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THE CITY OF COLUMBUS
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DEPARTMENT OF PUBLIC SERVICE

# DESIGN MEMO 6.41

To: Designers, Contractors, and City Departments

Date: 9/30/2022

Subject: Crosswalks

Category: Pedestrian and Bicycle Facilities

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Until further notice, this direction will be used for scoping, design, and construction plans within the City of Columbus Right of Way.

## Purpose

This document is intended to assist City staff and design consultants in selecting appropriate pedestrian crossing treatments for new marked crosswalks or to enhance existing marked crosswalks. In addition, this document provides guidance for refreshing, enhancing, or removing marked crosswalks as part of reconstruction or resurfacing projects.

This document is a compilation of research and best practices related to pedestrian crossing treatments nationwide and relies heavily on information from the Federal Highway Administration (FHWA) research on *Marked Versus Unmarked Crosswalks at Uncontrolled Crossing Locations*. The recommendations from the FHWA research have been adapted to fit the unique driver and pedestrian characteristics of Columbus, Ohio. In addition to FHWA research and industry best practices, this document has been supplemented with additional guidance and information specific to City of Columbus practices and the *Ohio Manual of Uniform Traffic Control Devices (OMUTCD)* as appropriate.

This document is not meant to be used as rigid standards, rather to provide additional guidance subject to engineering judgement on a case-by-case basis. The guidance is provided in a manner to balance requirements and flexibility based on engineering judgement, engineering study, and other necessary and useful considerations that are integral components of the decision making process.

## Background and Introduction

Crosswalk markings provide guidance for pedestrians who are crossing roadways, and in conjunction with signs and other measures, help alert road users of designated pedestrian crossing points across roadways. At non-intersection locations, crosswalk markings legally establish the crosswalk. (Source: OMUTCD)

Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex geometry, a substantial volume of heavy trucks, or other dangers without first providing adequate design features and/or traffic control devices. While pavement markings make crosswalk locations more visible to drivers, adding marked crosswalks alone may not make crossings safer, nor will they necessarily result in more vehicles yielding for pedestrians. For any location being considered, the appropriate treatment may be no markings or signing. At other locations, higher-level enhancement of the crossing, including LED bordered signs, rectangular rapid flashing beacon signs (RRFB), or pedestrian hybrid beacon (PHB) installations may be appropriate.

### Crosswalk Markings Used in Columbus

There are two types of crosswalk markings used within the City of Columbus, with a third type used only in roundabouts. Figure 1, illustrates these three types of crosswalk markings.

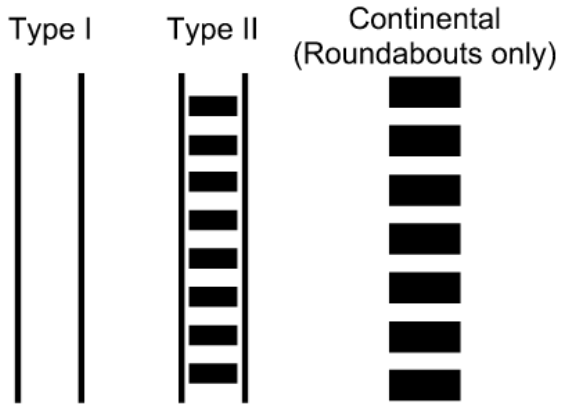


Figure 1: Typical Crosswalk Markings Used in Columbus

Standard Crosswalk Types

- Type I Crosswalk: This is the standard crosswalk marking used in the City of Columbus.
- Type II Crosswalk: This is the standard crosswalk marking with added perpendicular bars, also known as the “Modified Ladder” style of marking. Use of this marking style is addressed later in the crosswalk treatment section.
- Other Crosswalk Marking Styles: Solid, Dashed, and Zebra markings are not used in the City of Columbus. Continental style markings are only utilized at roundabouts. See the Roundabouts section for additional guidance on crosswalk markings at roundabouts.

Standard Placement/Orientation

Longitudinal crosswalk lines should be parallel to each other. Placed as close to perpendicular to the approach street as possible in order to minimize the pedestrian crossing distance (time in crosswalk), while also encompassing the ADA curb ramp locations. Longitudinal crosswalk markings may be placed as close as 1-foot outside of the detectable warning pad/truncated domes.

