

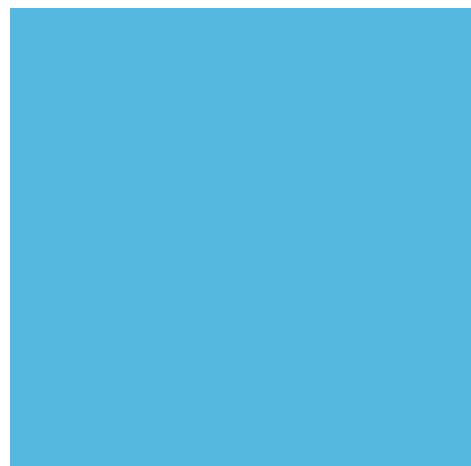
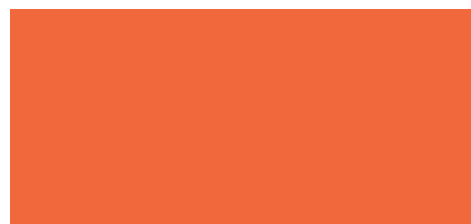
PIMA ASSOCIATION OF GOVERNMENTS



REGIONAL **ACTIVE** TRANSPORTATION PLAN



ACTIVE TRANSPORTATION TOOLBOX



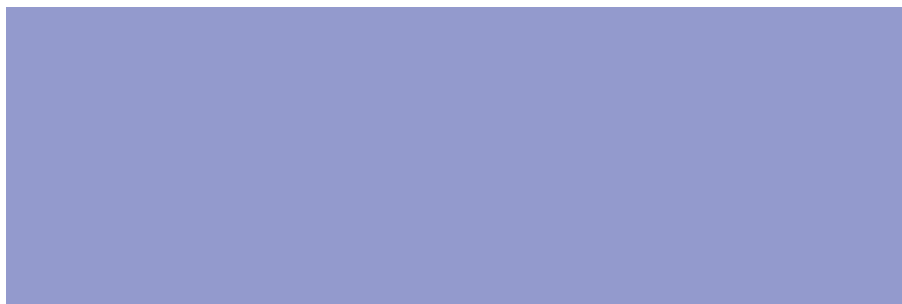
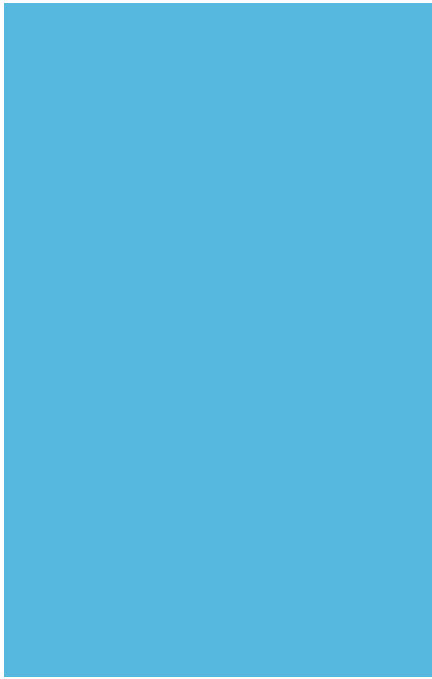
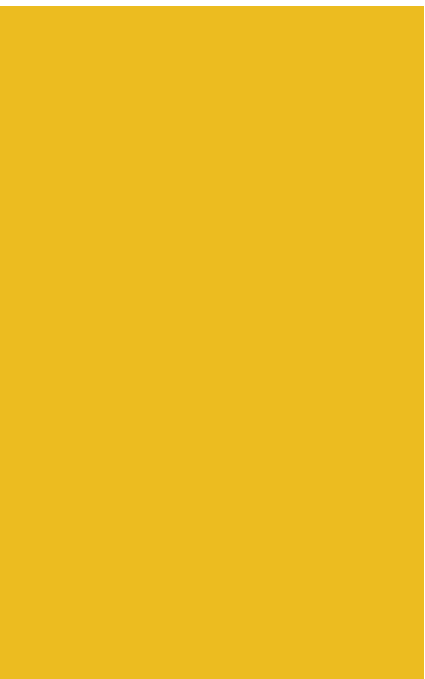
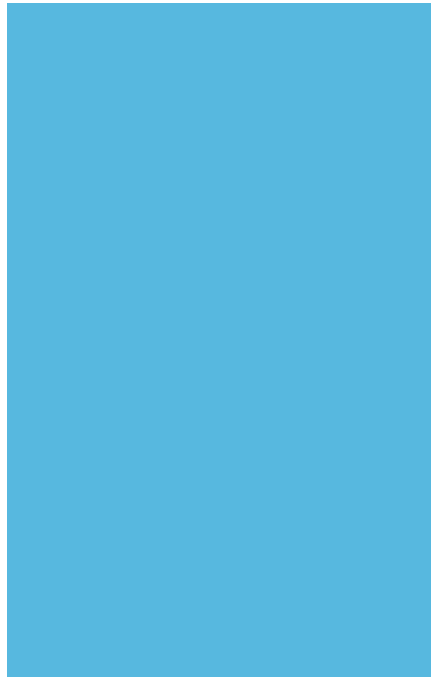


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INTRODUCTION

Introduction

The Active Transportation Toolbox was developed as part of the PAG Regional Active Transportation Plan (RATP) through an interactive process with PAG staff or PAG member agencies. The Active Transportation Toolbox compiles active transportation treatments for the region and their appropriate contexts and considerations.

To guide the development of the Active Transportation Toolbox, an interactive working session was held with PAG staff and key stakeholders from member agencies. Stakeholders identified active transportation treatments for the region and their appropriate context, use, and considerations.

THE GOALS OF THE ACTIVE TRANSPORTATION TOOLBOX ARE:

- ➔ Identify on-street and off-street active transportation treatments
- ➔ Align treatments with national best practices
- ➔ Develop guidelines for the contexts in which treatments may be used



HOW TO USE THE ACTIVE TRANSPORTATION TOOLBOX

The Active Transportation Toolbox should be used as a resource by member jurisdictions to:

- Understand available active transportation treatments
- Identify the best context-appropriate treatment for the jurisdiction
- Reference existing local standards, national best practices, and regional treatment guidelines
- Promote consistent transitions in active transportation facilities across jurisdictional boundaries in the region

The recommended application for each treatment are based on national best practices and may not be consistent with existing conditions.

Toolbox Overview

The Active Transportation Toolbox identifies preferred treatments within the following treatment types:



ON-STREET IMPROVEMENTS

Pedestrian and bicycle facilities along the roadway in the roadway footprint



OFF-STREET IMPROVEMENTS

Pedestrian and bicycle facilities separated from the roadway with a curb or buffer



CROSSING IMPROVEMENTS

Intersection active transportation treatments and midblock crossings



TRAFFIC CALMING MEASURES

Roadway and intersection enhancements to reduce speeding and distracted driving

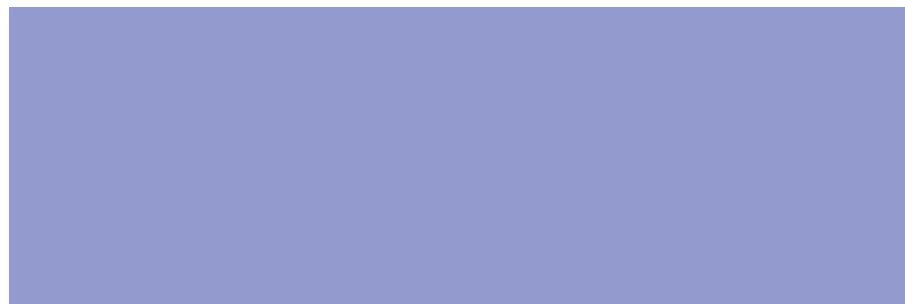
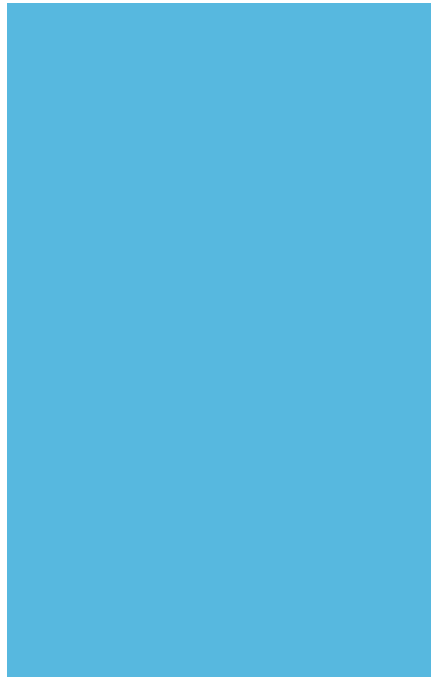
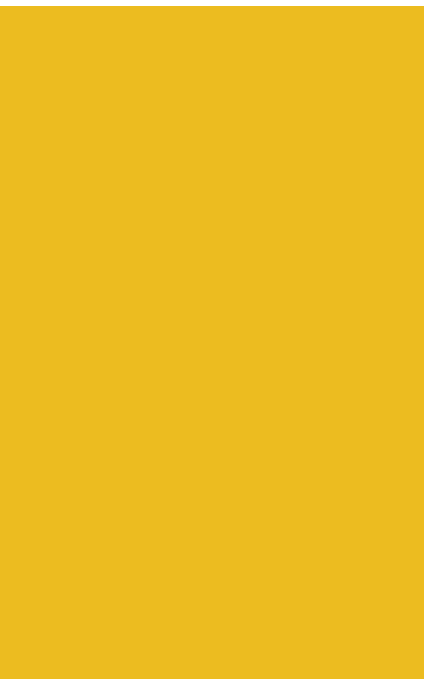


QUICK-BUILD SOLUTIONS

Affordable, fast, and temporary active transportation treatments

The following information is included for each treatment type and documents key information for implementing the treatment in its appropriate context, including:

Improvement Definition	Cost	Regional Treatment Guidelines
► Explanation of Potential Improvement	► Low, Medium, and High Cost	► Geographic Considerations, Markings, Signage
User Group Impacted	Application	Transit Integration
► Pedestrians, Those Using Personal Mobility Devices, Bicyclists, and Scooters	► Physical Context, Speed and Volume, Functional Classification	► Coordination with Transit Facilities
Benefits and Considerations	References to Local Standards and National Best Practices	Amenity Options
► Advantages and Factors for Implementing Potential Improvement	► Additional National Resources	► Lighting, Shade, Wayfinding, Technology



ON-STREET IMPROVEMENTS



Standard Bike Lane

A standard bike lane is an exclusive space for bicyclists using pavement markings and signage located adjacent to motor vehicle travel lanes.

IMPACTED
USERS:



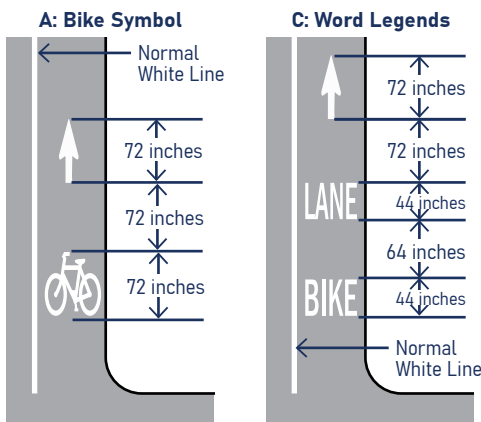


GEOMETRIC CONSIDERATIONS

- Design bike lanes to separate road users and reduce the stress of passing motor vehicles.
- The desirable bike lane width adjacent to a curb face is 5–7 feet (AASHTO).
- The desirable bike lane width adjacent to an edge of pavement is 6–7 feet (AASHTO).
- The minimum recommended distance between a bike lane and adjacent on-street parking is 5 feet to protect bicyclists from suddenly opened car doors (AASHTO).
- Bike lanes with a width of 7 feet or greater should include a buffer or other form of separation to distinguish them from auxiliary travel lanes or vehicle parking areas.

MARKINGS

Longitudinal pavement markings and bicycle lane symbol or word markings shall be used to define bicycle lanes (MUTCD 9E-1).



SIGNAGE

An optional “Bike Lane” sign (MUTCD R3-17) may be located prior to the beginning of a marked bike lane to designate that portion of the street for use by bicyclists (NACTO).



