Become known as the most disability friendly city by 2025

If everyone participates in social activities they enjoy, we would have a diverse community with opportunities to make connections, create anchors in the region, and be actively proud of our community.

We [also] need to ramp up public transportation to allow everyone access to all parts of the city at extended hours. This will help create economic justice and growth in our community.

The city needs to be connected with bike and walking trails and offer more public transportation.

Photo Credit: Neal Conway

Connected City

1. Introduction

1.1 Principles of a Connected City

1.2 Components of a Connected City

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- ◊ Intersections
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- ◊ Land Use
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- ◊ Main Street
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1. Introduction

Throughout Imagine Kalamazoo (IK2025) residents described their ideal neighborhood conditions: calmed traffic, retail establishments, and a variety of housing; among other things. The Connected City is the framework that works to connect neighborhoods; create inviting public places; and improve human, community, and environmental health residents desire. Using an approach that includes transportation choice; a set of principles and built environment components are used to describe and define the character of streets and the built environment. Working together, the principles and components guide the form, location, and quality of future development.

1.1 Principles of a Connected City

IK2025 participants said that a Connected City is accessible, comfortable, connected, convenient, engaging, and vibrant. The principles of Connected City were developed from the Strategic Vision Goals (Figure 1) to create comprehensive strategies that will be applied to projects. The qualitative principles are:

Accessible. An accessible place is capable of being used by people of all ages and mobility levels.

Comfortable. A comfortable place is an environment where visitors experience a sense of ease, enabling a feeling of personal safety and independence.

Connected. A connected place is a physical network offering multiple routing options to a diverse range of activities, resources, services, and places.

Convenient. A convenient place is easy to understand and navigate, Orientation, wayfinding, and routing choices support travelers in meeting their daily needs.

Engaging. An engaging place is designed to facilitate formal and informal social exchanges, creating a positive experiences along a street.

Vibrant. A vibrant place is an area pulsating with diversity of life, culture, and activity. The variety and concentration of retail, restaurants, and entertainment venues appeal to a broad spectrum of users throughout the day and into the night.

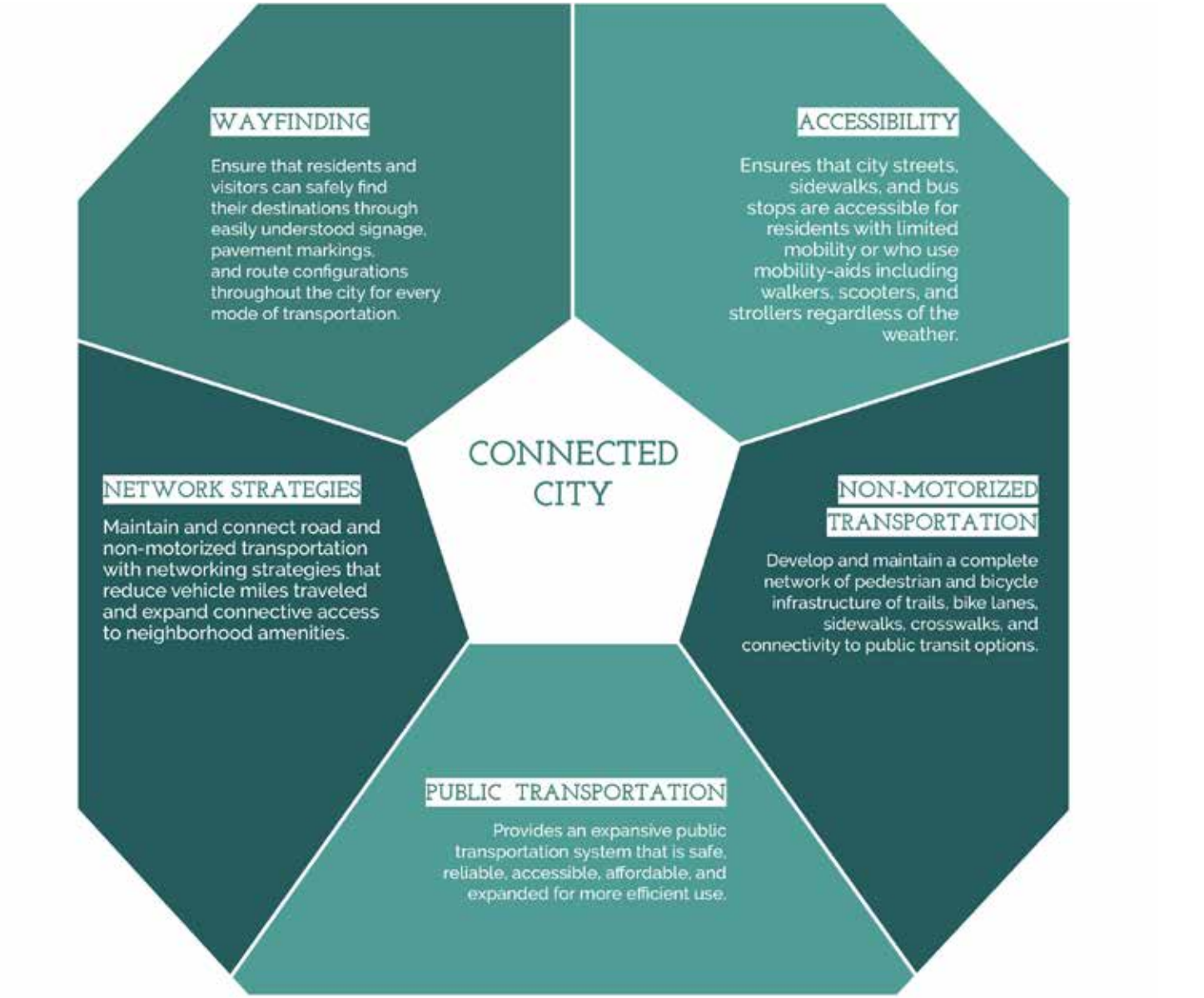
1.2 Components of a Connected City

The whole is greater than the sum of its parts. Every building, streetscape, programmed event, park, and trail collectively creates special experiences in Kalamazoo.. The principles are applied to each Connected City component.The built environment components are:

Streets. A variety of characteristics help shape a great street. The feel of a street can change dramatically with the type, texture and color of pavement; even the feeling that trees, lane width, and spacing of buildings give can impact a pedestrian's experience. As the streets are the primary piece of our transportation network and the majority of our public space,they have a direct impact on the overall character and feel of the City.

Strategic Goal: Complete Neighborhoods.

Figure 1



Connected City is Strategic Vision Goal that focuses on creating a complete network for walking, biking, riding, and driving in Kalamazoo. Master Plan recognizes that to realize a Connected City, Land Development must be tied with transportation.

Streets can be inviting public places of social connectivity as well as a transportation network. Streets can support dual roles within the network as both destination and generator of traffic.

Intersections. Intersections represent the critical junction of all modes of travel. The safety and efficiency of transportation modes are defined by the design and operation of intersection - most importantly, pedestrian crossings at intersections. Crosswalks should be considered as an extension of the sidewalk.

Sidewalks. Sidewalks, in their simplest form, join intersections together and are the pedestrian travel lane. A closer examination reveals a place of activity determined by design considerations like: sidewalk width, pavement type and texture, building placement, location of windows and entrances, wayfinding signs, shade and weather protection from awnings or trees, and street furniture.

The role of the urban sidewalk extends beyond that of a mere pathway for pedestrians. The urban sidewalk is the connective tissue that unifies the pedestrian experience within the fabric of the neighborhood center. It is a place for social exchange, dining, entertainment, shopping, and people-watching. When properly designed, people are willing to walk longer distances to a destination.

Photo credit: Neal Conway

Land Use. Pedestrian activity and economic vitality in urban commercial areas is generated by the intensity and diversity of land uses. Uses such as retail, restaurants, and entertainment serve as

> Walkability is "the extent to which the built environment is friendly to the presence of people living, shopping, visiting, enjoying, or spending time in an area."
>
> Dan Burden, Walkable Communities

destinations. The ground floor presence of doorways, window displays, and outdoor cafes all provide opportunities for socialization and interaction. These uses contribute to the highest volume of pedestrian activity and increase the vibrancy of the street. Office and residential land uses are activity generators. Their close proximity to destination uses is important in extending the duration of pedestrian activities that utilize the street. When generators are mixed with destinations that remain open beyond the work day for most employees, the area has an extended life. The street stays active and is no longer silent after five p.m.

Architecture. The average pedestrian walks at a pace of three miles per hour. For pedestrians to be adequately engaged and interested, the streetscape and adjacent buildings should vary in design or detail at least every fifty feet. The style of the architecture may vary from building to building. What remains consistent is the placement of a building at or near the front property line, clear building entrance, and ground floor transparency. These can greatly influence whether or not a pedestrian travels down a given block. This represents very different design requirements from that of a building seen by a driver in a moving vehicle.

Kalamazoo's residential and historic character are excellent guiding examples of what makes a neighborhood center and downtown vibrant and active. Studying what makes a great street starts with recognizing that the City has many incredible places to take queues from.

Public Spaces. Parks and open spaces encourage healthy living through opportunities for recreation and relaxation, contributing to the physical, social, and economic health of a city. Traditional public spaces and their linear companions, sidewalks and trails, represent the heart of the public realm. Their quality, placement, design, and utilization all contribute to quality of life.

2. Land Use & Transportation

"When considering integrated land use and transportation planning, placemaking promotes a simple principle: if you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places."

- Project for Public Places

Integrating land use and transportation is recognition that fast moving traffic creates safety issues for pedestrians, is dangerous and uncomfortable to bicycle with, and can limit the development opportunities for neighborhoods and downtown.

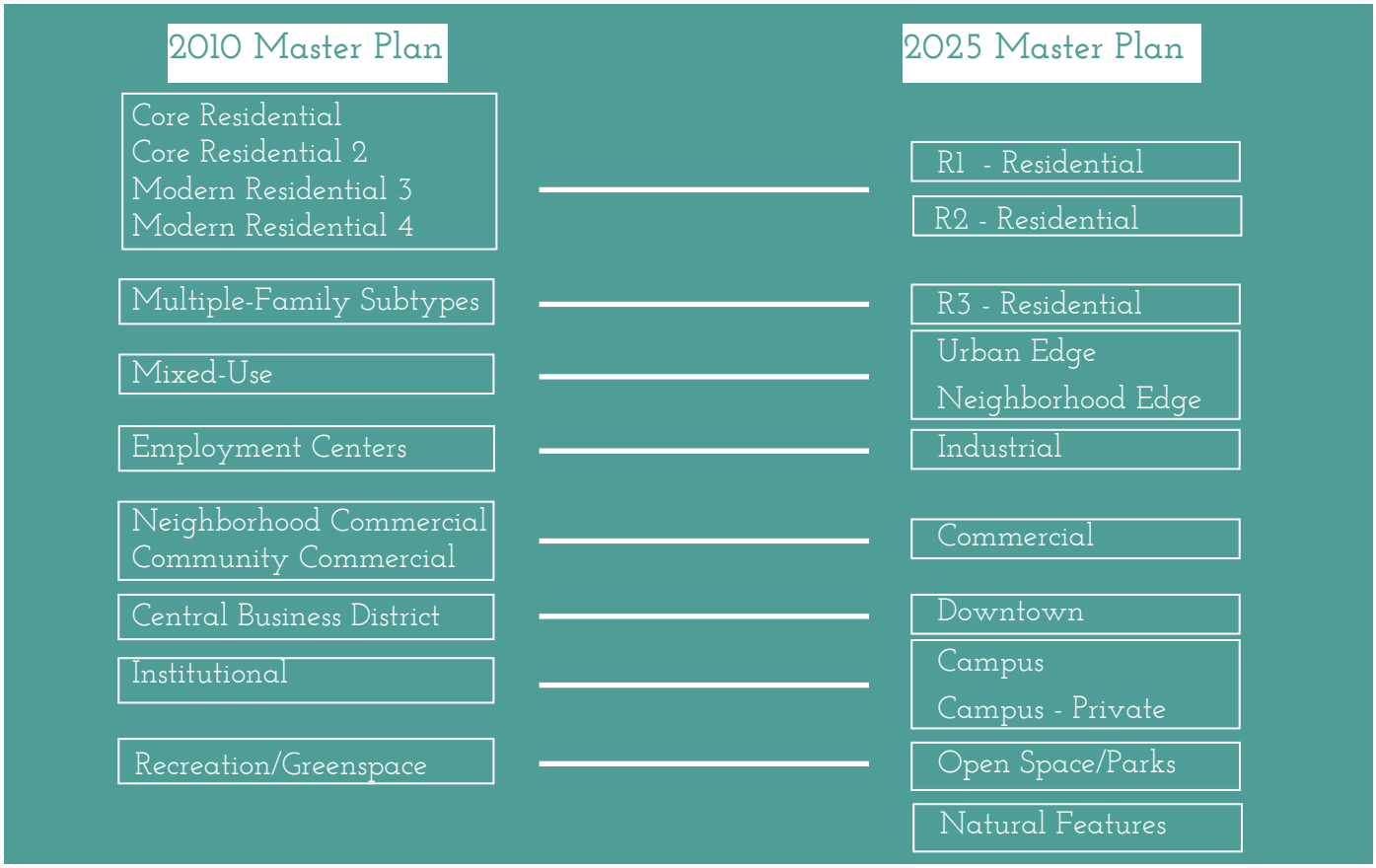
Through a new **Land Development Map**, future land use categories, street types, and nodes are combined to become the framework for design recommendations that calm traffic, promote walkability, include bicycle infrastructure, and focus development to support daily neighborhood needs and the goals for the 2025 Master Plan.

2.1 Future Land Use Categories

The 2025 Master Plan simplifies the land use categories; comparison below (Figure 2) from the 2010 Master Plan. The residential categories provide the context for a variety of low-density single-family housing types to medium density row

Land Use Categories 2025 Compared to 2010

Figure 2



houses, or higher density urban apartment buildings in neighborhoods. New categories are Urban and Neighborhood Edge that enable existing and new development flexibility for a variety of building types that support residential density and commercial scale in appropriate locations.

Future Land Use vs. Zoning Districts. Like previous master plans, appropriate future land uses are described and mapped in this document. It is important to note that future land use designations are not the same as zoning districts or standards. They are designations on a plan that provide guidance on appropriate land uses if a lot were to be redeveloped in the future. The designations will guide future Zoning Ordinance updates to achieve the goals of this document, such as Complete Neighborhoods or to support the City's Housing Strategy.

