

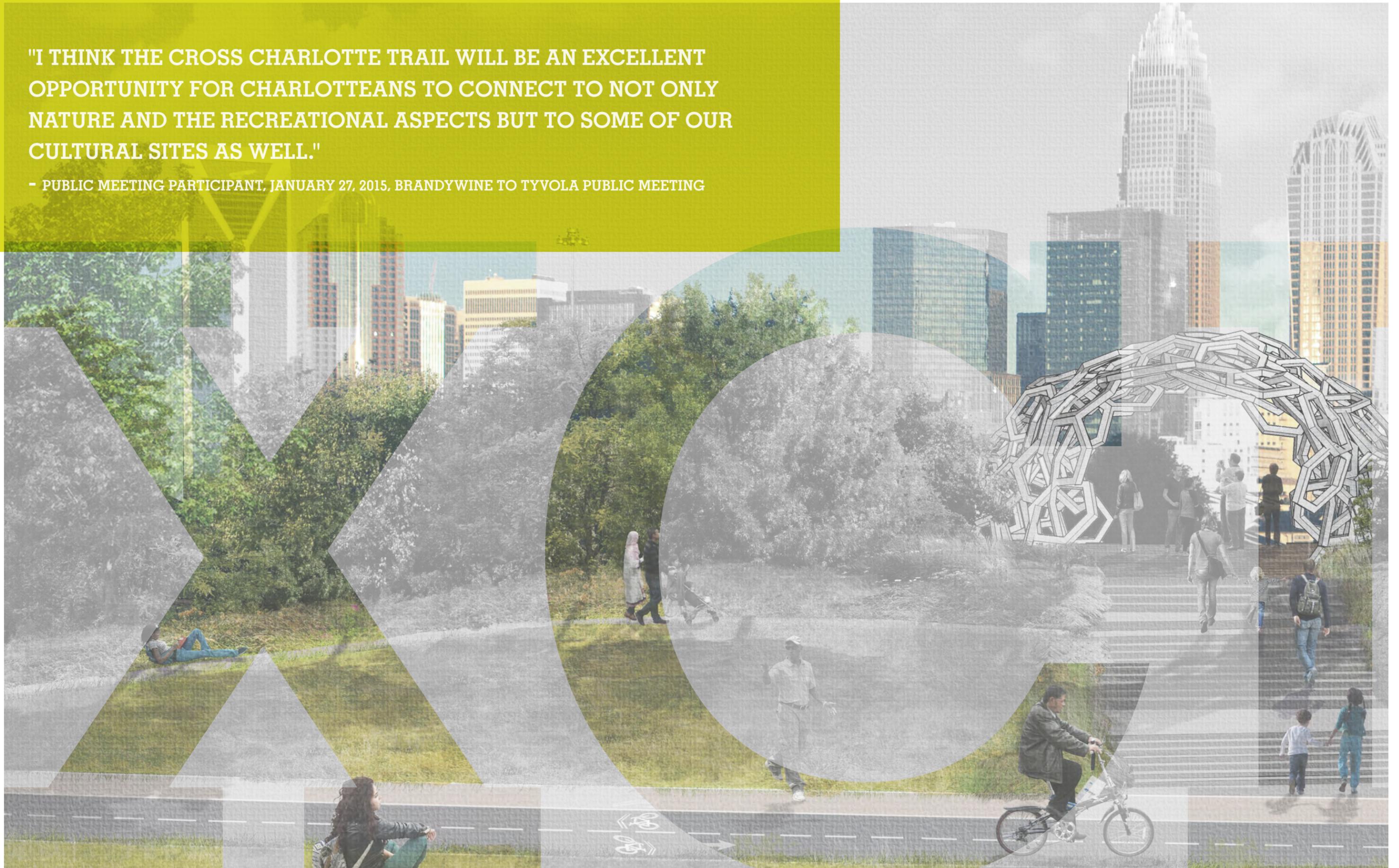
→ Mallard Creek Greenway
Source: https://getoffline.s3.amazonaws.com/uploads/image/picture/6431/large_10731798_1496766357273886_1426152828_n.jpg



→ Little Sugar Creek Greenway
Photo: Nancy Pierce

"I THINK THE CROSS CHARLOTTE TRAIL WILL BE AN EXCELLENT OPPORTUNITY FOR CHARLOTTEANS TO CONNECT TO NOT ONLY NATURE AND THE RECREATIONAL ASPECTS BUT TO SOME OF OUR CULTURAL SITES AS WELL."

- PUBLIC MEETING PARTICIPANT, JANUARY 27, 2015, BRANDYWINE TO TYVOLA PUBLIC MEETING



2.2

FACILITIES

The XCLT weaves through diverse neighborhoods, a variety of contexts and changing environmental conditions. A range of facility types and attention to design will be necessary to provide a consistent and intuitive experience along the 26-mile trail. One of the guiding goals of the project is to design a shared-use trail that is safe for all age groups and ridership skill levels. The success of existing trails and demand for more trails will ensure a high usership of the Trail that will need to be accommodated. To support these goals, a fully separated facility with horizontal and vertical buffers, between bicycle and pedestrian users and adjacent roadways, is preferred.



FACILITY TYPE

The XCLT is planned to be a "shared-use" trail system that will function as a linear park and transportation corridor suitable for walking, running and bicycling. The preferred shared-use path facility type is fully separated from motor vehicles and has three distinct types:

Buffered separated use path: where the pedestrian and bicycle path will be separated with a physical vertical and horizontal buffer, preferably a 5 foot planting strip. (Sections A1 + A2, pages 96-97)

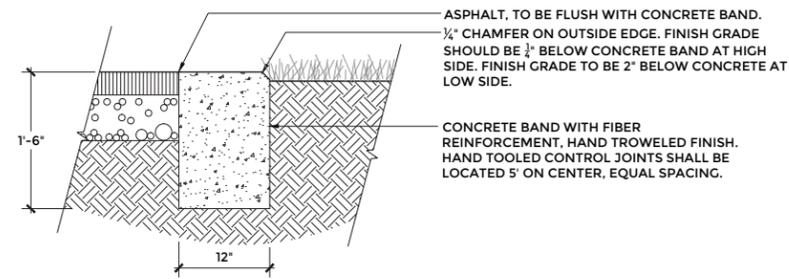
Separated use path: where a buffered separation is not possible due to spatial constraints, the pedestrian and bike path may be placed adjacent to each other. It is recommended that the pedestrian path be elevated +/- 2 inches above the bike path and the paths be separated horizontally with a 1 foot concrete band. (Sections B1 + B2, pages 98-99)

Shared-use path: in select locations where separation between the pedestrian and bike paths or uses is not possible, the path will be a single path mixing pedestrians and cyclist, but will be striped in the center to provide directional separation to minimize conflicts. (Sections C1, C2, C3, C4 and D1, pages 100-102)

In accordance with County standards, all greenway trails shall be limited to non-motorized users such as walkers, joggers and bicyclists. Vehicular access will be limited to maintenance, police and emergency vehicles, and pavement design for the Trails shall be such that these vehicles can be accommodated. Trail cross sections should be designed according to AASHTO's Guide for the Development of Bicycle Facilities (2012) and the latest Department of Justice's ADA design standards for pedestrian connectivity.



→ Concrete banding on LSCG.
Photo: Nancy Pierce



→ Concrete curb detail.
Source: LandDesign

FACILITY TYPE	INTENDED USE	WIDTH*	TEMPORARY CONSTRUCTION EASEMENT	MATERIAL / TREATMENT	
				Bike Path	Pedestrian Path
BUFFERED SEPARATED USE PATH (SECTIONS A,B)	Standard	35'	10'***	Asphalt with centerline, 1' concrete edge	Asphalt, 1' concrete edge, no centerline*
SEPARATED USE PATH (SECTIONS C,D)	Constrained width	30'		Asphalt with centerline, 1' concrete edge between pedestrian and bike path	Asphalt, 1' concrete edge, no centerline*
SHARED-USE PATH (SECTIONS E, F, G, H, I)	Highly constrained	26'		Asphalt with centerline, 1' concrete edge	
	Retrofit existing	22'	Existing asphalt with centerline****		

→ TABLE 2.1: Facility type descriptions.

- * Width refers to total corridor width which includes width of trail surface, buffer, shy and trail side zones.
- ** A 10 foot temporary construction easement should be provided on either side of the Trail pavement. The 10 foot temporary construction easement includes the 5 foot trail side zone. Outside of trail side zone grades should meet existing grade at 3:1 slope. Where this is not possible, the temporary construction easement should be determined on a case by case basis. Temporary construction easement widths may be required beyond the 10 feet. Width depends on utility locations, topography, required grading, construction access, etc.
- *** Other paving options under consideration.
- **** Centerline style to be determined.
- ***** Incorporation of a concrete band on the main trail promotes intuitive wayfinding.



→ Buffered separated use path. Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign



→ Separated use path. Boulder, CO.
Source: <http://www.marriageat10mph.com/pybloxom.cgi/kyle/2009/Jul/>



→ Shared-use path.
Photo: Nancy Pierce

TRAIL PLACEMENT BESIDE STREAM

In areas where the Trail follows a stream corridor, every effort should be made to avoid and minimize water quality buffer impacts to protect the integrity of the stream. The SWIM Buffer Ordinance defines three zones characterized by their function: Stream Side Zone, Managed Use Zone, and Upland Zone. The Stream Side Zone is the most restrictive of these. The Trail should not be located within the Stream Side Zone unless following an existing utility easement or otherwise permitted by the SWIM Buffer Ordinance. Bike paths and greenway trails are permitted uses within the Managed Use Zone provided the Trail does not exceed 10' wide. In locations where the Trail is located within the Managed Use Zone, and exceed 10'-wide, buffer impacts should be mitigated in accordance with the SWIM Buffer Ordinance. Mitigation should be accomplished through the City of Charlotte Umbrella Mitigation Bank program.

Avoid and minimize stream and wetland impacts to the extent possible. A wetland delineation should be conducted to identify these features during the early design phase. Once identified, and to the extent practicable, stream and wetland impacts should be minimized.

Segments of the proposed trail follow LSC through former industrial and commercial land uses where the SWIM buffer does not exist or have been encroached on by parking lots or staging areas. Within these areas where the Trail can be placed closer to the stream, the edge of pavement closest to the stream channel should be located a minimum of 7 feet from the top of the bank only where the stream channel is stable and suitable to support a trail facility.

Final trail location should be determined on a case-by-case basis to clearly define the top of the bank, site suitability and construction feasibility. Coordination with Charlotte-Mecklenburg Storm Water Services is recommended to determine trail proximity to the stream. The Post-Construction Stormwater Ordinance for the City of Charlotte, S.W.I.M Buffer Ordinance, and the LSC Feasibility Study from Matheson Avenue to 18th Street, dated August 31, 2015 provide additional guidance and should be referenced when determining final placement of the Trail.

See section A.4 of Appendix: Design Considerations for further analysis.



→ Zones defined by the SWIM Buffer Ordinance. Not to scale, for diagrammatic purposes only.



→ Opportunities for enhancing the stream should be explored through the planning and design process. This enhancement will create views to the creek and channel the sounds of the creek, increasing the user experience of the trail.
Photos: Nancy Pierce.

CROSS-SECTION AREAS DEFINED

The cross sections for the XCLT are comprised of the following zones:

TRAIL ZONE: This area includes the pedestrian path, bike paths and associated buffers.

PEDESTRIAN PATH: 8 foot minimum width path intended for walking and jogging.

BIKE PATH: 12 foot minimum width path intended for two-way directionally separated wheeled travel.

BUFFER: 5 foot minimum buffer to comfortably separate pedestrian and bicycle paths. Exceptions: The buffer can and should vary according to the character and area available to accommodate the Trail zone, while keeping a preferred minimum separation of 5'. Variation in width can provide opportunities for amenity areas, benches, art, landscape enhancements and lighting.

SHY ZONE: This zone helps ensure safe travel for cyclists by limiting vertical structures and obstructions adjacent to the path.

TRAIL SIDE ZONE: This area provides buffer from buildings and structures and should be used for trail enhancements such as landscaping, seating, wayfinding and other trail amenities.



