



Multi-Use Pathways

Information Briefing



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Anywhere!

Background

- Fairview & Locust Grove Intersection Project – Commission required revision to raised bike lanes
- Staff directed to modify designs to remove on street bike lanes on arterials.
- Engaged a Consultant to assist with Standard Drawings that would guide the design of future Multi-Use Path and Raised Bike Lane installations.

Potential Conflicts with Multi-Use Pathways

– AASHTO “Guide for the Development of Bicycle Facilities” 2012

1. At intersections and driveways, motorists entering or crossing the roadway often will not notice bicyclists approaching from their right, as they do not expect wheeled traffic from this direction. Motorists turning from the roadway onto the cross street may likewise fail to notice bicyclists traveling the opposite direction from the norm.
2. Bicyclists traveling on sidepaths are apt to cross intersections and driveways at unexpected speeds (i.e., speeds that are significantly faster than pedestrian speeds). This may increase the likelihood of crashes, especially where sight distance is limited.
3. Motorists waiting to enter the roadway from a driveway or side street may block the side-path crossing, as drivers pull forward to get an unobstructed view of traffic (this is the case at many sidewalk crossings, as well).
4. Attempts to require bicyclists to yield or stop at each cross-street or driveway are inappropriate and are typically not effective.

Potential Conflicts with Multi-Use Pathways

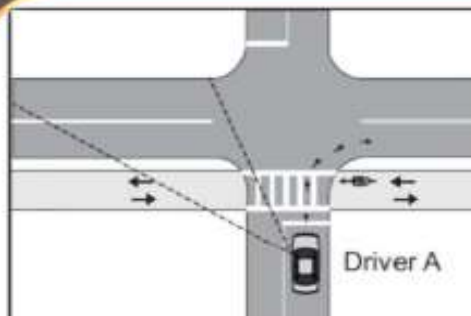
– AASHTO “Guide for the Development of Bicycle Facilities” 2012

12. Bicyclists on the sidepath, even those going in the same direction, are not within the normal scanning area of drivers turning right or left from the adjacent roadway into a side road or driveway.
13. Even if the number of intersection and driveway crossings is reduced, bicycle-motor vehicle crashes may still occur at the remaining crossings located along the sidepath.
14. Traffic control devices such as signs and markings have not been shown effective at changing road or path user behavior at sidepath intersections or in reducing crashes and conflicts.

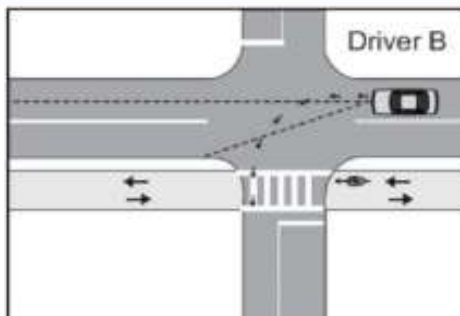
For these reasons, other types of bikeways may be better suited to accommodate bicycle traffic along some roadways.

SIDEPATH CROSSING CONSIDERATIONS

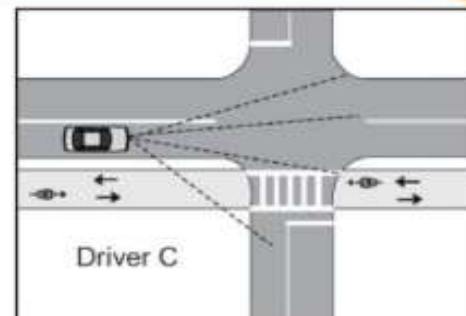
- ➡ Must consider driver's attention in the intersection
 - ➡ Where do drivers expect conflicting traffic?
 - ➡ Where are the virtual "blind spots"?



Right turning Driver A is looking for traffic on the left. A contraflow bicyclist is not in the driver's main field of vision.



Left turning Driver B is looking for traffic ahead. A contraflow bicyclist is not in the driver's main field of vision.



Right turning Driver C is looking for left turning traffic on the main road and traffic on the minor road. A bicyclist riding with traffic is not in the driver's main field of vision.

