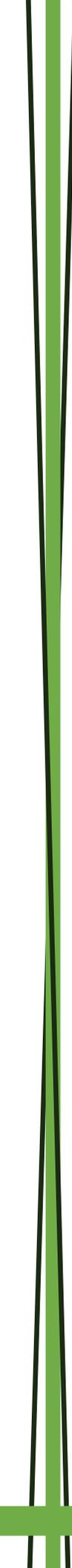


# Topeka and Shawnee County Complete Streets Design Guidelines 2019





Approved by Metropolitan Topeka Planning Organization (MTPO)  
February 28, 2019

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# PURPOSE, VISION, & BACKGROUND

## PURPOSE

The purpose of the Topeka and Shawnee County Complete Streets Design Guidelines is to ensure that City and County streets consider the needs of all users of the transportation system regardless of their age or abilities. These guidelines build on the foundation laid by the Complete Streets resolutions of the City of Topeka in 2009, Shawnee County in 2016, and the Metropolitan Topeka Planning Organization (MTPO) in 2011. These guidelines are intended to be a resource for staff, design professionals, developers and consultants. They seek to provide enough flexibility to respond to unique circumstances in the built environment and to incorporate emerging best practices.

The guidelines included in this document are based on best practices in Complete Streets design from jurisdictions across the U.S. A staff working group comprised of members of the City of Topeka and MTPO staff (Planning, Public Works, Engineering), Topeka Metro, and Shawnee County provided input and oversight throughout the process. This document touches on all aspects of street design, however, where necessary, the document refers to additional guidance and standards provided by City policy and City or national design standards.

In all cases, street design will be subject to staff approval based on these design guidelines and professional judgment.

## VISION

Topeka's streets are a vital component of the economy and health of the City and County and must meet the needs of residents, workers and visitors. The city and county's current street network is diverse and includes streets in a grid network with sidewalks in downtown and older parts of the city, transitional suburban streets, as well as formerly rural neighborhoods and developments built without sidewalks, curbs, gutters and storm sewer networks. Development patterns and contexts vary substantially from one part of the city to another. Older parts of Topeka contain traditional development patterns based on an interconnected street grid, whereas more recent suburban developments tend to be more auto-oriented with wide roadways and fast-moving traffic. Building on the City, County, and MTPO Complete Streets policies, this document sets forth the following vision for Topeka Streets:

THE PLANNING, DESIGN AND CONSTRUCTION OF TOPEKA AND SHAWNEE COUNTY'S STREETS WILL PROVIDE A BALANCED, SAFE AND RELIABLE NETWORK OF FACILITIES THAT OFFERS CONVENIENCE, CONNECTIONS, AND ACCESS FOR ALL USERS OF THE SYSTEM INCLUDING MOTORISTS, FREIGHT DRIVERS, PEDESTRIANS, BICYCLISTS AND TRANSIT RIDERS OF ALL AGES AND ABILITIES.

## GUIDING PRINCIPALS

This vision is further supported by the following guiding principles. Topeka and Shawnee County streets should:

- Create a balanced network of facilities for all modes of transportation.
- Support livable places and neighborhoods where people want to live, shop, work and play.
- Enhance the neighborhoods' history, context and sense of place.
- Support safety, comfort and health for all users.
- Be economically and environmentally sustainable.

## EXISTING POLICIES, PLANS & BACKGROUND INFORMATION

A number of existing policies, plans and design standards relate to the design guidelines provided in this document. A brief overview of these documents is provided below:

### POLICY SUPPORT FOR COMPLETE STREETS

## COMPLETE STREETS RESOLUTIONS:

### COMPLETE STREETS RESOLUTION

(2009, CITY OF TOPEKA AND 2016, SHAWNEE COUNTY)

In 2009, the City of Topeka adopted a Complete Streets Resolution; Shawnee County adopted a similar resolution in 2016. The guiding principle of the resolution is to “promote a safe network of access for pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.” The resolution also states that the City shall adequately fund the implementation of Complete Streets and incorporate pedestrian and bicycle facilities into capital improvement projects

### COMPLETE STREETS POLICY AND RECOMMENDED ACTION PLAN

(2011, METROPOLITAN TOPEKA PLANNING ORGANIZATION)

In 2011, the Metropolitan Topeka Planning Organization (MTPO) adopted a Complete Streets Policy and Recommended Action Plan. The purpose of the policy is to serve as a guide for government agencies within the MTPO to consider when developing their own Complete Streets policies. The policy references the idea that not every street will be designed for every mode of transportation. It also lists the various features of complete streets, including sidewalks, shoulders, bicycle facilities, safe crossing points, accessible curb ramps, bump outs, and bus stops. Design standards are referenced, including the City of Topeka and Shawnee County Design Criteria and Drafting Standards, Manual on Uniform Traffic Control Devices, and the Topeka-Shawnee County Regional Trails and Greenways Plan. Recommended implementation strategies include budgeting capital improvements related to Complete Streets, as well as seeking grants from state and federal sources. A suggested 20-step checklist is included for potential projects, and an example of a Complete Streets staff committee is listed, along with their possible duties.

## TOPEKA COMPREHENSIVE PLAN:

The Topeka Complete Streets Guidelines builds upon and articulates recent policy commitments the City has made to develop a more balanced and complete transportation system that enhances neighborhoods. The City's Comprehensive Plan includes two elements that contain strategies and policies supporting the design approach presented in the Complete Streets Guidelines, including the 2040 Land Use and Growth Management Plan (adopted by the City Council in March 2015) and the Neighborhood Health Element (adopted by the City Council in May 2012). The following chart includes a list of policies that support the development of this Manual and the design guidance it contains.

### TOPEKA COMPREHENSIVE PLAN POLICIES THAT SUPPORT COMPLETE STREETS

#### Land Use and Growth Management Policies:

- Create connected and walkable neighborhoods to promote a compact shape and serve as an amenity for retaining and attracting residents (page 4).
- Offer complete streets and multi-modal options to improve the livability of our community and extend the capacity of our street system (page 4).
- Transportation choices are important for future compact growth. Those choices include designing roads and facilities that handle multiple users, such as autos, public transportation, pedestrians, bicycles, etc. (page 36).
- New neighborhoods should have a high level of connectivity throughout. Complete streets should connect within neighborhoods and should also connect to adjoining neighborhoods.
- Streets should also be structured in short blocks that help promote walkability. Walkable neighborhoods are an important element of the livability of our community and will help attract "Millennials" and younger age cohorts vital to a growing community (page 36).
- Local, residential streets should be designed to slow traffic, using narrow street widths, smaller signs, parked cars, smaller curb radii, street trees, and traffic calming (page 41).

#### Neighborhood Health Element Policies:

- Plan for neighborhoods instead of subdivisions; plan for people, not cars (page 26).
- Adopt a Complete Streets policy to foster greater pedestrian and transit access along major arterials (page 26).
- Implement the Bikeways Plan to promote safe and alternative methods of transportation in the city (page 26).

## 2037 SHAWNEE COUNTY COMPREHENSIVE PLAN:

The County's Comprehensive Plan supports Complete Streets with references to the Complete Streets Policy and encourages roads to be designed for all users including motorists, bicyclists and pedestrians.

## NEIGHBORHOOD PLANS:

The City of Topeka has developed a series of neighborhood plans, with the majority including an infrastructure and circulation component. These plans support adding curbs, gutters, and storm sewers on streets which have ditches, along with a greater focus on multimodal transportation. Streetscape and gateway projects are recommended on “image” corridors, which leave an impression on people passing through the neighborhood. Examples include SE California Avenue, SW 17<sup>th</sup> Street, 6<sup>th</sup> Street, and 8<sup>th</sup> Street. Pedestrian lighting, landscaping, medians, walkways, and bikeways are typically important priorities on these corridors.

## DOWNTOWN TOPEKA REDEVELOPMENT PLAN (2000):

Adopted in 2000, the Downtown Topeka Redevelopment Plan includes a set of streetscape guidelines for all streets within the area. The pedestrian-friendly nature of Downtown is emphasized due to the importance of foot traffic for retail sales. Each corridor is classified as a primary or secondary pedestrian street. Further refinements classify each street within seven categories (S-1 through S-7), with variations including the presence or absence of furniture and medians, sidewalk width, number of travel lanes, and parking patterns. This plan is likely to be updated around 2020.

## DOWNTOWN CIRCULATION STUDY (2011):

The Downtown Topeka Circulation Study is an automobile traffic analysis of the area bounded by 3rd Street on the north, Madison Street on the east, 12th/Huntoon Streets on the south, and Topeka Boulevard to the west. The analysis examined the impact of anticipated changes to the street system. These changes include the Capitol District Project (on Kansas Avenue and 8th Street) and the reconfiguration of the I-70 access into Downtown. A Complete Streets scorecard is included and has elements to consider in future street construction projects such as sidewalk buffers, sidewalk widths, street trees and landscaping, pedestrian amenities like benches and kiosk, pedestrian scale lighting, bus shelters, ADA compliance, crosswalks, small curb radii, and curb extensions.

### CITY OF TOPEKA & SHAWNEE COUNTY STANDARDS & GUIDELINES

## CITY & COUNTY STANDARD TECHNICAL SPECIFICATIONS:

All construction, development, repair, or adjustments affecting city infrastructure must adhere to current standards. This set of specifications is intended to provide guidance for the design, review, and construction of those public improvements in or under the public right-of-way and public easements. Criteria and standards address earthwork and grading, landscaping, brick sidewalks and streets, pavement markings, work zone traffic control, pavement types and installation, and sidewalks. Standard plates accompany the manual, and include pavement, curb and gutter, driveway and alley approaches, curb ramps, and sidewalk details. Also included is a model layout for a street with a 60' wide right-of-way.

## CITY & COUNTY DESIGN CRITERIA & DRAFTING STANDARDS:

These standards include street design criteria. The minimum right-of-way requirements for streets are divided into five categories: principal arterial (105'), minor arterial (105'), collector (75'), minor collector (75'), and local residential (60'). Design speeds range from 40mph on arterials to 30mph on local residential streets. Minimum lane widths are 11' for through, left only, and right only lanes, as well as 12' for common center turn lanes. Sidewalk widths are required to be 5' on arterial and collector streets, and 4' on minor collector and local streets. Driveway standards are also included, with details on spacing, widths, and minimum distance from corners. Some of these standards will need to be updated to include the design guidance provided by the Complete Streets Design Guidelines.

## CITY OF TOPEKA MUNICIPAL CODE:

The Municipal Code contains the City's zoning (summarized below) as well as a number of other elements relevant to Complete Streets such as the adoption of the Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition (MUTCD), setting speed limits for City streets where no signs are posted, establishing maximum speed limits for school zones, and designating the City's through streets.

## CITY OF TOPEKA ZONING:

The City of Topeka zoning code divides the community into districts based on use such as residential, office, commercial, industrial, mixed use, and downtown mixed use. Each district type has various requirements for building setback, building height, and lot size. In addition to minimum curb-to-curb and sidewalk widths, minimum right-of-way dimensions of major traffic thoroughfares, collectors, minor streets, and pedestrian ways are included. The zoning code emphasizes a pedestrian-friendly orientation within mixed use and downtown districts, as well as "image" streets, with guidelines that place buildings at the back of sidewalks and parking lots behind buildings. Typical sections in this Complete Streets Design Guidelines are meant to be responsive to adjacent land uses.

## SHAWNEE COUNTY SUBDIVISION REGULATIONS:

The subdivision regulations for Shawnee County include design guidance for streets, alleys and public ways. This guidance includes minimum street dimensions and guidance related to the pavement widths for streets and sidewalks.

## TRAFFIC REQUESTS:

The City of Topeka Engineering Division has adopted written policies for several types of traffic requests, including accessible on-street parking, driveways across sidewalks, crosswalks, one-way streets, traffic control devices (i.e. parking signs, school signs, stop signs, yield signs), special warning and informational signs (e.g. deaf child, neighborhood watch), traffic calming, and truck routes. Each type of traffic request includes a unique procedure for completion.

## TOPEKA METRO BUS STOP GUIDELINES:

Topeka Metro has developed and honed over a period of years a design document that guides the planning and location of transit stops throughout Topeka and Shawnee County. These guidelines address location, amenities, traffic placement, passenger counts impacts and other key factors in the designing of bus stops for Topeka Metro.

## REGIONAL PLANS & GUIDANCE

## FUTURES 2040 REGIONAL TRANSPORTATION PLAN:

In 2017, the MTPO adopted an updated Regional Transportation Plan, featuring two major policy shifts from previous plans. These included moving away from projects that add roadway capacity and toward projects that preserve the existing network, as well as an increased emphasis on walking and bicycling. The guiding principles of the plan are sustainability, wellness and transportation, livability, and the transportation-land use connection. The characteristics of "Great Streets," such as balancing competing needs, encouraging human contact and social activities, promoting environmental sustainability, and creating a memorable character, are listed. Recommendations for Great Streets include adding streetscape elements, burying overhead power lines, and celebrating with public art. The plan budgets Great Streets Plans for key corridors including Topeka Boulevard, Kansas Avenue, SE 29th Street, SE 6th Street, SW Wanamaker Road, and US Highway 24.

## BIKEWAYS MASTER PLAN (2012):

The Topeka Bikeways Master Plan, developed by the Metropolitan Topeka Planning Organization (MTPO), outlines the development of the area's future bikeway network. The plan considers land use, destinations, market potential, and existing trails. A detailed plan of 25 bicycle routes lists the facility types by segment. One chapter is devoted to infrastructure design concepts for facility types, including shared streets, bicycle lanes, side paths or cycle tracks, and multi-use trails. The plan also includes a street typology map, categorizing streets into 12 types such as urban arterials, main streets, mixed use boulevards, neighborhood collectors, parkways, and locals.

## PEDESTRIAN MASTER PLAN (2016):

The Topeka Pedestrian Master Plan, developed by the Metropolitan Topeka Planning Organization (MTPO), provides a guide for improvement of the walking environment, and includes five goals: a complete pedestrian network, maintained sidewalks, safety and comfort, a culture of walking, and a focus on priority projects. The third goal of safety and comfort focuses on infrastructure elements of Topeka's streets, such as crosswalks, bump outs, refuge medians, nighttime lighting, removal of obstructions at corners, landscaped buffers, benches, and increased accessibility for people with disabilities. The plan also recommends that the City of Topeka Design Criteria and Drafting Standards Manual be updated to include these elements.

## TOPEKA METRO LONG RANGE TRANSIT PLAN (FORTHCOMING 2018):

The Topeka Metro Long Range Transit Plan was developed by Topeka Metro Planning and Operations staff in coordination with a steering committee consisting of various community representatives who have constituents and clients using transit, serve other community-based entities or have correlating city services or public works process as their primary focus. This document takes significant public feedback including a statistically valid survey, 2 rounds of online survey and several public open houses from current and potential transit users to help prioritize potential futures for transit services in Topeka. This information will help inform Topeka Metro Board and Staff decisions in the next 5-10 years.

### STATE & FEDERAL REGULATIONS & GUIDANCE

## STATE OF KANSAS SPEED LIMITS:

The State of Kansas regulates speed limits within municipalities, setting the speed limit in urban districts at 30 miles per hour unless otherwise posted. Local authorities may set alternative speed limits if determined appropriate through engineering or traffic investigation studies. These speeds may not exceed 65 miles per hour. Residential districts and school zones may also have a decreased speed limit of no less than 20 miles per hour.

## AASHTO GREEN BOOK (2011):

The American Association of State Highway and Transportation Officials' (AASHTO) Policy on Geometric Design of Highways and Streets, 6th Edition, 2011, commonly referred to as the "Green Book," contains the current design research and best practices for highway and street geometric design. The document provides guidance to highway engineers and designers who strive to make unique design solutions that meet the needs of highway users while maintaining the integrity of the environment. It is also intended as a comprehensive reference manual to assist in administrative, planning, and educational efforts pertaining to design formulation. Design guidelines are included for freeways, arterials, collectors, and local roads, in both urban and rural locations, paralleling the functional classification used in highway planning. The book, similarly, is organized into the following functional chapters to stress the relationship between highway design and function: Highway Functions, Design Controls and Criteria, Elements of Design, Cross-Section Elements, Local Roads and Streets, Collector Roads and Streets, Rural and Urban Arterials, Freeways, Intersections, and Grade Separations and Interchanges.

## **AASHTO GUIDE FOR THE DEVELOPMENT OF BIKE FACILITIES (2012):**

The AASHTO Guide for the Development of Bicycle Facilities is a resource for the design, development, and maintenance of safe on- and off-street bicycle facilities. The Guide presents a set of best practices for designing roadways that comfortably accommodate a variety of user types. The information in the Guide is not intended to be strict standards nor is it all-encompassing; rather it aims at providing guidance that should be used in conjunction with other regulations such as the Manual on Uniform Traffic Control Devices (MUTCD). The 2012 edition of this Guide is currently being updated.

## **PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG):**

State and local government facilities must follow the requirements of the 2010 Standards for Accessible Design for new construction and alterations. Beginning in 1992, specific guidelines were proposed to address elements within the public right-of-way. These are known as the Public Rights-of-Way Accessibility Guidelines (PROWAG). As of February 2, 2012, the PROWAG are still “proposed.”

Although not yet officially adopted as standards by the Department of Justice, these proposed guidelines are the currently recommended best practices and are recommended when planning, designing and constructing within the right-of-way. The proposed PROWAG covers pedestrian features in new or altered public rights-of-way, including sidewalks and other pedestrian ways, street crossings, medians and traffic islands, overpasses, underpasses and bridges. On-street parking, transit stops, toilet facilities, signs, and street furniture are also addressed. The guidelines apply to permanent as well as temporary facilities, such as temporary routes around work zones and portable toilets. Provisions in the guidelines address:

- Pedestrian Access Routes (including sidewalks, street crossings, curb ramps/ blended transitions)
- Detectable Warning Surfaces
- Pedestrian Signals
- Roundabouts
- On-Street Parking and Passenger Loading Zones
- Transit Stops and Shelters
- Street Furniture and Other Elements

## **HIGHWAY CAPACITY MANUAL: A GUIDE FOR MULTIMODAL MOBILITY ANALYSIS (2016):**

The Highway Capacity Manual is a publication of the Transportation Research Board. It contains concepts, guidelines, and computational procedures for computing the capacity and quality of service of various highway facilities, including freeways, highways, arterial roads, roundabouts, signalized and unsignalized intersections, rural highways, and the effects of mass transit, pedestrians, and bicycles on the performance of these systems. The 6th edition of the Highway Capacity Manual (2016) includes the methodologies that engineers and planners use to assess the traffic and environmental effects of highway projects. The manual includes an integrated multi-modal approach to the analysis and evaluation of urban streets from the points of view of automobile drivers, transit passengers, bicyclists, and pedestrians. This multi-modal approach is known as Multi-modal Level of Service or Quality of Service. Building on previous research (NCHRP Report 616, NCHRP 3-70) the 2010 Highway Capacity Manual enables agencies to balance the level of service needs of auto drivers, transit riders, bicycle riders, and pedestrians in their street designs by providing agencies with a tool for testing different allocations of scarce street right-of-way to the different modes using the street. It is anticipated that quality of service analysis will continue to improve as the understanding of various roadway user characteristics and perceptions improves and microsimulation analyses are calibrated accordingly.

## MANUAL ON UNIFORM TRAFFIC CONTROL (2009):

The MUTCD is issued by the Federal Highway Administration of the U.S. Department of Transportation to specify the standards by which traffic signs, road surface markings, and signals are designed, installed, and used. These specifications include the shapes, colors, fonts, sizes, etc., used in road markings and signs. In the United States, all traffic control devices must generally conform to these standards. The manual is used by state and local agencies and private design and construction firms to ensure that the traffic control devices they use conform to the national standard.

## NACTO TRANSIT STREET DESIGN GUIDE (2016):

The purpose of the National Association of City Transportation Officials (NACTO) Transit Street Design Guide is to provide design guidance for the development of transit facilities, and for the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit.

## NACTO URBAN BICYCLE DESIGN GUIDE (2014):

The purpose of the NACTO Urban Bikeway Design Guide is to provide cities with state-of-the-practice solutions that can help create complete streets that safely integrate people on bicycles. Most treatments included in the NACTO Urban Bikeway Design Guide are not directly referenced in the current version of the AASHTO Guide for the Development of Bicycle Facilities, although they are virtually all (with two exceptions) permitted under the MUTCD. The NACTO Urban Bikeway Design Guide is not intended to be a comprehensive guide for the geometric design of bikeways, rather it covers certain types of on-road bikeway designs, specifically bike lanes and several new and innovative types of on-street bikeway design treatments. It does not cover shared use paths, signal design, and many other relevant topics. In most cases, the NACTO Urban Bikeway Design Guide should be used in tandem with the AASHTO Bike Guide.

## NACTO URBAN STREET DESIGN GUIDE (2013):

The purpose of the NACTO Urban Street Design Guide is to provide cities with state-of-the-practice solutions that can help to design complete streets in urban settings. The NACTO Urban Street Design Guide recognizes the direct relationship between street design and economic development and emphasizes safety for all traffic modes. The NACTO Urban Street Design Guide is not intended to be a comprehensive guide for the geometric design of the street, rather it covers design principles to meet the complex needs of cities. It builds off the street design manuals adopted by several cities since 2009. The NACTO Urban Street Design Guide references the MUTCD.

## SEPERATED BIKE LANE PLANNING AND DESIGN GUIDE (2015):

The Separated Bike Lane Planning and Design Guide is issued by the Federal Highway Administration of the U.S. Department of Transportation and provides guidelines for one- and two-way separated bike lanes, including options for intersections, driveways, transit stops, accessible parking and loading zones. Recognizing this is a developing facility type, the guide provides case studies to aid in implementation. The guide also identifies data to collect before and after separated bike lane projects and potential future research to refine and improve the practice.

### OTHER RESOURCES INCLUDE:

FHWA Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts (2016); FHWA Small Town and Rural Multimodal Networks (2016); AASHTO Roadside Design Guide (2011); NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments (2017); Other documents cited throughout these guidelines

# STREET TYPES

## INTRODUCTION

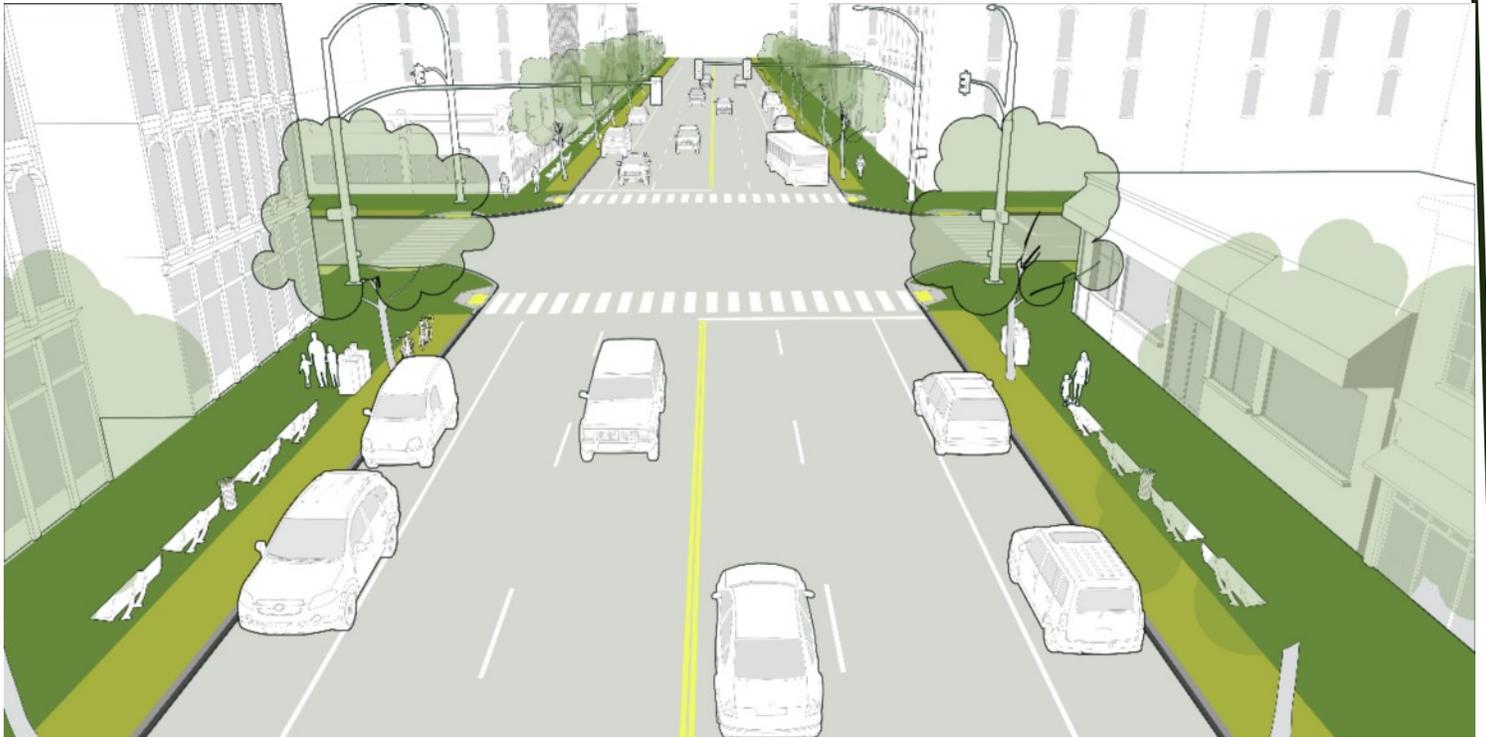
Streets are shared public spaces. Not only do they help us get where we need to go by walking, bicycling, taking transit, or driving, they are also the places where we hold parades, street festivals, political marches, and neighborhood block parties. They are a critical component of our community fabric. They provide access to neighborhoods, businesses, institutions, and recreation. They are an element of the public realm that can help shape and be shaped by our community, culture and creativity. To further support the City of Topeka and Shawnee County's Complete Streets Policies and provide a framework for ensuring that the City and County's streets serve all its users, the City and County have developed a new set of Street Types based on adjacent land use and character of the street. The new Street Types are aspirational—it may take some time to get there—but, going forward, these street types will guide future development and road projects, as well as any reconstruction or retrofit of existing streets.

The Street Types described in the following pages will supplement and enhance the traditional functional classification system of streets and, along with the design guidance and tools in subsequent chapters of this manual, provide the necessary flexibility to support diverse user needs and a range of land use conditions.

Traditional functional street classification systems such as those promoted by the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) Green Book establish a street hierarchy emphasizing automotive mobility versus property access. This traditional functional classification system is built almost exclusively around vehicular needs rather than a multimodal perspective of person throughput and goods movement. Expected and accommodated traffic volumes and travel speeds are often based on assigned classification of arterial, collector and local streets. In contrast, street typologies provide a more nuanced approach to balancing context, character, mobility and access. Street typologies were developed to provide additional guidance during the selection of street design elements as well as to help inform choices made during the visioning process of a corridor redesign project.

Because land use contexts can change throughout the length of a corridor, street types may change along the corridor as well. For example, a corridor may be categorized primarily as a Neighborhood Connector, however a commercial node along it may result in a segment being classified as a Main Street. Street design elements will change accordingly, reflecting the designated street type and its economic and mobility objectives.

# MIXED USE BOULEVARD



Mixed use boulevards are characterized by a mix of medium to high density land uses with buildings close to the street and are located primarily downtown and in central parts of Topeka. These streets tend to serve residents, visitors and workers. They should support high levels of walking, bicycling, transit, loading, parking, and delivery vehicles.

## KEY FEATURES:

- Buildings close to street
- Mix of retail, residential, institutional, and office land uses
- Medium to high density land use
- High volumes of motor vehicles and transit
- Medium pedestrian/bicycle activity on sidewalks and road-based bicycle facilities
- Frequent transit service and transit boarding and alighting facilities
- Reduced motor vehicle speeds
- Street furniture and enhanced lighting
- Need for on-street parking for motor vehicles and bicycles and loading zones

## EXAMPLE STREETS:

- SW 6th Avenue from SW Washburn to S Kansas Ave
- SE 6th Avenue from S Kansas to SE California
- NE Seward Avenue from NE Branner to NE Golden
- SW Washburn Avenue/ SW Lane (one-way couple) from SW 14th to SW 17th

# MAIN STREET



Main Streets also serve areas with a mix of land uses, however the scale of the businesses is smaller. The buildings tend to be close to the street and they often have enhanced, tailored streetscapes. These streets might also provide space for community events and festivals. They should focus on supporting pedestrian and bicycle activity.

