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WMPO Bicycle and Pedestrian Modal Subcommittee Meeting Agenda

TO: WMPO Bicycle and Pedestrian Modal Subcommittee Members
FROM: Abby Lorenzo, Senior Transportation Planner
DATE: November 28th, 2018
SUBJECT: December 4th, 2018 Meeting

A meeting of the WMPO Bicycle and Pedestrian Modal Subcommittee will take place on Tuesday, December 4th, 2018 at 3pm. The meeting will held in the **Harrelson Building 5th floor conference room located at 115 N. 3rd Street, Wilmington**.

The following is the agenda for the meeting:

- Call to Order
- Approval of the Agenda
- Approval of minutes from November 13th, 2018
- Cape Fear Moving Forward 2045 Bicycle and Pedestrian Project List Development
  - Action: Review additional subcommittee selected projects
  - Action: Review additional selected projects limits and scope
  - Action: Confirm final 150 preliminary projects
- Cape Fear Moving Forward 2045 Bicycle and Pedestrian Criteria Development
  - Action: Committee discusses and completes goals and objectives ranking and weighting activity
- Election of 2019 Chairman and Vice Chairman (Standing Committee)
  - Chairwoman Nominee: Carol Stein
  - Vice Chairwoman Nominee: Katie Ryan
- 2019 Bicycle and Pedestrian Committee Work Plan (Standing Committee)
  - Action: Review and adopt 2019 work plan
- 2019 Meeting Dates (Standing Committee)
  - Action: Review 2019 meeting dates, consider any meeting day changes, and adopt.
- Next Meeting : January 8th, 2019 at 3pm*

- Adjournment

Attachments:

- Minutes from the November 13th, 2018 meeting
- Bicycle and Pedestrian Subcommittee selected projects
- Bicycle and Pedestrian Subcommittee additional submitted project list
- Bicycle and Pedestrian Carryover Projects
- Bicycle and Pedestrian Draft Cross Sections
- Bicycle and Pedestrian Goals and Objectives Worksheet
- Criteria Flowchart
- 2019 Bicycle and Pedestrian Committee Work Plan
- *Draft* 2019 Committee Meeting Dates

WMPO Bicycle and Pedestrian Advisory Committee Meeting Minutes

Tuesday, November 13th, 2018 at 3pm
Room 611 at 320 Chestnut St.

Members Present

John Williams, Cape Fear Public Transportation Authority
Karin Mills, City of Wilmington
Shawn Spencer, New Hanover County
Carol Stein, Pender County
Joe Boyd, Town of Belville
Steve Whitney, Brunswick County
John Sneed, Visitors Bureau
Katie Ryan, Town of Wrightsville Beach
Barnes Sutton, Town of Navassa
Nick Cannon, TDM Coordinator WMPO
Al Schroetel, Cape Fear Cyclists
Vanessa Lacer, WAVE Transit
John Carter, Town of Leland

Staff and Guests Present

Abby Lorenzo, WMPO
Katie Moore, WMPO
Zach Manfredi, WMPO

1. Call to Order

S. Spencer called meeting to order.

2. Approval of Agenda

K. Ryan made a motion to approve agenda, seconded by J. Sneed

3. Approval of October 9, 2018 Minutes

Revise the minutes to list John Carter, Town of Leland as a Member Present.
A Schroetel made a motion to approve agenda as revised, seconded by K. Ryan

4. Cape Fear Moving Forward 2045 Bicycle and Pedestrian Project List Development

S. Spencer introduced the item as the list of projects selected by committee members

A. Lorenzo shared the limit to submit up to 200 projects to a consultant for cost estimate. The spreadsheet was designed for a discussion on how to build the list from the existing 118 to at least 150 projects. To submit the list to the consultant, each project needs limits and scope at a conceptual level.

A. Lorenzo shared that staff has identified several projects that are currently associated with a roadway project and those projects can remain on this committees list until the final design is chosen for those projects and it is found that the work addresses the need of the project. NCDOT will be holding public meetings for roadway projects once the design process is underway and that is a good time to connect with the project to discuss the need and planned bike/ped facilities.

S. Spencer began moving the committee through the list of projects with brief discussion on the need and/or rationale for selection. Committee discussed the limitations for adding bicycle and pedestrian crossings to existing controlled access bridges and an idea to consider the facilities within any new

crossing of the Cape Fear whether it is a roadway, rail, or dedicated pedestrian. Committee is committed to advocating for a crossing with connections on either side for bike/ped. A. Lorenzo shared that the Cape Fear Crossing project is planned to include those facilities. WMPO staff could work with NCDOT to determine a feasible connection between Brunswick County and Downtown Wilmington.

It was determined that moving through the list may not be necessary. Committee agrees to leave all projects selected in the list except the City Bond projects and fully committed projects planned for completion prior to the 2020 plan year.

Committee carried a motion to accept all selected projects except those identified as infeasible, City Bond projects, or projects committed prior to the 2020 plan horizon and to add a project for a bicycle and pedestrian crossing of the Cape Fear River.

Committee began to discuss how to choose more projects. A. Lorenzo demonstrated the use of the Map Tool Heat Map layer that shows the intensity of public comments by project location.

Idea shared to list projects that phase the completion of the Downtown Trail starting with the segment within the abandoned rail corridor near new multimodal center and the planned North Waterfront Park. The segments can be scored and funded separately. WMPO staff can recommend a method.

Project idea to improve the Salisbury St. Bridge to Wrightsville Beach to widen the sidewalk on the more heavily travelled side (south) that connects to sidewalks on either end.

Rather than try to determine additional projects at this meeting the committee agreed to individually select an additional 5 projects each for review at the December meeting. A. Lorenzo clarified that the default setting for the Map Tool is to open with selected projects shown in red. To turn on the full project list, the layers for "2045 Proposed Projects" need to be checked to be shown.

Committee received information on the limits of a project drawn inaccurately for the new Pine Valley Branch Library to be built at 17th St and College Road (corner enclosed by Satara Dr).