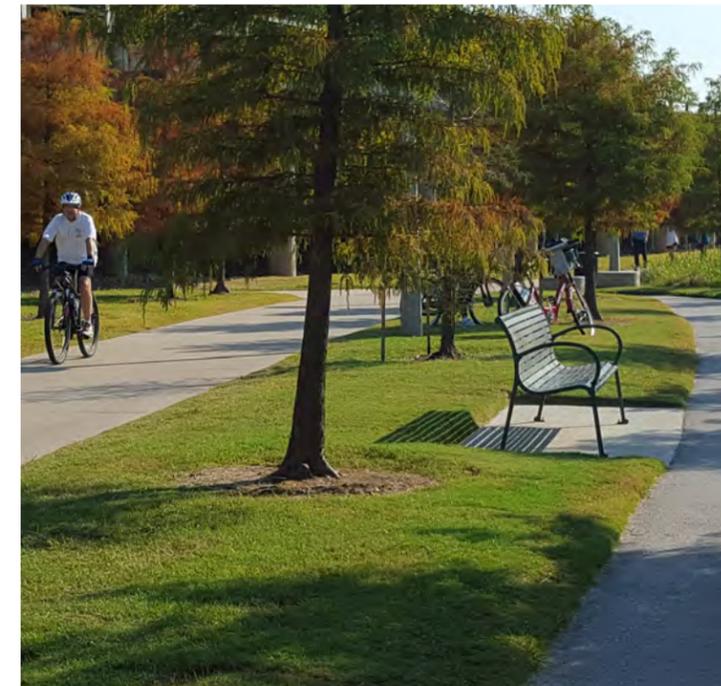
↳ Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign



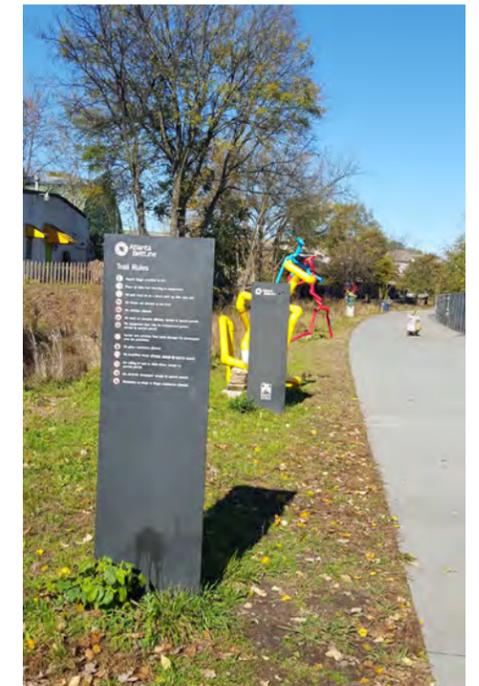
↳ Indianapolis, IN.
Source: <http://indyculturaltrail.org/>



↳ Indianapolis, IN.
Source: <http://indyculturaltrail.org/>



↳ Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign



↳ Atlanta Beltline, Atlanta, GA.
Photo: LandDesign



→ A: Buffered separated use path facility, outside of a road right of way.



→ B: Buffered separated use path facility, next to a road.

BUFFERED SEPARATED USE PATH

(SECTIONS A1, A2)

This is the preferred section for the XCLT and is recommended as the default facility unless a spatial constraint exists that cannot be overcome.

A 5 foot minimum buffer separates pedestrian and bicycle paths to create a safe experience for all users.

A 12 foot two-way bike path is directionally separated by a dashed white centerline.



→ A1: Buffered separated use path.

* One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

A2. Buffered separated use path next to road



→ A2: Buffered separated use path next to road.
 *Configuration may also include a one-way SBL on each side of the road.
 ** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

B1. Separated use path facility



SEPARATED USE PATH

(SECTIONS B1, B2)

A separated use path should be used where spatial constraints exist along the Trail that cannot be overcome; the buffer between the uses may be narrowed or removed but still provide separation of uses and directional separation of bicyclists via centerlines.

→ B1: Separated use path.

* Trail clear zone width assumes 5 foot trail side zones.

** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

B2. Separated use path next to road



2' Shy Zone
5' Trail Side Zone

8' Pedestrian Path

12' Two Way Bike Lane

2' Shy Zone
5' Trail Side Zone

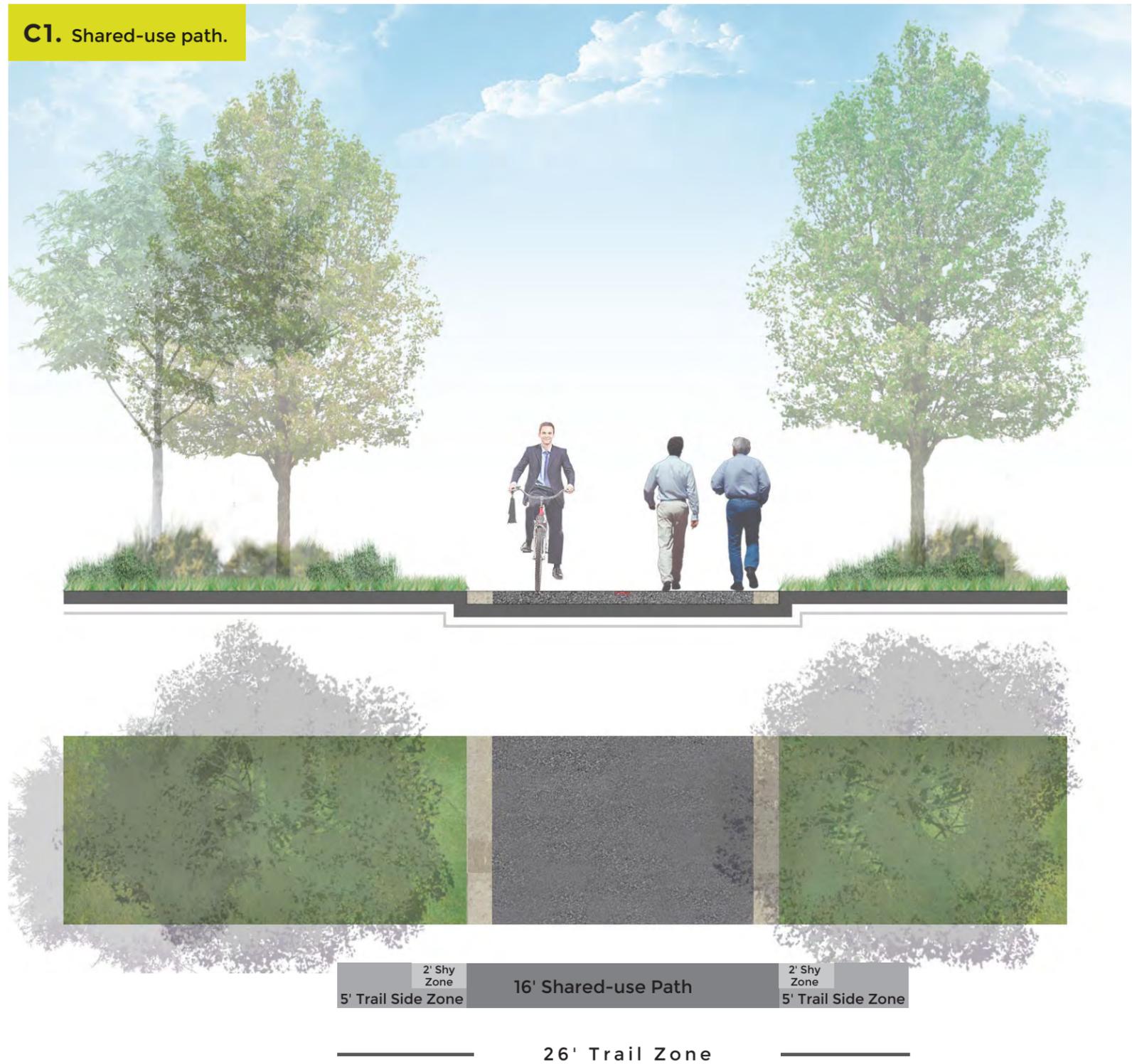
30' Trail Zone

↳ B2: Separated use path next to road.

* Trail clear zone width assumes 5 foot trail side zones.

** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

C1. Shared-use path.



SHARED-USE PATH

(SECTIONS C1, C2, C3, C4)

Shared-use paths should be used where adjacent uses or features constrain the Trail to the minimum width. Pavement markings and signage should be used to provide visual continuity of the Trail and provide directional separation to enhance usability and safety.

→ C1: Shared-use path outside of road right-of-way.

* Trail clear zone width assumes 5 foot trail side zones.

** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

C2. Shared-use path (next to road).



2' Shy Zone
5' Trail Side Zone 16' Shared-use Path 2' Shy Zone
5' Trail Side Zone

26' Trail Zone

→ C2: Shared-use path within road right-of-way.

* Trail clear zone width assumes 5 foot trail side zones.

** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

C3. Existing shared-use path with concrete banding



C4. Existing shared-use path



→ C3: Existing shared-use path with concrete banding outside of road right-of-way.
 * Trail clear zone width assumes 5 foot trail side zones.
 ** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

→ C4: Existing shared-use path outside of road right-of-way.
 * Trail clear zone width assumes 5 foot trail side zones.
 ** One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

D1. Retrofitting recommended for existing overland connector trail.



EXISTING TRAIL (SECTION D1)

Existing segments of the XCLT should promote continuity and user safety and experience through pavement markings and wayfinding.

Where the existing trail follows a quiet street, pavement markings should be applied to the adjacent sidewalk and sharrows should be applied to vehicle travel lanes to identify the route for bicyclists.

*Details of design solution for retrofitting existing trails is under consideration by City and County staff.

→ D1: Retrofitting recommended for existing overland connector trail.
* One foot concrete edge on trail will be used as determined by the XCLT project team for each segment.

TRAIL FACILITY TYPE LOCATIONS

Where feasible, the buffered separated use path is the preferred facility recommendation for the XCLT. Minimizing the number of transitions between facility type and maximizing the length of facility types will limit confusion while maintaining continuity for users and increase overall usability for the Trail.

As the Trail is further designed and developed, the following should be considered/studied to identify a variation (described above) to the preferred facility:

- Topography
- Existing Vegetation
- Environmental impact
- Land use and surrounding area
- Expected usership

TRANSITIONS AMONG FACILITY TYPES

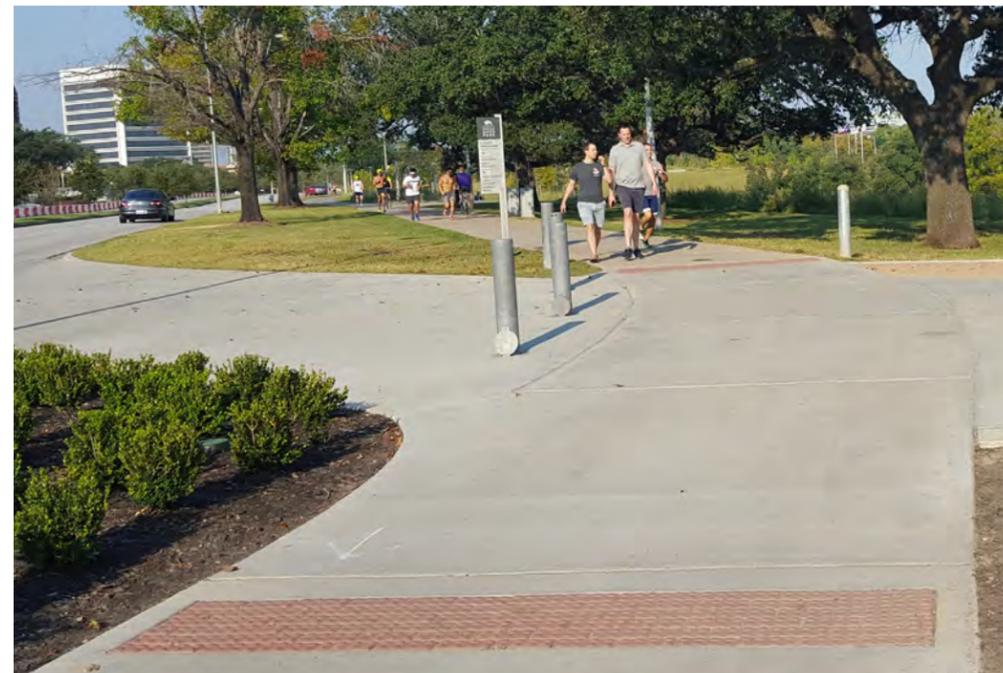
Where transitions occur, it is critical to alert users to avoid conflicts. Signage, pavement markings and varying pavement material should be placed in both directions before the transition, warning users of the upcoming change in trail facility. Rumble strips or banding should be used to provide tactile feedback to users as a reminder to pay close attention. Other design considerations may include landscaping and geometric variations of the Trail at transition locations.