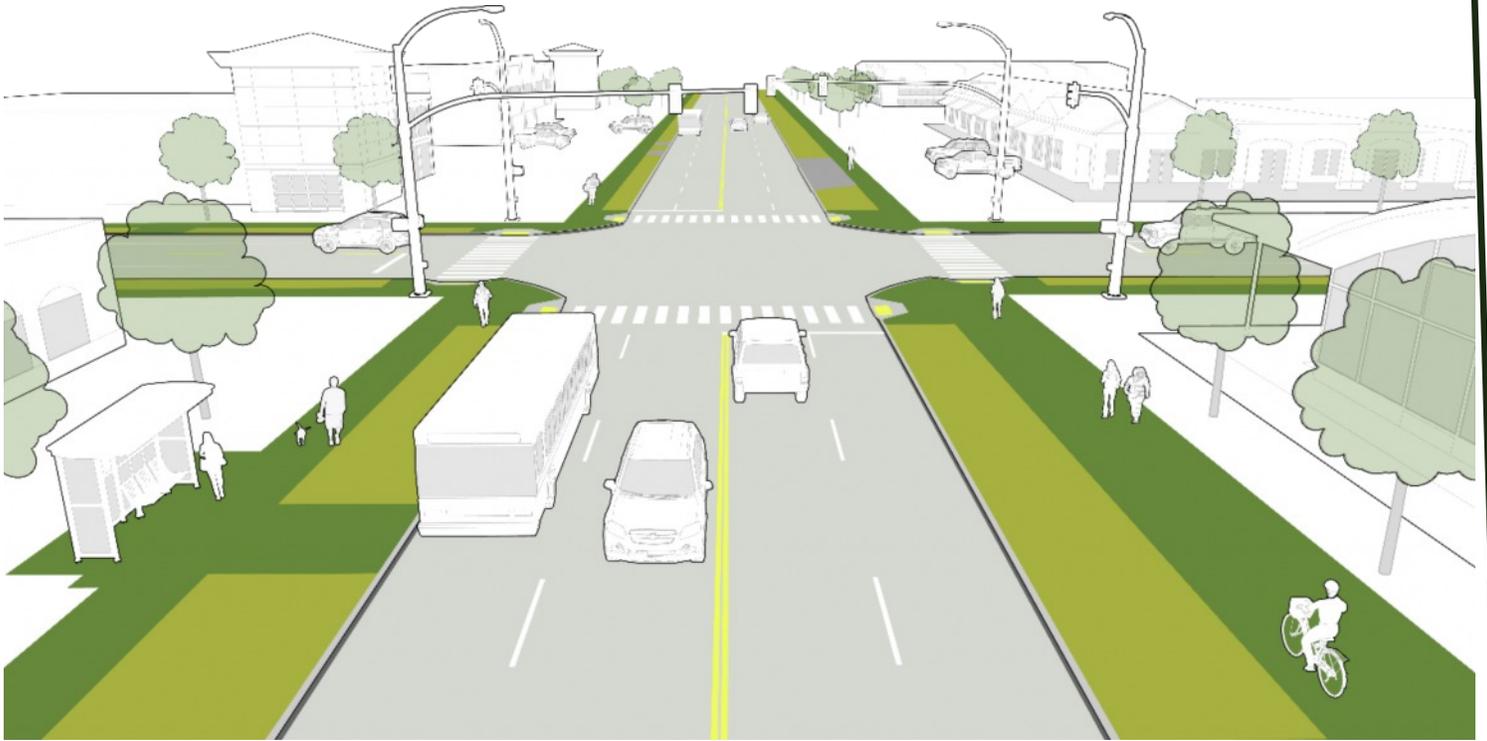
## KEY FEATURES:

- Buildings close to street
- Mix of land uses
- Small and medium size businesses
- Outdoor events & dining
- Street furniture and enhanced lighting
- Heavy pedestrian activity on sidewalks
- Bicycling on streets and bicycle facilities
- On-street motor vehicle parking
- Slow motor vehicle speeds

## EXAMPLE STREETS:

- S Kansas Avenue
- N Kansas Avenue

# COMMERCIAL CONNECTOR



Commercial Connectors typically serve employment and entertainment centers, commercial, and institutional land uses. These streets are currently dominated by motor vehicle traffic and tend to have less transit, pedestrian and bicycle activity. In Topeka, these corridors often provide regional connections. Street design for Commercial Connectors emphasizes safety for pedestrians and bicyclists by focusing on providing appropriate sidewalks, opportunities for pedestrians and bicyclists to safely cross the street, and separation from high volumes of traffic.

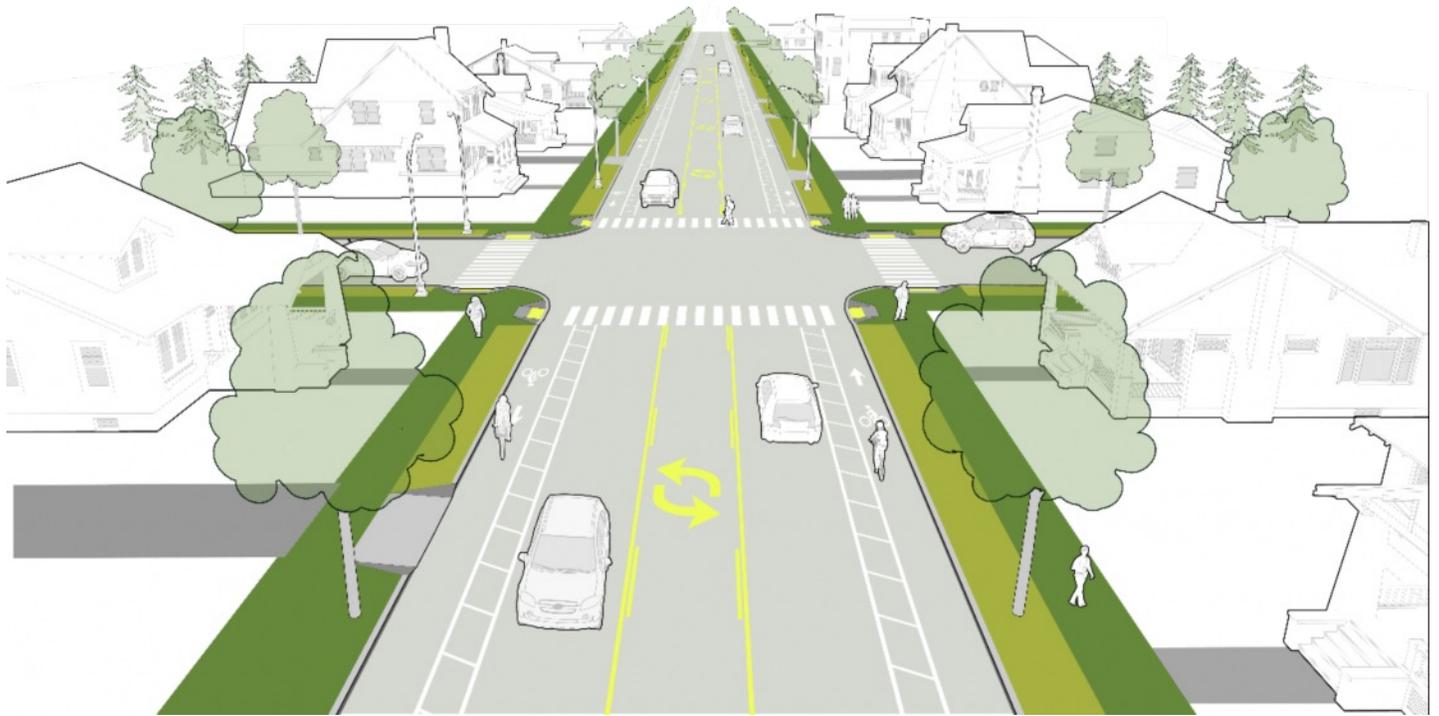
## KEY FEATURES:

- Buildings setback from street
- Large/big-box businesses
- Surface parking lots
- High volumes of motor vehicles and transit
- Light-Medium pedestrian/bicycle activity, but could increase with better accommodations

## EXAMPLE STREETS:

- SW Topeka Boulevard
- N Topeka Boulevard
- SW Wanamaker Road
- 21st Street
- California Street

# NEIGHBORHOOD CONNECTOR



Neighborhood Connector Streets are the backbone of the Topeka street network. They traverse multiple neighborhoods and often include small business or retail nodes. Neighborhood Connectors are currently dominated by motor vehicles, but also have a strong need to accommodate and encourage pedestrian and bicycle activity. These streets often have bus stops and are key routes in the transit network. Street design for Neighborhood Connectors should focus on reducing speeds, improving crossings, and providing sidewalks, potentially bikeways, tree plantings, street lighting, and neighborhood access to transit.

## KEY FEATURES:

- Connect multiple neighborhoods
- Residential with occasional businesses
- Continuous sidewalks and bicycle facilities
- Some are major bus routes

## EXAMPLE STREETS:

- SW 25th Street
- SW 37th Street
- Huntoon (Gage to Fairlawn)

# NEIGHBORHOOD RESIDENTIAL

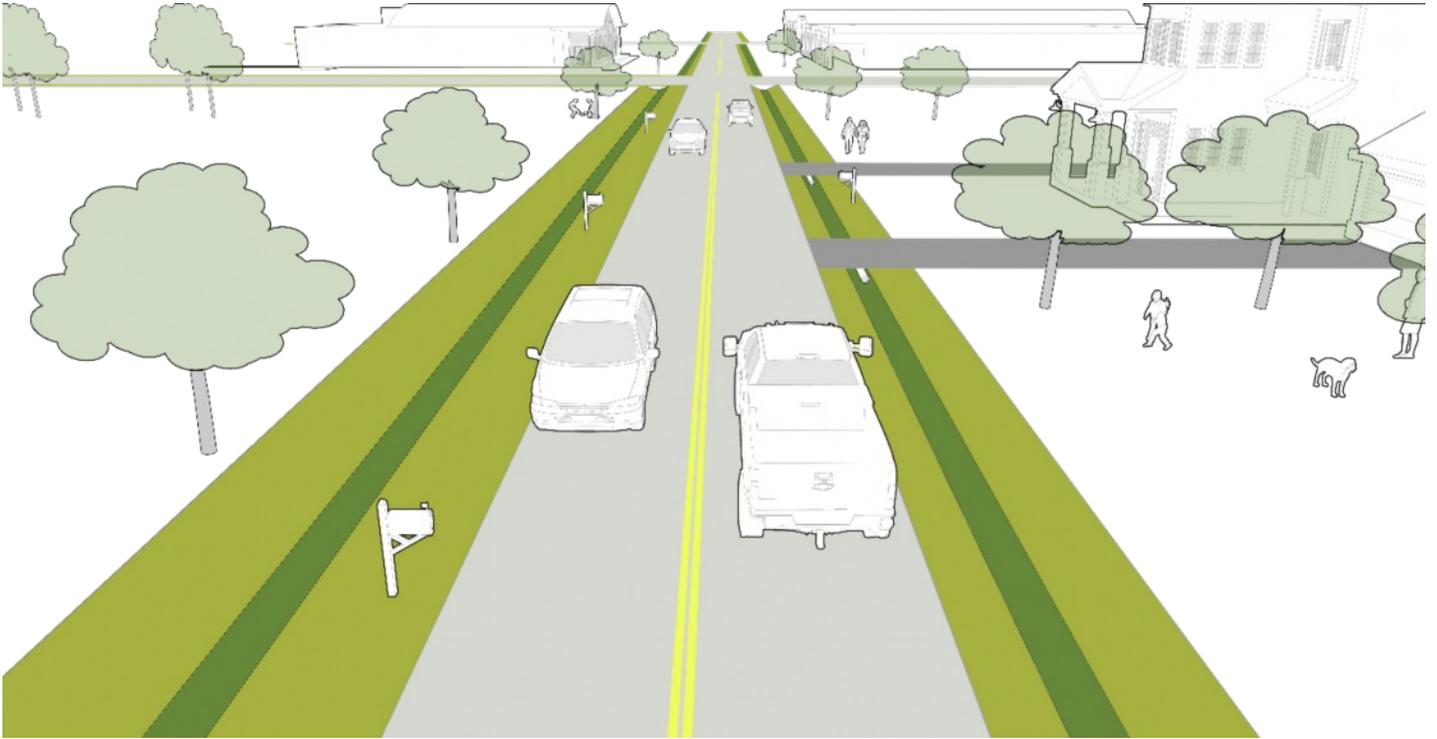


Neighborhood Residential Streets provide immediate access to residential town houses, duplexes, and single-family homes. They are used primarily for local trips and are characterized by lower volumes of vehicular traffic. These streets are not more than a single-lane in each direction and not intended for through-traffic. Design for neighborhood residential streets should focus on encouraging slow speeds, pedestrian safety, healthy street trees, and well-defined routes to nearby parks, transit, and schools.

## KEY FEATURES:

- Provide immediate access to single-family and multi-family residences
- Slow motor vehicle speeds
- Focus on pedestrian safety
- On-street parking

# RURAL RESIDENTIAL ("FARM TO MARKET" & RURAL/SUBURBAN)



Rural Residential streets are typically located on the outer edges of the City. They include traditional farm-to-market roadways with very large lot sizes or farms and newer roadways that serve rural/suburban residences with large lot sizes. They typically carry very low volumes of pedestrian, bicycle and vehicular traffic. These streets are not more than a single lane in each direction.

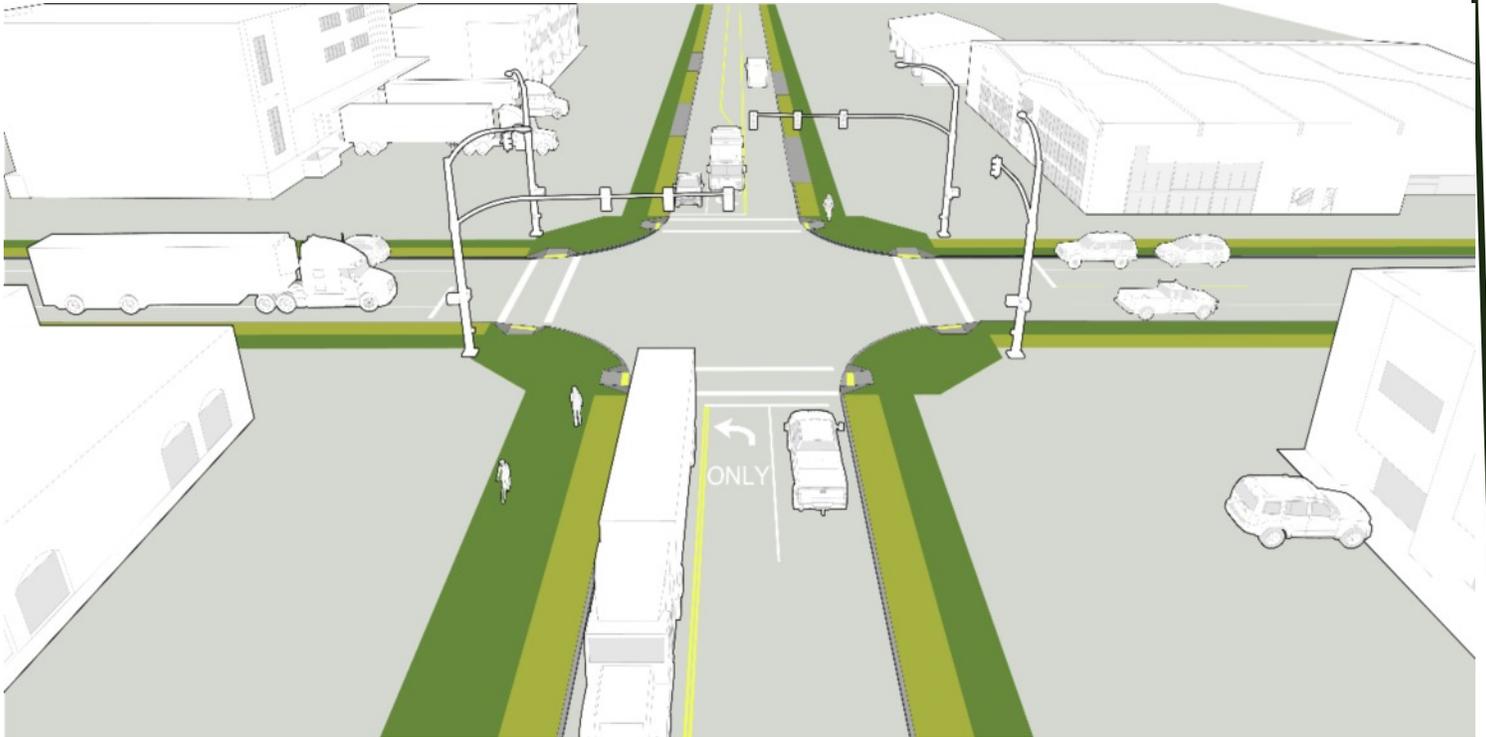
## KEY FEATURES:

- Provide immediate access to single-family residences on larger lots
- Lack curb and gutter
- Ditch drainage
- Higher motor vehicle speeds
- Shoulders for pedestrians and bicycle refuge from higher speed traffic

## EXAMPLE STREETS:

- SW 45<sup>th</sup> Street

# INDUSTRIAL STREET



These streets serve industrial corridors and are built to accommodate commercial trucks. While there may be fewer pedestrians and bicyclists in these locations, these streets may also serve as through routes to adjacent uses. Design considerations for industrial streets should focus on accommodating truck traffic and providing adequate lane width and turning radii, while also accommodating pedestrians and street trees.

## KEY FEATURES:

- Serve industrial areas
- Carry moderate to high volumes of trucks of all sizes
- Fewer bicyclists and pedestrians, but often they must pass through
- Few pedestrians, but accommodation still needed

## EXAMPLE STREETS:

- NW Lower Silver Lake
- SW 49th
- Wenger Road

# SHARED STREET



Shared Streets provide a single grade or surface that is shared by people using all modes of travel at extremely low speeds. They are often curbsless and the sidewalk is blended with the travel way. They can support a variety of land uses, including commercial, entertainment, dining, and residences. Design considerations for Shared Streets should include strategically defined edges and zones, and unique paving materials where feasible.

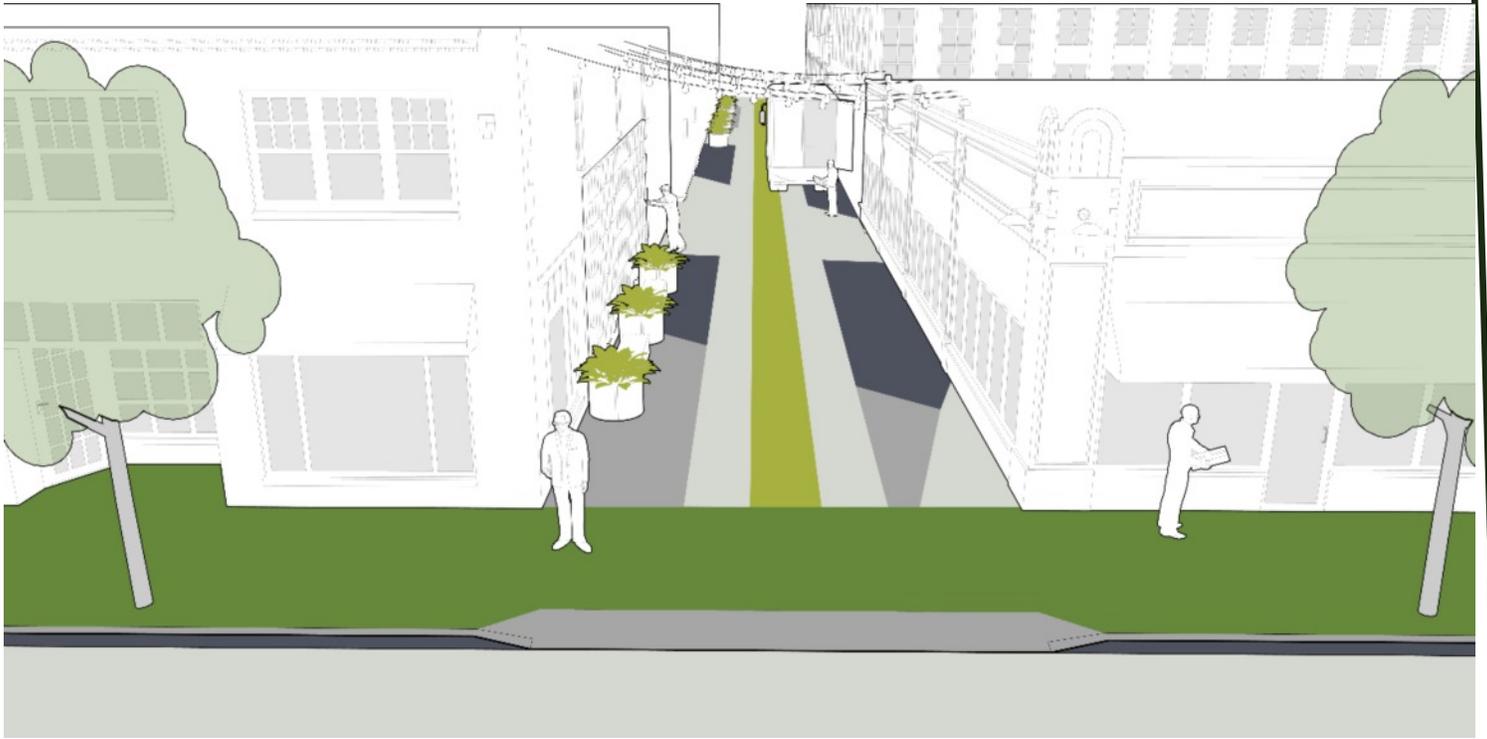
## KEY FEATURES:

- Multiple land uses
- Flush, curbsless street shared by all modes
- Sidewalk is blended with travelway
- All modes share the same space
- Extremely low speeds
- Often includes street furniture, unique paving, and lighting

## EXAMPLE STREETS:

- Old Town, Wichita

# ALLEY



Alleys may be public or private roadways. Their primary function is to provide access and service to both commercial and residential buildings

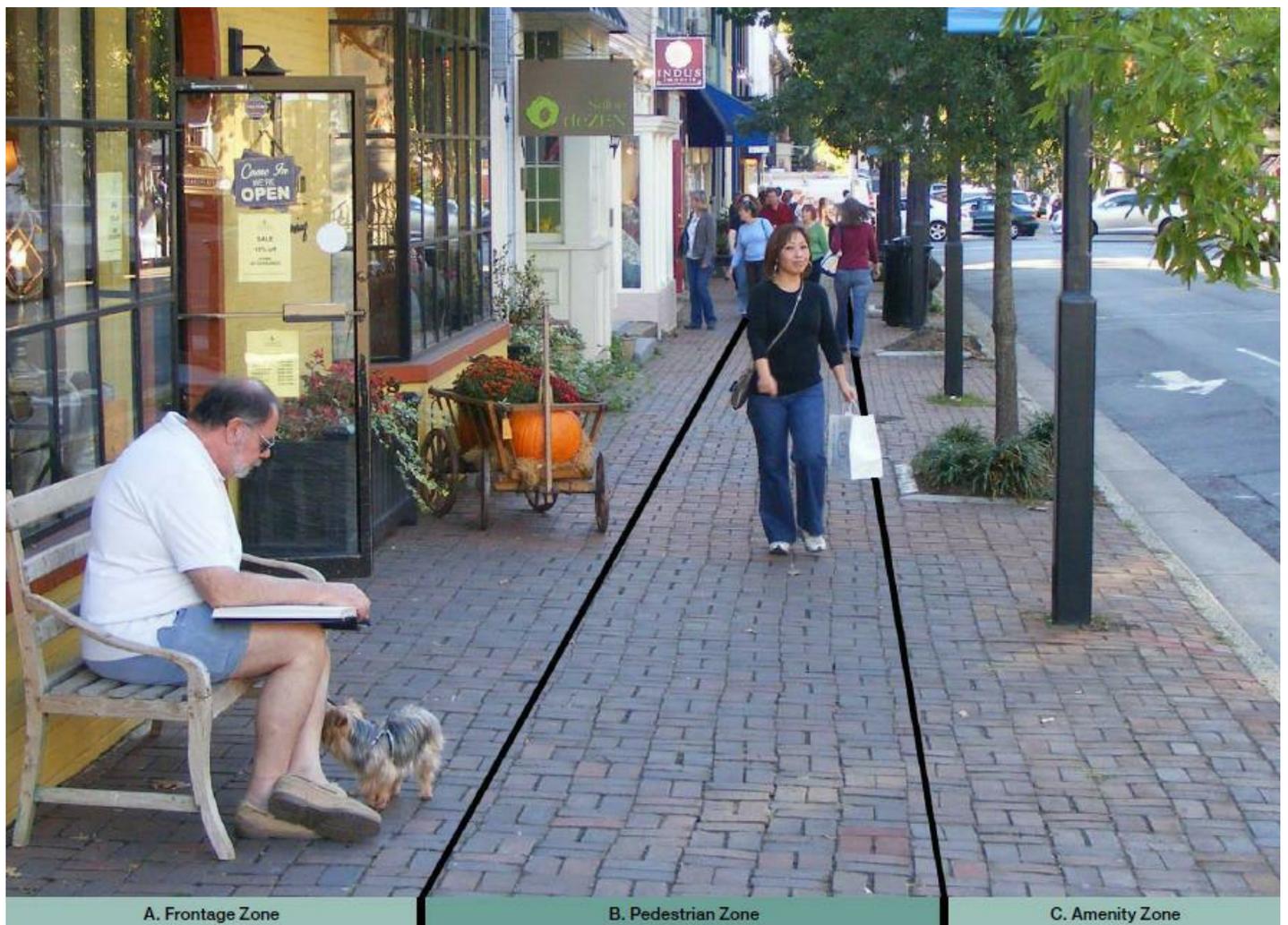
## KEY FEATURES:

- May be public or private
- Primary purpose is for access and service
- May occur in residential or commercial areas

# SIDEWALKS & STREETSIDES

## SIDEWALKS & THE PEDESTRIAN REALM

Sidewalks play a critical role in the character, function, enjoyment, and accessibility of neighborhoods, main streets, and other community destinations. Sidewalks are the place typically reserved for pedestrians within the public right-of-way, adjacent to property lines or the building face. In addition to providing vertical and/or horizontal separation between vehicles and pedestrians, the spaces between sidewalks and roadways also accommodate street trees and other plantings, stormwater infrastructure, street lights, transit facilities, and bicycle racks. This section provides an overview of the zones of the pedestrian realm.



A. Frontage Zone

B. Pedestrian Zone

C. Amenity Zone

## FRONTAGE ZONE:

The Frontage Zone is a shy zone adjacent to property line. It occupies the area of the pedestrian realm between the pedestrian zone and buildings along the street. On most sidewalks the frontage zone allows for shy distance to fences and building walls. In residential areas, the Frontage Zone may be occupied by front porches, stoops, lawns, or other landscape elements that extend from the front door of buildings to the edge of the pedestrian zone. The Frontage Zone of commercial properties within walkable business districts may include architectural features or projections, outdoor retail displays, café seating, awnings, signage, and other uses of the public right-of-way. Frontage Zones may vary widely in width from just a few feet to several yards and may include a combination of public right-of-way and private property. Some areas may not require a frontage zone adjacent to open space or parks.

## PEDESTRIAN ZONE:

Also known as the “walking zone,” the Pedestrian Zone is the portion of the sidewalk space used for active travel. For it to function, it must be kept clear of any obstacles and be wide enough to comfortably accommodate expected pedestrian volumes including those using mobility assistance devices, pushing strollers, or pulling carts. To maintain the social quality of the street, the width should accommodate pedestrians passing singly, in pairs, or in small groups as anticipated by density and adjacent land use. This area is typically paved, and in residential areas, it may be the only paved portion of the pedestrian realm.

## AMENITY ZONE:

The Amenity Zone lies between the curb and the Pedestrian Zone. This area is occupied by a variety of street fixtures such as street lights, street trees, bicycle racks, parking meters, signposts, signal boxes, benches, transit facilities, trash and recycling receptacles, and newspaper boxes. In commercial areas, it is typical for this zone to be hardscape pavement, pavers, or tree grates. In residential, or lower intensity areas, it is commonly a planted strip.

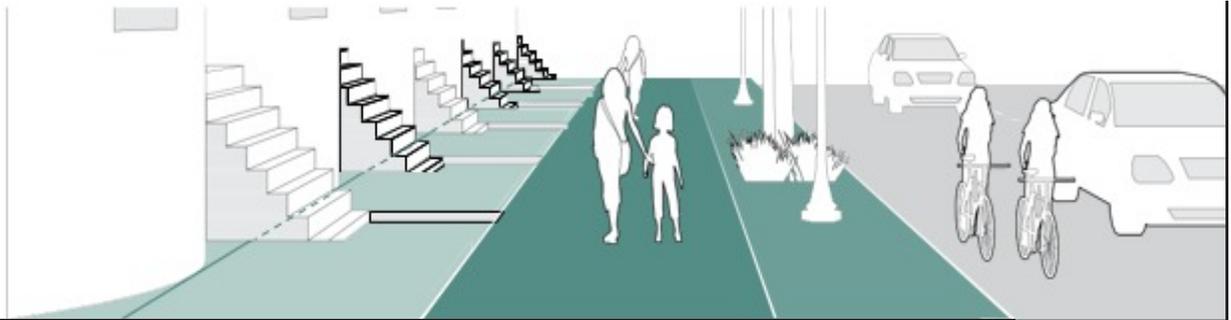
The Amenity can provide an emergency repository for snow cleared from streets and sidewalks, although snow storage should not impede access to or use of important mobility fixtures such as parking meters, bus stops, and curb ramps. Stormwater management plantings are commonly located in the Amenity Zone. The amenities in this zone should not encroach on the pedestrian zone which must be kept clear as described above.

## THE CURB:

Although not a zone per se, the curb is a unique and vital element of the street. It is the demarcation line between the pedestrian domain and the vehicular domain. The curb is typically a physical barrier providing vertical separation between the street and sidewalk. The curb coupled with adjacent gutter and stormwater inlets also plays a specific role in the drainage of the sidewalk and roadway and even of the adjacent property at times.

# PREFERRED WIDTHS FOR SIDEWALK ZONES

The width of the various sidewalk zones will vary given the Street Type, the available right-of-way, the scale of the adjoining buildings and the intensity and type of uses expected along a particular street segment. Parameters for these widths are set to complement the character of the surrounding area and the anticipated pedestrian activities. For example, a Main Street lined with retail that encourages window shopping necessitates greater widths while an Industrial street simply needs to provide adequate space for pedestrians to pass one another.



Street Type	Frontage Zone <sup>1</sup>	Pedestrian Zone <sup>2</sup>	Amenity Zone <sup>3</sup>	Total Width
	Door swings, Awnings, Café seating, Retail signage and displays, Building projections, Lawns, Fences, Landscaping, Benches, transit stops in some cases	Zone should be clear of any and all fixed obstacles. Clear space for pedestrian travel only.	Street lights and utility poles, Street trees, Bicycle racks, Parking meters, Transit stops, stormwater management plantings, Street furniture, signage, and ditches	
Mixed Use Boulevard	2'- 6'	5'-18'	6'-10'	14'-30'
Main Street	2'- 6'	5'-10'	6'-10'	14'-22'
Commercial Connector	2'-5'	5'-15'	6'-10'	14'-30'
Neighborhood Connector	2'	5'-8'	6'-7'	14'-17'
Neighborhood Residential	2'	5'	6-7'	11'-13'
Rural Residential	N/A	5'-10'	6'-10'	11'-20'
Industrial	2' or N/A	5'	6'-7'	11'-15'
Shared Streets	2'	N/A	N/A	N/A

Note: Locations of bus shelters may vary between the amenity zone and frontage zone based on sight lines and space constraints.

