CITY OF WILLARD

PLANNING AND ZONING REGULAR MEETING

February 17, 2026 at 6:00 PM

Willard City Hall, 224 W. Jackson St., Willard, MO

AGENDA

Update Posted on February 12, 2026, at 01:30 p.m.

The tentative agenda of this meeting includes:

PLEDGE OF ALLEGIANCE

CALL THE MEETING TO ORDER

1. **ROLL CALL**
2. **AGENDA AMENDMENTS/APPROVAL OF AGENDA**
3. **APPROVAL OF MINUTES**
   - **A.** Meeting Minutes for 01.06.2026
4. **CITIZEN INPUT**
5. **PUBLIC HEARING**
   - **A.** AN ORDINANCE ADDING SECTION 400.991 OF THE CITY CODE ADMINISTRATIVE SUBDIVISIONS
6. **DISCUSSION**
   - **A.** AN ORDINANCE ADDING SECTION 400.991 OF THE CITY CODE ADMINISTRATIVE SUBDIVISIONS.
   - **B.** CODE OF ETHICS POLICY
   - **C.** ACTIVE TRANSPORTATION PLAN
   - **D.** MUNICIPAL CODE REVISIONS FOR ACTIVE TRANSPORTATION

     400.1160 SITE PLAN
     400.1310 SIDEWALKS
     400.1320 PUBLIC IMPROVEMENTS
     400.150 PUBLIC IMPROVEMENTS EASMENTS
     405.105 SIDEWALKS
     405.120 STREETS
     405.156 LINEAR PARKS, TRAILS AND CONNECTIONS TO TRAILS
     ARTICLE II 405.150 SIDEWALKS
7. **NEW BUSINESS**
8. **UNFINISHED BUSINESS**
9. **ADJOURN MEETING**

If you have special needs which require accommodation, please notify personnel at the City Hall. Representatives of the news media may obtain copies of this notice by contacting the City Clerk at 417-742-5302.

Courtney Myers, City Clerk

CITY OF WILLARD, MO

PLANNING AND ZONING MINUTES

January 6, 2026

Staff present: Planning and Zoning Director: Mike Ruesch, Planning Assistant: Tammy Swisher

Guest: Terry Kathcart

Chairwoman Marianne Hill lead the **PLEDGE OF ALLEGIANCE**

CALL THE MEETING TO ORDER

Chairwoman Marianne Hill called the meeting to order at 6:02 P.M.

ROLL CALL

Roll call conducted by the Secretary Valorie Simpson. Present: Marianne Hill, Jeff LaMontia, Valorie Simpson, Josh Breeze, Steve Cobb, Alderman David Keene, Gary Walker. Not present; Sam Baird, Burnis Coleman, Celeen Thedell

AGENDA AMENDMENTS/APPROVAL

Motion made by Valorie Simpson to approve the agenda seconded by Alderman Keene. Voting aye: Marianne Hill, Jeff LaMontia, Valorie Simpson, Josh Breeze, Steve Cobb, Alderman David Keene, Gary Walker. Motion carried 7-0

APPROVAL OF MINUTES November 18, 2025

Motion was made by Alderman Keene to approve the minutes of November 18, 2025 seconded by Steve Cobb. Voting aye: Marianne Hill, Jeff LaMontia, Valorie Simpson, Josh Breeze, Steve Cobb, Alderman David Keene, Gary Walker. Motion carried 7-0

CITIZENS INPUT

None

DISCUSSION

A. Chapter 105.452 and 105.454 At the last meeting City Attorney Holly Dodge spoke about conflict of interest and referred to chapters 105.452 and 105.454. Copies of these chapters have been giving to the board. Pages are to be added to the Planning and Development Land Regulation Book.

B. Chapter 119 of the Willard Code. Copies of Chapter 119 have been giving to the board. Pages are to be added to Planning and Development Land Regulation Book.

C. Code of Ethics. The board discussed the resolution adopting a code of ethics for the Planning Commission. The board feels that attendance needs to be addressed and suggests that a board member must attend 75% of the meetings and if they miss three (3) meetings in a row, the Mayor may remove them from the board. Mike Ruesch will amend the code of ethics and bring back to the board for approval.

NEW BUSINESS

Mike Ruesch spoke about an administration ordinance that he will be bringing to the board. This would involve minor changes such as lot lines, re-plats, lot splits etc.

Public works is wanting revive all their standards, Chapter 405. Changes will be coming before the board.

UNFINISHED BUSINESS

Mike Ruesch spoke about the two sewer contracts that have been approved, this will improve the ability to develop areas in the city. The city will be annexing 40 acres on Farm Road 76.

ADJOURN

Motion made by Gary Walker to adjourn at 6:43 with a second by Alderman Keene. Voting aye: Marianne Hill, Jeff LaMontia, Valorie Simpson, Josh Breeze, Steve Cobb, Alderman David Keene, Gary Walker. Motion carried 7-0

Submitted by Valorie Simpson, Secretary

_____

Chairwoman Marianne Hill

_____

Valorie Simpson, Secretary

_____

Courtney Myers, City Clerk

_____

Chapter 400.991 – Administrative Subdivision Regulations

Article I — General Provisions

400.991 Title and Authority

This Chapter shall be known as the **"Administrative Subdivision Ordinance"** for the City of Willard Missouri. It supersedes conflicting local provisions where any inconsistency exists.

Purpose

To establish uniform administrative procedures and technical standards for Administrative replat, Lot Combination, Property Line Adjustment, Zoning Certificate, and Administrative Condominium within the City of Willard, promoting orderly development, protecting public health, ensuring adequate infrastructure, and preserving natural resources.

Administrative subdivisions are not subject to the subdivision procedures of these regulations beyond the classification and predesign conference requirement and the procedures and requirements set forth or cited in this section. However, administrative subdivisions are subject to the development standards set forth in this sub chapter (such as height, bulk, area, density and overlay regulations).

All lots created through the administrative subdivision process must comply with such development standards in order to be developed or improved (except individual cemetery plots).The administrative subdivision procedures may not be used to render a conforming lot nonconforming or to increase a nonconformity. However, the procedures may be used to reduce the nonconformity of a nonconforming lot.

Unless otherwise stated, the provisions of these regulations shall be administered by the Director of Planning and Development.

The director, with the assistance of the city attorney, shall have all necessary authority to administer and enforce these regulations on behalf of the city. Said authority shall include the ability to order, in writing, the remedy of any condition found in violation of these regulations and the ability to initiate legal action to insure compliance with the provisions including injunctions or other action to set aside subdivisions or any illegal conveyance of land which violates provisions of this article. The authority includes injunction, abatement, or other appropriate actions or proceedings.

In the administration of these regulations, the director shall:

1. Receive, review for completeness and substantial compliance, officially accept, and maintain current permanent files and records for all applications for subdivision approval.
2. Conduct inspections of proposed subdivisions to determine compliance with these regulations.
3. Ensure that copies of the subdivision regulations are available for public distribution.
4. Provide such technical and consultative assistance as may be required by the planning commission, the city council, and by the agencies of the city in the exercise of their duties relating to these regulations.
5. Perform such other duties and functions as required by these regulations.

Classification of Subdivision.

Classification of the subdivision shall be made by the director in accordance with the definitions of this section.

A. Subdivisions shall be classified as a platted subdivision or administrative subdivision in accordance with the provisions of this section.
B. Administrative subdivisions shall include an administrative re-plat, a lot combination, property line adjustment, tract certification, or qualifying administrative condominium in accordance with the provisions of this section.
C. The subdivision does not conflict with any adopted comprehensive plan, capital improvements plan, or zoning.
    1. ***Platted subdivision***. A subdivision of property into four or more tracts, parcels or lots, which is approved by the planning and zoning commission and city council and is recorded in the form of a plat at the office of the Greene County Recorder of Deeds.
    2. ***Administrative subdivision***. A subdivision of property which the director of planning and development has the authority to approve in accordance with this article.
    3. Classification of a subdivision as anything other than a "platted subdivision" shall not be construed as a waiver of any requirements of these regulations nor the provisions of any other ordinance or statute pertaining to the property.

D. Administrative subdivisions are limited to the following and shall meet the conditions for each as described herein:

1. ***Administrative re-plat.*** The subdivision of land shall be classified as an administrative re-plat if an existing lot in a previously recorded subdivision is subdivided into not more than five (5) tracts, parcels or lots, and does not include the dedication of a new street or other public way or change in existing streets, or alleys.
2. New tracts, parcels, or lots shall be served by individual utility stubs and meet stormwater requirements. The proposed replat shall be in compliance with all other provisions of this article, the zoning ordinance and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot shall be created.

   (i) The administrative re-plat is prepared for recording in accordance with the following standards:

   (i) The document shall be entitled "Administrative Re-plat of _____ Lot of _____ [Prior Subdivision Name]";

   (ii) All stormwater conveyance and/or detention facilities are required to be designed in accordance with the design standards adopted by the Department of Public Works and constructed, inspected and approved prior to issuance of building permits

3. ***Lot Combination.*** The assembly or combination of contiguous existing tracts of record. The proposed lot combination is consistent with the surrounding area. In determining consistency, the size and dimensions of lots previously developed, location of easements, the layout and design of existing subdivisions and the degree of deviation from previous development shall be considered.

   The proposed lot combination does not substantially increase the potential for development or does not substantially increase demands on public infrastructure serving existing and proposed tracts, parcels or lots.

4. ***Property Line Adjustment.*** Movement of a property line to correct an encroachment or property line dispute in which the property line is moved to change the dimensions of a tract while maintaining its original shape.The proposed property line adjustment shall be in compliance with

the zoning ordinances and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot shall be created.

5. ***Zoning Certification.***
    a. **Purpose:** The certificate ensures compliance with zoning regulations, preventing potential legal issues or fines. It also provides a formal record of the property's zoning status.
    b. **Application:** Property owners or developers shall submit an online zoning application, which shall include details about the property, proposed use, legal description and any associated plans.
    c. **Review:** Planning & Zoning shall review the application to ensure it complies with local zoning ordinances and regulations.
    d. **Verification:** If the application is approved, a zoning certificate may be issued, confirming that the property meets the required zoning standards and can be used for the intended purpose.
6. ***Administrative Condominium.*** A condominium development that is created, modified, or adjusted through an *administrative review process* rather than through a full public hearing process, if it meets certain qualifying criteria.

E. Requirements for an Administrative Condominium

1. May involve converting an existing building into individually owned condo units without altering exterior footprint or public improvements.

2. Meets all Zoning and Building Codes and comply with minimum standards for floor area, parking, access, fire separation, etc.

3. No new public street dedications, utility mains, or major drainage improvements required.

4. Recorded Documents
    a. Condominium Declaration: Establishes the condominium regime, rights, and obligations.
    b. Bylaws: Governs association, operation, and maintenance of condominiums and common or open space.
    c. Formally establishes an HOA or other directory body for the enforcement of bylaws rights and obligations.
    d. Both must be filed with the county recorder in compliance with state condominium statutes RSMo Chapter 448

F. Definitions

Administrative Subdivision: A review that is handled by staff (planning, zoning, building departments) rather than through a discretionary review by a planning commission or governing body.

Applicant: Owner or authorized agent applying under this Chapter.

Condominium – A form of real property ownership in which units are individually owned, while common areas (hallways, parking, amenities, etc.) are owned jointly by all unit owners through a condominium association, and governed by a recorded declaration and bylaws.

Sketch Plan: A conceptual drawing showing existing and proposed boundaries

G. Administrative Subdivisions

When Required: An administrative subdivision is required when any unplatted tract which contains less than ten (10) acres is created, reconfigured, or joined to another tract.

The Planning Director has the authority to approve Administrative Subdivisions when all of the following requirements are met:

1. Not more than three (3) tracts which contain less than ten (10) acres each shall be created, inclusive of any tract retained by the owner.
2. Each tract must follow the requirements of the zoning district within which it is located at the time of application.
3. Each tract must be lawful under these Regulations at the time the existing property description was recorded.
4. The configuration of the property shall have been created by a court decree or order resulting from testamentary or intestate provisions. Such property configuration must comply with the zoning district regulations within which it is located or have had a variance granted by the Board (of Zoning Adjustment).
5. Minimum lot area for the zoning district, excluding area dedicated for additional right-of-way complying with the current Willard Master Transportation Plan, shall be met.
6. Additional right-of-way required for future road improvements any other required public improvement may be provided without substantially reducing the usable space of any tract being considered.
7. Any proposed tract(s) without direct access to a public road must be served by a private ingress/egress easement at least fifty (50) feet in width.

8. Future development of all adjacent tracts shall not be hampered. Access through the proposed tracts may need to be provided to adjacent tracts impeded by environmental or topographic issues.
9. No tracts shall be created that are impaired by environmental factors, such as sinkholes or floodplain, to the extent that successful development of such tracts becomes questionable.
10. Where proposed tract(s) have access to public services such as sanitary sewer, the Planning Director shall consider whether lots created will be consistent with those in the surrounding vicinity, including existing subdivisions. With the creation of lots adjacent to existing recorded subdivision lots on a common street/road, tract frontage shall meet current zoning requirements
11. The proposed subdivision shall not result in public service requirements nor interfere with the maintenance of existing services.
12. The granting of the Administrative Subdivision shall not conflict with the intent of these Regulations.

H. Application Submission Requirements

1. A completed application form containing notarized signatures of all owners;
2. Copies of land descriptions for each proposed tract and that of any additional right-of-way being surrendered;
3. Warranty deed form for additional right-of-way containing notarized signatures of all owners, applicable only to newly created tracts that are less than ten (10) acres in size and adjacent to one (1) or more public rights-of way;
4. A copy of the most recently recorded deed for all property being reviewed;
5. Land survey of the property proposed for Administrative Subdivision, prepared by a land surveyor who is registered to practice in the state of Missouri, complying with the current Missouri Minimum Standards for Property Boundary Surveys, and including the following:
    i. Monuments at each corner;
    ii. Certificate of Approval signature block for the Planning Director;
    iii. All easements of record;
    iv. Full right-of-way for all adjacent streets;

6. Additional right-of-way required to comply with the road classification(s) as dedicated in the adopted City of Willard Master Transportation Plan;
    i. Right-of way, existing and additional shall be shown as one (1) combined tract.
    ii. The survey shall delineate existing and additional right-of-way.
    iii. Right-of-way shall be shown on the survey as an adjoining tract, and monuments shall be set at all corners of said

right-of-way, including corners on the existing centerline, points of curvature, and points of tangent.

7. The centerline alignment for roads, determined by the land surveyor and subject to review and approval by the City of Willard using the following criteria:
    i. Additional right-of-way required to comply with the road classification(s) as dedicated in the adopted the City of Willard Master Transportation Plan;
    ii. Right-of way, existing and additional shall be shown as one (1) combined tract.
    iii. The survey shall delineate existing and additional right-of-way.
    iv. Right-of-way shall be shown on the survey as an adjoining tract, and monuments shall be set at all corners of said right-of-way, including corners on the existing centerline, points of curvature, and points of tangent.
8. Description complete enough that the described tract of land may be located and identified

I. ***Administrative re-plats.*** *The director of planning and development has the authority to approve an administrative re-plat if it complies with one of the following requirements:*

1. The configuration of the property was created by a court decree or order resulting from testamentary or intestate provisions.
2. All lots in the proposed subdivision are at least 40 acres.
3. The director finds the subdivision of land satisfies all of the following conditions.

    a. The proposed subdivision is part of a previously final platted and recorded subdivision.

    b. The proposed subdivision does not:

        i. Create more than five new lots from each lot created by a previously recorded subdivision; and

        ii. The aggregate total of new lots created does not exceed five tracts, parcels or lots from each lot created by a previously recorded subdivision if any of the area of the proposed subdivision was part of a prior administrative re-plat or lot division

4. The proposed subdivision does not include the dedication of a new street or other public way or change in existing constructed streets or alleys.

5. The right-of-way adjacent to the proposed subdivision meets the widths prescribed by this article and by the city, or the proposed subdivision includes the dedication of additional right-of-way necessary to provide the prescribed right-of-way width.
6. The proposed subdivision includes the dedication of any easements determined necessary by the director of public works or to provide utilities to serve the subdivision.
7. Each lot of the proposed subdivision is already served by the following improvements:

   (i) Public sanitary sewer, and

   (ii) Potable water facilities.

8. Each lot of the proposed subdivision is either:
   a. Already served by stormwater conveyance and/or detention facilities, whether public or private; or
   b. Construction of private stormwater conveyance and/or detention facilities is proposed to be deferred to time of development in compliance with the following conditions:
      i. plat note is included on the administrative re-plat requiring the construction of the private stormwater conveyance and/or detention facilities prior to issuance of a building permit;
      ii. The subdivider submits preliminary design plans with the application for the administrative re-plat sufficient to show that the proposed private stormwater conveyance and/or detention facilities can be engineered to function as proposed; and
      iii. The director of public works approves the concept set forth in the preliminary design.

9. Each lot of the proposed subdivision has sidewalks meeting current city standards, or security for the construction of sidewalks is provided as set forth in this section.
10. The proposed subdivision is in compliance with all other provisions of this article, the zoning ordinance and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot will be created.
11. The proposed subdivision will not result in substantial impact on public infrastructure nor interfere with the maintenance of existing service levels, e.g. additional curb cuts, repaving, etc.

12. The proposed subdivision is consistent with the surrounding area in terms of the size and dimension of lots previously developed, the layout and design of existing subdivisions and the degree of deviation from previous development.

J. ***Lot combinations.*** The director of planning and development has the authority to approve lot combinations in which the configuration of the property is created by the assembly or combination of existing tracts of record under the following circumstances.

1. ***Court decree.*** The configuration of the property was created by a court decree or other resulting from testamentary or intestate provisions; or
2. ***Lot combination—No substantial impact.*** A lot combination upon a finding by the director that the proposed lot combination does not substantially increase the potential for development or does not substantially increase demands on public infrastructure serving existing and proposed tracts, parcels or lots, and the following conditions are satisfied:
    a. The proposed lot combination is in compliance with all other provisions of this article, the zoning ordinance and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot will be create;, and
    b. The proposed lot combination will not create any tract, parcel or lot which does not meet the minimum lot standards of the zoning district in which it is located; and
    c. The proposed lot combination shall not cause any construction over a public sanitary sewer line or sewer easement; and
    d. The proposed lot combination is consistent with the surrounding area. In determining consistency, the size and dimensions of lots previously developed, the layout and design of existing subdivisions and the degree of deviation from previous development shall be considered.

3. ***Lot combination—Substantial impact.*** A lot combination upon a finding by the director that the proposed lot combination substantially increases the potential for development or substantially increases demands on public infrastructure serving existing and proposed tracts, parcels or lots, and the following conditions are satisfied:
    a. The proposed lot combination is in compliance with all other provisions of this article, the zoning ordinance and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot will be created; and

b. The proposed lot combination will not create any tract, parcel or lot which does not meet the minimum lot standards of the zoning district in which it is located; and
c. The proposed lot combination shall not cause any construction over a public sanitary sewer line or sewer easement; and
d. The proposed lot combination is consistent with the surrounding area. In determining consistency, the size and dimensions of lots previously developed, the layout and design of existing subdivisions and the degree of deviation from previous development shall be considered; and
e. The proposed lot combination does not include the dedication of a new street or other public way or change in existing streets or alleys; and
f. The right-of-way adjacent to the proposed lot combination meets the widths prescribed by this article and by the city, or the proposed subdivision includes the dedication of additional right-of-way necessary to provide the prescribed right-of-way width; and
g. The proposed lot combination includes the dedication of any easements determined necessary by the director of public works or to provide utilities to serve the new lots; and
h. Each lot of the proposed lot combination subdivision is adequately served by individually metered utilities

K. ***Property Line Adjustment.*** Movement of a property line to correct an encroachment or property line dispute in which the property line is moved to change the dimensions of a tract while maintaining its original shape.

1. The proposed lot combination is in compliance with all other provisions of this article, the zoning ordinance and other ordinances and regulations of the City of Willard and no substandard tract, parcel or lot will be create;, and
2. The proposed lot combination will not create any tract, parcel or lot which does not meet the minimum lot standards of the zoning district in which it is located; and
3. The proposed lot combination shall not cause any construction over a public sanitary sewer line or sewer easement; and
4. The proposed lot combination is consistent with the surrounding area. In determining consistency, the size and dimensions of lots previously developed, the layout and design of existing subdivisions and the degree of deviation from previous development shall be considered.

L. **Administrative Condominium**

1. Define the scope of revision of an existing building into individually owned condo units without altering exterior footprint or public improvements.
2. Detail that the project meets all Zoning and Building Codes and complies with minimum standards for floor area, parking, access, fire separation, etc.
3. Note all easements, utilities, streets common areas, and drainage facilities.
4. All sewer installations shall comply with the city of Willard specifications for installation and use.
5. Compliance with floodplain and environmental regulations.
6. No additional nonconformities created.
7. Provide documentation for the following:
    a. Condominium Declaration: Establishes the condominium regime, rights, and obligations.
    b. Bylaws: Governs association, operation, and maintenance of condominiums and common or open space.
    c. Formally establishes an HOA or other directory body for the enforcement of by-laws rights and obligations.
    d. Both must be filed with the county recorder in compliance with state condominium statutes RSMo Chapter 448

M. Public Notification

Not required for administrative subdivisions unless a variance or waiver is involved.

N. Review, Conditions, Surety

Review Procedures

1. Staff circulates the Final Plat to relevant departments (Public Works, Utilities, Fire, Environmental Health, etc.) within jurisdiction.

2. Comments must be addressed prior to plat approval.

3. Approval may be granted with conditions; applicants must meet conditions before recording or provide surety.

O. Surety

Where improvements are incomplete, the applicant must post surety in an amount equal to 150% of cost estimate (performance bond, escrow, letter of credit) consistent with the jurisdiction's standard practices.

P. Effect of Approval

Recorded plats establish legal lots for transfer or development; unrecorded or improperly recorded plats are void, and no building permits will be issued for those parcels.

Q. Appeals and Variances

Appeals

1. **Willard**: Appeal must be filed with the Willard Board of Adjustments within 30 days of staff decision.

R. Transition and Effective Date

Transition

Applications existing at the time of this Chapter's adoption may continue under previous rules unless the applicant opts into the current process.

Severability

If any part of this Chapter is invalid, the remainder stays in full force.

First Reading: **Second Reading:**

Bill No: **Ordinance No:**

SECTION 400.165 AN ORDINANCE ADOPTING A CODE OF ETHICS FOR THE PLANNING COMMISSION FOR THE CITY OF WILLARD MISSOURI

WHEREAS, the Planning Commission is entrusted with duties and responsibilities that affect the public interest and the welfare of the community; and

WHEREAS, it is essential that members conduct themselves in a manner that promotes public trust, transparency, fairness, and integrity; and

WHEREAS, the Commission members are expected to be prepared, informed and avoid misrepresentation, and

WHEREAS, the establishment of a formal Code of Ethics provides clear guidance for ethical conduct and accountability in the performance of official duties;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF ALDERMEN OF THE CITY OF WILLARD MISSOURI

Section 400.165

1. **Adoption of Code of Ethics.**
   The Code of Ethics, attached hereto and incorporated by reference, is hereby adopted to govern the conduct of members of the Planning Commission.

2. **Purpose and Principles.**
   The Code of Ethics is established to affirm the commitment of members to the highest standards of ethical conduct in the performance of their public duties. Members shall serve the public interest above all private interests and shall exercise independent, impartial, and honest judgment in all matters before them.

3. **Standards of Conduct.**
   Members shall act with fairness, professionalism, and integrity; shall be prepared and informed; and shall avoid misrepresentation in any form. Conflicts of interest, including personal or financial gain, gifts, or favors, shall be avoided, disclosed when applicable, and shall require recusal from related discussions or decisions.
   a. In regards to conduct and ethics the committee would support refresher training as defined by the cities legal council.

4. **Confidentiality.**
   Members shall not use non-public or confidential information obtained through their official position for personal benefit and shall respect the confidentiality of information entrusted to them.

5. **Transparency and Public Participation.**
   Members shall conduct meetings openly, promote transparency, and encourage meaningful public participation in accordance with applicable laws and regulations.

6. **Attendance and Participation.** Members are expected to attend and be prepared to participate in meetings.
   a. No-show for 3 consecutive meetings or
   b. an attendance of less than 75% of meetings within a calendar year

   **Inability to meet attendance and participation requirements may result in loss of position on the Commission as recommended by the Chair and Mayor

Effective Date.
This Ordinance shall take effect immediately upon adoption.

ADOPTED this ___ day of _____, 2026,

Approved as to Form:_____

Holly Dodge, City Attorney

Approved By: _____

Troy Smith, Mayor

Attested By: _____

Courtney Myers, City Clerk

CITY OF WILLARD, MO

ACTIVE TRANSPORTATION DESIGN REFERENCE GUIDE

2026



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DESIGN GUIDELINES OVERVIEW



Active transportation infrastructure can take various forms, including bicycle lanes, shared-use paths, sidewalks, trails, and greenways. The core objective of this guidance is to offer the City of Willard residents a transportation network that is safe, well-connected, accessible, comfortable, and convenient. To achieve this, the guidance emphasizes the importance of implementing quality designs that work in harmony with other plans, policies, and standards set by the City of Willard. This guidance document focuses on three specific types of facilities. They are shared-use facilities and separated bicycle and pedestrian facilities. This document acknowledges that each active transportation project may have unique aspects, necessitating design adjustments or deviations from the standard guidelines. Therefore, it advocates for the application of context-sensitive solutions and professional engineering judgment in such cases. This design guidance establishes high expectations for the design and construction of active transportation infrastructure. These guidelines represent a compilation of recommendations from various state and national resources and are not intended to be a replacement for these documents. This document is a “quick reference guide” which is not intended to be an exhaustive list of all design considerations and details, and guidance shall not be considered a legal standard. Designers and the city should always consult the manuals and guidance outlined in the publications listed herein when finalizing and applying designs for any project.



Willard currently uses the Ozark Transportation Organization (OTO) design standards for their street design. Some of these design standards accommodate sidewalks and bike lanes, but there are no standards for shared-use paths, sidepaths, or bicycle boulevards. Guidance for these facilities in Willard is provided in this document along with additional guidance for sidewalks. These standard recommendations are found on pages 12-13, 37-38, and 54.

The design guidance summations included in these guidelines are included in color-coded boxes. These summations do not constitute the full guidance of any particularly-referenced publication. For more guidance, we recommend obtaining the full volumes of the reference for use in your planning process. [1]

These design guidelines were developed using research and guidance provided by multiple state and national sources including, but not limited to, the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the National Association of City Transportation Officials (NACTO). The collective work and publications developed by these respected entities are cited throughout the design guidelines. The publications cited in this document may vary in their recommendations regarding minimum design standards.

The following publications have been utilized in the development of these guidelines:

- AASHTO-Guide for the Development of Bicycle Facilities (2024)
- AASHTO-Guide for the Planning, Design, and Operations of Pedestrian Facilities (2021)
- FHWA-Small Town and Rural Multimodal Networks (2016)
- FHWA-Bikeway Selection Guide (2019)
- FHWA-Traffic Calming ePrimer
- FHWA-Separated Bike Lane Planning and Design Guide (2015)
- Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)- 11th edition (2023)
- Minnesota Department of Transportation-Bicycle Facility Design Manual (2020)
- NACTO-Urban Bikeway Design Guide (2025)
- NACTO-Urban Street Design Guide (2013)

[1] Publications cited in this document may be referenced or purchased at the following sites:

American Association of State Highway and Transportation Officials (AASHTO). "Guide for the Development of Bicycle Facilities." (2024): https://aashtojournal.transportation.org/aashto-releases-5th-edition-of-comprehensive-bicycle-guide/.

American Association of State Highway and Transportation Officials (AASHTO). "Guide for the Planning, Design, and Operations of Pedestrian Facilities, 2nd ed." (2021): https://store.transportation.org/Item/PublicationDetail?ID=4651.

Federal Highway Administration (FHWA). "Bikeway Selection Guide." (2019): https://highways.dot.gov/safety/pedestrian-bicyclist/bikeway-selection-guide.

Federal Highway Administration (FHWA). "Manual on Uniform Traffic Control Devices for Streets and Highway (MUTCHD) 11th Edition." (2023): https://mutcd.fhwa.dot.gov/kno_11th_Edition.htm.

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DESIGNING FOR VULNERABLE ROAD USERS



Section 11122(a)(2) states the definition of vulnerable road user is provided in 23 U.S. Code (U.S.C.) 148(a)(15), as follows:

"A nonmotorist-
a. with a fatality analysis reporting system [FARS] person attribute code that is included in the definition of the term "number of non-motorized fatalities" in section 490.205 of title 23, Code of Federal Regulations (or successor regulations); or

b. described in the term "number of non-motorized serious injuries" in that section.

This definition includes people walking, bicycling, using mobility aids (such as wheelchairs), or using most micromobility devices (whether motorized or not), but does not include motorcyclists. Throughout this plan, the phrase "people walking, biking, or rolling" is used to generally refer to vulnerable road users."

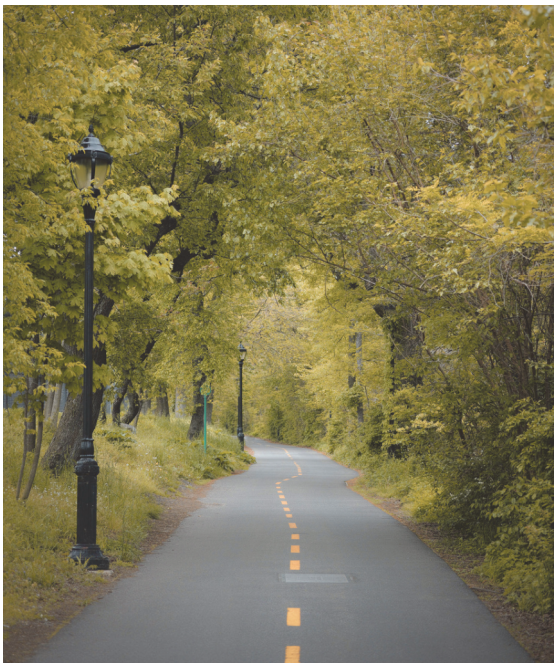
SHARED-USE FACILITIES

Shared-use facilities allow for and accommodate different types of users and are focused on creating safe and comfortable connections for bicycle riders, pedestrians, and people using mobility devices such as wheelchairs and electric mobility scooters. The design guidelines focus on the following types of shared-use facilities:



1 Shared-Use Paved Paths

Shared-use paved paths are pathways dedicated to pedestrians and bicycle riders, separated from motor vehicles and roadways, and often found in parklands accommodating both pedestrians and cyclists.



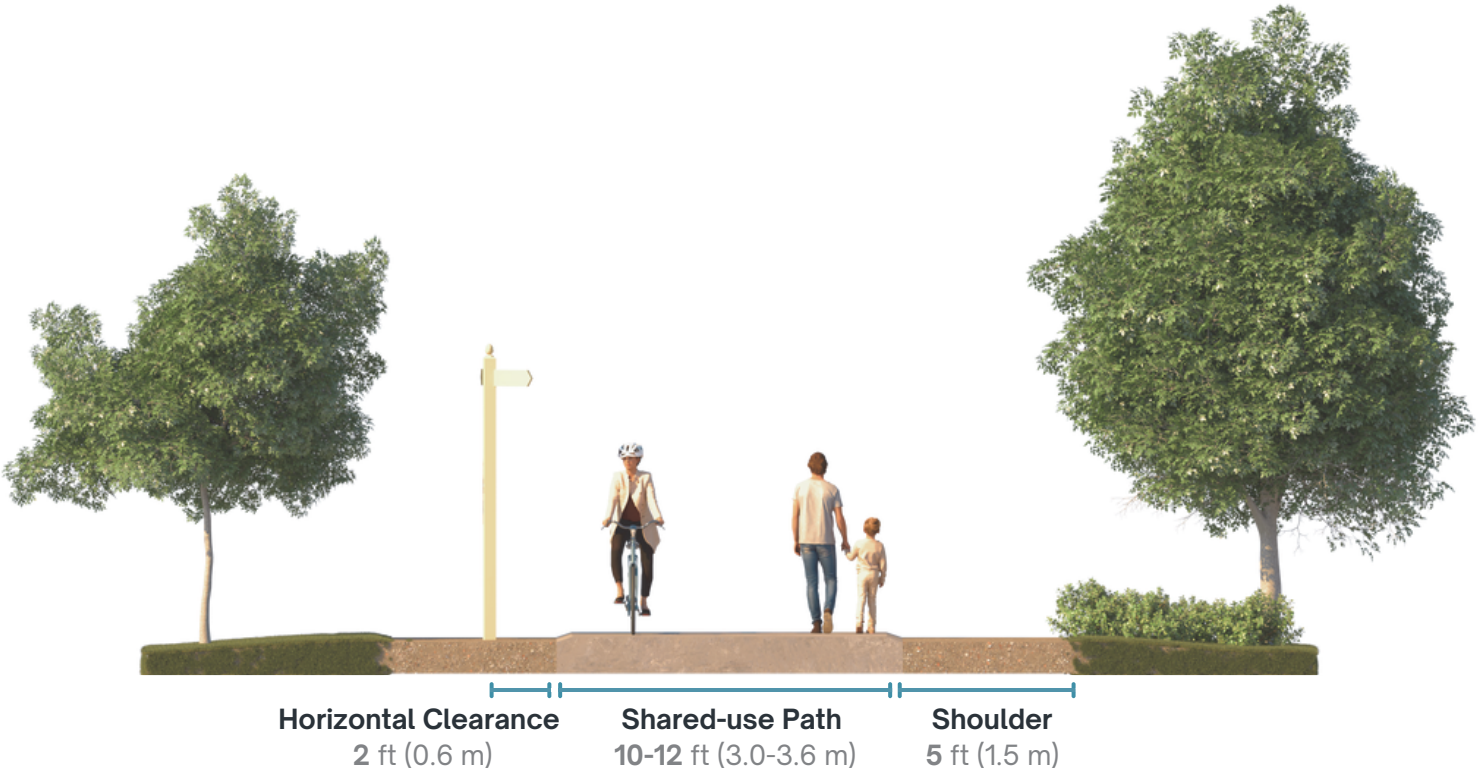
2 Sidepaths

Sidepaths are shared-use paved paths running parallel to a road, separated from motor vehicles by a barrier or buffer, and are for use by pedestrians and cyclists.

See pages 63-73 for design guidance for elements of pathway design and pages 75-79 for intersection and crossing design guidance specifically for pathways.

1 Shared-use Paved Paths

Shared-use paved paths can provide a travel network for non-motorized users to get to different places and make connections not along roadways. In addition to connecting different destinations, off-road shared-use paved paths can provide access to natural areas or for recreation.

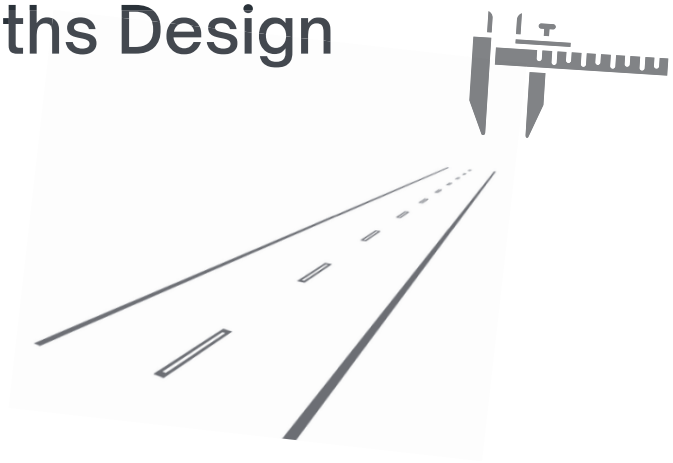


Typical Applications

- In natural areas and parks
- Shortcuts between cities or neighborhoods
- For recreation and transportation
- Surfaces can be concrete, asphalt, or other hard surfaces

Shared-Use Paved Paths Design

greenways/trails/paths



DESIGN GUIDANCE

AASHTO

GBF 6

Facility Widths

- A 10 ft wide path is the general minimum path width for two-directional shared use paths (6.4.3)
- An 11 ft width is the recommended minimum width to safely allow users to travel side-by-side (to allow for socializing when walking) and provide space for traffic traveling the opposite direction (6.4.3).
- FHWA provides the *Shared Use Path Level of Service Calculator* (SUP LOS), which can be used when determining appropriate widths (6.4.2).
- Paths less than the recommended width (8 ft minimum) should only be considered for low-traffic situations or short lengths where required because of physical constraints (6.4.3).
- Wider paths (over 12 ft) are useful:
  - to accommodate maintenance vehicles
  - on steep grades to allow for comfortable passing
  - through curves to provide more operating space
  - in heavy use situations with high concentrations of different user types
  - on regionally significant corridors (6.4.3).

Other Recommendations

- A 5 ft shoulder (2 ft minimum for short distances) should be maintained on each side of the path and kept clear of obstructions. Signs and vertical elements should be at least 2' from the path (6.6.1).

NACTO

UBDG 3.4

- Recommended width is between 11 ft (8 ft minimum) for low bicycle volume and 20 ft (15 ft minimum) for high bicycle volume. Minimum widths should only be used intermittently in constrained conditions along the path.
- The area alongside the path should be flush with the path and a lateral clearance of 2 ft (1 ft minimum when constrained) should be provided that is clear of obstructions.
- Separation of users improves safety and comfort when there is a high volume of pedestrians or bicycles and/or when the path is a main transportation corridor for bicycles.
- Highlight path crossings and prioritize the safe travel of path user over motorists.
- Striping (centerline and edge) and symbols on the pathway are optional
- Lighting is needed on all paths.

