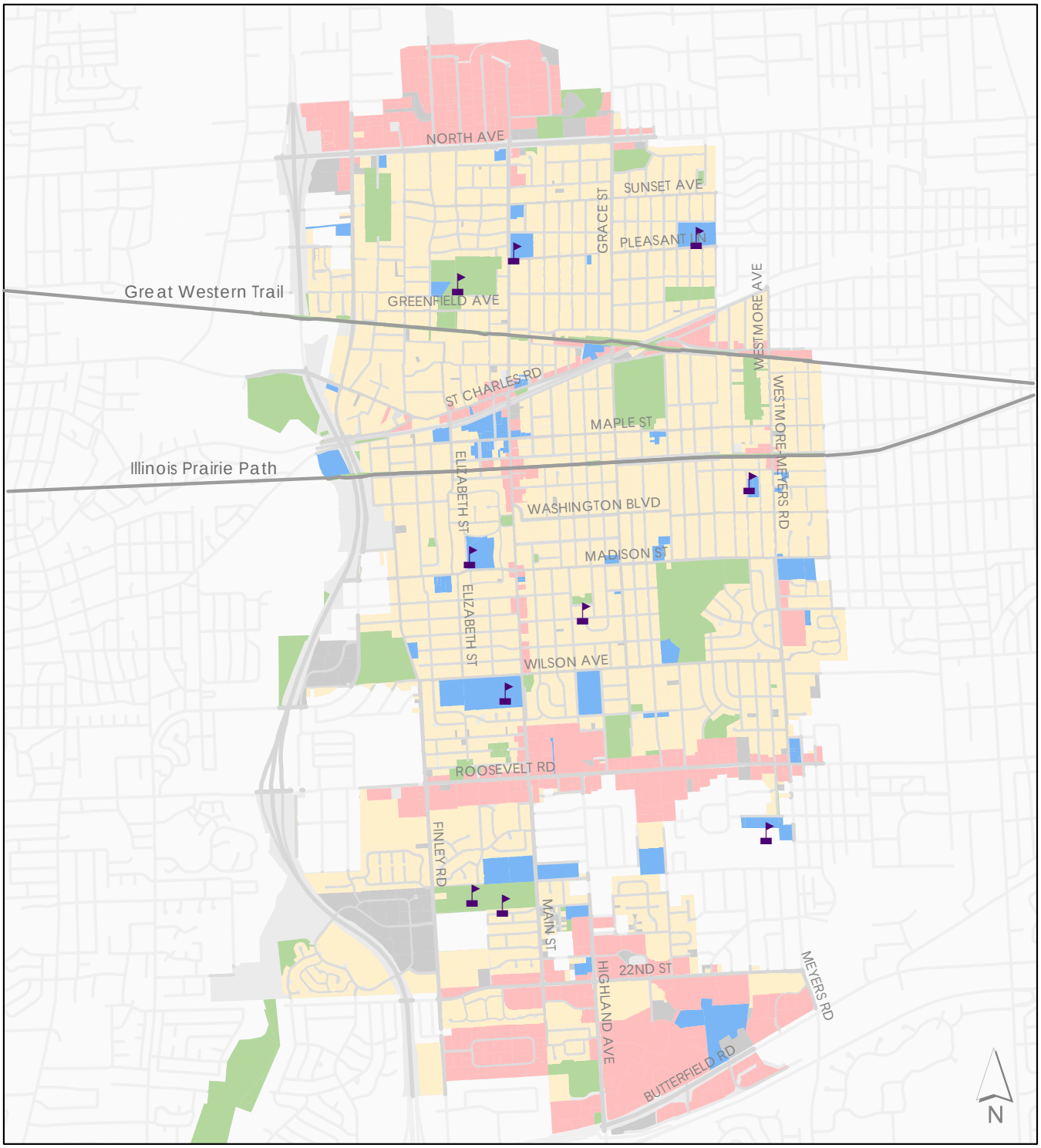
The community's network of regional trails draw cyclists from near and far, and its extensive system of local parks, schools, vibrant downtown, Yorktown Shopping Center, and abutting Forest Preserves suggest a framework for creating interconnected walking and biking routes that would serve residents and visitors alike.

The majority of the Village's land area is developed, as is its roadway network, meaning that most future development will focus on improvements to existing sites and roadways with a focus on high quality design that reflects the Village's aesthetic goals. With that in mind, the Village of Lombard is committed to providing a context-sensitive network of bikeways and sidewalks that connects people of all ages and abilities to local destinations and the regional bicycle network.

The existing conditions section of the plan provides an overview of existing conditions in the transportation network, priority destinations, policies and programs, and previous plans that impact pedestrians and cyclists.

Destinations

The Lombard Village-wide Bicycle and Pedestrian Plan will improve peoples' ability to bicycle within the community and strengthen connections to regional destinations in adjacent communities. A complete bicycle and pedestrian network provides safe streets for people traveling on foot and by bike while connecting people to the places they want to go. The following pages describe major Lombard destinations, land use, and transit stations.



Land Use & Destinations in Lombard

- Shopping & Offices
- Residential
- Institutional (i.e.- schools, civic uses)
- Open Space
- Industrial or Undeveloped
- Regional Trails
- Schools

0 0.375 0.75 1.5 Miles

Figure 1.

Parks

The Lombard Park District offers a wealth of year-round programming and 17 recreational areas through its widespread system of parks. The Commons, Madison Meadows, and Sunset Knoll Park are iconic, popular destinations. Several parks include walking and biking paths that often serve as connections between neighborhoods:

- Lilacia Park
- Madison Meadows
- Four Seasons Park
- The Commons
- Terrace View Park
- Lombard Lagoon

Schools

Lombard is served by six separate school districts – 41, 44, 45, 87, 88, and 89. All nine public elementary schools within the community are located within neighborhoods and do not provide bus service.

The Village's existing sidewalk policy fosters a safe environment for the many students who walk to school. The policy prioritizes sidewalk installation on at least one side of roads that are within three blocks of schools. The Village also produces a walking route map for each school building.

Public Transportation Stops and Stations

The Village of Lombard is served by transit routes, including the 301, 313, 674, 715, 877, and 888 Pace buses and a Metra Station located in downtown Lombard. The Pace buses provide residents in the southern portions of the Village with access to the Lombard Metra Station and the Yorktown Center. Figure 2 on the following page displays these bus stops and routes.

The limited availability of pedestrian crossings near transit stops on Roosevelt Road, Butterfield Road, 22nd Street, and Finley Road are barriers to using active transportation options.

Commercial Districts

The Village has four main commercial areas. Several of the commercial corridors have difficult crossings for pedestrians and cyclists. The shopping centers are not easily reached via bicycle due to a lack of bicycle facilities along abutting high speed and high volume roadways.

Roosevelt Road Corridor

The Village's largest commercial area boasts 1.7 million square feet of shopping centers, including several grocery stores. The corridor is situated in the center of the Village. The sidewalk network is nearly continuous along the corridor, but has limited signalized intersections to cross north or south.

North Avenue Corridor (Lombard Landings)

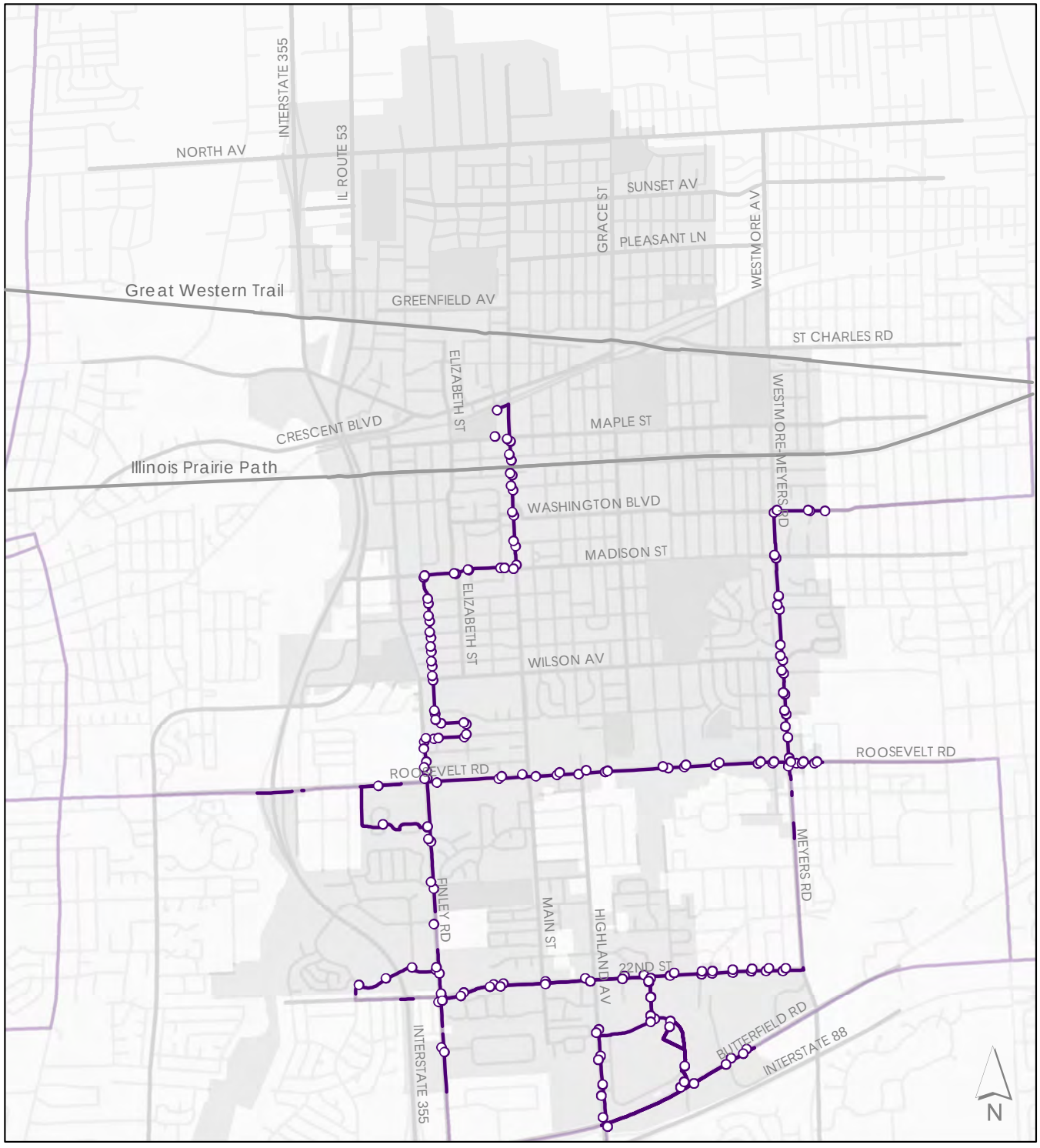
This district is located on North Avenue between Columbine Avenue and Grace Street. North Avenue is a roadway with three lanes in each direction and center turn lanes at intersections. These wide crossings are very difficult for pedestrians and cyclists. They provide limited safety features for people walking and biking.

Butterfield Road Corridor

The Butterfield Road corridor is home to Yorktown Center, Fountain Square, and the Highlands shopping centers. Like Roosevelt Road and North Avenue, Butterfield Road is an arterial roadway with a nearly continuous sidewalk, but limited crossings for pedestrians and cyclists. Similar to other roads within Lombard, crossings along Butterfield Road have significant crossing distances and limited safety features for people walking and biking.

Downtown Lombard

The Lombard Town Centre is located in the heart of Lombard on St. Charles Road and Main Street. It offers local shops and holds family-focused events like Cruise Nights. The Village recently upgraded the area's sidewalks and crosswalks and installed bump-outs at Lincoln Avenue and St. Charles Road. The downtown also features a newly constructed tunnel under the Metra Station to provide a dedicated pedestrian and bicycle connection between the north and south sides of the tracks.



Lombard Pace Bus Stops & Regional Routes

Bus Stops in Lombard
Lombard Bus Routes
Bus Routes in Surrounding Communities
Regional Trails
Parks
Lombard

0 0.375 0.75 1.5 Miles

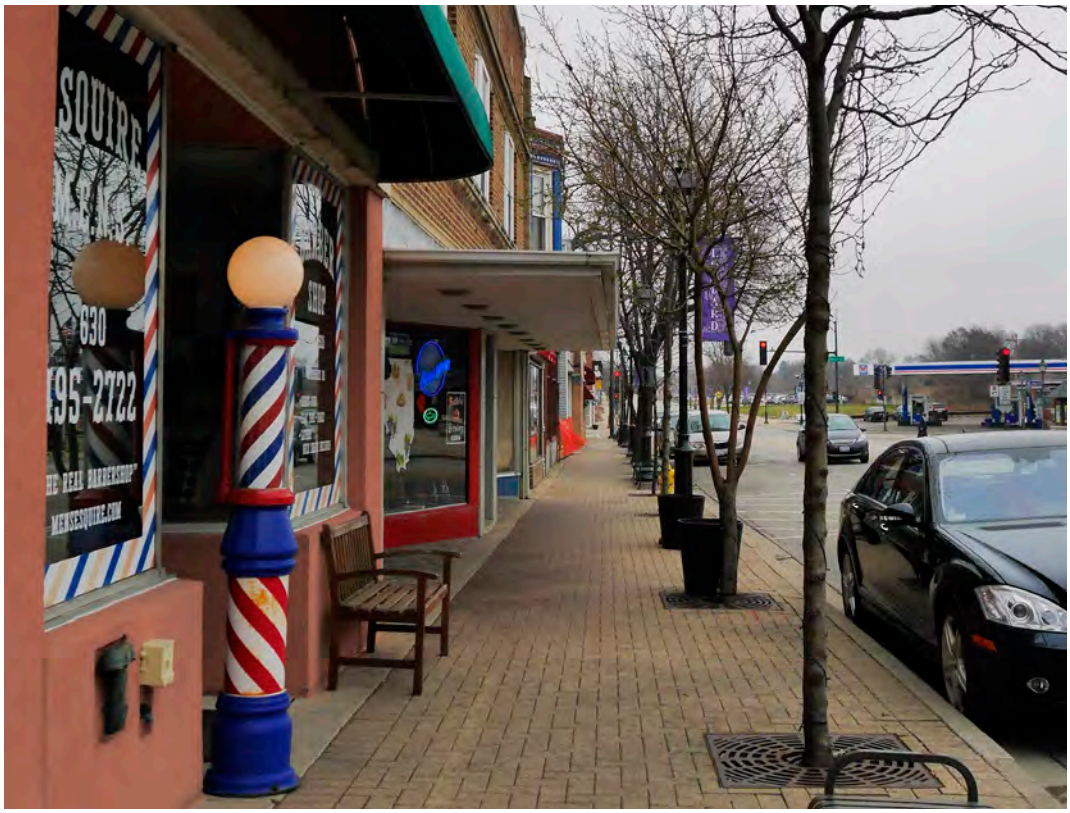
Figure 2.

Regional Forest Preserves

Just beyond Lombard's border lie several Forest Preserve District of DuPage County natural areas, including:

- Hidden Lake County Forest Preserve
- Churchill Woods Forest Preserve
- East Branch Forest Preserve
- Fullerton County Forest Preserve
- Lyman Woods County Forest Preserve

The Forest Preserve District of DuPage County plans to construct a new trail system running north/south along the east branch of the DuPage River. The DuPage County Department of Transportation completed a trail feasibility study in 2004. However, the trail remains conceptual. The County has not identified a potential funding source. A signed route along 22nd Street would connect Lombard to the proposed trail.



The many shops in the Lombard Town Centre are destinations for Lombard residents and visitors.

Bicycle Trails Map: Planned, Programmed, Existing (2013), Courtesy of the Village of Lombard

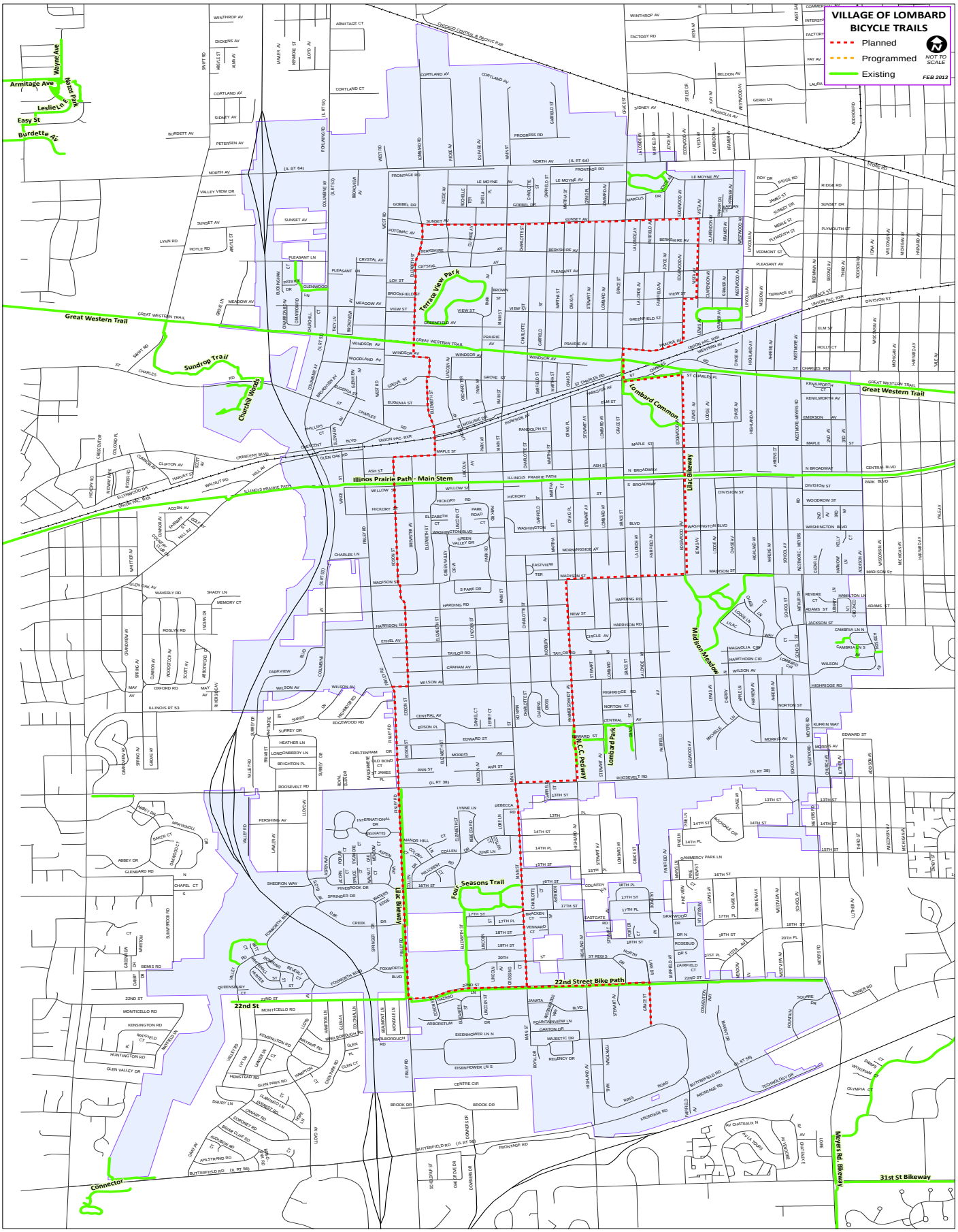


Figure 3.

Regional & Local Bicycle Network

Each year, tens of thousands of pedestrians and cyclists pass through Lombard on the Illinois Prairie Path and the Great Western Trail. Each trail runs east-west through the Village. The trail system connects Lombard to the Village of Villa Park in the east and the Fox River Trail to the west.

The Great Western Trail

The Great Western Trail provides access to the Commons Park and Westmore Woods within Lombard's boundaries, and Churchill Woods beyond its boundaries. The trail is located two blocks north of downtown Lombard and the Lombard Metra Station.

The Illinois Prairie Path

The Illinois Prairie Path runs parallel to S. Broadway Avenue and Willow Street. Like the Great Western Trail, the Illinois Prairie Path is located just two blocks south of downtown Lombard and the Lombard Metra Station.

The Village has recently invested in several trail enhancements to improve user experience, including pedestrian-scale lighting at trail crossings and three overpasses that separate trail users from St. Charles Road.

Trail crossing with stop sign for bicyclists and pedestrians

Illinois Prairie Path & Main Street

Great Western Trail Overpass at Grace Street

Great Western Trail Overpass at Metra Train Tracks near St. Charles Road

Lombard's local bicycle network consists primarily of:

- The Great Western Trail
- The Illinois Prairie Path
- Off-street paths through local parks.

There are no dedicated, on-street connections (i.e., bicycle lanes) that connect neighborhoods to the parks or to each other. There are two established bike routes in the Village. Both include off-street facilities:

- **22nd Street:** from Westmore-Myers Road to Finley Road. West of Finley Road, the route is signed, guiding cyclists to the East Branch Forest Preserve.
- **Finley Road:** between 22nd Street and Roosevelt Road.

While both Finley Road and 22nd Street are designated as off-street routes, the current facilities are narrow and may need additional improvements. Residents who participated in the planning process noted that the intersection of Finley Road and 22nd Street appears difficult to cross. They would like to see a bicycle route that connects to the Illinois Prairie Path. The plan's public input section notes resident comments regarding this and other areas of the Village.

Bike racks along the Great Western Trail and the Illinois Prairie Path give residents and visitors short-term bike parking options. Lombard's downtown area also features bicycle parking.

Bicycle rack locations along trails

Local Sidewalk Network

The Village of Lombard has a nearly complete network of sidewalks. However, gaps do exist, particularly in subdivisions that were formerly unincorporated. The Village's Sidewalk Policy addresses sidewalk network connectivity challenges by installing new sidewalks and by maintaining or replacing existing sidewalks. The policy outlines a tiered sidewalk cost-share program based on anticipated pedestrian volumes. The Village will contribute 100% of the cost of a sidewalk to:

- Areas within 3 blocks of schools
- Trip hazards 1 ¼ inch or greater
- Gaps of three lots or less in a continuous walkway around a city block
- Major trails or pedways
- Gaps adjacent to projects receiving State or Federal aid

The Village also has a 50/50 cost share program for deteriorated sidewalks and to complete a block with gaps. Finally, certain special service areas and new developments are required to pay 100% of sidewalk construction costs.

In addition, there are many intersections within the existing sidewalk network in need of ADA compliant curb ramps and detectable warnings.

Bicycle and Pedestrian Crashes

The Illinois Department of Transportation (IDOT) maintains a database of crashes that occur involving motor vehicles, pedestrians, and cyclists that are reported to the police. Much like almost every other community, data available does not reflect all crashes, since data sets do not include unreported crashes. Furthermore, areas with high numbers of crashes may correspond with areas where many people currently ride bikes and walk. Crashes in areas with low rates of walking or biking may actually show places that are more dangerous to ride, since a higher percentage of people walking or biking were involved in crashes. Without knowing how many people are biking and walking throughout the Village, it is difficult to discern an area's crash rate or level of risk.

Lombard Trail Counts

The estimated annual number of people using the **Great Western Trail** within Lombard Village limits is

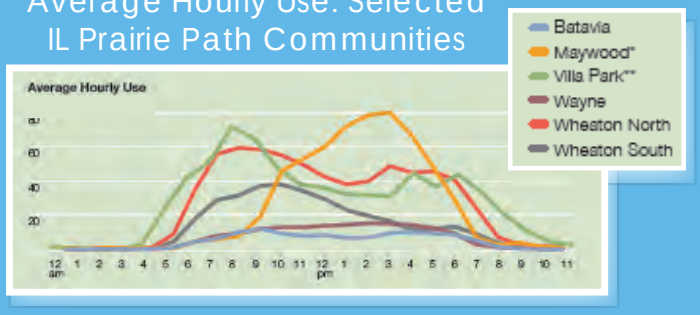
2x

larger than the Village's population.

Hourly usage rates from other trail communities suggest that the **Illinois Prairie Path** is mainly used for **recreation** trips as opposed to utilitarian trips.*

*Asterisks note numbers based on data from other Prairie Path communities.
SOURCES: 2013, *Making Trails Count: Illinois Prairie Path*, Trails for Illinois; Village of Lombard data

Average Hourly Use: Selected IL Prairie Path Communities



Top Trail Activities Along the Prairie Path*

Figure 4. Estimated number of people who visit the Illinois Prairie Path and the Great Western Trail in Lombard and nearby communities.

One fatal bicycle crash occurred in 2010 at the intersection of Park Avenue and the Great Western Trail.

High numbers of crashes occurred along Main Street, Westmore-Meyers Road, Grace Street, Roosevelt Road and 22nd Street. Trail crossings are also high-crash locations.

Figure 5. Bicycle Crashes 2009-2013

Summary of IDOT 2009-2013 bicycle crash reports:

-67 bicycle injury crashes and one fatal crash involving a cyclist occurred on Lombard's streets.

-The fatal crash occurred on Park Avenue near the Great Western Trail. The crash was allegedly caused by the driver failing to yield the right-of-way. The location of this crash is shown in Figure 5.

-The Village's highest number of bicycle crashes between 2009 - 2013 occurred within 100 feet of the Hickory Street and Main Street intersection. The highest injury crash location during this period is at the intersection of Main Street and the Illinois Prairie Path.

-Additional bicycle injury crashes occurred primarily at intersections along Roosevelt Road and Main Street south of the Prairie Path. These crashes occurred for a variety of reasons, including the driver or cyclist failing to yield the right-of-way and cyclists riding against traffic.

Intersection of Roosevelt Road and Main Street

One fatal pedestrian crash occurred in 2013 at the intersection of Highland Avenue and Roosevelt Road (Illinois Route 38).

High numbers of crashes occurred along Main Street, Roosevelt Road, Westmore-Meyers Road, Wilson Avenue, and Elizabeth Street. Trail crossings are also high-crash locations.

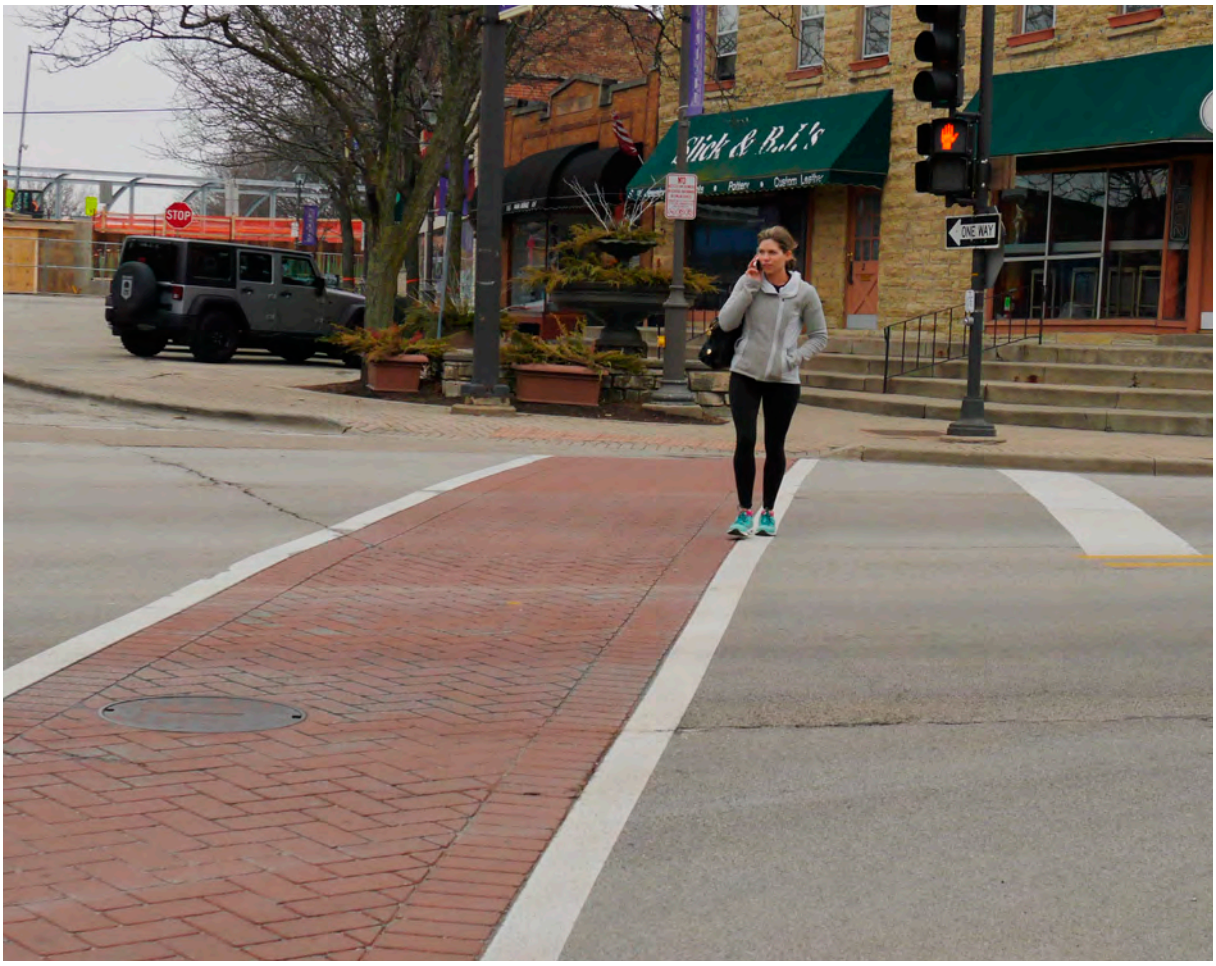
Figure 6. Pedestrian Crashes 2009-2013

Summary of IDOT 2009-2013 pedestrian crash reports:

-37 injury crashes involving pedestrians and one fatal crash.

-The fatal crash occurred at Highland Avenue and Roosevelt Road when a pedestrian crossed against the traffic signal. The location of this crash is shown in Figure 6.

-Pedestrian injury crashes were scattered around the Village. Like bike crashes, several occurred along Roosevelt Road and were caused by pedestrians crossing against a traffic signal and cyclists riding against traffic.



Downtown pedestrian crossing

Highway and Street Network

Understanding Lombard's road network is one of the first steps to presenting recommendations for improved bicycle and pedestrian connections throughout the Village. This section describes general roadway conditions according to the topics presented below. Subsequent sections of the Village-wide Bicycle & Pedestrian Master Plan will investigate how Village planners and engineers can work within these general roadway conditions to redesign transportation within the Village.

Annual Average Daily Traffic (AADT)

Engineers calculate annual average daily traffic (AADT) by dividing a street's yearly traffic volume by 365 days. As one might expect, Interstate routes and large, arterial and collector roadways have far higher AADT estimates than residential streets. The same is true in Lombard. More cars and trucks travel along I-355 and State-jurisdiction roadways per year than smaller, locally-owned roads. Understanding AADT is important to knowing the feasibility for potential bikeway designs. Roadways with high car volumes and high posted speed limits typically require separated or standard bike lanes to keep bicyclists safe and comfortable.

Number of Traffic Lanes

The number of traffic lanes tells planners and engineers about a road's width. Most streets in Lombard have two lanes, traveling in opposing directions. The Village's arterial and collector streets typically feature more lanes.

Speed Limit

The majority of Lombard's street network has a posted speed limit of 25 - 30 miles per hour (MPH). The Illinois Vehicle Code states that residential streets without posted speed limits follow a 30 MPH limit. Arterial streets' posted speed limits vary between 25 - 40 MPH. Posted speed limit is a commonly-used measure when assessing which type of bicycle infrastructure to install on a given roadway.

Roadway Functional Classification

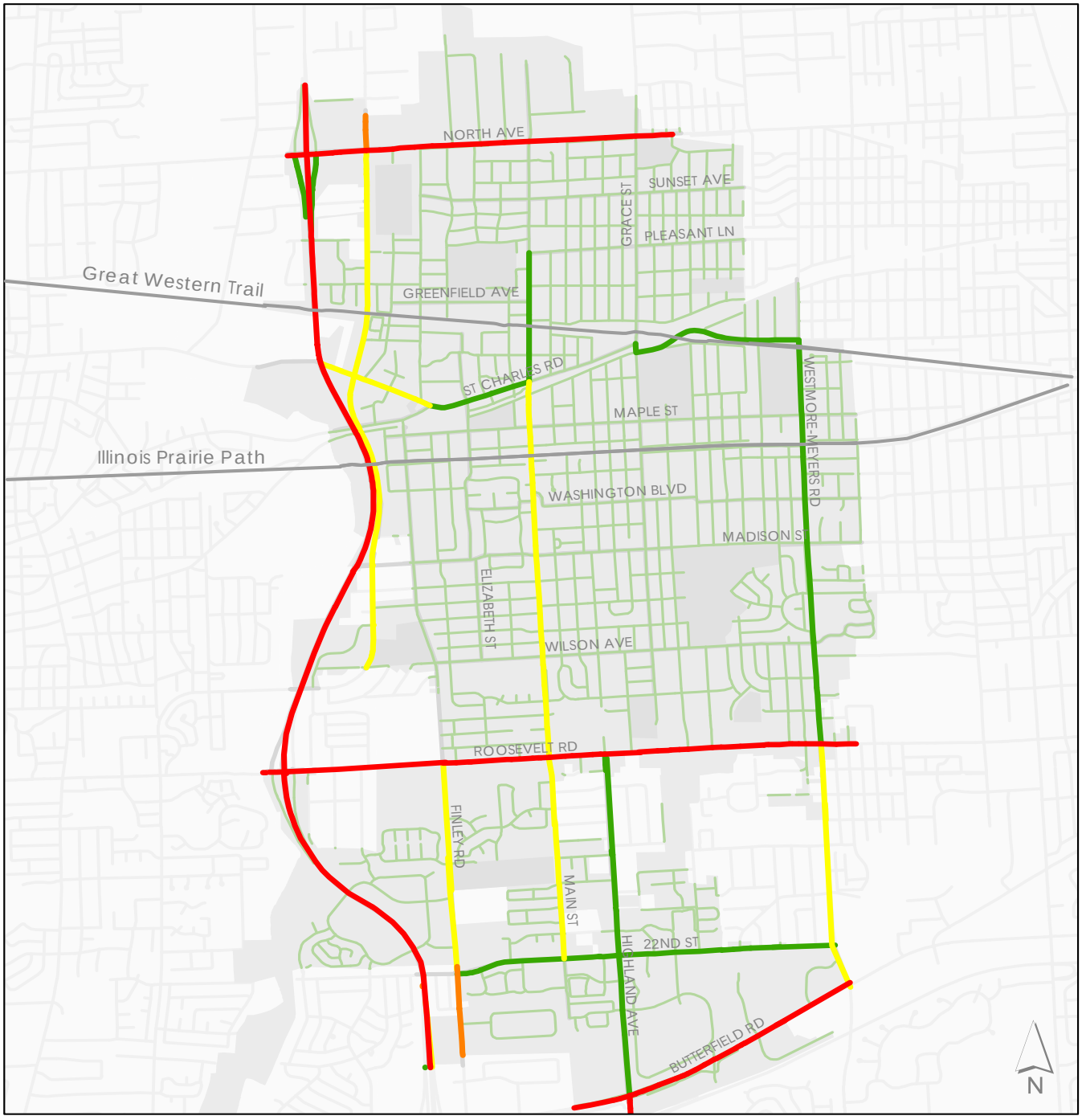
Streets are classified according to their planned use. Interstates are meant for longer-distance travel between cities or, as the name suggests, between states. Arterials and collectors are meant to accommodate higher traffic volumes than local streets. These roads typically offer a convenient, direct way for car drivers to travel across a town or city and reach major destinations. Such routes may need retrofitting to enhance comfort for people outside of private automobiles. Local roads and streets connect subdivisions to arterials and collectors. These streets are lined with trees, have low speeds, and connect to local schools and parks.

Roadway Jurisdictional Responsibility

Multiple government agencies are responsible for the roadways in the Village limits of Lombard. Only a few, short segments of Lombard roadways are owned by DuPage County. The rest are either controlled by the Toll Authority (in the case of I-355 and I-88), the State of Illinois, or the Village of Lombard. Due to multiple owners of the network, it is critical that cooperation between these agencies is maintained on roadway projects and operations of these roadways.

Traffic Signals & Pedestrian Crossing Signs

Most of Lombard's pedestrian crossing signs are located near parks or other open areas. These signs tell motorists to expect pedestrians in crosswalks. Traffic signals are used on roadways that need additional traffic control, greater than that which a stop sign could provide. Stop signs are typically placed on residential, low volume streets.



Source: IDOT

Annual Average Daily Traffic (AADT)

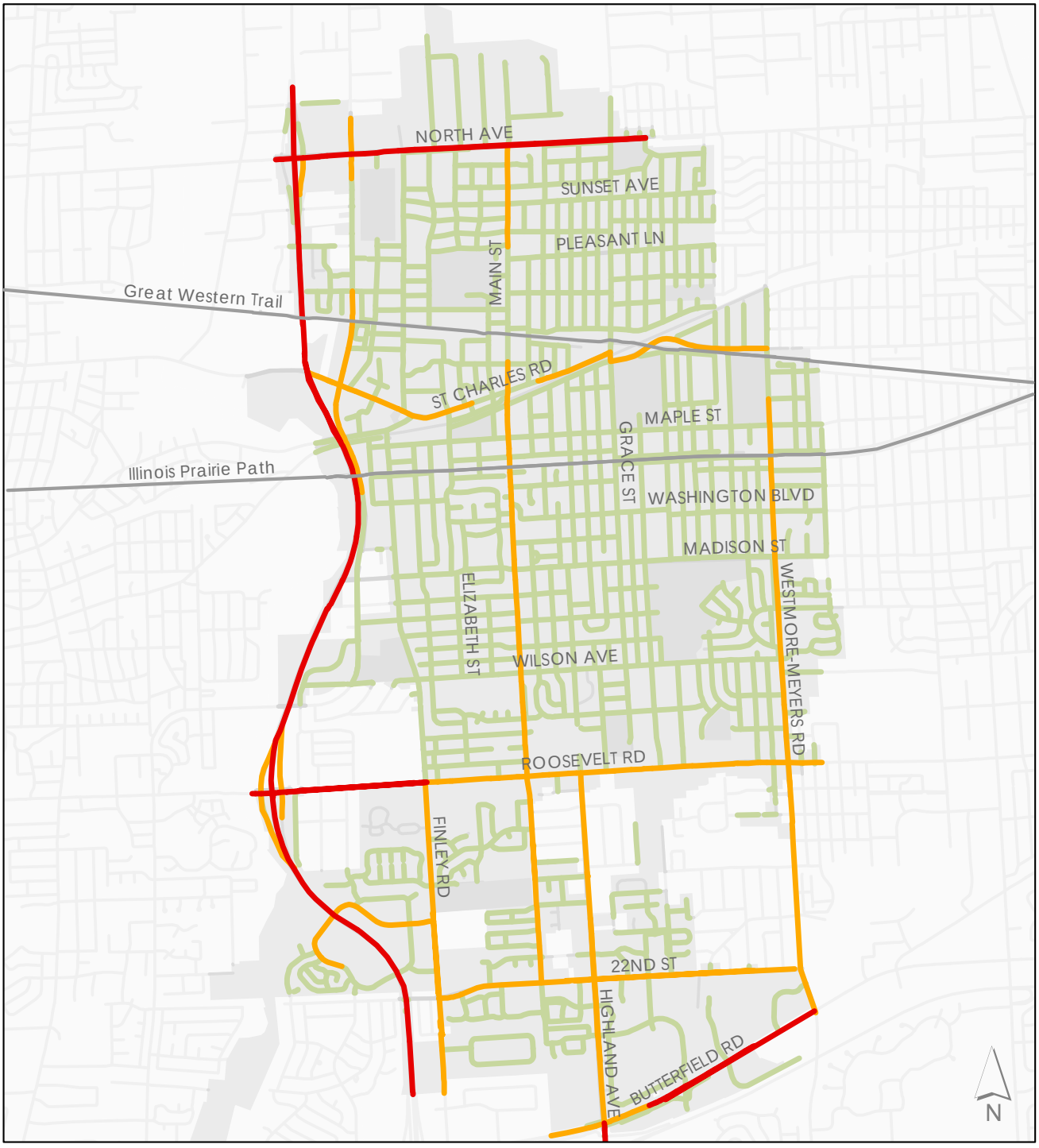
Number of vehicles per day

- < 10,000
- 10,000 - 15,000
- 15,000 - 20,000
- 20,000 - 25,000
- > 25,000

- Regional Trails
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

Figure 7.



Source: IDOT

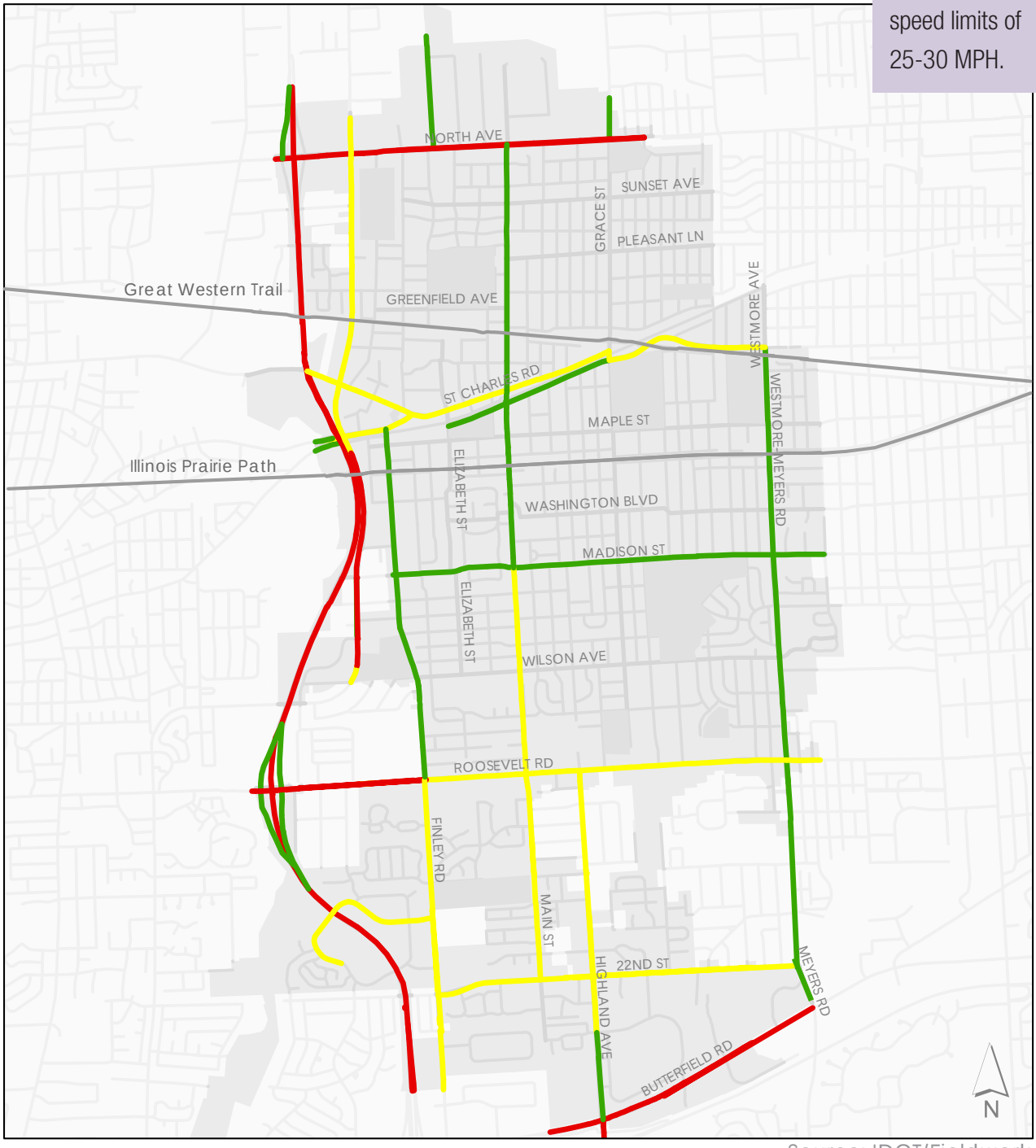
Number of Lanes

- 2 lanes
- 4 lanes
- 5 or more lanes
- Regional Trails
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

Figure 8.

All local roads have speed limits of 25-30 MPH.



Source: IDOT/Fieldwork

Posted Speed Limit on Major Roads

- 25 - 30 MPH
- 35 - 40 MPH
- 45 - 55 MPH
- Regional Trails
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

Figure 9.

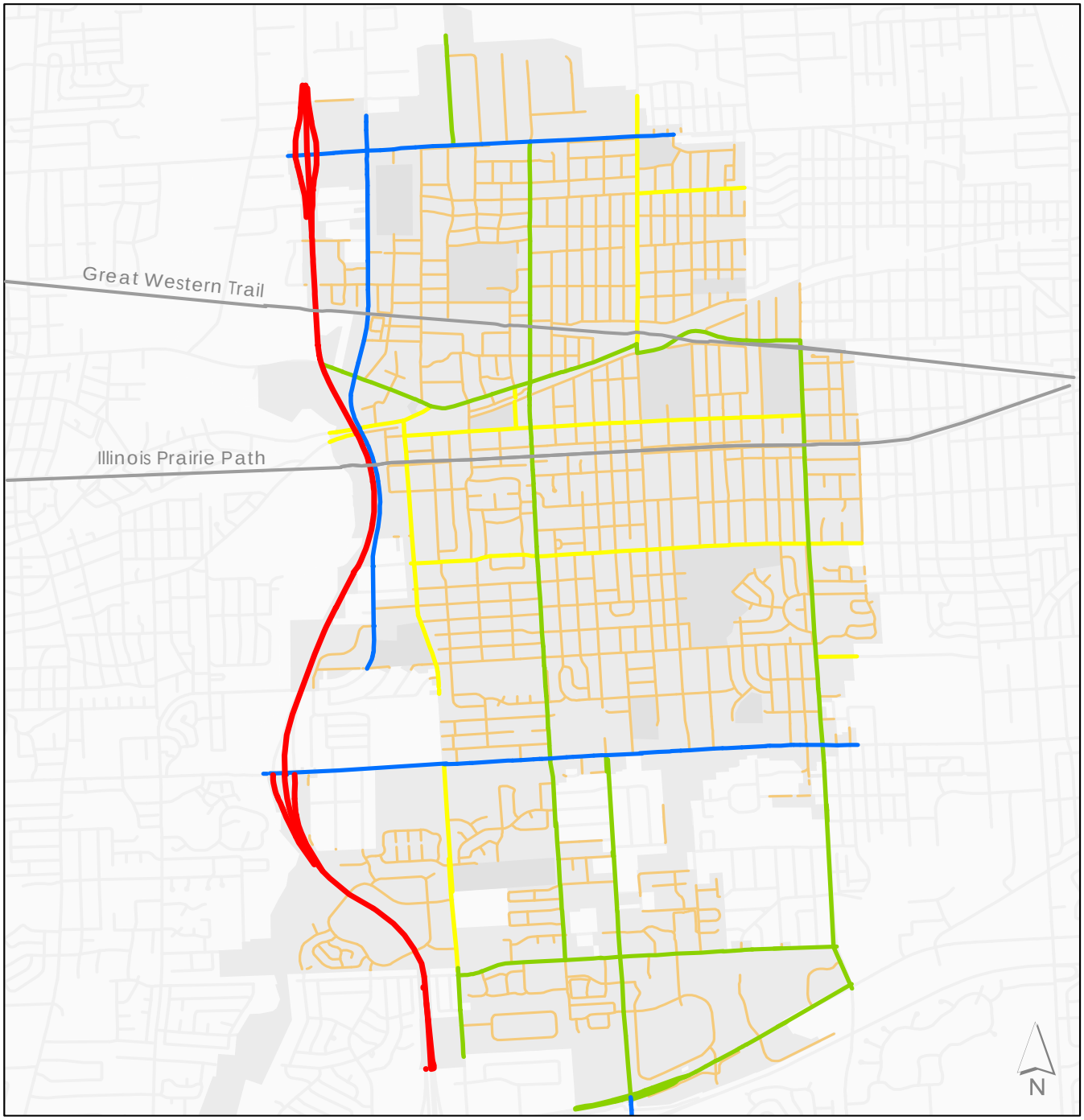

Great Western Trail
Illinois Prairie Path
N
Source: IDOT
Roadway Functional Class
Interstate
Principal Arterial
Minor Arterial
Collector
Local Road or Street
Regional Trails
Parks
Lombard
Miles
0
0.375
0.75
1.5

Figure 10.

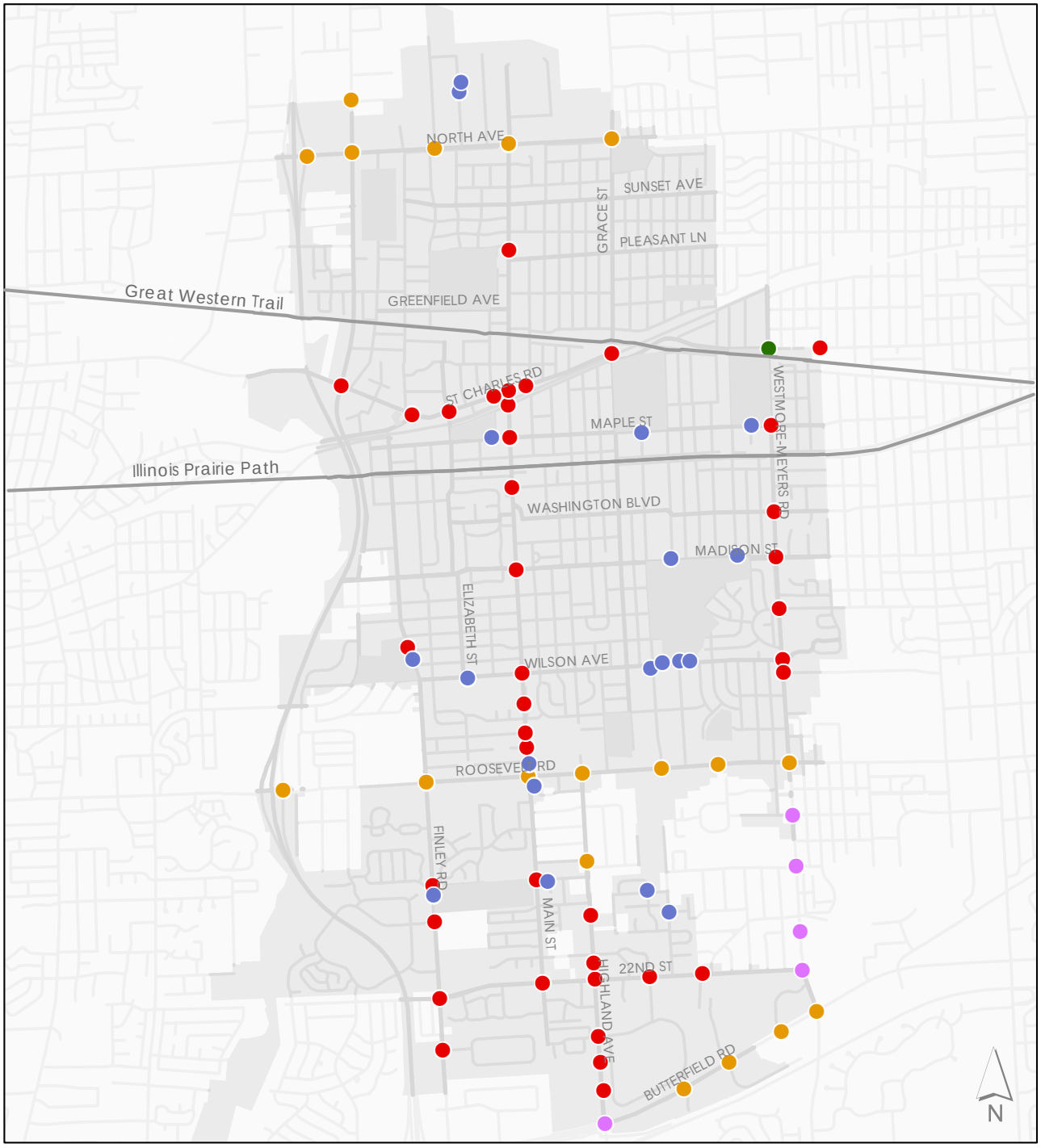
Source: IDOT

Street Jurisdiction

- Interstate
- State Routes
- County Roads
- Local Roads
- Regional Trails
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

Figure 11.



Source: Village of Lombard

Traffic Signals: Location & Ownership

- Lombard
- State
- Villa Park
- DuPage County
- Pedestrian Crossing Sign
- Regional Trails
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

Figure 12.

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Priority Corridors for Cyclists and Pedestrians

The northern portion of the Village has a traditional, grid-style street system and tends to be more comfortable to bicycle and walk in than the southern portion of the Village. Streets in the southern area lack a grid-style organization. These areas feature curved residential streets with many dead-ends. Higher car volume streets are often the only direct routes through these areas. "Big-box" stores and suburban-style strip center development are the predominate commercial land uses.

Regional trails often have adequate amenities such as benches, drinking fountains, and Lombard Trail System branded maps. These trails are widely used by people, have good access connections, and contribute to and create a strong bicycle culture in the Village. Many of the crossings for these trails have high visibility crosswalks and signage. However, residents perceive crossings across busier roadways with higher speeds and traffic volumes as inadequate.

The following is an overview of major streets within the Village of Lombard. Village limits are not the end of the roadways' extents; when thinking about the priority corridors, planners and engineers must consider these corridors' effects on the greater region. With improved infrastructure for people walking and biking, these streets could enhance the existing bicycle and pedestrian network. A summary of data and characteristics of each road are included below.

The intersection of Westmore-Meyers Road & Madison Street is perceived as challenging to cross.

Great Western Trail Pedestrian Bridge crossing over Grace Street

Figure 13.

North Avenue (Illinois Route 64)

Environment for Walking and Biking

This auto-oriented, principal arterial controlled by IDOT is in the northern portion of the Village. It enables car connections to neighboring municipalities and other regional destinations. The wide roadway is a major barrier to walking, especially because there is a large gap in the sidewalk network in the middle of this corridor, due to a noise barrier. Crossing the five lanes or more with fast-moving traffic is challenging.

The residential neighborhood east of Garfield Street has a row of sound-blocking barriers adjacent to North Avenue. The sidewalk continues along the North Avenue frontage road through these residential neighborhoods. North of North Avenue is an industrial park and contains some commercial properties, big-box retail and a hotel.

Roadway Characteristics - North Avenue

Right-of-Way Width: 72 ft

AADT: 41,000 - 52,000 vehicles

Speed Limit: 45 MPH

Number of lanes: Five or more lanes along segment

Parking: No parking along segment

Median: 6-30 ft median

Crashes: Two cyclist injury crashes and no pedestrian injury crashes

Intersection of North Avenue and Main Street

Roosevelt Road (Illinois Route 38)

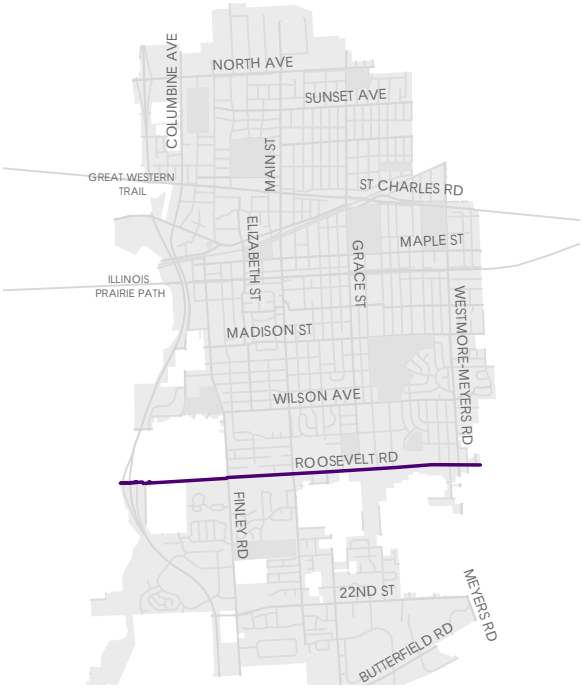


Figure 14.

Environment for Walking and Biking

A large portion of the commercial district in Lombard is located along Roosevelt Road, an IDOT controlled principal arterial. Like North Avenue, IDOT classifies Roosevelt Road as a Strategic Regional Arterial. Since so much retail is located along this corridor and there are residential areas on both sides of the roadway, many people were observed bicycling and walking along the corridor. There are quite a few surface parking lots and all businesses have one or more driveways. For example, there are six driveways with wide aprons within 500 feet of each other on the south side of Roosevelt Road, just east of Highland Avenue. There is a consistent network of sidewalks on both sides of the street throughout the corridor. There are typically grass buffers separating the sidewalk from the roadway.

The signalized intersections all have wide turn radii and pedestrians must cross six lanes of traffic with no refuge islands. It is evident from the crash data that people encounter problems when crossing Roosevelt Road on foot or bike. There is also a PACE bus route along Roosevelt Road, which acts as a pedestrian trip generator.

Roadway Characteristics - Roosevelt Road

Right-of-Way Width: 48-72 ft; varies along corridor

AADT: 41,000 vehicles

Speed Limit: 35 - 45 MPH

Number of lanes: Four traffic lanes

Parking: Surface parking lots along corridor

Median: 12 - 54 feet

Crashes: Six cyclist injury crashes, seven pedestrian injury crashes and one pedestrian fatal crash

Intersection of Roosevelt Road and Main Street

Butterfield Road (Illinois Route 56)

Environment for Walking and Biking

Butterfield Road (State Route 56) is an arterial roadway, controlled by IDOT. Butterfield Road runs along Lombard's southern boundary. The roadway currently funnels high levels of car traffic through the community and into surrounding jurisdictions. Finley Square Mall, Butterfield Plaza, and Yorktown Center border Butterfield Road, as well as other large retail establishments. Butterfield Road's high speeds and high levels of car traffic make the corridor more comfortable to drive along rather than walk or ride a bicycle. Two injury-causing pedestrian crashes occurred on Butterfield Road between 2009 – 2013. The road may also prove difficult to cross on foot or by bicycle. Interstate 88 is directly to the south of Butterfield Road, another obstacle for north-south travel across Butterfield. Pace bus service travels along Butterfield Road and includes many stops near Yorktown Center.

Roadway Characteristics - Butterfield Road

Right-of-Way Width: Most segments are greater than 41 feet wide

AADT: 47,000 - 55,000 vehicles

Speed Limit: 45 MPH

Number of Lanes: Five

Parking: No parking allowed

Median: Between 6 ft and 20 ft, depending on the segment

Crashes: Two pedestrian injury crashes

Figure 15.

Columbine Avenue (Illinois Route 53)

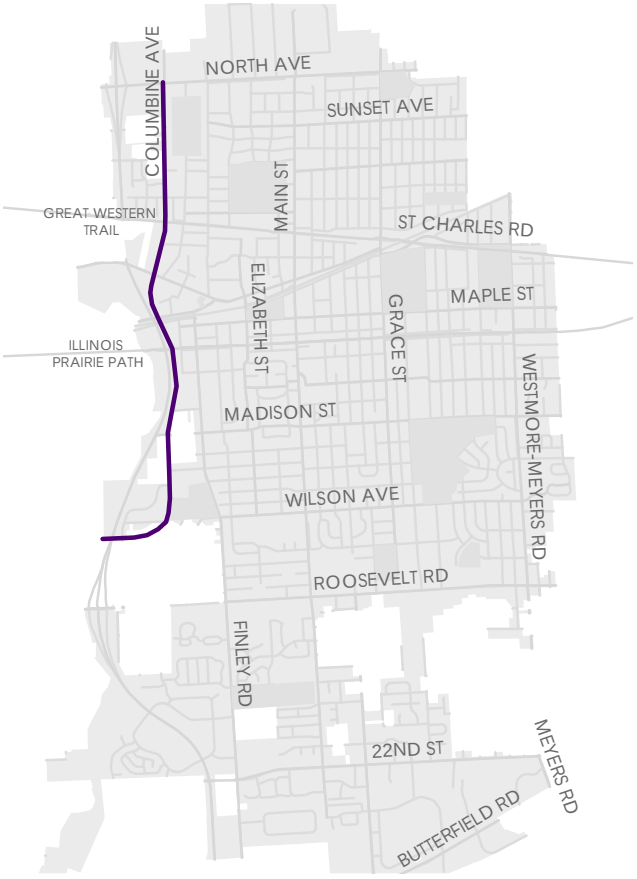


Figure 16.

Environment for Walking and Biking

Illinois Route 53 (Columbine Avenue) is a State-owned roadway running north-south near the Village's western boundary. The corridor runs roughly parallel with I-355. Most of the corridor is surrounded by single-family homes, although two clusters of office buildings dot the northern and southern segments, respectively. The curving roadway has posted speed limits higher than most other streets in the Village. This may make the route less welcoming to people bicycling than other streets throughout Lombard. Two crashes have occurred at the intersection of Columbine Avenue and North Avenue from 2009 – 2013. Moreover, Columbine is currently missing sidewalks. Nonetheless, Columbine Avenue is not without a significant destination: it borders Sunset Knoll Park on its southern end.

Roadway Characteristics - Columbine Avenue

Right-of-Way Width: 31 – 40 feet

AADT: 17,000 - 20,000 vehicles

Speed Limit: 35 - 45 MPH

Number of Lanes: Some segments contain two travel lanes, others four travel lanes

Parking: No parking

Median: No median

Crashes: Cyclist injury-causing crashes at the intersection of North Avenue

Highland Avenue (between Roosevelt Road and Butterfield Road)

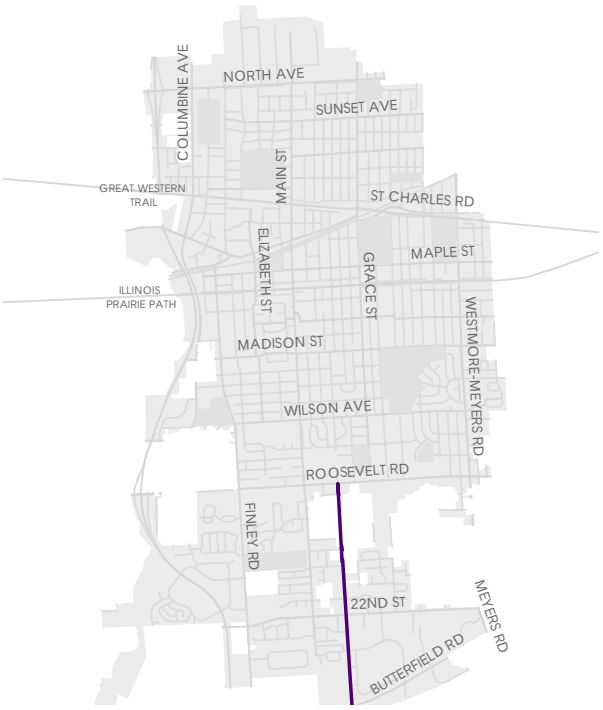


Figure 17.

Environment for Walking and Biking

Highland Avenue is a wide north-south road located in southern Lombard. IDOT controls the roadway from 13th Street through 20th Street, and the Village of Lombard controls the roadway south of 20th Street. The corridor is principally used to funnel motor vehicles throughout this region and beyond. The road features a center median to separate cars traveling in opposing directions. Some sides of the road are missing sidewalks, most notably near Yorktown Center. Many Lombard residents live near the area surrounding Highland Avenue. The corridor contains both single- and multi-family housing as well as offices and Allerton Ridge Cemetery. Sidewalks presently exist excepting the bridge over Columbine Avenue. A path is planned to connect Lyman Woods County Forest Preserve with Lombard's southern boundary.