## GUIDANCE:

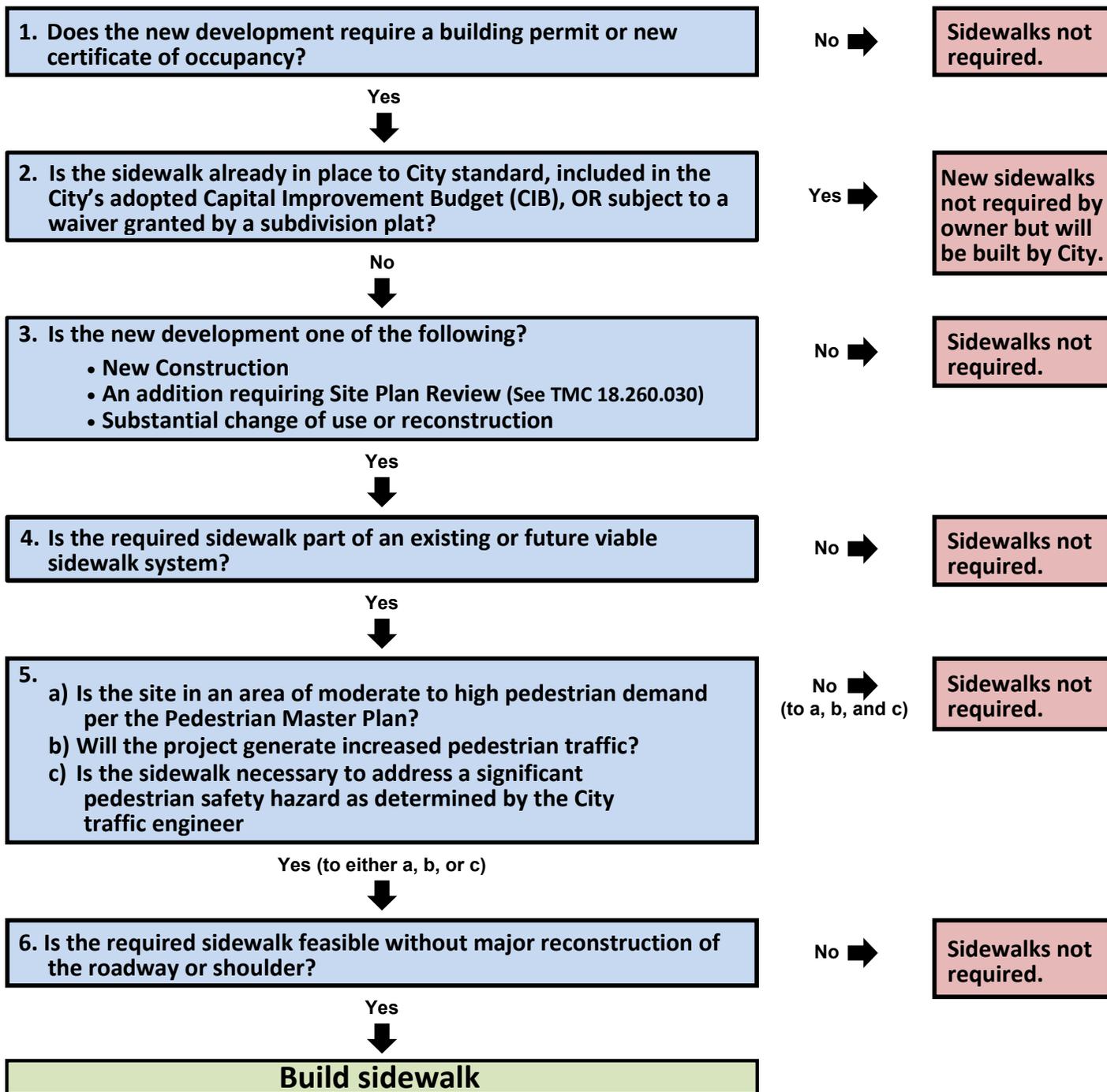
Frontage Zones used for sidewalk cafés are a special condition and should generally be no less than 6 feet in width. In locations with severely constrained rights-of-way, it is possible to provide a narrower Frontage Zone and Pedestrian Zone. Sidewalk width is based on street type, which is reflective of the context; therefore, in retrofit locations where development is not occurring and where existing buildings are anticipated to remain, 5 feet wide sidewalks may be adequate.

Stormwater management plantings require a minimum of 7 feet of width for the Amenity Zone. The final dimensions will be established based on the context of each landscape area. Where plantings are not provided in the Amenity Zone, this area may be at the lower end of the range. The provision of tree well or landscape strips within the Amenity Zone will be based on the existing or planned character of the neighborhood. Where on-street parking is not present, Amenity Zone width should be at the upper end of the recommended range and should be prioritized over the width of the Frontage Zone.

Sidewalks should be provided on both sides of all streets in most cases. The Sidewalk Decision Tree provided below provides guidance on determining if a sidewalk is required. Wider Pedestrian and Amenity Zones are preferred on streets with higher traffic volumes and speeds. Any Pedestrian Zone intended to also convey bicycle traffic (e.g., a shared use path) should be a minimum of 10 feet wide. For short segments through constrained environments, 8-foot wide shared use paths are acceptable.

## Sidewalk Decision Tree for New Development

\*Sidewalks are required for all new development when a building permit is issued (TMC 14.20.060(n)111.1) except when the Director of Planning or designee finds unique circumstances exist as described below (TMC 14.20.060(n)111.2).



### REFERENCES & RESOURCES:

Topeka Pedestrian Master Plan (2016); NACTO Urban Street Design Guide (2013); Downtown Topeka Circulation Study (2011); Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011); Downtown Topeka Redevelopment Plan (2000); AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities; Topeka Metro Bus Stop Guidelines (2018)

# SIDEWALKS MATERIALS

The key components of sidewalk construction are proper material selection, good detailing, and quality installation. These components work together to create smooth, stable, slip resistant, and durable sidewalks.

Sidewalk design plays a major role in establishing and reinforcing neighborhood and city identity. A specific palette of materials, colors, and patterns can be used to identify a neighborhood or district. In general, Neighborhood Residential and Industrial Street Types with relatively narrow sidewalks should have a single material for the entire sidewalk. Mixed Use Boulevard, Main Street, Commercial Connector, and Neighborhood Connector Street Types with wider sidewalks may have more than one type of paving material to differentiate between sidewalk zones. Varying sidewalk materials within a single zone can be used to accent or embellish special areas such as building entrances, trail approaches before crossing roadways, plaza edges, or transit stops. Inserting the name of each cross street in the paving at corners is a functional wayfinding technique that may be appropriate for Downtown or NOTO. New or reconstructed sidewalk materials should always match those of existing sidewalks to create a continuous walking and visual experience.



Topeka's sidewalks must be accessible to people of all ages and abilities. This includes everyone from people with vision, hearing, or mobility impairments to those pushing strollers or shopping carts. Accessibility is most critical in the Pedestrian Zone and at crossings. Materials and details should be selected to minimize gaps, discontinuities, rough surfaces, or any other vibration-causing features. Details should be designed to prevent the creation of tripping hazards as materials settle and age and to avoid uncomfortable or painful bumps and vibrations for pedestrians using wheeled devices such as walkers, strollers, and wheelchairs.

# MATERIALS & ACCESSIBILITY

The City of Topeka follows high accessibility standards. With respect to the public realm, the City of Topeka follows accessibility requirements set by the proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG). Refer to these guidelines for complete accessibility requirements and criteria. Listed below are highlights of the above accessibility guidelines, which discuss design features that have the greatest impact on accessibility including the grade and cross-slope of the sidewalk, curb ramps and crossings, and the selection of materials. The guidelines below meet or exceed all Federal and local guidelines and regulations regarding accessibility:

- Surfaces should be smooth, stable, and slip resistant and should minimize gaps, rough surfaces, and vibration causing features. Discontinuities in the surface, such as gaps, rises, and falls should not exceed 1/8" where feasible.
- The cross-slope of the walking zone may not exceed 2%; 1.5% is the desired design specification.
- Ramps must be present at all intersections (excluding raised crosswalks.) Their design should minimize conflicts with motor vehicles by directing pedestrians to crosswalks. Detectable warnings must be included in the ramps or approaching raised crosswalks to indicate where the roadway begins.
- Design of sidewalks and crossings should avoid pooling of rainwater or ice melt. Even small amounts of water can be hazardous and form ice.
- Designs should avoid conflicts with common obstacles in the Pedestrian Zone. Street furniture, traffic control devices, retail displays, and stormwater management features must be located outside of the Pedestrian Zone. Tripping hazards such as settled or uneven sidewalk materials, abandoned sign posts, and low planters should be addressed during redesign and construction of sidewalks.
- The Pedestrian Zone should be continuous across driveways and roadways and meet all the guidelines above.

## GUIDELINES

The following guidelines cover the selection of materials by sidewalk zone:

### FRONTAGE ZONE:

When the Frontage Zone supports active pedestrian use, like at building entrances, plazas, cafés, and where seating is provided along building facades, the Frontage Zone should be designed with the same principles as the Pedestrian Zone. Alternatively, when the Frontage Zone does not support active pedestrian use, such as where street trees, flower beds, rain gardens, and other greenscape elements are planted along building facades, materials selection should be similar to that of the Amenity Zone.

## PEDESTRIAN ZONE:

Concrete is the standard material for the Pedestrian Zone. Patterns can be sandblasted into standard concrete or special surface treatments done to add contrast and character to the surface. Pedestrian Zone materials should be continuous and differentiated across driveways.

Joints across shared use paths should avoid being vented along the direction of travel to ensure bicycle tires are not caught in expanding joints. Concrete joints generally should be installed to create a surface that is smooth and comfortable to accommodate people with disabilities.

Brick pavers may be used so long as it is feasible to achieve and maintain all accessibility requirements. Larger brick pavers are preferred to minimize joints and should be oriented in the direction of travel. Beveled-edge bricks should be avoided in the Pedestrian Zone. The City's policy for the preservation of brick sidewalks should be followed. If one of the following criteria are met, repair of the sidewalk is to be in brick:

- Located on a block within the vicinity of a state or national designated historic property,
- Located within or adjacent to a Historic District or designated Local Landmark,
- A neighborhood plan calls for preservation of the brick sidewalk,
- Located on a block where at least 60% of the sidewalk on one side of the street is brick, and is maintained in a level condition, or
- The property owner does not agree to replace it with concrete.

The installation of traditional brick pavers may result in uneven surfaces after settling if not properly maintained; this can result in uncomfortable surfaces for those with wheelchairs, pushing strollers, or pulling suitcases.

Transitions between concrete panels, unit pavers, and tree grates should be given special attention and designed to minimize bumps and differential settlement. Tree grate surfaces are not considered to be part of an accessible Pedestrian Zone.

## AMENITY ZONE:

Decorative accent strips of unit pavers are most appropriate for the Amenity Zone. Accent materials can include wire-cut bricks, unit pavers, or grating. Thematic elements such as markers and plaques can be embedded in this zone. Pavers are not recommended where gaps will result from cutting to meet existing surface features.

The use of stamped concrete as a substitute for brick pavers will be considered on a case-by-case basis. In all cases, the color and stamping pattern should closely match any existing brick. Where curbside bus stops with shelters are present, a minimum of 5 feet wide by 8 feet deep concrete landing zone should be provided at the front bus stop door.

## CURB ZONE:

Concrete is the standard material for curbs on city-owned streets. However, some areas of the City have stone and iron curbs which should be treated or restored as specified in the City's Brick Street Policy.

## REFERENCES & RESOURCES:

Topeka Pedestrian Master Plan (2016); NACTO Urban Street Design Guide (2013); Downtown Topeka Circulation Study (2011); Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011); Downtown Topeka Redevelopment Plan (2000); AASHTO Green Book ; AASHTO Roadside Design Guide; AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities; Topeka Metro Bus Stop Design Guide (2018)

# DRIVEWAYS & ACCESS MANAGEMENT

Driveways provide access from public rights-of-way onto private property. They should be used only where alley access or other shared access points or easements are unavailable. Driveways introduce a conflict zone between vehicles, pedestrians, and curbside uses, such as bicycle facilities or transit lanes and driveway vehicular access. They require special treatments to maintain a safe and comfortable walking environment.

The term “Access Management” refers to several techniques used to limit and consolidate vehicle access points to a given street. It is typically applied to streets in commercial and mixed-use contexts. It may be applied to other moderate to high traffic volume streets in other settings as appropriate.

Access Management techniques have been shown to improve roadway operations for all modes and reduce conflicts by improving traffic flow and redirecting drivers to intersections with appropriate traffic control devices. In most cases, Access Management improves overall safety because it reduces conflict points. Access Management strategies include driveway consolidation and size restrictions, limiting turning movements, installation of medians, and increasing parcel connectivity with service roads or other internal connections.

## CONSIDERATIONS:

When public sidewalks interact with private crossings, public sidewalks are given right-of-way priority. Driveways should be designed to reduce conflict for all modes on both the street and sidewalk.

Driveway width and apron turn radii should be minimized to the extent possible. Standard design is for 10 mph. The following tables provide recommended driveway dimensions. Driveway openings should not be larger than 22' wide for residential driveways, and 40' wide for industrial driveways.

RESIDENTIAL DRIVEWAY STANDARDS

Street	Throat Width	Return
Neighborhood Residential	10 ft. min. 22 ft. max.	1 ft. flare min. 5 ft. flare max.
Neighborhood Connector, Rural	10 ft. min. 22 ft. max.	3 ft. flare min. (preferred) 5 ft. flare max.
Commercial Connector	10 ft. min. 22 ft. max.*	10 ft. radius min. 20 ft. radius max.

\*Throat widths up to 30 ft. may be conditionally approved by the Public Works department.

COMMERCIAL DRIVEWAY – Passenger Vehicles

Street Typology	Two-way Driveways		One-way Driveways	
	Throat Width	Return	Throat Width	Return
Main Street, Mixed Use Boulevard	22 ft. min. 24 ft. max.	5 ft. flare**	12 ft. min. 14 ft. max.	5 ft. flare**
Neighborhood Connector, Rural Residential	24 ft. min. 33 ft. max.	5 ft. flare min.** 15 ft. radius max.	12 ft. min. 16 ft. max.	5 ft. flare min.** 15 ft. radius max.
Commercial Connector	25 ft. min. 35 ft. max.	15 ft. radius min. 30 ft. radius max.	14 ft. min. 16 ft. max.	15 ft. radius min. 30 ft. radius max.

\*\*For driveways on streets with on-street parking, flare may be reduced to 3 ft. minimum.

COMMERCIAL/INDUSTRIAL DRIVEWAY – Trucks

Street Typology	Two-way Driveways		One-way Driveways	
	Throat Width	Return	Throat Width	Return
Neighborhood Residential, Main Street*, Mixed Use Boulevard*	24 ft. min. 30 ft. max.	5 ft. flare min. 15 ft. radius max.	12 ft. min. 14 ft. max.	5 ft. flare min. 15 ft. radius max.
Neighborhood Connector, Rural	24 ft. min. 35 ft. max.	5 ft. flare min.** 20 ft. radius max.	12 ft. min. 16 ft. max.	5 ft. flare min.** 20 ft. radius max.
Commercial Connector,	30 ft. min. 40 ft. max.	25 ft. radius min. 40 ft. radius max.	16 ft. min. 20 ft. max.	25 ft. radius min. 40 ft. radius max.

\* Development on this street typology should be designed so that deliveries are typically made via curb-side loading zones, alleys, or driveways on side-streets, thereby reducing the need to provide wider driveways for delivery vehicles.

Sidewalks must meet ADA Standards at driveway crossings with the extension of the sidewalk alignment across the entrance maintaining a cross-slope not exceeding 2%.

Driveways must maintain the Pedestrian Zone as a continuous, level, and clearly delineated path across to encourage drivers to yield to pedestrians. For example, if the sidewalk is composed of brick, the brick surface treatment should be continuous across the driveway. If the Pedestrian Zone is composed of concrete and it is crossing an asphalt driveway, the concrete should be continuous across the driveway. Materials must meet accessibility requirements outlined in the Sidewalk Materials section found earlier in this chapter. Detectable warnings should be provided at commercial entrances.

In locations where sight distances are limited for drivers exiting driveways, such as at parking garage exits and other locations, stop/yield signs and other cautionary messages should be provided to ensure drivers proceed cautiously and yield to pedestrians on the sidewalk.

Three main strategies are employed in Access Management. The practicality and effectiveness of each strategy depends on the context and traffic characteristics of a street.

## DRIVEWAY CONSOLIDATION:

Research over the past decade has consistently shown that crash rates for all modes increase as the driveway density (number of driveways per mile) increases. Therefore, minimizing or reducing the number of driveways along a corridor can increase safety.

New or additional driveways will not be permitted for parcels with existing driveways or alley access. Parcels meeting these conditions would require approval from city engineer and planning director.

## RIGHT-IN / RIGHT-OUT TURNING RESTRICTIONS:

Right-in / right-out (RIRO) turning restriction is an access management technique that refers to a street or driveway where only right turns are permitted. RIRO configurations improve safety by reducing the number of conflict points between all roadway users. Research shows that approximately 72 percent of crashes at a driveway involve left-turning drivers. These crashes are primarily due to outbound vehicles turning left across through traffic and to inbound, left-turning vehicles conflicting with opposite direction through traffic. RIRO intersections may be established either by medians in the centerline of the roadway or by channelization medians (sometimes referred to as “pork chops”) in the entrance. Medians in the roadway are highly effective while medians in entrances are frequently disregarded by people in bicycles and cars.

## MEDIANS:

Similar to RIRO turning restrictions, roadway medians can also be used to prevent left turns into and/or out of driveways. They may also provide space for landscape features and pedestrian islands at crossing locations meeting certain criteria. Medians are most applicable within intersection influence areas and where there are high numbers of crashes associated with turning vehicles. Medians may be a good strategy to pursue along corridors targeted for pedestrian safety improvements. However, medians should not impede pedestrian access—median crossing islands should be provided at crossing locations, even where motorist movement is

## GUIDANCE:

In constrained locations where the sidewalk width is insufficient for a fully raised crossing, the roadway can be partially raised and the sidewalk partially lowered at driveway locations. This design minimizes the disruption to the pedestrian while still providing a traffic calming effect. On a typical 6-inch high sidewalk, this is achieved by ramping down the sidewalk at the driveway by 3 inches and raising the driveway by the same amount.

Vehicular access across sidewalks must maintain the minimum width requirements in the Pedestrian Zone. If the sidewalk is too narrow to achieve this, a curb extension should be considered where on-street parking is present. These locations should be designed to meet ADA Standards.

## DEVELOPMENT PROJECTS:

New and infill commercial, mixed use, industrial, and multi-family residential (more than five units) development projects on Mixed Use Boulevard, Commercial Connector, Main Street, and Neighborhood Connector streets should incorporate Access Management principles and tools by default. At a minimum, this means adhering to the City's minimum driveway spacing and seeking opportunities to consolidate driveways with adjacent developments. The City's access spacing requirements should be used for all new developments but may not be practical for redevelopment projects. In the case of small infill redevelopment/retrofit development entrance locations must be defined based upon a high degree of engineering judgement with final approval by the City Traffic Engineer or Public Works Director.

Properties should typically be restricted to one vehicular entrance (driveway) on each street frontage, and no more than two on any street frontage should be permitted without clear documentation of the vital need. The effort to consolidate or eliminate driveways should be made wherever possible. Where alleys exist, access should be provided from alleys.

Site planning standards for any development should encourage or require internal circulation between parcels that directs motor vehicles to locations with appropriate traffic control. Fewer driveways result in more space available for other elements that can enhance the streetscape such as street trees, landscaping and pedestrian amenities.

## RETROFIT APPLICATIONS:

Access Management principles should be considered for application on Main Street, Neighborhood Connector, Mixed Use Boulevard, and Commercial Connector corridors with any of the following conditions:

- A high number of crashes,
- Numerous and/or wide driveways where potential conflicts exist between motor vehicles, pedestrians and bicyclists,
- Driveways are spaced less than 90 feet on low volume roadways and entrances or 200 feet apart on higher volume facilities,
- Driveways are within the functional area of an intersection,
- Improvements in transit reliability and speed are desired,
- There are opportunities to develop shared access and/or internal circulation between parcels,
- A high number of left turns in and out of the driveways occur along a two-directional, multi-lane undivided facility.
- The corridor lacks left turn lanes

In retrofit / redevelopment situations, it may be impractical to relocate entrances at corner lots outside of the intersection influence area. In these instances, entrances should be located as far from the intersection as possible. Motor vehicle access and any delay associated with Access Management and driveway consolidation must be weighed against proven safety benefits. As an alternative to driveway consolidation, restricting turning movements (e.g. right-in right-out or median installation) should be considered.

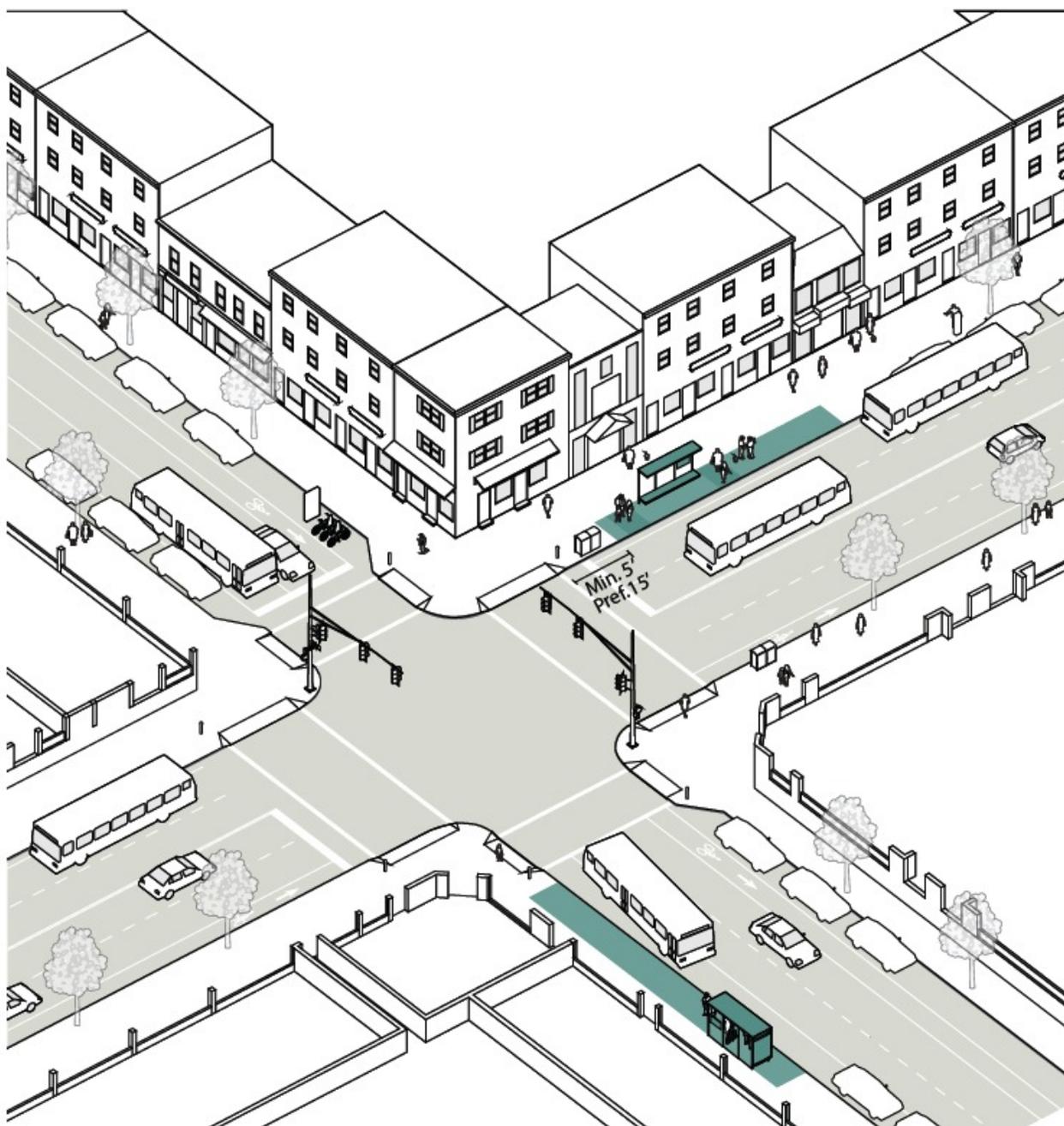
Access Management and driveway consolidation decisions should be informed by a comprehensive traffic impact analysis and pursued in cooperation with property owners to ensure impacts to businesses are minimized. Reduced access to businesses may require out-of-direction travel for all users, including walkers and bicyclists. The KDOT Access Management Policy (2013) provides additional guidance.

## REFERENCES & RESOURCES:

KDOT Access Management Policy (2013); City of Topeka Design Criteria and Drafting Standards (2008); City of Omaha Complete Streets Design Manual (Draft)

# TRANSIT STOPS

Any signed location where transit vehicles stop and service passenger boarding and alighting is a transit stop. The most basic transit stops have only a pole-mounted “header” sign indicating the transit provider. Higher volume stops generally have more passenger amenities such as benches, shelters, schedule information, trash receptacles, bicycle parking, and other features.



The transit stop in the upper portion illustrates a near side stop, while the transit stop in the lower portion shows a far side stop.

## CONSIDERATIONS:

Transit stop locations are determined based on a number of factors including existing traffic control infrastructure such as signalized crosswalks or existing crosswalks, intersection operations, bus routing, curbside conditions, transfer points, intersection geometry and sightlines, consideration of other street users, and major generators or destinations. The location of a transit stop can affect transit travel time, passenger safety, and roadway operations.

Transit stops on urban streets are typically located at the natural curb line or on a bus bulb or transit island. Transit operations, curbside uses, posted speed limits, traffic volumes, transit frequency, and typical bus dwell time all influence location decisions for transit stops. See Transit Accommodations at Intersections (Chapter 5) for bus bulb design guidance.

Transit stops may be located on the “near side” of an intersection before a signal or cross street, on the “far side” after a bus has passed through an intersection, or at a mid-block location between intersections. Generally, transit agencies prefer far-side stops when traffic flows are heavy, where there are sight distance problems, and where buses turn left. Near-side located bus stops may be appropriate where traffic flow is lower or where transit riders can more easily transfer without crossing the street. Stops can also be placed mid-block where there are major passenger generators or where space next to an intersection is insufficient. Pedestrian crossing desire lines should be anticipated to avoid unsafe pedestrian crossings.

Regardless of location, all transit stops will be ADA compliant, and should be safe, convenient, well-illuminated, and clearly visible. Transit stops should be connected to the larger pedestrian network with continuous sidewalks, curb ramps, and safe pedestrian crossings including signals, pavement markings, pedestrian islands and other measures. For example, active crossings alert drivers to the presence of pedestrians who intend to cross the street. Rectangular Rapid Flash Beacons are the most effective at attracting motor vehicle attention with the capacity to prompt 80 to 90 percent of drivers to stop or yield. Mid-block stops should provide access to mid-block crosswalks. Bus bulbs may be considered where additional pedestrian space is needed or where it is challenging for transit vehicles to reenter traffic.

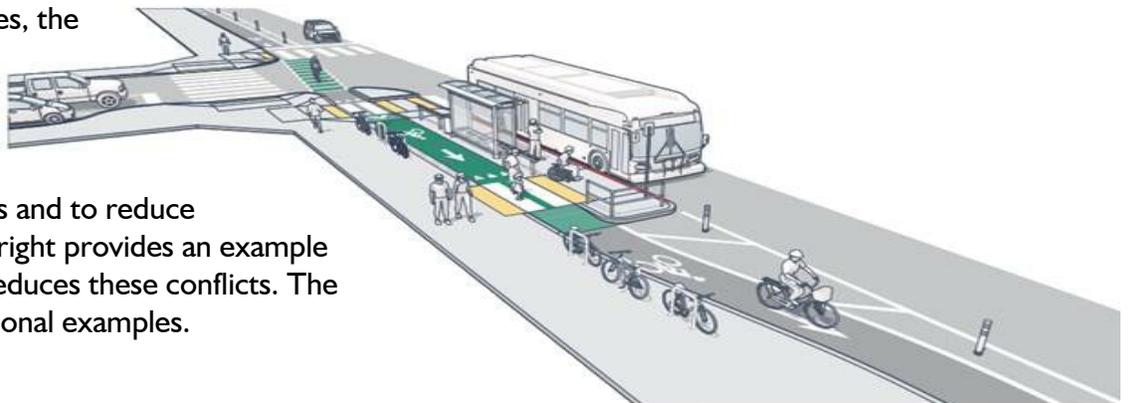
Seating at or near transit stops can improve passenger comfort, as can shade in the form of street trees or awnings. Seating need not be a unique and dedicated element, but may include leaning rails, planters, ledges, or other street elements.

## GUIDANCE:

The landing zone at the front transit vehicle door should be a clear zone 5 feet long (parallel to the curb) by 8 feet deep (beginning immediately adjacent to the curb). Newly constructed sidewalks along bus routes should have a 10-foot by 8-foot landing zone to provide an accessible space for loading and un-loading. If the sidewalk is not wide enough to support an 8-foot landing zone and on-street parking is present, a curb extension (bus bulb) should be built to accommodate the minimum width. Bus bulbs should extend to within 1 to 2 feet of the edge of the travel lane. All transit stops should meet ADA Standards.