2.2 Commercial & Neighborhood - Nodes

Throughout IK2025 the desire to have more daily needs closer for residents to walk to was heard in every neighborhood. To achieve this, the Future Land Development Plan designates Nodes at key intersections or along specific blocks. Nodes consist of walkable features and specific right-of-way and intersection design guidelines. The building form, parking, and architecture will be designed to attract residential mixed-use with retail, restaurants, and other office or commercial activity.

The Future Land Development Plan designates two scales of walkable urban Nodes: Commercial and Neighborhood. The Commercial Node is defined by large scale retail destinations that draw from several neighborhoods or outside the city. A Neighborhood Node is smaller in scale and provides easier access to daily needs within one or two adjacent neighborhoods. Both Nodes will apply the following design strategies.

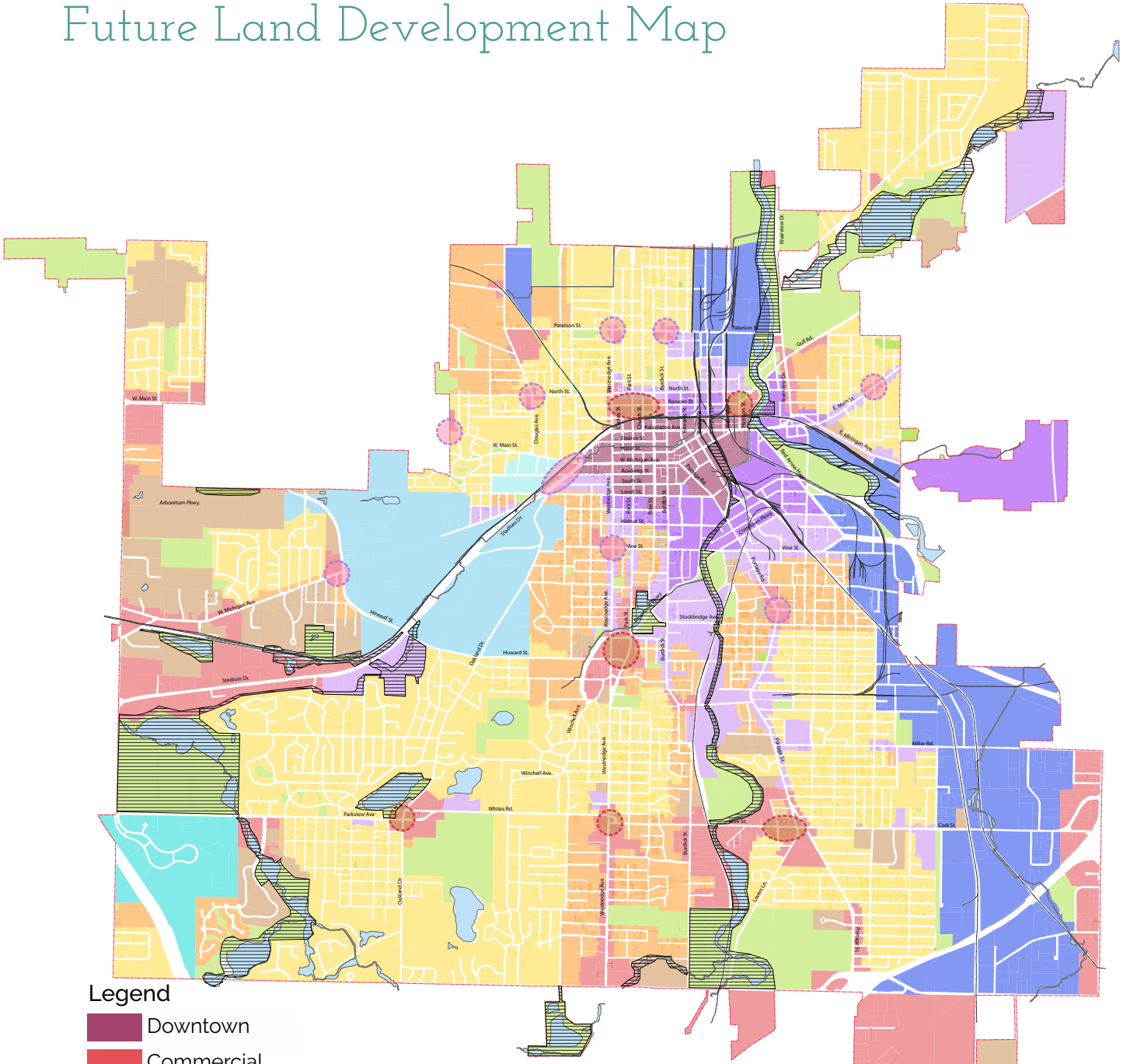
The framework for Land Development illustrated is updated from the 2010 Master Plan; it is based on the success of past master plans while incorporating new best practice research.

Street Design. Creating a comfortable and safe pedestrian environment, regardless of the street type designation, is critical at Nodes. This can include the implementation of:

- Widen sidewalks for outdoor cafes, furniture, and activities. (Standard is 5 to 6 feet)
- Street furniture (benches, planters, trash bins)
- Street trees
- Reduced traffic speed through street design
- Pedestrian-scaled lighting
- Bus stop shelters
- Bicycle parking
- Pedestrian-activated crossing lightsz
- Bulb-outs and curb extensions at intersections
- On-street parking that buffers pedestrians from vehicles.

Parking Management. To the greatest extent possible parking will be located at the rear or side of a building. Pedestrian safety, accessibility, and clear

Future Land Development Map



walking paths are priority in a Node with slowed vehicle traffic from driveways and within parking lots. Supporting reduced parking requirements, alternative parking arrangements, and Transportation Demand Management (TDM) strategies to reduce the area dedicated to parking and increase area dedicated to employment, housing, parks, public art, or other amenities. On-street parking is preferred to off-street and will count toward any parking minimums.

Building Placement. The placement of buildings is almost as critical as their uses. Creating a continuous and inviting walkable street requires building closely up to the sidewalk. In new development areas, placement for wider sidewalks that allow cafes, sandwich board signage, and other street furniture is desired. The building facade should have large clear windows and have clear accessible entry from both the parking areas and sidewalk.

Land Use. Nodes are critical walkable destinations for everyday use. Development can include commercial, office, and residential to create mixed-use areas that provide for increased housing and transportation choices, and the creation of vibrant places to serve local residents for daily needs.

Open Space. Development plans in nodes should incorporate public spaces (squares, plazas, etc.) into private developments to encourage social interaction, particularly where such spaces promote relationships between businesses, residents, and visitors. Open space should be designed with the node in mind, and not on a lot-by-lot project basis.

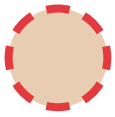
2.3 Future Land Development Map

Downtown

Allows high-density residential uses and compact combinations of pedestrian-oriented retail, office, and entertainment. Active uses (e.g. retail) are desired on the ground floor of Priority Streets and on corners. First floor residential and less active uses may be permitted on other street types within Downtown.

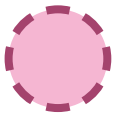
Commercial

Permits a wide range of retail, office, and entertainment uses. Residential may be incorporated into commercial areas to create a mixed-use area or serve as a transition to lower density residential. Mixing of uses may be horizontal or vertical. Active uses (e.g. retail) are encouraged on the ground floor, particularly at key intersections (nodes), corners, and along the front property lines.



Commercial Node

A large footprint walkable mixed-use area designed to provide a wide range of commercial uses, focused on meeting daily needs, and scaled to serve multiple neighborhoods. Housing, retail, restaurant, and office are permitted. Development must follow Node design standards to support the intent as a walkable and vibrant commercial area.



Neighborhood Node

Smaller footprint neighborhood serving walkable mixed-use area of commercial uses. The node is designed to provide a range of uses focusing on daily needs for the local population of a neighborhood. It

can include housing, retail, restaurant, and office uses, but at a smaller scale than those in the Commercial Node. Development within the node must follow design standards to support its intent as a walkable vibrant asset within a neighborhood.

Urban Edge

Allows for a mix of medium-scale uses in areas serving as transitions along more intense Downtown, commercial, or industrial development areas, It is often located on high-capacity transit corridors or at the intersection of transportation corridors. An expanded range of uses are permitted including light industrial maker spaces, commercial, office, and medium to high-density residential. Development is intended to attract employees and residents. Uses can include specialty retail, artist studios, food and beverage production/retail spaces that can attract regional customers.

Neighborhood Edge

This land use allows for a mix of zoning districts that respond to neighborhood context. The land uses contain small-scale neighborhood development. The zoning district can include single family to medium density residential, small footprint retail, offices, restaurants, and non-auto service-oriented development. Development can occur in a variety of buildings types - traditional commercial buildings and residential structures that have been converted to contain commercial uses.

Industrial

Accommodates industrial development and limited supporting commercial uses. Development in this classification could have a large impact on adjoining properties and the environment - it requires management of setbacks, access, and environmental mitigation.

There are three residential designations. They are context based and represent a sliding scale of intensity.

R1-Residential

Lowest intensity residential development.

R2-Residential

Medium intensity residential development.

R3-Residential

Highest intensity residential development.

Open Space/Parks

Land or water areas generally free from development. Primarily used for park and recreation purposes, but may also indicate private or public open spaces reserved for natural resource conservation.

Natural Features

An area with existing natural features, including creeks, floodplains, stands of large trees, and slope, that should be protected through such methods as conservation easements or land acquisition. The City will work with property owners, key stakeholders, and conservation minded organizations to achieve the long term protection of these areas for such ends as public enjoyment and environmental health. Development that occurs near these designations will need to complete a thorough analysis of the natural features and the proposed project to mitigate potential negative impacts.

Campus

Campus/Private Institution

Allows the development of one user or multiple similar uses on a large site. Typically includes multiple buildings and a street network. Campus-Private Institution requires the development and approval by the City of a site specific master plan.

2.4 Transportation Framework

The Transportation Framework aims to achieve a comprehensive, multimodal network designed with the adjacent land development in mind. Kalamazoo is very close to being a built-out community. Achieving a comprehensive transportation network cannot be accomplished by simply adding new streets. It requires making the best use of the existing network and changing the view of streets from simply a throughway to valuable public space.

Complete Streets Network. Planning for the use of streets should take into consideration the network of desired destinations - Downtown, Nodes, schools, parks, neighborhoods and access to them. A Complete Street network considers access to destinations by all transportation means: pedestrians, bicycling, and vehicles (bus, car, truck, semi-tractor trailer). This approach will allow for the evaluation of street design that connects the gaps in the network for all modes of transportation.

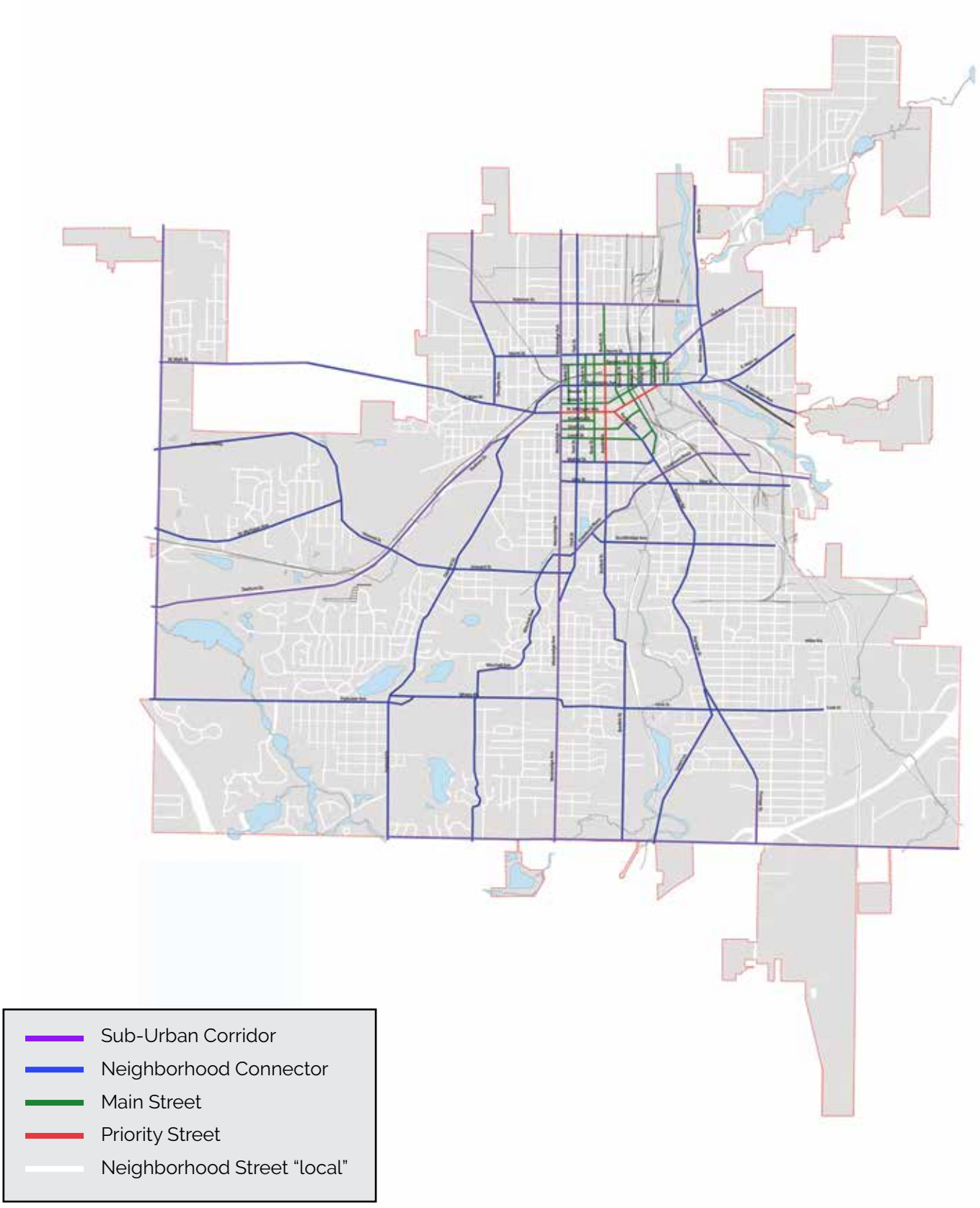
Inviting Public Places. Street right-of-way is one of the largest public realms in the city with nearly 25% of land used in Kalamazoo. One function of streets are for moving people from one location to another. The pedestrian areas (sidewalks, wide shoulders, shared use paths) are valuable public spaces that establish the character of an area, act as gateways, and encourage socialization and commerce.