An optional “No Parking Bike Lane” sign (MUTCD R7-9) may be used if parked vehicles frequently block the bike lane (NACTO).



✓ BENEFITS AND CONSIDERATIONS

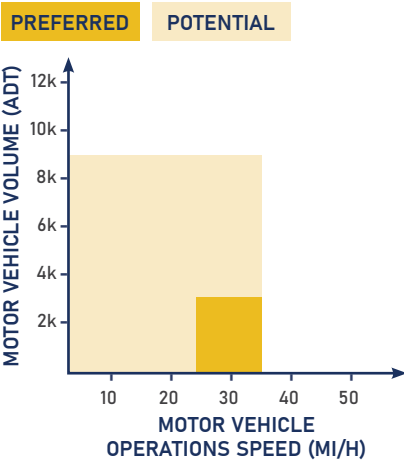
Increases bicyclist comfort and confidence on busy streets	✓
Creates separation between bicyclists and motor vehicles	✓
Increases predictability of bicyclist and motor vehicle positioning and interaction	✓
Increases total capacities of streets carrying bicycle and motor vehicle traffic	✓
Visually reminds motorists of space for bicyclists	✓
Most helpful on streets with < 3,000 motor vehicle average daily traffic	🔍
Green pavement may be used to enhance visibility of a bike lane	🔍
Gutter seams, drainage inlets, and utility covers should be flush with the ground and oriented to prevent conflict with bicycle tires	🔍
May be best suited for more confident bicyclists, especially on higher speed roadways	🔍
Bike lanes wider than 7 feet may be mistaken for vehicular travel lanes or parking lanes; consider buffered or separated bike lanes in such cases.	🔍

APPLICATION

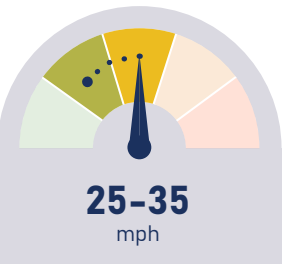
Land Use

URBAN	SUBURBAN	RURAL
Sometimes	Sometimes	Sometimes

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)
- [City of Tucson Street Design Guide \(2021\)](#)

REGIONAL TREATMENT GUIDELINES

- 6 to 10-foot-wide paved facility adjacent to travel lanes.
- Striping and signing along roadway sections and at intersections to identify proper bicycle/vehicle interactions.
- Potential use of green pavement in special situations.

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [FHWA Proven Safety Countermeasures](#)
- [AASHTO](#)
- [ADA](#)

TRANSIT INTEGRATION

In the event of bus pullout locations:

- Bicycle traffic is directed straight, to the left of the bus pullout zone, while buses transition across the bicycle lane to the right.
- Conflict-zone markings (skip dash markings) should be used to position the bicycle lane to the left of the bus pullout zone.
- Bus pullout lane must be wide enough to ensure buses do not extend into the bicycle lane.

AMENITY OPTIONS

- Wayfinding signage

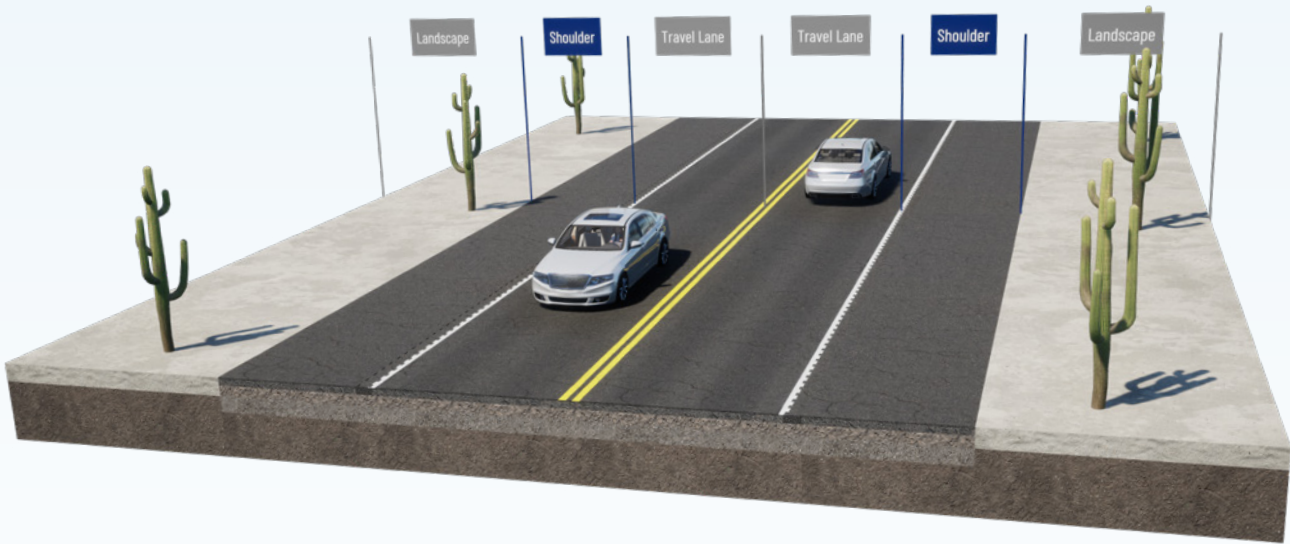
Paved Shoulder

A paved shoulder on the edge of the roadway serves as a space for bicyclists and pedestrians to travel where bike lanes and sidewalks are not provided.

IMPACTED
USERS:



Rural Paved Shoulder



GEOMETRIC CONSIDERATIONS

Roadway Classification	Volume	Speed (mph)	Minimum Width (feet)
Minor Collector	1,100 - 6,300	35	5
Major Collector	1,100 - 6,300	45	6.5
Minor Arterial	3,000 - 14,000	55	7
Principal Arterial	7,000 - 27,000	65	8

- Per NCHRP Synthesis 490, 2016:
- Rumble strips are an FHWA Proven Safety Countermeasure for reducing roadway departure crashes. If rumble strips are desired, provide gaps in the rumble strip pattern to allow access into and out of the paved shoulder area by bicyclists.

Volumes per FHWA Highway Functional Classification Concepts, Criteria and Procedures 2023 Edition

MARKINGS

- On paved shoulders designed for bicyclists, the edge should be clearly delineated. Options include:
- 4-inch white line
 - 8-inch white line
 - A narrow buffer space consisting of two 6-inch white lines separated by 18 inches

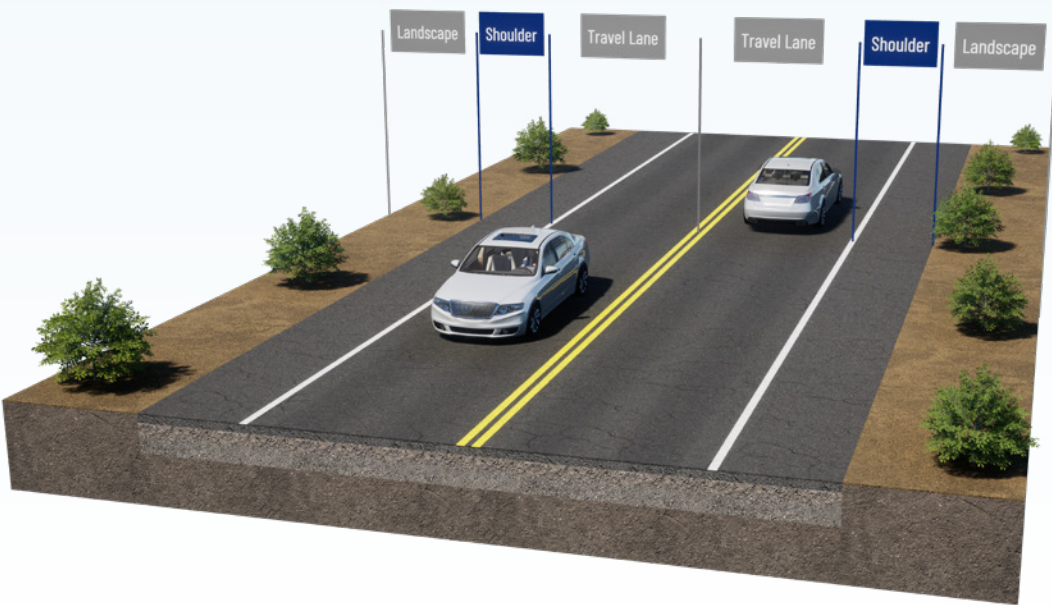
SIGNAGE

Appropriate striping and signing along roadway sections and at intersections to identify property bicycle/vehicle interactions.

BENEFITS AND CONSIDERATIONS

Provides roadway space for all users (bicyclists, pedestrians, motor vehicles)	✓
Improved pedestrian experience when sidewalks are not provided	✓
Improved bicyclist experience on roadway with higher speed and volume	✓
Requires a wider roadway to provide shoulder space	🔍

Urban Paved Shoulder



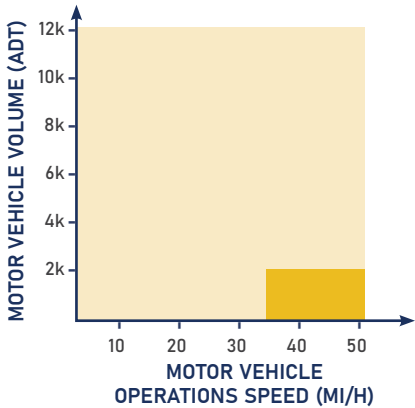
APPLICATION

Land Use

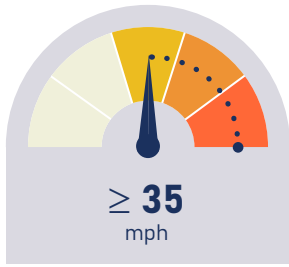
URBAN	SUBURBAN	RURAL
Rarely	Sometimes	Always

Speed and Volume

PREFERRED POTENTIAL



Vehicle Speed



Cost

\$
\$\$
\$\$\$

LOCAL STANDARDS

- Pima County Roadway Design Manual Chapter 2.6 Bicycle, Pedestrian and Transit Facilities

REGIONAL TREATMENT GUIDELINES

- Preferred width
- Urban – 6 feet
 - Rural Paved Road – 10 feet

NATIONAL RESOURCES

- NACTO Urban Bikeway Design Guide
- MUTCD 11th Edition
- AASHTO
- ADA

TRANSIT INTEGRATION

- In the event of bus pullout locations:
- Bicycle traffic is directed straight, to the left of the bus pullout zone, while buses transition across the bicycle lane to the right.
 - Conflict-zone markings (skip dash markings) should be used to position the bicycle lane to the left of the bus pullout zone.
 - Bus pullout lane must be wide enough to ensure buses do not extend into the bicycle lane.

