

Fayette County Master Path Plan

Path System Design Guidelines

MAY 2019



DESIGN GUIDELINES INTENT

These Path System Design Guidelines are intended to assist Fayette County and the cities of Brooks, Fayetteville, Peachtree City, Tyrone, and Woolsey in the selection and design of multi-use paths and other selected pedestrian and bicycle facilities. These design guidelines were developed as part of the Fayette County Master Path Plan. The design guidance was developed based on local and national best practices, and is tailored to the needs of an unconventional path system that is used not only by people walking and bicycling, but also shared with people operating golf carts.

These design guidelines are intended to clarify best practices for the design and construction of new paths and major path upgrades. There is an extensive network of existing paths, and the County recognizes that it is not feasible to retrofit every path to the standards outlined here. This design guidance is not exhaustive, nor is it a substitute for a more thorough evaluation by a landscape architect or engineer, upon implementation of facility improvements.

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INTRODUCTION

GUIDANCE BASIS

International Guidance

The International Light Transportation Vehicle Association, Inc., is accredited through the American National Standards Institute (ANSI). Through its Golf Course Safety Guidelines, the association provides design and operations guidance for golf cart paths so that they are "compatible with the designed capabilities of the golf cart." Topics covered include golf cart traffic, street crossings, and golf cart paths.

The guidance provided by the International Light Transportation Vehicle Association is primarily intended for golf course owners, but much of the guidance provided is applicable to a public path system. Where appropriate, guidance related to the capabilities of golf carts has been incorporated into this document.

National Guidance

The following standards and guidelines were consulted during development of this guide:

- » The Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD) defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic.
- » American Association of State Highway and transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* (2012) provides guidance on dimensions, use, and layout of multi-use paths and on-street bicycle facilities.

State Guidance

- » The Georgia Code Title 40 permits local governments to allow golf cart operation on roads under their jurisdiction, but doesn't give any further guidance.

Statewide guidance is provided by the Georgia Department of Transportation (GDOT).

- » The *Design Policy Manual* (2018) is the primary resource for roadway and active transportation facility design guidelines and standards of GDOT.
- » The *Pedestrian and Streetscape Guide* (2018) provides guidance on design of walkways and pedestrian support facilities. It does not provide standards or specifications.

Local Guidance

Fayette County's "Motorized Carts" ordinance states that "All operators of motorized carts shall abide by all traffic regulations applicable to vehicular traffic when using the recreation paths and authorized streets." The resources for management at the local level includes a list of streets organized by subdivisions, where motorized cart use is authorized.

Chapter 10 of the Fayette County Code includes the following regulations:

- » Golf carts are permitted for use on designated streets and paved recreation paths.
- » Golf carts are not allowed on sidewalks.
- » Pedestrians should be given due consideration and reasonable right-of-way by other users of the recreation paths to ensure safe passage.
- » An audible warning shall be given by operators of motorized carts and other users of the recreation paths, such as bicyclists and skaters, when approaching pedestrians from the rear.

MUNICIPAL

Generally, local ordinances establish that golf carts should stop and yield the right of way to others on paths. A brief summary of local ordinances related to golf cart use in Brooks, Fayetteville, Peachtree City, Tyrone, and Woolsey is provided below.

Brooks

The only reference to golf carts in Brooks' ordinances appears in Chapter 29, establishing a golf cart as a vehicle to which the town's street, sidewalk and parking ordinances apply.

Fayetteville

Golf cart rules are within Fayetteville's traffic and vehicle ordinance. Chapter 82 states:

- » A permit is required to operate on designated streets and paved recreation paths.
- » Operators must abide by traffic regulations.
- » Generally, golf carts are not authorized along major or collector streets, except where crossings are approved.
- » When approaching oncoming traffic, each user shall move to their right side of path, and pedestrians should get the right-of-way by other users to ensure safe passage.

Peachtree City

Chapter 78, Article III of Peachtree City's ordinance establishes the following:

- » Those driving golf carts shall yield to all other modes of transport.
- » Pedestrians should be given due consideration and reasonable right-of-way.
- » Golf carts are not permitted on sidewalks at any time.

Peachtree City has also developed a path user guide. It states that "golf carts DO NOT have the right-of-way on paths, on roads, or in crosswalks. Cart operators should use caution at all times. STOP before crossing roadways or driveways. YIELD to motor vehicles on roadway."

Tyrone

Tyrone's regulations for golf carts appear within their code for traffic and vehicles, Chapter 36, Article III. Article III establishes a golf cart as a motor vehicle with 3 or more wheels. Other rules are:

- » Speed limit: 20 miles per hour
- » Allowed on designated streets where the speed limit is 35 miles per hour or less
- » Registered electric golf carts are allowed on paved recreational paths.
- » Requires permits for golf carts

Woolsey

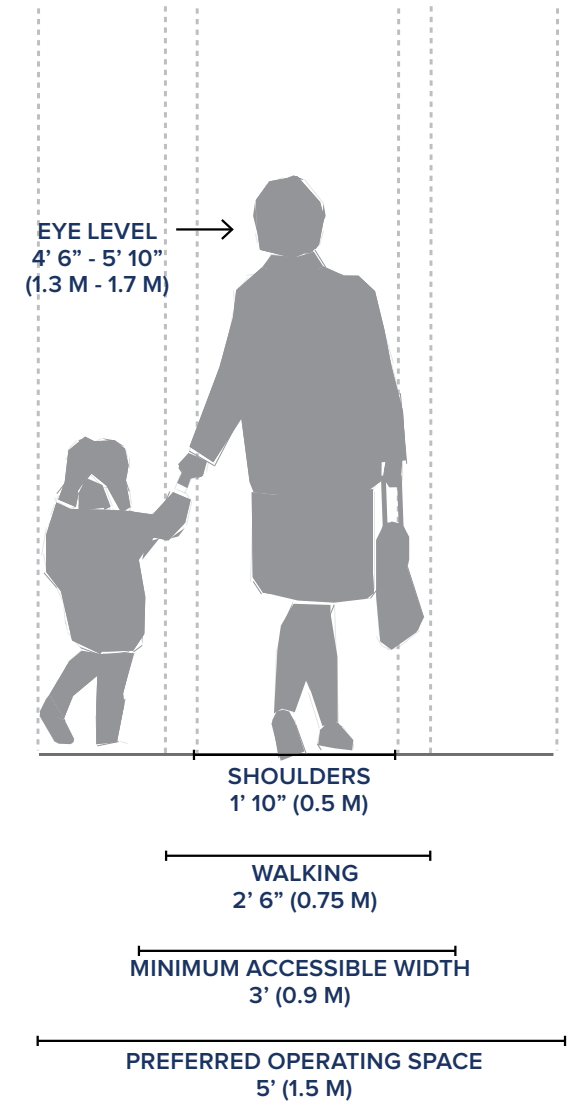
The town of Woolsey does not have regulations for golf carts.

DESIGN NEEDS OF PEDESTRIANS

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing.

Pedestrian Characteristics by Age

AGE	CHARACTERISTICS
0-4	<ul style="list-style-type: none"> » Learning to walk » Requires constant adult supervision » Developing peripheral vision and depth perception
5-8	<ul style="list-style-type: none"> » Increasing independence, but still requires supervision » Poor depth perception
9-13	<ul style="list-style-type: none"> » Susceptible to "darting out" in roadways » Insufficient judgment » Sense of invulnerability
14-18	<ul style="list-style-type: none"> » Improved awareness of traffic environment » Insufficient judgment
19-40	<ul style="list-style-type: none"> » Active, aware of traffic environment
41-65	<ul style="list-style-type: none"> » Slowing of reflexes
65+	<ul style="list-style-type: none"> » Difficulty crossing street » Vision loss » Difficulty hearing vehicles approaching from behind



Source: AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, Exhibit 2-1. 2004.

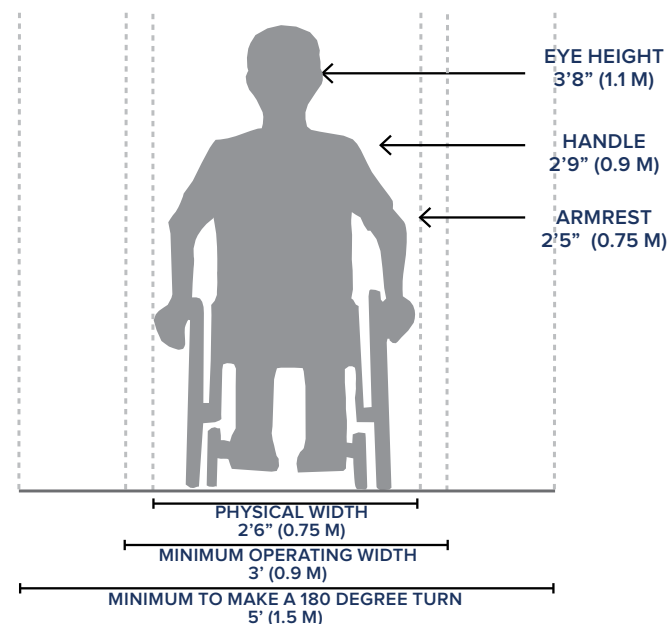
DESIGN NEEDS OF USERS WITH DISABILITIES

The table below summarizes common physical and cognitive impairments, how they affect personal mobility, and recommendations for improved pedestrian-friendly design. Note that this table is not inclusive of all ADA guidelines.

IMPAIRMENT	EFFECT ON MOBILITY	DESIGN SOLUTION
Physical Impairment Necessitating Wheelchair and Scooter Use	<ul style="list-style-type: none"> » Difficulty propelling over uneven or soft surfaces. » Cross-slopes cause wheelchairs to veer downhill or tip sideways. » Require wider path of travel. 	<ul style="list-style-type: none"> » Firm, stable surfaces and structures, including ramps or beveled edges. » Cross-slopes of less than two percent. » Sufficient width and maneuvering space.
Physical Impairment Necessitating Walking Aid Use	<ul style="list-style-type: none"> » Difficulty negotiating steep grades and cross slopes; decreased stability and tripping hazard. » Slower walking speed and reduced endurance; reduced ability to react. 	<ul style="list-style-type: none"> » Cross-slopes of less than two percent. Smooth, non-slippery travel surface. » Longer pedestrian signal cycles, shorter crossing distances, median refuges, and street furniture.
Hearing Impairment	<ul style="list-style-type: none"> » Less able to detect oncoming hazards at locations with limited sight lines (e.g. driveways, angled intersections, channelized right turn lanes) and complex intersections. 	<ul style="list-style-type: none"> » Longer pedestrian signal cycles, clear sight distances, highly visible pedestrian signals and markings.
Vision Impairment	<ul style="list-style-type: none"> » Limited perception of path ahead and obstacles; reliance on memory; reliance on non-visual indicators (e.g. sound and texture). 	<ul style="list-style-type: none"> » Accessible text (larger print and raised text), accessible pedestrian signals (APS), guide strips and detectable warning surfaces, safety barriers, and lighting.
Cognitive Impairment	<ul style="list-style-type: none"> » Varies greatly. Can affect ability to perceive, recognize, understand, interpret, and respond to information. 	<ul style="list-style-type: none"> » Signs with pictures, universal symbols, and colors, rather than text.