A. Lorenzo would like to submit a minimum of 150 projects to the consultant for cost estimate. At the next meeting the committee will work to identify up to 200 projects. WMPO staff will bring recommendations for projects to discuss

S. Spencer prompted discussion about a recent newspaper article covering the death of a cyclist due to a driver charged with a DUI. Committee agreed that more education is needed for the community and more specifically the reporter as the story implied that cycling on neighborhood roads is unsafe.

S. Spencer adjourned the modal subcommittee as the remainder of agenda items are for the Bicycle and Pedestrian Standing Committee to review. Those members of the MTP modal subcommittee were excused from attendance.

5. Discussion on Elections for Chairman and Vice Chairman for 2019 (Standing Committee)

A. Lorenzo introduced the item as a prompt for the committee to consider nominations for Chair and Vice Chair of the Bicycle and Pedestrian Committee.

K. Ryan shared willingness to remain as Vice Chair. Committee accepts K. Ryan as Vice Chair for 2019.

S. Spencer shares a preference to conduct nominations and vote for Chair for 2019.

Committee agrees to send nominations for Chairman/Chairwoman to Abby by November 28, 2018.

6. Review 2019 Bicycle and Pedestrian Committee Work Plan (Standing Committee)

A. Lorenzo presented information on the Draft 2019 Work Plan and explained the items by month.

Committee discussed items to consider for the next work year, including:

- continuing development of language to support local ordinance adoption
- regular NCDOT project updates to increase awareness and participation of the subcommittee
- addition/discussion of a Fall bike ride event in the Spring (February/March item)

Committee agrees to submit revisions and comments to Abby by November 28, 2018.

A. Lorenzo asked for the committee to determine a date for the 30th River to Sea. Proposed date of Saturday, May 4th with an earlier start of 7am. Planning for the event will begin in January.

7. Approval of Date and Time for December Meeting

A. Lorenzo asked the committee to consider changing the December meeting to fall one week earlier, on December 4th, 2018 (scheduled for December 11th, 2018).

Committee agrees to change the December meeting date to December 4, 2018 and the committee will be meeting in the Harrelson Conference Room located at 115 N. 3rd Street on the 5th Floor of the CresCom Building (former BB&T Building).

8. Next Meeting

December 4, 2018 at 3PM

9. Adjournment

S. Spencer made a motion to adjourn, seconded by K. Ryan.

Follow-up and Action Items:

a. Committee members to select an additional 5 projects each for review at December meeting.
b. Standing Committee members to send nominations for Chair to Abby by November 28.
c. Standing Committee members to send comments or changes to the Work Plan by November 28
d. WMPO staff to recommend projects for discussion, as needed, from the proposed projects
e. WMPO staff will discuss options for phasing of projects and report back at December meeting
f. WMPO to send out date, time, and location update to the committee

Bicycle and Pedestrian Modal Subcommittee Project Submissions

BP #		Submitter	Project	Rationale	Plan
BP-	1	Vanessa Lacer	GREENFIELD LAKE PARK bike lane	Connection between new Downtown Transit Center (N 3rd St and Campbell St), Greenfield Park, and neighborhoods Inbetween.	2040 MTP/ NHC Greenway Plan (5th Ave Bike Lane)
BP-	13	Steve Whitney	MUP From West Gate to Brunswick Nature Park connector	This MUP can be developed to connect to commercial and residentail areas along Rte 17	2040 MTP
BP-	14, 285	Al Schroetel, John Williams	Independence Blvd. BikePed Improvements (Carolina Beach Rd to River Rd) MUP	Connect with the newly purchased City and County park at Echo Farms and River Road Bike Lanes. Enhances the East Coast Greenway	2040 MTP
BP-	15	Al Schroetel	Independence Blvd. BikePed Improvements (S. 17th St to Carolina Beach Rd)	Connect with existing bike/ped facilities that end at the Cameron Art Museum. Enhances the East Coast Greenway. Also connects with the Cross City Trail 1/2 block to Northeast	2040 MTP
BP-	16	Nick Cannon, Karin Mills	Independence Blvd Extension (Randall to MLK)	Easy extension of the Cross City Trail that greatly incrases the amount of places people can go using a MUP	2040 MTP
BP-	28	Joe Boyd	Causeway Dr BikePed Improvement (Airlie to Waynick)		2040 MTP
BP-	35	Karin Mills	College Rd MUP (Hurst to Randall)		2040 MTP
BP-	36	Karin Mills	College Rd MUP (Randall to New Centre)		2040 MTP
BP-	39	Karin Mills	Burnt Mill Creek Path (Market to Archie Blue Park)		2040 MTP
BP-	45	Nick Cannon	Wilshire Blvd BikePed Improvement	Dozens of older citizens and members of lower income homes are along this road and use a bike or walk as a primary source of transportation. You can see the "goat paths" on this road.	2040 MTP
BP-	52	Karin Mills	Oleander Dr Bikeped Improvement (Hawthorne to 42nd)		2040 MTP
BP-	97	Al Schroetel	Plantation Road Bike Lanes & MUP	Bike lfacilities on Murrayville Rd Ext. & Old Plantation Road from N. College to the Military Cutoff Extension Links existing sub-divisions and projected expansion a middle school and two parks.	2040 MTP (NI)
BP-	132	John Carter	Old Fayetteville Rd. A MUP	Bike/Ped connection between Leland town center and two major schools	2040 MTP (NI)
BP-	147	Steve Whitney	Bike/ped access across Greenfield Lake (MUP)	This connection provides safe and conventient access between Sunset neighborhood and Hospital. The bridge across Lake makes walking path more useable with shorter routes	2040 MTP (NI)
BP-	178	Carol Stein, Al Schroetel, John Williams, Shawn Spencer	Sidbury Road NH/ Pend Bikeped Improvement	Major expansion will occur in this area in both New Hanover and Pander Counties.. Near I-140 and !-40 for future potential developments and commercial growth. Sidbury will be widened.	2040 MTP (NI)
BP-	193	Nick Cannon	Lake Ave (Halifax to College) BikePed Improvement	There is currently bike/ped way to get to Hugh McRae park and this would be one	2040 MTP (NI)
BP-	206	Carol Stein	Island Creek Rd BikePed Improvement	Access to 17 corridor(Hampstead) with current /future developments along route	2040 MTP (NI)
BP-	233	Nick Cannon	Floral Pkwy BikePed Improvements	Increase the opportunity for people to safetly shop to their biking needs at the mall and the adjacent shopping center	2040 MTP (NI)
BP-	237	Steve Whitney	Fletcher Road NE Bike/Ped Path	This connection provides safe pedestrian and bike access from Leland residential area to the playing fields in the Northeast Park	2040 MTP (NI)
BP-	238	John Carter	Brunswick Nature Park Connector MUP	Connection between US-17 and Brunswick Nature Park mountain bike trails	2040 MTP (NI)
BP-	239	Steve Whitney, John Carter	MUP from Rte 17 to BF, MC, and Brunswick Nature Park	This MUP can be developed as part of new residential construction. The connector follows Duke Power easement but can be constructed in easement area. Connection between US-17 and Brunswick Nature Park mountain bike trails	2040 MTP (NI)
BP-	240	John Carter	Blackwell Rd SE BikePed Improvement	Improve connectivity between Village Road and US17 corridor areas of Leland	2040 MTP (NI)
BP-	247	Carol Stein	Sloop Pt Loop Rd MUP	High populated area, Alternate to travelling via US17 273(Country Club) & 247(Sloop Point)	2040 MTP (NI)
BP-	249	Steve Whitney	Town of Leland near Jacky's Creek and Night Harbor Drive MUP	This short connection connects two neighorhoods and provides access between Ploof Road and River Road (Rte 133)	2040 MTP (NI)
BP-	268	Steve Whitney, Joe Boyd, John Carter, Duncan McCabe, John Williams	Leland/Wilmington bike/ped connection	Do not forget to include some connection between Wilmington and Leland to recognize future needs for this transportation corridor. Bike/Ped connection between Leland and Wilmington is critical to area-wide connectivity	2045 Public Input
BP-	269	Neal Andrew, Duncan McCabe, John Williams	Masonboro Loop Rd Bike Lanes (Navaho Trl to Carolina Beach Rd)		2045 Public Input