AMENITY OPTIONS

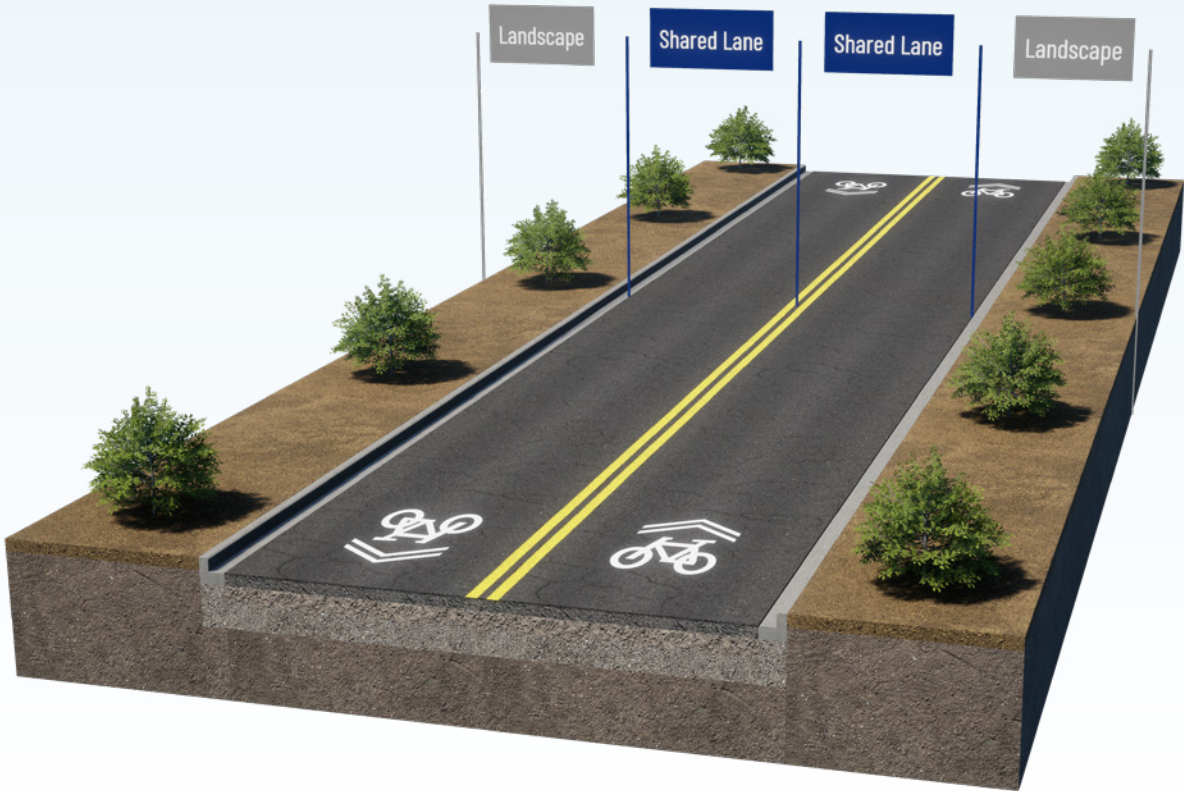
- None

Shared Lane

A shared lane has road markings used to indicate that bicyclists and motorists share the travel lane.

IMPACTED
USERS:

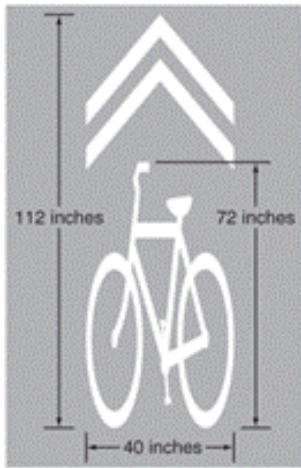




MARKINGS

Shared lane markings, otherwise known as ‘sharrows’, should be placed in the center of the travel lane to define the street as a shared lane.

New MUTCD guidance is currently being developed in the Standard Highway Signs publication.



MUTCD Figure 9C-9

SIGNAGE

An optional “Bike Route” sign (MUTCD D11-1) may be located prior to the beginning of a shared lane to indicate that bicyclists and motorists share travel lane and guide cyclists on a lower stress route.



BENEFITS AND CONSIDERATIONS

Encourages bicyclists to position themselves safely in lanes too narrow for a motor vehicles and bicycle to travel side by side	✓
Alerts motor vehicle drivers of the potential presence of bicyclists	✓
Doesn't require additional right-of-way	✓
Reduces the incidence of bicyclists riding on the sidewalk	✓
Use only where speed differential between motor vehicles and bicyclists is very low	🔍

APPLICATION

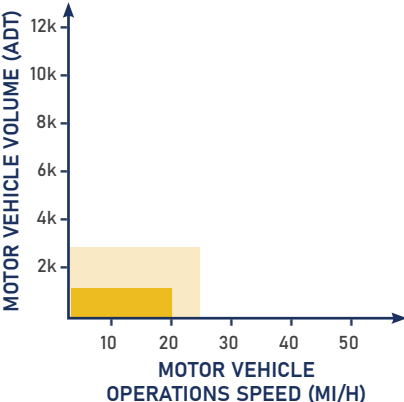
Land Use

 URBAN	 SUBURBAN	 RURAL
Sometimes	Sometimes	Rarely

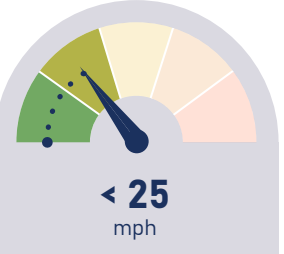
Speed and Volume

PREFERRED

POTENTIAL



Vehicle Speed



Cost

\$	\$\$	\$\$\$
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LOCAL STANDARDS

- City of Tucson Street Design Guide (2021)

REGIONAL TREATMENT GUIDELINES

- Frequent, visible placement of markings is essential.
- Shared lane markings should be placed in the center of the lane between wheel treads to minimize wear.

NATIONAL RESOURCES

- NACTO Urban Bikeway Design Guide
- MUTCD 11th Edition
- AASHTO
- ADA

TRANSIT INTEGRATION

Shared lanes should not be utilized along major transit routes.

AMENITY OPTIONS

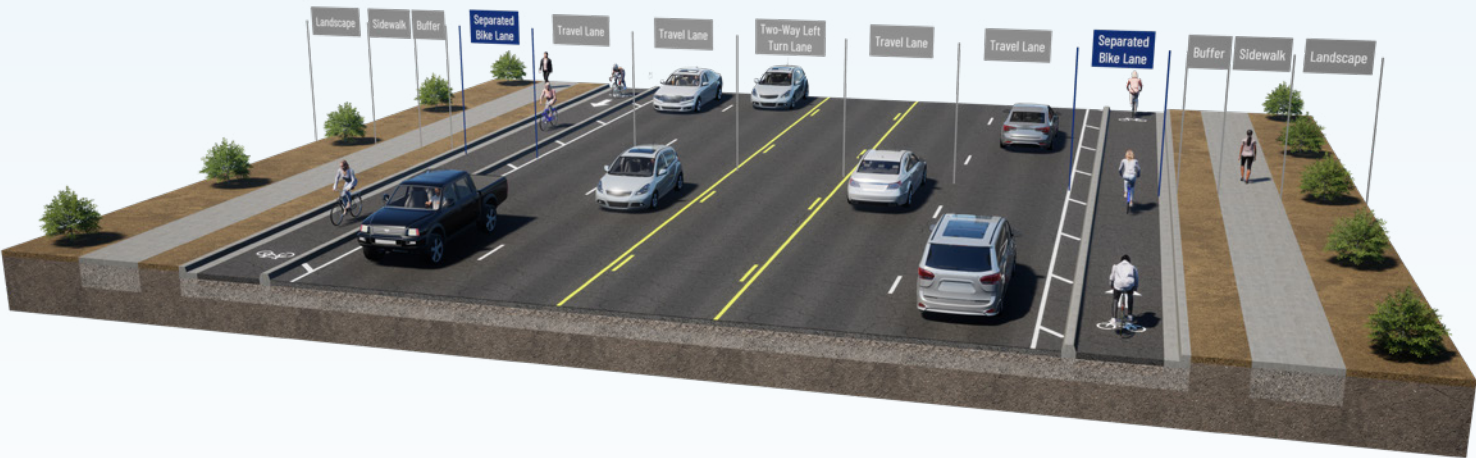
- Wayfinding signage

Separated Bike Lane

A separated bike lane is a bicycle facility adjacent to the roadway that uses a variety of methods to provide physical separation through the use of vertical objects between the vehicular and bicycle lanes.

IMPACTED USERS:



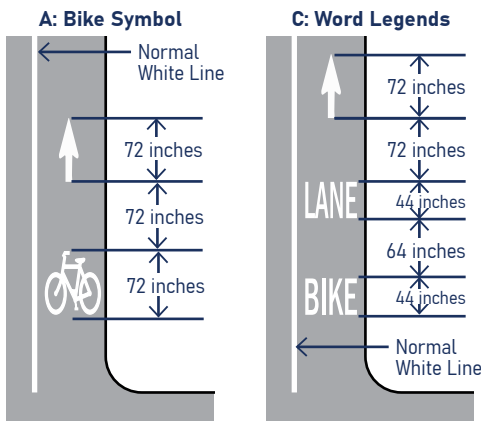


GEOMETRIC CONSIDERATIONS

- The desirable separated bike lane width is 6–8 feet (AASHTO).
- The minimum separated bike lane width is 4 feet (AASHTO).
- The preferred width of the median or curb separating the bike lane from motor vehicle traffic is 6 feet; the minimum practical width is 2 feet (AASHTO).
- A variety of physical protection measures may be used such as tubular markers, parked cars, movable planters, raised curb, etc.

MARKINGS

Longitudinal pavement markings and bicycle lane symbol or word markings shall be used to define bicycle lanes (MUTCD 9E-1).



SIGNAGE

An optional “Bike Lane” sign (MUTCD R3-17) may be located prior to the beginning of a separated bike lane to designate that portion of the street for use by bicyclists (NACTO).



BENEFITS AND CONSIDERATIONS

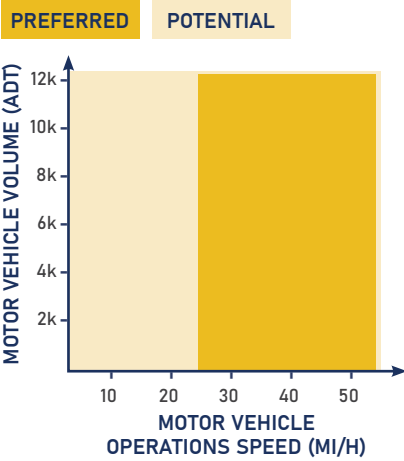
Dedicates and protects space for bicyclists by improving perceived comfort and safety	✓
Eliminates risk of collisions with over-taking motor vehicles	✓
Reduces risk of “dooring”	✓
Low implementation cost when using existing pavement and drainage	✓
More attractive to a wide range of bicyclists at all skill levels	✓
Most helpful on streets with few conflicts such as driveways or cross-streets	🔍
More feasible on streets with extra right-of-way	🔍
Most helpful on streets with high motor vehicle volumes and speeds	🔍
Most helpful on streets with high bicycle volumes	🔍

APPLICATION

Land Use

URBAN	SUBURBAN	RURAL
Always	Sometimes	Sometimes

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [City of Tucson Street Design Guide \(2021\)](#)

REGIONAL TREATMENT GUIDELINES

- Separated bike lanes should be maintained to be free of potholes, broken glass, and other debris.
- Gutter seams, drainage inlets, and utility covers should be configured so as not to impede bicycle travel and to facilitate stormwater run-off.
- Sidewalk curbs and furnishings should be used to prevent pedestrian use of the cycle zone.
- Two-stage turn boxes should be provided to assist in making turns from the separated bike lane facility.

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

TRANSIT INTEGRATION

- Consider wrapping the separated bike lane behind the transit stop zone to reduce conflicts between bicyclists and transit vehicles. Extra consideration may be needed to manage bicycle and pedestrian interactions.

AMENITY OPTIONS

- Wayfinding signage
- Bike counters

Buffered Bike Lane

A buffered bike lane is a conventional bike lane paired with a designated space separating the bicycle lane from the adjacent motor vehicle travel lane.

IMPACTED USERS:





GEOMETRIC CONSIDERATIONS

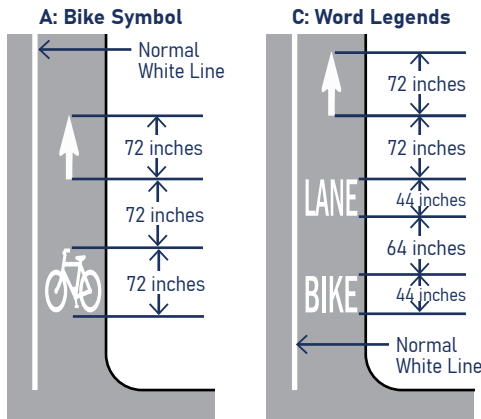
- Buffer should be a should be between 2 - 4 feet wide (AASHTO).
- If used, interior diagonal cross hatching should consist of 4" lines angled at 30 to 45 degrees and striped at intervals of 10 to 40 feet (NACTO).
- Where there is street parking and sufficient room exists, a buffer (3 ft. preferred) should be striped in between the parking lane and bike lane in addition to the buffer between the bike lane and the motor vehicle travel lane. Where space constraints make a double-buffered lane unfeasible, placement of the buffer may be determined based on parking utilization and turnover.