Future street maintenance and construction in Kalamazoo will consider a Complete Streets policy to evaluate network connectivity for all users, design for low speeds, take into account location within a neighborhood, and the access needs of the adjacent development. To reflect the integrated placemaking approach of land use and transportation a Framework of Streets has been developed..

Framework of Streets. This framework considers streets as they traverse the city, and the relationship to land use as it changes to get people in and around Kalamazoo. The design of the site, buildings, and public way respond to the transportation mode priorities (i.e., pedestrian, bicycle, or vehicular traffic) for the area. Furthermore, a Complete Streets policy will guide the network strategies that meet the goal to serve all users, connect neighborhoods, and calm traffic.

The Framework of Streets outlines five Street Types and primary non-motorized routes. The Street Types are informed by the land use designations in the Land Development Plan, each having a unique intent and set of design and development parameters. A street may change it's character as it meets the needs of the land use - for example a street may have it's beginning in a neighborhood and move into a small neighborhood Node. The changes may be subtle as you leave the neighborhood and as you get closer to the Node such as, buildings moving closer to the street, sidewalks getting wider, and more frequent on-street parking. Each street listed in the table below works together with other streets in the city to create our transportation network. (Figure 3)

Framework of Street Types

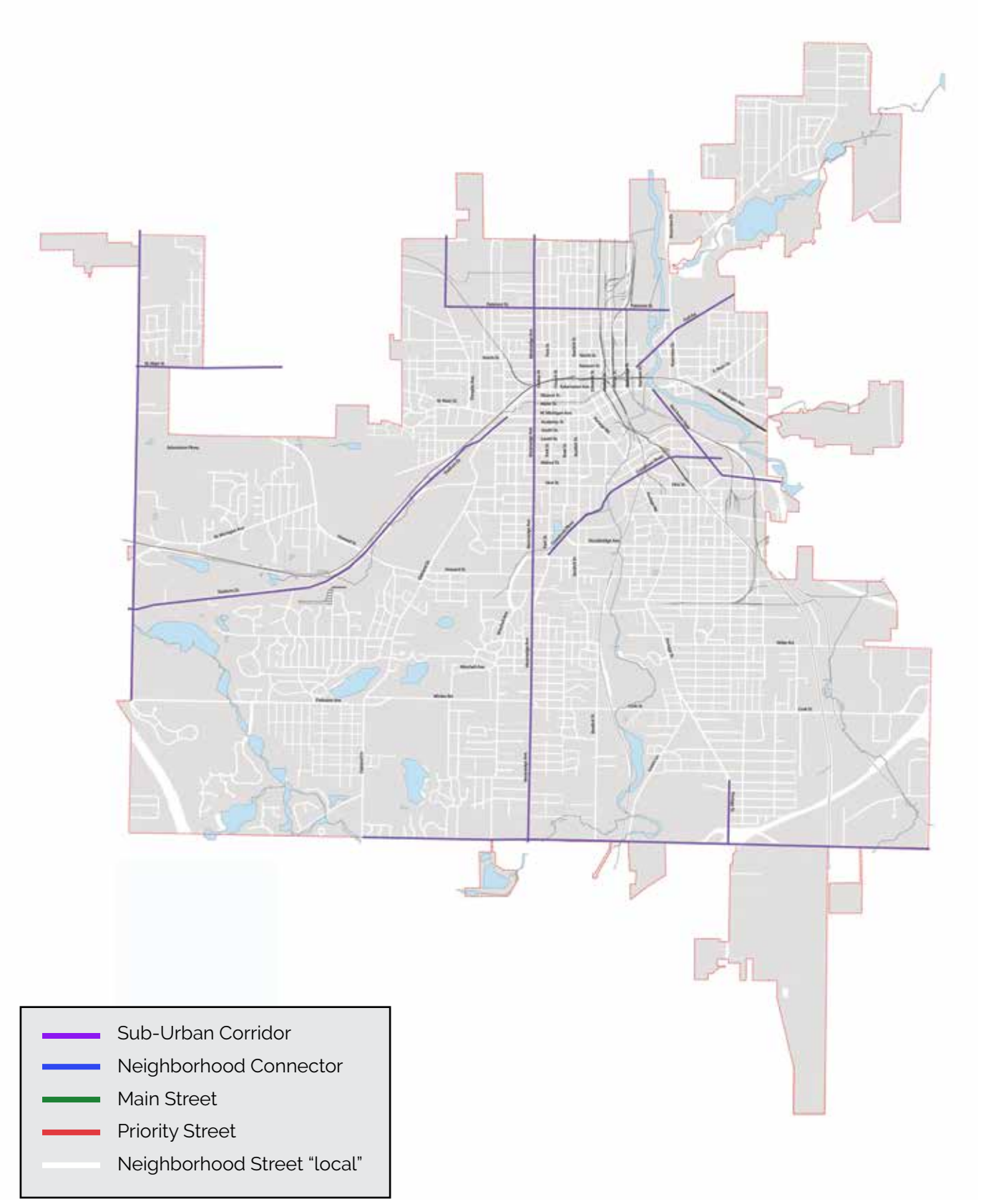


Framework of Street Types

Figure 3

Primary Non-Motorized Route	Neighborhood Streets	Main Street	Priority Street	Neighborhood Connector	Sub-Urban Corridor
On-Street: Protected bike lane that serve as bicycle/ pedestrian facilities on Neighborhood Connectors or Sub-Urban Corridors. Commonly found off-street as a parallel route when on-street facilities are not in place. Should be a minimum of 10' in width. Connections to parks, natural spaces, or rail corridors.	Slowed traffic Pedestrian crossing visibility On-street parking Sidewalk on at least one side of the street Bicycle route signage or sharrows to connect to primary non-motorized routes Some transit service	Primarily serves pedestrians Slowed traffic through Nodes Pedestrian crossing enhancements Crosswalk bump-outs On-street bike lanes On-street parking Center turn lanes	Downtown street Slowed traffic Pedestrian crossing enhancements Crosswalk bump-outs On-street bike lanes On-street parking High standards for streetscape, lighting, and wayfinding Transit served	Slowed traffic; especially through Nodes Pedestrian crossing enhancements Crosswalk bump-outs On-street bike lanes On-street parking Center turn lanes at major intersections High use transit route	Continuous center left turn lane Restricted left turns in/out of some driveways Bike lanes are protected or parallel off street No on-street parking High use transit route
Intersect with transit as often as possible Off-street parking may be provided for trail users See Non-Motorized Section for facilities	These include all other public and private streets in the city Very low traffic volume Slow speeds Frequent stop controlled intersections	Provides access to businesses, employment, mixed-use residential transit users and pedestrians Buildings are up to the street with minimal driveways	Downtown streets that create inviting public places for dining, shopping, relaxing, and family entertainment Transit served Buildings are up to the street with minimal driveways	Connects automobiles, bikes and pedestrians from neighborhood streets to Universities, Colleges, and Neighborhood and Commercial Nodes Retail and service businesses front the street	Office and retail land uses with some mixed-use residential Typically express transit routes that connect from sub-urban hubs to Neighborhood Connectors or Main Streets into
No motorized vehicles	< 30 mph	20-25 mph	20-25 mph	25-35 mph	30-45mph
See Non-Motorized Section for all facility types	2-lanes	2-3 lanes	2-3 lanes	2-4 lanes; may include dedicated transit lane	3-5 lanes; 2 to 4 lane Sub-Urban Corridor

Framework of Streets: Sub-Urban Corridor

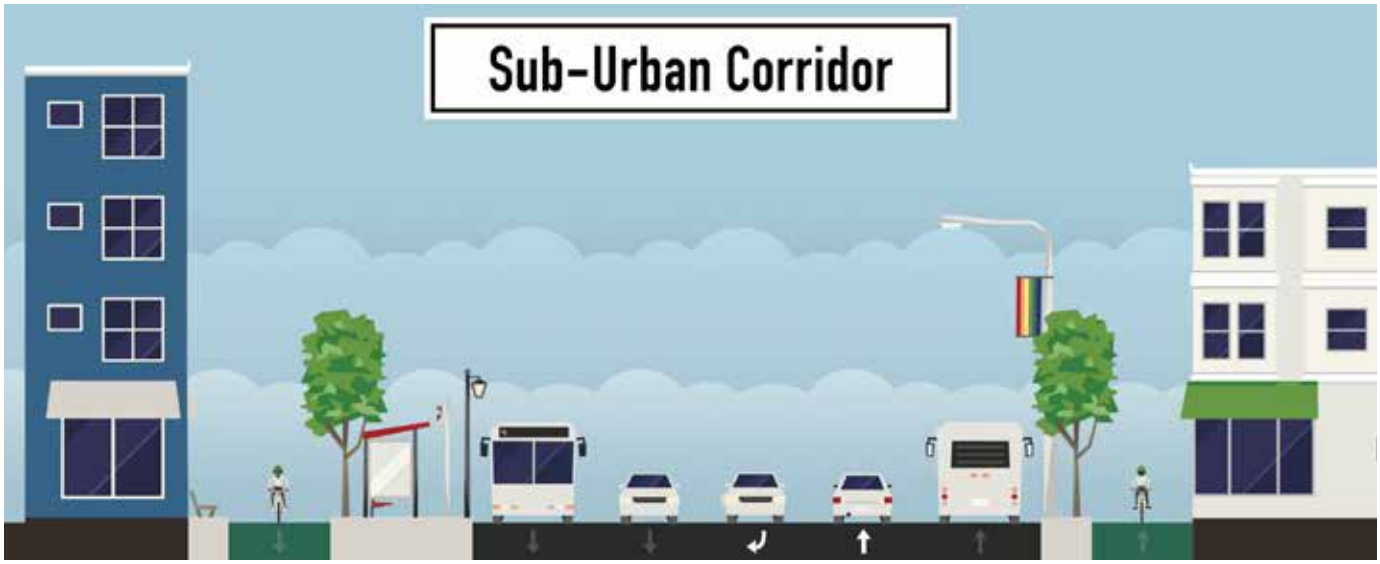


Sub-Urban Corridor. Kalamazoo's major corridors that bring traffic into the City play the biggest role in defining the visual image of the City. These corridors will encourage improved development patterns and visually improve the right-of-way. Safe pedestrian and bicycle movements are important on all streets in Kalamazoo, including these corridors. Parallel non-motorized routes provide safe access for pedestrians and bicyclists.

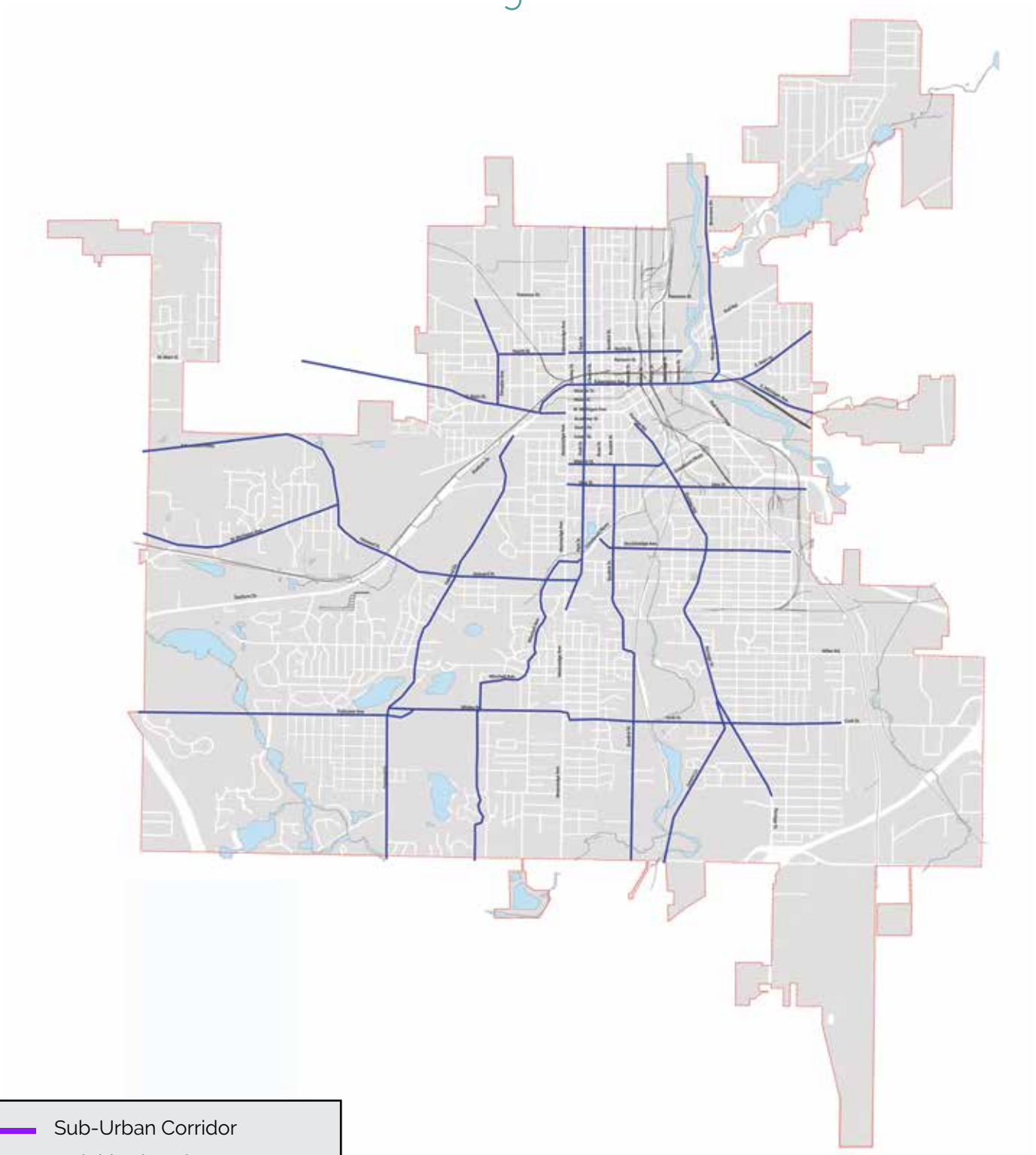
Adjacent Land Development. Sub-Urban Corridors pass through a variety of land use designations as they traverse the City. The marjority of uses along this street type are commercial, industrial or high density residential uses. Traffic volumes, vehicle speed, and limited pedestrian amenities make single family and walkable mixed use development less compatible. When Sub-Urban Corridors approach a Node, the street type will change in order to allow for special design features to be applied that slow traffic and increase walkability pedestrian and bicycle amenities.

Transit. Sub-Urban Corridors are also major transit routes in Kalamazoo. Improved bus stops, including American Disabilities Act (ADA) standards for either a concrete pad or shelter with signage, are critical elements for ridership. Future transit facilities may include express bus routes and dedicated lanes or bus rapid transit.