BP-	270	Joe Boyd, John Carter	Burnett Blvd MUP (Kentucky to Market)	Improved connectivity and safety between Greenfield Lake, CFMB, and downtown	2045 Public Input
BP-	273	Carol Stein	Country Club MUP	Bike accidents (4), highly popoulated residential area.	2045 Public Input
BP-	276	Carol Stein, Joe Boyd, John Carter, Duncan McCabe, John Williams	Rt 133 Bike Path-Southport	No other routes to Southport - adding feature before population development will add to appeal of Southport. Connection between Leland and Southport, serving multiple destinations along the way, including Boiling Springs Lakes and Brunswick Nature Park	2045 Public Input
BP-	277	Neal Andrew, Al Schroetel, Duncan McCabe, John Williams	Masonboro Loop Rd & Pine Grove Rd	Current bike lanes are intermittent and do not meet accepted standards. Add /Maintain Bike Lanes on Masonboro Loop Road to Hugh McRae Park that meet NACTO Specifications (5 feet).	2045 Public Input
BP-	280	Nick Cannon	College Acres MUP	Very high trafficed area by students	2045 Public Input
BP-	282	Neal Andrew	Sander Rd MUP		2045 Public Input
BP-	286	Joe Boyd	Ploof Rd Bicycle Lane		Leland Comp Bike Plan
BP-	297	John Carter	Village Road Loop Bicycle Lane	Dedicated bicycle lane along this route would connect the town centers of both Leland and Navassa, including areas of major development and redevelopment planned in coming years	Leland Comp Bike Plan
BP-	298	Joe Boyd	Old Leland Loop Bike Lane		Leland Comp Bike Plan
BP-	300	Al Schroetel	Porters Neck Rd Trail	Includes large existing sub-divisions, shopping centers and two schools. With BP-341 (Marsh Oaks & Folly's Isld) links neighborhoods to south with bike/ped access to Edwater Club Rd. school	NHC Greenway Plan
BP-	301	John Williams, Carol Stein	I-140 East Trail (Market St to Murrayville Rd)		NHC Greenway Plan
BP-	304	Duncan McCabe	Snows Cut Bridge Trail		NHC Greenway Plan
BP-	305	Neal Andrew, Duncan McCabe	South Carolina Beach Rd Trail		NHC Greenway Plan
BP-	306	Neal Andrew, Al Schroetel	South River Road Bike Lanes	Widen and Maintain Bike Lanes on River Road and bring them into NACTO Specifications (5 feet). Some section are less than 18 inches wide because of vegetation overgrowth.	NHC Greenway Plan
BP-	307	Neal Andrew, Duncan McCabe	Carolina Beach Rd Trail		NHC Greenway Plan
BP-	308	Neal Andrew, John Williams	Shipyard Trail		NHC Greenway Plan
BP-	323	John Carter	Western Rail Corridor Trail Greenway	Northern connection around the WMPO area, hopefully including another CF River crossing (not depicted)	NHC Greenway Plan
BP-	324	John Williams	US Hwy 421 Trail (Cape Fear River to Cape Fear Soccerplex)		NHC Greenway Plan
BP-	326	Duncan McCabe	Rogersville Rd Trail		NHC Greenway Plan
BP-	341	Al Schroetel	Bayfield Dr to Porters Neck Connection	Creates an off -Market Street route from Bayshore to the Porters Neck residential & commercial areas & to new elementary school. Uses an existing utility property and 1/10 mile MUP	NHC Greenway Plan
BP-	344	Carol Stein	Blue Clay Rd Bicycle Lane (Sidbury to Holly Shelter Rd)	Bike lane give option to avoid Rt 117 and connects Sidbury to Holly Shelter both roads seeing increased rural development , Connects two large routes BP-376(holly Shelter) & BP-178(Sidbury)	NHC Greenway Plan
BP-	345	Carol Stein	Blue Clay Rd Bicycle Lane (Sidbury to Prop Trail at Rail Corridor)	Area of increasing growth of new neighborhoods connection to CFCC. This connection with Sidbury Rd give access to US17	NHC Greenway Plan
BP-	373	Carol Stein, Joe Boyd, Al Schroetel	Gordon Rd. Bicycle Lane	Heavy commercial, residential and school road, with 4 accidents on report reviewed. Updated road with lane will improve safety. This area already has many residential and commercial facilities, a school and a major County park. Much larger residential communities are planned. Widening of Gordon Road already planned	NHC Greenway Plan
BP-	376	Carol Stein	Holly Shelter Rd Bicycle Lane (Prop Rail Trail to Blue Clay Rd)	Access to 17 corridor(Hampstead) with current /future developments along route	NHC Greenway Plan
BP-	396	Katie Ryan, Shawn Spencer	Military Cutoff (Eastwood to Wrightsville Bicycle Lane)	Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	NHC Greenway Plan