Standard Widths

The four standard widths of crosswalk markings should be used whenever possible unless extenuating circumstances exist for the crossing location. These widths, listed in Table 1, are measured from center to center of the longitudinal lines.

| Crosswalk Width | Typical Application |
|---|---|
| 10.5 Ft | Preferred width for average pedestrian volumes. |
| 13.5 Ft | Enhanced crossings (LED bordered signs and flashing beacon installations). |
| 16.5 Ft | When high volumes of pedestrians cross or where ADA curb ramps are misaligned and a narrower width is not feasible. |
| 19.5 Ft | |

Table 1: Columbus Standard Crosswalk Widths

Decorative and Special Crosswalk Materials

The City of Columbus uses a special brick crosswalk treatment, illustrated in Figure 2, at the signalized intersections in the downtown area called the “Block-O”. This crosswalk marking treatment is reserved for use in locations governed by the *Downtown Streetscape Standards,* adopted 10/19/2015, which that document also lists approved materials for these locations.

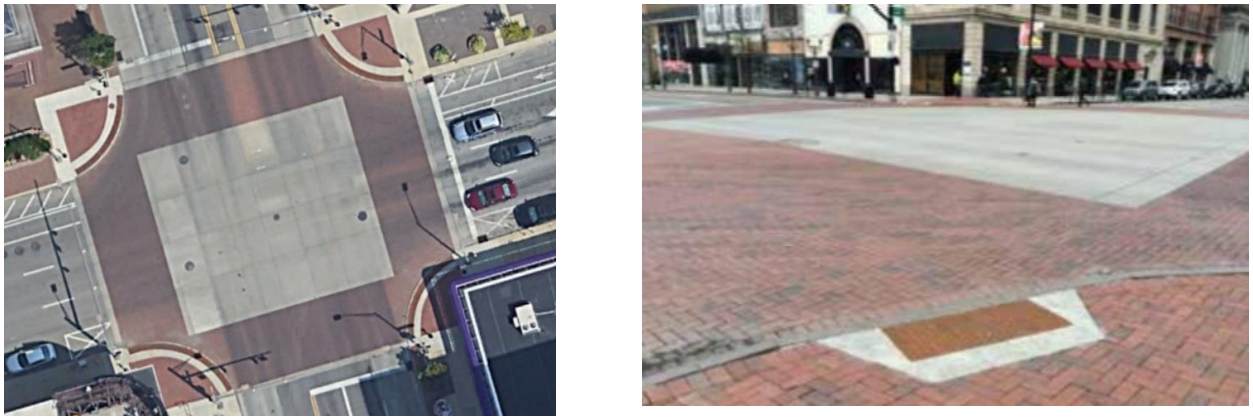

Figure 2: “Block-O” Crosswalk

Textured, brick, and/or colored pavement treatments should not typically be used in lieu of a marked crosswalk. When such treatments are used in Columbus, they are often aesthetic and used in combination with other traffic control devices, such as signalized intersections. When brick, textured/colored pavement, stamped treatments, and inlay treatments are desired, they must meet the requirements of *MUTCD Official Ruling 3(09)-24I-Application of Colored*

*Pavements,* dated 8/15/2013. Contact the Division of Traffic Management for additional guidance if decorative crosswalk materials are proposed for a crossing.

**Crosswalk Locations**

In general, marked crosswalks should be placed at intersections or mid-block locations adjacent to generators of high pedestrian traffic. Parking shall be prohibited adjacent to the crosswalks in accordance with Ohio Revised Code (ORC 4511.68 A(6) and A(7)).

Crosswalk Spacing

To prevent overuse of marked crosswalks, which dilutes the overall effectiveness of each crossing, marked uncontrolled crosswalks, described in the next section, should generally not be placed within 300 ft of an existing marked crossing. However, lower spacing may be used in high pedestrian volume areas or other areas where special circumstances exist and engineering judgment indicates that the location should be further reviewed.

High Pedestrian Volume Areas

Areas of the city where there are many pedestrian generators in close proximity, and where pedestrian activity is evident during most hours of the day are often called high pedestrian volume areas. The higher volume of pedestrians in these areas may change crossing treatment recommendations. In addition to less distance between marked crosswalks as mentioned above, it may be necessary to have wider crosswalks in these areas. Within Columbus, these high pedestrian volume areas include: OSU campus, Short North, downtown, and the Easton Town Center.