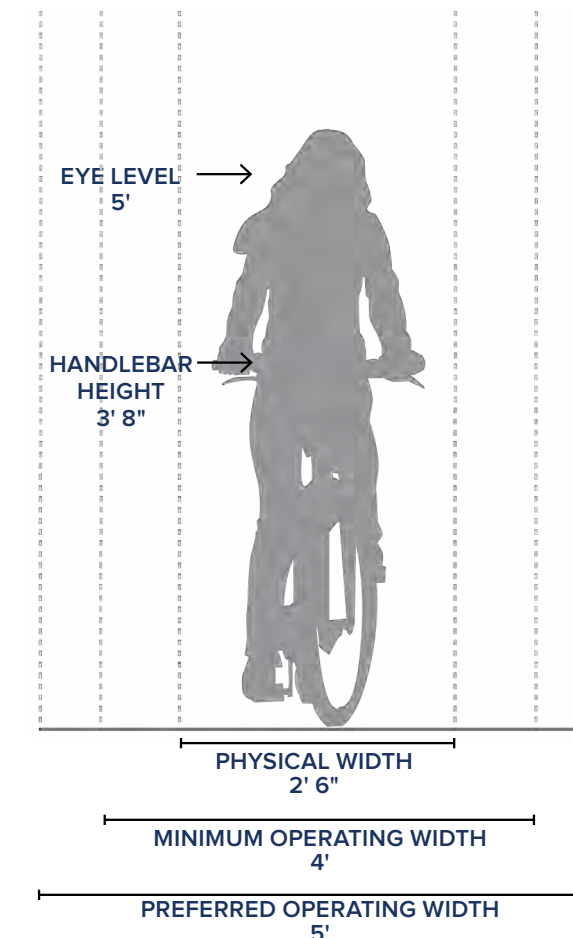
DESIGN NEEDS OF WHEELCHAIR USERS

People traveling in wheelchairs have specific needs. For example, maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element of accessible design. See "Physical Impairment Necessitating Wheelchair and Scooter Use" in the table above for more information on mobility impacts and design solutions for wheelchair users.



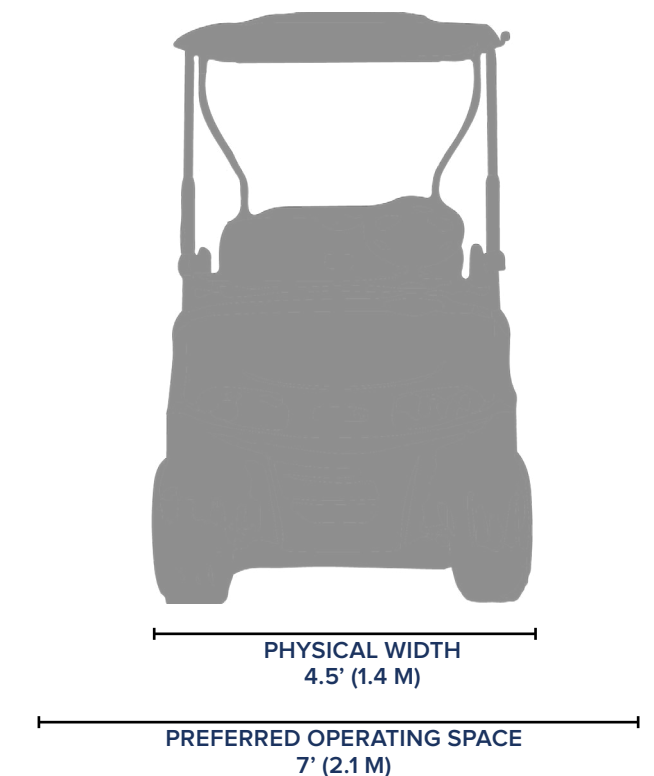
DESIGN NEEDS OF BICYCLISTS

Bicyclists and their bicycles exist in a variety of capabilities, sizes and configurations. These variations occur in the types of bicycle (such as a conventional upright bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level and experience of the cyclist). Multi-use path design should consider reasonably expected bicyclist types and utilize the appropriate design dimensions and standards. Bicyclists differ from pedestrians in several ways such as moving at a faster pace and generally having a higher center of gravity. Design of path curves is important for cyclists, as are the design of ramps, grade changes, and path surface transitions.



DESIGN NEEDS OF GOLF CART USERS

Golf Carts are the largest of the devices used on multi-use paths. They are typically 4-wheeled, and powered by an electric motor. The typical length of golf carts varies from 7.5 - 10', and standard wheelbase models can carry up to 4 people. Path design should consider the volume and mix of golf carts with respect to other non-motorized users and provide a comfortable experience for all. Golf carts differ from other users in several ways - they move at a faster speed, have greater mass, and require more space for passing other users and making turns. The typical turning radius of a golf cart ranges between 9.5 - 12'. Because golf carts require clear space to operate within a facility, the operating width is greater than the physical dimensions of the cart.





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CORRIDOR FACILITY TYPES

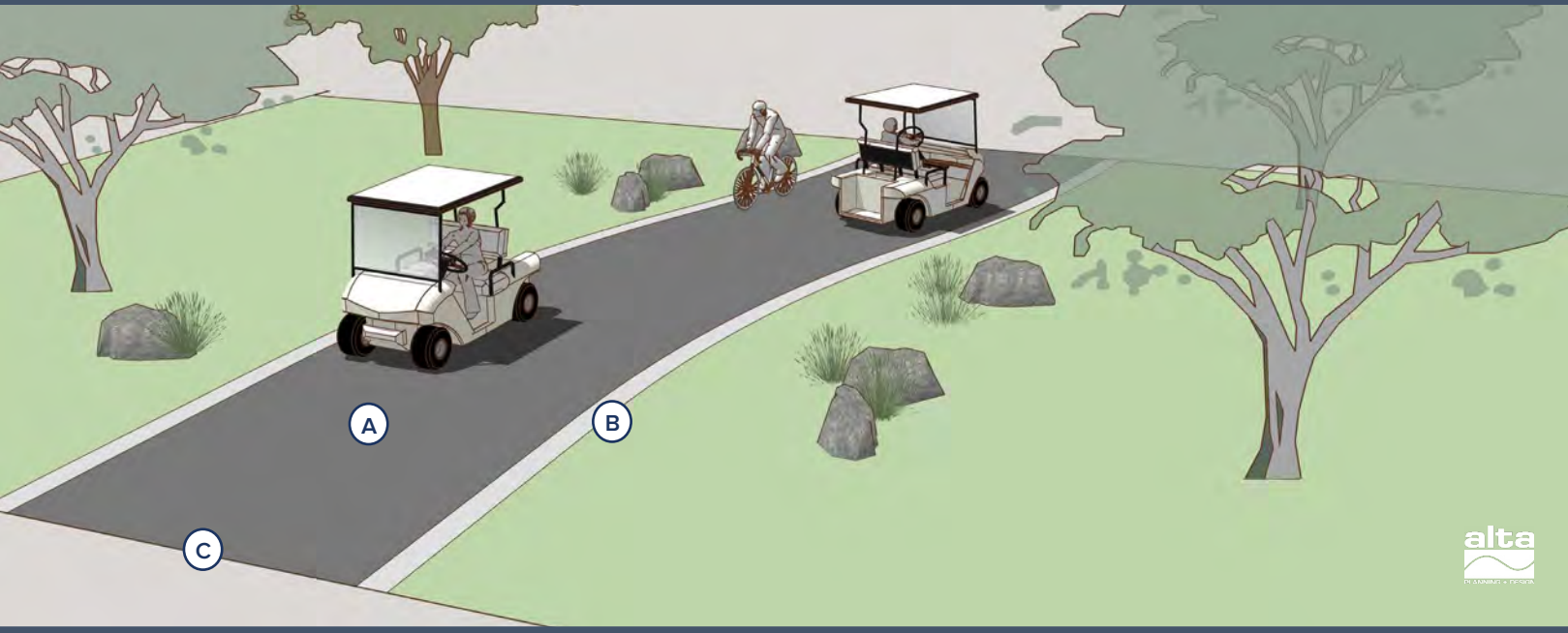
2A | MULTI-USE PATHS

2B | ON-STREET FACILITIES



2A

MULTI-USE PATHS



GENERAL GUIDANCE FOR MULTI-USE PATHS

Conventional multi-use paths allow for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. In Fayette County, golf cart operators are common users of the path system. Therefore, conventional multi-use path standards should be tailored specifically to the needs of golf carts while still comfortably accommodating other users. Multi-use paths are frequently found in parks, along rivers, streams, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Multi-use paths are also found alongside roadways; in this context, they are often referred to as sidepaths.

TYPICAL APPLICATION

The Atlanta Regional Commission (ARC) has developed design standards for "Trails of Regional Significance." The intent of these standards is to establish expectations for design quality for regional multi-use paths receiving funding from ARC. Because the path system in Fayette County also accommodates relatively high volumes of golf carts in addition to people walking or bicycling, many of ARC's "Trails of Regional Significance" standards are appropriate even for local multi-use paths in the County. An added benefit of using ARC's design standards as a starting point is that they may be more likely to be funded through ARC's competitive grant processes if they facilitate regional bicycle travel.

ARC's standards are as follows:

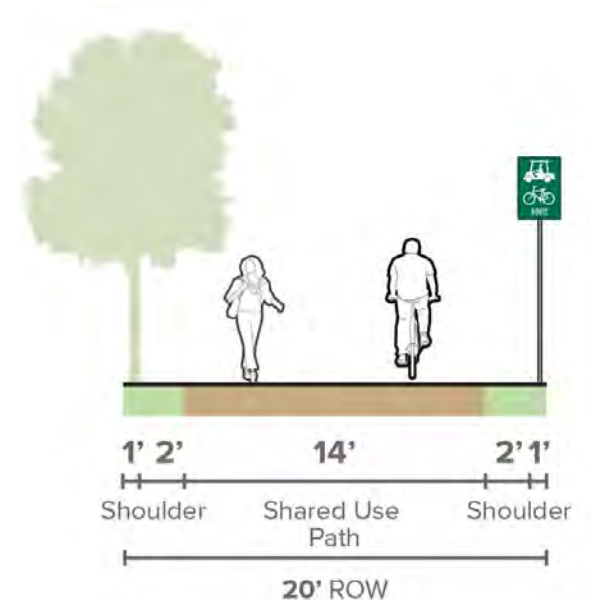
- » Be at least 12 feet wide to allow for comfortable passing even when users in the opposite direction are walking or biking two-abreast, and wider in dense areas where demand is likely to be high
- » Meet or exceed guidance put forth in AASHTO's *Guide for the Development of Bicycle Facilities* for physical separation from the roadway if built as a "sidepath"
- » Include wayfinding signage that provides information about popular destinations
- » Provide safe, convenient crossings that minimize delay and out-of-direction travel for path users

