LITTLETON LINKAGES
TRAIL STUDY

Trail Crossing Guidance and Recommendations

Prepared by

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FHU Reference Number 121288-01

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Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

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Introduction

This Trail Crossings Guidance document presents a range of crossing treatments that can be used to improve the safety and usability of trail crossings in Littleton. The information contained here is largely drawn from FHWA's *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*, with additional information from other national resources listed at the end of the document.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	● 2 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6 7 9	○ 5 6 7 9	○ 5 6 ● 9
3 lanes with raised median (1 lane in each direction)	● 2 3 4 5 7 9	● ❸ 5 7 9	○ ❸ 5 ● 9	○ 3 4 5 7 9	○ ❸ 5 ● 9	○ ❸ 5 ● 9	○ ❸ 4 5 7 9	○ ❸ 5 ● 9	○ ❸ 5 ● 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	● 2 3 4 5 6 7 9	● ❸ 5 6 7 9	○ ❸ 5 6 ● 9	○ 3 4 5 6 7 9	○ ❸ 5 6 ● 9	○ ❸ 5 6 ● 9	○ ❸ 4 5 6 7 9	○ ❸ 5 6 ● 9	○ ❸ 5 6 ● 9
4+ lanes with raised median (2 or more lanes in each direction)	● ❸ 5 7 8 9	● ❸ 5 7 8 9	○ ❸ 5 8 ● 9	○ ❸ 5 7 8 9	○ ❸ 5 ● 8 9	○ ❸ 5 ● 8 9	○ ❸ 5 ● 7 8 9	○ ❸ 5 ● 8 9	○ ❸ 5 ● 8 9
4+ lanes w/o raised median (2 or more lanes in each direction)	● ❸ 5 6 7 8 9	○ ❸ 5 ● 6 7 8 9	○ ❸ 5 6 8 ● 9	○ ❸ 5 6 7 8 9	○ ❸ 5 ● 6 7 8 9	○ ❸ 5 ● 6 8 ● 9	○ ❸ 5 6 ● 7 8 9	○ ❸ 5 ● 6 8 ● 9	○ ❸ 5 ● 6 8 ● 9

Given the set of conditions in a cell,

\# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

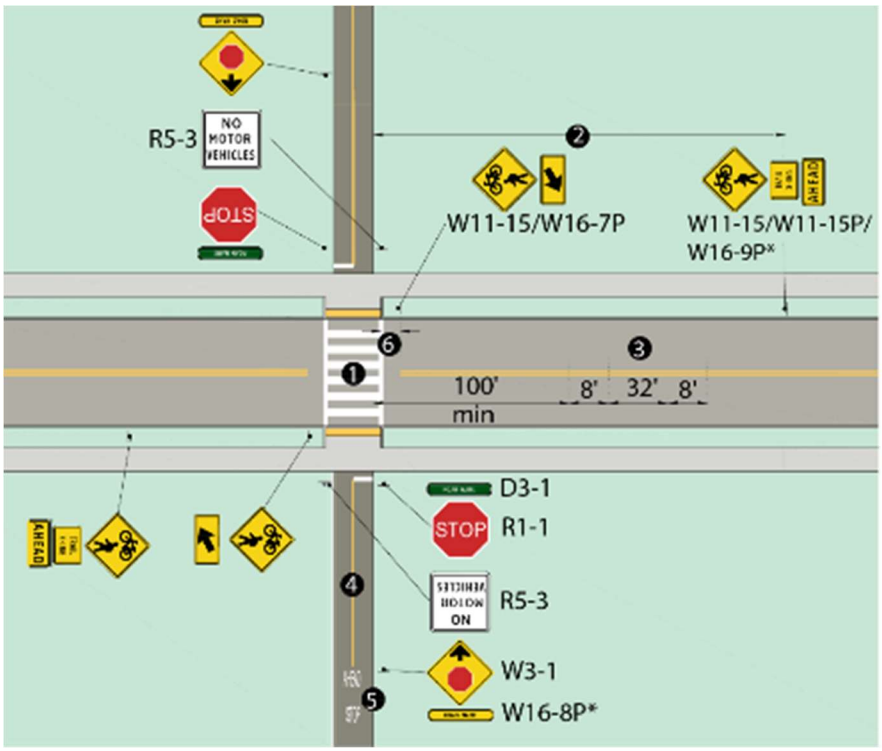
This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Table 1. This table from FHWA identifies suggested countermeasures for uncontrolled crossing locations according to roadway and traffic features, and informed the recommendations in this document.

As a companion to this document, the Littleton Crossing Treatments Recommendations table assigns recommended crossing treatments at specific locations in Littleton identified through the Littleton Linkages Trail Plan. These locations are identified on Map. X, which can be found X.

The guidance provided in this document is not meant to replace engineering investigations or feasibility studies. Crossing improvement treatments will need to be refined as projects progress into design.