ACCESSIBILITY

Keeping with the goal of user experience and equity/access for all, the Trail should be accessible for all users. The City of Charlotte follows the proposed guidelines set forth in the 2014 Public Rights-of-Way Accessibility Guidelines. These guidelines provide provisions for sidewalks and shared-use paths within the public right-of-way. These guidelines, as well as ADA standards, will govern the design of the XCLT.



→ Rumble Strips. Atlanta Beltline, Atlanta, GA.
Photo: LandDesign



→ Rumble Strips. Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign



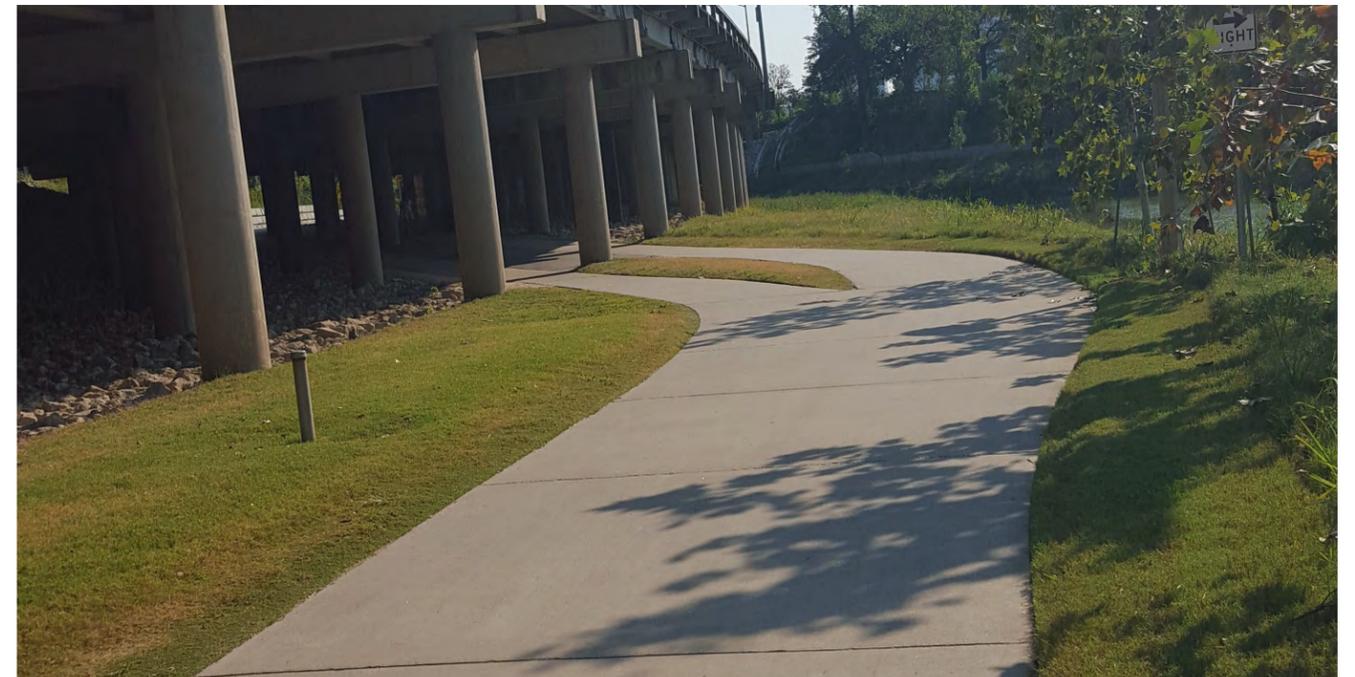
→ Change in ground plane signage is used to create innovative transition in facility type. Midtown Greenway, Minneapolis, MN.
Source: <http://raisethehammer.org/article/2664>



→ Change in paving and ground plane signage is used to create innovative transition in facility type. Katy Trail, Dallas, TX.
Source: <http://www.katytraildallas.org/site/PageServer>



→ Change in paving and ground plane signage is used to create innovative transition in facility type. Minneapolis, MN.
Source: <http://planplaceblog.com/2015/05/29/breathe-easier-bicycle-planning/>



→ Transitions should happen in areas with clear sight lines. Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign

"THIS TRAIL IS GOING TO BE MAGICAL FOR A LOT OF PEOPLE. THEY ARE GOING TO BE ABLE TO COME FROM NOT ONLY THE NORTH SIDE, WHERE UNCC IS, BUT ALSO THE SOUTH SIDE. HOPEFULLY MORE PEOPLE WILL BE ABLE TO COMMUTE INTO TOWN, OR WHEREVER THEIR JOB IS, GO GET GROCERIES, GO TO THE MOVIES AND DITCH THE CAR. "

- PUBLIC MEETING PARTICIPANT, JUNE 30, 2015, PUBLIC MEETING



2.3

CROSSINGS

The design of intersection and street crossings can be a determinant of user comfort, safety and overall trail success. Many times, small design details can be the key to a seamless, enjoyable and safe experience.

Intersection design will prioritize pedestrian and bicycle movements over vehicle movements and other forms of transportation. Pedestrian push button signals, passive detection, signage, striping and varying materials will be used in concert to create safe and comfortable intersection crossings.



Separation of users where streets and trails intersect is important, as this is where the largest opportunities for conflicts between modes exist, particularly in sections of the Trail that are more heavily used. By maintaining separation between pedestrians and bicyclists, conflicts between users who are traveling in opposite directions are minimized.

Intersection designs vary along the Trail depending on the facility type. Where uses are separated entering a crossing, the continuity of separating users should remain within the intersection. The AASHTO Guide to Bicycle Facilities and the Manual on Uniform Traffic Control Devices should be consulted during the design of intersection crossings.



→ A Dutch roundabout design provides clear marking of separate facility types and allows space for all users to navigate safely. Netherlands.
Source: <http://thisoldcity.com/sites/default/files/images/>



→ While the above photo shows user separation in intersection design, the user is still crossing in the wrong zone because she had to cross over to the bicycle zone to access the actuated signal push button. Details like push button locations are critical to ensuring a seamless user experience. Indianapolis, IN.
Photo: Toole Design Group



→ Safe, convenient crossing with separation of uses at Seattle Children's Hospital. Seattle, WA.
Photo: Adam Coppola Photography



→ Grade separated crossings eliminate conflicts with vehicles and pedestrian/bicycle traffic. Culverts can be use for this grade separated crossing with environmental permits but are often required to a very narrow facility. Because of this, signage, directional separation and adequate approaches are critical to ensure safe usability for users. Charlotte, NC.
→ Photo: LandDesign

TYPICAL RESIDENTIAL STREET CROSSING

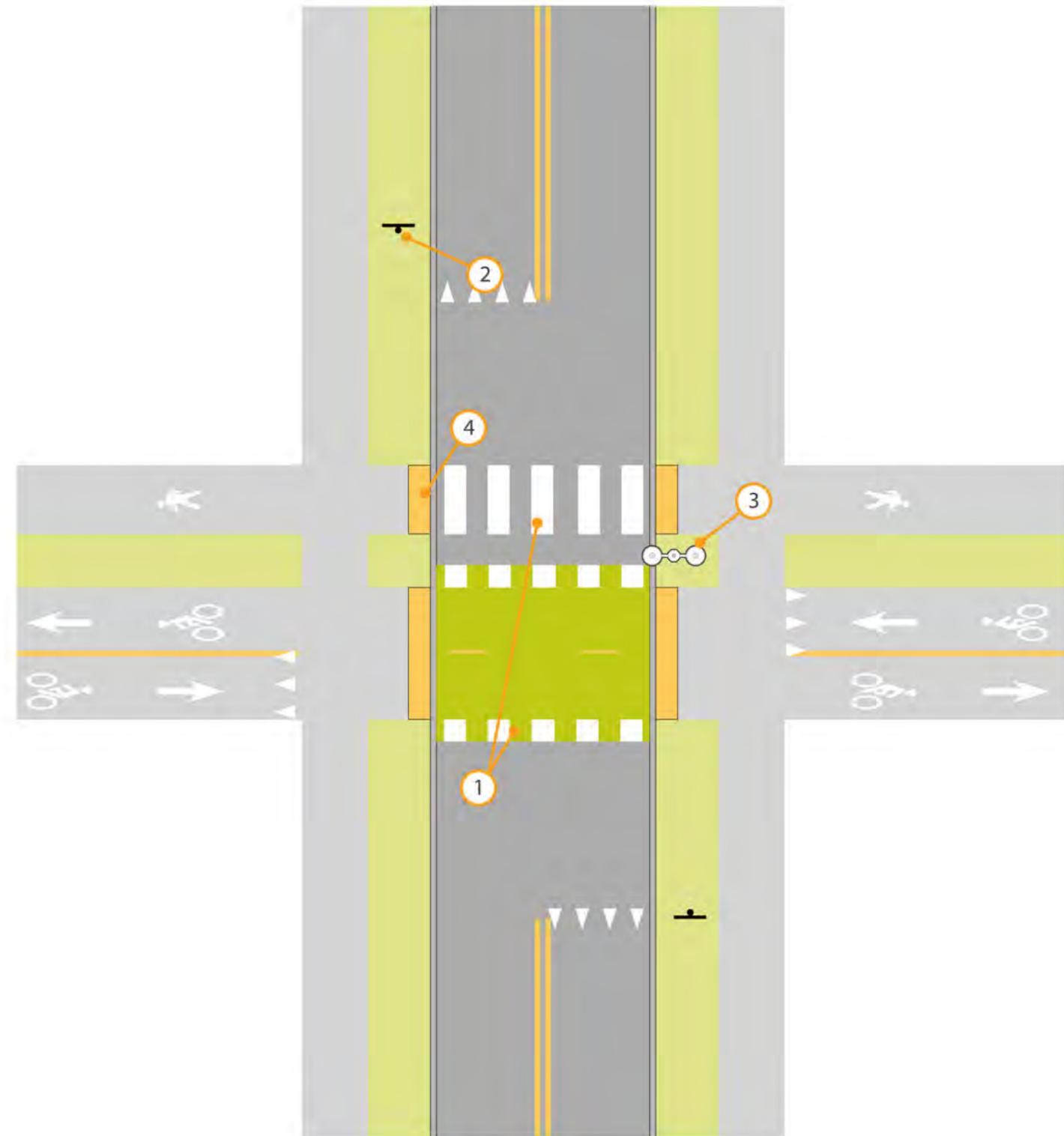
SIMILAR CONDITIONS:

Dawn Circle
Wellingsford Street
Belmont Avenue
Mellow Drive
Kentbrook Drive
Billmark Drive
Autumnwood Lane

SOUTH LOOP:
Northmore Street
Norwell Street

Low-volume residential street crossings generally do not require traffic signals, however each street is unique and an engineering analysis is needed to determine the most appropriate controls on the Trail and the roadway. Usually these crossings require mutual yielding behavior: motorists should yield to trail users who reach the crossing first, and vice versa. This behavior requires clear sight distances between trail users and motorists at these intersections. In all cases, crossing distances should be minimized as much as possible. Motorist speeds should be kept to a minimum at these locations. If motorist speeds are above 25 mph, traffic calming measures should be used on the approach to the crossing to reduce speeds. Refer to the AASHTO Bike Guide for further guidance on residential road crossings.

- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, separation should be maintained through the intersection, as shown. Green pavement markings for the bicycle crossing can help to increase the visibility of the crossing.
- 2 There are a variety of options for traffic controls at these crossings, including a rapid-flashing warning beacons, stop or yield control on the roadway approach, stop or yield control on the Trail approach, and others. The type of control should be chosen based on the specific conditions at each crossing.
- 3 Street lights should be provided to ensure trail users can be seen by approaching motorists at night.
- 4 Intersections must be ADA accessible.