Roadway Characteristics - Highland Avenue

Right-of-Way Width: 61 – 70 feet

AADT: 14,000 - 28,000 vehicles

Speed Limit: Varies between 25 MPH - 35 MPH, depending on the segment

Number of Lanes: The majority of the street has four travel lanes

Parking: No parking allowed

Median: 11 – 20 feet

Crashes: Multiple bicycle and pedestrian crashes; one fatal pedestrian crash at Roosevelt Road

Main Street (between North Avenue and 22nd Street)

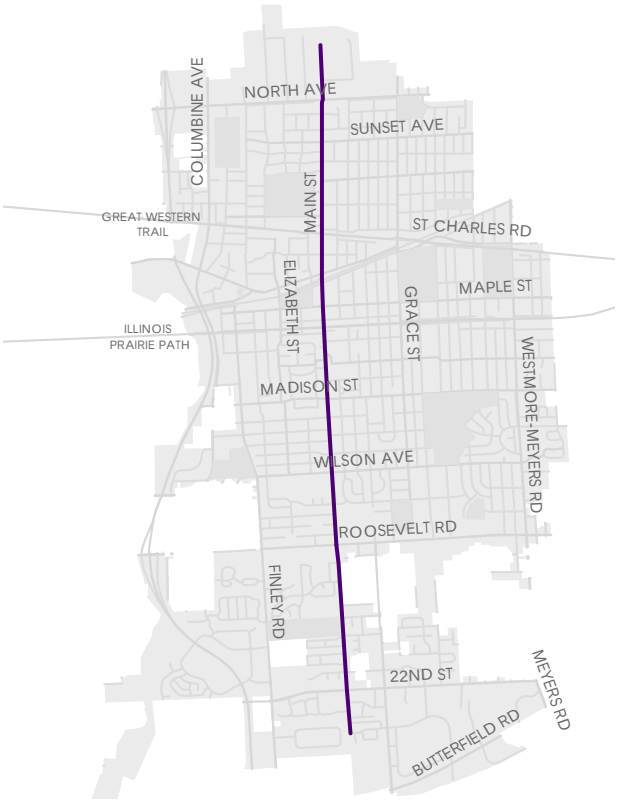


Figure 18.

Roadway Characteristics - Main Street

Right-of-Way Width: 21-60 ft; varies across the corridor.

AADT: 5,000 – 15,000 vehicles north of Metra tracks; 15,000 – 17,000 vehicles south of Metra tracks

Speed Limit: 25 – 30 MPH north of Madison Street; 35 MPH south of Madison Street

Number of lanes: Typically four through travel lanes, except just north of the Metra station, where the corridor briefly narrows to two travel lanes.

Parking: Prohibited along the majority, except just north of St. Charles Road, near downtown

Median: A short segment, south of Roosevelt Road contains a median (11-20 ft).

Crashes: 28 between 2009 - 2013.

Environment for Walking and Biking

Main Street provides a north-south connection between the main commercial districts, parks, residential areas, trails, and the Metra Station. There are consistent sidewalks along all of Main Street. North of the downtown area, single-family residential driveways consistently feed into Main Street. There are pedestrian crossings where St. Charles Road and Parkside Avenue cross Main Street near the Metra Station.

Main Street is a high-crash corridor. There were 28 bicyclist- or pedestrian-involved crashes between 2009 - 2013, many of which resulted in injuries. The intersection of Main Street and St. Charles Road is challenging for pedestrians, due to its angled crosswalks and wide curb radii. The crosswalks across St. Charles Road are parallel rather than continental style. It is also inadvisable to have one large corner curb ramp rather than two separate ramps pointing in the direction of travel. The latter style offers greater benefit to the visually impaired.

The intersection of Main Street and the Illinois Prairie Path was retrofitted with a pedestrian refuge island, yet the four travel lanes may intimidate trail users.

Much of the land on Main Street from 22nd Street to Wilson Avenue is styled after suburban strip center commercial development. The street's current design is frequently uncomfortable for bicycles due to fast-moving traffic. There are also many commercial driveways that cross the sidewalk, adding potential conflict points between people driving and biking. In most parts of this segment, there is little to no buffer between the traffic and sidewalk. The grass buffer between sidewalk and parking lots varies along the segment as well, which could make it challenging to acquire land for a sidepath.

At Crystal Avenue, a HAWK signal (High-Intensity Activated crosswalk beacon) connects children in the neighborhoods west of Main Street to the Pleasant Lane Elementary School. There is a high visibility crosswalk and safety signage for the Great Western Trail. Since there are only two lanes at this segment of the corridor, the crossing treatment appears effective.

The intersection of Main Sreet and the Illinois Prairie Path has high visibility striping and a refuge island for two-stage crossing. The Village also has plans to add rectangular rapid flash beacons (RRFBs) at this location in Spring 2016.

Informational kiosk in Lombard's downtown

The intersection of Main Street and St. Charles Road is a gateway into the Downtown area. There is a pedestrian plaza with public art and a Lombard informational kiosk.

Intersection of Main Street and St. Charles Road with angled crosswalks and wide curb radii

St. Charles Road

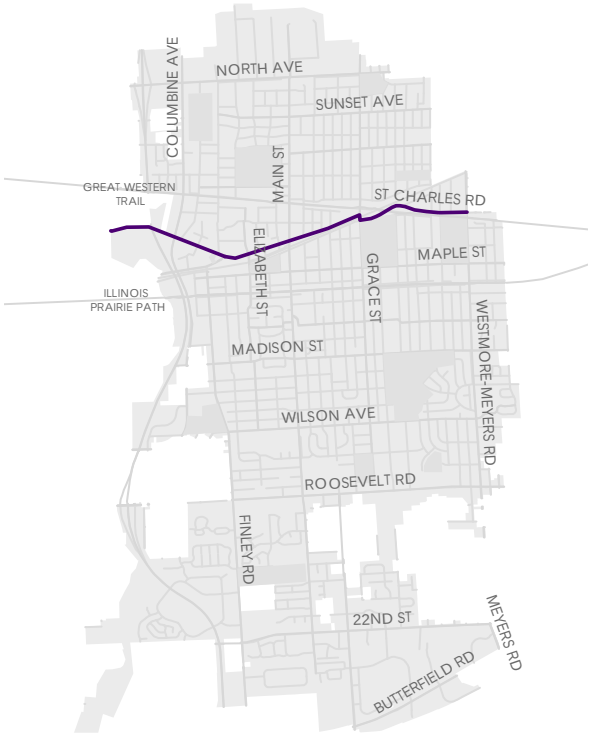


Figure 19.

Roadway Characteristics - St. Charles Road

Right-of-Way Width: 41 – 50 ft; 31 – 40 ft between I-355 and Westmore-Meyers Road

AADT: 9,000 - 17,000

Speed Limit: 25 - 40 MPH

Number of Lanes: Some segments have two lanes, others four

Parking: Parallel parking in some areas

Median: No median

Crashes: Three pedestrian crashes, three bicycle crashes

Environment for Walking and Biking

St. Charles Road is one of the main streets in the Village's downtown corridor. St. Charles Road is lined with popular, family-owned businesses such as restaurants, cafés, and other downtown destinations. Paradise Bay Water Park/the Commons, Lilacia Park, Helen Plum Library, and Westmore Woods are not far from St. Charles Road. The Churchill Woods Forest Preserve lies just outside Village limits to the west.

The Lombard Metra Station is not far, making it a heavily used pedestrian corridor. Further east, railroad lines form an at-grade crossing with St. Charles Road/Grace Street. The Great Western Trail also intersects with the street via overpass. Several of the crosswalks across St. Charles Road in the downtown area feature decorative brick paving. The pedestrian environment is further enhanced by decorative lighting, benches, and brick sidewalks. IDOT records show several pedestrian and bicycle crashes along St. Charles Road from 2009 – 2013. However, this may coincide with increased numbers of people walking and biking along the corridor.

Westmore-Meyers Road (between Roosevelt Road and St. Charles Road)

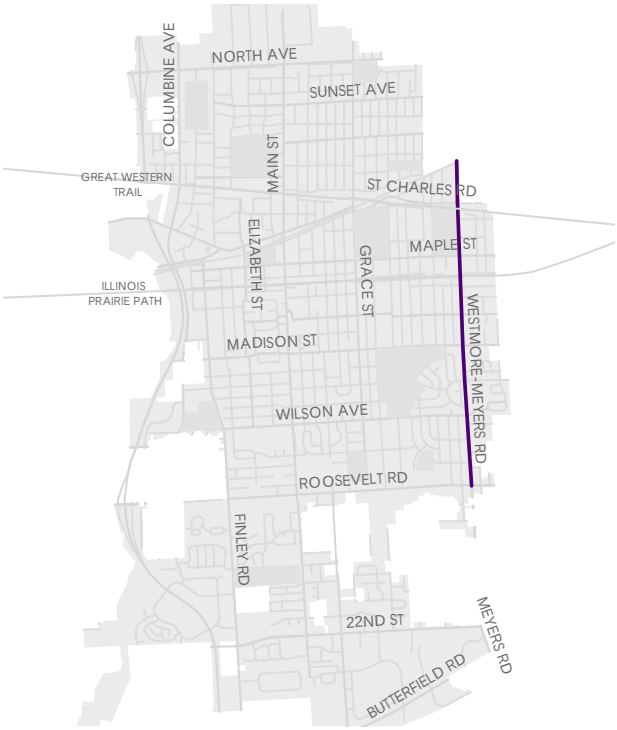


Figure 20.

Environment for Walking and Biking

Westmore-Meyers Road runs north and south, connecting primarily single-family residential to commercial and institutional land uses as well as neighboring municipalities. Westmore-Meyers Road is a minor arterial roadway that crosses the Illinois Prairie Path and the Great Western Trail. There are large surface-level parking lots south of Madison Street that detract from the pedestrian-scale walking experience. Currently, it would be uncomfortable for bicyclists to share the road with vehicles in the four lane portion south of Emerson Avenue. From observations, vehicles appear to travel faster than the 30 MPH speed limit, perhaps due to the wide roadway configuration. Furthermore, the crossing for the Illinois Prairie Path is difficult. While there is bicycle signage, there is no signalization, traffic moves quickly, and there is no refuge island, meaning people cannot cross in phases.

Increasing comfort for pedestrians should also be considered, especially because there is a Pace bus route that runs along Westmore-Meyers Road from Washington Boulevard to 22nd Street. Pedestrians must cross wide intersections without refuge islands and with limited crossing time.

Roadway Characteristics - Westmore-Meyers Road

Right-of-Way Width: 21-50 ft wide, varies across the corridor

AADT: 12,000 vehicles

Speed Limit: 25 - 30 MPH

Number of lanes: Four through traffic lanes, except where it narrows to two a few blocks before St. Charles Road

Parking: No parking allowed along corridor, but there are large surface-level parking lots south of Madison Street

Median: There is no median.

Crashes: Two pedestrian crashes, five bicycle crashes

Finley Road (from Sunset Avenue to 22nd Street)

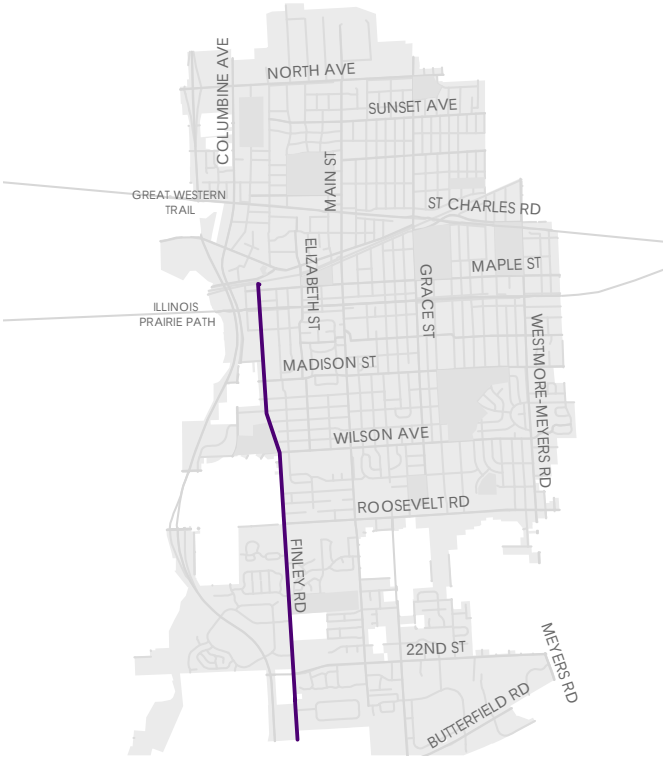


Figure 21.

Finley Road sidepath end

Roadway Characteristics - Finley Road

Right-of-Way Width: 30-54 ft; varies across the corridor

AADT: 5,000-10,000 vehicles north of Roosevelt; 15,000-20,000 vehicles south of Roosevelt

Speed Limit: 30 MPH north of Roosevelt; 35 MPH south of Roosevelt

Number of lanes: Two traffic lanes north of Roosevelt; four traffic lanes south of Roosevelt

Parking: No parking along segment.

Median: No median north of Roosevelt; 11-20 ft median south of Roosevelt

Crashes: Two pedestrian injury crashes and one bicycle injury crash near Finley Road & Roosevelt Road

Environment for Walking and Biking

Finley Road is a major collector, and connects to 22nd Street in the southern portion of the Village. Just south of the Finley Road and Roosevelt Road intersection, traffic speeds increase. Walking and biking along the corridor feels akin to a highway, producing an uncomfortable environment.

There is a standard-sized pedestrian sidewalk along the roadway, although much of it is overgrown with shrubbery, creating obstacles for bicyclists and pedestrians.According to a Village of Lombard existing and proposed bicycle trails map, there is already a sidepath on Finley Road south of Roosevelt Road. However, the sidepath ends on one side of the road and switches to the other side; those on foot and bicycle are forced to cross the roadway at locations that are not signalized or marked. There is quite a bit of multifamily and single-family housing and some commercial and industrial uses along this corridor.

Finley Road and 22nd Street is also a wide, uncomfortable crossing for bicyclists due to the lack of clearly marked crosswalks, wide roadways, and wide turn radii.

22nd Street (between Finley Road and Meyers Road)

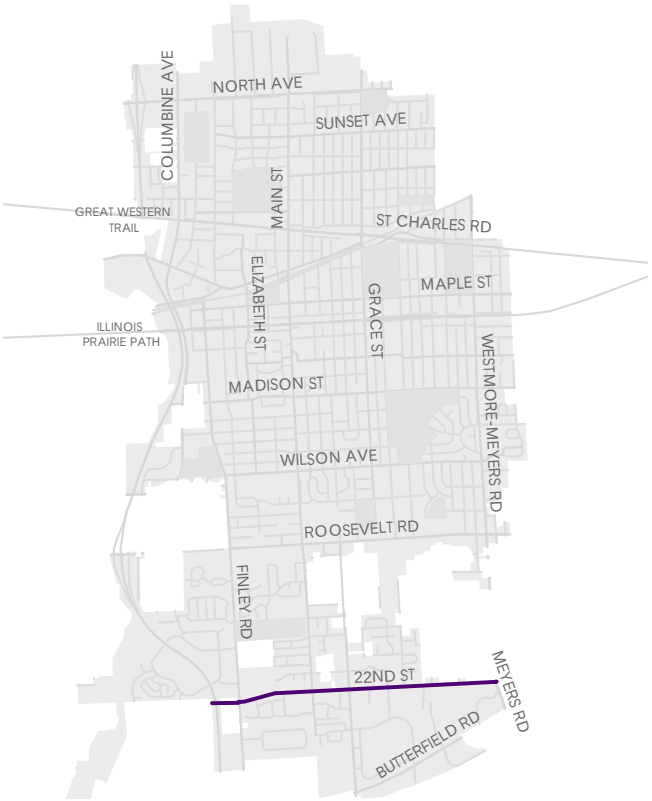


Figure 22.

This minor arterial roadway connects the east and west sides of Lombard in the southern portion of the Village, passing through primarily commercial land uses and a significant portion of the Village's multifamily housing. Yorktown Mall is a key destination to which this roadway connects residents. This street is located in the southern portion of the proposed Lilac Bikeway and, according to a Village of Lombard existing and proposed bicycle trails map, there is already an existing 22nd Street bicycle path that connects to the Finley Road bicycle path. This intersection of 22nd Street and Finley Road has signage and acts as a gateway to the Village.

Roadway Characteristics - 22nd Street

Right-of-Way Width: 34-48 ft; varies along corridor

AADT: 10,000-15,000 vehicles

Speed Limit: 40 MPH

Number of lanes: Four traffic lanes

Parking: No parking along the segment.

Median: 11-20 ft median

Crashes: Two bicycle injury crashes

22nd Street and Finley Road sidepath

Madison Street (between Finley Road and Westmore-Meyers Road)

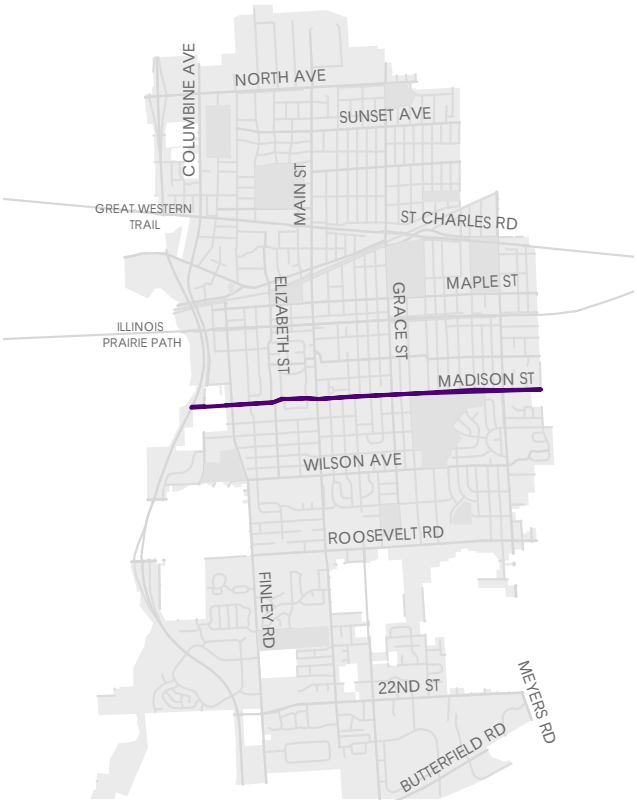


Figure 23.

Roadway Characteristics - Madison Street

Right-of-Way Width: Varies between 21-40 feet

AADT: 3,000-5,000 vehicles

Speed Limit: 30 MPH

Number of lanes: Two traffic lanes

Parking: No parking along segment

Median: There is no median

Crashes: Three bicycle injury crashes; no pedestrian injury crashes

Environment for Walking and Biking

This major collector roadway connects the east and west portions of Lombard and passes mainly through single-family residential land, institutional, and park land uses. The Madison Street and Main Street intersection feels uncomfortable for pedestrians. Current conditions include wide turn radii and an absence of marked crosswalks.

Intersection of Madison Street and Main Street

Grace Street

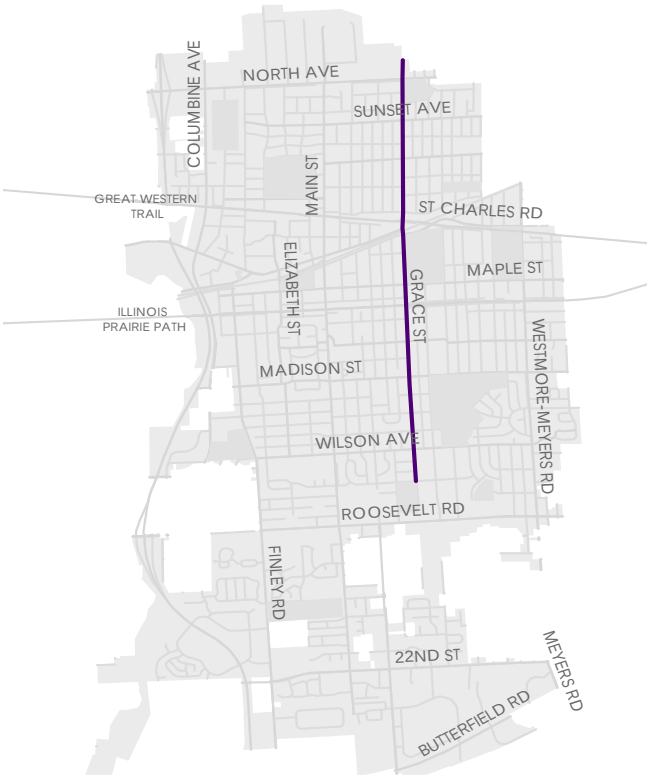


Figure 24.

Roadway Characteristics - Grace Street

Right-of-Way Width: 19-36 ft; varies across the corridor.

AADT: <3,000 vehicles south of the Great Western Trail; 5,000-10,000 vehicles on the northern portion

Speed Limit: 30 MPH south of the Great Western Trail; >30 MPH north where it connects to North Ave.

Number of lanes: Two lanes south of the Great Western Trail; four lanes north of Great Western Trail

Parking: No parking allowed throughout corridor.

Median: There is no median.

Crashes: Three bicycle crashes

Environment for Walking and Biking

Grace Street is a Lombard-owned collector street that passes mostly through single-family residential areas and also borders one side of Lombard Common Park. There is an attractive Great Western Trail pedestrian bridge where it crosses Grace Street.

However, the intersection where Grace Street crosses Saint Charles Road, the Metra train tracks and Parkside Avenue is a challenge for pedestrians. The intersections have wide turn radii, however the once-faded crosswalks were restriped in 2015. The at-grade, pedestrian crossing at the railroad tracks is in the middle of the sidewalk, which blocks the pedestrian way and hampers accessibility.

Maple Street

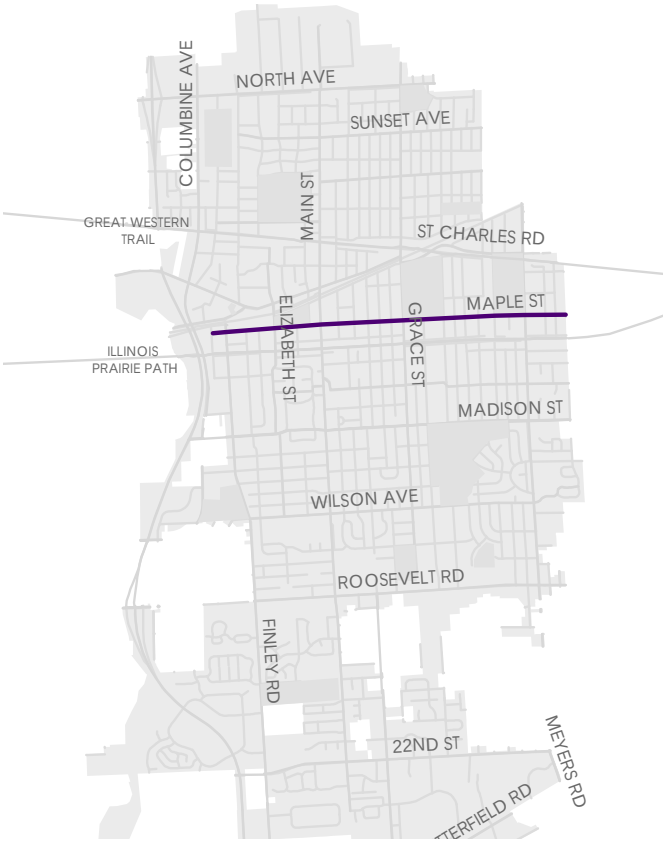


Figure 25.

Environment for Walking and Biking

Maple Street is a fairly quiet, low volume street in a residential area. It is conveniently situated next to the Helen Plum Library and Lilacia Park. Maple Street is important for Lombard's existing bicycle and pedestrian network, as it provides a comfortable route across the Village. The western segment of the street is bordered by multiple places of worship and schools. As of this report's publication, the Lombard Historical Society also takes up residence on Maple Street. One can reach the Commons and Westmore Woods by traveling east along Maple.

Roadway Characteristics - Maple Street

Right-of-Way Width: 21 – 30 feet

AADT: 3,000-5,000 vehicles

Speed Limit: 25 MPH

Number of Lanes: Two

Parking: Parallel parking on the south side of the street

Median: No median

Crashes: The intersection of Maple Street and Main Street is identified as a high-crash cluster on this report's bicycle crash map

Residential Streets in Lombard

Most of Lombard's residential streets are low-volume and therefore offer a comfortable environment for bicyclists and pedestrians. There is a sidewalk network that Lombard residents currently can use to walk to neighborhood schools and parks. Many of these corridors could offer safe bicycle routes, however they are often short, or not through streets. Bicyclists must cross Lombard's arterial and collector streets at certain intersections which can prove difficult and potentially unsafe.

Edson Avenue is a residential street that runs north-south through the Village, connecting residents with the Illinois Prairie Path. Sunset Knolls Park is also located nearby.

Existing Programs and Policies

Policies and Ordinances

Complete Streets Policy

The Village of Lombard's policy acknowledges a need to design streets to accommodate all road users, where feasible. The policy provides examples for transforming traditional suburban car-oriented roadways, including the following guidance:

- Widen shared paths, sidewalks and landscaped buffers
- Add bike lanes and other pavement markings
- Increase signage

The policy also provides a roadway project prioritization system for considering multimodal demand and recommends facility dimensions for each mode of travel.

Bicycle Use

The Village of Lombard Code of Ordinances addresses the use of Bicycles in Title VII, Chapter 71. The code is mostly consistent with the Illinois Vehicle Code. Section 71.14 of the code addresses bicycling on sidewalks. Cyclists are permitted to ride on sidewalks in the Village, except in the central business district where a cyclist must dismount and walk his or her bike.

Snow Removal

The Village requires all commercially zoned properties adjacent to public sidewalks to clear at least 36 inches of the sidewalk within 24 hours of a snow storm. Despite the policy, several participants in the public process noted that sidewalks are not always cleared in the winter, which makes walking difficult. The blocks leading to downtown Lombard were of particular note.

ADA Transition Plan

The Village of Lombard is currently developing an ADA transition plan and anticipates adoption in 2016.

Snow removal policies are important for creating a community that is walkable and bikeable throughout all seasons.

Programs

There are several bicycle- and pedestrian-focused activities and events that are already happening in Lombard. These include:

- **Bike to Work Week:** For several years, the Village has celebrated Bike to Work Week in June by encouraging residents and employees to bike for all or part of their trip to work.
- **Traffic Safety PSAs:** The Village Police Department developed a Public Safety video that explains Illinois' "must stop for pedestrians" law in 2014. The video is currently available at the following URL: https://www.youtube.com/watch?v=Ilmo_7bi1vE.
- **Safe Routes to School:** The Village of Lombard has developed preferred walking route maps for all of the schools in its boundary area and submitted two Safe Routes to School applications to fund sidewalk construction in neighborhoods with gaps. Neither application was selected by the Illinois Department of Transportation for funding.
- **Illinois Prairie Path Clean-Up:** The Village of Lombard organizes an annual clean-up on the trail to ensure that it is clear of debris for all users.

There are several additional programs and events that occur annually in Lombard. While these events are not bicycle or pedestrian focused, they represent an opportunity to reach out to the public about pedestrian and bicycle safety and awareness:

- **Lilac Time:** An annual celebration of springtime in the Village, the event boasts numerous activities throughout the month of May, including the Lilac Parade and the Mutt Strut 5K and Puppy Path.
- **National Night Out:** Every August, Village agencies and organizations gather to share information about safety in the community.
- **Cruise Nights:** Each week throughout the summer months, the Village holds a street festival with a variety of programmed activities.

Safe Routes to School (SRTS) programs encourage children and families to bike and walk to school by identifying safe and comfortable travel routes. The Village has produced a suggested walking route map for each school.

Village of Lombard Plan and Policy Review

As a part of the planning process, the consulting team reviewed relevant local and regional plans to better understand planned and existing conditions. Table 1 summarizes plans reviewed as part of this project.

Table 1. Existing Plans

Category	Plan Title	Maps
Villagewide Plans	Village of Lombard Comprehensive Plan (2014) Village of Lombard 2014 Strategic Plan Village of Lombard Annexation Strategies Plan, Update 2009	Village of Lombard Zoning Map (2015)
Village Downtown District & Open Space Plans	Downtown Lombard Revitalization Guidebook (2011) Lombard Park District, Districtwide Comprehensive Plan (2013)	n/a
County and Local Bicycle and Pedestrian Plans	Lilac Bikeway Recommendations from Ad Hoc Trails Committee Memo (2007) DuPage County Regional Bikeway Plan (2008) Illinois Prairie Path Access Study (2013) Village of Lombard Complete Streets Policy, 2013	DuPage County Lombard 10-Mile Loop (No Date Noted) The Village of Lombard Bicycle Trails Map (2012) Village of Lombard Bicycle Trails Map (2013) DuPage County Regional Bikeway Map (2014)

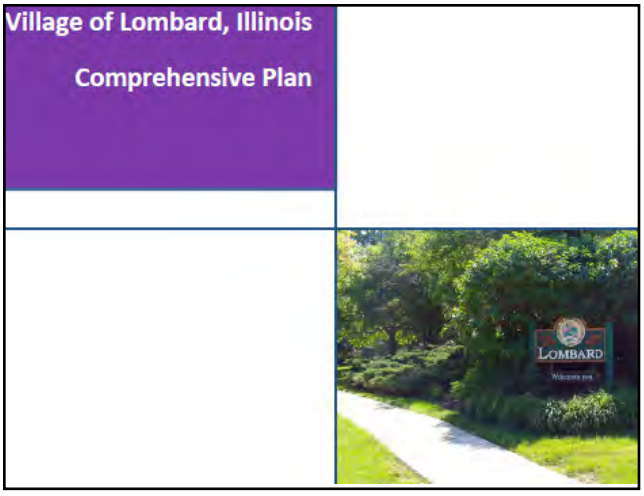
Village-wide Plans

Village of Lombard Comprehensive Plan (2014)

The transportation section provides general goals, such as emphasizing aesthetic designs in the corridors to distinguish Lombard from other communities, coordinating land uses and transportation, filling in sidewalk gaps, improving street lighting, improving public transportation (particularly for those traveling north and south in the community), providing adequate parking, and considering a Complete Streets approach.

The comprehensive plan also maps street classifications for the expressways, minor arterials, major arterials, and collector streets in the Village. Based on this system, the plan includes a chart displaying design improvements desirable for each roadway classification (page 45 of the plan). Per this chart:

- Sidewalks are required on all roadways except those classified as expressways.
- Recommended speed limits are 40-55 mph for major arterials, 40-45 mph for minor arterials, 30-40 mph for collectors, and 25-30 mph for local streets.



Village of Lombard's Comprehensive Plan

The plan identifies vehicular traffic congestion and delay issues with major corridors that pass through the community, including Roosevelt Road, Illinois Route 53, Main Street, St. Charles Road, Finley Road, Highland Avenue, Westmore-Myers Road, and 22nd Street. The plan recommends adding left turn lanes, adjusting signal timing to provide continuous movement of vehicles along arterials, repairing pavement, and closing side streets along commercial corridors.

The comprehensive plan recommends developing a local bicycle system to serve all areas of the Village. Lombard's place within the regional bicycle system would improve with connections to the Illinois Prairie Path and the Great Western Trail. The plan suggests linking the bicycle system to key activity centers, including community facilities, high density residential concentrations, and commercial and employment areas. The suggested improvements should be coordinated with the Park District and the Village's street program and capital improvement program.

Contained within the plan is a specific recommendation for the Lilac Bikeway, which would connect key activity centers in the Village, such as Yorktown, Lombard Commons, Roosevelt Road Corridor, and Downtown Lombard. The Bikeway would cover the central portion of Lombard, north and south from 22nd Street to Sunset Avenue and east to west from Vista Avenue to Finley Road.

The comprehensive plan mentions the need for connectivity improvements between the Village's north-south axis as well as a recommendation to work with Pace to improve public transportation service. To improve these services, the plan recommends a transfer station near JC Penny's at Yorktown Center. It also recommends reconsidering a Village circulator route or working with Pace to establish additional bus service to meet the need identified by the circulator route. The document also suggests adding a call-and-ride or similar program.

Specific suggested improvements in the Comprehensive Plan are as follows:

- Closing minor side street intersections with Roosevelt Road between Westmore-Meyers Road and Wisconsin Avenue.
- Intersection control and/or capacity improvements at Parkview Boulevard and Illinois Route 53 at the Woodlake Business Park.
- Complete and repair sidewalks
- Provide additional street trees
- Provide improved crosswalks
- Demark and enhance Village gateways
- Provide access control onto collector and arterial streets; reduce number of drives and curb cuts.

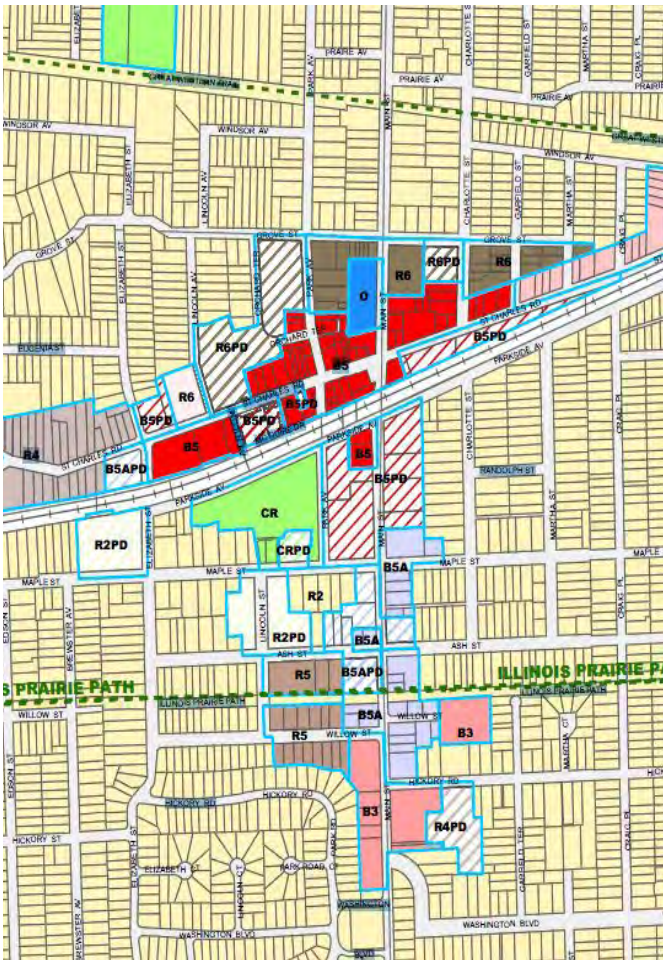
Village of Lombard 2014 Strategic Plan

According to a 2013 community survey of more than 360 responses, the top five words to describe Lombard are: lilacs, friendly, quiet, safe, and clean. More than 90 participants of a 2013 community forum found the following to be some of the top Village accomplishments: Lombard Town Center, new businesses downtown, communications improvements (Code Red, social media), elimination of fees (vehicle stickers, red light cameras), pedestrian accessibility, bike paths and Great Western Trail bridges, and Sunset Knoll improvements. The forum found the following to be some of the top community priorities: downtown development, open space preservation, and recreational facilities. The Village Board determined downtown development a primary priority. Downtown parking was considered a secondary priority. One of the proposed strategies to develop downtown was to improve the area's streetscape and roadway infrastructure.

The survey results showed that the majority of residents surveyed prefer to get information from the PRIDE newsletter, followed by the Village website, email, and newspaper. The majority of residents currently get information from the PRIDE newsletter, followed by the Lombardian newspaper, and the Village website. More than 70% of residents surveyed refer to Facebook as their social media outlet for information.

Village of Lombard Zoning Map (2015)

The majority of Lombard is zoned as single-family residential land, with quite a bit of existing and planned conservation/recreational zones interspersed throughout these residential areas. This arrangement gives the majority of Lombardians access to open space within 0.5 mile. Commercial and office nodes are clustered in the southern portion of the Village; industrial areas are located in the north and the south.

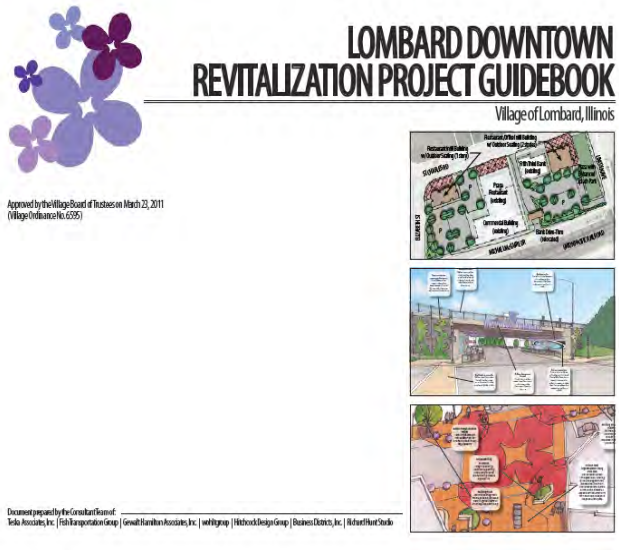


Lombard's Downtown Zoning Map shows that the main Downtown land uses include the Central Business District, Parks, Offices, General Neighborhood Shopping, Community Shopping, Central Residential, and General Residential zoning types.

Village of Lombard Annexation Strategies Plan (Update 2009)

Areas that may be annexed in the future include:

- Roosevelt Road east of Highland Avenue and west of Highland Point Center
- Southeast unincorporated area between Highland Avenue and Highland Estates
- Southeast unincorporated area (Grammercy Park)
- East Roosevelt Road commercial area
- Meyers Road Properties
- Butterfield East – East of I-355
- Ken Loch Golf Course



Village of Lombard's Downtown Revitalization Guidebook

Village Downtown District & Open Space Plans

Downtown Lombard Revitalization Guidebook (2011)

This guidebook lists transportation assets in Downtown Lombard, including grade separation at the UP Railroad on Main Street, Metra, Pace Route 674 bus, the "soon to be initiated Village circulator route" (project status: incomplete), regional bike trails, continuous sidewalks, and pedestrian countdown signals at St. Charles Road and Main Street.

The guidebook recommends a road diet with bike lanes on St. Charles Road (between Grace Street and Garfield Street) and Main Street (between Parkside Avenue and Ash Street), to improve the pedestrian environment, create a welcoming gateway, and improve traffic operations. The road diets are supported by the Public Works Department. However, the Fire Department expressed concern regarding the proposed projects' impacts on response times. The guidebook recommends studying drop-offs and pedestrian activity at the entrance to the Metra station at Michael McGuire Drive and Main Street.

The guidebook also shows specific locations for parking improvements, which include additional surface level lots or structures, on-street parking, and coordination between public and private partners with varying peak hours for shared spaces. The recommendations are based on current or planned needs from existing or proposed land uses and developments.

Specific recommended improvements from the Downtown Revitalization Guidebook include the following:

- High visibility crosswalk with bump-outs and signage at the southern portion of Lincoln Avenue and Main Street intersection.
- Midblock crossing on Main Street between Parkside Avenue and Maple Street, with safety features such as a HAWK beacon.
- New Park Avenue Metra pedestrian tunnel
- Minimized curb cuts and driveways, specifically St. Charles Road. Consolidating driveways for single land uses. Narrowing driveways, specifically gas stations at the intersection of St. Charles Road and Main Street.
- Improved connections between regional trails and downtown/Metra station. The guide recommends on-street bike routes along Park Avenue, Parkside Avenue, St. Charles Road, and Main Street. No bikeways should be constructed on sidewalks.
- Additional bike parking at the Metra station, which according to the Metra 2008 System-Wide Bicycle Inventory Report is full.
- Layover/staging facility and shelter for Pace buses at Main Street and Parkside Avenue
- East St. Charles Road has a different, more auto-oriented development pattern than the rest of the downtown core. Current issues are roadway width and pedestrian/bicycle access. Recommendations include:
  - -Road diet: four motor vehicle lanes to three
  - -Peak hour parking restrictions
  - -Pedestrian crosswalk on east side of Garfield Street at East St. Charles Road with signage and bump outs.
  - -Minimized curb cuts
  - -Enhance seating area and gateway elements at Grace Street
- Park Avenue and St Charles Road intersection
  - -Enhance the ability of people to travel along Park Avenue by foot and by bicycle
  - -Curb extensions, ADA compliant curb ramps, increased sidewalk width and narrowed vehicle travel lanes.
- Metra Train Station
  - -Pedestrian tunnel and adjacent sidewalk improvements *(completed)*
- Main Street underpass
  - -Create gateway into downtown core with downtown branding, art, and highlighted crosswalks.

Lombard Park District, Districtwide Comprehensive Plan (2013)

In addition to the Illinois Prairie Path and Great Western Trail, this plan mentions the nearby East Branch DuPage River Trail. The primary initiative for park trail strategies is to develop the Lilacia Trail loop (Lilac Bikeway) to connect major parks, including Lilacia Park, Sunset Knoll Recreation Center, Lombard Common Park, Madison Meadows Park, Terrace View Park, and schools. The plan outlines the following ongoing initiatives:

- The establishment of design standards for trail identification and wayfinding
- The construction of other trail amenities
- The comprehensive plan's long-term initiative would connect the neighborhood parks to the Lilacia loop and develop tertiary trail connections to other assets in the Village.

Parks with significant interior trail systems to consider incorporating into neighborhood, Villagewide and/or regional pedestrian/bicycle systems include:

- Lombard Lagoon: internal 0.5 mile trail system that connects to neighborhood sidewalk system
- Southland Park: 0.49 mile trail system on northern perimeter of park that does not connect to southern portion of park.
- Terrace View Park: 0.89 mile walking trail on northern portion of park. Lacks connection to neighborhood pedestrian system.
- Vista Pond Park: 0.46 mile walking loop around pond that recently underwent construction and now connects to Edgewood Avenue.
- Westmore Woods: 0.51 mile walking trail that connects to Great Western Trail at northern end of park, but lacks connection to neighborhood pedestrian system.

- Four Seasons Park: 0.66 mile internal trail system that lacks connection to neighborhood pedestrian system.
- Lilacia Park: 0.61 mile nature trail that connects to neighborhood pedestrian system.
- Lombard Common Park: 1.22 mile multiuse trail with a strong connection to surrounding neighborhood pedestrian system but fails to connect to Great Western Trail near northern boundary of park.
- Madison Meadows Park: 1.56 mile walking trail needs stronger connection to neighborhood pedestrian system.
- Sunset Knoll Park: 1.0 mile walking trail.
- Broadview Slough: 1.0 mile trail.

County and Local Bicycle and Pedestrian Plans

DuPage County Regional Bikeway Plan (2008)

The DuPage County Regional Bikeway Plan (June 2008) details policy, programming, and infrastructure goals, objectives, and priorities. The plan lists 5 main goals: countywide planning design; countywide safety, promotion and education; countywide intermodal capacity; countywide bicycle roadway system; and local actions to promote non-motorized travel. Each goal is broken down into multiple objectives, such as to link residential areas with major employment centers and shopping districts; promote non-motorized travel to the public; encourage secure bicycle storage facilities at employment centers, schools and shopping districts; and coordinate bicycle and pedestrian planning at all levels of government.

The plan documents the following priority projects within Lombard boundaries:

- East Central DuPage Bikeway (high priority): 22nd Street, Meyers Road, and 31st Street connecting Lombard, Downers Grove, and Oak Brook to the East Branch and Salt Creek Trails
- Lilac Bikeway Plan (moderate priority): Local bikeways linking destinations and trails within Lombard.

Lilacia Park includes a 0.61 mile nature trail. The trail is a popular destination in both summer and winter thanks to the Park District's and other partners' events and activities.

Illinois Prairie Path Access Study (2013)

This study analyzes roadway intersections along the Illinois Prairie Path and proposes standards for intersection typologies based on characteristics of the roadway and adjacent land uses. The application of bicycle and pedestrian accommodations are based on traffic volumes, vehicle speeds, crossing distances, and surrounding land uses. User perception and bicycle and pedestrian crashes were used to prioritize suggested intersection improvements.

This study includes a toolbox of crossing improvements based on land use and roadway typologies, which is described in Table 2.

Table 2. Illinois Prairie Path Typology Summary and Recommendations

Typology	Roadway Typology	Land Use	Crossing Goals	Crossing Treatments
A	Local Roadway	Residential Commercial Industrial	Increase trail user visibility at crossing Increase neighborhood awareness for trail access Connect sidewalk to trail	Wayfinding signage High visibility crosswalks Trail crossing warning signs Speed humps Raised crosswalks
B	Local Roadway	Open Space	Connect sidewalk to trail Maintain trail-like experience at crossing	High visibility crosswalks Trail crossing warning signs Speed humps
C	Minor Roadway	Residential Commercial Industrial	Decrease trail user crossing distance Control traffic at trail crossings with signage Provide connecting bike and pedestrian facilities Increase neighborhood awareness for trail access	Wayfinding signage High visibility crosswalks Trail crossing warning signs Refuge Island Corner refuge islands Curb extensions Bump-outs RRFB

This study also included a community survey to understand trail user perceptions. Figures 26 and 27 summarize these survey results.

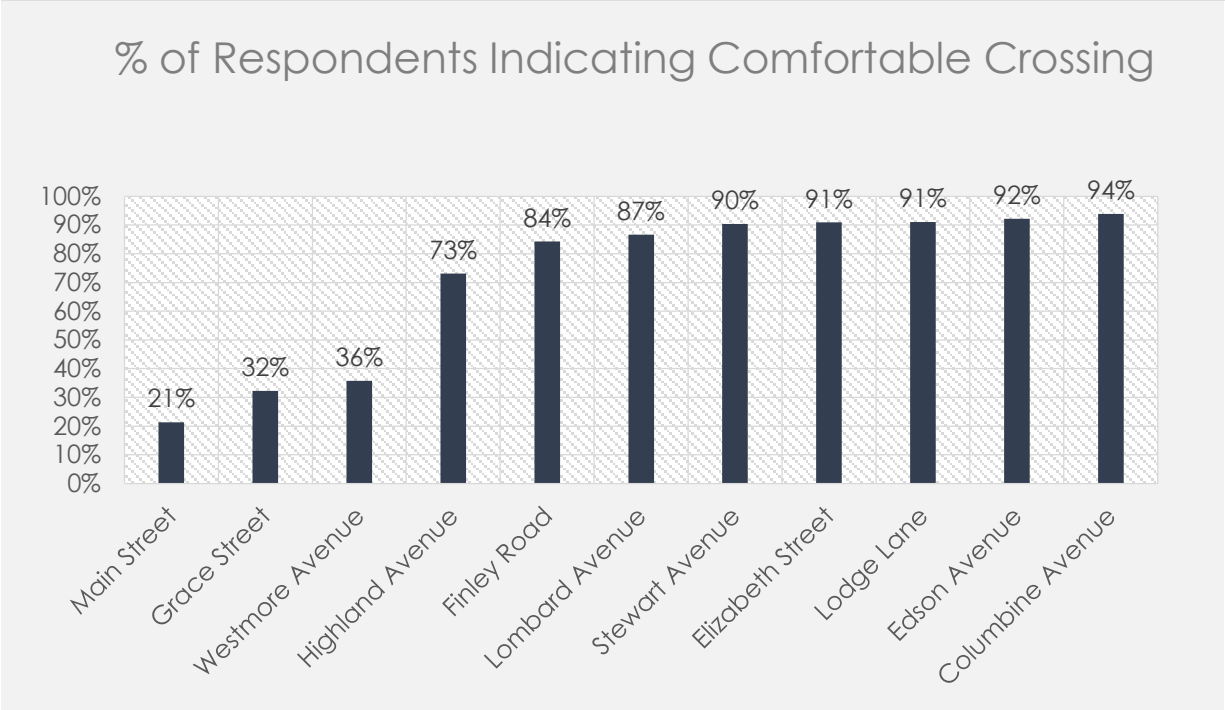


Figure 26.

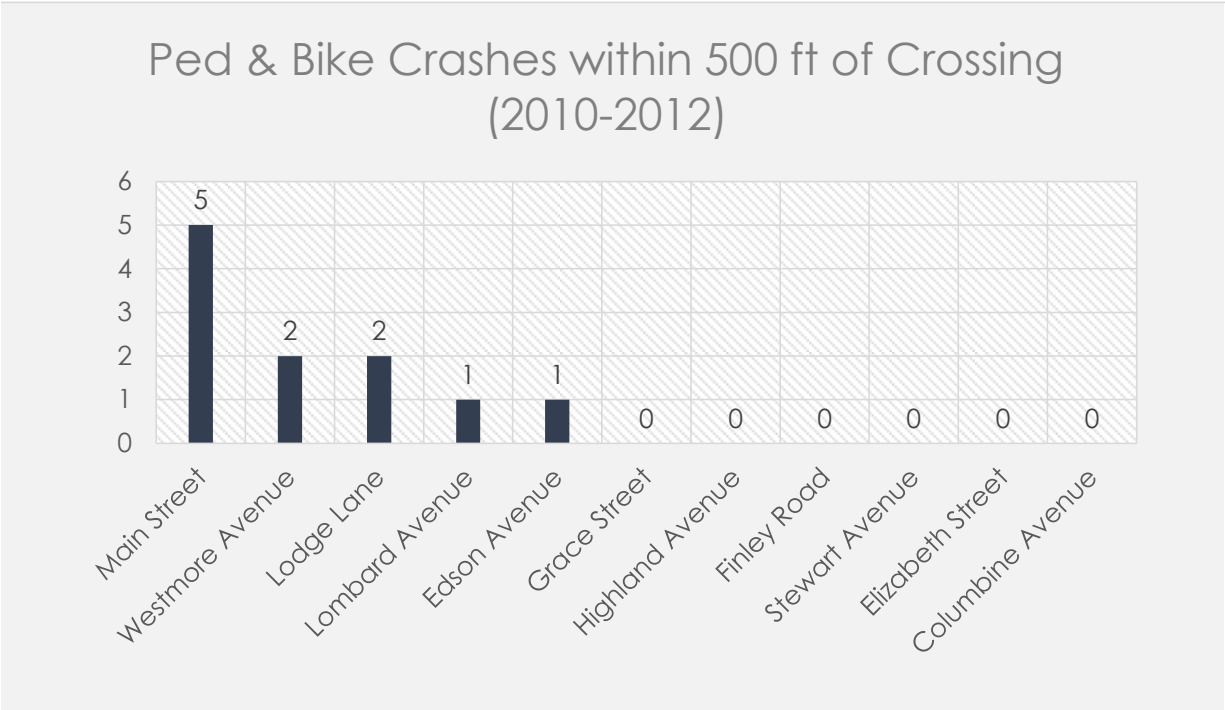


Figure 27.

Key takeaways from the study:

The intersections where the Illinois Prairie Path crosses local streets in Lombard in open space or residential land uses tend to be rated fairly high by survey participants in terms of perceived comfort and safety, except the Main Street crossing.

Respondents gave Main Street low ratings and left numerous comments about the crossing's condition. Trail users rated it very poorly in terms of safety for pedestrians and cyclists. Many of the commenters mentioned confusion in terms of whether motorists or cyclists are required to yield the right-of-way. Commenters also mentioned that if one motorist stops, the four lane roadway remains treacherous to cross because motorists in the other three lanes may not stop. Commenters expressed confusion regarding the "STATE LAW STOP FOR PEDESTRIANS" flexible post. Commenters suggested intersection design improvements such as high visibility signage and passively activated beacons.

Respondents left comments regarding challenges associated with crossing Westmore Avenue. Many participants felt that motorists in neighboring suburbs stop for pedestrians and cyclists; however, this is not the culture in Lombard. Commenters also mentioned a need for increased enforcement.

Village of Lombard Complete Streets Policy (2013)

In order to provide safer and more comfortable streets for all users, the Village enacted a Complete Streets Policy in 2013. The policy states, "Where feasible from an engineering and financial perspective and determined to be in the best interest of the public, new construction and roadway re-construction projects in the Village shall accommodate users of all ages and abilities including pedestrians, bicyclists, transit users, motorists and adjacent land users."

The policy provides examples for transforming traditional suburban car-oriented roadways found in Lombard into "complete streets" by widening shared paths, sidewalks, and landscaped buffers; adding bike lanes and other pavement markings; and increasing signage.

The policy provides a roadway project prioritization system for considering multimodal demand:

Priority A Streets

- Arterial streets
- Streets included in the Lilac Bikeway Plan
- Street segments or intersections with pedestrian/bicycle accidents
- Streets adjacent to schools

Priority B Streets

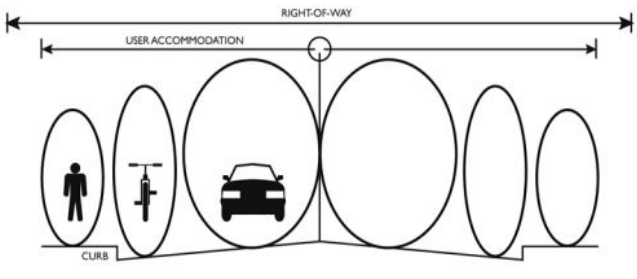
- Streets containing a high proportion of bus ridership
- Streets adjacent to high density residential area zones

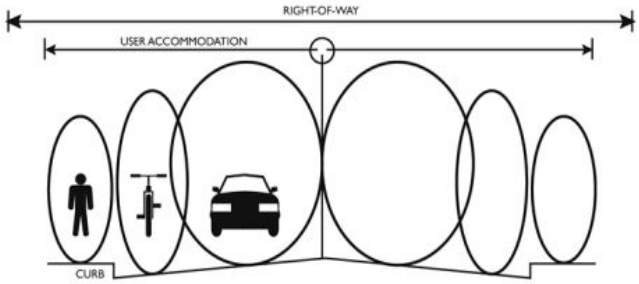
Priority C Streets

- Streets linking neighborhoods to schools
- Streets adjacent to the Illinois Prairie Path and the Great Western Trail
- Streets linking neighborhoods to parks
- Streets linking neighborhoods to community facilities (e.g., Library and historically significant facilities)

The policy provides cross-section development guidance to cover the majority of roadways in Lombard based on density, traffic speeds, and level of comfort. The guidelines are flexible and do not provide exact dimensions for the right-of-way nor for elements contained within the cross-sections (e.g., bike lanes, sidewalks). The cases presented within the policy include:

Design Guidance from Lombard's Complete Streets Policy





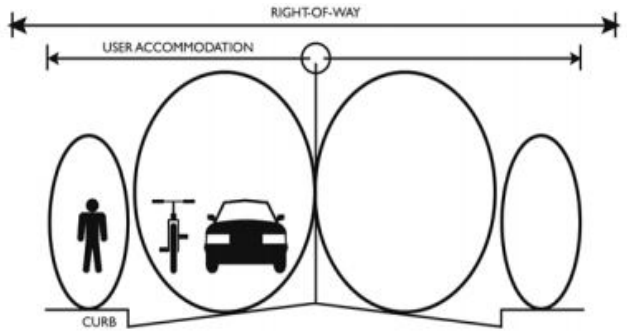
Case 1: Separate accommodation for all users

- Maximum separation
- No sharing or overlap between bicyclists, pedestrians and motorists
  - -Separated sidewalk (5 ft preferred), separated bike lane (4 ft preferred)
- Highest level of safety and comfort for all users
- Large speed differential between motorized and non-motorized users
- Requires most width out of the other cases
- Considered for:
  - -Areas with moderate to high pedestrian and bicycle volumes
  - -Areas with moderate to high motor vehicle speeds and traffic volumes
  - -Areas without substantial environmental or right-of-way constraints.

Case 2: Partial sharing for bicycles and motor vehicles

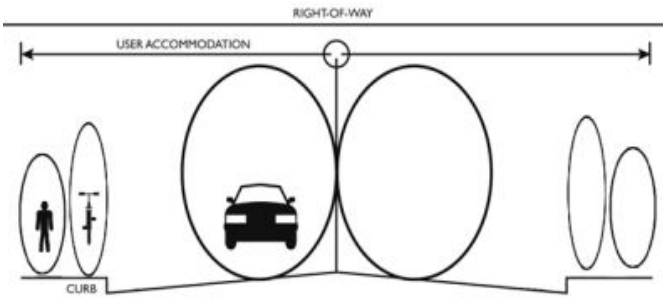
- Some sharing and overlap between bicyclists and motorists
  - -Separated sidewalk (5 ft preferred)
- Moderate to high density
- Typical travel lanes combined with narrow shoulders or narrow travel lanes combined with wide shoulders
- Considered for:
  - -Areas with low motor vehicle speeds
  - -Areas with low to moderate motor vehicle volumes
  - -Tighter right-of-way constraints

Design Guidance from Lombard's Complete Streets Policy



Case 3: Shared Bicycle/Motor Vehicle Accommodation

- Bicyclists and motorists share space and pedestrians are separate
  - -Separate sidewalk (5 ft preferred)
- Most densely developed areas where right-of-way is most constrained
- Considered for:
  - -Areas with low motor vehicle speeds
  - -Areas with low to moderate motor vehicle volumes
- Severely tight right-of-way constraints
  - -Areas without substantial environmental or right-of-way constraints.



Case 4: Partial sharing for bicycles and pedestrians

- Sharing and overlap between bicyclists and pedestrians.
  - -Shared use side path wide enough for pedestrians, wheelchair users and bicyclists to not interfere with each other's movements (10 ft preferred)

The policy also provides design standards, while emphasizing that there is no single standard to achieve complete streets outcomes. Instead, the policy recommends that standards be context-specific according to the community plans, local needs, projected demands, roadway conditions, and adjacent land uses. Some of the standards include:

Sidewalks:

- Generally 5 ft is preferred. Less can be considered in accordance with ADA guidelines.
- 10 ft is preferred in areas with heavy pedestrian traffic or shared use with bicyclists
- 5-8 ft in areas with high bus ridership
- Landscaped buffers should be considered to increase pedestrian comfort.

Bicycles:

- Bike lanes should be 4-5 ft
- Bike lanes should be developed in accordance with Lilac Bikeway Plan

Parking:

- Should serve adjacent land uses
- Acts as a buffer between pedestrians and vehicular traffic

Travel lanes:

- 10-11 ft for roadways where additional width could go to bike lanes and sidewalks
- 11-12 ft for roadways with higher design speeds, traffic volumes and truck routes

Landscaping, intersections, and transitions should also be considered within a Complete Streets context.

Lilac Bike Way Recommendations from Ad Hoc Trails Committee Memo (2007)

The Lilac Bike Way was a proposed route that was not implemented. The following improvements had to be completed before installing route signage:

- Crosswalks at Sunset Avenue crossing Grace Street, Prairie Avenue crossing Grace Street, and Edgewood Avenue crossing Maple Street.
- Widen Main Street sidewalk between Manor Hill School and Colleen Drive from 3' to 5'.
- Sidewalk ramps at Finley Road crossing Morris Avenue, north driveway from Manor Hill School on Main Street, and Windsor Avenue to cross Great Western Trail at Elizabeth Street.
- Stop signs at Edgewood Avenue crossing Illinois Prairie Path and at Elizabeth Street crossing Great Western Trail.

Planned and Existing Bike Route Maps

There are four main bicycle network maps that cover proposed and existing trails and routes for the Village of Lombard. DuPage County's Regional Bikeway Map (2014), DuPage County's Lombard Loop (unknown date), the Village of Lombard Proposed Bike Routes (2012), and the Village of Lombard Proposed Bike Routes (2013). Recommended proposed routes vary slightly between the two DuPage County Maps and the two Village of Lombard maps, but the existing trail systems and paths are mostly the same. Table 3, on the following page, notes the routes and cross-streets that are included in each corresponding map.

DuPage County Lombard 10-Mile Loop (No Date Noted)

The Lombard Loop, a map produced by DuPage County, is a suggested 10-mile circulator route that connects residents to parks, the Illinois Prairie Path, the Great Western Trail, and several destinations in Lombard and Villa Park, including the National University of Health Science, Paradise Bay, Sheldon Peck Homestead, Victorian Cottage Museum, and the Villa Park Historical Museum. The map neither proposes infrastructure improvements, nor does it note whether or not bicycle facilities are available along the route.

The Village of Lombard Bicycle Trails Map (2012)

Dated November 2012, this map features the regional trail connections included in the DuPage County Regional Bikeway Map, existing local trails, the Lilac Bikeway, and a handful of new proposed local bikeways. These new proposed bikeways include:

- Olde Towne Bikeway: Greenfield Avenue from Terrace View Path to West Road
- West Road from Greenfield Avenue to Windsor Avenue
- Windsor Avenue from West Road to Elizabeth Street
- Extending the 22nd Street Bikeway from Finley Road to Valley (marked as 'existing')
- Highland Avenue from Edward Street to 22nd Street
- Edward Street from Hammerschmidt Avenue to Grace Street
- The Yorktown East Trail: Grace Street from Edward Street to St. Charles Place
- 3rd Avenue Connector: Connects the Great Western Trail to the Illinois Prairie Path

The map also identifies the three Great Western Trail bridges, which allow trail users to bypass crossings at St. Charles Road, the Union Pacific West rail line, and Grace Street, a project funded by the Surface Transportation Program and completed in July 2013.

Village of Lombard Bicycle Trails Map (2013)

The Village of Lombard Bicycle Trails Map dated February 2013 depicts existing, planned, and programmed bicycle routes. Existing routes include the Illinois Prairie Path, Great Western Trail, the 22nd Street Bike Path (also called the West Branch DuPage River Trail), the Lilac Bikeway (Finley Road between 22nd Street and Roosevelt Road), and smaller paths that run through parks. The planned bike route is the Lilac Bikeway.

DuPage County Regional Bikeway Map (2014)

The DuPage County Regional Bikeway Map depicts existing and planned bikeways that connect the 39 communities in the county. It includes major existing trail systems, existing local off-street trails, and recommended local routes.

The following table summarizes existing and previously proposed bikeways in Lombard. An "X" indicates where the bikeways are identified.