BP-	397	Carol Stein	New Centre Dr Bicycle Lane (College to Clear Run Dr Trail)	Connects a very populated student area with commercial area. Assist in reduction of last report of 4 bike accidents.	NHC Greenway Plan
BP-	398	Nick Cannon	New Centre Dr Bicycle Lane (Columb to College)	This would be very beneficial for everyone wh	NHC Greenway Plan
BP-	406	Joe Boyd	Princess St Sharrow (5th Ave to 20th St)		NHC Greenway Plan
BP-	411	Carol Stein, John Williams	Sidbury Road NH/ Pend Bicycle Lane	Major expansion will occur in this area in both New Hanover and Pander Counties.. Near I-140 and !-40 for future potential developments and commercial growth. Sidbury will be widened	NHC Greenway Plan
BP-	423	Al Schroetel, Duncan McCabe	Market Street Rail Trail	Creates an off-Market St. bike / ped facility and more direct route from Gordon Rd/ Cape Harbor Drive to Porters Neck Rd.. Could be an option to BP-341	NHC Greenway Plan
BP-	426	Joe Boyd, John Sneed	North Smith Creek Trail (Greenway from Smith Creek Park to Northchase Pkwy)		NHC Greenway Plan
BP-	430	Neal Andrew	North River Rd Trail (Independence to Sanders)		NHC Greenway Plan
BP-	433	Neal Andrew, Duncan McCabe	Myrtle Grove Rd Trail (Carolina Beach Rd to Carolina Beach Rd)		NHC Greenway Plan
BP-	442	John Carter	Lumina Ave Sharrow	Improve safety for bikes along congested Lumina Drive	NHC Greenway Plan
BP-	456	Nick Cannon	College Rd Bike Lane (Market to Shipyard)	Giving people a safe way to travel down S. College by bike, ped, skate, etc. would reduce vehicular traffic and encourage the use of the transit system by being able to safely walk and bike to the S. College stops.	NHC Greenway Plan
BP-	458	Nick Cannon	Wrightsville Ave Bike Lane	Already a very commonly biked on road. Bike lanes would make it even safer. Bike lanes are also on Wrightsville Ave East of S. College road then stop.	NHC Greenway Plan
BP-	464	Neal Andrew, Duncan McCabe, John Williams	Carolina Beach Bike Lane (3rd St to St Andrews)		NHC Greenway Plan
BP-	468a	John Carter	Downtown Trail Greenway (Phase I, Riverfront Boardwalk to Bess St)	Trail loop in upcoming northern area of downtown and up-use of old railroad corridor	NHC Greenway Plan
BP-	468b		Downtown Trail Greenway (Phase II, Nutt St to Burnt Mill Creek)	Trail loop in upcoming northern area of downtown and up-use of old railroad corridor	NHC Greenway Plan
BP-	468c		Downtown Trail Greenway (Phase III, Burnt Mill Creek to Colonial Dr)	Trail loop in upcoming northern area of downtown and up-use of old railroad corridor	NHC Greenway Plan
BP-	556	Neal Andrew, Al Schroetel	17th St/NHC Library Connection	Connect to Navaho Trail improvements and from there to S. 17th. This links BP-165, BP-275 and BP-556 into a bike/ped facility that connects a huge residential area to the library & X-City Trail)	2045 Public Input
BP-	559	Carol Stein, Nick Cannon, Karin Mills	Complete Cross City Trail	Cross City Trail needs completed. Can only travel one way - high bike crashes (9). Kerr Ave will have bike lanes will connect a large length of bike avenues. I agree that the multiuse path should continue along randal and not just be a bike lane for people to travel the wrong way in	2045 Public Input
BP-	560	Patrick Boykin			
BP-	561	Patrick Boykin	Carolina Beach Rd and Myrtle Grove Rd Crossing Improvement		NHC Greenway Plan
BP-	563	Katie Ryan, John Sneed	Causeway Drive & Salisbury Street	Congested area with bike, ped, and vehicle traffic making their way to businesses, beach, and residences	NHC Greenway Plan
BP-	574	Shawn Spencer	Drysdale and Military Cutoff Crossing	Very critical ped crossing as this will be the future Drysdale Extension and needs to allow Gary Shell XC trail users to easily access East side of Military Cutoff.	NHC Greenway Plan
BP-	577	Shawn Spencer	Bayshore Dr and Market St Crossing Improvement	this would allow access to residents from West side of Mkt St to the XC trail via Bayshore and Middle Sound.	NHC Greenway Plan
BP-	579	Shawn Spencer	Military Cutoff & Station Rd Crossing Improvement	this Crosswalk would allow access from West side of Military to the Cross City Trail	NHC Greenway Plan
BP-	581	Patrick Boykin, Vanessa Lacer	Carolina Beach Rd and S. College Rd Crossing Improvement	Crosswalk improvement would allow safe passage from the south to the Monkey Junction Super Stop (located near McDonalds) which is served by 3 bus routes including route 201 which has the 2nd highest ridership of all 16 routes.	NHC Greenway Plan
BP-	584	Vanessa Lacer	College Rd & Shopping Center Entrance	routes including route 201 which has the 2nd highest ridership of all 16 routes.	NHC Greenway Plan
BP-	590	Shawn Spencer, Katie Ryan	Military Cutoff and Wrightsville Ave	this is a very active or could be an active pedestrian and cyclist crossing since Eastwood and Military project are going to make crossing there impossible. Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	NHC Greenway Plan