- » Include support facilities at trailheads and along the route including seating, trash cans, water fountains, bathrooms, bike parking, and/or public art
- » Accommodate the full range of bicycle types, including cargo bikes, tandems, incumbents, tag-along/trailer bikes, and bicycle trailers

DESIGN FEATURES

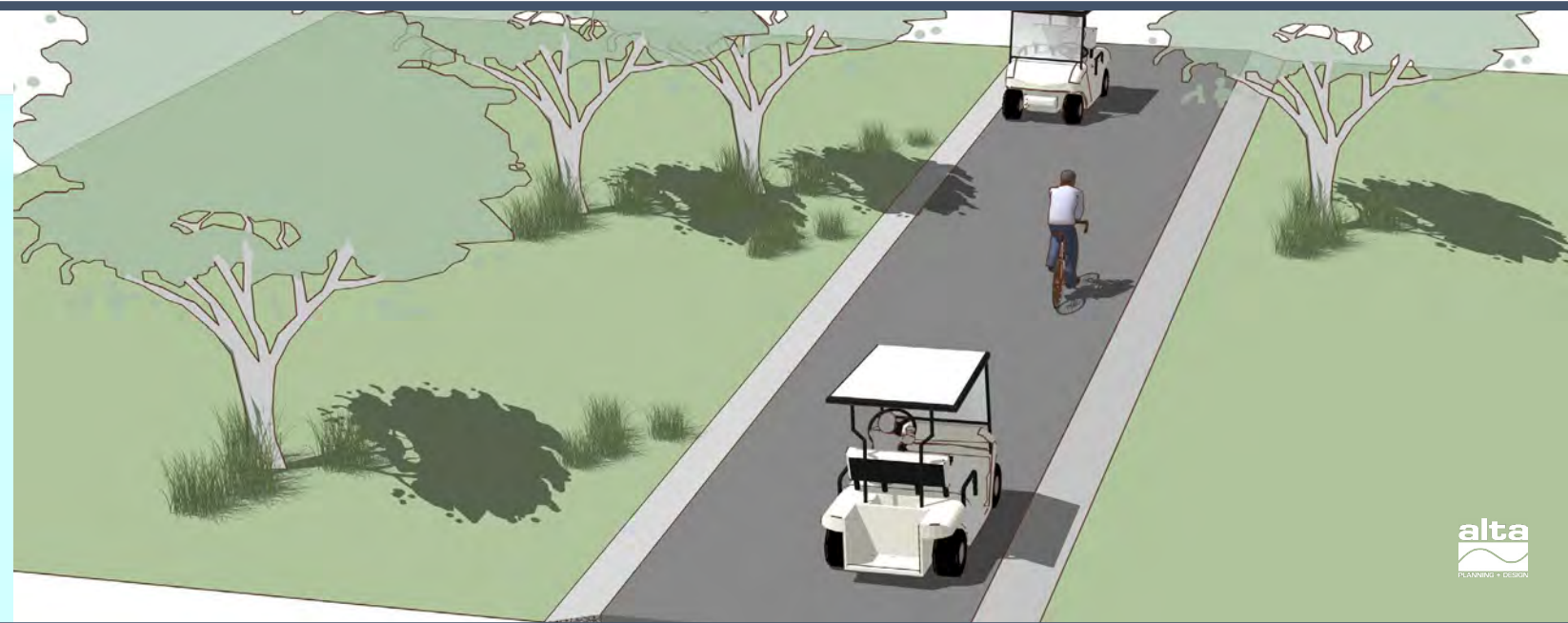
- A** Preferred path width is 14 ft (4.3 m), and minimum width is 12 ft (3.7 m). Twelve feet is the minimum width needed to allow two golf carts to pass each other, and also enables a bicyclist to pass another path user going the same direction, while another path user is approaching from the opposite direction. Fourteen feet is the preferred width for multi-use paths designed to facilitate golf carts, pedestrians, and bicyclists. Where pedestrian volumes are extremely high, a separate track 5 ft (1.5 m) sidewalk can be provided for separate use. Where conditions are highly constrained, a minimum path of 8 ft may be used, per the AASHTO Guide for the Development of Bicycle Facilities (2012 Edition). However, this guideline was not created with golf carts in mind and a path that is narrower than 12 ft may require users to pull off onto the shoulder for comfort and safety when passing.
- B** A 2 ft (0.6 m) or greater shoulder on both sides of the path should be provided free of obstacles. An additional foot of lateral clearance, for a total of 3 ft (1.0 m), is required by the MUTCD for the installation of signage or other furnishings.
- » Materials: Asphalt and concrete are both common paving materials for multi-use paths. Aggregates such as GAB, granite, etc. may be specified, but must follow ADA compliance. Shoulders are typically unpaved.
- C** Stable, slip-resistant path surface and ADA-accessible curb ramps with tactile warning strips for ADA-accessibility
- » Running slopes not to exceed 5%, unless following road grade per PROWAG

- » Cross-slopes not to exceed 2%
- » Standard clearance to overhead obstructions should be 10 ft (3.0 m), where feasible
- » Frequent access points from the local road network



MULTI-USE PATH
PREFERRED CONDITIONS*

*Minimum dimensions for use in constrained conditions are described in the text to the left



MULTI-USE PATH ALONG STREAMS AND RIVERS

Riparian and waterway corridors often offer excellent shared use path development and gap closure opportunities. These corridors include canals, drainage ditches, rivers, and streams and offer excellent transportation and recreation opportunities for multi-use path users of all ages and skills.

TYPICAL APPLICATION

- » Along riparian and waterway corridors
- » Within 100-year floodplain
- » Outside of Riparian Buffers- The Georgia Erosion and Sedimentation Act of 1975 (O.C.G.A. 12-7) and its subsequent amendments require that primary and secondary trout streams maintain an undisturbed riparian buffer of 50', and all other streams maintain a minimum buffer of 25' (measured from where vegetation is wrested by normal stream flow).
- » Outside of watershed protection boundaries. Refer to Chapter 104, Article VII Section 104-182 for the full list of buffer and setback requirements of each water system. Also refer to the ordinances of local jurisdictions.

DESIGN FEATURES

- » Provide durable, low maintenance materials that can withstand flooding such as concrete instead of asphalt
- » Public access to the shared use path may be prohibited during the following events:
 - » Canal/flood control channel or other utility maintenance activities
 - » Inclement weather or the prediction of storm conditions

MULTI-USE PATH: RAIL-TO-TRAIL

Commonly referred to as Rails-to-Trails, these facilities are vacated rail corridors that have been converted into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain. The railroad may form an agreement with any person, public or private, who would like to use the rail corridor as a multi-use path or linear park until it is again needed for rail use. Fayette County and local municipalities should acquire inactive rail rights-of-way whenever possible to preserve the opportunity for Rail-to-Trails development.

TYPICAL APPLICATION

- » Along inactive rail corridors
- » In full conversions of inactive rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established and only require upgrades for bicycle and pedestrian use.
- » Corridors formerly used as rail lines typically require hazardous material remediation.

DESIGN FEATURES

- » Where possible, leave as much of the ballast in place as possible to disperse the weight of the Rail-to-Trail surface and to promote drainage. Ballast is often contaminated and may need to be removed for public use.
- » Railroad grades are very gradual. This makes Rails-to-Trails attractive to many users, and easier to adapt to ADA guidelines.



MULTI-USE PATH: RAIL-WITH-TRAIL

Rails-with-Trails projects typically consist of paths adjacent to active railroads within railroad right-of-way. It should be noted that some constraints could impact the feasibility of Rails-with-Trail projects. In some cases, space needs to be preserved for future planned freight, transit, commuter rail service and operations and maintenance vehicle access.

TYPICAL APPLICATION

- » Along active rail corridors
- » Concerns with trespassing and security can vary with the amount of train traffic on the adjacent rail line and the local context, i.e. whether the section of track is in an urban or rural setting.

DESIGN FEATURES

- » Railroads typically require fencing with all Rails-with-Trail projects.
- (A)** If required, fencing should be a minimum of 5 feet in height with higher fencing than usual next to sensitive areas such as switching yards. Setbacks from the active rail line will vary depending on the speed and frequency of trains, and available right-of-way.
- (B)** Twenty feet minimum buffer between centerline of tracks and fence along multi-use paths
 - » Separation greater than 20' will result in a more pleasant multi-use path user experience and should be pursued where possible.

MULTI-USE PATH UTILITY CORRIDOR

Corridors for utility lines may be able to also accommodate multi-use paths. Easements over underground utilities such as water, sewer, natural gas, or buried electric or optic lines are well suited for trail use. Above-ground utilities such as telephone, cable or overhead electric may also present opportunities for multi-use path development. Utility companies benefit from this arrangement by having uninterrupted, easily accessible routes to their facilities.

TYPICAL APPLICATION

- » Along underground utility easements for water, sewer, natural gas, or buried electric or fiber-optic lines.
- » Along above-ground utility corridors such as telephone, cable, or overhead electric

DESIGN FEATURES

- (A)** Utility companies may require specific landscaping limitations, such as regular trimming or vegetative height restrictions that may compromise the aesthetics of the multi-use path.
 - » Individual utility companies may have their own policies and guidelines about buffer requirements.
 - » Given the context, there may be structural requirements for multi-use paths to support maintenance activities of utility companies.
 - » Where excavation may be limited, consider the use of aggregate trail surfaces, so long as they comply with ADA guidelines.



BASIC SIDEPATH

A sidepath is a bi-directional multi-use path located immediately adjacent and parallel to a roadway. Sidepaths can offer a high-quality experience for golf cart users and bicyclists where traffic speeds and/or volumes are too high to share the roadway. See page 22 for an additional figure of the basic sidepath preferred conditions.

TYPICAL APPLICATION

Although paths in independent rights-of-way are preferred, sidepaths may be considered where one or more of the following conditions exist:

- » Along collector roadways with a posted speed less than 45 mph
- » To provide continuity between existing segments of multi-use paths in independent rights-of-ways
- » For use near schools and neighborhoods, where increased separation from motor vehicles is desired

DESIGN FEATURES

- A** Standard Tread Width: The preferred width is 14' so that golf cart users can pass each other, bicyclists, and pedestrians comfortably during 2-way operation.
- B** Roadway Separation: The preferred separation width is 6.5'. Minimum separation width is 5'.
- » Sight Lines: It is important to keep approaches to intersections and major driveways clear of obstructions such as parked vehicles, shrubs, and signs on public or private property.

SIDEPATH ALONG MAJOR ROADWAY

Where there is a need to accommodate pedestrians, bicyclists, and golf cart users along high-speed and/or multi-lane arterial roadways, sidepaths should be designed to a higher standard to support safe and comfortable operation. Sidepaths along major roadways should be set back further from the street than the minimum AASHTO guidance of 5 feet, should feature design cues that encourage people driving to yield to path users at driveways, and should provide shade trees where possible to increase user comfort and define the path edge. See page 22 for an additional figure of the sidepath along major roadway preferred conditions.