MUTCD

9E.13

- A solid center line may be used to separate two directions of travel where passing to the left of the line is not permitted

2 Sidepaths

Shared-use paved paths along roadways are often referred to as sidepaths. They are used by non-motorized users (bicyclists, pedestrians, joggers, wheelchairs, etc.) and provide a physically separated travel area from motorized traffic. The increased separation between motorized and non-motorized traffic provides a more comfortable experience for a wider variety of users. In areas of high speed and high traffic volume, increasing the space between the roadway and the sidepath is recommended to maintain a high comfort level for users. Crosswalk enhancements are also recommended with increased speed and traffic volume.

Another consideration in using sidepaths is reducing the risk of collisions, especially at intersections and driveways. This can be done by reducing the number of driveways, encouraging low-speed approaches at crossings, maintaining visibility to all users, and designing to increase awareness of all users. These designs may include elements like small roadway turning radii, using crosswalk markings through the pathway's crossing, raised crossings, and stop or yield markings on the roadway to discourage encroachment.



Shoulder
5 ft (1.5 m)

Sidepath
10-12 ft (3.0-3.6 m)

Roadway Separation
6 ft (1.83 m)

Typical Applications

- Total traffic lanes - 3 or more
- Along high-volume or high-speed roadways where increased separation is desired
- Where there is room in the right-of-way to accommodate
- Where volumes of pedestrians and bicyclists are relatively low
- Fill gaps in the network between other low-stress routes

Sidepath Design



DESIGN GUIDANCE

AASHTO

GBF 6 & 7

Facility Widths

- A 10 ft wide path is the general minimum path width for two-directional shared use paths (6.4.3)
- An 11 ft width is the recommended minimum width to safely allow users to travel side-by-side (to allow for socializing when walking) and provide space for traffic traveling the opposite direction (6.4.3).
- FHWA provides the *Shared Use Path Level of Service Calculator* (SUP LOS), which can be used when determining appropriate widths (6.4.2).
- Paths less than the recommended width (8 ft minimum) should only be considered for low-traffic situations or short lengths where required because of physical constraints (6.4.3).
- Wider paths (over 12 ft) are useful:
  - to accommodate maintenance vehicles
  - on steep grades to allow for comfortable passing
  - through curves to provide more operating space
  - in heavy use situations with high concentrations of different user types
  - on regionally significant corridors (6.4.3).

Other Recommendations

- A 5 ft shoulder (2 ft minimum for short distances) should be maintained on each side of the path and kept clear of obstructions. Signs and vertical elements should be at least 2' from the path (6.6.1).
- Pedestrians and bicyclists may be separated to improve comfort and safety (6.4.4)
- The recommended width of the street buffer is at least 6 ft measured from the white edge line or curb when no edge line is provided to the side path. Wider buffers are recommended when speeds are 35 mph or more or when approaching intersections or driveways. Vertical elements can be considered when the desired street buffer width is not available (7.4.1)

NACTO

UBDG 3.4

- Recommended width is between 11 ft (8 ft minimum) for low bicycle volume and 20 ft (15 ft minimum) for high bicycle volume. Minimum widths should only be used intermittently in constrained conditions along the path.
- The area alongside the path should be flush with the path and a lateral clearance of 2 ft (1 ft minimum when constrained) should be provided that is clear of obstructions.
- Separation of users improves safety and comfort when there is a high volume of pedestrians or bicycles and/or when the path is a main transportation corridor for bicycles.
- Highlight path crossings and prioritize the safe travel of path user over motorists.
- Striping (centerline and edge) and symbols on the pathway are optional
- Lighting is needed on all paths.

MUTCD

9E.13

- A solid center line may be used to separate two directions of travel where passing to the left of the line is not permitted

Laneshift Design Note:

When in public right-of-way and functioning as a sidewalk, sidepaths should be designed in accordance with PROWAG. Although the maximum slope of a shared-use path should be 5%, the grade should also generally match the grade of the adjacent roadway. When the roadway grade exceeds 5%, the shared-use path may match or be less than the roadway grade.

Shared-Use Facilities

Recommendations for Willard

1 Shared-Use Paved Paths

Shared-use paved paths can be located along roadways or in properties that are not adjacent to a street. These standards are for paved paths that are not adjacent to a roadway, but may cross roadways as needed.

Feature	Standard	Considerations
Width	12 feet Minimum	-
Location	In locations that are not inside the street right of way	-
Crossings	Evaluate safety and comfort at crossings (mid-block and intersections)	Some measures include: • RRFB or HAWK • Curb extensions • Raised crosswalks • Pedestrian refuge islands

2 Sidepaths

The current Ozark Transportation Organization (OTO) design standards do not include sidepaths in their current roadway designs. Many of the roadways include sidewalks, which can be modified to provide a sidepath by widening at least one of the sidewalks to 12 feet wide instead of the recommended OTO design standard sidewalk width. Additional right of way may be required on streets where sidepaths are planned to allow for the additional width that sidepaths (12 feet) have compared to sidewalks (6 feet).

Feature	Standard	Considerations
Width of Sidepath	12 feet Minimum	Additional ROW may be required to accommodate a 12' sidepath instead of a standard sidewalk.
Buffer width between roadway and sidepath	6 feet Minimum	The current OTO standard already provides a vegetative buffer between the roadway and the sidewalk, but doesn't specify the width. Additional width should be considered on high-speed roadways (over 35 MPH).
Location	Minimum of one side of the street	A sidepath should be on at least one side of the street. The Active Transportation Network Plan can be referenced to determine which side of the street has been recommended for sidepaths.
Crossings	Evaluate safety and comfort at crossings (mid-block and intersections)	Some measures include: • RRFB or HAWK • Curb extensions • Raised crosswalks • Pedestrian refuge islands

BICYCLE FACILITIES

Well-designed bicycle facilities not only encourage more cycling but also help individuals operate their bikes legally and predictably. This design guidance focuses on the following bicycle facilities, as outlined below:

1 Physically Separated Facilities

Separated Bike Lanes:
Separated bike lanes have horizontal and vertical separation from motor vehicles, distinct from pedestrian areas, enabling one-way or two-way travel.

2 Visually Separated Facilities

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

Buffered Bike Lanes:
Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

Paved Shoulders:
Paved shoulders refer to extra pavement wide enough for bicycle use, located outside the travel lane and separated from motor vehicles by the roadway's edge line.

3 Mixed Traffic Facilities

Shared roadways are present in various settings, allowing cyclists to ride legally, including local neighborhood streets, urban streets, and suburban and rural highways. These roadways offer cyclists minimal to no physical separation from motor vehicles and are best suited for low-volume, low-speed roads. Shared roadways form the basis for many bicycle boulevards, but function as designated bicycle facilities only when properly designed.

Bicycle Boulevards:
Bicycle boulevards are streets with low motorized traffic volumes and speeds, designated and designed to prioritize bicycle travel. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.

See pages 63-73 for design guidance for elements of bike lane design and pages 80-85 for intersection and crossing design guidance specifically for bike lanes.

1 Physically Separated Facilities

Separated Bike Lane

A separated bike lane (SBL) is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. SBLs have different forms, but all share common elements—they provide space that is intended to be exclusively or primarily used for bicycles and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where on-street parking is allowed, SBLs are located on the curbside of the parking (in contrast to bike lanes). SBLs may be one-way or two-way and may be at the street, sidewalk, or intermediate level. NACTO refers to separated bike lanes as protected bike lanes.

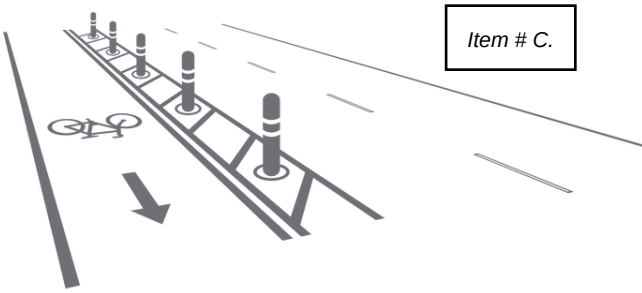
At sidewalk level, a curb or median separates them from motor traffic, while a buffer and/or different pavement colors/textures separate the SBL track from the sidewalk. If at street level, they can be separated from motor traffic by raised medians, on-street parking, or bollards. By separating people on bikes from motor traffic, SBL can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public.



Typical Applications

The separated bike lane zone offers a clear operating area for bicyclists. Because of the physical separation between the bike lane and the adjacent travel lanes, the design may be more sensitive to debris accumulation, maintenance access, and operating space impacts than conventional on-street bike lanes.

Separated or Protected Bike Lane Design



DESIGN GUIDANCE

AASHTO

GBF 7

Facility Widths

- The type of curb adjacent to the bike lane may require an additional shy distance, or small buffer of space, when considering lane widths (7.3.3 & 7.3.4).
- Bike lanes should be wide enough to accommodate anticipated bicycle volumes (7.3.4).
- The preferred minimum width of a one-way separated bike lane is 7.5 ft. This width allows for side-by-side riding or passing (7.3.4).
- The absolute minimum bike lane width is 5.5 ft without considering shy distance. At this width, bicyclists will not be able to pass slower users until there is a break in the facility and an opportunity to overtake (7.3.4).
- Two-way separated bike lanes should have a preferred minimum combined width of at least 11 ft, not including shy distances, to accommodate occasional passing (7.3.4). Given this total width, clear signs and markings should be provided so that the separated bike lane is not mistaken for an additional motor vehicle travel lane (7.9.6).

Additional Recommendations

- Determining on-way versus two-way operation requires analysis factors such as safety, connectivity, ease of access, available right-or-way, public feedback, curbside uses, intersection operations, feasibility, and other factors (7.2.3).
- Changes in bike lane elevation and horizontal alignment should be smooth and infrequent (7.2)
- The recommended width of a street buffer for separated bike lanes is at least 6 ft measured from the white edge line (7.4.1)
- Wider buffers are recommended on multilane roads with speeds greater than or equal to 35 mph and when approaching features such as transit or accessible on-street parking (7.4.1)
- A buffer of 4 ft minimum eliminates door zone conflicts. The buffer can be reduced to 2 ft but it will result in an overlap of door zone and bike lane (7.4.1)
- Smaller buffers can be used when vertical elements provide separation (7.4.1).
- Buffers are not needed in constrained conditions of streets with speeds 30 mph or less and flexible delineator posts on the white edge line (7.4.1)

NACTO

UBDG 3.3

Facility Widths

- Design for future volumes as the protection on this facility attract more users.
- Rideable width is the useable width of the bikeway. It doesn't include unrideable areas, gutter pans, and shy distances. It may extend into parts of the buffer that are rideable.
- Preferred rideable width of one-way protected bike lane is 8 to 12.5 ft (minimum is 6.5 to 7 ft).
- Preferred minimum rideable width of two-way protected bike lane is 13 ft (absolute min. of 8 ft).
- Consider maintenance vehicle access in determining width of the facility

Additional Recommendations

- Only recommended on street facility for All Ages & Abilities for streets with:
  - speeds of 25 mph or more
  - multiple travel lanes in each direction
  - vehicle volumes over 6,000 vehicles per day
- Include visibility zones approaching driveways and intersections and consider geometric changes to slow vehicular turns across protected bike lanes
- Bike lane symbols or work markings should be at the beginning of a bike lane, after major driveways, at intersections, and at least every 500 ft.
- Green surface treatment can be used to increase the conspicuity of bike lanes and crossings.
- Bike lane signs may be used at the start of a bike lane and can be used to supplement pavement markings along the bike lane.
- Avoid merging or mixing bike lanes and vehicular traffic at intersections.
- Two-way protected bike lanes require specific attention at intersections.
- Yellow dotted centerlines should be used along two-way bike lanes.
- Consider a modified two-way sign at T-intersections or major driveways to alert drivers to look both directions for bicycle traffic.

MUTCD

9E.07

- Buffer space shall be marked with solid longitudinal lines.
- BIKE LANE (R3-17) signs should be used to distinguish the bicycle lane

Laneshift Design Note:
A clear-through area of 10 ft (3.0 m) is beneficial for allowing snow plows and street sweepers to access the area.



1 Pedestrian Separation/Sidewalk Buffer:

Separation from pedestrians is particularly important when a separated bike lane is located immediately adjacent and is at the same level as a sidewalk.

- Design and construct separated bike lanes that are clearly distinct from the sidewalk. This is accomplished using a curb, separation buffer space (often landscaped), different pavement or other surface treatments, or detectable tactile guidance strips (AASHTO GBF 7.5). NACTO recommends the sidewalk buffer be a 2 ft area clearly not meant for pedestrians, and if that isn't available using tactile warning delineators along the sidewalk

2 Roadway Separation/Street Buffer:

The roadway separation is the vertical element between the bike lane and the adjacent roadway. The width of the separation will vary depending on the separation type. Street buffer guidance can be found in section 7.4 of AASHTO GBF and section 3.3.2 of NACTO UBDG.

- AASHTO recommends a street buffer of 6 ft wide to allow space for typical street design elements but also outlines instances that it can be wider or narrower (AASHTO GBF Section 7.4).
- A separation width of 3 ft (0.9 m) allows for various separation methods and provides space adjacent to a parking lane to accommodate door swing and passenger unloading.
- Constrained raised bike lanes can use a 1-2 ft street buffer with a 5-6 ft bike lane (NACTO UBDG 3.3).
- A minimum width roadway separation of 1 ft (0.3 m) may be possible with a mountable or vertical curb face.

Types of Roadway Separation for Separated Bike Lanes

Vertical elements are needed in the street buffer zone. They can be continuous (including poured medians or vehicle parking) intermittent (including flexible delineator posts, rigid bollards, parking stops, or planters) and provide a separation between bicycle and vehicular traffic. Buffer zones can also contain a mix of different separation types, such as flexible delineator posts in between parking stops.

Most retrofit projects use intermittent vertical elements, which can be designed to work with the existing drainage pattern of the roadway.

The type of vertical barrier used can also provide a visual cue to drivers that the roadway has a different character where they should drive more cautiously and at slower speeds.

NACTO recommends that more robust separation should be used where vehicles are more likely to enter the bike lanes, such as at intersections or on retail corridors.



Option 1: Flexible Delineator Posts/Rigid Bollards

AASHTO (GBF 7.4.2.4):

- Meet MUTCD requirements and specifications
- Require closer spacing
- For high-speed environments.

NACTO (UBDG 3.3):

- Buffer typically 2 ft wide, but minimum of 3 ft when speeds are over 25 mph.
- Space 10 to 40 ft apart, but space closer where high curbside demand or at intersections.



Option 2: Parking Stops

AASHTO (GBF 7.4.2.5):

- May need to be supplemented with flexible delineator posts to increase visibility.
- Require pavement markings to delineate the buffer zone.
- May not be appropriate for speeds over 35 mph.
- Should be secured to roadway.

NACTO (UBDG 3.3):

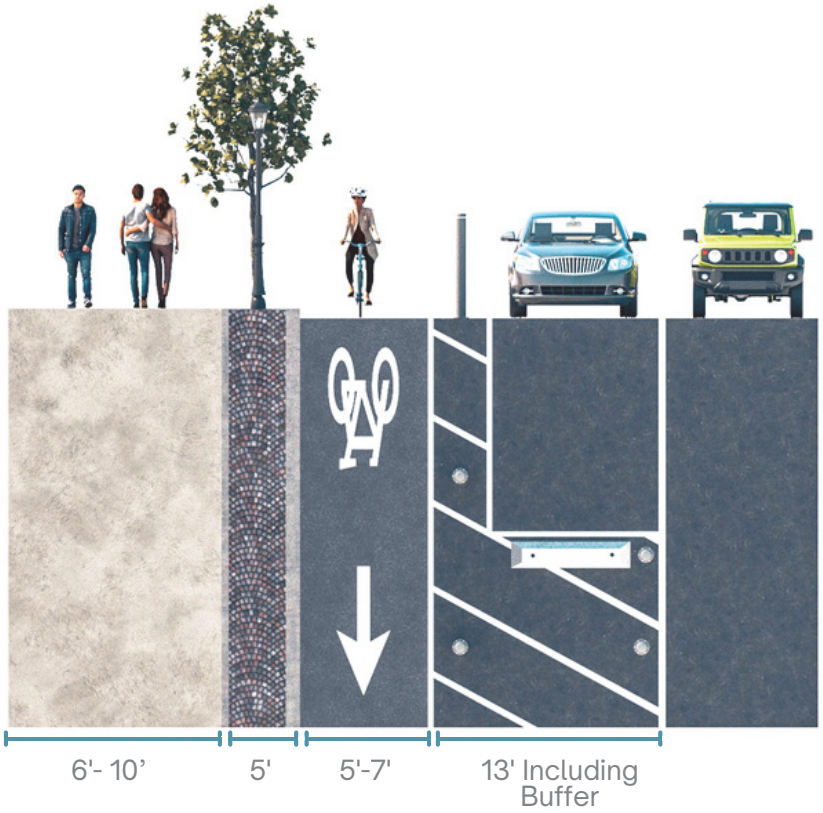
- Buffer typically 2 to 3 ft wide, but minimum of 3 ft when speeds are over 25 mph.
- Spacing is typically 5 to 20 ft apart.



Option 3: Planters

AASHTO (GBF 7.4.2.6):

- Require pavement markings to delineate the buffer zone.
- Should not obstruct sight-lines.
- Can effectively reduce motorist operating speeds.



Option 4: On-Street Parking

AASHTO (GBF 7.4.2.3):

- Require pavement markings to delineate the buffer zone.
- Additional vertical element should be used where parking demand is low.
- Door zone of 4 ft (2 ft minimum) should be provided.

NACTO (UBDG 3.3):

- Buffer width should be a minimum of 3 ft to accommodate the full swing of a vehicle door.
- Vertical elements can be installed 0.5 to 1 ft from the parking line.
- Parking lanes may be reduced to 7 ft wide to allow more space for the bikeway.



Option 5: Poured/Constructed Median

NACTO (UBDG 3.3):

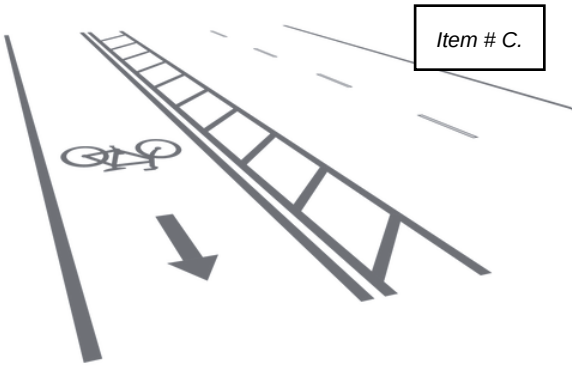
- Buffer width should be a minimum of 3 to 4 ft.
- Vertical elements or object markers should be used incorporated into the median at intersections to improve visibility.
- Need to consider drainage in the design to reduce water in the bikeway.

2 Visually Separated Facilities

Unlike physically separated facilities, visually separated facilities have no physical barrier between adjacent vehicle travel lanes and bike lanes. The paint is the delineator between bike lanes and vehicle travel lanes for visually separated facilities.

These facilities should be kept clear of debris and obstructions and should be a smooth rideable surface. Also, considerations regarding intersections, loading zones, on-street parking, and transit stops apply to these facilities as with physically separated bicycle facilities.





Buffered Bike Lane Design

Buffered bike lanes are conventional bike lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle lane and/or parking lane. As per MUTCD chapter 9, buffered bike lanes are required to have the bicycle lane symbol or word and/or chevron and arrow. This defines the lane to be used solely for bicyclists. A buffer is not required between the bike lane and parking, and a solid line may be used to separate them. However, if there is additional road width, a buffer between the parking and bike lane may be considered to reduce door zone conflicts or to narrow vehicle travel lanes to encourage slower vehicle speeds. The lane markings should be dashed in areas where traffic is meant to cross the bicycle lane.

Buffered Bike Lane
without Parking

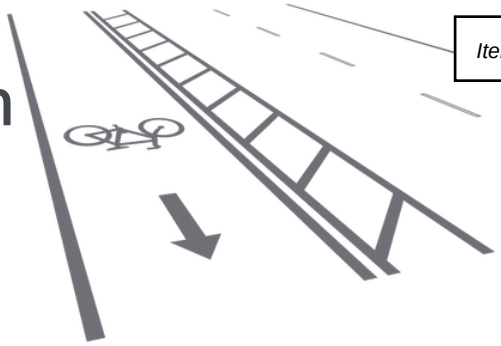


Typical Buffer Width: 3'

NACTO Buffer Minimum: 18"

MUTCD Recommendation:
If the buffer space is less than 2', NO chevron or diagonal striping may be applied. If the buffer space is 2'-3', chevron or diagonal marking SHOULD be used. If the buffer is greater than 3', then chevron or diagonal marking MUST be applied.

Buffered Bike Lane Design



DESIGN GUIDANCE

AASHTO

GBF 9

Facility Widths

- Gutters may be included in the bike lane width when the cross slope is less than 2%, they aren't narrow, they are smooth and rideable, and they don't present a crash hazard (9.4.1.2).
- Bike lane widths are measured by (9.4.1.2):
  - face of curb or edge of pavement to the center of the bike lane line.
- center of parking lane line to center of bike lane line.
- When bicycle lane widths are more than 7 ft it may look like a travel lane to motorists, so separated bike lanes or buffered bike lanes should be considered (9.4.1.3).
- Bike lane widths vary between 4 ft and 11 ft but depend on many factors. A minimum of 6.5 ft is needed for occasional passing and 8 ft or more is needed for side-by-side riding (9.4.1.3).
- Wider bike lanes and/or buffer lanes are beneficial when there are (9.4.1.3 & 9.5):
  - high traffic volumes and/or speeds
  - over 5 percent heavy vehicles
  - bike lanes adjacent to railings or barriers (require additional shy space)
  - speeds over 30 mph or 6,000 vehicles per day
  - high parking turnover

Additional Recommendations

- State laws and local ordinances vary on what motorist activity is allowed in bike lanes (9.4).
- Bike lanes are not designed to allow bicycle users to leave and enter them as needed (9.4).
- Require cleaning to keep clear of debris and should be a smooth rideable surface (9.4.1).
- Door zones for bike lanes next to bike lanes are important considerations (9.6).
- May be beneficial to use separated bike lanes at transit stops (9.7).
- Bicycle routes through intersections or driveways should be continuous and legible to all users (9.12).
- See section 9.12 for additional intersection design guidance.
- Buffers are desirable on streets with a posted speed >30 mph and >6,000 vehicles per day (9.5).

NACTO

UBDG 3.2

Facility Widths

- Preferred width is 6 to 7 ft to accommodate passing and riding side by side (4 ft minimum width).
- Bike lanes wider than 7 ft should have at least a 2 ft buffer and a protected bike lane should be considered to prevent use of the bike lane for parking or vehicular travel.
- Lanes narrower than 6 ft may not accommodate cargo bikes or larger devices.
- Two-way bike lanes should be 13 ft wide (9 ft minimum for short segments).

Additional Recommendations

- One way buffered bike lanes can be used on roadways with the following conditions:
  - vehicle speeds of less than or equal to 25 mph
  - single lane in each direction
  - less than or equal to 12,000 vehicles per day (for All Ages & Abilities: less than or equal to 6,000 vehicles per day and less than or equal to 600 vehicles in the peak hour)
  - low curbside demand
  - heavy vehicles are rare
  - lane blockages are unlikely
- Two-way buffered bike lanes can be used when streets are 25 mph or less and have 6,000 vehicles per day or less.
- Consider adding vertical elements of separation or traffic-calming measures
- Provide parking buffers of 3 ft for the door zone.
- Bike lanes along the curbside generally have 2 to 4 ft buffers between them and traffic.
- Bike lane words or markings should be used at the start of the bike lane, intersections, major driveways, and at least every 500 ft along the bike lane.
- Green surface treatments can be used the full length of the bike lane or at intersections and driveways.
- The buffer between the bike lane and vehicular traffic is marked by a solid white stripe on each side of the buffer edges. Diagonals or chevrons should be used in the buffer space if wider than 2 ft.
- Bike lane and no parking signs can be used along blocks as needed.
- Roadways should be designed in a way to limit speed (narrow lanes, raised crosswalks, medians, roundabouts, etc.)
- Avoid merging or mixing bike lanes and vehicular traffic at intersections and use dotted bike lane lines to continue them through intersections.

MUTCD

9E.06

- Buffer space shall be marked with solid white lines on both edges.

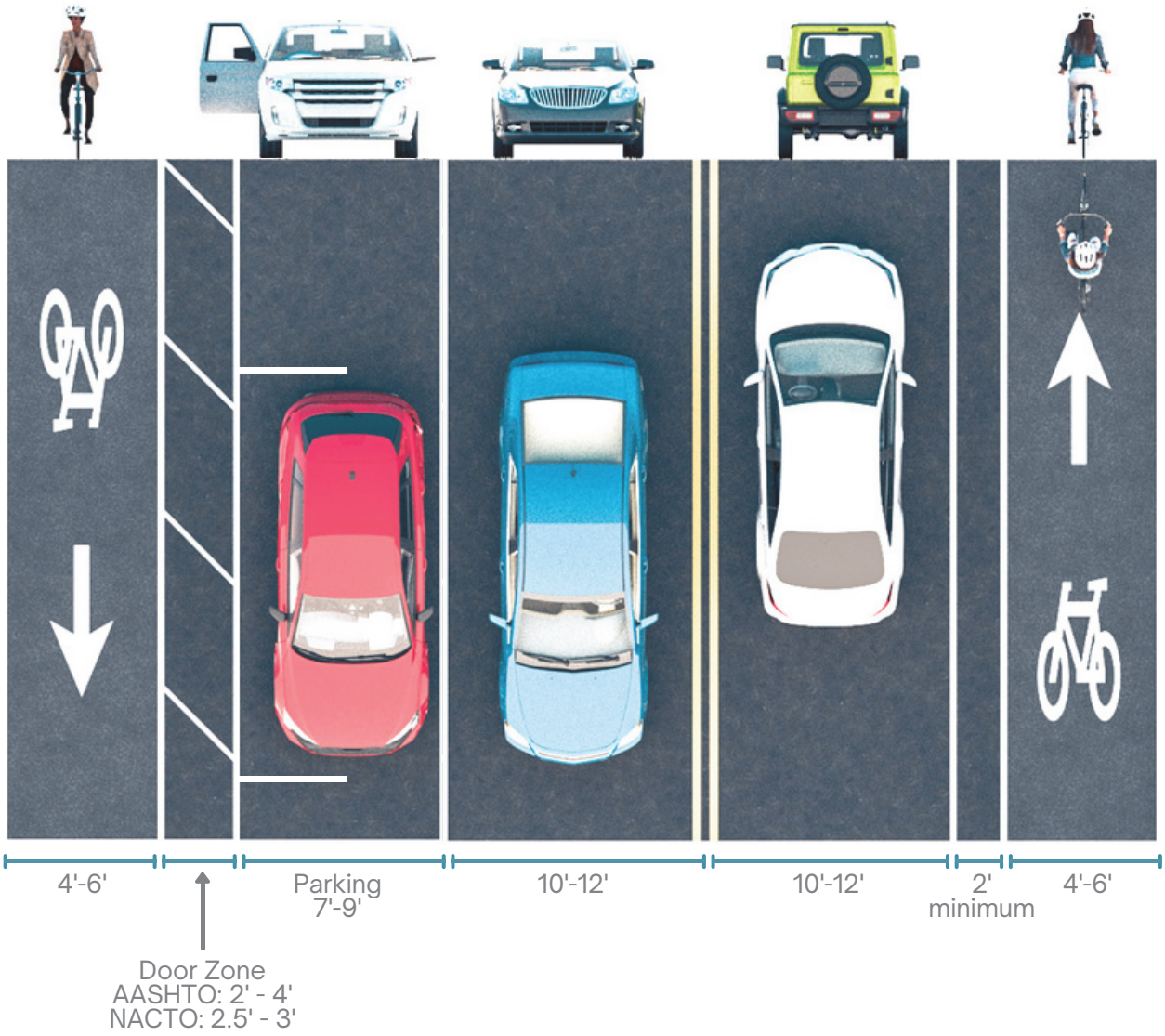
See pages 70-71 for design guidance for pavement markings for buffered bike lanes.

See page 64 for design guidance on bi-directional bikeways.

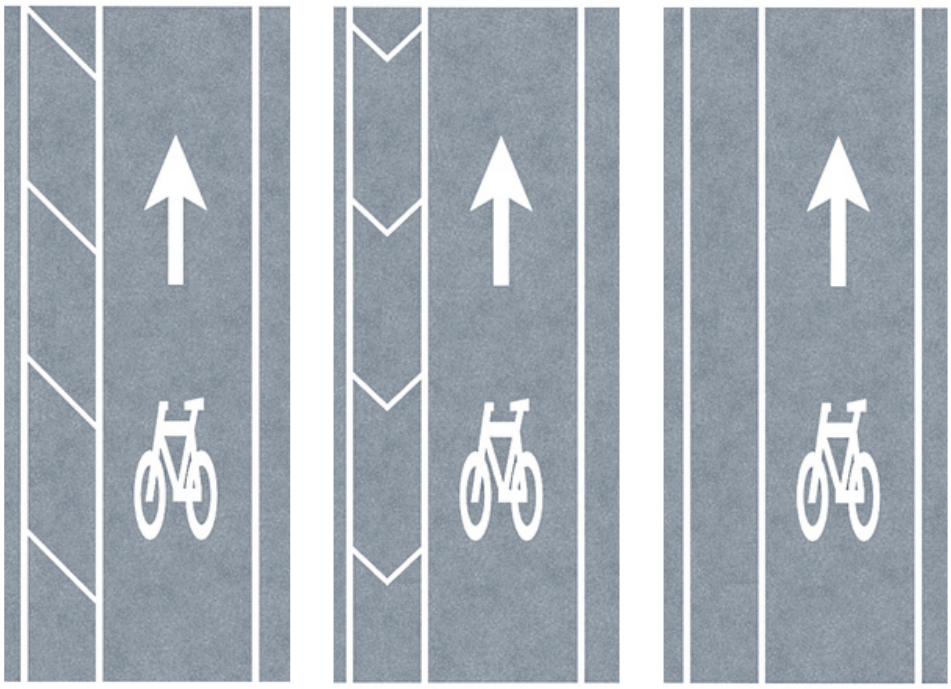


Visually Separated Bicycle Facility with Parking





Preferred Buffer Types



AASHTO: 2'-4'
NACTO: 2'-3'
MUTCD: 3' or more

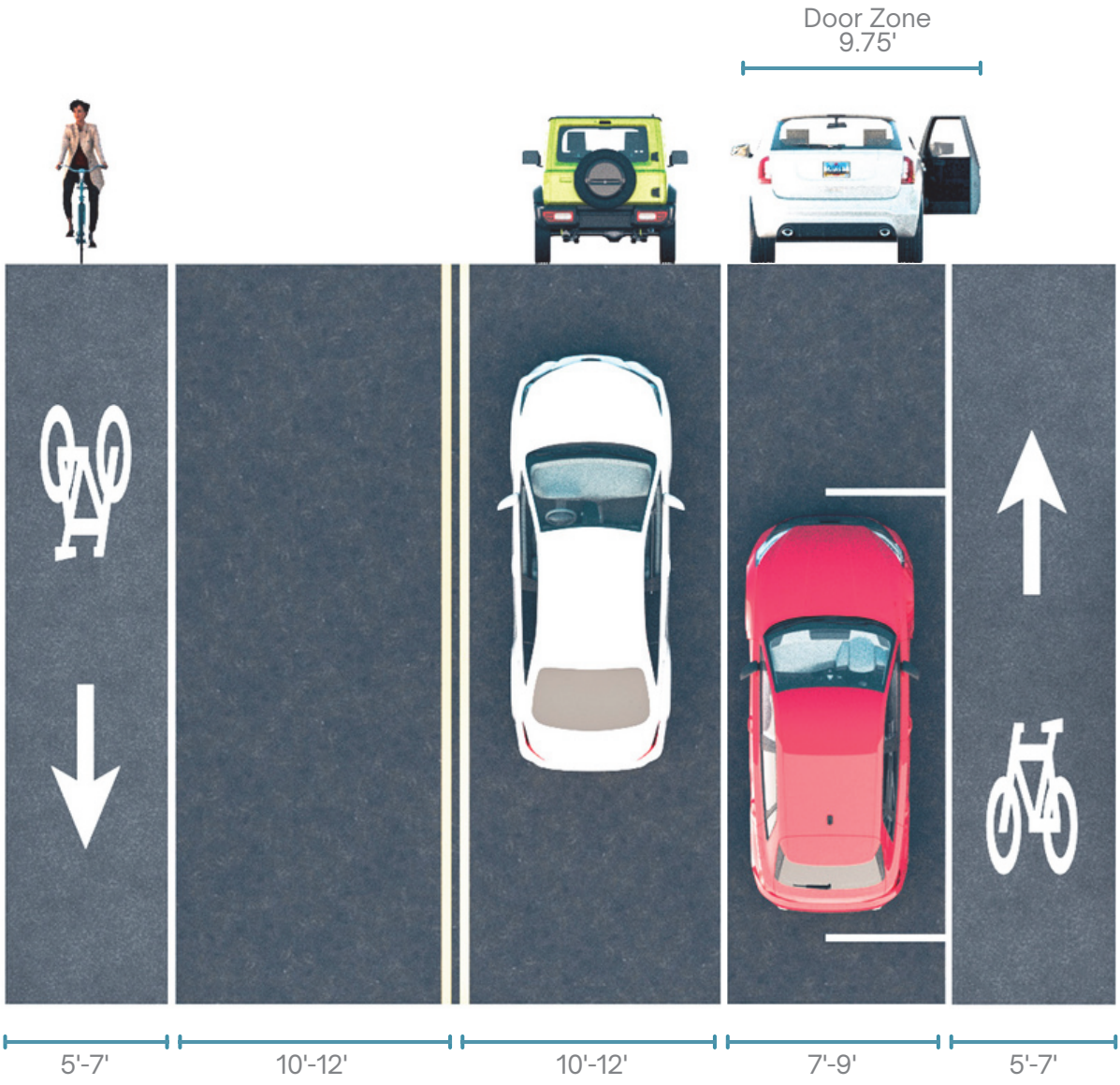
AASHTO: 4' or more
NACTO: 3' or more
MUTCD: 3' or more

<2'

Guidance on buffer markings is provided in AASHTO GBF 9.5, NACTO UBDG 3.2.4., and MUTCD 9E.06.

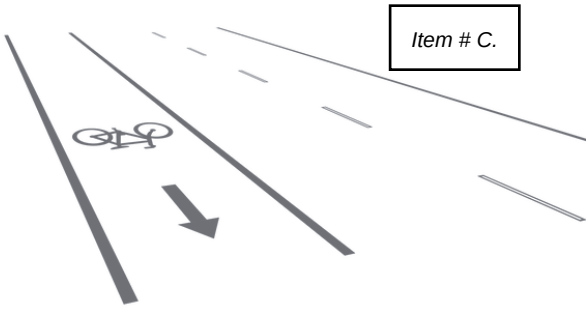
Conventional/Constrained Bike Lane Design

Conventional bike lanes provide an exclusive space for bicyclists on the roadway. These facilities can be located adjacent to both directions of vehicular traffic. Vehicular traffic is not allowed to travel in dedicated bike lanes unless temporarily to access parking, entering & exiting alleyways or driveways. Stopping, standing, and parking within a dedicated bike lane is prohibited.



- On streets with high traffic volume, regular truck traffic, high parking turnover, or speed limit > 30 mph, consider treatments that provide wider bike lanes or greater separation between bicycles and motor traffic.

Conventional/Constrained Bike Lane Design



DESIGN GUIDANCE

AASHTO

GBF 9

Facility Widths

- Gutters may be included in the bike lane width when the cross slope is less than 2%, they aren't narrow, they are smooth and rideable, and they don't present a crash hazard (9.4.1.2).
- Bike lane widths are measured by (9.4.1.2):
  - face of curb or edge of pavement to the center of the bike lane line.
  - center of parking lane line to center of bike lane line.
- When bicycle lane widths are more than 7 ft it may look like a travel lane to motorists, so separated bike lanes or buffered bike lanes should be considered (9.4.1.3).
- Bike lane widths vary between 4 ft and 11 ft but depend on many factors. A minimum of 6.5 ft is needed for occasional passing and 8 ft or more is needed for side-by-side riding (9.4.1.3).
- Wider bike lanes are beneficial when there are (9.4.1.3):
  - high traffic volumes and/or speeds
  - over 5 percent heavy vehicles
  - bike lanes adjacent to railings or barriers (require additional shy space)
  - speeds over 30 mph or 6,000 vehicles per day
  - high parking turnover

Additional Recommendations

- State laws and local ordinances vary on what motorist activity is allowed in bike lanes (9.4).
- Bike lanes are not designed to allow bicycle users to leave and enter them as needed (9.4).
- Require cleaning to keep clear of debris and should be a smooth rideable surface (9.4.1).
- Door zones next to bike lanes are important considerations (9.6).
- May be beneficial to use separated bike lanes at transit stops (9.7).
- Bicycle routes through intersections or driveways should be continuous and legible to all users (9.12).
- See section 9.12 for additional intersection design guidance.

NACTO

UBDG 3.2

Facility Widths

- Preferred width is 6 to 7 ft to accommodate passing and riding side by side (4 ft minimum width).
- Bike lanes wider than 7 ft should have at least a 2 ft buffer and a protected bike lane should be considered to prevent use of the bike lane for parking or vehicular travel.
- Lanes narrower than 6 ft may not accommodate cargo bikes or larger devices.
- Two-way bike lanes should be 13 ft wide (9 ft minimum for short segments).