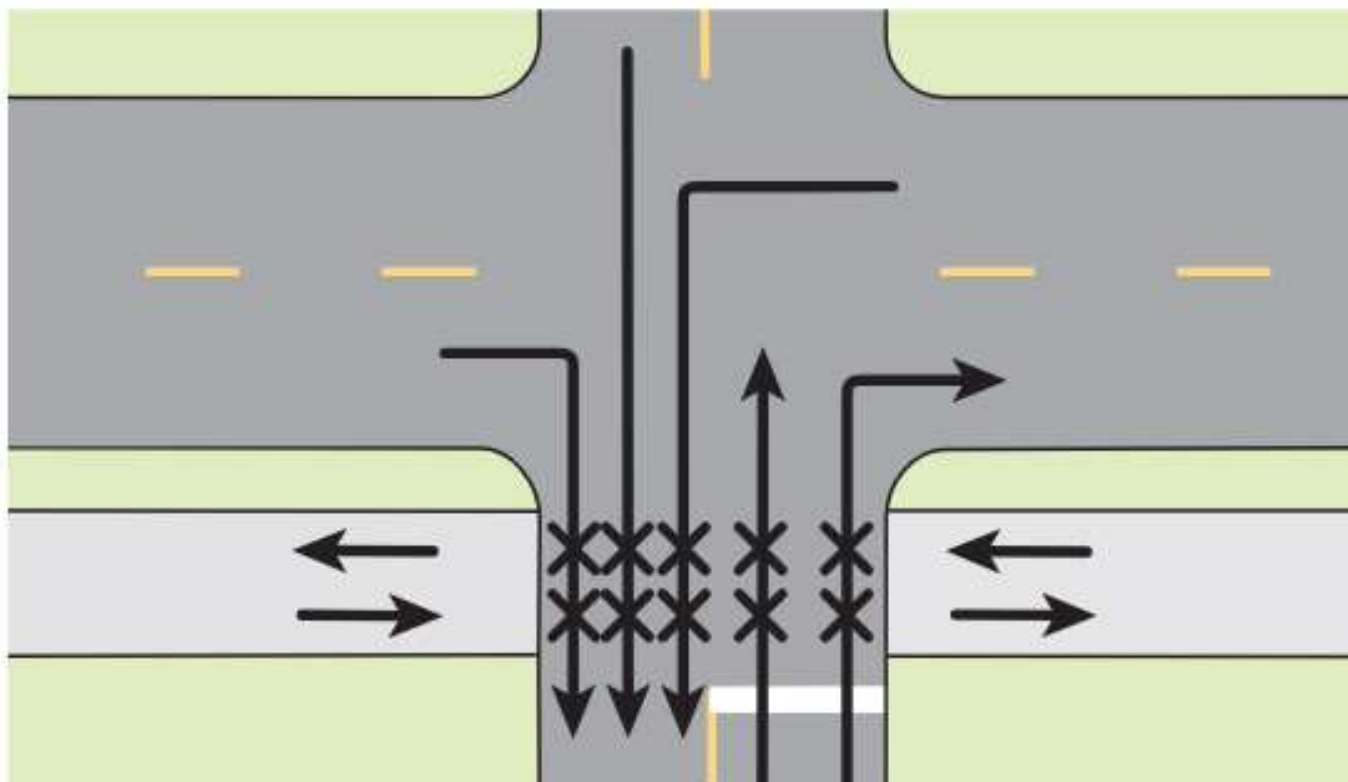


Figure 7-2: Intersection and driveway conflicts at path

Sidepath Crossing Design



- National Center for Biotechnology Information & National Library for Medicine
 - Studied 20 years of crash and injury data from Montreal
 - “Engineering guidance in the United States has discouraged bicycle facilities that resemble cycle tracks, including parallel sidepaths and sidewalk bikeways, suggesting that these facilities and cycle tracks are more dangerous than bicycling in the street.”
 - Data suggest that the injury risk of bicycling on cycle tracks is less than bicycling in streets.
 - The accident probability is also decreased at intersections where the cycle track approaches are deflected between 2 and 5m away from the main roadway.

MassDOT Separated Bike Lane Planning & Design Guide



4.3.6 RECESSED (SET BACK) CROSSINGS

Recessed bicycle and pedestrian crossings are a central element of the protected intersection discussed in [Section 4.3.1](#). The benefits of a recessed crossing apply equally to shared use path intersections with streets, driveways or alleys where permissive motorist turns are allowed. **Similar to roundabouts, a recessed**

crossing can reduce conflicts at crossings by creating space for the motorist to yield to approaching bicyclists followed by an additional space of approximately one car length to wait at the edge of the roadway to look for a gap in traffic without blocking the path. Raised crosswalks and refuge islands can be incorporated into the treatment to provide additional safety benefits. [EXHIBIT 4U](#) provides an example of a recessed crossing at a shared use path intersection.