MARKINGS

Where there is street parking and sufficient room exists, a buffer (3 ft. preferred) should be striped in between the parking lane and bike lane in addition to the buffer between the bike lane and the motor vehicle travel lane

Longitudinal pavement markings and bicycle lane symbol or word markings shall be used to define bicycle lanes (MUTCD 9E-1).

Per MUTCD, buffers greater than 3 feet wide shall have chevrons or diagonal markings; 2-3 foot buffers shall have chevrons or diagonal markings.



SIGNAGE

An optional "Bike Lane" sign (MUTCD R3-17) may be located prior to the beginning of a buffered bike lane to designate that portion of the street for use by bicyclists (NACTO).

An optional "No Parking Bike Lane" sign (MUTCD R7-9/R7-9a) may be used if parked vehicles frequently block the buffered bike lane (NACTO).



BENEFITS AND CONSIDERATIONS

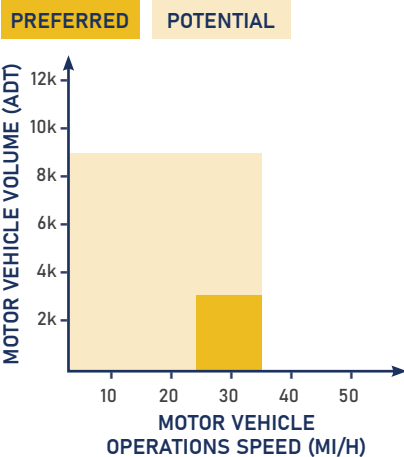
- Provides greater separation between motor vehicles and bicyclists than a standard bike lane ✓
- Provides space for bicyclists to pass another bicyclist without entering motor vehicle travel lane ✓
- May be used anywhere a standard bicycle lane is considered if sufficient right-of-way exists
- May be used on streets with higher motor vehicle volumes and speeds

APPLICATION

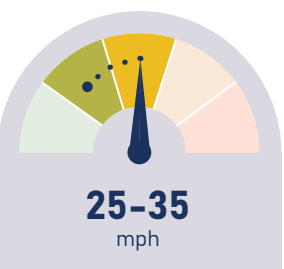
Land Use

URBAN	SUBURBAN	RURAL
Always	Always	Sometimes

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [City of Tucson Street Design Guide \(2021\)](#)

REGIONAL TREATMENT GUIDELINES

- Striping and signing along roadway sections and at intersections to identify proper bicycle/vehicle interactions.
- Potential use of green pavement in special situations.

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

TRANSIT INTEGRATION

In the event of bus pullout locations:

- Bicycle traffic is directed straight, to the left of the bus pullout zone, while buses transition across the bicycle lane to the right.
- Conflict-zone markings (skip dash markings) should be used to position the bicycle lane to the left of the bus pullout zone.
- Bus pullout lane must be wide enough to ensure buses do not extend into the bicycle lane.

AMENITY OPTIONS

- Wayfinding signage
- Bike counters

Bicycle Boulevard

A bicycle boulevard is a local street designated and designed to give bicycle travel priority. A bicycle boulevard uses signs, pavement markings, and traffic calming measures to discourage through trips by motor vehicles and slow traffic.

IMPACTED
USERS:





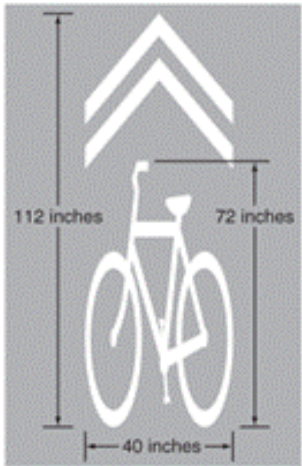
GEOMETRIC CONSIDERATIONS

- Bicycle boulevards combine road markings, traffic calming measures, and crossing improvements across major roadways to enhance the comfort and efficiency of bicyclists traveling along the route.

MARKINGS

Shared lane markings may be placed in the center of the travel lane to define the street as a shared lane.

New MUTCD guidance is currently being developed in the Standard Highway Signs publication.



MUTCD Figure 9C-9

SIGNAGE

The City of Tucson Bicycle Boulevard Master Plan recommends modified street signs and wayfinding signs to increase visibility and familiarity with bicycle priority streets.



BENEFITS AND CONSIDERATIONS

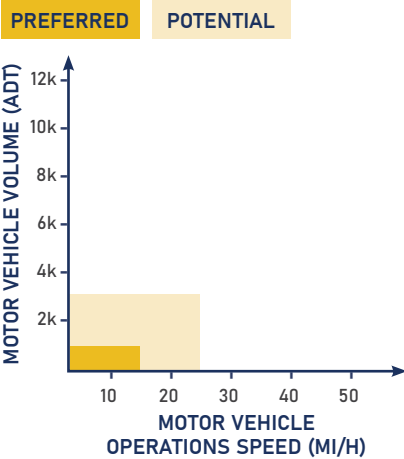
Reduces motor vehicle volumes and speeds	✓
Improves bicyclist comfort on a corridor	✓
Reduces crash volume and severity of motor vehicle with bicyclists	✓
Cost-effective use of existing local roadways to make connections to other bicycle facilities	✓
Requires continuous and connected right-of-way or access easements between intersections with major streets	🔍

APPLICATION

Land Use

 URBAN	 SUBURBAN	 RURAL
Always	Sometimes	Sometimes

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [City of Tucson Street Design Guide \(2021\)](#)
- [City of Tucson Bicycle Boulevard Master Plan](#)

REGIONAL TREATMENT GUIDELINES

- Utilize roadway designs to slow motor vehicle speeds
- Create safe and convenient roadway crossing opportunities for bicyclists and pedestrians
- Utilize local rainwater harvesting practices that incorporate vegetation and public art into traffic calming measures to enhance the corridor

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [FHWA Proven Safety Countermeasures](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

TRANSIT INTEGRATION

Bicycle boulevards should not be utilized along transit routes.

AMENITY OPTIONS

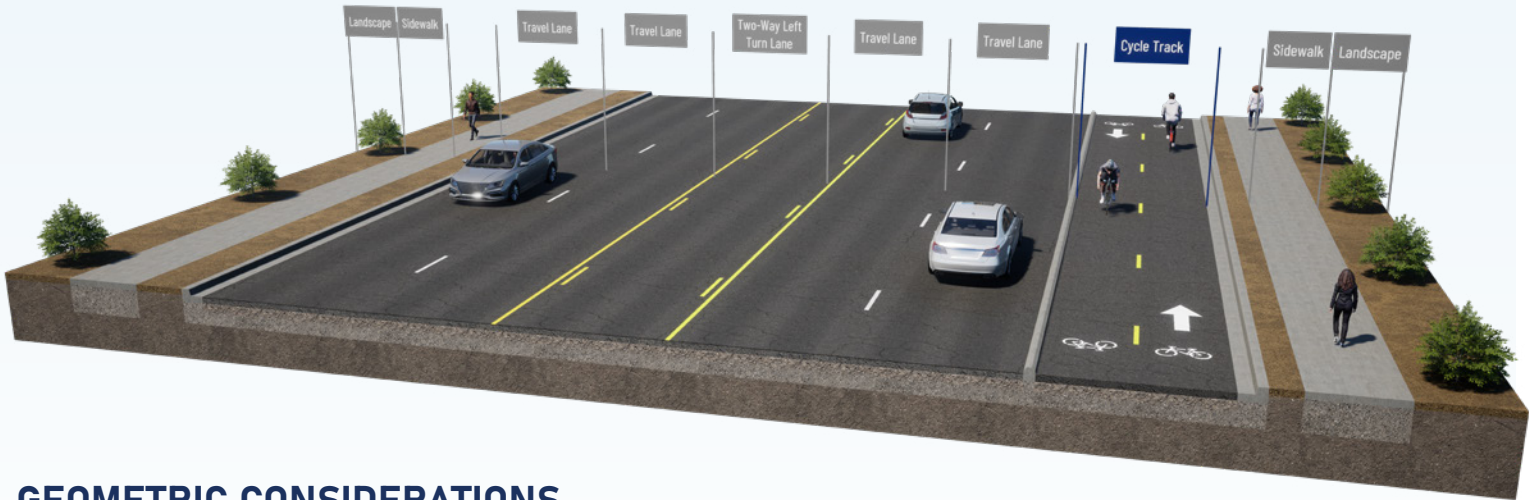
- Wayfinding signage
- Bicycle boulevard naming/branding

Cycle Track

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane allowing bicycle movement in both directions.

IMPACTED
USERS:



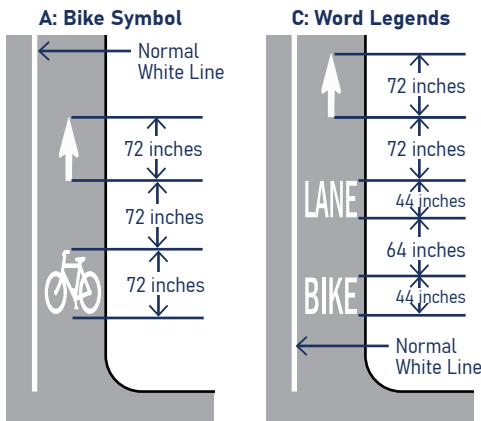


GEOMETRIC CONSIDERATIONS

- Preferred travel surface width is 13 feet. Minimum width is 8 feet (NACTO).
- When protected by a parking lane, 3 feet is the preferred width for a parking buffer.

MARKINGS

Longitudinal pavement markings and bicycle lane symbol or word markings shall be used to define bicycle lanes (MUTCD 9E-1).



SIGNAGE

A “DO NOT ENTER” sign (MUTCD R5-1) with “EXCEPT BIKES” plaque (R3-7bP) may be posted along the facility.

If on a one-way street, a “ONE WAY” sign (MUTCD R6-1, R6-2) with “EXCEPT BIKES” plaque (R3-7bP) may be posted along the facility and at intersecting streets.

Intersection traffic controls along the street may be installed and oriented toward bicyclists.



BENEFITS AND CONSIDERATIONS

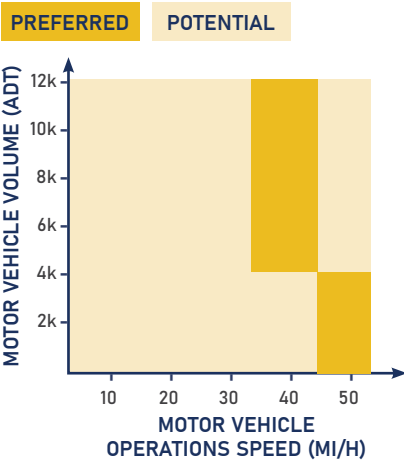
Provides two-way bicycle traffic on one side of the road	✓
Dedicates and protects space for bicyclists by improving perceived comfort and safety	✓
Eliminates risk of collisions with over-taking vehicles	✓
Reduces risk of “dooring”	✓
Low implementation cost when using existing pavement and drainage	✓
More attractive to a wide range of bicyclists at all skill levels	✓
Provides enhanced protection for bicyclists on streets with high motor vehicle volumes and speeds	✓
Best used on streets with few conflicts such as driveways or cross-streets on one side of the street	🔍
Best used on streets with extra right-of-way on one side	🔍
Best used on streets with high bicycle volumes	🔍
Utilize two-stage turn boxes at intersections for bicyclists turning left	🔍
Physical separation may be achieved using parked cars, curb, planters, etc.	🔍
Commonly used when limited ROW prevents the use of separated bike lanes	🔍

APPLICATION

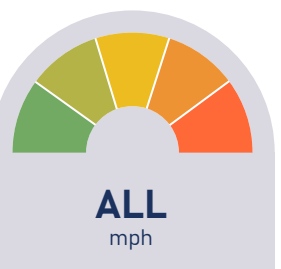
Land Use

 URBAN	 SUBURBAN	 RURAL
Sometimes	Sometimes	Rarely

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- City of Tucson Street Design Guide (2021)

REGIONAL TREATMENT GUIDELINES

- A dashed line may be used to separate two-way bicycle traffic and to help differentiate between adjacent pedestrian space.
- Potential use of green pavement in special situations.