Additional Recommendations

- One way buffered bike lanes can be used on roadways with the following conditions:
  - vehicle speeds of less than or equal to 25 mph
  - single lane in each direction
  - less than or equal to 12,000 vehicles per day (for All Ages & Abilities: less than or equal to 6,000 vehicles per day and less than or equal to 600 vehicles in the peak hour)
  - low curbside demand
  - heavy vehicles are rare
  - lane blockages are unlikely
- Two-way buffered bike lanes can be used when streets are 25 mph or less and have 6,000 vehicles per day or less.
- Consider adding vertical elements of separation or traffic-calming measures
- Provide parking buffers of 3 ft for the door zone.
- Bike lanes along the curbside generally have 2 to 4 ft buffers between them and traffic.
- Bike lane words or markings should be used at the start of the bike lane, intersections, major driveways, and at least every 500 ft along the bike lane.
- Green surface treatments can be used the full length of the bike lane or at intersections and driveways.
- The buffer between the bike lane and vehicular traffic is marked by a solid white stripe on each side of the buffer edges. Diagonals or chevrons should be used in the buffer space if wider than 2 ft.
- Bike lane and no parking signs can be used along blocks as needed.
- Roadways should be designed in a way to limit speed (narrow lanes, raised crosswalks, medians, roundabouts, etc.)
- Avoid merging or mixing bike lanes and vehicular traffic at intersections and use dotted bike lane lines to continue them through intersections.

MUTCD

9E.01

- Longitudinal pavement markings and bike lane symbols or word markings shall be used to define bike lanes.
- An established bike lane cannot also be an established shoulder.

See pages 70-71 for design guidance for pavement markings specifically for conventional bike lanes.

See page 64 for design guidance on bi-directional bikeways.



3 Mixed Traffic Facilities

Bicycle Boulevard/Shared Lanes/Shared Roadways

Bicycle boulevards are streets with low motorized traffic volumes and speeds, designated and designed to prioritize bicycle travel. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.

Low-traffic residential streets can be designated for bicycle use. Optimal street dynamics and design elements include but are not limited to the following:

- Traffic calming measures such as speed bumps, chicanes, or roundabouts.
- Bicycle-friendly intersections with features like bike boxes and signage.
- Neighborhood connectivity to provide direct routes to key destinations.
- Grid-patterned streets are well-suited as they provide alternative routes for vehicular traffic and minimize turns.
- Regular maintenance and enforcement to ensure compliance with traffic calming measures.

Well-designed bicycle facilities and implemented traffic calming measures to maintain low vehicle volumes and speeds have the potential to create an all ages and all abilities facility for bicycle riders. These traffic calming measures also improve safety for pedestrian movement. For additional information on traffic calming measures, see the section on Traffic Calming on pages 55-60.







Bike Boulevards/Shared Lanes/ Shared Roadways

DESIGN GUIDANCE

AASHTO

GBF 8 & 9

Recommendations

- Bike boulevards are preferable on roads with volumes of < 1,000 vehicles per day (3,000 vehicles per day maximum) and at or below 15 mph (25 mph maximum) (8.2.1).
- Traffic calming and traffic management treatments are key on bicycle boulevards (8.1). According to AASHTO, three key principles define bicycle boulevards:
  - manage vehicular volumes and speeds, which may require traffic calming (methods in section 8.4) or diversion strategies (methods in section 8.5) (8.2.1)
  - prioritized right-of-way at local street crossings that minimize the need for bicyclists to stop (8.2.2)
  - safe and convenient crossings at major streets that accommodate the slowest user (methods in sections 8.6 and 8.7). Additional crossing measures may be needed in crossings where there is not a traffic signal (8.2.3)
- Wayfinding signage and shared lane markings (sharrows) may be used to identify the bicycle boulevard route. Sharrows are generally placed in the center of the travel lane (8.3.1).
- BICYCLES MAY USE FULL LANE (R4-11) signs can be used where motorists may need to wait behind bicyclists or change lanes to pass at a safe distance (8.3.1.3).
- Speeds should be posted when they are lower along bicycle boulevards than the citywide local street speed limit. Advisory speed signs should also be posted as required with traffic calming design measures (8.3.2).
- Shared roadways are more compatible with good quality pavement without hazards, good sight distances, appropriate timing for signals at intersections, and roadway design that encourages lower speeds or lower traffic volumes (9.3).
- Traffic calming measures are most effective when used every 200 ft to 400 ft (8.4).
- Wide curb lanes are not recommended as a strategy for improving passing of bicyclists (9.3.2).

NACTO

UBDG 3.2

Recommendations

- Bike boulevards are appropriate for streets with speeds of less than 20 mph (25 mph maximum), have a single lane in the same direction, have up to 2,000 vehicles per day (3,000 vehicles per day maximum and 500 vehicles per day for All Ages & Abilities), and less than 150 vehicles in the peak hour (50 vehicles in peak hour for All Ages & Abilities).
- Travel in each direction for bicycles should be allowed.
- Shared lane markings should be placed in the center of the lane. They should be within 50 ft of the approach and receiving side of all intersections as well as every 100 ft to 250 ft midblock. When the bike boulevard route changes direction in an intersection, shared lane marking can be placed close together to help bicyclists navigate turns and identify the route.
- Traffic calming should be used to improve comfort levels by managing speeds and volumes of motorists.
- Centerlines should not be used mid-block and are optional at intersections.
- Additional design treatments to organize the roadway should be considered when two-way roads have 24 ft or more of roadway travel width and one-way roads have 15 ft or more of roadway travel width.
- When the roadway is too narrow to allow vehicles to pass bicyclists, speeds should be limited to 10-20 mph.
- Wayfinding signs should be used consistently through the city and can be identified with BIKE ROUTE (D11-1) signs.
- BICYCLES ALLOWED USE OF FULL LANE (R9-20) signs may be used.
- Intersections should prioritize bicycle traffic and maximize safety through geometric changes, traffic control devices, and/or bike lane protection.
- Contraflow bike lanes should be used on one-way streets to permit bicycle travel in both directions.

MUTCD

9E.09, 9E.10

- Shared lane markings shall not have green-colored pavement applied as a background

- Bicycle Facilities

Recommendations for Willard



1 & 2 Physically & Visually Separated Facilities

The Proposed Trails and Connectivity Plan does not include bike lanes, however bike lanes are listed in the OTO standards. The bike lanes identified in the OTO standards are 4’ wide and do not include a buffer. If the City of Willard determines to implement bike lanes at some point in the future, wider bike lanes and and the inclusion of buffers should be considered based on the vehicle speeds and volumes of the roadways. Additionally, vertical separation should be used on roadways with higher speeds and volumes. Accommodating this additional space for wider bike lanes and buffers could require a wider roadway and/or narrower vehicular travel lanes.

3 Mixed Traffic Facilities

The current OTO standards do not include bicycle boulevards in any facility design. Bicycle boulevards are used on roadways with low traffic volumes and speeds. Collector streets and arterials often have traffic speeds and volumes that are too great for safe and comfortable bicycle boulevards. As such, they are typically incorporated into local neighborhood streets. OTO does not have a street standard for local neighborhood streets.

Feature	Standard	Considerations
Speed of vehicular traffic	Maximum of 25 MPH	Traffic calming measures can be installed as needed to reduce vehicular speeds along bicycle boulevards.
Sharrows on roadway	Placed along route in the center of the travel lane at a maximum distance of 250 feet	Sharrows can be placed in intersections to show which direction the bicycle route is traveling.
Signage	Used to designate bicycle boulevard routes	Bike route signage is especially important for bicycle riders when the route changes, such as when it turns onto another roadway.
Intersection prioritization and protection	Evaluate comfort and safety at each intersection and implement measures as needed	Some measures include: • minimized stop signs along the bike route • Curb extensions • Raised crosswalks • Bike crossing islands

PEDESTRIAN FACILITIES

See page 54 for design guidance for pedestrian facilities specific to the City of Willard.

1 Sidewalks

Sidewalks are an essential element in a community as they are often the most readily accessible and cost-effective way to connect residents to destinations within the city.

2 Pedestrian Crossings

A walkable environment includes safe and frequent crossings. We will explore some aspects that should or can be included.

Pedestrian Refuge/Crossing Islands
Pedestrian islands reduce the exposure time for pedestrians or bicyclists at intersections and can also allow users to cross one direction of traffic at a time.

Marked Crossings
High-visibility marked crossings can be utilized at intersections or other locations where pedestrian traffic is anticipated to improve yielding behavior by drivers.

Curb Ramps
Curb ramps provide accessible pedestrian access between sidewalks and the street where there is a curb face or change in elevation.

3 Pedestrian Crossing Signals:

Pedestrian crossings and signals are crucial components of urban infrastructure designed to enhance the safety and convenience for pedestrians. Signals can be utilized at intersections or mid-block to warn motorists and bring additional attention to pedestrians. Signalized intersections are used frequently in cities nationwide; however, in the design guidance, two signals will be explored in greater detail.

Rectangular Rapid Flashing Beacon
RRFBs are manually or passively activated warning beacons alerting drivers to yield.

High-Intensity Activated Crosswalk Beacon (HAWK) or Pedestrian Hybrid Beacon (PHB)
HAWKs are hybrid signals that stop traffic on high-volume roadways.

4 Additional Pedestrian Safety Countermeasures

Curb Extensions
Curb extensions are an element that can physically narrow the roadway and create safer and shorter crossings for pedestrians.

Crosswalk Visibility Enhancements
Low visibility creates an unsafe environment at crossings.

Leading Pedestrian Interval (LPI)
LPIs give pedestrians advance time to enter crossings before the signal changes for motorists.

Most modes of transportation begin and end with a walk or roll. Well-designed and strategically placed sidewalks, pedestrian crossings, and signals can increase safety and comfort for the largest user group of any active transportation network. While sidewalks, pedestrian crossings, and signals are focused on moving pedestrians safely and comfortably, they also serve bicycle riders in most cases. Missouri laws state that bicycles are permitted to ride on the sidewalk in non-business districts and are required to yield to pedestrians. In Missouri bicycles are considered vehicles and people riding a bicycle have the same rights, duties, and responsibilities as vehicle drivers. However, at shared-use path crossings motorists are expected to stop whenever a person walking, running, or bicycling is using the crossing area.







1 Sidewalks

Sidewalk Considerations

Sidewalk widths will vary based on available ROW, street widths, and adjoining uses. Sidewalk widths should be based on the anticipated use and the surrounding amenities and uses. For example, a downtown sidewalk should have a greater width than a sidewalk located along a typical residential street. High-volume sidewalks will require additional width to allow for passing in various directions compared to lower-volume sidewalks.



1 Frontage Area
The area from the front door to the right of way but can also adjoin or abut buildings, front porches, stoops, lawns, or other landscaped areas. In downtown environments, this area can include outdoor retail signage, seating, awnings, or other intrusions within the right of way.

3 Amenity Area
This area is typically between the pedestrian area and the street. It is usually occupied by streetlights, signal boxes, benches, trash receptacles, trees or other landscaping, bike racks, and various stormwater control measures. These areas can create snow storage areas from cleared streets or sidewalks.

2 Pedestrian Area
This area typically comprises a sidewalk or shared-use path. It is the portion of the right of way meant for pedestrians to travel actively. The width should be set to accommodate the volume of pedestrian activities, which should include the passing of people both alone and in groups and the use of wheelchairs, strollers, or wagons.

Pedestrian Refuge/Crossing Islands

Crossing islands provide pedestrians with a refuge when using multistage crossings. These are typically found at mid-block crossings where pedestrians must cross the street away from an intersection. These can also be found in roundabouts, right turn lanes, or even in downtown areas where the crossing is unusually long or misaligned. Crossing islands have various designs and warrant an engineered solution. As traffic speed or the number of traffic lanes that must be crossed increases, crossings feel less safe for pedestrians entering the intersection. Pedestrian islands can be used to reduce the exposure time for pedestrians or bicyclists at intersections and can also allow pedestrians to cross one direction of traffic at a time. The FHWA has published considerations for pedestrian islands. These include that they should be considered in curbed sections of multilane roadways with a significant mix of pedestrian and vehicular traffic, where traffic volumes are over 9,000 vehicles per day and travel speeds are 35 mph or greater. Other design considerations include being at least 4 feet (preferably 8 feet) in width and an adequate length to accommodate the anticipated number of pedestrians waiting for traffic gaps before crossing.





Typical Applications

- In areas where vehicle speeds and volumes make pedestrian crossings prohibitive.
- Typically applied where three lanes of traffic or more diminish pedestrians' feelings of safety and comfort.

Design Guidance

Crossing Island Requirements:

- Should be in crossings that are 50 feet or more.
- Pedestrian refuge islands should be at least 6' in width, however, 8-10' feet is preferred.
- Mid-block crossings should have a “Z” configuration that forces pedestrians to face oncoming vehicular traffic.
- Raised concrete islands or some form of vehicular barrier is required to protect anyone using the crossing island. Vegetation and aesthetic treatments can be used if it doesn’t obscure visibility.
- Where a 6-foot wide median cannot be attained, a narrower raised median is still preferable to nothing. The minimum protected width is 6 feet, based on the length of a bicycle or a person pushing a stroller. The refuge is ideally 40 feet long.

Marked Crossings

Typical Applications

Marked crossings are not always necessary at intersections on streets with low volumes and speeds. However, they should be considered near schools, transit stops, hospitals, major public buildings, and parks regardless of traffic volumes and speeds.

Judgment should be used on the applicability and design of crossings, but generally, marked crossings should be used on multi-lane roads (over 2 lanes) when speeds are higher than 20 mph or when there are high traffic volumes (such as over 3,000 ADT). It should be noted that marked crosswalks, alone, do not always achieve a high level of safety. Additional safety measures are often needed to create traffic calming and increase safety at crossings.

Design Guidance

All legs of signalized intersections should be marked unless there is a section where pedestrians are prohibited from crossing.
Crossings should be placed to accommodate pedestrian desire lines. They should be at intersections but may be needed mid-block in high-traffic areas to encourage crosswalk use.
Markings should be highly visible.



Curb Ramps

Curb ramps are required anywhere the pedestrian travel-way crosses a vehicular or rail travel-way. This is enforced by Federal, State, and Local laws that protect pedestrians, bicyclists, and individuals with mobility disabilities. Curb ramps come in various sizes and shapes based on roadway design, grades, and drainage. At a minimum, curb ramp landings are typically 5 feet by 5 feet, with a max cross slope in all directions of 2%. Ramp and landing widths should reflect the width of the sidewalk. Flares along the ramp are required when the surfaces adjacent to the ramp are traversable. A barrier curb is usually used when adjacent to landscape or other amenities that make the space un-walkable.

Design Guidance

Ramp Requirements:

- Max slope – 1 : 12 or 8.33%
- Max slope of side flares – 1 : 10 or 10%
- Max cross slope – 2%
- Truncated domes are required at all curb ramps. This is to alert those with visual impairments that they are coming up to the street edge.
- Avoid using radial curb ramps as this could cause an individual with visual impairments to navigate the street outside of the painted crosswalk.



3 Pedestrian Crossing Signals

There are several types of pedestrian crossing signals. The most familiar and common are located at signalized intersections. Two additional signals, RRFBs, and HAWKs, are also used at pedestrian crossings. Pedestrian Signals are typically located at signalized intersections and allow time for pedestrians to cross the street safely and in the direction of normal traffic flow. Signals can also be used to cross islands. The issue with signals is that some individuals will cross against the direction of the signal, which can cause crashes or disrupt normal traffic flow, which can cause vehicles to rear-end another vehicle. Signal guidance and requirements are found in the MUTCD 11th Edition Chapter 4I.

Typical Requirements

- A signal must be timed to allow sufficient time for crossing the street
- Signals must have an audible sound to notify those with visual impairments that it is safe to cross
- Delay left turn movements to allow pedestrians to clear the crossing
- Adequate signage is needed to inform pedestrians how to use the signal
- Signal timing is typically 3.5 feet per second as a measurement of travel time

Types of Pedestrian Signal Activation:

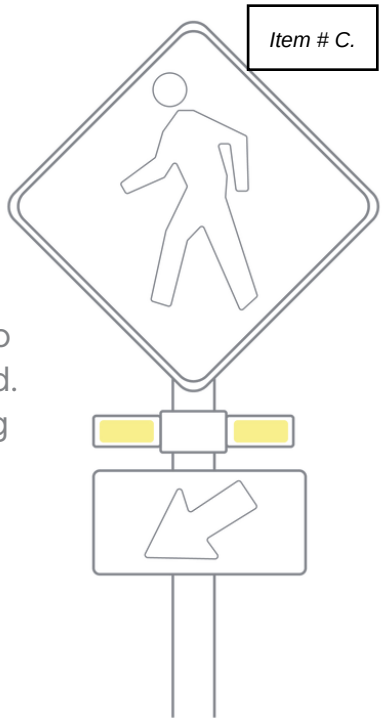
Option 1: Pedestrian Light Controlled

These crossings are controlled by pedestrian-operated signals. Pedestrians press a button to activate the traffic light, stopping vehicles and allowing pedestrians to cross. They are common in urban areas with significant pedestrian activity.

Option 2: Pedestrian User-Friendly Intelligent

These crossings use sensors to detect when pedestrians are waiting and when they have finished crossing. The lights adjust accordingly to ensure safe crossing times. They are typically found in urban areas, it is designed to be more responsive to pedestrian needs than pedestrian-actuated crossings.

Rectangular Rapid Flashing Beacon (RRFB)



RRFBs are warning beacons that can be installed at a crossing to alert drivers that a crosswalk is in use and that they need to yield. They are used in combination with the standard crossing warning signs and markings and can be used at mid-block crossings or intersections where a signal is not warranted. RRFBs can be activated manually or passively through detection.

Typical Applications

- Crosswalk visibility enhancements
- Pedestrian refuge island
- Advance STOP or YIELD markings and signs

Design Guidance

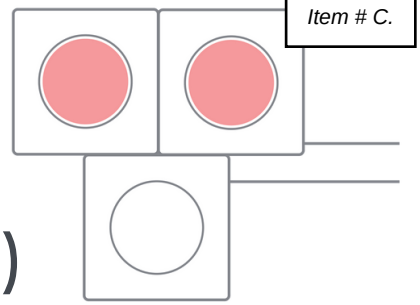
- Install RRFBs in the median rather than the far-side of the roadway if there is a pedestrian refuge or other type of median.
- Use solar-powered panels to eliminate the need for a power source.
- Reserve the use of RRFBs for locations with significant pedestrian safety issues, as over-use of RRFB treatments may diminish their effectiveness.
- A detailed study of actuation is recommended to provide a context-sensitive solution and avoid false signals, which could diminish effectiveness.
- See MUTCD 11th Edition Chapter 4L and Section 5.11.7 of AASHTO GBF for additional design requirements.



RRFB with Median and Pedestrian Refuge Island



High-Intensity Activated Crosswalk Beacon (HAWK) or Pedestrian Hybrid Beacon (PHB)



High-Intensity Activated Crosswalk Beacon (HAWK) is a hybrid signal that allows pedestrians and bicyclists to stop traffic from crossing high-volume roadways. This type of signal is usually located along long stretches of roadway where intersecting roads don't warrant a signal. The MUTCD recommends a minimum volume of pedestrians and bicyclists an hour for major arterial crossings or volumes exceeding 2,000 vehicles per hour. This type of crossing should be added for all crossings where other crossing controls have proven inadequate. Push button actuators should be placed conveniently for all users and abide by other ADA standards. Passive signal activations such as cameras, pavement loops/pucks, and infrared sensors may also be considered. See MUTCD 11th Edition Chapter 4J and Section 10.7 of AASHTO GBF for additional design requirements.

Typical Applications

- In general, HAWKs are used where it is difficult for pedestrians to cross a roadway, such as when gaps in traffic are insufficient or speed limits exceed 35 miles per hour.
- They are very effective at locations where three or more lanes will be crossed, or traffic volumes are above 9,000 annual average daily traffic.
- Installation of a HAWK must also include a marked crosswalk and pedestrian countdown signal.
- If a community is not already familiar with HAWKs, agencies should conduct appropriate education and outreach as part of implementation.



HAWK Crossing





4 Additional Pedestrian Safety Countermeasures

Curb Extensions

Curb extensions narrow the roadway both visually and physically. They improve pedestrian visibility by aligning them with parking lanes and also create shorter and safer crossings for pedestrians. The narrowing of the roadway and decrease in the curb radii also encourages slower turning speeds.

Typical Applications

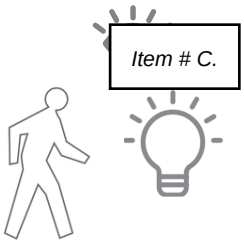
- In neighborhoods or low-speed streets where there are high numbers of pedestrians, and slower vehicle speeds are desired.
- Where on-street parking is present to increase pedestrian visibility.

Design Guidance

- Where curb extensions create drainage impacts, they can be designed as islands with a small 1 to 2-foot gap between the curbs or use a trench drain.
- Curb extensions should be at least as long as the width of the crosswalk.



Crosswalk Visibility Enhancements



Poor lighting conditions, obstructions such as parked cars, and horizontal or vertical roadway curvature can reduce visibility at crosswalks, contributing to safety issues. For multilane roadway crossings where vehicle volumes are in excess of 10,000 Average Annual Daily Traffic (AADT), a marked crosswalk alone is typically not sufficient. Under such conditions, more substantial crossing improvements could prevent an increase in pedestrian crash potential. According to FHWA, the following enhancements can be made to improve crosswalk visibility.

High-Visibility Crosswalks:

UP TO **40**% REDUCTION IN **PEDESTRIAN** CRASHES

High-visibility crosswalks use patterns (i.e., bar pairs, continental, ladder) that are visible to both the driver and pedestrian from farther away compared to traditional transverse line crosswalks. They should be considered at all midblock pedestrian crossings and uncontrolled intersections. Agencies should use materials such as inlay or thermoplastic tape instead of paint or brick for highly reflective crosswalk markings.

Improved Lighting:

UP TO **42**% REDUCTION IN **PEDESTRIAN** CRASHES

Crosswalk lighting should aim to illuminate with positive contrast to make it easier for a driver to identify the pedestrian visually. This involves carefully placing the luminaires in forward locations to avoid a silhouette effect of the pedestrian.

Enhanced Signing and Pavement Markings:

UP TO **25**% REDUCTION IN **PEDESTRIAN** CRASHES

On multilane roadways, agencies can use “YIELD HERE TO PEDESTRIANS” or “STOP HERE FOR PEDESTIANS” signs 20 to 50 feet in advance of a marked crosswalk to indicate where a driver should stop or yield to pedestrians, depending on State law. To supplement the signing, agencies can also install a STOP or YIELD bar (commonly referred to as ”shark’s teeth”) pavement markings.
In-street signings, such as ”STOP Here for Pedestrians“ or ”YIELD Here to Pedestrians, “ may be appropriate on roads with two- or three-lane roads where speed limits are 30 miles per hour or less.

Sources:
1. The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections - Lessons from a New York City Experience (2012)
2. Handbook of Road Safety Measures (2004)
3. Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, FHWA (2017).

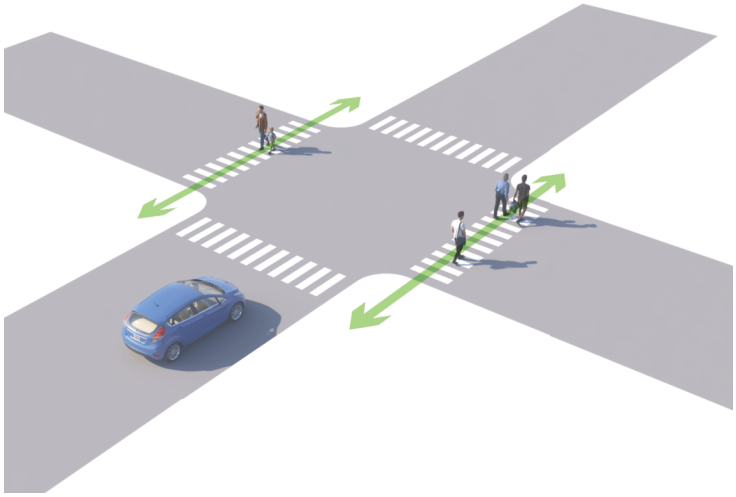
Leading Pedestrian Intervals

A leading pedestrian interval (LPI) allows pedestrians to enter the crosswalk at an intersection 3 to 7 seconds before vehicles are given a green indication. Pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn right or left.

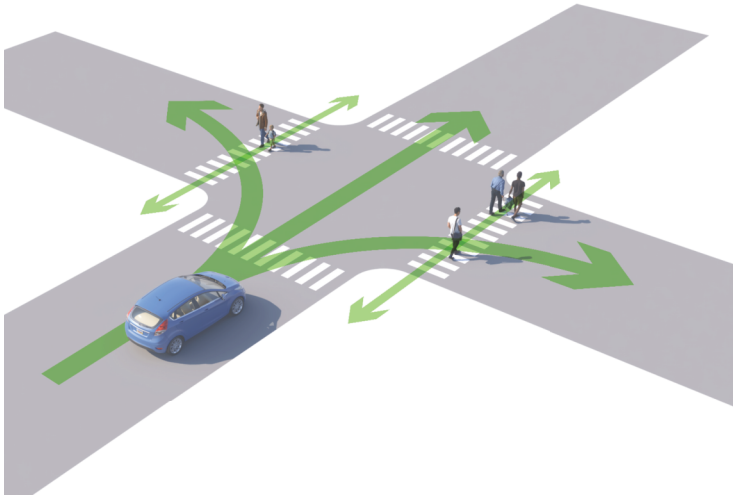
UP TO 13% REDUCTION IN PEDESTRIAN CRASHES AT INTERSECTIONS

LPIs provide the following benefits:

- Increased visibility of crossing pedestrians.
- Reduced conflicts between pedestrians and vehicles.
- Increased likelihood of motorists yielding to pedestrians.
- Enhanced safety for pedestrians who may be slower to start into the intersection.



Phase 1 (First 3-7 seconds):
Pedestrians are given a minimum 3 to 7 second head start entering the intersection. This is the pedestrian-only phase.



Phase 2 (After 3-7 seconds):
Through and turning traffic is given the green light. Turning traffic yields to pedestrians already in the crosswalk.

Sources
1. Manual on Uniform Traffic Control Devices, Section 4I.06. FHWA (2023).
2. Safety Evaluation of Protected Left-Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety, FHWA (2018)

Pedestrian Facilities

Recommendations for Willard

1 Sidewalks

The current OTO standards include sidewalks in most facility designs. Sidewalks should also be included on all local streets.

Feature	Standard	Considerations
Width of sidewalk	6 feet Minimum	The current OTO standard gives a range of minimum sidewalk widths. The recommendation of this design guidance is to use a 6' minimum sidewalk width.
Buffer width between roadway and sidewalk	6 feet Minimum	The current OTO standard already provides a vegetative buffer between the roadway and the sidewalk but doesn't specify the width. Additional width should be considered on high-speed roadways (over 35 MPH).
Location	Both sides of the street or on one side of the street when a sidepath is on the other side of the street	-
Crossings	Evaluate safety and comfort at crossings (mid-block and intersections)	Some measures include: • RRFB or HAWK • Curb extensions • Raised crosswalks • Pedestrian refuge islands

TRAFFIC CALMING

1. Vertical Treatments
2. Horizontal Treatments
3. Routing Restriction
4. Travel Lane Width Reduction

According to FHWA and Institute of Transportation Engineers (ITE), “The primary purpose of traffic calming is to support the livability and vitality of residential and commercial areas through improvements in non-motorist safety, mobility, and comfort. These objectives are typically achieved by reducing vehicle speeds or volumes on a single street or a street network. Traffic calming measures consist of horizontal, vertical, lane narrowing, roadside, and other features that use self-enforcing physical or psycho-perception means to produce desired effects.”

Traffic calming measures are used to alter driver behavior in a way that improves safety for all users, and often focuses on improving conditions for non-motorized street users. These measures not only increase safety by reducing vehicle speed and/or volume, but they can create a sense of place for communities.



1 Vertical Traffic Calming Treatments

Vertical treatments force drivers to slow down by creating a change in the height of the roadway. Extensive planning, design, and public outreach are needed prior to traffic calming elements being placed on the street. Designers should strive to design context-sensitive and appropriate solutions. Examples of vertical treatments include:

- Speed Hump
- Speed Cushion
- Speed Table
- Offset Speed Table
- Raised Crosswalk
- Raised Intersection

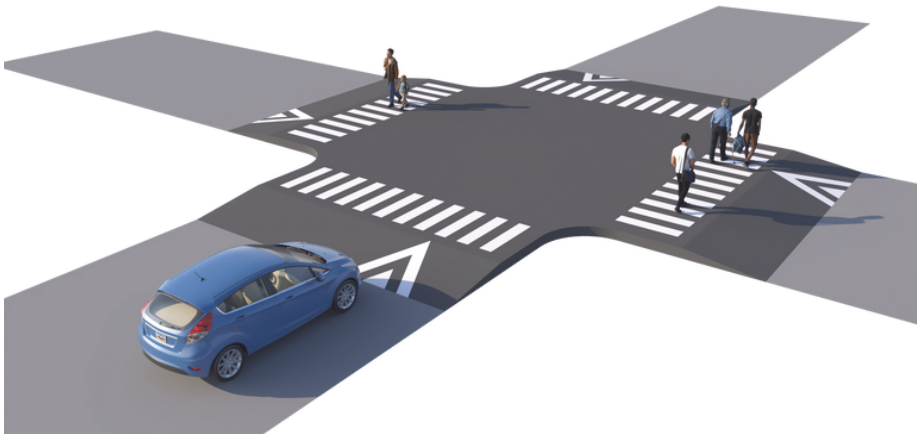
Typical Applications

Vertical speed control elements should be applied where the roadway's target speed cannot be achieved through the use of conventional traffic calming elements, such as medians, narrower roadways or lanes, curb extensions, enforcement, or lower speed limits.

Design Guidance

- Unless otherwise desired, vertical traffic calming should reduce a street's target speed to 20 mph or less (AASHTO GBF 8.4.3).
- Implementation may be carried out on a trial basis to gauge residents' support before finalizing the design. Temporary speed humps, tables, and cushions should be used with caution as they can diminish residents' opinions due to unappealing design and reduced functionality.
- Should allow bicycle riders and vehicle drivers to navigate with minimal discomfort at intended speeds and should be visible and marked when necessary.
- Additional guidance is found in Section 8.4.3 of AASHTO GBF and Section 3.1.2 of NACTO UBDG.

Raised Intersection



2 Horizontal Traffic Calming Treatments

Horizontal treatments create a horizontal shift or deflection in the roadway for drivers to navigate. This shift requires drivers to reduce their speed from what it would be if they were driving in a straight path. Extensive planning, design, and public outreach are needed before traffic calming elements are placed on the street. Designers should strive to design context-sensitive and appropriate solutions. Examples of horizontal treatment include:

- Lateral Shift
- Chicane, Neckdown, or Pinch Point
- Realigned Intersection
- Traffic Circle
- Roundabout
- Mini-roundabout
- Curb extensions

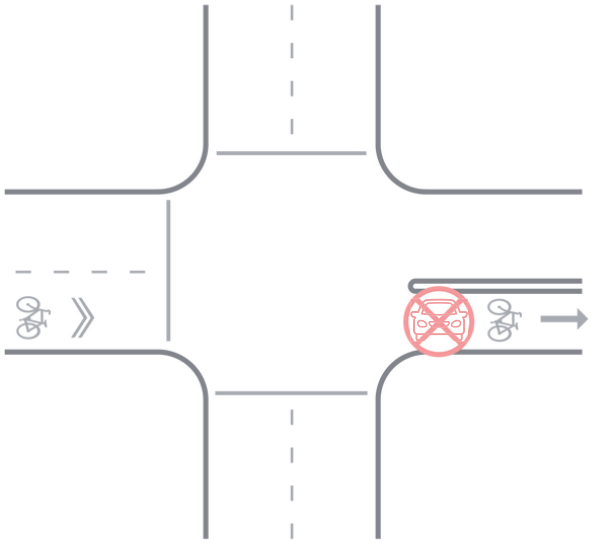
Design Guidance

- When using horizontal speed management treatments, a minimum clear width of 12 feet for travel shall be maintained.
- Space for bicycles to bypass horizontal treatments should be considered when the average daily vehicle volumes are greater than 2,000 vehicles per day (AASHTO GBF 8.4.2).
- Additional guidance is found in Section 8.4.2 of AASHTO GBF and Section 3.1.2 of NACTO UBDG.

Mini Roundabout



3 Routing Restriction



Routing restrictions are intended to eliminate some portions of cut-through traffic by preventing particular vehicle movements. Some routing restrictions can be created using paint on the roadway, but they are most effective when raised curbs or other physical barriers exist. Extensive planning, design, and public outreach are needed before traffic calming elements are placed on the street. Designers should strive to design context-sensitive and appropriate solutions. Examples of routing restrictions include:

- Diagonal Diverter
- Full Closure
- Half Closure
- Median Barrier
- Forced Turn Island

Typical Applications:

- Urban and suburban settings along roadways and at intersections.
- Where it is desired to reduce vehicle traffic along a particular route and an alternative route is available to through vehicular traffic, while preserving local access as necessary.

Design Guidance

- Where emergency vehicle access is still needing to be maintained, there should be breakaway or lockable bollards or gates.
- A gap or channel in the physical restrictions can allow at-grade access for bicyclist movements.
- It is important to consider where diverted traffic will go and what effect that will have.
- Each type of routing restriction has its own design requirements and should be designed with engineering principles and judgment.
- Need to maintain access to residences and businesses and divert vehicular traffic on through trips to other routes.
- Additional guidance is found in Section 8.5 of AASHTO GBF and Section 3.1.2 of NACTO UBDG.

4 Travel Lane Width Reduction/ Creating Enclosure

Reducing travel lane widths is an effective traffic-calming measure that can help slow down vehicle speeds and enhance safety for all road users. Here's how narrower travel lanes contribute to traffic calming and slowing traffic:

Physical Impact on Traffic Flow

Reduced Speed:
Studies have shown that reducing lane widths from 12 feet to 10 or 11 feet can result in lower vehicle speeds. The reduced width discourages speeding and promotes a more controlled driving pace.

Traffic Calming Effect:
Narrower lanes can create a natural traffic-calming effect, slowing down vehicles without the need for additional physical barriers like speed bumps.

Safety Improvements

Shorter Crossing Distances for Pedestrians:
Reducing lane widths can shorten the distance pedestrians need to cross, decreasing their exposure to moving vehicles and enhancing their safety.

Increased Buffer Zones:
Narrowing travel lanes can create space for wider shoulders, bike lanes, or buffer zones between travel lanes and sidewalks, providing additional safety for cyclists and pedestrians.

Enhanced Visibility:
Slower speeds and narrower lanes improve drivers' ability to see and react to pedestrians, bicyclists, and other vehicles, reducing the likelihood of accidents.

Space Reallocation

Bike Lanes and Sidewalks:
The space saved from narrowing travel lanes can be reallocated to create dedicated bike lanes and wider sidewalks or sidepaths, promoting active transportation and improving safety for non-motorized users.

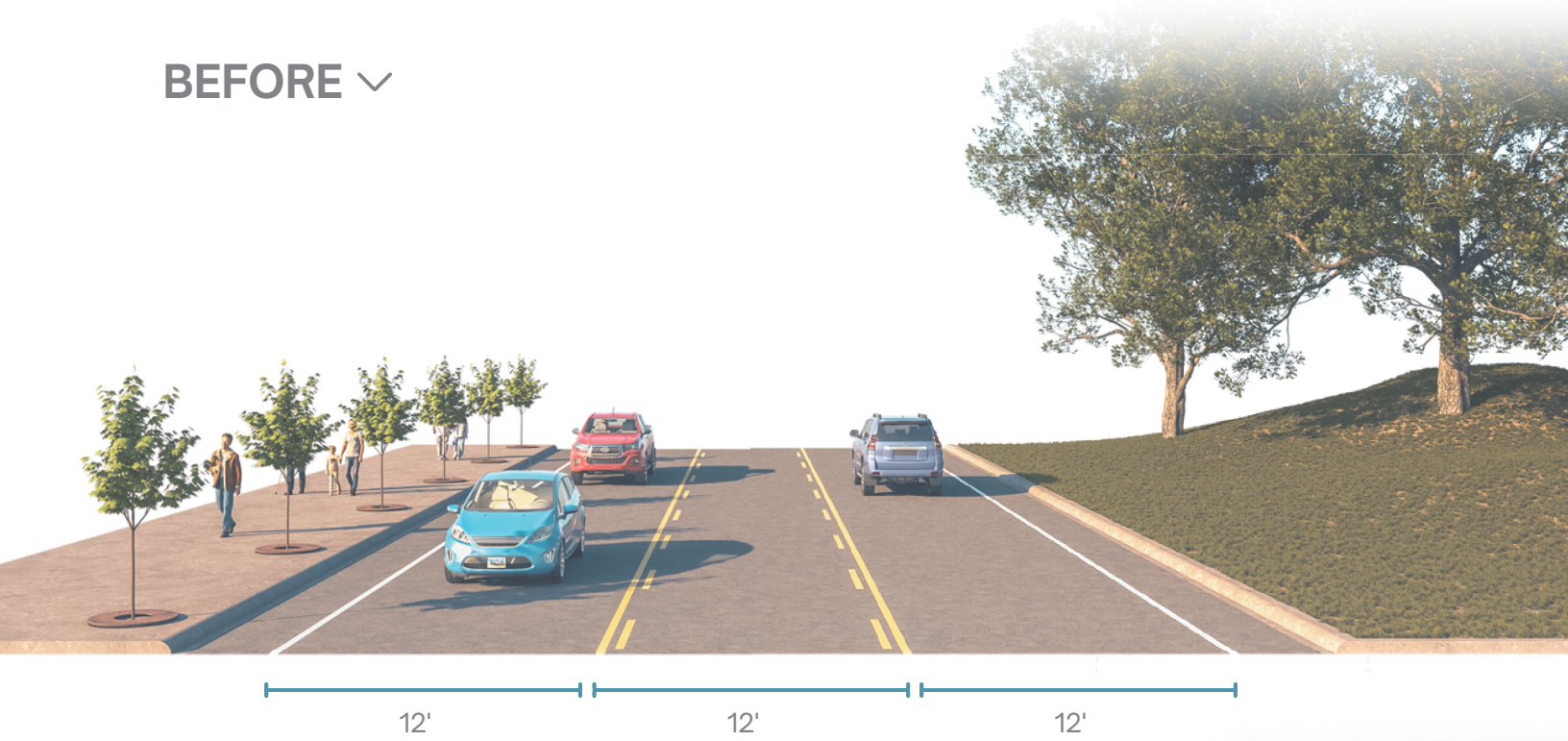
Landscaping and Buffer Zones:
Additional space can also be used for landscaping, street furniture, or buffer zones, enhancing the street's aesthetic appeal and providing physical barriers that further calm traffic.