TYPICAL APPLICATION

- » Along roadways with a posted speed of 45 mph or above
- » Along multi-lane arterials, particularly those with strip commercial land uses
- » Along State routes

DESIGN FEATURES

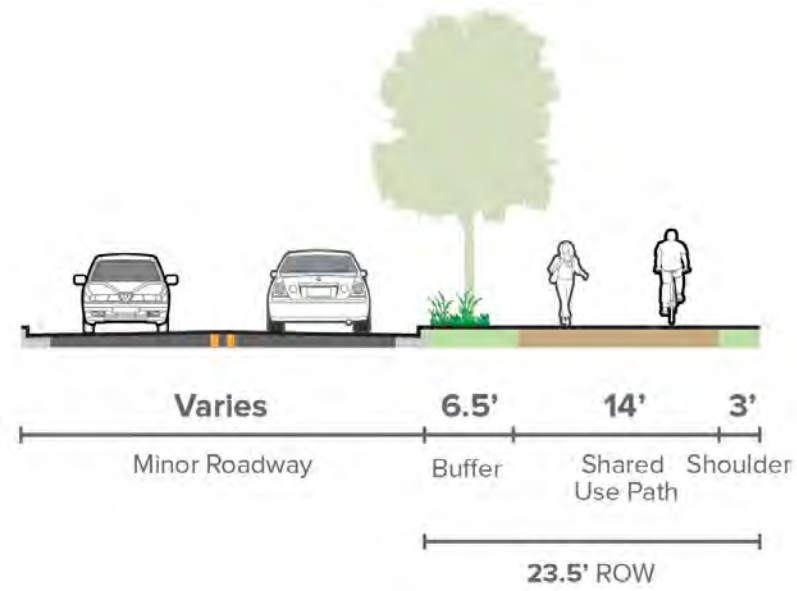
- A** Set the path back at a preferred distance of 20' from the roadway or in clear zone (whichever is greater) to provide increased separation from high speed/volume roadways. A path setback of at least 20' provides sufficient space for 1 vehicle to pull completely out of the travel lane when making right turns into driveways or at cross streets without crossing the path.
- » Where a 20' or greater setback is not possible, use

steep driveway ramps to encourage appropriate vehicle speeds. Where conditions are constrained, a minimum 5' buffer is required, per AASHTO guidance.

- » Sidepaths accommodating golf carts along GDOT roadways must be located outside of GDOT's specified clear zone.
- B** Maintain a level path surface at roadway intersections.
- C** Provide shade trees in the 20' landscaped buffer between the roadway and sidepath where feasible, taking care to maintain clear sight triangles at driveways and cross streets.
- D** Mark crosswalk and yield lines at high-volume driveway.
- E** Install "Do Not Block Crosswalk" signage.

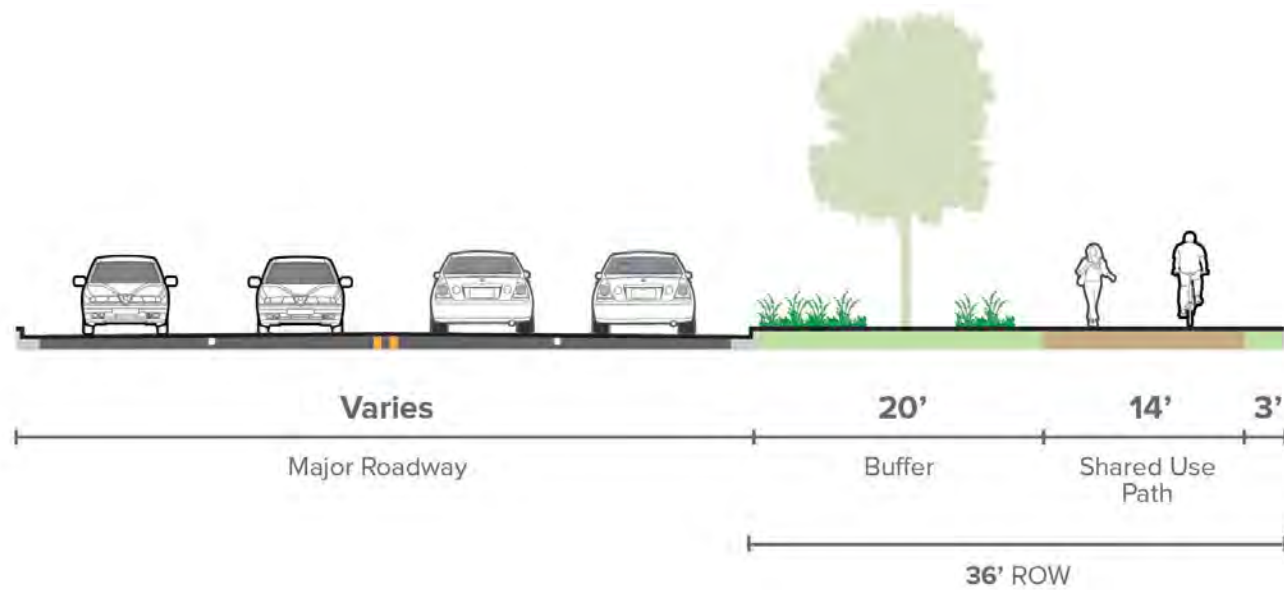
SIDEPATH PREFERRED CONDITIONS

Below is a comparison between two different sidepath configurations based on roadway conditions. These figures represent the preferred conditions for both minor and major roadway adjacencies.



**BASIC SIDEPATH
PREFERRED CONDITIONS***

*Minimum dimensions for use in constrained conditions are described on pages 20 and 21

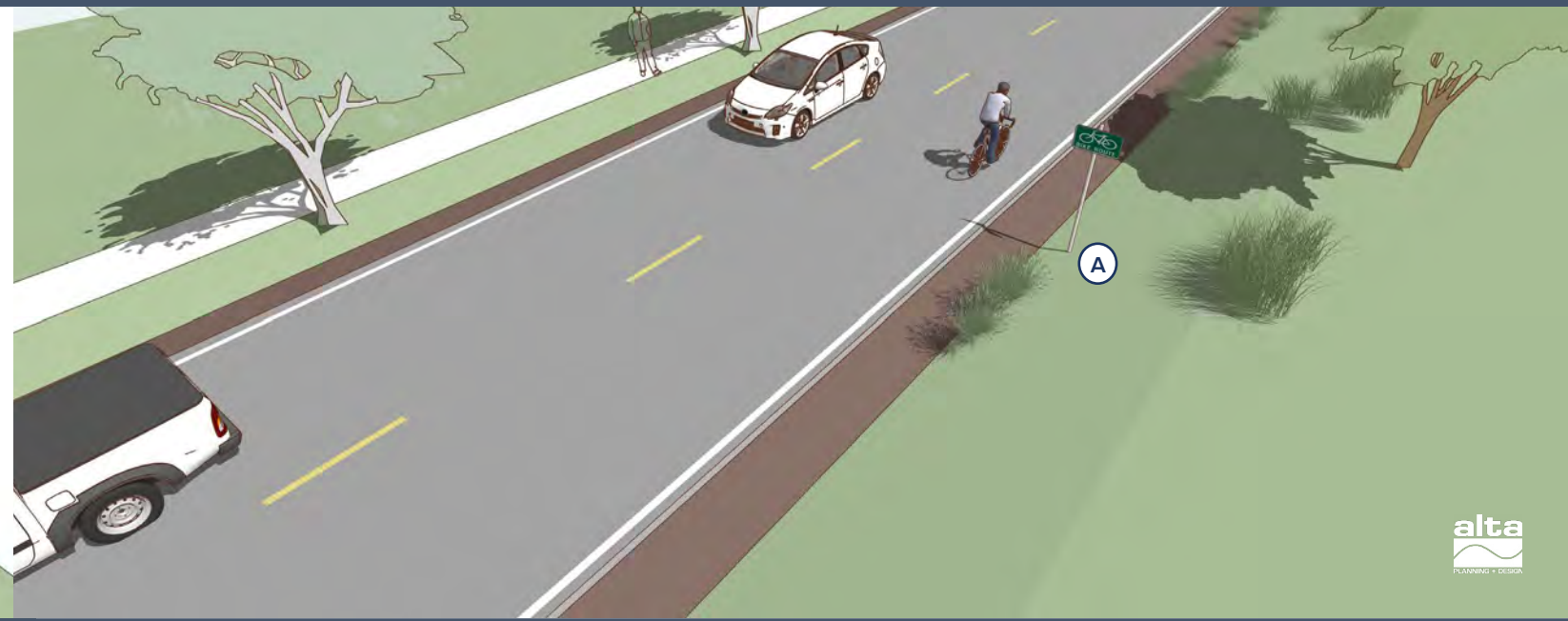
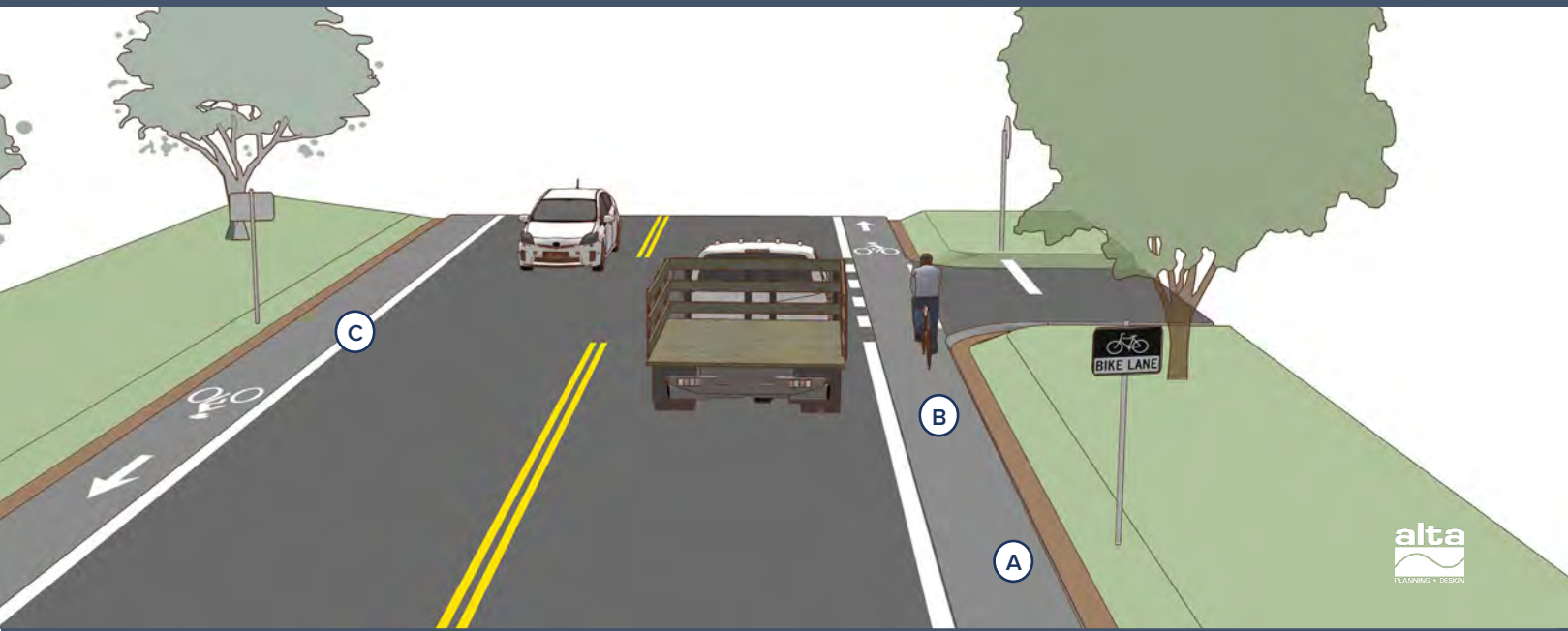


**SIDEPATH ALONG MAJOR ROADWAY
PREFERRED CONDITIONS***



2B

ON-STREET FACILITIES



SHOULDER BIKEWAY

Typically found in less-dense areas, shoulder bikeways are paved roadways with striped shoulders wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway.