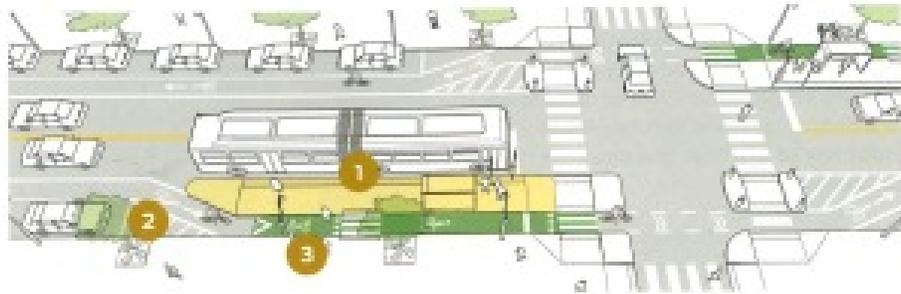
Landing zones should be provided at all doors of the transit vehicle at stops with shelters, and at the front door of the bus at all other stops. Transit stops in Topeka are typically located so that the bus remains in the travel lane while boarding and de-boarding. In select locations with bus pull-out lanes, the length of the stop can be up to 80 feet. Transit stops should be setback a minimum of 5 feet from crosswalks and storm water inlets. Where feasible, a 10-foot setback is preferred.

On streets with bike facilities, the bike facility should be routed behind the transit stop to reduce conflicts between boarding and alighting buses and bicyclists and to reduce weaving. The image to the right provides an example of a floating bus stop that reduces these conflicts. The following page shows additional examples.





**Boarding Bulb out stop**, this bus stop projects out from curb and in line with parking or lane width to bring passengers out to the edge of the traffic lane with the traffic lane isn't adjacent to curbside.



**Side Boarding Stop**, this bus stop provides a bicycle lanes through a bus stop location uninterrupted and avoids bus/bicycle conflicts. Pedestrians are provided crossing through the bicycle lane to access the transit vehicle.



**Bus/Transit Lane based Bus Stop**, this bus infrastructure has exclusive access to this lane, rather than sharing it with other single occupant motor vehicle traffic.



**Median or Center Lane Stop**, rather than being placed at the outermost lane of the roadway, this bus stop is provided in the center lane. Signal phasing and routes help enable this infrastructure type many times for Bus Rapid Transit service. Pedestrian access to these stops is provided by intersection or midblock pedestrian crossings.

**REFERENCES & RESOURCES:**

Topeka Metro Bus Stop Guidelines (2018); AASHTO Guide for Geometric Design of Transit Facilities on Highways and Streets (2014); NACTO Urban Street Design Guide (2013)

# TRANSIT SHELTERS

Well-designed transit stops can help make transit more comfortable and convenient. When providing a bus shelter, an ADA compliant, 5 feet long (parallel to the curb) by 8 feet deep landing zone should be provided. Space should be provided for snow storage during winter months to maintain clear and accessible landing zones.

Shelter placement must allow for unobstructed loading and unloading. Shelters must provide at a minimum the route information, telephone number for maintenance, protection from the weather, seating or leaning bars.

## CONSIDERATIONS:

The location of transit shelters should minimize obstructions of sight lines. Curb extensions can be combined with transit shelters to alleviate sight obstructions. Shelters should be located between store entrances or shop windows wherever possible. Transparent materials such as glass help eliminate sight obstructions and improve security.

Shelters can be placed 6 feet from the building face where sidewalks are 15 feet wide or greater to provide an accessible path behind the shelter, where space allows.

Shelters can provide more than just protection from inclement weather and a place to rest:

- Smart shelters can provide real-time travel information or other news.
- Shelters are a good location to incorporate art displays or historic information.
- Designs may also consider solar power to support lighting and heating elements to increase the comfort of waiting passengers.

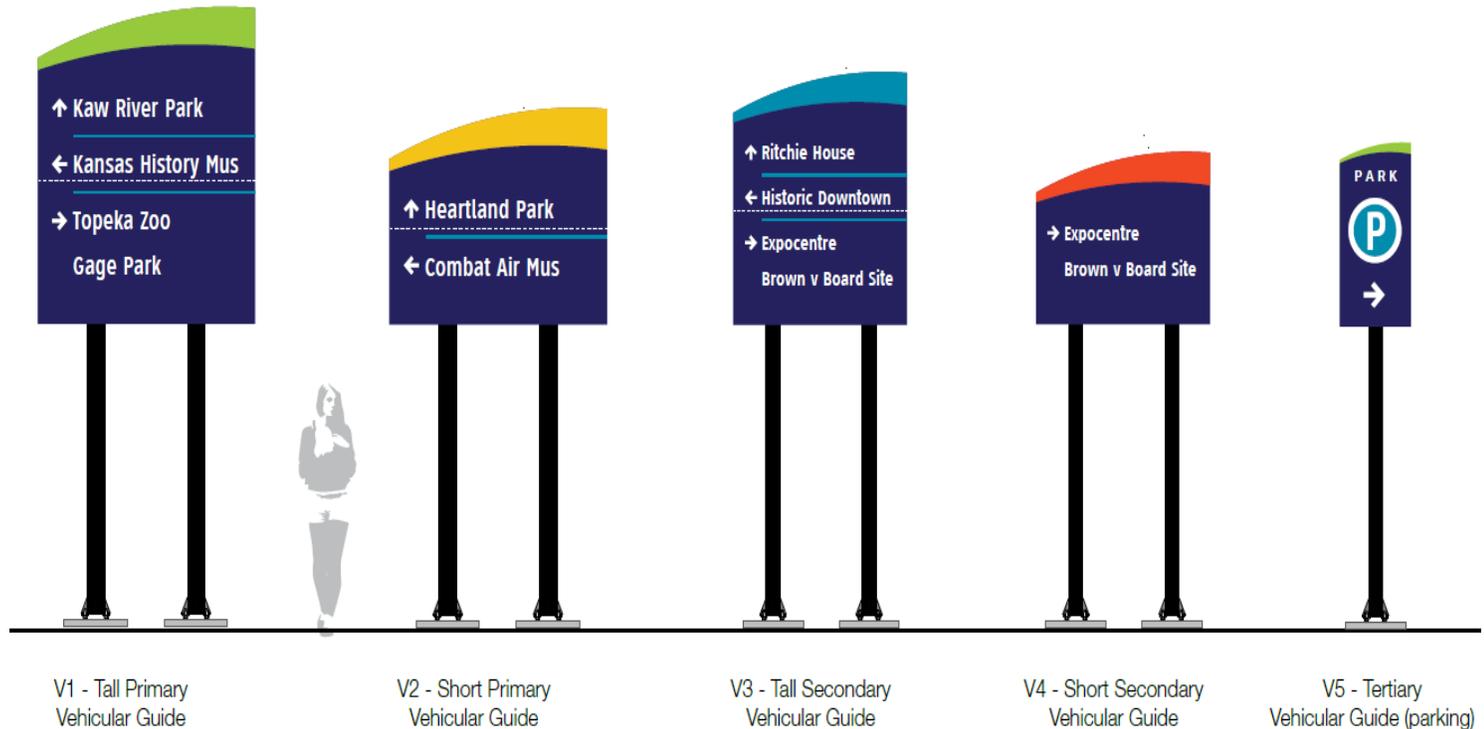
## GUIDANCE:

The following minimum clear widths for shelter placement should be maintained:

- 1 foot from a blank building face (shelters should not block active store windows)
- 8 feet from the back of curb
- 15 feet from crosswalks for visibility at near-side bus stops
- 1 foot from any ground obstruction (i.e., manhole, tree pit, sign post, etc.)
- 10 feet from fire hydrants
- 3 feet to the right of the landing zone (maximum 25 feet to the right of the landing zone)

# WAYFINDING & INFORMATIONAL SIGN PLACEMENT

Providing a wayfinding system that is legible to pedestrians and bicyclists is an important element of a complete street and further enhances the efficiency with which people can travel around the City. Well-designed wayfinding reduces uncertainty, and is particularly important for visitors, tourists, college students, seniors, people with disabilities, and families with children, who are less comfortable getting lost. The ability to create modern and distinctive wayfinding can distinguish walking or bicycling routes, highlight specific destinations, and define popular routes. The City of Topeka is currently developing a Wayfinding Guide that will provide important information branding and sign design.



## CONSIDERATIONS:

- All information provided on wayfinding signs should be clear and concise. It should convey the message with the fewest words and/or graphics as possible. People should be able to understand the information quickly.
- All wayfinding signage must meet ADA guidelines and be accessible to persons in wheelchairs.
- Wayfinding should be located outside the Pedestrian Zone to not obstruct the walkway.
- Wayfinding signs should be MUTCD Compliant.

## REFERENCES & RESOURCES:

Topeka Wayfinding Guide (under development)

# BICYCLE SHARE STATIONS



Topeka Metro launched the Topeka Metro Bikes bicycle share program in April of 2015. Participants access a bicycle with an account number and PIN code and can return bicycles to any station in the network. Users are able to purchase plans hourly or annually, with two hours of daily free time available for annual plans.

The stations are located to encourage short, one-way trips for commuting, shopping, running errands, social outings, exercise, and sightseeing. Bike share can help extend the reach of transit by providing a simple solution for travel and bike storage for trips that are within bicycling distance of a transit stop. Bicycle sharing is particularly suited for Topeka's commuting, student, and tourist populations, as well as its generally flat topography.

Bicycle share promotes healthy, active lifestyles and is a green sustainable transportation alternative to driving.

## CONSIDERATIONS:

Vandalism, safety, and redistribution are all concerns of any bicycle share system. Stations should be located to maximize security of equipment and safety for users. As with all other street furnishings, station locations should not encroach on the pedestrian clear zone of the sidewalk.

If adequate space between the curb and building space is not available for a station, one on-street parking space can be converted to a Topeka Metro Bikes station and provide ten building frontage customer parking spaces, compared to one vehicle space.

## GUIDANCE:

Topeka's bikeshare system is dockless, meaning that users can lock their bike at one of 150 approved racks throughout town. Racks are located at bus stops, near businesses, or at larger bikeshare stations. The footprint of a single rack can be as small as 4' by 6' while larger stations can be up to 7' by 30'. Station locations should:

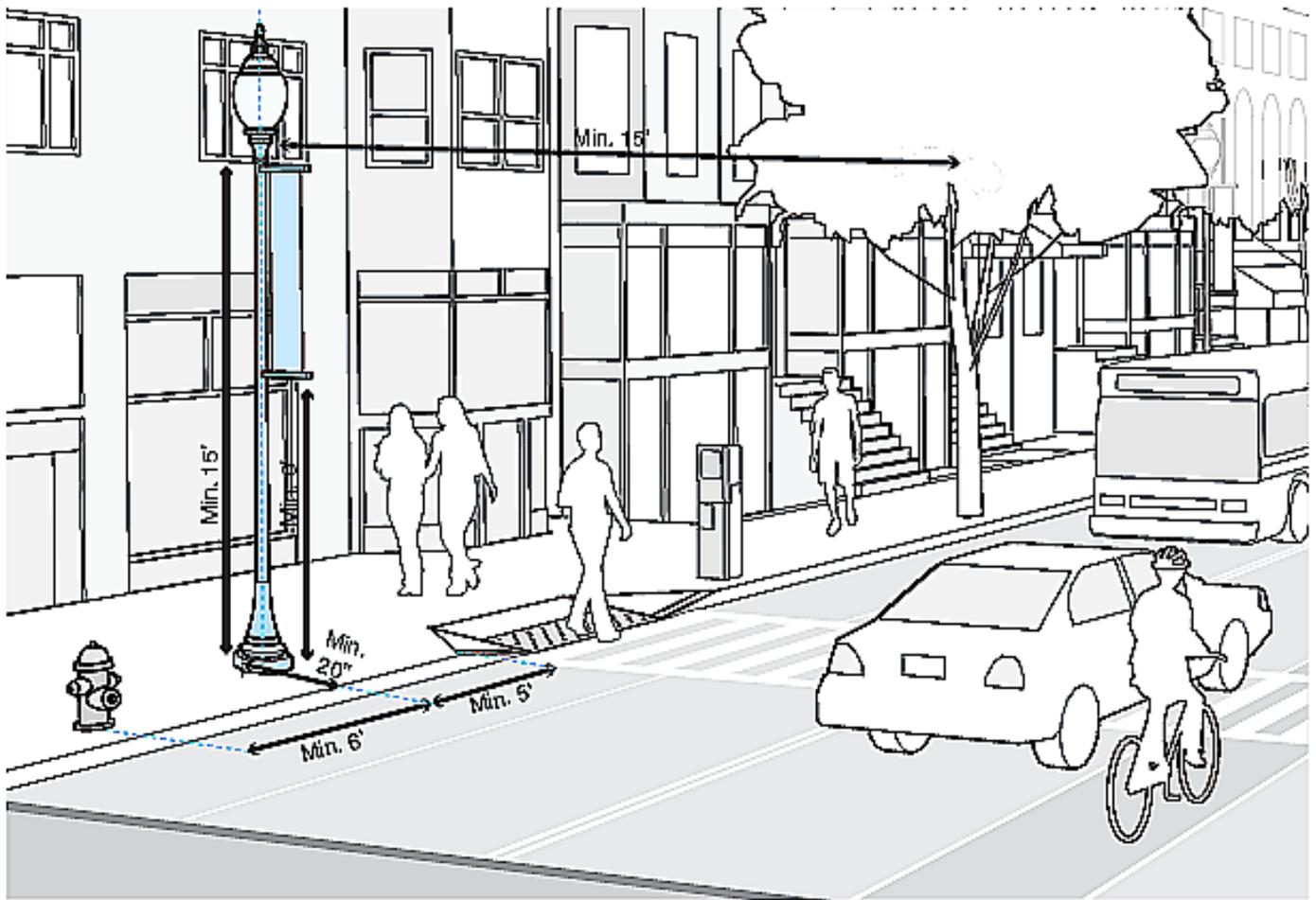
- Maintain a 5' clear pedestrian path
- Target popular destinations and high-density areas
- Receive sufficient sunlight for solar apparatus (if kiosk is part of station)
- Utilize sidewalks, private property, or parking lanes efficiently
- Avoid obstructing utilities, fire hydrants, or other street furniture
- Locate near residential zones by taking advantage of parks, nearby businesses or community buildings that facilitate a convenient location to ride from a person's home.

# STREET LIGHTS

Street lights add comfort and safety to the street while providing character and scale. Street lighting is typically oriented toward the vehicle or pedestrian travel ways; however, additional street lighting can highlight public art, architectural features, or be an artistic expression itself.

Street lighting can also be an expression of street type. Higher activity commercial streets typically have a higher level of overall street lighting, while lower intensity areas such as residential streets and parkways will generally have less frequent street lights and lower lighting levels.

Mid-block installations policy in neighborhoods should be reviewed and updated.



Minimum Street Light Centerline Clearances	Traffic Light or Tree	15'
	Curb Ramp	5'
	Fire Hydrant	6'
Minimum Pole Centerline Setbacks from Curb	Sidewalks <7' wide	20"
	Sidewalks >7' wide	2'- 3"

Minimum Vertical Clearances for Banners Hanging Plants*	Banner Brackets	15'
	Bottom of Banner	9'
	Hanging Plant Brackets	13'
	Bottom of Hanging Plants	9'

\*Note: Banners and hanging plants must be installed parallel to the roadway.

## CONSIDERATIONS:

Pedestrian scale lighting (lower than 20 feet) should be used alone or in combination with roadway scale lighting in high-activity areas to encourage nighttime use and as a traffic calming device. In general, lighting should reflect the character and urban design of the street type to create a recognizable hierarchy of roads and spaces. On low speed streets, lighting is typically located in the Amenity Zone of the street, with light poles typically located a minimum of 18 inches off the front of curb.

Lighting should be oriented toward travelers both in the roadway and on the sidewalk. Adequate lighting at intersections and crossings is essential. Critical locations such as ramps, crosswalks, transit stops, and seating areas that are used at night must be visible and lit.

Lighting may either alternate on either side of a street or be arranged parallel. Parallel arrangements are more formal and common in retail activity centers. Lighting should be located in concert with street trees – often alternating trees and lights – so that trees do not block the illumination.

Light fixtures should be selected to efficiently direct light to the desired area of the roadway and sidewalk. Light fixtures should enable a variety of light distributions to adapt to different street and sidewalk configurations while maintaining the same fixture appearance. The distribution type should be selected based on street and sidewalk width. Glare should be mitigated by selecting the proper optical design. Sky glow is a consequence of several components of lighting: light directed to the sky from fixtures and light reflected off the ground. Light trespass is light that enters an area where it is not wanted, such as street light entering a residential property. Both sky glow and light trespass can be irritating and detrimental to the environment.

## GUIDANCE:

Lighting on residential streets should not illuminate residential quarters such as upper level windows to the extent possible. Both top and side deflectors are available with most pedestrian light fixtures to provide permanent night sky protection, as well as on-request residential. Quality and color temperature of light can impact the character and visitor perception of a street or neighborhood. LEDs require less energy and maintenance and are designed to minimize light trespass and light pollution. LEDs can also enhance visibility, with better color rendering (i.e., colors appear more natural) and a more even spread of light, eliminating the need for over lighting. Power to street lights should be provided underground. Street lights circuits should be turned on and off by a single photo cell so that all the lights come on and go off at the same time. In some locations where events (concerts, street dances, or festivals) may happen, it may be desirable to have AC power outlets available in some of the street light bases.

## STREET TREES

Trees play an important role in making streets comfortable, delightful, memorable, and sustainable. Used appropriately, they can help define the character of a street. Trees provide shade that reduces energy use and mitigates the urban heat island effect. Their leaves capture rainwater and evaporation cools the ambient urban air temperature. Trees sequester carbon dioxide and thus contribute to the mitigation of climate change associated with the greenhouse effect. Trees capture gaseous pollutants and particulates in the tree canopy surface, removing as much as 60% of the airborne particulates at street level.

Trees are part of the urban forest contributing to natural diversity. They provide habitat for a range of living creatures in the urban context, including people. Psychologically, trees have been found to reduce stress and improve concentration. This may partly explain why studies have found that tree lined retail corridors do better than counterparts lacking street trees. Consumers spend more time on tree lined streets more often than those without trees and spend more time and money there.

## CONSIDERATIONS:

Street trees are both a transportation and urban design tool. As vertical elements in the streetscape, trees help to frame and define the street wall, accentuate spaces and focus view corridors. Canopy trees provide an enclosure to the street that reinforces the sense of intimacy and scale. This enclosure can have positive effects in slowing traffic and increasing driver awareness. Street trees improve walkability by providing necessary shade and filtered light. They provide interest and intrigue to pedestrians walking along a block face. Street trees are an opportunity to express the image of a community through plant selection and arrangement. Trees also provide seasonal interest and variation.

Trees come in a wide variety of shapes and sizes. The biodiversity of the urban forest is an increasingly important aspect of maintaining a healthy tree coverage. Using a range of tree species beyond those typically found on the City's streets is strongly encouraged. Below is a

suggested list of species to be used as street trees due to their tolerance of urban conditions.



### City of Topeka Landscape Ordinance Recommended Species List

<b>Understory or Ornamental Trees</b> (25' tall or less), 1.25" - 1.5" caliper:	Japanese Whitespire Birch, Redbud, Smoketree, Flowering Crabapple, Chinese Fringtree, Magnolia (Little Girl Hybrids or Royal Star), Japanese Maple, Amur Maple (Flame or Autumn Blaze), Whitebud, "Forest Pansy" Redbud, "Oklahoma" Redbud, Thornless Cockspur Hawthorne, Flowering Dogwood, Japanese Tree Lilac, American Hornbeam, American Hophornbeam, Parrotia, Serviceberry, Goldenraintree
<b>Medium Shade Trees</b> (25' - 45' tall), 1.25" - 1.5" caliper:	Zelkova, Sweetgum, Red Maple, Shantung Maple, Sugar Maple, River Birch, Honeylocust, Linden, Cypress, Blackgum, Buckeye, Catalpa, Lacebark Elm, Horsechestnut, Japanese Pagodatree, Yellowwood, Norway Maple, Autumn Blaze Maple
<b>Large Canopy Trees</b> (45' tall or greater), 2.0" - 2.5" caliper:	Kentucky Coffeetree, Ginkgo, English Oak, Chinkapin Oak, Red Oak, Sawtooth Oak, Shingle Oak, Swamp White Oak, Londonplane Tree, Hackberry, Bur Oak, White Oak, Willow Oak, Walnut, Tuliptree
<b>Coniferous Trees</b>	Upright Juniper, Eastern Red Cedar, Eastern White Pine, Limber Pine, Southwestern White Pine, Norway Spruce, White Spruce, Serbian Spruce
<b>Shrubs</b>	Barberry, Boxwood, Burning Bush, Butterfly Bush, Cotoneaster, Dogwood, Forsythia, Holly, Hydrangea, Lilac, Mahonia, Pyracantha, Serviceberry, Spirea, Viburnum, Weigela, Althea, Azalea, Bayberry, Buckthorn, Chokeberry, Euonymus, Hypericum, Juniper, Privet, Quince, Sumac, Sweetspire, Yew, Keria, Potentilla
<b>Ornamental Grasses</b>	Blue Fescue, Bluestem, Moor Grass, Northern Sea Oats, Pampas Grass, Reed Grass, Ribbon Grass, Sedge, Silver Grass, Switch Grass, Feather Reed Grass, Fountain Grass, Maiden Grass, Indian Grass, Silver Grass
<b>Groundcovers</b>	Ajuga, Euonymus, Ivy, Liriope, Vinca Minor, Bishops Weed, Leadwort, Pachysandra, Sedum, Honeysuckle, Creeping Mahonia, Creeping Wintergreen

Other acceptable resources that can be utilized are:

<https://www.opkansas.org/resident-resources/residential-property-maintenance/property-maintenance-tips/approved-trees-for-planting/>  
<https://www.gouldevans.com/treelists/GreatTrees.pdf>

\*Topeka City Forester may be consulted for guidance

In order to select an appropriate street tree for a specific street, the species must have the appropriate scale and form for the context of the street and the adjacent landscaping and land uses as well as the appropriate amount of soil volume to thrive. Other considerations include: sun exposure and culture; whether the trees growth might interfere with sidewalks surfaces, sight distances, or other site amenities; if overhead and subsurface utilities might impede growth; the desired quality of light and shade; mature canopy size in relation to adjacent buildings; and frequency of curb-running vehicles such as buses.

## GUIDANCE:

Clusters of like trees are encouraged in appropriate spaces, however groupings should be spaced to minimize effects of possible disease or infestations. Shade trees should be spaced approximately one tree for every 30-40 linear feet on center. Ornamental trees should be specified where overhead utilities are present. Smaller ornamental trees should be spaced approximately 20 feet apart feet on center. Evergreen trees are not to be used as street trees. As street trees mature, they must be limbed up to a height of 7 feet from finished grade in order to provide clearance for pedestrians. For areas with mid-high residential density, consider low growing shrubs that can better withstand the impacts from dogs. All sight triangle regulations for corners must be followed as well.

The exposed surface area of tree wells shall be a minimum of 4 feet by 10 feet. Tree wells shall support a subsurface tree trench large enough to provide sufficient arable soil volume and adequate moisture for individual trees, holding a minimum volume of 300 cubic feet per tree. Continuous trenches that link individual wells shall be provided where possible. Planting strips and tree wells should be planted with hardy evergreen ground cover or grass sod or covered with a tree grate. In densely urban areas or those with limited sidewalk width, ADA-compliant tree grates are preferred.

## PLANTINGS & STORMWATER MANAGEMENT

A variety of sustainable stormwater management techniques are available to help to collect, treat, and slow runoff from impervious roadways, sidewalks, and building surfaces. Urban and suburban developments contain many pollution-generating and nonpollution-generating impervious surfaces that change natural drainage patterns. This often results in flooding issues and the need for expensive drainage flow control storage and water quality treatment facilities. Impervious surfaces, such as concrete and asphalt, prevent rainwater from being absorbed at the source. Effort should be made to avoid stormwater grates that have extrusions that run parallel with the flow of traffic to try and avoid bicycle crashes.

As a result, stormwater flows (including pollutants) enter the pipe network and are discharged into receiving water bodies or become an additional burden to municipal wastewater systems. Innovative stormwater management techniques can help reduce the impact of development by managing stormwater at the source and mimicking natural or pre-development conditions. These techniques are sustainable, generally less expensive, and can add aesthetic and ancillary social benefits to the built environment. In addition, these techniques can help reduce pollution to rivers and other water bodies, decrease flooding, increase groundwater recharge, and reduce energy consumption. Among the techniques that can be used to manage stormwater are:

- Pervious pavements
- Bioswales
- Flow-through planters
- Pervious strips
- Rain Gardens



# ROADWAYS

## INTRODUCTION

From the earliest days of automobiles, when cars and trucks traveled in 9-10-foot lanes adjacent to narrow streetcar lines on Topeka's streets, roadways have played a role in defining the character of the City, its neighborhoods and its districts. The development of this Complete Streets Design Guide provides an opportunity for the City to expand its definitions of mobility, efficiency, and safety of roadways to consider the needs of a broad group of system users that includes all ages, abilities, and modes. This chapter provides design guidance for roadways in Topeka with a primary focus on the space between the two curbs faces. This space is largely used for vehicular movement, parking, and loading. Several types of bicycle accommodation can also be provided in the roadway. In addition, medians and other raised features that occur between the curbs delineating the sidewalk zone are also located in the curb to curb space.

# SAFE SPEEDS

A key component of complete streets is creating an environment where users of all modes can feel comfortable. Streets should operate at speeds that are comfortable, not only for motor vehicles, but also for bicyclists of various ages and abilities. The goal of designing for safe speeds is to create an environment that encourages speeds appropriate for the street type and context. Street designs should aim to limit excessive speeding, and target design speeds should be appropriate for the street type and context of surrounding land uses. New streets should be designed to produce operating speeds that match the target design speed, which should also match the posted speed limit. On existing streets with excessive speeds, traffic calming measures may be considered in conjunction with enhanced law enforcement to reduce speeds to improve safety and comfort for all users. Lowering posted speed limits without addressing street design generally does not reduce speeding and, in turn, does not improve safety.

In Kansas, the default statutory speed limit is 30 miles per hour in urban districts (KSA 8-1558). Local authorities may alter the speed limit based on an engineering and traffic analysis to determine if the recommended speed is “reasonable and safe” based on certain conditions <sup>1</sup>. In school zones, the maximum speed is 20 miles per hour.

Pedestrians and bicyclists are particularly vulnerable in the event of a crash with a motor vehicle. The severity of a pedestrian injury in the event of a crash is directly related to the speed of the vehicle at the point of impact. For example, a pedestrian who is hit by a motor vehicle traveling at 20 mph has a 13% likelihood of death or severe injury, whereas a pedestrian hit by a motor vehicle traveling at 40 mph has a 73% likelihood of death or severe injury <sup>2</sup>.



Source: Tefft, Brian C. *Impact speed and a pedestrian's risk of severe injury or death. Accident Analysis & Prevention. 50. 2013*

The table below provides the recommend speeds for the Street Types introduced in Chapter 2 of this document.

Street Type	Design Speed
Shared Street, Alley	10-15 mph
Main Street, Neighborhood Residential	20 mph
Mixed Use Boulevard	25 to 30 mph
Neighborhood Connector, Industrial Street	30 mph
Commercial Connector	35 mph
Rural Residential	30-40 mph

<sup>1</sup> KSA §8-1560, KSA §8-1559

<sup>2</sup> Tefft, B. (2013). *Impact Speed and a Pedestrian's Risk of Severe Injury or Death. Accident Analysis and Prevention: 50, pp. 871-878.*

# LANE WIDTHS

Lane widths are an important design element that impact comfort and safety for vulnerable users such as pedestrians and bicyclists. Narrowing lane widths shortens pedestrian crossing distances and frees up space for additional elements such as wider sidewalks and buffers, separated bike lanes, bike lanes with buffers, and other elements. Narrowing lane widths, as an element of an integrated urban street design, may also contribute to lower operating speeds which improves pedestrian and bicyclist safety and comfort.

Traditionally, across the US, 12 feet has been the standard for motor vehicle travel lane width (often 11 feet plus gutter in Topeka) but the AASHTO “Green Book” allows 10-foot travel lane widths in low-speed environments (45 mph or less). Narrower lane widths have been avoided in the past due to concerns about vehicle occupant safety and congestion, especially on arterial roadways. However, research has shown that in most cases, travel lane widths between 10 and 11 feet on arterials and collectors do not negatively impact overall motor vehicle safety or operations, nor do they have a measurable effect on capacity. A Transportation Research Record study found one exception where 10-foot wide travel lanes should be used with caution— on four-lane, undivided arterial roadways<sup>3</sup>. Designers should use lane widths at the lower end of the acceptable range whenever possible.

The benefits of narrower lane widths include:

- Lower speeds, improving the safety of all users
- Fewer, less severe crashes for all users
- Reduced crossing distance for pedestrians
- Reduced footprint of the roadway, resulting in better use of land and reduced run-off

Table 2 summarizes guidelines for selecting lane widths in the City of Topeka based on adjacent land uses and desired street character for the City’s street typologies. Engineering judgment will be necessary to determine the appropriate lane width guidance from the table below. The values in this chart should be applied to major street reconstructions, as well as resurfacing or other maintenance projects where lane reallocation or resizing may occur. On streets with transit service, an outside lane of 12-13 feet is preferred. Streets with a large percentage of truck traffic may require the maximum roadway widths tabulated below.

Many existing residential streets in Topeka are “yield streets,” which are two-way streets with parallel parking on both sides, where oncoming drivers must yield in order pass each other when parked cars are present. These streets are generally 20 to 28 feet in width (curb to curb dimension) and carry traffic volumes that do not exceed 1,500 vehicles per day.

**Table 2: Lane Width\* Recommendations by Street Typology**

Street Typology	Minimum	Preferred	Maximum
Mixed Use Boulevard	10'	11'	12'
Main Street	10'	10'	11'
Commercial Connector	10'	11'	12'
Neighborhood Connector	10'	11'	11'
Neighborhood Residential	9'	10'	10'
Rural Residential	10'	10'	12'
Industrial	11'	12'	14'
Shared Street	N/A	N/A	N/A

\* Widths include the gutter pan. On streets with combined curb and gutter, the effective lane width, particularly for bicyclists, is reduced by the steep slopes of the gutter pan.

## RESOURCES AND REFERENCES:

AASHTO Green Book; FHWA Achieving Multimodal Networks; NACTO Urban Street Design Guide

<sup>3</sup> Potts, Ingrid B., Douglas W. Harwood, and Karen R. Richard. “Relationship of Lane Width to Safety on Urban and Suburban Arterials.” *Transportation Research Record*, Issue 2023 (2007): 63–82.