Additional guidance is found in Section 8.4.1 of AASHTO GBF.

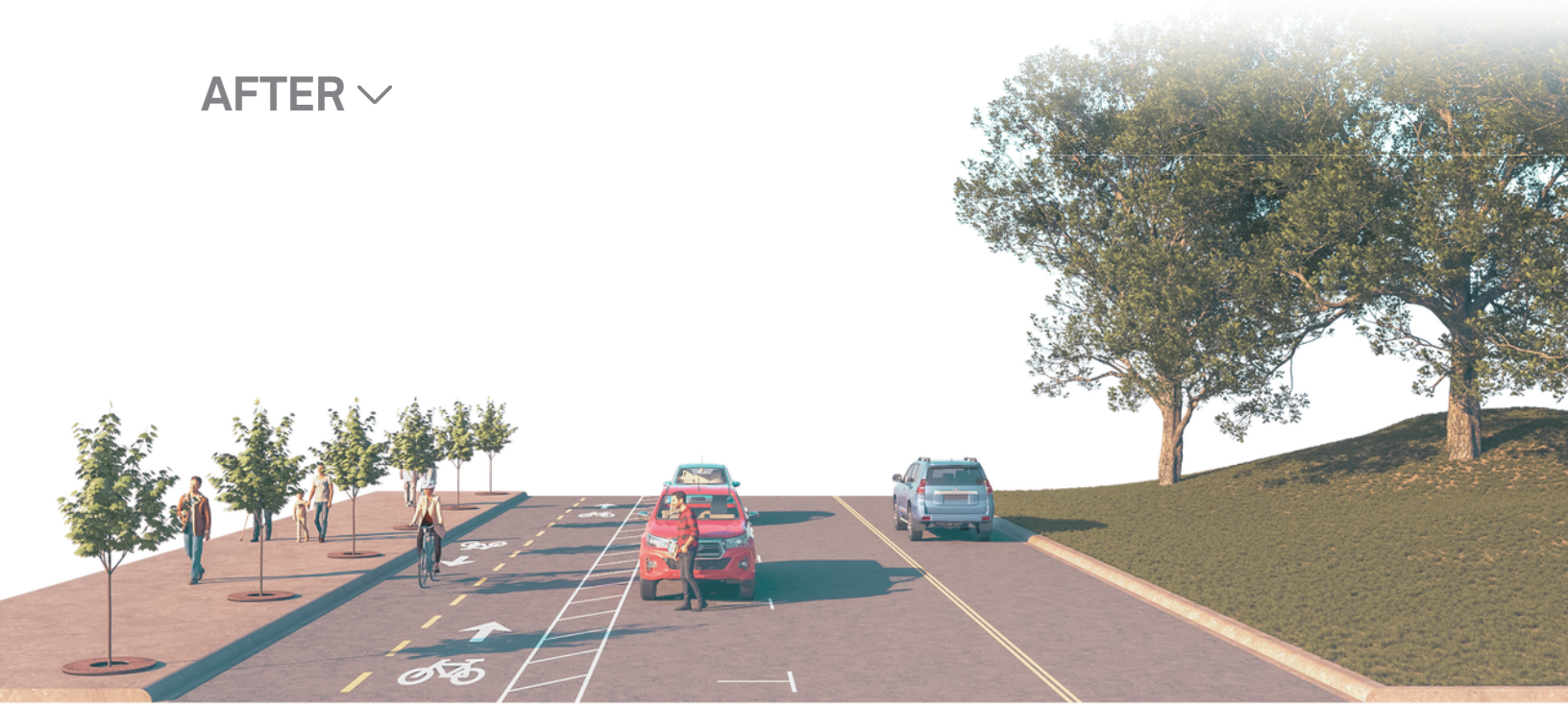
Design Guidance

- Reducing lane widths should involve careful attention to design and planning, coupled with extensive public engagement.

BEFORE



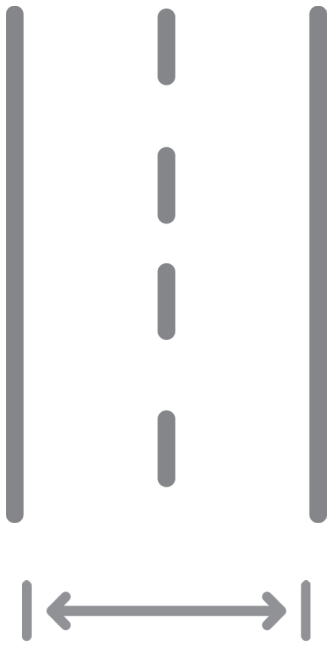
AFTER



EVALUATING SURPLUS RIGHT-OF-WAY

Opportunities exist to evaluate the right-of-way (ROW) along corridors or sections of roadway to evaluate their current usage and whether there is an opportunity to alter their current use to provide better facilities for vulnerable road users while still providing sufficient service levels for motorists. Road reconfigurations provide a method of utilizing existing right of way and roadway width to increase safety and can often include additional facilities for other modes of travel, such as dedicated transit lanes, widened and enhanced sidewalks, and bike lanes.

According to FHWA, a Road Diet repositions pavement markings to better meet the needs of all road users. A classic Road Diet converts a four-lane undivided roadway to a three-lane roadway, but many other reconfigurations are used by States and local jurisdictions. For example, a road diet could convert the roadway space from five to three lanes, two to three lanes, or various lanes of a three-lane roadway. An agency could even use a Road Diet on a one-way street.



Resources such as the Road Diet Information Guide (FHWA) navigate to the appropriate application and implementation of road diets. Many factors should be considered when planning and designing a road reconfiguration, including extensive public outreach and traffic studies and the potential positive and negative effects on all stakeholders, including businesses, neighborhoods, vulnerable road users, and motorists.

GENERAL DESIGN GUIDANCE

The following pages provide guidance on various aspects of paths and general bike and mixed-use facilities. Many recommendations for these design elements are found in Chapter 5 of AASHTO GBF. The following pages include information on:

- Transitions between facility types
- Bi-Directional Bikeways
- Side Slopes
- Fence/Barrier Guidance
- Cross Slopes
- Stopping Sight Distance
- Grade
- Options to Mitigate Excessive Grades
- Surfaces
- Accessibility
- Vertical Alignment
- Drainage
- Design Speed
- Horizontal Alignment
- Pavement Markings
  - Pavement Markings for Buffered Bike Lanes
  - Pavement Markings for Conventional/Constrained Bike Lanes
- Signage
- Signage and Wayfinding & General Trail Signage Information



Transitions Between Facility Types:
Bicycle networks are composed of a variety of facilities (i.e. sidepaths, bike lanes, mixed traffic facilities, etc.) and each transition between facility types is unique and requires careful planning and design. A good transition zone will clearly indicate what users are required to do and maximize their safety and comfort.

One key design element for the transition between sidepaths and street level facilities is the design of the bicycle ramp. AASHTO GBF provides design guidance in Section 5.10.7.

A physical separation, such as poured curbs and medians in conjunction with pavement markings (i.e. arrow showing travel direction with a bike rider marking) can be helpful in providing clear direction to bicycle riders in advance of and during transitions between facility types. These can also be helpful at intersections to improve comfort and safety of bicycle riders by preventing the accidental mixing of bicycles and vehicles at the intersection.

Section 7.10 of the AASHTO GBF provide guidance and examples for a variety of transition types in different contexts. This guidance covers where ideal transition points are as well as more complicated transitions such as two-way bike lanes to one-way bike lanes and vice versa.

NACTO Section 3.1.4 covers their guidance for bike transitions. The guidance in this section covers lateral shifts for bikeways as well as bike ramps and vertical grade transitions. Other guidance for transitions can be found in the sections for each bike facility type.

Bi-Directional Bikeways:
Bicycle network routes should allow and prioritize bicycle travel in each direction. Bi-directional travel is typically easily accomplished with paths, however on-street facilities may require additional planning and design.

On-street bi-directional travel may be accomplished in a variety of ways. Some examples include:

- Bike lanes on each side of the roadway
- Two-way bike lanes - typically protected bike lanes that accommodate travel in each direction
- Contraflow bike lane - often a bike lane on the left side of the street for the opposite direction of travel on a one-way street

Signage to notify motorists can be considered when bi-directional bike traffic is present. This may be particularly beneficial at driveways to notify drivers that bicycles may be approaching from either direction.

Additional design guidance for two-way contraflow bike lanes can be found in NACTO UBDG and AASHTO GBF.





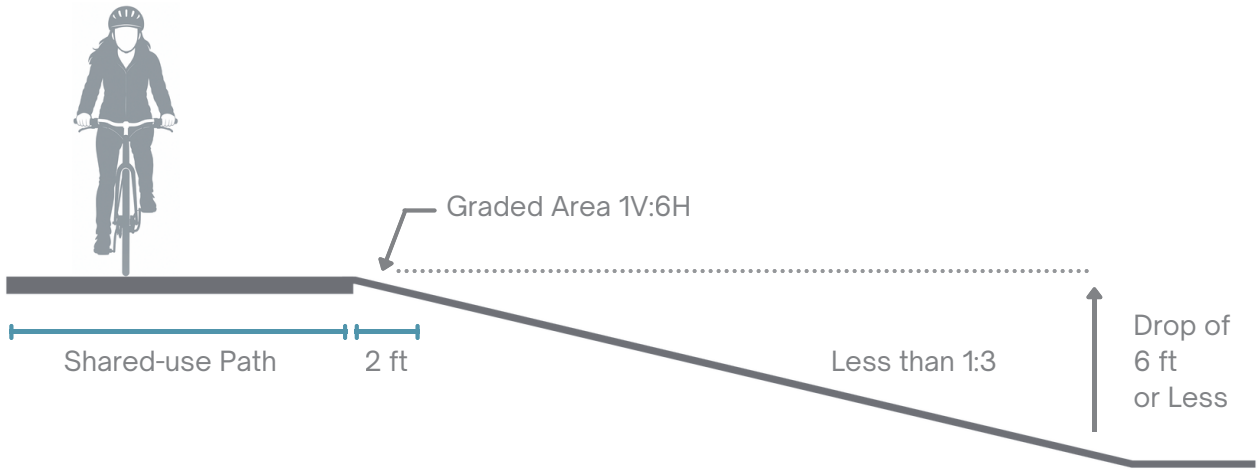
Side Slopes:
The shoulders of paths should be graded in a manner that provides a recoverable area for users who leave the path either intentionally or unintentionally. At a minimum, there should be a 2-foot-wide graded area with a maximum slope of 1V:6H. Ideally, the shoulder should be 5 feet wide, but the minimum 2 feet of clear shoulder at a maximum of 1V:6H slope should be maintained. See AASHTO GBF 6.6.1.1 for guidance.

In locations with a downhill slope greater than 1V:3H adjacent to the path, a wider shoulder (5 feet or more) with a 1V:6H slope should be considered before the top of the steeper slope. Conditions such as slope, the height of the drop, and conditions at the bottom of the drop should be considered in analyzing whether barriers such as fences, rails, or dense vegetation should be used to reduce risks to trail users.

A physical barrier or rails are recommended where a 5-foot wide recovery area cannot be maintained, and there are:

- slopes of 1V (vertical):3H (height) or steeper with a drop of 6 feet or greater,
- slopes of 1V:3H or steeper adjacent to a parallel body of water or other substantial obstacle,
- slopes of 1V:2H or steeper with a drop of 4 feet or greater, or
- slopes 1V:1H or steeper with a drop of 1 foot or greater.

Condition 1: Gentle side slope, no fence or additional graded area needed



Condition 2: Steep side slope, additional graded area provided

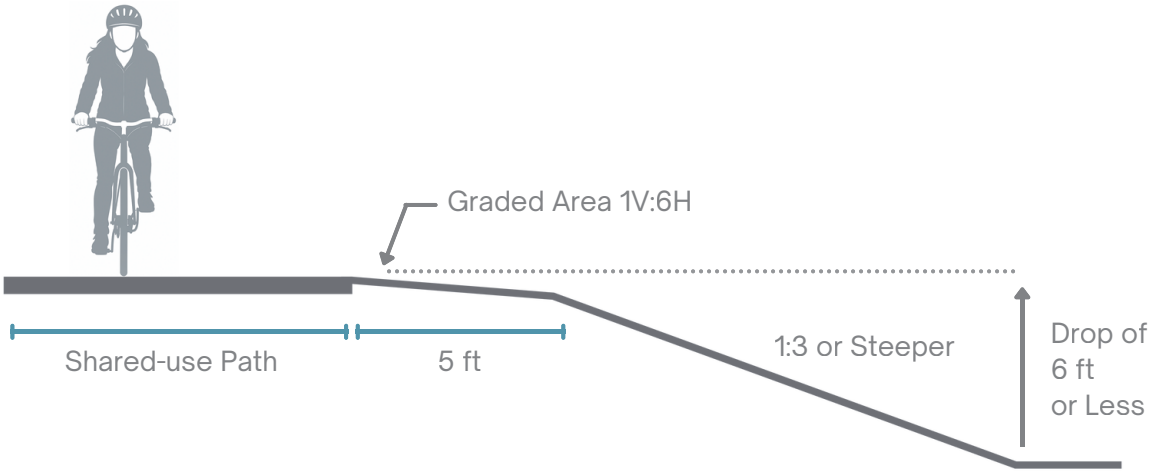
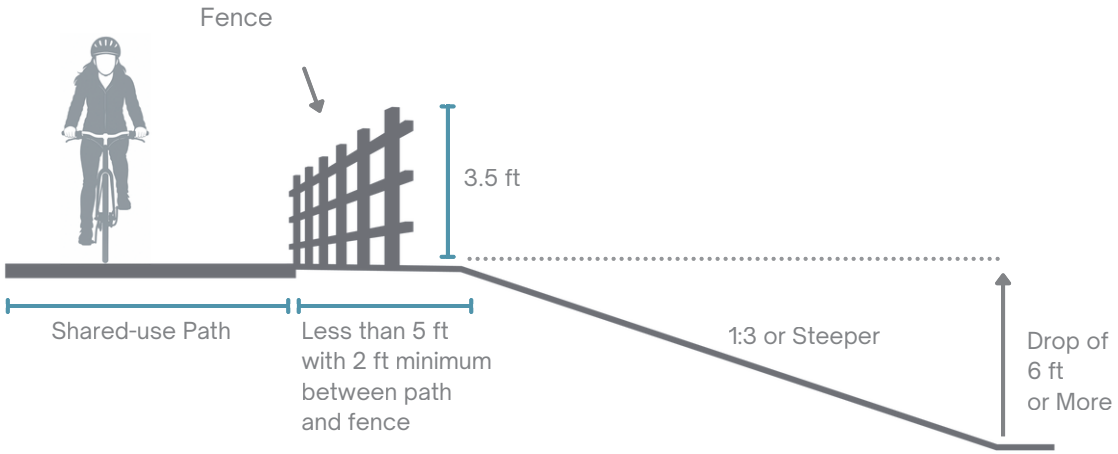


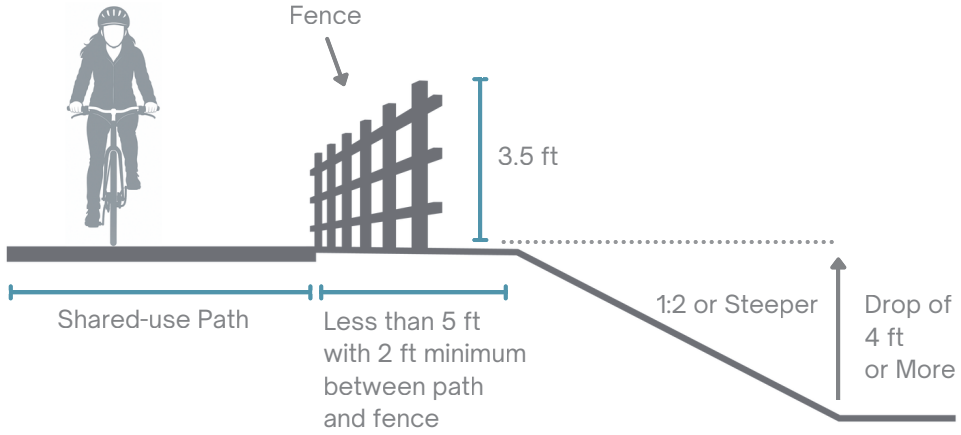
Image based off Bicycle Facility Design Manual, MNDOT



Fence/Barrier Guidance:

When barriers, such as fences, are used there should be a 2' clear area between the edge of the path and the barrier. Also, when fences or rails are adjacent to a path, rub rails should be used to prevent handlebars from getting caught. The images below also show some guidance for when fences or barriers are adjacent to slopes.





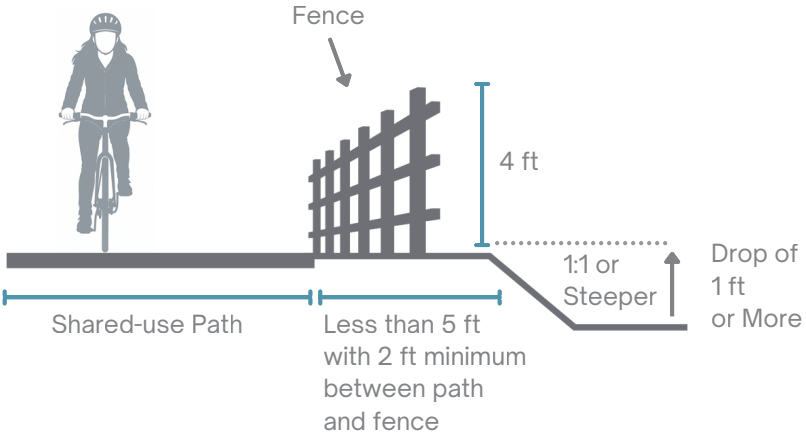


Image based off Bicycle Facility Design Manual, MNDOT

Cross Slopes:
The ideal cross slope for bike and pedestrian facilities is 1%-1.5%, as they are easier for people in wheelchairs to navigate while being able to convey drainage. Additionally, cross slopes should not exceed 2% to meet disability design requirements. See AASHTO GBF 5.6.3 for additional guidance.

Cross slopes should transition to connect to existing slopes to adjust to changes in slope or drainage, or sometimes to a horizontal curve. These transitions should be smooth and comfortable for users and have a minimum length of 5 feet per 1% change in cross slope.

Stopping Sight Distance:
Bicycle facility design should take into consideration stopping sight distance to ensure that there is time to react to unexpected conditions. Stopping sight distance calculations include variables such as reaction time, starting speed, the coefficient of friction between the path and the wheels, the grade of the path, and the braking ability of the user's equipment. Formulas for calculating stopping sight distance can be found in resources such as the 2024 AASHTO Bike Guide. Sight distance needs to be evaluated for vertical curves, as well as horizontal curves. In locations where there isn't adequate stopping sight distance for trail users, pavement markings such as a solid yellow center stripe indicating a "no passing" zone or curve warning signs should be considered. See AASHTO GBF 5.5 for additional guidance.

Grade:
Paths should have a maximum grade of 5%. Grades should be minimized on long stretches, as steep ascents and descents can be difficult and dangerous for many trail users. Pedestrian access standards must also be met with shared-use paved paths, which also limits maximum grades to 5%, except under certain circumstances which can be found on the U.S. Access Board website.

Grades of less than 0.5% should be avoided because they create challenges with stormwater conveyance. It is better to use small rolling hills that convey storm drainage to outlet locations.

The path material must also be considered, as grades steeper than 3% may be difficult for users when the path is unpaved.

Options to mitigate excessive grades include:

- When long grades must be used, provide an additional width of 4 to 6 feet to permit slower bicyclists to dismount and walk uphill and to provide more space for fast downhill riders.
- Use higher design speeds for horizontal and vertical alignments, stopping sight distance, and other geometric features.
- Install hill warning signs for bicyclists (W7-5 in the MUTCD) and alert users to the maximum percent grade on the downhill approach.
- Provide greater clearances on each side of the path and/or railings where appropriate.
- Provide resting areas and resting intervals with flatter grades.
- Use a series of short switchbacks with 4 to 6 feet of extra maneuvering space.
- Consider the use of advisory speed plaques.

See AASHTO GBF 6.6.4.1 for additional guidance.

Surfaces:
Paths can be either concrete or asphalt. Asphalt is the most common surface since it has the lowest initial cost. However, concrete paths have been proven to reduce maintenance costs over the long term and are more durable. When concrete is used, saw-cut concrete joints are recommended to improve users' experience.

Asphalt's advantages include that it has a lower initial construction cost, is softer and preferred by runners and walkers, and pavement markings are often more visible on asphalt over concrete due to a higher contrast.

A soil investigation should be performed and considered along with the expected loads (maintenance and emergency vehicle use should be considered) on the trail to determine the pavement section design for all paved paths.

Efforts should be made to ensure a smooth riding surface. When utility covers or drainage grates are required, they should be bicycle-compatible and flush with the pavement surface.

See AASHTO GBF 6.6.2 for additional guidance.

Accessibility:
Aspects such as the surface type, cross slope, and grade directly affect the accessibility of paths. Wheelchair users can most easily navigate hard surface paths with a cross slope of 1%. Slopes of paths should be 5% or less, and rest areas and rest intervals should be considered for long stretches of steep slopes.

Vertical Alignment:
The vertical alignment should provide users with a smooth and comfortable experience. It should also provide users with sight distances that allow them to pass other users safely. In flat areas, a gradually rolling vertical profile can help convey stormwater better than letting the area remain flat around the path.

See AASHTO GBF 6.6.4 for additional guidance.

Drainage:
Minimum cross slopes of 1 percent and longitudinal grades of 0.5% typically provide conditions for adequate drainage, and paths are typically sloped uniformly in one direction rather than crowning. The slope direction typically follows the natural terrain to avoid the need for channelized flow where possible. When needed, manhole covers and bicycle-compatible drainage grates should be located outside the bicycle/pedestrian facility.

See AASHTO GBF 6.6.6 for additional guidance.

Design Speed:
Design speeds should be selected and used for all pertinent features along a facility to provide continuity. Usually, the selected speed should be at least as high as the preferred speed of the fastest common user. This speed depends on many conditions, including the type of equipment being used, the purpose and length of the trip, the condition and grade of the path, wind conditions, and the number and type of other users. Design speeds for paths are typically reported in 2 mph increments and range from 12 mph to 30 mph. Most paths in flat areas have a design speed of 18 mph, but it varies depending on all the path conditions. In some areas, it may be desirable to lower speeds through geometric design, such as horizontal curves, to reduce the likelihood of crashes at conflict points.
See AASHTO GBF 6.5 for additional guidance.

Horizontal Alignment:
Most adult bicyclists lean while turning at corners to avoid falling. There are two methods for calculating the minimum radius of horizontal curvature for bicycles: using the “lean angle” or the superelevation method. These methods are outlined in resources such as the 2024 AASHTO Bike Guide. When the minimum radius of horizontal curvature cannot be achieved in the path design, warning signs or widened pavement through constrained corners can be used. See AASHTO GBF 6.6.3 for additional guidance.

Pavement Markings:
Pavement markings on bicycle and mixed use facilities can be used to indicate separation of lanes, provide guidance on assigned travel paths, and provide information in advance of turning and crossing maneuvers. They should be retroreflective and use materials that will minimize loss of traction under wet conditions.

On two-way facilities, a solid yellow centerline stripe may be used when passing is not advisable (due to sight distance concerns or heavy user volumes), and a broken yellow line may be used when passing is permitted.

In some areas of extremely heavy path volumes, pedestrians and wheeled users can be segregated using pavement markings. The markings and signage should clearly define what lane is used for bi-directional pedestrian use and also define lanes for each direction of bicycle traffic. The pedestrian only lane should be on the side of the path with a view when applicable. Bicycle specific marking requirements are found in Chapter 9E of the MUTCD 11th Edition and AASHTO GBF 6.6.9.

Additionally, pavement markings can be used at potential conflict points to prevent collisions between motorists and bicyclists/pedestrians. This can include stop bars at intersections as well as crosswalk markings across the intersection. It can also include markings on a path to warn users to yield and watch for vehicles.

Green pavement markings are often used for bicycle facilities and standards for their use can be found in Chapter 3H.06 of the MUTCD 11th Edition.

Pavement Markings for Buffered Bike Lanes:

- Bicycle lane word and/or symbol and arrow markings (MUTCD Figure 9E-1) shall be used to define the bike lane and designate that portion of the street for preferential use by bicyclists.
- The buffer shall be marked with 2 solid white lines. White lines on both edges of the buffer space indicate lanes where crossing is discouraged, though not prohibited (MUTCD 9E.06). For clarity, consider dashing the buffer boundary where cars are expected to cross at driveways.
- The buffer area shall have interior diagonal cross-hatching if it is between 2 ft and 4 ft wide or chevron markings if wider than 4 feet (AASHTO GBF 9.5).
- Consider separated bike lanes with vertical elements when space allows for buffers of 6 ft or more (AASHTO GBF 9.5).

Pavement Markings for Conventional/Constrained Bike Lanes

- Mark a bike lane line with a normal solid white line and a standard bike lane symbol marking (AASHTO GBF 9.4.2). The MUTCD 2023 Section 9E provides standards and guidance for applying these elements.
- Lane markings should remain solid and not dotted at the driveway crossing. The MUTCD does not recognize a driveway as an intersection (MUTCD 2023).
- Bicycle lane word and/or symbol and arrow markings (MUTCD Figure 9E-1) shall be used to define the bike lane and designate that portion of the street for preferential use by bicyclists. These markings shall be placed outside of the motor vehicle tread path at intersections, driveways, and merging areas in order to minimize wear from the motor vehicle path.
- A solid white lane line marking shall be used to separate motor vehicle travel lanes from the bike lane.
- A dotted lane line can be used in high conflict areas such as intersections where vehicles may be entering the bike lane and where transit vehicles will be frequently crossing the bike lane (AASHTO GBF 9.12.1).
- A through bike lane shall not be positioned to the right of a right-turn-only lane or to the left of a left turn-only lane (MUTCD 9E.02). A bike lane may be positioned to the right of a right-turn-only lane if split-phase signal timing is used (AASHTO GBF 9.12.3.7).
- Guidance for bike lane markings at intersections is provided in AASHTO GBF 9.12.
- Bike lane symbols should be placed within 50' of an intersection and then at intervals that are not more than every 250 feet in urban areas. Symbols may be needed more frequently depending on factors such as the frequency of driveways or turn lanes (AASHTO GBF 9.4.2).
- Bike lane symbols may be up to 1,000 feet apart in rural areas (AASHTO GBF 9.4.2).



Signage:
Signage can serve many purposes, and guidance for bike facility specific signage can be found in the 11th Edition of the MUTCD in Chapters 9B, 9C, and 9D.

Warning Signage:
Careful attention should be placed on warning signage. Warning signs can be used to notify of path narrowing, a crossing ahead, steep grades, etc. Guidance for warning signs can be found in Chapter 9C of the MUTCD 11th Edition.

Directional Signs:
Place directional signs at junctions and decision points to help users navigate the network. Use arrows or symbols to indicate where users should go to reach specific destinations or points of interest. Signs can also be used at mid-block crossings to notify users of what streets they are crossing as well as to notify drivers of the name of the trail they are crossing. Guidance for directional signage can be found in Chapter 9D of the MUTCD 11th Edition.

Signage and Wayfinding:
Knowing your location within an active transportation network is important for user security while enhancing the experience. An opportunity exists for the city to develop a comprehensive wayfinding and signage program for the active transportation network. A comprehensive wayfinding and signage plan can delve into the system's look, feel, and brand to create a unified approach to navigating on bike and foot. Essential elements of a wayfinding and signage plan are as follows:

Clear and Consistent Signage:
Ensure all signage is clear, easy to read, and consistent throughout the system. Use large fonts and high-contrast colors to make signs easily visible, even from a distance. Ensure that the signage has a consistent look and feel both in the physical structure of the sign and in the maps.

Distance Markers:
Install distance markers at regular intervals along routes to inform users of how far they have traveled and how far they have left to go. This information can be especially helpful for planning breaks and estimating travel time.

Emergency Information:
Include emergency contact information and instructions on what to do in case of an emergency on signage, especially for paths that aren't along roadways. This can include contact numbers for local emergency services, trail rules, and safety tips.

Trailhead Signage:
Provide clear signage at trailheads indicating the trail's name, difficulty level, length, and any important safety information. Trailhead signage should also include a map of the trail system with key landmarks and points of interest marked.

Trail Markers:
Install trail markers regularly along the trail to reassure users that they are on the right path. Depending on the terrain, these markers can be posts, blazes painted on trees, or other visible markers.







Trail Maps:
Provide trail maps at key locations such as trailheads, parking areas, and visitor centers. These maps should be easy to read and include information on trail difficulty, length, elevation gain, and points of interest.

Multilingual Signage:
If the trail system is frequented by users who speak different languages, consider providing multilingual signage to ensure that all users can understand important information.

Accessible Signage:
Ensure that signage is accessible to users with disabilities, including those who are visually impaired or have mobility impairments. Use braille, tactile markers, and wheelchair-accessible formats as needed.

Regular Maintenance and Updates:
Regularly inspect and maintain signage to ensure that it remains in good condition and continues to provide accurate information to users. Replace damaged or faded signs promptly to avoid confusion.

INTERSECTION DESIGN GUIDANCE

The following pages provide guidance on intersection design on bicycle and mixed-use facilities. The following information is provided:

Path Intersection and Crossing Design

- Intersection Design
- Mid-Block Crossing Design
- Driveway Intersections
- Minor Intersection Crossings
- Managing Bicycle Speed at Crossings
- Crossing Accessablitity

Bike Lane Intersection and Crossing Design

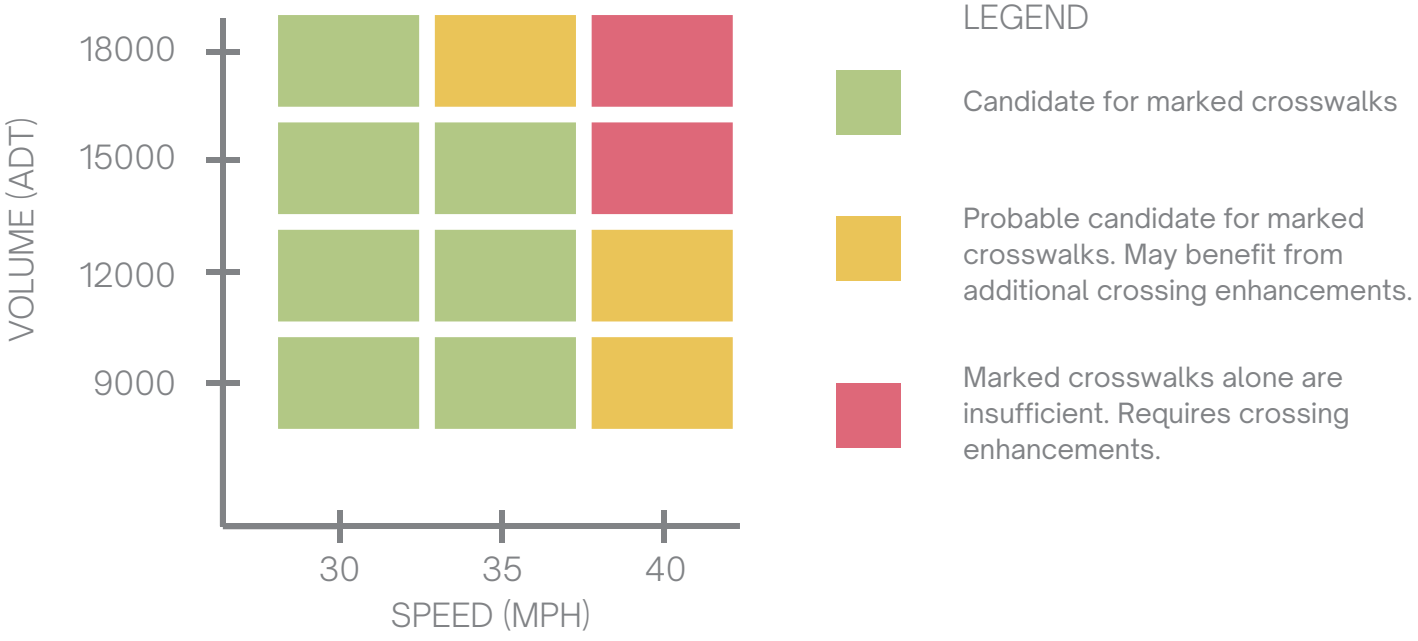
- Protected Intersection
- Key Intersection Elements
- Intersection Crossing Markings
- One-way Separated Bike Lane Driveway Crossings
- Two-way Separated Bike Lane Driveway Crossings
- Mixing Zones





Path Intersection and Crossing Design

People of all ages and abilities use shared paths for activities like walking and cycling. These paths often intersect with roadways, posing user challenges at these points. Crossing designs should minimize path users' exposure to traffic and minimize the speed differential where travel movements intersect.
Intersection crossing criteria should be established based on the slowest users, which are typically pedestrians and child bicyclists. When paths intersect roadways away from designated crossings, conflicts can arise between path users and road users. It is crucial to apply sound design principles for these midblock intersections, similar to regular road intersections. Inappropriate treatments at these crossings can lead to users' non-compliance. For instance, using stop signs where visibility is good may not be effective, whereas yield signs could match user behavior better. Conflicts may also arise at angled intersections, affecting sightlines between path and road users. Ideally, intersections should be close to a 90-degree angle to ensure good visibility and stopping distances for everyone. By incorporating these design principles, conflicts at path and roadway intersections can be reduced or prevented effectively. See AASHTO GBF 6.7 for additional guidance.



Source: Small Town and Rural Design Guide, FHWA

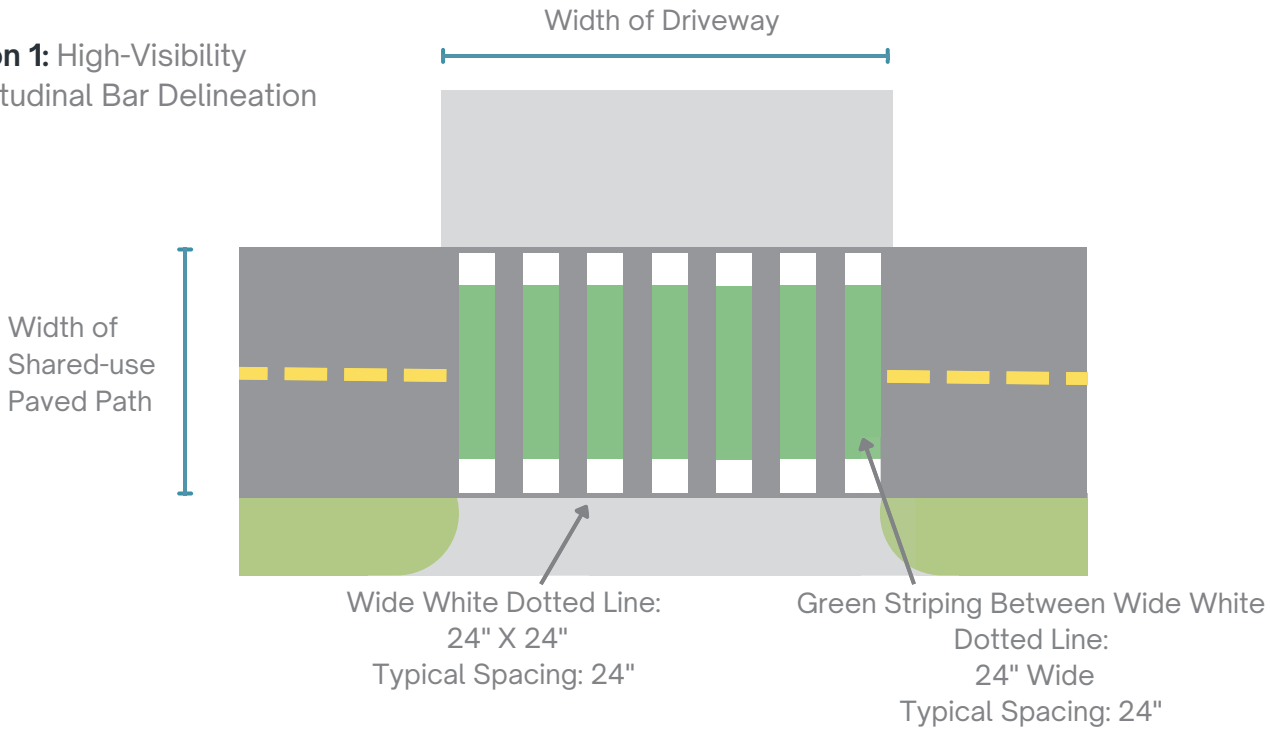
Intersection Design:
Intersection design for shared use paths requires careful attention to address potential conflicts. The design should be predictable and orderly to provide comfort and increase safety. Each intersection is unique and requires engineering judgment to determine the best treatment. Basic measures that can be used to reduce crash severity and frequency include reducing the speeds of path users and motorists, increasing the predictability of behavior, and limiting the amount of exposure at conflict points.

Mid-Block Crossing Design:
Mid-block crossings are similar to intersection design, and the same design principles apply. Many features can be considered, and some may be appropriate at different locations, but engineering judgment should be used to determine appropriate treatments based on the conditions at the crossing location. One principle that should be considered in the design is that it is safest at crossings for the path to be perpendicular to the roadway and provide the best lines of sight for path users and drivers.