Intersections. Intersection improvements are employed to create safe pedestrian movements on Sub-Urban Corridors. Clearly marked crosswalks and the use of bulb outs or medians to reduce crossing length should be incorporated into designs, especially at transit served intersections. Where non-motorized paths connect and parallel routes, significant signage should alert both motorists and bicyclists to use care and share the road.



Framework of Streets: Neighborhood Connector



Neighborhood Connector. Connectors provide cross-city access and connect Commercial and Neighborhood Nodes for all modes of transportation. Slower speeds than a Sub-Urban Corridor, bicycle infrastructure can occur on-street adjacent to vehicular traffic. Building placement will vary as the Connector completes the network connectivity through neighborhoods and the Downtown

Adjacent Land Development. Neighborhood Connectors occur througout the City. Because of the connectors' low speed, and neighborhood connectivity, all development types are appropriate including new single family infill and revitalizing existing residential. With a Node, special design features are applied to further slow traffic and increase pedestrian and bicycle amenities.

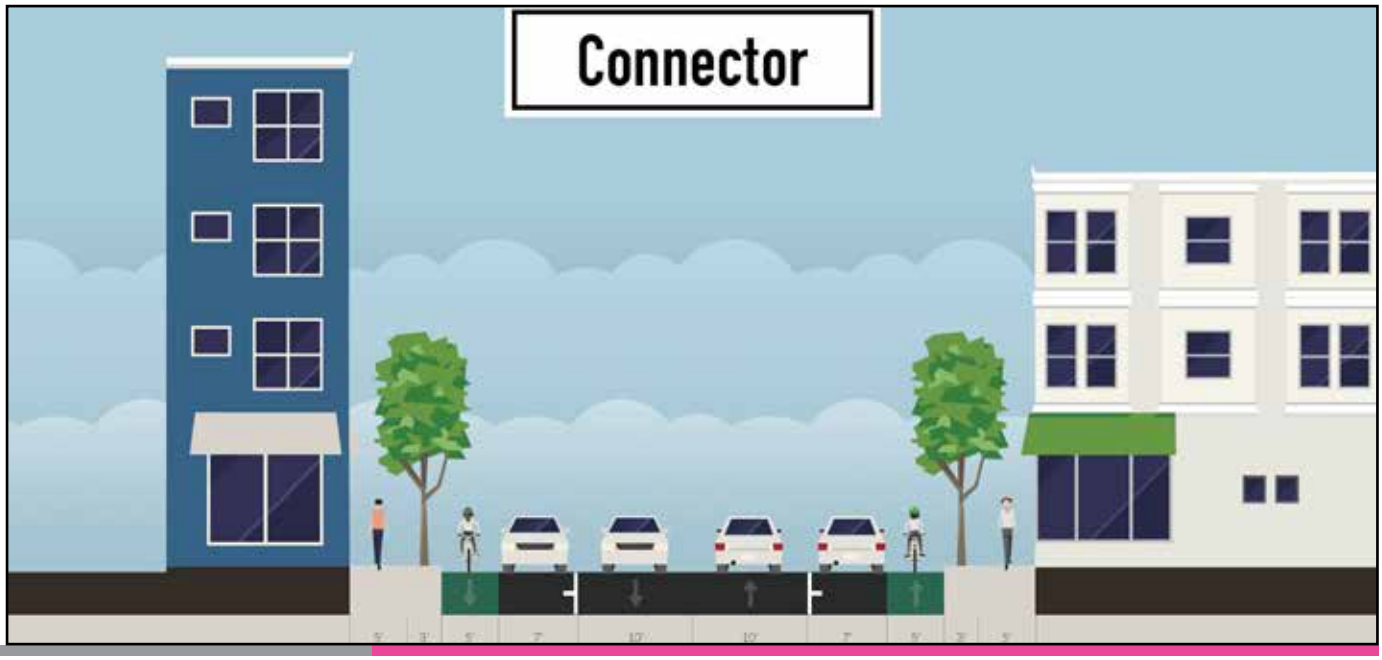
Transit. Neighborhood Connectors are often transit routes in Kalamazoo. Improved bus stops, including American Disabilities Act (ADA) standards for either a concrete pad or shelter with signage, are critical to ridership. Consider bike racks at these facilities.

Bicycle Infrastructure. Bicycle routes can be placed on-street as bike lanes or as protected bike lanes. Each street should be evaluated if right of way supports the construction of protected lanes or striped lanes.

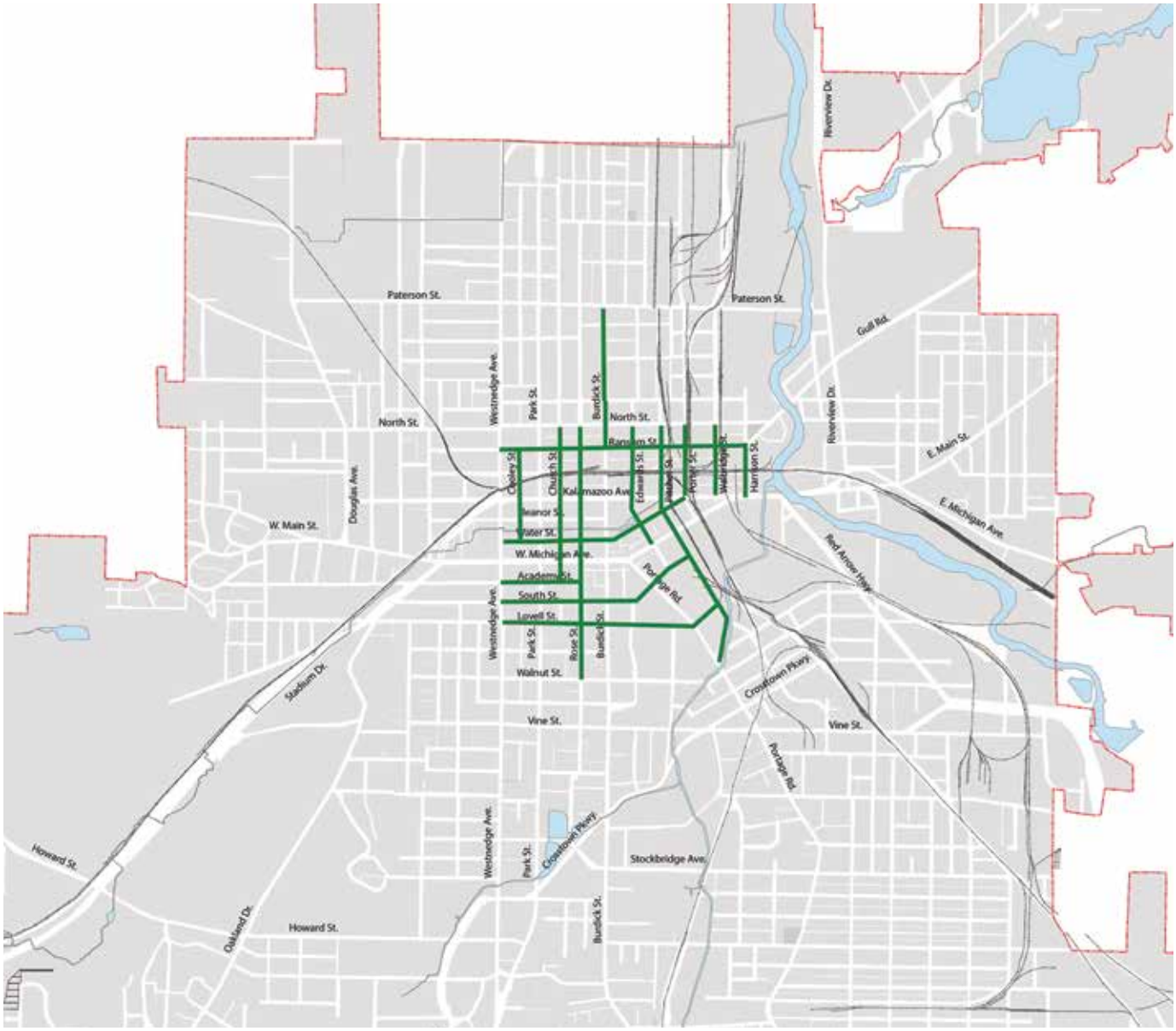
Pedestrian Infrastructure. Sidewalks should be located on both sides of a Neighborhood Connector, Clearly marked crosswalks and the use of bulb outs or medians to reduce crossing length should be incorporated into designs, especially at transit served intersections.

Kalamazoo Ave
Photo Credit: Rebekah Kik

Neighborhood Connectors provide critical links for within City movement by all modes of travel.



Framework of Streets: Main Street



- Sub-Urban Corridor
- Neighborhood Connector
- Main Street
- Priority Street
- Neighborhood Street "local"

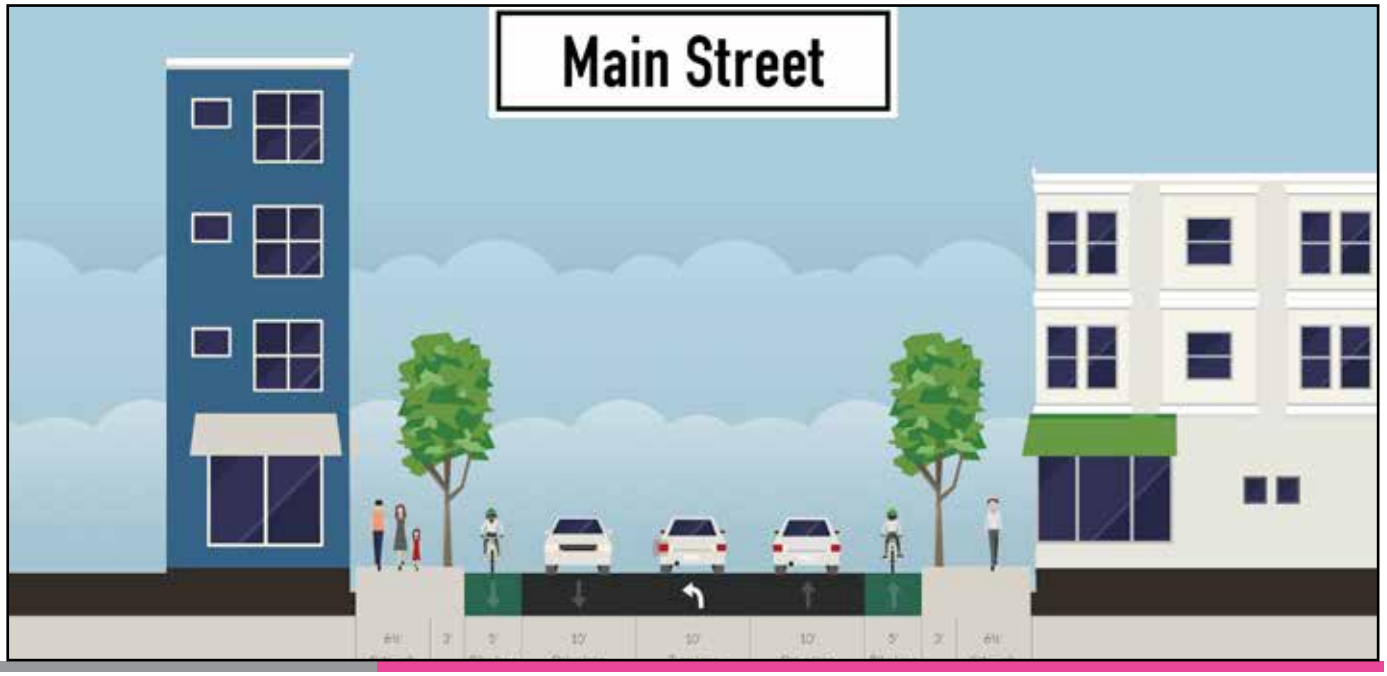
Main Street. Main Streets balance all transportation users with the aim to support economic development and a lively public place. On-street parking, on-street bicycle lanes, and sidewalks with pedestrian amenities encourage travel by any mode. This balance of users helps to create a vibrant, active street.

Adjacent Land Development. Main Streets are found in Downtown and neighborhoods. The slow moving traffic provides for many development types. The corners are particularly good for mixed use. The Main Street is where retail and restaurants meet other active uses and are encouraged on the ground floor of buildings. Buildings are located close to the sidewalk and parking is accessible to the side and rear of buildings.

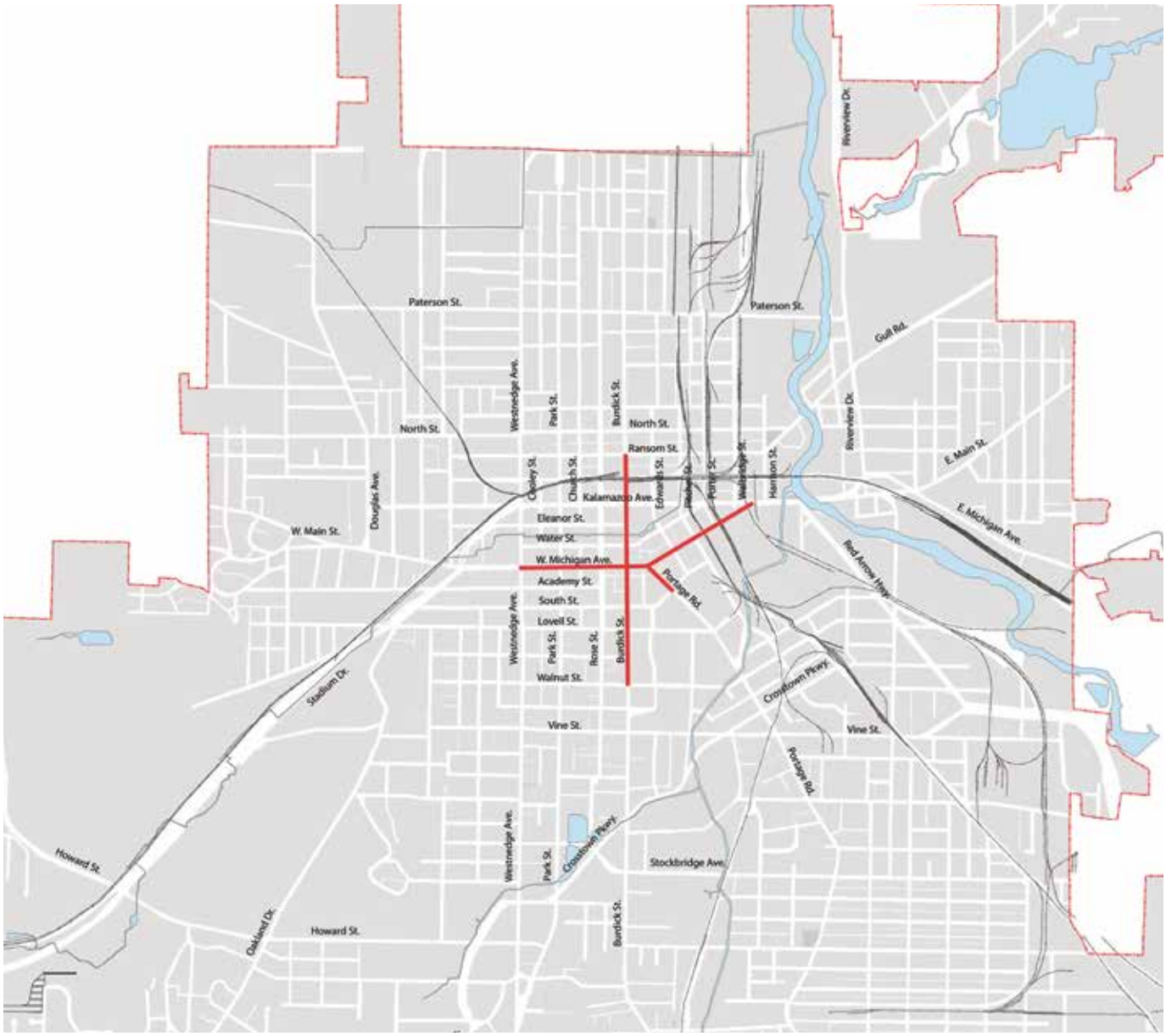
Transit. Transit routes may occur on Main Streets. Especially the smaller circulator buses such as the Holly Jolly Trolley. A permanent circulator bus was suggested many times through participation in the Imagine Kalamazoo meetings. Connectivity to the edge neighborhoods, College/University, and throughout Downtown were mentioned.