Table 3. Existing and Previously Proposed Bikeways

Route/Street Name	From	To	Facility Type	Lombard Loop (unknown date)	Lombard Proposed Bike Routes (2012)	Lombard Proposed Bike Routes (2013)	DuPage County Regional Bikeway Map (2014)
N. Elizabeth Street	Terrace View Park	W. Maple Street	Lombard VP Loop/ Proposed Local Bikeway	X			X
W. Maple Street	S. Elizabeth Street	Finley Road	Lombard VP Loop/ Proposed Local Bikeway	X			X
Finley Road	W. Maple Street	Roosevelt Road	Lombard VP Loop/ Proposed Local Bikeway	X			X
Edson Avenue	W. Maple Street	W. Central Avenue	Lombard VP Loop/ Proposed Local Bikeway	X			X
W. Central Avenue	Edson Avenue	S. Highland Avenue	Lombard VP Loop/ Proposed Local Bikeway	X			X
Grace Street	the Commons	Southland Park	Lombard VP Loop/ Proposed Local Bikeway	X			X
Highland Avenue	Roosevelt Road	E. 22nd Street	Lombard VP Loop/ Proposed Local Bikeway	X			X
Columbine	W North Avenue	I-355	Lombard VP Loop/ Proposed Local Bikeway	X			X
22nd Street	Ardmore Avenue	Westmore Myers Avenue	Lombard VP Loop/ Proposed Local Bikeway	X			X
Illinois Prairie Path			Existing Regional Bikeway		X	X	X
Great Western Trail			Existing Regional Bikeway		X	X	X
Vista Pond Loop			Existing Regional Bikeway		X	X	X
Lombard Common			Existing Regional Bikeway		X	X	X
Madison Meadows Path			Existing Regional Bikeway		X	X	X
Four Seasons Trail			Existing Regional Bikeway		X	X	X
22nd Street Bike Path	Meyers Road	Valley Road	Existing Local Bikeway		X	X	X (planned from Finley to Valley Rd)
Finley Road	22nd Street	Roosevelt Road	Existing Local Bikeway		X	X	X
NCC Pedway (Hammerschmidt/ Highland)			Existing Local Bikeway		X	X	X
Cambria Lane Paths			Existing Local Bikeway		X	X	X
Glenwood	Pleasant Lane	Columbine Lane	Existing Local Bikeway		X	X	
Greenfield Avenue	Terrace View Path	West Road	Proposed Local Bikeway		X	X	

Table 3. Existing and Previously Proposed Bikeways (continued)

Route/Street Name	From	To	Facility Type	Lombard Loop (unknown date)	Lombard Proposed Bike Routes (2012)	Lombard Proposed Bike Routes (2013)	DuPage County Regional Bikeway Map (2014)
West Road	Greenfield Avenue	Windsor Avenue	Proposed Local Bikeway			X	
Windsor Avenue	West Road	Elizabeth Street	Proposed Local Bikeway			X	
22nd Street	Finley Road	Valley Road	Proposed Local Bikeway			X	
Highland Avenue	Edward Street	22nd Street	Proposed Local Bikeway			X	
Edward Street	Hammersc-hmidt Avenue	Grace Street	Proposed Local Bikeway			X	
Grace Street	Edward Street	St. Charles Place	Proposed Local Bikeway			X	
3rd Avenue	Great Western Trail	Illinois Prairie Path	Proposed Local Bikeway			X	
Finley Road	22nd Street Bike Path	Wilson Avenue	Proposed Lilac Bikeway		X	X	
Wilson Avenue	Finley Road	Edson Street	Proposed Lilac Bikeway		X	X	
Edson Street	Wilson Avenue	Maple Street	Proposed Lilac Bikeway		X	X	
Maple Street	Edson Street	Elizabeth Street	Proposed Lilac Bikeway		X	X	
Elizabeth Street	W Maple Street	Sunset Avenue	Proposed Lilac Bikeway		X	X	
Sunset Avenue	Elizabeth Street	Vista Avenue	Proposed Lilac Bikeway		X	X	
Vista Avenue	Sunset Avenue	View Street	Proposed Lilac Bikeway		X	X	
View Street	Vista Avenue	Edgewood	Proposed Lilac Bikeway		X	X	
Edgewood Avenue	View Street	Prairie Avenue	Proposed Lilac Bikeway		X	X	
Prairie Avenue	Edgewood Avenue	Grace Street	Proposed Lilac Bikeway		X	X	
Grace Street	Prairie Avenue	Parkside Avenue	Proposed Lilac Bikeway		X	X	
Parkside Avenue	Grace Street	Edgewood Avenue	Proposed Lilac Bikeway		X	X	
Edgewood Avenue	St. Charles Place	Madison Street	Proposed Lilac Bikeway		X	X	
Madison Street	Edgewood Avenue	Hammerschmidt Avenue	Proposed Lilac Bikeway		X	X	
Hammerschmidt Avenue	Madison Street	Roosevelt Road	Proposed Lilac Bikeway		X	X	
Roosevelt Road	Hammersc-hmidt Avenue	Main Street	Proposed Lilac Bikeway		X	X	
Main Street	Roosevelt Road	22nd Street	Proposed Lilac Bikeway		X	X	
22nd Street	Grace Street	Finley Road	Proposed Lilac Bikeway		X	X	
Grace Street	22nd Street	Majestic Drive	Proposed Lilac Bikeway		X	X	


STOP
WEST RD
DU PAGE COUNTY
GREAT WESTERN TRAIL
DU PAGE COUNTY
What's it like to walk and bike in Lombard?
The Village of Lombard is currently developing a village-wide bicycle and pedestrian plan.
Want to hear more about the plan and provide your comments in person?
Bring your voice to the Community Meeting on Wednesday, July 1 from 7-9 PM at the Lombard Village Hall

Public Engagement

Plan Vision Statement

Lombard will endeavor to make cycling and walking a viable option for everyday trips by developing a complete network of streets that support active transportation use and by connecting the Great Western Trail and Illinois Prairie Path to businesses, residential areas, and parks. Through changes to the built environment, events, and public education, the Village of Lombard will strive to foster safe, healthy, and convenient transportation choices.

The plan's Vision Statement, intended to guide the development of Lombard's first village-wide bicycle and pedestrian plan, was developed after receiving feedback from residents and stakeholders interested in improving access to walking and biking in the community. Hundreds of community members participated in various outreach activities aimed at identifying local destinations, current challenges to walking and biking, and preferred walking and biking routes that will inform plan recommendations.

Public outreach included the following steps:

- Advisory committee formation.
- Plan promotion, including opportunities for participating through social media, print media, local events, and local businesses and organizations.
- Gathering of online input.
- Community workshop in June 2015.
- National Night Out

The outreach efforts resulted in a larger than average participation rate for a community of Lombard's size.

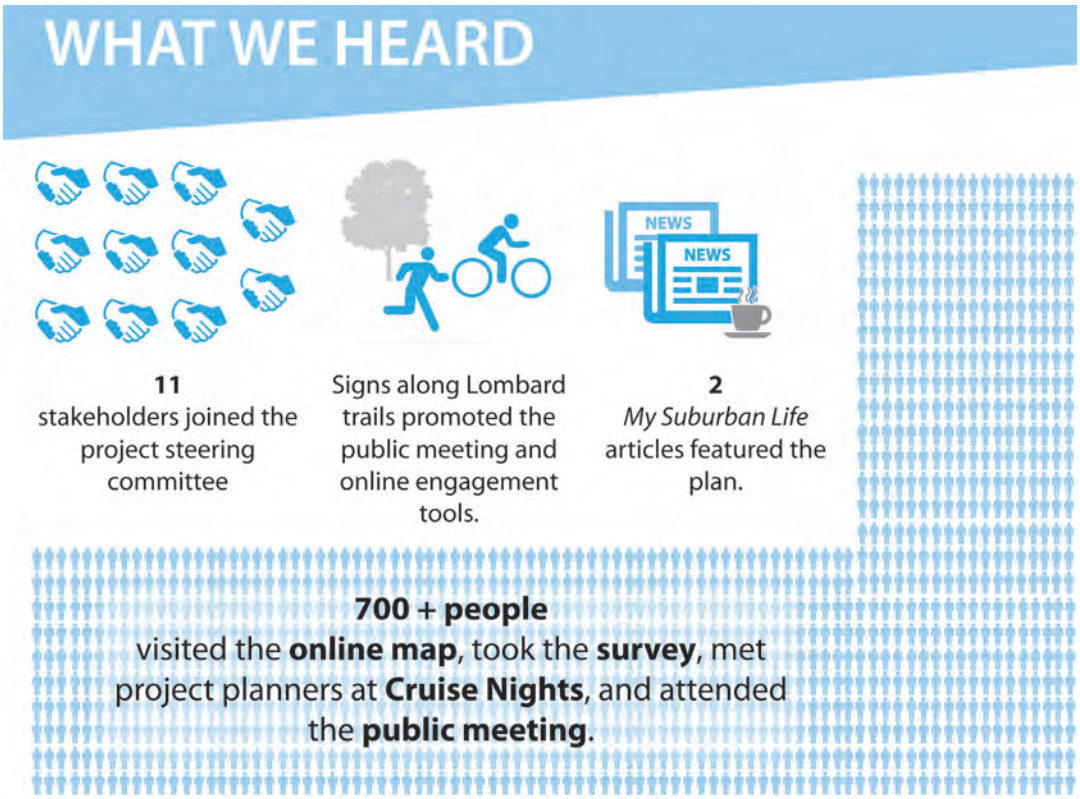


Figure 28. This infographic depicts a few results from the plan's public engagement process.

Advisory Committee

The advisory committee guided the plan's vision and suggested local media outlets and ways to obtain feedback from a broad cross-section of residents. The committee consists of the following agencies and stakeholders:

- DuPage County Division of Transportation
- DuPage County Health Department
- DuPage FORWARD
- Elmhurst Bike Club
- Friends of the Great Western Trail
- Illinois Prairie Path Corporation
- Lombard Chamber of Commerce
- Lombard Park District
- Lombard Town Centre
- Village of Lombard
- Yorktown Center

Key Findings

During the meeting, the advisory committee members discussed their goals, vision, and priorities for the Village of Lombard.

The plan's vision statement, stated at the beginning of this chapter, is based on the priorities identified by the advisory committee:

- Make walking and biking safe, healthy, and convenient choices for daily travel.
- Create better connections between the Illinois Prairie Path and the Great Western Trail within Lombard.
- Develop better bicycle connections from residential areas to local businesses.
- Create safe crossings for cyclists and pedestrians at busy intersections.
- Develop an integrated signage system for bicycle travel on existing trails and recommended on-street facilities (i.e.,bicycle lanes and bicycle boulevards).
- Increase bicycle parking at local priority destinations such as businesses, parks, and schools.
- Educate all Lombard citizens regarding driving, biking, and walking safety.

Summary of Key Issues Identified

Several themes emerged from the community's feedback:

- North/south bicycle connections are greatly needed.
- Improve bicycle friendliness of major streets
- Provide bicycle and pedestrian connections to key community destinations.
- Improve at-grade trail crossings.
- Create safer crossings at arterials.
- Fill in sidewalk gaps.
- Create additional amenities.
- Educate all users of the road and trails on rights, responsibilities, and trail etiquette; enforce when necessary.

Lombard residents at the community workshop

Plan Outreach

The project team and advisory committee members formulated a number of ways to involve in the development of plan recommendations, specifically:

Tabling at Cruise Nights

The team attended Cruise Nights on June 13th and June 20th to speak to residents about the plan, gather input, and promote the workshop and online engagement tools. About 20 people stopped by the table to discuss ideas before the events ended early due to severe weather.

Promoting on social media

A variety of online resources helped promote the plan, survey, and online map. These included: Lombard's website, the Lombard Facebook page, the Friends of the Great Western Trail listserv, the Elmhurst Bike Club listserv, the Illinois Prairie Path Corporation website, and the Active Transportation Alliance listserv and blog.

Targeting trail users

The project team posted signs on the Illinois Prairie Path and Great Western Trail to inform trail users of the plan and ways to participate.

Distributing hard copy fliers around popular community destinations

Flyers promoting the plan were left at Performance Bike Shop, the Lombard Public Library, the downtown medical center, and the Metra station.

The project team posted signs on Lombard's most popular trails to inform users about public engagement opportunities.

National Night Out

The project team tabled at National Night Out in Lombard Common Park the evening of August 4, 2015. This was an event for residents to learn more about public safety in the community and the Lombard police and fire department, as well as other public safety groups, were there.

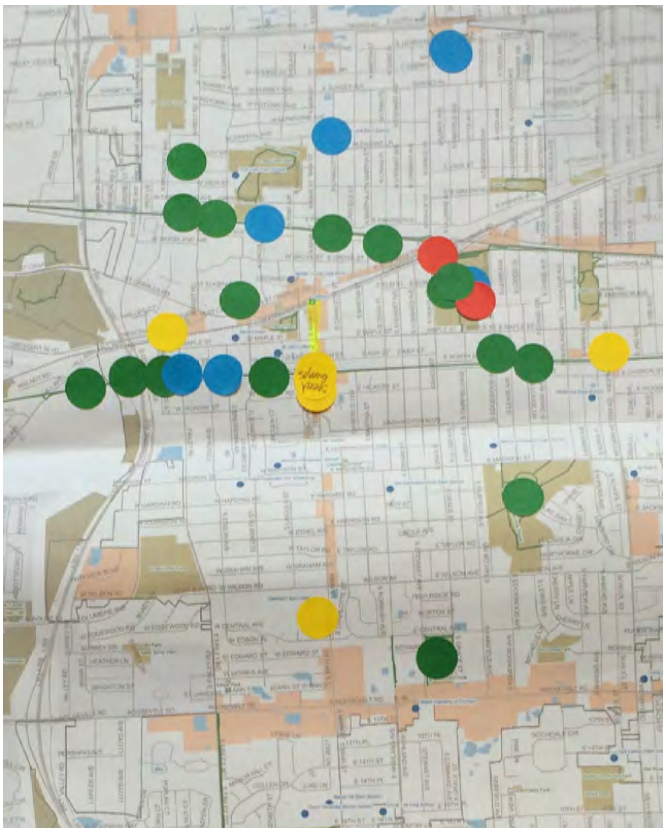
The project team brought two large maps for those passing by to mark with stickers where they live, destinations they like to walk and bike to, and hazards to walking and biking. 46 people placed stickers for where their homes are located on the map. Around another 15 people stopped by the table but did not place a home sticker on the map. When people stopped to look at the maps the project team told them about the plan and asked if they had any input on improving biking and walking in the community. The majority of people who stopped by the table mentioned that the greatest community resources for walking and biking in Lombard are the Illinois Prairie Path and the Great Western Trail and that they regularly enjoy utilizing these trails with their families. Respondents mentioned that these trails are very well-kept and were one of the most common walking and biking destinations marked on the map.

Respondents also mentioned parks as one of the primary destinations that they enjoy reaching by biking and walking. The park where the event was held, Lombard Common, was a popular destination. One family mentioned that the parking lot can be unsafe to walk through due to lack of sidewalks. Other parks mentioned as destinations include the Lombard Lagoon and Madison Meadow.

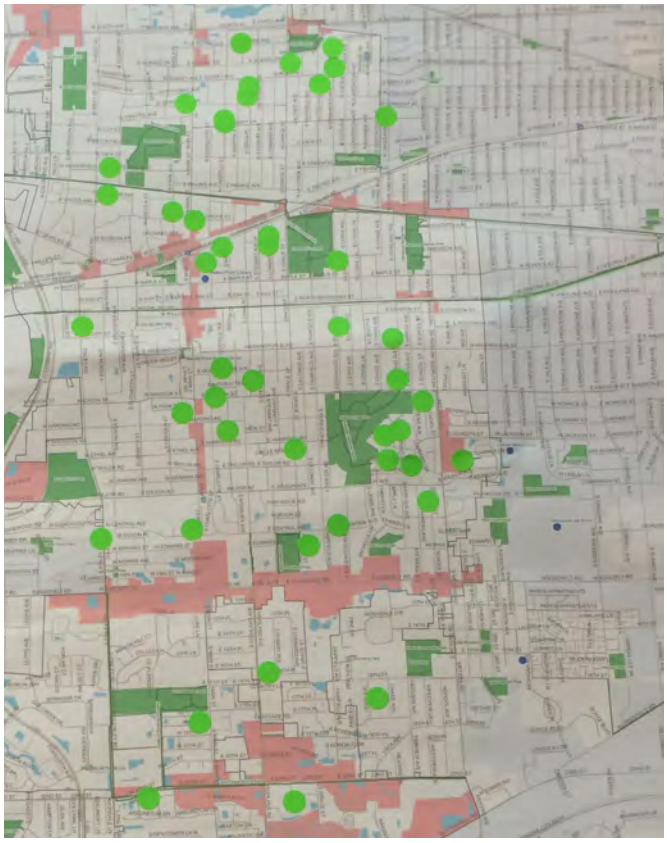
Several people mentioned that the intersection of the Illinois Prairie Path and Main Street is a biking hazard. A shop owner near the intersection said that she often sees cars hit people on bikes or near misses. Someone who stopped by suggested removable speed bumps at this location. A few people who stopped by the table said that north/south connections through the Village are poor for biking. While there are calm residential streets to bike on, the intersections with major roadways such as Roosevelt Road are uncomfortable to navigate. Respondents also mentioned interest in reaching schools by walking and biking.

The existing trails are shining examples of the Village's investment in bicycling and walking infrastructure. Residents identified these trails as valuable amenities.

In contrast to the photo above, residents reported difficulty bicycling and walking along busy, car-oriented roadways.



Dots on a map to illustrate National Night Out participants' opinions about walking and biking in Lombard.



Dots on a map to illustrate where National Night Out participants live.

Two members of the project team at National Night Out.

Online Survey Results

More than 200 residents and trail users responded to the online survey. Nearly 80% of respondents reported living in Lombard and less than 5% of participants reported living outside of the Village. These respondents come primarily from communities along the Illinois Prairie Path. About 13% of respondents did not leave zip code or community information.

Survey participants were asked to respond to a series of questions about pedestrian issues, bicycle issues, and program and policy ideas. Highlights of the results are listed in the following sections.

Results Regarding Walking

Walking Characteristics of Respondents

- Nearly 90% of respondents reported taking either daily or weekly walks.
- Many respondents described taking destination-based walking trips, such as to parks, schools, downtown Lombard, the library, or the Metra Station.
- Those who reported taking recreation-based trips indicated that they walk on the Illinois Prairie Path, Great Western Trail, or around their neighborhood.

Level of Walkability

- More than 90% of respondents answered that Lombard is either "very walkable," or "moderately walkable."

Priority Improvements

- 53% ranked intersection improvements as a high or medium-high priority.
- More than 56% of respondents listed unsafe intersections as a barrier to walking.

Top Three Survey Results: "Please rank your top priorities for improving the walking environment in Lombard":

Top result: Create safer street crossings at intersections

2) Repair cracked, broken, or inadequate sidewalks

3) Enhance lighting

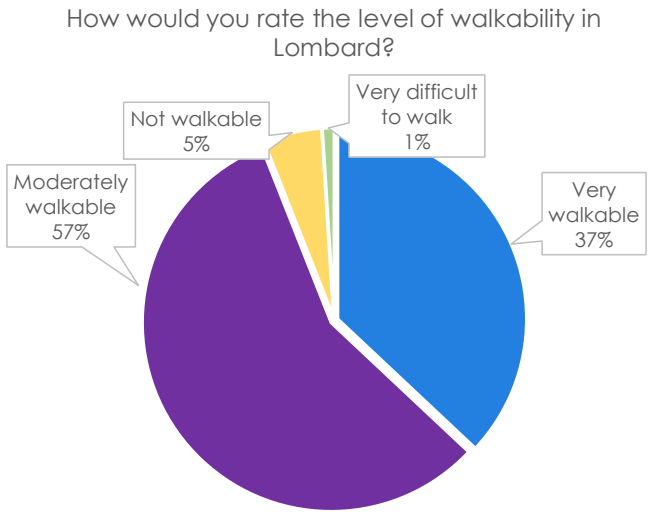


Figure 29.

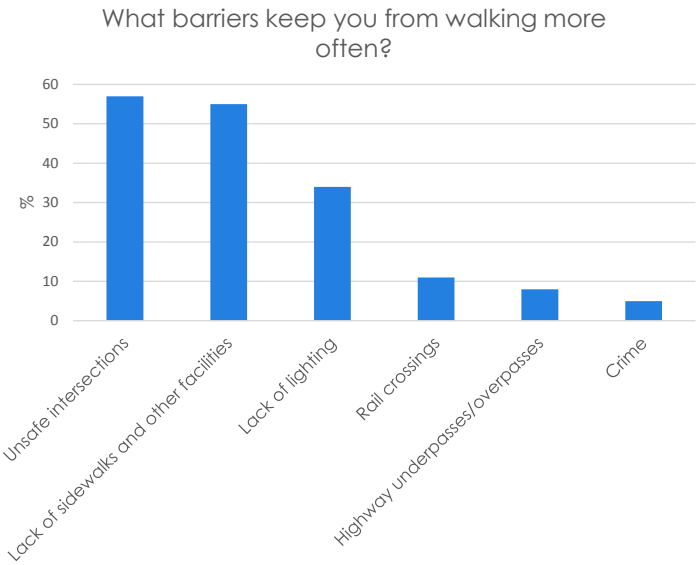


Figure 30.

Crossings in Lombard are highly variable with regards to bicycling and walking comfort. The two crossings shown above offer extremely different user experiences.

Results Regarding Biking

Biking Characteristics of Respondents

- 47% of the respondents reported biking weekly.
- The vast majority, 97%, of respondents bike for recreation, while 30% reported that they bike for other trips.

Level of Bikeability

- Almost 70% of survey participants believe that Lombard is moderately bikeable.

Priority Improvements

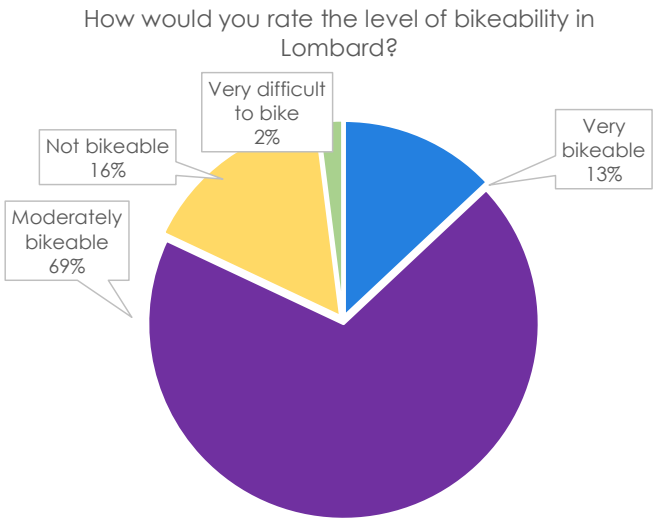
- When asked to rank top priorities for bicycle improvements in the community, 55% ranked installing bike routes along major streets as a high- or medium-high priority. 45% said creating safer intersections should be a priority.
- Several respondents selected "other," and wrote comments about trail improvements, specifically about crossings such as Main Street and Westmore-Meyers Road.
- Participants cited trail maintenance issues such as foliage trimming and pesticide use, as well as requests for lighting along the trail and at the intersection of the Illinois Prairie Path and Grace Street.

Top Three Survey Results: "Please rank your top priorities for improving the biking environment in Lombard":

Top result: Install bike paths or provide bikeways parallel to major streets

2) Create safer street crossings at intersections

3) Install bike paths or routes through neighborhoods



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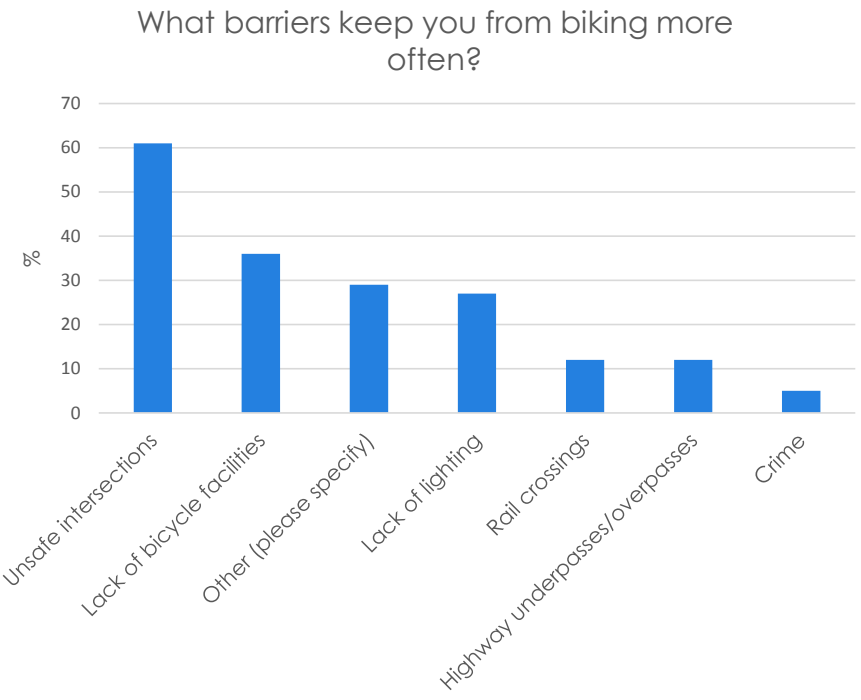


Figure 32.

Policy and Program Results

Policies

- Survey respondents indicated support for policies that increase or create safer access to walking and biking.
- 40% of people who answered the question regarding biking- and walking-related policies suggested the need for policies that support bicycle and pedestrian facilities year-round.
- Four respondents used the optional space for comments to write about the need for crosswalk enforcement.

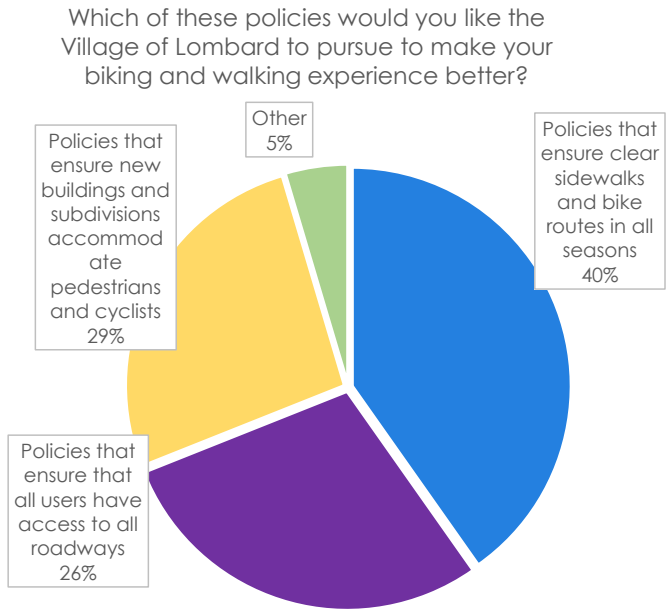


Figure 33.

Programs

- A preference for enforcing safe driver behavior (32%) was indicated in the results; followed by walking, biking, and transit encouragement activities (28%); and enforcement of safe travel behavior for cyclists and pedestrians (55%).
- Additional write-in responses were mostly focused on enforcement issues, such as the education or ticketing of pedestrians, cyclists, and drivers for not following the rules of the road. Crosswalk stings and other enforcement or education programs dealing with yielding to participants were frequently proposed.

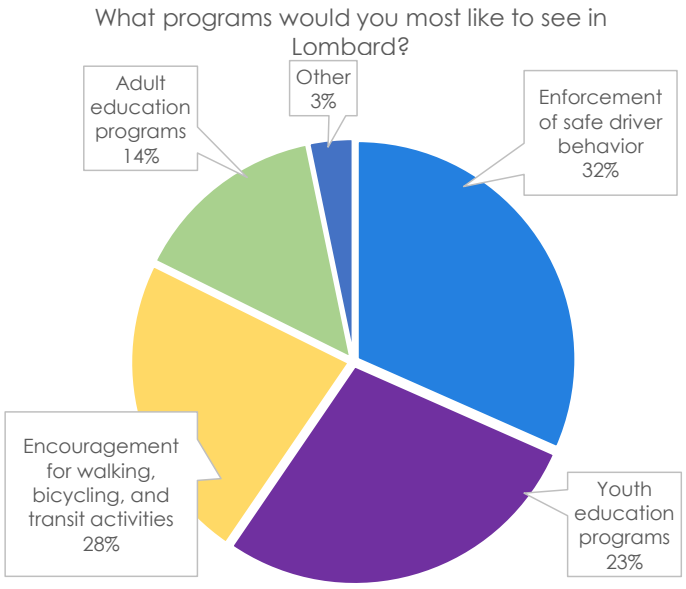


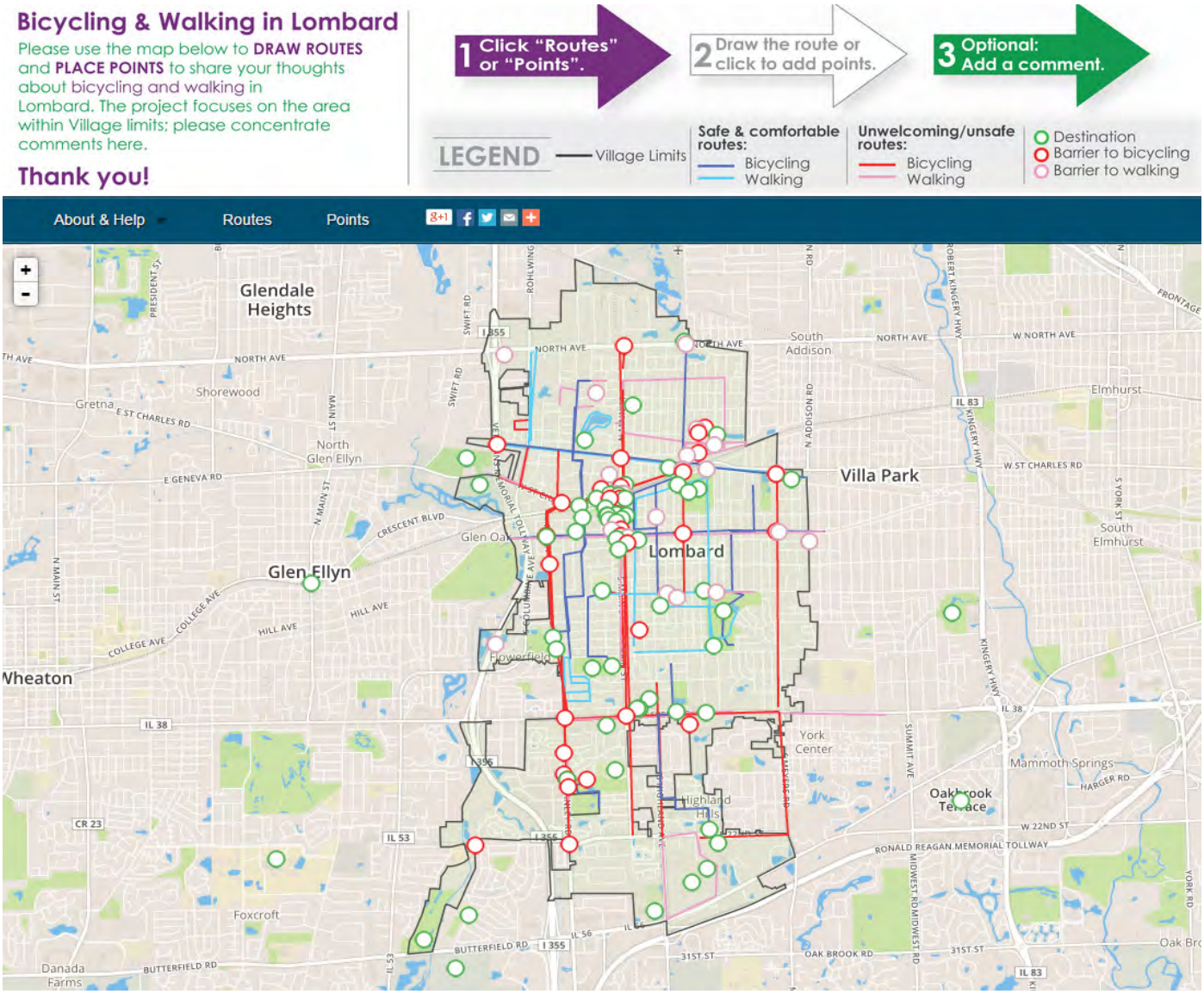
Figure 34.

Interactive Map Results

Almost 500 people visited the online interactive map, and many participated by adding points, lines, and/or comments that indicate suggested routes, barriers, and destinations. This input is crucial to the plan's public process, as it provides a way for residents of the community to easily and anonymously share their opinions on biking and walking in Lombard.

Safe & Comfortable Bicycling and Walking Routes

There are a number of bicycle and walking routes that users marked as "safe and comfortable". Unsurprisingly, many said that the Great Western Trail, the Illinois Prairie Path, and the trails within Madison Meadow Park feel safe and comfortable. While it is positive that users say these paths themselves are popular, well-used, and safe, many also mentioned the lack of connectivity between these trails and other Lombard destinations.



The online interactive map was open throughout the entire public engagement process and viewed by 471 people.

Furthermore, users addressed a number of perceived dangerous intersections one must cross on foot or by bike to reach these trails. These intersections will be specifically discussed in detail in a later section. Apart from trails, residents marked the following streets as safe and comfortable routes.

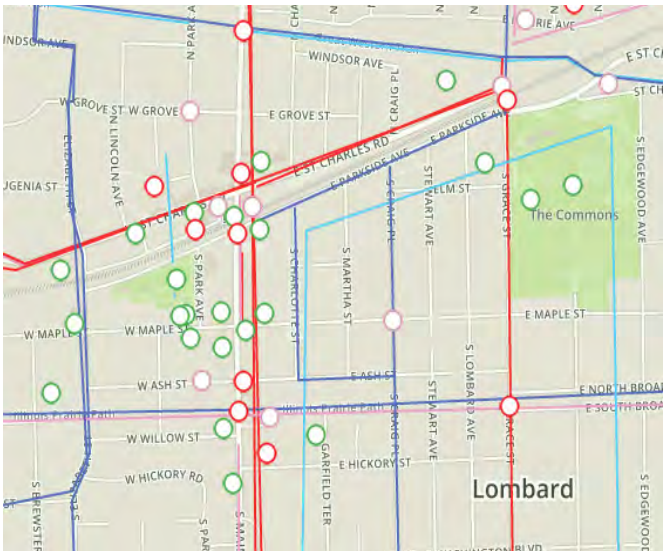
Bicycle routes

- Edson Avenue (Wilson Road to Hickory Street)
- Elizabeth Street (Madison Street to Sunset Avenue)
- Parkside Avenue (Main Street to Grace Street)
- Highland Avenue (St. Charles Road to Broadway Avenue)
- Lodge Lane (Broadway Avenue to Madison Street)

Walking routes

- Madison Street (Main Street to Lodge Lane)
- Wilson Avenue (Charlotte Street to Fairfield Avenue)

These routes are significant because many do not have existing bicycle or pedestrian infrastructure. However, residents identify the streets as routes they already travel.



Most points on the map were concentrated in downtown Lombard.

Unwelcoming/Unsafe Bicycling and Walking Routes

The map enables users to draw lines along routes that they deem unwelcoming or not comfortable for bicycling or walking. From these lines, it is evident that people feel unsafe along many of the Village's major corridors. Residents may be dissuaded from bicycling or walking at all if they have to find more complicated routes to reach their destinations. Users marked Main Street, Finley Road, Westmore-Meyers Road, and Grace Street as unwelcoming and unsafe bicycling routes.

Respondents' comments regarding Main Street's barriers to walking and biking are important to note in greater detail. Main Street is an integral corridor and community asset, as it connects Lombard's downtown with the rest of the Village. The concentration of businesses in Lombard's downtown core means that with proper infrastructure and encouragement, the area could be popular with people biking, walking, or driving.

Roosevelt Road is another problematic route for residents and visitors traveling on foot and by bike. Other east-west streets that map participants marked as unwelcoming or unsafe include St. Charles Road, 22nd Street, and Sunset Avenue. Finally, certain segments of Columbine Avenue, N. West Road, and Highland Avenue. Several other streets surrounding Yorktown Center were also marked as a concern.

Difficult Intersections

People who left comments on the map had the opportunity to comment on points or line segments already marked by other users. From this information, it is clear which intersections Lombard's residents feel need additional attention.

As mentioned earlier, many residents feel that some trail crossings are a concern for pedestrians and bicyclists. Along the Illinois Prairie Path, over 25 different users commented that it is dangerous to cross at Main Street on foot or by bike. There is a crosswalk, median, and yield sign here, yet many commenters note that cars still do not stop for cyclists or pedestrians. One commenter suggested adding flashing yellow crosswalk signs. Another mentioned the importance of educating drivers about yielding to pedestrians. Twelve users commented that they feel unsafe at the Westmore-Meyers Road and Illinois Prairie Path intersection. Five users agree that the intersection of Finley Road and the Illinois Prairie Path is difficult to cross. One user expressed frustration about reaching this portion of the trail by bike, saying it, "defeats the purpose to drive there for a bike ride" because you "can't get there safely with children on bikes."

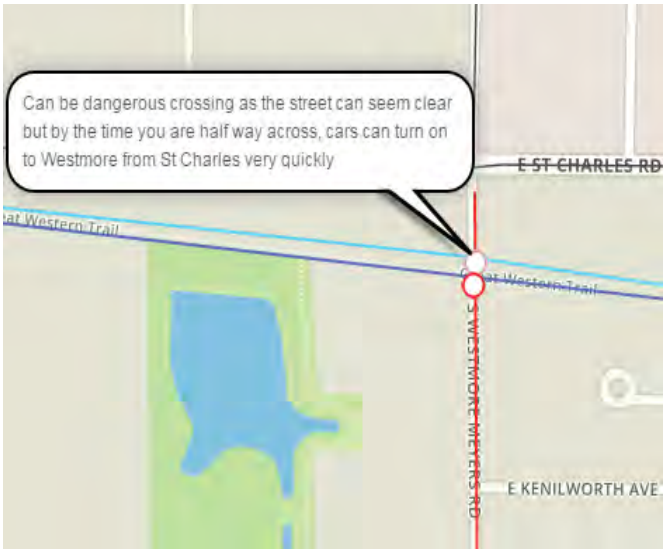
Respondents indicated two challenging intersections along the Great Western Trail. The first is the intersection of Main Street and the Great Western Trail. However, one person noted that it is easier to cross at this location than the Prairie Path and Main Street. Secondly, eight different users perceived the crossing at Westmore-Meyers Road as challenging; sometimes it appears that it is safe to cross, but then cars very quickly turn onto the street from St. Charles Road.

Users paid particular attention to the Main Street corridor. There were multiple comments regarding the area near Parkside Avenue, St. Charles Road, and Main Street, where the Lombard Metra station is located. Nine comments noted that it is difficult to cross Parkside Avenue when heading south on Main Street. Residents mentioned how the crosswalks at Main Street and St. Charles Road are not well marked and there is no buffer from traffic. Others described a desire to construct an overpass.

This is a crucial intersection, because it is important that pedestrians and cyclists can easily and safely access the train. Further south, 12 comments indicate the hazards of crossing Roosevelt Road and Main Street.

The second most-discussed intersection is Stewart Avenue and Madison Street. Twenty-five different users commented about the intersection's potentially unsafe design for children biking and walking to nearby Hammerschmidt Elementary School. The current intersection design lacks a crosswalk or crossing guard. One user suggested following the example of Wilson Avenue and Edgewood Avenue and installing a painted crosswalk and a "STOP for pedestrians in crosswalk" sign. Another commented that this intersection should be included in a Safe Routes to School Plan. According to one user, 80% of the students who attend Hammerschmidt Elementary enter the school from Stewart Street, thereby reinforcing the intersection's importance to the community.

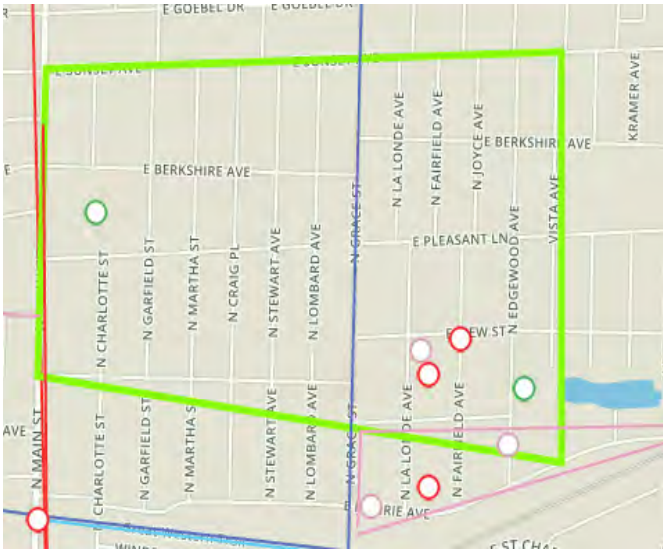
Other intersections highlighted on the map as unwelcoming or a concern include Finley Road and 22nd Street and North Avenue and Grace Street.



One user's comment regarding the intersection of Westmore-Meyers Road and St. Charles Road

Connectivity

A well-connected bicycle and pedestrian network is an essential aspect to making bicycling and walking safe and convenient for a community. This is something Lombard residents indirectly and directly noted in their input. Eleven comments suggested that there should be a path to connect the Illinois Prairie Path with the Great Western Trail. Two routes were suggested: one would use Elizabeth Street, and the other would go from the Prairie Path to Finley Road, then Crescent Boulevard to St. Charles Road to the Great Western Trail. Two different comments regarding this path mentioned the idea of routing this connecting trail through the downtown to promote local businesses. Residents expressed difficulty reaching the Illinois Prairie Path via Finley Road. Users say Finley could be a good candidate for an on-street bike lane in order to provide this direct connection.



Many participants noted a lack of sidewalks in the neighborhood pictured above.

Other Comments

Participants who left comments regarding the online map expressed a variety of ideas related to making Lombard a better place to live and move. Among them:

- Columbine Avenue from North Avenue to the Great Western Trail is heavily used by pedestrians and is currently unsafe.
- The lack of crosswalks along Highland Avenue prevents safe crossing to Yorktown Center (from Majestic Drive to Butterfield Drive).
- The gravel and dirt sections of the Great Western trail are impassable after a heavy rain; it would be better if the entire path were paved.
- There are empty lots currently for sale at the intersection of Willow Street and Main Street near the Illinois Prairie Path that could potentially be converted to a trailhead/picnic shelter/parking lot for trail users.
- A more direct route from the Great Western Trail to the south side of St. Charles Road would provide safer and more convenient access to the Commons Park.
- The sidewalk abruptly ends along Finley Road.
- Cars reach high speeds along Maple Street between Main Street and Grace Street due to a lack of stoplights. The intersection of Maple Street and Craig Place sees a high number of pedestrians.
- There is an overall lack of bike racks in Lombard. Current bicycle racks are frequently at capacity.
- Multiple comments discuss a need for driver education regarding yielding for pedestrians and other right-of-way laws. It seems that although appropriate pedestrian infrastructure—such as refuge islands, signs, and crosswalks—are present in some places, drivers are not aware what is required of them.

Community Workshop Results

On Wednesday, July 1, 2015, residents gathered at Lombard Village Hall to share their local knowledge and to propose potential improvements. Fifteen residents attended the workshop.

The meeting began with a presentation that focused on the benefits of walking and biking and the types of facilities that can help encourage active forms of transportation. The audience remained engaged throughout the presentation by responding to "what's wrong with this picture"-style slides that highlighted common challenges to walking and biking. The workshop utilized audience participation polling tools that displayed participants' opinions on bike- and walk-friendliness, programs, and policies. The group then divided into two sections to highlight destinations, barriers, and preferred routes on a map and brainstorm education, encouragement, and enforcement programs.

Summary of the Live Polling Questions

Walkability & Bikeability

- The majority (81%) of participants reported taking daily walks when the weather allows.
- 53% find Lombard moderately walkable and 41% find it very walkable.
- Just over half of participants (52%) reported that they bike daily, especially during warmer months.
- The majority of respondents (75%) believe Lombard is moderately bikeable.

Priorities

- Respondents prioritized the idea of installing new intersection improvements to improve the pedestrian realm.
- Installing bike routes and creating safe intersections were tied for the top two priorities for bicycle improvements.
- Participants prioritized the enforcement of safe walking, biking, and driving behavior when it comes to establishing new biking and walking programs.
- Clearing bike lanes and sidewalks year-round was listed as the top policy priority.

Mapping Results

The Community Workshop Map, Figure 35, summarizes the routes, barriers, and destinations that were noted by the workshop participants. A few highlights include:

- Destinations included schools, parks, the library, the Metra station, and Forest Preserves.
- Community members noted that there are many unsafe crossings in Lombard, particularly along Roosevelt Road and at trail crossings.
- Multiple routes were identified for bicycle improvements, including Westmore-Meyers Road.
- Participants noted a need in particular for routes that connect north and south Lombard to the Illinois Prairie Path, the Great Western Trail, and shopping districts.
- One group expressed a need for a low-stress route that connects cyclists across Roosevelt Road to Yorktown Center and Target. Grace Street and Fairfield Avenue were suggested as possibilities.
- The East Branch River Trail was listed as a high priority trail project.

Workshop participants describe their map.

Programming Brainstorm Results

The two groups took time to brainstorm ideas for education, encouragement, and enforcement programs in Lombard.

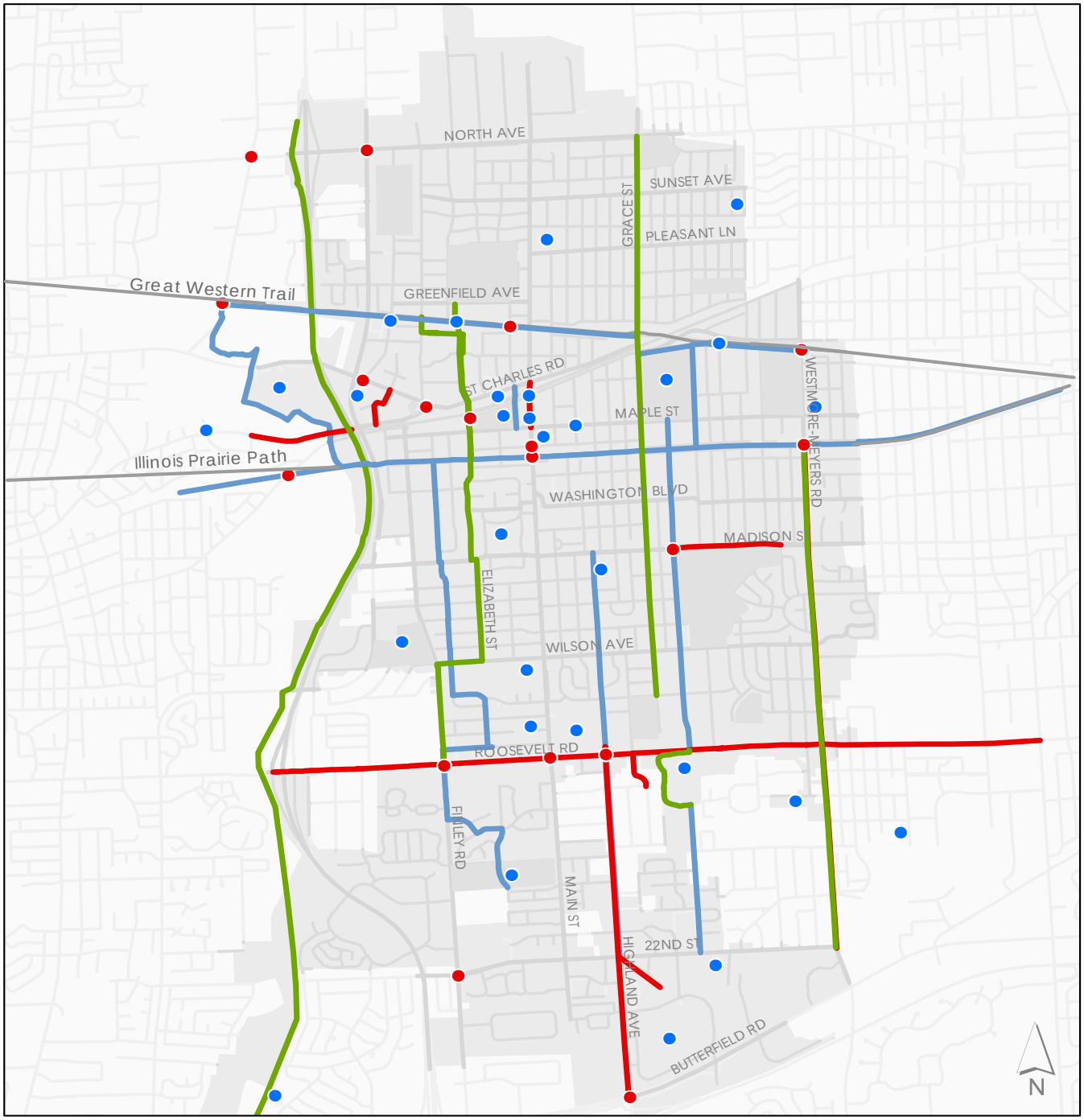
These types of programs effectively encourage citizens and visitors to follow the rules of the road, no matter their preferred form of transportation. Encouragement programs, such as offering incentives for visiting local business by bicycle, foster community pride and engage citizens.

In total, the public meeting participants suggested 20 ideas. Many ideas involved educating bicyclists and motorists regarding local and state regulations. Other ideas involved enforcement techniques to ensure such regulations are followed. Still other ideas sought to develop enthusiasm for bicycling and walking in the Village.

At the end of the meeting, attendees were asked to select their favorite ideas. The most popular proposed programs were:

- "Bike to the library" program or campaign
- "Share the Road" campaign
- "Trail Etiquette" campaign

The community workshop included residents of all ages.



Community Workshop Results (June 2015)

- Barrier to walking/biking
- Destination
- Potential for new or improved biking/walking infrastructure
- Safe and comfortable biking/walking routes
- Unsafe and unwelcoming biking/walking routes
- Great Western Trail
- Parks
- Lombard

0 0.375 0.75 1.5 Miles

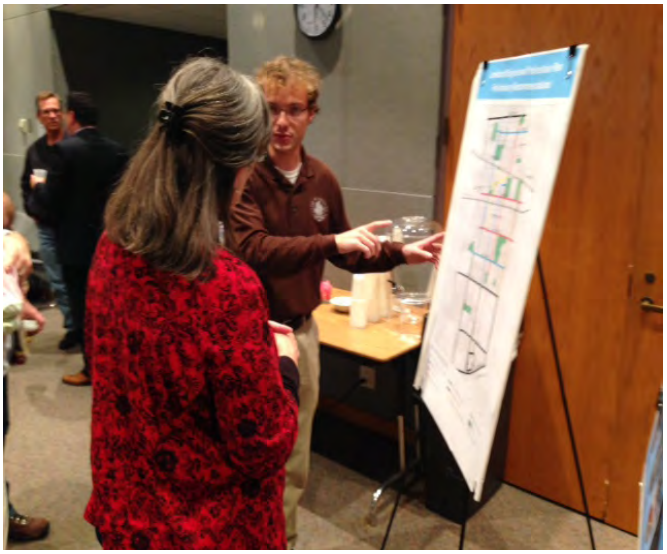
Figure 35.

Advisory Committee Meeting and Public Workshop – Recommendations Phase

On November 12, 2015, the study team convened a second Advisory Committee meeting. Approximately ten community leaders listened to an overview of existing conditions, public engagement, and proposed recommendations. Their comments were positive. They liked the recommendation for bike lanes on Westmore-Meyers Road and mentioned that the improvement might have the side effect of raising adjacent residential property values. Attendees also appreciated the idea of streetscape improvements downtown and bicycle access improvements in the Yorktown Center mall parking lots.

On November 19, 2015, the study team held a second public open house to reveal recommendations and obtain feedback. Over twenty residents attended, listened to a brief overview presentation, and discussed the recommendations over large maps. The comments were very positive. Attendees enjoyed the idea that once the recommendations are wholly implemented, every Lombard resident will be within one-half mile of bicycle or pedestrian improvements. Attendees were excited about a key recommendation along Westmore-Meyers Road that will reduce the number of lanes from 4 to 3. They also identified the detailed wayfinding signage proposed from the trails to Lombard destinations as good recommendations.

Public open house attendees listen to an overview of recommendations.



Workshop participants discuss a map of proposed recommendations.

Recommendations

The recommendations presented in this chapter are informed by:

- The existing conditions analysis
- Public input
- Stakeholder and Advisory Committee Input
- Fieldwork observations
- Quantitative analysis using geographic information systems computer software (GIS)
- Best practices from other North American cities

Existing roadway characteristics such as traffic volume, crashes, roadway width, posted speed limit, jurisdiction, and truck routes helped determine proposed networks. Network development also takes the following factors into account:

- Directness of routes
- Barriers (physical and psychological)
- System connectivity for residents and visitors of all ages and abilities
- Potential routes' connection to multiple destinations (e.g., parks and schools), land uses, and neighborhoods

The recommendations presented in this chapter develop a system of comfortable bicycle facilities. These facilities are intended to be comfortable even for residents who do not currently use bicycles for transportation. Intersection improvements will further assist residents by lowering bicyclists' actual and perceived risk within these areas.

Recommendations to improve the pedestrian sphere take the Village's current policies and practices into account, such as planned improvements to fill sidewalk "gaps." For this reason, pedestrian improvements focus on linear enhancements (i.e., sidewalks and sidepaths) but also discuss intersection "spot" improvements.

The preceding sections are not to say that Lombard is devoid of active transportation. On the contrary, the previous sections discuss the Village's robust trail network and numerous residential streets that are comfortable to walk and bike. Building upon these existing amenities will invite more people to bike and walk throughout Lombard for utilitarian needs and for recreation. If streets are made with these forms of transportation in mind, they will quickly integrate with the rest of Lombard's transportation system.

Policy recommendations and recommendations for new education and encouragement programs multiply the positive effects of installing new infrastructure for biking and walking. These recommendations will help educate and encourage area residents to use the recommended bike lanes and other improvements.

This section includes recommmendations to help make Lombard's street network as inviting to people biking and walking as the already well-loved trail system.

Types of Infrastructure Recommendations

Bicycle Infrastructure

Table 4 describes frequently used infrastructure for developing bikeway and pedestrian networks. Table 5 discusses traffic calming, intersection improvements, and pedestrian infrastructure.

Table 4. Types of Bicycle Infrastructure

Facility Type	Intended User	Recommended Roadway Typology	Key Details
Trail	Bicycles (road, mountain, or other varieties, depending on the surface) Pedestrians Equestrians (depending on prohibitions)	N/A (off-street)	Also called a shared-use path (SUP) or greenway.
Sidepath	Pedestrians Bicycles	Major arterials and collectors	Usually located adjacent to one side of the road. Sidepaths are bidirectional and intended for bicyclists and pedestrians.
Protected Bike Lane	Bicycles	Major arterials and collectors	Also called separated or protected bike lanes. Provides protection from motor vehicles by placing physical obstacles (e.g., vertical posts, planters, parked cars) between people biking and people driving.
Buffered Bike Lane	Bicycles	Major arterials and collectors	Provides more distance from cars than do standard bike lanes. Buffer design may take a variety of shapes and placements, depending on the project.
Bike Lane without Buffer ("Standard" Bike Lane)	Bicycles	Wider residential streets, minor arterials and collectors	Provides some distance between people driving and people biking. "Standard" bike lanes offer space for bicyclists. However, when used alongside busier roadways, they may be less welcoming to timid riders than protected bike lanes
Bike Boulevard	Bicycles	Residential areas	A variety of traffic calming measures and on-street pavement markings help facilitate low-stress travel through residential areas.

A variety of infrastructure tools help create vibrant biking villages and cities. Corridors that are stressful to walk and bike along—with high traffic volumes, high posted speeds, multiple travel lanes—require greater separation between people biking and people driving. Calmer streets—such as those in Lombard's residential areas—have less car traffic and lower speeds. These may already be comfortable spaces to bike and walk. Facility types that encourage roadway "sharing," such as bicycle boulevards, are generally appropriate options.

The illustrations below correspond to the facility types referenced in Table 4.

Off-street infrastructure options:

Shared Use Path

Trail*

Sidepath*

* Indicates a facility currently found in Lombard

On-street infrastructure options:

More separation from car traffic

Protected Bike Lane

Buffered Bike Lane

Bike Lane

Bike Boulevard

Less separation from car traffic

Types of Pedestrian Infrastructure & Traffic Calming

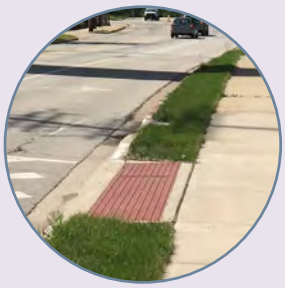
Common types of traffic calming infrastructure are detailed in Table 5. The facilities described in the previous table indicate infrastructure specific to either bicyclists or pedestrians. In actuality, however, these types of amenities offer benefits for all roadway users in the form of reduced crashes as a result of roadway space reallocation.

When implemented in strategic locations, these improvements calm traffic by lowering motor vehicle speeds, increasing the visibility of bicyclists/pedestrians, and increasing these users' predictability. Some treatments—such as the introduction of center turn lanes and corresponding roadway reallocation projects ("road diets")—have been proven to reduce the number of motor vehicle collisions, injuries, and deaths.

Table 5. Types of Pedestrian Infrastructure and Traffic Calming

Facility Type	Intended User	Key Details
Right-of-Way Reallocation ("Road Diet")	All users	Reduces the roadway space dedicated to cars and trucks and increases accommodations for vulnerable users Often improves safety and reduces speeding
Sidewalk	Pedestrian	Sidewalks give pedestrians their own space, adjacent to motor vehicle traffic.
Curb Ramps	Pedestrians	The Americans with Disabilities Act (ADA) specifies a number of accessibility improvements within the public way such as tactile bumps and curb ramps at crossings. Other features for universal access include auditory signals at pedestrian crossings and ample seating areas along pathways.
Crossing Marking Improvements	Pedestrians	High visibility crosswalks show motorists where to anticipate people crossing the street.
Curb Improvements	Pedestrians	Curb improvements include a variety of potential treatments: adding curb ramps for easier pedestrian access, tightening turning radii to slow vehicle traffic, increasing the size and geometry of porkchop islands, and removing slip lanes to narrow pedestrian crossings and slow motor vehicle traffic.
Bike and Pedestrian Wayfinding Improvements	Bicycles and pedestrians	Wayfinding signage signals people walking and bicycling to follow certain bicycle- and pedestrian-friendly routes. Signage should indicate the mileage and time required to reach key destinations.
Pedestrian Countdown Timer	Pedestrians	Pedestrian countdown timers show people walking the time remaining to cross a street before the signal changes to "DON'T WALK."
Median Refuge Islands	Bicycles and pedestrians at trail crossings	Median refuge islands provide a place to wait when crossing a multi-lane roadway. They are also used at trail crossings to provide a space for people walking and bicycling to wait to cross.
Bicycle Intersection Improvements	Bicycles	Bicycle intersection improvements alert drivers to crossing bicyclists by using striping to indicate bicyclists' travel paths. "Bicycle boxes" are tools that provide a space for bicyclists to wait at traffic signals, ahead of motor vehicle traffic. Since the stop bar for motor vehicles is placed behind people bicycling, bicyclists are able to cross intersections ahead of cars.
Gateway Improvements	All users	Often refered to as "chokers" or "neckdowns," gateway improvements calm traffic as they enter key areas of the Village.
Neighborhood Traffic Circle	All users	Neighborhood traffic circles are traffic calming devices that slow car traffic at intersections.
Pedestrian Signals such as Rectangular Rapid Flash Beacons (RRFB) and HAWK Signals	Pedestrians	RRFBs and HAWK signals encourage motorist yielding when installed at unsignalized intersections or at midblock crosswalks. RRFBs with passive detection systems are actuated by a pedestrian's presence near the crossing. Active warning signals can also be placed near unsignalized trail crossings to warn motorists of bicyclists' and other trail users' presence

Right-of-Way Reallocation ("Road Diet")



Curb Ramp

Crossing Marking Improvements

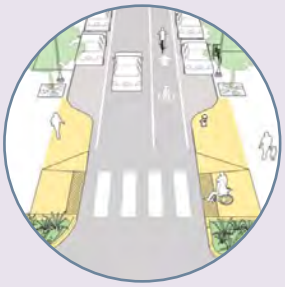
Curb Improvements

Bike and Ped Wayfinding

Pedestrian Countdown Timer*

Median Refuge Island

Bicycle Intersection Improvements



Gateway Improvements

Neighborhood Traffic Circle

Pedestrian Signals

* Indicates a facility currently found in Lombard

Network Recommendations

The team used a two-fold decision-making process when deciding on network recommendations, as depicted in the following map. The process involved analyzing street connectivity and opportunities to provide improved connections to destinations and residences. Next, the team analyzed each corridor to develop preliminary facility type recommendations. This involved assessing the existing street environment as well as desired design outcomes, such as fewer instances of vehicular speeding and collisions between motorists and vulnerable users.

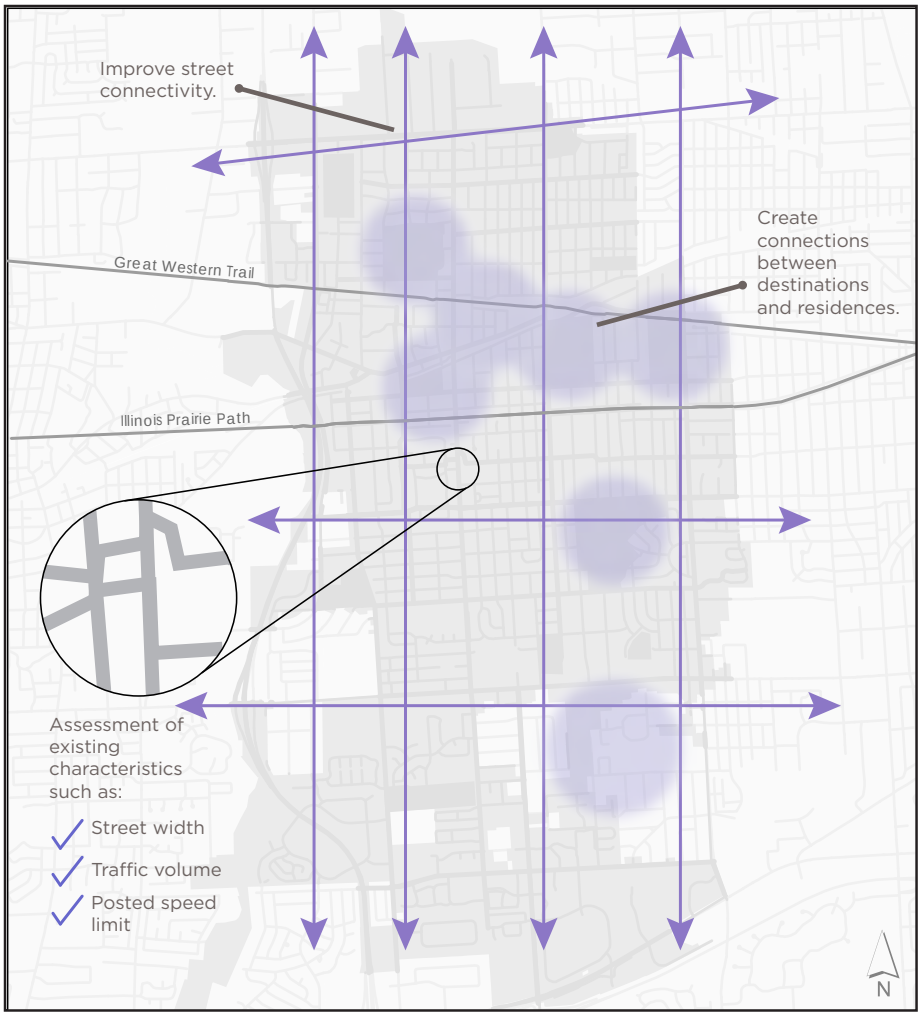


Figure 36. This conceptual map explains the team's approach to network development, leading to facility selection (e.g., road diet with bike lanes, bike boulevard, etc).