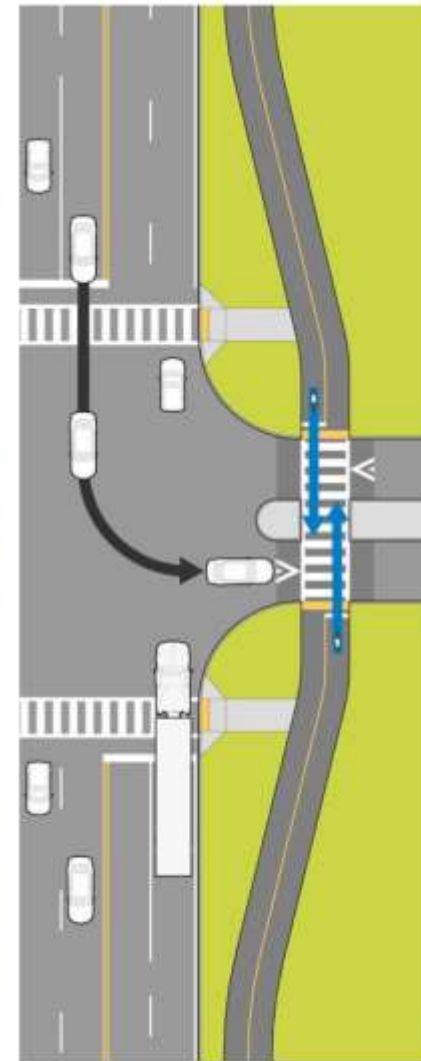


EXHIBIT 4U: Recessed Crossing at Shared Use

MDOT Sidepath Application Criteria

Sidepath Design Best Practices

HIGHLIGHTS

Designers may reduce crash risk for bicyclists by raising the visibility of bicyclists going in both directions, establishing priority, and reducing speed. Following are some examples of how this can be achieved through treatments such as signs, truck aprons, and raised crossings.

1 STANDARD SIGNS

Providing clear signs and pavement markings warns motorists of a bicycle contraflow conflict. The guide shows applicable regulatory, signal, and warning signs related to sidepaths and provides suggestions on when they should be used.



2 NON-STANDARD SIGNS

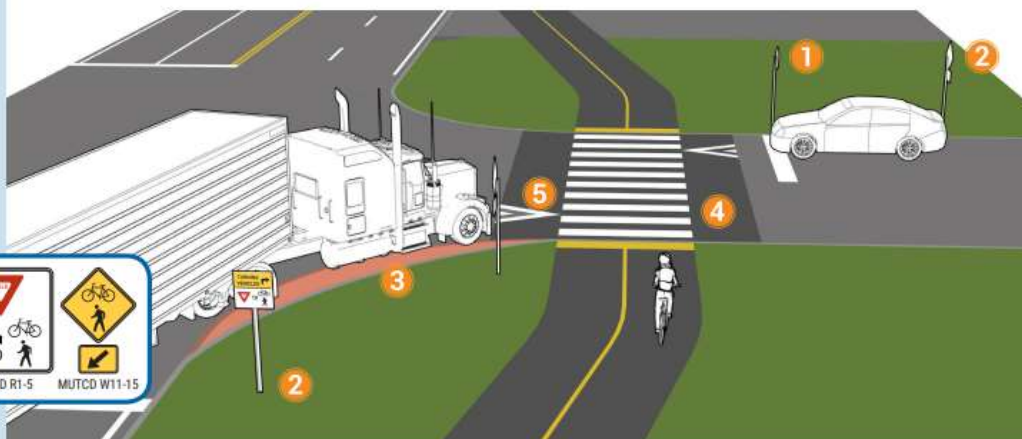
An option for warning motorists of contraflow bicycle conflict is the R10-15b sign, which is usually found at signalized locations. Use of this sign at unsignalized intersections will require FHWA approval.



4 RAISED CROSSINGS

Creating a raised crossing encourages drivers to slow down and pay more attention to the crossing, helping to achieve the desired vehicle speed and driver awareness.

MDOT's Sidepath Intersection and Crossing Treatment Guide contains information on the latest state-of-the-practice principles for designing sidepath crossings. This handout highlights just some of the guidance. Refer to the full guide for more information on these designs and their application. The process in the guide is designed to help practitioners evaluate the appropriateness of elements such as those shown here.



EXAMPLE INTERSECTION

There are many designs for roads and sidepaths that improve safety for bicyclists. This example intersection graphic shows several treatments that designers may employ.

- 1 In this example, the **stop sign** for drivers gives bicyclists the priority through the intersection. At signalized intersections, this can be achieved using a **dedicated bicycle signal phase or leading interval**, depending on vehicle volumes.
- 2 A **sign** warns motorists to look for sidepath users ahead*.
- 3 The **curb radii** entering and exiting the intersection are reduced to slow vehicles and increase motorist yielding. The truck apron shown allows for truck movements. The **offset distance** between the sidepath and the motorist travel lane is increased to slow vehicles.

- 4 The **raised crossing** is designed to slow motorists by requiring them to ramp up to the sidepath. This design also provides a level crossing for the sidepath users.
- 5 White intersection **pavement markings** are provided to alert drivers of the potential for crossing bicyclists.