BP-	591	Katie Ryan, Duncan McCabe	Greenville Loop Road & Oleander	Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	NHC Greenway Plan
BP-	597	Vanessa Lacer	17Th St & Glen Meade Rd	Crosswalk improvements would allow safe passage to access bus stops on both sides of the street. These stops are served by 3 routes (105, 205, 209).	NHC Greenway Plan
BP-	604	Patrick Boykin	Lake Park Blvd and Lewis Dr Crossing Improvements		NHC Greenway Plan
BP-	619	Vanessa Lacer	Carolina Beach Rd & Antoinette Dr	routes including route 201 which has the 2nd highest ridership of all 16 routes.	NHC Greenway Plan
BP-	625	Patrick Boykin	Sanders and River Road Crossing Improvements		NHC Greenway Plan
BP-	626	Patrick Boykin, Vanessa Lacer	River Rd and Carolina Beach Rd Crossing Improvement	Crosswalk improvement would allow safe crossing for bus passangers accessing route 301 which has a bus stop on both sides of the street at CB Rd and River Rd.	NHC Greenway Plan
BP-	627	Patrick Boykin	Piner and Myrtle Grove Crossing Improvement		NHC Greenway Plan
BP-	633	Shawn Spencer	Military Cutoff & Cayman Ct Crossing Improvement	this Crosswalk would allow access from West side of Military to the Cross City Trail	2045 Public Input
BP-	635	Katie Ryan, Shawn Spencer	Parker Farm Drive & Military Cutoff	Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	2045 Public Input
BP-	636	Shawn Spencer	University Dr & College Rd Crossing Improvements	There has been a need for ped crossing here since UNCW was built. Safety of Students is paramount	2046 Public Input
BP-	639	Vanessa Lacer	S 21st St & Market St	A pedistrian crossong signal/traffic light would allow safe passage across Market St. to access bus stops on either side of Market and 21st St.	2047 Public Input
BP-	642	Shawn Spencer	Eastwood Rd & Bay Creek Dr Crossing Improvement	This is necessary since it connects Rodgersville To The North side of Eastwood Multi Use Sidewalk	2048 Public Input
BP-	644	Katie Ryan	Causeway Drive & S. Lumina	Congested area with bike, ped, and vehicle traffic making their way to businesses, beach, and residences	Walk Wilmington
BP-	646	Karin Mills	College Rd and Oleander Dr Crossing Improvements		Walk Wilmington
BP-	647	Joe Boyd, Shawn Spencer	Market St & Gordon Road Crossing Improvements	This will be necessary when the MUP along Gordon Road is built.	Walk Wilmington
BP-	648	Katie Ryan	Military Cutoff & Eastwood	Crossing/Pedestrian Signal	Walk Wilmington
BP-	649	Duncan McCabe	New Centre and College Rd Crossing Improvements		Walk Wilmington
BP-	661	Carol Stein, Karin Mills	College Rd & Randall Crossing Improvement	High bike and pedestrian traffic	2040 MTP (NI)
BP-	669	Shawn Spencer	3rd St and Dawson St Crossing Improvement	There needs to be a ped/Bike crossing here to set the tone for travelers entering the city via this route.	2040 MTP (NI)
BP-	681	Vanessa Lacer	OLEANDER DR & DAWSON ST Crosswalk Improvement	Residents of the nearby WHA property need a safe crossing to access food, medicine, etc at the shopping center. A majority of the residents of Hillcrest residents are elderly and do not drive.	2040 MTP (NI)
BP-	700	Duncan McCabe	Market St & Lullwater Dr		2040 MTP (NI)
BP-	722	Vanessa Lacer	3RD ST N & RED CROSS ST	Croswalk improvements would allow safe passage from the Downtown business district to the new Downtown Transit Center (to be located at North 3rd and Campbell St).	2040 MTP (NI)
BP-	744	Vanessa Lacer	10TH ST & DAWSON ST	Crosswalk improvements important for safe access to bus stops and neighborhood resources in a low resource community with many transit dependant residents.	2040 MTP (NI)
BP-	765	Vanessa Lacer	10TH ST & WOOSTER ST	Crosswalk improvements important for safe access to bus stops and neighborhood resources in a low resource community with many transit dependant residents.	2040 MTP (NI)
BP-	774	Katie Ryan	Military Cutoff & Sir Tyler	Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	2040 MTP (NI)
BP-	775	Katie Ryan	Military Cutoff & Destiny Way	Connectivity to trails, library, businesses, shopping, route to beach, residences, new development	2040 MTP (NI)
BP-	792	Karin Mills	Market St & Green Meadows Dr Crosswalk Improvement		2040 MTP (NI)
BP-	795	Shawn Spencer	Gordon Rd & Netherlands Dr Crossing Improvement	When Gordon Rd gets the MUP this will help people get to and from Park	2040 MTP (NI)
BP-	834	Patrick Boykin	Ocean Ave and Island Greenway Crossing Improvement		2040 MTP (NI)
BP-	838	Steve Whitney, Joe Boyd	Intersection of Rte 17 and Waterford Way/Ploof Road Crossing	This intersection was recenlty improved but failed to include pedestrian crossing signal. Not a safe crossing of Rte 17. Major new commercial and residentail development occuring at this location	2040 MTP (NI)

BP-	839	Steve Whitney	Intersection of Rte 17 and West Gate and Grandflora Blvd Crossing	This intersection connects major residential and commercial development. This is currently is not a safe bike/ped crossing	2040 MTP (NI)
BP-	843	Patrick Boykin	K Ave & US 421 Crossing Improvements		2040 MTP (NI)
BP-	845	Patrick Boykin	Harper and Canal Dr Intersection Improvements		Carolina Beach Pedestrian Plan
BP-	846	Patrick Boykin	St Joseph and Lake Park Blvd Intersection Crossing Improvements		Carolina Beach Pedestrian Plan
BP-	854	Patrick Boykin	Harper Ave and 7th Street Intersection Improvements		Carolina Beach Pedestrian Plan
BP-	NA	Steve Whitney	Belville Elementary Connector in Bellville (MUP)	This project would connect Belville Elementary School to residential areas in Belville, Leland and County	
BP-	NA	Steve Whitney	Brunswick Forest to Town Creek Park and Schools (MUP)	This MUP would make use of anew road from Bruswick Village Blvd. to Hewlett Burton Road, existing Hewlett Burton, Hazel's Branch Road, Zion Church Road, and new bike/ped paths along Rte 17. A pedestrian signal at Governors Road would lead to bike/ped path to Town Creek park and elementary and middle schools.	
BP-	NA	BPAC	Wrightsville Beach Bridge Sidewalk Realignment	Remove sidewalk from north side of bridge, shift travel lanes, provide 8' vertically separated sidewalk on south side.	