## Controlled versus Uncontrolled Crossing Locations

Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths. Crosswalks at controlled locations are governed by the traffic control devices (traffic signals or STOP or YIELD signs). Any marked crosswalks at controlled locations shall not have pedestrian warning signage, while use of regulatory signage may be appropriate.

At uncontrolled locations (not controlled by traffic signals or STOP or YIELD signs), crosswalk markings used in conjunction with signs and other measures help to alert road users of a designated pedestrian crossing point across roadways. At non-intersection locations, crosswalk markings legally establish the crosswalk. (Source: OMUTCD)

**Controlled Crossings**

Signalized Intersections

- Type I crosswalks shall be installed on all legs at signalized intersections with ADA compliant curb ramps, unless a crossing is prohibited or meets other criteria specified in this section.
- Type II crosswalks shall be installed at signalized intersections along all Safe Routes to School (SRTS) priority routes.

- A “Block-O” crosswalk treatment should be installed at signalized intersections within the city’s downtown limits. If the “Block-O” treatment is not being specified, signalized intersections within the downtown limits shall have Type II crosswalks.
- Marked crosswalks at controlled trail crossings shall be Type II crosswalks without signage. See the Trail Crossings section later in the document for additional guidance on crosswalk markings at trails.
- Type II crosswalks shall be installed at signalized intersections where Bus Rapid Transit (BRT) stations are located. See the Transit Stops section later in the document for additional guidance on crosswalk markings at transit stops.

Stop Controlled Intersections

- Type I crosswalks may be installed at all-way stop controlled intersections and across the stopped approaches of minor-street stop controlled intersections.
- Type II crosswalks may be installed at stop controlled intersections along all SRTS priority routes.

Roundabouts

See the *Traffic Control – Required Roundabout Pavement Marking and Signage* document for guidance on standard roundabout crosswalk markings. Contact the Division of Traffic Management for additional guidance and a copy of this document.

**Uncontrolled Crossings**

Crosswalk markings should not be used indiscriminately, thus an engineering study should be performed before a marked crosswalk is installed at an uncontrolled location (i.e., a site not controlled by a traffic signal, STOP, or YIELD sign). The *OMUTCD* (Section 3B.18) provides criteria for where new marked crosswalks alone should not be used without other measures.

Type I vs Type II Crosswalks at Uncontrolled Crossings

- If a crosswalk treatment evaluation determines that a marked crosswalk is justified, Type I crosswalks should be the first treatment considered.
- If a crosswalk treatment evaluation determines that a marked crosswalk is justified at a mid-block location, then a Type II crosswalk shall be installed.
- Type II crosswalks may be installed at uncontrolled locations along all SRTS priority routes.
- If a crosswalk treatment evaluation determines that a marked crosswalk is justified at an uncontrolled trail crossing, then a Type II crosswalk shall be installed. See the Trail Crossings section later in the document for additional guidance on crosswalk markings at trails.

## Evaluation of Crossing Treatments

Evaluation of pedestrian crossing requests and their treatment should consider pedestrian volumes, traffic volumes, vehicle speeds, proximity to other crossing opportunities, nearby traffic

control, and the context of the adjacent land use. Special emphasis, in terms of establishing more frequent crossings, is given to high pedestrian volume areas with higher volumes of expected pedestrian traffic.

Locations with higher vehicle volumes and speeds typically need higher levels of control, in order to establish safe crossings. Additionally, locations identified on the *Vision Zero Columbus High Injury Network* or *HIN*, may also need a higher-level of treatment as well as analysis of crash history to determine if there are crash patterns that should be addressed as part of any crossing implementation.

Crossing locations should be evaluated as individual locations, the 300-foot requirement in the flow chart excludes crossings at the same intersection. For example, existing crosswalk markings on the north side of an intersection do not preclude evaluation for the installation of new markings on the south side of the same intersection.

**Step 1: Screening of Potential Crossing Locations**

Potential crossing locations are first screened by considering the following questions to determine the feasibility of installing a marked crosswalk:

Question 1 – Is the location within a high pedestrian volume area? (As discussed above, these are areas where drivers expect to see higher volumes of pedestrian traffic during most times of day. Examples within Columbus include the OSU Campus, Short North, downtown, and within the Easton Town Center).