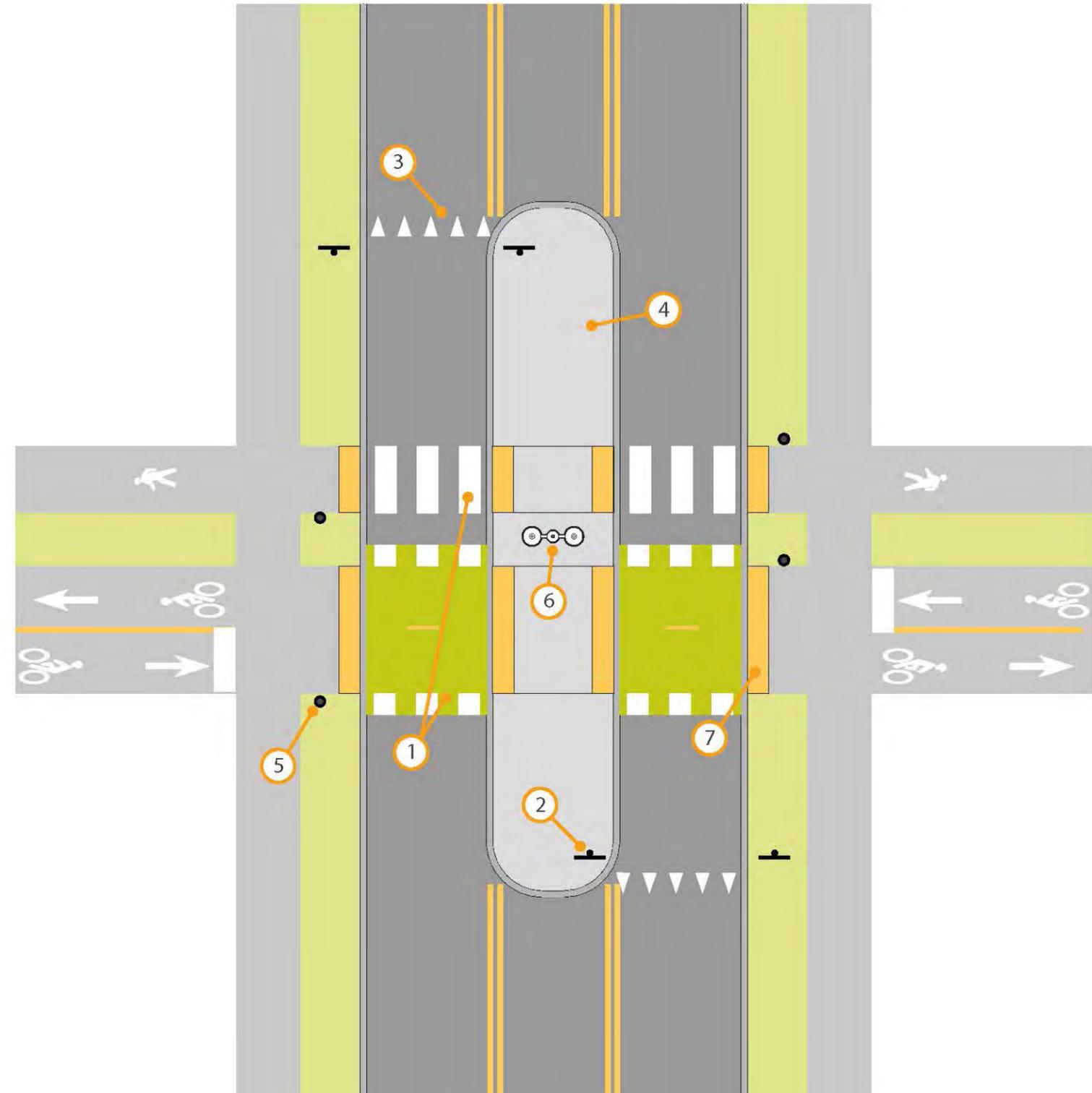
TYPICAL LOCAL / COLLECTOR STREET CROSSING

SIMILAR CONDITIONS:

East Craighead Road	36th Street
10th/12th Street	Greensboro Street
Parkwood Avenue	Rocky River Road W
North Davidson Street	SOUTH LOOP:
Jordan Place	36th Street
Matheson Avenue	

The XCLT will cross local streets that have a wide variety of traffic conditions. Each crossing is unique and must be designed based on an engineering analysis of speeds, volumes, sight distances and other factors. There are many different types of design solutions that can be used to ensure the comfort and safety of trail users at these locations. The AASHTO Bike Guide should be consulted for further guidance on local road crossings.

- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, separation should be maintained through the intersection, as shown. Green pavement markings for the bicycle crossing can help to increase the visibility of the crossing.
- 2 There are a variety of options for traffic controls at these crossings, including a traffic signal, rapid-flashing warning beacons, stop or yield control on the roadway approach, stop or yield control on the Trail approach, and others. The type of control should be chosen based on the specific conditions at each crossing.
- 3 Yield or stop bars should be recessed 20-50 feet from crossings. The median refuge should extend from crossing to bar location.
- 4 The median refuge island should be a minimum of 6 feet wide. If the refuge island is less than 8 feet wide, crossings for bicycles and pedestrians should be angled to allow for more queuing space.
- 5 If a signal or warning beacon is used, signal poles (and associated push buttons and signal heads) should be placed in a location that is convenient and visible to approaching pedestrians and bicyclists. The signal should be designed to provide enough time for the Trail user to cross the entire width of the road in one cycle. Push buttons should also be provided in the median for trail users who may not finish the entire crossing in one cycle.
- 6 Street lights should be provided to ensure trail users can be seen by approaching motorists at night.
- 7 Intersections must be ADA accessible.



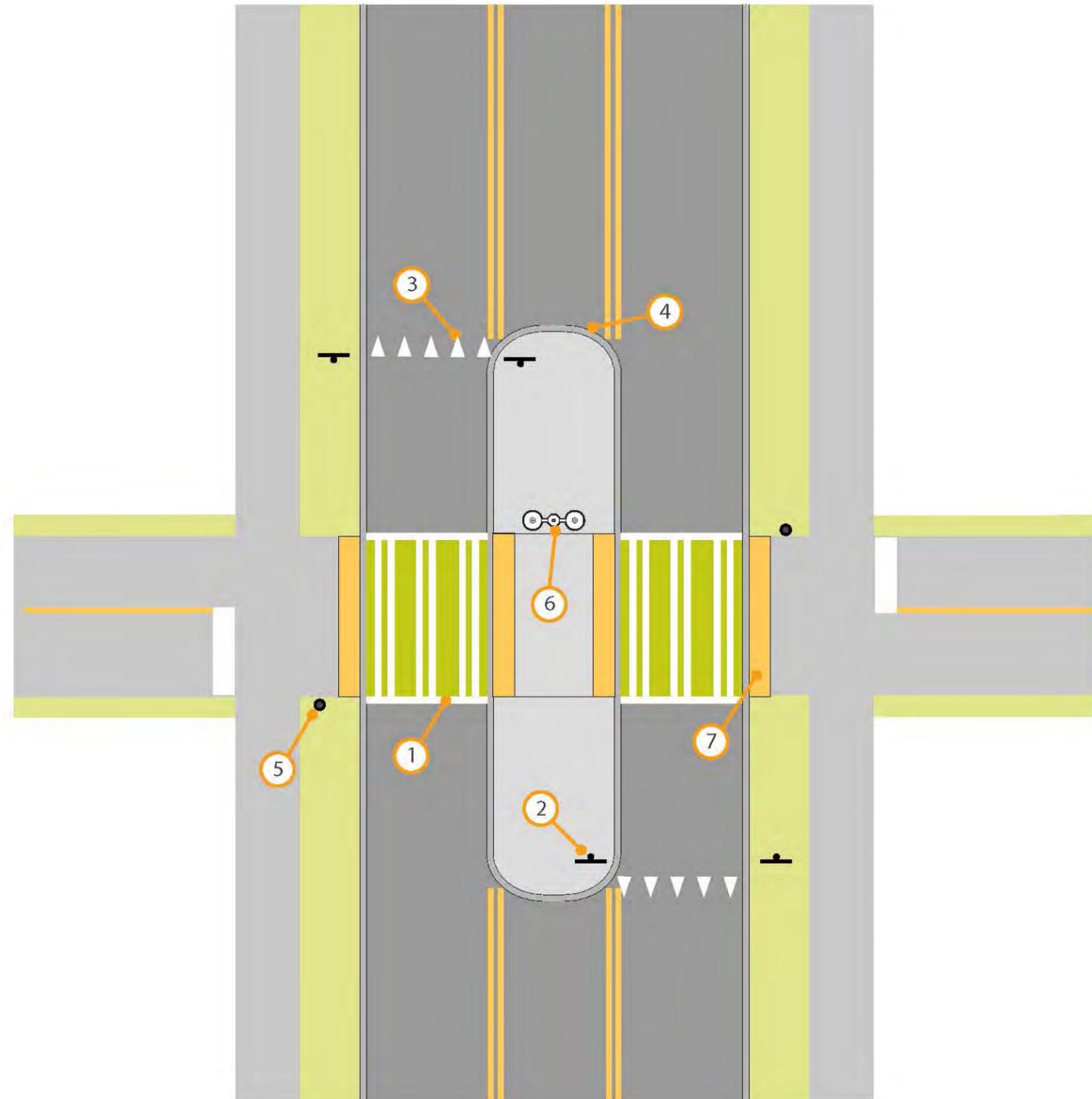
TYPICAL LOCAL / COLLECTOR STREET COMBINED CROSSING

SIMILAR CONDITIONS:

East Craighead Road	36th Street
10th/12th Street	Greensboro Street
Parkwood Avenue	Rocky River Road W
North Davidson Street	SOUTH LOOP:
Jordan Place	36th Street
Matheson Avenue	

The XCLT will cross local streets that have a wide variety of traffic conditions. Each crossing is unique and must be designed based on an engineering analysis of speeds, volumes, sight distances and other factors. There are many different types of design solutions that can be used to ensure the comfort and safety of trail users at these locations. The AASHTO Bike Guide should be consulted for further guidance on local road crossings.

- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, separation should be maintained through the intersection, as shown. Green pavement markings for the bicycle crossing can help to increase the visibility of the crossing.
- 2 There are a variety of options for traffic controls at these crossings, including a traffic signal, rapid-flashing warning beacons, stop or yield control on the roadway approach, stop or yield control on the Trail approach, and others. The type of control should be chosen based on the specific conditions at each crossing.
- 3 Yield or stop bars should be recessed 20-50 feet from crossings. The median refuge should extend from crossing to bar location.
- 4 The median refuge island should be a minimum of 6 feet wide. If the refuge island is less than 8 feet wide, crossings for bicycles and pedestrians should be angled to allow for more queuing space.
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- 6 Street lights should be provided to ensure trail users can be seen by approaching motorists at night.
- 7 Intersections must be ADA accessible.



TYPICAL ARTERIAL STREET CROSSING (SIGNAL / ABOVE GRADE)

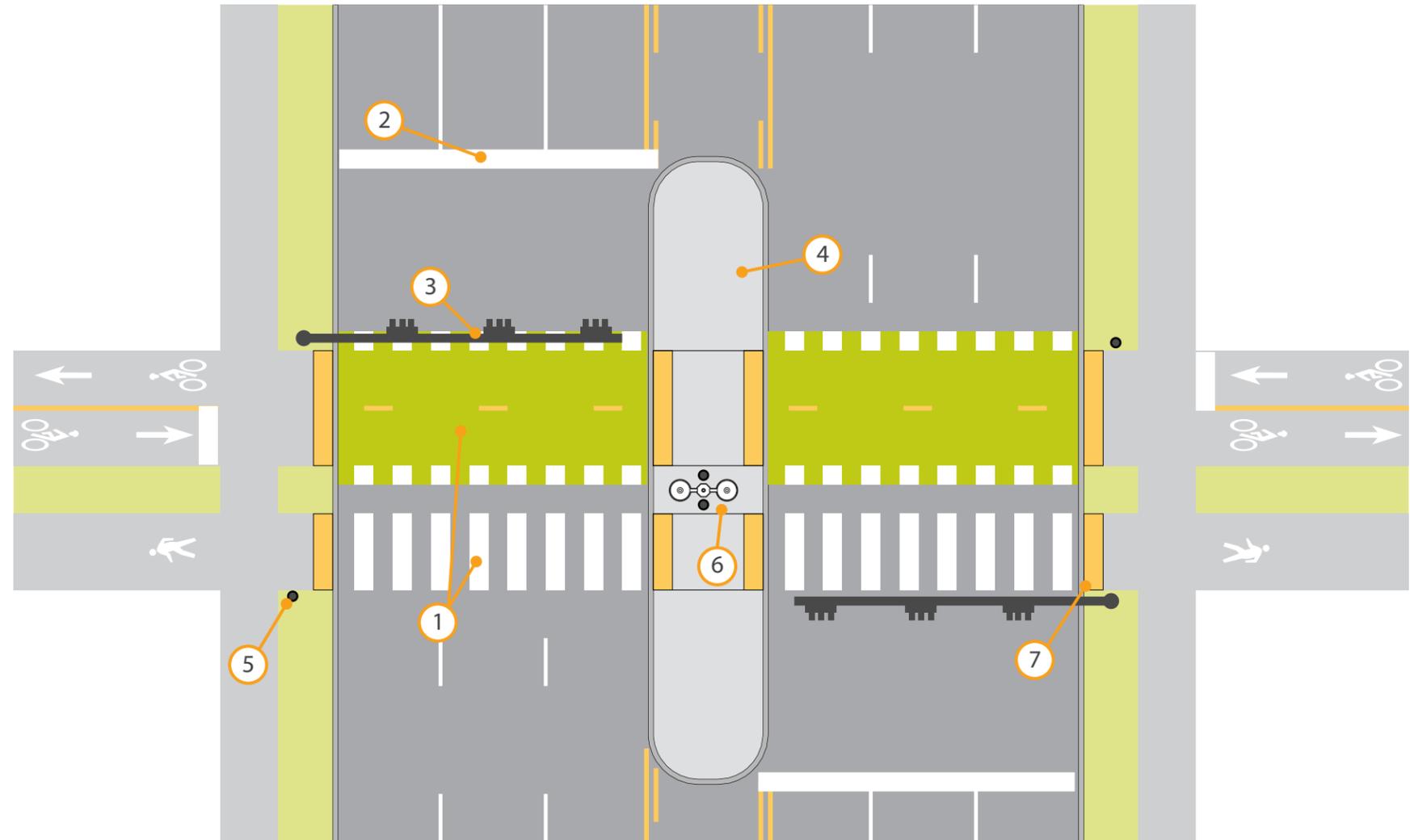
SIMILAR CONDITIONS:

Orr Road at Tryon

SOUTH LOOP:
Old Concord Road

Arterial street crossings are where trail users come into contact with higher volumes of motor vehicle traffic, and as such, must be designed to provide a high level of comfort and safety for pedestrians and bicyclists. These locations should typically be signalized. An engineering analysis is needed to determine the type of signal that is warranted. Trail users must be given clear information about upcoming conditions in advance of the crossing, and clear sight lines are essential. The AASHTO Bike Guide should be consulted for further guidance on arterial road crossings.

- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, separation should be maintained through the intersection, as shown. Green pavement markings for the bicycle crossing can help to increase the visibility of the crossing. Separate pedestrian versus bicycle signal heads should be provided.
- 2 Stop bars should be recessed 20-50 feet from crossings. The median refuge should extend from crossing to stop bar locations.
- 3 Traffic signals should be used at crossings between the XCLT and arterial roadways. Based on engineering analysis, this may include a full traffic signal, a HAWK signal, or other signal types.
- 4 The median refuge island should be a minimum of 6 feet wide. If the refuge island is less than 8 feet wide, crossings for bicycles and pedestrians should be angled to allow for more queuing space.
- 5 Signal poles (and associated push buttons and signal heads) should be placed in a location that is convenient and visible to approaching pedestrians and bicyclists. The signal should be designed to provide enough time for the Trail user to cross the entire width of the road in one cycle. Push buttons should also be provided in the median for trail users who may not finish the entire crossing in one cycle.
- 6 Street lights should be provided to ensure trail users can be seen by approaching motorists at night.
- 7 Intersections must be ADA accessible.



TYPICAL ARTERIAL STREET COMBINED CROSSING

(SIGNAL / ABOVE GRADE)

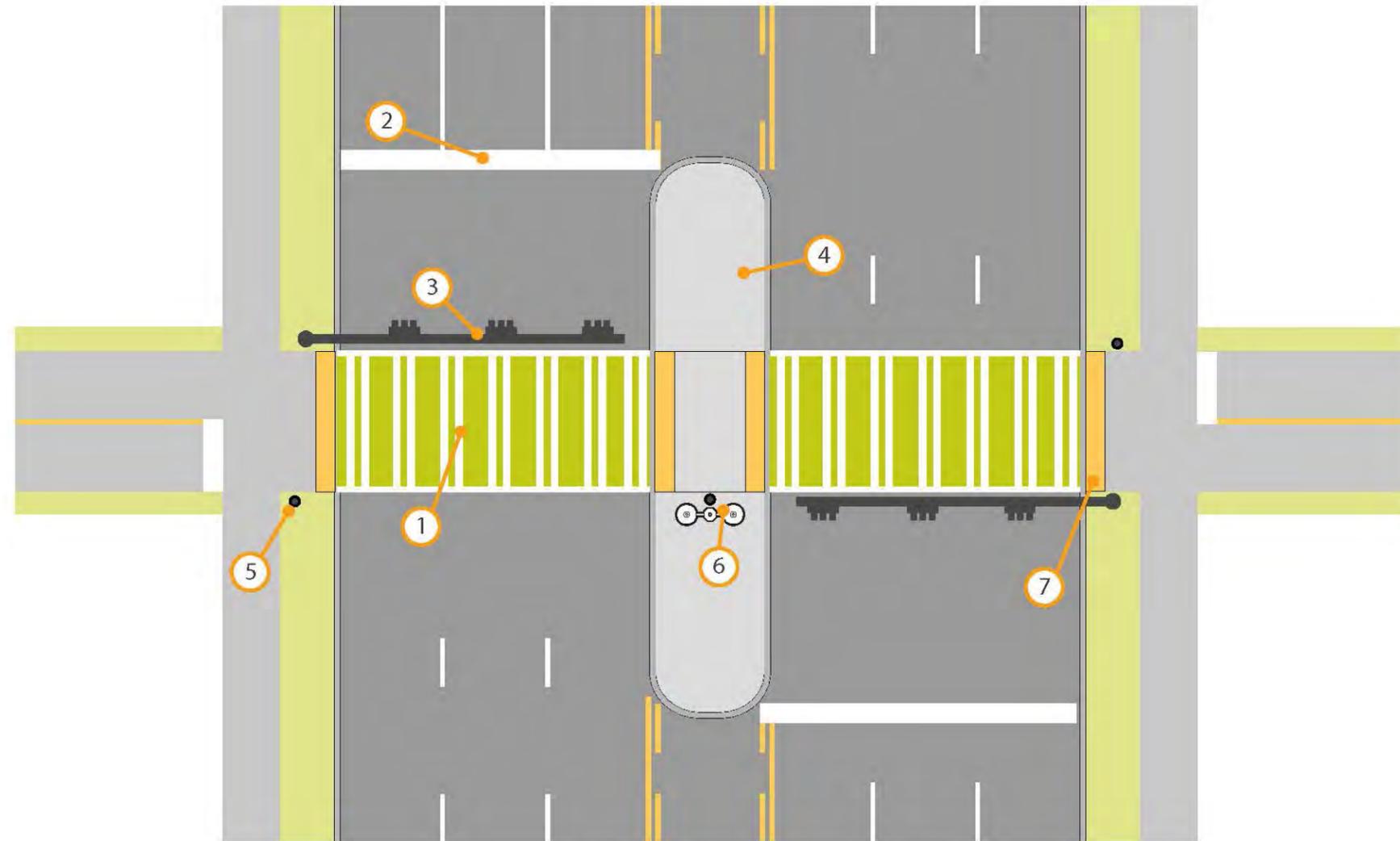
SIMILAR CONDITIONS:

Orr Road at Tryon

SOUTH LOOP:
Old Concord Road

Arterial street crossings are where trail users come into contact with higher volumes of motor vehicle traffic, and as such, must be designed to provide a high level of comfort and safety for pedestrians and bicyclists. These locations should typically be signalized. An engineering analysis is needed to determine the type of signal that is warranted. Trail users must be given clear information about upcoming conditions in advance of the crossing, and clear sight lines are essential. The AASHTO Bike Guide should be consulted for further guidance on arterial road crossings.

- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, separation should be maintained through the intersection, as shown. Green pavement markings for the bicycle crossing can help to increase the visibility of the crossing. Separate pedestrian versus bicycle signal heads should be provided.
- 2 Stop bars should be recessed 20-50 feet from crossings. The median refuge should extend from crossing to stop bar locations.
- 3 Traffic signals should be used at crossings between the XCLT and arterial roadways. Based on engineering analysis, this may include a full traffic signal, a HAWK signal, or other signal types.
- 4 The median refuge island should be a minimum of 6 feet wide. If the refuge island is less than 8 feet wide, crossings for bicycles and pedestrians should be angled to allow for more queuing space.
- 5 Signal poles (and associated push buttons and signal heads) should be placed in a location that is convenient and visible to approaching pedestrians and bicyclists. The signal should be designed to provide enough time for the Trail user to cross the entire width of the road in one cycle. Push buttons should also be provided in the median for trail users who may not finish the entire crossing in one cycle.
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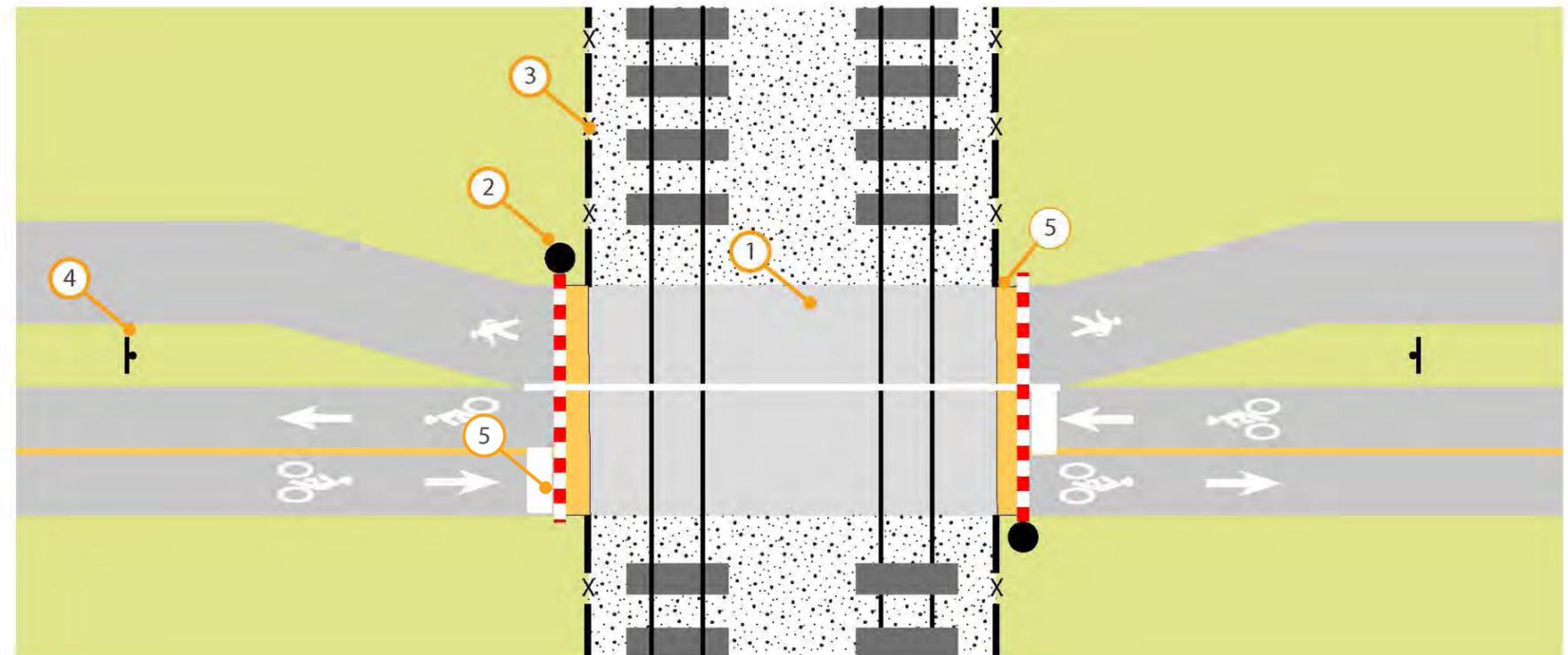
TYPICAL RAIL CROSSING

SIMILAR CONDITIONS:

Alexander Street Park
Cullman Avenue
Orr Road and Tryon Street with BLE
Orr Road

At-grade railroad crossings are a special type of crossing that requires additional safety measures. Because a train has a limited ability to stop in short distances, active warning devices, like warning lights and gates, should be used to make trail users aware of approaching trains. The tracks themselves present a risk to bicyclists, but this risk is minimized by providing a perpendicular crossing of the tracks. The AASHTO Bike Guide and the MUTCD should be consulted for further guidance on railroad crossings.