NATIONAL RESOURCES

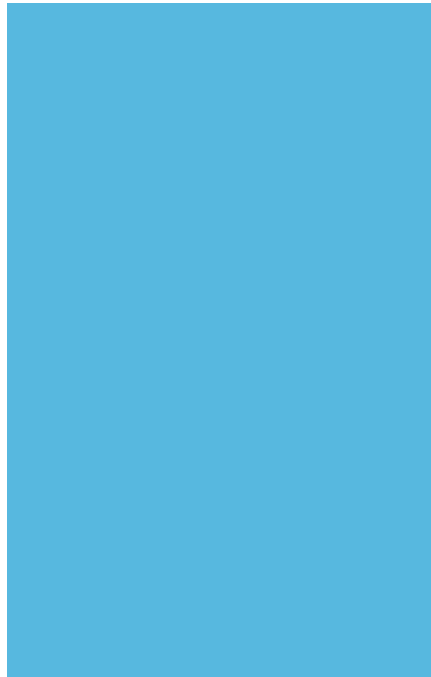
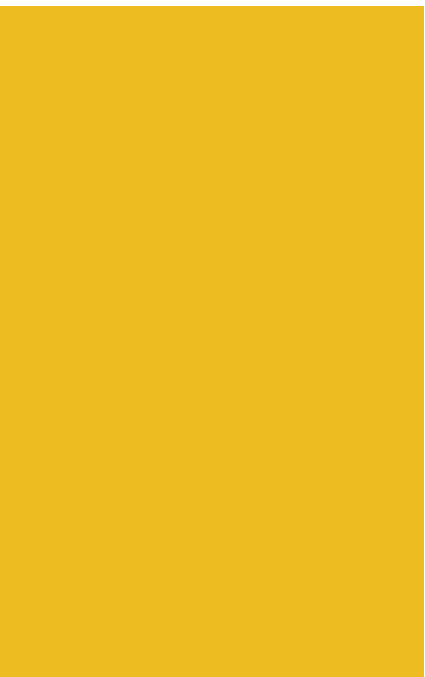
- NACTO Urban Bikeway Design Guide
- AASHTO
- MUTCD 11th Edition
- ADA

TRANSIT INTEGRATION

- Consider wrapping the cycle track behind the transit stop zone to reduce conflicts with transit vehicles and passengers.
- A raised median, bus bulb, or curb extension may be configured in the cycle track buffer area to accommodate transit stops.

AMENITY OPTIONS

- Wayfinding signage
- Bike counters



OFF-STREET IMPROVEMENTS

Sidewalk

A sidewalk is the paved portion of a street right-of-way, beyond the curb or edge of roadway pavement, which is intended for use by pedestrians.

IMPACTED
USERS:





GEOMETRIC CONSIDERATIONS

Design sidewalks to separate pedestrians from other road users.

- The minimum sidewalk width is 5 feet if set back from the curb (FHWA).
- The minimum sidewalk width is 6 feet if set back from the curb face (FHWA).

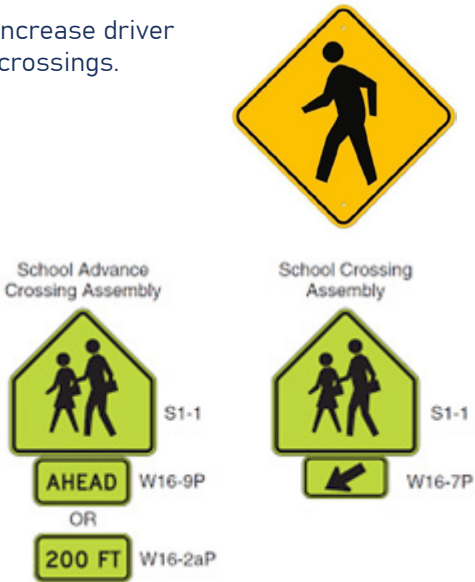
MARKINGS

No markings are required for sidewalks.

SIGNAGE

MUTCD W11-2 sign may be used to increase driver awareness of potential pedestrian crossings.

MUTCD S1-1, potentially paired with other signs (W16-9P, W16-2aP, W16-7P), may be used to increase driver awareness of school zone.



BENEFITS AND CONSIDERATIONS

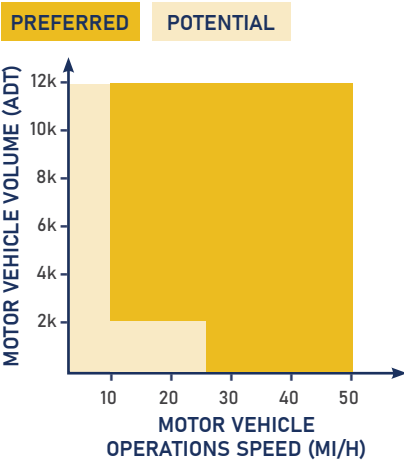
Provides a dedicated space for pedestrians to safely travel	✓
Reduces “walking along roadway” crashes	✓
May not support a rural character when combined with curb and gutter	🔍
Requires a moderate roadway right-of-way	🔍

APPLICATION

Land Use

 URBAN	 SUBURBAN	 RURAL
Always	Always	Sometimes

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [Pima County Roadway Design Manual Chapter 2.6 Bicycle, Pedestrian and Transit Facilities](#)
- [City of Tucson Street Design Guide \(2021\)](#)

REGIONAL TREATMENT GUIDELINES

- The recommended sidewalk width is 5 feet but may be increased to accommodate special conditions.
- When the sidewalk is designed to be flush with the back of the raised curb, the standard width is 6 feet.

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [FHWA Proven Safety Countermeasures](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)
- [ADOT Traffic Safety Guidelines for School Areas](#)
- [PROWAG](#)

TRANSIT INTEGRATION

Sidewalks should connect pedestrians directly to transit stops.

AMENITY OPTIONS

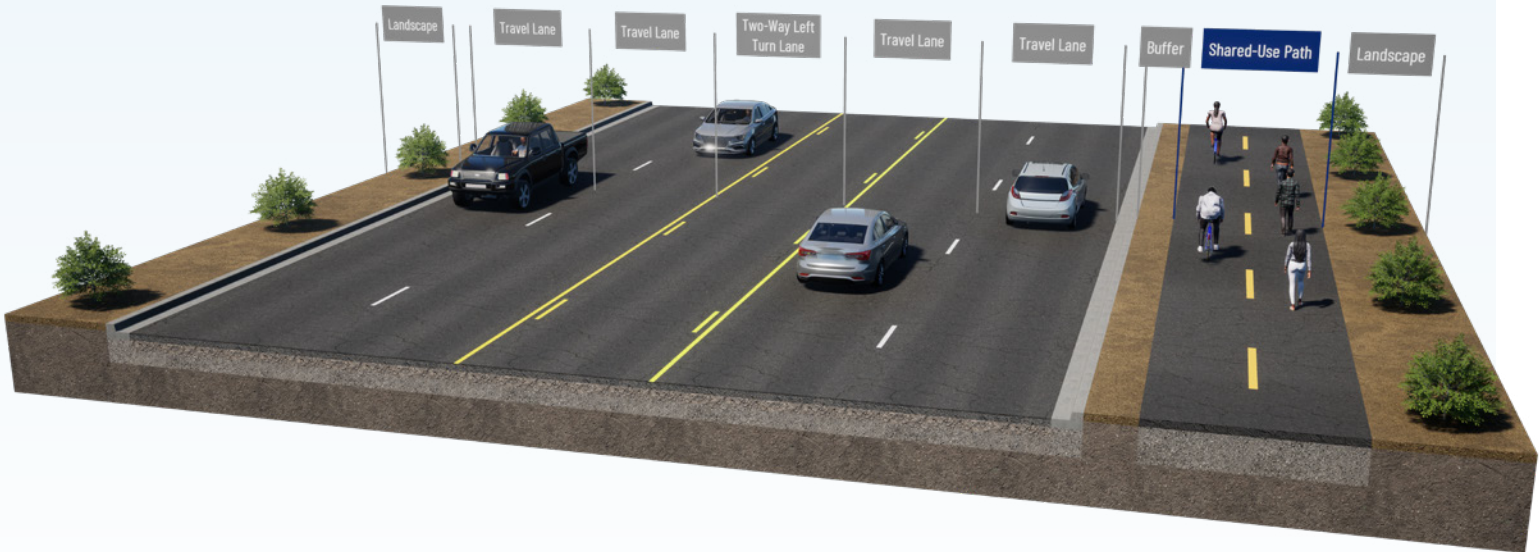
- A furnishing zone of 4–6 feet may be placed between the street and sidewalk to create a buffer between pedestrians and motor vehicles while providing space for mailboxes, signs, street lighting, and other utilities
- Landscaping
- Public art, shading, and seating are encouraged at various locations along the sidewalk

Shared-Use Path

A shared pathway for bicycles and pedestrians that is physically separated from motorized vehicular traffic by an open space or barrier.

IMPACTED
USERS:





GEOMETRIC CONSIDERATIONS

- The desired shared-use path width is 12–14 feet (AASHTO).
- The minimum shared-use path width is 10 feet (AASHTO).
- A desired graded area of 3 feet with a maximum 1:6 slope should be maintained on both sides of the shared-use path (FHWA).
- A minimum graded area of 2 feet with a maximum 1:6 slope should be maintained on both sides of the shared-use path (FHWA).

MARKINGS

In most circumstances, center line markings are not needed, but may be used in the following situations:

- When striping is required, use a 4-inch broken yellow center line stripe.
- Solid center lines may be provided on blind corners and on approaches to roadway crossings.

SIGNAGE

Bikes Yield to Peds (MUTCD R9-6) signs may be used to clarify yielding rules on shared-use paths.



Bicycle and Pedestrian Crossing (MUTCD W11-15) signs may be used at all roadway crossings.



✓ BENEFITS AND CONSIDERATIONS

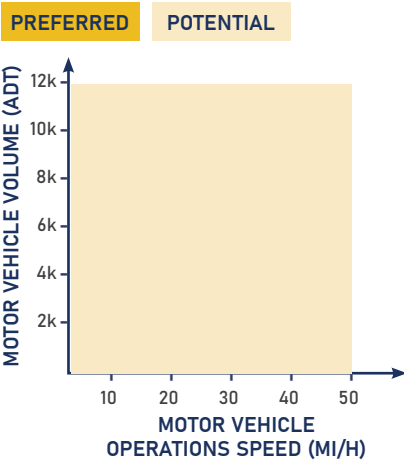
Provides access for all users to areas primarily served by high-speed roads	✓
Used as a system of off-road transportation routes	✓
More attractive to a wide range of bicyclists at all skill levels	✓
Shared-use paths fall under ADA accessibility requirement	
Conflicts exist between bicyclists and pedestrians on the path traveling at different speeds	
May require a lot of right-of-way	

APPLICATION

Land Use

 URBAN	 SUBURBAN	 RURAL
Sometimes	Sometimes	Always

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [Pima Regional Trail System Master Plan](#)
- [Pima County Roadway Design Manual Chapter 2.6 Bicycle, Pedestrian, and Transit Facilities](#)
- [City of Tucson Street Design Guide \(2021\) Chapter 3](#)

REGIONAL TREATMENT GUIDELINES

Per the Pima Regional Trail System Master Plan:

- 12-foot-wide paved shared-use path
- 4 feet unpaved on one side
- 2 feet soft/mowed on side opposite unpaved