Bicycle and Pedestrian Modal Subcommittee Additional Project Submissions				
BP #		Submitter	Project	Rationale
BP-	49	Barnes Sutton	Peachtree Ave BikePed Improvement	Provide designated connection from S Kerr (BP 457) to Hugh McRae and the Municipal Golf Course
BP-	56	Patrick Boykin	Clarendon Ave MUP	CB Ped Plan
BP-	131	John Carter	Lossen Ln BikePed Improvement	Improved connectivity and safety between Greenfield Lake, CFMB, and downtown
BP-	146	Barnes Sutton	Halifax Rd BikePed Improvement	Based on the redevelopment of the mall to include residential and medical uses, a connection to Hugh McRae would be beneficial.
BP-	165	Al Schroetel	Navaho Trail MUP	Links numerous exiting communities and in conjunction with BP-275 creates a afe passage from Masonboro Loop to College Ave and there to schools and new library
BP-	194	Barnes Sutton	Indpendence Mall Frontage	Based on the redevelopment of the mall to include residential and medical uses, a connection to Hugh McRae would be beneficial.
BP-	212	Carol Stein	US Hwy 117 BikePed Improvement	Connects a growing area with businesses, schools, churches along this route. Provides safe and convenient route for area - needs to be included for future road enhancesments to hande increaslng volume
BP-	246	John Carter	Fort Fisher Blvd BikePed Improvement	Better bikeped connection from ferry terminal to Fort Fisher Rec area and Kure Beach
BP-	248	John Carter	Chappell Loop Rd BikePed Improvement	Connectivity completion (fills gap among other projects in Leland)
BP-	261	Barnes Sutton	Cedar Hill Rd MUP	Providing a MUP in an area of proposed high intensity commercial as well as high density residential where no current bicycle/pedestrian facilities exist
BP-	275	Al Schroetel	Landsdown Rd MUP	Creates a safe passge from Navaho Trail to S. College. Connects with BP-165 to create a safe passage form Masonboro Loop to S. College
BP-	281	John Sneed	Waynick Blvd	increased saftey for a high ped/bike traffic area
BP-	303	John Sneed	Dow Road Trail	increased conectivity for Pleasure Island
BP-	316	John Sneed	River to Sea Trail	increased connectivity DT to Beach
BP-	322	John Sneed	CB Waterfront Trail	increased connectivity for Pleasure Island
BP-	325	John Sneed	Wrightsville Beach Trail	increased connectivity DT to Beach
BP-	336	John Sneed	Airlie Road	increased connectivity DT to Beach
BP-	337	Patrick Boykin	Alabama Ave MUP	CB Ped Plan
BP-	349	John Sneed	Cape Fear Bld	increased conectivity for Pleasure Island
BP-	355	Carol Stein	Castle Hayne Rd Bike Lane (I-40 - Kerr)	This route is becoming an area of newer residential development. This is a very busy corridor that has seen several bike accidents as the road has no accomodation. A Church, School and many businesses are on this route.
BP-	370	John Carter	Front St Sharrow	Bike friendly improvements in high bike/ped use area
BP-	381	Al Schroetel	John D Barry Sharrow or Bike Lane	Links large area of Pine Valey to the new Pine Valley Library and also to BP-556 for safe passage to large communities further south without going on S. College Rd
BP-	409	Patrick Boykin	Saint Joseph St Bike Lanes and Sidewalk	CB Ped Plan
BP-	432	John Sneed	South Smith Creek Trail	Better access to SCP, the cross point for I-40/College at exit 420 would be better if it could be an underpass following the creek
BP-	437	Carol Stein	Castle Hayne Rd Bike Lane (Kerr-McRae)	Area of 4 bike crashes. Corridor from outskirts of downtown to Wrightsboro on Castle Hayne. Large neighborhood has been developed and is continuing. Corridor connects to Wrightsboro with several shopping areas.
BP-	441	John Sneed	Causeway DR	increased connectivity DT to Beach
BP-	457	Barnes Sutton	Kerr Ave Bike Lane (Patrick to Wrightsville)	A route running parallel to College with the assumption that College will continue to be the main artery for automobile traffic.
BP-	469	Patrick Boykin	Ocean Blvd MUP	CB Ped Plan
BP-	471	John Carter	Front St Sharrow	Bike friendly improvements in high bike/ped use area
BP-	551	Patrick Boykin	Central Lake Park Blvd Sidewalks (Atlanta to Alabama)	CB Ped Plan
BP-	580	Patrick Boykin	Carolina Beach Rd & Mateo Dr Crossing Improvement	
BP-	589	Vanessa Lacer	Carolina Beach Rd & Shipyard Crossing Improvement	Crosswalk inprovements would provide safer access to this intersection which is served by 3 bus routes. This interscection has also been the site of 21-45 pedestrian crashes.
BP-	594	Vanessa Lacer	Carolina Beach Rd & Independence Crossing Improvement	Crosswalk inprovements would provide safer passage across this intersection which is served by the 2nd highest ridership route (201) and provides food store access.
BP-	698	Vanessa Lacer	Market St & Barclay Hills Dr Crossing Improvement	Crosswalk would provide safe passage across Market St.and safe access to bus stops on either side of the street. This intersection is served by 4 bus routes (101, 105, 106, 108).
BP-	754	Vanessa Lacer	Princess Place Dr & 30th St Crossing Improvement	Crosswalk inprovements would provide safer passage across this intersection which is served by the highest ridership route (101) and has been the site of 35-75 pedestrian crashes.
BP-	788	Vanessa Lacer	3rd St & Brunswick Street Crossing Improvement	Croswalk improvements would allow safe passage from the Downtown business district to the new Downtown Transit Center (to be located at North 3rd and Campbell St).
BP-	849	Patrick Boykin		
BP-	851	Patrick Boykin		
BP-	852	Patrick Boykin		
BP-	853	Patrick Boykin		
BP-	179/209	Carol Stein	Hampstead Bypass Path	A multi-use Path folloiwng an existing powerline easement. Increased population in Pender County will benefit from a section of the county dedicated to exercise and avoids the US-17 business routings.
BP-	NA	Shawn Spencer		There needs to be a ped/bike crossing signal installed at Echo Farms and George Anderson as this will give access to Echo Farms Park to citizens on East side of 421 and access to XC Trail MUP on West side of 421
BP-	NA	Al Schroetel	Apache Trail MUP	Creates a way to get from Mohican Tr to Navaho Tr without going on Masonboro Loop. Links with BP-275 and BP-165 for safe way from Masonboro Loop to College Ave and to schools/new library
BP-	NA	Al Schroetel	Cape Fear River Crossing	Link with BP-268 to permit safe and convenient travel for cyclists and pedestriansbeween Leland / Navassa and Wilmington