Bikeway and Pedestrian Considerations

Although the Plan's overall goal is to increase the bicycle- and pedestrian-friendliness of the entire system, certain corridors are prioritized for redesign and inclusion of new or improved facilities. The team created recommendations by assessing the following considerations:

Safety

Corridors and intersections with high numbers of crash locations, compared to other streets throughout the system.

Latent and Existing Demand

Proximity to high-demand destinations, as revealed in the Live, Work, Play, Learn Analysis which is described on the following page. Some of these high-demand areas are currently difficult to reach by foot or by bike. These include places such as Yorktown Mall, commercial areas along Roosevelt Road, and the western entrance of Four Seasons Park from Finley Road.

Public Input

Residents who participated in the public input process particularly valued safe access to the Village's two trails. Residents also discussed particular intersections that are currently wide and intimidating for bicycle travel as well as areas they currently enjoy walking and biking. Connecting the area's parks was seen as an important priority.

This consultant team studied the area's transportation system with multiple trips by bike, by car, and on foot.

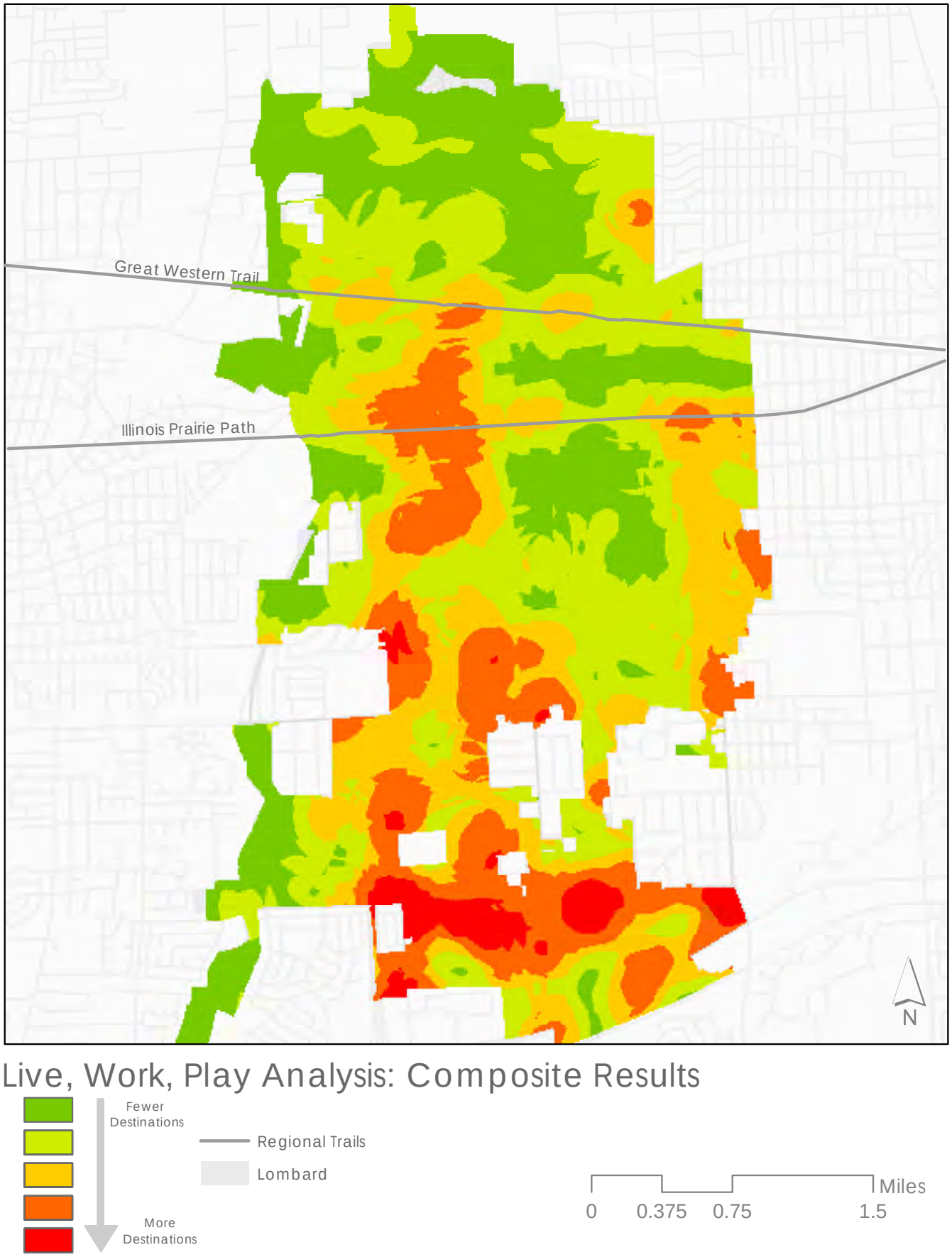

Great Western Trail
Illinois Prairie Path
N
Live, Work, Play Analysis: Composite Results
Fewer Destinations
More Destinations
Regional Trails
Lombard
Miles
0
0.375
0.75
1.5

Figure 37.

Live, Work, Play, Learn Analysis

As a part of the existing conditions analysis, the Alta team conducted a Live, Work, Play, Learn analysis that looks at demographic and villagewide points of interest to help gain a better understanding of where trip origins and destinations are concentrated throughout the village. This information will help determine how to align proposed bikeway and pedestrian networks with areas of high trip demand.

The red color represents areas with the highest scoring in terms of composite density. Residential areas, workplaces, recreational space, and educational institutions are all factored into this overall scoring of destinations within the village. The analysis shows that there is a strong composite density along Main Street as well as the area near Yorktown Mall. Other areas with several destinations include the eastern border of the village (along Westmore-Meyers) and several nodes along the regional trail system. All of these areas should receive strong consideration for improved bicycle and pedestrian access, particularly on-street bicycle accommodation and intersection improvements.

Residential Areas

Residential areas include a variety of places where Lombard residents live, including apartment buildings and detached, single family houses. Population density increases with higher numbers of people per square mile. If other conditions are met (i.e., the presence of suitable infrastructure), more trips can be made in areas with higher population density.

Workplaces

Workplaces denote areas where businesses operate in Lombard. Depending on the type of job, employment can act as a trip attractor (e.g., retail stores or cafes) or trip generator (e.g., office parks and office buildings) or both. High levels of employment density exist in the southern portion of the Village. The downtown area is home to a diverse selection of local businesses.

Recreational Space

Recreational space includes parks and retail areas where people "play." Lombard's parks are fairly evenly distributed throughout the village. Some parks, such as Four Seasons Park and Lilacia Park attract higher numbers of visitors each year than smaller parks. Nonetheless, the proposed bicycle and pedestrian network should help residents reach the diversity of Lombard's recreational offerings.

Educational Institutions

The density of educational institutions was calculated based on school enrollment numbers. All school levels are included within the calculation of where people in Lombard learn.

Bicycle Level of Traffic Stress (LTS) Analysis

A Level of Traffic Stress (LTS) analysis classifies roadways according to adult bicycle riders' approximated stress levels as they travel along a given corridor. The methods used for the Level of Traffic Stress Analysis were adapted from the 2012 Mineta Transportation Institute (MTI) Report 11-19: Low-Stress Bicycling and Network Connectivity. The approach outlined in the MTI report uses roadway network data, including posted speed limit, number of travel lanes, and presence and character of bicycle lanes, as a proxy for bicyclist comfort level.

The results of these models can be used to identify pedestrian and bicycle network gaps as potential areas for improvement. The analysis can also help aid in system-wide planning by addressing the areas that are currently most stressful. The LTS analysis identifies clusters of roadways along which it is currently comfortable to bike.

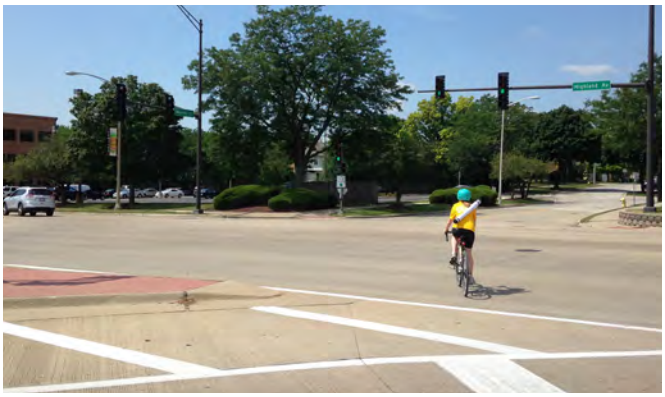
A roadway's perceived level of traffic stress closely follows a road's functional classification. Arterials are often much more stressful than neighborhood streets. This makes sense because roads with multiple lanes and high speed limits, without comfortable bicycle facilities, have higher stress estimates than roadways with fewer lanes and lower posted speed limits.

The results of the analysis validate the information gathered through the public input process, from field work, and from the maps presented in previous sections. A few major points are summarized in the box in the following column.

Key Street Characteristics from the Level of Traffic Stress Analysis:

The LTS analysis crunches roadway data according to corridor and intersection characteristics. Main findings include:

- Major north/south connections are stressful for adult cyclists.
- Madison Street can be moderately stressful.
- Intersections stemming from arterials and collectors are stressful. Figure 38 shows this by the yellow and red markings branching from main arterials.
- East-west connections are generally comfortable to bike and walk.
- Overall, lower stress clusters exist within neighborhoods, but clusters are separated by one another from higher stress crossings at main roads.



In some cases, residential, lower traffic volume roadways with lower stress levels become more stressful due to the presence of wide intersections without separate space for people bicycling. The top example shows the intersection of Westmore-Meyers Road and Roosevelt Road. The bottom shows Highland Avenue, adjacent to Yorktown Mall.

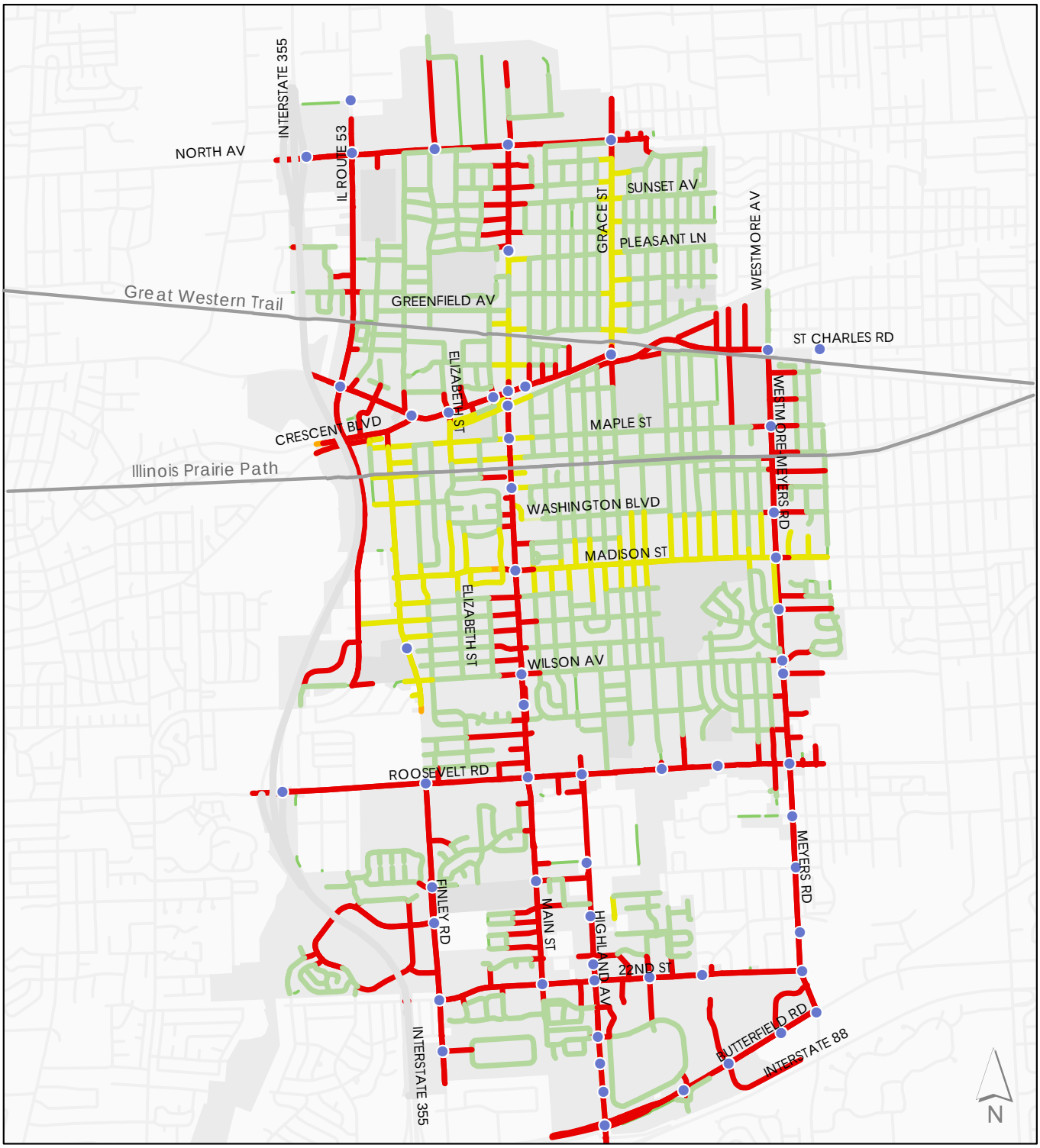

INTERSTATE 355
NORTH AV
IL ROUTE 53
GRACE ST
SUNSET AV
PLEASANT LN
WESTMORE AV
Great Western Trail
GREENFIELD AV
ST CHARLES RD
ELIZABETH ST
CRESCENT BLVD
MAPLE ST
WESTMORE-MEYERS RD
Illinois Prairie Path
WASHINGTON BLVD
MADISON ST
ELIZABETH ST
WILSON AV
ROOSEVELT RD
MEYERS RD
FINLEY RD
MAIN ST
HIGHLAND AV
22ND ST
BUTTERFIELD RD
INTERSTATE 88
INTERSTATE 355
N
Bicycle Level of Traffic Stress (LTS) Analysis
Limited access highway
Traffic Signals
Lower Traffic Stress
Higher Traffic Stress
Regional Trails
Parks
Lombard
Miles
0
0.375
0.75
1.5

Figure 38.

Road Diet Analysis

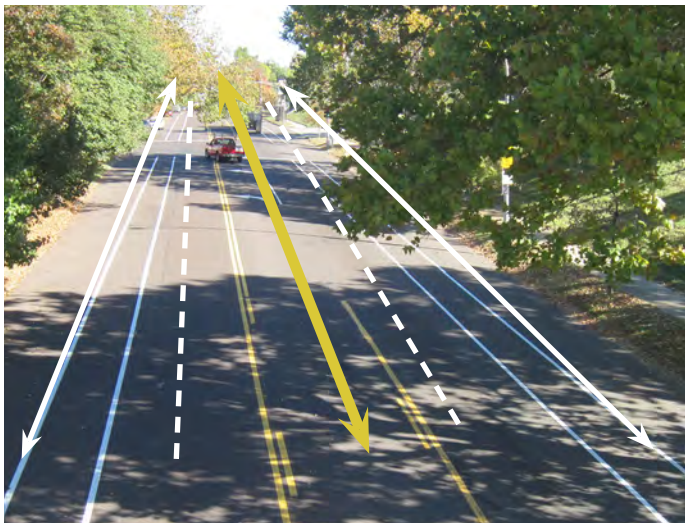
The road diet analysis investigated Lombard's road network's potential for converting motor vehicle lanes to other uses. Travel lane conversions use existing travel lanes for on-street parking, bike lanes, sidewalk expansions, or other roadway features. Many roads undergo "four-to-three" conversions, for instance, to convert four lane roads into two travel lanes plus one center turning lane. These conversions make space for bicycle lanes and pedestrian accommodations, when lane's widths are narrowed from the original conditions. Communities similar to Lombard have completed road diets and accrued benefits such as lower vehicular crash rates along such facilities, the addition of more protected non-motorized transportation facilities, and improved quality of life for abutting property owners.

By applying available ADT data to roads with four or more lanes, the team investigated whether a road is a viable candidate for a road diet. Some minor data gaps necessitated certain assumptions concerning some data points.

The light green, green, and yellow-colored lines represent roads that, after a preliminary analysis, may be likely candidates for reconfiguring the roadway through a road diet. Using a portion of the pavement width to better accommodate and encourage biking and walking along these roads would improve Lombard residents' travel options. Historically, the Village may consider road diets for streets with an average of fewer than 15,000 vehicles per day. Safety for all roadway users increases when road diets are installed. Car crashes decline after roadways are restriped for road diets. The presence of a center turn lane reduces potential conflict points between drivers as they turn.

Although the analysis identifies potential road diet candidates, the Village should analyze other factors such as traffic dispersion, number of curb-cuts, number of potential turning movements, bus stops, intersection operations, and adequate pavement width to include bicycle lanes before selecting road diets to implement. The analysis, therefore, is intended for general planning purposes only and is reliant on subsequent review in order to define bikeway types recommended for these roadways.

Broadway, a street in St. Louis, was restriped to include bike lanes and a center turn lane. Village officials in Lombard can undertake such projects within a street's planned resurfacing schedule.



The above illustration shows the street in St. Louis with lines to approximate the street's striping before the road diet. Previously, the street included two travel lanes in both directions and did not include bike lanes or a center turn lane.

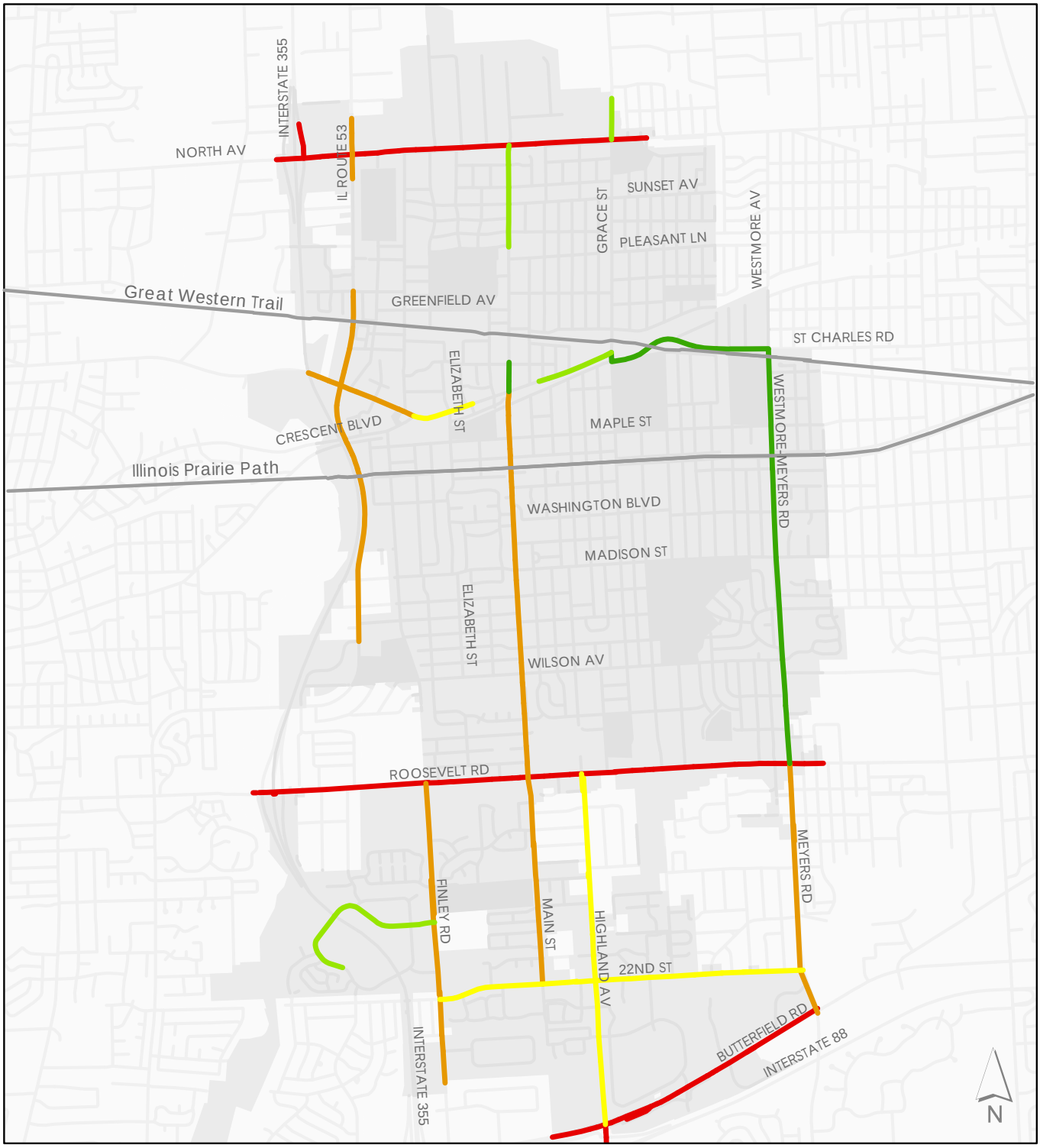

INTERSTATE 355
NORTH AV
IL ROUTE 53
GRACE ST
SUNSET AV
PLEASANT LN
WESTMORE AV
Great Western Trail
GREENFIELD AV
ST CHARLES RD
ELIZABETH ST
CRESCENT BLVD
MAPLE ST
WESTMORE-MEYERS RD
Illinois Prairie Path
WASHINGTON BLVD
MADISON ST
ELIZABETH ST
WILSON AV
ROOSEVELT RD
MEYERS RD
FINLEY RD
MAIN ST
HIGHLAND AV
22ND ST
BUTTERFIELD RD
INTERSTATE 88
INTERSTATE 355
N
Road Diet Feasibility Analysis
Not included in analysis
Higher Suitability
Lower Suitability
Regional Trails
Parks
Lombard
Miles
0
0.375
0.75
1.5

Figure 39.

Wide, low traffic volume roadways, such as Westmore-Meyers Road, offer high potential to reallocate roadway width to other users.

Main Street offers opportunities for streetscaping and parking improvements.

Priority Corridors for Providing Access to Traveling by Bicycle and by Foot

Chapter 1: Existing Conditions discusses a number of streets throughout Lombard that are integral to the Village's transportation system. The recommendations, presented in the previous maps and the corresponding tables, illustrate opportunities to address issues in these spaces that currently prevent Lombard residents from biking and walking comfortably throughout the Village.

The priority corridors, discussed in the plan's recommendations, are categorized as follows:

- Neighborhood street with bicycle boulevard
- Major street with bike lane or protected bike lane
- Major street with shared use path or sidepath

Dividing the Village's key corridors in such a way allows decision-makers and the public to envision a match between street types and the corresponding type of bicycle and/or pedestrian infrastructure selected for the given corridor. Additionally, "fixing" key intersections along these corridors will help make people walking and biking feel welcomed.

National best practice provides a basis for such recommendations for bikeway selection. Figure 39 below illustrates the relationship between a street's posted speed limit, number of vehicles traveling the route, and the resulting recommendation for bicycle accommodation along the route.

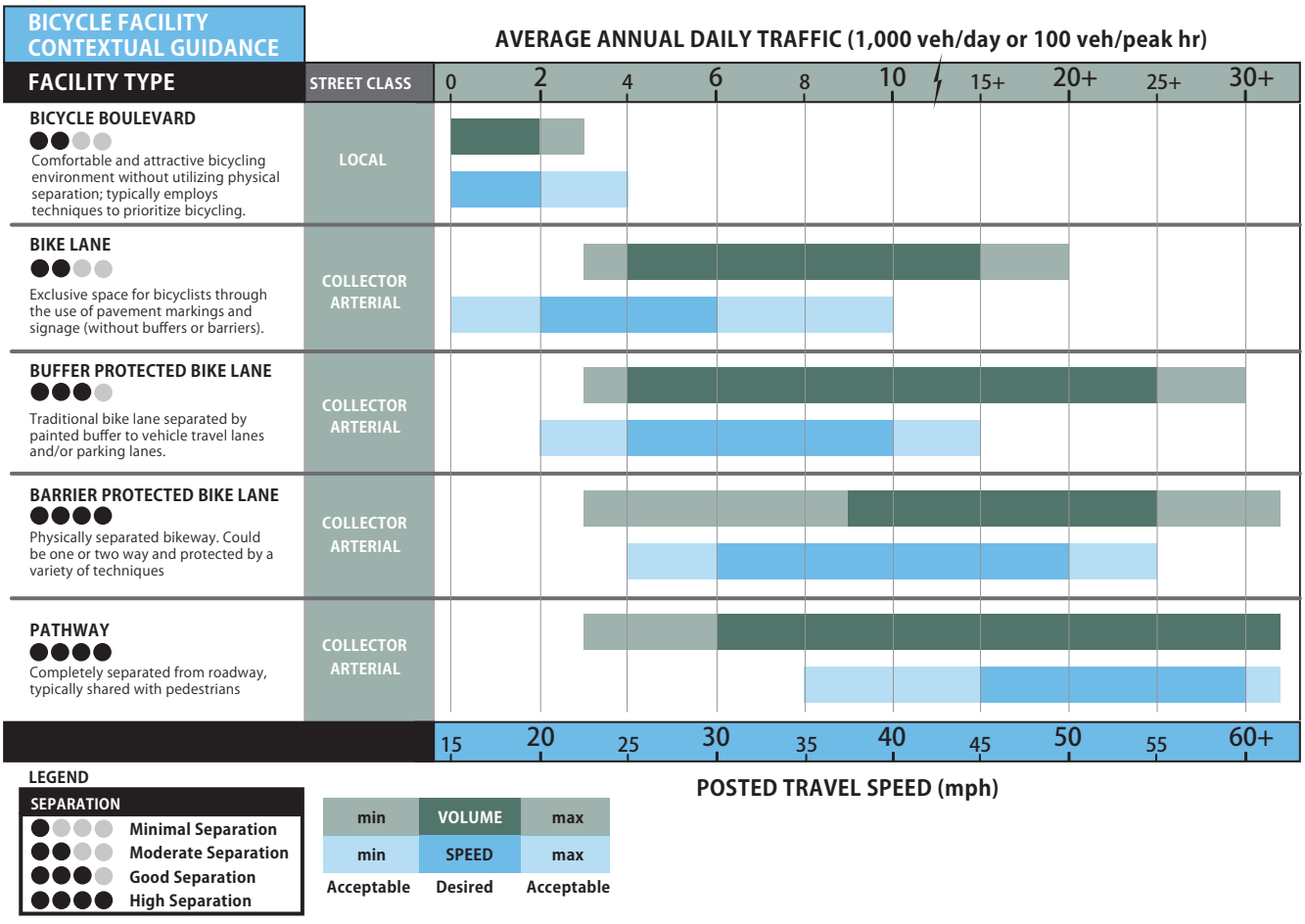
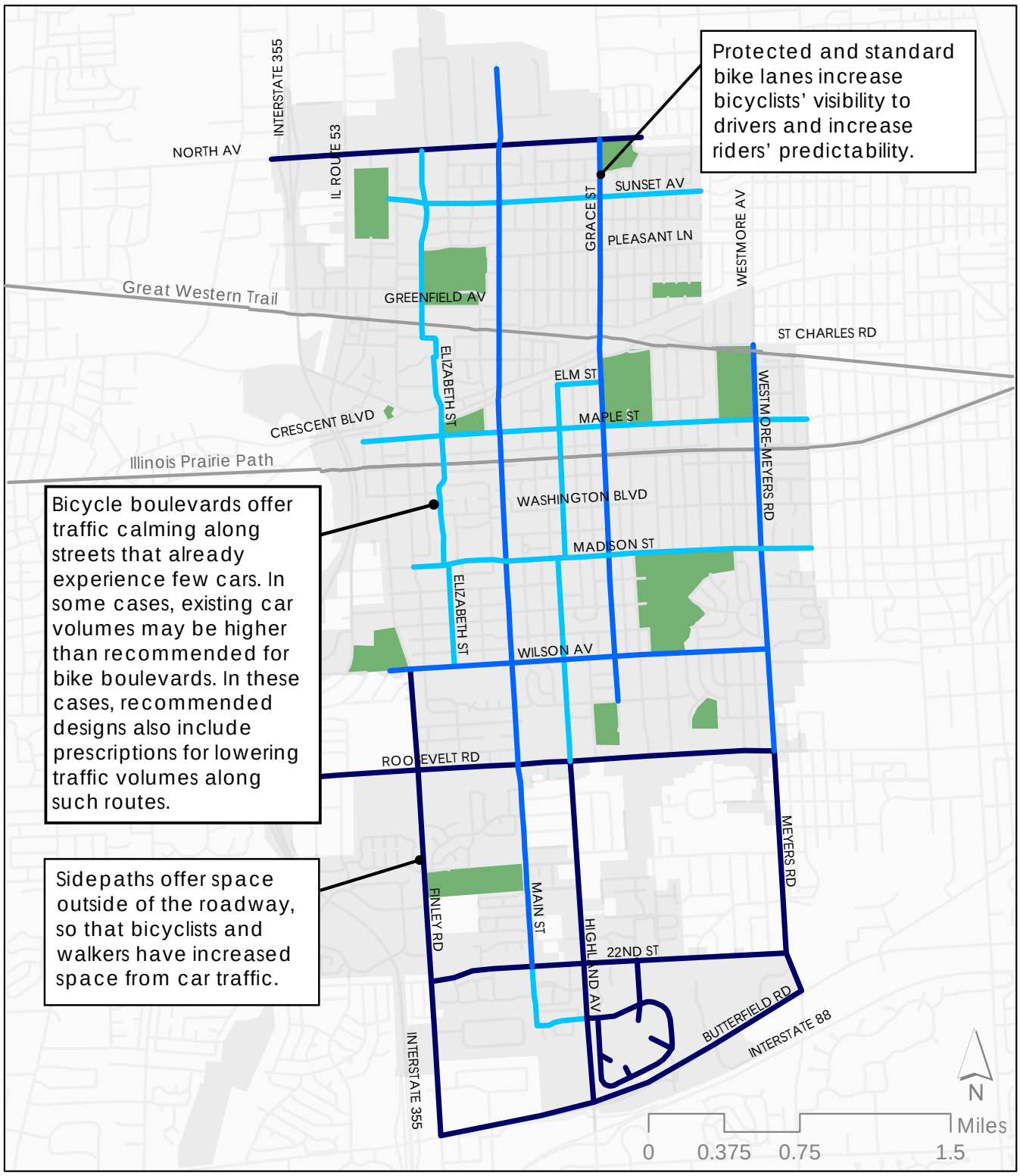


Figure 40. The chart above describes the relationship between facility types, average daily traffic, and posted speed limits. The chart helps planners judge the potential appropriateness of various types of bicycle infrastructure. (Sources: FHWA. Separated Bike Lane Planning and Design Guide. 2015. AASHTO Guide for the Development of Bicycle Facilities. 2012. FHWA. Manual on Uniform Traffic Control Devices. 2009. NACTO. Urban Bikeway Design Guide. 2012. NCHRP Report 766: Recommended Bicycle Lane Widths for Various Roadway Characteristics. 2014)



Proposed Biking and Walking Route Categories

- Neighborhood street - bicycle boulevard consideration
- Major street - bike lane or protected bike lane consideration
- Major street - shared use path or sidepath consideration

Enables shared space

Enables separate space

- Regional Trails
- Parks
- Lombard

Figure 41.

Recommended Bicycle and Pedestrian Improvements

Figure 42 illustrates the plan's recommended corridor and intersection improvements. Twenty corridors and more than 40 intersections are identified for improvements.

Transitions between on- and off-street facilities should include appropriate signage and intersection design. See design guidelines for more information.

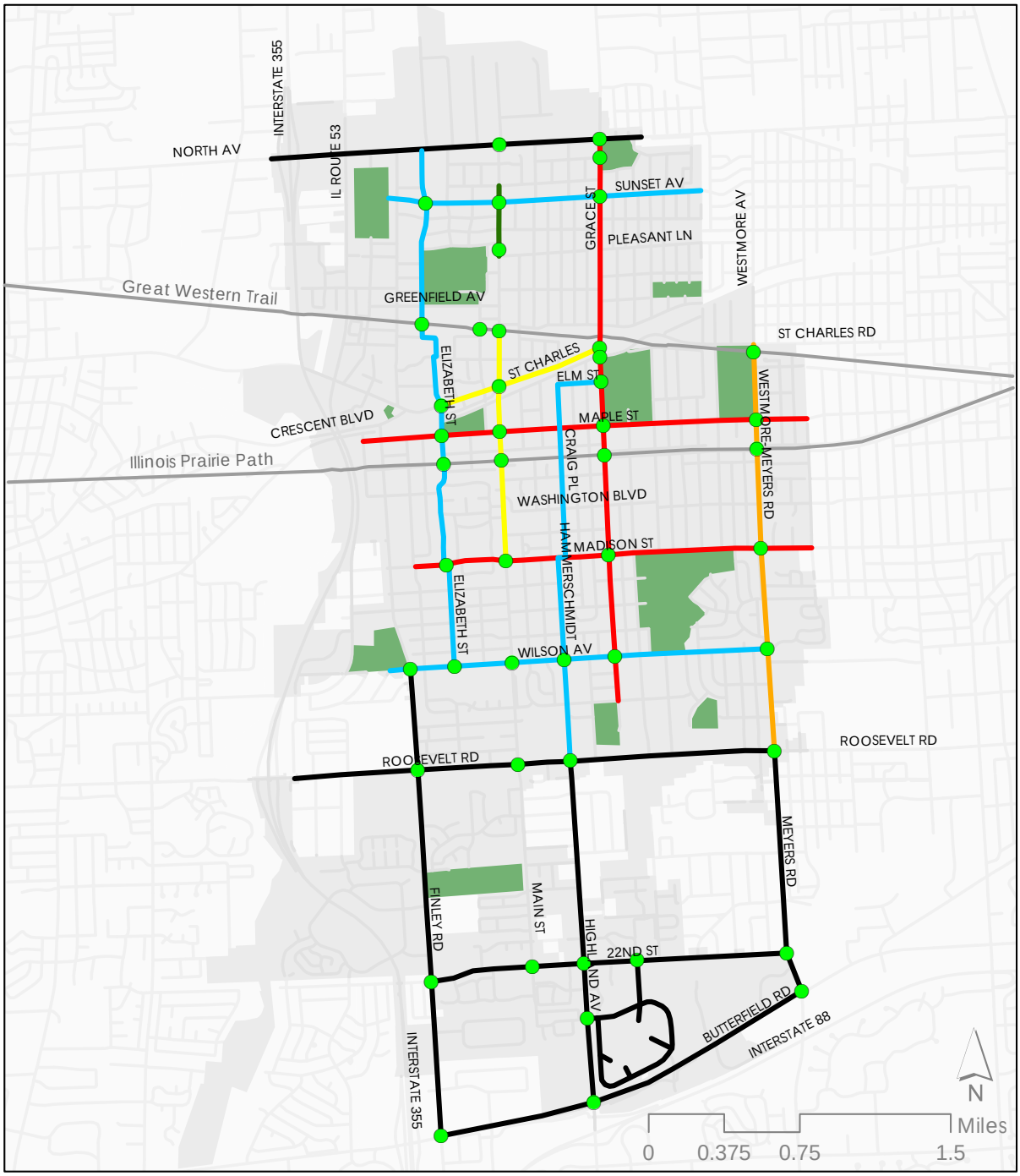
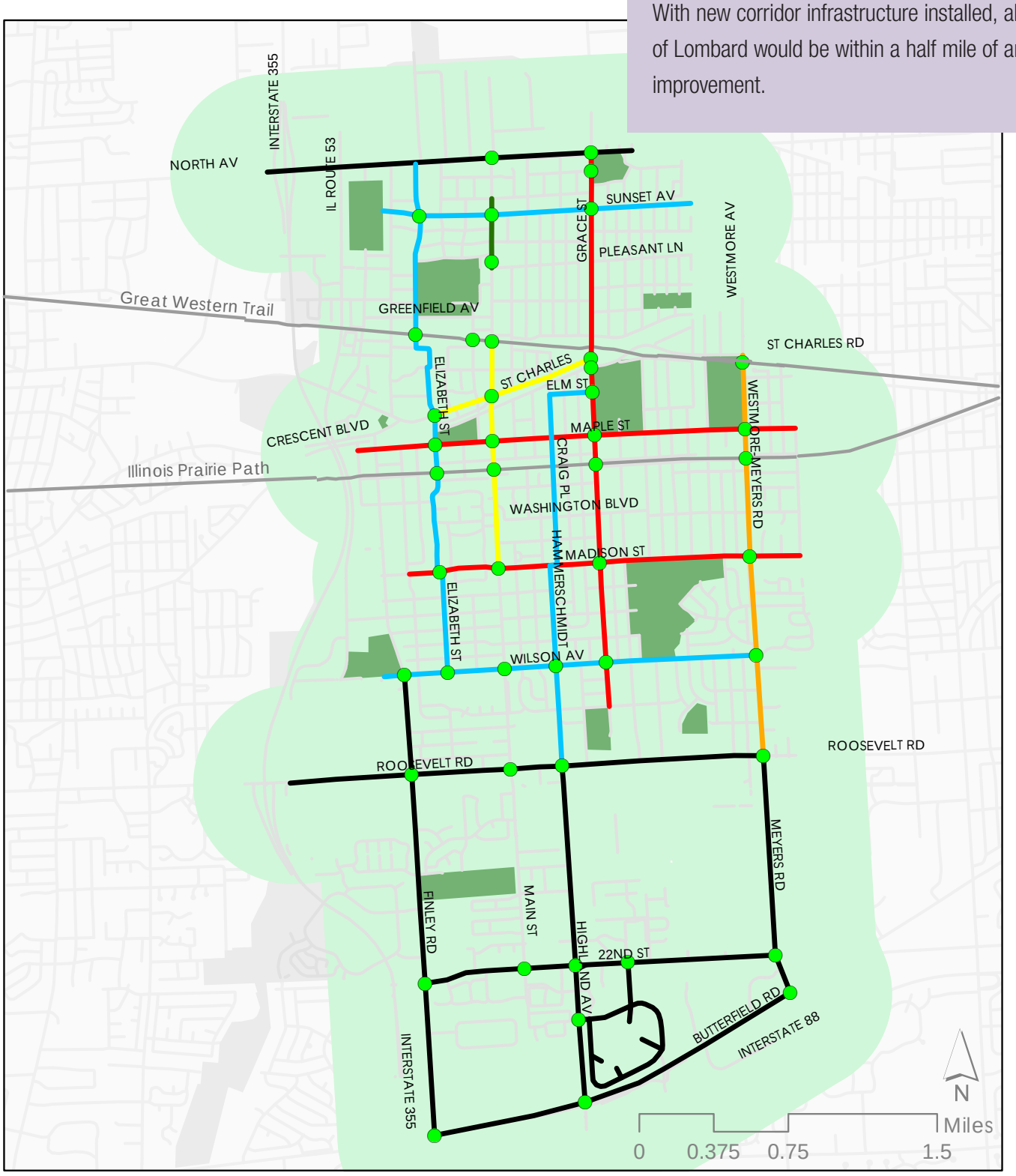


Figure 42.

With new corridor infrastructure installed, all of Lombard would be within a half mile of an improvement.



Recommendations

- Bike Boulevard
- Bike Lanes
- Road Diet and Buffered Bike Lanes
- Road diet and parking
- Shared Use Path
- Streetscape improvements
- Intersection Improvement
- Regional Trails
- Parks
- Lombard
- 0.5 Mile Buffer

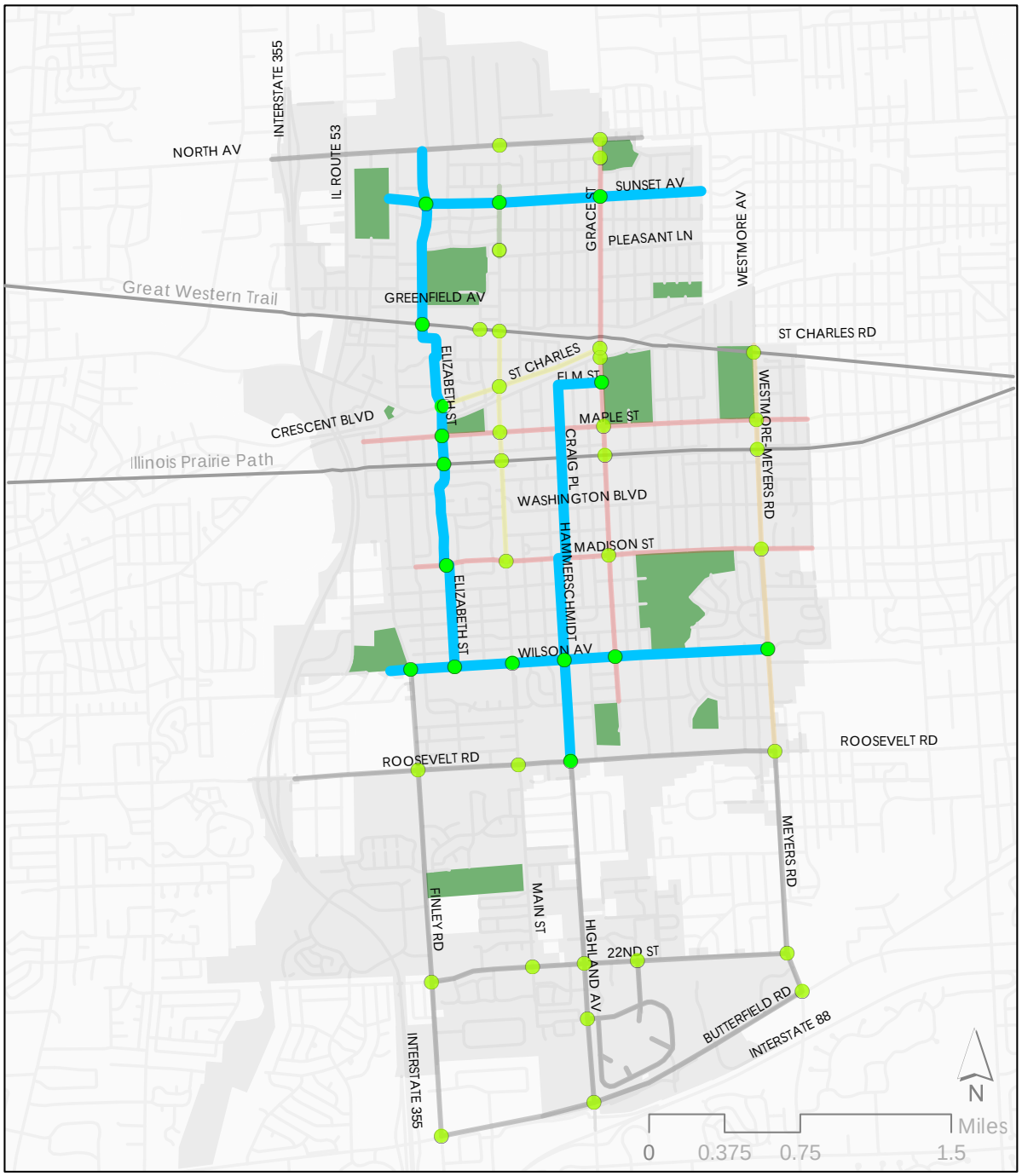
Figure 43.

Table 6. Recommended Intersection Improvements

Location	Continental Crosswalks	Countdown Timers	Improve Curb Ramps	Improve Curb Radii	Access Management	Bike Detection / Actuation	Wayfinding	Bike Crossing Markings	Two-Stage Turn Queue Box	RRFB	Refuge Island	Improve Corner (Porkchop) Island	Mini Traffic Circle	Curb Bumpouts	Raised Crosswalk	Comments
Westmore-Meyers Road / Maple Street	■	■	■			■		■	■							
Meyers Road / 22nd Street	■	■										■				
Main Street / North Avenue	■	■										■				
Grace Street / North Avenue	■	■										■				
Westmore-Meyers Road / Roosevelt Road	■			■	1		■				2					1, north leg-remove SB lane; 2, north leg
Highland Avenue / Butterfield Road	■	■	■													
Finley Road / 22nd Street	■	■		■								■				
Meyers Road / Butterfield Road	■	■	■													
Highland Avenue / 22nd Street	■	■	■	■			■									
Grace Street / 22nd Street	■	■	■	■			■									
Finley Road / Butterfield Road	■	■										■				
Highland Avenue / Yorktown Mall Drive	■	■	■													
Highland Avenue / Roosevelt Road	■		■	■							1					1, north leg left turn lane
Elizabeth / Madison	■						■	■								
Main Street / Madison Street	■	■		■				■								
Main Street / 22nd Street	■	■		■												
Main Street / Roosevelt Road	■	■		■												
Main Street / Maple Street	■	■		■												
Finley Road / Roosevelt Road	■	■										■				
Elizabeth Street / Wilson Avenue	■						■							1		1, NW, NE, SE corners
Main Street / St. Charles Road	■	■												■		
Westmore-Meyers Road / Wilson Avenue					1	■		■								1, west leg
Grace Street / Elm Street							■									
Grace Street / Maple Street							■									

Table 6. Recommended Intersection Improvements (cont.)

Location	Continental Crosswalks	Countdown Timers	Improve Curb Ramps	Improve Curb Radii	Access Management	Bike Detection / Actuation	Wayfinding	Bike Crossing Markings	Two-Stage Turn Queue Box	RRFB	Refuge Island	Improve Corner (Porkchop) Island	Mini Traffic Circle	Curb Bumpouts	Raised Crosswalk	Comments
Grace Street / Wilson Avenue							■									
Elizabeth / Prairie Path							■									
Elizabeth / Maple							■									
Great Western Trail / Park Ave							■									
Elizabeth / Great Western Trail							■									
Elizabeth / Sunset							■									
Grace / Prairie Path							■									
Madison / Grace							■									
Westmore-Meyers Road / Madison Street					1	■		■	■							1, Arthur Dr
Elizabeth / St. Charles		■		■		■		■								
Main Street / Illinois Prairie Path										1						1, sides + median
Main Street / Great Western Trail										■						
Westmore-Meyers Road / Great Western Trail							■				1					1, with road diet
Westmore-Meyers Road / Illinois Prairie Path							■			■	1					1, with road diet
Main St at Pleasant Lane school											1					1, with road diet
Grace Street / St. Charles Road				■	1			■								1, north-south
Grace Street / Parkside Avenue				■	1			■								1, north-south
Finley Road / Wilson Avenue							■						■			
Grace Street / Sunset Avenue							■						■			
Wilson Avenue/ Hammerschmidt Ave													■			
Main Street / Sunset Avenue					1						■					1, east-west
Grace / Le Moyne														■	■	
Main Street / Wilson Avenue				■		■	■	■								



Recommendations Highlighting Bike Boulevards

- Bike Boulevard
- Bike Lanes
- Road Diet and Buffered Bike Lanes
- Road Diet and Parking
- Shared Use Path
- Streetscape improvements
- Intersection Improvement
- Regional Trails
- Parks
- Lombard

Figure 44.

Table 7. Bike Boulevard Recommendations

Name	From	To
Wilson Avenue	Highmoor Road	Westmore-Meyers Road
Sunset Avenue	West Road	Westwood Avenue
Elizabeth Street	West Road	Wilson Avenue
Hammerschmidt Avenue / Craig Place / Elm Street	Grace Street	Roosevelt Road

Neighborhood Streets - Bicycle Boulevards

Streets that have the potential to install bicycle boulevards have some of the lowest levels of car traffic within the Village. Routes selected for bicycle boulevards offer continuous paths throughout long stretches of the Village, compared to other, shorter segments of neighborhood streets.

Since these streets already function as low-stress bicycle routes, the facility design focuses on improving intersections. Crossings should allow for uninterrupted or even priority travel for people bicycling. In some cases, this may mean the installation of traffic calming to control car movements and speed.

Streets in this category include:

- Elizabeth Street
- Hammerschmidt Avenue/Craig Place/Elm Street
- Sunset Avenue
- Wilson Avenue

Bicycle boulevards may utilize a variety of tools to accomplish design goals related to enabling bicyclists to find their way, enhancing bicyclists' visibility, and controlling traffic volumes and speed. The following "application levels" describe the many forms of bicycle boulevard treatments.

- Level 1 - Signage
- Level 2 - Pavement markings
- Level 3 - Intersection treatments
- Level 4 - Traffic calming
- Level 5 - Traffic diversion

Bicycle boulevards allow a street's unique character to shine through.

Less Intensity

Level 1: Signage

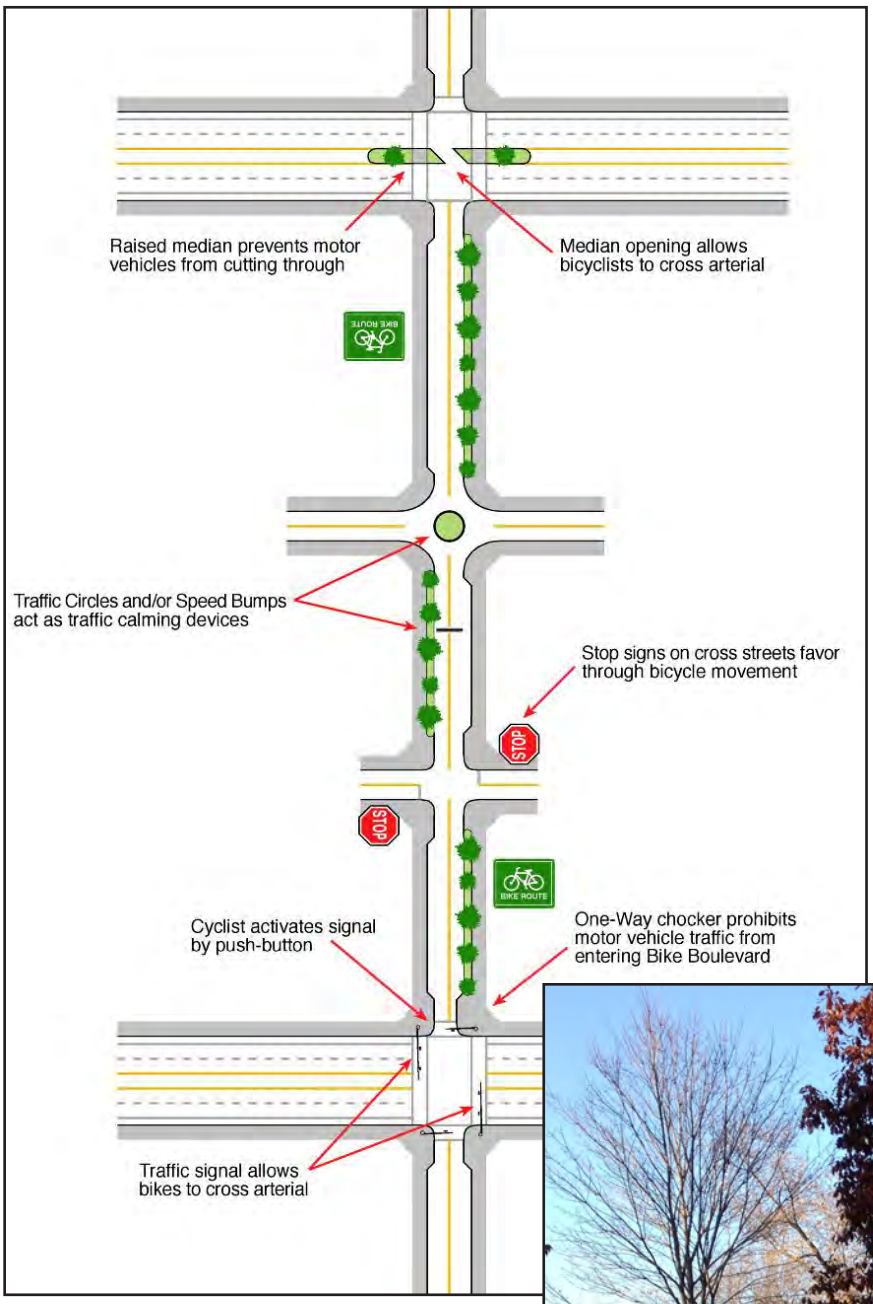
Level 2: Pavement Markings

Level 3: Intersection Treatments

Level 4: Traffic Calming

Level 5: Traffic Diversion

More Intensity



This graphic describes how bicycle boulevard design can create a comfortable travel environment for bicyclists as they traverse minor and major streets.

Residential streets are candidates for providing bicycle boulevards, especially those that connect neighborhoods with parks and schools.

Major Streets - Bike Lane with or without Buffer or Physical Separation

As shown in Figures 45 and 46, streets recommended for barrier- or buffer-protected bike lanes or bike lanes without a barrier/buffer have traffic volumes and/or speeds that would otherwise discourage bicycle travel in the absence of such facilities. The streets in this category are wide enough to fit bike lanes or bike lanes with additional buffering from traffic to lessen traffic stress. The following list groups several of Lombard's busy, retail/commercial area-focused streets within this category:

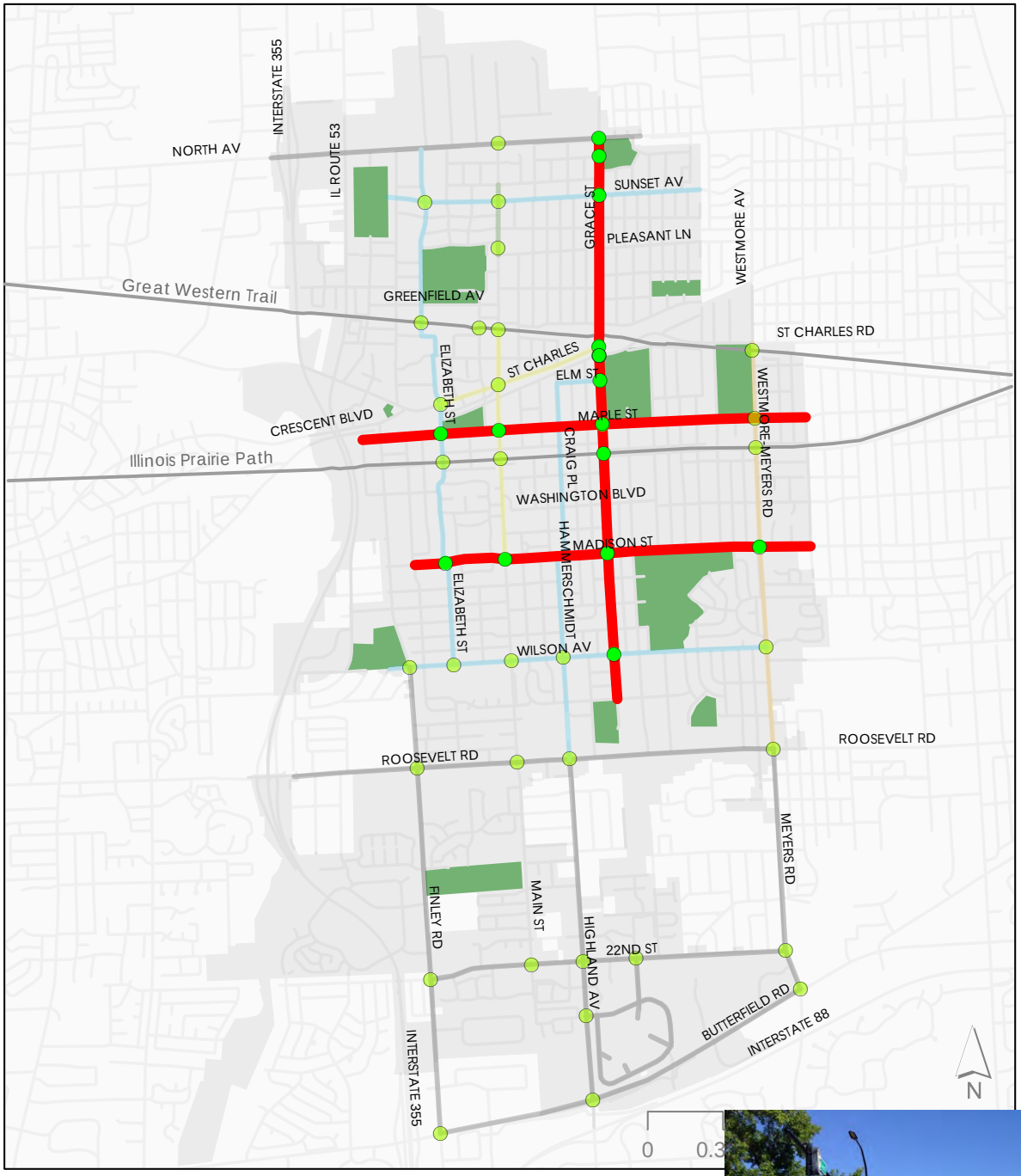
- Main Street
- Grace Street
- Wilson Avenue
- Main Street
- Westmore-Meyers Road

Bike lanes have additional benefits besides dedicating space for bicycle travel. Such projects should be seen as holistic changes to improving how Lombard's streets function- not mere amenities for a small portion of the population.

- Car travel lanes are often narrowed when bike lanes are installed, thereby improving safety for drivers. Narrower lanes are shown to improve driver safety.
- Bike lanes place an additional buffer between pedestrians and moving cars.
- The suggested resurfacing projects include the addition of new or improved crosswalks and other features to help pedestrians safely and easily cross busy roadways.
- Bike lane projects that also involve "road diets" may reduce motor vehicle crashes by 19 to 47%, according to findings from the FHWA. These roadway reallocations also reduce the number of car travel lanes that pedestrians must cross.

Bike lanes provide riders with a predictible travel path.

Buffered bike lanes give extra space between bicyclists and cars.



Recommendations Highlighting Bike Lanes

- Bike Boulevard
- Bike Lanes
- Road Diet and Buffered Bike Lanes
- Road Diet and Parking
- Shared Use Path
- Streetscape improvements

Figure 45.

Table 8. Bike Lane Recommendations

Name	From	To
Grace Street	North Avenue	Central Avenue
Maple Street	Vance Court	Addison Avenue
Madison Street	Edson Avenue	Addison Avenue

Bike lanes should include intersection markings that depict bicyclists' travel path through crossings. Such features allow drivers to anticipate bicyclists in intersections.

Recommendations Highlighting Buffered Bike Lanes and Road Diet

- Bike Boulevard
- Bike Lanes
- Road Diet and Buffered Bike Lanes
- Road Diet and Parking
- Shared Use Path
- Streetscape improvements
- Intersection Improvement
- Regional Trails
- Parks
- Lombard

Figure 46.

Table 9. Buffered Bike Lane/Road Diet Recommendation

Name	From	To
Westmore-Meyers Road	St. Charles Road	Roosevelt Road

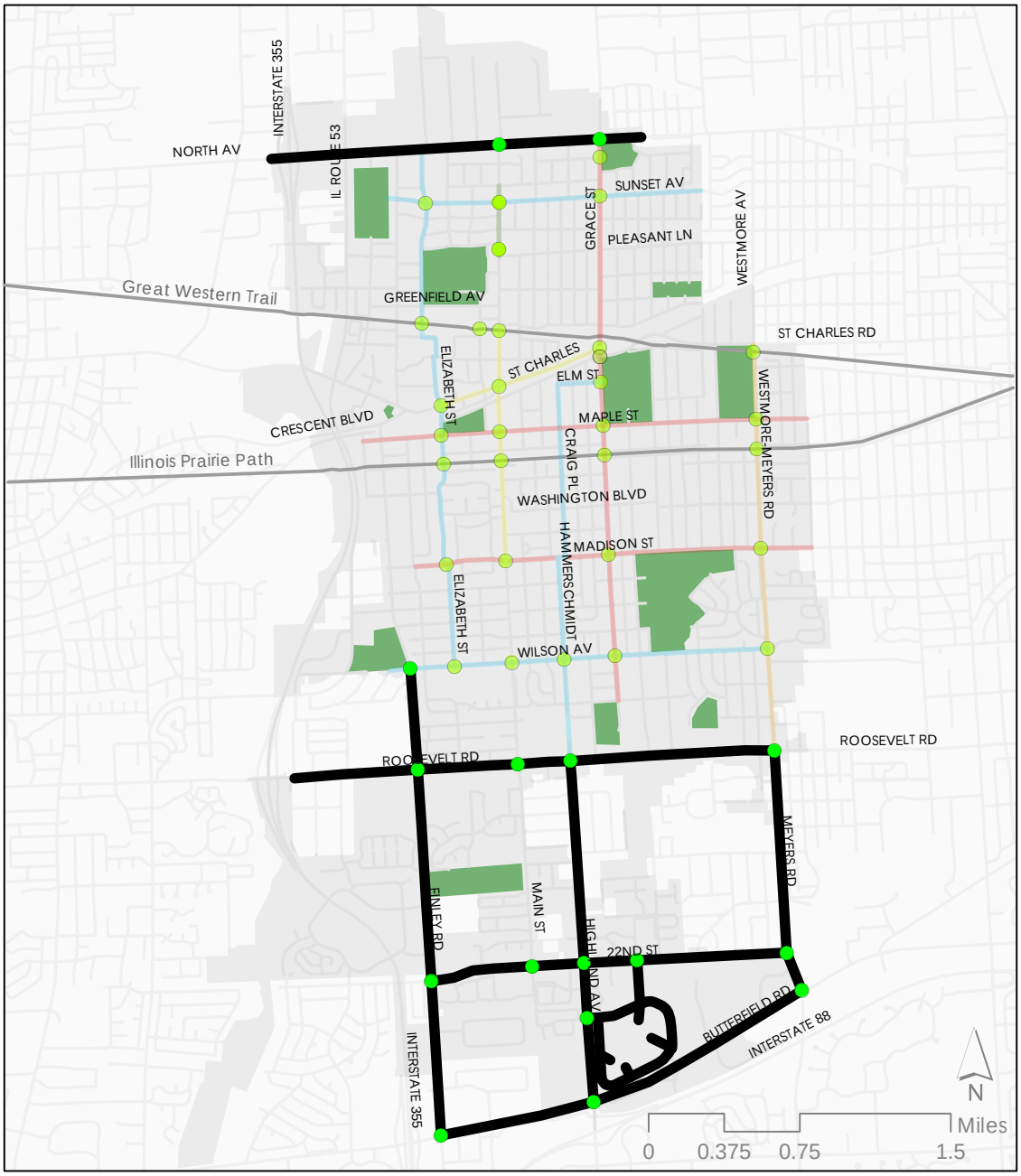
Major Streets - Shared Use Path or Sidepath

Off-street bikeways are recommended adjacent to high speed and high car traffic volume roadways help provide increased separation from motor vehicles and a low degree of travel stress. Such situations work well with few driveways in order to avoid conflict with motor vehicles. The majority of the streets in this category are located in the southern part of the Village. Here, certain constraints make the installation of on-street bike lanes more difficult than in other parts of the Village.

Streets in this category include:

- North Avenue
- Finley Road
- Highland Road
- Meyers Road
- Roosevelt Road
- 22nd Street
- Butterfield
- Access to Yorktown Mall

Sidepaths in southern Lombard will use a familiar type of infrastructure treatment to enable bicycle and pedestrian access to popular destinations, such as Yorktown Mall.



Recommendations Highlighting Shared Use Paths

- Bike Boulevard
- Bike Lanes
- Road Diet and Buffered Bike Lanes
- Road Diet and Parking
- Shared Use Path
- Streetscape improvements
- Intersection Improvement
- Regional Trails
- Parks
- Lombard

Figure 47.