Question 2 – Is the location on the HIN? The latest HIN information is available at: https://vision-zero-columbus.hub.arcgis.com/

Question 3 – Is the distance to the nearest marked crossing greater than 300 feet?

Question 4 – Are there nearby pedestrian generators or a planned development that will generate pedestrian traffic?

Question 5 – Is there and existing sidewalk network or a future CIP project adding sidewalk and/or Shared Use Path (SUP)?

If the answer is “No” to any the above screening questions, then it is less likely that this location would be further considered for a marked crosswalk. However, this does not mean that a marked crosswalk cannot be further considered, but that other treatments such as curb extensions with or without median islands and traffic calming elements should be first considered to accommodate pedestrians wishing to cross at these locations. Research has shown that low driver compliance and yielding rates can be expected at these locations where conditions in the area are likely to lead to very low volumes of pedestrians crossing.

**Step 2: Crosswalk Treatment Evaluation**

If it is determined through Step 1 that a potential crossing location should be further considered, the responsible group (e.g. design consultant, developer, or requesting party) should complete an evaluation to determine the appropriate crosswalk treatment. For capital improvement or

private development projects, this should be completed as early in the planning process as possible.

Considerations for Crosswalk Treatment Evaluation

The following items may be considered, and documented as appropriate, as part of the evaluation and determination of an appropriate crossing treatment:

- Roadway characteristics: key characteristics of the roadway to be crossed, including:
    - roadway classification (see Step 3 for additional information on local roads);
    - posted speed limit;
    - presence of a school speed zone (coordination with School Zone Coordinator is required;)
    - existing or proposed roadway condition - number of vehicular travel lanes including turn lanes and TWLTLs;
    - presence of a curbed median;
    - pedestrian crossing distance;
    - presence of adequate sidewalk/shared use path (SUP)/ADA compliant curb ramps serving each side of the location;
    - type of traffic control of the nearest intersection(s);
    - distance to nearest marked crosswalk;
    - discussion of possibility for consolidation of multiple crossing points;
    - potential sight distance issues; and
    - presence of street lighting.
- Pedestrian count data: if the location does not have recent pedestrian count data, a count should be collected that will capture the peak pedestrian hour crossing the roadway under evaluation. It is preferred that data be collected on a non-holiday Tuesday, Wednesday, or Thursday between April and October, however some locations may have characteristics that may call for a weekend count to observe patterns. If the location is near a school, data should be collected when school is in session.
- Vehicular count data: average daily traffic (ADT) volumes determined from a recent count (less than 3 years old, or forecasted if volume changes are anticipated).
- Forecasted data: pedestrian crossing volumes and/or vehicular volumes may be forecasted for locations with new development nearby. These projections should include an hourly pedestrian volume and/or daily vehicular volume based on information pertinent to the area. For example, the projection for a crossing location near a transit stop should include a pedestrian volume based on ridership estimates for the stop nearest the crosswalk and include discussion of any growth rates applied to current ridership information (if any are applied).
- Area pedestrian generators: a map/figure illustrating the type and location of pedestrian generators within a quarter-mile of the crossing location. This is especially important for locations where entire corridors are being evaluated to determine the most appropriate crossing locations. Identify Central Ohio Transit Authority (COTA) or other transit stop

locations with the quarter-mile area and note the daily boarding and alighting data for each stop.

- Safety information: crash data for the most recent 5-year period should be reviewed to determine if there are any crash patterns, especially those involving vulnerable road users (pedestrian and cyclists), in the area of the proposed crossing. Any safety issues found should be addressed as part of the implementation of any crossing treatment or flagged for improvement in a separate project if not feasibly included with a crossing treatment.
- Proposed treatment: sketch or rough exhibit illustrating the recommended crossing treatment.

Minimum Pedestrian Volume Criteria

In order for a crossing location to be recommended for marking installation, the following minimum pedestrian volume criteria should be considered:

Criteria 1 – At least 20 pedestrians crossing during any one hour, or 18 pedestrians per hour crossing during any two hours of the same day, or 15 pedestrians per hour crossing during any three hours of the same day. This criteria is for pedestrians crossing a single roadway, not the total number of pedestrians crossing all legs at an intersection. (i.e., If the location under consideration is an intersection, the volume of pedestrians crossing the major roadway should be considered separately from the volume of pedestrians crossing the minor roadway or side street). If the peak hour pedestrian count is less than the criteria in the first sentence, then consider median refuge islands, curb extensions, traffic calming, etc., as feasible. This criteria is based on driver compliance (yielding) research.