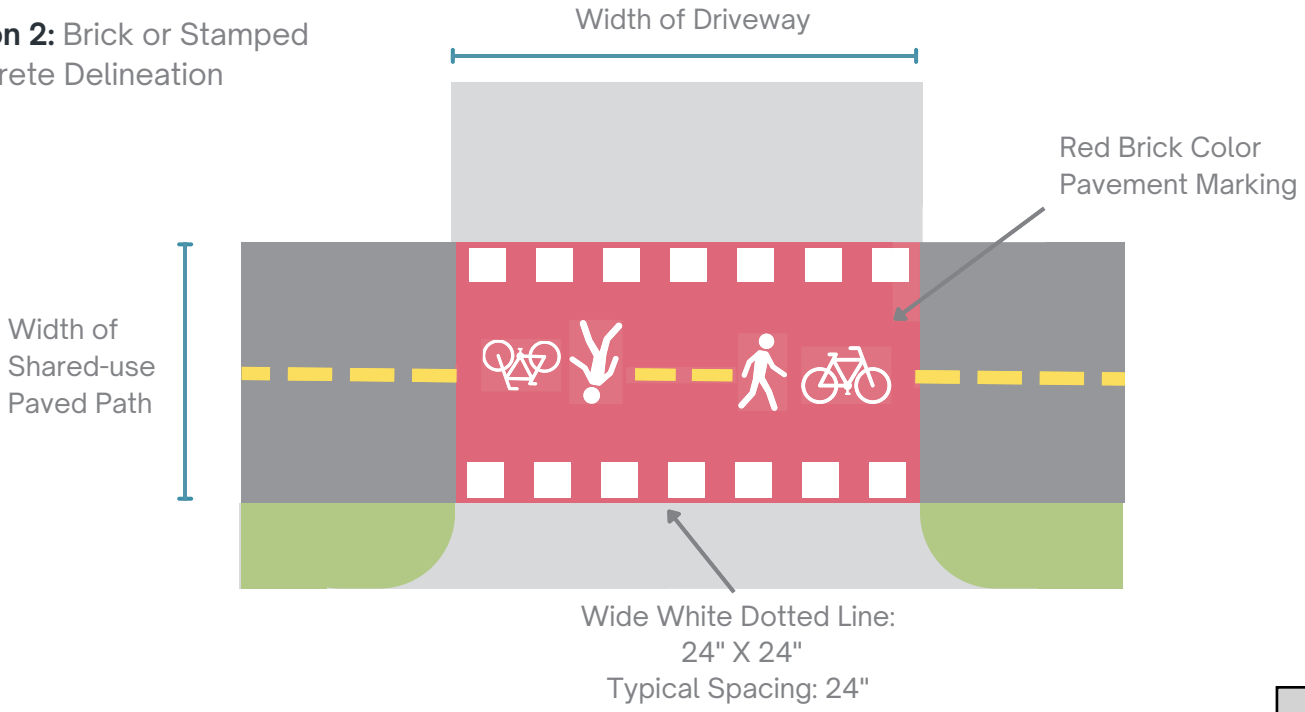


Driveway Intersections for Paths:
Pathways with a low density of driveways are the ideal condition. However, shared-use paths frequently must cross driveways and some design options help bring drivers' attention to the path and its users. One option is to continue the path surface across the driveway so it is clear that the path users have the right of way. Signs and pavement markings can also be used, as well as small corner radii, to encourage reduced speeds.

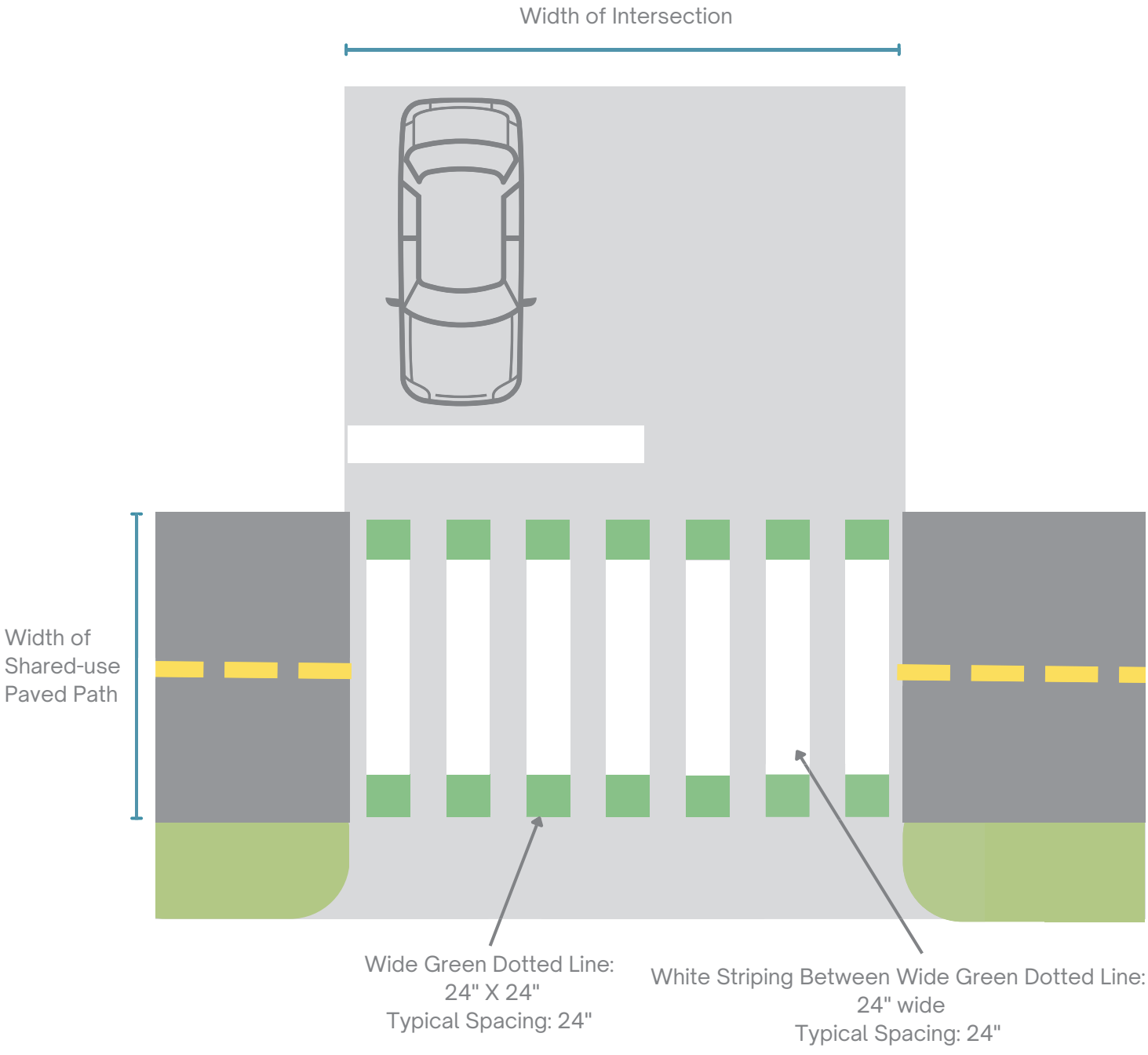
Option 1: High-Visibility Longitudinal Bar Delineation



Option 2: Brick or Stamped Concrete Delineation



Minor Intersection Crossings:
It is not always cost effective to continue shared-use paved paths over minor intersection crossings. In these cases, the intersection or road material can remain, and white high-visibility longitudinal bars are recommended to be painted in the crossing area to increase visibility for vehicle operators and vulnerable road users.



Managing Bicycle Speed at Crossings:
Design methods can be used to reduce shared path users' speeds at the approach of a street crossing. One such method is a chicane, which introduces horizontal curvature, to slow users before a crossing where they must yield, stop, or have limited sight distance. Chicanes should be placed in a location that allows users to navigate them and then be able to direct their attention to the intersection they are approaching.

Crossing Accessibility:
The transition between the shared use path and roadway should be smooth and accessible, and usable by individuals with disabilities. Ramps should be the full width of the side path and have detectable warning surfaces along the full width as well.



Bike Lanes Intersection and Crossing Design

Intersections and crossings are important considerations in designing safe and comfortable bike lanes. Due to vehicular traffic converging at intersections, strategic design is needed to mitigate risks. Ideally bike lanes and vehicular traffic will maintain their separation at intersections, but in constrained locations with low speeds “mixing zones”, or spaces where bicycle traffic is reintroduced to vehicular traffic, may be considered.

Protected Intersection:
Protected intersections use corner refuge islands, forward stop bars, and setback crossings to maintain the separation between cyclists and vehicles. These elements improve visibility and provide safe waiting areas for cyclists, making it easier for them to navigate the intersection. See AASHTO GBF 7.9.7 for additional guidance on protected intersections.



Key elements for intersection design are outlined in section 7.9 of AASHTO GBF and th include minimizing exposure to conflict and reducing speeds at potential conflict points. Another key factor is increasing visibility of the bicycle riders to motorists. These factors should be considered in intersection design, as well as minor intersection design and driveway crossings. Chapter 4 of NACTO UBDG also provides recommendations improving safety for intersection design.

Minimizing Exposure to Conflict

Pedestrian Islands

Islands reduce crossing distances and improve visibility by keeping the intersection clear. Wider islands support high volumes of people walking and biking, raising the intersection's capacity. In some cases, islands can reduce the signal time needed for pedestrians.

Bike Queue Area

People biking can wait ahead of the crosswalk for a green signal or a gap in traffic. This shortens crossing distances and accommodates the natural positioning of people biking. Bike detection is optional.

Corner Island

A corner island separates bikes from motor vehicles, prevents motor vehicles from encroaching on the bikeway, and creates a protected queuing area for people on bikes waiting to turn.

Motorist Waiting Zone

The space between the motor vehicle lane and the crossbike provides a place for motor vehicle drivers to wait before turning across the bike's path of travel.

Reducing Speeds

Compact Corners

Small turn radii force turning drivers to slow down. If there is no raised crossing, the corner radius is the primary method to reduce turn speed.

Raised Crossings

See "Increasing Visibility for more details

Increasing Visibility

Clear Sight Distance

A clear approach sightline gives drivers time to see and yield to people in the crossbike and gives people on bike or on foot time to see and react to turning cars.

No Stopping / No Standing Zone

Motor vehicle parking and stopping are prohibited on the approach to the intersection. This improves sight distance.

Bikeway Setback

The setback determines how much room will be available for drivers to wait and yield, and the angle at which they cross the bikeway. Larger setbacks provide better visibility and give people bicycling more time to notice and react to turning vehicles.

Markings

Markings provide conspicuity and directional guidance to bikes in the intersection. They are marked with dotted bicycle lane line extensions and may be supplemented with green color or bike symbols between these lines.

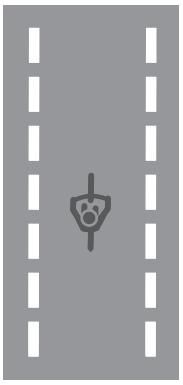
Raised Crossing

Raised crossings improve bicyclists' visibility and reduce the speed at which vehicles turn by bringing the vehicle crossing up to (or near) the sidewalk level. In addition, the raised crossing is a signal to turning cars that through-moving bikes and pedestrians have the right of way.

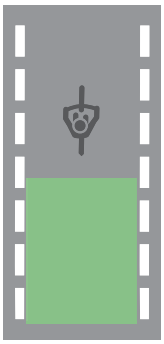
Intersection Crossing Markings:

Intersection crossing markings indicate the intended path of bicyclists. They guide bicyclists on a safe and direct path through intersections, including driveways and ramps. They provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane. AASHTO GBF section 9.12 contains guidance for bicycle lanes at intersections and NACTO UBDG section 4.1.2 has guidance for crossings at intersections. MUTCD's standards for crosswalk markings are found in Chapter 3C and standards for bicycle specific crossings are found in Chapter 9E of the MUTCD 11th Edition. The following design elements should be considered based on existing intersection conditions:

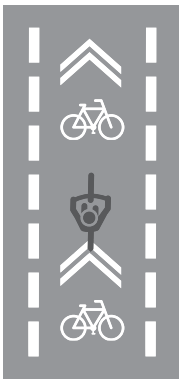
- Dotted lines should bind the bicycle space and should be white, skid-resistant, and retro-reflective (see MUTCD for requirements for dotted line extensions through intersections). Dotted lines should be used to delineate conflict areas within the bike lane and solid bicycle lane lines should be used immediately after the conflict area (AASHTO GBF 9.12.1).
- Colored pavement may be used for increased visibility within conflict areas or through the entire intersection (AASHTO GBF 9.12.1).
- Crossing lane width should match the position and width of the bike lane on each side of the intersection. Bike lanes should not be narrowed at street crossings.
- When two-way cycle tracks go through the intersection, markings should indicate the two-way traffic through the intersection.



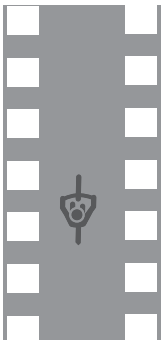
Dotted lines shall bind the bicycle crossing space. See MUTCD Sec. 38.08 for dotted line extensions through intersections. Stripping shall be a minimum of 6 inches adjacent to motor vehicle travel lanes and shall otherwise match the width and lateral positioning of leading bike lane striping, except when using wide white dotted line markings.



Colored pavement may be used for increased visibility within conflict areas or across entire intersections. Green colored pavement is experimental in the MUTCD.



Shared lane markings (MUTCD Figure 9c-9) may be used for increased visibility within conflict areas or across entire intersections. Placement shall be in the middle of the moving lanes and close to crosswalks.

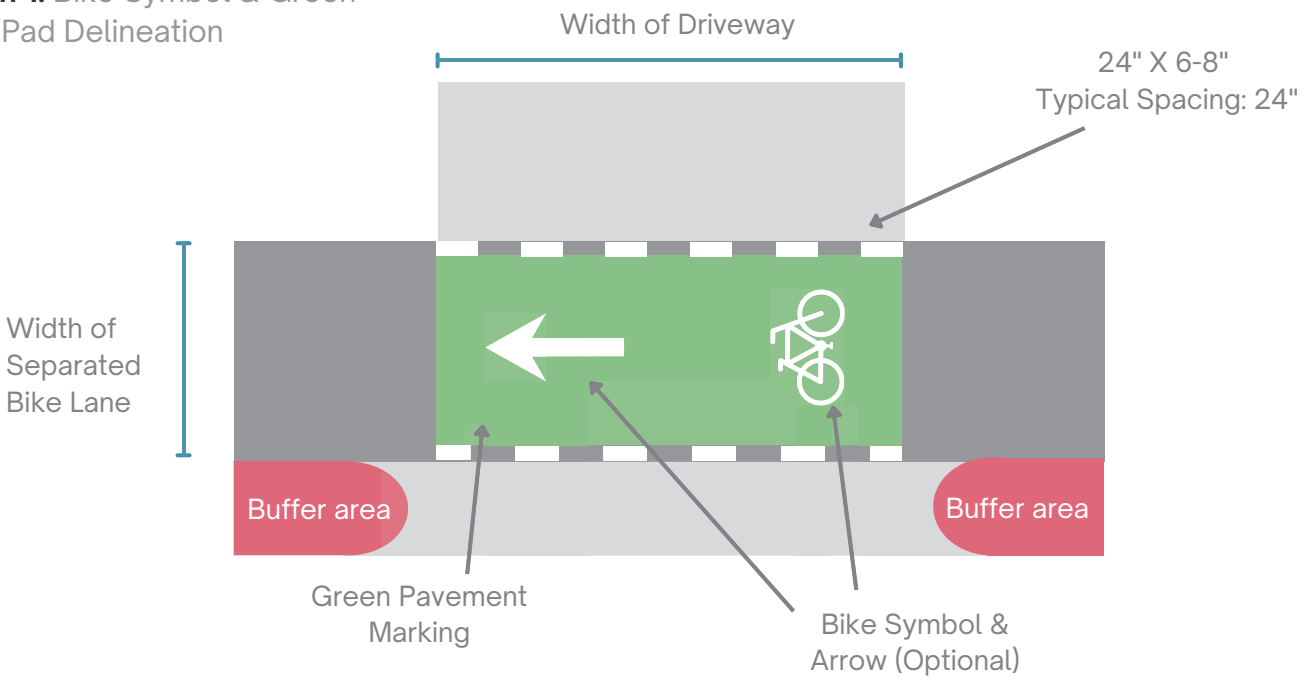


Wide dotted line markings (NACTO also refers to these as "Elephant's feet" markings) may be used as an alternative to dotted line extensions to increase visibility. If used, the markings should be 14-24 inches square, with equal distance spacing between markings. Markings should be positioned on the outside of the lane.

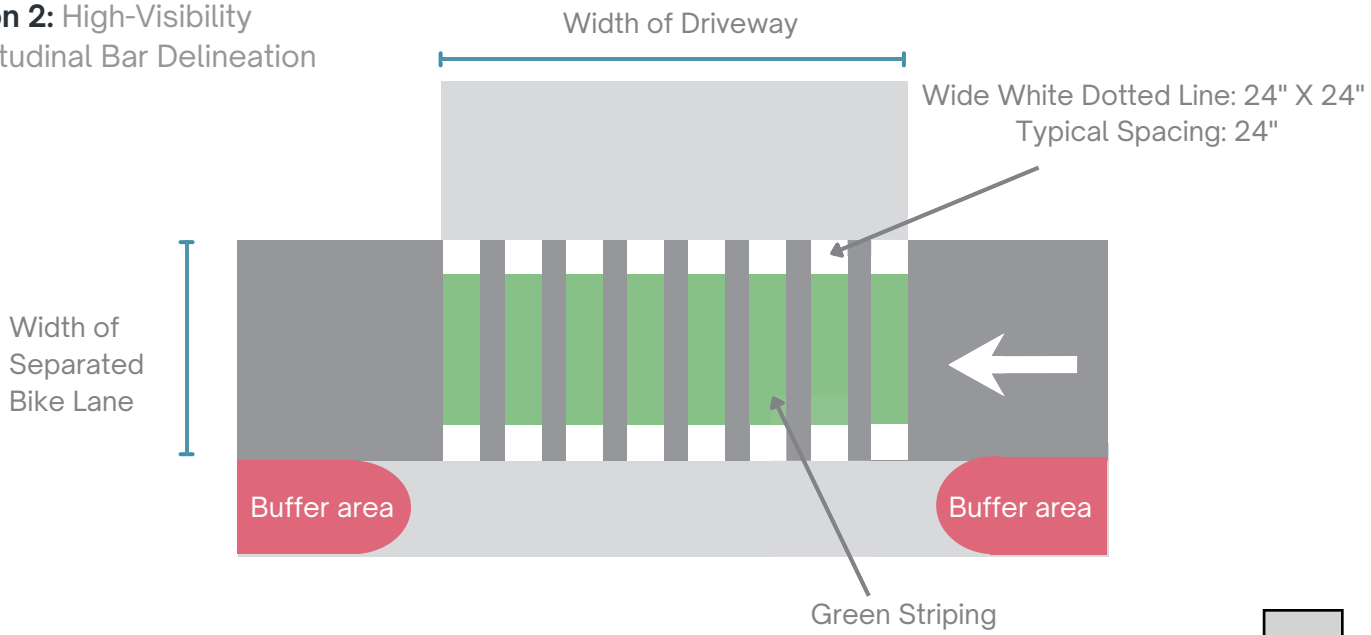
One-Way Separated Bike Lane Driveway Crossings:

Separated bike lanes (SBL) frequently cross driveways. Pavement markings and signage can help to increase visibility for bike riders in the SBL and help influence motorists to yield where applicable. The figures below show options for pavement markings which can help achieve these goals. Pavement markings can be applied as paint or as thermoplastic. Thermoplastic is a higher cost option however, it does have a longer useful life. Please reference MUTCD 11th edition and for full details and specifications for pavement markings (Chapter 9E.04) and regulatory signage Chapter 9B).

Option 1: Bike Symbol & Green Paint/Pad Delineation

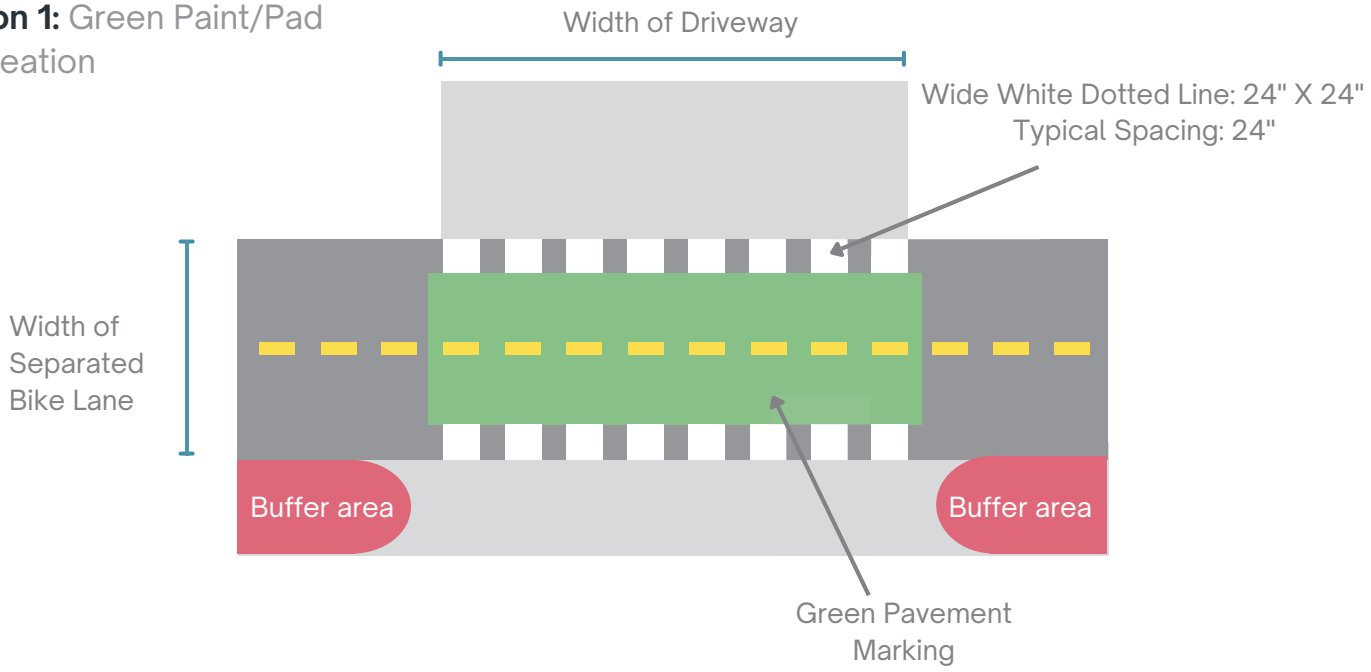


Option 2: High-Visibility Longitudinal Bar Delineation

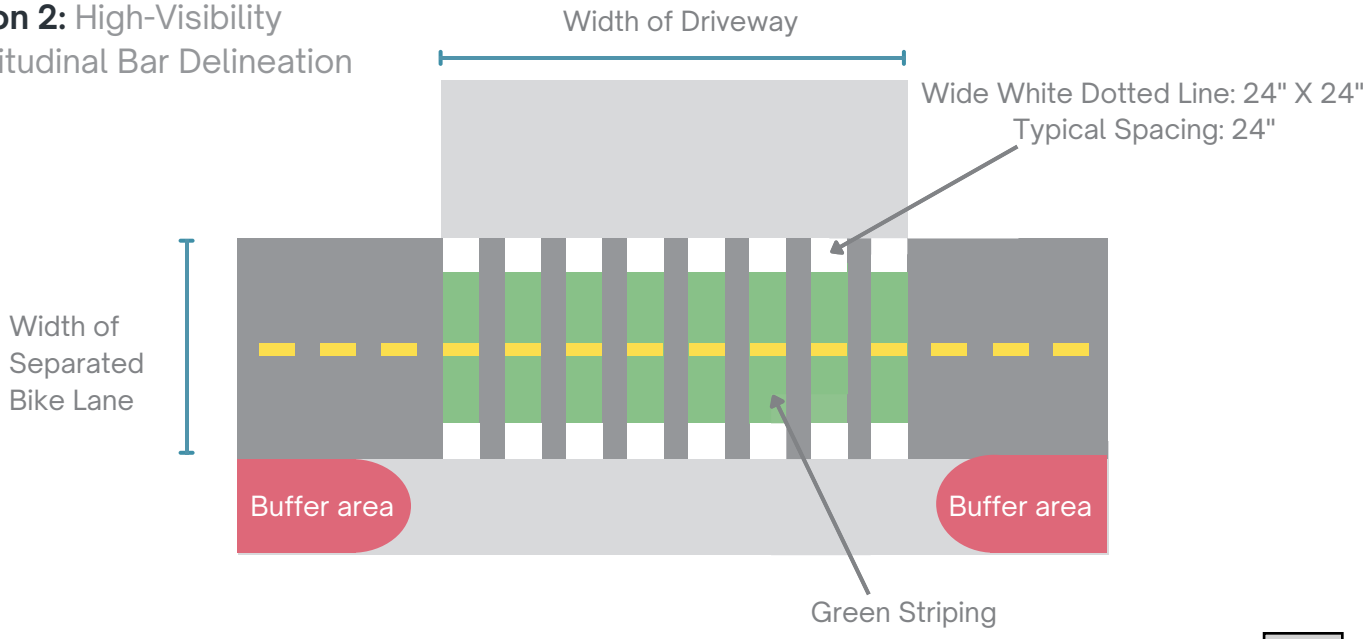


Two-Way Separated Bike Lane Driveway Crossings:
The figures below show options for pavement markings which can help achieve the goals outlined on the previous page but are for two-way separated bike lanes rather than one-way. Please reference MUTCD 11th edition and for full details and specifications for pavement markings (Chapter 9E.04) and regulatory signage Chapter 9B).

Option 1: Green Paint/Pad Delineation



Option 2: High-Visibility Longitudinal Bar Delineation



Mixing Zones:

Mixing zones are where a vehicular lane and bicycle lane cross paths and merge or switch lane placement. This typically occurs at intersections where the vehicular traffic has a dedicated right-turn lane. Mixing zones are only applicable on street segments with one-way separated bike lanes. Streets with speeds in excess of 35 mph may require deceleration lanes in advance of the mixing zone. See AASHTO GBF 7.9.9 for additional guidance on intersection design with mixing zones.

NACTO warns that mixing zones are not necessarily All Ages and Abilities bikeways as they don't provide the level of comfort needed for that designation. However, they are considered safer than having a bike lane in between travel lanes or dropping the bike lane altogether.

Mixing zones are recommended to be used only when:

- the bicycle lane is one-way in the same direction of traffic as motorists.
- speeds are 35 mph or less.
- it isn't possible to provide dedicated bicycle facilities at the intersection approach.

Mixing zones with a yielding area must have markings to indicate where motorists enter the shared space and shall yield. Shared lane markings and turn arrows must be provided where the mixing zone continues into the intersection and bicycles, and motorists continue to share space. Signage and markings should be used to inform users of the mixing zone and provide instructions for positioning in the lane. Standards for pavement markings at mixing zones can be found in Section 9E.02 and 9E.03 of the MUTCD 11th Edition.



CITY OF WILLARD, MISSOURI

RESOLUTION NO:

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF WILLARD, MISSOURI, APPROVING THE ACTIVE TRANSPORTATION PORTION OF THE COMPREHENSIVE PLAN.

WHEREAS, the comprehensive plan does not specifically address Active Transportation and is in need of revision, and

WHEREAS, public engagement in the form of meetings, surveys and active community participation helped shape the active transportation document, and

WHEREAS, an active lifestyle has been proven to be beneficial ,

NOW, THEREFORE, BE IT RESOLVED BY THE PLANNING & ZONING COMMITTEE OF THE CITY OF WILLARD, MISSOURI, AS FOLLOWS:

WE APPROVE OF THE ACTIVE TRANSPORTATION PLAN AS DEFINED IN THE FOLLOWING DOCUMENTS

Dated: This the **17th day of February, 2026** by the Board of Aldermen of the City of Willard, Missouri.

Valorie Simpson-Secretary

Attested by Courtney Meyers, City Clerk

CITY OF WILLARD, MO

ACTIVE TRANSPORTATION NETWORK PLAN

2026



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OVERVIEW



Active transportation is defined as transportation that is powered primarily by humans and includes walking, biking, rolling, and running. The strategic planning of an active transportation network within a city, region, and state has many benefits, including health, safety, and increased economic development. The network plan developed with the City of Willard focuses on the identification and prioritization of shared-use paved paths, sidepaths, on-street bicycle facilities, as well as strategic sidewalk connections. This plan is designed to complement and be an extension of the city's comprehensive plan and the integration of these facilities into the broader transportation system. Implementation of this plan can enhance how people move between origins and destinations by providing a convenient alternative for everyday travel.

Willard has the foundation for a well-connected, safe, and accessible active transportation network, with the Frisco Highline Trail serving as the core corridor linking neighborhoods to key destinations such as schools, retail, and restaurants located along Miller Road. However, Highway 160 and several arterial and collector roads currently present barriers to walking, riding, and rolling throughout Willard.

The purpose of the Willard, MO Active Transportation Network Plan is to develop an actionable plan that provides safe active transportation options throughout the City of Willard. A core tenet of the plan is to facilitate active transportation options for people of all ages and abilities.

This plan is not intended to replace the use of motorized vehicles, but rather to expand transportation options and encourage walking, biking, and rolling. This is achieved through proposed amenities and active transportation infrastructure for residents and visitors of Willard.

EXISTING CONDITIONS

About the Project Location



Willard, Missouri, was founded in 1884 as a railroad stop along the St. Louis–San Francisco Railroad. With the rail line extending north to Kansas City, Willard quickly became a key point in a growing transportation hub. The community was later incorporated in 1949, officially becoming the City of Willard.

Willard, Missouri, is located in southwest Missouri in Greene County and is part of the Springfield metropolitan statistical area. Positioned just five miles north of Interstate 44 (I-44) and the City of Springfield, Willard occupies a prime location for continued growth and development. Highway 160 (Hwy 160) bisects the community from northwest to southeast, creating opportunities for future development along this important corridor. Running parallel to Hwy 160 and Jackson Street, the Frisco Highline Trail is a 35-mile rail-to-trail route stretching from Springfield to Bolivar, Missouri, with the heart of Willard situated at mile marker 6.



Willard, MO in 2025

Willard has an estimated population of 6,418 *[American Community Survey (ACS) 2023, 5-year estimate*)] and has grown by 15% (*ACS 2018, 5-year estimate*) over the past five years. The median age is 30, and 34% of residents are under 18. Known for the high quality of its public schools, Willard continues to attract families seeking strong educational opportunities and affordable housing. Agriculture and an aggregate stone quarry are among the community's largest industries, while many residents commute to Springfield for employment. The median household income is $87,204, and the median value of an owner-occupied home is $204,300. (*Data source, ACS 2023, 5-year estimate).* On average, households in Willard spend about 28% of their income on transportation *(Housing & Transportation Index).* Developing a well-connected, comfortable active transportation network can help reduce these transportation costs by giving residents more opportunities to walk, bike, or roll to local destinations.

EXISTING ACTIVE TRANSPORTATION FACILITIES 2025



GUIDING PRINCIPLES

Project Purpose

In the early stages of the Willard Active Transportation Network Plan, six guiding principles were developed in collaboration with the steering committee. These principles were established to shape the planning process and guide project-related discussions. Throughout the process, they served as a consistent reference point, helping to ensure alignment across planning activities.

1 ADAPTABLE

The Willard Active Transportation Network Plan will be adaptable and relevant, facilitating accessibility for all members of the community.

2 CONNECTIVITY

The Willard Active Transportation Network Plan will form an interconnected system linking key destinations, creating a resilient community.

3 VISIONARY

The Willard Active Transportation Network Plan will be inviting and full of opportunity, transforming the community into a vibrant and connected destination.

4 ACCESSIBLE

The Willard Active Transportation Network Plan will be designed to serve all modes and be accessible to all users.

5 COMMUNITY FOCUSED

The Willard active transportation network plan will promote growth and forward movement by creating a beautiful, family-friendly space that fosters community and freedom.

6 SAFETY

The Willard Active Transportation Network Plan will offer improved conditions and access, ensuring a safe and secure environment for walking and biking.

STEERING COMMITTEE

A project steering committee was created to offer incremental feedback on the planning process, serve to oversee progress, help address obstacles, and monitor progress toward key milestones.

Meeting #1 — June 2025

During the kickoff meeting in June 2025, the steering committee created a project purpose statement and guiding principles to guide the Willard Active Transportation Network Plan.



June 2025 Steering Committee Meeting

Meeting #2 — July 2025

The guiding principles were finalized in the July 2025 meeting, and the steering committee also conducted a walk audit.



July 2025 Steering Committee Meeting



August 2025 Steering Committee Meeting



November 2025 Steering Committee Meeting, input on draft network plan

Meeting #3 — August 2025

The steering committee meeting in August 2025 helped sharpen the identified active transportation routes. The steering committee reviewed feedback that was received from the community at public input sessions and provided guidance on the network.

Meeting #4 — November 2025

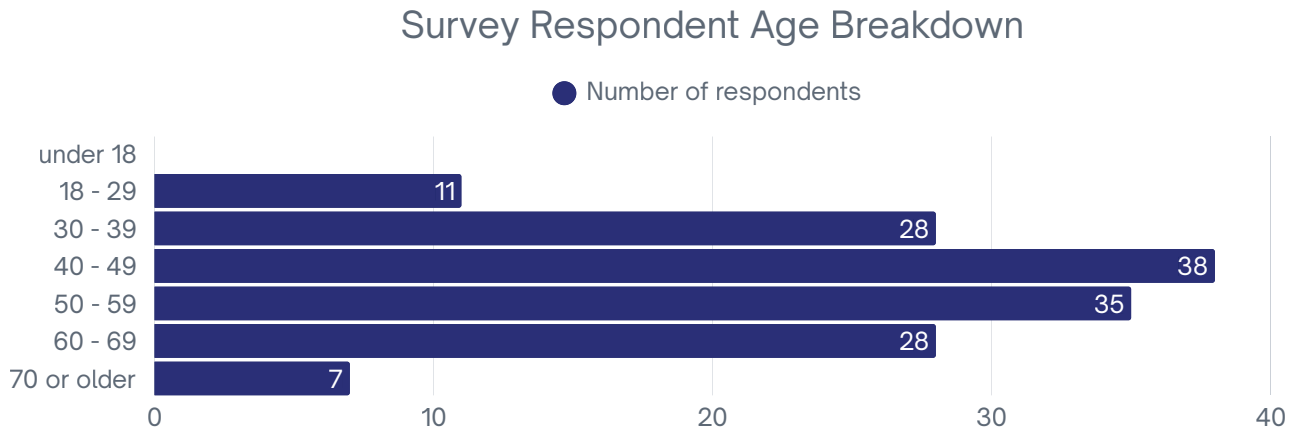
In November 2025, the steering committee was briefed on the results from both the public survey and the two public outreach sessions. The draft plans were also reviewed.

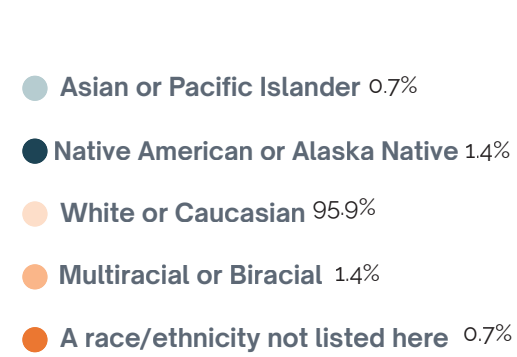
PUBLIC ENGAGEMENT

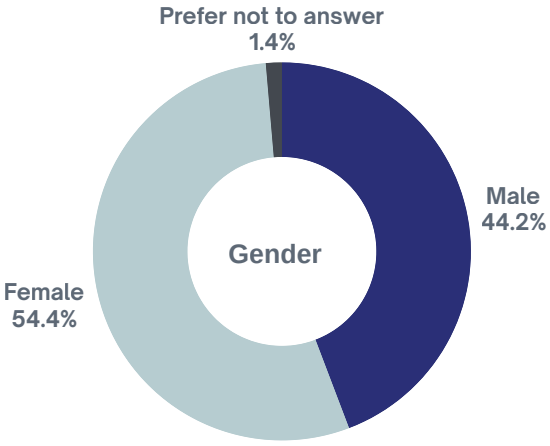
Online Community Survey

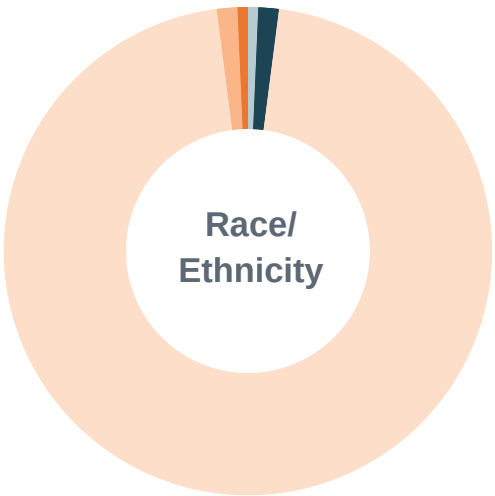
An online project survey was made available for the public during the planning process. The survey was designed to gather community feedback on usage, preferences, challenges, and desires for active transportation in Willard. The survey, comprised of 41 questions, *received 147 responses* from the community. The survey was made available between July 3 - November 11, 2025.