High-Visibility Markings and Standard Warning Signs



Notes:

* Signs are optional but recommended

1. Crosswalk markings legally establish midblock pedestrian crossing
2. Length varies: see MUTCD table 2c-4
3. Roadway markings
4. Shared-use path centerline as needed
5. Optional pathway markings and signage
6. Sign placement 4'-50' from crossing

Figure 1. High-Visibility Markings and Standard Warning Signs (Credit: Toole Design)

Treatment Description

- High-visibility crosswalk markings
- Parking restrictions on crosswalk approach (where applicable)
- Adequate nighttime lighting levels
- Crosswalk warning signs, double-sided to improve visibility from both directions
- Optional: In-street yield to pedestrians paddle sign

Figure 2. Markings and warning signs at a W&OD Trail crossing in Vienna, VA

Conditions

- Posted speed limits: 25 mph or less
- Annual daily traffic: <9,000 vehicles
- Typically two-lane roads

Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Caley Ave and Datura St

Powers Ave and Fox St

Treatment Highlight:

Advance Warning Signs

Advance pedestrian warning signs should be used where motorists may not be expecting crossings and there may be limited sight distance. There are many crossing scenarios that warrant advance warning signs, but this crossing countermeasure should specifically be considered where posted speed limits are 30 mph or greater and there are 3 or more travel lanes.

Figure 3. Advance pedestrian warning sign located prior to a crosswalk

Rectangular Rapid Flashing Beacons (RRFBs)

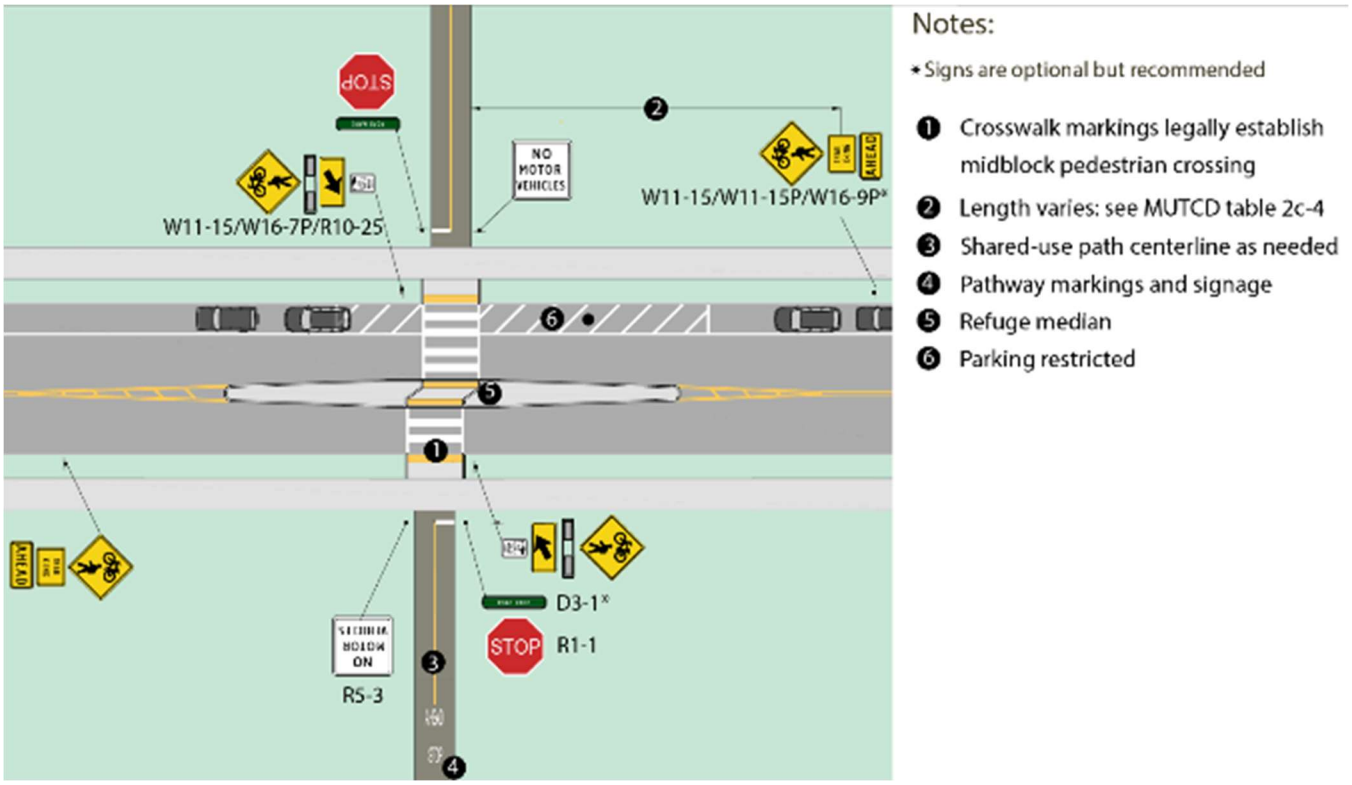


Figure 4. Rectangular Rapid Flashing Beacons (Credit: Toole Design)

Treatment Description

- Pair with High-Visibility Crosswalk Markings and Standard Warning Signs, double-sided to improve visibility from both directions
- User-actuated beacons that supplment warning signs
- Flashing yellow lights alert drivers that pedestrians and cyclists may be crossing

Figure 5. RRFB at a Virginia Capital Trail crossing

Conditions

- Posted speed limits: 30 mph
- Annual daily traffic: >9,000 vehicles
- Typically two-lane roads