Table 10. Shared Use Path Recommendations

Name	From	To
Mall Connection	Local Streets	Mall Entrances
22nd Street	Finley Road	Meyers Road
Meyers Road	Roosevelt Road	Butterfield Road
Roosevelt Road	Valley Road	Westmore-Meyers Road
North Avenue	I-355	Joyce Street
Finley Road	Wilson Avenue	Butterfield Road
Butterfield Road	Finley Road	Meyers Road

Streetscaping Elements

The plan recommends improving the streetscaping along St. Charles Road between Elizabeth Street and Grace Street. Elements could include decorative pavers, planters, and curb bump-outs. The overall "look and feel" can complement downtown Lombard's streetscaping design. Similar features along Main Street between the Great Western Trail and Madison Street will improve aesthetics along one of the Village's main thoroughfares.

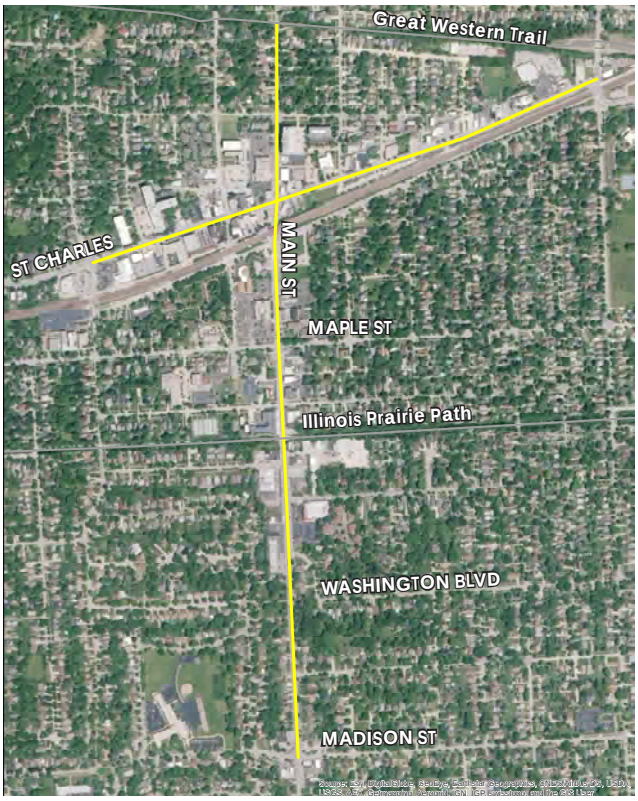
Parking Additions

The team recommends adding on-street parking and an improved crossing by the mid-block crosswalk across from Pleasant Lane Elementary School. Main Street south of Pleasant Lane currently features one travel lane in either direction. Narrowing Main Street between Pleasant Lane and Goebel Drive, by adding on-street parking, will keep Main Street's cross-section the same as Main Street south of Pleasant Lane. This segment crosses the proposed bicycle boulevard on Sunset Avenue. Fewer lanes on Main Street will assist people on bikes as they cross Main Street to continue along the bicycle boulevard.

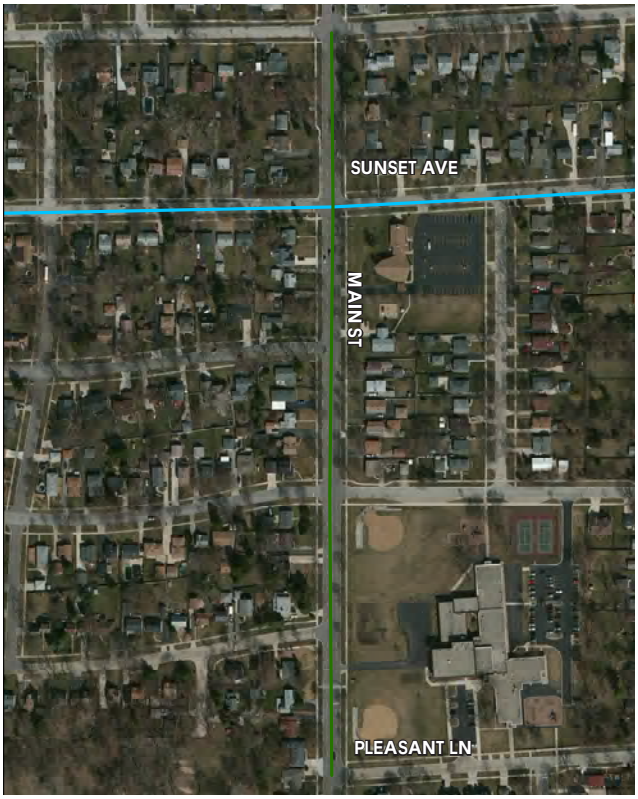
The existing midblock crosswalk on Main Street between Crystal Avenue and Pleasant Lane provides a connection to an elementary school. Reconfiguring two of the existing travel lanes as parking lanes and adding curb extensions will improve pedestrian comfort.

Table 11. Streetscaping and Parking Improvements

Name	From	To
Main Street - Streetscaping	Goebel Drive	Pleasant Lane
St. Charles Road - Streetscaping	Elizabeth Street	Grace Street
Main Street - Parking and Crossing Improvements	Great Western Trail	Madison Street



The yellow lines on Main Street and St. Charles illustrate the location of proposed streetscaping improvements.



The green line on Main Street illustrates the proposed parking additions. The blue line indicates the proposed bicycle boulevard along Sunset Avenue.

Crossing Marking Improvements

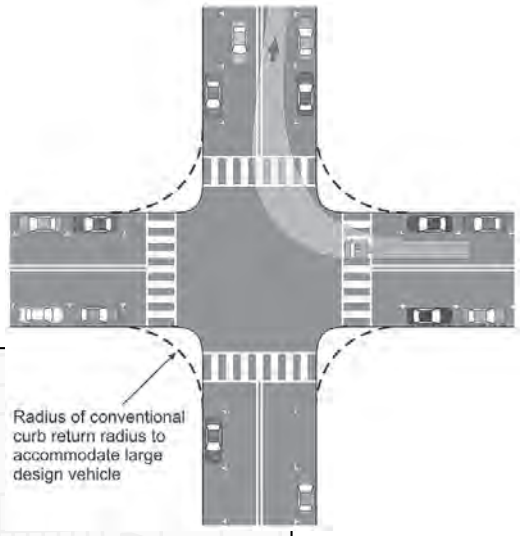
The plan includes 28 crossing marking improvements.

High visibility crosswalks should include curb ramps and other accessibility features.

Figure 48.

Curb Improvements: Ramps, Turning Radii Reduction, and/or Porkchop Island Improvements

The plan includes 23 curb improvements.



Tightening curve radii results in improvements in the pedestrian realm (image source: Federal Highway Administration).

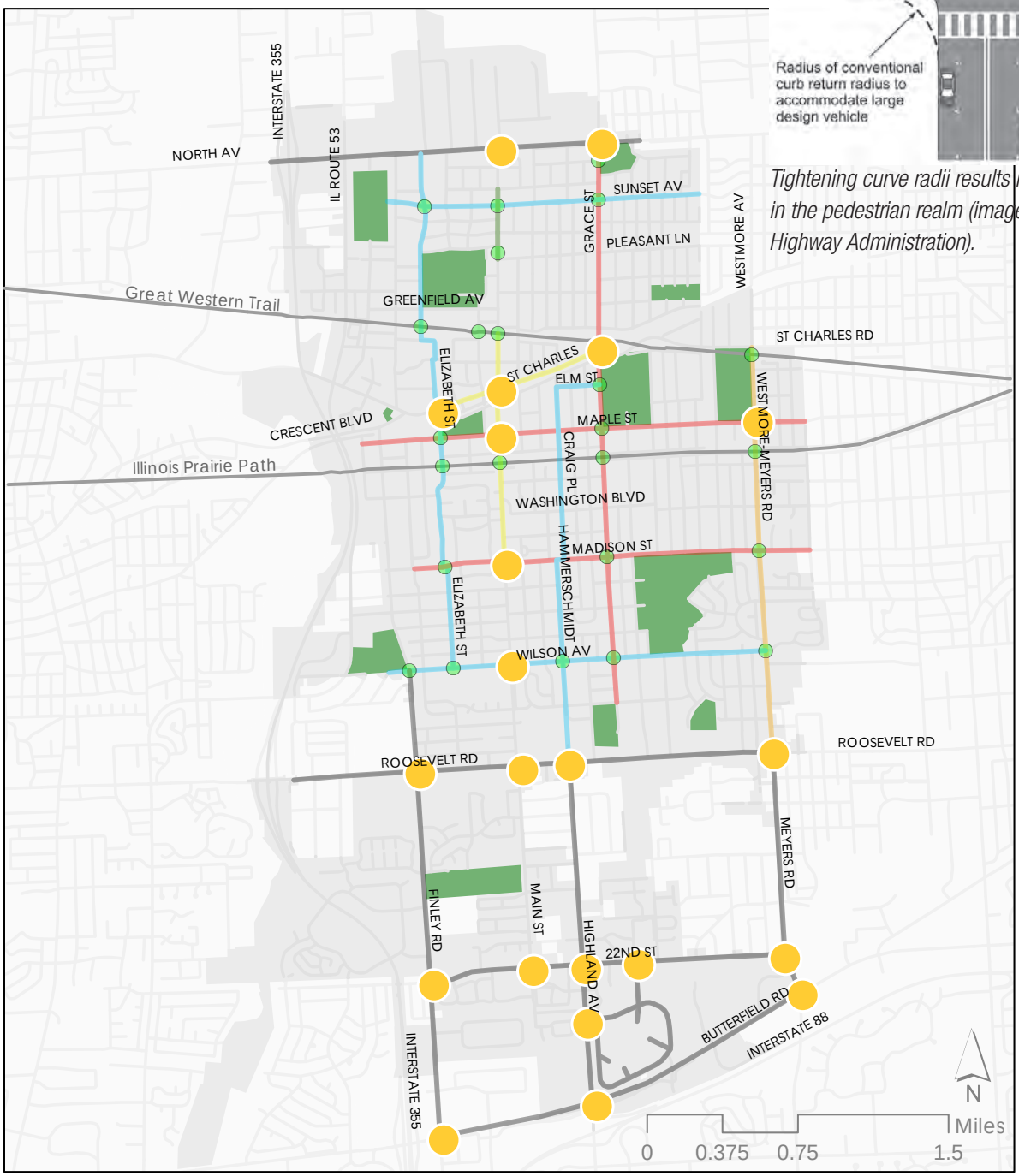


Figure 49.

Pedestrian and Bicycle Wayfinding

The placement of wayfinding signs throughout the Village could indicate to bicyclists and pedestrians direction, distance, and travel time to destinations - in turn increasing comfort, convenience and utility of the active transportation network. Signage can serve both wayfinding and safety purposes, including:

- Helping to familiarize users with the bikeway and trail system;
- Helping users identify the best routes to destinations;
- Helping to address commonly-held perceptions about travel time and distance;

Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Lombard should create a community-wide Bicycle and Pedestrian Wayfinding Signage Plan that identifies:

- Sign locations along existing and planned routes;
- Sign type – what information should be included and what is the sign design;
- Destinations to be highlighted on each sign; and
- Approximate distance and time to each destination.

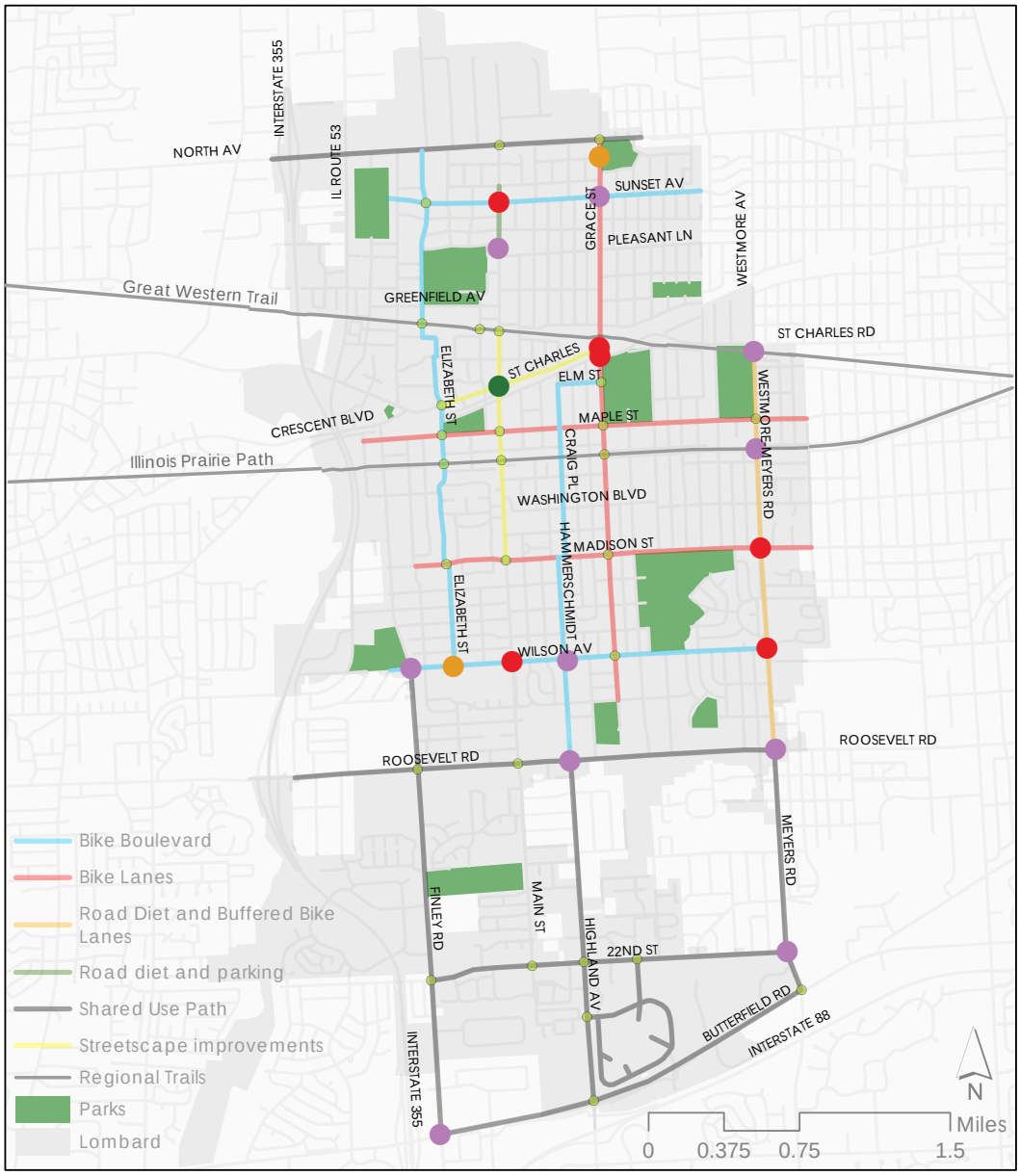
Figure 50 illustrates areas of interest for potential wayfinding signage to direct people to local destinations.

Figure 50.

Traffic Calming Measures

Traffic calming helps manage vehicular travel and speeds. Median refuge islands give pedestrians a place to wait while crossing a street. Neighborhood traffic circles calm traffic on neighborhood streets. Diverters move the flow of car traffic away from certain streets, while gateway features extend the curb at the end of a block to reduce pavement width and calm traffic as cars enter a neighborhood or slower-speed street.

Village decision-makers should weigh pros and cons before installing these treatments within specific neighborhoods throughout the community.



Recommendations Highlighting Traffic Calming Measures

- Access Management
- Curb Bumpouts
- Gateway
- Median Refuge Island
- Neighborhood Traffic Circle
- Non-Traffic Calming Improvement

Figure 51.

Pedestrian Signals (RRFBs and HAWKs)

Rectangular rapid flash beacons (RRFBs) and High-Intensity Activated crossWalK (HAWK) beacons are traffic control devices used to allow pedestrians to cross safely. The plan recommends three pedestrian signals at various intersections, shown below in Figure 52. The Village is in the process of installing an RRFB where Main Street crosses the Illinois Prairie Path. The Village currently features a pedestrian signal on Finley Road, near Four Seasons Park.

RRFBs provide more secure crossings for pedestrians and trail users.

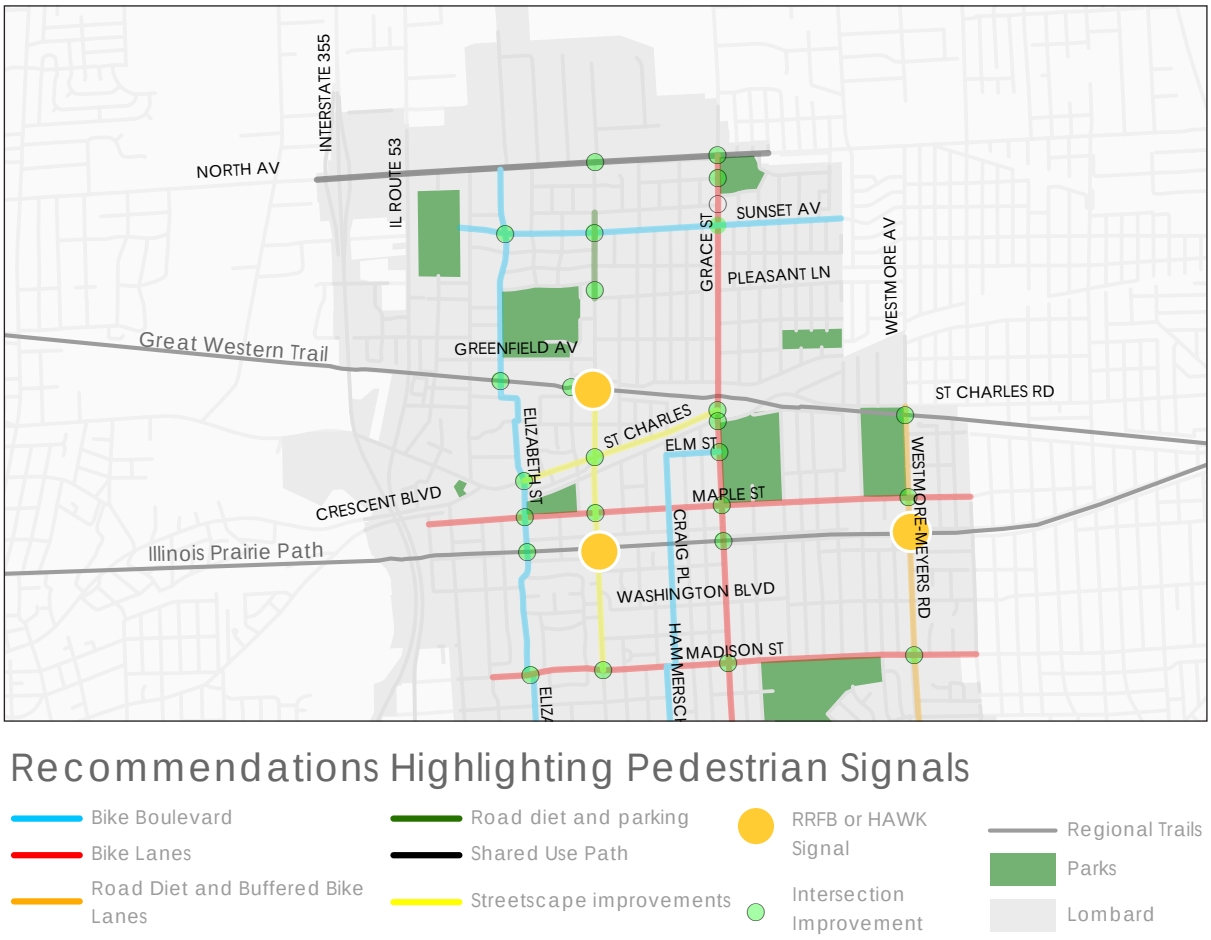


Figure 52.

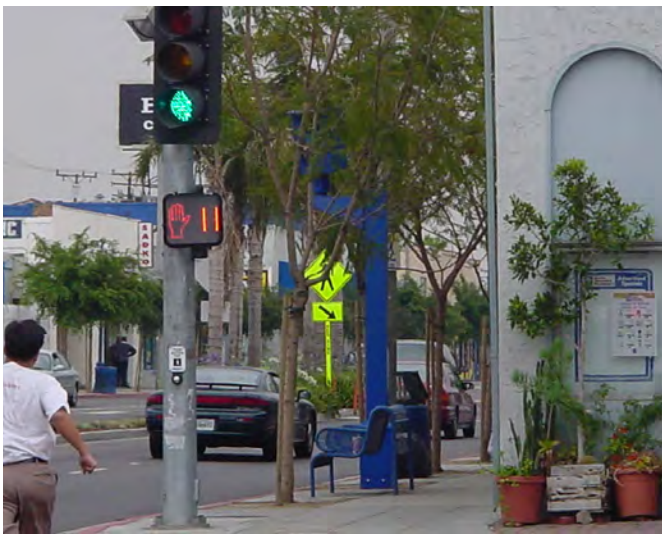
Current Projects

The Village is already working to install more pedestrian countdown timers throughout Lombard. These timers will help pedestrians understand the time remaining during a pedestrian crossing phase. The Village will install the pedestrian countdown timers in areas with high levels of pedestrian activity.

Lombard is currently working towards implementing a variety of bicycle and pedestrian projects including:

- New Rectangular Rapid Flash Beacon (RRFB) assembly at Main Street and Prairie Path crossing
- Pedestrian countdown signals with accessible push buttons
- Prairie Path and Great Western Trail informational signage in conjunction with DuPage County

Current signage along the Great Western Trail in Lombard.



An example intersection with a pedestrian countdown signal.

An example of a Rectangular Rapid Flash Beacon (RRFB) and pedestrian refuge island.

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Implementation

This implementation chapter helps create actionable steps to installing the bicycle and pedestrian infrastructure recommended in the previous chapter. Fixing streets in need of accessibility improvements for all users requires political will as well as a budget and an action plan for success. By prioritizing certain recommended new facilities, the team offers to help the Village in focusing efforts in a documented action plan and strategically deciding which recommendations to implement in the short-, medium-, and long-term. Understanding the Village's resurfacing plan can help the Village install new bicycle infrastructure, while saving time and money compared to operating outside of this schedule. Coordination amongst Village staff can ensure that proposed design changes are installed during routine road resurfacing.

A number of local, state, and federal funding sources are available to assist Lombard in reaching the plan's vision. These sources are detailed in this chapter.

Over time, as Lombard installs more bicycle infrastructure, Village decision makers can update the plan's list of recommended bikeway features or upgrade existing facilities. The Village's recent trail upgrades, including a series of impressive overpasses, has proven that Lombard is more than capable of providing visionary improvements to assist people enjoying the community by walking, running, or biking.

Prioritization

Prioritization of bicycle recommendations considers safety, connectivity to existing facilities, proximity to schools, proximity to parks, connectivity to proposed facilities, connections to activity centers, and ease of implementation. Table 12 shows how these components were ranked as Good, Fair, or Poor. These rankings are converted into numerical values in order to quantify prioritization. Safety issues are a high priority so were given an increased value by multiplying the associated ranking by two. Similarly, public input indicated that connections to existing facilities such as trails were important to residents. Therefore, that criteria was also valued greater in rankings.

Table 12. Prioritization Evaluation Criteria

Criteria	Description	Ranking
Safety	The project will help improve areas with past bicycle and pedestrian crashes.	Good = 2 ; Fair = 1; Poor = 0 Ranking x 2 for greater weighting
Connectivity to existing facilities	The project will help build the overall network. This was a top priority identified in public input.	Good = 2 ; Fair = 1; Poor = 0 Ranking x 2 for greater weighting
Proximity to schools	The project will have value to school travel, connecting directly or indirectly to a school.	Good = 2 ; Fair = 1; Poor = 0
Proximity to parks	The project will connect directly or indirectly to a park.	Good = 2 ; Fair = 1; Poor = 0
Connectivity to proposed facilities	The project will ultimately impact and connect to the overall network.	Good = 2 ; Fair = 1; Poor = 0
Connections to Activity Centers	The project will make it easier to access important destinations such as job hubs, shopping centers, and civic buildings.	Good = 2 ; Fair = 1; Poor = 0
Ease of Implementation	The project's potential cost, right-of-way impacts, and roadway impacts.	Good = 2 ; Fair = 1; Poor = 0

Table 13. Implementation Prioritization

Name	From	To	Length (mi)	Type	Schools	Parks	Bike/Ped Crash	Connect to Proposed	Connect to Activity Centers	Connect to Existing	Implementation
High Priority											
Elizabeth Street	West Road	Wilson Avenue	2.7	Bike Boulevard	Good	Good	Fair	Good	Good	Good	Good
Westmore-Meyers	St Charles Road	Roosevelt Road	2.0	Buffered Bike Lanes	Fair	Fair	Good	Good	Good	Good	Good
Grace Street	North Avenue	Central Avenue	2.8	Bike Lanes	Good	Good	Fair	Good	Fair	Fair	Good
Mall Connection -	22nd St	North Mall Entrance	0.3	Shared Use Path	Poor	Poor	Fair	Good	Good	Good	Fair
Medium Priority											
Madison Street	Edson Avenue	Addison Avenue	1.8	Bike Lanes	Good	Good	Fair	Good	Fair	Poor	Fair
Main Street	Great Western Trail	Madison Street	1.1	Streetscape	Poor	Poor	Good	Fair	Good	Fair	Fair
22nd Street	Finley Road	Meyers Road	1.8	Shared Use Path	Fair	Fair	Fair	Fair	Poor	Good	Fair
Main Street	Goebel Drive	Pleasant Lane	0.3	Road diet and parking	Good	Good	Fair	Fair	Fair	Poor	Good
Maple Street	Vance Court	Addison Avenue	2.2	Bike Lanes	Poor	Good	Fair	Good	Good	Poor	Fair
Low Priority											
Highland Avenue	Roosevelt Road	Butterfield Road	1.7	Shared Use Path	Poor	Fair	Good	Fair	Good	Poor	Poor
Roosevelt Road	Valley Road	Westmore-Meyers	2.4	Shared Use Path	Poor	Fair	Good	Fair	Good	Poor	Poor
St. Charles Road	Elizabeth Street	Grace Street	0.8	Streetscape	Poor	Poor	Good	Fair	Good	Poor	Fair
Wilson Avenue	Highmoor Road	Westmore-Meyers	1.9	Bike Boulevard	Fair	Good	Fair	Good	Poor	Poor	Fair
Sunset Avenue	West Road	Westwood Avenue	1.6	Bike Boulevard	Fair	Fair	Fair	Fair	Poor	Poor	Good
Finley Road	Wilson Avenue	Butterfield Road	2.3	Shared Use Path	Poor	Fair	Fair	Fair	Fair	Poor	Poor
Hammerschmidt	Grace Street	Roosevelt Road	2.1	Bike Boulevard	Fair	Fair	Poor	Fair	Poor	Poor	Good
Mall Connection - around			1.5	Shared Use Path	Poor	Poor	Poor	Fair	Good	Poor	Poor
Meyers Road	Roosevelt Road	Butterfield Road	1.2	Shared Use Path	Fair	Poor	Fair	Poor	Poor	Poor	Poor
North Avenue	I-355	Joyce Street	1.8	Shared Use Path	Poor	Fair	Poor	Poor	Fair	Poor	Poor
Butterfield Road	Finley Road	Meyers Road	2.0	Shared Use Path	Poor	Poor	Poor	Poor	Fair	Poor	Poor

Bicycle and Pedestrian Funding Sources

There are multiple funding sources for transportation programs in Illinois. Most programs are both highly competitive and require a local match but can provide grant funding opportunities for the projects recommended in this plan. This section lays out the available funding sources by the agencies that administer them. A summary table is included in Table 14 on pages 118 and 119.

Fixing America's Surface Transportation (FAST) Act

The newest federal legislation, Fixing America's Surface Transportation (FAST) Act was signed into law on December 4, 2015. The FAST Act replaces the Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The FAST Act is the first long-term comprehensive surface transportation legislation since the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005.

The FAST Act increases existing federal funding by 11% over a five-year time span. Funding totals $305 billion. Of the $305 billion, $284 billion is specifically for surface transportation, for which bicycle and pedestrian infrastructure projects are eligible.

Overall, the FAST Act represents minor changes compared to MAP-21. The FAST Act sets funding sources for bicycle and pedestrian projects at a similar level as in the past.

Programs or policies not explicitly mentioned in the FAST Act remain in place under the new law.

City staff should remain attentive to new program details, materials, or guidelines as they become available from IDOT and other funding sources.

Surface Transportation Block Grant Program Set-Aside (STBGP) and Bicycle and Pedestrian Funding

The FAST Act includes organizational changes to the country's existing Transportation Alternatives Program (TAP), which provides funding for bicycle and pedestrian infrastructure. Under the FAST Act, the TAP is folded into the Surface Transportation Program (STP), which is renamed Surface Transportation Block Grant Program Set-Aside (STBGP). Previously, TAP acted as a stand-alone program. Funding formerly housed under TAP, however, remains a specific set-aside within STBGP. As with TAP under MAP-21, STBGP covers a variety of project types, including, but not limited to bicycle- and walking-focused projects. States are now able to administer a specific amount ($820 million – $850 million total) rather than a percentage of state funds, as was MAP-21 regulation. The percentage of available STBGP funds will gradually increase over the five year period. Total available funding started at $10.1 billion as of the Act's signing. Funding will increase to $12.1 billion in 2020.

Recreational Trails program funding will stay at the 2009 funding level as part of a STBGSP set-aside.

Highway Safety Improvement Program (HSIP) and Bicycle and Pedestrian Funding

Highway Safety Improvement Program (HSIP) funds may not be used for non-infrastructure construction projects under the FAST Act. HSIP funds totaled 3.6% of all FY 2015 non-motorized funding.

National Highway Traffic Safety Administration (NHTSA) Section 405 National Priority Safety Programs

The FAST Act includes a new subgrant housed under Section 405 of the National Priority Safety Programs. The subgrant aims to improve bicycle and pedestrian safety through law enforcement officer training, bicycle and pedestrian enforcement campaigns, and bicycling and walking traffic law awareness projects. States must have bicycle and pedestrian fatalities greater than 15% of total traffic fatalities. Twenty states are eligible for this funding source.

Programs Administered by the Illinois Department of Transportation (IDOT)

IDOT administers federal pass-through funds for local and regional bicycle and pedestrian projects and safety initiatives, authorized by the new FAST Act. See previous section for details regarding differences between the FAST Act and previous legislation related to pedestrian and bicycle funding.

The FAST Act also contains other pedestrian and bicycling-eligible funding programs designed to improve air quality and fix traffic safety issues.

Illinois Safe Routes to School Program (SRTS)

The SRTS program, uses both infrastructure and non-infrastructure approaches to improve conditions for students who walk or bike to school. The program is designed to enable and inspire children to walk and bike to school through improvements to the local active transportation network within two miles of schools and through programs and initiatives. The local match is 20%. Eligible project sponsors include schools, school districts, and governmental entities. The program encourages applicants to form a local coalition of stakeholders.

Illinois Transportation Enhancement Program (ITEP)

ITEP was designed to promote and develop non-motorized transportation options, along with streetscape beautification. Since the adoption of MAP-21, IDOT has continued to maintain the ITEP website, but as of the writing of this plan, no call for projects has been announced since 2012.

Through ITEP, IDOT awards a portion of federal TAP funds competitively, and any local or state government with taxing authority is eligible to apply. Local governments are required to provide 20% matching funds and work must begin on the projects within three years of receipt of the award.

Highway Safety Improvement Program (HSIP)

The goal of the HSIP program is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. It requires states to set performance measures and targets for reducing traffic-related fatalities and serious injuries for all modes of transportation. HSIP funds infrastructure solutions and is administered by IDOT's Division of Traffic Safety. The program funds preliminary engineering, land acquisition, construction, and construction engineering. A minimum 10% local match is required.

Programs Administered by the Illinois Department of Natural Resources (IDNR)

IDNR offers two grant programs that fund land acquisition for trails, construction of new trails, and maintenance of existing trails. These two programs are described below.

Recreational Trails Program (RTP)

The Recreational Trails Program (RTP) was combined with other funding sources under TAP in MAP-21. As mentioned previously, TAP is now the Surface Transportation Block Grant Program Set-Aside (STBGP). RTP funding will stay at 2009 levels. These funds are set aside in the STBGP.

Illinois Bicycle Path Grant Program

The Illinois Bicycle Path Grant Program funds land acquisition, construction, and repairs of non-motorized bike trails. Applications are due in March when requests for proposals are released. Grants are capped at $200,000 per year and cover up to 50% of project costs.

Programs Administered by the Chicago Metropolitan Agency for Planning (CMAP)

CMAP administers two federal pass-through funds that are pertinent to bicycle and pedestrian facilities – the Congestion Mitigation and Air Quality Improvement Program and the regional allocation of the Transportation Alternatives Program. Each are described below.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

THE FAST Act continues to authorize walking and bicycle projects as CMAQ-eligible activities. CMAQ regulations and requirements under the FAST Act remain relatively similar to those under MAP-21. The CMAQ program is a flexible funding source that targets projects and programs to help meet the congestion mitigation and air quality reduction requirements of the federal Clean Air Act.

Bicycle and pedestrian facilities, transit improvements, and traffic flow enhancements make up some of the eligible projects. CMAP will give priority to projects that reduce ozone emissions and particulate matter. The local match is 20%.

Transportation Alternatives Program (TAP)

CMAP's allocation of the state TAP program has focused its funding on bicycle projects. Higher scores are assigned to projects that provide for low-stress bicycle facilities. Some eligible projects include connecting two existing trails, installing sidepaths or buffered bike lanes, and extending an existing regional trail.

For this competitive program, 50% of the funding is allocated by a formula based on population, with the other 50% being discretionary. The local match is 20%.

CMAP generally gives priority to projects that are a part of the Regional Greenways and Trails Plan, have a high population density near the trail or facility, and have a facility that is well designed. Additional points are given to projects that are "shovel ready" and that have a local match above the 20% minimum.

Programs Administered by DuPage County

DuPage County provides two sources of funding that may be applied to bicycle and pedestrian facilities. The Surface Transportation Program offers flexible funding for non-motorized transportation projects, and the Community Development Block Grant Program offers capital improvement funds for projects that benefit low- and moderate-income residential neighborhoods.

Surface Transportation Program (STP)

The Surface Transportation Program provides flexible funding that may be used by states and municipalities for projects to preserve or improve conditions and performance on any Federal Aid highway, bridge projects on any public road, facilities for non-motorized transportation, transit capital projects, and public bus terminals and facilities.

The program is administered by the DuPage County Mayors and Managers Association. DuPage County's STP program funds two categories of projects—highway projects and Transportation Control Measures (TCMs). Eligible projects must be located on Federal Aid Highway System roads and must be classified as an arterial or collector. Eligible highway projects can include road widening, reconstruction, and intersection improvements, whereas TCM projects could include transit

improvements and bicycle and pedestrian facilities. The DuPage County STP program provides a 70/30 percent federal/local match ratio for highway projects and a higher 75/25 percent match ratio for TCM projects. Right-of-way acquisition and engineering costs are not eligible for STP funding. All approved projects must be added to CMAP's Transportation Improvement Program.

Community Development Block Grants (CDBG)

Administered by DuPage County's Community Development Commission, CDBGs provide flexible funding for a variety of community development purposes. The Neighborhood Investment, Community-Wide Benefit, Accessibility Improvements, and Planning Projects category under the CDBG program offers capital improvement funds for several project types, including street improvements, sidewalk improvements, and accessibility improvements to public facilities. Projects eligible for funding must serve primarily residential neighborhoods with 35.83% of the population considered low- to moderate-income. A map of eligible block groups within Lombard is available at http://www.dupageco.org/Community_Services/Community_Development_Commission/1305/. The required local match varies by project type, ranging from 25% for high-severity street improvement projects to 50% for accessibility projects. Accessibility projects are capped at $50,000.

Other Local Funding Sources

The Village of Lombard and its partners may want to consider exploring additional grants to fund programs and projects recommended in this plan. For example, the DuPage Foundation is a public charity that provides funding for non-profit organizations to advance work in arts and culture, education, environment, and health and human services. While the Village of Lombard is ineligible for this funding source, local non-profit organizations such as the Friends of the Great Western Trail and the Illinois Prairie Path Corporation are eligible for initiatives that support the education and encouragement recommendations. Grants range from $2,500 to $20,000.

Lombard's current bicycle and pedestrian projects were funded using a diverse array of funding mechanisms. Familiarity with the various funding options available through local partners, state governmental entities, and the federal government gives public sector employees a menu of options when planning new and improved infrastructure projects.

Table 14. Summary of Available Funding Opportunities

	Transportation Enhancements (ITEP)	Safe Routes to School (SRTS)	Highway Safety Improvement Program (HSIP)	Section 402- State and Community Highway Safety Grant Program	Recreational Trails Program (RTP)
Program Purpose	To foster cultural, historic, aesthetic and environmental aspects of our transportation infrastructure	To enable and encourage children to walk and bike to school through the 5 Es.	To fund highway infrastructure safety projects aimed at reducing fatalities and serious injuries.	To create safety programs aimed at reducing traffic crashes.	To develop and maintain recreational trails and facilities for both motorized and non-motorized users.
Program Administrator	IDOT	IDOT	IDOT Division of Traffic Safety	IDOT Division of Traffic Safety	IDNR
Eligible Projects	Bike/ped facilities, safety education programs and encouragement incentives.	Bike/ped facilities, safety education programs and encouragement incentives.	Bike lanes, paved shoulders, Trail/Highway intersection improvements, crosswalks, signal improvement, and curb cuts as well as safety education and awareness programs.	Enforcement campaigns to improve bike/ped safety, helmet promotion, educational materials, and training.	Trails, Trail/Highway intersection improvements, trailheads, educational materials, and training.
Key Project Requirements	Must relate to surface transportation.	Can only be spent within 1 ½ miles of a school.	Must address goals written in State Highway Safety Plan.	Must address goals written in State Highway Safety Plan.	30% allocated to non-motorized trail project, 30% for motorized, 40% for diversity of trail use.
Application Process	Irregular schedule at call of IDOT.	Irregular schedule at call of IDOT.	Generally there is an annual update to the Plan at call of IDOT Division of Traffic Safety.	Generally each spring at call of IDOT Division of Traffic Safety.	Irregular schedules at call of Illinois Department of Natural Resources.
Local Match Required	Typically 20%	20%	10%	No match required	Typically 20%, some 50%
Who Can Apply	Local governments	Any governmental entity	Any governmental entity or non-profit	Any governmental entity or non-profit	Any governmental entity or non-profit

Table 14. Summary of Available Funding Opportunities (cont.)

Illinois Bicycle Path Grant Program	Surface Transportation Program (STP)	Community Development Block Grants (CDBG)	Congestion Mitigation and Air Quality (CMAQ)
To develop and maintain recreational trails and facilities for both motorized and non-motorized users.	To fund state and local road and transportation projects.	To fund community development projects in low- and moderate income communities.	To improve air quality and reduce traffic congestion in areas that do not meet air quality standards.
IDNR	DuPage County Mayors and Managers Association	DuPage County Community Development Commission	CMAP
Trails, Trail/Highway intersection improvements, trailheads, educational materials, and training.	Bike/ped facilities. Road projects that include sidewalks receive additional points.	Accessibility projects, sidewalk improvements, street improvements, and other neighborhood facilities.	Bike/ped facilities, safety education programs and encouragement incentives, active transportation plans, bike/ped maps, bike/ped coordinator position.
Must be used for non-motorized bicycle paths.	1) Must reduce single occupancy vehicle trips and positively impact air quality. 2) Must be applied toward projects on collectors or arterials.	Must be in predominantly residential neighborhoods with at least 35.83% of the population identified as low- or moderate-income.	1) Must be spent in non-attainment and maintenance areas. 2) Will be evaluated on air quality emissions.
March application deadline, pending funding availability.	Varies depending upon sub-regional council of government	Varies, depending on funding availability.	Generally, an annual call for proposals.
Typically 50%	Typically 25% for bike/ped projects	25% - 50%	Typically 20%
Local governmental agencies	Local governments in DuPage County	Local governments	Local or state governmental agencies

Priority Projects

The following section identifies and provides details of priority projects for short- to medium-term implementation. These priority projects were chosen for their ability to improve connectivity throughout the Village. Each project can be accomplished relatively quickly and inexpensively, while offering high value for people walking and biking.

The priority projects included in this section are:

- Grace Street bicycle lanes/shared lane markings and striped on-street parking
- Trail-to-Village wayfinding
- Westmore-Meyers Road buffered bike lanes and Meyers Road shared-use path
- Yorktown Mall bicycle and pedestrian access improvements

Each corridor improvement should feature improvements at key intersections. Corridor maps for Grace Street and Westmore-Meyers Road identify possible improvements.

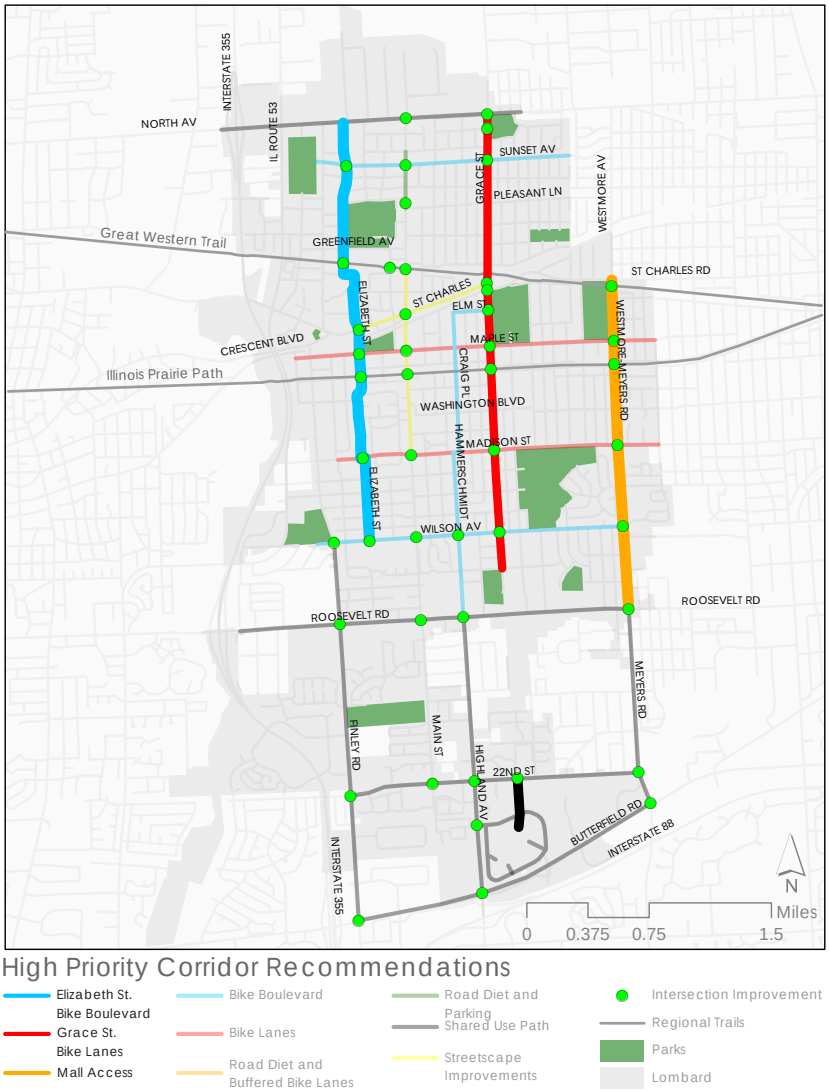
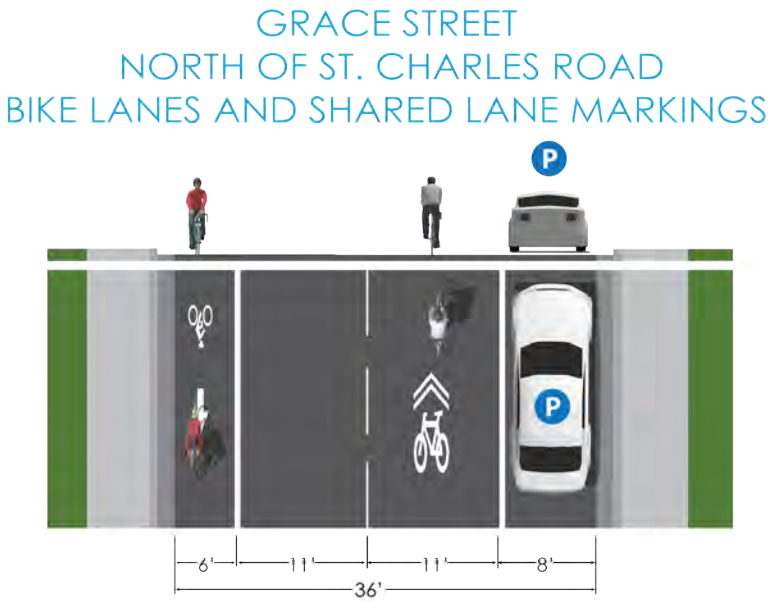


Figure 53.



Proposed conditions: Grace Street

Grace Street

Total Mileage: 2.8 miles

Project Highlights: Formalize bicycle accommodation along a key north-south, low stress, neighborhood street. Connect a variety of Village parks.

Current Key Issues: The street is currently fairly welcoming to bicycle travel. Adding additional support for bicyclists through the installation of bike lanes and shared lane markings will allow for continued use as a bicycle corridor.

Proposed Improvements: Stripe a bicycle lane along car travel lanes without formalized on-street parking. Install shared lane markings besides striped on-street parking

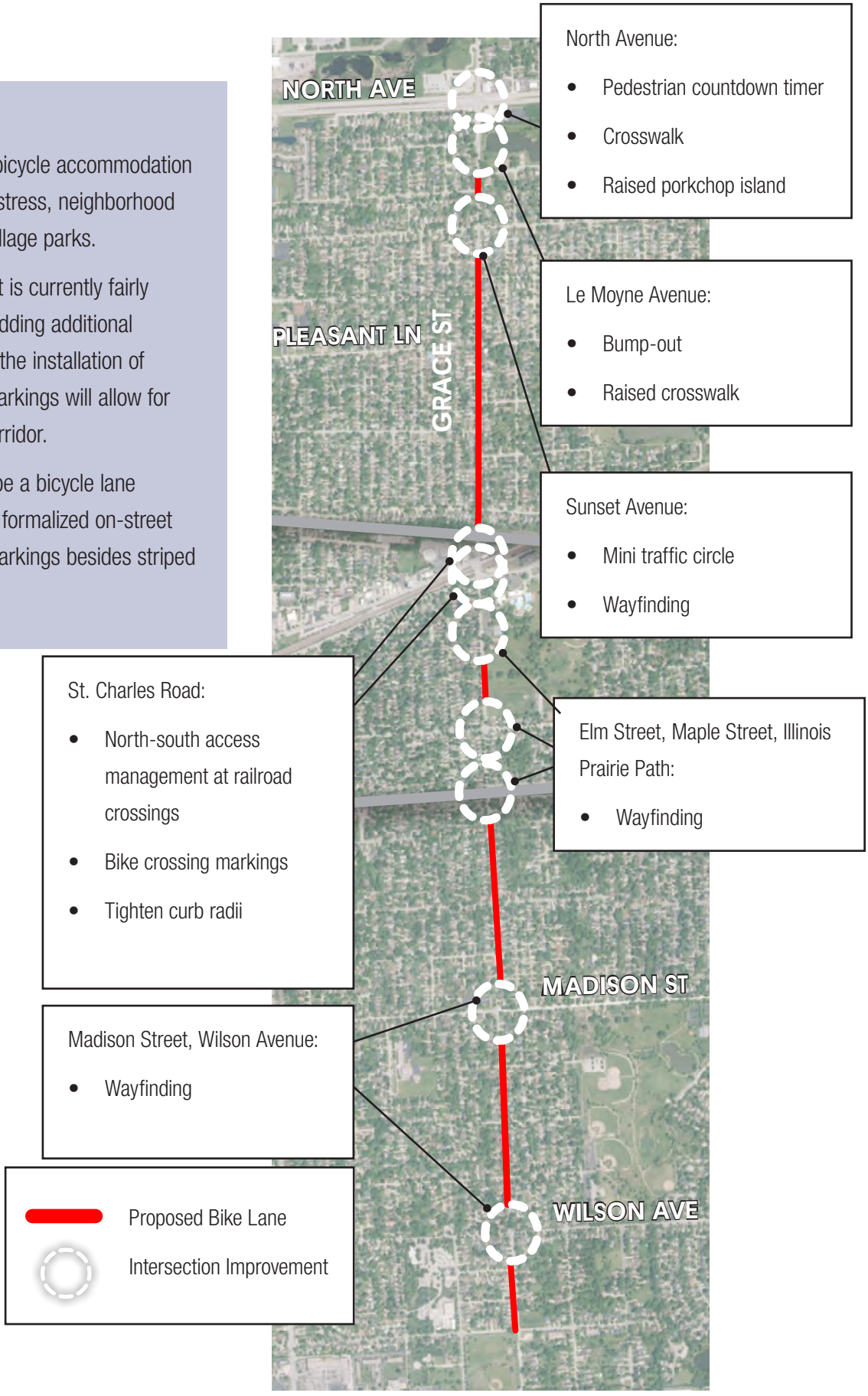


Figure 54.

Wayfinding

Numerous project stakeholders and members of the public discussed the need for wayfinding to Lombard destinations. Wayfinding signage should be attractive and customized with the Village's name. Signage should point to the direction of nearby destinations and specify mileage and time to reach each destination.

The photosimulation (Figure 55) illustrates a possible location for signage installation. The Village is already working to identify potential signage opportunities. Wayfinding along the Great Western Trail and Illinois Prairie Path will lead trail users to Lombard's downtown, helping spur economic development in the heart of the Village.

The image at right illustrates a potential sign mock-up.

This map, reproduced from this plan's Recommendations chapter, identifies "areas of interest," displayed in purple, for installing wayfinding signage near local destinations.

Figure 55. Wayfinding signage will complement the Village's existing kiosks and other signage by providing direction to local areas of interest.

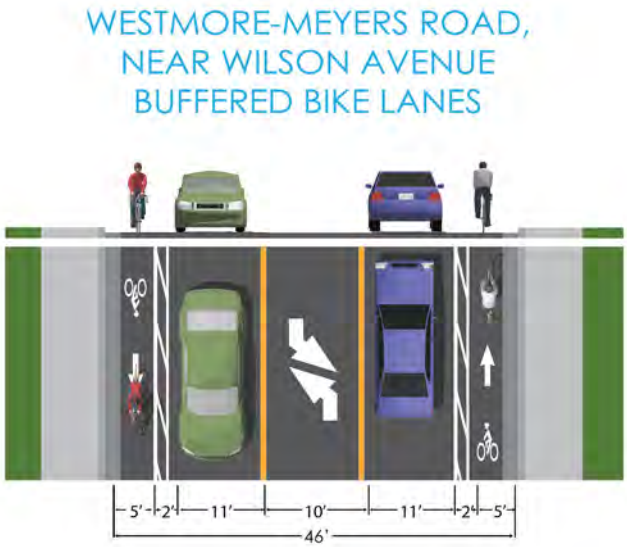
Westmore-Meyers Road

Total Mileage: 2.0 miles

Project Highlights: Utilize relatively low car traffic volumes to install pedestrian improvements and protected bike lanes. Create a marquee project that functions as an important north-south connection along the Village's eastern neighborhoods.

Current Key Issues: A number of pedestrian and bicycle crashes have occurred on Westmore-Meyers Road. The multiple lanes and high car travel speeds result in a high stress environment that discourages bicycle travel.

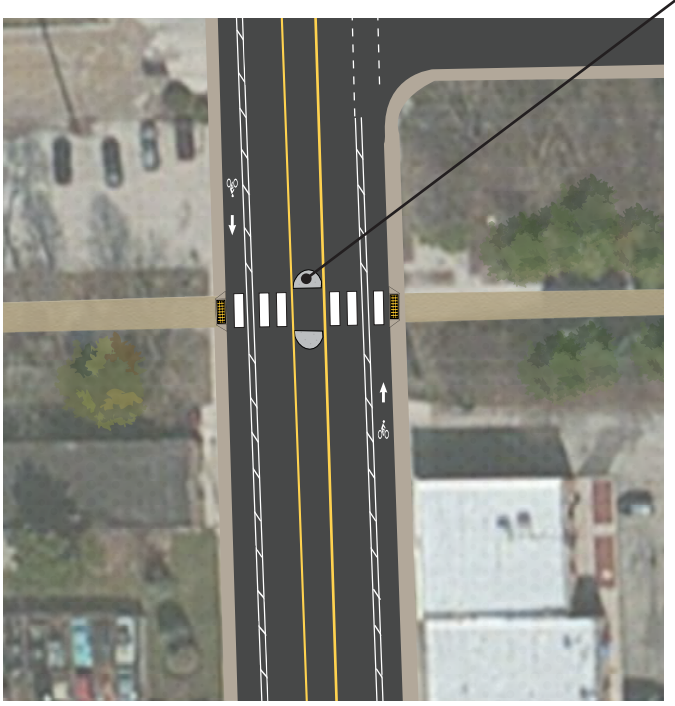
Proposed Improvements: Create protected bike lanes with physical separation from car traffic. Utilize a painted buffer without physical separation in areas with residential driveways, to allow for car access/exit to and from local homes.



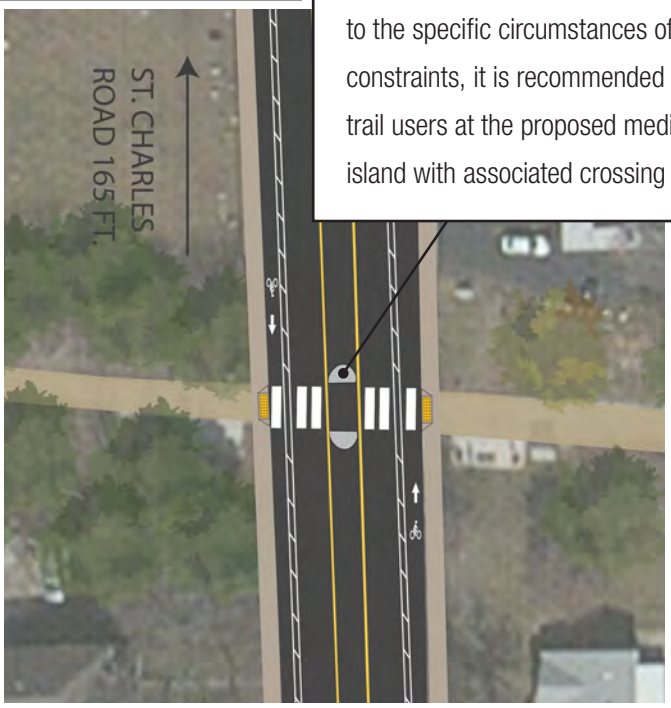
Proposed conditions: Westmore-Meyers from St. Charles Road to Roosevelt Road

Installing RRFBs or in-road "STOP FOR PEDESTRIAN" signs can increase driver yield rates.

The recommended road diet allows for a median refuge island where the Great Western Trail crosses Westmore Meyers Road. Given the proximity to the signalized intersection at St. Charles Road, an ideal crossing would route the trail to the intersection to cross. That possibility is not advised given the location of existing private property. Due to the specific circumstances of these constraints, it is recommended to cross trail users at the proposed median refuge island with associated crossing signage.



Proposed conditions: Westmore-Meyers at Illinois Prairie Path



Proposed conditions: Westmore-Meyers at St. Charles Road

Maple Street:

- Two-stage left turn queue box
- Bike detection and actuation
- Bike crossing markings
- High-visibility crosswalks
- Pedestrian countdown timer
- Curb ramps

Madison Street:

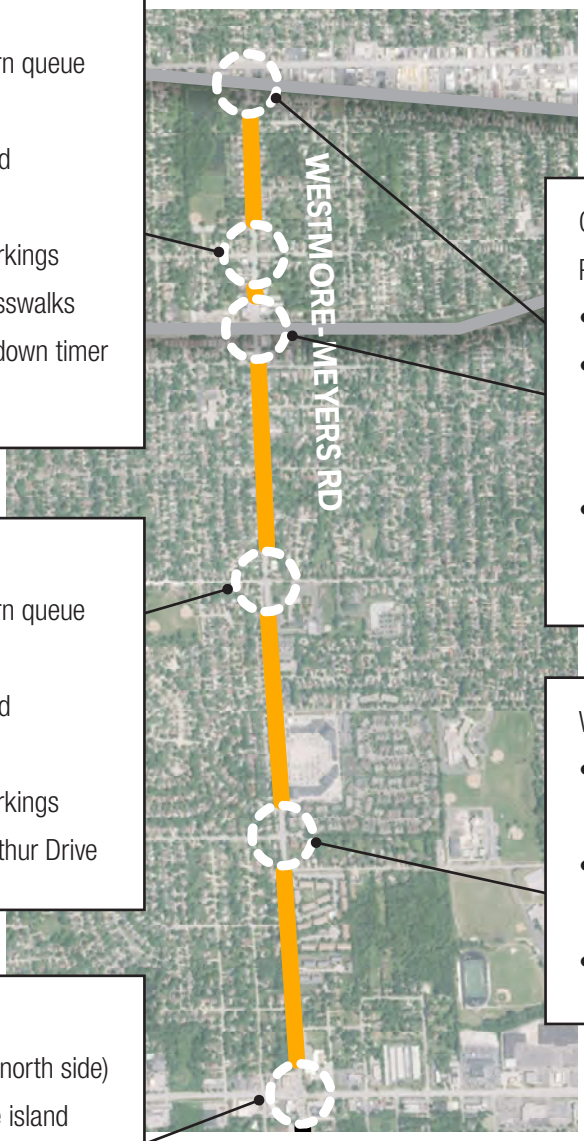
- Two-stage left turn queue box
- Bike detection and actuation
- Bike crossing markings
- Cul-de-sac on Arthur Drive

Roosevelt Road:

- Gateway feature (north side)
- Pedestrian refuge island
- High visibility crosswalks
- Tigten curb radii
- Bike signage

Remove:

- Southbound travel lane



Great Western Trail; Illinois Prairie Path:

- Refuge island
- Rectangular Rapid Flashing Beacon (RRFB) and/or crossing signage
- Wayfinding signage

Wilson Road:

- Access management (west side)
- Bike detection and actuation
- Bike crossing markings

Regional Trails

Proposed Buffered Bike Lane

Intersection Improvement

Figure 56. A photosimulation depicting Westmore-Meyers Road following a reallocation of travel lanes. The proposed design includes bike lanes and a center turn lane.

Yorktown Mall Access

Priority Mileage (shown with a thick line in Figure 57): 0.2 miles

Total Mileage (shown in a thin line in Figure 57): 1.5 miles

Project Highlights: Formalize bicycle accommodation from the adjacent street network directly to entrances to the mall. Space currently used for excess pavement could be reallocated to improve bicycle comfort.

Current Key Issues: Like most suburban malls, access by any mode other than a car can be a difficult experience. As transportation, demographic, and shopping trends change, retrofitting large mall parking lots is a modern strategy.

Proposed Improvements: Create a dedicated shared use path with adjacent vegetation or gateway features around and across the mall parking lot in order to connect the Village's streets to the mall's entrances.

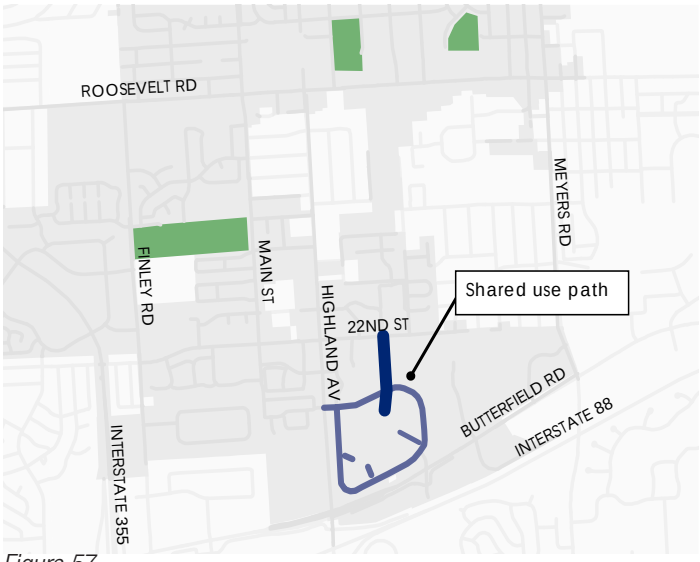


Figure 57.

Existing conditions (Image source: nearmap.com)

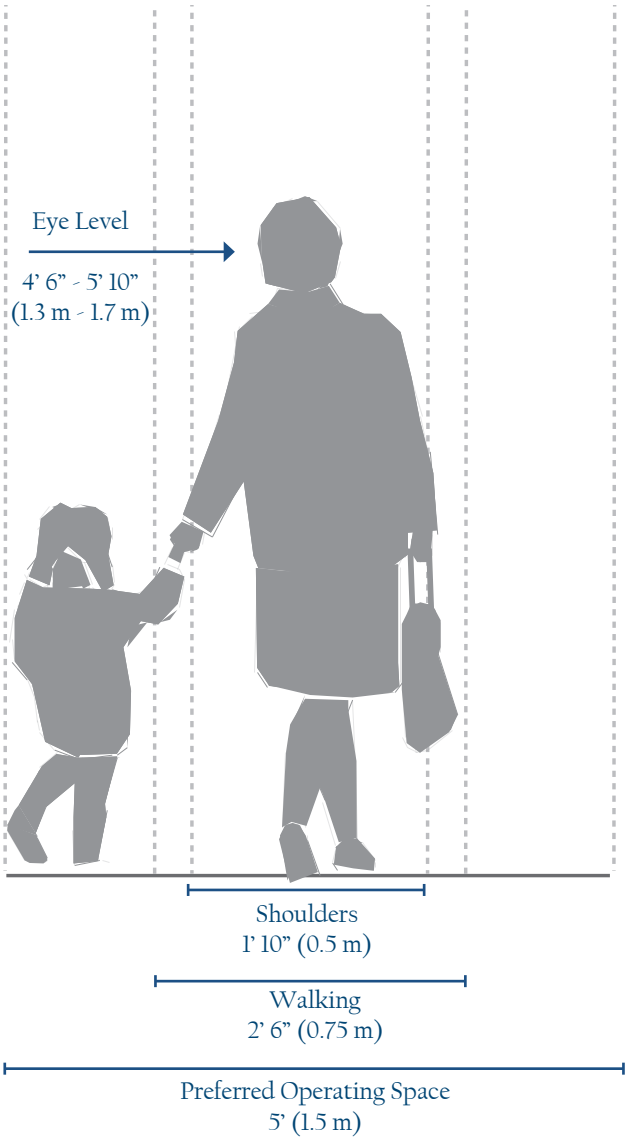
Figure 58. A photosimulation illustrating a possible design to improve pedestiran and bicycle access to Yorktown Mall.

APPENDIX: DESIGN GUIDELINES

PEDESTRIAN FACILITIES

TYPES OF PEDESTRIANS

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. Table A-1 to the right summarizes common pedestrian characteristics for various age groups.