NATIONAL RESOURCES

- [NACTO Urban Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

AMENITY OPTIONS

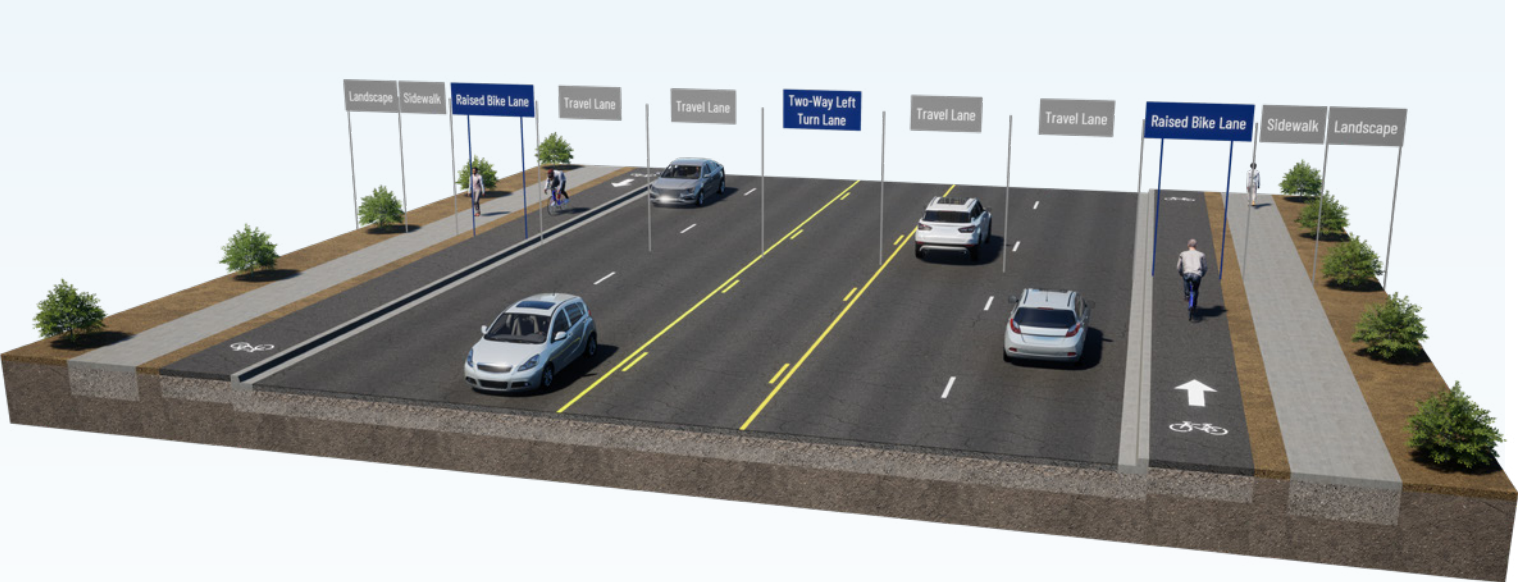
- Refer to Crossing Improvements section for guidance on appropriate crossing facilities. A rectangular rapid flashing beacon (RRFB) may be considered at arterial roadway crossings to increase visibility, however a HAWK or Pedestrian Hybrid Beacon crossing is recommended which provides a significantly higher level of driver compliance.
- Public art, shading, and seating are encouraged at various locations along the shared-use path
- Bike counters

Raised Bike Lane

A raised bike lane is a bicycle facility that is vertically separated from motor vehicle traffic.

IMPACTED
USERS:



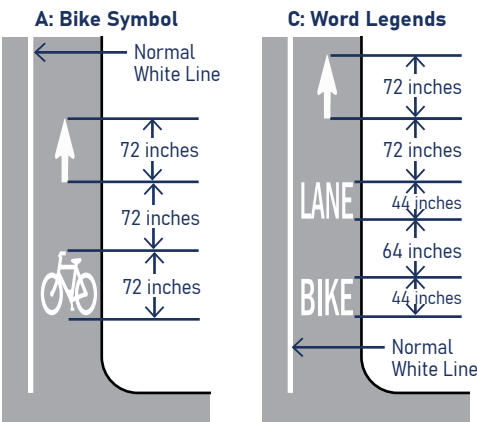


GEOMETRIC CONSIDERATIONS

- Preferred travel surface width is 6.5 – 8 feet. Minimum width is 5 feet (AASHTO).
- Vertical separation between the roadway and the raised bike lane should be between 1 and 6 inches (AASHTO).
- Vertical separation between the raised bike lane and the sidewalk should be between zero and 5 inches (AASHTO).
- If used, a mountable curb should have a 4:1 slope edge without any seams or lips to interfere with bike tires to allow for safe entry/exit of the roadway (AASHTO).

MARKINGS

Longitudinal pavement markings and bicycle lane symbol or word markings shall be used to define bicycle lanes (MUTCD 9E-1).



SIGNAGE

An optional “Bike Lane” sign (MUTCD R3-17) may be located prior to the beginning of a marked bike lane to designate that portion of the street for use by bicyclists (NACTO).



An optional “No Parking Bike Lane” sign (MUTCD R7-9/R7-9a) may be used if parked vehicles frequently block the bike lane (NACTO).



BENEFITS AND CONSIDERATIONS

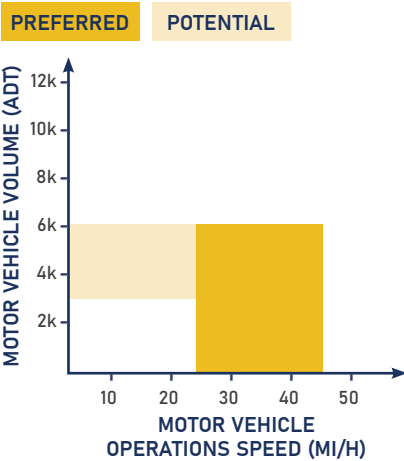
Dedicates and protects space for bicyclists to improve perceived comfort and safety	✓
More attractive to a wide range of bicyclists at all skill levels	✓
Encourages bicyclists to ride in the bikeway rather than the sidewalk	✓
Can visually reduce the width of the street	✓
Minimizes maintenance costs due to limited motor vehicle wear	✓
With new roadway construction a raised bike lane can be less expensive to construct than a wide or buffered bike lane	✓
May be at the level of the adjacent sidewalk or set at an intermediate level between the roadway and sidewalk	🔍
May be paired with a furnishing zone between the motor vehicle travel lane and the raised bike lane	🔍
Best used on streets with few driveways and cross streets	🔍
May be used on streets with many curves where motor vehicles may encroach into bike lane	🔍
On streets with high motor vehicle volumes and speeds	🔍

APPLICATION

Land Use

URBAN	SUBURBAN	RURAL
Always	Sometimes	Rarely

Speed and Volume



Vehicle Speed



Cost



LOCAL STANDARDS

- [City of Tucson Street Design Guide \(2021\)](#)

REGIONAL TREATMENT GUIDELINES

- If configured at a height flush with the sidewalk, green pavement, pavement markings, textured surfaces, landscaping, or other furnishings should be used to discourage pedestrian use of the cycle zone.

NATIONAL RESOURCES

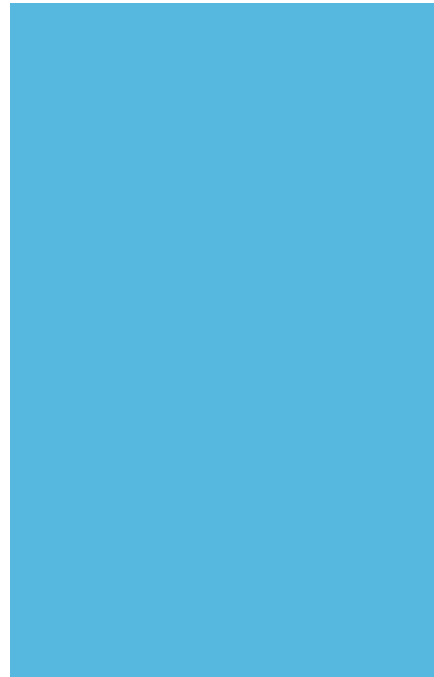
- [NACTO Urban Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

TRANSIT INTEGRATION

Consider wrapping the raised bike lane behind the transit stop zone to reduce conflicts with transit vehicles and passengers.

AMENITY OPTIONS

- Wayfinding signage
- Bike counters



CROSSING IMPROVEMENTS

Marked Crosswalk

IMPACTED
USERS:



A marked crosswalk is a location dedicated for pedestrians to cross the street.



APPLICATION

Land Use

 URBAN

Always

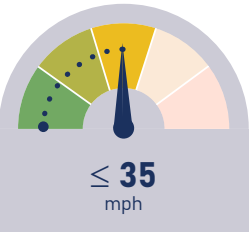
 SUBURBAN

Always

 RURAL

Always

Vehicle Speed



≤ 35
mph

Cost

\$

\$\$

\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Channelizes pedestrians to a single crossing location	✓
Advises motor vehicle drivers where to anticipate pedestrians crossing the road	✓
Intersection crossings should be kept as narrow as possible	🔍
Accessible curb ramps are required by the ADA at all crosswalks	🔍
Insufficient pedestrian protection on roadways of 4 lanes or greater with an ADT of 12,000 or greater	🔍
Visibility concerns can be addressed with High-Visibility Crosswalks per FHWA Proven Safety Countermeasures	🔍

LOCAL STANDARDS

- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)
- [ARS School Zones](#)

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [FHWA Proven Safety Countermeasures](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)
- [FHWA Guide for Selecting Countermeasures at Uncontrolled Pedestrian Locations](#)

Raised Crosswalk

IMPACTED
USERS:



A raised crosswalk is a ramped speed table spanning the entire width of the roadway, often placed at midblock crossing locations. The crosswalk is marked with paint and/or special paving materials.



APPLICATION

Land Use

 URBAN

Sometimes

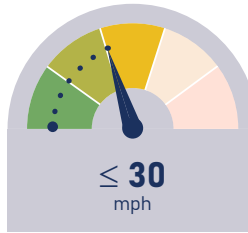
 SUBURBAN

Sometimes

 RURAL

Rarely

Vehicle Speed



≤ 30
mph

Cost

\$

\$\$

\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Reinforces slow speeds for motor vehicles encouraging drivers to yield to pedestrians	✓
Allows pedestrians to cross the street at grade with the sidewalk	✓
Should be used in conjunction with crosswalk visibility enhancements	🔍
Special attention should be given to drainage	🔍
Typically installed on 2-lane or 3-lane roads with ADT under 9,000	🔍
Multiple raised crosswalks on one route may disrupt transit, maintenance, or emergency service vehicles	🔍
May create challenges for street sweepers and pavement maintenance	🔍

LOCAL STANDARDS

- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)
- [ARS School Zones](#)

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)
- [FHWA Guide for Selecting Countermeasures at Uncontrolled Pedestrian Locations](#)

Pedestrian Refuge Island

A pedestrian refuge island is a space in the center of the road where a vulnerable road user can safely wait, separated from motor vehicle travel lanes, while crossing the street in two stages.

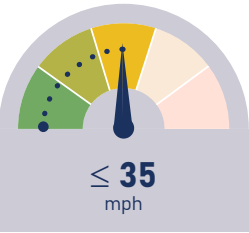


APPLICATION

Land Use

URBAN
Always
SUBURBAN
Always
RURAL
Sometimes

Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Reduction in pedestrian crashes	✓
Pedestrians may cross the street in two stages	✓
Preferred 8 feet wide for pedestrian comfort (minimum 6 feet wide)	🔍
Should be illuminated or highlighted with street lights, signs, and/or reflectors to ensure they are visible to motorists	🔍
Can be used in conjunction with other crossing improvements such as marked crosswalks, RRFBs, HAWKs, and raised crosswalks	🔍

LOCAL STANDARDS

- ARS School Zones

NATIONAL RESOURCES

- ITE Traffic Calming Measures
- AASHTO
- ADA
- FHWA Guide for Selecting Countermeasures at Uncontrolled Pedestrian Locations

Protected Intersection

IMPACTED USERS:

A protected intersection is an intersection with the bikeway set back from the parallel motor vehicle traffic giving bicyclists a dedicated path through the intersection.

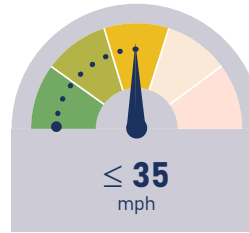


APPLICATION

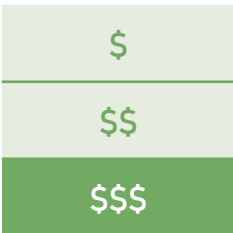
Land Use

URBAN
Sometimes
SUBURBAN
Sometimes
RURAL
Rarely

Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Provides separated space for bicyclists to cross the intersection	✓
Reduces the distance and time for a bicyclist to cross the intersection	✓
Reduces motor vehicle turn speeds	✓
Improves driver visibility of bicyclists	✓
Transitions from standard bike lanes should start far in advance of the intersection	🔍
Standard separated bike lane widths should be used in the protected intersection	🔍
Provide a queuing space for bicyclists	🔍
May increase difficulties for visually impaired pedestrians	🔍
May require special street sweeping practices	🔍

NATIONAL RESOURCES

- NACTO Urban Street Design Guide
- MUTCD 11th Edition
- AASHTO
- ADA

Raised Intersection

IMPACTED
USERS:



A raised intersection is an intersection that is elevated to the level of the sidewalk to ensure that drivers cross slowly.