TYPICAL APPLICATION

- » Along low-volume 2-lane roadways that are popular with recreational bicyclists. Low-volume roadways average less than 400 AADT (Annual Average Daily Traffic).
- » This facility is not appropriate in urban areas and should only be used in rural contexts where available pavement width is limited.
- » Note: When bike lanes are directly adjacent to a curb, bike lanes must be at least 5' wide per AASHTO guidance.

DESIGN FEATURES

- (A)** If 4 feet or more is available for bicycle travel, the full bike lane treatment of "Bike Lane" (MUTCD R3-17) signs, pavement markings, and an 8" bike lane line should be provided.
- (B)** Contrasting Pavement: As an aesthetic treatment, colored or contrasting pavement increases contrast between the shoulder and the roadway.
- (C)** Edge Line Rumble Strips- If used, bicycle-tolerable designs can minimize impacts to bicyclists.
 - » If it is not possible to meet minimum bicycle lane dimensions, a reduced-width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided. "Bike Route" signage (MUTCD 11-1) may be installed where there is not sufficient width for bike lanes.

SIGNED SHARED ROADWAY

Many low-volume roadways in Fayette County are popular with golf cart users and bicyclists despite a lack of dedicated facilities for bicycling. Where available asphalt width is limited, but demand for golf cart use or bicycling is present, signing roadways with "Bike Route" or "Bike/Golf Cart Route" signage can increase driver awareness of the possible presence of golf cart users and/or bicyclists. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass people operating golf carts or a bicycling.

TYPICAL APPLICATION

- There are 2 distinct applications for signed shared roadways:
- 1) Along low-speed local and collector streets in urban and suburban environments, where both golf carts and bicyclists can comfortably mix with vehicle traffic
 - 2) Along higher-speed rural roadways popular with recreational bicyclists. Typically, these bike routes feature very vehicle volumes and only one travel lane in each direction.



Bike Route Sign - For use along high speed rural roadways



Combined wayfinding route sign - low speed urban or suburban roadways

DESIGN FEATURES

- (A)** Custom golf cart/bike route confirmation signs or MUTCD D11-1 should be applied at intervals frequent enough to keep users informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:
 - » Beginning or end of route
 - » At major changes in direction or at intersections with other routes
 - » At intervals along routes not to exceed 1/2 mile

MULTI-USE PATH CROSSING TREATMENT AT UNSIGNALIZED LOCATION

Pedestrians are the most vulnerable users of multi-use pathways and their tolerance for stress crossing roadways should be the controlling influence on crossing treatment selection at uncontrolled locations. The chart below provides guidance on pedestrian crossing treatment selection.

CROSSING TREATMENT SELECTION

Selecting the most appropriate multi-use path crossing treatment depends on the characteristics of the roadway that the path crosses. Treatments range from a simple marked crosswalk to full traffic signals or grade separated crossings. Use an engineering study to evaluate treatment options before a marked crosswalk is installed. The engineering study should consider the following along with other appropriate factors:

- » Posted or statutory speed limit or 85th-percentile speed
- » Average daily traffic (ADT)
- » Number of lanes
- » Presence of or opportunity for a median
- » Sight distance
- » Pedestrian volumes and delays
- » Distance from adjacent signalized intersections
- » Possibility to consolidate multiple crossing points
- » Presence of street lighting

03

CROSSINGS AND INTERSECTIONS

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE* At unsignalized locations	AADT <9,000 <30 mph			AADT 9,000 -15,000 30 - 40 mph			AADT >15,000 >40 mph						
	2 lane	3 lane		2 lane with median refuge	3 lane		2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
Crosswalk Only (high visibility)	✓	✓		X	X	X	X	X	X	X	X	X	X
Crosswalk with warning signage and yield lines	EJ	EJ		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Active Warning Beacon (RRFB)	EJ	EJ		✓	✓	✓	✓	✓	X	✓	X	X	X
Hybrid Beacon	X	EJ		EJ	✓	✓	✓	✓	✓	✓	✓	✓	✓
Full Traffic Signal	X	X		EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
Grade separation	X	X		EJ	EJ	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓

LEGEND	
Most Desirable	✓
Engineering Judgement	EJ
Not Recommended	X

*Roadway characteristics such as lane configuration, AADT (Annual Average Daily Traffic), and posted speed - not functional classification - should determine appropriate crossing treatment.



MINOR STREET CROSSING

Where multi-use paths configured as sidepaths cross minor streets, roadway crossings should be set back from the parallel roadway, and signage and markings should be used to clarify the responsibilities of path and road users.

TYPICAL APPLICATION

- » Where a sidepath crosses a minor roadway

DESIGN FEATURES

- (A)** Install path-scale stop signage (MUTCD R1-1) signage where the path approaches the minor roadway.
- (B)** Stop bars are required at every intersection with a minor street.
- (C)** 25- 50' sections of centerline are recommended at the approach of each crossing.
- (D)** "Bend out" crossing with multi-use path crossing setback of 20' preferred to allow space for one vehicle to cue in the space between the perpendicular roadway and the crosswalk.
- » Where achieving a setback crossing is not possible,

- a lateral shift in or "bend-in" crossing approach laterally shifts the multi-use path immediately adjacent to the turning lane to increase visibility.
- (E)** High-visibility marked crosswalk
- (F)** ADA-compliant curb ramps with detectable warning devices
 - » Custom advance warning signage featuring golf cart users, pedestrians, and bicyclists (see Custom Signage on page 39 for more information) with MUTCD supplemental plaque W16-7P and "Do Not Block Crosswalk" signage.



Path-scale (18 inch) MUTCD R1-1 Stop Sign - For use at 4-way intersections

CHANNELIZED RIGHT TURN LANE

At some intersections of arterial streets, design vehicle requirements or intersection angles may result in wide turning radii at corners. Configuring the intersection as a channelized (or free-right) turn lane with a raised refuge island can improve conditions for vulnerable path users trying to cross the street.

To improve safety and comfort for pedestrians, treatments to slow traffic at pedestrian and multi-use path crossings are recommended such as provision of a raised crosswalk, high visibility crosswalk, and/or pedestrian crossing signage.

TYPICAL APPLICATION

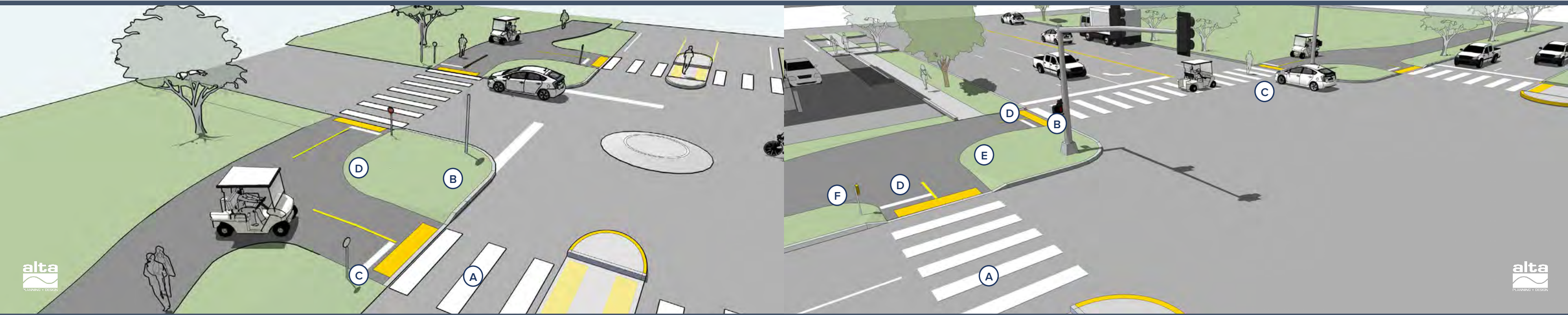
- » Intersections with high right turn traffic volumes, and very low levels of golf cart user, pedestrian, and bicyclist activity
- » As an improvement to intersections with an existing traditional channelized right-turn lane

DESIGN FEATURES

- (A)** The preferred angle of approach is no more than 15-30 degrees¹.
- (B)** Design the right turn lane to encourage appropriate deceleration in preparation for yielding to path users including a 12' minimum width for openings.
- (C)** Maximum lane width of 14 feet
- (D)** A refuge island with a minimum width of 14' is placed at the narrowest spot for queuing two carts and wide maneuvering.

- (E)** Painted shoulder visually narrows turn lane
 - » Desired speed through turn lane: 14-18 mph
- (F)** Can be configured as a raised crosswalk
 - » High-speed channelized right turn lanes result in the greatest delay and risk for path users. High-Speed is categorized as a design speed or average observed speed at the crosswalk greater than 20 mph. These locations are good candidates for additional interventions to increase yielding.
 - » A raised pedestrian crossing may be used to slow driver speeds, encourage yielding, and prioritize crossing pedestrians over turning vehicles. A raised crossing is recommended if the posted speed is 30 mph or less and turn volumes are 6,000 ADT or less.
 - » If further yielding compliance is needed, active warning beacons such as a Rectangular Rapid Flashing Beacon (RRFB) may be used.

¹ FHWA. Pedestrian Facilities User Guide, 2002.



SETBACK CROSSING AT 4-WAY STOP-CONTROLLED INTERSECTION

Where sidepaths approach 4-way stop-controlled intersections, setting path crossings back from the roadway crossing can decrease confusion associated with which user has the right of way. Setting the path crossing back from the roadway crossing allows motor vehicle drivers to make the decision about whether to yield to path users independently from navigating right of way with other vehicles at the stop-controlled intersection, a concept borrowed from modern roundabout design.

TYPICAL APPLICATION

- » Stop-controlled intersections where one or more approaching roadway features a sidepath.

DESIGN FEATURES

- (A)** Mark crosswalks with high-visibility crosswalk markings.
- (B)** Sidepath crossings set back 20' from the roadway intersection to improve driver visibility of vulnerable roadway users in the crosswalk, and to allow space for right-turning vehicles to pull completely out of the through lane while waiting for path users to cross.

- » Custom advance warning signage featuring golf cart users, pedestrians, and bicyclists (see Custom Signage page 39 for more information) with MUTCD supplemental plaque W16-7P and "Do Not Block Crosswalk" signage
- (C)** Install 18 inch path-scale stop signs (MUTCD R1-1) and stop bars at each approach to reinforce that bicyclists and golf cart users must stop.
- (D)** Ensure geometry of path approaches is compatible with the capabilities and 9.5 - 12' turning radius of golf carts.