Bicycle Infrastructure. Bicycle traffic is an important element to Main Streets. Because of the extremely calmed nature of the street design, on-street bicycle infrastructure may include striped bicycle lanes, sharrows that connect to main routes, and signed bike routes.

Pedestrian Infrastructure. Sidewalks should be located on both sides of a Main Street and be made as wide as possible to encourage outdoor activity (dining, events, or public art). Streetscape improvements should be installed to enhance the pedestrian's experience. Clearly marked crosswalks and the use of bulb outs or medians to reduce crossing length should be incorporated into designs, where crossing Neighborhood Connector, or Sub-Urban Corridor intersections.



Framework of Streets: Priority Street



- Sub-Urban Corridor
- Neighborhood Connector
- Main Street
- Priority Street
- Neighborhood Street "local"

Priority Streets. Priority Streets are high volume, very low speed streets that focus on pedestrian movements and the pedestrian experience. Located in Downtown Kalamazoo, they represent the core retail and entertainment blocks. Active uses combined with wide sidewalks, inviting streetscape, and public art together create a vibrant urban shopping area. On-street parking on both sides of the street.

Adjacent Land Development. Active uses, such as retail and entertainment, should be located on the ground floor on Priority Streets. To support these uses, the ground floor should be designed with an obvious entrance, high levels of window transparency, and pedestrian-oriented signage. Residential and office uses are permitted, but should be located on upper stories. Buildings are located up to the sidewalk and parking is handled through side or rear entry. Curb cuts should not be allowed on these streets except for alleys.

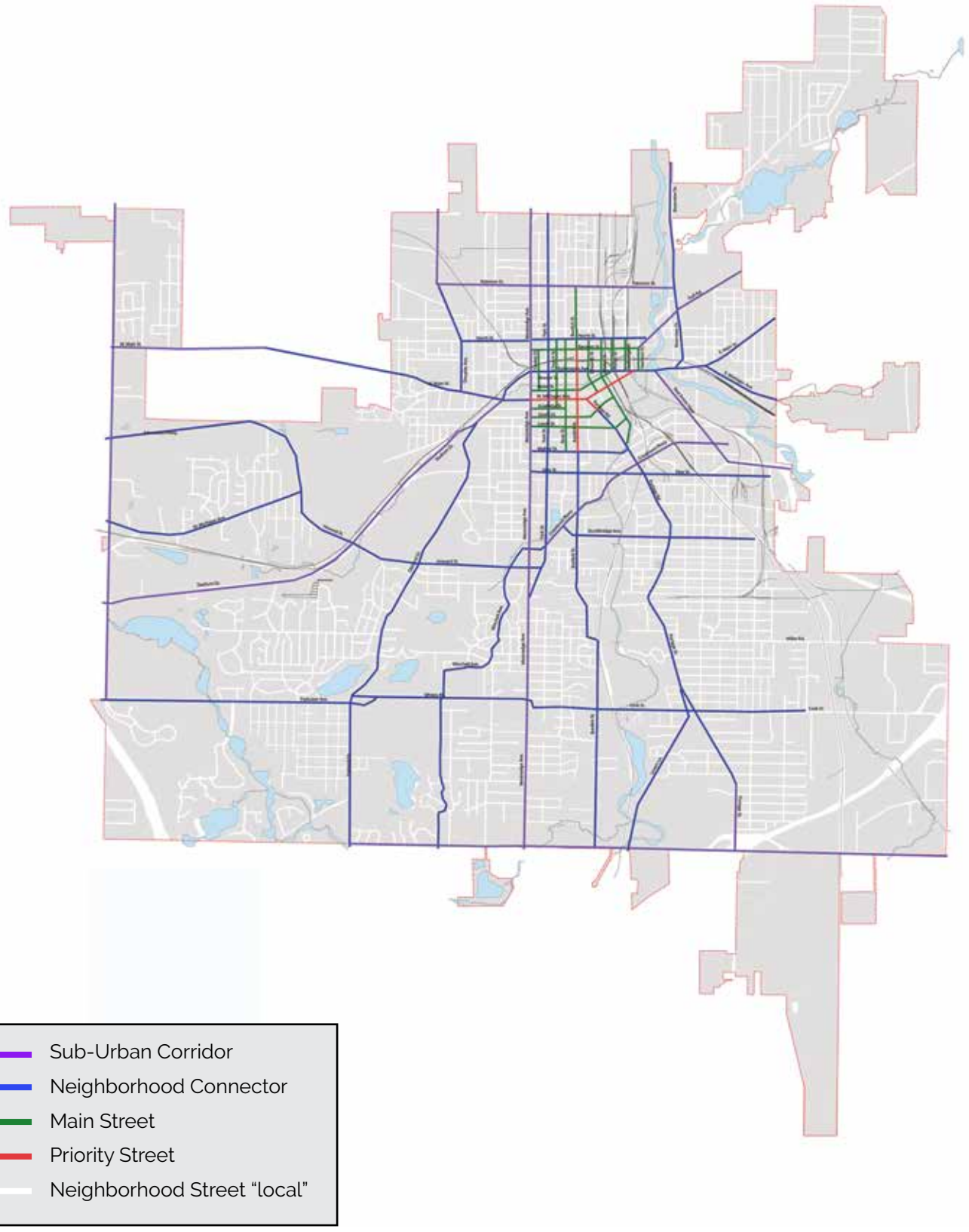
Transit. Access to transit from Priority Streets is key to the Downtown. Clearly marked transit stops, improved with such elements as signage, benches, or shelter will facilitate transit use.

Bicycle Infrastructure. Bicycle infrastructure, including signage and parking should be included into the design of Priority Streets. Bicycle lanes are located on the street and may include protected lanes, striped bicycle routes, and signed routes.

Pedestrian Infrastructure. Priority Streets have wide sidewalks improved with high quality streetscape and pedestrian amenities to create the greatest access to retail and entertainment. These streets should strive to create inviting outdoor spaces.

Kalamazoo Mall Photo credit: Neal Conway

Framework of Streets: Neighborhood Street



Neighborhood Streets. The Neighborhood Streets sometimes called "locals" focus on the traditional grid of streets that are lined with many types of neighborhood residential. These are two lane streets designed for very slow speeds, have sidewalks one at least one side, and connect to the Neighborhood Connector or Main Street networks.

Adjacent Land Development. Every type of single family home, duplex, row house, and small apartment buildings exist on the Neighborhood Street. Some streets may have home occupation uses operating out of the residence such as: chiropractor, day care, salon, counseling or other small personal service.

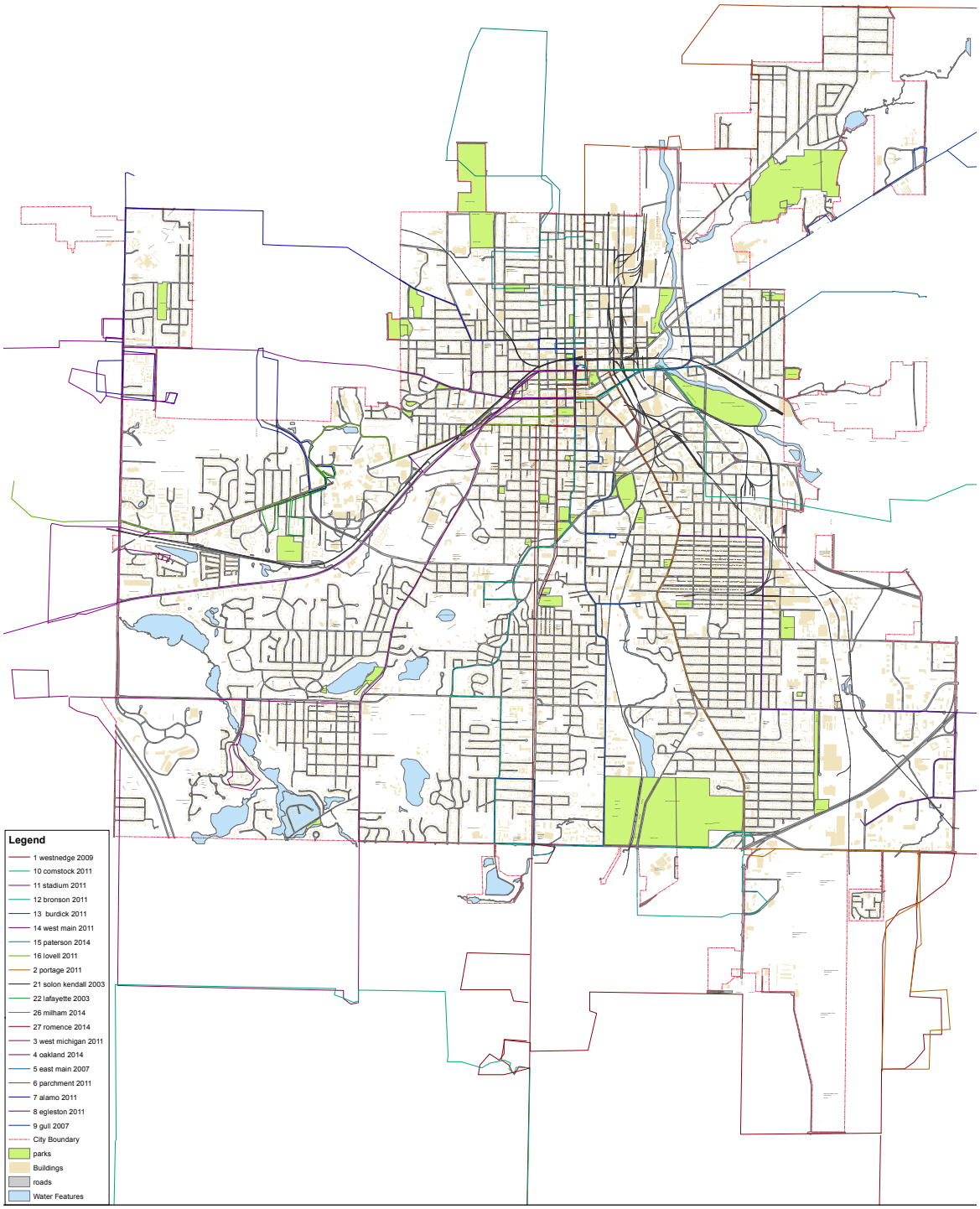
Transit. Access in and out of neighborhoods are critical for those who do not have personal transportation. Providing transportation options to vulnerable populations close to where they live is especially important to those who do not drive such as seniors, students, and those who have disabilities. Shelters and bicycle racks should be located here.

Bicycle Infrastructure. Bicycle lanes are located on the street and may include striped bicycle routes, and signed routes. Neighborhood Street bike routes are used to connect to the larger non-motorized network.

Pedestrian Infrastructure. Sidewalks should be at least on one side of the street and a minimum of 5 feet wide. Pedestrian scaled lighting should be located on streets with transit infrastructure and intersections of Neighborhood Connectors, Main Streets, and Sub-Urban Corridors.

Elizabeth Street Photo credit: Google Maps

2017 Existing Transit Circulation Map



3. Transit Planning

3.1 Transit Circulation

Through IK 2025, participants discussed the desire for an expanded transit system. Expansion of the current hub and spoke network could include additional transfer stations (hubs) and new routes and stops. In addition to network changes, transit discussion in IK 2025 also noted the need for changing perceptions of transit ridership and creating transit-supportive development.

System Expansion. IK 2025 results found that many would like to see additional transfer stations within the network. Additional hubs would provide flexibility within the system, allowing users to more easily reach their destinations without having to first travel to the Transportation Center in Downtown to change buses. New routes and stops should be explored to ensure all neighborhoods have transit access connecting to commercial areas, the university campuses, and Downtown. Bus Rapid Transit (BRT) is another option for expanding the system that should be explored - specifically, what routes would be most appropriate for this service.

Enhanced Transportation. To increase transit ridership, the perception of transit in Kalamazoo needs to change. Increased education on routes, destinations, and service record can impact potential riders perception. Last year, funding from Metro Transit, the City, and grants began to update transit stops to meet ADA requirements throughout their service area. In the next 5 years, new signage, benches, and shelters will be located in high ridership areas. Partnerships between Kalamazoo businesses and Metro Transit can assist in reaching more potential riders.

Transit Supportive Development. The City of Kalamazoo recognizes that finite land area exists for development and compact building types that encourage walkability also support retail vitality and transit ridership. The Future Land Development Plan took the location of transit routes into consideration by locating walkable urban mixed use development along transit corridors.

Transit also relies on maintaining a network of publicly accessible streets and pathways that are safe and convenient for walking and bicycling. Additional bicycle facilities, such as safe, covenant parking and repair stations should be considered near transit stops. Sidewalks at transit stops, particularly in Nodes and Downtown should be sufficiently wide to accommodate waiting passengers. Developing a network of inviting public spaces within our streets encourages transit, in addition to fostering social interaction, pedestrian activity, environmental sustainability, economic growth, and public health.