# TRAFFIC CALMING

Different tools and treatments can be used to reduce operating speeds to a “desired speed” and improve conditions for vulnerable road users. Ideally, the street environment provides cues to the driver to reduce speed. This can be accomplished through a variety of geometric design features, often called traffic calming or neighborhood traffic management. Several of these features are described below. They are most appropriate for Shared Streets, Main Streets or Neighborhood Residential Streets. Some treatments are also appropriate to reduce traffic volumes.

Compared with conventionally-designed streets, traffic-calmed streets typically have fewer collisions and far fewer injuries and fatalities. These safety benefits are the result of slower speeds for motorists. Slower speeds result in a broader cone of vision for drivers, shorter stopping distances, and less kinetic energy during a collision. Enforcement and regulatory measures are a necessary complement to any physical infrastructure to manage travel speeds.



## VERTICAL DEFLECTION TREATMENTS SPEED CUSHIONS, SPEED HUMPS & RAISED CROSSWALKS

Vertical traffic calming treatments compel motorists to slow speeds. These treatments are typically used where other types of traffic controls such as stop signs are less frequent.



Speed cushion



Raised crosswalk

## CONSIDERATIONS:

- Where traffic calming must not slow an emergency vehicle, speed cushions should be considered. Speed cushions provide gaps spaced for an emergency vehicle's wheelbase to pass through without slowing.
- Consider using raised crosswalks at intersections to slow traffic turning onto the neighborhood greenway from a major street.
- Speed humps and raised crosswalks impact bicyclist comfort. The approach profile should preferably be sinusoidal or flat.
- Continuous devices, such as speed humps and raised crosswalks, are more effective to achieve slower speeds than speed cushions.
- Impacts on drainage and maintenance should be considered.

## GUIDANCE:

The City's traffic calming policy guides when traffic calming treatments should be considered, but in general traffic calming may be used to reinforce the desired speeds given the street typology and land uses.

- Vertical deflections, such as speed humps and speed cushions, should have a smooth leading edge, a parabolic rise, and be engineered for a speed of 20 to 30 mph. Speed humps should be clearly marked with reflective markings and signs.
- Speed humps should extend the full width of the roadway and should be tapered to the gutter to accommodate drainage. Speed humps are not typically used on roads with rural cross-sections; however, if they are used on such roads, they should match the full pavement width (including paved shoulders).
- Speed humps or speed cushions are most appropriate for neighborhood residential streets.

## HORIZONTAL TREATMENTS

### CURB EXTENSIONS, CHICAINES, NECKDOWNS & TRAFFIC CIRCLES

Horizontal traffic calming treatments can be appropriate along street segments or at intersections where width contributes to higher motor vehicle speeds. It can be particularly effective at locations where on-street parking is low-occupancy during most times of day, there is a desire to remove or decrease stop control at a minor intersection, and where there are long block lengths.

Horizontal traffic calming reduces speeds by creating deflections and narrowing lanes, which creates a sense of enclosure and additional friction between passing vehicles. Narrower conditions require more careful maneuvering around fixed objects and when passing bicyclists or oncoming automobile traffic. Some treatments may slow traffic by creating a yield situation where one driver must wait to pass. These treatments are most appropriate for shared streets and neighborhood residential streets.



*CHICANE*



*NECKDOWN*



*CURB EXTENSION*



*NEIGHBORHOOD TRAFFIC CIRCLE*

## CONSIDERATIONS:

- Horizontal traffic calming treatments must be designed to deflect motor vehicle traffic without forcing the bicycle path of travel to be directed into a merging motorist.
- Neighborhood traffic circles are used at uncontrolled or yield-controlled intersections to reduce collisions and improve bicycle and pedestrian safety. Note, these are used on through streets as a traffic calming measure. This does not refer to the small circles found on cul-de-sacs. In general, cul-de-sacs are not preferred due to the lack of neighborhood connectivity.
- Infrastructure costs will range, dependent upon the complexity and permanence of design. Simple, interim treatments, such as striping and flexposts, are low-cost. Curbed, permanent treatments that integrate plantings or green infrastructure are higher-cost.
- Chicanes can be appropriate on emergency routes with low traffic volumes that allow emergency vehicles to straddle the centerline.

## GUIDANCE:

- The size of chicanes will vary based on the targeted design speed and roadway width but must maintain 20 feet wide curb-to-curb at a minimum to accommodate emergency vehicles.
- Horizontal treatments are most effective if they deflect motorists midblock (with chicanes) or within intersections (with neighborhood traffic circles).

## DIVERTERS:

Diverters alter the movement of through vehicle traffic either through partial diversion (closing half of a street entrance) or full diversion (prohibiting through movement of all vehicle traffic). Diverters are commonly designed to maintain through travel for bicycles and pedestrians even while altering routes for vehicles. Partial diverters preclude entry or exit of one direction of traffic and channelize remaining movements.

Diagonal diverters are the most common form of full diversion. Diagonal diverters connect diagonal corners creating two disconnected streets. Vehicles are forced into a right angle turn even while maintaining through travel for bicycles and pedestrians.

- Full diverters must be designed with transit and emergency vehicle navigation in mind. Typically, emergency vehicles must be able to travel over the diverter.
- Diverters affect all traffic. They are effective at reducing or precluding cut-through traffic, but as a result all local traffic is diverted as well.

## OTHER TRAFFIC CALMING MEASURES:

Other design elements can have a traffic calming effect as well including gateway and pavement treatments, street trees, narrower lanes, and on-street parking.

## TOPEKA'S TRAFFIC CALMING PROGRAM:

The City of Topeka has a formal policy for requesting traffic calming measures and where traffic calming may be appropriate <sup>4</sup>. Criteria for traffic calming applications include traffic volumes, vehicle speeds, number of lanes, grade, and presence of transit service. To request traffic calming measures, 75% of households must sign a petition to the City Traffic Engineer.

### RESOURCES AND REFERENCES:

NACTO. Urban Bikeway Design Guide. 2nd Edition.; Huang and Cynecki (2001). The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior; FHWA ITE Traffic Calming Web site; FHWA Achieving Multimodal Networks; City of Topeka Traffic Calming Policy; NACTO Urban Street Design Guide (2013); FHWA Traffic Calming ePrimer (online)

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<sup>4</sup> [https://s3.amazonaws.com/cot-wp-uploads/wp-content/uploads/publicworks/TrafficEngineering/TRAFFIC\\_CALMING\\_POLICY.pdf](https://s3.amazonaws.com/cot-wp-uploads/wp-content/uploads/publicworks/TrafficEngineering/TRAFFIC_CALMING_POLICY.pdf)

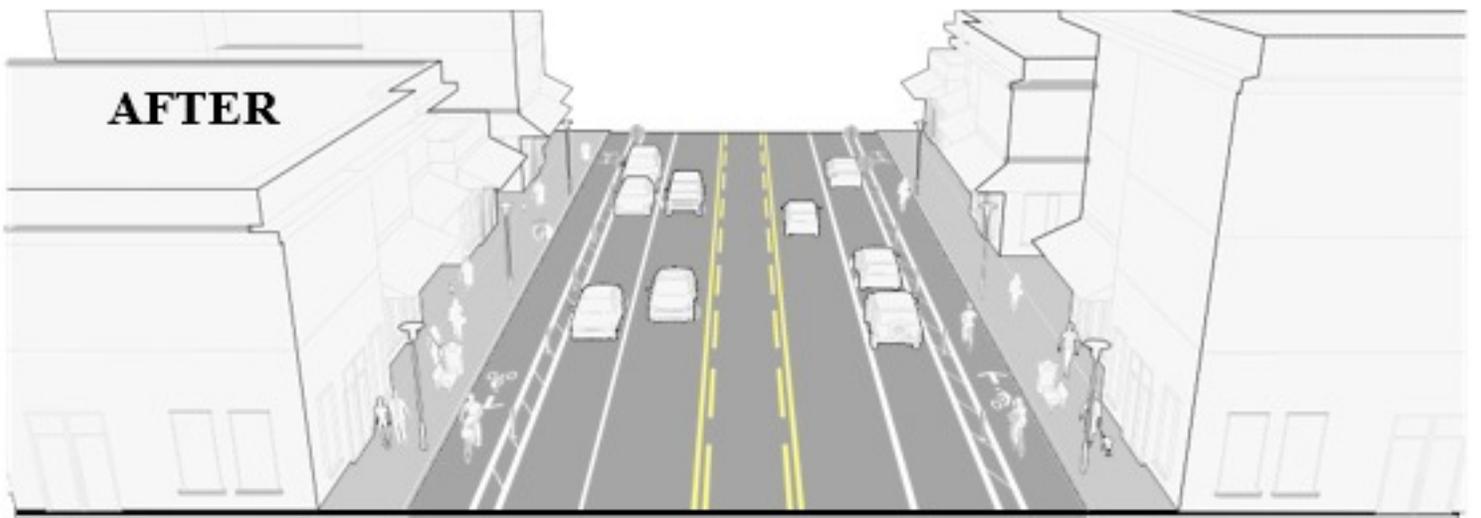
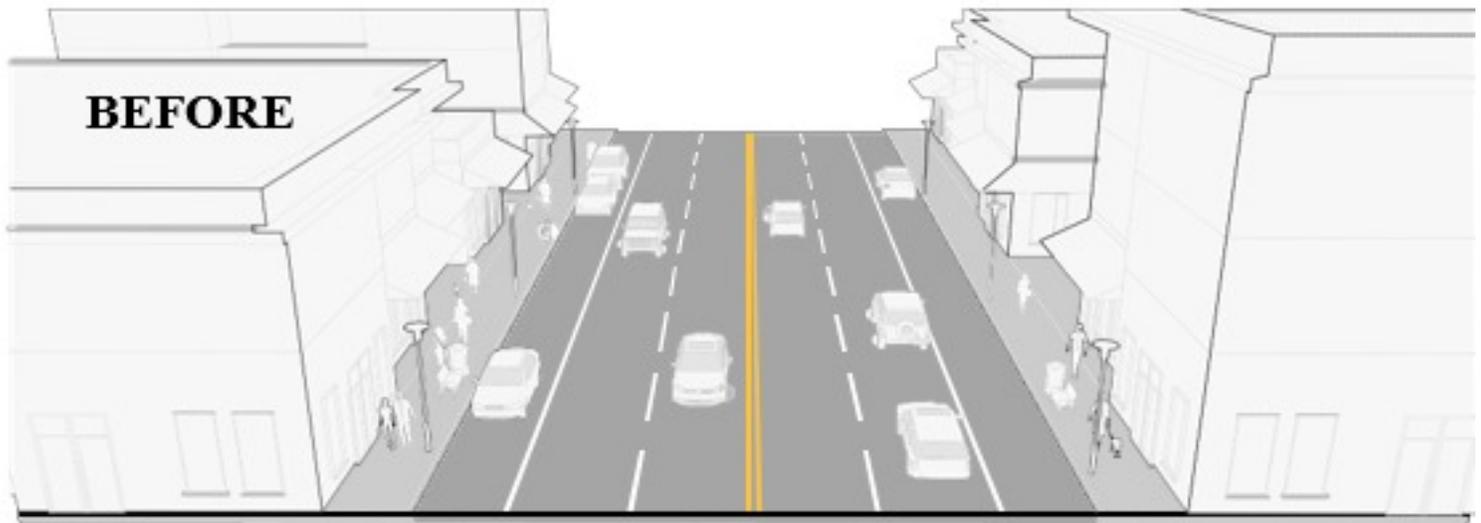
# LANE DIETS & ROAD DIETS

## LANE DIETS:

As discussed in the previous section on lane widths, narrower lanes can improve comfort and safety for vulnerable users such as pedestrians and bicyclists. Narrower lanes can shorten crossing distances and create space for wider sidewalks and buffers, separated bike lanes, or bike lanes with buffers. Space can also be dedicated to plantings and amenity zones and reduces crossing distances at intersections. The TRB Highway Capacity Manual recognizes that there is minimal difference in motor vehicle capacity for travel lanes between 10 and 12.9 feet at signalized intersections and does not provide any capacity factors for lane widths in this range. Lane narrowing or “lane diets” can be achieved through repaving or restriping projects. For additional considerations and guidance on the recommended lane widths for various street types in Topeka, refer to the Lane Widths section on page 41.

## ROAD DIETS:

Road Diets offer a way to rebalance the street to meet the needs of all users. Road Diets are the reconfiguration of one or more travel lanes to calm traffic and provide space for bicycle lanes, turn lanes, streetscapes, street furniture, wider sidewalks, adjacent commercial uses and other purposes. Four- to three-lane conversions are the most common Road Diet, but there are numerous types (e.g., three to two lanes, or five to three lanes). FHWA has identified Road Diets as a Proven Safety Countermeasure.



## CONSIDERATIONS:

The most common road diet configuration involves converting a four-lane road to three lanes: two travel lanes with a turn lane in the center of the roadway. The center turn lane at intersections and commercial entrances often provides a great benefit to traffic congestion and reduces left turn and rear end crashes. A three-lane configuration with one lane in each direction and a center turn lane is often as productive (or more productive) than a four-lane configuration with two lanes in each direction and no dedicated turn lane.

Four to three lane conversions have been found to reduce total crashes by an average of 29.7 percent. The magnitude of the safety benefits at specific locations depends on the street context and the specific design of the conversion. Four to three lane conversions typically have minimal effects on the vehicular capacity of the roadway links because left-turning vehicles are moved into a common two-way left turn lane. However, reducing the number of lanes at signalized intersections must be analyzed to determine the reduction in through put and compare the advantages and disadvantages of this configuration for all roadway user types.

The space gained for a center turn lane is often supplemented with painted, textured, or raised center islands. If considered during reconstruction, raised center islands may be incorporated in between intersections to provide improved pedestrian crossings, incorporate landscape elements and reduce travel speeds.

Roadway configurations with two travel lanes and a center turn lane can:

- Discourage speeding and weaving.
- Reduce the potential for rear end and sideswipe collisions.
- Improve sight distances for left-turning vehicles.
- Reduce pedestrian crossing distances and exposure to motor vehicle traffic.
- Increase visibility of crossing pedestrians & reduce the potential for multi-threat vehicle-pedestrian crashes.
- Reallocate space for sidewalks, standard bicycle lanes, protected bike lanes, bus bulbs, or curbside parking, which in turn creates a buffer between motor vehicle traffic and pedestrians.
- Improve access for emergency vehicles by allowing them to use the center turn lane to bypass traffic if a continuous two-way left turn lane is provided.
- Depending on vehicle volumes, may increase delay for vehicles, bicyclists and pedestrians entering the converted roadway from side streets and entrances due to a reduction in gaps.
- Create the possible need for traffic signals, roundabouts or multi-way stop control at intersections that do not currently have such traffic control measures.

## GUIDANCE<sup>5</sup>:

Engineering judgement and traffic analysis will be necessary to determine feasible candidates for road diets.

- Four-lane streets with volumes less than 15,000 vehicles per day generally are good candidates for four- to three-lane conversions.
- Four-lane streets with volumes between 15,000 to 20,000 vehicles per day may be good candidates for four- to three-lane conversions. A traffic analysis is needed to determine feasibility.
- Six-lane streets with volumes less than 35,000 vehicles per day may be good candidates for six- to five-lane (including two-way center turn lane) conversions. A traffic analysis is needed to determine feasibility.
- See Appendix B of the FHWA Road Diet Guide (2014) for an overview of Road Diet Feasibility Determination Factors, Characteristics, and Sample Evaluative Questions
- Other lane conversions regardless of volume may be warranted to meet other roadway functions (i.e. traffic safety, multi modal, or freight). A traffic analysis is needed to determine feasibility.

## RESOURCES AND REFERENCES:

FHWA Road Diet Guide (2014); FHWA Achieving Multimodal Networks; NACTO Urban Street Design Guide (2013); Manual on Uniform Traffic Control Devices (2009); Highway Capacity Manual

<sup>5</sup> Volume thresholds based on study volumes in FHWA Road Diet Informational Guide (2014); TRB Highway Capacity Manual (2010), p. 18-36.

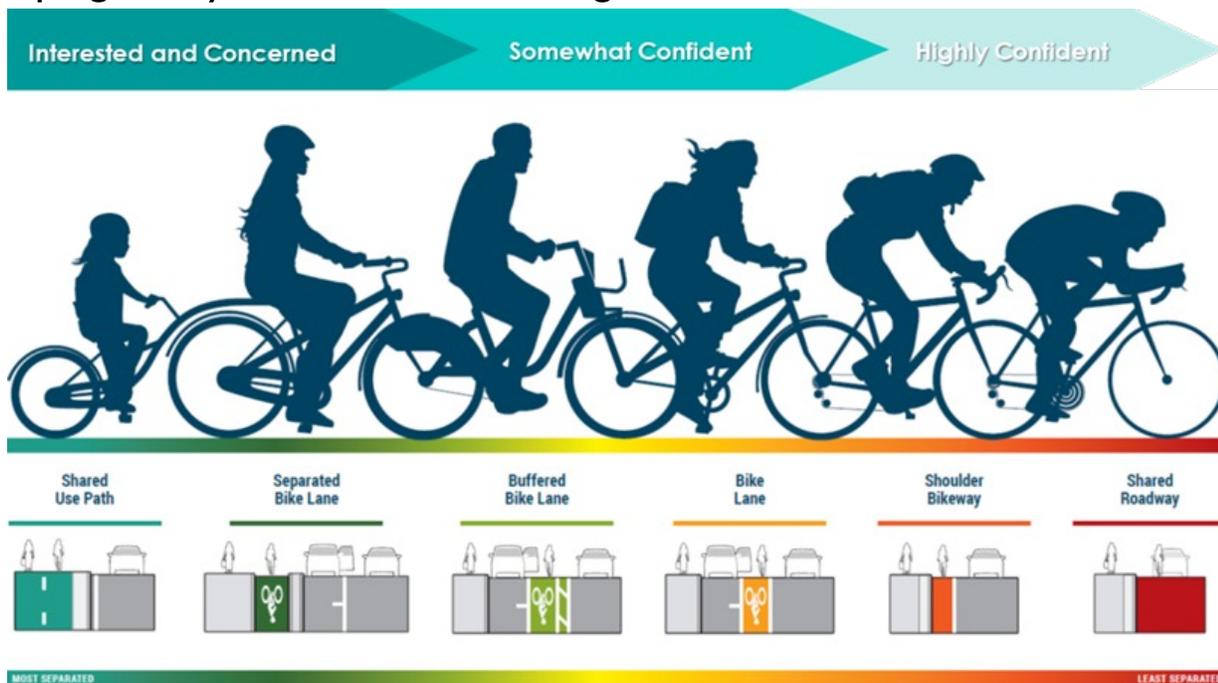
# BICYCLE FACILITIES

Motor vehicle traffic volume and speed are critical contextual considerations for bicyclist safety and comfort. Proximity to motor vehicle traffic is a significant source of stress, safety risks, and discomfort for bicyclists, and corresponds with sharp rises in crash severity and fatality risks for vulnerable users when motor vehicle speeds exceed 25 miles per hour. As motorized traffic volumes increase above 3,000 vehicles per day, it becomes increasingly difficult for motorists and bicyclists to share roadway space. This section provides an overview of the different types of bicyclists, information on how to choose the appropriate facility, and design guidance for various facilities.

## TYPE OF CYCLISTS:

The figure below illustrates a typical range of cyclist types. The greatest percentage of the population—upwards of 51-56%—falls into the “Interested but Concerned” category. The “Interested but Concerned” are most comfortable cycling separated from motorized vehicles. On the other end of the spectrum, only roughly 4-7% of the population is “Experienced and Confident,” comfortable sharing the road with motorized vehicles. In the middle, approximately 5-9% are “Casual and Confident,” comfortable cycling for short distances with motorized vehicles. (Approximately 30% are not interested in bicycling at all.)<sup>6 7</sup>

People generally fall into one of four categories based on their level of comfort:



These percentage values are typical ranges for most US communities.



Interested but concerned bicyclists require physical bicycle infrastructure improvements before they will want to ride.

Experienced and confident bicyclists will ride comfortably on most types of streets but may be uncomfortable in certain situations or road conditions.

Strong and fearless bicyclists will ride in any road conditions or environment.

<sup>6</sup> Geller, R. “Four Types of Cyclists.” Portland Office of Transportation. (<https://www.portlandoregon.gov/transportation/article/264746>)

<sup>7</sup> Dill, J. and N. McNeil. (2013, January) “Four Types of Cyclists? Examining a Typology to Better Understand Bicycling Behavior and Potential.” Paper presented at the Annual Meeting of the Transportation Research Board.

## DESIGNING FOR “INTERESTED BUT CONCERNED” & ‘EXPERIENCED AND CONFIDENT’ BICYCLISTS:

Bicyclists’ comfort levels decrease proportionally with increases in motor vehicle volumes and a widening differential between the speed of bicycles and the speed of adjacent traffic. As a result, both traffic volume and traffic speed are important considerations when choosing an appropriate bikeway type for a given location. In general, as both volume and speed increase, there is a greater need for separation of the bikeway from traffic to appeal to a wider cross-section of people. Wider bikeways (i.e., more than the standard five feet) also help to mitigate the effects of volume and speed, albeit to a lesser extent than increasing facility separation with painted buffers or physical barriers.

From a bicyclist comfort point of view, separated bike lanes and shared use paths are generally preferable to traditional bicycle lanes, shoulders, or buffered bike lanes once traffic volumes reach 6,000 vehicles per day or prevailing motor vehicle speeds exceed 35 miles per hour.

In addition to traffic volume and speed, land use is also an important factor in selecting the appropriate bicycle facility type for a given roadway. See the table below for information on appropriate bicycle facilities for urban and suburban roadways associated with the street types discussed earlier in this document:

Speed Limit*	Traffic Volume	Appropriate Bicycle Facilities	Street Type
25 mph or less	3,000 vehicles/day or fewer	Shared lanes or bicycle boulevards	Main Street, Neighborhood Residential, Shared Street, Alley
25 to 30 mph	3,000-6,000 vehicles/day	Bike lanes (buffered bike lanes preferred)	Mixed Use Boulevard
>30 mph	>6,000 vehicles/day	Bike lanes, buffered/separated bike lanes or shared use paths	Commercial Connector, Neighborhood Connector, Rural, Residential, Industrial Street

\*It is generally assumed that vehicle operating speeds are the same as the posted speed limit. If operating speeds differ, use the operating speed for bicycle facility selection.

## CHOOSING BETWEEN SEPERATED BIKE LANES & SHARED USE PATHS:

The type of separated bike facility— separated bike lane or shared use path— and method of separation should be determined once it is decided that physical separation from motor vehicles should be provided.

Where both walking and bicycling demand are relatively low and are expected to remain low, a shared use path may be considered in lieu of a separated bike lane to satisfy demand for walking and bicycling in a single facility to reduce project costs. The shared use path may be located on one or both sides of the street, depending upon bicycle and pedestrian network connectivity needs. Shared use paths for this purpose should be designed with the same design principles as separated bike lanes, while also accommodating pedestrian use. As volumes increase over time, the need for separation should be revisited. The Shared-Use Path Level of Service Calculator can help project proponents understand potential volume thresholds where conflicts between bicyclists and pedestrians will limit the effectiveness of a shared use path. When Level of Service is projected to be at or below level ‘C,’ separate facilities for pedestrians and bicycles should be provided, unless right-of-way constraints preclude separation. As this calculator requires user volumes and other data that may not be available during the planning process, project proponents can estimate activity by using existing volumes on similar streets and shared use paths in the vicinity and adjusting as necessary to account for existing and future land uses adjacent to the facility, as well as regional trends and mode shift goals.

## TYPICAL APPLICATION:

**Shared use paths** will generally be considered on any road with one or more of the following characteristics:

- Total traffic lanes: 3 lanes or greater
- Posted speed limit: 30 mph or greater
- Average Daily Traffic: 9,000 vehicles or greater
- Parking turnover: frequent
- Bike lane obstruction: likely to be frequent
- Streets that are designated as truck or bus routes

Shared use paths may be preferable to separated bike lanes in low density areas where pedestrian volumes are anticipated to be fewer than 200 people per hour on the path.

**Separated bike lanes** will generally be considered on any road with one or more of the following characteristics:

- Total traffic lanes: 3 lanes or greater
- Posted speed limit: 30 mph or more
- Average Daily Traffic: 9,000 vehicles or greater
- Parking turnover: frequent
- Bike lane obstruction: likely to be frequent
- Streets that are designated as truck or bus routes

Preferred in higher density areas, adjacent to commercial and mixed-use development, and near major transit stations, stops, or locations where observed or anticipated pedestrian volumes will be higher.

**Buffered bike lanes** will generally be considered on any road with one or more of the following characteristics:

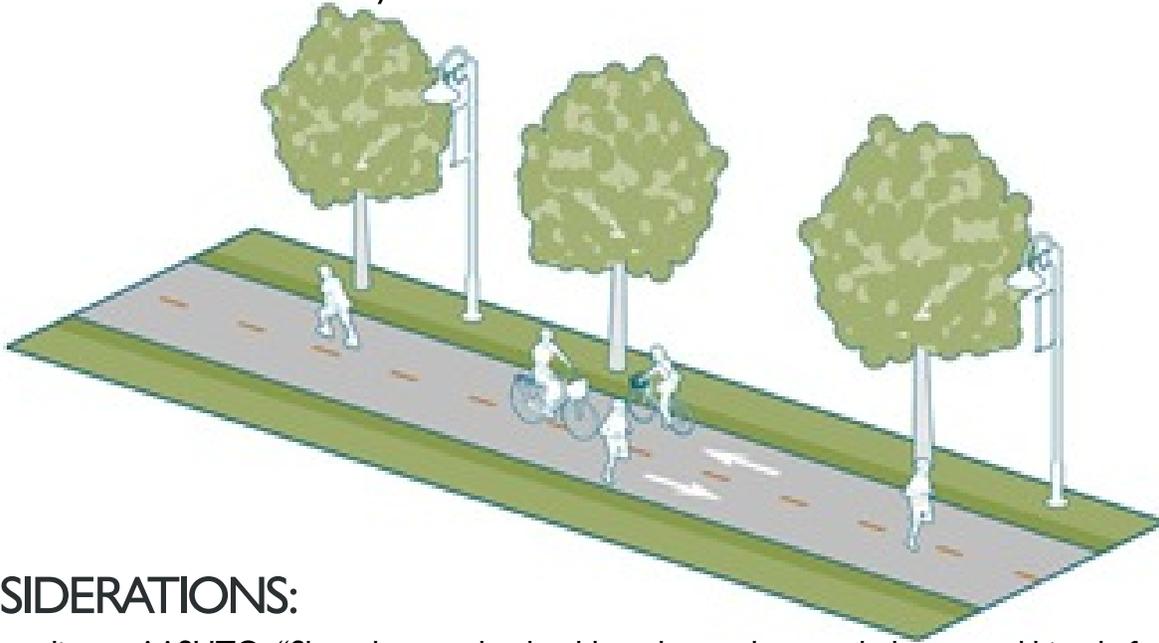
- Total traffic lanes: 3 lanes or fewer
- Posted speed limit: 30 mph or lower
- Average Daily Traffic: 6,000 vehicles or fewer
- Parking turnover: infrequent.
- Bike lane obstruction: likely to be infrequent
- Where a separated bike lane or shared use path is infeasible or not desirable

**Conventional bike lanes** will generally be considered on any road with one or more of the following characteristics:

- Total traffic lanes: 3 lanes or fewer
- Posted speed limit: 30 mph or lower
- Average Daily Traffic: 6,000 vehicles or fewer
- Parking turnover: infrequent
- Bike lane obstruction: likely to be infrequent
- Where a separated bike lane or shared use path is infeasible or not desirable

# SHARED USE PATHS/SIDEPATHS

A shared use path is a two-way facility physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. Shared use paths, also referred to as trails, are often located in an independent alignment, such as a greenbelt or abandoned railroad. However, they are also regularly constructed along roadways; often bicyclists and pedestrians will have increased interactions with motor vehicles at driveways and intersections on these “sidepaths.” Appropriate bicycle specific road markings for conflict zones should be marked at intersections as well as additional bicycle specific signaling devices should be considered and installed if necessary.