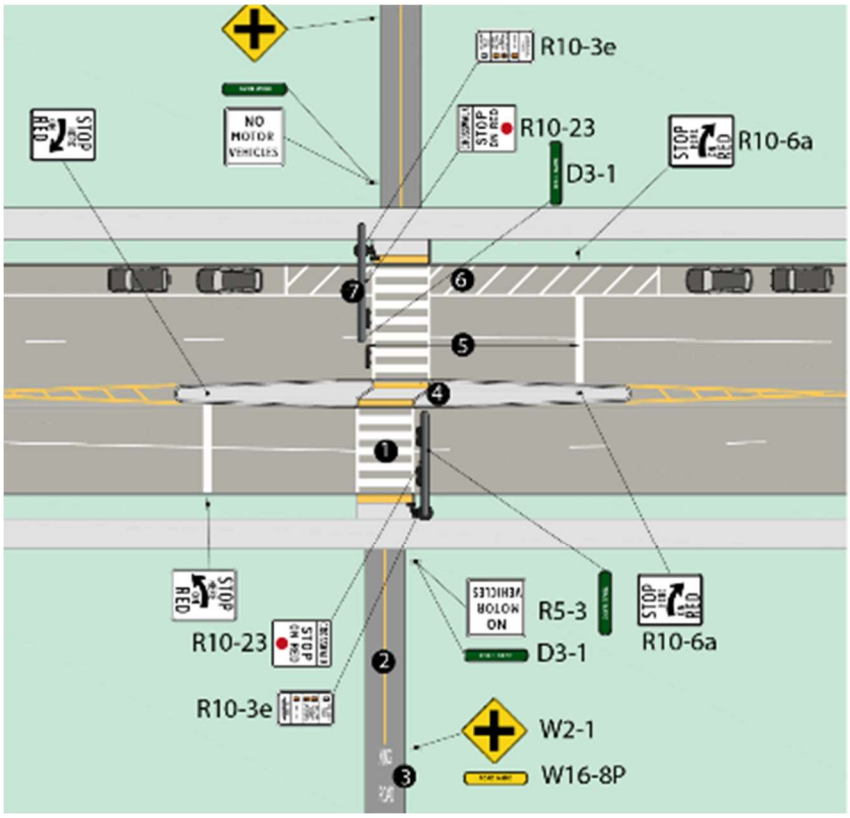
Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Lake Ave and Prince St

Windermere St and Berry Ave

Pedestrian Hybrid Beacons (PHBs)



Notes:

1. Crosswalk markings legally establish midblock pedestrian crossing
2. Shared-use path centerline as needed
3. Pathway markings and signage
4. Refuge median
5. Stop bar placement 40' min from traffic signal
6. Parking restricted
7. Mast arm with pedestrian hybrid beacon

Figure 6. Pedestrian Hybrid Beacons (Credit: Toole Design)

Treatment Description

- Pair with High-Visibility Crosswalk Markings and Standard Warning Signs
- User-actuated beacons
- Yellow to red light sequence directs motorists to slow and come to a stop

Conditions

- Posted speed limits: 35 mph and greater
- Annual daily traffic: >9,000 vehicles
- Roads with 3 or more travel lanes

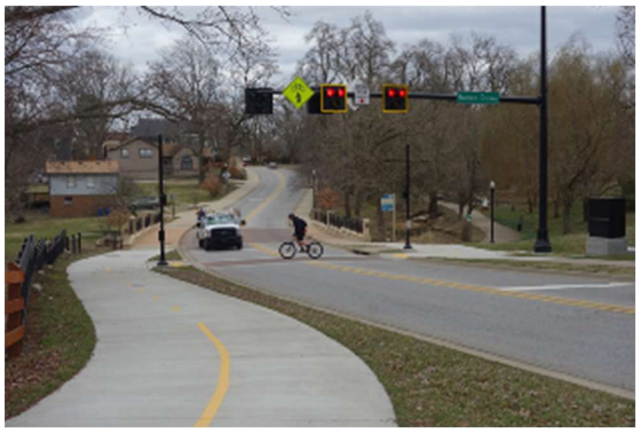


Figure 7. PHB along the Razorback Greenway in Arkansas

Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Belleview Ave and Michigan Ct