Best Practice: Bus Rapid Transit

Bus Rapid Transit (BRT) is a transit system that utilizes bus-only lanes, traffic signal priority, limited stops, and off-board fare payment to increase speed and reliability as compared to a local bus service. BRT systems have many of the same benefits of a light rail system - at a fraction of the cost. The City of Grand Rapids was the first in Michigan to institute a BRT system in 2014. Within one year, ridership increased by 35%.

Source: www.rtamichigan.org/what-is-bus-rapid-transit

4. Non-Motorized Plan

In 1998, the City adopted the first Non-Motorized Plan. This update builds off of the original plan recognizing that it was not substantially completed, and that it encompasses the framework for improving the right-of-way. This is not a special interest plan for recreational needs, while that group will stand to benefit, the focus is rather to become a City where the needs of all people and their transportation choices are planned for. The term "pedestrian" will be used broadly to cover walking, bicycling, and individuals who utilize personal mobility devices such as scooters and wheelchairs.

4.1 Pedestrian Environment

It is important that the design of the Non-Motorized Plan network understand who will be walking and cycling in Kalamazoo; and what deters others from choosing to walk or bicycle. An assessment of the current status of walkability in Kalamazoo was made with the assistance of many residents, the Kalamazoo Area Transportation Study (KATS), and City's Public Services Department. During Imagine Kalamazoo input sessions, walking audits, and evaluations were conducted throughout the city. Participants used maps to record observations about pedestrian and bicycling conditions.

The general pedestrian issues identified through Imagine Kalamazoo are:

- The need to improve crossing conditions at many busy intersections.
- Sidewalks missing or in poor condition.
- Access management is needed; curb cuts are in poor condition; locations are dangerous for crossing.
- Speeding on the part of drivers.
- Transit stops need ADA improvements, shelters, bike racks, and route information.

Complete Network. Gaps and conditions in the sidewalk system were common topics discussed

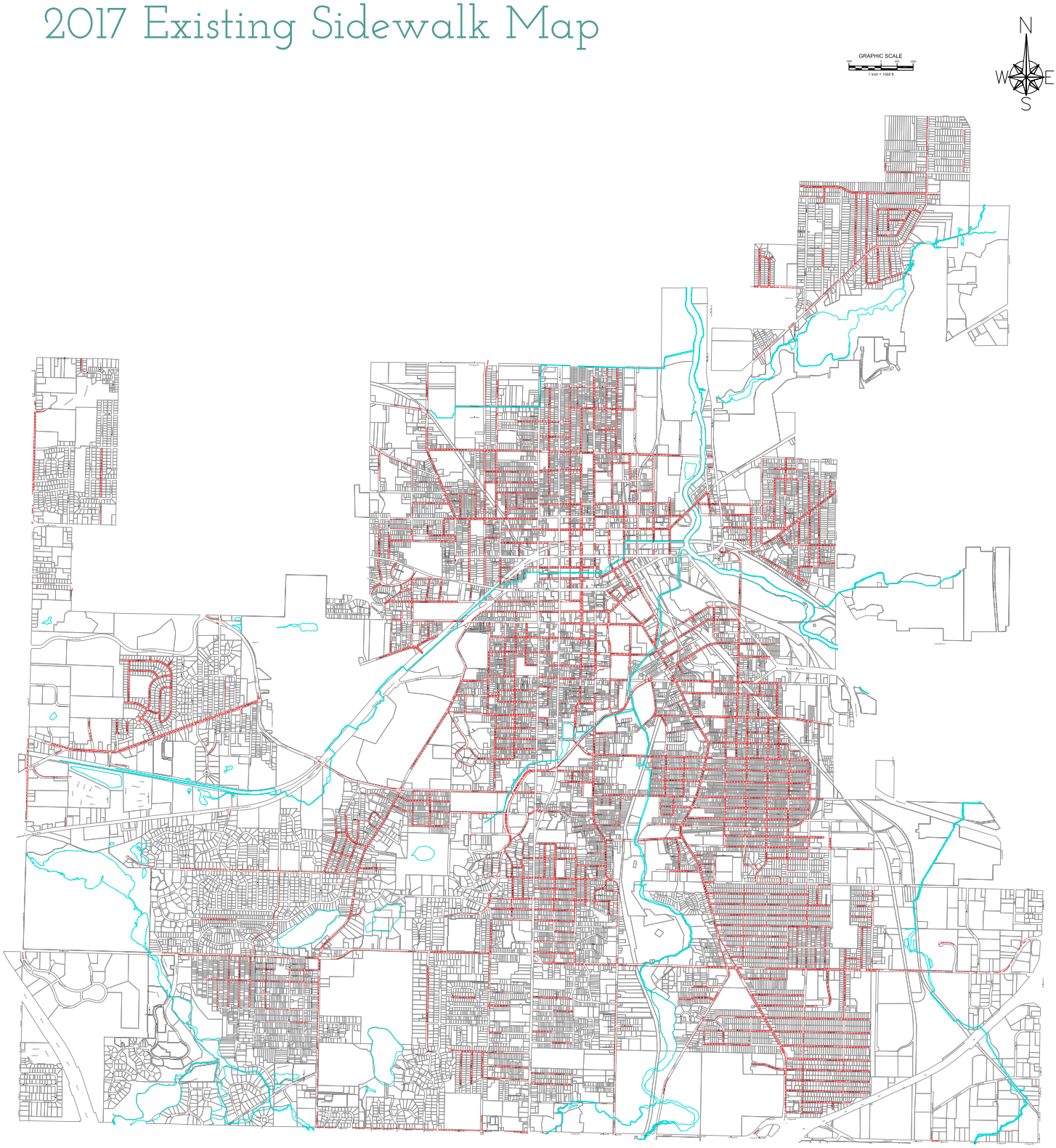
Best Practice: Walkability

Walkable City - 10 Actions Cities can Take to Improve Quality of Life:

1) *Put cars in their place* - cities should put aside the "car-first" mentality.
2) *Mix the uses* - a diversity of uses and supportive zoning encourages walking.
3) *Get the parking right* - under priced parking discourages adaptive reuse.
4) *Let transit work* - transit must be intentionally designed and enjoyable.
5) *Protect the pedestrian* - road improvements should focus on safety.
6) *Welcome bikes* - cities must encourage cycling.
7) *Shape the spaces* - good design increases the number of pedestrians.
8) *Plant trees* - street trees increase auto safety and the pedestrian environment.
9) *Make friendly building faces* - entertain pedestrians with good design.
10) *Pick your winners* - focus on priority areas.

Source: "Walkable City" by Jeff Speck. "10 Techniques for Making Cities More Walkable." City Lab; December 2012.

2017 Existing Sidewalk Map



during IK 2025. Meeting participants drew directly on maps to illustrate areas of missing sidewalks and locations of those in poor condition. To prioritize closing the gaps, participants noted their most frequent destinations: schools, parks, and Neighborhood or Commercial Nodes topped the list. As a goal for future sidewalk projects, residents noted that the City should focus first around these areas, using 1/4 mile or about a 5-minute walk.

Sidewalks as well as bicycle networks need to focus on the City's foundational block system to repair and complete the non-motorized connectivity. Existing sidewalks are shown on page 45 and should meet all American Disabilities Association (ADA) requirements. Crosswalks should be used to keep pedestrians together where they can be seen by motorists. Crosswalks with pedestrian timed signals are critical in commercial areas, especially in Nodes and in Downtown. All sidewalks should be designed to be wide enough for two people to pass comfortably at a minimum and clear of obstacles. Streetscape improvements can add to the enjoyment of walking when shaded by trees, benches are available for rest, and these amenities can create an additional buffer along traffic lanes.

4.2 Bicycle Network

The City is committed to continuously improving the bicycling environment in Kalamazoo. In 2017, the City was awarded a bronze Bicycle Friendly Award from The League of American Bicyclists. Community Planning & Development, Parks and Recreation, and Public Services are working together, along with Kalamazoo County Parks, local bicycle advocacy groups, and local anchor institutions, to provide a comprehensive bicycle network. With City partners and local businesses, the goal is to achieve a gold certificate by 2020.

Primary Network Routes. The primary bicycle network is composed of both on street and off street facilities that connect throughout the City. The updated 2025 Non-Motorized Map shown on

Streetscape improvements make sidewalks safe, accessible, and appealing for everyone. Photo credit: Neal Conway

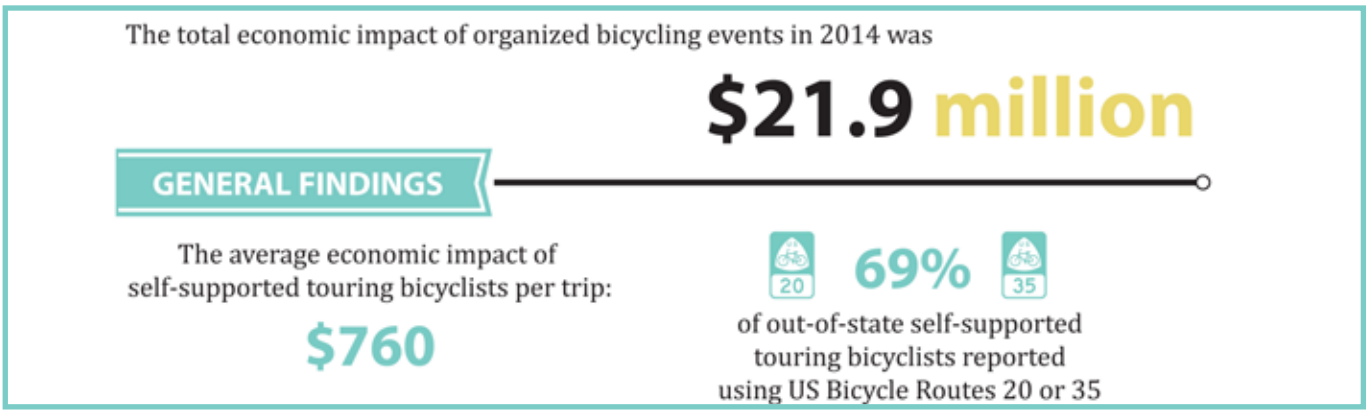
Development near rivers or creeks should make these natural elements as accessible as possible while protecting the environment. Photo credit: Neal Conway

page 48 and is built upon the 1998 map and includes additional routes identified with IK2025 participants to connect neighborhoods with destinations. Using the combined Land Use and Transportation Framework, each street will be evaluated for the type of bicycle facility that is appropriate to safely operate within the right-of-way, or to plan for off-street paths. Coordination with transit is also important in creating a comprehensive transportation network. Bicycle parking is needed at hubs and key stops where transit routes and bicycle routes intersect.

Infrastructure. Effective bicycle infrastructure requires the right facilities in the right locations. The context of city streets should first be evaluated with the Complete Streets policy. Bicycle facility options should be vetted with extensive public engagement to determine whether bicycle routes should be signed, striped, protected, or off-street and which options are available due to right-of-way constraints. To pilot and test bicycle routes and configurations pop-up bike lanes can be used to gain insight and pubic input. Amenities like placing bicycle racks should be planned along surrounding streetscape and land development, with concentrated groups of bike parking within Nodes and in Downtown.

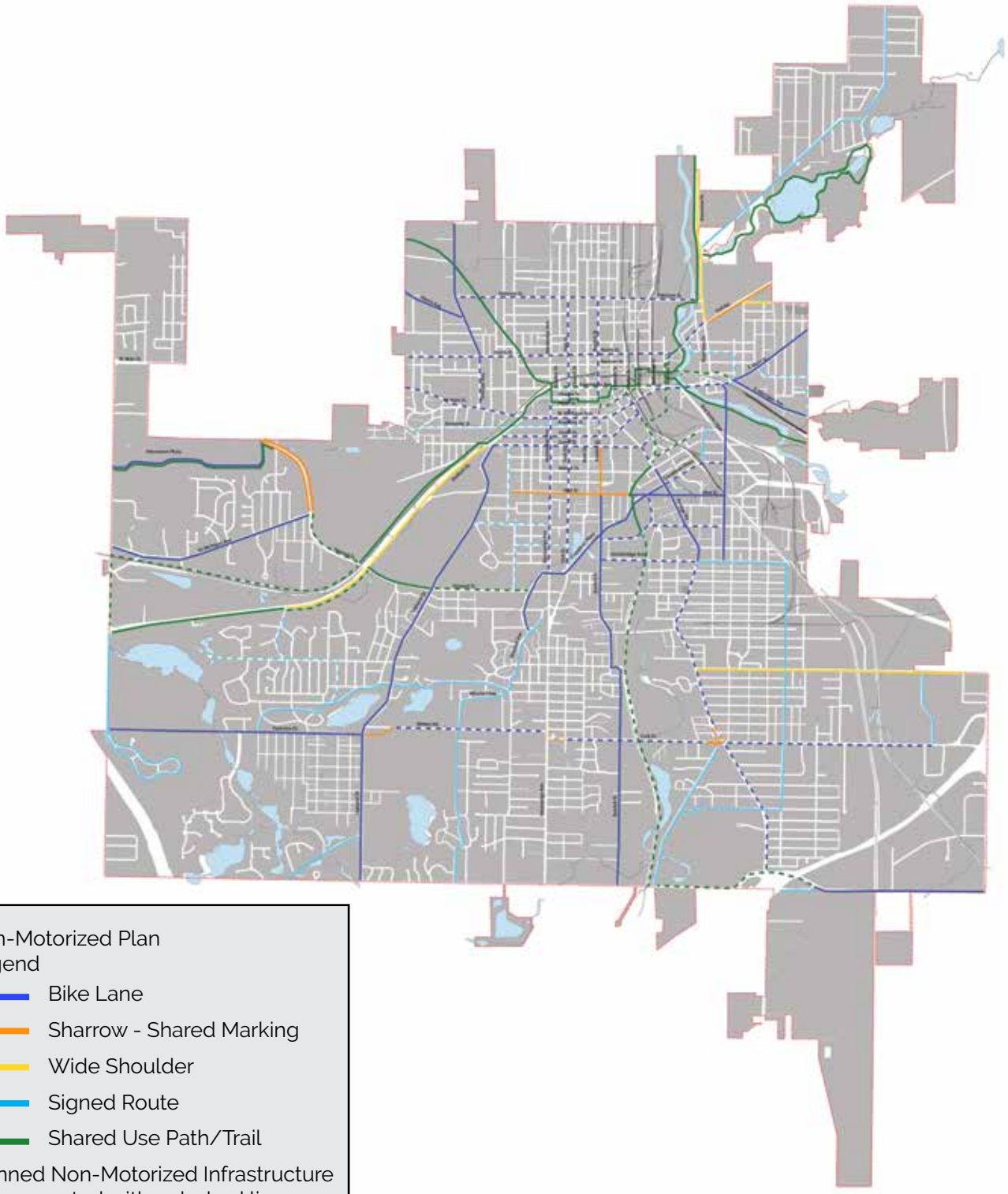
The distribution of maps and other information about bicycling in Kalamazoo needs to be updated and published regularly to help cyclists who are starting to ride and for visitors to understand the network. Other promotions can be published to inform users of special events, bicycle amenity locations, and make use of Kalamazoo's natural resources. Partnering with existing events such as Bike Week, the Tweed Ride, and the Slow Roll are excellent opportunities to introduce a friend to the network.