## CONSIDERATIONS:

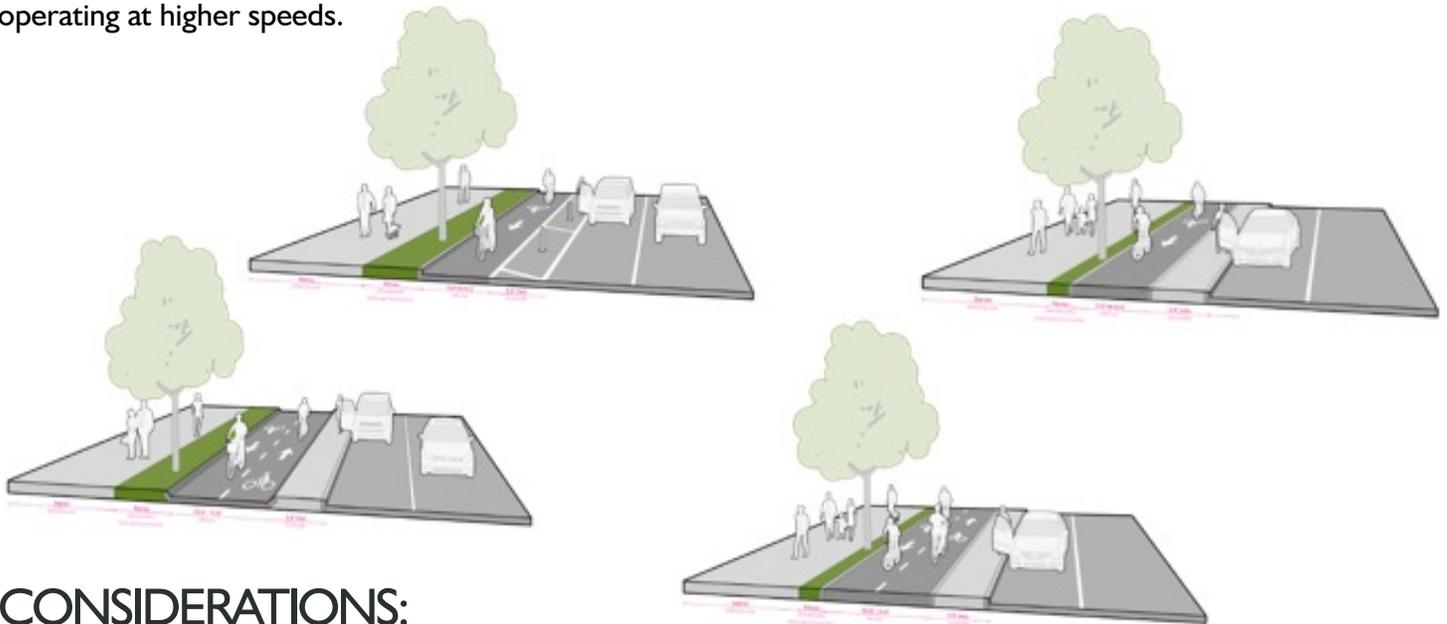
- According to AASHTO, “Shared use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a network of on-road bike lanes, shared roadways, bicycle boulevards, and paved shoulders.” In other words, in some situations it may be appropriate to provide an on-road bikeway in addition to a sidepath along the same roadway.
- Shared use paths make up a network or system of routes designed specifically for off-street travel. Shared use paths are used for recreation, leisure activity, and commuting. These paths are located along waterways, within parks and open spaces, along roadways, and through easements and rights-of-way for utilities. Shared use paths are appropriate when an on-street route may be too risky due to the speed of the road, most users are recreational or leisure users, or to provide a direct route between points of interest.
- Many people express a strong preference for the separation between bicycle and motor vehicle traffic provided by paths when compared to on-street bikeways. Sidepaths may be desirable along high volume or high-speed roadways, where accommodating the targeted type of bicyclist within the roadway in a safe and comfortable way is impractical. However, sidepaths may present increased conflicts between path users and motor vehicles at intersections and driveway crossings. Conflicts can be reduced by minimizing the number of driveway and street crossings present along a path and otherwise providing high-visibility crossing treatments.
- Paths typically have a lower design speed for bicyclists than on-street facilities and may not provide appropriate accommodation for more confident bicyclists who desire to travel at greater speeds. In addition, greater numbers of driveways or intersections along a sidepath corridor can decrease bicycle travel speeds and traffic signals can increase delay for bicyclists on off-street paths, compared to cyclists using in-street bicycle facilities such as bike lanes. Therefore, paths should not be considered a substitute to accommodating more confident bicyclists within the roadway.

## GUIDANCE:

- Widths as narrow as 8 feet are acceptable for short distances under physical constraint. Warning signs should be considered at these locations.
- In locations with heavy volumes or a high proportion of pedestrians, widths exceeding 10 feet are recommended. A minimum of 11 feet is required for users to pass with a user traveling in the other direction. It may be beneficial to separate bicyclists from pedestrians by constructing parallel paths for each mode.
- Paths must be designed according to state and national standards. This includes establishing a design speed (typically 18 mph) and designing path geometry accordingly. Consult the AASHTO Guide for the Development of Bicycle Facilities for guidance on geometry, clearances, traffic control, railings, drainage, and pavement design. Shared use paths must also conform to Public Rights-of-way Accessibility Guidelines (PROWAG) if in a public right-of-way, or Advance Notice of Proposed Rulemaking (AN-PRM) on Accessibility Guideline for Shared Use Paths if in a private right-of-way.

## SEPARATED BIKE LANES

Separated Bike Lanes (also known as protected bike lanes or cycle tracks) are an exclusive bikeway facility type that combines the user experience of a sidepath with the on-street infrastructure of a conventional bike lane. They are physically separated from motor vehicle traffic and distinct from the sidewalk. Separated bike lanes are more attractive to a wider range of bicyclists than striped bikeways on higher volume and higher speed roads. They eliminate the risk of a bicyclist being hit by an opening car door and prevent motor vehicles from driving, stopping, or waiting in the bikeway. They also provide greater comfort to pedestrians by separating them from bicyclists operating at higher speeds.



## CONSIDERATIONS:

- Separated bike lanes can provide different levels of separation:
  - Separated bike lanes with flexible delineator posts (“flexposts”) alone offer the least separation from traffic and are appropriate as an interim solution.
  - Separated bike lanes that are protected from traffic by a row of on-street parking offer a high degree of separation.
  - Separated bike lanes that are raised with a wider buffer from traffic provide the greatest level of separation from traffic but will often require road reconstruction.

In constrained environments, reductions should be made to the street and vehicle space before narrowing sidewalks and other spaces allocated to pedestrians. This reduction can include decreasing the number of travel lanes, narrowing existing lanes, or adjusting on-street parking.

# BUFFERED BIKE LANES

Buffered bicycle lanes are created by painting or otherwise creating a flush buffer zone between a bicycle lane and the adjacent travel lane. While buffers are typically used between bicycle lanes and motor vehicle travel lanes to increase bicyclists' comfort, they can also be provided between bicycle lanes and parking lanes in locations with high parking turnover to discourage bicyclists from riding too close to parked vehicles.

## CONSIDERATIONS:

- Preferable to a conventional bicycle lane when used as a contra-flow bike lane on one-way streets.
- Typically installed by reallocating existing street space.
- Can be used on one-way or two-way streets.
- Consider placing buffer next to parking lane where there is commercial or metered parking.
- Consider placing buffer next to travel lane where speeds are 30 mph or greater, or when traffic volume exceeds 3,000 vehicles per day.
- Where there is 7 feet of roadway width available for a bicycle lane, a buffered bike lane should be installed instead of a conventional bike lane. The preferred configuration is a 5-foot or wider bike lane and an 18-inch or wider buffer. Typical buffer widths are 3 to 5 feet.
- Buffered bike lanes allow bicyclists to ride side-by-side or to pass slower moving bicyclists.
- Research has documented buffered bicycle lanes increase the perception of safety.



## GUIDANCE:

- The minimum width of a buffered bike lane adjacent to parking or a curb is 4 feet exclusive of gutter (if present); a desirable width is 6 feet.
- The minimum buffer width is 18 inches. There is no maximum width. Diagonal cross hatching should be used for buffers less than 3 feet in width. Chevron cross-hatching should be used for buffers greater than 3 feet in width.
- Buffers are to be broken where curbside parking is present to allow cars to cross the bike lane.

# CONTRA-FLOW BIKE LANES

One-way streets and irregular street grids can make bicycling to specific destinations within short distances difficult. Contra-flow bicycle lanes can help to solve this problem by enabling only bicyclists to operate in two directions on one-way streets. Contra-flow lanes are useful to reduce distances bicyclists must travel and can make bicycling safer by creating facilities that help other roadway users understand where to expect bicyclists.

## CONSIDERATIONS:

- Contra-flow lanes follow the same design parameters as conventional bicycle lanes. However, the left side marking is a double yellow line. The line should be dashed if parking is provided on both sides of the street. Contra-flow lanes may also be separated by a buffer or vertical separation such as a curb.
- Contra-flow lanes must be placed to the motorist's left. A bicycle lane or other marked bicycle facility should be provided for bicyclists traveling in the same direction as motor vehicle traffic on the street to discourage wrong-way riding in the contra-flow lane.
- Parking is discouraged against the contra-flow lane as drivers' view of oncoming bicyclists would be blocked by other vehicles. If parking is provided, a buffer is recommended to increase the visibility of bicyclists. On-street parking should be restricted at corners.
- Contra-flow lanes are less desirable on streets with frequent and/or high-volume driveways or alley entrances on the side with the proposed contraflow lane. Drivers may neglect to look for opposing direction bicyclists on a one-way street.



## GUIDANCE:

- Contra-flow bicycle lanes are used on one-way streets that provide more convenient or direct connections for bicyclists where other alternative routes are less desirable or inconvenient.
- Contra-flow lanes should be used where there is a clear and observed need for the connection as evidenced by wrong-way riding bicyclists or bicyclists riding on sidewalks in the opposing direction.
- Contra-flow lanes are often short, connecting segments. They are not typically used along extended corridors.
- Contra-flow lanes may only be established where there is adequate roadway width for an exclusive lane.
- Care should be taken in the design of contra-flow lane termini. Bicyclists should be directed to the proper location on the receiving roadway.

# BIKE LANES

Bicycle lanes provide an exclusive space for bicyclists in the roadway. Bicycle lanes are established by lines and symbols on the roadway surface. Bicycle lanes are for one-way travel and are normally provided in both directions on two-way streets and/or on one side of a one-way street. Bicyclists are not required to remain in a bicycle lane when traveling on a street and may leave the bicycle lane as necessary to make turns, pass other bicyclists, or to properly position themselves for other necessary movements. Bicycle lanes may only be used temporarily by vehicles accessing parking spaces and entering and exiting driveways and alleys. Stopping, standing, and parking in bike lanes is prohibited.

## CONSIDERATIONS:

- Typically installed by reallocating existing street space.
- Can be used on one-way or two-way streets.
- Contra-flow bicycle lanes may be used to allow two-way bicycle travel on streets designated for one-way motor vehicle travel to improve bicycle network connectivity.
- Stopping, standing and parking in bike lanes may be problematic in areas of high parking demand and deliveries, especially in commercial areas.
- Wider bike lanes or buffered bike lanes are preferable at locations with high parking turnover.
- Bike lanes can be placed on the left side of one-way streets and some median-divided streets, resulting in fewer conflicts between bicyclists and motor vehicles, particularly on streets with heavy right-turn volumes, on-street parking, and/or frequent bus service.



## GUIDANCE:

- The minimum width of a bike lane adjacent to a curb is 5 feet exclusive of a gutter (4 feet in highly constrained locations); a desirable width is 6 feet.
- The minimum width of a bike lane adjacent to parking is 5 feet; a desirable width is 6 feet.
- Optional parking Ts or hatch marks can highlight the door zone on constrained corridors with high parking turnover to guide bicyclists away from motor vehicle doors.

# SHARED LANE MARKINGS

Shared lane markings (or “sharrows”) are pavement markings that denote shared bicycle and motor vehicle travel lanes. The markings are two chevrons positioned above a bicycle symbol, placed where the bicyclist is anticipated to operate. In general, this is a design solution that should only be used in locations with low traffic speeds and volumes as part of a signed route or bicycle boulevard. Shared lane markings are sometimes used as a temporary solution on constrained, higher-traffic streets (up to 10,000 vehicles per day) until additional right-of-way can be acquired, but should not be considered a permanent solution in these contexts.

## CONSIDERATIONS:

- Typically used on local, collector, or minor arterial streets with low traffic volumes. Commonly used on bicycle boulevards to reinforce the priority for bicyclists and encourage proper positioning for bicyclists.
- Typically feasible within existing right-of-way and pavement width even in constrained situations that preclude dedicated facilities.
- May be used as interim treatments to fill gaps between bike lanes or other dedicated facilities for short segments where there are space constraints.
- May be used for downhill bicycle travel, in conjunction with climbing lanes intended for uphill travel.
- Typically supplemented by signs, especially Bikes May Use Full Lane (R4-11).



## GUIDANCE:

- Intended for use only on streets with posted speed limits of up to 25 mph and traffic volumes of less than 3,000 vehicles per day. Maximum posted speed of street: 35 mph.
- May be used as a temporary solution on constrained streets with up to 10,000 vehicles per day until a more appropriate bikeway facility can be implemented. Maximum posted speed of street: 35 mph.
- Intended for use on lanes up to 14 feet wide (up to 13 feet preferred). For lanes 15 feet wide or greater, stripe a 4-foot bike lane instead.
- The marking’s centerline must be at least 4 feet from curb or edge of pavement where parking is prohibited.
- The marking’s centerline must be at least 11 feet from curb where parking is permitted, so that it is outside the door zone of parked vehicles.
- For narrow lanes (11 feet or less), it may be desirable to center shared lane markings along the centerline of the out-side travel lane.

# BICYCLE BOULEVARD TREATMENTS

Bicycle boulevards incorporate traffic calming treatments with the primary goal of prioritizing bicycle through-travel, while discouraging motor vehicle traffic and maintaining relatively low motor vehicle speeds. These treatments are typically applied on quiet streets, often through residential neighborhoods. Treatments vary depending on context, but often include traffic diverters, speed attenuators such as speed humps or chicanes, pavement markings, and signs. Bicycle boulevards are also known as neighborhood greenways and neighborhood bikeways, among other locally-preferred terms.

## CONSIDERATIONS:

Many cities already have signed bike routes along neighborhood streets that provide an alternative to traveling on high-volume, high-speed arterials. Applying bicycle boulevard treatments to these routes makes them more suitable for bicyclists of all abilities and can reduce crashes as well.

Stop signs or traffic signals should be placed along the bicycle boulevard in a way that prioritizes the bicycle movement, minimizing stops for bicyclists whenever possible.

Bicycle boulevard treatments include traffic calming measures such as street trees, traffic circles, chicanes, and speed humps. Traffic management devices such as diverters or semi-diverters can redirect cut-through vehicle traffic and reduce traffic volume while still enabling local access to the street.

Communities should begin by implementing bicycle boulevard treatments on one pilot corridor to measure the impacts and gain community support. The pilot program should include before-and-after crash studies, motor vehicle counts, and bicyclist counts on both the bicycle boulevard and parallel streets. Findings from the pilot program can be used to justify bicycle boulevard treatments on other neighborhood streets.

Additional treatments for major street crossings may be needed, such as median refuge islands, bicycle signals, rapid flashing beacons, and HAWK or half signals. For more information on Traffic Calming treatments supporting bicycle boulevards, see Traffic Calming.

## GUIDANCE:

- Maximum Average Daily Traffic (ADT): 3,000, and less than 50 motor vehicles per hour in the peak direction at the peak hour
- Preferred ADT: Up to 1,000
- Target speeds for motor vehicle traffic are typically around 20 mph; there should be a maximum 15 mph speed differential between bicyclists and vehicles.

## RESOURCES AND REFERENCES:

AASHTO Policy on Geometric Design of Highways and Streets (2013); AASHTO Guide for the Development of Bicycle Facilities (2012); FHWA Shared Use Path Level of Service Calculator (2006); FHWA Separated Bike Lane Planning and Design Guide (2015); Manual on Uniform Traffic Control Devices (2009); Bicycle Facilities and the Manual on Uniform Traffic Control Devices: Dashed Bicycle Lanes (FHWA website); NACTO Urban Bikeway Design Guide (2014); NACTO Urban Street Design Guide; NACTO Designing for All Ages & Abilities; MassDOT Separated Bike Lane Planning and Design Guide (2015); Fundamentals of Bicycle Boulevard Planning & Design (2009); FHWA Rural Design Guide (2016)



# INTERSECTIONS & CROSSINGS

## INTRODUCTION

This Chapter provides design guidance for intersections and crossings. Many modes come together in the city's intersections creating a challenge for the designer who must balance the needs of many different users in intersections that can range in both scale and complexity. Foremost, the designer must consider the safety of all users. In addition, convenience and minimal delay are also important factors. In addition to their transportation function, intersections may serve as gateways to residential or commercial neighborhoods and contribute to the character of the City.

## INTERSECTION GEOMETRY

Well-designed intersection geometry is crucial for creating safe and efficient multimodal intersections. Many of Topeka's intersections have complicated geometric configurations as the street network has been augmented over time. Within the City's historic neighborhoods, the roadway grid pattern provides predictable four-legged approaches, but there are also many instances of larger and more complex intersections.

Designing multimodal intersections requires geometry that increases safety for all users in combination with effective and efficient traffic control measures. Changes in geometry can help to reduce motor vehicle turning speeds, increase pedestrian comfort and safety, and create space for dedicated bicycle facilities. Key considerations of intersection geometry include the location of pedestrian crossing ramps and crossings relative to motor vehicle paths, curb radii (see Curb Radius), selection of the appropriate design vehicle, and parking or other access needs.

*Intersection geometry must be approved by the City of Topeka, who utilize guidelines and standards from:*

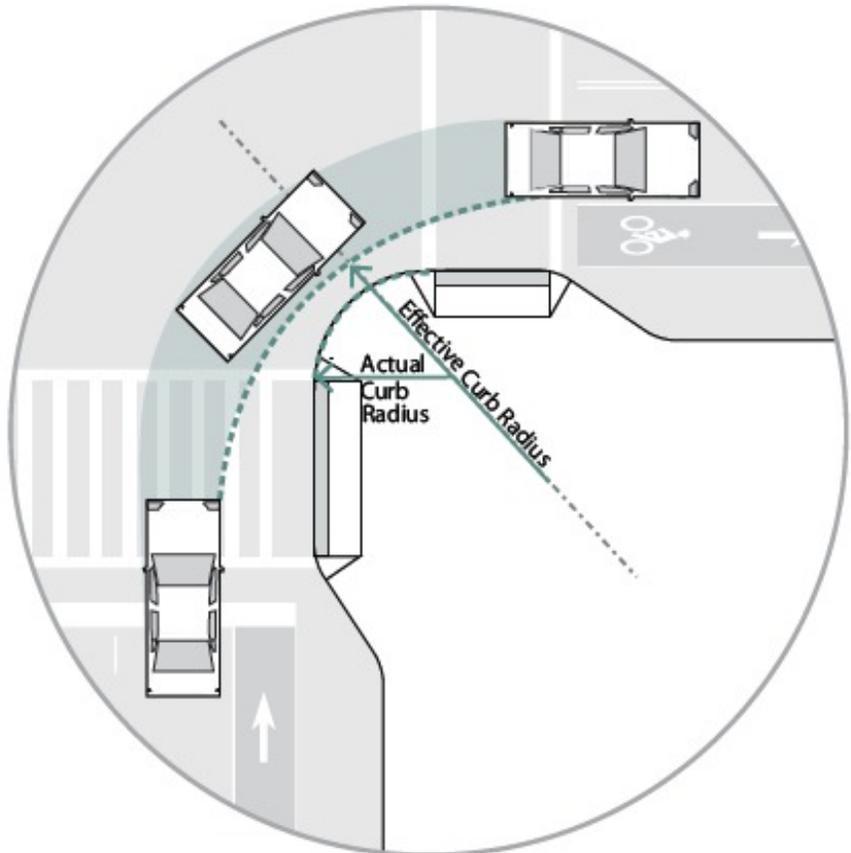
- The Manual of Uniform Traffic Control Devices (MUTCD)
- The National Association of City Transportation Officials (NACTO) Urban Street, Bikeway, and Transit Design Guides
- American Association of State Highway Transportation Officials (AASHTO) "Green Book"

# CORNERS & CURB RADII

Pedestrian safety and comfort is directly impacted by the width and configuration of street corners. However, streets must accommodate large turning vehicles, including school buses and transit vehicles. One of the most challenging aspects of intersection design is to accommodate large motor vehicles while keeping intersections as compact as possible for pedestrian safety. This requires a design flexibility and engineering judgment, as each intersection is unique in terms of the angles of the approach and departure, the number of travel lanes, the presence of a median, and other features that fundamentally impact corner design.

## CONSIDERATIONS:

- Design intersections to maximize the safety of the intersection:
  - Minimize the number of conflict points.
  - Reduce the number of legs of multi-leg intersections where feasible.
  - Provide perpendicular crossing alignments where feasible
  - Reduce driveway access points within the functional area of a signalized intersection.
  - Minimize lane offsets through the intersection to the extent feasible; where lane offsets exceed 3 feet of lateral offset through the intersection, or where multiple lanes are offset in parallel, consider supplemental markings directing traffic to the appropriate downstream receiving lane through the intersection. Minimizing offsets also helps minimize collisions from users of bicycle and pedestrian infrastructure.
- Design corners with consideration for the effective curb radius in addition to the actual curb radii, the effective curb radius is the curve which vehicles follow when turning, which may be affected by on-street parking, bicycle lanes, medians, and other roadway features. The curb radii may be reduced in certain contexts.
- Consider places where wide crossings negatively impact pedestrian safety and pedestrians may be placed at risk if the actual curb radius is too small and trucks wheels come up on the curb.
- Incorporate curb extensions (as described elsewhere in these guidelines) to benefit pedestrians. It is acceptable to have a curb extension with a larger curb radius that shortens crossing distances while accommodating large vehicles.



## GUIDANCE:

- Select the design vehicle according to the types of vehicles using the intersection with considerations to relative volumes and frequencies. In most cases, the curb radii are based on a Single Unit vehicle with a 42' turning radius.
- If the City anticipates the need to accommodate a larger design vehicle, a radius evaluation based on this larger vehicle would be required. Examples of typical turning templates would include a SU, WB-40, WB-50, WB-60 and WB-67.
- Intersection design should strive for an actual curb radius that is between 10' to 25'. The default curb radii for two intersecting Neighborhood Residential streets is 10' to 20' (exceptions apply for angled streets). For all other street classifications, including streets that intersect with Neighborhood Residential streets, corner design should strive for an actual curb radius that is no more than 20' (exceptions apply for angled streets and Industrial Streets). Exceptions should be made along bus routes and in industrial areas where a curb radius of 30-feet may be needed. Engineering judgement should be used with the goal of keeping curb radii as small as feasible to maintain lower speeds and reduce crossing distances for pedestrians.
- In locations where large vehicles make occasional turns, designers may consider mountable truck aprons. Mountable truck aprons deter passenger vehicles from making higher-speed turns, but accommodate the occasional large vehicle without encroachment or off-tracking into pedestrian waiting areas. Mountable truck aprons should be visually distinct from the adjacent travel lane and sidewalk. The mountable surface should be visually distinct from the adjacent travel lane, sidewalk and bicycle facility. The heights of mountable areas and curbs should be no more than 3 inches above the travel lane to accommodate lowboy trailers.

A variety of strategies can be employed to minimize curb radii:

- On-street parking and bicycle lanes may provide the larger effective curb radii to accommodate the appropriate design vehicle.
- On low volume (less than 2,000 vehicles per day), two-lane streets, assume that a large vehicle will use the entire width of the departing and receiving travel lanes, including the oncoming traffic lane.
- At signalized intersections, assume the large vehicle will use half the width of the departing lane and part of the receiving lanes on the intersecting street.
- At signalized intersections where additional space is needed to accommodate turning vehicles, consider recessing the stop bar on the receiving street to enable the vehicle to use the entire width of the receiving roadway (encroaching on the opposing travel lane).
- In some cases, allow a large turning vehicle to encroach on the adjacent travel lane on the departure side (on multi-lane roads) to make the turn.
- Use a compound curve to vary the actual curb radius over the length of the turn, so that the radius is smaller as vehicles approach a crosswalk and larger when making the turn.
- In some cases where there are alternative access routes, it may be possible to restrict turning movements by large vehicles at certain intersections and driveways to enable tighter curb radii.
- Turn restrictions and alternate access routes should be properly signed and must be approved by the City of Topeka.

# CURB RAMPS

Curb ramps transition pedestrians from the sidewalk to the street. The designs of curb ramps are critical for all pedestrians, but particularly for people who use mobility devices. The Americans with Disabilities Act (ADA) standards require that all pedestrian crossings be accessible to people with disabilities by providing curb ramps at intersections and midblock crossings, as well as other locations where pedestrians can be expected to enter the street. Curb ramps also benefit people pushing strollers, grocery carts, suitcases, or bicycles.

## CONSIDERATIONS:

- Furnishing zones or terraces (the space between the curb and sidewalk) should be considered to provide enough width at intersections for curb ramps to gain sufficient elevation to the sidewalk, which will depend on the curb height chosen.
- Separate curb ramps should be prioritized for each crosswalk at an intersection rather than a single ramp at a corner for both crosswalks. Separate curb ramps improve orientation for visually impaired pedestrians by directing them toward the correct crosswalk.
- Consider providing wider curb ramps in areas of high pedestrian volumes and crossing activities.

## REQUIREMENTS & GUIDANCE:

- Curb ramps at marked crossings must be wholly contained within the crosswalk, excluding side flares.
- Ramps are required to have landings. Landings provide a level area with a cross slope of 2% or less in any direction for wheelchair users to wait, maneuver into or out of a ramp, or bypass the ramp altogether. Landings should be at least as wide as the ramp, and should at a minimum, be 4' by 4'. Where possible landings should be designed 5' by 5'.
- Flares are required when the surface adjacent to the ramp's sides is walkable, however, they are unnecessary when this space is occupied by a landscaped buffer.
- Maximum slope: 1:12 (8.33%).
- Maximum slope of side flares: 1:10 (10%).
- Maximum cross-slope: 2% (1–2% with tight tolerances recommended).
- Truncated domes (the only permitted detectable warning device) must be installed on all new curb ramps to alert pedestrians to the sidewalk and street edge.
- Curb ramps should direct pedestrians into the crosswalk. The bottom of the ramp should lie within the area of the crosswalk.
- Type II ramps, which provide one ramp leading to each crosswalk at an intersection, are strongly preferred over Type I ramps that only provide a single ramp for multiple crosswalks.

## RESOURCES AND REFERENCES:

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011)

# CURB EXTENSIONS

Curb extensions, also known as neckdowns, bulb-outs, or bump-outs, are created by extending the sidewalk area at corners or mid-block. Curb extensions are intended to increase safety, calm motor vehicle traffic, and provide extra space along sidewalks for users and amenities.



## CONSIDERATIONS:

- Curb extension design should consider the turning needs of emergency and larger vehicles.
- Care should be taken to maintain direct routes across intersections, aligning pedestrian desire lines on either side of the sidewalk. Curb extensions often make this possible, as they provide extra space for grade transitions.
- Consider providing a 20-foot-long curb extension to restrict parking within 20' of an intersection to improve sight distance.
- When curb extensions conflict with turning movements of larger vehicles, prioritize reducing the width and/or length over elimination. Mountable aprons may also be considered to accommodate larger turning motor vehicles.

## REQUIREMENTS & GUIDANCE:

- Curb extensions should be considered only where parking is present, or where motor vehicle traffic deflection is provided (through other curbside uses such as bike share stations or parklets).
- Curb extensions are particularly valuable in locations with high volumes of pedestrian traffic, near schools, at unsignalized pedestrian crossings, or where there are demonstrated pedestrian safety issues.
- A typical curb extension extends the approximate width of a parked car (or about 6' from the curb).
- The minimum length of a curb extension is the width of the crosswalk. This allows the curvature of the curb extension to start after the crosswalk, which should deter parking. NO PARKING signs should also be used to discourage parking. The length of a curb extension can vary depending on the intended use (i.e., storm water management, transit stop waiting areas or transit stops, restrict parking).
- Curb extensions should not reduce a travel lane or a bicycle lane to an unsafe width.

## RESOURCES AND REFERENCES:

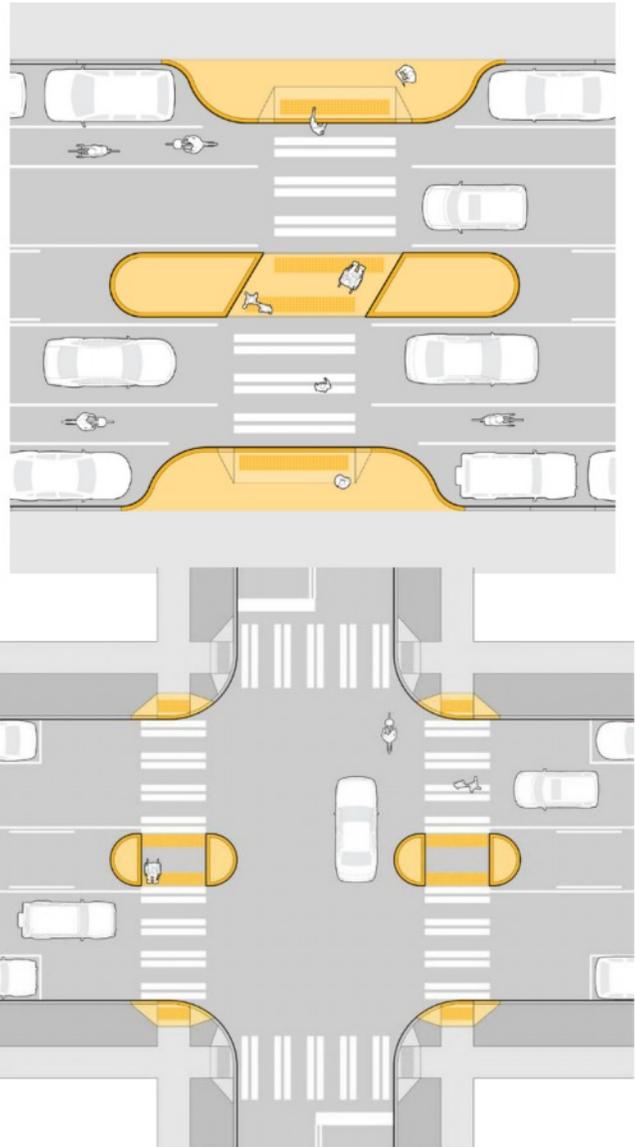
AASHTO Guide for the Development of Bicycle Facilities (2012) ; NACTO Urban Streets Design Guide (2012) - Curb Extensions

# CROSSING ISLANDS

Crossing islands are raised islands that provide a pedestrian refuge and allow multi-stage crossings of wide streets. They can be located along the centerline of a street, as roundabout splitter islands, or as “pork chop” islands where right-turn slip lanes are present.

## CONSIDERATIONS:

- There are two primary types of crossing islands. The first type provides a cut-through of the island, keeping pedestrians at street grade. The second type ramps pedestrians up above street grade to an intermediate or sidewalk level, though this may present challenges to constructing accessible curb ramps.
- Crossing islands should be considered at signalized intersection where pedestrians are required to cross more than two lanes of travel at a time, to allow for multi-stage crossings, which in turn allow shorter signal phases.
- Crossing islands can be coupled with other traffic-calming features (See Traffic Calming).
- Crossing islands can also be coupled with signal options including island mounted RRFB, crossing signs with LED beacons on the sign, and LEDs mounted in the crosswalk leading to the island.
- At mid-block crossings where width is available, islands should be designed with a stagger, or in a “Z” pattern, encouraging pedestrians to face oncoming traffic before crossing the other side of the street.