* The use of the R10-15b as portrayed in the figure above is not consistent with current MUTCD standards and will require FHWA approval.

See more information:
[www.michigan.gov/
mdot-SidepathResearch](http://www.michigan.gov/mdot-SidepathResearch)

MDOT
Michigan Department of Transportation

Hampshire County Complete Streets Design Manual



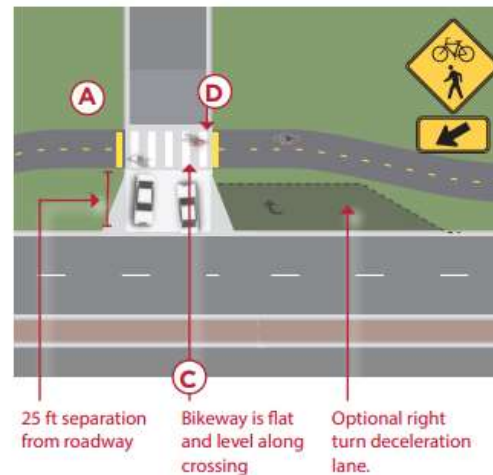
Urban, Rural and Suburban Complete Streets Design Manual

SIDEPATH CROSSINGS

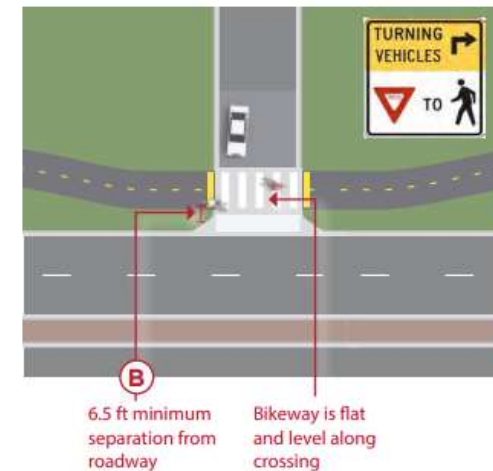
Sidepaths provide a high degree of comfort on long uninterrupted roadway segments, but have operational and safety concerns at driveways and intersections with secondary streets. Crossings should be designed to promote awareness, and facilitate proper yielding of motorists to bicyclists and pedestrians.

Relative Cost: Medium

High Speed Conditions



Low/Intermediate Speed Conditions



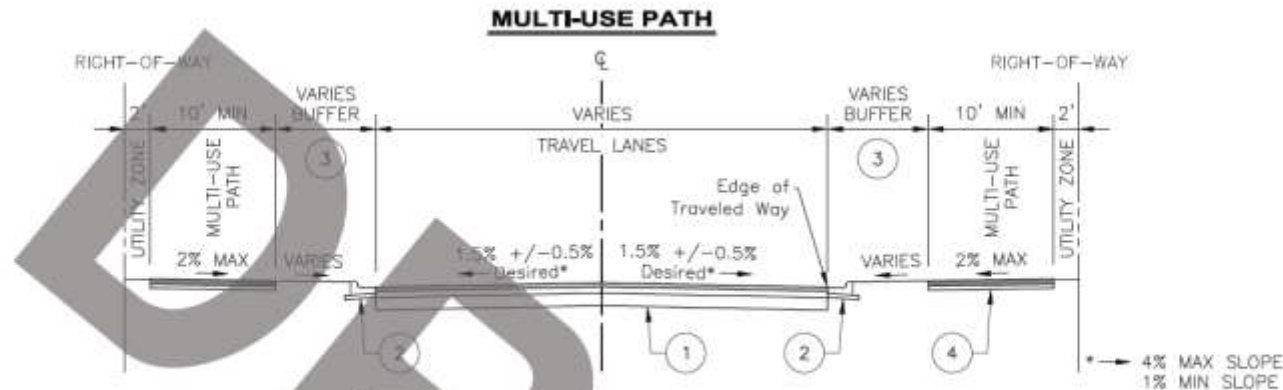
Typical Application

- At controlled and uncontrolled sidepath crossings of driveways or minor streets.
- Used to provide for visibility and awareness of the crossing by motorist in advance of the crossing.
- Increases the predictability of sidepath and road user behavior through clear, unambiguous right of way priority.

Design Features

- A** The sidepath should be given the same priority as the parallel roadway at all crossings.
- A** Provide clear sight triangles for all approaches of the crossing.
- B** Maintain physical separation to the crossing of 6.5 to 25 ft. (Scheppers 2011). As speeds on the parallel roadway increase, so does the preference for wider separation distance. (FDOT 2005).
- C** Configure crossings with raised speed table and median safety island
- D** Use high visibility crosswalk markings to indicate the through area of the crosswalk.