Bicycle and Pedestrian Carryover Projects		
Staff Notes	**Project**	**Rationale**
DA Project	Clarendon Ave MUP	CB Ped Plan, Application for FY 2019 TASA-DA Funding
DA Project	Belville Elementary MUP	TIP: U-5527E
DA Project	College Rd and Holly Tree Ped Crossing	TIP: U-5534Q
DA Project	Rice Hope MUP	TIP: U-5534V
2018-2027 STIP	S. 17th Street MUP	TIP: EB-5600
2018-2027 STIP	Peachtree Avenue Bicycle Lane	TIP: EB-5719

BikePed Segments														
Project #	Project Name	Project Type	From	To	Segment Length (Ft)	Lane Width (Ft)	Median Width (Ft)	On Street Parking (Ft if applicable)	MUP (Width in Ft, if applicable)	Sidewalk (Width in Ft, if applicable)	Bike Lane (Width in Ft, if applicable)	Crosswalk (Width in Ft, if applicable)	Crosswalk (Type, painted or stamped, if applicable)	Type Section Detail #
BP-1	5th Ave Bike Lane	On Street Bike Lane	Cambell Street	Greenfield Lake Park	10,975						14.5' preferred from curb face to edge of bike lane			NHC Greenway Plan 5-48
BP-13	West Gate Park Connector	MUP	West Gate Dr	Wire Rd	3750				10' paved					Leland Ped Plan A-24
BP-14,285	Independence Blvd MUP Ph I	MUP	River Rd	US 421 (Carolina Beach Rd)	6520				10' paved					NHC Greenway Plan 5-7
BP-15	Independence Blvd MUP Ph II	MUP	Us 421 (Carolina Beach Rd)	S 17th St	4000				10' paved					NHC Greenway Plan 5-7
BP-16	Independence Blvd Extension MUP	MUP	Randall Pkwy	South of MLK Jr Pkwy	8350				10' paved					NHC Greenway Plan 5-7
BP-28	Causeway Dr Bicyclist Improvements	Streetscape/Road Diet	Airlie Rd	Waynick Blvd	7050	14' travel lane (1 per direction) with 11' center turn lane	None	8' (south side only)	12' paved					WB Community Plan Causeway Dr Alternative 2
BP-35	College Rd MUP Ph I	MUP	Hurst Dr	Randall Pkwy	3170				10' paved					
BP-36	College Rd MUP Ph II	MUP	Randall Pkwy	New Centre Dr	2500				10' paved					
BP-39	Burnt Mill Creek Path	MUP	Market ST	Archie Blue Park	6520				10' paved					NHC Greenway Plan 5-7, 3-21
BP-45	Wilshire Blvd BikePed Improvements	Bike Lanes and Sidewalk	Wrightsville Ave	Kerr Ave	5400					5' (Each Side)	4' (Each Side)			NHC Greenway Plan 5-47
BP-52	Oleander Dr BikePed Improvements	Bike Lanes and Sidewalk (from 39th St to 42nd St)	Hawthorne Rd	42nd St	5600					5' (Each Side)	5' (Each Side)			NHC Greenway Plan 5-47
BP-97	Plantation Road BikePed Improvements	MUP	Crooked Pine Rd	End of Plantation Rd (East End)	11000				10' paved					NHC Greenway Plan 5-7
BP-147	Central Blvd/Morningside Dr Bike Lanes	Sharrows/MUP	Burnett Blvd	Yaupon Dr	6100				10' paved					NHC Greenway Plan 5-7, 5-38
BP-178	Sidbury Rd BikePed Improvements	Bike Lanes and Sidewalks	US 17	Dairy Farm Rd	35000					5' (Each Side)	4' (Each Side)			Pender County Collector Street Plan Figure 24
BP-193	Lake Ave BikePed Improvements	Bike Lanes and Sidewalks (from Halifax to 41st St)	Hallifax Rd	College Rd	3250					5' (Each Side)	4' (Each Side)			NHC Greenway Plan 5-47
BP-206	Island Creek Rd BikePed Improvements	Bike Lanes and Sidewalks	US 17	Royal Oak Ct	18200					5' (Each Side)	4' (Each Side)			Pender County Collector Street Plan Figure 24
BP-233	Floral Pkwy BikePed Improvements	Bike Lanes and Sidewalks	Indpendence Mall Entrance	Wrightsville Ave	2660					5' (Each Side)	4' (Each Side)			NHC Greenway Plan 5-47
BP-237	Fletcher Rd NE MUP	MUP	Lanvale Rd NE	Northwest Township District Park	3300				10' paved					NHC Greenway Plan 5-7
BP-238	Brunswick Nature Park Connector II	MUP	Mallory Creek Dr	Brunswick Nature Park	13,850				10' paved					Leland Ped Plan A-24
BP-239	Brunswick Nature Park Connector I	MUP	US 17	Mallory Creek Dr	10,900				10' paved					Leland Ped Plan A-24
BP-240	Blackwell Rd SE Trail	MUP	NC 133/River Rd	Chappell Loop Rd SE	7300				10' paved					Leland Ped Plan A-24
BP-247	Sloop Point Loop Rd MUP	MUP	Country Club Dr	US 17	21500				10' paved					Pender County Collector Street Plan Figure 27
BP-249	Jackey's Creek Connector MUP	MUP	Jackeys Creek Ln	Night Harbor Dr SE	1,000				10' paved					Leland Ped Plan A-24
BP-268	Leland/Wilmington BikePed Connection	MUP	Village Rd	3rd St	16,450				12' paved					*Will need to be physically separated due to access controlled facility running parallel.
BP-269	Masonboro Loop Trail II	MUP	Navaho Trl	College Rd/NC 132	17,100				10' paved					NHC Greenway Plan 5-7
BP-270	3rd Street MUP	MUP	Us 421 (Carolina Beach Rd)	Market Street	8,950				10' paved					NHC Greenway Plan 5-7