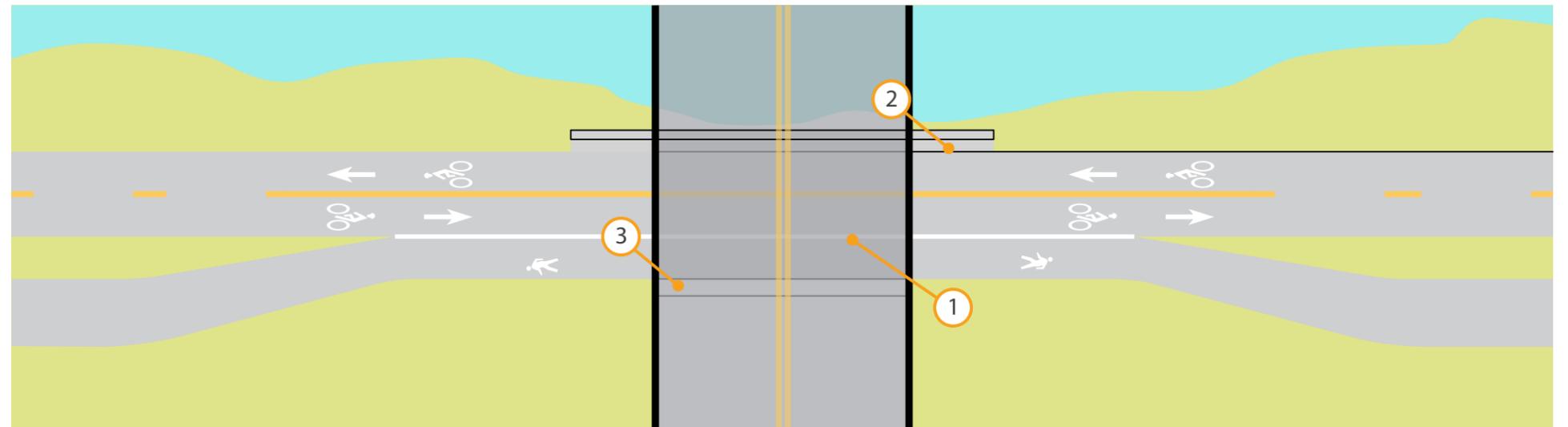
- 1 If separation between bicyclists and pedestrians is provided on the approach to the crossing, the separation should be removed to create one combined crossing. The width of the facilities should not be reduced in these combined crossings if possible. This crossing should be perpendicular to the tracks to minimize risk to bicyclists.
- 2 Automatic railroad crossing warning signs, lights and gates should be placed on each side of the crossing. The gate should span the entire width of the crossing.
- 3 Fencing should be provided on each side of the rail corridor to assist with prevention of illegal crossing of the tracks.
- 4 Advanced warning signs should be placed to make users aware of the upcoming railroad crossing.
- 5 Intersections must be ADA accessible.



TYPICAL CULVERT CROSSING

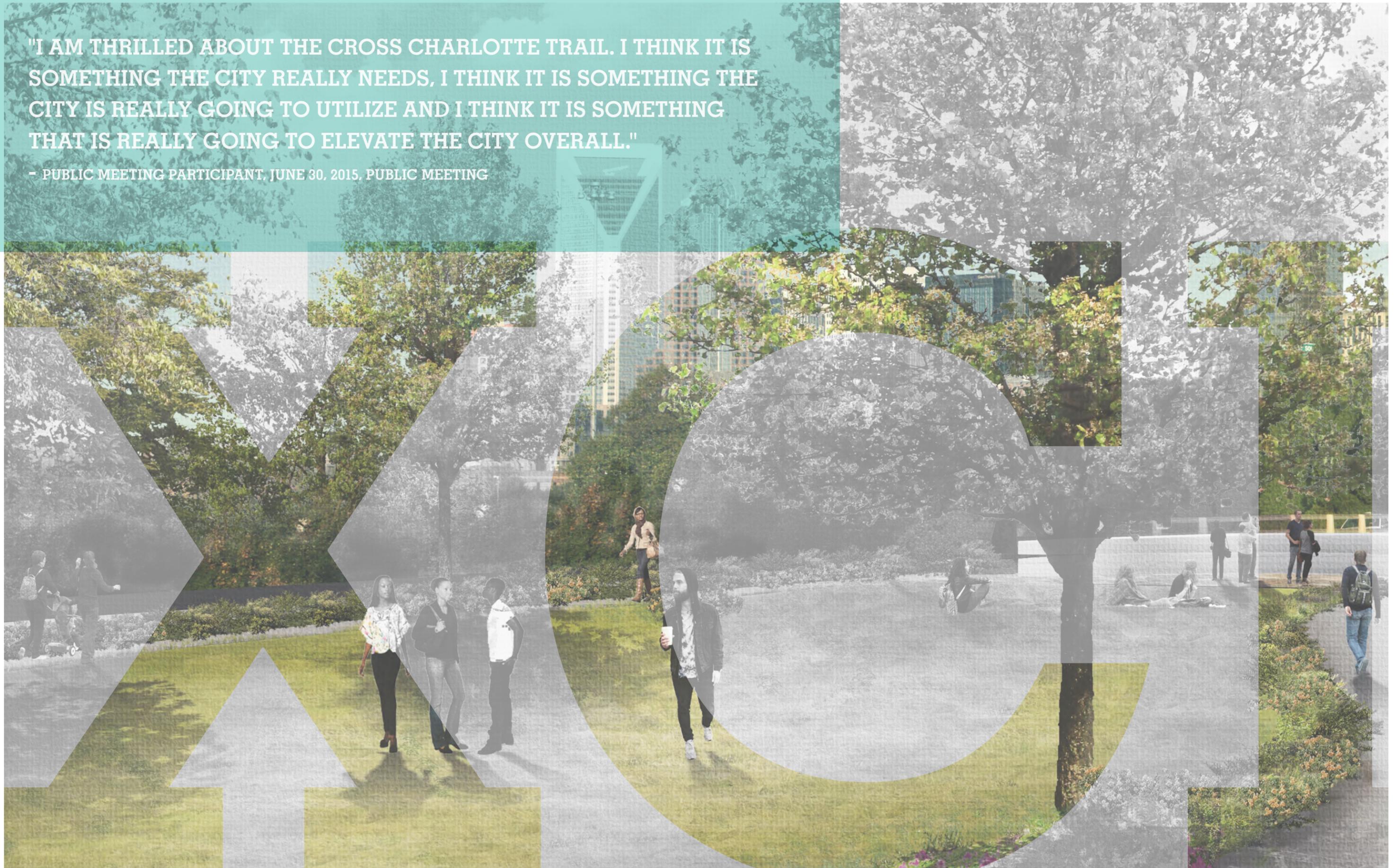
In several locations, the XCLT will parallel an adjacent stream and cross beneath roads via culverts (underpasses). Examples of this type of crossing can be found on the LSCG. In these locations, space is at a premium and it will be necessary to reduce the width of the pathway. In all cases, these undercrossings should be designed in accordance with the AASHTO Bike Guide and the Americans with Disabilities Act Accessibility Guidelines.

- 1** In locations where the approach to the underpass consists of separate trails for pedestrians and bicyclists, separation should be maintained in the underpass. The cross section should be maximized to the extent possible, but should not be narrower than 12 feet in width (consisting of 8 feet for two-way bicycle travel and 4 feet for pedestrian travel). The 12 foot minimum does not include shy distance from adjacent vertical walls.
- 2** Provide at least 2 feet of shy distance between the Trail and adjacent vertical walls. On the side of the Trail nearest the creek, this shy distance can consist of a gutter to collect silt during storm events. A minimum vertical clearance of 10 feet is desirable for adequate vertical shy distance.
- 3** Depending upon the length of the underpass, additional lighting may be needed, per the AASHTO Bike Guide.
- 4** Intersections must be ADA accessible.



"I AM THRILLED ABOUT THE CROSS CHARLOTTE TRAIL. I THINK IT IS SOMETHING THE CITY REALLY NEEDS, I THINK IT IS SOMETHING THE CITY IS REALLY GOING TO UTILIZE AND I THINK IT IS SOMETHING THAT IS REALLY GOING TO ELEVATE THE CITY OVERALL."

- PUBLIC MEETING PARTICIPANT, JUNE 30, 2015, PUBLIC MEETING



2.4

PLACEMAKING + TRAILSIDE AMENITIES

In this section, key design elements supporting the overall trail experience are described. This includes hardscape, pavement surface and markings, intersections, gateways, planting, site furnishings, wayfinding and art. Together they will begin to establish a brand and continuity of place along the corridor. These elements will also help identify a clear trail route, promote equal and easy access to the Trail, and enhance user comfort and safety. The following guidelines neither replace the City's development regulations nor waive requirements for compliance with other applicable codes. Rather, they are intended to augment such standards to ensure a desired consistency and achieve a level of quality throughout the Trail.

Building on the successful elements that define LSCG, with some additions, the elements proposed in this Master Plan are geared towards creating a consistent and continuous unifying character for the entire trail, tying together existing and future sections. These elements will enhance the intuitive wayfinding and sense of place. Of equal importance is the understanding that the Trail crosses through a variety of character areas, and should complement and enrich the unique qualities of each.



5 GUIDING PRINCIPLES FOR PLACEMAKING ON THE CROSS CHARLOTTE TRAIL



→ Natural and well placed boulders reflect the natural character of the creek environment but can also provide a variety of functions such as seating, retaining walls and play.
Photo: LandDesign

1 AUTHENTIC MATERIALS

Materials should be high quality and true to themselves; avoid the use of materials that imitate other material. If a brick look is desired, brick should be used, not stamped concrete or asphalt. Natural materials should be used to the greatest degree possible, with a preference given to stone, boulders, brick, asphalt, concrete and black metal.



→ Wood swings and stone clad walls.
Photo: LandDesign



→ Morrison Gardens is a privately funded public open space along LSCG. The material selection reflects a unique space while still adhering to the use of authentic materials and the repetition of key elements.
Photo: LandDesign



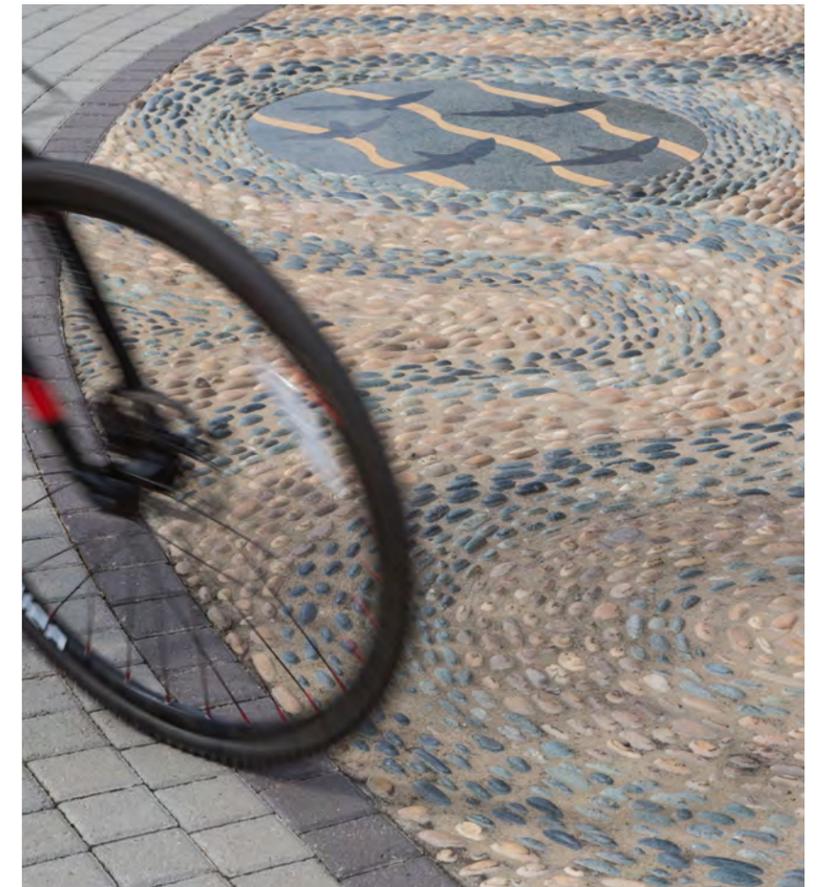
→ The Charlottetowne Avenue bridge does not adhere strictly to the authentic materials principle. It was designed to repeat the materials of stone and concrete, but the stone is not real. It is concrete formed to mimic stone. When budget constraints and practicality prevent the use of authentic materials, construction quality and finish must be closely controlled. This bridge blends in beautifully and successfully adds to the coherence of the place.
Photo: LandDesign

→ This series of three photos illustrate how repetition of materials help promote trail coherence. A 1 foot concrete band distinguishes the main trail and standardized furnishings are repeated to create unity.
Photo: LandDesign



2 REPETITION WITH ARTFUL VARIATION

In this section, recommendations for furnishings and materials are intended to promote a high quality, unified trail experience. Simplicity and repetition create visual harmony that in turn promotes a sense of place, coherence and continuity. In turn, artful and contextual variations may be incorporated to support the unique character of places, or to create public art opportunities, while still respecting the core design principles. It is preferable that natural materials still be used and an “artful” variation be applied discerningly.