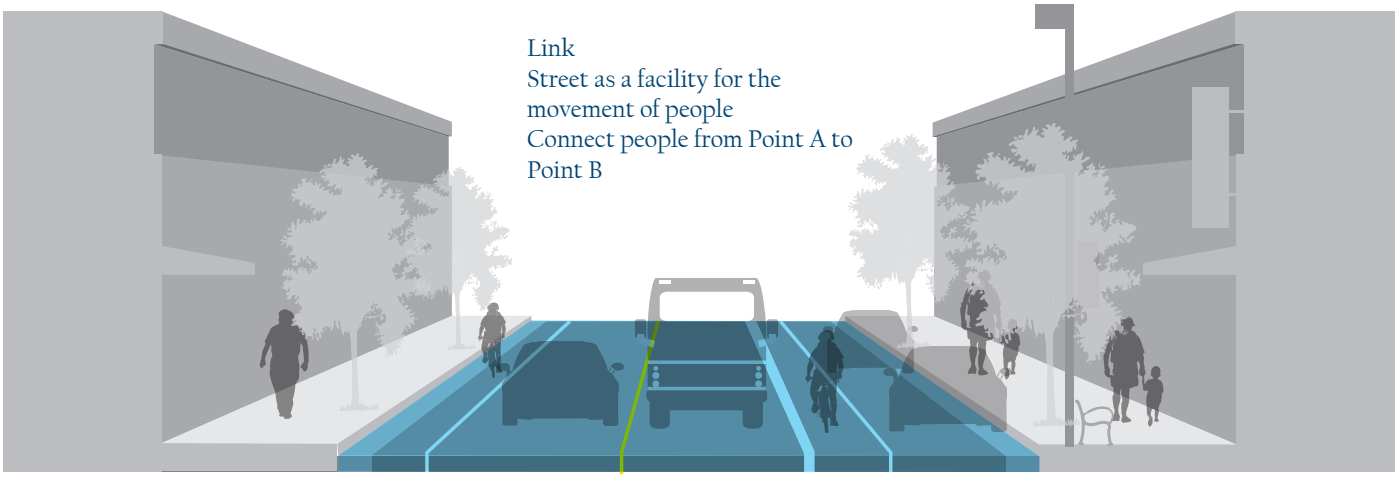
The MUTCD recommends a normal walking speed of three and a half feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to three feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.

TABLE A-1: PEDESTRIAN CHARACTERISTICS BY AGE

Age	Characteristics
0-4	Learning to walk
	Requires constant adult supervision
	Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision
	Poor depth perception
9-13	Susceptible to "dart out" intersection dash
	Poor judgment
	Sense of invulnerability
14-18	Improved awareness of traffic environment
	Poor judgment
19-40	Active, fully aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street
	Vision loss
	Difficulty hearing vehicles approaching from behind Could become disoriented or have limited cognitive abilities

A street serves as a **place** and as a **link**. In the United States following WWII, most roadways have been designed with the primary focus being to connect destinations via automobile. Roadways designed in this fashion typically function as a link that is designed only to connect point A to point B in a manner that facilitates quick motor vehicle travel. However, roadways also function as a social space and have a relationship with the places where people live, work and play. Treating streets simply as links often ignores the other important contexts and functions that streets should address. The Complete Streets design philosophy is a shift to use both link and place concepts in designing roadways. Designing for all modes with both link and place considerations has the potential to add value to Lombard's roadway system. This will help the village transition to a network that is more sustainable and safe, while providing public spaces that are inviting for people and businesses.

Since ample guidelines exist on the accommodation of automobiles along roadways, and Lombard roadways are, for the most part, designed to give these users priority, this guide is intended to focus on the design considerations for bicyclists, pedestrians and transit users.



SIDEWALKS

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped planting strip area. Sidewalks are a common application in both urban and suburban environments.

Attributes of well-designed sidewalks include the following:

Accessibility: A network of sidewalks should be accessible to all users.

Adequate width: Two people should be able to walk side-by-side and pass a third comfortably. Different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should accommodate a high volume of walkers.

Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.

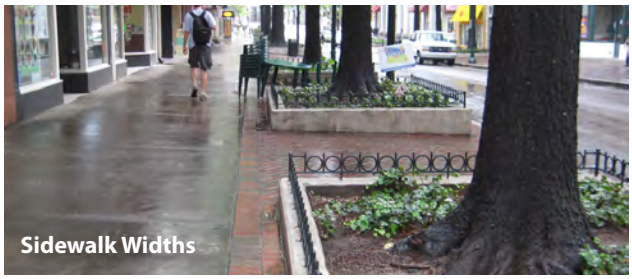
Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.

Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users, and be designed in a manner that contributes to the safety of people.

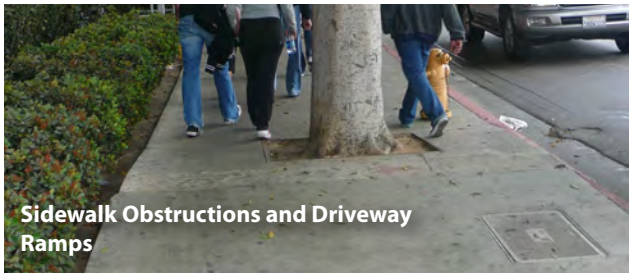
Drainage: Sidewalks should be well graded to minimize standing water.

Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.

Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.



Sidewalk Widths



Sidewalk Obstructions and Driveway Ramps

Pedestrian Amenities

SIDEWALK WIDTHS

Description

The width and design of sidewalks will vary depending on street context, functional classification, and pedestrian demand. Below are preferred widths of each sidewalk zone according to general street type. Standardizing sidewalk guidelines for different areas of the city, dependent on the above listed factors, ensures a minimum level of quality for all sidewalks.

Discussion

It is important to provide adequate width along a sidewalk corridor. Two people should be able to walk side-by-side and pass a third comfortably. In areas of high demand, sidewalks should contain adequate width to accommodate the high volumes and different walking speeds of pedestrians. The Americans with Disabilities Act requires a 4 foot clear width in the pedestrian zone plus 5 foot passing areas every 200 feet.

Street Classification	Parking Lane/ Enhancement Zone	Furnishing/ Green Zone	Pedestrian Through Zone	Frontage Zone	Total Sidewalk Area
Local Streets	7 feet	4 - 8 feet	5 - 6 feet	N/A	9 - 12 feet
Commercial Areas	8 - 10 feet	6 - 8 feet	6 - 12 feet	2 - 8 feet	14- 28 feet
Arterials and Collectors	8 - 10 feet	6 - 8 feet	4 - 12 feet	2 - 4 feet	12 -24 feet

Areas that have significant accumulations of snow during the winter may prefer a wider furnishing zone for snow storage.

Six feet enables two pedestrians (including wheelchair users) to walk side-by-side, or to pass each other comfortably

Total sidewalk area excludes parking dimensions

Recommended dimensions shown here are based on guidelines. Exact dimensions should be selected in response to local context and expected/desired pedestrian volumes.

Additional References and Guidelines

USDOJ. (2010). ADA Standards for Accessible Design.
United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).

Materials and Maintenance

Sidewalks are typically constructed out of concrete and are separated from the roadway by a curb or gutter and sometimes a landscaped boulevard. Surfaces must be firm, stable, and slip resistant.

SIDEWALK OBSTRUCTIONS AND DRIVEWAY RAMPS

Description

Obstructions to pedestrian travel in the sidewalk corridor typically include driveway ramps, curb ramps, sign posts, utility and signal poles, mailboxes, fire hydrants and street furniture.

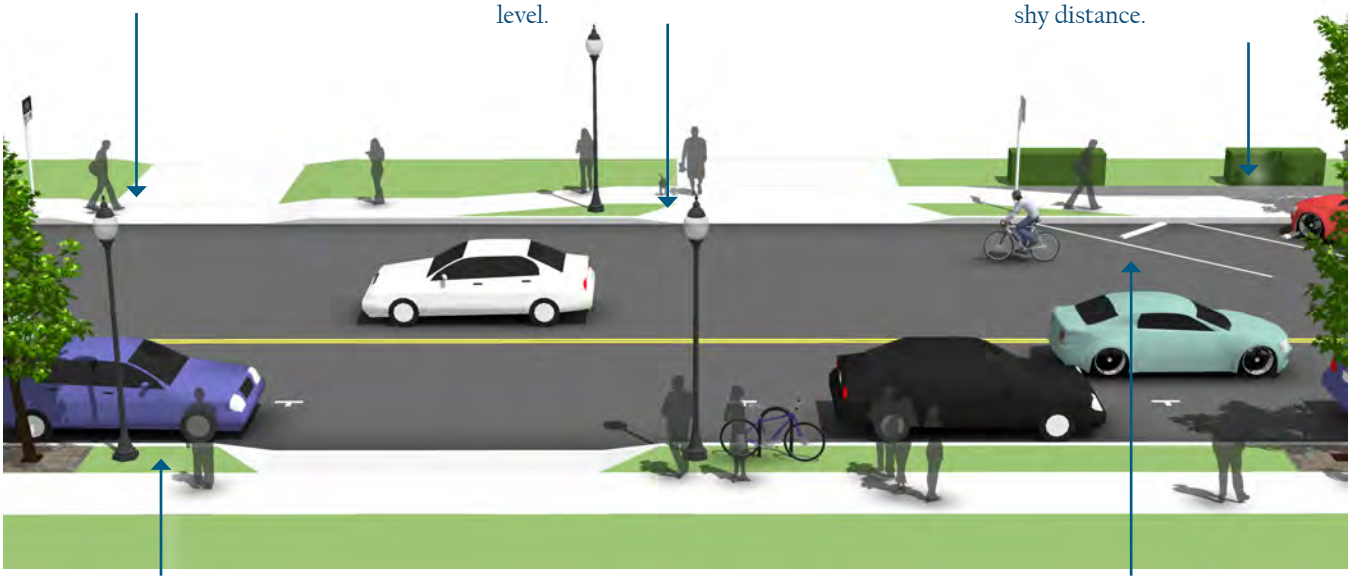
Guidance

- Reducing the number of accesses reduces the need for special provisions. This strategy should be pursued first.
- Obstructions should be placed between the sidewalk and the roadway to create a buffer for increased pedestrian comfort.

Dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade. This is the least-preferred driveway option.

Where constraints preclude a planter strip, wrapping the sidewalk around the driveway allows the sidewalk to still remain level.

When sidewalks abut hedges, fences, or buildings, an additional two feet of lateral clearance should be added to provide appropriate shy distance.



Planter strips allow sidewalks to remain level, with the driveway grade change occurring within the planter strip.

When sidewalks abut angled on-street parking, wheel stops should be used to prevent vehicles from overhanging in the sidewalk.

Discussion

Driveways are a common sidewalk obstruction, especially for wheelchair users. When constraints only allow curb-tight sidewalks, dipping the entire sidewalk at the driveway approaches keeps the cross-slope at a constant grade. However, this may be uncomfortable for pedestrians and could create drainage problems behind the sidewalk.

Additional References and Guidelines

USDOJ. (2010). ADA Standards for Accessible Design.
United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).
AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities.

Materials and Maintenance

Excessive cracks, gaps, pits, settling, and lifting of the sidewalk creates a pedestrian tripping hazard and reduces ADA accessibility; damages sidewalks should be repaired.

PEDESTRIAN AMENITIES ON MAIN STREET

Description

A variety of streetscape elements can define the pedestrian realm, offer protection from moving vehicles, and enhance the walking experience. Pedestrian amenities should be placed in the furnishing zone on a sidewalk corridor. Signs, meters, and tree wells should go between parking spaces. Key features are presented below.

Street Trees

In addition to their aesthetic and environmental value, street trees can slow traffic and improve safety for pedestrians. Trees add visual interest to streets and narrow the street's visual corridor, which may cause drivers to slow down. It is important that trees do not block light or the vision triangle.

Street Furniture

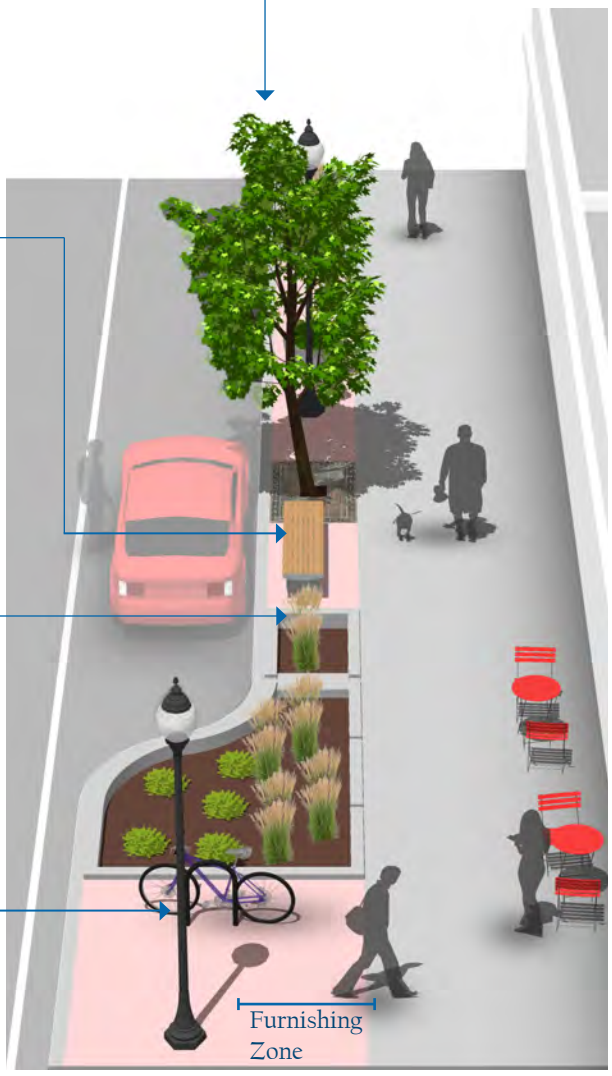
Providing benches at key rest areas and viewpoints encourages people of all ages to use the walkways by ensuring that they have a place to rest along the way. Benches should be 20" tall to accommodate elderly pedestrians comfortably. Benches can be simple (e.g., wood slats) or more ornate (e.g., stone, wrought iron, concrete). If alongside a parking zone, street furniture must be 3 feet from the curbface.

Green Features

Green stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers). Bioswales are natural landscape elements that manage water runoff from a paved surface. Plants in the swale trap pollutants and silt from entering a river system.

Lighting

Pedestrian scale lighting improves visibility for both pedestrians and motorists - particularly at intersections. Pedestrian scale lighting can provide a vertical buffer between the sidewalk and the street, defining pedestrian areas.



Additional References and Guidelines

United States Access Board. (2007)

Public Rights-of-Way Accessibility Guidelines (PROWAG)

Materials and Maintenance

Establishing and caring for your young street trees is essential to their health. Green features may require routine maintenance, including sediment and trash removal, and clearing curb openings and overflow drains.

PEDESTRIANS AT INTERSECTIONS

Attributes of pedestrian-friendly intersection design include:

Clear Space: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

Visibility: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

Legibility: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

Accessibility: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards and follow universal design principles.

Separation from Traffic: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.

Lighting: Adequate lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, suburban and rural intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.


Marked/Raised Crosswalks


Median Refuge Islands


Minimizing Curb Radii


Curb Extensions


ADA Compliant Curb Ramps

MARKED CROSSWALKS

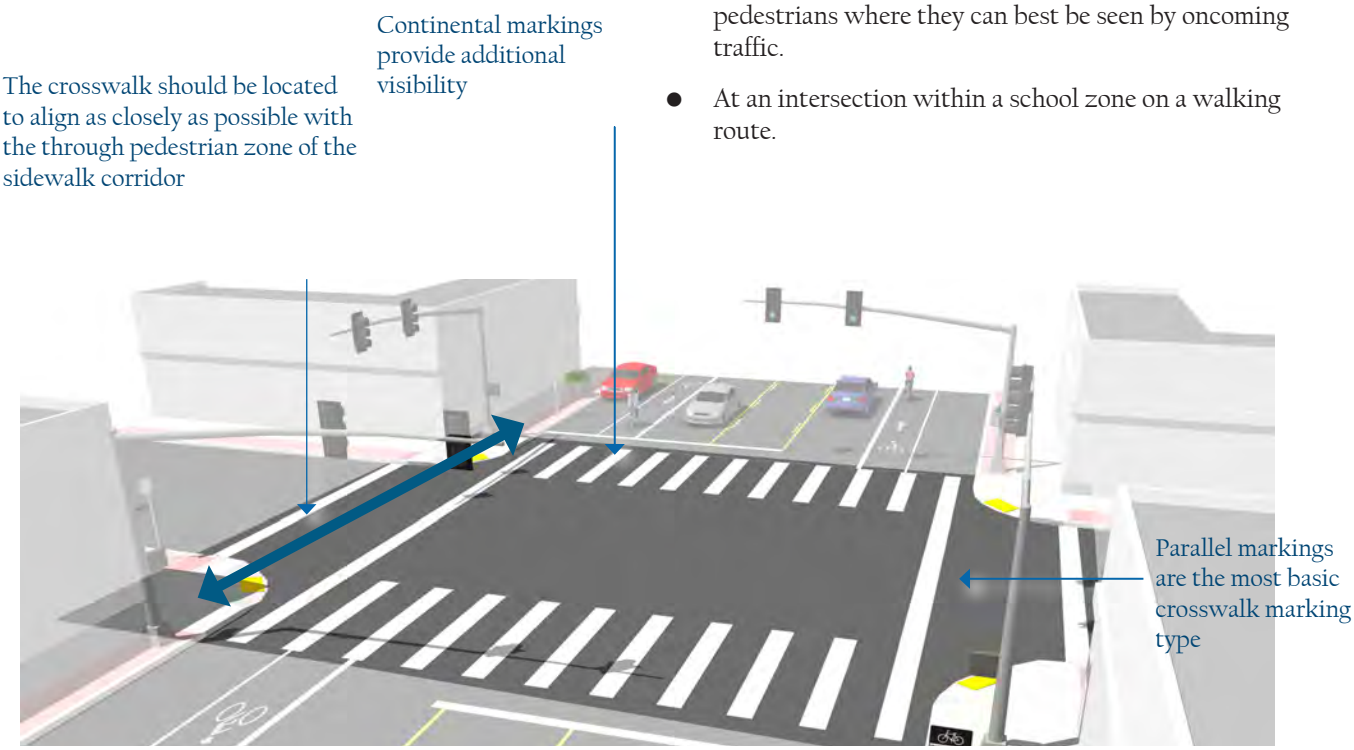
Description

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer especially on multi-lane roadways.

At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Guidance

- At signalized intersections, all crosswalks should be marked. At unsignalized intersections, crosswalks may be marked under the following conditions:
- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.
- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.



Discussion

Continental crosswalk markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected, including: school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and at intersections where there is expected high pedestrian use and the crossing is not controlled by signals or stop signs.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices. (3B.18) AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities. FHWA. (2005). Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations. FHWA. (2010). Crosswalk Marking Field

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. Thermoplastic markings offer increased durability compared to conventional paint.

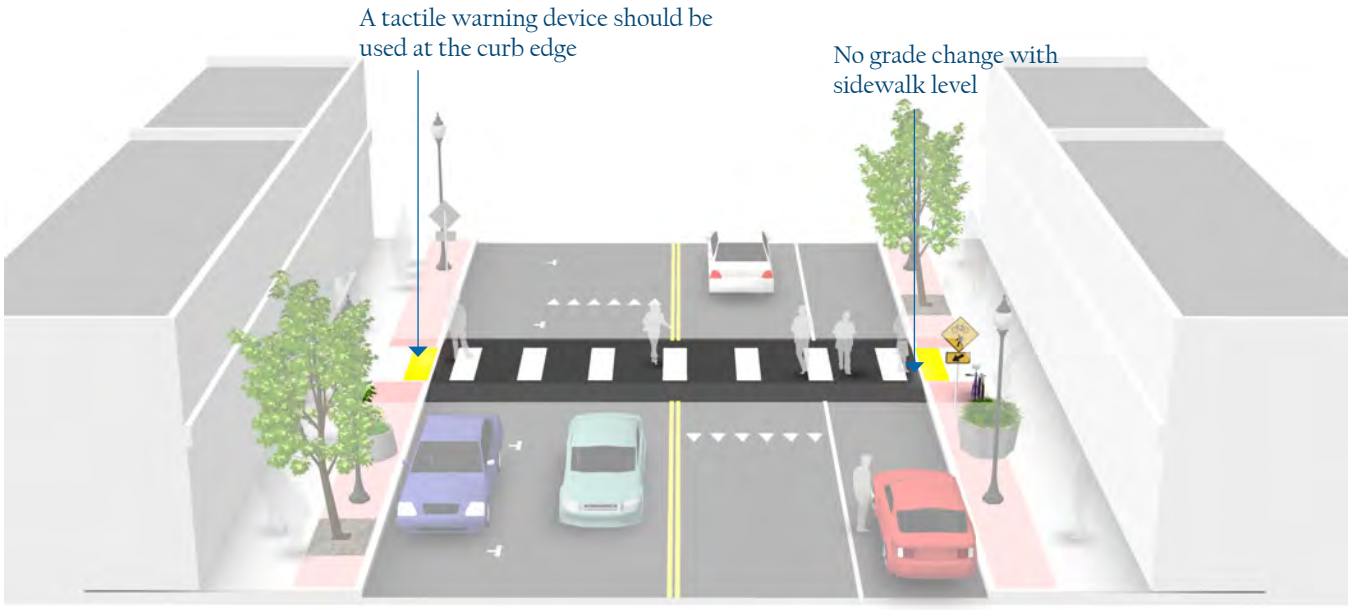
RAISED CROSSWALKS

Description

A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used only in very limited cases where a special emphasis on pedestrians is desired, and application should be reviewed on case-by-case basis.

Guidance

- Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.
- Approaches to the raised crosswalk may be designed to be similar to speed humps.
- Raised crosswalks can also be used as a traffic calming treatment.



Discussion

Like a speed hump, raised crosswalks have a traffic slowing effect which may be unsuitable on emergency response routes.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices. (3B.18) AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities.
USDOJ. (2010). ADA Standards for Accessible Design.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

MEDIAN REFUGE ISLANDS

Description

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

Guidance

- Can be applied on any roadway with a left turn center lane or median that is at least 6' wide.
- Appropriate at signalized or unsignalized crosswalks
- The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.
- The island should be at least 6' wide between travel lanes (to accommodate bikes with trailers and wheelchair users) and at least 20' long.
- On streets with speeds higher than 25 mph there should also be double centerline marking, reflectors, and "KEEP RIGHT" signage.

Cut through median islands are preferred over curb ramps, to better accommodate bicyclists.

Discussion

If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Shrubs and ground plantings should be no higher than 1 ft 6 in. On multi-lane roadways, consider configuration with active warning beacons for improved yielding compliance.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices. AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities. NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Refuge islands may collect road debris and may require somewhat frequent maintenance. Refuge islands should be visible to snow plow crews and should be kept free of snow berms that block access.

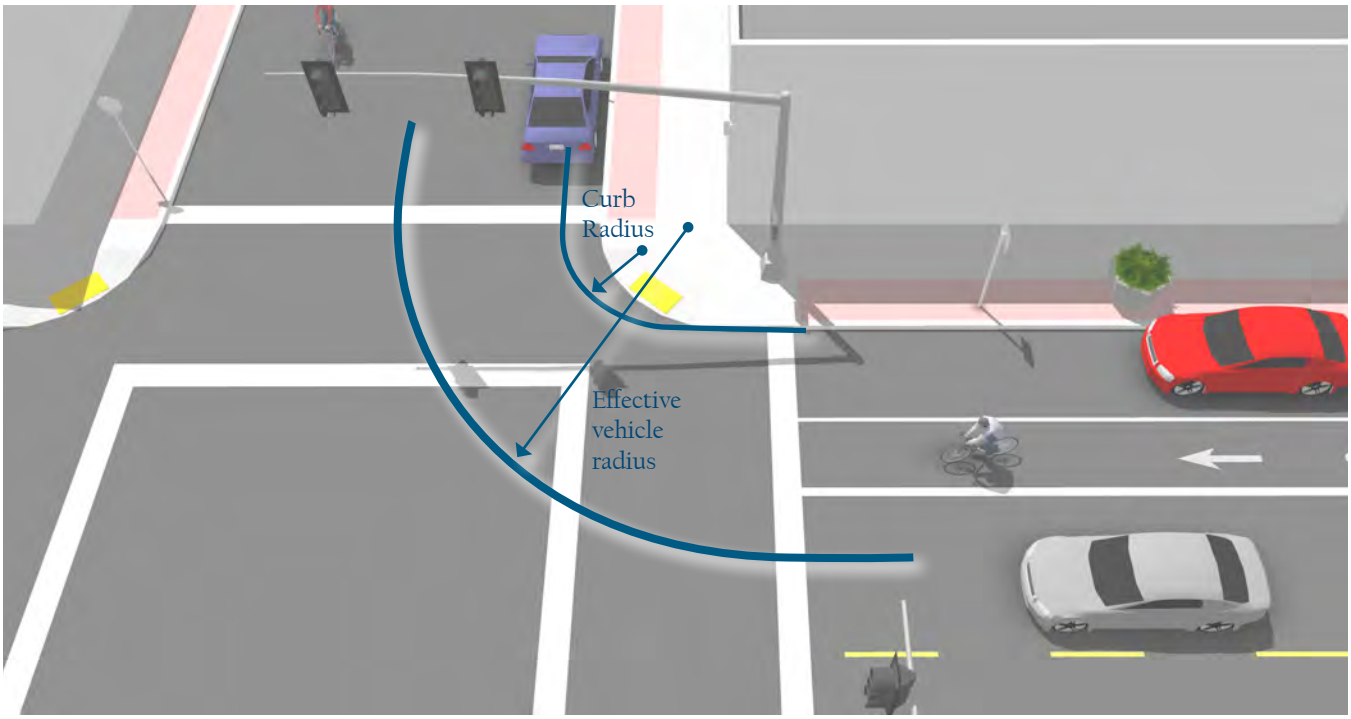
MINIMIZING CURB RADII

Description

The size of a curb's radius can have a significant impact on pedestrian comfort and safety. A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances.

Guidance

- The radius may be as small as 3 ft where there are no turning movements, or 5 ft where there are turning movements, adequate street width, and a larger effective curb radius created by parking or bike lanes.
- Auto Turn analysis should be used if school buses or trucks will frequently use the intersection in question.



Discussion

Several factors govern the choice of curb radius in any given location. These include the desired pedestrian area of the corner, traffic turning movements, street classifications, design vehicle turning radius, intersection geometry, and whether there is parking or a bike lane (or both) between the travel lane and the curb.

Additional References and Guidelines

AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities. AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

Materials and Maintenance

Improperly designed curb radii at corners may be subject to damage by large trucks.

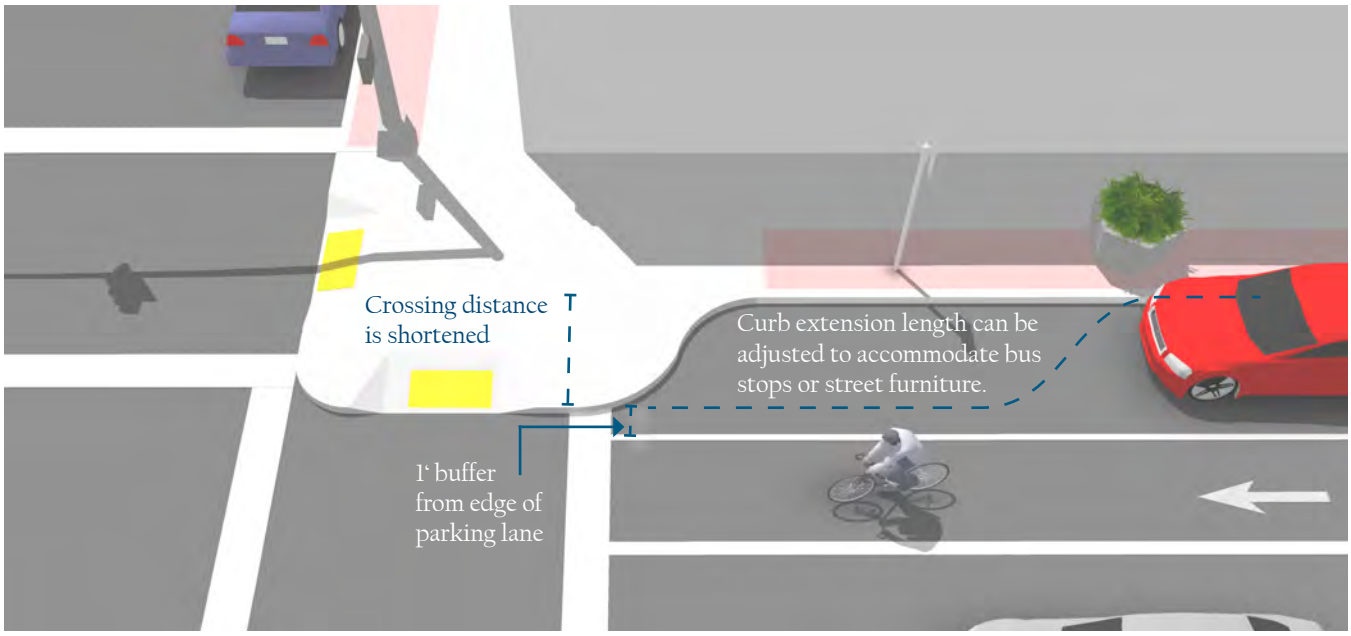
CURB EXTENSIONS IN THE MAIN STREET AREA

Description

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

Guidance

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.



Discussion

If there is no parking lane, adding curb extensions may be a problem for bicycle travel and truck or bus turning movements.

Additional References and Guidelines

AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities. AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.

Materials and Maintenance

Planted curb extensions may be designed as a bioswale, a vegetated system for stormwater management.

ADA COMPLIANT CURB RAMPS

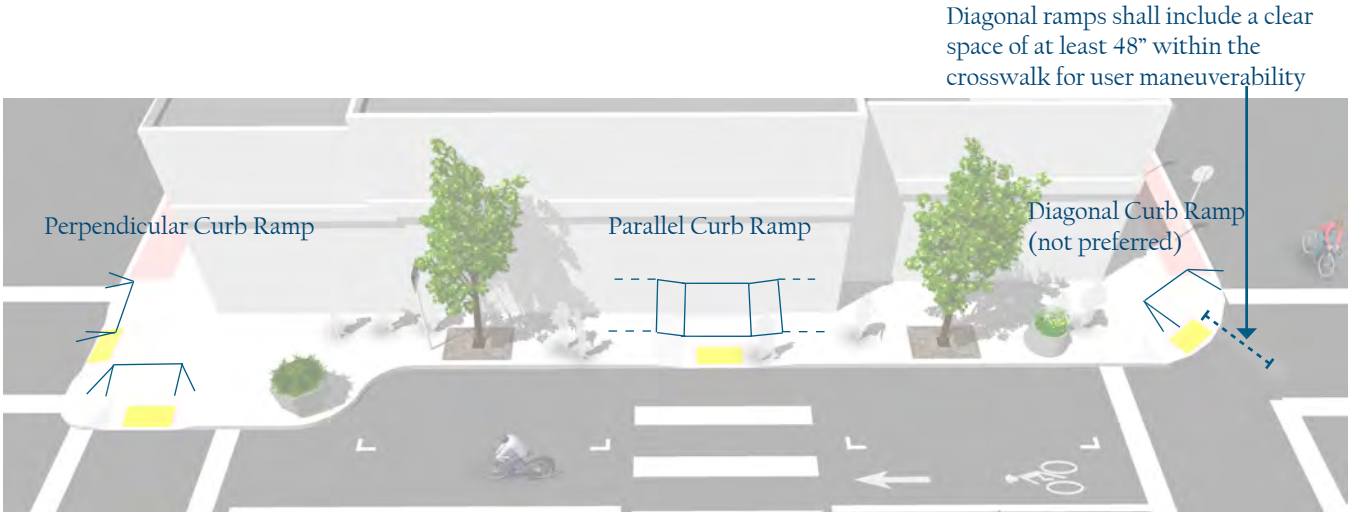
Description

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

Although diagonal curb ramps might save money, they create potential safety and mobility problems for pedestrians,including reduced maneuverability and increased interaction with turning vehicles, particularly in areas with high traffic volumes. Diagonal curb ramp configurations are the least preferred of all options.

Guidance

- The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.
- The ramp shall slope no more than 1:50 (2.0%) in any direction.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5'-0" long and at least as wide as the ramp, although a width of 5'-0" is preferred.



Crosswalk spacing not to scale. For illustration purposes only.

Discussion

The edge of an ADA compliant curb ramp will be marked with a tactile warning device (also known as truncated domes) to alert people with visual impairments to changes in the pedestrian environment. Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident. These devices are most effective when adjacent to smooth pavement so the difference is easily detected. The devices must provide color contrast so partially sighted people can see them.

Additional References and Guidelines

United States Access Board. (2002). Accessibility Guidelines for Buildings and Facilities. United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG). USDOJ. (2010). ADA Standards for Accessible Design.

Materials and Maintenance

It is critical that the interface between a curb ramp and the street be maintained adequately. Asphalt street sections can develop potholes at the foot of the ramp, which can catch the front wheels of a wheelchair.

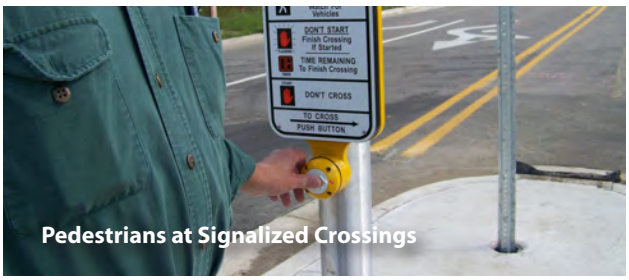
Signalization

Crossing beacons and signals facilitate crossings of roadways for pedestrians and bicyclists. Beacons make crossing intersections safer by clarifying when to enter an intersection and by alerting motorists to the presence of pedestrians and bicyclists.

Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Push buttons, signage, and pavement markings may be used to highlight these facilities for pedestrians, bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, traffic volumes, and the anticipated levels of pedestrian and bicycle crossing traffic.

An intersection with crossing beacons may reduce stress and delays for crossing users, and discourage illegal and unsafe crossing maneuvers.



Pedestrians at Signalized Crossings


Pedestrian Hybrid Beacon

Additional References and Guidelines

United States Access Board. (2007). Public Rights-of-Way Accessibility Guidelines (PROWAG).
AASHTO. (2004). Guide for the Planning, Design, and Operation of Pedestrian Facilities.

Materials and Maintenance

It is important to repair or replace traffic control equipment before it fails. Consider semi-annual inspections of controller and signal equipment, intersection hardware, and loop detectors.

PEDESTRIANS AT SIGNALIZED CROSSINGS

Description

Pedestrian Signal Head

- All traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage.
- Countdown signals should be used at all signalized intersections to indicate whether a pedestrian has time to cross the street before the signal phase ends.

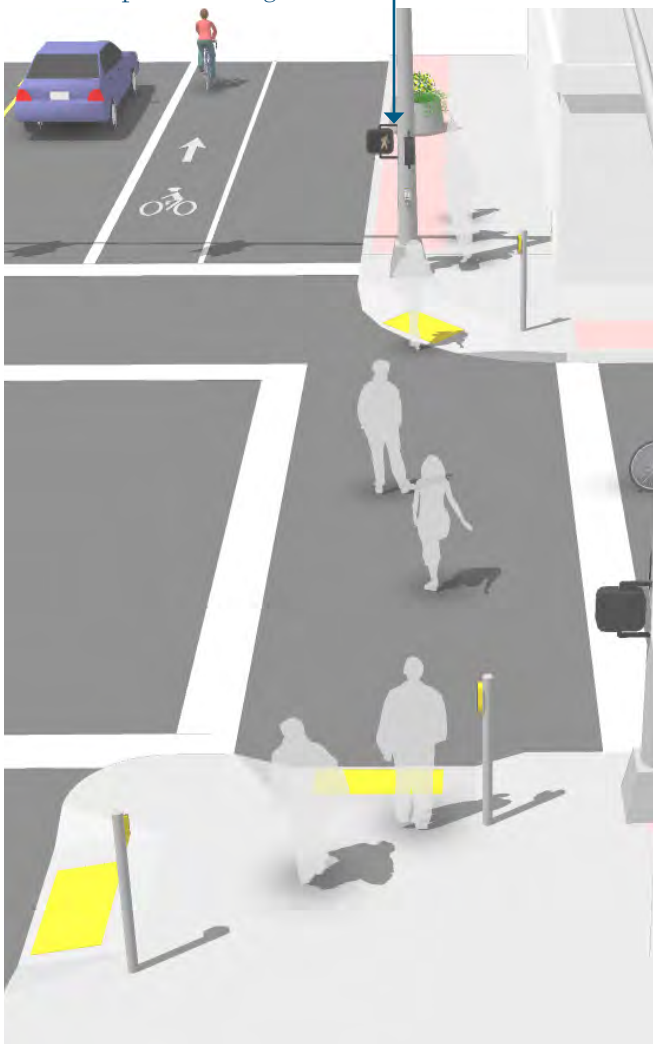
Signal Timing

- Providing adequate pedestrian crossing time is a critical element of the walking environment at signalized intersections. The MUTCD recommends traffic signal timing to assume a pedestrian walking speed of 3.5' per second, meaning that the length of a signal phase with parallel pedestrian movements should provide sufficient time for a pedestrian to safely cross the adjacent street.
- At crossings where older pedestrians or pedestrians with disabilities are expected, crossing speeds as low as 3' per second may be assumed.
- In busy pedestrian areas such as downtowns, the pedestrian signal indication should be built into each signal phase, eliminating the requirement for a pedestrian to actuate the signal by pushing a button.

Discussion

When push buttons are used, they should be located so that someone in a wheelchair can reach the button from a level area of the sidewalk without deviating significantly from the natural line of travel into the crosswalk, and marked (for example, with arrows) so that it is clear which signal is affected. In areas with very heavy pedestrian traffic, consider an all-pedestrian signal phase to give pedestrians free passage in the intersection when all motor vehicle traffic movements are stopped.

Audible pedestrian traffic signals provide crossing assistance to pedestrians with vision impairment at signalized intersections



Consider the use of a Leading Pedestrian Indication (LPI) to provide additional traffic protected crossing time to pedestrians

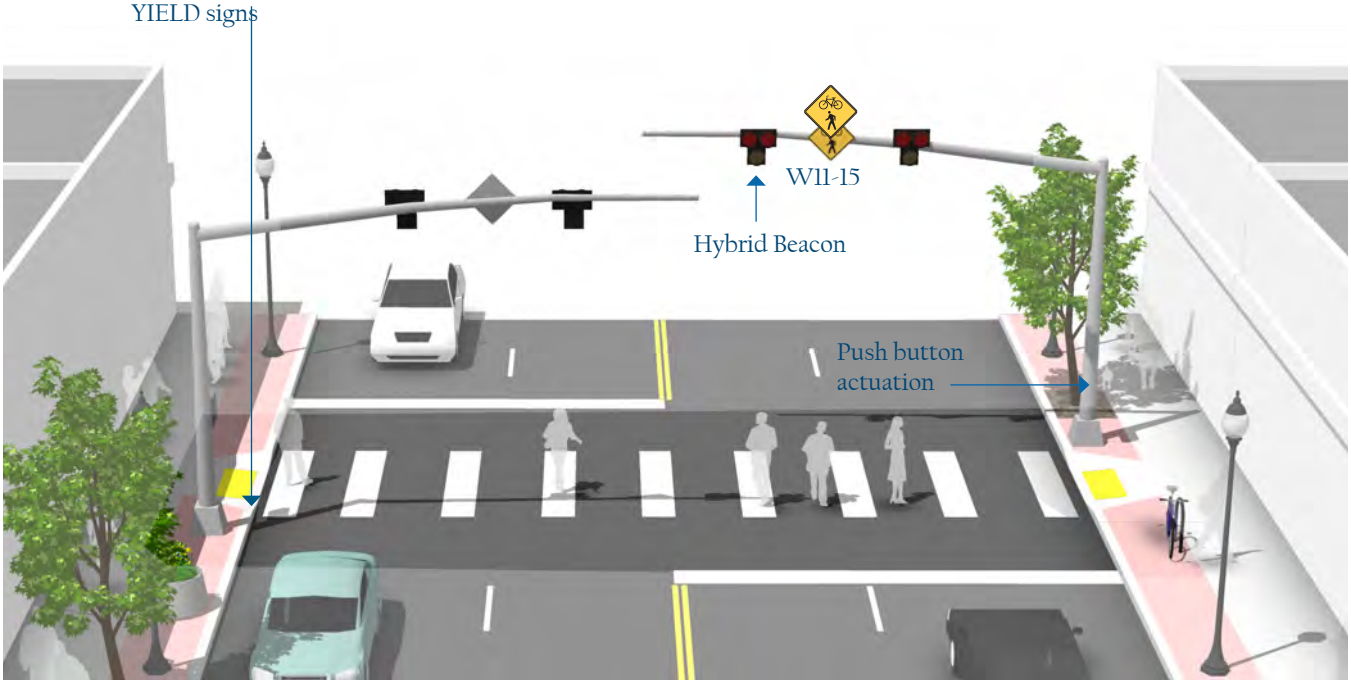
PEDESTRIAN HYBRID BEACON

Description

Hybrid beacons are used to improve non-motorized crossings of major streets. A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk

Guidance

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.



Discussion

Hybrid beacon signals are normally activated by push buttons, but may also be triggered by infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

ACTIVE WARNING BEACONS

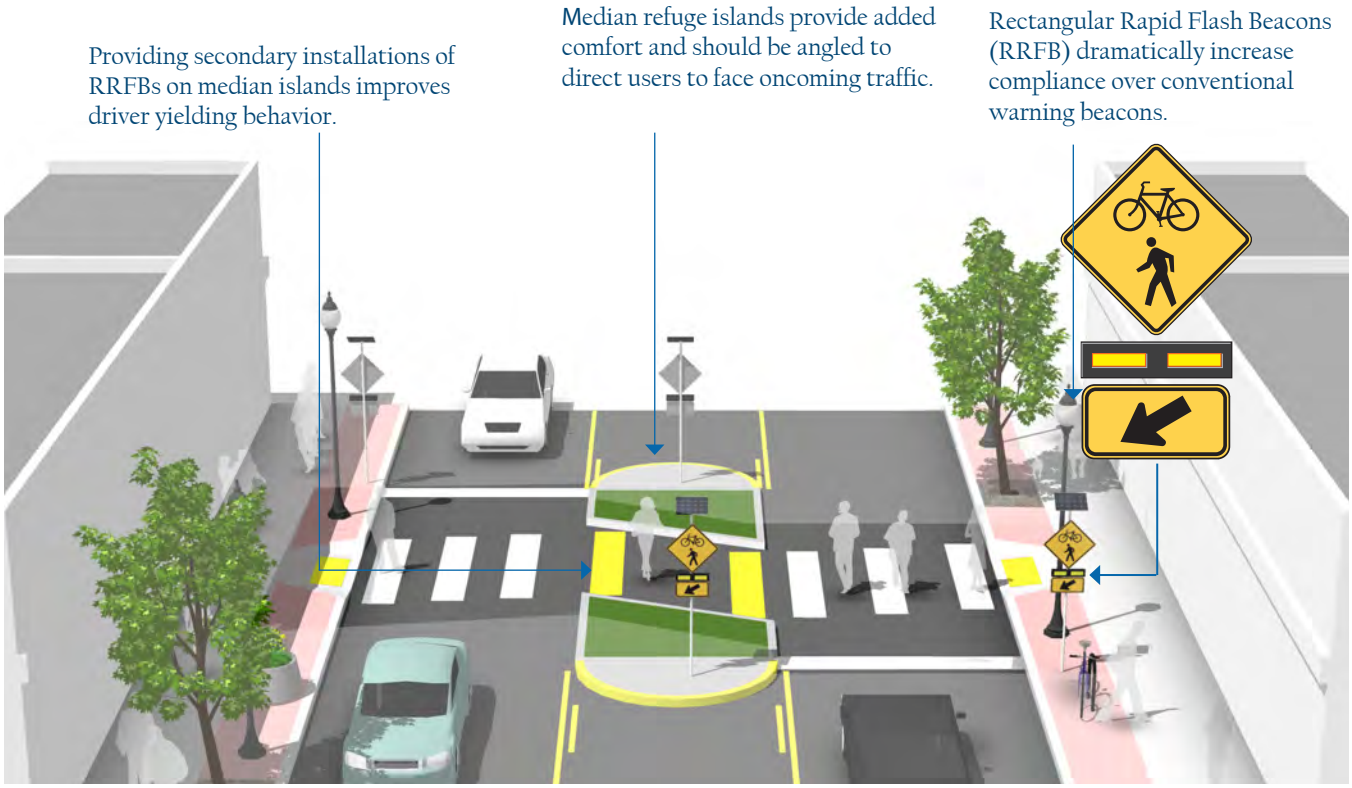
Description

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or rectangular rapid flash beacons (RRFB).

Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.



Discussion

Rectangular rapid flash beacons have the highest compliance of all the warning beacon enhancement options. A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent. Additional studies over long term installations show little to no decrease in yielding behavior over time.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide. FHWA. (2009). Manual on Uniform Traffic Control Devices. FHWA. (2008). MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11)

Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs can run for years without issue.

DESIGN GUIDELINES: SHARED USE PAVED TRAIL DESIGN AND OFF-STREET FACILITIES

SHARED USE PAVED TRAILS AND OFF-STREET FACILITIES

A shared use paved trail (also known as a greenway) allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Trail facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of shared use paved trails include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the trail.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the trail where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.


Trails in River and Utility Corridors


Trails in Abandoned Rail Corridors


Trails in Existing Active Rail Corridors


Natural Surface Trail


Boardwalks

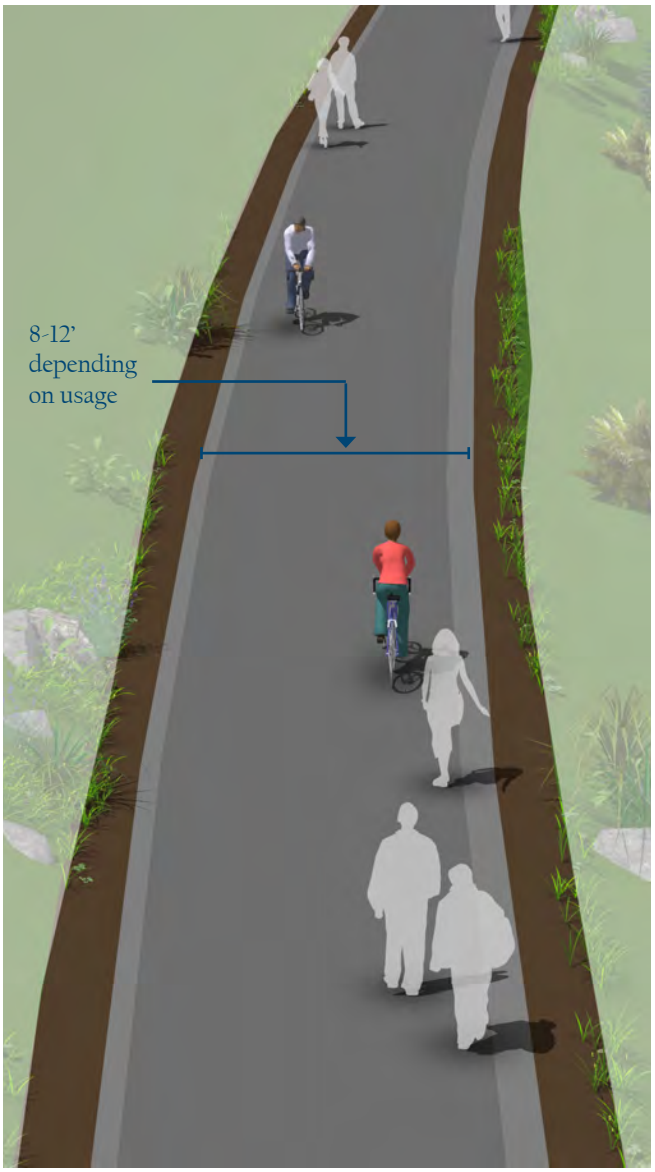

General Design Practices


Trails Along Roadways

GENERAL DESIGN PRACTICES

Description

Shared use paved trails can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle trails should generally provide directional travel opportunities not provided by existing roadways.



Guidance

Width

- 8 feet is the minimum allowed for a two-way bicycle trail and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the trail should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Discussion

Terminate the trail where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

SHARED USE PAVED TRAILS IN ABANDONED RAIL CORRIDORS

Description

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street trails. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

In some cases, rail owners may rail-bank their corridors as an alternative to a complete abandonment of the line, thus preserving the rail corridor for possible future use.

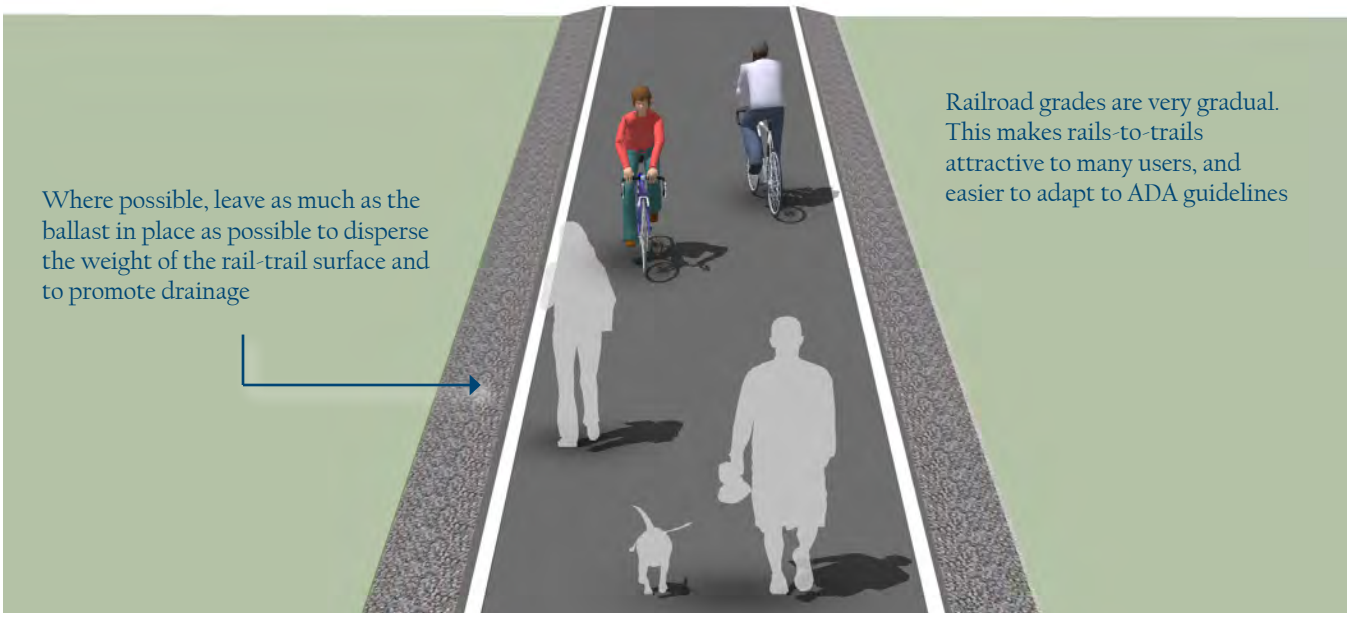
The railroad may form an agreement with any person, public or private, who would like to use the banked rail line as a trail or linear park until it is again needed for rail use. Municipalities should acquire abandoned rail rights-of-way whenever possible to preserve the opportunity for trail development.

Guidance

Shared use paved trails in abandoned rail corridors should meet or exceed general design practices. If additional width allows, wider trails, and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

If converting a rail bed adjacent to an active rail line, see Shared use paved trails in Existing Active Rail Corridors.



Discussion

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum trail widths, but often lack preferred shoulder and lateral clearance widths.

Rail-to-trails can involve many challenges including the acquisition of the right of way, cleanup and removal of toxic substances, and rehabilitation of tunnels, trestles and culverts. A structural engineer should evaluate existing railroad bridges for structural integrity to ensure they are capable of carrying the appropriate design loads.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

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SHARED USE PAVED TRAILS IN EXISTING ACTIVE RAIL CORRIDORS

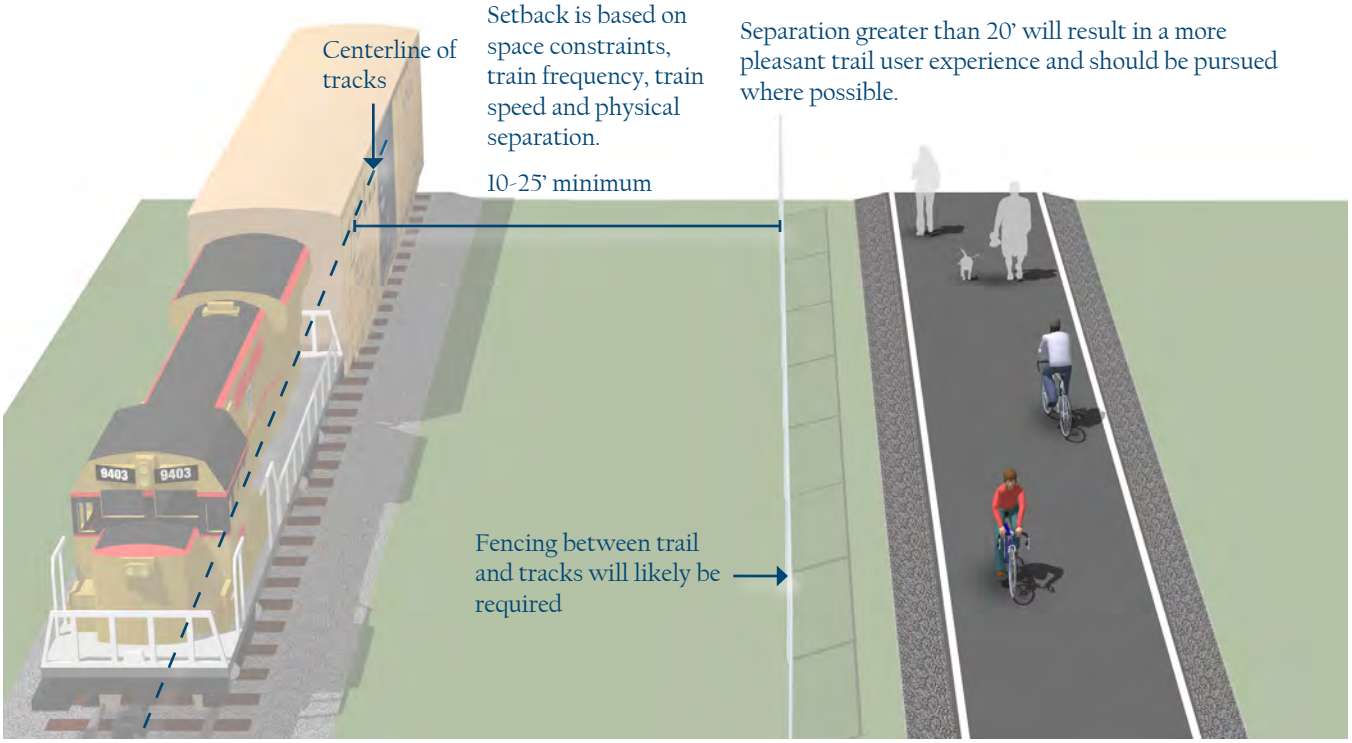
Description

Rails-with-Trails projects typically consist of trails adjacent to active railroads. It should be noted that some constraints could impact the feasibility of rail-with-trail projects. In some cases, space needs to be preserved for future planned freight, transit or commuter rail service. In other cases, limited right-of-way width, inadequate setbacks, concerns about safety/trespassing, and numerous mid-block crossings may affect a project's feasibility.

Guidance

Shared use paved trails in utility corridors should meet or exceed general design standards. If additional width allows, wider trails, and landscaping are desirable.

If required, fencing should be a minimum of 5 feet in height with higher fencing than usual next to sensitive areas such as switching yards. Setbacks from the active rail line will vary depending on the speed and frequency of trains, and available right-of-way.



Discussion

Railroads may require fencing with rail-with-trail projects. Concerns with trespassing and security can vary with the volume and speed of train traffic on the adjacent rail line and the setting of the shared use paved trail, i.e. whether the section of track is in an urban or rural setting.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *Rails-with-Trails: Lessons Learned.* 2002.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

SHARED USE PAVED TRAILS IN RIVER AND UTILITY CORRIDORS

Description

Utility and waterway corridors often offer excellent shared use paved trail development and bikeway gap closure opportunities. Utility corridors typically include powerline and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.

Guidance

Shared use paved trails in utility corridors should meet or exceed general design practices. If additional width allows, wider trails, and landscaping are desirable.

Access Points

Any access point to the trail should be well-defined with appropriate signage designating the trail as a bicycle facility and prohibiting motor vehicles.

Trail Closure

Public access to the trail may be prohibited during the following events:

- Canal/flood control channel or other utility maintenance activities
- Inclement weather or the prediction of storm conditions

Discussion

Similar to railroads, public access to flood control channels or canals may be undesirable. Hazardous materials, deep water or swift current, steep, slippery slopes, and debris all may constitute risks for public access. If desired, consider appropriate fencing to keep trail users within the designated travel way. Creative design of fencing is encouraged to make the trail facility feel welcoming to the user.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

Natural Surface Trail

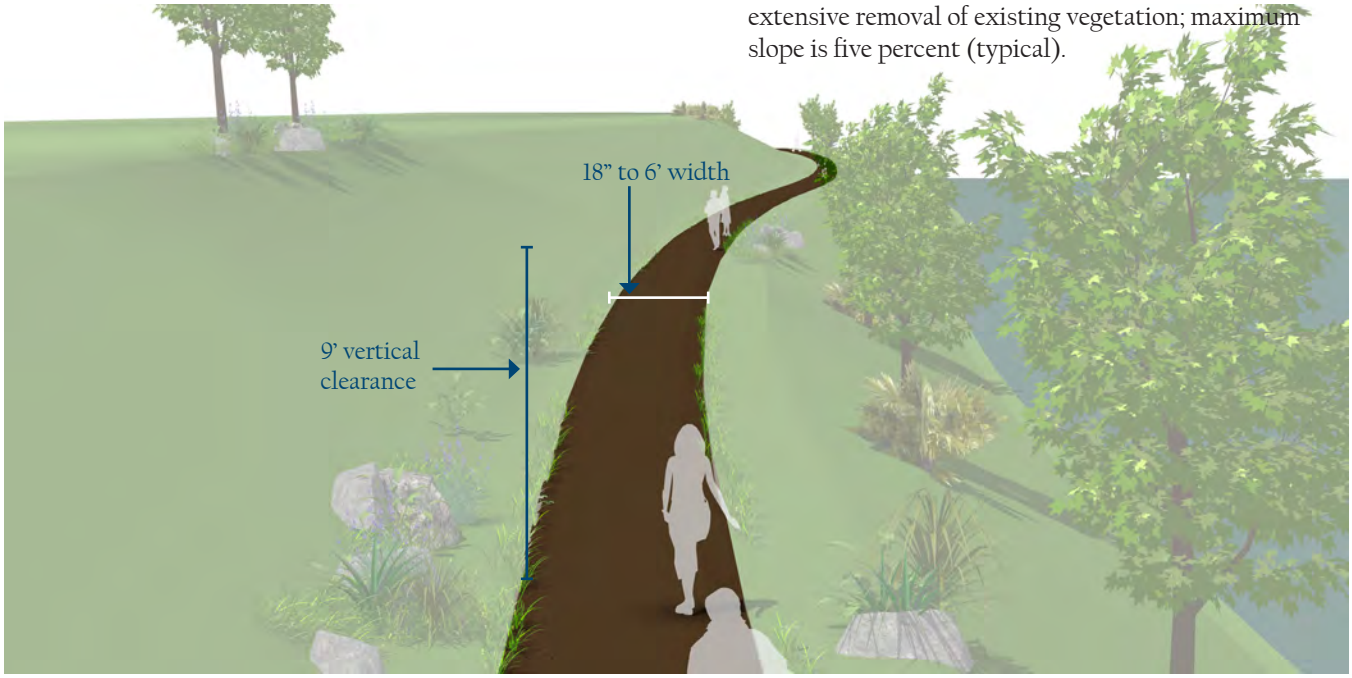
Description

Sometimes referred to as footpaths, hiking trails or single track trails, the soft surface shared use trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Guidance

Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.

- Mountain bike trails are typically 18-24 inches wide and have compacted bare earth or leaf litter surfacing.
- Base preparation varies from machine-worked surfaces to those worn only by usage.
- Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.
- Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).



Discussion

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.

Due to their narrow width and ability to contour with the natural topography, single-track mountain bike trails typically require the least amount of disturbance and support features of all types of trails.

Additional References and Guidelines

IMBA. *Managing Mountain Biking.* 2007.
IMBA. *Trail Solutions.* 2004.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Consider implications for accessibility when weighing options for surface treatments.

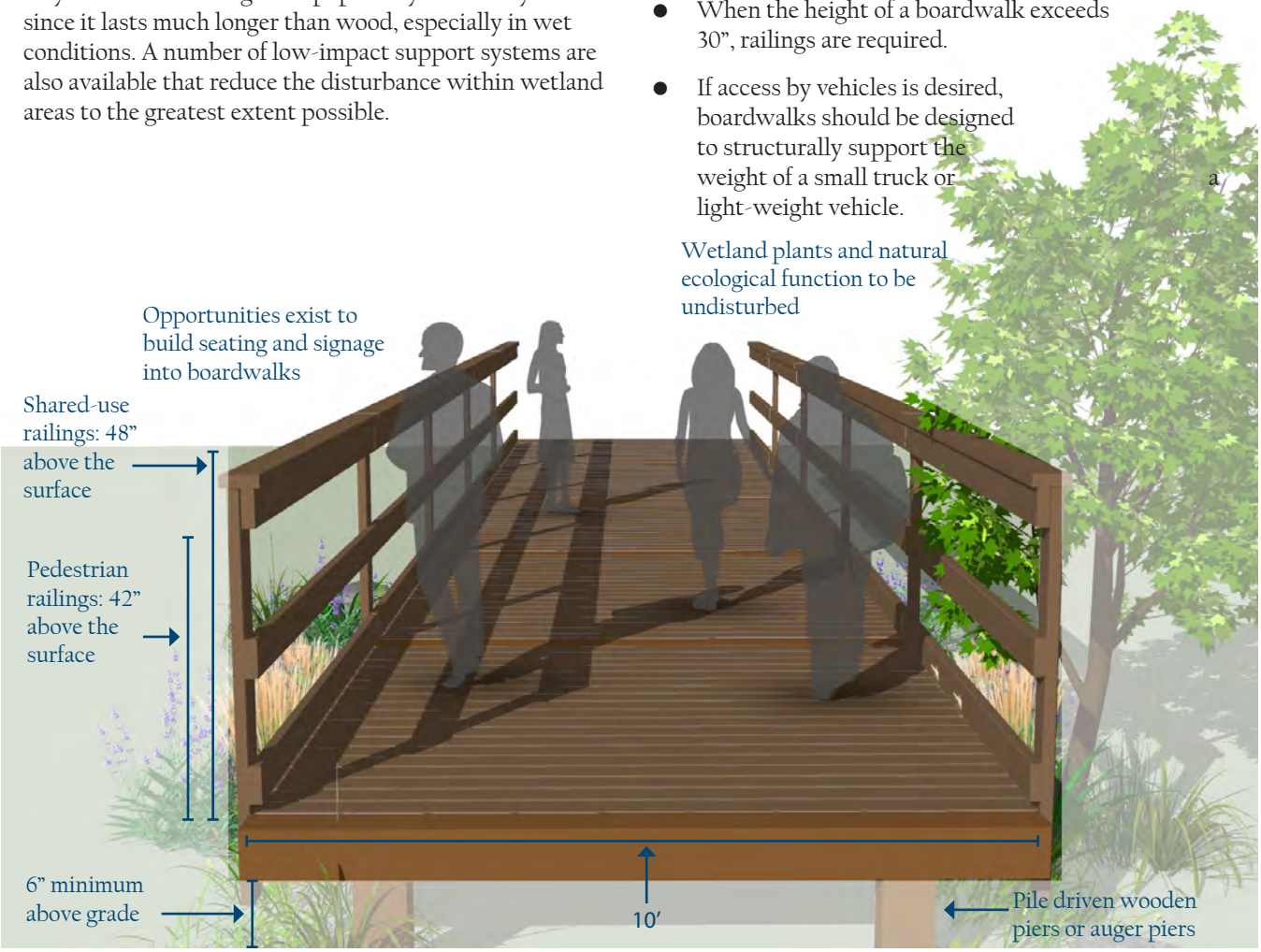
BOARDWALKS

Description

Boardwalks are typically required when crossing wetlands or other poorly drained areas. They are usually constructed of wooden planks or recycled material planks that form the top layer of the boardwalk. The recycled material has gained popularity in recent years since it lasts much longer than wood, especially in wet conditions. A number of low-impact support systems are also available that reduce the disturbance within wetland areas to the greatest extent possible.