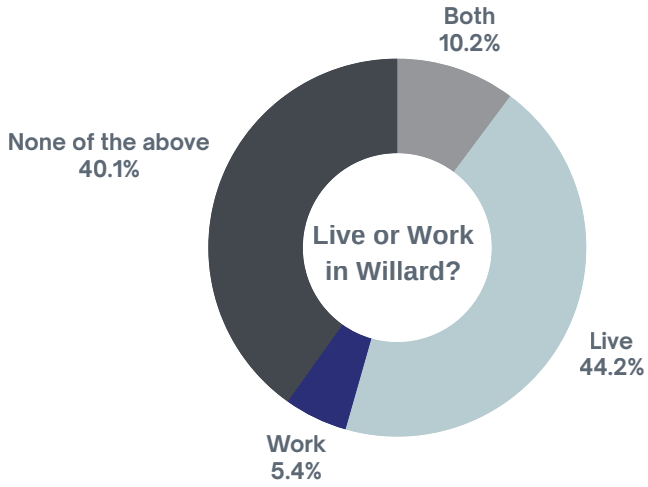
See Appendix B for the results of the online public survey.











Key Online Survey Insights

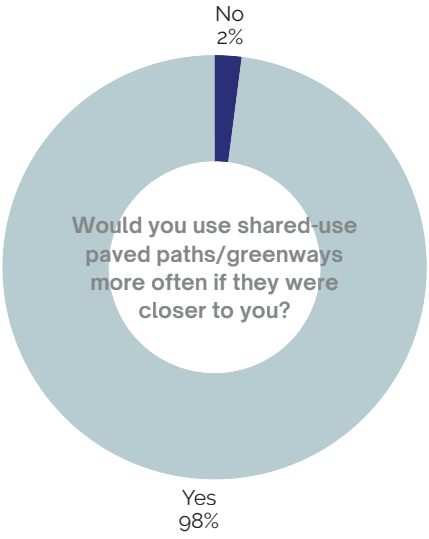
The survey results indicate that improving bicycling and walking conditions in Willard is a clear community priority. Over half of respondents (54%) stated that improving bicycle infrastructure is very important to them, while an even greater share (62%) expressed the same for walking conditions. Notably, 65% of respondents already walk in Willard, underscoring the importance of providing safe, comfortable, and accessible active transportation options.

Nearly all respondents (98%) reported that they would use shared-use paved paths or greenways more frequently if these facilities were located closer to them. In addition, 90% agreed with the statement, *"I support improving bicycle conditions within our community, whether I ride or not,"* demonstrating widespread public support for active transportation improvements.

Respondents identified that the most critical step to increasing walking and biking in the city is expanding the network of sidewalks, shared-use paths, and bike lanes. Factors such as exercise, health, and opportunities to spend time outdoors were cited as key factors that encourage a culture of physical activity within the community.

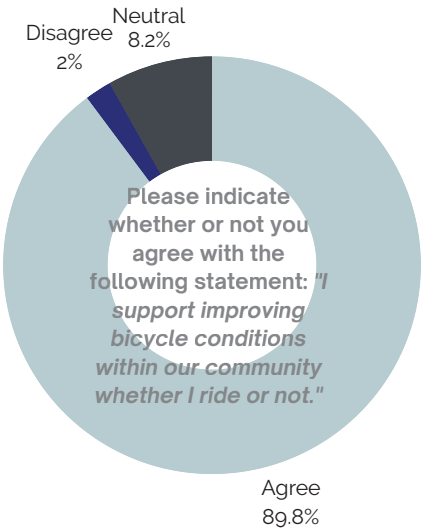
Top Three Factors Discouraging Biking and Walking in Gentry

1. **Lack of connected greenways, sidewalks, and bike lanes**
2. **Aggressive motorist behavior**
3. **Unsafe street crossings**



Top Three Amenities that are Most Important for Bike Riders and Pedestrians in Gentry

1. **Trail surfaces**
2. **Connection to other trails**
3. **Restrooms**



Public Input Sessions

During the planning process, two in-person public input sessions were conducted to highlight and promote awareness of the plan and to gain valuable community feedback. The first public session was held on August 29, 2025, at the Tiger Pride Night tailgate community event at Willard High School. The second session was held at the Willard Parks & Recreation Trunk or Treat event at the Frisco Highline Trailhead on October 25, 2025.

Attendance at both events was successful. Combined, approximately *230 individuals* participated in the public sessions through interactions with the proposed network map and guided exercises, such as placing stickers on feedback boards.

At each public input session, community members were invited to engage with preliminary network maps and place priority sticker dots on boards to indicate their top three choices for each topic. One board asked participants which bicycle and pedestrian example they would feel most comfortable using, while another asked about the destinations where they would most like to walk, bike, or roll, such as schools, workplaces, or parks.

See Appendix A for the results of the two public input sessions.

Community Feedback & Prioritization

Feedback from the interactive boards and preliminary maps showed that the community placed a strong emphasis on access to **schools**, which received the highest number of first-priority votes. Access to **parks** followed as a second priority, and **restaurants** received the most votes as a third priority. When asked about preferred bicycle and pedestrian examples, participants expressed the greatest comfort with shared-use paved paths and sidepaths “greenways”, followed by rural recreational roads, and then protected bike lanes.



August 2025 Public Input Session



October 2025 Public Input Session

Focus Groups Overview

Three focus group meetings were held in June 2025 with key stakeholders and organizations to share the planning process, highlight key objectives, surface opportunities/challenges, and ensure coordination related to active transportation in Willard. Focus groups consisted of the Willard Fire Department, Willard Public Schools, and Chamber of Commerce.

Challenges and Opportunities

Conversations at the public input sessions with steering committee members and with the focus groups helped bring to light key opportunities and challenges in Willard.

Key Opportunities:

Strong existing assets and conditions were identified as focus areas for improving the active transportation ecosystem. The existing assets and conditions included:

- T**he Frisco Highline Trail**- The trail is an intercity shared-use paved path that was identified as a potential backbone for building spur connections and downtown connections. There are also opportunities for regional events on the trail. An example is the Square to Square event that occurs on the Razorback Greenway in Northwest Arkansas.
- **The Mile 6 Brewery-** The brewery is identified as an existing popular destination that has the potential to be a hub for events, including group bike rides.
- **Close Proximity of Schools-** Many of the schools in Willard are within proximity to each other, providing the opportunity to make strategic connections that benefit connectivity to multiple schools.
- **Tunnels under Hwy 160**- The existing tunnel south of town, under Hwy 160 at FM 103, and the tunnel scheduled for construction at SH AB and SH 160 are key connections underneath a state highway that acts as a barrier for the safe movement of active transportation users.
- **Engaged Citizens-** The overwhelming participation and input received at the two public input sessions and the online survey demonstrate that the public is civically engaged in the process.
- **Influence Future Development-** Willard has the opportunity to adopt plans and revise ordinances ahead of major new and infill development that will create a safe and connected community for active transportation.



Pressing Challenges:

Community feedback also helped identify physical challenges in existing connectivity, to be addressed, including:

- **Unsafe Crossings at Schools** - Specifically noted were the intersection of Lester St. and Jackson St., which is the entrance to the High School, and on Farmer Rd. between Knight St. and Walnut Ln., where Willard Intermediate and Willard North Elementary Schools are located.
- **Disconnected City** - There was an emphasis on the bisection of the community by SH 160. Neighborhoods south and west of SH 160 do not have easy access to the core of the community, and those north of SH 160 do not have easy access to Apple Market or Miller Farm Park.
- **Sidewalk Connectivity Gaps** - The city is making great progress on constructing new sidewalks along Jackson St., although some gaps still exist. In addition, key sidewalk gaps on Main and South St. disconnect the core of Willard. South of town, there is a sidewalk gap from a large multi-family complex to the DG Market.
- **A Lack of Strategic Traffic Calming** - Unsafe speeds and limited pedestrian crossings on Jackson St., considered the gathering place of the community, was a common theme throughout the public input process. Lester St., Walnut Ln., and Miller Rd., where school-aged children walk to access popular destinations after school (Casey's and Sonic) were also highlighted. These are also roads that directly connect to schools, parks, and the rec center.



KEY NEXT STEPS

Key Steps within the next 90 days:

Actionable steps that can be taken within the next 90 days include:

- Adopt the Active Transportation Network Plan as an amendment to the Comprehensive Plan.
- Meet with city legal to discuss a path forward to update municipal codes, including categorizing updated codes into quick wins such as increasing sidewalk width, which aids in overall pedestrian comfort and safety.
- Identify and allocate funding that can be used as a 20% match for federally funded grants in the future.
- Identify local, regional, state, and federal funding sources.
- Find local Frisco Highline Trail champions to work with community organizers from Bolivar and Springfield to create a regional event on the trail. This can serve to highlight Downtown Willard and bring visitors through Willard. See the Square to Square ride as an example of a regional community bike ride https://razorbackgreenway.org/square-2-square/.

Key Mid-term Steps:

Key mid-term steps that will help build a safer transportation network for all ages and abilities include:

- Strategically plan to apply for a large federal discretionary grant, to include a project of significant impact.
- Adopt universal development codes that ensure private developers build sidewalks, sidepaths, and shared-use paved paths as adopted in the Active Transportation Network Plan for any new or infill projects.
- Work with Willard city departments such as Parks & Rec, Planning, Fire, and Police to create a “Travel With Care” safety campaign to bring awareness about “rules of the road” pertaining to pedestrians, people on bikes, and vehicles. See National Highway Transportation Safety marketing campaigns for open-source materials https://www.trafficsafetymarketing.gov/ and Travel With Care Tulsa as an example of a local safety campaign https://travelwithcaretulsa.com/.

Key Long-term Steps:

Key long-term steps that will help build a safer transportation network for all ages and abilities include:

- Consider allocating a specific amount of funding per year to plan, design, and implement the active transportation network.

PROPOSED TRAILS & CONNECTIVITY NETWORK



A successful Active Transportation Network Plan is context sensitive, meaning there is no one-size-fits-all solution for every street and intersection. The Willard Active Transportation Network Plan has identified various facility types to achieve its goals. For a successful active transportation system to function to its full potential, the following characteristics should be included in the design phase:

Safe

Pedestrians, people on bikes, and anyone not utilizing motorized vehicles on or adjacent to roadways are considered vulnerable road users. Vulnerable road users can be exposed to traffic and other variables that can leave them open to physical danger when moving about a city. The safety of vulnerable road users must be a primary goal of any active transportation plan. With safety as the primary goal, participation in riding bikes and walking can increase.

Comfortable

Prioritizing the comfort of an active transportation system for users of all ages and abilities can help encourage additional usage and increase the accessibility of the system. Focusing on reducing points of conflict, creating separation between vulnerable users and vehicles, and reducing unnecessary transitions are ways to increase the comfort level for a diverse number of users.

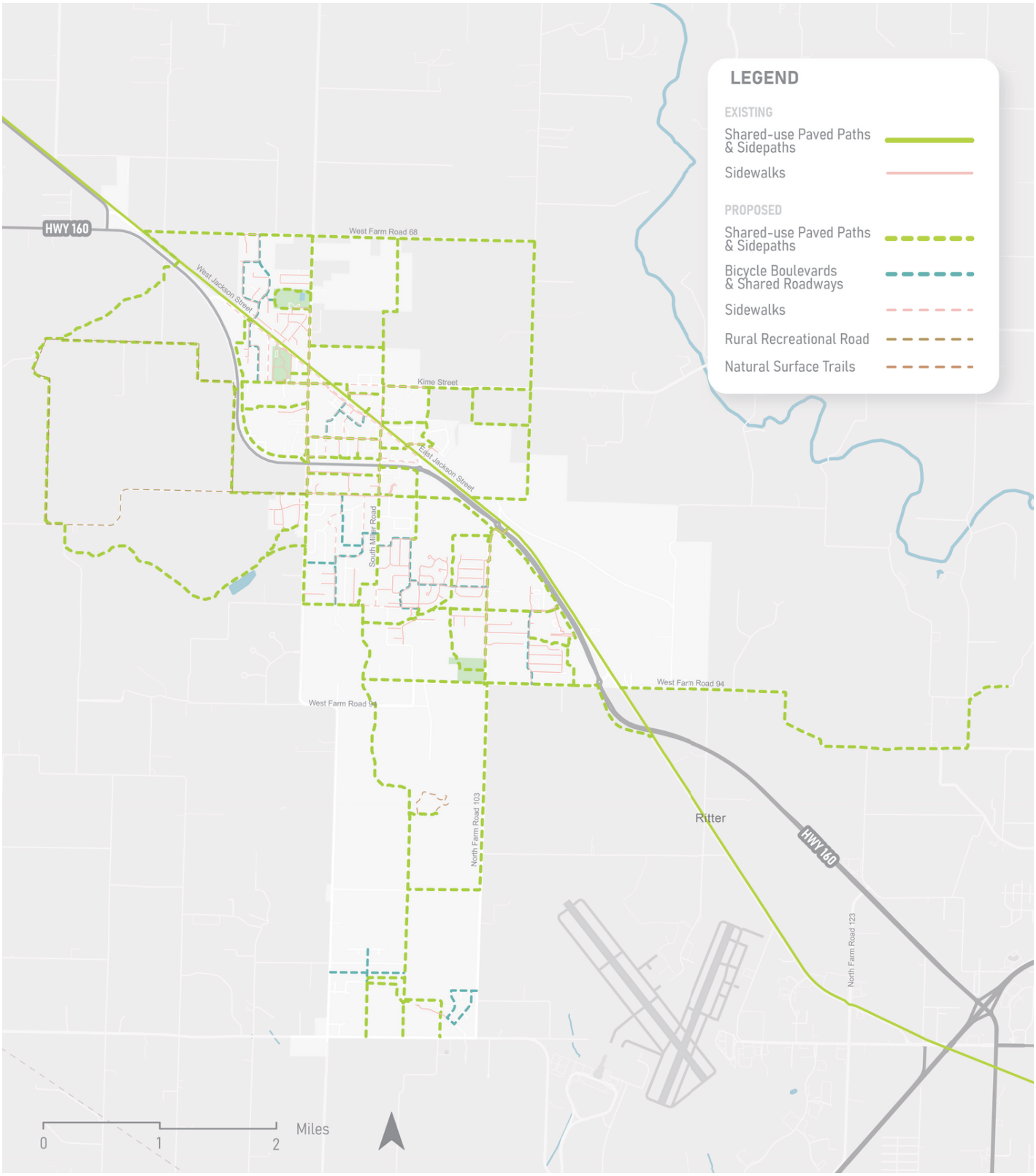
Connected

City residents and those who work or go to school in Willard require the ability to connect to useful destinations such as grocery stores, medical offices, schools, and parks. Developing a plan for infrastructure that ensures connectivity to these essential resources helps residents and visitors thrive and decreases dependence on vehicular travel.

After planning, the next steps are designing and implementing. For the public to view the infrastructure as a functioning piece of the transportation system, it needs to be connected to a defined origin and destination. In other words, each piece of the puzzle is dependent on the others for the full system to function. For example, a sidepath that is connected to a neighborhood but dead ends in an undeveloped field will not be used as intended; however, if the sidepath is connected to a commercial development, it becomes useful and will be used as designed.

OVERALL NETWORK

This map reflects proposed active transportation connectivity projects within the city of Willard. *For more information about Downtown Core Connectivity, see page 14.*



DOWNTOWN CORE CONNECTIVITY



PROPOSED INFRASTRUCTURE PRIORITIZATION

The prioritization is provided as a tool to guide the city's future investments in its trails and connectivity network. The prioritization of facilities listed below is intended to be used as a list of "recommendations" to pursue; however, the city can and may choose to pursue projects in any particular order, and that may fall outside of the prioritization list. All proposed projects, including shared-use paved paths, on-street infrastructure, and sidewalks, have been prioritized based on the following criteria.

1 Health and Safety

Three subcategories were considered under Health and Safety:

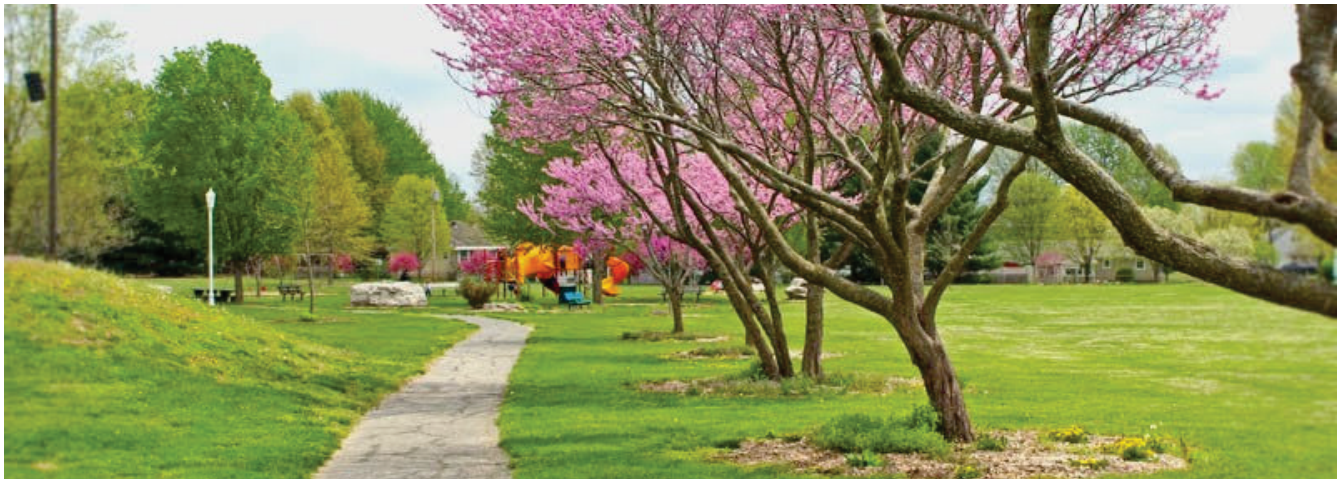
1. **Provides a safer crossing of SH 160**
   - 5 points = Intersects Hwy 160
   - 0 points = Does not intersect Hwy 160

2. **Percent of families at the Census Block Group level living below the poverty rate***
   - 5 points = >5.9% - ⩽10.2%
   - 3 points = >1.3% - ⩽5.9%
   - 1 point = 0% - ⩽1.3%

3. **Percent of school-age children living at or below the poverty level***
   - 5 points = >16.5% - ⩽24.5%
   - 3 points = >5.9% - ⩽16.5%
   - 1 point = 0% - ⩽5.9%

Source: https://data.census.gov/

As referenced on page 8 under pressing challenges, increasing the safety and comfort of bicycle and pedestrian crossings under or over SH 160 was a common theme during both the steering committee and public input sessions. Feeling safe and being safe when crossing higher volume, higher speed roadways and highways is a key factor influencing an individual's choice to walk, bike, roll, or run within a community. Increasing both real and perceived safety can facilitate an increase in usership of active transportation facilities and can have a positive effect on the health and safety of a community. Poverty rates were included under this category as there is a direct correlation between living in poverty and one's overall health and well-being. Creating safe and comfortable active transportation connections in these areas can decrease the barriers to a healthy future.



2 Connectivity

Five subcategories were considered under Connectivity.

1. **Access to open spaces and parks**
- 5 points = Direct access or serves as a segment of a route that provides direct connectivity to a park/open space(s)
- 4 points = Within 1/8 mile
- 3 points = Within 1/4 mile
- 2 points = Within 1/2 mile
- 1 point = Within 3/4 mile
- 0 points = Over 3/4 mile

2. **Access to grocery stores**
- 5 points = Direct access or serves as a segment of a route that provides direct connectivity to a grocery store(s)
- 4 points = Within 1/8 mile
- 3 points = Within 1/4 mile
- 2 points = Within 1/2 mile
- 1 point = Within 3/4 mile
- 0 points = Over 3/4 mile

3. Connectivity Gap Closure
- 5 points = high impact
- 3 points = medium impact
- 1 point = low impact

4. School walk accessibility analysis
- 5 points = Multiple schools within 1/4 mile or serves as a segment of a route that provides direct connectivity to a school(s)
- 4 points = One school within 1/4 mile
- 3 points = Multiple schools within 1/2 mile
- 2 points = One school within 1/2 mile
- 1 point = One school within 3/4 mile
- 0 points = Over 3/4 mile of a school

5. **Direct or enhances access to employment hubs/centers**
- 5 points = Direct access to identified employment hubs or serves as a segment of a route that provides direct connectivity to an employment center(s)
- 4 points = Within 1/8 mile
- 3 points = Within 1/4 mile
- 2 points = Within 1/2 mile
- 1 point = Within 3/4 mile
- 0 point = Over 3/4 mile of identified employment hubs/centers

At the two public input sessions, schools and parks were the top two destinations ranked as a 1st priority to which people would like to be able to walk, ride, and roll safely (see Appendix A); therefore, projects that create connections to these destinations were included in the criteria for prioritization. Although the grocery store and employment hubs/centers were not listed in the top priorities, they are considered essential destinations for a healthy community and so were added under the Connectivity Category. Connectivity gap closure was based on projects that would fill a gap for existing infrastructure, such as sidewalk gaps. These projects, once constructed, can make a large impact on the entire active transportation network.

The prioritization matrix considers the “Health and Safety” and “Connectivity” variables as described and generates a “cost-to-benefit priority score” value that is used to rank the projects. This value measures each project’s benefits relative to its cost, allowing for a balanced comparison of overall value.

The costs reflected in the following tables represent planning level cost estimates for various projects and facility types. Costs for each facility were assigned a cost score category based on the level of complexity to construct and include factors such as topography, right-of-way acquisition, utilities, and drainage. Cost estimates are to be used for planning purposes only, and each project will require full design and engineering to finalize a firm and detailed cost estimate.

TOP 10

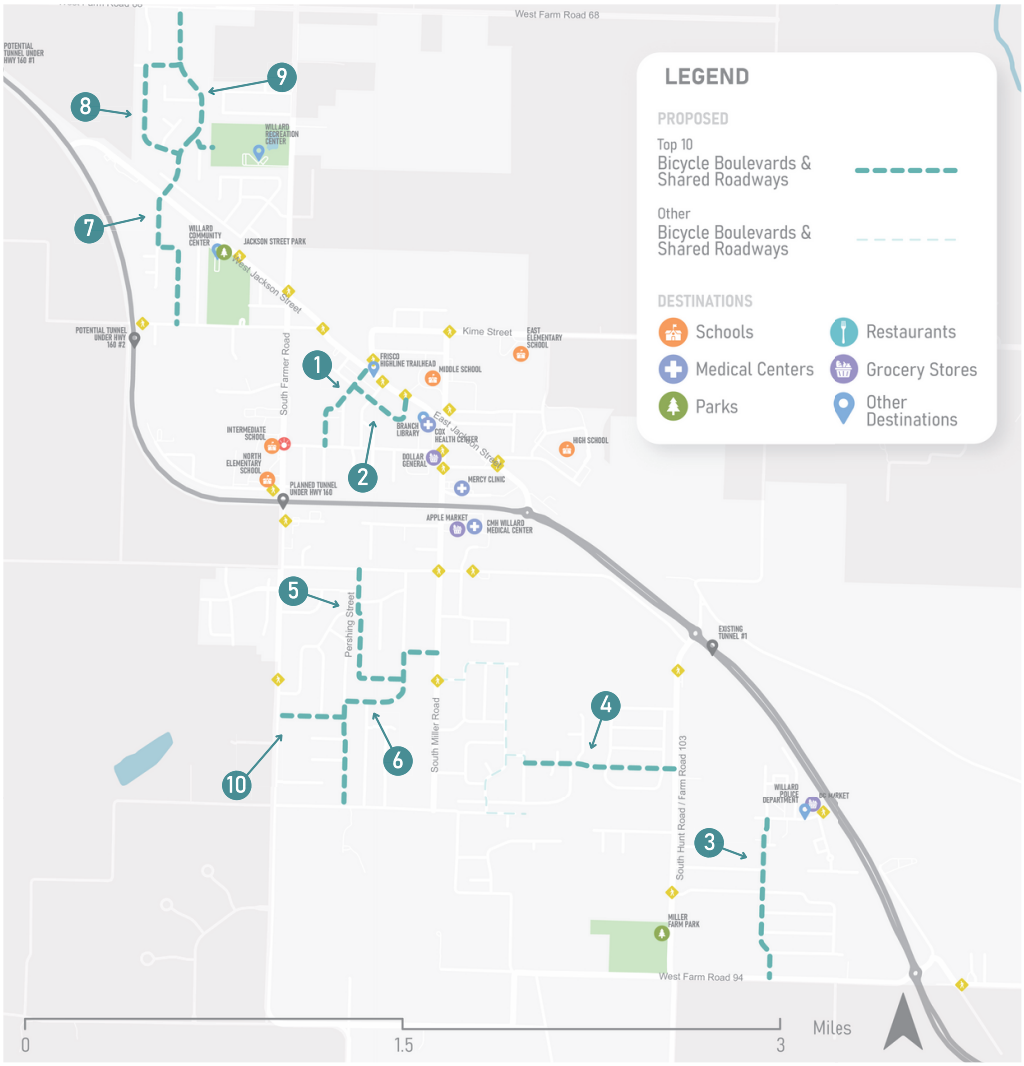
PROPOSED SHARED-USE PAVED PATHS & SIDEPATHS



Project ID	Project Alias	Planning Level Low Cost Estimate	Planning Level High Cost Estimate	Cost to Benefit Priority Score
1	Frisco Highline Trail Connector #1	$65,000	$75,000	285
2	Frisco Highline Trail to Highschool Connector	$214,000	$246,000	257
3	Lester St. Sidepath	$204,000	$235,000	247
4	Middle School Connector	$64,000	$74,000	243
5	Hughes Rd. Sidepath	$463,000	$532,000	234
6	Tiger Aly Sidepath	$308,000	$355,000	203
7	South St. Connector	$16,000	$18,000	191
8	Mill St. Sidepath	$245,000	$282,000	191
9	Wiley St. Sidepath	$822,000	$946,000	190
10	S Farmer St. Sidepath	$646,000	$743,000	184

TOP 10

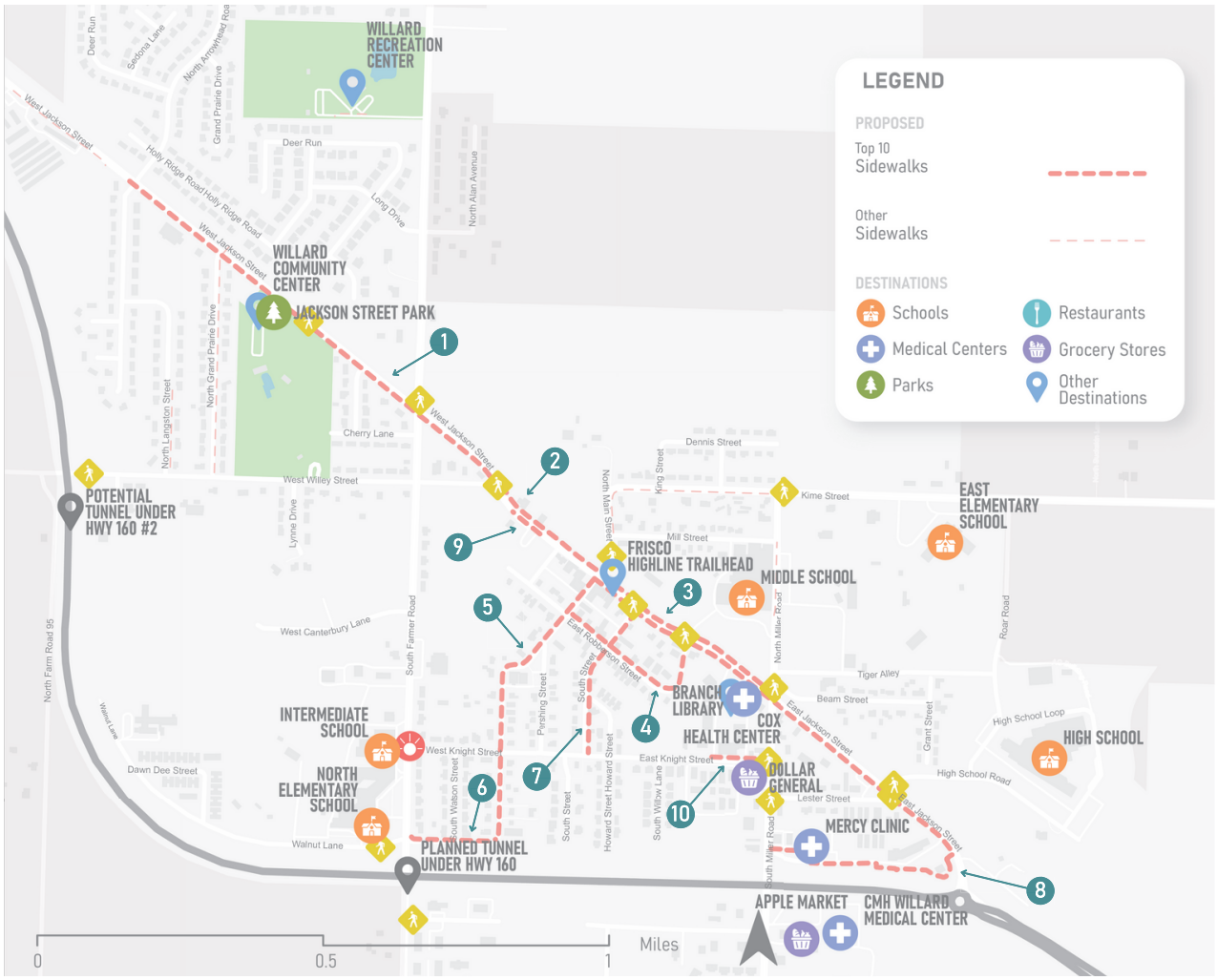
PROPOSED ON-STREET BICYCLE FACILITIES



It is recommended that streets should only be converted to a bicycle boulevard if the posted speed limit is 25 mph or less. A traffic study is strongly recommended on the conversion of any road to a mixed-traffic facility.

Project ID	Project Alias	Planning Level Low Cost Estimate	Planning Level High Cost Estimate	Cost to Benefit Priority Score
1	S Main Bicycle Boulevard	$179,000	$205,000	209
2	E Robberson St. & S Perryman St. Bicycle Boulevard	$155,000	$178,000	187
3	Megan Ln. Bicycle Boulevard	$311,000	$358,000	186
4	Osage Dr. Bicycle Boulevard #2	$291,000	$334,000	180
5	S Barwick Pl. Bicycle Boulevard	$296,000	$340,000	160
6	Pershing St. & John F Kennedy Dr. Bicycle Boulevard	$464,000	$534,000	160
7	Arrowhead Rd. Bicycle Boulevard South	$375,000	$432,000	159
8	Deer Run Bicycle Boulevard	$373,000	$429,000	149
9	Arrowhead Rd. Bicycle Boulevard North	$268,000	$309,000	137
10	Ridgeview Dr. Bicycle Boulevard	$127,000	$146,000	134

TOP 10 PROPOSED SIDEWALKS



Project ID	Project Alias	Planning Level Low Cost Estimate	Planning Level High Cost Estimate	Cost to Benefit Priority Score
1	W Jackson St. Sidewalk #2	$394,000	$454,000	297
2	E Jackson St. Sidewalk North	$288,000	$331,000	267
3	E Jackson St. Sidewalk South	$391,000	$449,000	267
4	E Robberson St. Sidewalk	$151,000	$174,000	257
5	S Main Sidewalk	$255,000	$293,000	245
6	Walnut Ln. Sidewalk West	$71,000	$82,000	233
7	South St. Sidewalk	$131,000	$151,000	233
8	Walnut Ln. Sidewalk East	$179,000	$206,000	213
9	Willard First Baptist Church Sidewalk	$29,000	$34,000	193
10	E Knight St. Sidewalk	$48,000	$56,000	191

KEY BIKE & PEDESTRIAN SAFETY IMPROVEMENTS

The following projects have been identified as high-priority connections that would deliver significant and immediate benefits if implemented by the City of Willard.



Project ID	Project Alias	Planning Level Low Cost Estimate	Planning Level High Cost Estimate
1	Lester St. & Jackson St. Safer Crossing	$240,000	$276,000
2	Improved Intersection Study at Miller Rd. and Walnut Ln.	TBD, pending study	
3	Willard Intermediate & North Elementary School SUPP	$831,000	$955,000
4	Completion of Jackson St. Downtown Improvements from Jefferson St to Perryman St. Refer to design by CJW.		
5	Miller Rd. Connectivity	$1,804,000	$2,074,000

POLICY RECOMMENDATIONS

Current City of Willard Municipal Codes and Comprehensive Plan - 2019

The project team reviewed the City of Willard Municipal Codes and Comprehensive Plan - 2019 with an emphasis on researching ordinances and language pertaining to active transportation users, planning, and implementation. The city has a solid foundation to build upon. The following are the most relevant recommended policy revisions, amendments, or changes the city may consider in support of active transportation within the community.

Policy Recommendations

Municipal Code	Language Specific to Active Transportation	Recommendations
Title III Traffic Code, Ch 300, 300.010 Definitions	Electric Bicycle	Consider moving the definitions of “Electric Bikes" to Section 375.010 "Bicycle and Motorized Bicycle-Defined" so that all definitions of bicycles are under the same chapter.
Title III Traffic Code, Ch 320, 320.030 General Speed Limit, Schedule I	Except where otherwise provided by signs erected pursuant to duly passed and approved ordinances, no person shall operate a vehicle on any street in the City in excess of thirty (30) miles per hour	Table I-A General Speed Limits lists several roads and subdivisions as 20 mph. Consider adding a blanket code that all residential streets are 20 mph.
Title III Traffic Code, Ch 345, 345.090 Distance To Be Maintained When Overtaking A Bicycle	The operator of a motor vehicle overtaking a bicycle proceeding in the same direction on the roadway, as defined in Section 300.010, shall leave a safe distance when passing the bicycle and shall maintain clearance until safely past the overtaken bicycle.	This code may be problematic. Section 300.010 does not define a "bicycle". It only defines e-bikes. Suggestion is to either add "bicycle" to definitions in Ch. 300.010 or move the definitions of "Electric Bicycles" to Section 375.010. "Safe distance" is subjective. Consider adding "3 feet" in place of "safe distance". In addition, this section aligns more with Ch. 375, Bicycles, Motorized Bicycles, and Electric Bikes
Title III Traffic Code, Ch 375 Bicycles, Motorized Bicycles, and Electric Bicycles		For this entire chapter, consider reviewing each section to ensure uniformity with language that includes "bicycle," "motorized bicycle," and "electric bicycle".

Municipal Code	Active Transportation Specific Language	Recommendations
Title III Traffic Code, Ch 375, 375.050 riding to Right- Required for Bicycles and Motorized Bicycles	Bicyclists may ride abreast when not impeding other vehicles.	Consider making this clearer and stating, "may ride two abreast".
Title IV Land Use, Article XV Required Public Improvements, Section 400.1320. Blocks.	B. Block lengths shall not exceed one thousand three hundred twenty (1,320) feet or be less than three hundred (300) feet, except under unusual conditions.	Consider adding requirements of midblock crossings on arterials and collectors if they are over 600' in length between intersections. (See Ft. Smith as an example- 27-503-13- A) An easement for utilities and pedestrians with a minimum width of 20 feet; or B) an easement reserved for pedestrian passage with a minimum width of 10 feet.
Title IV Land Use, Article XIV Plans, Plats and Other Required Information, 400.1160 Site Plan 1.i. and 2.i.	The general location and approximate dimensions of all vehicular and pedestrian circulation elements, including streets, driveways, entrances, curb cuts, parking and loading areas and sidewalks, including slope and gradient of vehicular elements.	Consider including “bicycle circulation”.
Title IV Land Use, Article XV Required Public Improvements, 400.1310	Sidewalks	Consider requiring sidewalks along two (2) sides of all streets, or one sidepath and one sidewalk, depending on the active transportation plan. This is also found under Article II, 405.150, and XVII Miscellaneous Regulations, Art II, 405.150
Title IV Land Use, Article XV Required Public Improvements, 400.1350	Easements may be required for the installation of utilities and stormwater improvements.	Consider including easements are also required for shared-use paved paths, sidepaths, and sidewalks.
Title IV Land Use, Section 405 Design Standards for	Local Streets shall be designed so as to	Suggestion is to add “motorized”. “Local streets shall be designed so as

Policy Recommendations

Municipal Code	Active Transportation Specific Language	Recommendations
Title IV Land Use, Section 405 Design Standards for Public Improvements, Art II, 405.120 G.	Permanent dead-end or cul-de-sacs shall be no longer than eight hundred (800) feet and shall provide at the closed end a paved turnaround...	Consider adding language that dead-end streets or cul-de-sacs will incorporate access for a connected active transportation for people riding, rolling, or walking.
Title IV Land Use, Section 405 Design Standards for Public Improvements, Art II, 405.150 B.1.	1. Sidewalks along minor streets shall be a minimum of five (5) feet wide; 2. Sidewalks along collector and arterial streets and in the vicinity of schools, recreation areas and other community facilities shall be a minimum of five (5) feet wide.	Consider increasing the minimum sidewalk width to six (6) feet wide. This allows two people to comfortably walk side by side.
Title IV Land Use, Art II, Ch 405.156 Linear Park Trails and Connections to Trails, B.1.a.	A trail is planned within a linear park as identified by the Willard Comprehensive Plan	Consider adding language that would include “and all future active transportation plans.”
Title IV Land Use, Article XV Required Public Improvements, Section 400.1320. Blocks.	B. Block lengths shall not exceed one thousand three hundred twenty (1,320) feet or be less than three hundred (300) feet, except under unusual conditions.	Consider adding requirements of midblock crossings on arterials and collectors if they are over 600 ft in length between intersections. (See Ft. Smith as an example- 27-503-13- A) An easement for utilities and pedestrians with a minimum width of 20 feet; or B) an easement reserved for pedestrian passage with a minimum width of 10 feet.
Title IV Land Use, Article XIV Plans, Plats and Other Required Information, 400.1160 Site Plan 1.i. and 2.i.	The general location and approximate dimensions of all vehicular and pedestrian circulation elements, including streets, driveways, entrances, curb cuts, parking and loading areas and sidewalks, including slope and gradient of vehicular elements.	Consider including “bicycle circulation”.
Title IV Land Use, Article XV Required Public Improvements, 400.1310	Sidewalks	Consider requiring sidewalks along two (2) sides of all streets, or one sidepath and one sidewalk, depending on the active transportation plan. This is also found under Article II, 405.150, and XVII Miscellaneous Regulations, Art II, 405.150

Municipal Codes- General Recommendations

For new and infill developments, if the City of Willard allows a fee in lieu of for sidewalks, sidepaths, or shared-use paved paths, the policies and guidelines should be clear and transparent. It should also be the exception and not the norm. The City of Houston has a good example of a fee in lieu of program. https://www.houstontx.gov/planning/Publications/docs-pdfs/Sidewalk-Regulations-English.pdf.