Shared Use Paths. Plans for a regional green way began in the early 1990's. Since then over 130 miles of trailway have been built throughout the County. Since 1998, the City of Kalamazoo has been a major missing link to the system. In 2016. plans began to solidify around the "Downtown Connector" that would connect the Jack Coombs trail at Harrison Street with the Kal-Haven Trail at Westnedge Avenue. A pop up bike lane was tested in early 2015 which lead to several routes being considered. In 2017, the trail was



Organized bicycling events positively impact the economy of Michigan. Participants in these events support local businesses and bring tourism to cities.
Source: Michigan Department of Transportation. "The Economic Benefits of Bicycling in Michigan."

Bicycle Network: Existing & Planned



Non-Motorized Plan
Legend

- Bike Lane
- Sharrow - Shared Marking
- Wide Shoulder
- Signed Route
- Shared Use Path/Trail

Planned Non-Motorized Infrastructure is represented with a dashed line

complete from east to west. Designs for the north to south connection from the Jack Coombs, that connects into the Portage Creek Bicentennial Park trail at Kilgore Road are being finalized. A portion from Walnut Street to Lake Street that runs through Upjohn Park was finished in 2017.

The City of Kalamazoo intends to continue to link trailways through the City to link with the KRVT offering the community an excellent commuting and recreational asset. These facilities, due to their access within residential areas provide a travel option to many business and cultural destinations.

Bike racks at local businesses near the trail and bike lanes give residents and visitors the option not to drive and free parking.
Photo credit: Rebekah Kik

"Downtown Connector" of the Kalamazoo River Valley Trail connects east and west ends of the regional trail to businesses.
Photo credit: Rebekah Kik

Best Practice: Urban Trails

Indianapolis Cultural Trail
Indianapolis, Indiana, is taking what may be the boldest step of any American city towards supporting bicyclists and pedestrians. The Indianapolis Cultural Trail, 8 miles of separated greenway, more than just a separated bike path, the Cultural Trail is an economic development tool that will help support and connect the city's many cultural and civic destinations. It will help revitalize the inner city by bringing more people downtown and increasing the length of time that people spend in the central city. It will also enhance street life at existing destinations and help foster new public spaces throughout the downtown. A combination of private and federal funds is being used to pay for the project. Public spaces have generally not attracted this kind of private investment, particularly in car-dominated heartland cities, but a bold vision and strong leadership at a community foundation has now raised the bar for other cities.

Source: Project for Public Spaces: "Bold Moves and Brave Actions. Article. www.pps.org

4.3 Designing and Maintaining Pedestrian Facilities

To create a pedestrian friendly community, Kalamazoo has a solid infrastructure to build from. Downtown and neighborhoods both have an extensive network of sidewalks to build upon. To develop specific pedestrian plans that address design options and policies that can impact walking is now a recognized best practice among cities. There are many examples that Kalamazoo can look to for ideas. One of the most notable changes is the National Association for City Transportation (NACTO) Urban Street Design Guide that is a resource of non-motorized facilities throughout the world. Adopting standards from NACTO is incorporated into the City's Complete Street Policy.

The Sidewalk. Sidewalks in their simplest form, join intersections together and are the 'pedestrian travel lane'. This closer examination reveals a stage of activity determined by design considerations like sidewalk width, pavement type and texture, building placement, awnings and street furniture giving the City its walkable life.

Good pedestrian access and routing is defined by the sidewalk network and its quality throughout the City. The role of the urban sidewalk extends beyond that of a mere pathway for pedestrians. The urban sidewalk is the connective tissue that unifies the pedestrian experience within the fabric of the downtown public realm. It is a place for social exchange, dining, entertainment, shopping and people watching. Such great streetscapes engage us and enlivens physical activity. People are willing to walk longer distances when they are in an environment that stimulates and offers an experience to our destination.

The Sidewalk Zones. The sidewalk is made up of four zones: curb, furnishing/ curb lawn, walkway, and building frontage. Not all streets can accommodate every zone as much of Kalamazoo is built and sidewalk width is constrained. Each sidewalk can be considered by Street Type to evaluate which zones are necessary for each zone. Recommendations for each zone width cannot always be met, competition for space can be designed through reducing the width of some or all of the zones or increasing the dimension of the entire sidewalk.

Neighborhood Sidewalk. In residential and neighborhood commercial areas the furnishing/curb lawn zone is usually planted with grass and trees. Space for signage, utilities, transit stops, and other amenities depending on the surrounding environment. The walkway area should be no less than 5 feet in residential areas and no less than 6 feet in neighborhood commercial areas.

Transit stops, shelters, loading pads, and signs are located in the furnishing zone. Care should be taken to consider the transit user's comfort and safety. All ADA requirements must be met.

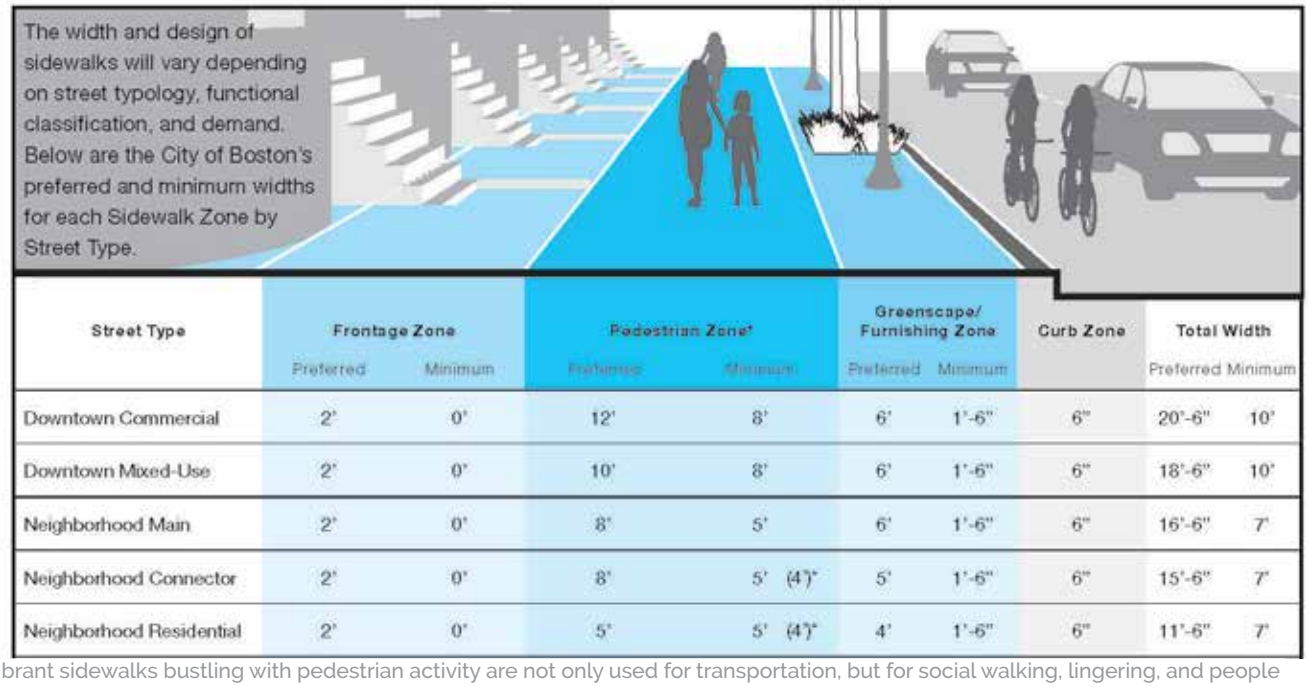
Connector Street. Along Connector streets the sidewalk is sometimes only available on one side of the street. If possible, on-street parking, an extended furniture zone, trees, and other amenities should be included when the street intersects with neighborhood commercial Nodes. The frontage zone is the

Green Infrastructure: Residential

Before - Typical residential street. www.nacto.org

After - Residential street with stormwater plantings. 1. planting strip. 2. bike boulevard; curb extensions. 3. Mid-block extension. 4. Permeable pavement blocks. www.nacto.org

Best Practice: Sidewalk Zones - Boston, MA



Street Type	Frontage Zone		Pedestrian Zone*		Greenscape/ Furnishing Zone		Curb Zone	Total Width	
	Preferred	Minimum	Preferred	Minimum	Preferred	Minimum		Preferred	Minimum
Downtown Commercial	2'	0'	12'	8'	6'	1'-6"	6"	20'-6"	10'
Downtown Mixed-Use	2'	0'	10'	8'	6'	1'-6"	6"	18'-6"	10'
Neighborhood Main	2'	0'	8'	5'	6'	1'-6"	6"	16'-6"	7'
Neighborhood Connector	2'	0'	8'	5' (4')*	5'	1'-6"	6"	15'-6"	7'
Neighborhood Residential	2'	0'	5'	5' (4')*	4'	1'-6"	6"	11'-6"	7'

Vibrant sidewalks bustling with pedestrian activity are not only used for transportation, but for social walking, lingering, and people watching. Sidewalks, especially along Downtown Commercial, Downtown Mixed-Use, and Neighborhood Main Streets, should encourage social uses of the sidewalk realm by providing adequate widths. www.nacto.org

space from the building face to the walkway that can be anything from a few inches to a several feet. Some street furniture such as benches, awnings, and planter boxes can be located in this zone.

Priority and Main Streets. In commercial areas the furnishing zone can be paved or planted. Landscaping elements should always be included, even where it is paved. Trees, potted plants, green infrastructure like rain garden planters all improve the walking environment and the adjacent development.

In the furnishing zone, tree wells should always be flush with the surrounding pavement. Commercial areas will include sidewalk cafes, bike racks, signs, mailboxes, transit stops, traffic control hardware, and lighting; all other utilities should be buried. It is essential that the furnishing area is adequate so that clear space is retained for the walkway.

Driveways. Driveways intersecting with the sidewalk are conflict points with drivers and pedestrians. Sidewalks should always cross the driveways instead of having driveways sloping through walkways. The sloped portion of the driveway apron should be kept entirely within the furnishing zone and kept as narrow as possible.

Adjacent Parking Lots. Parking lots should provide landscaping, wheel stops, walls or fences to prevent encroachment of vehicles onto sidewalks. Gravel from unpaved parking lots should not be allowed to accumulate on sidewalks and snow cleared from lots should not accumulate onto the sidewalk.

Intersections. Intersections represent the critical junction of all modes of travel. The safety and efficiency for transportation modes are defined the by the design and operation of intersections, most importantly pedestrian crossing treatment at the intersections.

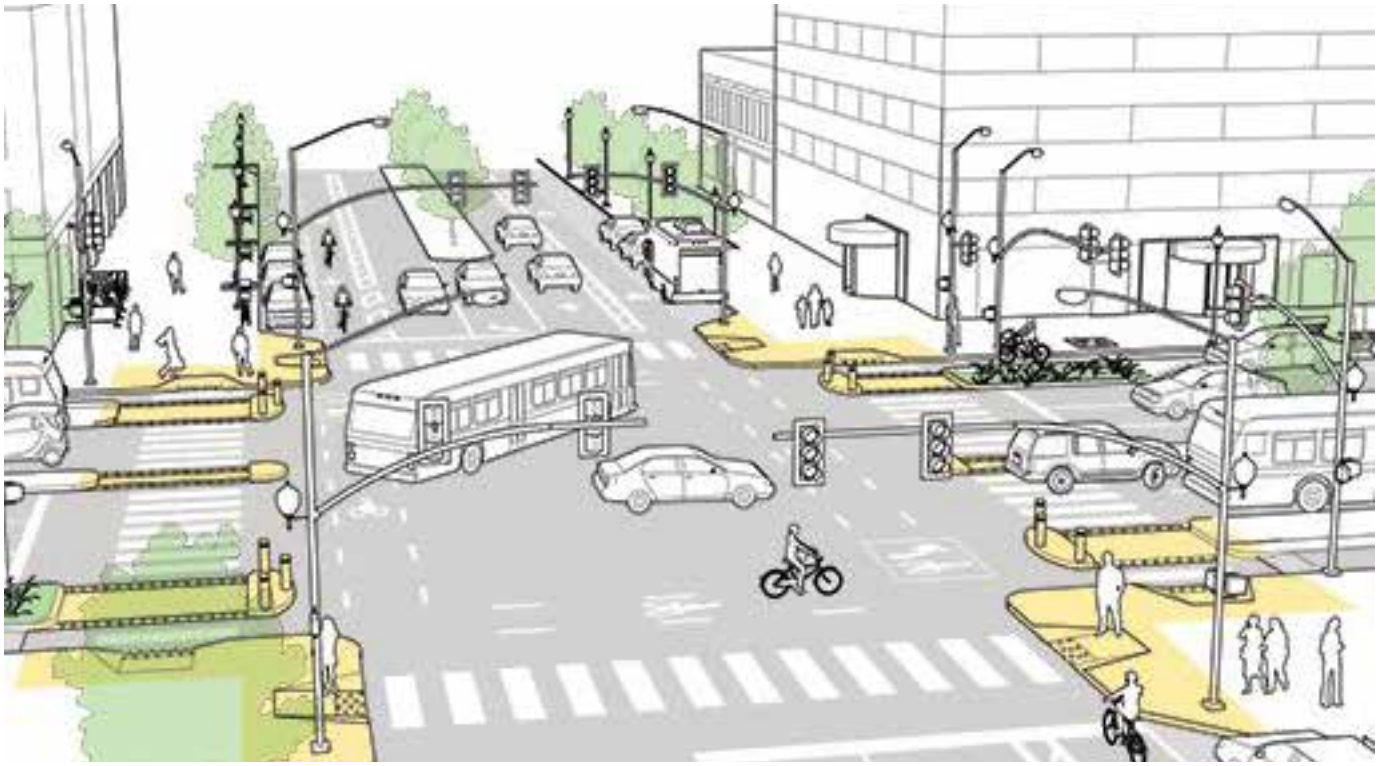
Identifying the Street Types Framework begins to establish design expectations for intersections or corner queuing zones as a basic pedestrian design measure. To create a walkable city, great care must be given to intersection design as they connect types of streets and Nodes. Creating street and intersection design guidelines are essential to minimizing conflicts between different modes of travel.