Typical Section



SHEET 1 OF 7

EXHIBIT NO.

MUP-01

MULTI-USE PATH EXAMPLE APPLICATIONS
TYPICAL SECTIONS

NOTES

- 1 MATERIAL SECTIONS WILL BE DETERMINED BY ACHD DURING DESIGN. REFER TO ACHD POLICY MANUAL FOR ADDITIONAL INFORMATION.
- 2 STANDARD 6" VERTICAL CURB AND GUTTER PER ACHD STANDARD DRAWING SD-701, SHOWN. SPECIFIC CURB TYPES TO BE DETERMINED BY ACHD DURING DESIGN. (REFERENCE 1)
- 3 ROADSIDE BUFFER IS MEASURED FROM EDGE OF TRAVELED WAY TO FRONT OF MULTI-USE PATHWAY. REFER TO TABLE 1, FOR BUFFER WIDTHS BASED ON LEVEL OF TRAFFIC STRESS (LTS). LTS 1 OR 2 PREFERRED. MINIMUM 3' BUFFER BETWEEN CURB AND MULTI-USE PATHWAY. BUFFER MATERIAL TO MEET CURRENT ADA DETECTABILITY STANDARDS.
- 4 MATERIAL SECTION WILL BE DETERMINED BY ACHD DURING DESIGN.

TABLE 1: MULTI-USE PATHWAY BUFFER WIDTH PER LEVEL OF TRAFFIC STRESS

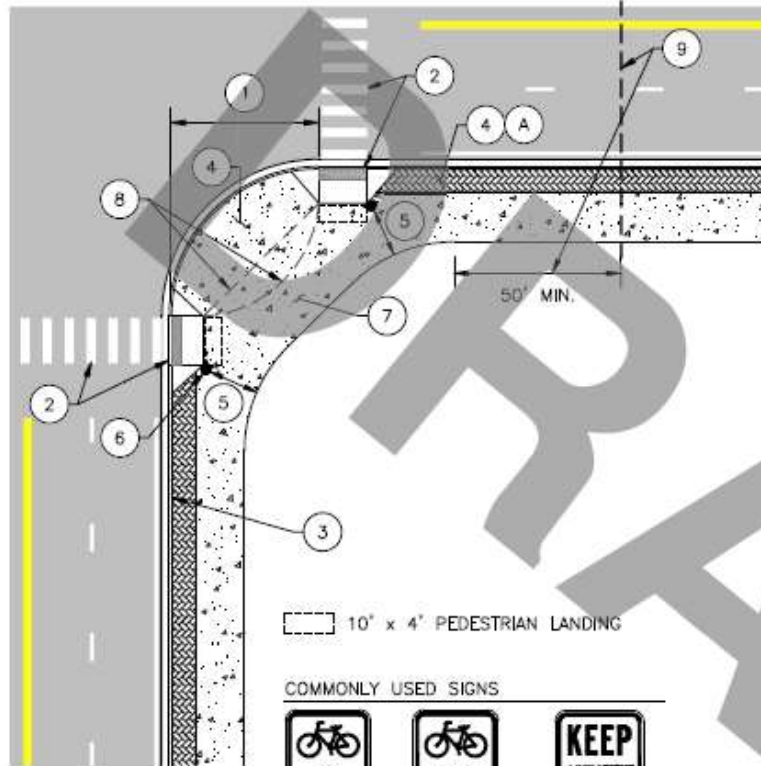
TOTAL TRAVEL LANES	TOTAL BUFFER WIDTH (INCLUDES CURB & GUTTER, SHOULDERS, PARKING, LANDSCAPING, ETC.)			
	<5'	5'-10'	11'-14'	15'+
1-2	LTS 2	LTS 2	LTS 1	LTS 1
3	LTS 3	LTS 2	LTS 1	LTS 1
4-5	LTS 4	LTS 3	LTS 2	LTS 1
6+	LTS 4	LTS 4	LTS 3	LTS 2



Signalized Intersection



ELEMENTS OF A MIXED-USE PATH INTERSECTION (SIGNALIZED)