Requiring minimum parking spaces could hinder infill and increase the cost for private development. Consider removing parking minimums for retail spaces and office buildings. If safe and welcoming active transportation infrastructure is implemented, this could reduce some of the need and demand for parking spaces.

Consider adding language that requires bicycle racks for commercial, office, industrial, and multi-family developments. For example, requiring one (1) bike rack per multi-family development of 10 units or fewer, and one (1) additional bike rack per every additional 10 units. For industrial, office, and commercial, consider requiring one (1) bike rack for every 20 parking spaces. In addition, parking lots should include appropriately marked locations with racks for bicycle parking. (See Fort Smith, Arkansas, as an example for commercial parking. 27-601-2.B. See City of Madison, WI Off-Street Parking and Loading Standards. 28.141(4), Table 281-3) See *Essentials of Bike Parking* by the Association of Bicycle and Pedestrian Professionals for best practices and installation of bike racks.

Consider adding and updating the definition of micromobility. Factors to consider are speed, weight, watts, and/or width. For example, the use of a golf cart should not be allowed due to their speed and width. The International Transport Forum uses the characteristics of speed and weight to define types of micromobility. See Definition of Micromobility, p. 11, https://www.itf-oecd.org/sites/default/files/safer-micrombility-technical-report.pdf

Consider adding language that would define the type of micromobility vehicle that may use a sidepath, shared-use paved path, sidewalk or bike lane. See the City of Fayetteville Article XI Operation of Vehicles and Use of City Trails.
https://library.municode.com/ar/fayetteville/codes/code_of_ordinances?nodeId=CD_ORD_TITVIITRCO_CH71TRRU_ARTXIOPVEUSTR_71.170RETYVEALSHEPATR

Consider adding language that a developer may be required to construct a shared-use paved path/sidepath linkage or corridor or grant an easement approved in the Willard Active Transportation Network of the Comprehensive Plan. This should also be included for infill projects. Fayetteville, AR (Title XV- Unified Development Code, Chapter 166.04- Required Infrastructure Improvements, B(4)(k) has a model ordinance addressing this.

2019 Comprehensive Plan Recommendations

Comprehensive Plan	Active Transportation Specific Language	Recommendations
Transportation	Street Classifications, p.12	Consider updating typical sections to include updated standards and best practices for bicycle and pedestrian infrastructure.
Future Land Use	Categories, pp. 30-32	Under Parks and Open Spaces, trails are listed as an appropriate use. Consider adding shared-use paved paths as an appropriate use in additional land use categories.
Future Land Use	Goal 3: Manage the Environmental Impact of Willard's Growth, p.36. As Willard grows, efforts should be made to manage or reduce detrimental environmental effects.	Consider updating to add language that implementing and encouraging the use of active transportation will limit the environmental impacts of Willard's growth by reducing detrimental environmental effects.

Comprehensive Plan- General Recommendations
Future Land Use, Categories, p. 32- "Enhance and preserve the visual image of the City of Willard as viewed from Hwy 160." This purpose aligns with the active transportation culture and the welcoming environment of Willard. How does Willard want to convey that eco-tourists on the Frisco Line are welcome to stop and visit Willard instead of riding straight through? Are there safe crossings to get into town, wayfinding signage to places to eat? When people are on the trail, do they know when they have entered and exited the City of Willard on the trail?
Future Land Use, Goal 1: Utilize Land More Efficiently Within Willard- Including active transportation connections to both infill and new developments is a way to set a precedent for when strategic annexation occurs. Developers will see that the norm in the city is to provide safe, welcoming, and accessible transportation choices instead of relying on only one type of transportation.

APPENDIX A

Combined Results of Public Input Sessions 1 and 2

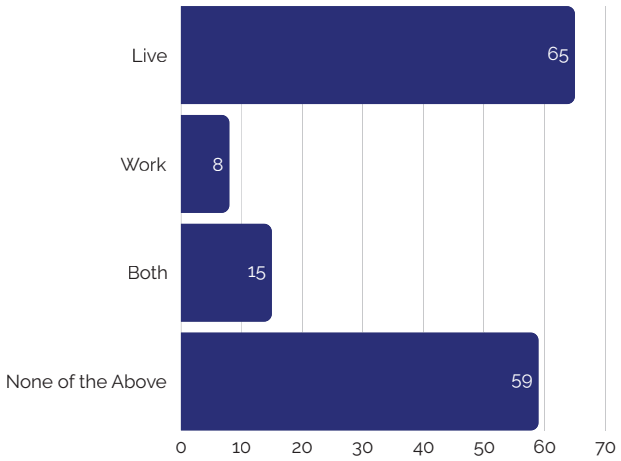
Facilities I would feel most comfortable using.	Green (1st)	Orange (2nd)	Pink (3rd)
Shared-use Paved Paths & Sidepaths "Greenways"	123	41	20
Rural Recreational Roads	30	68	37
Protected Bike Lanes	21	38	42
Revitalized Alleyway	14	19	29
Conventional Bike Lane	10	25	47
Bicycle Boulevard & Shared Roadway	6	7	19
TOTAL	**204**	**198**	**194**

Combined Results of Public Input Sessions 1 and 2

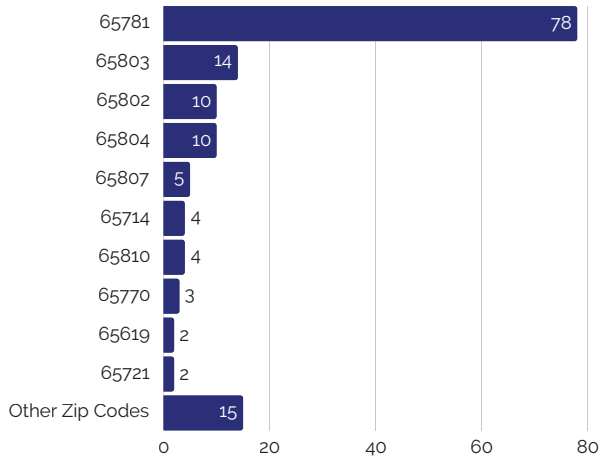
Places I would like to get to by walking, riding, or rolling.	Green (1st)	Orange (2nd)	Pink (3rd)
School	66	30	27
Park	59	40	19
Restaurant	26	32	30
Visit Friends or Family	22	12	33
Library	11	40	27
Grocery Store	16	25	31
Church	16	17	13
Medical	8	16	11
Shopping	7	17	29
Work	5	7	14
TOTAL	**236**	**236**	**234**

APPENDIX B Public Survey Results

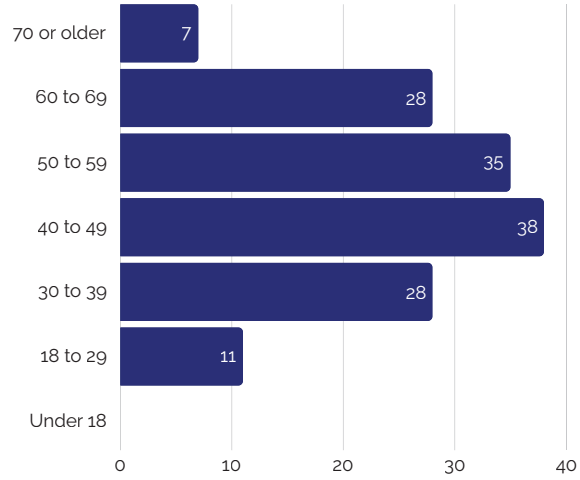
1. Do you live or work in Willard?



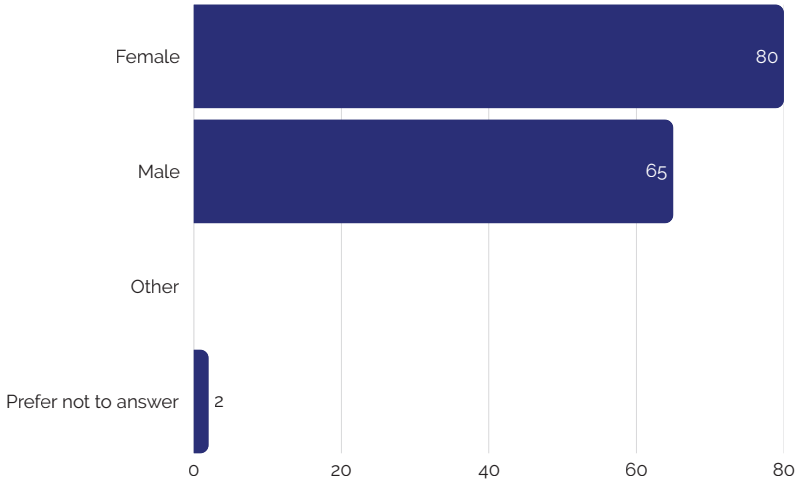
2. What is your zip code?



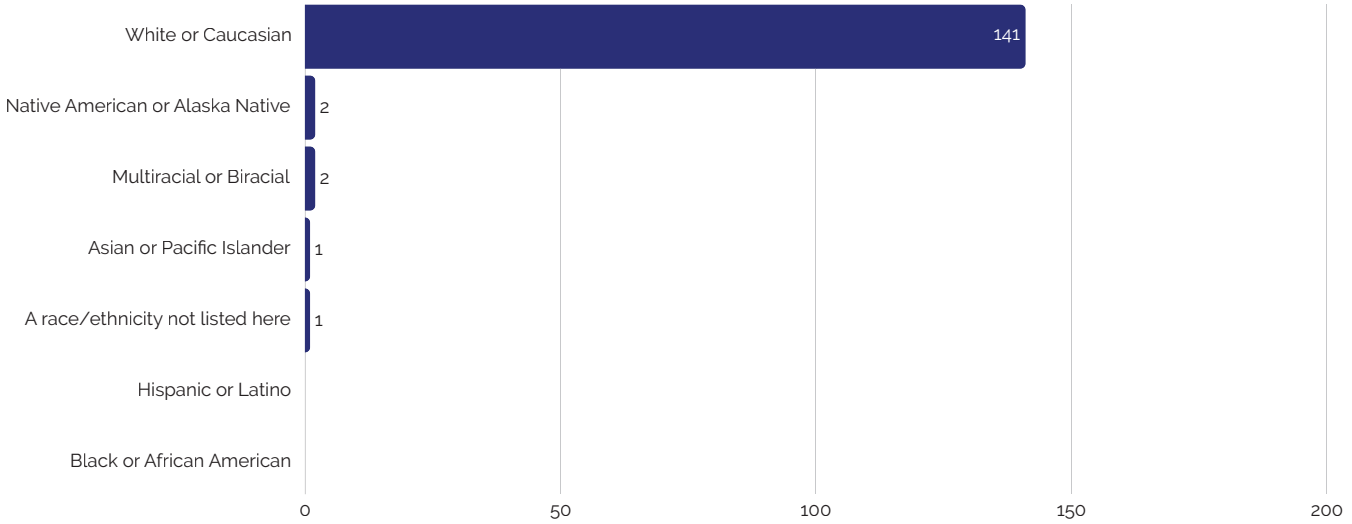
3. What is your age?



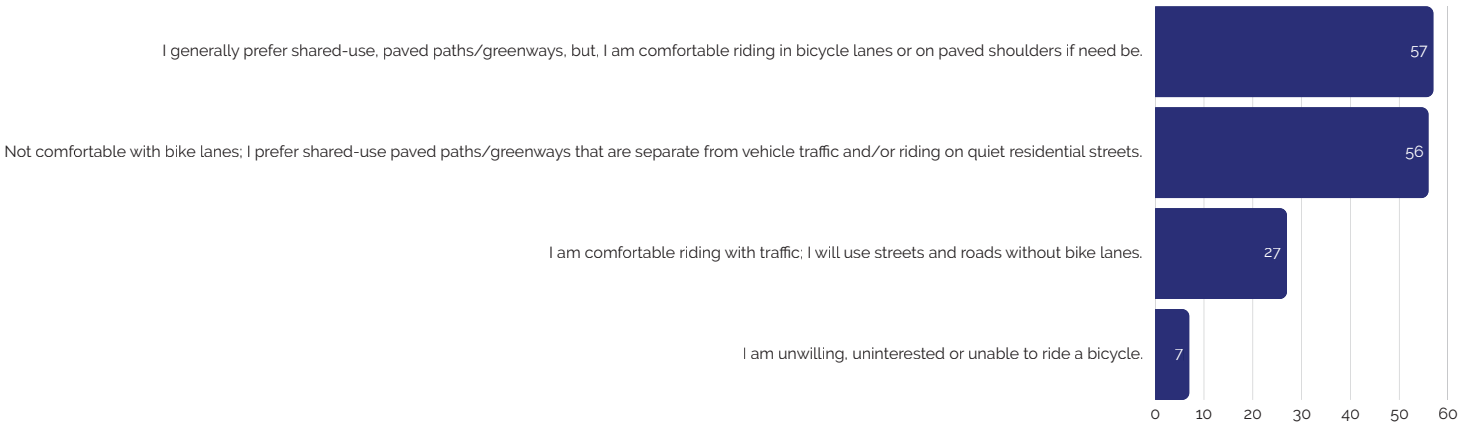
4. What is your gender?



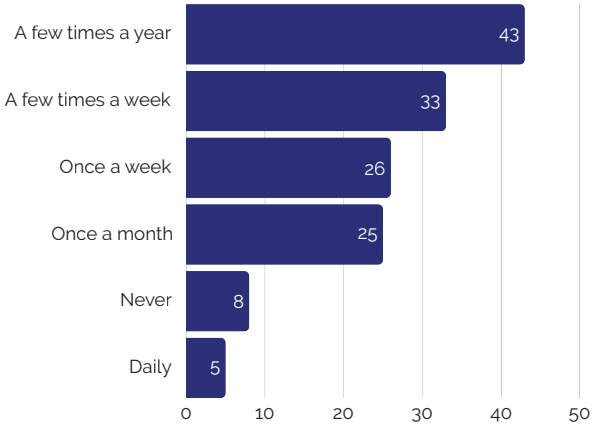
5. Which of the following best describes you?



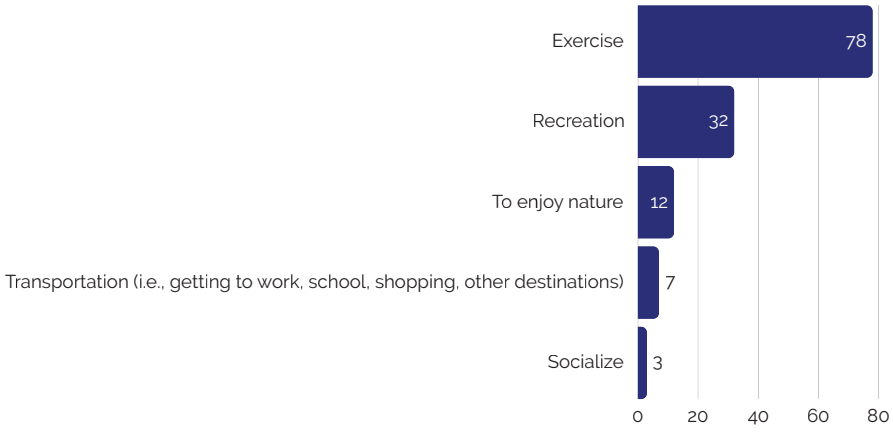
6. What is your bicycling level of comfort?



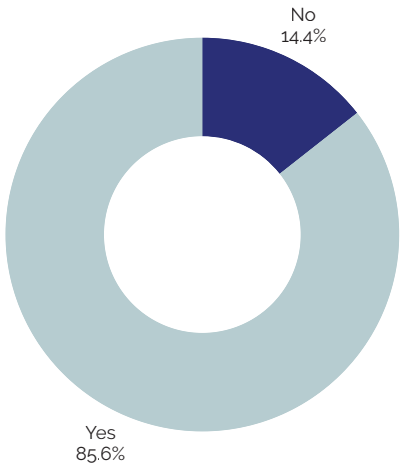
7. How often do you ride a bicycle within Willard?



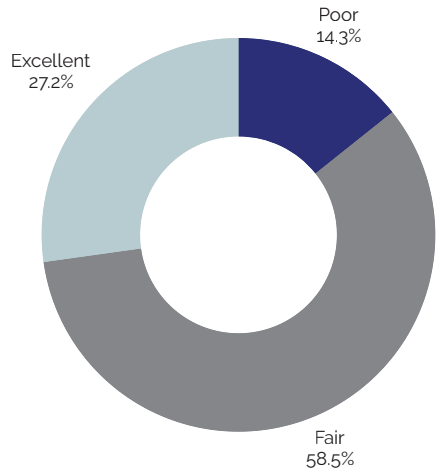
8. When you ride a bicycle in Willard, what are the primary purposes for riding? *(Number of times listed as #1 choice)*



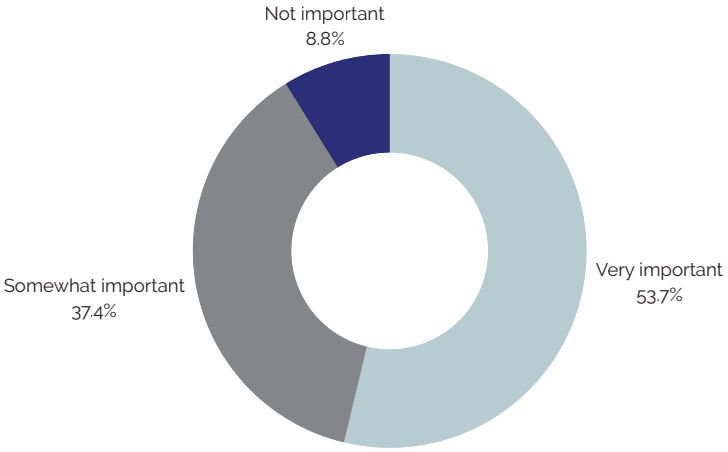
9. Do you feel safe and comfortable riding a bike in Willard?



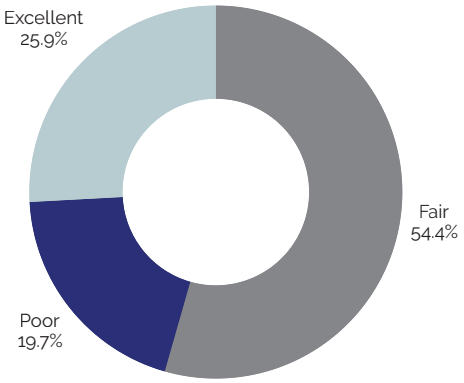
10. How do you rate present bicycling conditions in Willard?



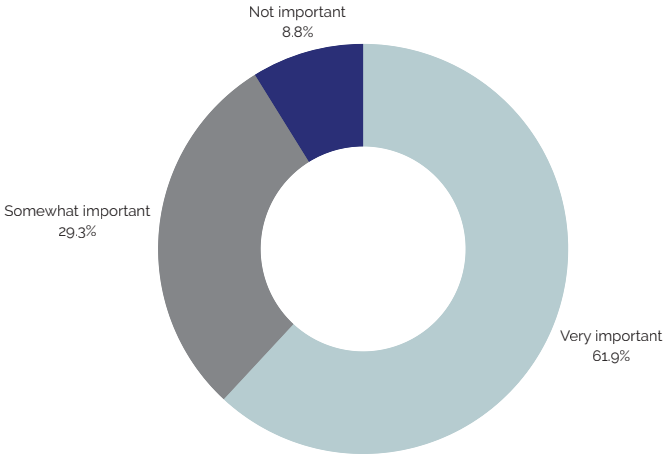
11. How important to you is improving bicycling conditions in Willard?



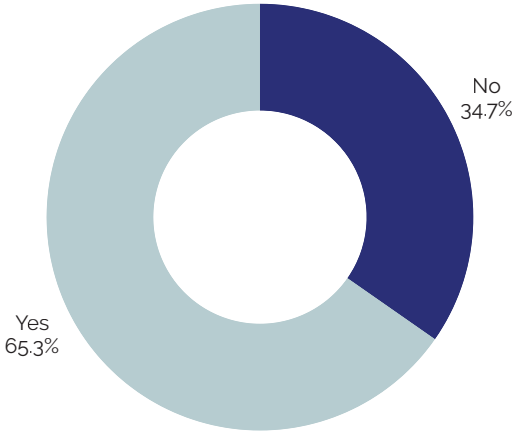
12. How do you rate present walking conditions in Willard?



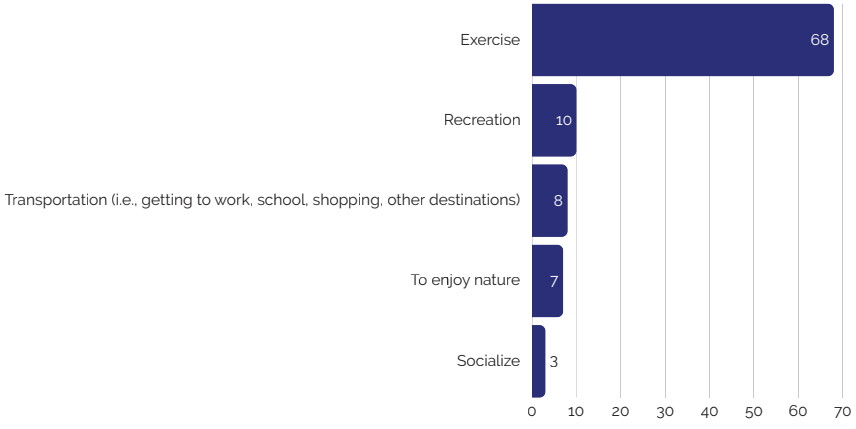
13. How important to you is improving walking conditions in Willard?



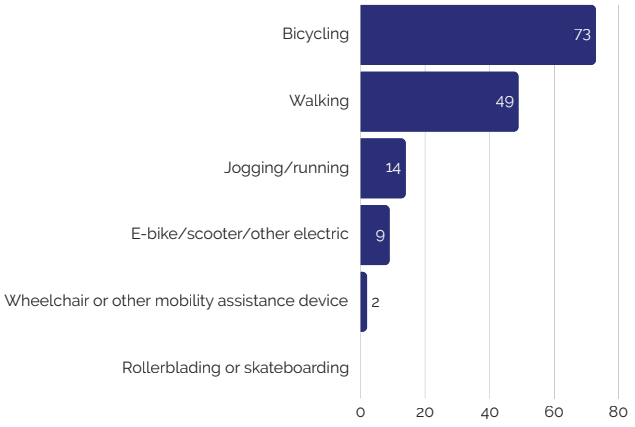
14. Do you walk in Willard?



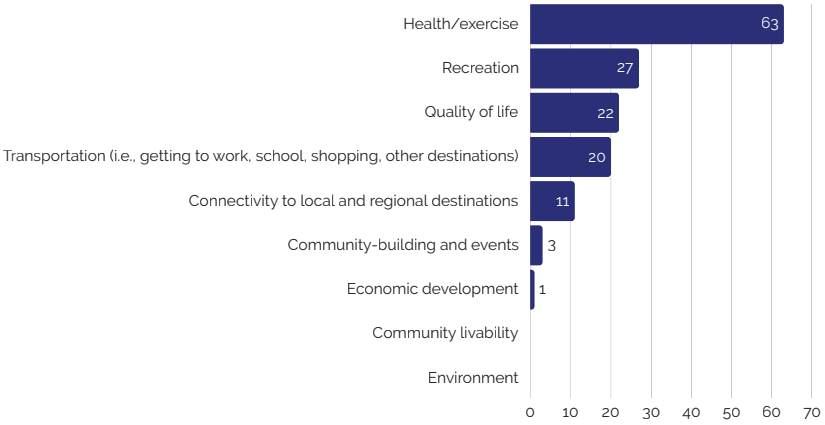
15. When you walk in Willard, what are the primary purposes for your trips? *(Number of times listed as #1 choice)*



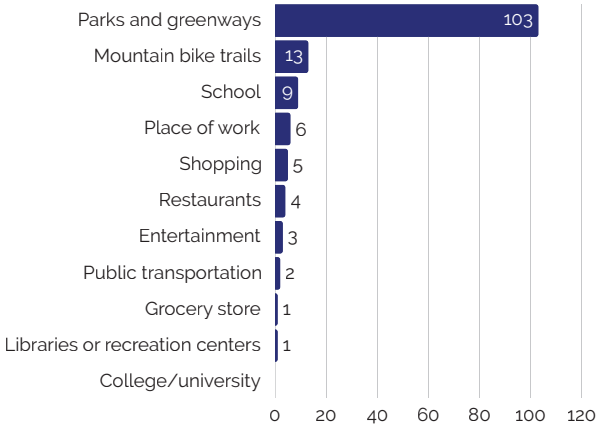
16. What are your preferred transportation modes when using a shared-use paved path/greenway? *(Number of times listed as #1 choice)*



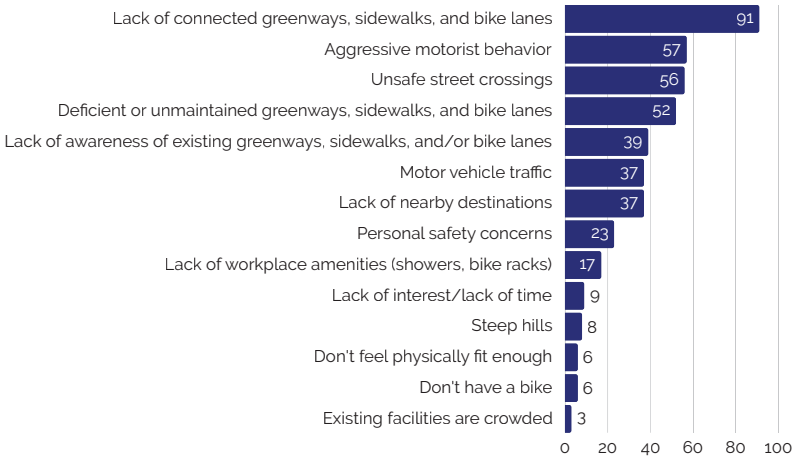
17. What do you consider to be the most important benefits and uses of a bicycle and pedestrian network in Willard? *(Number of times listed as #1 choice)*



18. *What destinations would you most like to be able to reach by bicycling or walking? (Number of times listed as #1 choice)*



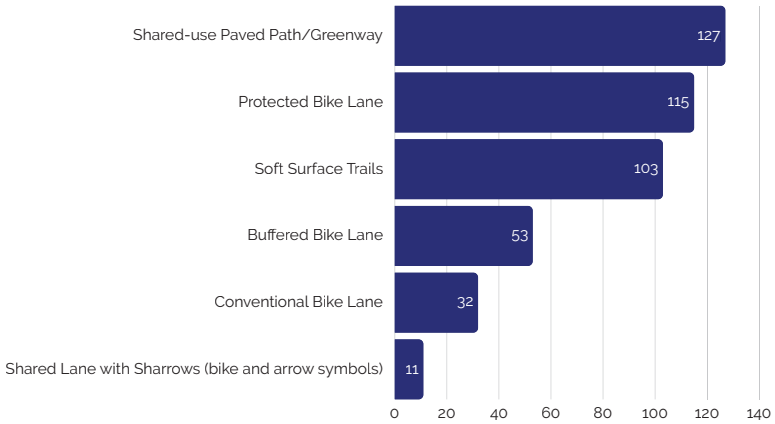
19. What are the top three factors that discourage bicycling or walking in Willard? *(multiple choice)*



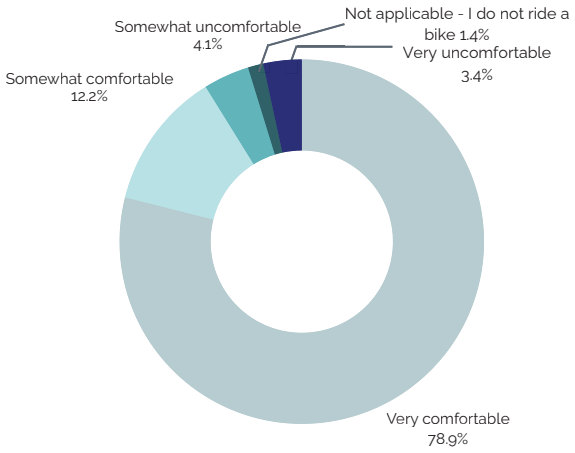
20. What are the top three factors that encourage bicycling or walking in Willard? *(multiple choice)*



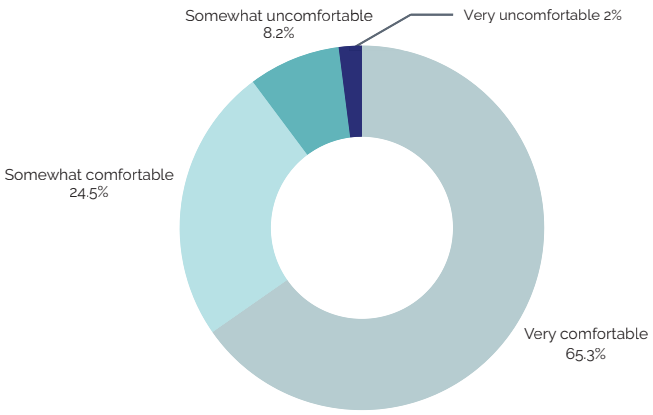
21. Which bicycle facilities do you prefer? *(multiple choice)*



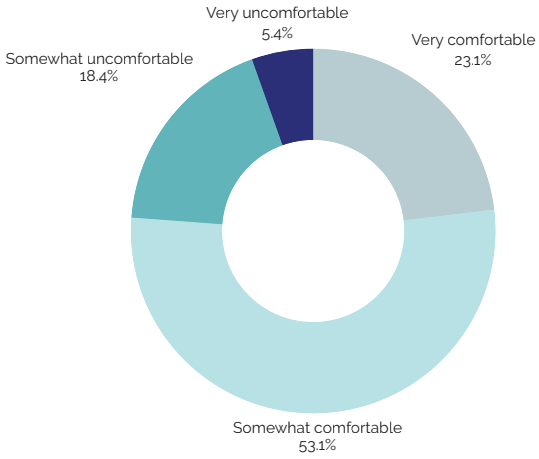
22. Please indicate your level of comfort while riding a bicycle on the following: *Shared-use paved path/greenway*



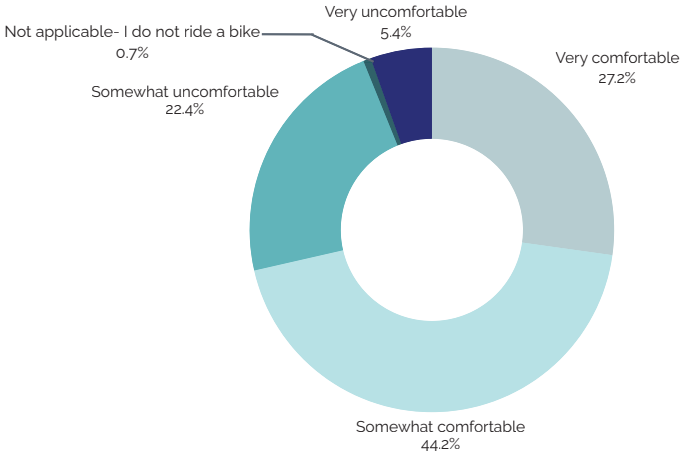
23. Please indicate your level of comfort while riding a bicycle on the following:
Protected bike lane



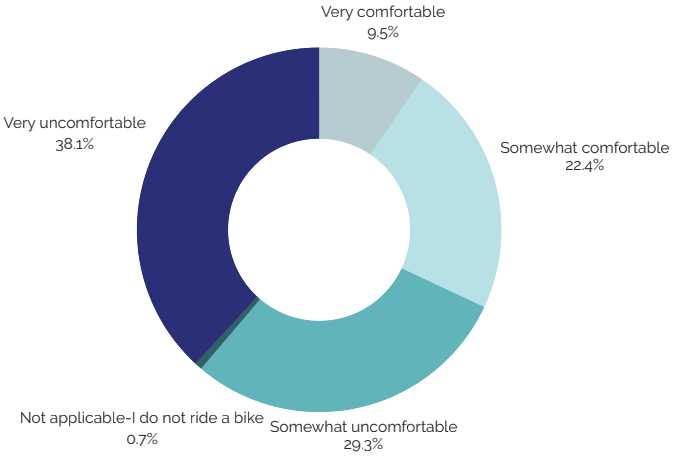
24. Please indicate your level of comfort wh
riding a bicycle on the following:
Buffered bike lane



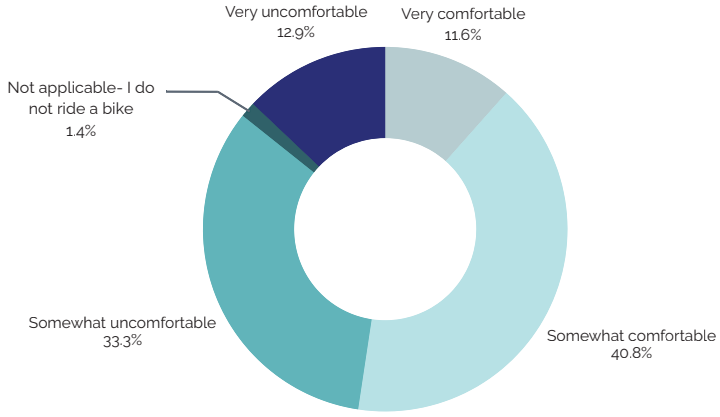
25. Please indicate your level of comfort while riding a bicycle on the following:
Quiet residential streets



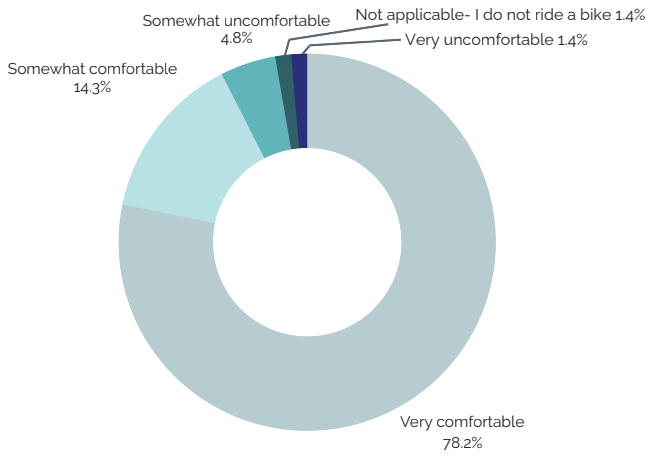
26. Please indicate your level of comfort while riding a bicycle on the following:
Shared lane with sharrows (bike and arrow symbols)



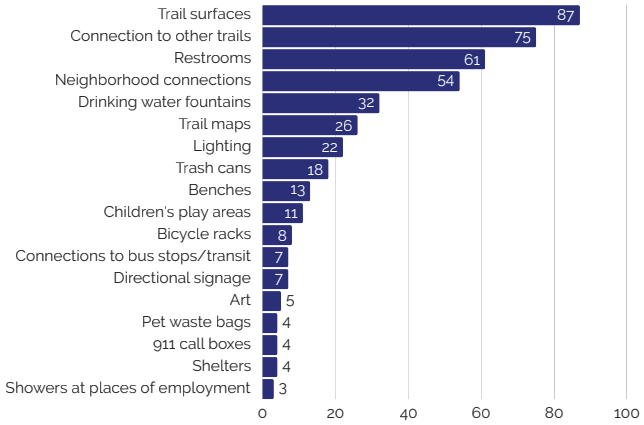
27. Please indicate your level of comfort while riding a bicycle on the following:
Conventional bike lane



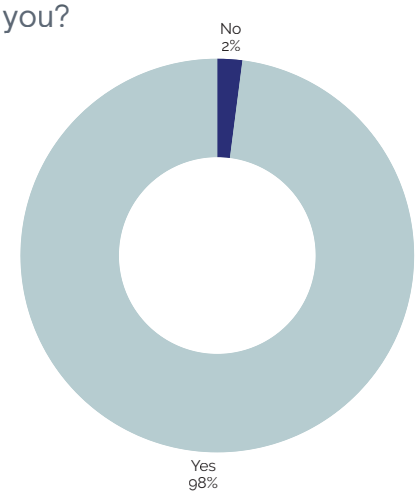
28. Please indicate your level of comfort while riding a bicycle on the following:
Soft surface trails



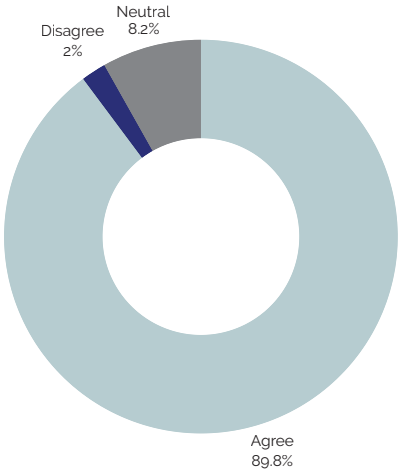
29. What are the top three amenities that are most important for bike riders and pedestrians in Willard? *(multiple choice)*



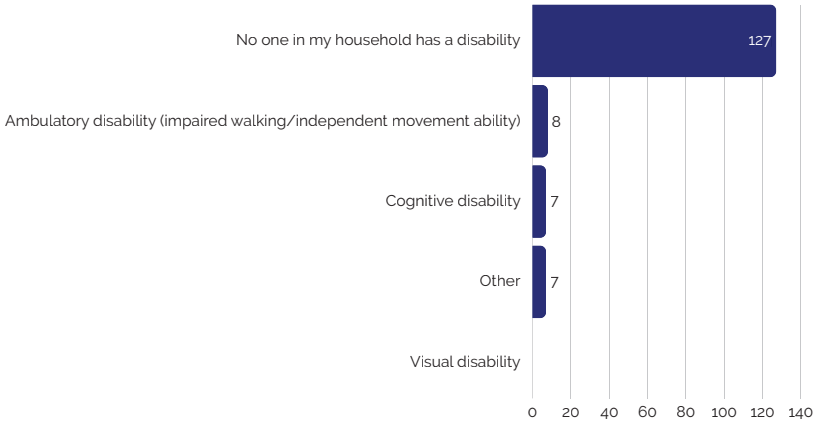
30. Would you use shared-use paved paths/greenways more often if they were closer to you?