## REQUIREMENTS & GUIDANCE:

- **Minimum width: 6 feet**
- Preferred width: 10 feet (to accommodate bicyclists and wheelchair users)
- **Curb ramps with truncated dome detectable warnings are required.** Truncated domes should extend the entire cut-through width or 24 inches deep minimum measured from the back of the curb on the ramp surface so that pedestrians with visual impairments do not unknowingly enter a roadway.
- A 4-foot minimum long separation is necessary between curb ramps so that people using wheelchairs can clear one ramp before negotiating the next. Level cut-throughs provide an effective alternative, especially at narrow islands that will not accommodate opposing curb ramps with a 4-foot separation.
- A “nose” that extends past the crosswalk is not required, but is recommended to protect people waiting on the crossing island and to slow turning motor vehicle drivers.
- Vegetation and other aesthetic treatments may be incorporated, but must not obscure visibility.

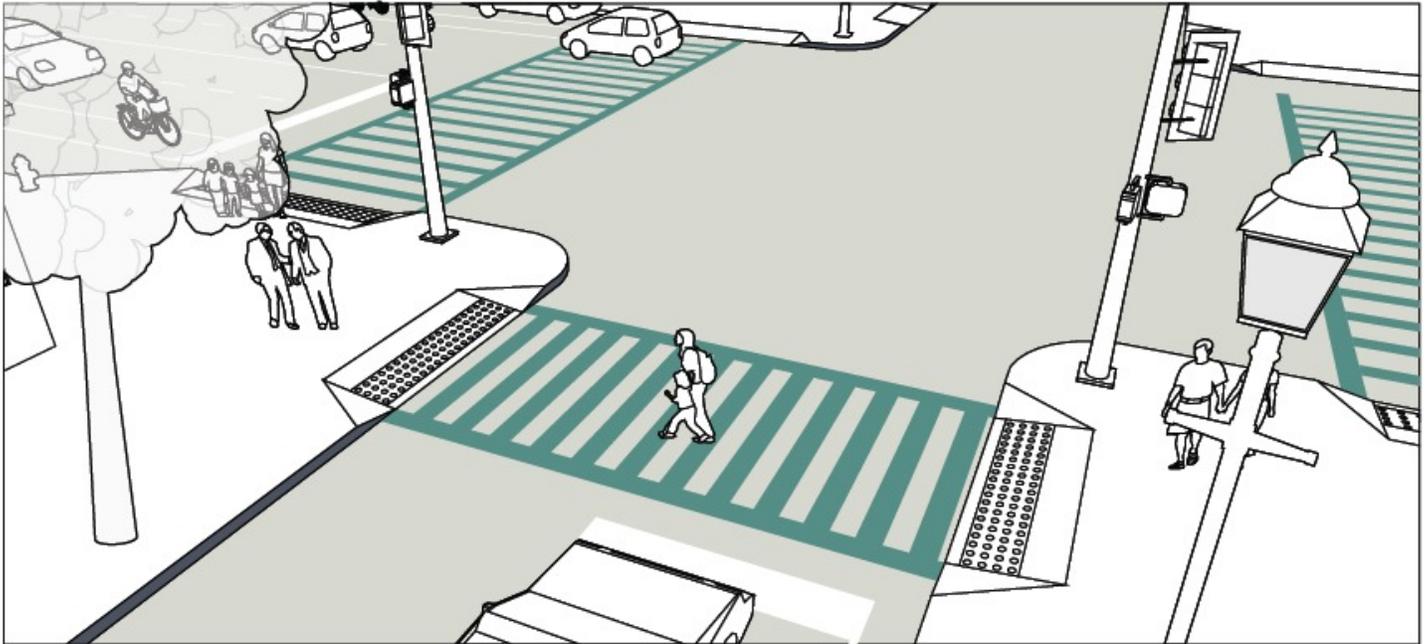
Cut-through widths should equal the width of the crosswalk. Cut-throughs may be wider to allow the clearing of debris and snow, but should not encourage motor vehicles to use the space for U-turns.

## RESOURCES AND REFERENCES:

NACTO Urban Street Design Guide (2013); Manual on Uniform Traffic Control Devices (2009)

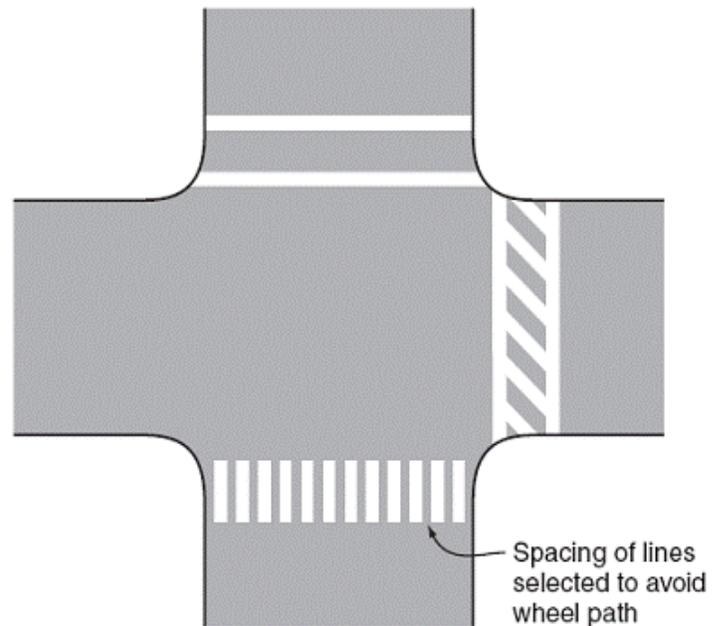
# CROSSWALK DESIGN & INSTALLATION

Legal crosswalks exist at all locations where sidewalks, or in the absence of curbs, from the edges of the roadway, meet the crossing roadway, regardless of whether pavement markings are present. According to Kansas state law, drivers are required to yield to pedestrians in crosswalks at intersections, regardless of whether they are marked or not. Providing marked crosswalks communicates to drivers that pedestrians may be present, increases crosswalk visibility to motor vehicle drivers, and helps guide pedestrians to locations where they should cross the street. In addition to pavement markings, crosswalks may include signals/beacons, warning signs, and raised platforms.



## CONSIDERATIONS:

- Marked crosswalks should be used only at locations where significant pedestrian activity is occurring or anticipated to help ensure that motorists associate crosswalk and pedestrian activity. To create a convenient, connected, and continuous walking network, the first step is identifying locations for marked crosswalks. Begin by identifying desire lines and destinations such as schools, parks, civic buildings, retail areas, and transit stops. Then, identify where it is safest for people to cross. These observations should inform location and prioritization of crossing improvements.
- Marked crosswalks help guide pedestrians to locations where they should cross the street as well as inform drivers of pedestrian movements. In addition to intersections, marked crosswalks are used in locations where pedestrians may not be expected, such as at mid-block crossings or uncontrolled crossings (crossings where motorists do not have signals or stop signs).



*Examples of transverse, diagonal, and continental crosswalk markings (clockwise from top) Source: MUTCD*

- As with any installation of traffic control devices, the most essential tool for crosswalk installation is the use of engineering judgment. Engineering judgment should be used and, if applicable, an engineering study performed when considering the marking of crosswalks.
- There are many different styles of crosswalk striping and some are more effective than others. Topeka uses transverse, continental, and diagonal crosswalk patterns. Continental striping patterns are more visible to drivers.
- Pedestrian signal phases must be timed based on the length of the crossing. If pedestrians are forced to wait longer than 40 seconds, non-compliance is more likely.
- Raised crossings calm traffic and increase the visibility of pedestrians (see Traffic Calming).
- Curb extensions, also known as bulb-outs and bump-outs, reduce the distance pedestrians must cross, and calm traffic (see Curb Extensions).
- Consider pedestrian signals, HAWK or RRFBs, or gateway treatments to slow traffic and allow for crossing gaps at intersections (see Signalized Intersections)

## REQUIREMENTS & GUIDANCE:

- The surfacing material must be compliant with all ADA standards identified by the current version of the Public Rights-of-Way Accessibility Guidelines (PROWAG) requirements.
- To the extent possible, striped, or marked crosswalks should align with the sidewalks or pedestrian routes that serve them. Designs should balance the need to reflect the desired pedestrian walking path with orienting the crosswalk perpendicular to the curb; perpendicular crosswalks minimize crossing distances and therefore limit the time that pedestrians are exposed.
- To the extent feasible, striped, or marked crosswalks should not be placed where existing drainage structures or utility covers are located; verify that either the surface of the drainage structure or utility cover is ADA compliant. Otherwise, verify that a minimum 4 feet accessible route is provided within the crosswalk to bypass the structure or cover.
- Crosswalks should be at least 8 feet wide, or the width of the approaching sidewalk if it is greater. In areas of heavy pedestrian volumes, crosswalks can be up to 25 feet wide.
- Marked crosswalks at signalized or stop-controlled intersections should include a stop bar to indicate to drivers a safe distance from the crosswalk to stop so as to not place pedestrians at risk, particularly on multi-lane approaches. Stop bars shall be designed in accordance with the MUTCD. Stop bars at stop-controlled and signalized intersections should be striped no less than 4 feet and no more than 30 feet from the approach of crosswalks.
- A line of painted triangles, also referred to as “shark’s teeth” yield markings are appropriate for use as the yield line at unsignalized locations, as per the MUTCD. Sharks teeth should be placed 30 to 50 feet prior to crosswalks at unsignalized locations. This distance is far enough away to provide for improved sight distance in the adjacent lanes. If the bars are placed more than 50 feet away, motorists are more likely to ignore the line and stop only a few feet prior to the crosswalk.
- Add pedestrian beacons, signals, crossing islands, curb extensions, and/or other traffic calming measures when average daily traffic (ADT) volumes exceed 12,000 vehicles per day on 4-lane roads or speeds exceed 40 mph.

### RESOURCES AND REFERENCES:

NACTO Urban Street Design Guide (2013); Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines (2005); Proposed Guidelines for Pedestrian Facilities in the Public Right-of- Way (PROWAG; 2011); ADA Accessibility Guidelines (2004); Manual on Uniform Traffic Control Devices (2009); FHWA, Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (2017)

# SIGNALIZED INTERSECTIONS

Signal timing for pedestrians is provided with pedestrian signal heads. Pedestrian signal heads display the three intervals of the pedestrian phase: The Walk Interval, signified by the WALK indication, alerts pedestrians to begin crossing the street. The Pedestrian Change Interval, signified by the flashing DON'T WALK indication, alerts pedestrians approaching the crosswalk that they should not begin crossing the street. The Don't Walk Interval, signified by a steady DON'T

## CONSIDERATIONS:

- One primary challenge for traffic signal design is to balance the goals of minimizing conflicts between turning motor vehicles with the goal of minimizing the time required to wait at the curb for a WALK indication.
- Intersection geometry and traffic controls should encourage turning motor vehicles to yield the right-of-way to pedestrians.
- Signal design should also minimize the time that pedestrians must wait. Requiring pedestrians to wait for extended periods can encourage crossing against the signal. The 2010 Highway Capacity Manual states that pedestrians have an increased likelihood of risk-taking behavior (e.g., jay-walking) after waiting longer than 30 seconds at signalized intersections.
- Opportunities to provide a WALK indication should be maximized whenever possible. Vehicular movements should be analyzed at every intersection to utilize non-conflicting phases to implement Walk Intervals. For example, pedestrians can always cross the approach where vehicles cannot turn at a four-leg intersection with the major road intersecting a one-way street when the major road has the green indication.
- Free-flowing right-turn lanes are discouraged at signalized intersections. Where they are present and unsignalized, the pedestrian signal and push button should be located on the channelization (“pork chop”) island. A yield or crosswalk warning sign should then be placed in advance of the crosswalk. Turn lane geometry should be designed to slow turning motor vehicle traffic to encourage yielding to pedestrians and improve safety.
- When any separated bicycle infrastructure is utilized (examples being separated bicycle lanes or sidepaths) consider specific signals for these road users to ensure predictable intersection crossing.



## REQUIREMENTS & GUIDANCE:

- Pedestrian signals should allocate enough time for pedestrians of all abilities to safely cross the roadway. The MUTCD specifies a pedestrian walking speed of 3.5 feet per second. The minimum pedestrian clearance time, is calculated using the pedestrian walking speed and the crossing distance. To the extent feasible, pedestrian clearance time should be maximized.
- Countdown pedestrian displays inform pedestrians of the amount of time in seconds available to safely cross during the flashing DON'T WALK (or upraised hand) interval. All pedestrian signal heads should contain a countdown display provided with the FLASHING DON'T WALK indication.
- In areas with higher pedestrian activity, such as near transit stations and main streets, push button actuation may not be appropriate. Instead, people should expect a pedestrian cycle at every signal phase, rather than having to push a button to call for a pedestrian phase.
- Bicycle specific signals should consider the use of sensors set in the sidepath rather than requiring a user activated button.

## RECTANGLE RAPID-FLASH BEACONS

At some uncontrolled crossings, particularly those with four or more lanes, it can be difficult to achieve compliance with laws that require motorists to yield to pedestrians. Vehicle speeds and poor pedestrian visibility combine to create conditions in which very few drivers are compelled to yield.

One type of device proven to be successful in improving yielding compliance at these locations is the Rectangular Rapid Flash Beacon (RRFB). RRFBs are a pedestrian crossing sign combined with an intensely flashing beacon that is only activated when a pedestrian is present. RRFBs are placed curbside below the pedestrian crossing sign and above the arrow indication pointing at the crossing.

## CONSIDERATIONS:

- The design of RRFBs should be in accordance with FHWA's Interim Approval 21 (IA-21) for Optional Use of Rectangular Rapid Flashing Beacons issued March 20, 2018.
- RRFBs can be used when a signal is not warranted at an unsignalized crossing. They are not appropriate at intersections with signals or STOP signs.
- RRFBs are installed on both sides of the roadway at the edge of the crosswalk. If there is a pedestrian refuge or other type of median, an additional beacon should be installed in the median.

## REQUIREMENTS & GUIDANCE:

- RRFBs are considerably less expensive to install than mast-arm mounted signals. They can also be installed with solar-power panels to eliminate the need for a power source.
- RRFBs should be limited to locations with critical safety concerns and should not be installed in locations with sight distance constraints that limit the driver's ability to view pedestrians on the approach to the crosswalk.
- RRFBs should be used in conjunction with advance yield pavement lines and signs, which are discussed on the previous page.
- Usually implemented at high-volume pedestrian crossings, but may also be considered for priority bicycle route crossings or locations where bike facilities cross roads at mid-block locations.

# LEADING PEDESTRIAN INTERVAL

The Leading Pedestrian Interval (LPI) initiates the pedestrian WALK indication three to seven seconds before motor vehicles traveling in the same direction are given the green indication. This signal timing technique allows pedestrians to enter the intersection prior to turning vehicles, increasing visibility between all modes.

- The LPI should be used at intersections with high volumes of pedestrians and conflicting turning vehicles, and at locations with a large population of older adults or school children who tend to walk slower.
- A lagging protected left arrow for left turning motor vehicles should be provided to accommodate the LPI.

Considerations and Guidelines should be added once further studies have been completed.

## ACCESSIBLE PEDESTRIAN SIGNALS

Accessible pedestrian signals (APS) and accessible detectors are devices that communicate information in non-visual formats about the pedestrian phase to pedestrians with visual and/or hearing disabilities. APS and detectors may include features such as audible tones, speech messages, detectable arrow indications and/or vibrating surfaces.

### CONSIDERATIONS:

- APS pushbutton and signal pole locations should be carefully considered to encourage natural pedestrian flow and not impede on people with accessibility needs. Consider moving pushbuttons and signals out of the natural pedestrian access route.

### REQUIREMENTS & GUIDANCE:

- When new pedestrian signals are installed, APS with pushbuttons are required. For existing pedestrian signals, the APS and pedestrian pushbuttons should be provided when the signal controller and software are altered, or the signal head is replaced.
- Pushbutton locator tones are used for locating the pedestrian pushbutton needed to actuate the WALK interval. Detectable arrows should be located on pushbuttons to point in the same direction as the crosswalk. At corners of signalized locations where two pushbuttons are present, they should be separated by at least 10 feet.
- Audible walk indications should have the same duration as the pedestrian walk indication, unless the pedestrian signal rests during the pedestrian phase, in which case the audible indication should be provided in the first seven seconds of the Walk interval.
- For automatically-called pedestrian phases, pushbuttons can be used to activate accessible pedestrian signal features, such as detectable arrow indications and/or speech messages.

### RESOURCES AND REFERENCES:

NACTO Urban Streets Design Guide (2013); MUTCD (2009)

# HIGH-INTENSITY ACTIVATED CROSSWALK-BEACON

Pedestrian-activated beacons, including the High-intensity Activated Crosswalk Beacon (HAWK), are a type of hybrid signal intended to allow pedestrians and bicyclists to stop traffic at unsignalized crossing locations (refer to MUTCD for volume, crossing length, and speed warrant information). This type of signal may be used in lieu of a full signal that meets any of the traffic signal control warrants in the MUTCD. It may also be used at locations which do not meet traffic signal warrants, but where assistance is needed for pedestrians or bicyclists to cross at a marked crosswalk.

## CONSIDERATIONS:

While this type of device is intended for pedestrians, it would be beneficial to retrofit it for bicyclists, using bicycle detection and bicycle signal heads on major cycling networks. Depending upon the detection design, the agency implementing these devices may provide different clearance intervals for bicyclists and pedestrians. The provision of bicycle signal would require permission to experiment from FHWA.



## REQUIREMENTS & GUIDANCE:

- The MUTCD recommends minimum volumes of 20 pedestrians or bicyclists an hour for major arterial crossings (volumes exceeding 2,000 vehicles/hour).
- This type of device should be considered for all arterial crossings in a bicycle network, and for trail crossings, if other engineering measures are found inadequate to create safe crossings.
- Pushbutton actuators should be “hot” (respond immediately when pressed), be placed in convenient locations for all users, and abide by other ADA standards. Passive signal activation, such as video or infrared detection, may also be considered.
- See FHWA’s Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations publication and the MUTCD to determine warrants for traffic control at midblock crossings.

## RESOURCES AND REFERENCES:

NACTO Urban Street Design Guide (2013); Manual on Uniform Traffic Control Devices (2009); Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations (2005)

# BICYCLE SIGNALS, DETECTION, ACTUATION

Bicyclists have unique needs at signalized intersections. Bicycle movements may be controlled by the same indications that control motor vehicle movements, by pedestrian signals, or by bicycle-specific traffic signals. Separated bike lanes create situations that may require leading or protected phases for bicycle traffic, or place bicyclists outside the cone of vision of existing signal equipment. In these situations, signals for bicycle traffic will be required.

## CONSIDERATIONS:

- Bicycle-specific signals may be appropriate to provide additional guidance or separate phasing for bicyclists, per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
- It may be desirable to install advanced bicycle detection on the intersection approach to extend the signal phase, or to prompt the signal phase and allow for bicycle through movements.
- Video detection, microwave and infrared detection can be alternatives to loop detectors.
- Another strategy in signal timing is coordinating signals to provide a “green wave,” such that bicycles will receive a green indication and not be required to stop, due to the signal progression. Several cities, including Portland, OR and San Francisco, CA have implemented “green waves” for bicycles.
- Bicyclists may also follow the pedestrian signal at intersection crossings. If bicyclists follow the pedestrian signal, it is illegal to enter on flashing DON'T WALK despite the different crossing speeds of bicyclists compared to pedestrians.



## REQUIREMENTS & GUIDANCE:

- A stationary, or “standing,” bicyclist entering the intersection at the beginning of the green indication can typically be accommodated by increasing the minimum green time on an approach, per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
- A moving, or “rolling,” bicyclist approaching the intersection towards the end of the phase can typically be accommodated by increasing the red time (change and clearance intervals), per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
- Set loop detectors to the highest sensitivity level possible without detecting vehicles in adjacent lanes and field check. Type D and type Q loops as specified by California Department of Transportation<sup>8</sup> are preferred for detecting bicyclists.
- Install bicycle detector pavement markings and signs per the MUTCD, AASHTO Guide for the Development of Bicycle Facilities, and the NACTO Urban Bikeway Design Guide.

## RESOURCES AND REFERENCES:

AASHTO Guide for the Development of Bicycle Facilities (2012) ; NACTO Urban Bikeway Design Guide (2012); Manual on Uniform Traffic Control Devices (2009)

<sup>8</sup> [http://www.dot.ca.gov/hq/esc/oe/project\\_plans/highway\\_plans/2010-RSP-and-NSP/rspe-05b.pdf](http://www.dot.ca.gov/hq/esc/oe/project_plans/highway_plans/2010-RSP-and-NSP/rspe-05b.pdf)

# TRANSIT ACCOMMODATIONS AT INTERSECTIONS

The design of intersections and the provisions for transit vehicles need to meet the goals of the transit system—primarily to retain and/or improve the reliability and efficiency of the service. Transit delays occur most often at intersections and are a key element in system and route planning. The delay at traffic signals can account for at least 10% of overall bus trip time and up to 50% or more of bus delay.

Most Topeka Metro transit stops are located at intersections on Topeka streets. While many stops are identified only by signs, transit shelters and transit stop benches have been installed throughout Topeka. Guidance for Transit Accommodations and Stops can be found in Chapter 3: Sidewalks and Streetsides.

## TRANSIT PRIORITY AT INTERSECTIONS

By prioritizing transit at intersections, service can become more reliable, efficient, and environmentally friendly due to less queuing and stopping and starting, thus making transit a more attractive mode of transportation. Transit prioritization strategies include signal coordination, signal priority, transit-only lanes, and queue jump or bypass lanes. These strategies can dramatically improve transit operations at a relatively low cost compared to corridor-wide modifications.

Signal coordination times a series of traffic signals along a corridor to permit smooth progression of traffic. This progression reduces overall traffic congestion, thus aiding transit travel times together with other motor vehicular travelers. Signal coordination uses a pre-timed signal timing program.

Transit signal priority (TSP) enables an approaching transit vehicle to communicate with a traffic signal and alter the signal timing in a way to advantage transit progression. Transit signal priority may extend the signal green time, truncate the red phase, swap signal phases, insert a transit-only phase, or skip signal phases. The margin of signal time prioritized for transit is typically made up in modifications to the remaining signal phases with the overall signal cycle length remaining generally unchanged and fully recovered in the following cycle.

During highly congested periods or on routinely congested corridors, TSP alone may be ineffective at improving transit service. In these cases, short transit only queue jump lanes at intersections provide an opportunity for transit vehicles to bypass stopped traffic and move forward through a congested intersection. Queue jump lanes may be transit-only or combined with general purpose right turn lanes. They may extend to the far-side of an intersection to permit transit vehicles to additional space to merge back into through traffic. Queue jump lanes are often paired with a separate signal to permit the queue jump lane to advance and clear while other vehicles traveling in the same direction are given a red light.

*Transit only and queue jump lanes, as well as all signal coordination and prioritization, must be coordinated with and approved by the City of Topeka and Topeka Metro.*

### CONSIDERATIONS:

- Signal coordination can reduce delay for transit as well as motor vehicles. Signal coordination uses a pre-timed signal program for traffic and pedestrian crossings.
- Transit signal priority requires special communication technology to permit communication between the signal and approaching transit vehicles. TSP may be used on either pre-timed or activated signals.
- Signal coordination and signal priority can be used with or without the presence of dedicated transit only lanes or queue jump and bypass lanes at intersections.
- Advanced stop bars may be used in combination with queue jump lanes to help transit vehicles re-enter the traffic stream or jump to the front of the queue. Advanced stop bars stop all traffic some distance back from the traffic signal.

- Transit-only queue jump lanes may be enhanced with colored pavement or striping to further define it as a transit-only space.
- Queue jump lanes gain the greatest advantage when they are provided separate signal phasing to permit lanes to clear in advance of general traffic.
- Queue jump lanes can be used at intersections without a transit stop, as well as with one at either the near- or far-side, if there is enough space on the roadway.
- Traffic signal priority typically cannot be activated for more than two signal cycles in a row and then cannot be activated until two to three additional signal cycles have passed to enable overall intersection recovery.

## REQUIREMENTS & GUIDANCE:

- When providing a queue jump lane with a leading signal phase, designers should consider the overall signal cycle lengths and impacts to delay for other users.
- If space is not available for a queue jump lane or bypass lane, consider using a right-hand turn lane to double as a transit advantage lane, by allowing transit vehicles to move up in the queue at a signal where right turn on red is permitted. If right-turn lanes are used, appropriate signage such as RIGHT LANE MUST TURN RIGHT must be accompanied by EXCEPT BUSES placards.
- Transit signal priority should be considered on all priority transit routes. Studies should be conducted to understand the impact to traffic on cross streets and other corridor users. TSP should be installed only when there are documented schedule adherence issues.
- Signal coordination should take all modes into consideration, including travel speeds of bicyclists and pedestrians along the corridor. Signal coordination should seek to optimize progression of all modes.
- Public and transit operator education is needed on how to use queue jump lanes in multimodal environments and how to manage transit vehicle, other or vehicle, pedestrian, and bicycle interactions.
- Compliance may be an issue if advance stop bars are used.

## RESOURCES AND REFERENCES:

NACTO

# BICYCLE ACCOMMODATIONS AT INTERSECTIONS

As noted in the Topeka Bikeways Master Plan, thoughtful intersection design is critical to provide safe infrastructure for bicyclists using on-street facilities. This subsection includes best practices for safe and comfortable accommodations for bicyclists at intersections.

## BIKE BOXES

A bike box provides dedicated space between the crosswalk and motor vehicle stop bar where bicyclists can wait during the red-light phase at signalized intersections. The bike box allows a bicyclist to take a position in front of motor vehicles at the intersection, which improves visibility and motorist awareness, and allows bicyclists to “claim the lane” if desired. Bike boxes aid bicyclists in making turning maneuvers at the intersection and provide more queuing space for multiple bicyclists than that provided by a typical bicycle lane.



### REQUIREMENTS & GUIDANCE:

FHWA granted interim approval to intersection bike boxes on October 12, 2016.

- Bike boxes are typically painted green and are a minimum of 6 feet in depth. 10 to 16 feet is recommended.
- Bike box design should be supplemented with appropriate signage according to the latest version of the MUTCD. Right turns on red shall be prohibited using a No Turn on Red (R10-11) sign from any approach with a bike box.
- Bike box design should include appropriate adjustments to the minimum green and red clearance time.

## REQUIREMENTS & GUIDANCE CONTINUED:

- Where right turn lanes for motor vehicles exist, bicycle lanes should be designed to the left of the turn lane and the bike box should not extend over the right turn lane.
- Considerations In locations with high volumes of turning movements by bicyclists, a bicycle box should be used to allow bicyclists to shift towards the desired side of the travel way. Depending on the position of the bicycle lane, bicyclists can shift sides of the street to align themselves with motor vehicles making the same movement through the intersection.
- In locations where a bicycle lane is placed to the right of a shared through right turn lane, the bicycle box allows bicyclists to move to the front of the traffic queue and make their movement first, minimizing conflicts with the turning.
- In addition, stop bars and other regulatory paint marking may need to be moved further back away from the intersection to provide ample crossing space for off street bicycle facilities.

### RESOURCES AND REFERENCES:

FHWA Interim Approval for Optional Use of an Intersection Bicycle Box (IA-18); NACTO Urban Bikeway Design Guide - Bike Boxes; FHWA Separated Bike Lane Planning and Design Guide (2015); MassDOT Separated Bike Lane Planning & Design Guide (2016)

## CONFLICT AREA MARKING

Conflict area markings are intersection pavement markings designed to improve visibility of bicyclists, alert all roadway users of expected behaviors, and reduce conflicts with turning motor vehicles.

### CONSIDERATIONS:

- The level of emphasis and visibility: dashed lane lines may be sufficient for guiding bicyclists through intersections; however, consider enhanced markings with green pavement and/or symbols at complex intersections, or at intersections with documented conflicts and safety concerns.
- Consider motor vehicle wheel paths during marking placement. Marking can be implemented so that motor vehicle paths straddle the lines and reduce required maintenance.
- Driveways with higher volumes may require additional pavement markings and signage.
- Consider using intersection pavement markings as either spot treatments or standard intersection treatments. A corridor-wide treatment can maintain consistency; however, spot treatments can be used to highlight conflict locations

### REQUIREMENTS & GUIDANCE:

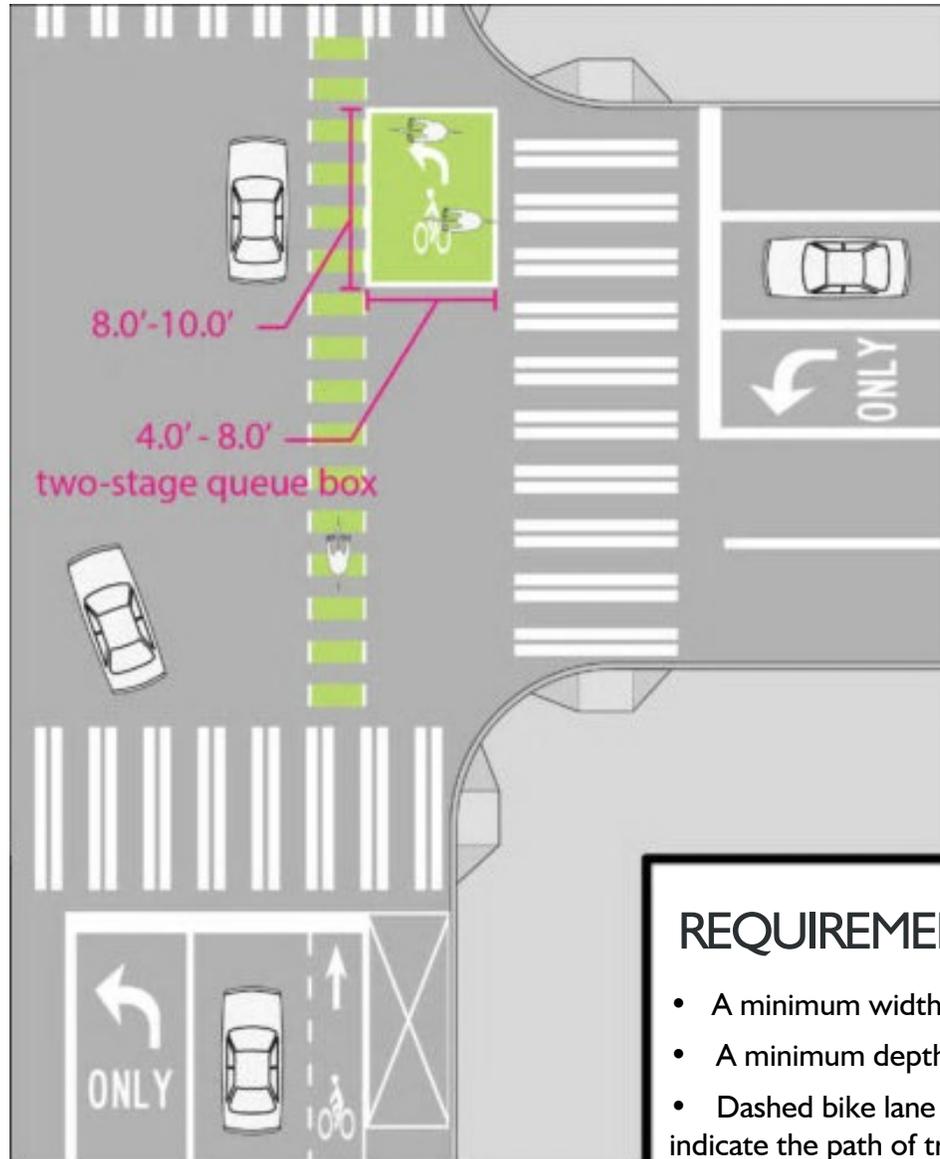
- Dashed white lane lines should conform to the latest edition of the MUTCD. These can be used through different types of intersections based on engineering judgment.
- A variety of pavement marking symbols can enhance intersection treatments to guide bicyclists and warn of potential conflicts.
- Green pavement markings can be used along the length of a corridor or in select conflict locations.