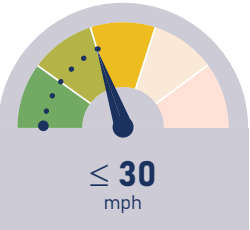


APPLICATION

Land Use

	URBAN
Sometimes	
	SUBURBAN
Sometimes	
	RURAL
Rarely	

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Reinforces slow speeds for motor vehicles encouraging drivers to yield to pedestrians	✓
Allows pedestrians to cross the street at grade with the sidewalk	✓
Often used with crosswalk visibility enhancements	
Special attention should be given to drainage	
Do not use if sight distance is limited or street is steep	
Multiple raised intersections on one route may disrupt bus or emergency service vehicles	
May create maintenance challenges for sweepers and pavement maintenance vehicles	

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

Bike Box

IMPACTED
USERS:



A bike box is a designated area in advance of a crosswalk at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.



APPLICATION

Land Use

	URBAN
Sometimes	
	SUBURBAN
Rarely	
	RURAL
Rarely	

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Increases visibility of bicyclists	✓
Reduces signal delays for bicyclists	✓
Facilitates bicyclist left turn positioning at intersections during red signal indication	✓
Helps prevent "right-hook" conflicts with turning motor vehicles	✓
Groups bicyclists together to quickly clear an intersection	✓
Utilize where there is a desire to better accommodate left turning bicycle traffic	
A "No Turn on Red" sign should be installed to prevent motor vehicles from entering the queuing area	
Green paving inside the queuing area should be used to increase visibility	

NATIONAL RESOURCES

- [NACTO Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

Two-Stage Turn Box

IMPACTED
USERS:



A Two-Stage Turn Box is a designated place for cyclists that have made a through movement at a signalized intersection to rotate their bikes 90-degrees and wait for the subsequent through movement, thereby formalizing a two-stage left-turn.



APPLICATION

Land Use

	URBAN
Sometimes	
	SUBURBAN
Sometimes	
	RURAL
Rarely	

Vehicle Speed

Cost



\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Improves bicyclist ability to safely and comfortably make left turns	✓
Provides a formal queuing space for bicyclists making a two-stage turn	✓
Reduces turning conflicts between bicyclists and motor vehicles	✓
Prevents conflicts arising from bicyclists queuing in a bike lane or crosswalk	✓
Separates turning bicyclists from through bicyclists	✓
The queuing box should be placed in a protected area, typically within an on-street parking lane or between the bicycle lane and the pedestrian crossing	
A "No Turn on Red" sign should be installed if right-turning motor vehicles enter the queuing area	
Green paving inside the queuing area should be used to increase visibility	
Good to pair with cycle tracks, raised bike lanes, and separated bike lanes	

NATIONAL RESOURCES

- [NACTO Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

Overpass

IMPACTED
USERS:



An overpass is a structure that allows for pedestrians and bicyclists to travel above the flow of motor vehicle traffic.



APPLICATION

Land Use

	URBAN
Sometimes	
	SUBURBAN
Sometimes	
	RURAL
Rarely	

Vehicle Speed

Cost



\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Provides complete separation of pedestrians/ bicyclists from motor vehicle traffic	✓
Provides crossings where no other facilities are available	✓
Most appropriate over busy, high-speed roadways	
Pedestrians will not use if there is a more direct route available	
Lighting, vandalism, and security are major concerns	
Needs to meet ADA standards so space for overpass may be challenging to achieve	

NATIONAL RESOURCES

- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

Tunnel

IMPACTED
USERS:

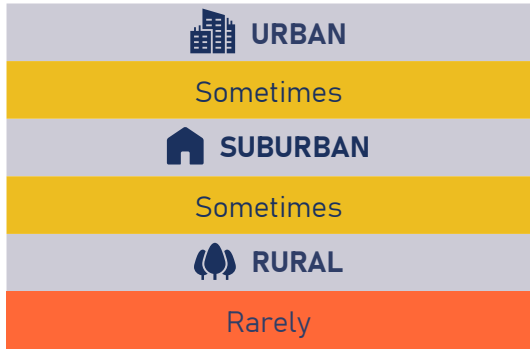


A tunnel is a structure that allows for pedestrians and bicyclists to travel below the flow of motor vehicle traffic.



APPLICATION

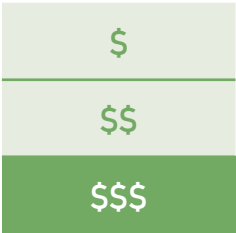
Land Use



Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Provides complete separation of pedestrians/ bicyclists from motor vehicle traffic	✓
Provides crossings where no other facilities are available	✓
Pedestrians will not use if there is a more direct route available	🔍
Lighting, vandalism, and security are major concerns	🔍
Needs to meet ADA standards so space for tunnel may be challenging to achieve	🔍
Separation of bicyclists and pedestrians may be necessary	🔍

NATIONAL RESOURCES

- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

PELICAN Crossing

IMPACTED
USERS:

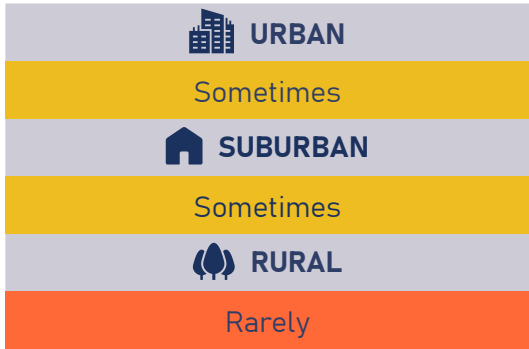


The PEdestrian LIght Control ActivationN (PELICAN) is a pedestrian-actuated two-stage crossing that incorporates the median island as a pedestrian refuge between the two crossing stages. The PELICAN is used mid-block on major streets. The PELICAN uses standard Red-Yellow-Green signal for motorists that remains green unless activated by a pedestrian.

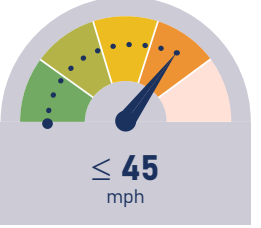


APPLICATION

Land Use



Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Minimizes the potential for stops, delays, and crashes	✓
Not used for intersections	🔍
Used mid-block on major streets	🔍

NATIONAL RESOURCES

- [FHWA Report](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

TOUCAN Signal

IMPACTED USERS:    

The TwO groUps CAN cross (TOUCAN) system is used at locations of heavy bicycle and pedestrian crossing activity, like Bike Boulevards. Motorists on the street that is being crossed see a standard Red-Yellow-Green signal. Motorized traffic on the crossing street is not allowed to proceed through these signals, and are forced to turn right, decreasing the number of cars on the neighborhood street.



APPLICATION

Land Use

 URBAN
Sometimes
 SUBURBAN
Rarely
 RURAL
Rarely

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Provides traffic calming for neighborhood streets	✓
Bicyclists see a bicycle signal face	✓
Pedestrians get a standard WALK indication	✓
Bicyclists and pedestrians have separate crossing areas	✓

LOCAL STANDARDS

- [City of Tucson Bicycle Boulevard Master Plan](#)

NATIONAL RESOURCES

- [NACTO Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)

Pedestrian Hybrid Beacon

IMPACTED USERS:    

A pedestrian hybrid beacon, otherwise known as a High intensity Activated crossWalk (HAWK), is a pedestrian traffic control device designed to help pedestrians safely cross higher-speed roadways at midblock crossings and uncontrolled intersections.



APPLICATION

Land Use

 URBAN
Sometimes
 SUBURBAN
Sometimes
 RURAL
Sometimes

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

May be used at mid-block locations or intersections	✓
Associated with very high driver compliance	✓
Stop lines and marked crosswalks are required	
FHWA Proven Safety Countermeasure	
The BikeHAWK is an adaptation for bicycle users	

LOCAL STANDARDS

- [City of Tucson Bicycle Boulevard Master Plan](#)
- [ADOT Traffic Safety Guidelines for School Areas](#)
- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)
- [ARS School Zones](#)

NATIONAL RESOURCES

- [FHWA Proven Safety Countermeasures](#)
- [NACTO Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)
- [FHWA Guide for Selecting Countermeasures at Uncontrolled Pedestrian Locations](#)
- [Journal of Traffic Control Device Research](#)

Rectangular Rapid Flashing Beacon (RRFB)

IMPACTED
USERS:



An RRFB is a pedestrian-activated yellow flashing beacon used at marked crosswalks to enhance the conspicuity of vulnerable users crossing the road.



APPLICATION

Land Use

	URBAN
Always	
	SUBURBAN
Always	
	RURAL
Sometimes	

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Increases visibility of pedestrians at a marked crosswalk	✓
FHWA Proven Safety Countermeasure	
A beacon should be placed on each side of the marked crosswalk	
Over-use of RRFB treatment may diminish their effectiveness and provide a false sense of security to users	
Consider alternative facilities for locations with high bicyclist volumes	
Total travel lanes impact the appropriateness of an RRFB and may need to be supplemented by another facility, such as a Pedestrian Refuge Island	

LOCAL STANDARDS

- [ARS School Zones](#)

NATIONAL RESOURCES

- [FHWA Proven Safety Countermeasures](#)
- [NACTO Bikeway Design Guide](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)
- [FHWA Guide for Selecting Countermeasures at Uncontrolled Pedestrian Locations](#)
- [FHWA STEP Program](#)

Leading Pedestrian Interval

IMPACTED
USERS:



Leading pedestrian interval is signal timing that gives pedestrians the opportunity to enter the crosswalk at a signalized intersection 3-7 seconds before vehicles in the adjacent travel lane are given a green indication.

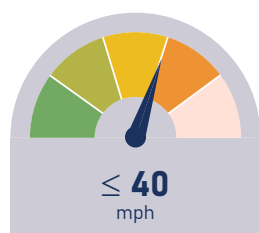


APPLICATION

Land Use

	URBAN
Always	
	SUBURBAN
Always	
	RURAL
Always	

Vehicle Speed



Cost

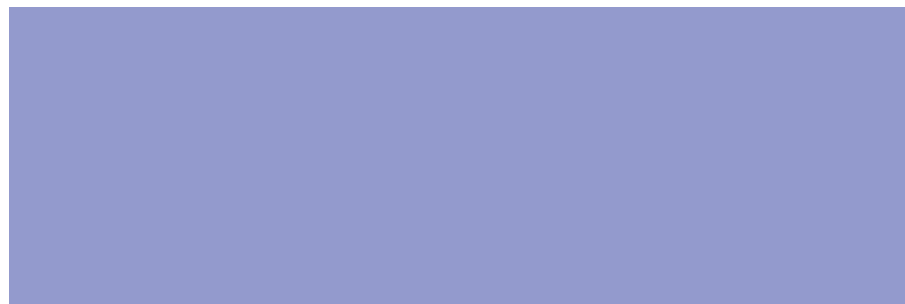
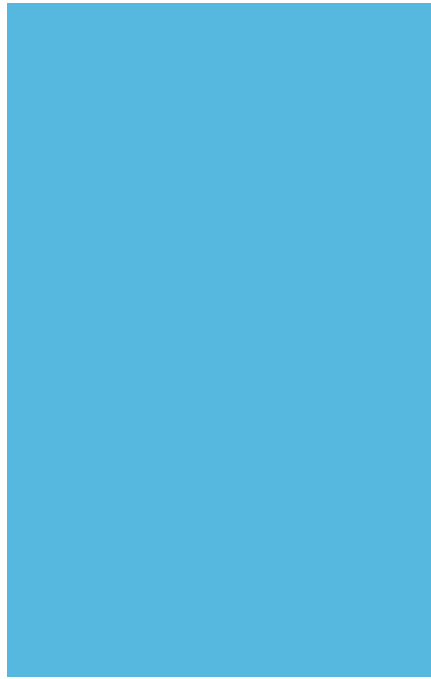
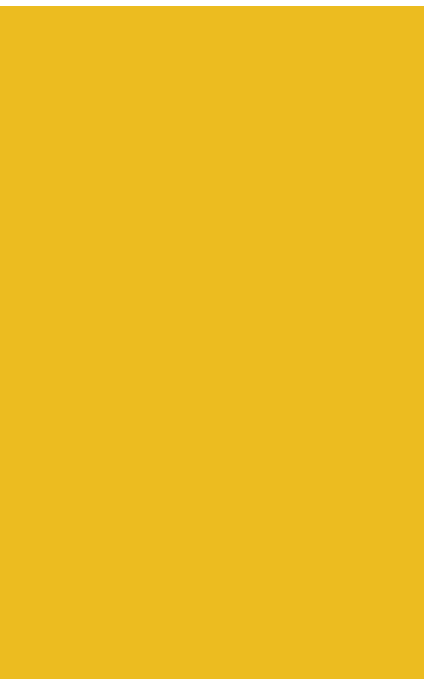
\$
\$\$
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✓ BENEFITS AND CONSIDERATIONS

Increases visibility of crossing pedestrians	✓
Reduces conflicts between pedestrians and vehicles	✓
Increases likelihood of motorists yielding to pedestrians	✓
Enhanced safety for pedestrians who may be slower to enter the intersection	✓
FHWA Proven Safety Countermeasure	
Should be used at intersections with high turning volumes	

NATIONAL RESOURCES

- [FHWA Proven Safety Countermeasures](#)
- [FHWA's Handbook for Designing Roadways for the Aging Population](#)
- [MUTCD 11th Edition](#)
- [AASHTO](#)
- [ADA](#)



TRAFFIC CALMING MEASURES



Curb Extension

A curb extension is a sidewalk or curb that extends into a parking or travel lane to make the street narrower.