S Platte Canyon Rd and Depew St

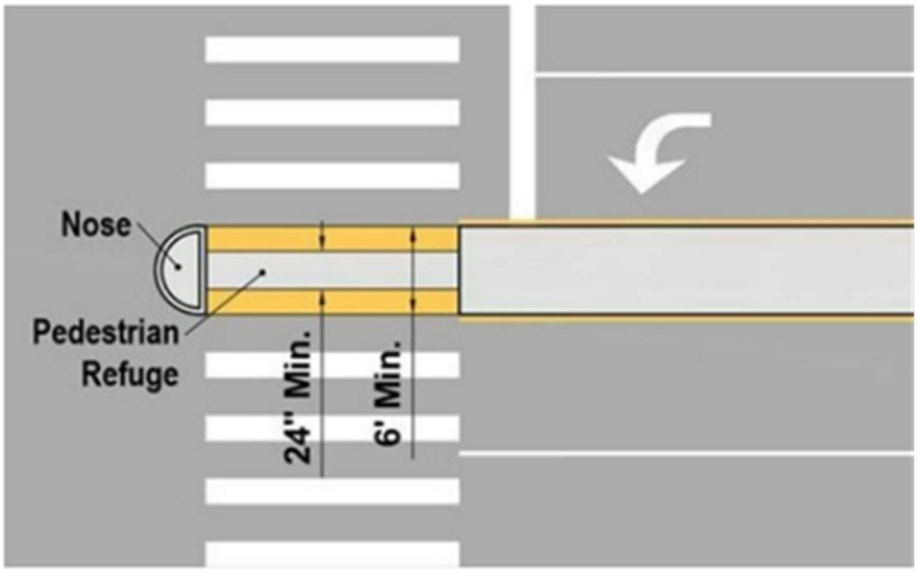


Figure 8. Median Refuge Island

Treatment Description

- Can be used at intersections or midblock crossings
- Pedestrian islands can be used to provide refuge when crossing all travel lanes at one time is not possible
- Pair with High-visibility Crosswalk Markings and Standard Warning Signs
- Can be combined with RRFBs and PHBs

Conditions

- Multi-lane roadways with medians or wide lane widths

Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Lowell Blvd and Aksarben Ave (south of Arrowhead Rd)

Belleview Ave and Windermere St

Curb Extensions

Figure 9. Curb Extension

Treatment Description

- Curb extensions shorten crossing distances and slow vehicle turning speeds
- Can be used at intersections or midblock crossings
- Pair with High-visibility Crosswalk Markings and Standard Warning Signs
- Can be combined with RRFBs and PHBs

Conditions

- Roadways with on-street parking lanes
- Intersections with wide turning radii

Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Powers Ave and Fox St

Prentice Ave and Huron St

Raised Crosswalks

Figure 10. Raised crosswalk in Victoria, BC

Treatment Description

- Raised crosswalks are ramped speed tables that span the width of the roadway
- Pedestrians are more prominent in the driver's field of vision on the elevated crosswalk
- Approach ramps may reduce vehicle speeds and improve motorist yielding
- Pair with High-visibility Crosswalk Markings and Standard Warning Signs

Conditions

- Posted speed limits: <30 mph
- Annual daily traffic: <9,000 vehicles
- Can be used at midblock crossings or intersections

Recommended Example Locations in Littleton

Additional locations recommended for this crossing treatment can be found in the Littleton Crossing Treatments Recommendations document.

Little's Creek Trail and Rapp St

Lee Gulch Trail and Elati St

Protected Intersections

Figure 11. Protected Intersection in Silver Spring, MD

Treatment Description

- Bikeway is separated from parallel vehicle traffic
- Corner islands extend the bike lane separation and tighten the corner turning radius
- Reduces the distance and time during which people on bikes are exposed to conflicts

Conditions

- Usually implemented at intersections with separated bicycle facilities or side paths
- Typically used in high traffic areas with high volumes of bicyclists and pedestrians

Recommended Locations in Littleton

Belleview Ave and Windermere St

Grade-Separated Crossings

Figure 12. Trail overpass in Madison, WI

Figure 13. Trail underpass in Austin, TX

Treatment Description

- Overpasses separate people biking and walking from vehicle traffic by creating a bridge over the roadway
- Underpasses and Tunnels route people biking and walking under the roadway

Conditions

- Appropriate where at-grade crossings cannot be accomodated (ex. multi-track railroad crossings and limited access highways)
- Require careful consideration, trail users prefer at-grade crossings when grade separated crossings add time or significant effort.

Recommended Locations in Littleton

Broadway north of Jamison Ave (tunnel)

Littleton Downtown Station to the Littleton Community Trail (overpass using existing drainage structure shown in photo or new trail bridge)

Treatment Highlight: Railroad Overpasses

Treatment Description

- Design to meet current and future operational needs of the railroad
- Provide 2 feet of clear area on either side of the trail
- Fencing to prevent debris from falling on the active tracks below

Conditions

- Clearance requirements vary by railroad and type

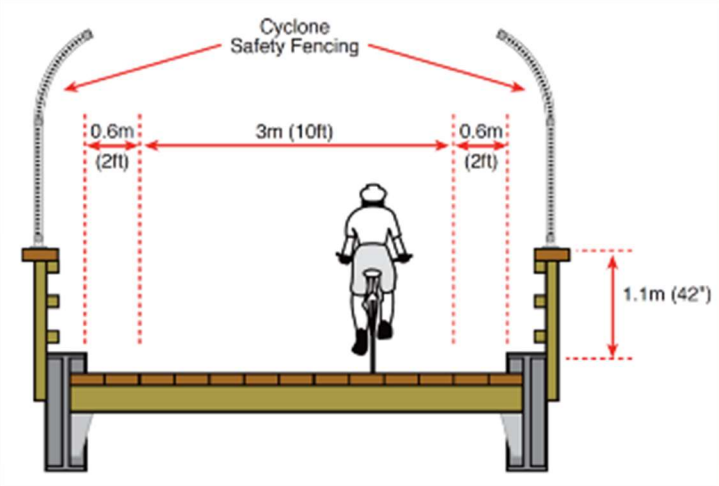


Figure 14. Track Overcrossing

(FHWA Rails-with-Trails Best Practices and Lessons Learned, 2021)