10' x 4' PEDESTRIAN LANDING

COMMONLY USED SIGNS



R9-5



R9-6



R9-7



R10-4B(L)
MOD



R10-15(R)
MOD

NOTES

- 1 6' TO 16' FOR 35 TO 45 MPH MAINLINE. 16' TO 24' FOR 45 TO 50 MPH MAINLINE. MINIMUM SETBACK FROM FACE OF CURB TO MUP CROSSING TO IMPROVE VISIBILITY FOR VEHICLES, PEDESTRIANS, AND BICYCLISTS. 6' MINIMUM SETBACK WHEN ADJACENT TO RIGHT TURN LANE. (REFERENCE 3, 4, 5)
- 2 WIDTH OF CROSSWALK AND CURB RAMP OPENING SHALL BE EQUAL TO THE WIDTH OF THE MULTI-USE PATH.
- 3 6" VERTICAL CURB & GUTTER PER ACHD STANDARD DRAWING SD-701.
- 4 AREA MAY BE UTILIZED FOR SIGNAL EQUIPMENT AND OTHER TRAFFIC CONTROL DEVICES.
- 5 10 FT MINIMUM FROM FACE OF SIGNAL OR BUTTON POLE BASE TO BACK OF PATHWAY FOR ZONE MANEUVERABILITY.
- 6 PEDESTRIAN PUSH BUTTON POLE EQUIPPED WITH APS PER ACHD STANDARD DRAWING TS-1106.02.
- 7 AREA TO REMAIN CLEAR AND FREE FROM OBSTRUCTIONS FOR MULTI-USE MIXING ZONE AND QUEUE STORAGE.
- 8 CURB (OR OTHER ADA DETECTABLE SURFACE FEATURE) MAY BE UTILIZED IN THIS AREA FOR CHANNELIZATION. IF UTILIZED, MINIMUM CLEAR SPACE BETWEEN CURB AND BACK OF PATHWAY SHALL BE EQUAL TO THE WIDTH OF THE MULTI-USE PATHWAY.
- 9 SEE SHEET MUP - 2 FOR MULTI-USE PATHWAY TO BIKE LANE TRANSITIONS.
- A SIGNAGE IS CONSIDERED CONTEXT SENSITIVE TO EACH PROJECT AND SPECIFIC SIGNAL EQUIPMENT LAYOUT. MUTCD SIGNS TO BE CONSIDERED INCLUDE R9-5, R9-6, R9-7, R10-4B(L/R) MOD, R10-15 (MOD).

SHEET 3 OF 7

EXHIBIT NO.