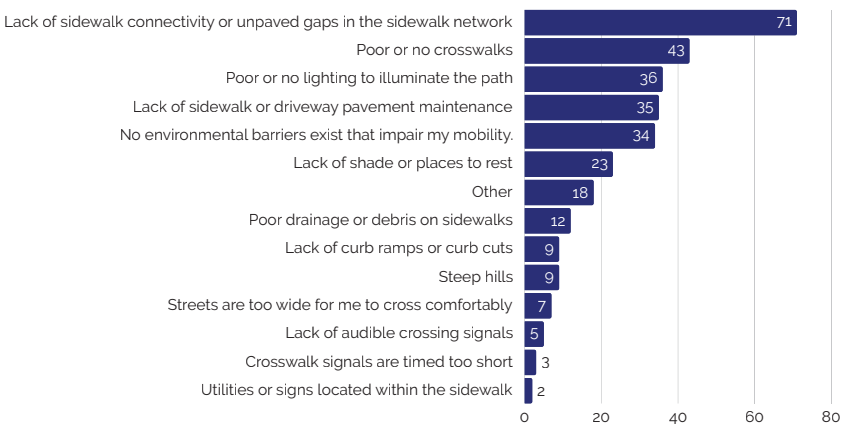
31. Please indicate whether or not you agree with the following statement: "I support improving bicycle conditions within our community whether I ride or not."



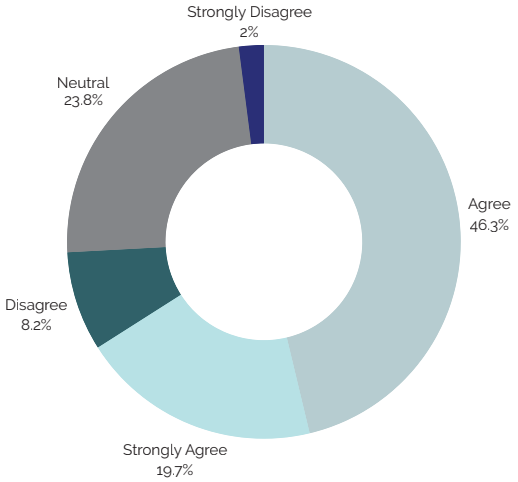
32. Do you or a member of your household have any of the following disabilities?



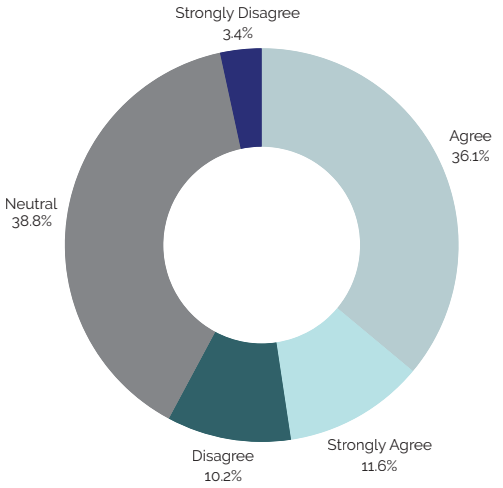
33. What barriers exist, if any, that impair your mobility on streets, roads, and sidewalks in Willard?



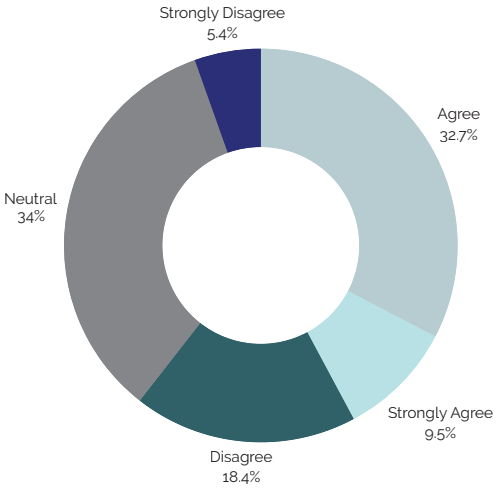
34. Willard has a bicycle and pedestrian culture that is welcoming to people of all ages and abilities.



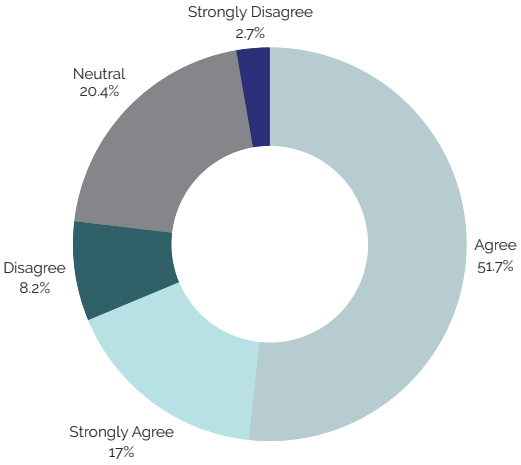
35. Willard has a bicycle and pedestrian culture that proactively pursues input and feedback from an array of voices within the community.



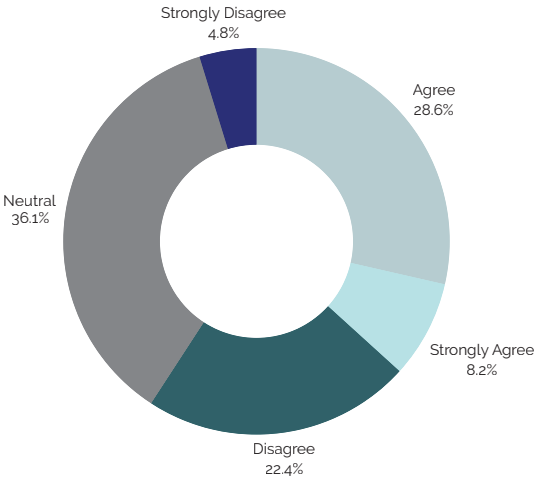
36. Willard has a bicycle and pedestrian culture that proactively encourages and supports biking and walking as a useful transportation method for trips to places like work and school.



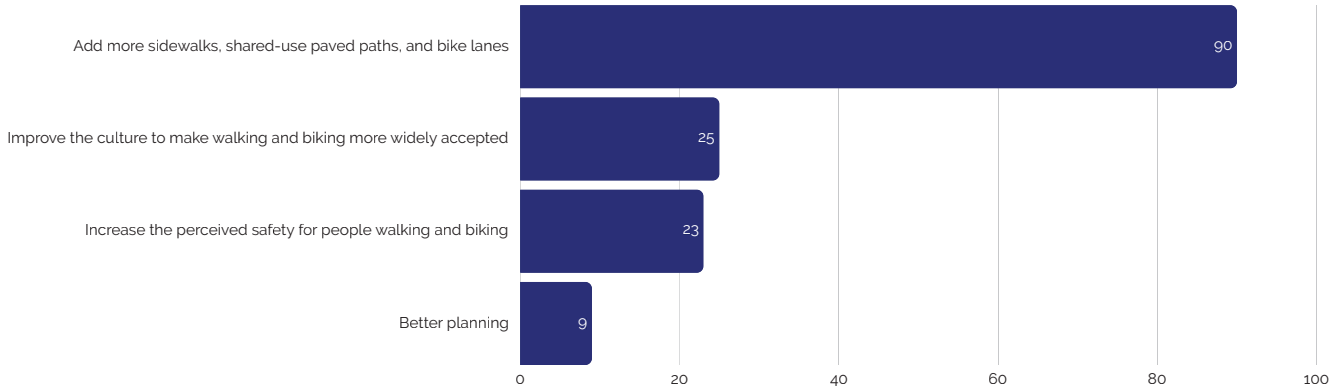
37. Willard has a bicycle and pedestrian culture that proactively encourages and supports biking and walking for recreation and fitness.



38. Willard has a safe, connected, and comfortable (low-stress and intuitive) bicycle and pedestrian network that is available for useful transportation and recreation.



39. What is the most critical step that Willard can take to help increase walking and biking in the city?



40. What are some of the biggest obstacles that Willard has in helping people bike, walk, or roll more frequently?

(Answers that stated "none", "N/A", etc., were omitted. Answers are unaltered.)

Do what you have to do to keep our small businesses alive! Lower rent, all that. Get good safe biking areas away from vehicle traffic. Design things with the safety of children and bikers in mind. Fix sidewalks and especially get the street lights fixed. There are two out on my street on Sarah Ct.
Aggressive motorists
More sidewalks in older and upcoming neighborhoods
I don't know...I just ride the Katy and I don't often ride into Willard unless the trail rides spends the night there...
Safe and accessible bike and walk paths/lanes
Lack of courage or the interest in evolving
Places to bike, walk or roll.
Prioritizing neighborhood connections and investment in pedestrian and bicycle realm.
Connectivity
Heat in July & August
Willard has deteriorating main artery/venous sidewalks, but lacks critical capillary sidewalks in high traffic neighborhoods.
Automobile centric population, believes bicycles belong on sidewalks, lack of driver attention, low connectivity for sidewalks
Keeping trails clear, trimming overhanging bushes
Need more trails.
Adding lanes. Connecting trails. Informing public
More trails
Some of your roads lack shoulders or bike lanes. Also, some maintenance is necessary on the greenways to remove underground roots that make the surface uneven.
Vehicles do not let Riders cross in cross walks
Need more side walks in the older neighborhoods to connect to schools and shopping!
lack of awareness
Financial funding
Lack of restroom facilities or stops along the way to take a break and grab a snack or have lunch
The town is separated by a highway
Street crossings without traffic control
Better intersections
education programs
No sidewalks, speeding reckless drivers
Lack of connections
Several roads without bike lanes or shoulders
I think you are doing well. But fixing potholes and trail damage quickly after storm, plus "bush whacking" trimming would be a few things. Restrooms, and a place to take "shelter" in a storm (even if it just an overhead roof) would encourage riding even in more inclement risky rainy wweather.
Even though the greenway trail is paved it is pretty rough.

Lack of community desire. If not for the Frisco Trail Willard has nothing going on this topic. Willard should endorse and promote the FHT and thus promote Willard to both residents and visitors.
Maintenance of the trails and surfaces.
Safer connections to parks and green spaces from south side of town to the north side
The more greenways, and connections to greenways from quiet residential streets, or protected bike lanes to those streets and greenway connections, the more people that will be able to utilize them to get to school/work/entertainment spots or for out and back recreation.
Connect the Frisco better with town
Not enough sidewalks and better trail connections
Vegetation overgrowth. Too narrow on the Frisco trail. Stressful for cyclists sharing trail with walkers, dog walkers and runners.
Sidewalks that randomly end
Connecting existing infrastructure to outlying neighborhoods
safe streets for biking to get to bike trails
Keep the trail repaired, overgrown and clean
Narrow streets barely have enough room for two cars passing, much less room for cyclists.
Lack of restrooms , poor lighting
Not enough sidewalks
Lack of connected greenways/shares use paths
Finances to make sidewalks and trails
Size and space
Connecting to attractive destinations. Springfield needs to connect the Frisco to their trail network. The State needs a bridge over highway 13 to connect Willard to Bolivar.
Being cool and fixing the trails
Paved surfaces
Not enough trails around the town
We use the Frisco Trail primarily for biking. The curb egresses need to be improved on most street crossings.
More trails
Narrow rodes. Not enough side walk
Personal safety
Dogs on trail north or town
Connected trails, sidewalks, and bike lanes
Complete lack of the Willard city government to take responsibility or accountability of tree and grass maintenance and management. It’s dangerous for people to ride due to low hanging branches and shrub growing from the sides. The un mowed grass makes street crossings unsafe and someone will get hurt it’s just a matter of time., ask the Katy trail folks about the effects of not mowing, it got a seven year old killed.
Trail Head parking
Would like the Frisco trail to be paved
I don't live in Willard. I only use the Greenway. I wouldn't feel comfortable exploring Willard off protected bike paths (roadways, lanes, etc)
Bicycle education
There is still a mindset that bikes need to stay on the trails and not share roads with cars.
Clean up frisco
Growing paths

Please connect with Springfield. It would be great if you guys could put a greenway trail on FR 94 that connects to the Ridder Springs. That would allow people who live in Willard to ride their bikes to Springfield for work. You might also encourage Springfield to complete the Grant Avenue Parkway to Lost Hill. That would build a regional connection between Willard and Springfield. It would allow Springfield citizens to ride their bikes from Sunshine Street to Lost Hill, over to FR 94, to get on the Frisco Trail to make it into Willard to enjoy restaurants and shops. Building connected communities is best for citizens.
More places to rest in the shade and fill the cracks in the pavement on the trail.
Money
Disconnect between city government and the cycling community. City officials should look for examples from other cities who are taking advantage of high quality trail systems.
Narrow and busy roads without sidewalks
We need a sidewalk in Hughes Rd! I would also love to see (or be made aware of) a paved walking/jogging trail at Miller Park.
Trim the bike trail more often so you don't have to dodge branches
Safety. We have an awesome trail to use, however, the motor vehicle crossings are unsafe. Motorists do not pay attention at crossings and feel they have the right of way. I use the trail daily, and almost daily, I stop at a crossing for multiple cars to pass before one stops and allows me to cross. Lighting would be helpful, too. The trail is very dark in the morning before sunrise and evening after sunset.
Bathrooms
Not enough protected bike lanes and lack of safe access from trail to businesses.
I know people who walk on Farm Road 94 that live on the city limit side. I'm surprised they haven't been hit yet. Sidewalks are needed.
Lack of adequate sidewalks around town, especially in busy pedestrian areas, for example, no sidewalks on Hughes Rd that connects several sub divisions and many side streets off of Hughes rd have sidewalks, but not Hughes Rd itself
Sidewalks
Bike riders are taking over the walking trails.
Do more than events for families-recreational in nature
Keep ditches and sides of road mowed. Can't see cars from around a lot of corners due to grass being so tall. This will also make Willard as a community look cleaner and more inviting. 160 through town especially. Animals that have been killed on the road are unpleasant to ride or walk by.
Lack of connection between areas
More trails or bikes routes
Connecting the west side of town to the east side. If you live west of West Bypass, there are little sidewalks or bike lanes to get to the schools or trail.
More trails
Need sidewalk from pheasant Lane up to the rec center. Walking or riding a bike and the road is very dangerous at that location. You have to walk in the road up to the rec center to be able to get to a sidewalk to get to town.
Seems like many people in Willard are just realizing that the Frisco Highline trail exists much less what a tremendous asset it is. Thank goodness for Ozark Greenways.
There is no safe or easy access to cross Hwy. 160 to get over to the trail for individuals and families living in the neighborhoods located around the police station. This is the main reason we don't use the trail very often.
Not enough trails
Accessibility
Safety
Have to use main roads versus sodewalks

Needs better ways to cross highway
Dogs are Loose all the time.
Texting and driving
US-160 (Olympian Blvd.) is a major highway barrier with few safe crossings.
Getting the public to collectively agree on somethong
Lighting for use after daylight
Bike lanes espesically on backroads to get to the trail
Aggressive / stupid drivers.
The trail is the only part that's friendly to bikers. The rest of the city and outside area is very hazardous. I spent 17 years of my life growing up there.
Knowing where to park to use the trails
Lack of connected trail systems to go in different directions than Frisco (or get to it from other places).
Need more lights. Reduce sketchy areas of Willard. Police patrol more.
Aggressive motorists unaccepting of people on bikes
Already answered, but we need a much better, more connected sidewalk network throughout Willard. More so than anything needed for bikes at the moment.
Weather - we need an indoor walking track like republic has
Access or knowledge
Making sure drivers know where the bikers are
No sidewalk on Kime, Miller and Main St. Kime is very dangerous to walk but my only option to leave the house on a walk with my dog and kids.
160 is hard to get across. Few places to stop and get a drink or food.
The frisco is amazing for Willard but there needs to be better connections to it from other parts of town. Having to ride 1/2 a mile down 160 from bull's eye to get to farm road 91 isn't fun. Maybe a spur from the frisco south into the neighborhoods south of 160 and AB
Poor street planning Poor street surface Narrow sidewalks Lack of sidewalks Poorly managed public works
People let their dogs roam without a leash. The concern over getting chased by a dog is what stops me from exercising alone in Willard. People here are irresponsible pet owners.
I have to drive anywhere to be able to walk, or cross the busiest street to get to the closest neighborhood. (I live off 94 and 101).
Crosswalk safety. Particularly the crosswalk at the high-school. There have many many close calls with people not seeing/paying attention while turing off Jackson to go to the high school. Lack of crosswalk and people speeding near them.
The lack of sidewalks near busy roads
Sidewalks not being fixed
Better crosswalks and better sidewalks to connect to the Frisco Trail
More sidewalks
Motor vehicles do not watch for bikes and pedestrians
Lack of sidewalks and connections to the Frisco trail.
Lack of sidewalks in neighborhoods to connect to trails and motor vehicle drivers speeding on residential streets
Crosswalks
Narrow streets with no shoulder, low visibility, and deep ditches
Money
Connectivity and adding recreation areas for people

41. Is there anything else you would like to tell us about walking, biking, and/or rolling in Willard?

(Answers that stated "none", "N/A", etc., were omitted. Answers are unaltered.)

No, it would be cool to have paths for biking away from vehicle traffic that would encourage exercise!
Focus on connections to the Frisco Highline Trail as the main artery, to downtown Willard, and focusing on connections to residential areas
Sidewalks require a lot of planning. They need planned to work with the existing topography, drainage, utilities etc. Just thinking one can just build a sidewalk from A to B without considering drainage, landscaping, etc leads to sidewalks that look like after-thoughts (e.g. New Melville) :).
I dont believe that biking is a main concern in willard. I feel like most residents are unable to walk to school from their neighborhood without walking on the side of a road or a street.
The greenways trail is great. would like to see more shared use connections, especially to parks, shopping areas, and residential areas, would like to see sidewalks on both sides of streets.
We enjoy running. Walking & biking on the trail frequently. Having trash cans handy would be helpful.
Love Frisco. Mile 7 is a great addition
I prefer riding in Willard over towns like Nixa, Republic, or Ozark
I love riding on the Frisco trail in Willard
Miller Road is too narrow , and there needs to be sidewalks so children can walk to school safely!
Please create safe passage to the Frisco trail. Please consider paving more of the trail.
Extend the pavement on the frisco
More connections please!
Love the Frisco
Thanks Willard! Thanks Bike Lovers and hikers/joggers and those who participate in maintaining the trails and culture. Much appreciated! Maybe a sign frequently saying "keep right, allow others to pass..notify passing on right" would help those not familiar with trail culture..
I walk or ride to stay as fit as I can. Also love seeing others walking and riding. Enjoy socializing with them.
Happy to see some interest on this topic from Willard.
No, we enjoy riding there very much.
Thanks!
I am a cyclist that uses the trail very frequently. I would be appreciative if any improvements to the trail. Especially widening the paved section to make it more comfortable for all. And somehow making the intersections more safe.
It's one of my favorite places to ride bikes
More bicycle signage would be helpful, and more connections via bike lanes to the Feisco
Thanks for offering a public restroom on the Frisco. Love Mile 6 Taproom.
Trim the trees on the Frisco on the paved section
The frisco is nice but it's the only trail in town
We love Willard! We appreciate the restrooms and picnic tables.
Please make more opportunities for the community to enjoy nature
Keep improving. Love it. The more connected the better.
There is not enough to do in Willard
The Frisco trail is great but going anywhere else by bike is not safe.
Don't add any trails or make any changes until you can properly maintain and manage what you're already responsible for.

Keep Frisco free of limbs and debris
I appreciate what we have and hope we can progress and encourage quality growth.
Extend sidewalks towards south side of town. Extend sidewalks down Miller to Hughes road and along AB to Hughes road. Hughes road also needs sidewalks. Thank you!
The cracks-gaps in paved areas make pushing stroller hard
Please prioritize a sidewalk on Hughes rd. There are dozens of pedestrians of various ages on the road (children, adults, elderly) with dogs and strollers, and people drive way too fast on that hilly road for there to not be sidewalks.
Stricter rules for bike riders. They need to follow the stop signs
Three cheers for the Frisco Highline Trail, Mike 6 Taproom, and all the fun activities at the trailhead!
Please add easier and safe access to the trail from the neighborhoods surrounding the police station
I hate biking with cars. They can not be trusted
Fun but highway is too fast paced
Please add more shared use path (11' or wider) connections between neighborhoods and the Frisco Highline Trail
Better sidewalks, designated own bike lane
The Frisco Trail is awesome but the city has been slow to adopt anything
Important to develop. Connect to other areas of there was an off shoot of the trail to Ritter springs/sac river. Would be huge.
If Frisco is the "Highway" there needs to be a system of interior trails to connect people and places around Willard to that highway without needing a car, public roads or sidewalks. If building more trails is not feasible, make dedicated paths with a strong emphasis on riding confidence in their safety. Its no secret there is a large presence of cyclist hatred when people are behind the wheel of a vehicle, so minimizing those friction points is key.
More street lights and to make people feel safe while walking in Willard. There are some rough looking areas
Thanks for sending the survey!
Sidewalks!
We need an indoor walking track like Republic has.
My neighborhood doesn’t have many sidewalks and requires pedestrians to walk on the road. Which in itself a problem but on Pershing street there are always cars on the road that you have to walk around making it even more dangerous.
The pump track idea is still a good one.
It’s past time for improvements
We need a skate park
Paving sidewalks along other roads in Willard. Particularly Jackson, opposite side of the trail.
Needs culture building, water fountains and restrooms
We need more sidewalks and connections available to the Frisco trail.

APPENDIX C Sources

1. The Housing and Transportation Affordability Index. (2025, November). Willard, Missouri Fact Sheet. https://htaindex.cnt.org/fact-sheets/?lat=37.304944&lng=-93.428258&focus=place&gid=14814#fs
2. U.S. Census Reporter. (2025, November). Willard, MO.
3. American Community Survey. (2025, November). https://data.census.gov/
4. Wikipedia. (2025, November). Willard, Missouri. https://en.wikipedia.org/wiki/Willard,_Missouri#History

Acknowledgments

Steering Committee

- Mike Ruesch, City of Willard, Director of Planning & Development
- Tammy Nephew, City of Willard, Planning Assistant

Members of the Steering Committee included representation from:

- City of Willard Parks & Recreation Department
- City of Willard Director of Public Works
- City of Willard City Administrator
- City of Willard Fire Department
- City of Willard Police Department
- Willard Public Schools
- Mid-Missouri Bank
- Ozark Greenways
- Ridewell Corporation
- Missouri State
- AMCE

A special acknowledgment and thank you to Willard residents and Greene County community members who provided invaluable local knowledge and experience that helped form the network plan.

Section 400.1160. Site Plan. [Ord. No. 020227 §1(14.3), 2-27-2002; Ord. No. 040913 §1, 9-13-2004; Ord. No. 101228D §5, 12-28-2010]

A. The site plan submitted should provide sufficient information to determine whether the proposed development is in compliance with these regulations. The site plan shall include the following information:

1. *Minor site plan.* Three (3) copies shall be submitted.

a. The name and address of the applicant.

b. The owner's name and address, including trustees and, if different from the applicant, the owners signed consent to the filing of the application and authorization for the applicant to act in his/her behalf.

c. Date of application submittal.

d. Street address or common description of the property.

e. The proposed use or uses and a general description of the proposed development.

f. A legal description and a survey, certified by a registered land surveyor, showing property boundary lines and dimensions; and all easements, roadways, rail lines and public rights-of-way, any part of which cross or are adjacent to and affect the subject property; and that all necessary easements can be obtained.

g. An approximate north arrow and scale.

h. The zoning classification and present use, if any, of the subject property.

i. The general location and approximate dimensions of all vehicular, bicycle and pedestrian circulation elements, including streets, driveways, entrances, curb cuts, parking and loading areas and sidewalks, including slope and gradient of vehicular elements.

j. The location and size of existing public water and sewer utilities on and adjacent

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to the site and location of fire hydrants.

k. The location, designation and total area of all useable open space.

l. Location, size, use and arrangement of all proposed buildings and computations showing height in stories and feet, floor/area ratio, total floor area, total square feet of ground area coverage of proposed and existing buildings which will remain, if any, and building separations.

m. All existing or other drainage facilities, including size and dimensions of flow.

n. The location, size and arrangement of all proposed outdoor signs.

o. A landscaping plan in accordance with Article VIII and drawings of proposed screening or buffer plantings and types of materials or plantings used.

p. A soil erosion control plan for the period during which construction will be taking place and after construction is complete.

q. Any other information that may be required by the City to determine that the application is in compliance with this Chapter.

2. *Major site plan.* Fifteen (15) copies shall be submitted.

a. The name and address of the applicant.

b. The owner's name and address, including trustees, and, if different from the applicant, the owners signed consent to the filing of the application and authorization for the applicant to act in his/her behalf.

c. Date of application submittal.

d. Street address or common description of the property.

e. The proposed use or uses and a general description of the proposed development.

f. A legal description and a survey, certified by a registered land surveyor, showing property boundary lines and dimensions; and all easements, roadways, rail lines and public rights-of-way, any part of which, cross or are adjacent to and affect the subject property; and that all necessary easements can be obtained.

g. An approximate north arrow and scale.

h. The zoning classification and present use, if any, of the subject property.

i. The general location and approximate dimensions of all vehicular, bicycle and pedestrian circulation elements, including streets, driveways, entrances, curb cuts, parking and loading areas and sidewalks, including slope and gradient of vehicular elements.

j. The location and size of existing and proposed public water and sewer utilities on and adjacent to the site and location of fire hydrants.

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k. The location, designation and total area of all useable open space.

l. Location, size, use and arrangement of all proposed buildings and computations showing height in stories and feet, floor/area ratio, total floor area, total square feet of ground area coverage of proposed and existing buildings which will remain, if any, and building separations.

m. All existing and proposed storm sewers or other drainage facilities, including size and dimensions of flow.

n. The location, size and arrangement of all proposed outdoor signs.

o. A landscaping plan in accordance with Article VIII and drawings of proposed screening or buffer plantings and types of materials or plantings used.

p. A soil erosion control plan for the period during which construction will be taking place and after construction is complete.

q. In the case of any use for which a conditional use permit has been granted, any information necessary to demonstrate compliance with all conditions imposed by the conditional use permit.

r. Any other information that may be required by the City to determine that the application is in compliance with this Chapter.

A.

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Section 400.1310. Sidewalks. [Ord. No. 020227 §1(15.8), 2-27-2002]

A. Sidewalks shall be required along ~~one (1) side~~ two (2) sides of all streets, or one (1) sidewalk and one sidepath. If the Commission finds that unusual or peculiar conditions prevail with respect to traffic and/or safety of pedestrians, the Commission may require different standards of walkway improvements to ensure safe pedestrian access to schools, parks, other public use areas or adjoining streets.

B. Sidewalks shall be constructed in conformance with the provisions of Chapter 405, Design Standards for Public Improvements. Sidewalks may be constructed of other suitable materials if the Commission determines that:

1. Such sidewalks will serve residents of the development as adequately as concrete walks; and

2. Such sidewalks would be more environmentally desirable or more in keeping with the overall design of the development; and

3. The City will not incur greater than normal expense in maintaining such sidewalks dedicated for public use.

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Section 400.1320. Blocks. [Ord. No. 020227 §1(15.9), 2-27-2002]

A. Block length and width or acreage within bounding streets shall be such as to accommodate the size of lot required by the zoning district and to provide for convenient access, circulation and safety of street traffic.

B. Block lengths shall not exceed one thousand three hundred twenty (1,320) feet or be less than three hundred (300) feet, except under unusual conditions.

C. A block should be arranged so as to provide two (2) tiers of lots and to allow for adequate pedestrian access through the subdivision and to adjoining properties.

D. If the block is over 600 feet in length between intersections a midblock crossing or arterials and collectors shall be installed consisting of:

1. An easement for utilities and pedestrians with a minimum width of 20 feet; or

2. An easement reserved for pedestrian passage with a minimum width of 10 feet

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Section 400.1350. Lot Easements. [Ord. No. 020227 §1(15.12), 2-27-2002]

A. Easements may be required for the installation of utilities and stormwater improvements. Minimum easement width shall be ten (10) feet, except that a wider easement may be required by the Commission as determined appropriate by the City Engineer. The size and location of drainage easements shall be approved by the City Engineer. Any stormwater facilities developed in accordance with this Section shall be in a dedicated easement to the City. All easements shall be of sufficient width to enable the access and movement of equipment necessary for maintenance and/or repair.

B. All easements shall connect with easements established in adjoining properties.

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Section 405.150. Sidewalks. [Ord. No. 020227 §1(Art. II §2.4), 2-27-2002]

A. Sidewalks shall be constructed on one (1) side of all streets and shall not be built over water lines.

B. Sidewalks shall be located within the street right-of-way, one (1) foot inside the right-of-way line. Sidewalk subgrade shall be compacted to ninety-five percent (95%) Standard Proctor ASTM D698. Sidewalks shall be constructed of Portland concrete and shall be four (4) inches thick. Expansion joints shall be provided every fifty (50) feet; contraction joints at five (5) feet. Sidewalk widths shall be constructed to the following applicable minimum standard: **[Ord. No. 200810A, 8-10-2020]**

1. Sidewalks along minor streets shall be a minimum of five (5) feet wide.

2. Sidewalks along collector and arterial streets and in the vicinity of schools, recreation areas and other community facilities shall be a minimum of five (5) feet wide.

3. Sidewalks in the vicinity of commercial districts or shopping centers shall be a minimum of eight (8) feet wide.

C. Whenever the Board of Aldermen finds that a means of pedestrian access is necessary from the subdivision to schools, parks, playgrounds or other roads or facilities and that such access is not conveniently provided by sidewalks adjacent to the streets, the developer may be required to construct other walkway improvements to provide such access in compliance with the requirements of Chapter 400 Land Development Regulations, Article XV, Required Public Improvements.

D. All sidewalks shall be constructed up to each intersecting street and wheelchair ramps shall be provided at intersections and other major points of pedestrian flow. Where required, wheelchair ramps and depressed curbs shall be constructed in accordance with the standards of the Americans With Disabilities Act in effect at the time of construction.

E. A grass planting strip shall be provided between the curb and the sidewalk.

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Section 405.120. Streets — General Requirements. [Ord. No. 020227 §1(Art. II §2.1), 2-27-2002]

A. The classifications, extent, width, grade and location of all streets shall conform to the Willard Comprehensive Plan and major street plan. In any case where additional street right-of-way is required, the additional right-of-way shall be split on both sides of the existing right-of-way unless otherwise approved by the Board of Aldermen. Where not shown, the arrangement and design standards of streets shall conform to the provisions herein and/or the Missouri Department of Transportation or Greene County where applicable. Streets which have an entry onto a State highway will require approval from the Missouri Department of Transportation. Streets which have an entry onto a Greene County roadway will require County approval.

B. The arrangement of streets in new subdivisions shall be coordinated with existing, proposed and anticipated streets outside of the subdivision. Provision shall be made for the continuation of existing streets in adjoining areas.

C. When a new subdivision adjoins a tract susceptible to being subdivided, new streets shall be extended to the boundaries of such tract.

D. Streets shall be related appropriately to the topography and street grades shall conform as closely as practical to the original topography. Street grades shall be in accordance with the requirements of this Chapter.

E. Street jogs with centerline offsets of less than one hundred fifty (150) feet shall be prohibited.

F. Local streets shall be designed so as to discourage motorized through traffic. However, provisions must be made for the extension of arterial and collector streets into and from adjoining areas.

G. Permanent dead-end streets or culs-de-sac shall be no longer than eight hundred (800) feet and shall provide at the closed end a paved turnaround having a minimum diameter of one hundred (100) feet to the face of the outside curb and one hundred twenty (120) feet to the street right-of-way line. See Drawing No. 1. All dead-end streets and cul-de-sac's shall incorporate access for connected active transportation for people riding, rolling, or walking. **[Ord. No. 200810A, 8-10-2020]**

H. Any street dead-ended for access to an adjoining property or temporary in nature because of authorized staged development shall be provided with temporary, all-weather turnaround at the end of the street and the use of such turnaround shall be guaranteed to the public until such time as the street is extended. Every lot shall have access to a road that provides reasonable ingress and egress for emergency vehicles as well as for the intended use of the lot.

I. When a subdivision abuts or contains an arterial street, the Planning and Zoning Commission may require marginal access streets, reverse frontage lots or other such treatment as may be necessary for adequate protection of abutting properties and to provide separation of through and local traffic.

J. Half-streets shall be prohibited except where such streets, when combined with a similar street (developed previously or simultaneously) on property adjacent to the subdivision, create a street that meets the right-of-way and pavement requirements of Chapter 400 Land

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Development Regulations and this Chapter. In such case, the developer shall dedicate that

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portion of land in the proposed subdivision that will complete the street right-of-way to the minimum standards.

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Section 405.156. Linear Park Trails And Connections To Trails. [Ord. No. 241125A, 5-12-2025]

A. Purpose. The purpose of these requirements is to facilitate the development and maintenance of linear park trails and connectors within the City of Willard, aligning with the goals outlined in the Willard Trails Master Plan and the City of Willard Comprehensive Plan. Linear park trails serve as vital recreational and transportation corridors, promoting non-motorized travel and enhancing the overall quality of life for residents.

B. Trail Easement Dedication.

1. An easement through property to be subdivided shall be dedicated for the construction of a linear park trail if:

   a. A trail is planned within a linear park as identified by the Willard Comprehensive Plan and all future active transportation plans; and

   b. A trail easement has not been previously dedicated.

2. The easement shall have a minimum width of thirty (30) feet and shall generally follow the alignment specified in the Willard Parks Master Trail Plan. Easements for linear park trails may be mandated during the review of preliminary plats by the Planning and Zoning Commission or during the administrative review of subdivisions by the Director of Planning and Development and Director of Parks. Trail width shall be a minimum of twelve (12) feet of concrete with a two (2) foot level shoulder on each side of the trail. Trail shall be installed in accordance with the Willard twelve (12) foot multi-use trail Section-TS-12.

C. Neighborhood Linear Park Connectors.

1. A neighborhood linear park connector shall be established during the review of platted subdivisions by the Planning and Zoning Commission or during the review of lot division administrative subdivisions by the Director of Planning and Development.

2. The easement for a neighborhood linear park connector shall extend between a public street within, or adjacent to, the property to be subdivided and either:

   a. An easement for a linear park trail, if located on the subdivider's property or abuts the proposed subdivision.

   b. The boundary of the property being subdivided if the linear park trail easement is on adjacent property.

   c. Trail easements shall not run in utility easements without prior written approval of the City.

3. A ten (10) feet wide easement for a neighborhood linear park connector shall be sufficient to accommodate construction, grading, and stormwater drainage. Linear park connector width shall be eight (8) feet with a one (1) foot shoulder even with the trail on each side.

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4. Neighborhood linear park connectors must permit free pedestrian access and may be encouraged to utilize other types of easements.

5. Additional neighborhood linear park connectors are encouraged to enhance connectivity within subdivisions.

6. Neighborhood linear park connectors shall be a minimum of eight (8) feet wide and constructed according to City of Willard Design Standards for Public Improvements.

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Section 405.150. Sidewalks. [Ord. No. 020227 §1(Art. II §2.4), 2-27-2002]

A. Sidewalks shall be constructed on ~~one (1) side~~ two (2) sides of all streets (or one (1) sidewalk and one sidepath) and shall not be built over water lines.

B. Sidewalks shall be located within the street right-of-way, one (1) foot inside the right-of-way line. Sidewalk subgrade shall be compacted to ninety-five percent (95%) Standard Proctor ASTM D698. Sidewalks shall be constructed of Portland concrete and shall be four (4) inches thick. Expansion joints shall be provided every fifty (50) feet; contraction joints at five (5) feet. Sidewalk widths shall be constructed to the following applicable minimum standard: **[Ord. No. 200810A, 8-10-2020]**

1. Sidewalks along minor streets shall be a minimum of ~~five (5)~~ six (6) feet wide.

2. Sidewalks along collector and arterial streets and in the vicinity of schools, recreation areas and other community facilities shall be a minimum of ~~five (5)~~ six (6) feet wide.

3. Sidewalks in the vicinity of commercial districts or shopping centers shall be a minimum of eight (8) feet wide.

C. Whenever the Board of Aldermen finds that a means of pedestrian access is necessary from the subdivision to schools, parks, playgrounds or other roads or facilities and that such access is not conveniently provided by sidewalks adjacent to the streets, the developer may be required to construct other walkway improvements to provide such access in compliance with the requirements of Chapter 400 Land Development Regulations, Article XV, Required Public Improvements.

D. All sidewalks shall be constructed up to each intersecting street and wheelchair ramps shall be provided at intersections and other major points of pedestrian flow. Where required, wheelchair ramps and depressed curbs shall be constructed in accordance with the standards of the Americans With Disabilities Act in effect at the time of construction.

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E. A grass planting strip shall be provided between the curb and the sidewalk.

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