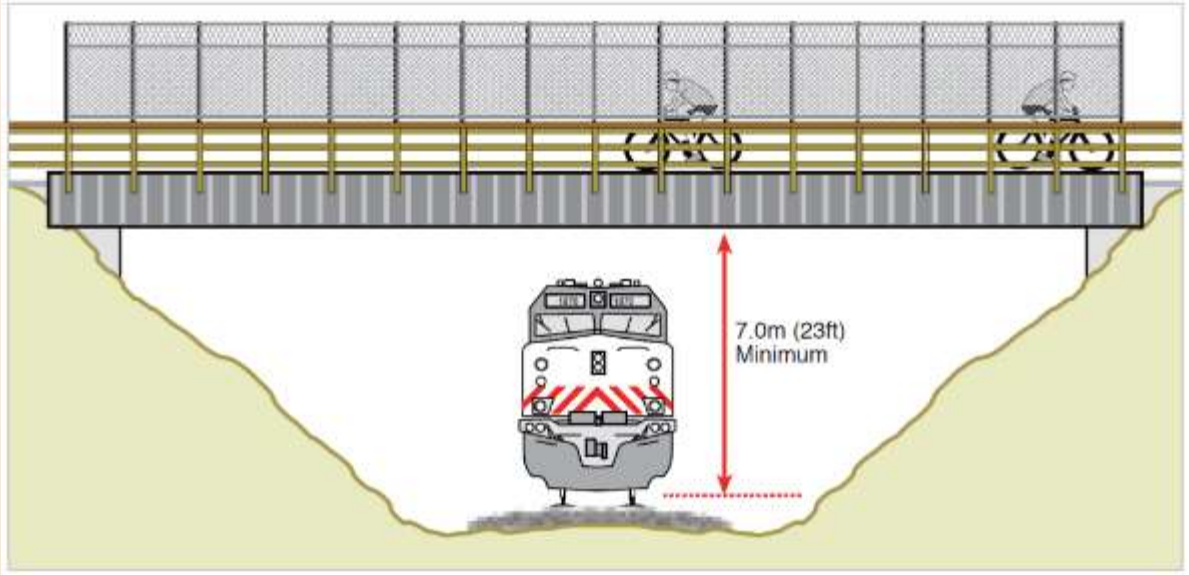


Figure 15. Rail-with-Trail Track Overcrossing for Amtrak-Required Clearance Height for Non-electrified Track

(FHWA Rails-with-Trails Best Practices and Lessons Learned, 2021)

Resources

National Association of City Transportation Officials. May 2019. Don't Give Up at the Intersection. Protected Intersections. https://nacto.org/publication/dont-give-up-at-the-intersection/protected-intersections/

US Department of Transportation, Federal Highway Administration. July 2018. Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations. https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/docs/STEP-guide-improving-ped-safety.pdf

US Department of Transportation, Federal Highway Administration. June 2018. Countermeasure Tech Sheet: Raised Crosswalk. https://safety.fhwa.dot.gov/ped_bike/step/docs/techSheet_RaisedCW2018.pdf

US Department of Transportation, Federal Railroad Administration and Federal Highway Administration. May 2021. Rails-with-Trails Best Practices and Lessons Learned. https://railroads.dot.gov/sites/fra.dot.gov/files/2021-06/Rails%20with%20Trails%20Best%20Practices%20and%20Lessons%20Learned.pdf

Crossings Near Parks and Schools

Littleton has parks and schools located in every neighborhood. By providing sidewalks, bicycle facilities, trails, and safe crossings to access these community assets, the City of Littleton is helping to: reduce driving for short trips, encourage physical activity, and support independent travel by non-drivers, including children and older adults.

While all pedestrian and bicycle crossings should be designed and built to safe and accessible standards, crossings near schools and parks warrant an extra level of attention due to the presence of more children and families accessing these facilities.

Understanding Children's Travel Needs

In addition to being physically smaller than adults, children's cognitive abilities and motor skills are still developing. In combination, this means that children are:

- Less visible to people driving
- More vulnerable to crash forces
- More prone to making mistakes

Their relative lack of experience and developing motor skills also mean children have a harder time judging the speed of oncoming traffic and can take longer to react as they process information before acting.

When walking or biking, very young children are accompanied by parents and caregivers, while some older children may travel with their peers. In both cases, additional space is required for group travel with mixed modes – parents may walk next to their child on a bike while an older group of children may be on bikes, scooters, or skateboards.

Principles for Crossings Near Schools and Parks

According to the National Association of City Transportation Officials (NACTO) and Global Designing Cities Initiative, improving street crossings is one of "Ten Action to Improve Streets for Children" and is closely related to providing safe bicycling facilities and lowering speeds by design. The principles below center children's travel needs in the planning and design of crossings near parks and schools. Table 1 lists possible crossing treatments that can be used in support of the principles. More information on these treatments can be found in the Littleton Trails Crossing Guidance document.

Increase visibility and awareness – To create a supportive walking and bicycling environment, crossings should be frequently spaced, be well marked and signed, and have clear sightlines for both drivers and pedestrians. Because children are smaller than adults, parked cars and other obstructions can easily impede sightlines and reduce visibility. Daylighting crossings (restricting parking) or installing raised crosswalks can help address these issues.