MUP-03

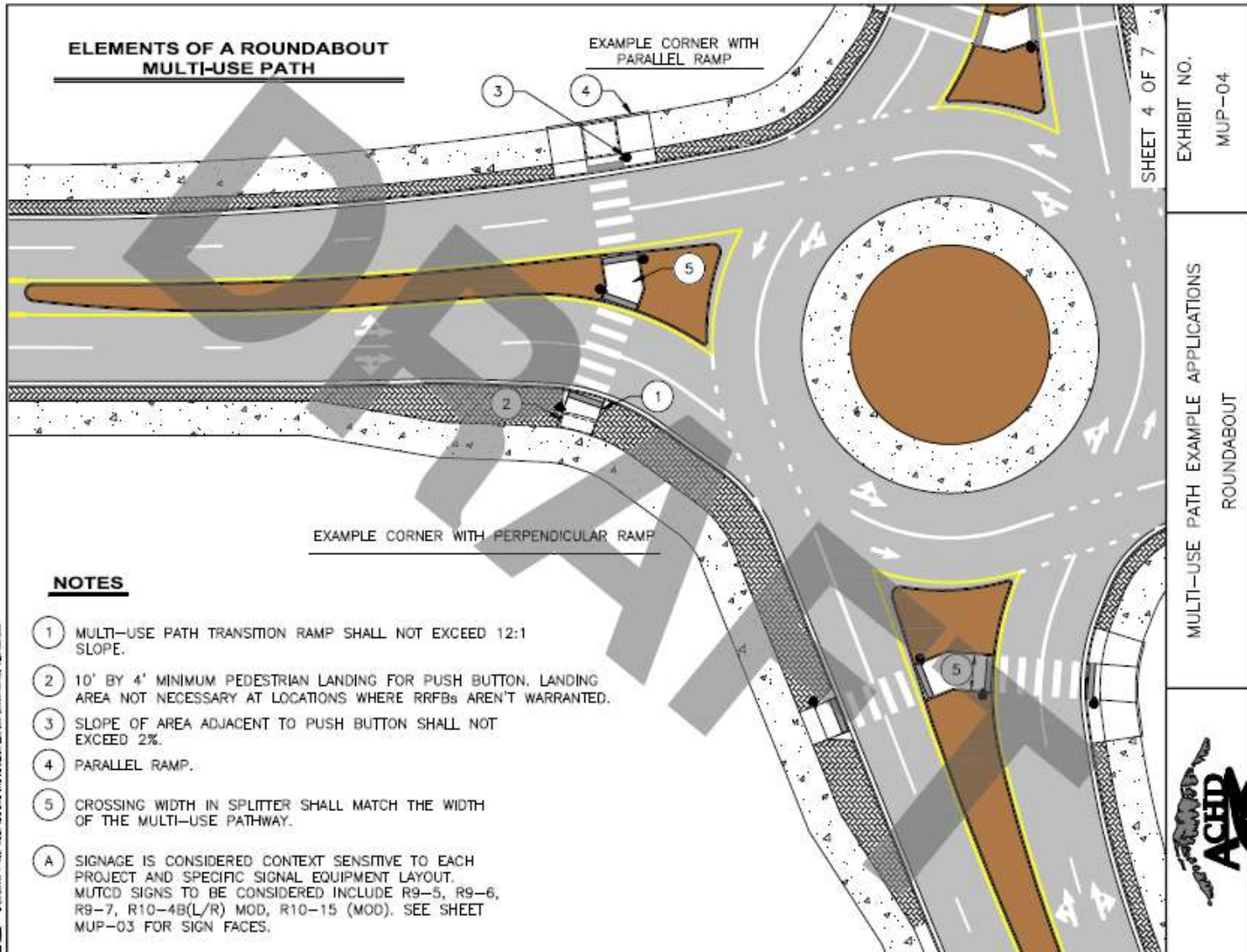
MULTI-USE PATH EXAMPLE APPLICATIONS

SIGNALIZED INTERSECTION

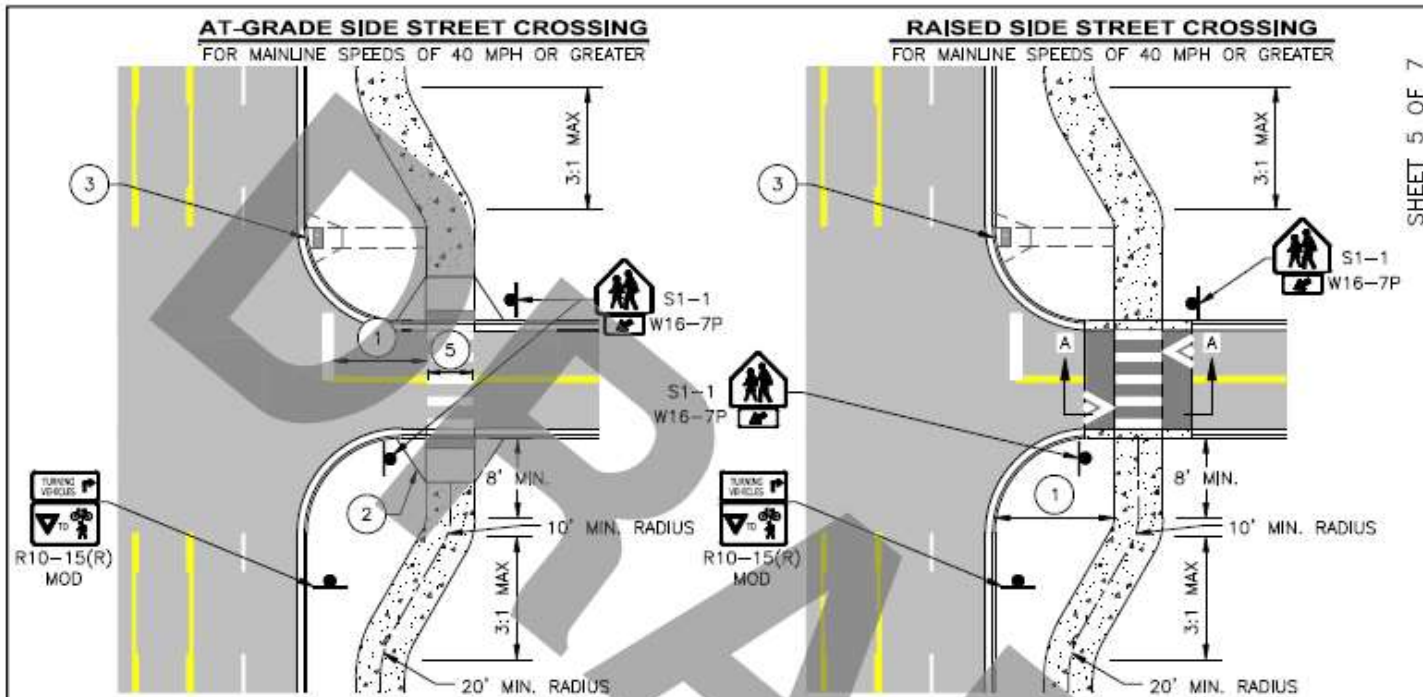


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www.idaho.gov

Roundabout



Side Street Intersection



SHEET 5 OF 7

EXHIBIT NO.