Guidance

- Boardwalk width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with average anticipated use and whenever rails are used.
- When the height of a boardwalk exceeds 30", railings are required.
- If access by vehicles is desired, boardwalks should be designed to structurally support the weight of a small truck or light-weight vehicle.[a]



Discussion

In general, building in wetlands is subject to regulations and should be avoided.

The foundation normally consists of wooden posts or auger piers (screw anchors). Screw anchors provide greater support and last much longer.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Wetland Trail Design and Construction.* 2007.

Materials and Maintenance

Decking should be either non-toxic treated wood or recycled plastic. Cable rails are attractive and more visually transparent but may require maintenance to tighten the cables if the trail has snow storage requirements.

SHARED USE PAVED TRAILS ALONG ROADWAYS

Description

Shared use paved trails along roadways, also called Sidepaths, are a type of trails that run adjacent to a street.

Because of operational concerns it is generally preferable to place trails within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the trail.

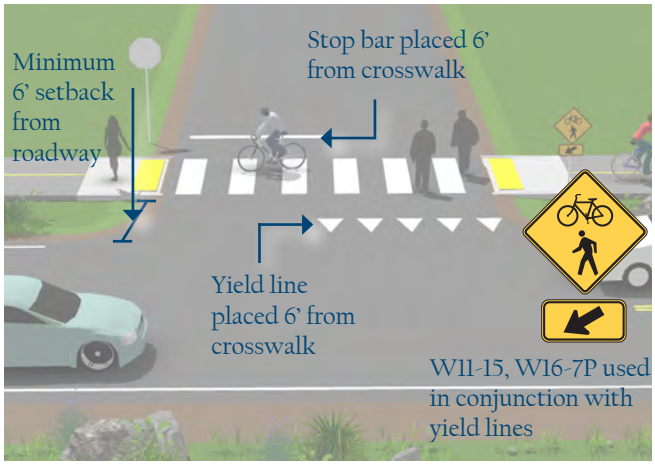
The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings.

In general, there are two approaches to crossings: adjacent crossings and setback crossings, illustrated

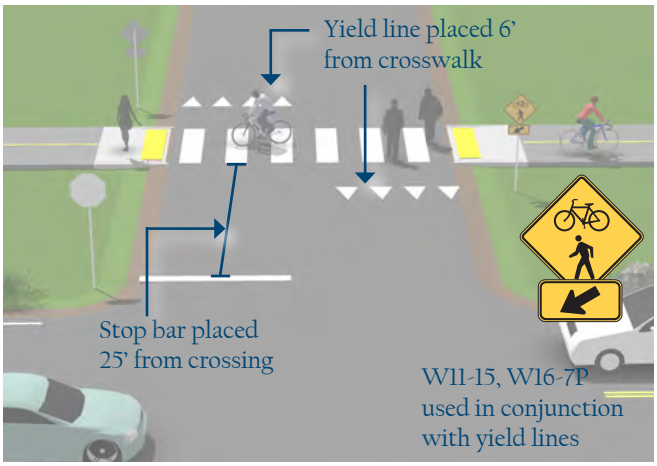
Guidance

- Guidance for sidepaths should follow that for general design practises of shared use paved trails.
- A high number of driveway crossings and intersections create potential conflicts with turning traffic. Consider alternatives to sidepaths on streets with a high frequency of intersections or heavily used driveways.
- Where a sidepath terminates special consideration should be given to transitions so as not to encourage unsafe wrong-way riding by bicyclists.
- Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Crossings may be STOP or YIELD controlled depending on sight lines and bicycle motor vehicle volumes and speeds.

Adjacent Crossing - A separation of 6 feet emphasizes the conspicuity of riders at the approach to the crossing.



Setback Crossing - A set back of 25 feet separates the trail crossing from merging/turning movements that may be competing for a driver's attention.



Discussion

The provision of a shared use paved trail adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities.

To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
NACTO. *Urban Bikeway Design Guide.* See entry on Raised Cycle Tracks. 2012.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

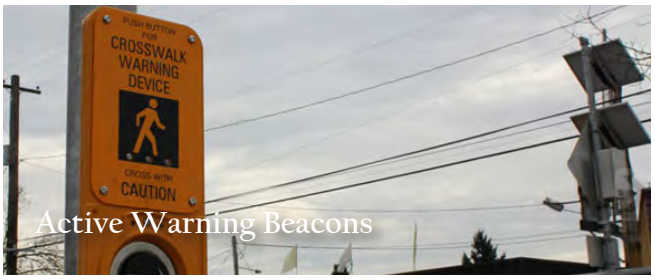
TRAIL/ROADWAY CROSSINGS

At-grade roadway crossings can create potential conflicts between trail users and motorists, however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for trail users. This is evidenced by the thousands of successful facilities around the United States with at-grade crossings. In most cases, at-grade trail crossings can be properly designed to provide a reasonable degree of safety and can meet existing traffic and safety standards. Trail facilities that cater to bicyclists can require additional considerations due to the higher travel speed of bicyclists versus pedestrians.

Consideration must be given to adequate warning distance based on vehicle speeds and line of sight, with the visibility of any signs absolutely critical. Directing the active attention of motorists to roadway signs may require additional alerting devices such as a flashing beacon, roadway striping or changes in pavement texture. Signing for trail users may include a standard "STOP" or "YIELD" sign and pavement markings, possibly combined with other features such as bollards or a bend in the trail to slow bicyclists. Care must be taken not to place too many signs at crossings lest they begin to lose their visual impact.

A number of striping patterns have emerged over the years to delineate trail crossings. A median stripe on the trail approach will help to organize and warn trail users. Crosswalk striping is typically a matter of local and State preference, and may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically yield to crosswalk users, additional measures may be required to increase compliance.


Marked/Unsignalized Crossings



Active Warning Beacons


Route Users to Existing Signals


Hybrid Beacons

Undercrossings


Overcrossings

MARKED/UNSIGNALIZED CROSSINGS

Description

A marked/unsignalized crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, trail traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time.

Guidance

Maximum traffic volumes

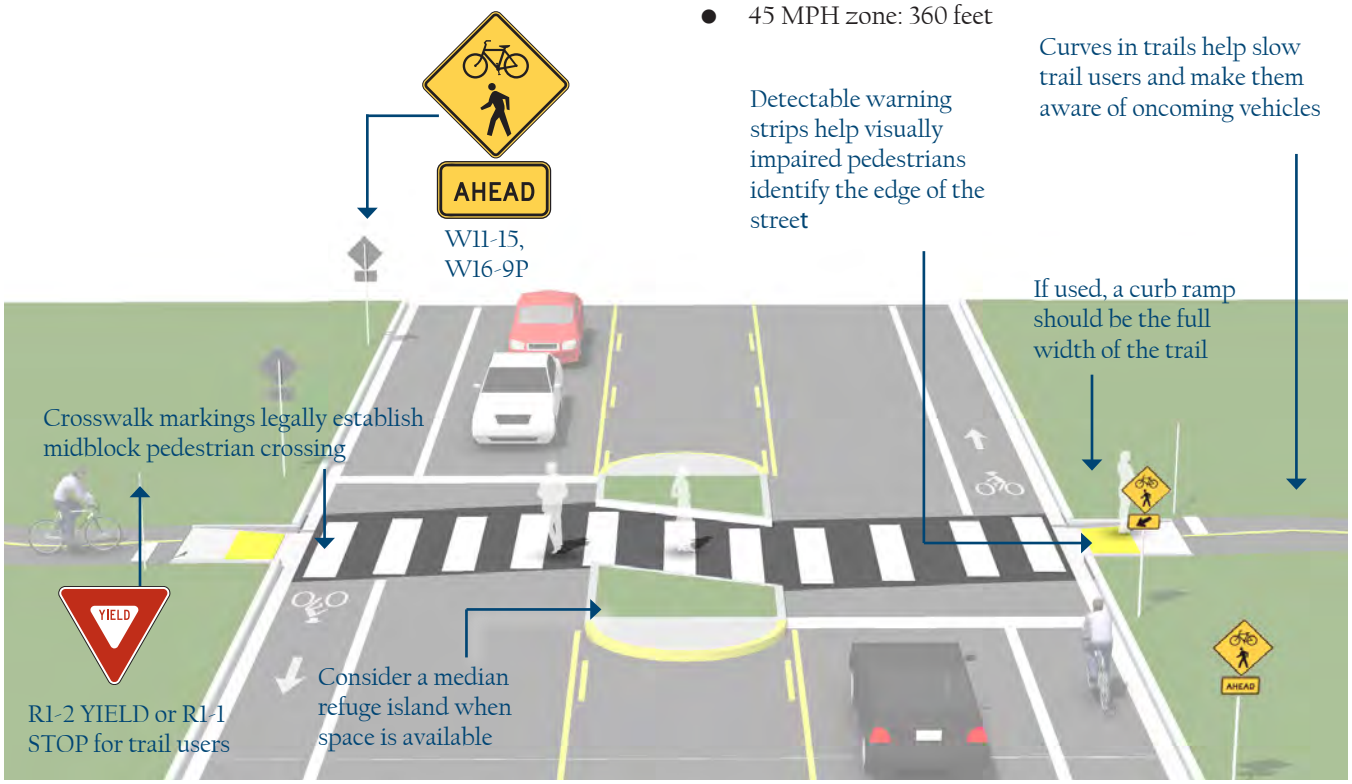
- ≤9,000-12,000 Average Daily Traffic (ADT) volume
- Up to 15,000 ADT on two-lane roads, preferably with a median
- Up to 12,000 ADT on four-lane roads with median

Maximum travel speed

- 35 MPH

Minimum line of sight

- 25 MPH zone: 155 feet
- 35 MPH zone: 250 feet
- 45 MPH zone: 360 feet



Discussion

Unsignalized crossings of multi-lane arterials over 15,000 ADT may be possible with features such as sufficient crossing gaps (more than 60 per hour), median refuges, and/or active warning devices like rectangular rapid flash beacons or in-pavement flashers, and excellent sight distance. For more information see the discussion of active warning beacons.

On roadways with low to moderate traffic volumes (<12,000 ADT) and a need to control traffic speeds, a raised crosswalk may be the most appropriate crossing design to improve pedestrian visibility and safety.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs.

ACTIVE WARNING BEACONS

Description

Enhanced marked crossings are unsignalized crossings with additional treatments designed to increase motor vehicle yielding compliance on multi-lane or high volume roadways.

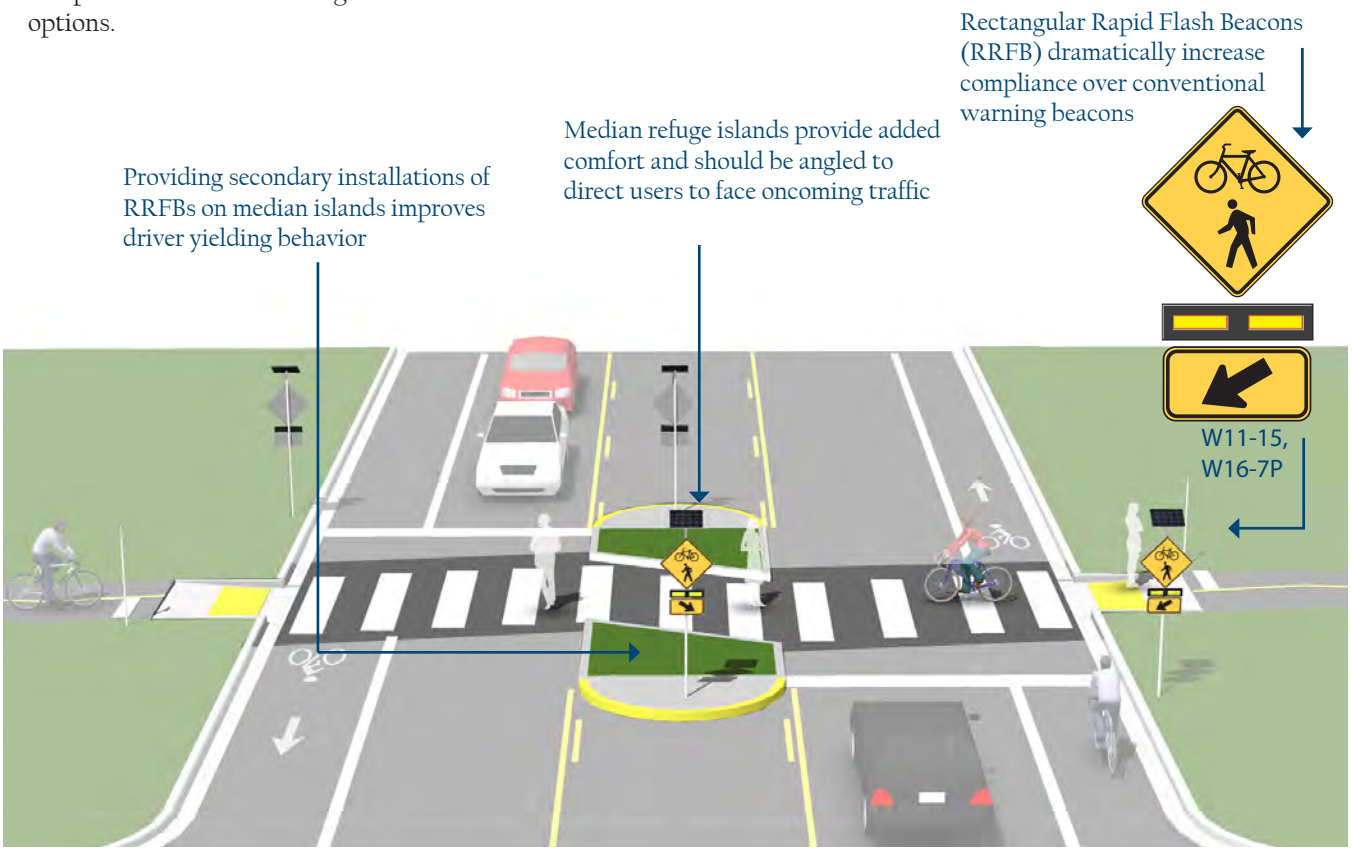
These enhancements include trail user or sensor actuated warning beacons, Rectangular Rapid Flash Beacons (RRFB) shown below, or in-roadway warning lights.

Rectangular rapid flash beacons show the most increased compliance of all the warning beacon enhancement options.

Guidance

Guidance for marked/unsignalized crossings applies.

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Warning beacons shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.



Discussion

An FHWA report presented study results showing of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88%. Additional studies of long term installations show little to no decrease in yielding behavior over time. Additional studies in Oregon reported compliance rates as high as 99% when actuated.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
FHWA. *MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11).* 2008.
FHWA. *Effects of Yellow Rectangular Rapid-Flashing Beacons on Yielding at Multilane Uncontrolled Crosswalks.* 2010.
Alhajri, F., Carlso, K., Foster, N., Georde, D. *A Study on Driver's Compliance to Rectangular Rapid Flashing Beacons.* 2013.

Materials and Maintenance

Locate markings out of wheel tread when possible to minimize wear and maintenance costs. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

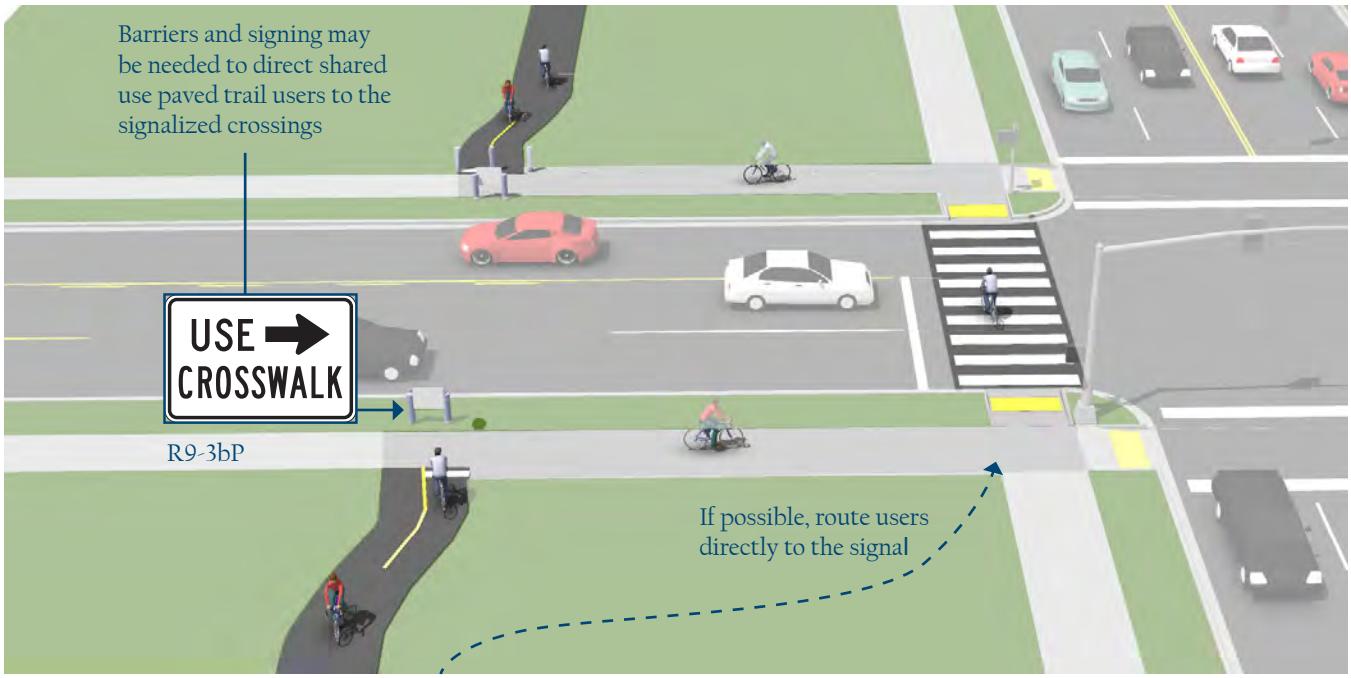
ROUTE USERS TO SIGNALIZED CROSSINGS

Description

Trail crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct trail users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.

Guidance

Trail crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route trail directly to the signal.



Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgement and the context of the location should be taken into account when choosing the appropriate allowable setback. Pedestrians are particularly sensitive to out of direction travel and jaywalking may become prevalent if the distance is too great.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

If a sidewalk is used for crossing access, it should be kept clear of snow and debris and the surface should be level for wheeled users.

PEDESTRIAN HYBRID BEACON CROSSINGS

Description

Pedestrian hybrid beacons provide a high level of comfort for crossing users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

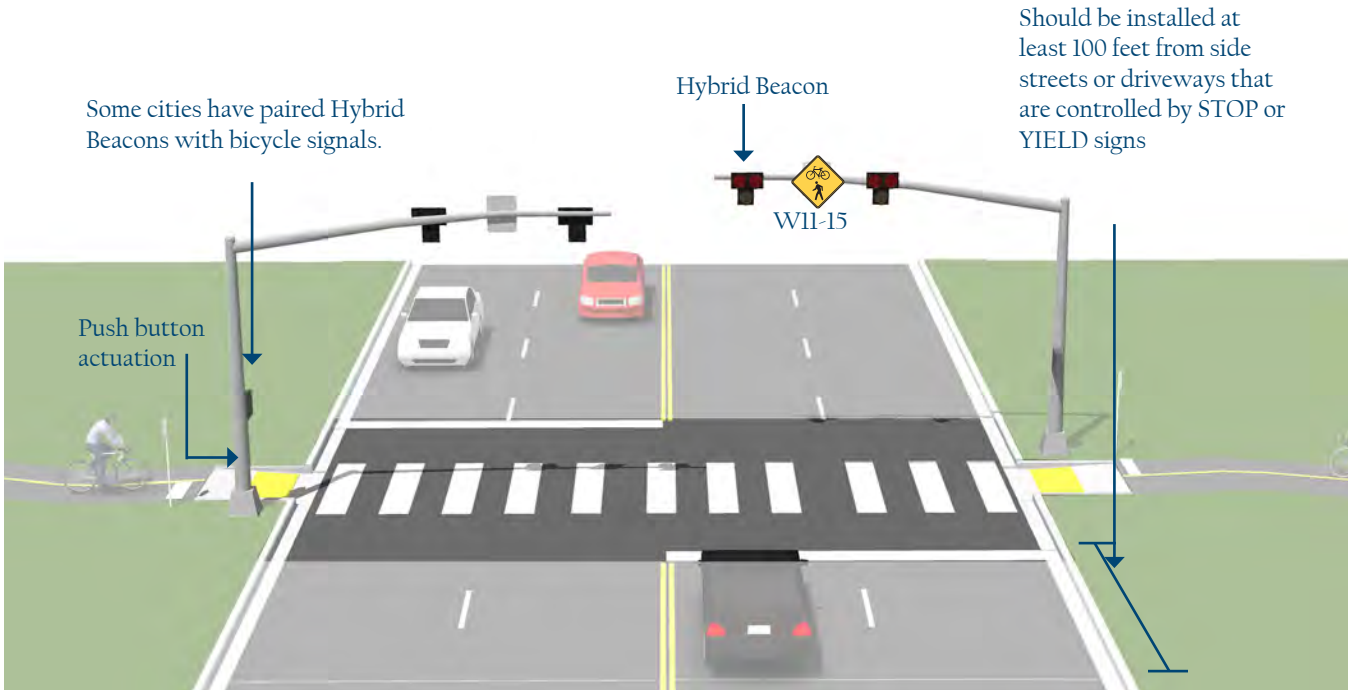
Hybrid beacon installation faces only cross motor vehicle traffic, stays dark when inactive, and uses a unique 'wig-wag' signal phase to indicate activation. Vehicles have the option to proceed after stopping during the final flashing red phase, which can reduce motor vehicle delay when compared to a full signal installation.

Guidance

Hybrid beacons (illustrated here) may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable trail crossings.

FHWA does not allow bicycle signals to be used with Hybrid beacons, though some cities have done so successfully.

To maximize safety when used for bicycle crossings, the flashing 'wig-wag' phase should be very short and occur after the pedestrian signal head has changed to a solid "DON'T WALK" indication as bicyclists can enter an intersection quickly.



Discussion

Shared use paved trail signals are normally activated by push buttons but may also be triggered by embedded loop, infrared, microwave or video detectors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

FULL TRAFFIC SIGNAL CROSSINGS

Description

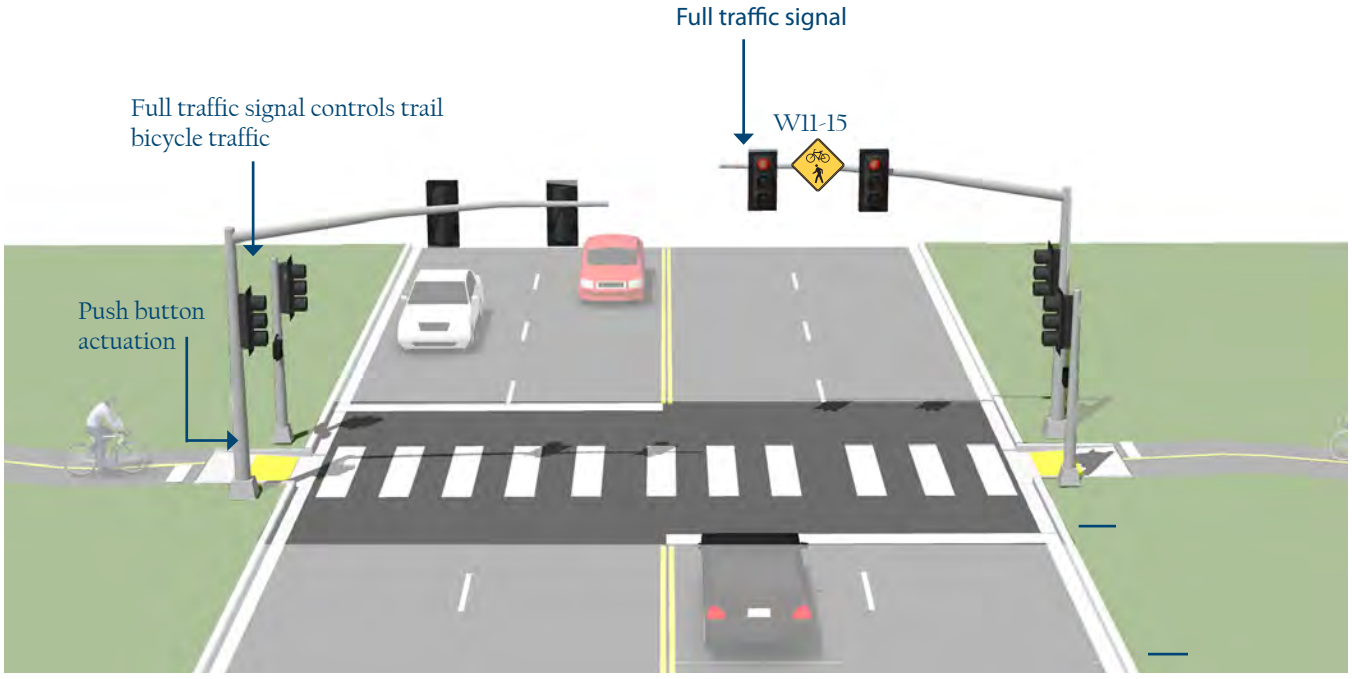
Signalized crossings provide the most protection for crossing trail users through the use of a red-signal indication to stop conflicting motor vehicle traffic.

A full traffic signal installation treats the trail crossing as a conventional 4-way intersection and provides standard red-yellow-green traffic signal heads for all legs of the intersection.

Guidance

Full traffic signal installations must meet MUTCD pedestrian, school or modified warrants. Additional guidance for signalized crossings:

- Located more than 300 feet from an existing signalized intersection
- Roadway travel speeds of 40 MPH and above
- Roadway ADT exceeds 15,000 vehicles



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Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Additional References and Guidelines

FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Traffic signals require routine maintenance. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.

UNDERCROSSINGS

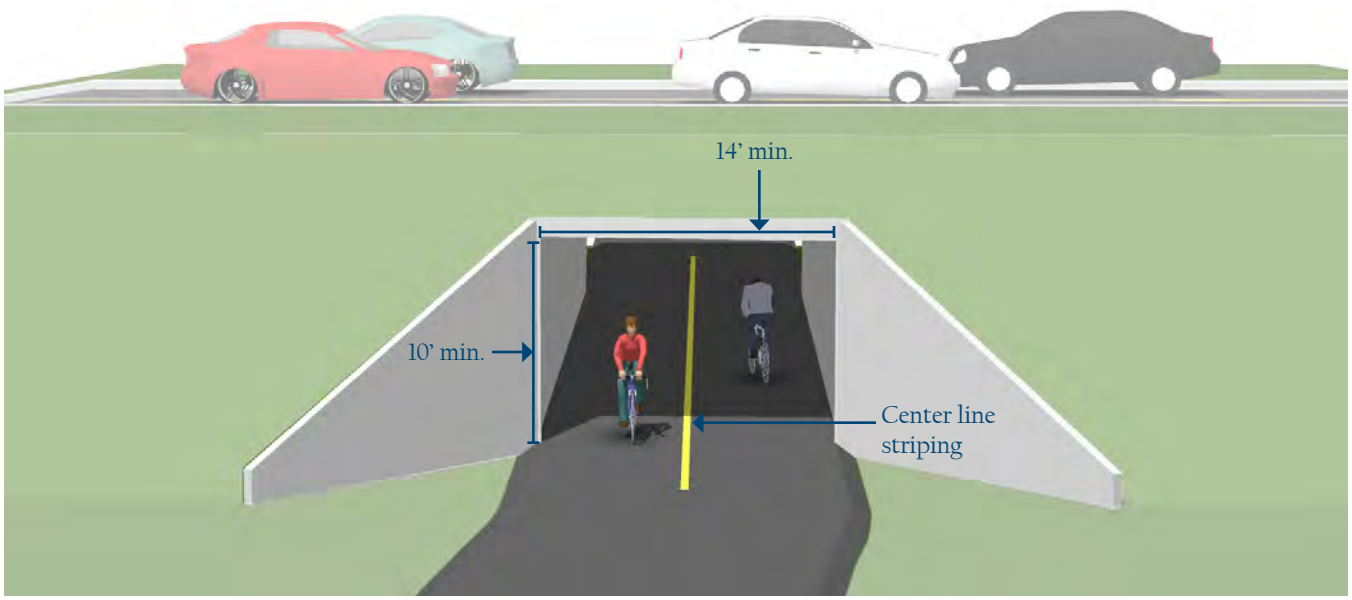
Description

Bicycle/pedestrian undercrossings provide critical non-motorized system links by joining areas separated by barriers such as railroads and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group grade separation may be considered in many types of projects.

Guidance

- 14 foot minimum width, greater widths preferred for lengths over 60 feet.
- 10 foot minimum height.
- The undercrossing should have a centerline stripe even if the rest of the trail does not have one.
- Lighting should be considered during the design process for any undercrossing with high anticipated use or in culverts and tunnels.



Discussion

Safety is a major concern with undercrossings. Shared use paved trail users may be temporarily out of sight from public view and may experience poor visibility themselves. To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency cell phones at each end and completely visible for its entire length from end to end.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

14 foot width allows for maintenance vehicle access.

Potential problems include conflicts with utilities, drainage, flood control and vandalism.

OVERCROSSINGS

Description

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, waterways or major transportation corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group grade separation may be considered in many types of projects.

Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below versus a minimum elevation differential of around 12 feet for an undercrossing. This results in potentially greater elevation differences and much longer ramps for bicycles and pedestrians to negotiate.

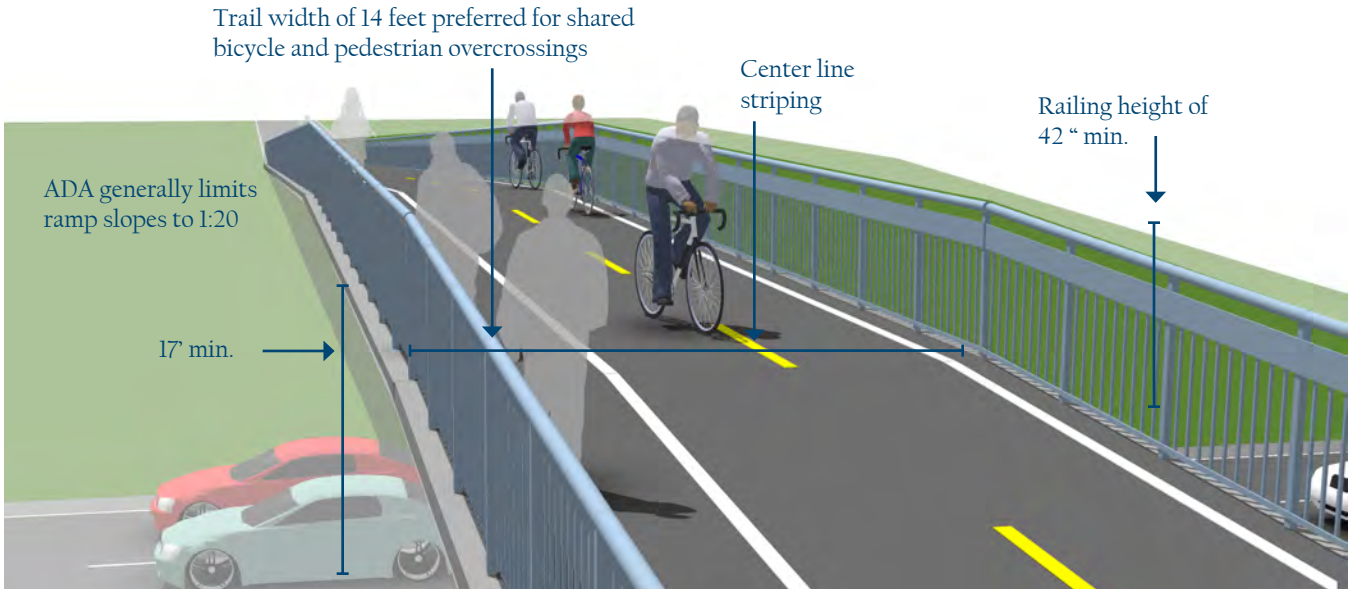
Guidance

8 foot minimum width, 14 feet preferred. If overcrossing has any scenic vistas additional width should be provided to allow for stopping. A separate 5 foot pedestrian area may be provided for facilities with high bicycle and pedestrian use.

10 foot headroom on overcrossing; clearance below will vary depending on feature being crossed.

Roadway:	17 feet
Freeway:	18.5 feet
Heavy Rail Line:	23 feet

The overcrossing should have a centerline stripe even if the rest of the trail does not have one.



Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet.

Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

Potential issues with vandalism.

Overcrossings can be more difficult to clear of snow than undercrossings.

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DESIGN GUIDELINES:
BICYLE FACILITY DESIGN

SHARED ROADWAYS

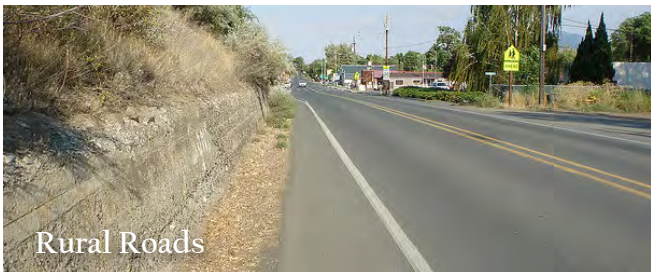
On shared roadways, bicyclists and motor vehicles use the same roadway space. Sharing may include side-by-side operation, or single lane in-line operation depending on the configuration.

These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

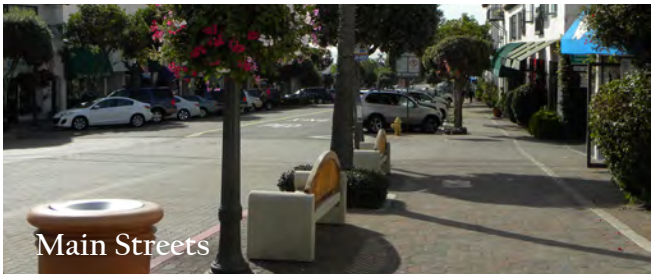
Bicycle Boulevards

Bicycle boulevards are a special class of shared roadways designed for a broad spectrum of bicyclists. They are low-volume local streets where motorists and bicyclists share the same travel lane. Treatments for bicycle boulevards are selected as necessary to create appropriate automobile volumes and speeds, and to provide safe crossing opportunities of busy streets.


Rural Roads

Signed Shared Roadway


Marked Shared Roadway


Main Streets


Bicycle Boulevards

RURAL ROADS

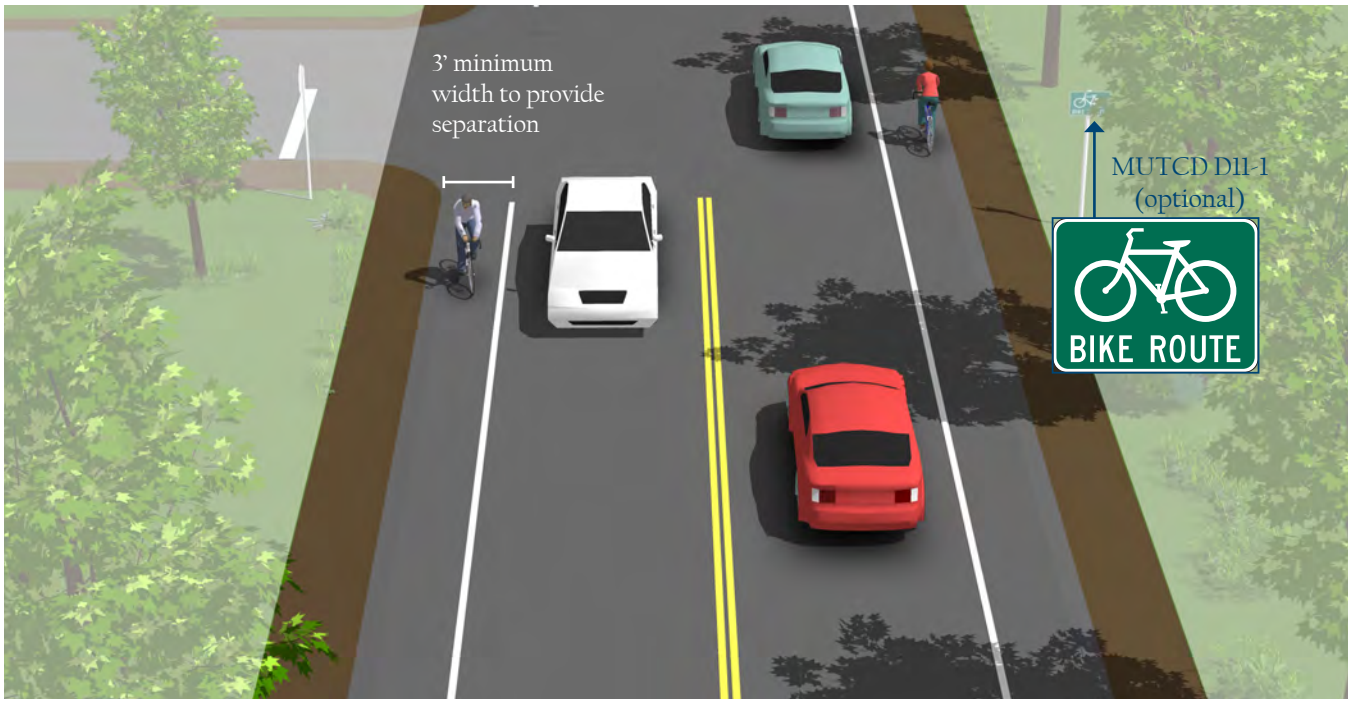
Description

Rural roads are often the primary routes connecting communities. These roads pass through less-dense areas, and are usually paved roadways with striped shoulders, but no curb and gutter. Sidewalk provision on rural roads is uncommon.

Shoulders wide enough for bicycle travel are the preferred type of bicycle facility on rural roads. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway.

Guidance

- If 4 feet or more is available for bicycle travel, the full bike lane treatment of signs, legends, and an 6" bike lane line would be provided.
- If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.
- Rumble strips are not recommended on shoulders used by bicyclists unless there is a minimum 4 foot clear path. 12 foot gaps every 40-60 feet should be provided to allow access as needed.



Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a marked shared roadway in these locations.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

SIGNED SHARED ROADWAY

Description

Signed shared roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

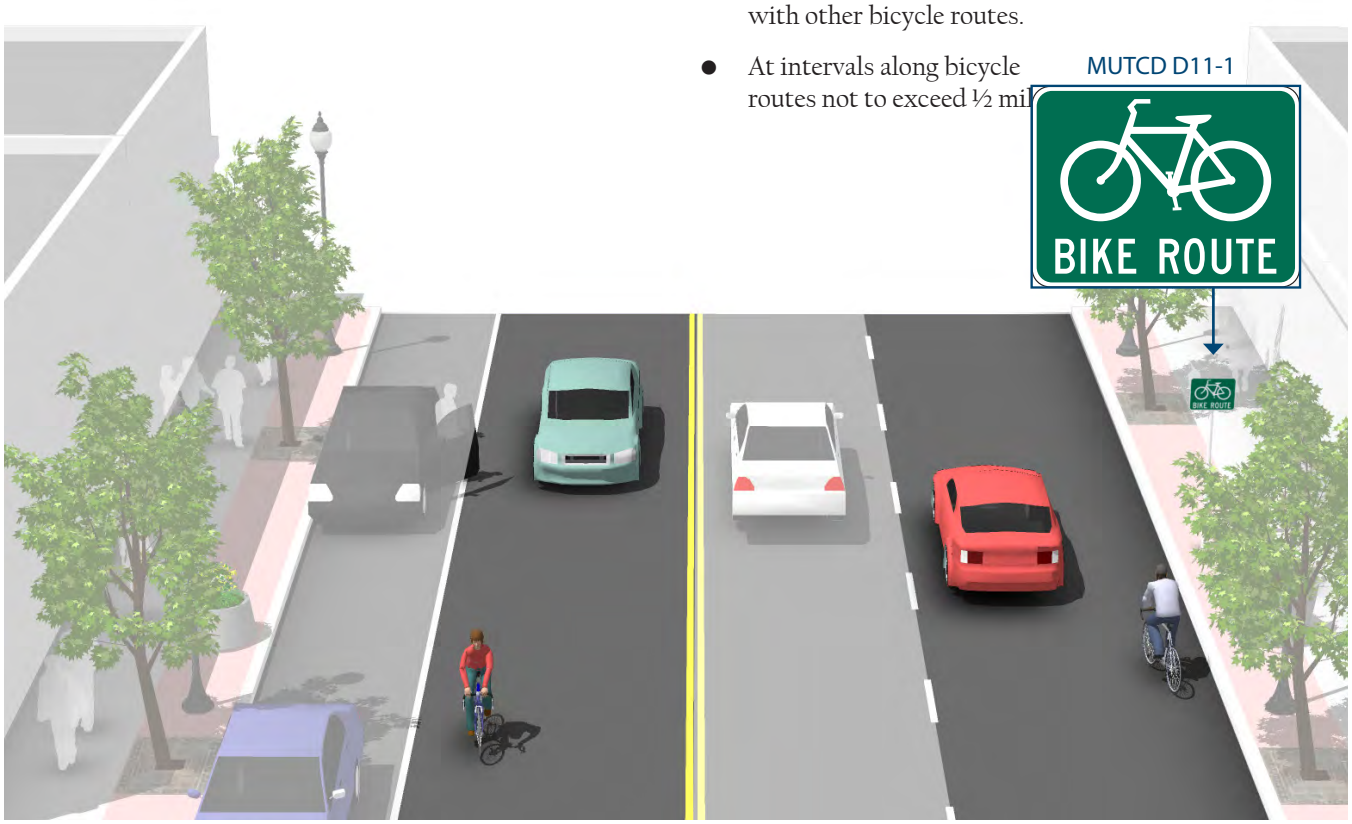
Guidance

Lane width varies depending on roadway configuration.

Bike route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:

- Beginning or end of Bicycle Route.
- At major changes in direction or at intersections with other bicycle routes.
- At intervals along bicycle routes not to exceed ½ mi

MUTCD D11-1



Discussion

Signed Shared Roadways serve either to provide continuity with other bicycle facilities (usually bike lanes) or to designate preferred routes through high-demand corridors.

This configuration differs from a neighborhood greenway due to a lack of traffic calming, wayfinding, pavement markings and other enhancements designed to provide a higher level of comfort for a broad spectrum of users.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

MARKED SHARED ROADWAY

Description

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.

In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles.

In all conditions, SLMs should be placed outside of the door zone of parked cars.

Guidance

- May be used on streets with a speed limit of 35 mph or under. Lower than 30 mph speed limit preferred.
- In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.
- Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present, 4 feet from edge of curb with no parking. If parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.

Regular Lane Adjacent to Parking

Wide Lane without Parking

Discussion

If collector or arterial, this should not be a substitute for dedicated bicycle facilities if space is available.

Bike Lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated bike lanes, or to designate bicycle detection at signalized intersections. (MUTCD 9C.07)

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

MAIN STREETS

Description

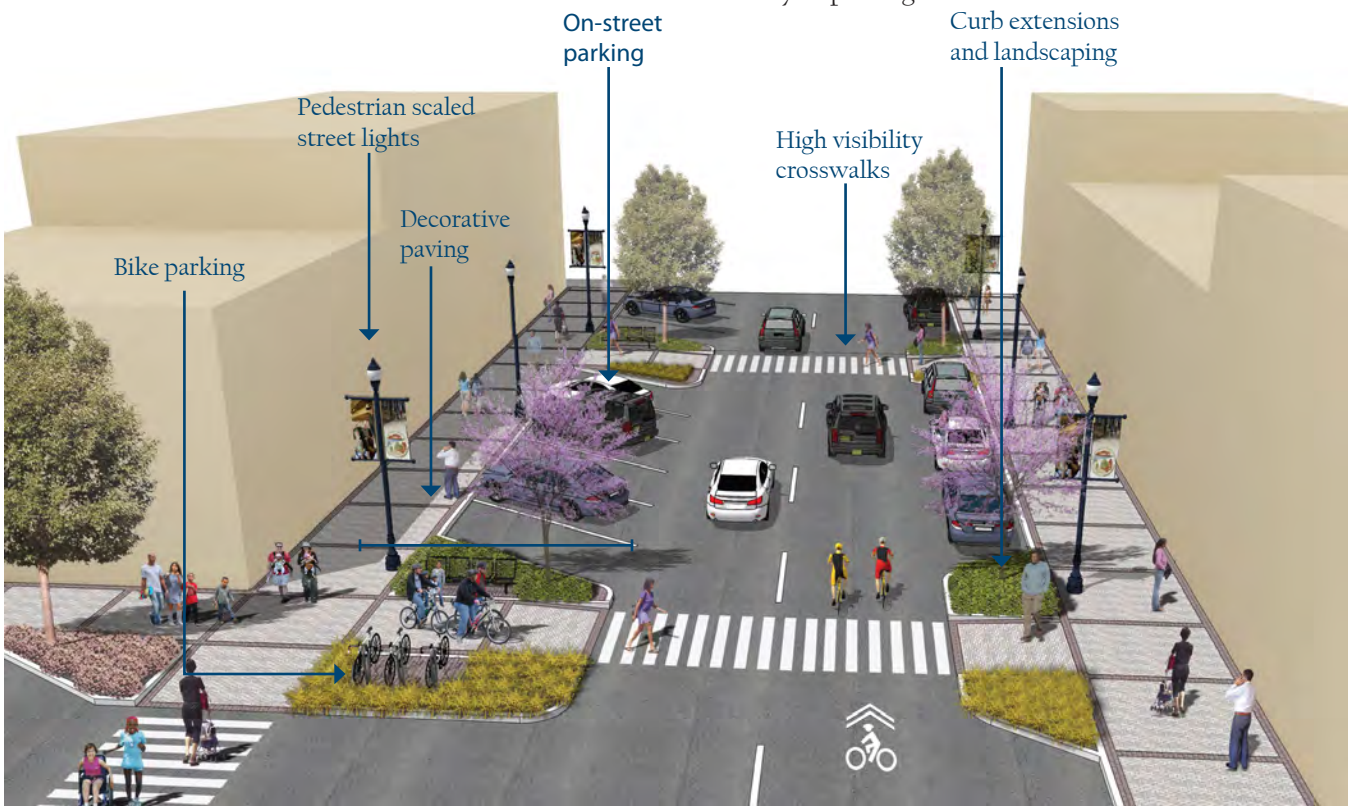
Inviting, walkable streets form the historic and cultural core of many communities. These streets are the primary streets through the middle of community "downtowns," and they serve many uses as a commercial hub, social space and transportation corridor.

Main streets should prioritize the needs of pedestrians through the urban form of land uses, the provision of on street parking and the calming of traffic to make street crossing opportunities frequent, safe and comfortable.

Guidance

Main Streets have a variety of design characteristics in different communities, but they often include the following key components:

- Wide sidewalks
- Lighting and furnishings
- Parking between the sidewalk and lanes of travel
- Curb extensions
- Landscaping
- Decorative pavers
- High visibility crosswalks
- Bicycle parking



Discussion

If the main street area is configured as a couplet, these design elements should extend, at a minimum, to both ends of the couplet, and on both streets.

Other streets within a main street district can also benefit from improvements. If connecting streets have commercial uses or functions as a secondary gateway to the main street, they should at a minimum, have wide sidewalks, pedestrian lighting and street trees.

Additional References and Guidelines

ITE. *Designing Walkable Urban Thoroughfares.* 2010.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Street Design Guide.* 2013.

Materials and Maintenance

Placing Shared Lane Markings between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

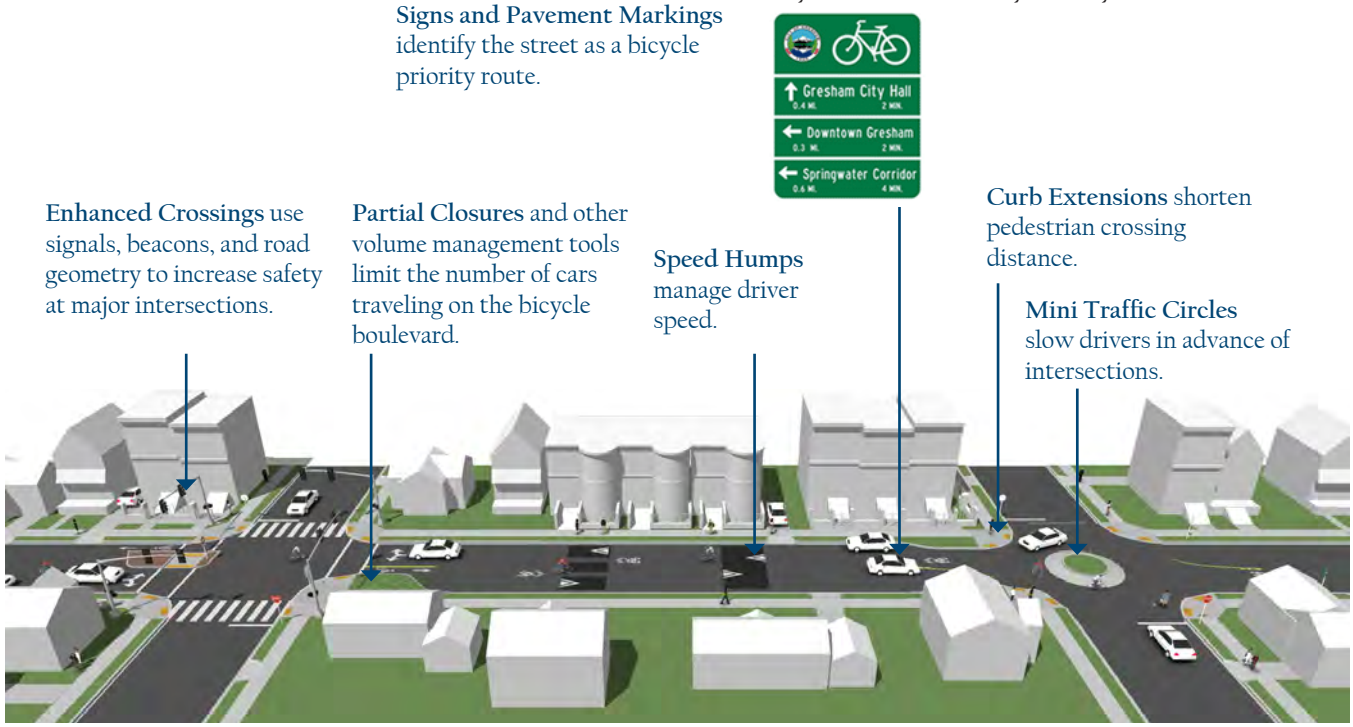
BICYCLE BOULEVARD

Description

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

Guidance

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day in most communities.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.



Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

Traffic calming can deter motorists from driving on a street. Anticipate and monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis. For more information see the *Traffic Calming* section in this guide.

Additional References and Guidelines

Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
BikeSafe. *Bicycle countermeasure selection system.*
Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.

Materials and Maintenance

Vegetation should be regularly trimmed to maintain visibility and attractiveness.

SEPARATED BIKEWAYS

Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.


Shoulder Bikeways


Bicycle Lanes


Buffered Bike Lanes


Cycle Tracks

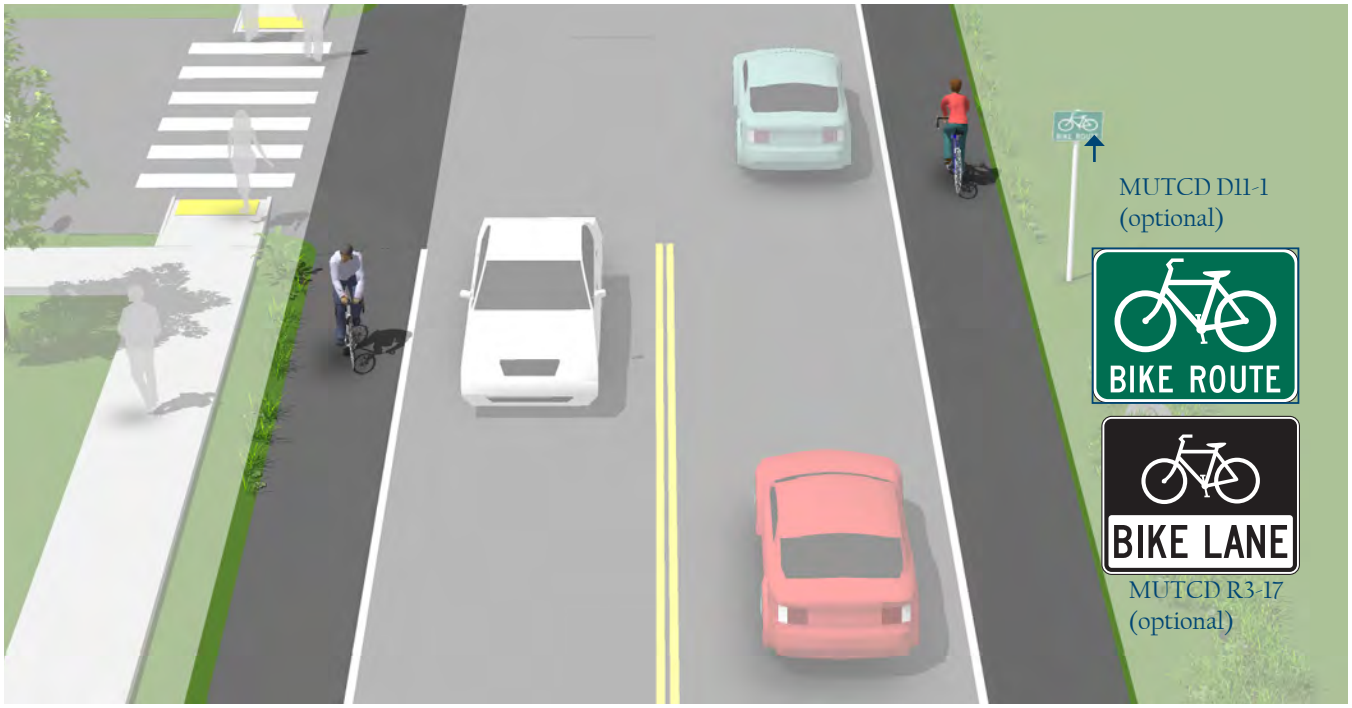
SHOULDER BIKEWAYS

Description

Typically found in less-dense areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. Shoulder bikeways should be considered a temporary treatment, with full bike lanes planned for construction when the roadway is widened or completed with curb and gutter. This type of treatment is not typical in urban areas and should only be used where constraints exist.

Guidance

- If 4 feet or more is available for bicycle travel, the full bike lane treatment of signs, legends, and an 8" bike lane line would be provided.
- If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.
- Rumble strips are not recommended on shoulders used by bicyclists unless there is a minimum 4 foot clear path. 12 foot gaps every 40-60 feet should be provided to allow access as needed.



Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a marked shared roadway in these locations.

Where feasible, roadway widening should be performed with pavement resurfacing jobs.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

BICYCLE LANE

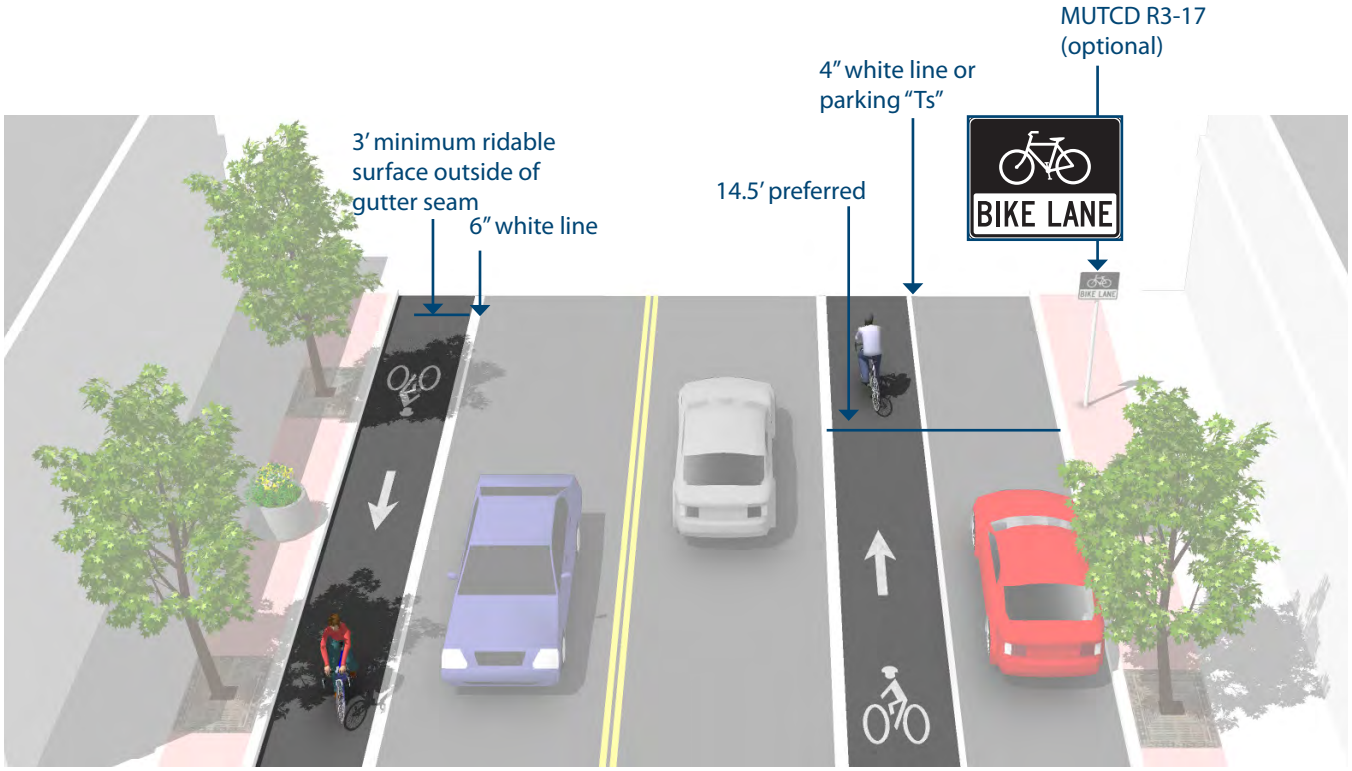
Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.

Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum).
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider buffered bike lanes when further separation is desired.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

BUFFERED BIKE LANE

Description

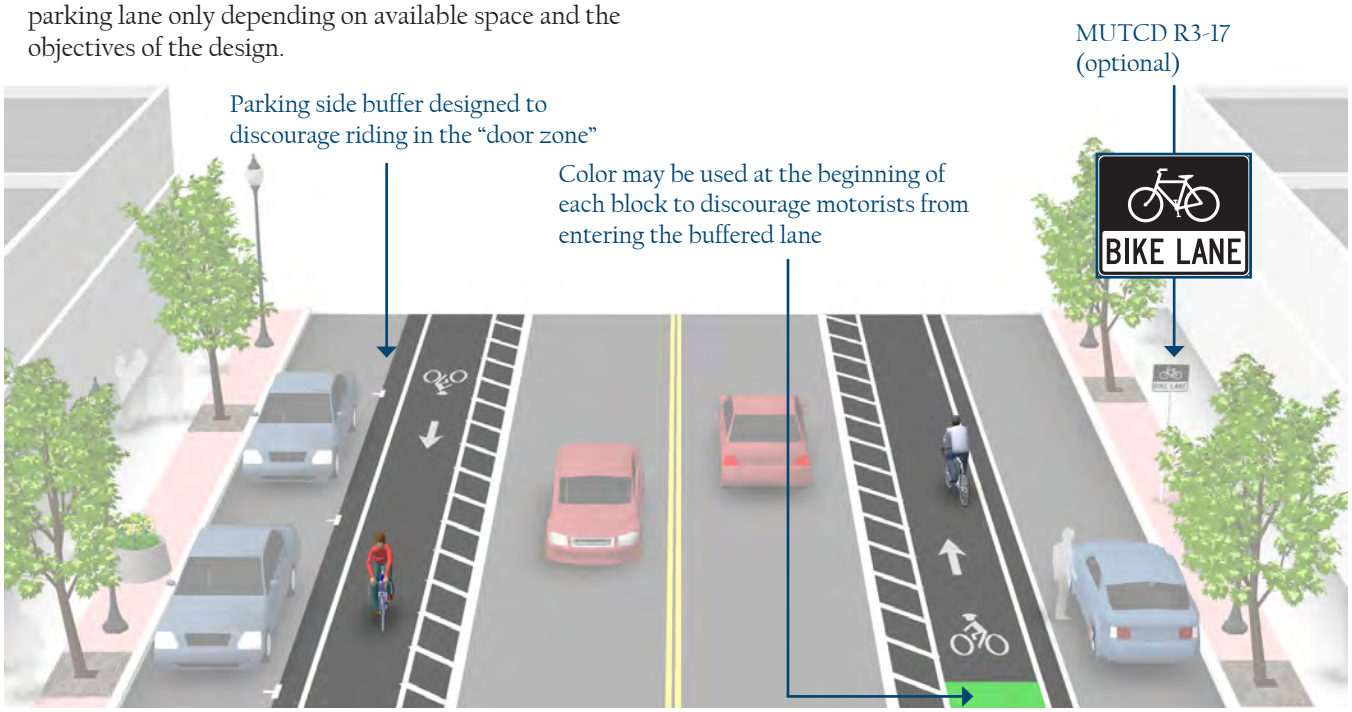
Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes follow general guidance for buffered preferential vehicle lanes as per MUTCD guidelines (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane and/or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

Buffered bike lanes can buffer the travel lane only, or parking lane only depending on available space and the objectives of the design.