The intersections within the Street Types Framework are defined along major pedestrian routes. At the intersection of Priority and/or Main Street types these are identified as Priority intersections. They should be studied as valuable trade offs in traffic operations, to decrease walking distances and improve pedestrian visibility where street geometries allow. Intersections of Main Streets with any other street type shall also be considered a Priority Intersection. (Figure 4)

The intersections of Connectors and Sub-Urban Streets shall be considered for Connector and Sub-Urban Intersection design as a minimum. (Figure 5)
Crosswalks. Most crosswalks at minor street intersections are unmarked and the crossing distance is typically short. Crosswalks that are marked at mid-block crossings should be signed for pedestrians and all applicable laws. Pedestrians have the right of way

Priority and Main Street Intersection Design

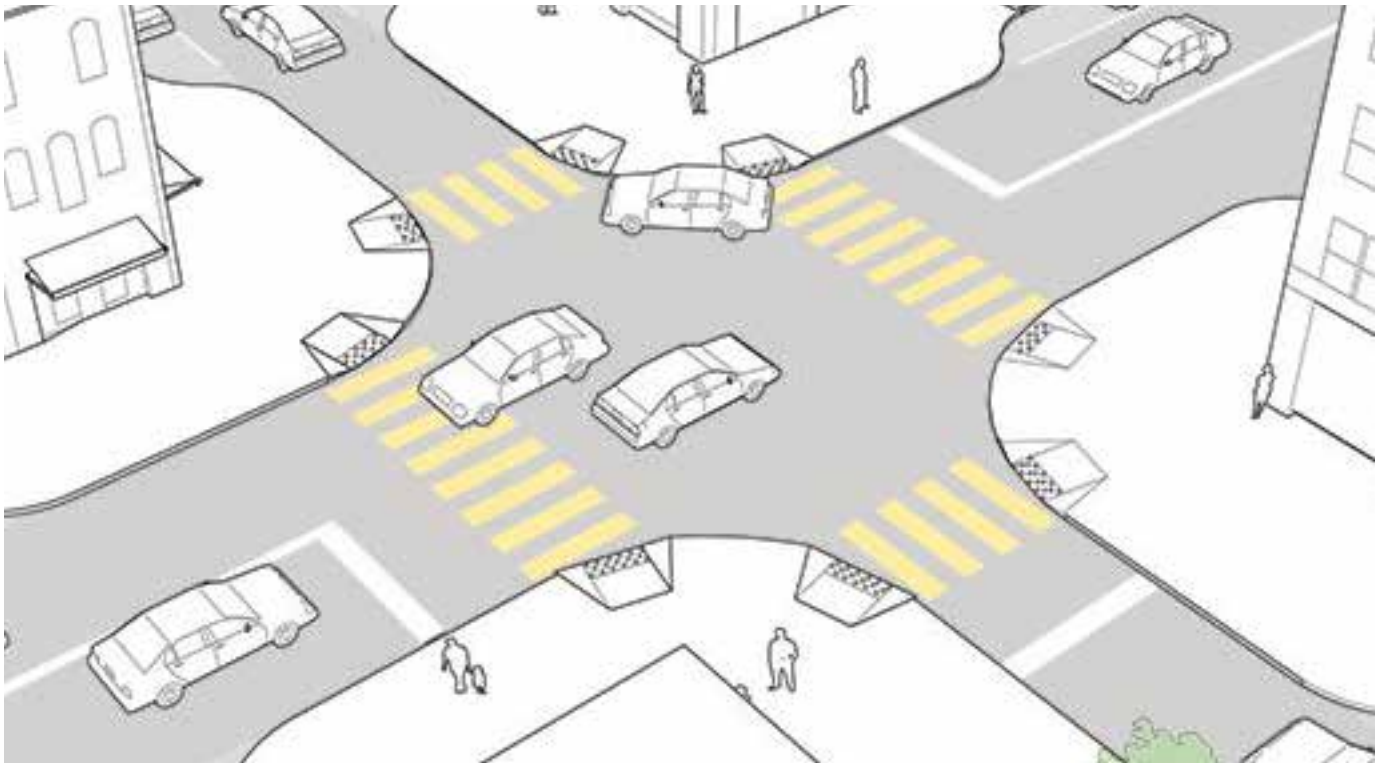
Figure 4



All modes should be considered, green infrastructure, visibility, and high pedestrian movements. www.nacto.org

Connector and Sub-Urban Intersection Design

Figure 5



All modes should be considered, green infrastructure, visibility, and high automobile movements. www.nacto.org

at crosswalks but are required by law to obey traffic control devices and laws. Crosswalks throughout the City are important connective infrastructure that can also be used to denote urban trail connectivity, celebrate gateways of neighborhoods, cultural amenities, and festivals. Attributes of good crosswalks:

Clarity. It is clear where to cross and easy to understand possible conflict points with traffic.

Visibility. Pedestrians can see and be seen by approaching traffic; lighting is adequate and obstacles do not obscure the view.

Appropriate Intervals. The potential demand for crossing is reasonably well served by available crossing opportunities.
Adequate Crossing Time - The pedestrian is allotted or can take an adequate amount of time to cross and does not need to wait an unreasonably long time to begin crossing. Timing at lights on Priority and Main Streets should not employ push button activated pedestrian walk signals, but be timed for optimal crossing at each light cycle. Audible signals with visual queues and countdowns should be used at all Downtown intersections and Nodes
Limited Exposure - The distance required to cross is short or is divided into shorter segments with median refuges.
Continuous Path - The cross walk is a direct extension of the pedestrian travel path and is free of obstacles and hazards.

All other intersections at a minimum shall be Americans with Disabilities Act compliant. When a school, park, multi-family residential, neighborhood church, or other neighborhood amenity is within 1/4 mile of the intersection; crosswalks shall be painted to connect sidewalks through the intersection.

Bicycle Infrastructure Types. Since the Non-Motorized Plan was written in 1998, many new types of bicycle facilities have been built throughout the country. The rise of gasoline prices, congestion, and the desire for physical exercise has invigorated a new generation of bicyclists. These cyclists typically ride an average of 3 miles or less for commuting to

Gilmore Keyboard Festival "keyboard" crosswalks installed at concert venue locations. Photo credit: MLive

Downtown Intersection. Photo credit: MLive

work, getting to appointments, and running errands. The comfort and safety of commuters has evolved the striped bike lanes and connectivity of the bike network.

The following definitions are summarized and images credited are taken directly from the NACTO Urban Bikeway Design Guide. All credit is through NACTO's mission to be a non-profit peer to peer resource. More information can be found at their website: www.nacto.org.

The configuration of a bike lane requires a thorough consideration of existing traffic levels and behaviors, adequate safety buffers to protect bicyclists from parked and moving vehicles, and enforcement to prohibit motorized vehicle encroachment and double-parking. Bike Lanes may be distinguished using color, lane markings, signage, and intersection treatments.

Bike Lane. A Bike Lane is defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists. Conventional bike lanes run curbside when no parking is present, adjacent to parked cars on the right-hand side of the street or on the left-hand side of the street in specific situations. Bike lanes typically run in the same direction of traffic, though they may be configured

Bike Lane - design credit: NACTO

Buffered Bike Lane - design credit: NACTO

Contra Flow Bike Lane - design credit: NACTO

in the contra-flow direction on low-traffic corridors necessary for the connectivity of a particular bicycle route.

Buffered Bike Lanes. 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. A buffered bike lane is allowed as per MUTCD guidelines for buffered preferential lanes.

Contra Flow Bike Lanes. Contra-flow bicycle lanes are bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic. They convert a one-way traffic street into a two-way street: one direction for motor vehicles and bikes, and the other for bikes only. Contra-flow lanes are separated with yellow center lane striping. Combining both direction bicycle travel on one side of the street to accommodate contra-flow movement results in a two-way cycle track.

Left Side Bike Lanes. Left-side bike lanes are conventional bike lanes placed on the left side of one-way streets or two-way median divided streets. They offer advantages along streets with heavy delivery or transit use, frequent parking turnover on the right side, or other potential conflicts that could be associated with right-side bicycle lanes. The reduced frequency of right-side door openings lowers dooring risk.

Cycle Tracks. A cycle track is an exclusive bike facility that combines the user experience of a

Left Side Bike Lane - design credit: NACTO

One Way Cycle Track - design credit: NACTO

Raised Cycle Track - design credit: NACTO

separated path 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 for bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where on-street parking is allowed cycle tracks are located to the curb-side of the parking (in contrast to bike lanes).

Cycle tracks may be one-way or two-way, and may be at street level, at sidewalk level, or at an intermediate level. If at sidewalk level, a curb or median separates them from motor traffic, while different pavement color/texture separates the cycle track from the sidewalk. If at street level, they can be separated from motor traffic by raised medians, on-street parking, or bollards. By separating cyclists from motor traffic, cycle tracks can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public.

One Way Cycle Track. One-way protected cycle tracks are bikeways that are at street level and use a variety of methods for physical protection from passing traffic. A one-way protected cycle track may be combined with a parking lane or other barrier between the cycle track and the motor vehicle travel lane. When a cycle track is elevated above street level it is called a raised cycle track and different design considerations may apply.

Raised Cycle Track. Raised cycle tracks are bicycle

Two Way Cycle Track (Protected bike lane) - design credit: NACTO

Two Way Cycle Track - Bike lanes are separated from sidewalks. Photo Credit: People for Bikes

Two Way Cycle Track - Bike lanes protected by planters. Photo credit: Bike Portland

facilities that are vertically separated from motor vehicle traffic. Many are paired with a furnishing zone between the cycle track and motor vehicle travel lane and/or pedestrian area. A raised cycle track may allow for one-way or two-way travel by bicyclists. Two-way cycle tracks have some different operational characteristics that merit additional consideration.

Raised cycle tracks may be at the level of the adjacent sidewalk, or set at an intermediate level between the roadway and sidewalk to segregate the cycle track from the pedestrian area. A raised cycle track may be combined with a parking lane or other barrier between the cycle track and the motor vehicle travel lane (refer to protected cycle tracks for additional guidance). At intersections, the raised cycle track can be dropped and merged onto the street (see cycle track intersection approach), or it can be maintained at sidewalk level, where bicyclists cross with pedestrians, possibly with a dedicated bicycle signal.

Two-Way Cycle Tracks. Two-way cycle tracks (also known as protected bike lanes, separated bikeways, and on-street bike paths) are physically separated cycle tracks that allow bicycle movement in both directions on one side of the road. Two-way cycle tracks share some of the same design characteristics as one-way tracks, but may require additional considerations at driveway and side-street crossings. A two-way cycle track may be configured as a protected cycle track—at street level with a parking lane or other barrier between the cycle track and the motor vehicle travel lane—and/or as a raised cycle track to provide vertical separation from the adjacent motor vehicle lane.

Intersection Treatments. 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 a clear right-of-way, and facilitating eye contact and awareness with competing modes. Intersection treatments can resolve 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, the adjacent street function and land use.

Bike Box. A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.
Markings. Intersection crossing markings indicate the intended path of bicyclists. They guide bicyclists on a safe and direct path through intersections, including driveways and ramps. They provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

Two Stage Turning Movements. Two-stage turn queue boxes offer bicyclists a safe way make left turns at multi-lane signalized intersections from a right side cycle track or bike lane, or right turns from a left side cycle track or bike lane.Two-stage turn queue boxes may also be used at unsignalized intersections to simplify turns from a bicycle lane or cycle track, as for example, onto a bicycle boulevard. At midblock crossing locations, a two-stage turn queue box may be used to orient bicyclists properly for safe crossings. Multiple positions are available for queuing boxes, depending on intersection configuration.

Median Refuge Islands. Median refuge islands are protected spaces placed in the center of the street to facilitate bicycle and pedestrian crossings. Crossings of two-way streets are facilitated by allowing bicyclists and pedestrians to navigate only one direction of traffic at a time. Medians configured to protect cycle tracks can both facilitate crossings and also function as two-stage turn queue boxes. Refer to the Two-Stage Turning Movement illustrations.

Through Bike Lanes. For bicyclists traveling in a conventional bike lane or from a truncated cycle track, the approach to an intersection with vehicular turn lanes can present a significant challenge. For this reason it is vital that bicyclists are provided with an opportunity to correctly position themselves to avoid conflicts with turning vehicles. This treatment specifically covers the application of a through bicycle lane or 'bicycle pocket' at the intersection. For other potential approaches to provide accommodations for bicyclists at intersections with turn lanes, please see bike box, combined bike lane/turn lane, bicycle signals, and colored bike facilities.

Bike Box - design credit: NACTO

Bike Lane Intersection Markings - design credit: NACTO

Two Stage Turning Movements - design credit: NACTO

Combined Bike Lane/Turn Lane. A combined bike lane/turn lane places a suggested bike lane within the inside portion of a dedicated motor vehicle turn lane. Shared lane markings or conventional bicycle stencils with a dashed line can delineate the space for bicyclists and motorists within the shared lane or indicate the intended path for through bicyclists. This treatment includes signage advising motorists and bicyclists of proper positioning within the lane.

When configured on a cycle track corridor, the combined lane is commonly called a mixing zone, and is intended to minimize conflicts with turning vehicles at intersections as an alternative to an exclusive bike signal phase.

Cycle Track Intersections. The approach to an intersection from a cycle track should be designed to reduce turn conflicts for bicyclists and/or to provide connections to intersecting bicycle facility types. This is typically achieved by removing the protected cycle track barrier or parking lane (or lowering a raised cycle track to street level), and shifting the bicycle lane to be closer to or shared with the adjacent motor vehicle lane. At these intersections, the experience is similar to a conventional bike lane and may involve similar applications of merging area treatments and intersection crossing markings. At the intersection, the cycle track may transition to a conventional bike lane or a combined bike lane/turn lane. Cycle track crossings of signalized intersections can also be accomplished through the use of a bicycle signal phase that reduces conflicts with motor vehicles by separating in time potentially conflicting bicycle and motor vehicle movements.

Through Bike Lane - design credit: NACTO

Through Lane - design credit: NACTO

Cycle Track Intersection - design credit: NACTO