Criteria 2 – If criteria 1 is not met, the location may be further considered if there are special circumstances or engineering judgement indicates that the location should be further reviewed. Examples are locations where a high presence of children or elderly pedestrians is observed or expected at the crossing location. If special circumstances exist at the location under evaluation, the number of pedestrians may be weighted using engineering judgement. If weighting is applied, documentation of the weighting, in addition to the observed count information should be included in a memo.

If either of these criteria are not met, installation of a marked crossing at the location should not be considered. The information from the crosswalk treatment evaluation should be submitted and filed for use in future consideration of the location, if appropriate.

If either criteria is met, treatment options should be selected using the FHWA “STEP Guide” research (FHWA-SA-17-072). For ease, the research matrix that lists STEP pedestrian crash countermeasures is included herein as Figure 3.

| 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) | ❶ 2 4 5 6 | ❶ 5 6 7 9 | ① 5 6 ❼ ❾ | ❶ 4 5 6 | ❶ 5 6 7 9 | ① 5 6 ❼ ❾ | ❶ 4 5 6 7 9 | ① 5 6 7 9 | ① 5 6 ❾ |
| **3 lanes with raised median** (1 lane in each direction) | ❶ 2 3 4 5 | ❶ ❸ 5 7 9 | ① ❸ 5 ❼ ❾ | ① 3 4 5 7 9 | ① ❸ 5 ❼ ❾ | ① ❸ 5 ❼ ❾ | ① ❸ 4 5 7 9 | ① ❸ 5 ❼ ❾ | ① ❸ 5 ❾ |
| **3 lanes w/o raised median** (1 lane in each direction with a two-way left-turn lane) | ❶ 2 3 4 5 6 7 9 | ❶ ❸ 5 6 7 9 | ① ❸ 5 6 ❾ | ① 3 4 5 6 7 9 | ① ❸ 5 6 ❼ ❾ | ① ❸ 5 6 ❾ | ① ❸ 4 5 6 7 9 | ① ❸ 5 6 ❾ | ① ❸ 5 6 ❾ |
| **4+ lanes with raised median** (2 or more lanes in each direction) | ❶ ❸ 5 7 8 9 | ❶ ❸ 5 7 8 9 | ① ❸ 5 8 ❾ | ① ❸ 5 7 8 9 | ① ❸ 5 ❼ 8 ❾ | ① ❸ 5 8 ❾ | ① ❸ 5 ❼ 8 ❾ | ① ❸ 5 8 ❾ | ① ❸ 5 8 ❾ |
| **4+ lanes w/o raised median** (2 or more lanes in each direction) | ❶ ❸ 5 6 7 8 9 | ① ❸ 5 ❻ 7 8 9 | ① ❸ 5 ❻ 8 ❾ | ① ❸ 5 ❻ 7 8 9 | ① ❸ 5 ❻ ❼ 8 ❾ | ① ❸ 5 ❻ 8 ❾ | ① ❸ 5 ❻ ❼ 8 ❾ | ① ❸ 5 ❻ 8 ❾ | ① ❸ 5 ❻ 8 ❾ |

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)

Figure 3: FHWA "STEP Guide" Matrix for Selecting Countermeasures (Source: FHWA-SA-17-072, page 16)

**Step 3: Further Considerations**

If the crossing location meets the conditions under Step 2, the following further considerations are listed for use in finalizing the crosswalk treatment.

Local Roadways

Unless there are extenuating circumstances, crosswalk treatments should generally not be considered on a street classified as "Local" functional classification. Circumstances that may warrant crosswalk treatment include designation on the SRTS plan or locations adjacent to large pedestrian generators. For any location being considered due to a high pedestrian generator, the crossing treatment installation should include pedestrian connections within private property to ensure a complete safe pathway for pedestrians. Contact the Division of Traffic Management for further guidance and to discuss specific site characteristics.