Guidance

- The minimum bicycle travel area is 5 feet wide.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.



Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices. (3D-01).* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

CYCLE TRACKS

Guidance

Cycle tracks should ideally be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles.

One-Way Cycle Tracks

- 7 foot recommended minimum to allow passing. 5 foot minimum width in constrained locations.

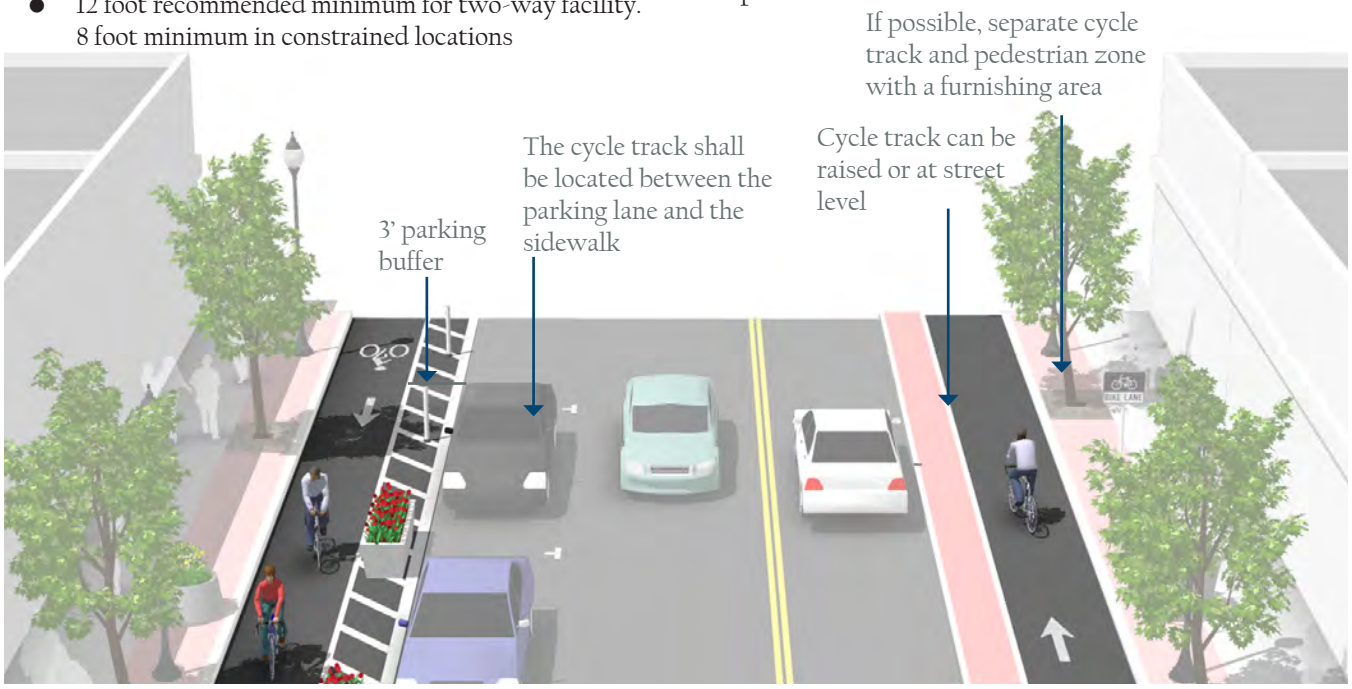
Two-Way Cycle Tracks

- Cycle tracks located on one-way streets have fewer potential conflict areas than those on two-way streets.
- 12 foot recommended minimum for two-way facility. 8 foot minimum in constrained locations

Description

A cycle track is an exclusive bike facility that combines the user experience of a separated trail with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic and distinct from the sidewalk. Cycle tracks have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks.

Raised cycle tracks may be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk to separate the cycle track from the pedestrian area.



Discussion

Special consideration should be given at transit stops to manage bicycle and pedestrian interactions. Driveways and minor street crossings are unique challenges to cycle track design. Parking should be prohibited within 30 feet of the intersection to improve visibility. Color, yield markings and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic. If configured as a raised cycle track, the crossing should be raised so that the sidewalk and cycle track maintain their elevation through the crossing.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

In cities with winter climates, barrier separated and raised cycle tracks may require special equipment for snow removal.

SEPARATED BIKEWAYS AT INTERSECTIONS

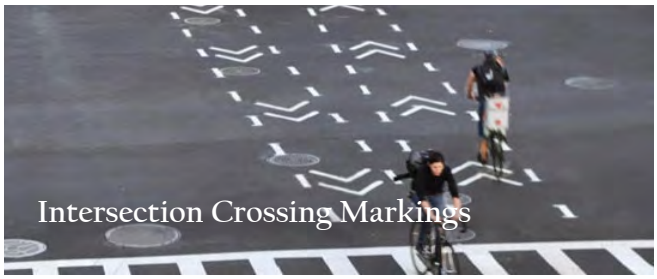
Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.


Bike Boxes


Bike Lanes at Right Turn Only Lanes


Colored Bike Lanes in Conflict Areas


Intersection Crossing Markings


Two Stage Turn Boxes


Single Lane Modern Roundabouts

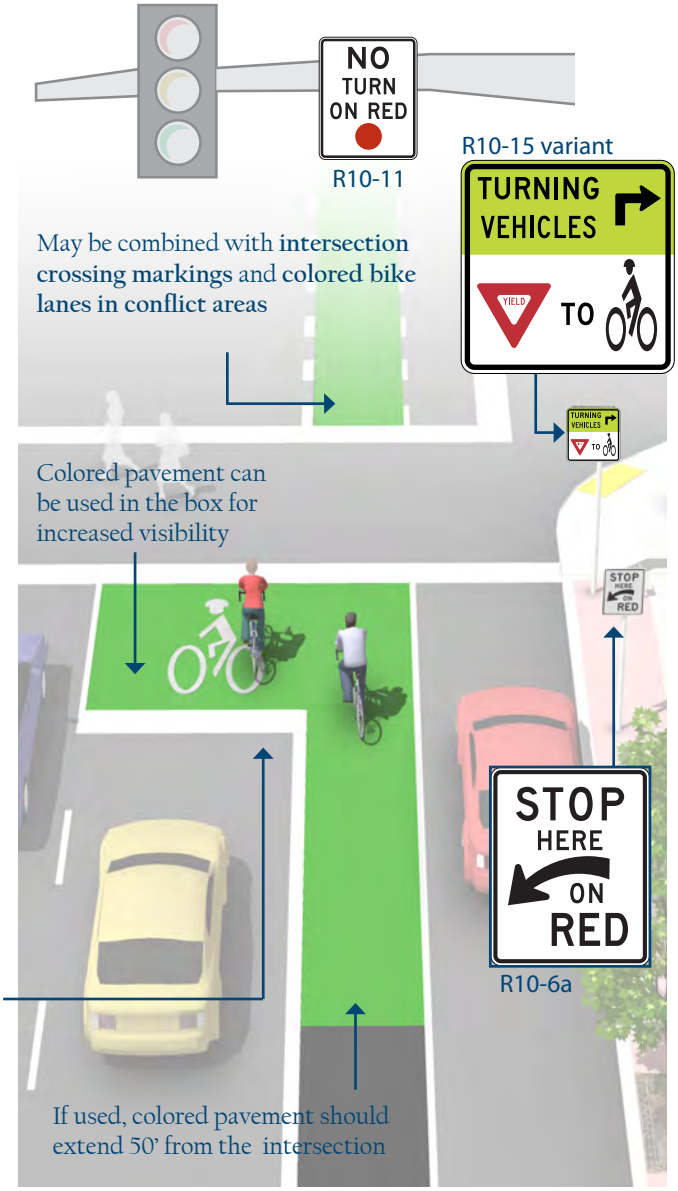
BIKE BOX

Description

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

Guidance

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed overhead to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.



Discussion

Bike boxes are considered experimental by the FHWA.

Bike boxes should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles. Bike boxes should be used in locations that have a large volume of bicyclists and are best utilized in central areas where traffic is usually moving more slowly. Prohibiting right turns on red improves safety for bicyclists yet does not significantly impede motor vehicle travel.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.
FHWA. Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. 2011.

Materials and Maintenance

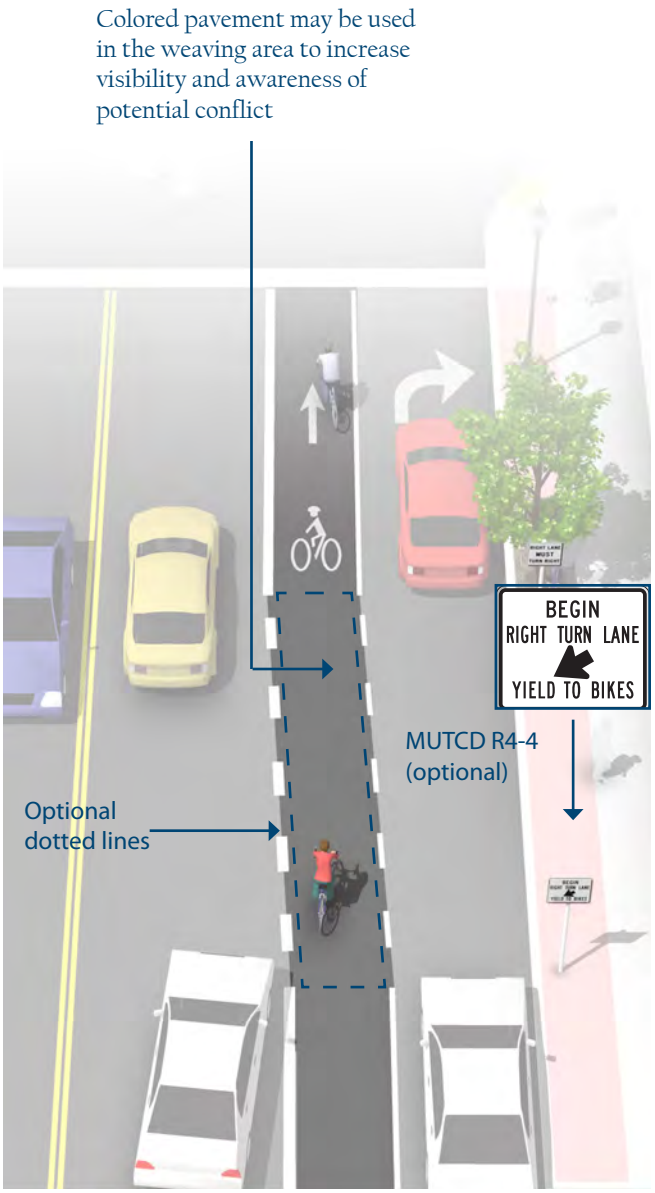
Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

BIKE LANES AT RIGHT TURN ONLY LANES

Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a shared bike lane/turn lane.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.



Guidance

At auxiliary right turn only lanes (add lane):

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored conflict areas to promote visibility of the mixing zone.

Where a through lane becomes a right turn only lane:

- Do not define a dotted line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Shared lane markings may be used to indicate shared use of the lane in the merging zone.

Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see shared bike lane/turn lane, bicycle signals, and colored bike facilities.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

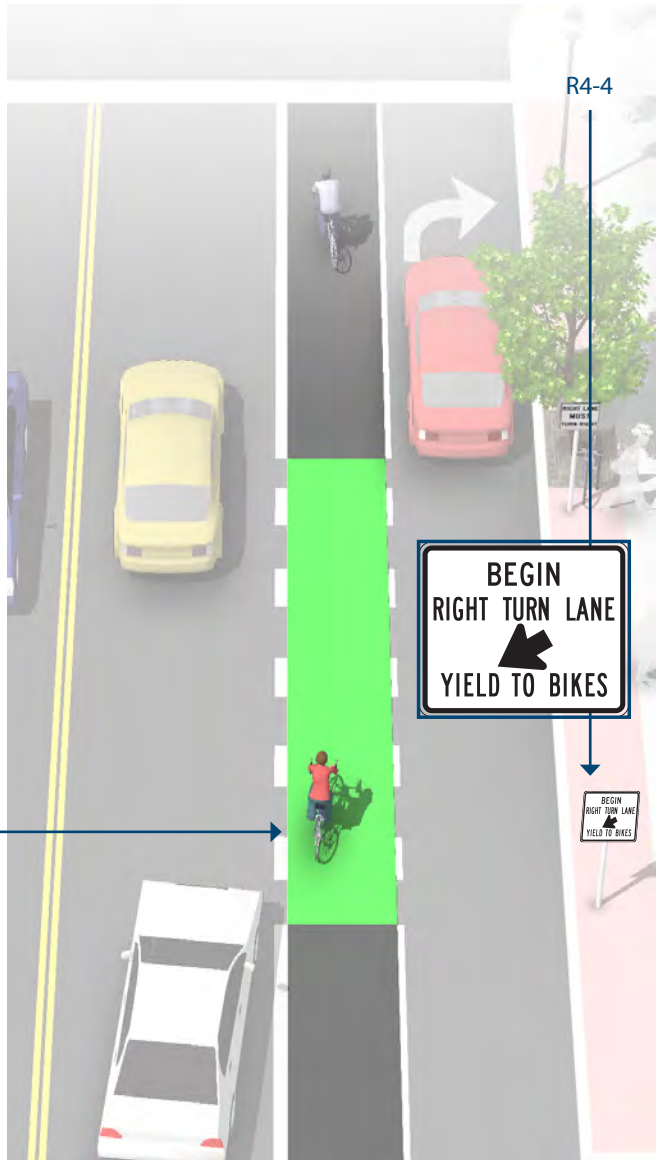
COLORED BIKE LANES IN CONFLICT AREAS

Description

Colored pavement within a bicycle lane increases the visibility of the facility and reinforces priority of bicyclists in conflict areas.

Guidance

- Green colored pavement was given interim approval by the Federal Highways Administration in March 2011. See interim approval for specific color standards.
- The colored surface should be skid resistant and retro-reflective.
- A "Yield to Bikes" sign should be used at intersections or driveway crossings to reinforce that bicyclists have the right-of-way in colored bike lane areas.



Discussion

Evaluations performed in Portland, OR, St. Petersburg, FL and Austin, TX found that significantly more motorists yielded to bicyclists and slowed or stopped before entering the conflict area after the application of the colored pavement when compared with an uncolored treatment.

Additional References and Guidelines

FHWA. Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. 2011.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

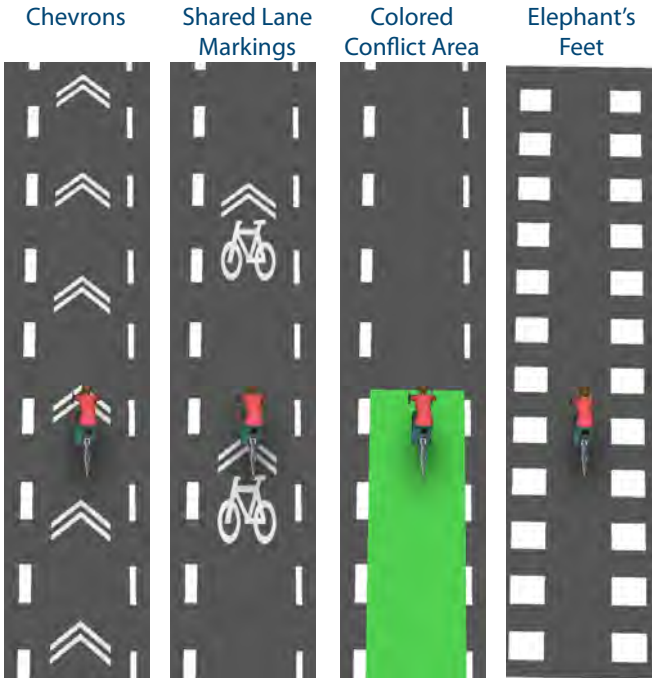
INTERSECTION CROSSING MARKINGS

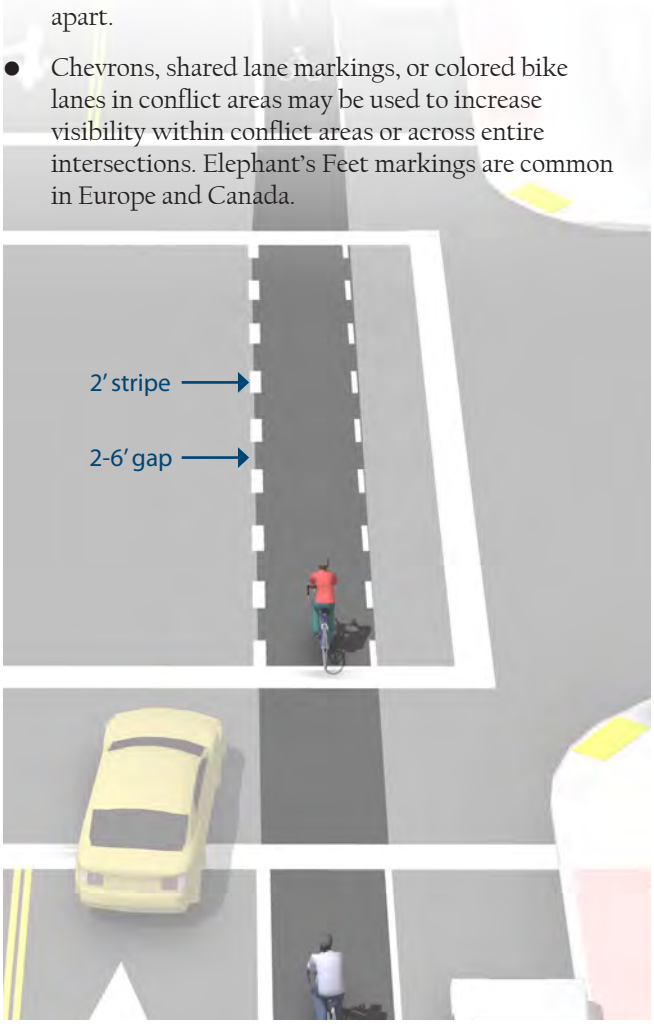
Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Guidance

- See MUTCD Section 3B.08: "dotted line extensions"
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dotted lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, or colored bike lanes in conflict areas may be used to increase visibility within conflict areas or across entire intersections. Elephant's Feet markings are common in Europe and Canada.





Discussion

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices. (3A.06).* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.

TWO-STAGE TURN BOXES

Description

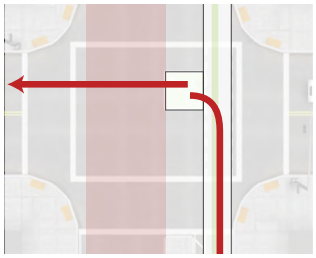
Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side cycle track or bike lane.

On right side cycle tracks, bicyclists are often unable to merge into traffic to turn left due to physical separation, making the provision of two-stage left turn boxes critical. Design guidance for two-stage turns apply to both bike lanes and cycle tracks.

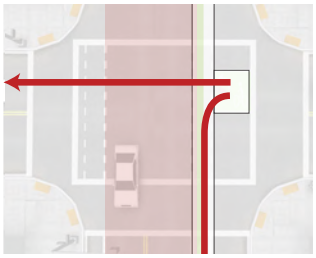
Guidance

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or cycle track buffer area. It could also be placed with set back pedestrian crossing shadowed by sidewalk curb line.
- 6' minimum depth of bicycle storage area
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A "No Turn on Red" (MUTCD R10-11) sign may be installed on the cross street to prevent vehicles from entering the turn box.

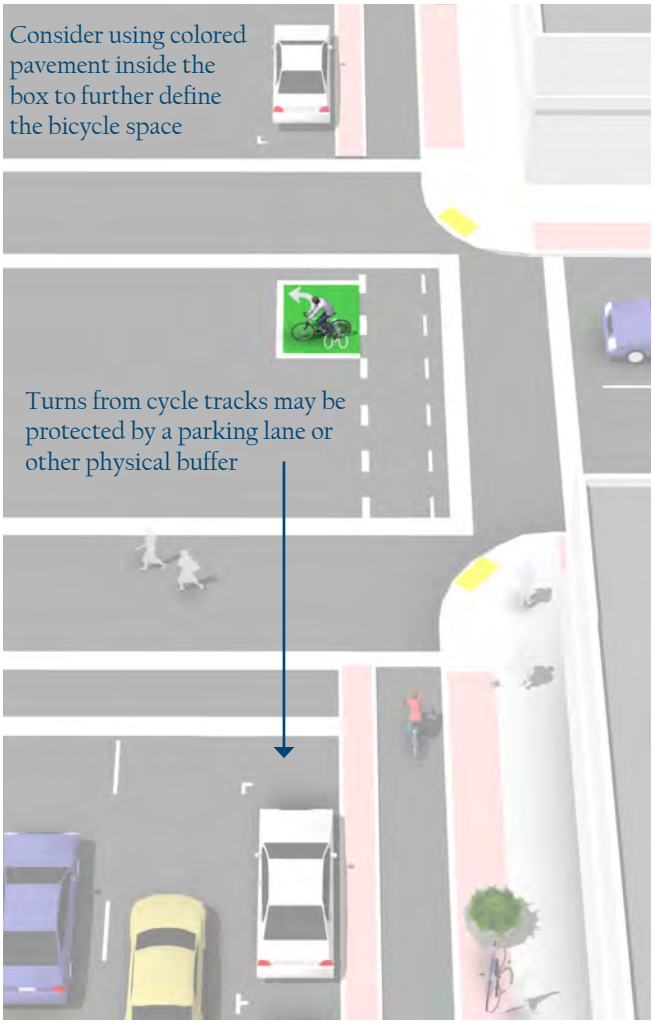
Cycle track turn box protected by physical buffer:



Bike lane turn box protected by parking lane:



Turns from a bicycle lane may be protected by an adjacent parking lane or crosswalk setback space



Discussion

Two-Stage Turn boxes are considered experimental by FHWA.

While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through street, followed by one for the cross street) before proceeding.

Additional References and Guidelines

NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates.

BICYCLISTS AT SINGLE LANE MODERN ROUNDABOUTS

Description

Roundabouts are circular intersection designed with yield control for all entering traffic, channelized approaches and geometry to induce desirable speeds. They are used as an alternative to intersection signalization.

Other circulatory intersection designs exist but they function differently than the modern roundabout. These include:

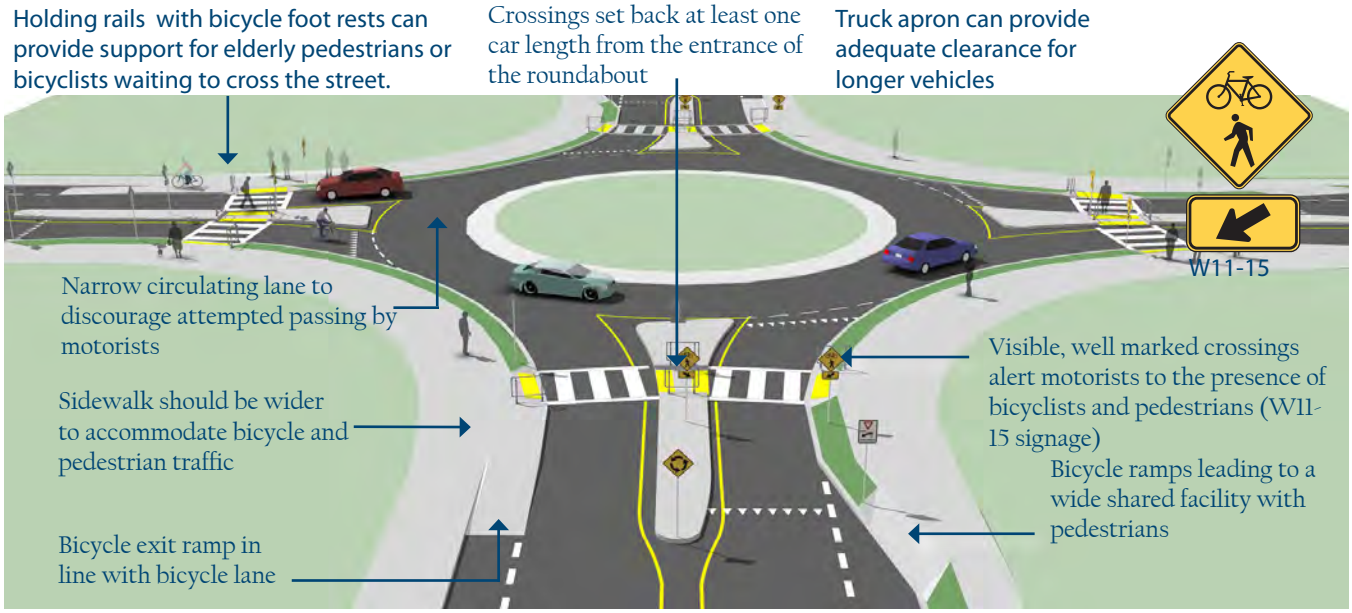
Traffic circles (also known as rotaries) are old style circular intersections used in some cities in the US where traffic signals or stop signs are used to control one or more entry.

Neighborhood Traffic Circles are small-sized circular intersections of local streets. They may be uncontrolled or stop controlled, and do not channelize entry.

Guidelines

It is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

- 25 mph maximum circulating design speed.
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to "take the lane."
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.



Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

On bicycle routes a roundabout or neighborhood traffic circle is preferable to stop control as bicyclists do not like to lose their momentum due to physical effort required. At intersections of shared use paved trails, pedestrian and bicycle only roundabouts are an excellent form of non-motorized user traffic control.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
TRB. *NCHRP 672 Roundabouts: An Informational Guide.* 2010.
TRB. *NCHRP Report 572 Roundabouts in the United States.* 2007.
Hourdos, John et al. *Investigation of Pedestrian/Bicyclist Risk in Minnesota Roundabout Crossings.* 2012. TRB. *NCHRP 674 Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities*. 2011.

Materials and Maintenance

Signage and striping require routine maintenance.

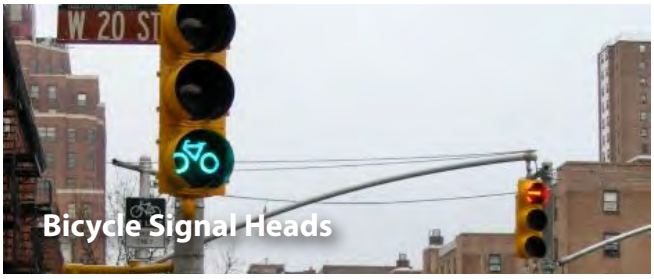
BIKEWAY SIGNALIZATION

Bicycle signals and beacons facilitate bicyclist crossings of roadways. Bicycle signals make crossing intersections safer for bicyclists by clarifying when to enter an intersection and by restricting conflicting vehicle movements. Bicycle signals are traditional three lens signal heads with green, yellow and red bicycle stenciled lenses that can be employed at standard signalized intersections. Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Push buttons, signage, and pavement markings may be used to supplement these facilities for both bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, Average Daily Traffic (ADT), anticipated bicycle crossing traffic, and the configuration of planned or existing bicycle facilities. Signals may be necessary as part of the construction of a protected bicycle facility such as a cycle track with potential turning conflicts, or to decrease vehicle or pedestrian conflicts at major crossings. An intersection with bicycle signals may reduce stress and delays for a crossing bicyclist, and discourage illegal and unsafe crossing maneuvers.


Bicycle Detection and Actuation


Hybrid Beacons (HAWK)



Bicycle Signal Heads

BICYCLE DETECTION AND ACTUATION

Description

Push Button Actuation

User-activated button mounted on a pole facing the street.

Loop Detectors

Bicycle-activated loop detectors are installed within the roadway to allow the presence of a bicycle to trigger a change in the traffic signal. This allows the bicyclist to stay within the lane of travel without having to maneuver to the side of the road to trigger a push button.

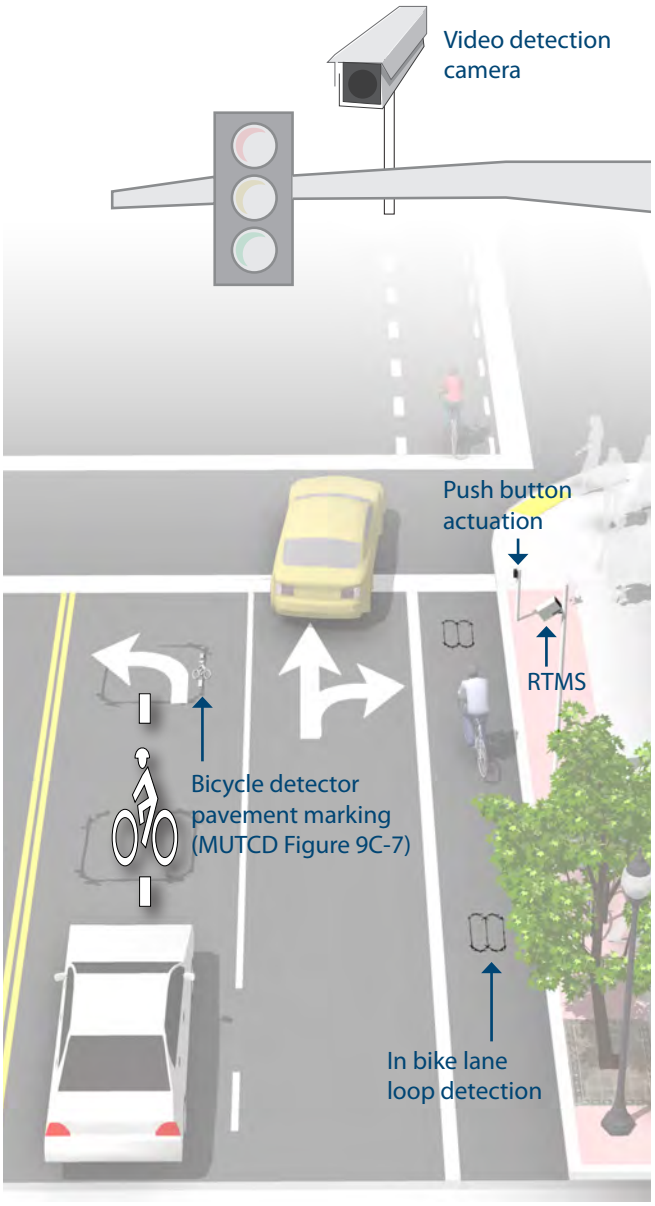
Loops that are sensitive enough to detect bicycles should be supplemented with pavement markings to instruct bicyclists how to trip them.

Video Detection Cameras

Video detection systems use digital image processing to detect a change in the image at a location. These systems can be calibrated to detect bicycles. Video camera system costs range from $20,000 to $25,000 per intersection.

Remote Traffic Microwave Sensor Detection (RTMS)

RTMS is a system which uses frequency modulated continuous wave radio signals to detect objects in the roadway. This method marks the detected object with a time code to determine its distance from the sensor. The RTMS system is unaffected by temperature and lighting, which can affect standard video detection.



Discussion

Proper bicycle detection should meet two primary criteria: 1) accurately detects bicyclists and 2) provides clear guidance to bicyclists on how to actuate detection (e.g., what button to push, where to stand).

Bicycle loops and other detection mechanisms can also provide bicyclists with an extended green time before the light turns yellow so that bicyclists of all abilities can reach the far side of the intersection.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Signal detection and actuation for bicyclists should be maintained with other traffic signal detection and roadway pavement markings.

BICYCLE SIGNAL HEADS

Description

A bicycle signal is an electrically powered traffic control device that should only be used in combination with an existing traffic signal. Bicycle signals are typically used to improve identified safety or operational problems involving bicycle facilities. Bicycle signal heads may be installed at signalized intersections to indicate bicycle signal phases and other bicycle-specific timing strategies. Bicycle signals can be actuated with bicycle sensitive loop detectors, video detection, or push buttons.

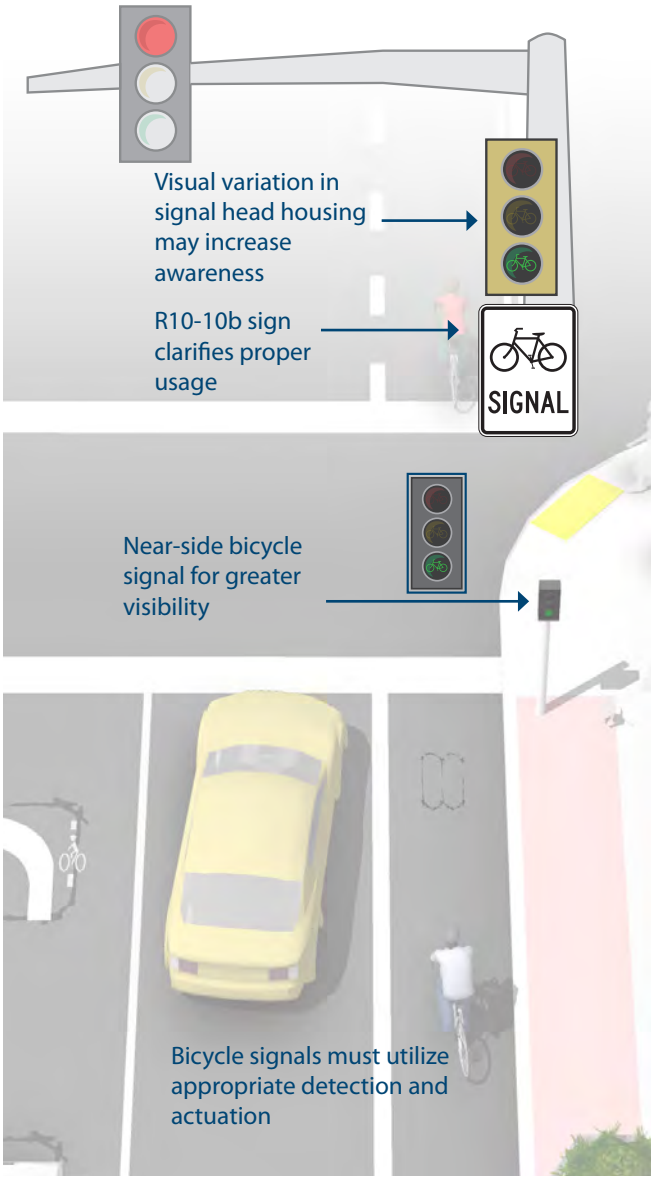
Bicycle signals are typically used to provide guidance for bicyclists at intersections where they may have different needs from other road users (e.g., bicycle-only movements).

FHWA currently limits the use of bicycle signal faces to where bicyclists would not be in conflict with any other vehicle movements, however many cities have successfully experimented with bicycle signals in other ways including the use of leading bicycle intervals.

Guidance

Specific locations where bicycle signals have had a demonstrated positive effect include:

- Those with high volume of bicyclists at peak hours
- Those with high numbers of bicycle/motor vehicle crashes, especially those caused by turning vehicle movements
- At T-intersections with major bicycle movement along the top of the "T."
- At the confluence of an off-street bike trail and a roadway intersection
- Where separated bike paths run parallel to arterial streets



Discussion

Local municipal code should be checked or modified to clarify that at intersections with bicycle signals, bicyclists should only obey the bicycle signal heads. For improved visibility, smaller (4 inch lens) near-sided bicycle signals should be considered to supplement far-side signals.

Additional References and Guidelines

FHWA. *MUTCD - Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)*. 2013.
NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Bicycle signal heads require the same maintenance as standard traffic signal heads, such as replacing bulbs and responding to power outages.

BIKEWAY SIGNING

The ability to navigate through a city is informed by landmarks, natural features and other visual cues. Signs throughout the city should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and travel time to each destination

Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.

Wayfinding Sign Types


Wayfinding Sign Placement

WAYFINDING SIGN TYPES

Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

Confirmation Signs

Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.

Can include destinations and distance/time. Do not include arrows.

Turn Signs

Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.

Include destinations and arrows.

Decisions Signs

Mark the junction of two or more bikeways.

Inform bicyclists of the designated bike route to access key destinations.

Destinations and arrows, distances and travel times are optional but recommended.

Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

See image at right for an example of a regional logo used for visual communication for the Razorback Regional Greenway.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

WAYFINDING SIGN PLACEMENT

Along a route to indicate a nearby destination.

Confirmation Signs

Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs

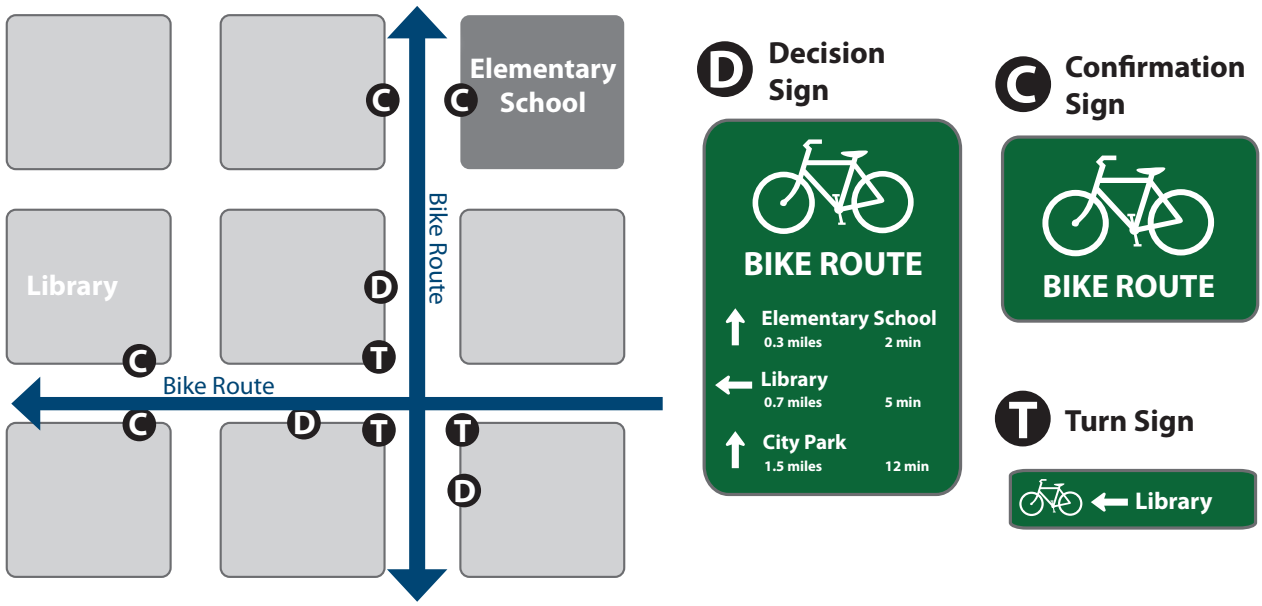
Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.

Guidance

Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.



Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to 5 miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
NACTO. *Urban Bikeway Design Guide.* 2012.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

BICYCLE SUPPORT FACILITIES

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

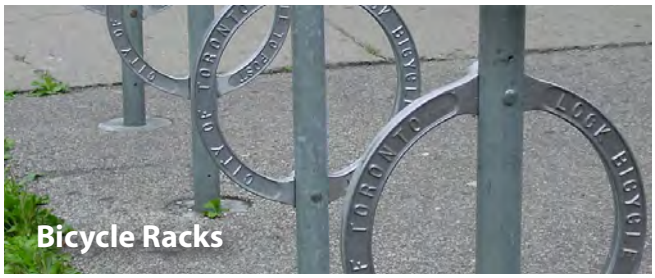
Access to Transit

Safe and easy access to bicycle parking facilities is necessary to encourage commuters to access transit via bicycle. Providing bicycle access to transit and space for bicycles on buses and rail vehicles can increase the feasibility of transit in lower-density areas, where transit stops are beyond walking distance of many residences. People are often willing to walk only a quarter- to half-mile to a bus stop, while they might bike as much as two or more miles to reach a transit station.

Roadway Construction and Repair

Safety of all roadway users should be considered during road construction and repair. Wherever bicycles are allowed, measures should be taken to provide for the continuity of a bicyclist's trip through a work zone area.

Only in rare cases should pedestrians and bicyclists be detoured to another street when travel vehicle lanes remain open. Contractors performing work should be made aware of the needs of bicyclists and be properly trained in how to safely route bicyclists through or around work zones.



Bicycle Racks


Bicycle Corral


Bicycle Lockers


Secure Parking Areas

BICYCLE RACKS

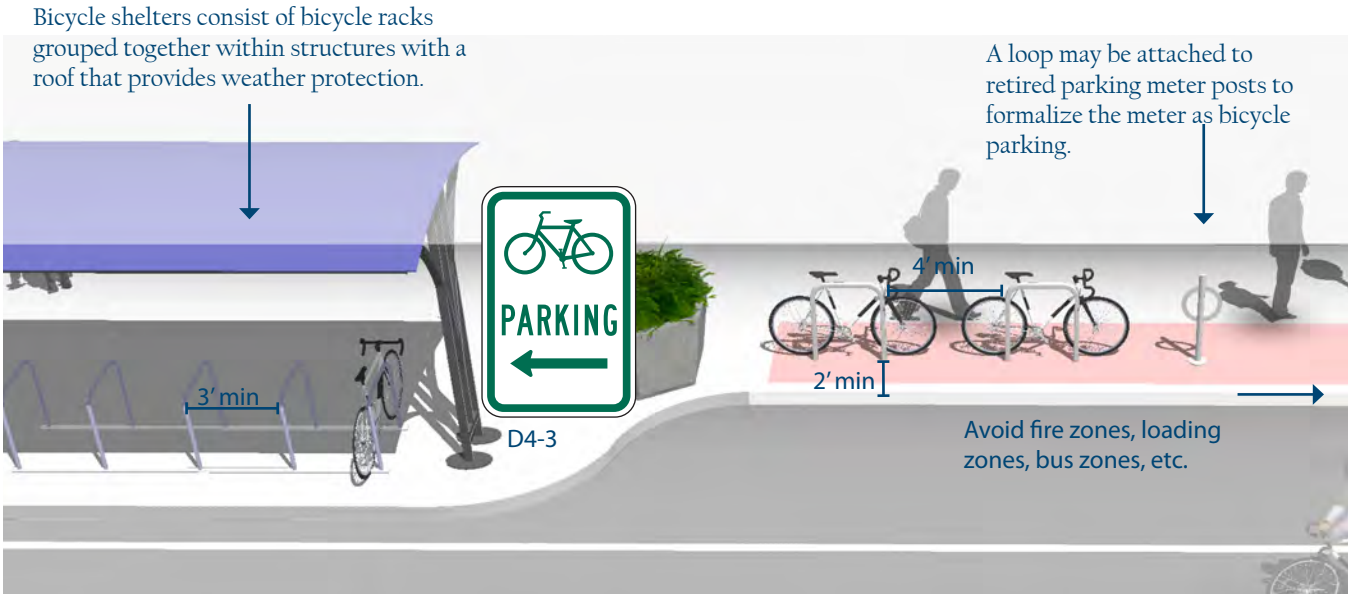
Description

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over.
- Allows locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

Guidance

- 2' minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50' maximum distance from main building entrance.
- Minimum clear distance of 6' should be provided between the bicycle rack and the property line.
- Should be highly visible from adjacent bicycle routes and pedestrian traffic.
- Locate racks in areas that cyclists are most likely to travel.



Discussion

Where the placement of racks on sidewalks is not possible (due to narrow sidewalk width, sidewalk obstructions, street trees, etc.), bicycle parking can be provided in the street where on-street vehicle parking is allowed in the form of on-street bicycle corrals.

Some types of bicycle racks may meet design criteria, but are discouraged except in limited situations. This includes undulating "wave" racks, schoolyard "wheel bender" racks, and spiral racks.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
APBP. *Bicycle Parking Guide 2nd Edition.* 2010.

Materials and Maintenance

Use of proper anchors will prevent vandalism and theft. Racks and anchors should be regularly inspected for damage. Educate snow removal crews to avoid burying racks during winter months.

ON-STREET BICYCLE CORRAL

Description

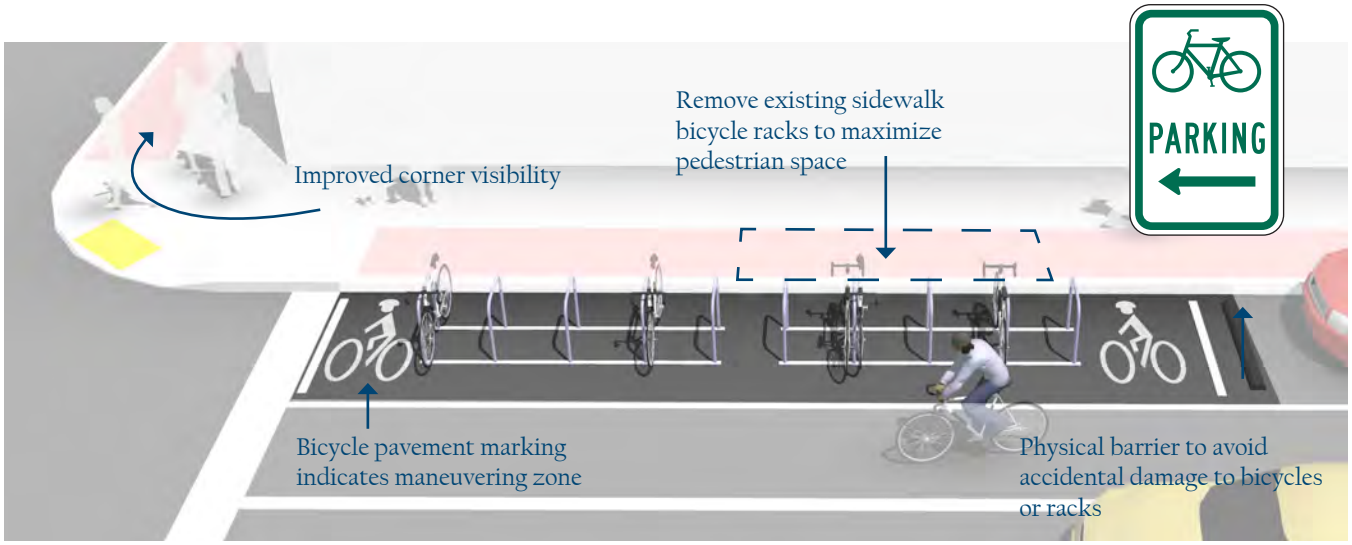
Bicycle corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.

Bicycle corrals move bicycles off the sidewalks, leaving more space for pedestrians, sidewalk café tables, etc. Because bicycle parking does not block sightlines (as large motor vehicles would do), it may be possible to locate bicycle parking in 'no-parking' zones near intersections and crosswalks.

Guidance

See guidelines for sidewalk bicycle rack placement and clear zones.

- Bicyclists should have an entrance width from the roadway of 5' – 6'.
- Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for bicycle corrals since the concrete extension serves as delimitation on one side.



Discussion

In many communities, the installation of bicycle corrals is driven by requests from adjacent businesses, and is not a city-driven initiative. In such cases, the city does not remove motor vehicle parking unless it is explicitly requested. In other areas, the city provides the facility and business associations take responsibility for the maintenance of the facility. Communities can establish maintenance agreements with the requesting business. Bicycle corrals can be especially effective in areas with high bicycle parking demand or along street frontages with narrow sidewalks where parked bicycles would be detrimental to the pedestrian environment.

Additional References and Guidelines

APBP. *Bicycle Parking Guide 2nd Edition.* 2010.

Materials and Maintenance

Physical barriers may obstruct drainage and collect debris. Establish a maintenance agreement with neighboring businesses. In snowy climates the bicycle corral may need to be removed during the winter months.

BICYCLE LOCKERS

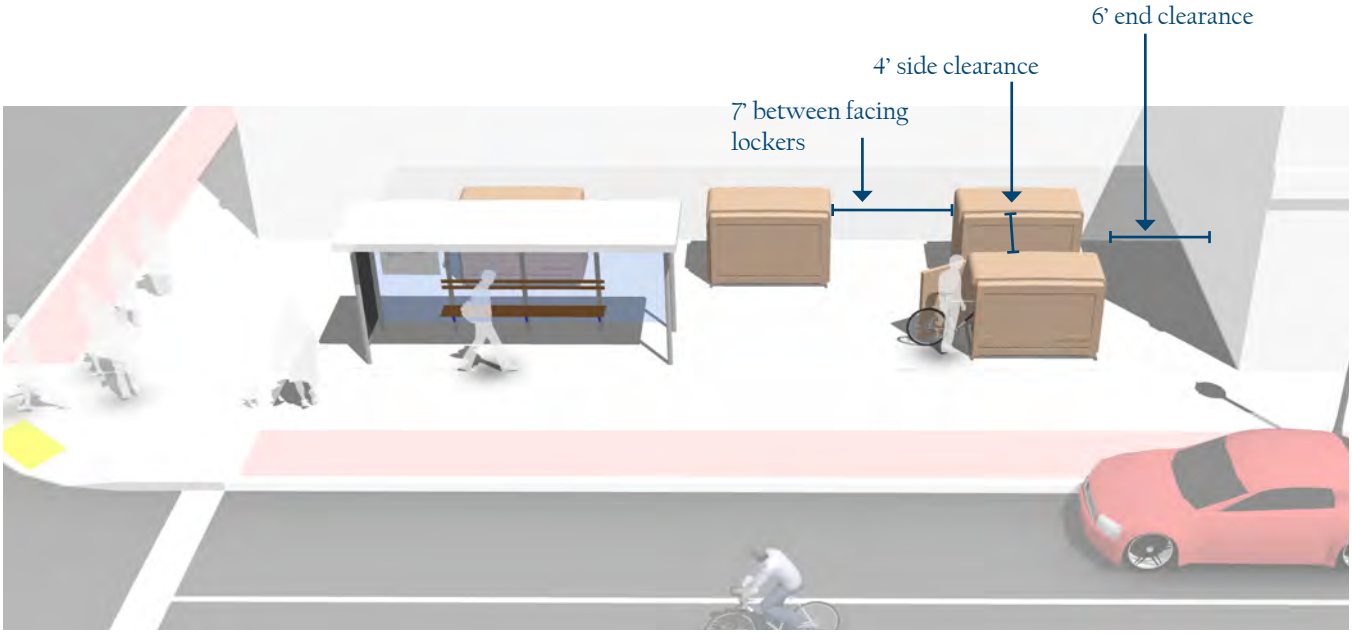
Description

Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain.

Bicycle lockers provide space to store a few accessories or rain gear in addition to containing the bicycle. Some lockers allow access to two users - a partition separating the two bicycles can help users feel their bike is secure. Lockers can also be stacked, reducing the footprint of the area, although that makes them more difficult to use.

Guidance

- Minimum dimensions: width (opening) 2.5'; height 4'; depth 6'.
- 4 foot side clearance and 6 foot end clearance.
- 7 foot minimum distance between facing lockers.
- Locker designs that allow visibility and inspection of contents are recommended for increased security.
- Access is controlled by a key or access code.



Discussion

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free. Potential locations for long-term bicycle parking include transit stations, large employers, and institutions where people use their bikes for commuting and not consistently throughout the day.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
APBP. *Bicycle Parking Guide 2nd Edition.* 2010.

Materials and Maintenance

Regularly inspect the functioning of moving parts and enclosures. Change keys and access codes periodically to prevent access to unapproved users.

SECURE PARKING AREAS (SPA)

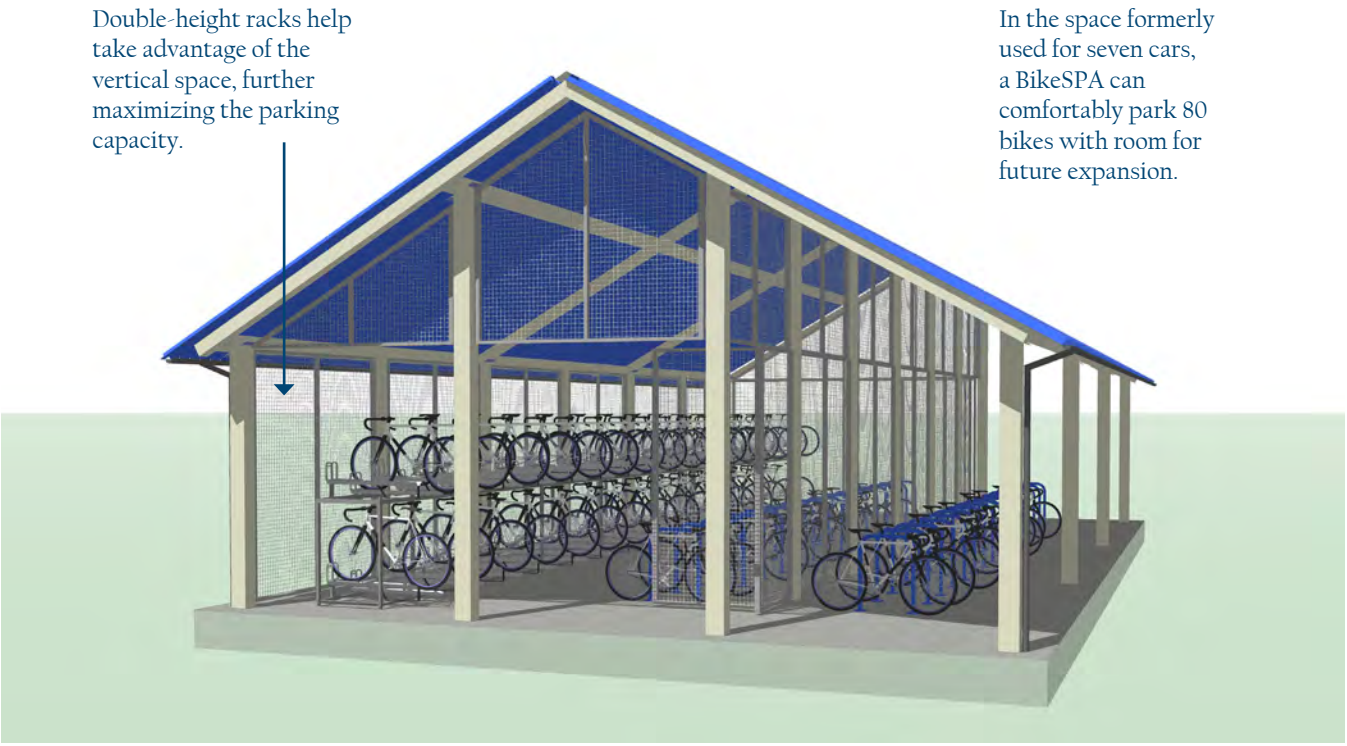
Description

A Secure Parking Area for bicycles, also known as a BikeSPA or Bike & Ride (when located at transit stations), is a semi-enclosed space that offers a higher level of security than ordinary bike racks. Accessible via key-card, combination locks, or keys, BikeSPAs provide high-capacity parking for 10 to 100 or more bicycles. Increased security measures create an additional transportation option for those whose biggest concern is theft and vulnerability.

Guidance

Key features may include:

- Closed-circuit television monitoring.
- Double high racks & cargo bike spaces.
- Bike repair station with bench.
- Bike tube and maintenance item vending machine.
- Bike lock "hitching post" – allows people to leave bike locks.
- Secure access for users.



Discussion

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free. BikeSPAs are ideal for transit centers, airports, train stations, or wherever large numbers of people might arrive by bicycle and need a secure place to park while away.

Additional References and Guidelines

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
APBP. *Bicycle Parking Guide 2nd Edition.* 2010.

Materials and Maintenance

Regularly inspect the functioning of moving parts and enclosures. Change keys and access codes periodically to prevent access to unapproved users.

BIKEWAY MAINTENANCE

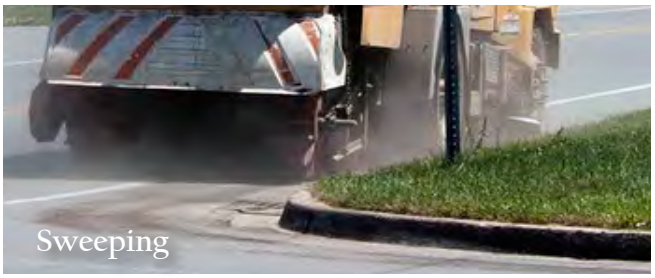
Regular bicycle facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flat, and installing bicycle-friendly drainage grates. Pavement overlays are a good opportunity to improve bicycle facilities. The following recommendations provide a menu of options to consider to enhance a maintenance regimen.

Recommended Walkway and Bikeway Maintenance Activities

Maintenance Activity	Frequency
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping/ blowing	As needed, with higher frequency in the early Spring and Fall
Pavement sealing	5 - 15 years
Pothole repair	1 week – 1 month after report
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	As needed
Signage replacement	As needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

This Section Includes:

- Sweeping
- Signage
- Roadway Surface
- Pavement Overlays
- Drainage Grates
- Gutter to Pavement Transition
- Landscaping
- Maintenance Management Plan


Sweeping


Roadway Surface


Drainage Grates


Gutter to Pavement Transition

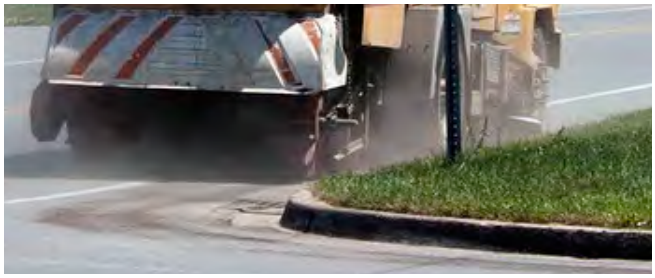

Landscaping


Maintenance Management Plan

SWEEPING

Description

Bicyclists often avoid shoulders and bike lanes filled with gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, potentially causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.



Guidance

- Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes.
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility.
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders.
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders.
- Perform additional sweeping in the Spring to remove debris from the Winter.
- Perform additional sweeping in the Fall in areas where leaves accumulate .

SIGNAGE

Description

Bike lanes, shared shoulders, Bicycle Boulevards and trails all have different signage types for wayfinding and regulations. Such signage is vulnerable to vandalism or wear, and requires periodic maintenance and replacement as needed.

Guidance

- Check regulatory and wayfinding signage along bikeways for signs of vandalism, graffiti, or normal wear.
- Replace signage along the bikeway network as-needed.
- Perform a regularly-scheduled check on the status of signage with follow-up as necessary.
- Create a Maintenance Management Plan.

ROADWAY SURFACE

Description

Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Various materials are used to pave roadways, and some are smoother than others. Compaction is also an important issue after trenches and other construction holes are filled. Uneven settlement after trenching can affect the roadway surface nearest the curb where bicycles travel. Sometimes compaction is not achieved to a satisfactory level, and an uneven pavement surface can result due to settling over the course of days or weeks. When resurfacing streets, use the smallest chip size and ensure that the surface is as smooth as possible to improve safety and comfort for bicyclists.

Guidance

- Maintain a smooth pothole-free surface.
- Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼".
- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings.
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred.
- If chip sealing is to be performed, use the smallest possible chip on bike lanes and shoulders. Sweep loose chips regularly following application.
- During chip seal maintenance projects, if the pavement condition of the bike lane is satisfactory, it may be appropriate to chip seal the travel lanes only. However, use caution when doing this so as not to create an unacceptable ridge between the bike lane and travel lane.

PAVEMENT OVERLAYS

Description

Pavement overlays represent good opportunities to improve conditions for bicyclists if done carefully. A ridge should not be left in the area where bicyclists ride (this occurs where an overlay extends part-way into a shoulder bikeway or bike lane). Overlay projects also offer opportunities to widen a roadway, or to re-stripe a roadway with bike lanes.

Guidance

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge.
- If the shoulder or bike lane pavement is of good quality, it may be appropriate to end the overlay at the shoulder or bike lane stripe provided no abrupt ridge remains.
- Ensure that inlet grates, manhole and valve covers are within ¼ inch of the finished pavement surface and are made or treated with slip resistant materials.
- Pave gravel driveways to property lines to prevent gravel from being tracked onto shoulders or bike lanes.

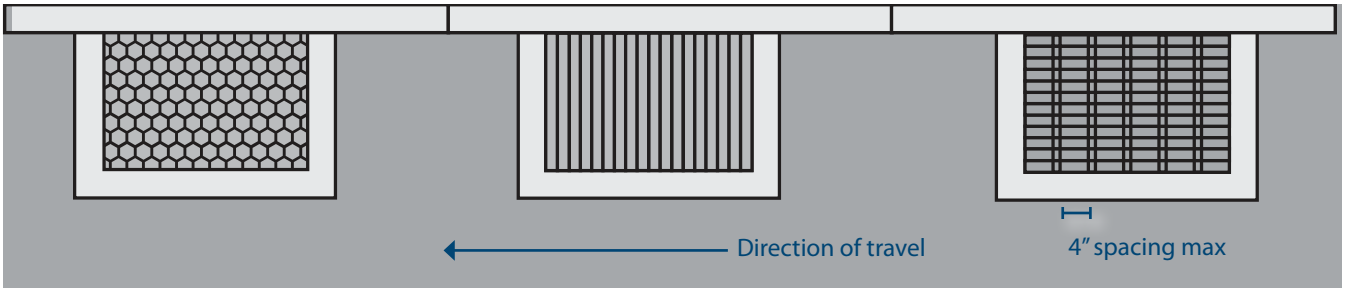
DRAINAGE GRATES

Description

Drainage grates are typically located in the gutter area near the curb of a roadway. Drainage grates typically have slots through which water drains into the municipal storm sewer system. Many older grates were designed with linear parallel bars spread wide enough for a tire to become caught so that if a bicyclist were to ride on them, the front tire could become caught in the slot. This would cause the bicyclist to tumble over the handlebars and sustain potentially serious injuries.

Guidance

- Require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires and assistive devices do not fall through the vertical slats.
- Similarly, tree grates that are in the path of travel for bicycles and assitive devices should also have slats that are perpendicular to the direction of travel.
- Create a program to inventory all existing drainage grates, and replace hazardous grates as necessary – temporary modifications such as installing rebar horizontally across the grate should not be an acceptable alternative to replacement.



GUTTER TO PAVEMENT TRANSITION

Description

On streets with concrete curbs and gutters, 1 to 2 feet of the curbside area is typically devoted to the gutter pan, where water collects and drains into catch basins. On many streets, the bikeway is situated near the transition between the gutter pan and the pavement edge. This transition can be susceptible to erosion, creating potholes and a rough surface for travel.

The pavement on many streets is not flush with the gutter, creating a vertical transition between these segments. This area can buckle over time, creating a

Guidance

- Ensure that gutter-to-pavement transitions have no more than a ¼" vertical transition.
- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred.
- Provide at least 3 feet of pavement outside of the gutter seam.

Description

Bikeways can become inaccessible due to overgrown vegetation. All landscaping needs to be designed and maintained to ensure compatibility with the use of the bikeways. After a flood or major storm, bikeways should be checked along with other roads, and fallen trees or other debris should be removed promptly.

Guidance

- Ensure that shoulder plants do not hang into or impede passage along bikeways
- After major damage incidents, remove fallen trees or other debris from bikeways as quickly as possible

MAINTENANCE MANAGEMENT PLAN

Description

Bikeway users need accommodation during construction and maintenance activities when bikeways may be closed or unavailable. Users must be warned of bikeway closures and given adequate detour information to bypass the closed section. Users should be warned through the use of standard signing approaching each affected section (e.g., "Bike Lane Closed," "Trail Closed"), including information on alternate routes and dates of closure. Alternate routes should provide reasonable directness, equivalent traffic characteristics, and be signed.

Guidance

- Provide fire and police departments with map of system, along with access points to gates/bollards
- Enforce speed limits and other rules of the road
- Enforce all trespassing laws for people attempting to enter adjacent private properties

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