MUP-05

MULTI-USE PATH EXAMPLE APPLICATIONS
UNSIGNALIZED SIDE STREET CROSSINGS

NOTES

- 1 16' MINIMUM SETBACK FROM STOP BAR. MINIMUM SETBACK TO BIKE CROSSING TO IMPROVE VISIBILITY FOR VEHICLES, PEDESTRIANS, AND BICYCLES. PROVIDES SPACE FOR 1 VEHICLE BETWEEN STOP BAR AND CROSSING.
- 2 MULTI-USE PATH TRANSITION RAMP SHALL NOT EXCEED 8:1 SLOPE.
- 3 WHEN CROSSING OF MAINLINE IS REQUIRED, BOTH MAINLINE PEDESTRIAN RAMP SHALL BE DESIGNED TO ACCOMMODATE THE FULL WIDTH THE MUP. PEDESTRIAN RAMP SHALL MEET CURRENT ADA STANDARDS.
- 4 APPROACH RAMP AND DEPARTURE RAMP SHALL NOT EXCEED 12:1 SLOPE. SPEED HUMP MARKINGS SHALL BE USED ON TRANSITION RAMP.
- 5 CROSSING WIDTH SHALL BE EQUAL TO THE MUP WIDTH. THE CROSSING SHALL MEET ADA REQUIREMENTS.
- 6 STORMWATER FACILITIES SHALL BE CONSIDERED ON A CASE BY CASE BASIS. RAISED CROSSING IS IDEAL WHEN SIDE STREETS/APPROACHES SLOPE AWAY FROM THE MAINLINE.



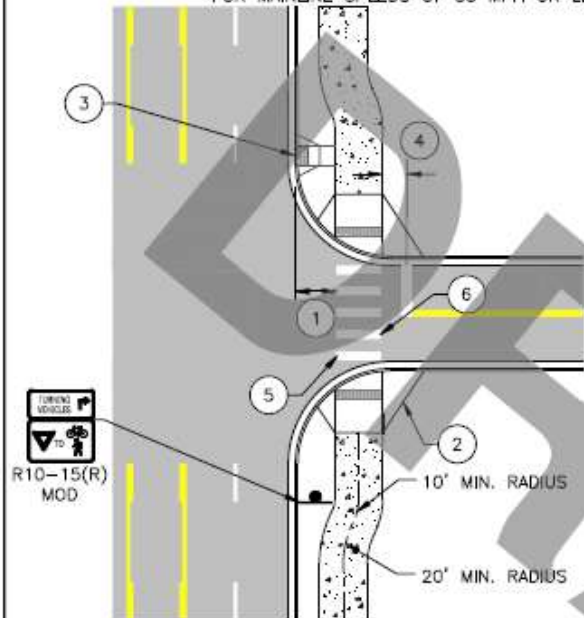
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Side Street Intersection



AT-GRADE SIDE STREET CROSSING

FOR MAINLINE SPEEDS OF 35 MPH OR LESS



NOTES

1. 6' MINIMUM SETBACK FROM FACE OF CURB. MINIMUM SETBACK TO BIKE CROSSING TO IMPROVE VISIBILITY FOR VEHICLES, PEDESTRIANS, AND BICYCLES. (REFERENCE 3, 4)
2. MULTI-USE PATH TRANSITION RAMP SHALL NOT EXCEED 8:1 SLOPE.
3. WHEN CROSSING OF MAINLINE IS REQUIRED, PEDESTRIAN RAMP SHALL MEET CURRENT ADA STANDARDS AND DIMENSIONS SHALL BE PER THE PLANNED USE OF THE DESTINATION SIDE.
4. 4' MINIMUM SETBACK FROM CROSSWALK PER ACHD STANDARD DRAWING TS 1112.03.
5. 10' MINIMUM WIDTH AT SIDE STREET CROSSINGS. THE CROSSING SHALL MEET ADA REQUIREMENTS.
6. AT GRADE CROSSING SHOWN, RAISED CROSSINGS TO BE CONSIDERED ON A CASE BY CASE BASIS. RAISED CROSSING SHALL BE PER DETAIL A ON SHEET MUP-05.

SHEET 6 OF 7

EXHIBIT NO.
MUP-06

MULTI-USE PATH EXAMPLE APPLICATIONS
UNSIGNALIZED SIDE STREET CROSSINGS



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Advantages of Setback Crossing

- Removes right turning vehicle conflicts at crossings.
- Removes conflict from left turning vehicle at crossings.
- Bicyclists and other users slow down approaching side street crossing.
- Allows vehicles on side street to yield at the pedestrian and bike crossings separate from looking for gaps in vehicle traffic of main roadway.
- Provides a safer street crossing for all users.

Conclusions



- Designing facilities for all users as directed by the Commission
- Designing facilities to fit the environment
- Design Details reviewed with the PAG and BAC last week
- Design Details will be used to advance current design projects

Comments or questions ?

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Anywhere!