Trail Crossings

For purposes of this document, trails are defined as designated, signed regional connections, (i.e., The Central Ohio Greenways, The Alum Creek Trail, etc.). Local multipurpose paths/trail connectors/SUPs that are typically located within the right-of-way are not defined as trails. Crossings along local multipurpose paths, trail connectors, and SUPs must go through crossing treatment evaluation.

The standard application at uncontrolled trail crossing locations is a Type II crosswalk with trail warning signage (W11-15) and a diagonal arrow plaque (W16-7P). At controlled locations, the standard application shall include a Type II crosswalk alone (without warning signage). Engineering judgement should be used to determine if further enhancements or markings across side street or driveway approaches should be considered. Contact the Division of Traffic Management for further guidance and to discuss specific site characteristics.

Transit Stops

The presence of a transit stop or group of stops, does not alone justify installation of a marked crossing. The treatment evaluation should determine if a marked crossing treatment is appropriate based on ridership data as well as specific site conditions.

If a marked crossing is determined to be appropriate at a transit stop, it is recommended that the marked crosswalk be placed behind (upstream) of the bus stop location to prevent pedestrians from walking out in front of the bus. COTA transit stops should be placed on the far side of intersections, providing a 50-foot separation between the marked crosswalk and the transit stop. COTA also publishes a *Transit Stop Design guide* that should be consulted when designing crosswalks in the vicinity of COTA stops. Enhancement of crossings in the vicinity of transit stops can become complex; contact the Division of Traffic Management for further guidance.

School Crossings

Treatment of school crossings locations should be as outlined on the most recent *SRTS plan*. If an additional crossing, change in crossing, or a crossing at a school not covered under the SRTS plan is desired, coordination should occur with the DPS School Zone Coordinator by contacting the Division of Traffic Management.

Prohibiting Pedestrian Crossings

Legal crosswalks exist at most roadway intersections, even if they are not marked or don't currently have ADA curb ramps. An unmarked crosswalk is a legal crossing unless signage is erected indicating otherwise. (ORC 4511.01(LL)(3) and Columbus Code 900.04(b) and 2101.09(2)). The following is guidance on when such signs may be installed at or adjacent to an intersection to prohibit pedestrians from crossing:

- Heavy right or left-turn volumes across the path of pedestrians crossing the roadway. This may also include slip lanes/free-flow right-turn lanes, and right-turn bypass lanes.

- Physical conditions or complex geometry of the intersection provide inadequate visibility of pedestrians crossing the roadway.
- Physical conditions or complex geometry at the intersection make ADA accessibility of the location infeasible.
- An enhanced crossing is located in the immediate vicinity of the location.

See the

- ADA Considerations section for additional information.

Physical barriers as well as information about where pedestrians should cross the street is recommended for locations where No Pedestrians signage (R9-3a) is installed.

**Additional Details on Crossing Treatments Used in Columbus**

The following additional details specific to certain treatment types should be considered when finalizing crosswalk treatments.

Standard Signage (W11-2 with W16-7P or S1-1 with W16-7P)

The following guidelines should be used along with engineering judgement to determine if crosswalk warning signage should be installed:

- If the location is not within a high pedestrian volume area, the installation of crosswalk warning signs should be strongly considered.
- If the STEP guide matrix indicates that a higher level treatment should always be considered, but found not to be appropriate or recommended at the location, then double-sided crosswalk warning signage should be included.
- If the location is in a corridor with other marked crosswalks, an effort should be made to maintain the character of the corridor in regards to crosswalk warning signage (e.g., if doubled sided warning signs are frequently used throughout a corridor, then it is strongly recommended to utilize this treatment).
- School Crossing signs (S1-1) are to be used within school zones and at marked crosswalks that are located on SRTS priority corridors.

The standard signage application for marked crosswalks at uncontrolled locations without further enhancement shall be crosswalk warning signs (W11-2) with diagonal arrow plaques (W16-7P). These signs shall be fluorescent yellow-green.

In the past, the City of Columbus used regulatory signage in conjunction with crosswalk warning signage. This signage, Yield with Fine and City Code signs (CMR-188.01), shall no longer be used.