→ Series of photos illustrate the variation in the use of stone to reflect different character areas. Clockwise from top-left: boulders used for public art, seeded stone and stone mosaic in a more classic setting, cut stone pavers in a more contemporary setting.
Photo: LandDesign



→ Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign

3 ENGAGING LANDSCAPE PALETTE

Plant material should be used as a design tool to add interest, provide comfort and mitigate for environmental impacts. Trail systems are made up of destinations and corridors, with more intense improvements typically focused within the destinations. In terms of creating a statement with planting, it is recommended that the entire corridor be considered. Seeding of large grass swaths along the Trail can create a strong and inexpensive impact to the Trail experience.



→ Food truck Friday along the Charlotte Rail Trail.
Photo: Nancy Pierce

4 UNPRESCRIBED PLACES

Many urban “vestiges” of land exist along the Trail corridor. These currently undeveloped areas provide, for a variety of reasons, ideal opportunities for community “interventions” whether it be for urban agriculture, art, or temporary gathering spaces. As seen along the Blue Line Rail Trail, these interventions help to create a unique sense of place and character. It is recommended and encouraged that opportunities for community-based interventions be allowed as long as they do not interfere with the functionality of the Trail.



→ Unique seating along the Charlotte Rail Trail.
Photo: Nancy Pierce



→ LSC in Optimist Park. While a complete stream restoration may not presently be feasible in this section, enhancements should be made to utilize this natural asset as the focal point for the Trail whenever possible.

Photo: LandDesign

5 CHARLOTTE-CENTRIC

The XCLT provides the opportunity to showcase some lesser known and unique assets in Charlotte including cultural, historic and natural resources. LSC, skyline views, rail history, historic mills, Sugar Creek Presbyterian Church and Cemetery, McGill Rose Garden and Rosedale Plantation can have enhanced visibility and connectivity to the larger City due to their proximity to the Trail. Wayfinding, views and interpretive education should be woven along the Trail to bring a richer experience to the corridor.



→ Matheson Avenue and Central Avenue both provide excellent views of the skyline and Charlotte's infrastructure.

Photo: <http://www.bondedlogistics.com/intermodal>



→ Bridges provide an opportunity to highlight our streams and should function as secondary gateways to trails. Simple improvements can be made to existing culverts and bridges to highlight these special places.

Photo: LandDesign



Asphalt trail with concrete band

Secondary trails + plazas are concrete, brick or stone

Concrete with band in scour areas

→ Diagram of proposed materials and principles from LSCG



PLACEMAKING PRECEDENT

The placemaking tools found along the section of LSCG at the Metropolitan should be used along the XCLT. These include the use of black furnishings (light poles, bollards, etc.), boulders placed in appropriate areas along the Trail to enhance the landscape, the use of natural materials such as wood and stone instead of products that replicate these materials, an asphalt trail with concrete banding and incorporating secondary trails and plazas in nodes/gateways and trailheads to create gathering places along the Trail.

By using these existing elements, the Trail system will become cohesive. This will not only be aesthetically pleasing but will also help create a more user friendly trail system.

TRAILHEADS + ACCESS

The XCLT is envisioned to be a continuous new path to all kinds of great places. These great places serve as gateways and access points to the Trail, otherwise known as "trailheads." Having a multitude of trailheads from large to small scale is the goal. This will support the vision of an easily accessible trail. Trailheads do not need to be formal and provide all of the amenities typically found at a trailhead. Instead, providing a variety of amenities and character areas will add to the appeal and experience of the Trail. To accomplish this, public and private partnerships should be forged to supply a variety of destinations and entry points.



→ Providing a variety of sizes of community gathering spaces along the Trail is important to achieve a lively and activated public amenity as well as a driver for positive community building and an economic impact.
Photo: LandDesign



→ Destinations and trails are co-located, but trail flow is not interrupted. Destinations are adjacent to the Trail.
Buffalo Bayou Greenway, Houston, TX.
Photo: LandDesign



→ In Houston, a major trailhead for the Buffalo Bayou was incorporated into a new regional park with a nature playscape, skatepark, bike rental vendor and amphitheater.
Photo: LandDesign

PRIMARY TRAILHEADS

Trailheads are typically designated locations to begin and/or end a trail experience. They provide trail oriented amenities such as parking, restrooms, public gathering areas with seating, bike rentals or bike share, bike parking, fix-it stations, trail etiquette and trail maps. In the middle section of the XCLT, key destinations and existing publicly owned land can be enhanced to serve as trailheads, such as Eastway Park, UNCC and the Hidden Valley Stream Restoration Park.

SECONDARY TRAILHEADS

Other public existing facilities such as schools and streets are ideal secondary trailheads. Secondary trailheads should provide some access to parking and provide benches, trash, recycling stations and drinking fountains. Secondary trailheads should be located at all secondary locations to the main trail.

TRAILHEADS CREATED THROUGH PUBLIC/PRIVATE PARTNERSHIPS

Many of the images found throughout this Master Plan illustrate carving out space along the alignment to create a string of destinations and interesting places to access or stop along the Trail. These special places can only happen through partnerships between the public and private sectors. Seeking out and supporting opportunities for partnerships to create new pockets of publicly-accessible open space to supplement the existing should be a focus early on in the development of the Trail.

SECONDARY CONNECTIONS

Along the trail alignment, many secondary connections will be made for private properties, adjacent development and public gathering spaces and street. All public connections to the Trail should meet accessibility guidelines and be usable for bicyclists and pedestrians. Connections should also be well marked with a change in paving material and vertical signage. The shy zone and trailside zone should be maintained at the intersection of secondary connections and the Trail.

Public connections to the Trail need to provide direct access to the Trail. Mecklenburg County Park and Recreation's (MCPR) wayfinding signage developed for LSCG should be incorporated at all public connections.

Where possible, private connections to development should be made to provide direct access to the Trail. Locations for private connections should be incorporated into the land development review process or should require a permit. Private connections should be allowed to be gated at the property line to control access. An annual connection fee for private commercial establishments should be considered.

When the Trail is separated at street crossings, a public trail connection to the sidewalk should be made. This includes when the Trail is outside of the road right-of-way and needs to connect back to the city sidewalks or other greenway systems.



→ All public connections should be denoted with signage and a change in material. Secondary trails should not be asphalt to help establish the coherence of the main trail.



→ Trail signage that displays the crossing and directional information as well as pavement markings need to be visible at these connections.
Photo: LandDesign



→ Trail signage should be located at all public connections. Atlanta Beltline, Atlanta, GA.
Photo: LandDesign



→ Along some trails, annual connection fees are charged for all private connections. Each private connection is reviewed and requires a permit. Trail signage should be located at all public connections. Dallas, TX.
Source: <http://www.bringfido.com/restaurant/10275/>

ENHANCING TRAIL ETIQUETTE

Due to the overwhelming success and popularity of Charlotte's existing greenways and trails, users commonly express frustrations about interactions with other users and bicycle / pedestrian conflict. Much of the design and development of the XCLT has been oriented towards addressing the complaints and safety issues that have arisen as Charlotte's trails have grown increasingly congested.

Basic trail etiquette should be provided to all users of the Trail, and should be based upon the following principles:

- Be courteous and predictable
- Stay right, except to pass
- Give audible warning before passing
- Obey signs and guidance

The goal of emphasizing trail etiquette is the reduction of conflicts among users. These guidelines can be especially helpful on shared-use paths, and can assist in easing interactions between bicycles and pedestrians (who may move at significantly different speeds).

Information on trail etiquette should be disseminated to both frequent and occasional users of the Trail in a wide variety of ways, including signage, wayfinding and posting of rules where appropriate. Etiquette should be provided at trailheads and street crossings where users of Charlotte's overall transportation network are expected to access the Trail. Trail etiquette could be provided alongside maps for distribution at B-Cycle and other rental stations to target occasional users of the Trail. It is recommended that the City of Charlotte augment these efforts with periodic education campaigns and analysis of trail operations and conflicts during peak hours.



→ BikeHouston provides easy to understand flyers at bike rental stations to educate users on appropriate trail etiquette. Houston, TX.
Photo: LandDesign



→ Public feedback indicated a desire for a decrease in conflicts between pedestrians (often walking with children and pets) and bicyclists.
Photo: Nancy Pierce



→ Atlanta BeltLine Etiquette Campaign supports positive trail interactions. Atlanta, GA.
Source: Beltline.org



→ Mecklenburg County Park and Recreation (MCPR) signage and wayfinding system developed for LSCG will be adapted for some of the unique conditions when separating pedestrian and bicycle paths. The wayfinding system can promote trail etiquette, directional and location information in a way that doesn't detract from the experience of the Trail. (To be updated with MCPR)
Source: Mecklenburg County Park and Recreation



→ Along use separated segments, signage needs to clearly identify locations for cyclists and pedestrians. Indianapolis, IN.
Source: <http://indyculturaltrail.org/>



→ Pavement markings and signage can get complicated with separation of uses, as shown in this photo from NYC. Signage in conjunction with distinct trail surface material for each use is becoming the standard across the country to enhance trail wayfinding and coherence.
Photo: LandDesign



→ Nice detail of bike symbol integrated into the 1 foot edging in New York City.
Photo: LandDesign



→ Example signage indicating pedestrian only pathway.
Photo: LandDesign



→ Wayfinding along the Buffalo Bayou in Houston is made easier with bike-up maps along the Trail and maps mounted to rental bikes.
Photo: LandDesign

SIGNAGE AND WAYFINDING

Mecklenburg County Park and Recreation has developed a wayfinding system for the entire County trail system including LSCG. Signage along the XCLT alignment should work seamlessly with the existing wayfinding along the corridor so that it is intuitive and easily navigable.

Signs are important for safety, orientation and education. A unified system of signs helps to reinforce a brand and continuity of a lengthy corridor. Signs should be secondary to the Trail surface as a means of guiding trail users along the XCLT.



→ Orientation Kiosk for Mecklenburg Country Park and Recreation wayfinding system.
Source: MCPR Greenway Wayfinding



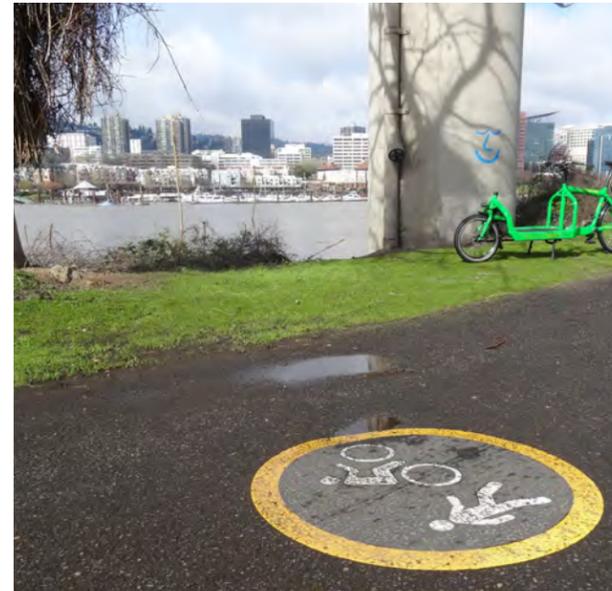
TRAIL MATERIALS

One of the challenges of the XCLT is creating a visually unifying theme that can be applied not only to new sections of the Trail, but that can also be integrated into existing sections without requiring reconstruction. This unifying theme should serve several purposes:

1. It should help aid trail users in orientation.
2. It should serve as an intuitive identifier of the XCLT.
3. It should reinforce separation of use when applicable.

A strong reliance on wayfinding signage can disrupt the flow for the user, and signs frequently disappear into urban landscapes and environments. A combination of intuitive clues and wayfinding should be used to provide a seamless trail experience.

It is recommended that the XCLT use a combination of pavement treatments, markings and signage as visually unifying elements. This will enable a simple, low-cost retrofit to existing sections of the Trail, and a high-quality and visually appealing element for new sections of the Trail that will also serve to reinforce separation of use (areas of the Trail designated for bicycle use versus pedestrian use).