### RESOURCES AND REFERENCES:

AASHTO Guide for the Development of Bicycle Facilities (2012); NACTO Urban Bikeway Design Guide (2012); Manual on Uniform Traffic Control Devices (2009)

# TWO-STAGE TURN QUEUE BOX

A two-stage turn queue box should be considered where bike lanes are continued up to an intersection and a protected intersection is not provided. The two-stage turn queue box designates a space for bicyclists to wait while performing a two-stage turn across a street at a location outside the path of traffic.



## CONSIDERATIONS:

FHWA granted interim approval to two-stage turn queue boxes on July 13, 2017.

Two-stage turn queue box dimensions will vary based on the street operating conditions, the presence or absence of a parking lane, traffic volumes and speeds, and available street space. The turn box may be placed in a variety of locations, including in front of the pedestrian crossing (the crosswalk location may need to be adjusted), in a 'jug-handle' configuration within a sidewalk, or at the tail end of a parking lane or a median island.

## REQUIREMENTS & GUIDANCE:

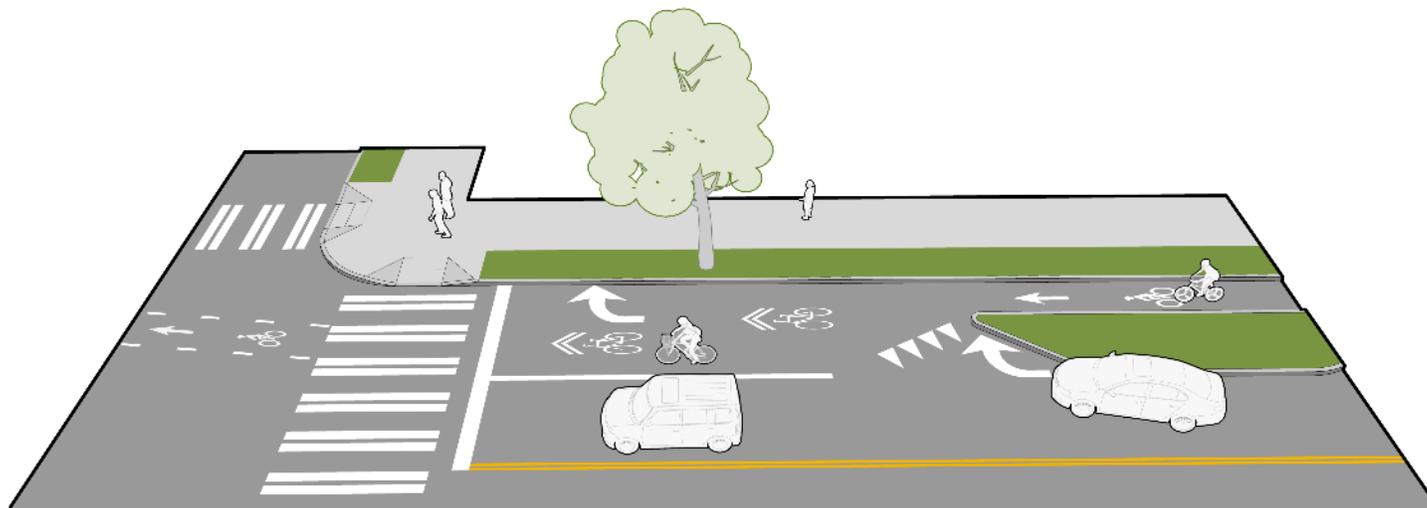
- A minimum width of 10 feet is recommended.
  - A minimum depth of 6.5 feet is recommended.
  - Dashed bike lane extension markings may be used to indicate the path of travel across the intersection.
- NO TURN ON RED (R10-11) restrictions should be used to prevent vehicles from.
  - The use of a supplemental sign instructing bicyclists how to use the box is optional.
  - The queue box should consist of a green box outlined with solid white lines supplemented with a bicycle symbol and a turn arrow to emphasize the crossing direction.

## RESOURCES AND REFERENCES:

FHWA Interim Approval for Optional Use of Two-State Bicycle Turn Boxes (IA-20); NACTO. Urban Bikeway Design Guide. 2nd Edition.; MassDOT. Separated Bike Lane Planning and Design Guide. 2015.; FHWA. Separated Bike Lane Planning and Design Guide. 2015.; FHWA. Bicycle Facilities and the Manual on Uniform Traffic Control Devices - Two-Stage Turn Box. 2015.

# MIXED ZONES

A mixing zone requires turning motorists to merge into the adjacent bicycle facility at a defined location in advance of an intersection before turning. The mixing zone design limits bicyclists' exposure to motor vehicles by defining a limited merge area approaching an intersection for the turning motorist. Motorists and bicyclists are expected to yield to each other with priority given to the bicyclist traveling in the bicycle facility, similar to vehicles changing lanes. Mixing zones are only compatible with one-way bike facilities.



## CONSIDERATIONS:

Protected intersections are preferable to mixing zones. Mixing zones are generally appropriate as an interim solution or in situations where severe right-of-way constraints make it infeasible to provide a protected intersection.

Mixing zones are only appropriate on street segments with one-way bike facilities. They are not appropriate for two-way separated bike lanes due to the contra-flow bicycle movement.

## GUIDANCE:

- Locate merge points where the entering speeds of motor vehicles will be 20 mph or less by minimizing the length of the merge area and locating the merge point as close as practical to the intersection.
- Minimize the length of the motor vehicle storage portion of the turn lane.
- Provide a buffer and physical separation (e.g., flexible delineator posts) from the adjacent through lane after the merge area, if feasible.
- Highlight the conflict area with green surface coloring and dashed bike lane markings, as necessary, or shared lane markings.
- Provide a BEGIN RIGHT (or LEFT) TURN LANE YIELD TO BIKES sign (R4-4) at the beginning of the merge area.
- Restrict parking within the merge area.
- At locations where sidewalk level separated bike lanes approach the intersection, the bike lane should transition to street level prior to the pedestrian crosswalk.
- Where posted speeds are 35 mph or higher, or at locations where it is necessary to provide storage for queued vehicles, it may be necessary to provide a motor vehicle deceleration/storage lane in advance of the merge point.

## RESOURCES AND REFERENCES:

NACTO. Urban Bikeway Design Guide. 2nd Edition.; MassDOT. Separated Bike Lane Planning and Design Guide. 2015. FHWA.; Separated Bike Lane Planning and Design Guide. 2015.

# THROUGH BIKE LANE APPROACH

Where a right (or left) turn only lane approaching the intersection is adjacent to a bike lane, a through bike lane design should be implemented. A through bike lane requires turning motorists to merge across a bike lane at a defined location in advance of an intersection to access the turn only lane. A through bike lane design reduces potential for “right hook” and limits bicyclists’ exposure to motor vehicles by defining a limited merge area for the turning motorist.

## CONSIDERATIONS:

Through lanes for bicyclist should be used where right (or left) turn only lanes exist. Pavement markings should be dotted lines or green dashes to define the merging space. The desired width of the bike lane should be 6 feet and a minimum width of 4 feet.

## GUIDANCE:

- Locate merge points where the entering speeds of motor vehicles will be 20 mph or less by (a) minimizing the length of the merge area and (b) locating the merge point as close as practical to the intersection.
- Minimize the length of the storage portion of the turn lane.
- Use a bicycle lane symbol to designate that portion of street for bicyclists.
- Highlight the conflict area with green surface coloring and dashed bike lane markings, as necessary, or shared lane markings placed on a green box.
- Provide a BEGIN RIGHT (or LEFT) TURN LANE YIELD TO BIKES sign (R4-4) at the beginning of the merge area.
- Restrict parking within the merge area.
- Where posted speeds are 35 mph or higher, or at locations where it is necessary to provide storage for queued vehicles, it may be necessary to provide a motor vehicle deceleration/storage lane in advance of the merge point.

## RESOURCES AND REFERENCES:

NACTO Urban Bikeway Design Guide (2014); MassDOT Separated Bike Lane Planning and Design Guide (2015); FHWA Separated Bike Lane Planning and Design Guide (2015)

# OFFSET STREET CONNECTION

Topeka has many offset intersections, forcing a bicyclist onto an intersecting arterial before they can proceed to a collector street (Topeka Bikeways Master Plan). Offset streets can be challenging for bicyclists to navigate. Common configurations include a bicycle lane offset street connection, separated bike lane offset street connection, bicycle center turn lane, or two-stage turn queue boxes.

## GUIDANCE:

Design will be context-dependent and will vary significantly depending on the direction of offset. Consider wayfinding, turn lanes, or pavement markings to improve bicycle connections.

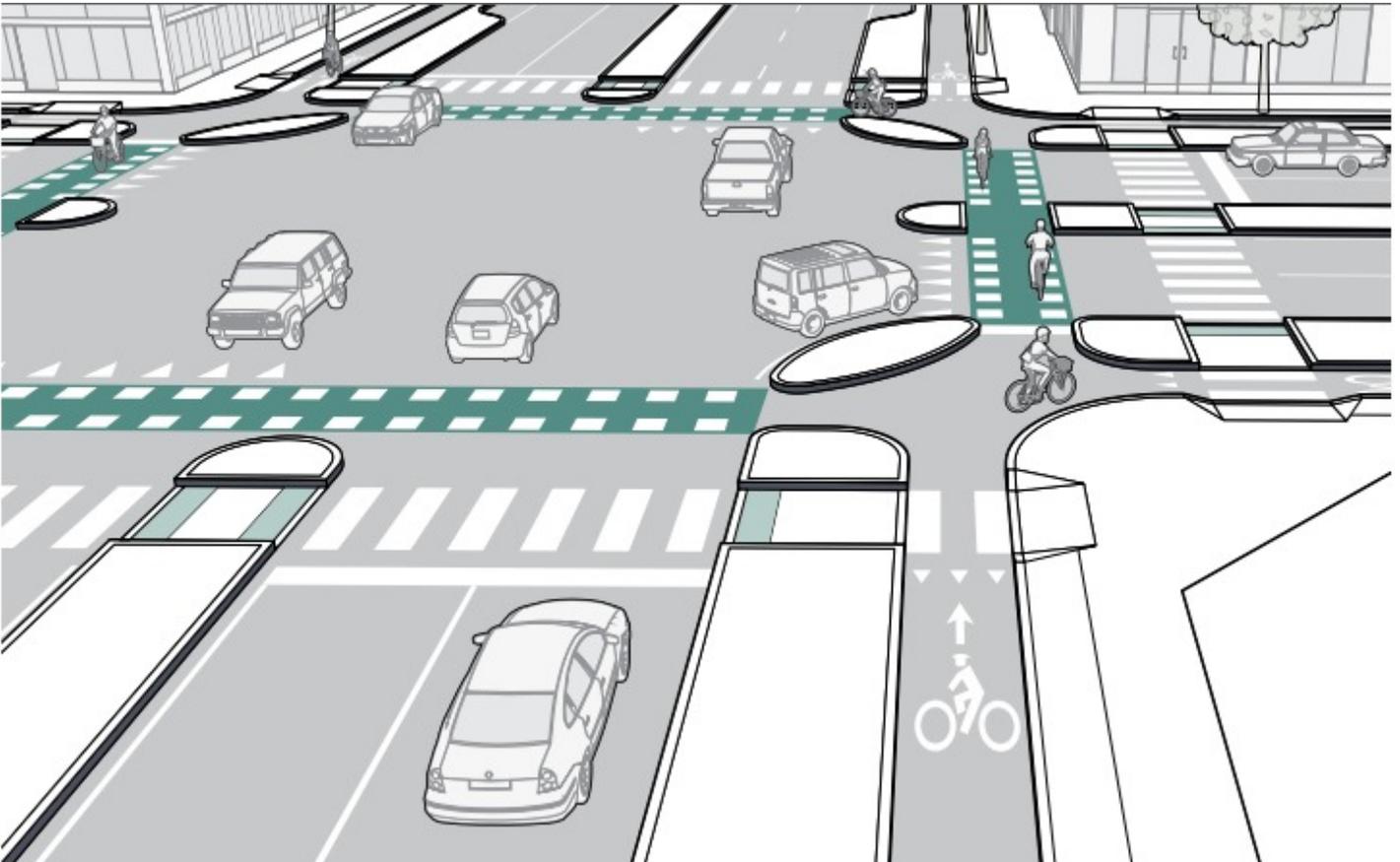
On streets with heavier motor vehicle volumes and higher speeds, design treatments may include two-stage left turn boxes (for offset streets to the right of one another), placed in the through-street parking lane, along with a crosswalk or crossing island. Other options include a pair of one-way protected bike lanes, or a two-way separated bike lane, crossing island, and contra-flow bike lanes.

For signalized offset streets to the left of one another, dedicated bicycle left turn lanes on the offset streets may be appropriate. In this case a leading bicycle interval (LBI) signal phase should be considered to allow the left-turning bicyclists to move to the right side of the through street as part of their left-turn maneuver.

The selection of treatment should also consider the neighboring land uses which might facilitate a predominant type of bicyclist that will use the intersection. Consider the comfort level of maneuvering in the roadway and the amount of delay the treatment imposes on bicyclists.

## SEPERATED BIKE LANES AT INTERSECTIONS

Separated bicycle lanes provide an exclusive travel way for bicyclists alongside roadways separate from motor vehicle travel lanes, parking lanes, and sidewalks. Separated bike lane designs at intersections should manage conflicts with turning motor vehicles, pedestrians, and increase visibility for all users.



## CONSIDERATIONS:

Separated bicycle lane designs at intersections should consider signal operation and phasing to manage conflicts between turning motor vehicles and bicyclists. Bicycle signal heads should be considered to separate conflicts.

Colored pavement can supplement short dashed lines to demarcate the protected bike lane through intersections, where engineering judgment deems appropriate.

At non-signalized intersections, design treatments to increase visibility and safety include:

- Warning signs
- Raised intersections
- Special pavement markings (including colored surface treatment)
- Parking restrictions in advance of the intersection

## GUIDANCE:

- It is preferable to maintain the separation of the bike lane through the intersection, rather than introduce the bicyclist into the street with a merge lane. Where this separation is not possible, see guidance on Mixing Zones.
- Increasing visibility and awareness are two key design goals for separated bike lanes at intersections. In some cases, restrict parking within 20 to 40 feet of the intersection to improve the visibility of bicyclists on intersection approaches. Use markings and signage at intersections to give priority to separated bicycle lanes.
- The interaction between bicyclists and pedestrians should be given high priority to prevent conflicts. Bicyclists should be alerted of pedestrian priority through signs, markings, and materials. Stop or yield conditions and locations should also be determined based on intersection geometry and volumes.
- Pedestrian accessibility shall be maintained over the separated bike lanes. All slopes shall meet ADA requirements and proper markings and materials should be installed to guide pedestrians through the crossings.
- Separated bike lanes should typically be routed behind transit stops (i.e., the transit stop should be located between the bike lane and motor vehicle travel lanes). If this is not feasible, the separated bike lane design should include treatments such as signage and pavement markings to alert bicyclists to stop for buses and pedestrians accessing transit stops.
- When separated bike lanes are provided at roundabouts, they should be continuous around the intersection, and parallel to the sidewalk. Separated bike lanes should generally follow the contour of the circular intersection (See Separated Bike Lanes at Roundabouts).

## RESOURCES AND REFERENCES:

Bicycle Facilities and the Manual on Uniform Traffic Control Devices; NACTO Urban Bikeway Design Guide; FHWA Separated Bike Lane Planning and Design Guide (2015)

# NEXT STEPS & IMPLEMENTATION

## INTRODUCTION

With the development of these Complete Streets Design Guidelines, the City of Topeka and Shawnee County have already taken a major step towards realizing the multimodal goals outlined in the complete streets policies of both the City and County. The design guidelines in the previous chapters of this document are an administrative mechanism for implementing the complete streets policies. Combined with engineering judgement, these guidelines provide the necessary flexibility to develop multimodal streets that complement and support adjacent land uses. This chapter outlines further actions that the City and County should take to institutionalize this design guidance and ensure the implementation of the community's goal to provide streets that meet the needs of people of all modes, ages, and abilities.

## IMPLEMENTATION ACTIONS

The following key actions are recommended:

### DEVELOP A STREET TYPOLOGY MAP FOR THE CITY OF TOPEKA & SHAWNEE COUNTY:

Using the new street typologies described in Chapter 2, the City's Future Land Use Map, and Neighborhood Plans and maps, staff from the City, County, and MTPO should create a map that designates the appropriate street type for each City and County street based on the newly established typologies. Due to the changing land use character along many corridors, it is assumed that most streets will include multiple typologies along their length. As noted in Chapter 2, these street typologies will not replace the existing functional classification, however, in concert with engineering judgement, they will be used to determine the appropriate number of lanes, lane width, design speed, and other design elements (sidewalk widths, bike facilities, etc.) that are appropriate given the established street typology and land uses. The Planning Department will lead the effort to create this street typology map.

### UPDATE CURRENT CITY, COUNTY AND MTPO DOCUMENTS TO REFLECT NEW STREET TYPOLOGIES AND COMPLETE STREET DESIGN GUIDELINES:

The design guidance in this document updates and supersedes any previous design guidance developed by the City, County or MTPO that may conflict with the guidelines provided here. Following the current schedule for updates, the City and County should update their design manuals to reflect the new guidance in this document. The City's Public Works and Engineering staff will lead this effort. The priority documents and policies for updating include:

- City of Topeka and Shawnee County Standard Technical Specifications
- City of Topeka and Shawnee County Design Criteria and Drafting Standards
- City Speed Limits
- Traffic Calming Criteria
- Bikeways & Pedestrian Master Plans

## REVISE THE CURRENT STREET DEVELOPMENT PROCESS TO INCORPORATE COMPLETE STREETS EARLIER IN THE CAPITOL IMPROVEMENT PLAN IDENTIFICATION PROCESS:

Typically, there are three primary ways in which a street is developed or reconstructed:

- 1) New development- streets are designed and constructed by developers as part of new development
- 2) Routine maintenance and repair- the city or county conducts preventative and rehabilitative mill and overlay projects
- 3) Complete reconstruction or expansion-the entire roadway is redesigned, reconstructed, and in some cases expanded

As there is limited funding for roadways projects in any given year, projects that fall into the latter two categories must be prioritized for inclusion in the Capital Improvement Plan (CIP) and Capital Improvement Budget (CIP). Currently, the City of Topeka and Shawnee County have different processes for determining which streets are included in each jurisdiction's CIP.

At the City, potential CIP street projects are identified using the Futures 2040 Topeka Regional Transportation Plan, the Bikeways and Pedestrian Plans, City Council input, and coordination with utilities projects slated for reconstruction. At the writing of this document, city engineering staff use the proposed list of projects and determine a rough budget for each based on the design elements required in the current City/County Standard Technical Specifications and Design Criteria and Drafting Standards, however, there is not currently a procedure at this stage in the process for ensuring that proposed projects incorporate complete streets elements or that the rough budget assigned accounts for such items. Once the proposed CIP list is created, it is provided to the public for comment. Planning staff also reviews the CIP list and evaluates it using a complete streets project checklist, however at this stage it is often too late to incorporate additional design elements such as wider sidewalks, bike facilities, or improved crossings since the budget has already been determined.

The County has a less formal process and fewer staff resources available to identify projects, however their project budgets are also typically set before an assessment of complete streets elements is determined. It is recommended that both the City and County process be revised to include the following steps during the "discovery" phase of a project so that appropriate budgets can be determined:

- 1) Use the Street Typology map (described above) to determine the appropriate street type and the design elements that should be included.
- 2) Utilize the existing Complete Streets Checklist and the Topeka and Shawnee County Complete Streets Design Guidelines to determine if there are additional design elements that should be included in the rough cost estimate for the project.
- 3) Where right-of-way constraints exist, use the complete streets decision making matrix to determine trade-offs.

## CONDUCT COMPLETE STREETS TRAINING FOR CITY/COUNTY STAFF AND DESIGN CONSULTANTS:

The Topeka and Shawnee County Complete Streets Design Guidelines provide a new way of considering and designing streets that requires both flexibility and engineering judgement. To achieve the best results, developers, design consultants, and City and County staff must be familiar with the guidelines herein and understand the underlying vision and guiding principles of the City and County's complete streets policies and program. It is recommended that a complete streets design workshop or series of workshops be held for City/County staff and local design consultants during times best suited to accommodate the construction season. This workshop would provide an overview of complete streets principles as well as specific training regarding the contents of this document. This workshop would be appropriate for staff at multiple levels involved in both street design and review.

# CONDUCT COMPLETE STREETS OUTREACH AND EDUCATION:

An important component of a successful Complete Streets Program is to provide the public with an understanding of the policy and program goals as well as the steps towards implementation. The Greater Topeka Partnership is developing a complete streets marketing campaign in collaboration with the Complete Streets Advisory Committee/MTPO to implement Momentum 2022 – Topeka/Shawnee County Holistic Economic Development Strategy. This effort will include an on-line video, multi-media notifications, product branding, and marketing materials to increase the community’s awareness and understanding of complete streets concepts. It is intended to show why complete streets investments are good for the community and to personalize stories regarding the diverse choices and needs of neighbors and community members who represent a range of travel modes, ages, abilities, and backgrounds. Funding for the campaign is through private and corporate donations where health, sustainability, and quality of place align with the funder’s goals. The timetable for anticipated roll-out is summer/fall of 2018.

# TEMPORARY DEMONSTRATION PROJECTS:

Many of the design elements presented in this document are new to the public, the City, and the County. The City and County should consider testing some of these concepts through temporary demonstration projects. Demonstration project can help the public become familiar with new concepts and provide City and County staff with an opportunity to assess the potential benefits and challenges of different designs. Demonstration projects can be led by community groups, local government or both in partnership and can be in place for a day or 2-3 months depending on the objectives of the demonstration effort. Demonstration projects are most effective when executed through a systematic process that encourages a well thought out design, the use of quality materials, and ensures the demonstration is thoroughly evaluated. The following should be considered:

1. Issue Identification: The issue or issues to be resolved through the pilot project need to be clearly defined. Is the goal to slow traffic, shorten crossing distances, provide space for bikes, etc.?
2. Best Practices Research: The issue and potential solutions should be researched, and a preliminary plan for the pilot project developed. The plan should include the implementing department and public partner if a community group will be involved, a conceptual design, a list of materials, the pilot project timeframe and proposed evaluation strategy.

3. Assessment: A clear outline of the potential benefits of the proposed solution along with a list of possible concerns should be compiled as part of the plan. For projects that are installed for longer periods of time, data such as bicycle and pedestrian counts, vehicle counts, speed data, parking utilization, etc. should be collected along with opinion surveys about the project.



*A day-long demonstration event in Kansas City, MO with new crosswalks, parking separated bike lanes, street trees, and shortened crossing distances. The Better Block Foundation provides resources for how to organize a demonstration event.*

# FUNDING

The Complete Streets resolution passed in 2009 by the City of Topeka states, “It shall be a goal of the City to adequately fund the implementation of this policy.” Complete streets projects and programs can be funded by a variety of local, state, federal, private sources. These funding sources are often combined to fund projects as part of the City’s Capital Improvement Plan.

## LOCAL

### CITYWIDE HALF-CENT SALES TAX FOR STREETS:

In 2009, voters approved a half-cent sales tax to maintain and repair existing streets in Topeka, which include elements of complete streets. This source is currently used to fund sidewalk repairs through the 50/50 Sidewalk Cost Share Program, as well as the ADA Sidewalk Ramp Program. The 2009 Citywide sales tax can only be used for existing streets and cannot be used to add new elements (sidewalks, bike facilities, markings, etc.) to existing streets. The tax sunsets in 2019, with renewal pending voter approval.

### COUNTYWIDE HALF-CENT SALES TAX FOR STREETS:

In 2014, Shawnee County voters approved a renewal of a half-cent sales tax, for the years 2017 through 2031. These funds are used to repair existing streets and build new streets, which include elements of Complete Streets. Bikeways identified for construction through the Topeka Bikeways Master Plan are currently funded at \$500,000 annually, in even numbered years between 2018 and 2026.

### GENERAL OBLIGATION BONDS:

General Obligation (GO) bonds are used to fund projects with an expected life of 10 years or more. The City uses a portion of property taxes to make payments on debt service to repay bond holders. GO bond projects are frequently used to fund major street rehabilitation, reconstruction, and widening projects, which include complete streets elements. Sometimes GO bonds are used to fund complete streets elements in neighborhoods deemed eligible through the Department of Neighborhood Revitalization’s Stages of Resource Targeting (SORT) program. GO bonds also fund new sidewalk construction prioritized in the Pedestrian Master Plan, at \$600,000 per year, as well as citywide complete streets projects at \$100,000 per year.

### GENERAL FUNDS:

Local general funds are often used to pay salaries for staff who design and operate complete streets projects and programs. For example, local communities may employ staff in planning, public works, parks, and police departments to plan, design, and operate walking and bicycling networks and programs. This may include tasks like plowing sidewalks, resurfacing shared use paths, designing bikeways, implementing non-motorized planning documents, helping schoolchildren cross busy streets, and hosting walk and bike to work events.

## STATE

### MOTOR FUEL TAX:

Motor fuel tax funds from the State of Kansas pay for labor, material, and equipment costs of Topeka’s Street Maintenance Division. This division performs preventative and deferred maintenance work, which includes improvements to complete streets elements such as crosswalks, bikeway pavement markings, signs, crossing beacons, and stoplights.

## FEDERAL

### COMMUNITY SERVICE BLOCK GRANT:

The Community Services Block Grant provides funds to alleviate the causes and conditions of poverty in communities and includes transportation projects. Administered by the U.S. Department of Health and Human Services, funding is allocated to states who then make it available to local communities. Funded projects have included: commercial district streetscape improvements; sidewalk improvements; safe routes to school; and neighborhood-based walking and bicycling facilities that improve local transportation options or help revitalize neighborhoods.

### FEDERAL HIGHWAY ADMINISTRATION PEDESTRIAN & BICYCLE FUNDING OPPORTUNITIES<sup>9</sup>:

The Federal Highway Administration maintains a data-table to assist communities in understanding which federal funding programs could be used for pedestrian and bicycle projects. The table provides an overview. Specific program requirements must be met and eligibility must be determined on a case-by-case basis. For example: transit funds must provide access to transit and Congestion Mitigation and Air Quality Improvement (CMAQ) funds must benefit air quality in eligible areas.

### HIGHWAY SAFETY IMPROVEMENT PLAN:

Federal Highway Safety Improvement Program (HSIP) funds are available for safety projects aimed at reducing traffic fatalities and serious injuries. Bike lanes, roadway shoulders, crosswalks, intersection improvements, underpasses and signs are examples of eligible projects. Projects in high-crash locations are most likely to receive funding. KDOT, which administers federal funds within the state, has not yet identified pedestrian and bicycle safety as an emphasis area, which would make pedestrian and bicycle safety projects more likely to be funded under this program.

### TRANSPORTATION ALTERNATIVES PROGRAM:

The Transportation Alternatives Program (TAP) provides federal funds to the Kansas Department of Transportation (KDOT) for projects that advance bicycle, pedestrian, and recreational trail facilities. TAP pays for up to 80% of eligible project costs, with a local match of 20% required. Eligible activities include sidewalks, bicycle infrastructure, rail-to-trail projects, pedestrian and bicycle signals, traffic calming, lighting, and safety-related infrastructure. Safe Routes to School projects may be funded through TAP, and include both infrastructure and non-infrastructure projects, such as education, enforcement, training, and public awareness campaigns. Projects must be included in an existing plan document, such as a pedestrian or bicycle master plan. All City of Topeka projects must be in alignment with the Metropolitan Topeka Planning Organization's Regional Transportation Plan.

## OTHER

### CROWDFUNDING/ LOCAL DONATIONS & PRIVATE FUNDRAISING:

Crowdfunding focuses on raising money for projects through many small donations, typically via the internet. Websites, such as gofundme.com, ioby.com and indiegogo.com, allow fundraising campaigns to be easily established. Topeka Bikeways non-profit participates in the Topeka Gives event each year to generate local donations to aid in bicycle infrastructure funding.

### PEOPLE FOR BIKES:

People for Bikes is a charitable foundation sponsored by the bicycle industry. The organization runs a community grant program, funding projects such as shared-use paths, mountain bike trails, bicycle parking, and Open Streets events. Grants of \$10,000 are awarded and must be matched with local funding of at least 50%. Grant cycles occur one to two times annually.

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<sup>9</sup> [https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/funding/funding\\_opportunities.cfm](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm)