SETBACK CROSSING AT SIGNALIZED INTERSECTION

Where sidepaths are designed to accommodate golf cart users approach signalized intersections, special considerations - such as custom signage, setback crosswalks, and golf-cart-friendly geometric design apply.



Custom Sign: Golf Carts use Ped Signal (R9-5 variant)

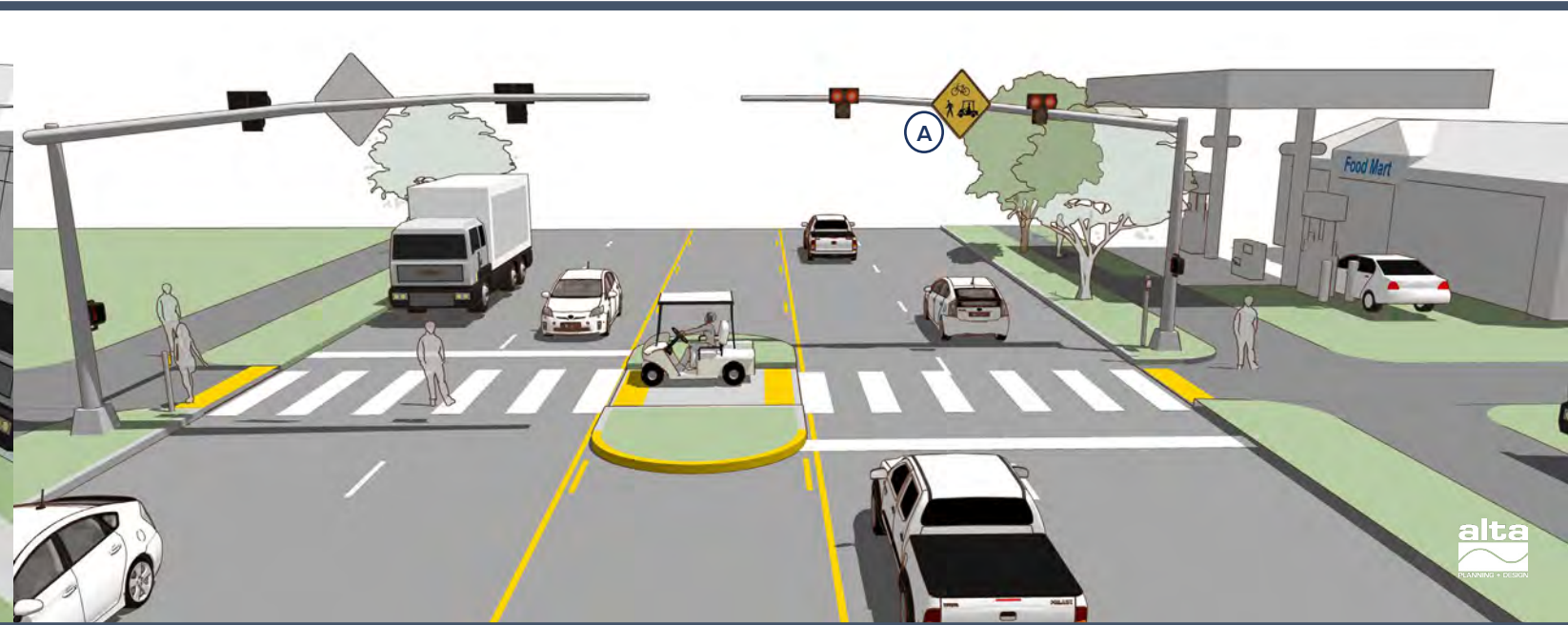
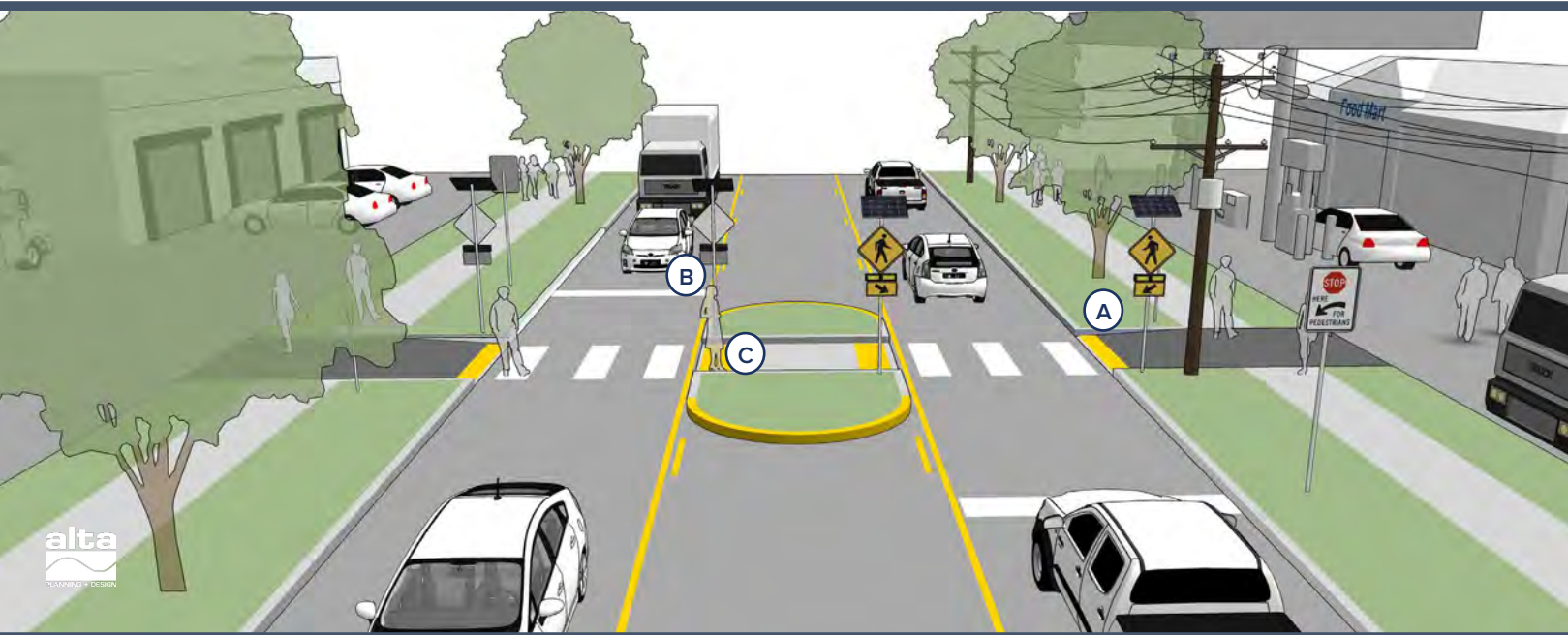
TYPICAL APPLICATION

- » Signalized intersections where one or more approaching roadways feature a sidepath

DESIGN FEATURES

- (A)** Mark crosswalks with high-visibility crosswalk markings.
- (B)** Install "Golf Carts Use Ped Signal Signage (MUTCD R9-5 variant). Signs should be installed near the edge of the path in the vicinity of where golf cart users will be crossing the street."
- (C)** Sidepath crossings set back 20' from the roadway intersection to improve driver visibility of vulnerable roadway users in the crosswalk, and to allow space for right-turning vehicles to pull completely out of the through lane while waiting for path users to cross.
- (D)** Install path-scale stop bars at each path approach.
- (E)** Ensure geometry of path approaches is compatible with the capabilities and turning radii of golf carts.

- » Signal enhancements such as Leading Pedestrian Intervals (LPis) and exclusive/protected pedestrian phases should be considered to improve safety at signalized intersections that include crossings of multi-use paths designed to accommodate golf cart users.
- » Install custom advanced warning signage (see "Custom Signage: Path Crossing/Advance Warning Sign" on page 39) to increase driver awareness that pedestrians, golf cart users, and bicyclists may be present at the intersection.
- (F)** Consider installing secondary push buttons mounted on small poles to improve convenience for golf cart users
 - » Passive detection devices save path users the trouble of having to locate a push button or exit golf cart vehicles. These most commonly include inductive loop detectors, as well as microwave and video detection technologies.



MID-BLOCK CROSSING RECTANGULAR RAPID FLASH BEACON (RRFB)

Rectangular Rapid Flash Beacons (RRFB) are a type of active warning beacon used at unsignalized crossings. They are designed to increase motor vehicle yielding compliance at marked crosswalks.

TYPICAL APPLICATION

- » Guidance for marked/unsignalized crossings applies
- » RRFBs shall not be used at crosswalks controlled by YIELD signs, STOP signs, Pedestrian Hybrid Beacons (HAWKs), or traffic control signals.
- » RRFBs shall initiate operation based on user actuation and shall cease operation at a predetermined time after the user actuation or, with passive detection, after the user clears the crosswalk.
- » Rectangular Rapid Flash Beacons (RRFB) dramatically increase compliance over conventional warning beacons.

DESIGN FEATURES

- » An RRFB consists of two rectangular-shaped yellow indications, each with an LED-array-based light source.
- » When actuated, the two yellow indications in each RRFB unit shall flash in a rapidly flashing sequence.
- A** RRFBs are typically activated by path users manually with a push button, or can be actuated automatically with passive detection systems.
- B** Providing secondary installations of RRFBs on median islands improves conspicuity and driver yielding behavior.
- C** Median islands can be painted or raised concrete.

MID-BLOCK CROSSING PEDESTRIAN HYBRID BEACON (PHB)

Pedestrian Hybrid Beacons (PHB), formerly known as High-Intensity Activated Crosswalks (HAWK), can be used to improve multi-use path crossings of major streets. A hybrid beacon consists of a signal head with two red lenses over a single yellow lens on the major street, and a pedestrian signal head for the crosswalk.

Hybrid beacons are only used at marked mid-block crossings or unsignalized intersections. They are activated with a pedestrian pushbutton at each end. If a median refuge island is used at the crossing, another pedestrian pushbutton can be located on the island to create a two-stage crossing.