→ Shared-Use Path pavement marking in Portland, OR .
Source: LandDesign



→ Boston Freedom Trail marked with red brick centerline.
Source: <http://bbs.wenxuecity.com/Mediterranean/377357.html>



→ Pavement markings show clear separation of uses and direction at an intersection refuge in Portland, OR.
Source: LandDesign



→ Red asphalt used for bike path.
Source: <http://www.makingspaceforcyclng.org/>



→ Shared-use Path with periodic directional marking on the Schuylkill River Trail in Philadelphia, PA
Source: <http://urbanland.uli.org/development-business/developing-along-philadelphias-schuylkill-river-trail/>



→ Red centerline along the Pigeon Creek Greenway Passage in Evansville, Indiana.
Source: <http://www.visitevansville.com/attractions/pigeon-creek-greenway-passage>

FACILITY, PAVEMENT AND MARKINGS

Asphalt is proposed to be the strong unifying element that will be used on all surfaces that are exclusive for bicycle use (i.e. sections of the Trail where pedestrians are separated from bicyclists). On sections of trail where bicyclists and pedestrians share the same surface, which define all existing trails, a marked centerline is recommended. A variety of pavement types, other than asphalt, may be used along the trail alignment and in transitional areas to alert cyclists of intersections, plazas, change in facility type, or speed. Asphalt and concrete may also be used for pedestrian paths along separated use facilities.

Where indicated on facility types, a 1 foot concrete band will be installed as an edge restraint to provide longevity to the asphalt trail. The band also functions as a unifying element along the trail alignment and as a visual separator between cyclists and pedestrians in a separated path facility.

It is recommended that shared-use paths and bike paths have a centerline indicating separation of travel. The centerline marking is recommended to provide visual contrast to pavement surface. Centerline marking can be paint, thermoplastic, concrete or brick. Centerline material to be determined by the XCLT project team. It is recommended a dashed centerline should be used along areas where it is appropriate for cyclists to pass, and a solid centerline will be used in potential conflict areas where there is limited visibility, near intersection approaches, and where passing is inadvisable.

The *AASHTO Guide for the Development of Bicycle Facilities* specifies that pavement markings should be retroreflective, should not be slippery, and should not exceed a height of more than 0.16 inches (Section 5.4.1.). The AASHTO design guide references Part 9 of the MUTCD, which dictates traffic control devices for bicycle facilities.

DESIGN GUIDANCE

A wide variety of precedent examples for urban trail markings exist in the United States and internationally. Recently, the Federal Highway Administration has published a memorandum expressing the agency's support for "taking a flexible approach to bicycle and pedestrian facility design." The *AASHTO Guide for the Development of Bicycle Facilities* is the primary national resource for the design of such facilities, but many more resources exist and should be employed as design guidance for the XCLT. According to the FHWA, "many of the treatments in the NACTO [Urban Bikeway Design Guide] are compatible with the AASHTO Bike Guide and demonstrate new and innovative solutions for the varied urban settings across the country. The vast majority of treatments illustrated in the NACTO Guide are either allowed or not precluded by the MUTCD." The US DOT "encourages transportation agencies to go beyond the minimum requirements, and pro actively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilized universal design characteristics where appropriate."

Bicycle and pedestrian pavement markings will be applied to the horizontal surface of the Trail to indicate the appropriate user group. Bicycle and pedestrian markings will be a white pavement marking in accordance with MUTCD, state and local standards.

Pavement markings should be applied to existing asphalt and concrete facilities to provide continuity and a unifying element at all markings along the entire XCLT, and also to provide directional separation along highly traveled multi-use facility.

See section A.4 of Appendix: Design Considerations for further analysis.

ON ROAD PAVEMENT MARKINGS

Where the XCLT alignment exists along low-speed and low-traffic volume streets and roads, pavement markings should adhere to the Manual on Uniform Traffic Control Devices (MUTCD). The NACTO Urban Bikeway Design Guide should also be referenced, and serve as a source of inspiration for designers that showcases experimental treatments and those with interim approval from the MUTCD.

Shared Lane Markings (SLMs or “sharrows”) are already used commonly in Charlotte. Sharrows “indicate a shared lane environment for bicycles and automobiles” on roadways where travel speed differentials are low (NACTO Urban Bikeway Design Guide). These markings also designate the ideal lane positioning for cyclists on low-volume and low-traffic streets. SLMs can also be used as wayfinding to direct bicyclists along circuitous routes. Frequent, visible placement of markings along bicycle-friendly routes is essential. Shared Lane Markings should conform with MUTCD standards.

CROSSING TREATMENTS

The safety of trail users at roadway crossings is a paramount concern. In addition to typical warning signs, pavement markings may be used to indicate to trail users and motorists that they are approaching a crossing. Lettering on both the Trail and roadway (*Trail Xing* and *Road Xing*) should be provided in advance of crossings with advance yield and stop lines for all roadway users.

In recent years, Charlotte and other cities around the country have experimented with colored pavement treatments at crossings and other areas where conflicts are expected to occur. Green retro reflective thermoplastic can be used as a traffic control device to highlight crossings and areas where bicyclists are expected to operate. Green Colored Pavement has received Interim Approval from the Federal Highway Administration (FHWA). Nonstandard striping patterns may also be used to alert motorists of crossings and may, as a result, increase safety. However, provisions for nonstandard striping would be subject to approval by state and federal agencies.

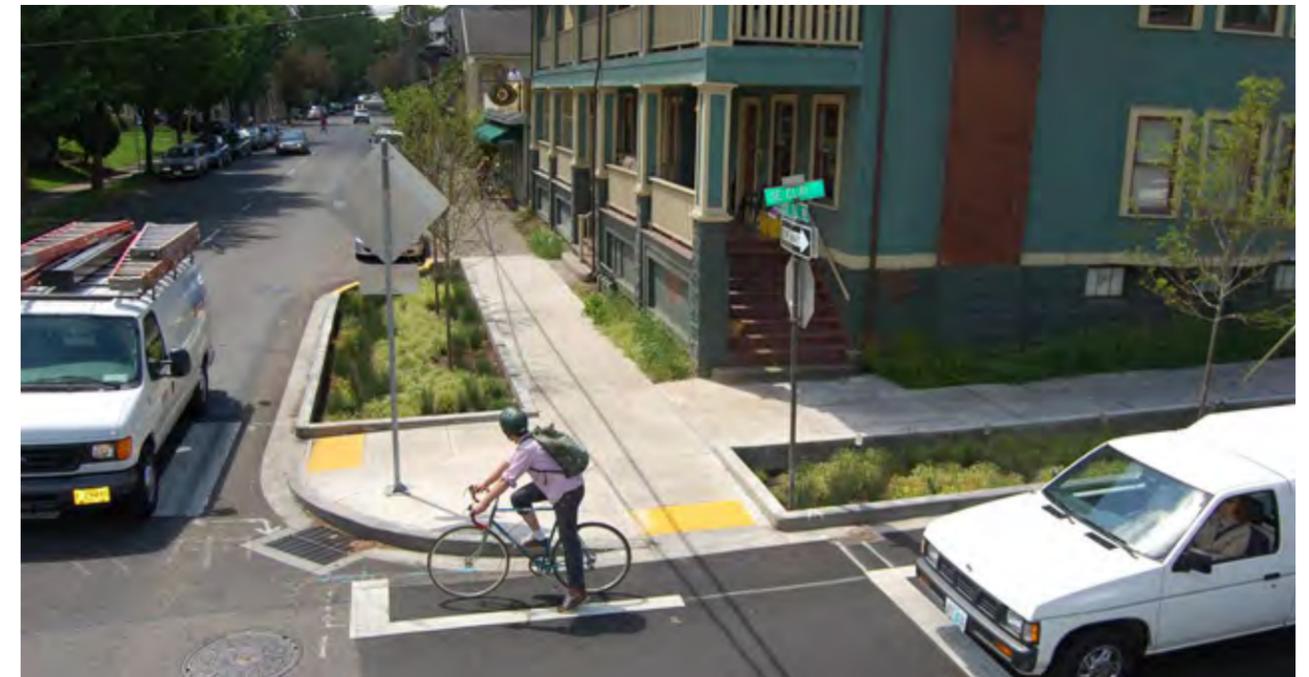
Other crossing treatments, such as Rectangular Rapid Flashing Beacons (RRFBs), have been shown to increase motorist yielding compliance at crosswalks and trail crossings. See the *Crossings* section of this chapter for more information on these traffic control devices.

Rumble strips and detectable warnings are intended to alert cyclists as they approach a major pedestrian entrance to the Trail or potential conflict zone. Bicycle rumble strips are designed significantly different from those used for motor vehicles and should not hamper the bicyclist’s travel, but should be significant enough that the bicyclist feels a noticeable vibration prior to reaching the conflict point. The rumble strips are intended to remind bicyclists to watch for and slow down when approaching entryways on the path. ‘Walk your bike’ signs should be provided where there are steep slopes or areas that are not safe to ride through due to width.

STOP LINES

Stop lines serve as a traffic control device that indicate the point behind which vehicles or trail users should come to a stop at an intersection. Where provided, stop lines should “consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made” (MUTCD). Stop lines may be incorporated with rumble strips and ADA features to alert pedestrians and bicyclists.

Cities in the United States have experimented with a second, forward stop bar for bicyclists at unsignalized, low traffic volume crossings. The purpose of this stop bar is to encourage bicyclists to wait and queue where they are more visible to cross traffic. Where provided, these stop bars should provide space for queueing ahead of pedestrian crossing zones.



→ Forward Stop Bar. Portland, OR.
Source: NACTO



→ Brooklyn, NY. Rumble strips.
Photo: LandDesign



→ Buffalo Bayou Greenway, Houston, TX. Rumble strips.
Photo: LandDesign



→ Brookline, MA. Shared Lane Marking (SLM).
Source: National Association of City Transportation Officials (NACTO)



→ Portland, OR. Modified SLM provides directional guidance along a bicycle-friendly street known as a "Bike Boulevard" or "Neighborhood Greenway" (Portland, OR).
Source: National Association of City Transportation Officials (NACTO)

FURNISHINGS

Furnishings are functional components along the Trail that provide comfort and coherence. They should be sited to support the space in which they are located. It is recommended that furnishings are placed at trailheads and key destinations along the Trail. Furnishings will be the repeating elements that reinforce the Trail's brand and help create a sense of place. Site furnishings selection should be coordinated with Mecklenburg County and City of Charlotte staff.



→ Lighting increases the usability of the Trail as a true transportation corridor. Decorative light fixtures enhance the Trail character and help to promote the brand and identity of the XCLT.

Photo: LandDesign

LIGHTING

While NC law requires a front headlight on bicycles, many trail users may not own or have access to lights capable of lighting walking or cycling paths. Many bicycling specific lights are intended for conspicuity, or for the user to "be seen," rather than to "see" a dynamic path or environment. Lighting adequate for this purpose would represent a prohibitive cost for many users, and for the Trail to effectively serve as a transportation corridor through Charlotte, adequate lighting for travel at night will be required. Lighting also should be provided along the total length of the Trail to increase the safety and comfort of adjacent property owners, trail user and to discourage vandalism.

Pedestrian scaled lighting shall be located along the Trail facility in areas of high use. Specific attention should be given to urban locations, nodes of activity, and trail and road intersections.

- Recommended lighting levels: One footcandle along paths, 3-5 footcandles at trail intersections.
- Match existing LSCG fixtures.
- Placement: Place at a minimum 2 feet from edge of trail outside shy zone. Space uniformly and in concert with tree spacing to achieve recommended light levels.
- Bollard lights can be used to identify pedestrian and bicycle paths at intersections and midblock crossings.
- Lighting should be designed to be energy efficient and limit light pollution to neighboring residential properties.
- New sections of trail should have conduits installed for installation of future electrical and lighting.



→ Bike repair station for trail users.
Source: <http://www.dero.com/product/fixit/>

BIKE REPAIR STATIONS

Similar to the bike repair station located behind the Park Road Shopping Center on the LSCG, bike repair stations should be located at reasonable distances along the Trail and at trailheads to provide the tools necessary for basic repairs. These stations should be located adjacent to the Trail but with enough distance to not impede trail flow. Opportunities exist for these maintenance stations to be sponsored by local bike shops, cycling clubs and advocacy groups.



→ Charlotte B-cycle bike share at Bland Street Station.
Source: <https://southendclt.files.wordpress.com/2013/07/bike-share-bland-station.jpg>

B-CYCLE

To provide bicycle use to the general public, B-cycle station locations should be liberal along the Trail at key destinations, trailheads and activity nodes. Further coordination and partnership is encouraged to provide bike access to users. Specific station locations will be identified with formed coordination/partnership and should be located out of the floodplain.



→ Charging station in NYC greenway.
Photo: LandDesign

CHARGING STATION

Charging stations should be located in destination areas or nodes along the Trail for the benefit of users to charge their phones. These stations must be located out of the floodplain.