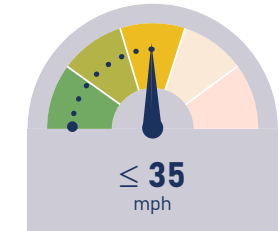


APPLICATION

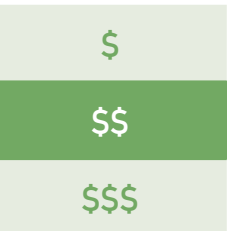
Land Use



Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Increases visibility of pedestrians	✓
Reduces speed of turning motor vehicles	✓
Encourages pedestrians to cross at designated locations	✓
Prevents motor vehicles from parking at corners	✓
Increases pedestrians ability to see approaching traffic by putting them out further into the street	🔍
Midblock extensions can provide an opportunity for a midblock pedestrian crossing	🔍
Can be used to place landscaping and street furniture along the roadway	🔍
Other active facilities, including bike lanes, lighting, and ADA facilities, required extra consideration when implementing Curb Extensions	🔍

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [FHWA Traffic Calming ePrimer](#)
- [AASHTO](#)
- [ADA](#)

Chicane

A chicane is a series of alternating curves or lane shifts that are located in apposition to force a motorist to steer back and forth out of a straight travel path.

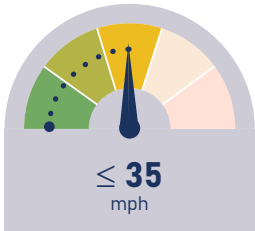


APPLICATION

Land Use



Vehicle Speed



Cost



✓ BENEFITS AND CONSIDERATIONS

Slows motor vehicle speeds through forced turns	✓
Adds more potential green space to a street	✓
Increases the ability of pedestrians to see approaching traffic	✓
Slows traffic by visually narrowing the street	✓
May affect street sweeping	🔍
May reduce on-street parking	🔍
May include a space to the right for bicycles to bypass the chicane	🔍
May be appropriate if traffic volume is relatively low	🔍
May reduce space for bicyclists to operate	🔍
Appropriate lighting and visibility enhancements must be incorporated	🔍

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [FHWA Traffic Calming ePrimer](#)
- [AASHTO](#)
- [ADA](#)



Traffic Circle

A traffic circle is a raised island, placed within an unsignalized intersection, around which traffic circulates.



Treat Ave and 1st St

✓ BENEFITS AND CONSIDERATIONS

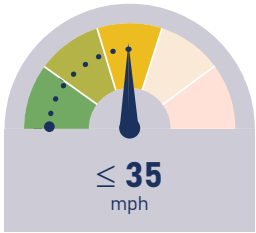
Creates horizontal deflection to slow motor vehicles	✓
Reduces the number of conflict points at intersections	✓
Reduces crash severity for all users	✓
May increase sideswipe crashes and fixed-object crashes	🔍
Appropriate at intersections of local streets	🔍
Can be used with all-way STOP control, all-way YIELD control, or two-way STOP control	🔍

APPLICATION

Land Use

🏢 URBAN
Sometimes
🏠 SUBURBAN
Sometimes
🌲 RURAL
Rarely

Vehicle Speed



Cost

\$
\$\$
\$\$\$

LOCAL STANDARDS

- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)

NATIONAL RESOURCES

- [NACTO Urban Street Design Guide](#)
- [FHWA Traffic Calming e Primer](#)
- [AASHTO](#)
- [ADA](#)

Speed Hump

A speed hump is an elongated mound in the roadway pavement surface extending across the travel way at a right angle to the traffic flow.



7th St and Forgeus Ave

✓ BENEFITS AND CONSIDERATIONS

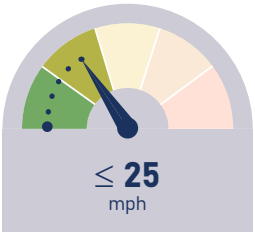
Do not place near intersections	🔍
Appropriate for local streets with low ADT	🔍
Not appropriate for primary emergency vehicle or transit routes	🔍
Increases discomfort for bicyclists along the route	🔍
May cause issues with drainage	🔍
Should be accompanied with a sign warning drivers (MUTCD W17-1)	🔍

APPLICATION

Land Use

🏢 URBAN
Sometimes
🏠 SUBURBAN
Always
🌲 RURAL
Sometimes

Vehicle Speed



Cost

\$
\$\$
\$\$\$

NATIONAL RESOURCES

- [FHWA Traffic Calming ePrimer](#)
- [AASHTO](#)
- [ADA](#)

Speed Cushion

A speed cushion is two or more raised areas placed laterally across a roadway.



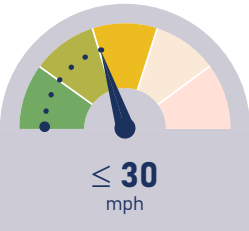
National Association of City of Transportation Officials

APPLICATION

Land Use

	URBAN
	Sometimes
	SUBURBAN
	Always
	RURAL
	Rarely

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

Allows emergency and transit vehicles to pass through unaffected	✓
Generally appropriate for local streets with low ADT	🔍
Do not place near intersections	🔍

NATIONAL RESOURCES

- [FHWA Traffic Calming ePrimer](#)
- [AASHTO](#)
- [ADA](#)

Speed Table

A speed table is a raised area placed across the roadway with a flat top long enough to accommodate the entire wheel base of most passenger cars. This helps reduce vehicular speeds.



National Association of City of Transportation Officials

APPLICATION

Land Use

	URBAN
	Sometimes
	SUBURBAN
	Sometimes
	RURAL
	Sometimes

Vehicle Speed



Cost

\$
\$\$
\$\$\$

✓ BENEFITS AND CONSIDERATIONS

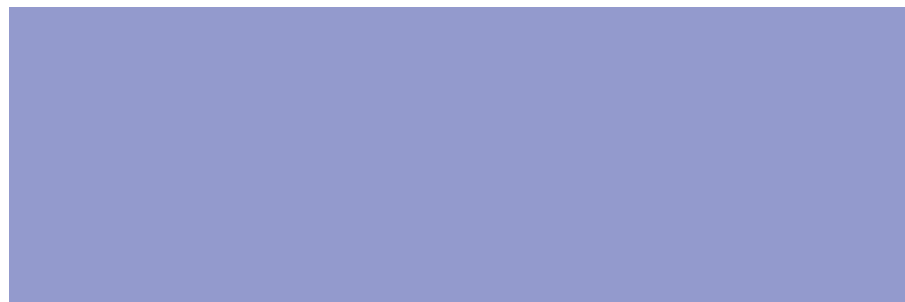
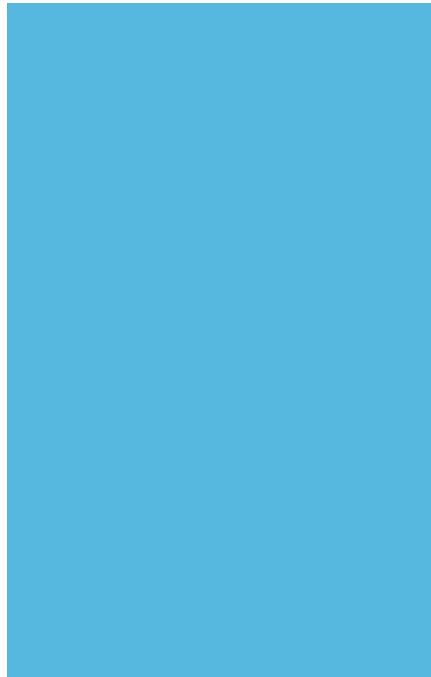
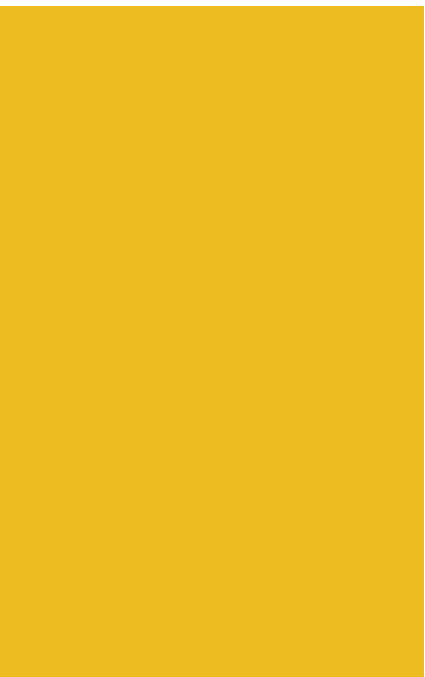
May be designed as a raised crosswalk if it coincides with a midblock crossing	✓
Should be accompanied with a sign warning drivers (MUTCD W17-1)	🔍
Slopes should not exceed 1:10 or be less steep than 1:25	🔍
Do not place near intersections	🔍
Not appropriate for primary emergency vehicle routes	🔍

LOCAL STANDARDS

- [Pima County/City of Tucson Signing and Pavement Marking Manual \(2020\)](#)

NATIONAL RESOURCES

- [FHWA Traffic Calming ePrimer](#)
- [AASHTO](#)
- [ADA](#)



QUICK-BUILD SOLUTIONS



Quick-Build Solutions

According to Smart Growth America, quick-build demonstration projects are temporary installations to test new street design improvements that improve safety and accessibility. However, these treatments can be used more permanently if they are regularly maintained and the public continues to show support.

BENEFITS

- May improve safety overnight on dangerous corridors or intersections. Cheaply tests specific designs, interventions, and materials
- Gathers valuable feedback on designs
- Encourages the use of other transportation modes or different travel patterns
- Cheaply tests specific designs, interventions, and materials



MATERIALS

Low Investment

TRAFFIC CONES OR TYPE I/II BARRICADES

Potential Uses:

- Traffic Circles
- Curb Extensions
- Median Islands
- Separated Bike Lanes

FREESTANDING DELINEATORS

Potential Uses:

- Traffic Circles
- Curb Extensions
- Median Islands
- Separated Bike Lanes

PLANTERS

Potential Uses:

- Traffic Circles
- Curb Extensions
- Median Islands
- Separated Bike Lanes

FLEXIBLE DELINEATOR POSTS

Potential Uses:

- Traffic Circles
- Curb Extensions
- Median Islands
- Separated Bike Lanes

K-71 DELINEATOR POSTS

Potential Uses:

- Traffic Circles
- Curb Extensions
- Median Islands
- Separated Bike Lanes

PLASTIC BARRIERS

Potential Uses:

- Separated Bike Lanes



PIMA ASSOCIATION OF GOVERNMENTS



REGIONAL ACTIVE
TRANSPORTATION PLAN