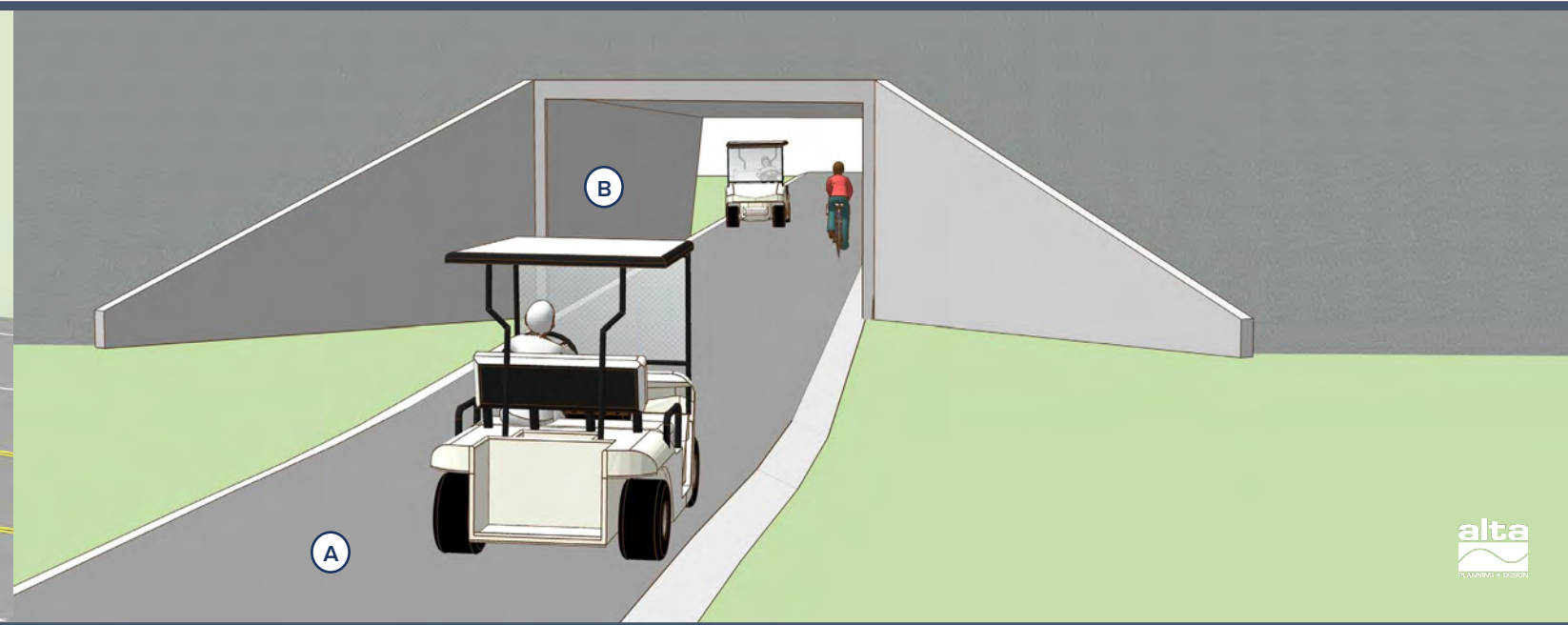
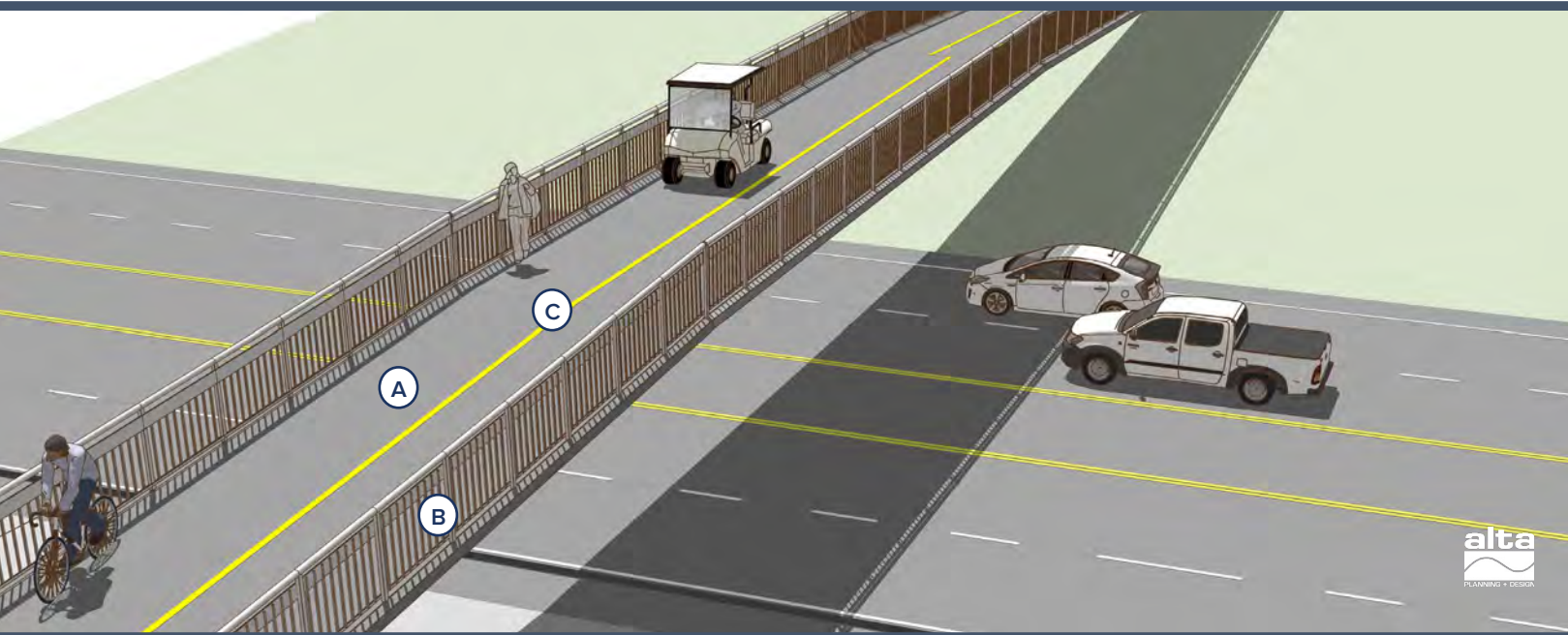
TYPICAL APPLICATION

- » To improve multi-use path crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal
- » At mid-block crossing locations.

DESIGN FEATURES

- » Hybrid beacons may be installed without meeting traffic signal warrants if roadway speeds and volumes are excessive for comfortable crossings.
- » Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

- A** Custom warning signage including golf cart, bicycle, and pedestrian icons may be installed where such users are expected.
- » If installed to facilitate multi-use path crossings that accommodate bicyclists and golf cart users, omit the alternating flashing "wig-wag" red phase in favor of a longer solid red phase to reduce potential confusion about whether vehicles must yield to these users.
- » Beacons may be mounted on posts instead of overhead on mast arms as long as there are two heads facing each approach and there is a beacon adjacent to each travel lane.
- » If installed within a signal system, signal engineers should evaluate the need for the hybrid beacon to be coordinated with other signals.



OVERCROSSING

Multi-use path overcrossings provide critical system links by joining areas separated by barriers such as wide arterials, waterways or major transportation corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

TYPICAL APPLICATION

- » Where shared-use paths cross high-speed and high-volume roadways, and where an at-grade signalized crossing is not feasible or desired, or where crossing railways or waterways
- » Depending on the type of facility or the desired user group, grade separation may be considered in many types of projects.

DESIGN FEATURES

- A** Overcrossings should be at least 12 feet wide and additional width provided at scenic viewpoints.
- B** Railing height must be a minimum of 42 inches for overpasses.
- C** Lane markings help manage two-way traffic.

UNDERCROSSING

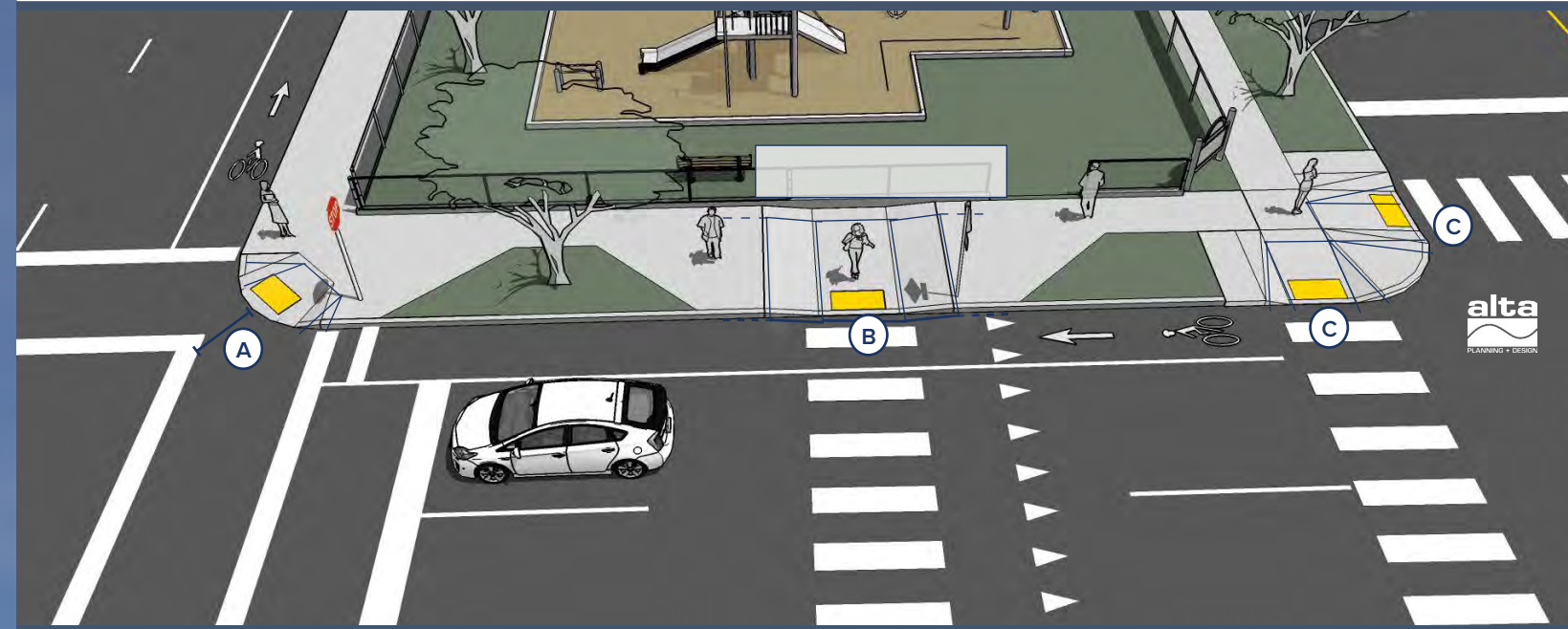
Multi-use path undercrossings provide critical non-motorized system links by joining areas separated by barriers such as railroads and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist.

TYPICAL APPLICATION

- » To provide continuity of a multi-use path where a barrier exists.
- » Underpasses work best with favorable topography, when they are open and accessible, and exhibit a sense of safety.
- » Typically utilize existing overhead roadway bridges adjacent to steams or culverts under the roadway that are large enough to accommodate multi-use path users
- » Proper drainage must be established to avoid pooling of storm water, however, some underpasses can be designed to flood periodically (after significant rainfall, for instance).

DESIGN FEATURES

- A** Width: Undercrossings should be at least 14 feet wide (16' preferred where practical).
- » Length: Minimize the length of the undercrossing. Greater widths preferred for lengths over 60 feet.
- B** Vertical Clearance: 10 foot (3.0 m) minimum, 8 ft (2.4 m) in constrained conditions.
- » Markings: The undercrossing should have a centerline stripe even if the rest of the path does not have one.
- » Lighting should be considered during the design process for any undercrossing with high anticipated use or in culverts and tunnels.