Create physical space between users – This can be done by widening sidewalks or adding curb extensions or pedestrian islands. This principle helps accommodate groups of bicyclists and pedestrians traveling together. Often, by repurposing portions of the roadway to create physical space between users, intersections become smaller and easier to cross.

Calm traffic speeds – The relationship between vehicle speed and injury crashes has been well documented in traffic safety research; slower speeds save lives and reduce serious injuries. At slower speeds, drivers have a wider field of vision, and stopping distances are shorter, helping drivers see and react to potential conflicts before they happen.

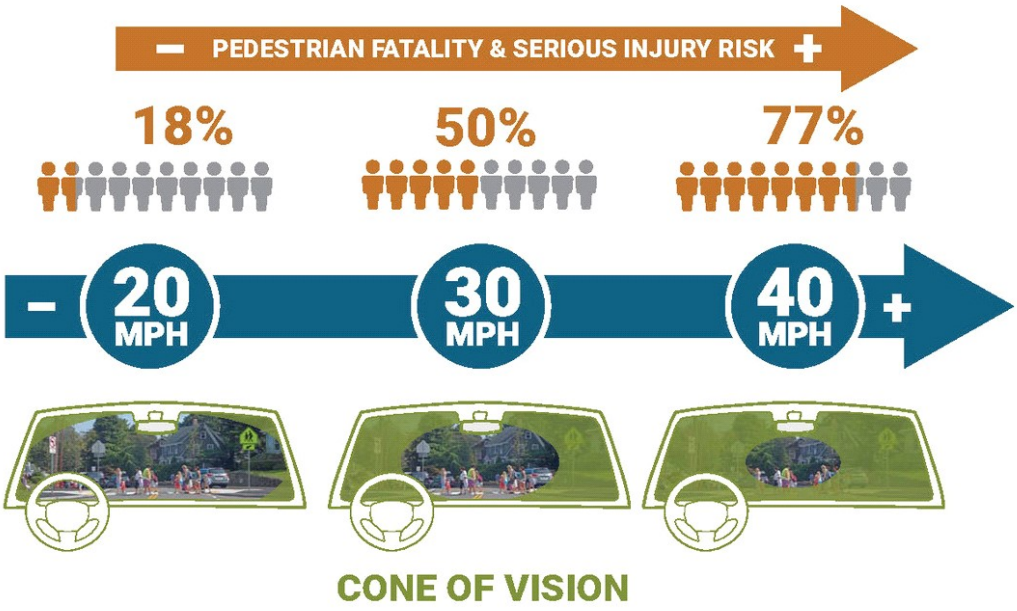


Figure 1. Infographic showing relationship between higher speeds and pedestrian fatality and serious injury risk for adult. Fatality and serious injury risk is likely higher for children. (Credit: Toole Design)

Use signals to separate users in time – Clarify bicyclist and pedestrian right of way at crossings with signals and signal modifications that prohibit turns while bicyclists and pedestrians are crossing or allow bicyclists and pedestrians to start crossing before drivers get a green signal. This principle is most applicable at large intersections with multiple travel lanes in each direction, and high volumes of users of all modes.

Table 1. Treatments that can be used to achieve crossing principles

Principle	Treatments
Increase visibility and awareness	High visibility crosswalk markings, Standard warning signs, double sided to improve visibility from both directions, In-street yield to pedestrian signs, Raised crosswalks, RRFBs
Create physical space between users	Curb extensions, Pedestrian refuge islands, Protected intersections, Grade-separated crossings
Calm traffic speeds	Curb extensions, Raised crosswalks
Use signals to separate users in time	PHB, Bike signals, Leading pedestrian intervals

Supplemental Recommendations

- Crossings should be provided at frequent intervals and designed to be as short and simple as possible.
- To encourage walking trips, schools and parks should have multiple pedestrian access points.
- Install traffic calming measures on streets adjacent to schools and parks, and consider additional crossing signage, markings, and lighting to improve visibility during day and nighttime conditions.
- Prioritize crossing improvement projects near schools and parks – *Add description of prioritization scoring for this project.*
- Pursue grants and/or establish dedicated funding to improve crossings near schools and parks.

Resources

National Association of City Transportation Officials and Global Designing Cities Initiative. 2020. Designing Streets for Kids. https://globaldesigningcities.org/publication/designing-streets-for-kids/ (

National Recreation and Park Association. Safe Routes to Parks: Improving Access to Parks Through Walkability. https://www.nrpa.org/uploadedFiles/nrpa.org/Publications_and_Research/Research/Papers/Park-Access-Report.pdf

US Department of Transportation, Federal Highway Administration. July 2018. Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations. https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/docs/STEP-guide-improving-ped-safety.pdf

US Department of Transportation, Federal Highway Administration. May 2023. Safe System Approach to Speed Management. https://highways.dot.gov/sites/fhwa.dot.gov/files/Safe_System_Approach_for_Speed_Management.pdf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Guide to Crossing Treatment Types:

1. **Standard crosswalk elements:** high-visibility crosswalk markings, parking restrictions on crosswalk approach *(where applicable)* , adequate nighttime lighting levels assessment, and crosswalk warning signs
2. **Advanced signage**
3. **Rectangular Rapid-Flashing Beacons (RRFBs)**
4. **Pedestrian Hybrid Beacons (PHBs)**
5. **5a. Pedestrian Island. 5b. Curb Extension. 5c. Raised Crosswalk.**
6. **Grade-separated crossing**
7. **Reallocate Roadway Lanes / Restriping**
8. **Protected Intersection**

Project ID	Cross streets	Crossing Treatment Recommendations	Notes	Google Maps Link
	***Phasing of crossing improvements provided in separate tab**			
C1	W Belleview Avenue & S Michigan Court	1, 4, 5a	West side of intersection: Extend median for a crosswalk island; Add ADA ramps; Work towards transitioning from Hollywood curbs less than 3-feet wide with rolled curbs to ADA-compliant sidewalks at least 4-feet wide.	W Belleview Avenue & S Michigan Court
C2	S Lowell Boulevard & W Arrowhead Road	1, 3, 5a	Crossing is technically at Lowell Blvd and Aksarben Rd. Move crosswalk from north to south side of Lowell at Aksarben intersection. Construct refuge island in the Two Way Left Turn Lane (vehicles do not need to use this lane to turn left on the south side of the intersection). Reconstruct curb ramps to meet ADA standards including detectable warning surfaces. Add RRFB due to heavier traffic on Lowell Blvd.	S Lowell Boulevard & W Arrowhead Road
C3	**S Windermere Street & W Belleview Avenue***	5a, 7, 8	Add pedestrian refuge island to the north leg of the intersection. Restripe north and south legs to provide a separate bike lane that is not shared with the right turn lane. Add green conflict markings across Belleview Ave. Consider adding a leading pedestrian interval if not already implemented at this signalized intersection. Long-term, consider geometric design changes to construct a protected intersection for north/south bike lane movements on Windemere.	S Windermere Street & W Belleview Avenue
C4	S Elmwood Street & W Prentice Avenue	1, 3, 5b	West side of intersection: add ADA ramps; Work towards transitioning from Hollywood curbs less than 3-feet wide with rolled curbs to ADA-compliant sidewalks at least 4-feet wide; use on-street parking lane on both sides of Prentice Ave to create a curb extension to shorten crossing distance.	S Elmwood Street & W Prentice Avenue
C5	S Hickory Street Midblock	1, 2	Add new midblock crossing at the Progress Park access road. This crossing would connect Progress Park to Cornerstone Park and provide a connection to the Big Dry Creek Trail from the west. Additional improvements (stairs, ramp) would be required to overcome grade changes on the west side of the roadway.	S Hickory Street Midblock
C6	**W Prentice Avenue & S Huron Street***	1, 2, 5b	Install crossing improvements on west side of intersection; Add ADA ramps; Work towards transitioning from Hollywood curbs less than 3-feet wide with rolled curbs to ADA-compliant sidewalks at least 4-feet wide; Long-term, add curb extensions to better define the intersection and use the extra space in the street. This intersection provides access to Progress Park.	W Prentice Avenue & S Huron Street
C7	S Windermere Street & W Berry Avenue	1, 2, 3, 5b	Install crossing improvements on the north side of the intersection to avoid conflicts with multi-family residential driveway on southwest corner of the intersection; Construct "floating" curb extensions, or small pedestrian refuge islands, in the existing bike lanes at the crossing and reroute the bike lanes into the existing parking lanes at the crossing (restrict on-street parking).	S Windermere St & W Berry Avenue

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Project ID	Cross streets	Crossing Treatment Recommendations	Notes	Google Maps Link
	***Phasing of crossing improvements provided in separate tab**			
C8	W Powers Avenue & Fox Street S	1, 5b	Install crossing improvements on the west side of the intersection; Add ADA ramps; Work towards transitioning from Hollywood curbs to sidewalks.	W Powers Avenue & Fox Street S
C9	Little's Creek Trail Crossings	2, 5c	Install raised crosswalks across S Curtice St and S Rapp St.	Little's Creek Trail Crossings
C10	Railroad overpass at Littleton Downtown Station	6	Structural engineering assessment to see if existing drainage structure can support a trail crossing; Alternative: construct a new pedestrian bridge.	Overpass at Littleton Downtown Station
C11	W Lake Avenue & S Prince Street	3, 5b	Add RRFB and curb extensions to existing crosswalk on north side of intersection.	W Lake Avenue & S Prince Street
C12	S Bemis Street Midblock	1, 2	Add ADA ramps; Suggest using location across from the War Memorial Rose Garden that already has a ramp to the road from a path in Sterne Park.	S Bemis Street Midblock
C13	S Sterne Parkway & W Lake Avenue	1, 5b	Install crossing improvements on the east side of the intersection; Add sidewalk and ADA ramps to the southeast corner of the intersection; Add parking restrictions on crosswalk approaches; Add curb extension on southeast and northeast corners.	S Sterne Parkway & W Lake Avenue
C14	**W Shepperd Avenue & S Gallup Street***	1,2, 3, 5b	Install crossing improvements on the south side of the intersection; Parking restrictions on crosswalk approach; Curb extension on the southwest corner; Add ADA ramps.	W Shepperd Avenue & S Gallup St
C15	**W Caley Avenue & S Datura Street***	1, 2, 5b	Long-term, cover the creek to have the trail go over it and align with existing crossing; Add parking restrictions on the crosswalk approach.	W Caley Avenue & S Datura Street
C16	S Elati Street & W Sterne Parkway	1, 2, 3, 5b	Install crossing improvements on the south side of the intersection; Parking restrictions on crosswalk approach; Build "floating" curb extensions, or small pedestrian refuge islands, in the existing bike lanes, and re-route bike lanes into existing parking lane space at the crossing; Add ADA ramps; Work towards transitioning from Hollywood curbs less than 3-feet wide with rolled curbs to ADA-compliant sidewalks at least 4-feet wide.	W Elati Street & S Sterne Parkway
C17	S Windemere Street & Lee Gulch Trail	1, 2, 3, 5b	Upgrade curb ramps to meet ADA requirements; Upgrade existing paint and flex post curb extensions to concrete.	S Windermere Street & Lee Gulch Trail
C18	**S Apache Street & W Ridge Road***	1, 5b	Upgrade curb ramps to meet ADA standards; stripe crosswalk across north leg of intersection; Add curb extensions on north side of intersection.	S Apache Street & W Ridge Road
C19	Rangeview Drive & S Prince Street	2, 3	Install crossing improvements on the north side of the intersection; including advanced signage and RRFB.	Rangeview Drive & S Prince Street