Yield Lines and Yield Here for Pedestrians Signage (R1-5)

Yield lines and associated signage are not utilized on one-lane approaches, but should be considered at multi-lane approaches and mid-block locations where pedestrian yield rates are proven or suspected to be low. In heavily parked areas, the additional parking loss should be considered when recommending this treatment. Caution should be used when yield lines are being considered at intersections where the yield lines may introduce confusion due to the traffic

control at the location.

In-street Pedestrian Crossing Sign (R1-6)

Consider truck and bus turning movements as well as snow plowing (whether crossing is on a snow priority route and size of plow trucks employed) when placing in-street signage. This signage should not be used in school zones or other areas with high numbers of children due to its potential to obstruct visibility of pedestrians in this context.

Raised Crosswalks

Criteria for this treatment includes daily traffic volumes below 1,500 vehicles per day and posted speed limits not to exceed 25 mph. Additionally, raised crosswalks are not appropriate for roadways along primary emergency response routes.

Curb Extensions/Bumpouts/Refuge Islands/Medians

Curb extensions and medians should be considered for use at crossing locations prior to consideration of active or enhanced treatments such as RRFBs and PHBs. Medians that cannot be constructed wide enough to be true pedestrian refuge areas may be added adjacent to the marked crossing.

Pedestrian Activated LED Bordered Signs (W11-2)

Pedestrian activated LED bordered signs (W11-2) should be considered on any roadway with a minor or major collector functional classification, and to enhance crossing locations prior to consideration of higher-level treatments (RRFBs and PHBs). Examples are locations where driver expectation of crossing pedestrians may not be high or where yield rates are proven or suspected to be low, such as roadways with speeds of 35 mph or higher, or where a pedestrian generator is located such that it cannot be seen from the street.

When utilized on roadways that are three or more lanes in width, the pedestrian activated LED bordered crosswalk warning signage (W11-2) should be doubled-sided (installed back to back) for each approach.

RRFBs and PHBs

RRFBs and PHBs may be considered after lower-level treatments have been implemented on any roadway with an arterial or major collector functional classification having a posted speed limit greater than 25 mph or where site conditions do not allow for the adequate installation of lower-level treatments. The need for these higher-level devices shall be based on engineering judgement and discussed within the crosswalk treatment evaluation.

PHBs must meet the minimum guidelines in Chapter 4F of the *OMUTCD* in order to be considered, and evaluation of these guidelines should be included in the crosswalk treatment evaluation. Contact the Division of Traffic Management for further guidance and to discuss specific site characteristics.

ADA Considerations

When enhanced crossing treatments are added across arterial roadways, designers should consider removal of ADA curb ramps at the adjacent unmarked crossing within the same intersection. Locations where ADA curb ramps across arterial roadways are removed, typically do not require “No Pedestrian Crossing” signage with the removal of the ramps as the location is considered an unsignalized arterial intersection within the *City of Columbus ADA Rules and Regulations dated April 1, 2018*.

When a marked crosswalk is desired at a location where ADA curb ramps are not present, the project should install ADA compliant curb ramps. Per the Columbus ADA Guidelines, this applies not only to the crossing that is to be marked, but the entire intersection.

## Supplemental Information and Additional Considerations

### Avoiding Overuse of Crossing Treatments

The FHWA recommends that overuse of crosswalk markings should be avoided to maximize their effectiveness. Crosswalk markings and higher-level, active enhanced treatments, should be used discriminately within the City of Columbus so that the effectiveness of these treatments is not deteriorated by overuse. Although these treatments may be effective at individual locations, overuse of these treatments city-wide may lead to a decrease in their value as drivers become desensitized to them. Minimum pedestrian and vehicular volume criteria have been established with this in mind. (Source: Boulder Pedestrian Crossing Treatment Installation Guidelines)

### Removal of Crossing Treatments

Conditions that contribute to the need for a marked crosswalk or crossing treatment may change over time, and an existing crosswalk or treatment may no longer be needed. This could be closure of an adjacent pedestrian generator or other development, resulting in the change of pedestrian patterns in the area. In other cases, traffic volume or speed increases, roadway widening, or installation of nearby traffic signals may make the crosswalk location no longer an appropriate or viable crossing treatment location. When a roadway surface is to be impacted by reconstruction or resurfacing, a review of any uncontrolled crosswalks should be performed to determine their use and need.

## Reference Documents

The resources noted below were used in the literature review conducted as part of the creation of this document.

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