CURB RAMP ORIENTATION

Accessible curb ramps are the design element that allows all users to make the transition from the street to sidewalks and multi-use paths. The Americans with Disabilities Act (ADA) guidelines require accessible curb ramps for new construction and for most maintenance activities. There are a number of factors to be considered in the selection and orientation of curb ramps.

Although diagonal curb ramps might seem more efficient, they create potential safety and mobility problems for pedestrians, particularly those using wheelchairs and blind pedestrians. Diagonal ramps orient users into the traffic zone, and force wheelchairs to turn and re-enter the crosswalk. Pedestrians with vision impairments may be oriented into the middle of the intersection, instead of directly into the crosswalk as with perpendicular ramps. Therefore, diagonal curb ramp configurations are not recommended.

TYPICAL APPLICATION

- » The ramp shall slope no more than 1:12 (8.3%), with a maximum cross slope of 1:48 (2.1%). A slope of no more than 1:12 is desirable.
- » If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- » The level landing at the top of a ramp shall be a minimum of 5'-0" long (in the direction of the ramp run) and at least as wide as the ramp. If there is a change in direction between ramps and landings, the landing should be a minimum of 5'-0" wide.

- » Curb ramps shall be located so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles. Three configurations are illustrated above.

DESIGN FEATURES

- A** Diagonal curb ramps are not recommended. If used, diagonal ramps shall include a clear space of at least 48" within the crosswalk for user maneuverability.
- B** Parallel curb ramp
- C** Perpendicular curb ramps

04

ADDITIONAL GUIDANCE



WAYFINDING

A path wayfinding system consists of comprehensive signing and/or pavement markings to guide users to their destinations along preferred routes.

TYPICAL APPLICATION

- » Wayfinding signs will increase users' comfort and accessibility to the path system.
- » Signage can serve both wayfinding and safety purposes including:
 - » Help familiarize users with the path system
 - » Help users identify the best routes to destinations within bicycling, and golf-cart-trip distances or connections to other modes
 - » Help address mis-perceptions about time and distance
 - » Help overcome a "barrier to entry" for people who do not frequent the path system

SIGN TYPES

- A** Confirmation signs indicate that golf cart users and bicyclists are on the right path to their destinations. They include destinations and distance/time, but not arrows.
- B** Decision signs indicate the junction of two or more golf cart and bicycling routes to access key destinations. The signs include destinations, arrows and distances. Travel times are optional.
 - » Modified versions of standard MUTCD bicycle wayfinding signage are shown. The County could consider custom wayfinding signage with branding to reflect community character.
 - » Signs/plaques can be standardized for the County to easily make replacements, removals, or additions when needed.

CUSTOM SIGNAGE: PATH CROSSING/ ADVANCE WARNING SIGNS

Typical users of the path system in Fayette County include people driving or riding in golf carts as well as pedestrians and bicyclists. As such, the warning signage for path crossings in Fayette County may, at the discretion of the local jurisdiction, include all three of these common users on one sign, as opposed to standard pedestrian warning signage (MUTCD W11-2), combined pedestrian and bicycle warning signage (MUTCD W11-15) or golf cart warning signage (MUTCD W11-11).



Custom combined pedestrian, golf cart, and pedestrian warning signage based on standard MUTCD warning sign

TYPICAL APPLICATION

- » Advanced warning for multi-use path crossings (in combination with MUTCD supplemental plaque W16-9p)
- » Multi-use path crossings (in combination with MUTCD supplemental plaque W16-7p)
- » When used at uncontrolled path crossings, consider supplementing with an informational sign that states "Golf carts must stop and proceed when clear" to reduce confusion about the responsibilities of golf cart users in this condition.

DESIGN FEATURES

- » Golf cart user, pedestrian, and bicyclist icons can be included on one sign, or used individually to specify the most predominant user.
- » The warning sign shall be diamond-shaped with a black legend and border on a yellow background per the MUTCD.



Supplemental plaque: W16-9p For advanced warning applications



Supplemental plaque: W16-7p For use at path crossings

CUSTOM SIGNAGE: GOLF CARTS USE PEDESTRIAN SIGNAL

At signalized intersections that include multi-use path crossings, golf cart users should be directed to use the pedestrian signal. Since this is a relatively uncommon situation throughout the United States, the MUTCD does not have specific guidance or a standard sign intended to communicate this guidance. However, a modified version of MUTCD R9-5 can be used to clarify traffic control for golf cart users at signalized intersections.

The installation of secondary push buttons mounted on small poles, or passive detection devices can improve convenience for golf cart users.

TYPICAL APPLICATION

- » Multi-use path crossings at conventional signalized intersections
- » Mid-block multi-use path crossings where a Pedestrian Hybrid Beacon (PHB) has been installed

DESIGN FEATURES

- » Customized version of MUTCD R9-5
- » Sign should be installed near the edge of the path in the vicinity of where golf cart users will be crossing the street.



CUSTOM SIGNAGE: USE BY GOLF CARTS PROHIBITED

Custom signage for golf cart users can help clarify and reinforce where golf cart use is permitted.

TYPICAL APPLICATION

- » On streets or multi-use paths where golf cart use is prohibited

DESIGN FEATURES

- » Modified version of MUTCD R9-3a



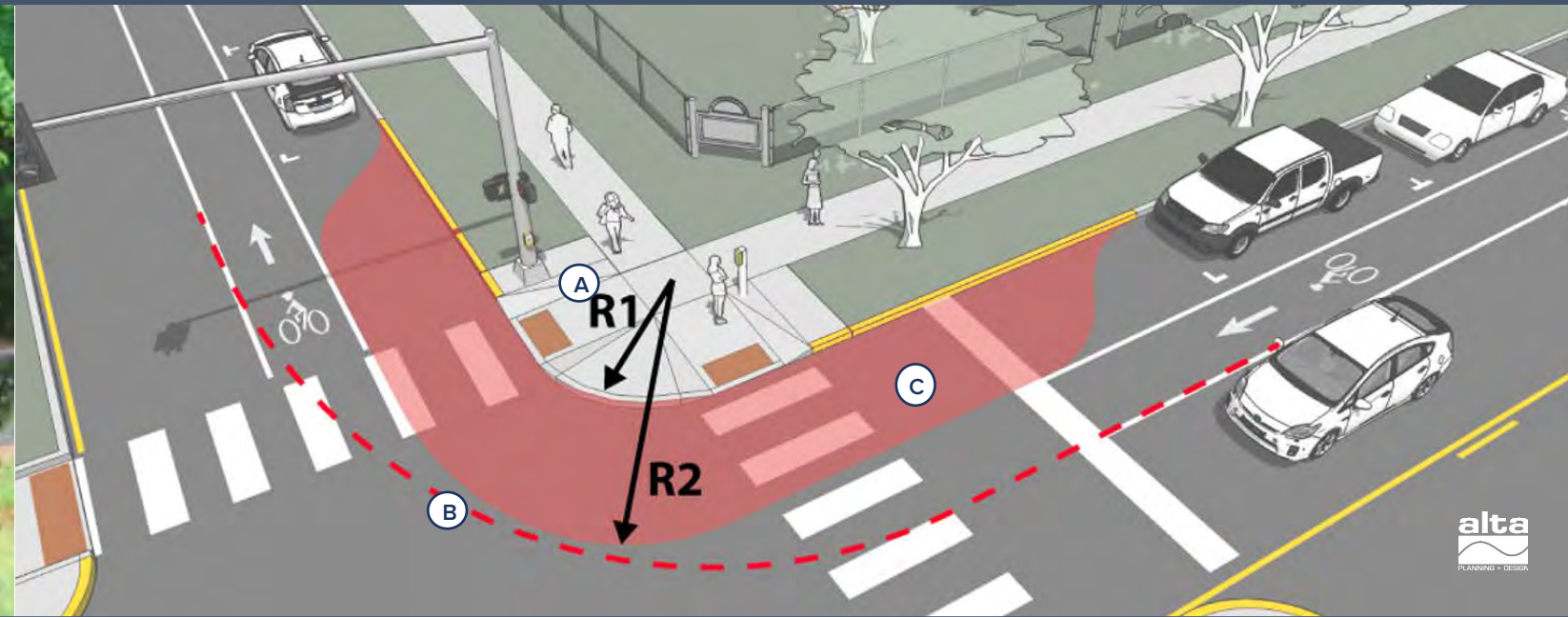
CUSTOM SIGNAGE: SPECIFIC TURNING MOVEMENTS PROHIBITED

In some cases, golf cart operation may be permitted along a street or path, but there may be a need to prohibit specific turning movements for safety. Peachtree City has developed custom signage intended to communicate such prohibitions to promote safe operation of golf carts.

TYPICAL APPLICATION

- » Where specific turning movements by golf cart users is prohibited





OPTIONAL PATH AMENITIES

When designing functional multi-use paths, the path amenities and design elements matter. Beside the selection of dimensions and materials of the multi-use path surface, additional elements, such as a lights, fencing, benches and other amenities help create a unique identity for each multi-use path. It is important that these details work together to create a complete experience for all users.

TYPICAL APPLICATION

- » The list of amenities may include:
 - » Lighting
 - » Seating
 - » Fencing and Railings
 - » Public Art and Sculpture
 - » Bicycle Parking
 - » Bicycle Fix-It Stations
 - » Drinking Fountains
 - » Restrooms
 - » Trash and Recycle Receptacles
 - » Emergency Call Boxes
 - » Trailheads
 - » Bicycle Access to Transit

DESIGN FEATURES

- » Lighting for multi-use paths should be considered on a case-by-case basis in areas where 24-hour activity is expected (such as college campuses or downtown areas), with full consideration of the maintenance commitment lighting requires.
- » Seating along multi-use paths provides a place for multi-use path users to rest, congregate, contemplate, or people-watch along multi-use paths. Benches can be designed to create identity in a place. Place seating away from the pathway on separate pads to keep seated pedestrians away from moving carts.
- » Railing and fences are important features on bridges, some boardwalks, or in areas where there may be a hazardous drop-off or hazardous adjacent land uses (such as active rail lines).
- » Trash and recycle receptacles facilitate proper maintenance and appearance of the greenway and multi-use path system.

PEDESTRIAN-FRIENDLY CURB RADII REDUCTION

The size of a curb's radius can have a significant impact on pedestrian comfort and safety. A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances and consider the effective radius in any design vehicle turning calculations.

TYPICAL APPLICATION

- » The curb radius may be as small as 3 ft where there are no turning movements, or 5 ft where there are turning movements and adequate street width. On-street parking and bike lanes create a larger effective turning radius and can therefore allow a smaller curb radius.

DESIGN FEATURES

Corners have two critical dimensions which must be considered together:

- (A) The physical radius, which controls the pedestrian experience
- (B) The effective radius, which is the widest turning arc that a vehicle can take through the corner. It is larger than the physical radius.
- (C) The area shown in red indicates the potential for a curb extension that would shorten pedestrian crossing distance and improve driver visibility of pedestrians.