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	***Phasing of crossing improvements provided in separate tab**			
C20	W Geddes Avenue & High Line Canal Trail	1, 2, 5c	Remove traffic calming speed hump currently located about 95 feet west of this crossing; Convert crossing into a raised intersection (with Heritage High school parking lot).	W Geddes Avenue & High Line Canal
C21	W Geddes Avenue & S Gallup Street	N/A	The pedestrian signal seems to be optimally sited on the apex of a horizontal curve in the roadway to maximize sight distance to the signal when approaching from both directions. Relocating the signal to the east will significantly worsen the sight distance approaching the signal from the west, which will likely reduce compliance with the signal. Rather than move the signal, relocate approximately 100' of the trail to the current signal location. The trail can be reconstructed along the visible desire path from the existing trail to the signal location.	W Geddes Avenue & S Gallup Street
C22	S Elati Street & Lee Gulch Trail	1, 2, 5c	Upgrade curb ramps to meet ADA standards.	S Elati Street & Lee Gulch Trail
C23	S Broadway & W Jamison Avenue	6	Widen sidewalk on north side of Jamison Ave between S Broadway and Lee Gulch Trail; Install wayfinding to point across S Broadway to indicate continuation of Lee Gulch Trail; Tunnel under Broadway may be an option for a future phase.	S Broadway & W Jamison Avenue
C24	S Platte Canyon Road & S Depew Street	1, 2, 4, 5a	Install crossing improvements on the north side of the intersection; incorporate ped refuge island into existing median; Install marked crosswalk across Depew Street to connect north and south sides of Columbine Trail.	S Platte Canyon Road & S Depew Street
C25	W Mineral Avenue & S Wolff Street	5a, 5b	Install crossing improvements on the north side of the intersection; reorient ADA ramps to align with crosswalk; Reduce turning radius or add curb extension; Add ped refuge island in the center of Wolff St with 16-foot-wide lane on either side.	W Mineral Avenue & S Wolff Street
C26	W Mineral Avenue & S Dusk Court	5a, 5b	Install crossing improvements on the north side of the intersection; reorient ADA ramps to align with crosswalk; Reduce turning radius or add curb extension; Add ped refuge island in the center of Dusk Ct with 16-foot-wide lane on either side.	W Mineral Avenue & S Dusk Court
C27	W Mineral Avenue & Polo Ridge Drive	5b	Install crossing improvements on the north side of the intersection; Add ADA ramp on northwest corner; Reduce turning radius or add curb extension.	W Mineral Avenue & Polo Ridge Drive

Phased Crossing Treatment Recommendations					
Project ID	**Cross streets**	**Crossing Treatment Recommendations**	**Phase 1**	**Phase 2**	**Phase 3**
C3	S Windermere Street & W Belleview Avenue*	5a, 7, 8	Consider leading pedestrian interval if not already implemented at this signalized intersection.	Restripe the north and south leg to provide a separate bike lane that is not shared with right turn lane. Add green conflict markings across Belleview. Construct pedestrian refuge islands.	Construct protected intersection treatment for north / south bike lanes on Windermere.
C6	W Prentice Avenue & S Huron Street*	1, 2, 5b	Add crosswalk paint and signage	Relocate ADA ramps to align with crossing.	Add curb extensions, especially in the SW quadrant, to shorten crossing distances and better use available ROW.
C14	W Shepperd Avenue & S Gallup Street*	1, 2, 3, 5b	Add crosswalk paint, signage, and parking restrictions.	Temporary curb extension on SW corner.	Add permanent curb extension on SW corner, RRFB, and add ADA ramps
C15	W Caley Avenue & S Datura Street*	1, 2, 5b	Add parking restrictions and advanced signage.	Add curb extension.	Construct cover over creek to realign the trail.
C18	S Apache Street & W Ridge Road*	1, 5b	Add flex posts to reduce the corner radii on Apache and realign the crosswalk	Add permanent curb extensions on the north corners of the intersection.	

Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.