BP-273	Country Club MUP	MUP	US 17	Sloop Point Loop Rd	18,000				10' paved					Pender County Collector Street Plan Figure 27
BP-276	River Rd MUP	MUP	Village Rd	WMPO Boundary	40,000				10' paved					Leland Ped Plan A-24
BP-277	Masonboro Loop Trail I	MUP	Hugh McRae Park	Navaho Trl	18,500				10' paved					NHC Greenway Plan 5-7
BP-280	College Acres MUP	MUP	Oriole Dr	College Rd	5,100				10' paved					NHC Greenway Plan 5-7
BP-282	South River Rd Trail I	MUP	Us 421 (Carolina Beach Rd)	River Rd	5,000				10' paved					NHC Greenway Plan 5-7
BP-286	Ploof Rd Path	MUP	US 17	Chappell Loop Rd SE	3,700				10' paved					Leland Ped Plan A-24
BP-297	Village Rd Loop	MUP/Shoulder Bicycle Lanes/Sharrows			19,060				10' paved		4'			Leland Bike Plan 3-8 #1
BP-298	Chappell Loop	Shoulder Bicycle Lanes/Sharrows	Blackwell Rd	River Rd	12,600						4'			Leland Bike Plan 3-9 #2 (Chappell Loop Rd SE and neighborhood connections only--Blackwell Rd and NC 133 addressed in other projects)
BP-300	Porters Neck Rd Trail	MUP	Bald Eagle Ln	Future Passive Park	31,680				10' paved					NHC Greenway Plan 5-7
BP-301	I-140 East Trail	MUP	Market St	Murrayville Rd	36,000				10' paved					NHC Greenway Plan 5-7
BP-304	Snow's Cut Bike/Ped Bridge	Bike/Ped Bridge	Soundside Dr	Bridge Barrier Rd	3,170									
BP-305	South Carolina Beach Rd Trail	MUP	Sanders Rd	River Rd	24,300				10' paved					NHC Greenway Plan 5-7
BP-306	South River Rd Trail II	MUP	Sanders Rd	Soundside Dr	31,500				10' paved					NHC Greenway Plan 5-7
BP-307	Carolina Beach Rd Trail	MUP	17th St	Sanders Rd	29,600				10' paved					NHC Greenway Plan 5-7
BP-308	Shipyard Trail	MUP	River Rd	Hugh McRae Park	19,000				10' paved					NHC Greenway Plan 5-7
BP-323	Western Rail Corridor Trail	MUP	New Hanover County Line	US HWY 421	9,500				10' paved					NHC Greenway Plan 5-10
BP-324	US HWY 421 Trail	MUP	Sutton Steam Plant Rd	Battleship Park	23,500				10' paved					NHC Greenway Plan 5-7
BP-326	Rogersville Rd Trail	MUP	Eastwood Rd	Wrightsville Ave	4,230				10' paved					NHC Greenway Plan 5-7
BP-341	Bayfield Dr Sharrow	Sharrows	Bayshore Dr	Porters Neck Rd	7,200									NHC Greenway Plan 5-38
BP-344	Blue Clay Rd Bicycle Lanes I	Bicycle Lanes	Holly Shelter Rd	Sidbury Rd	11,400						4' (Each Side)			NHC Greenway Plan 5-46
BP-345	Blue Clay Rd Bicycle Lanes II	Bicycle Lanes	Sidbury Rd	Proposed Rail Trail Corridor	11,650						4' (Each Side)			NHC Greenway Plan 5-46
BP-373	Gordon Rd BikePed Improvements	Bike Lanes and Sidewalks	College Rd	Military Cutoff Rd	14,600					5' (Each side)	4' (Each Side)			
BP-376	Holly Shelter Rd BikePed Improvements	Bike Lanes and Sidewalks	Blue Clay Rd	Royal Oak Ct	33,800					5' (Each side)	4' (Each Side)			Pender County Collector Street Plan Figure 24
BP-396	Military Cutoff Bike Lanes	Bicycle Lanes	Wrightsville Ave	Eastwood Rd	3200						5' (Each Side)			NHC Greenway Plan 5-47
BP-397	New Centre Dr Bicycle Lanes I	Bicycle Lanes	College Rd	Terminus	2100						5' (Each Side)			NHC Greenway Plan 5-47
BP-398	New Centre Dr BikePed Improvements	Bicycle Lanes and Sidewalks (Sigmon Rd to Market St)	College Rd	Columb Dr	5550					5' (Each side, approxi	5' (Each Side)			NHC Greenway Plan 5-47
BP-406	Princess Street Sharrows	Sharrow	5th St	20th St	6,070									NHC Greenway Plan 5-38
BP-411	Sidbury Rd BikePed Improvements	Bike Lanes and Sidewalks	US 17	Dairy Farm Rd	3,800					5' (Each Side)	4' (Each Side)			Pender County Collector Street Plan Figure 24
BP-423	Market St Rail Trail	MUP	Cape Harbor Dr	Porters Neck Rail Trail	26,400				10' paved					NHC Greenway Plan 5-9

BP-426	North Smith Creek Trail	MUP	Smith Creek Park	Northchase Pkwy	27,980				10' paved					NHC Greenway Plan 5-7
BP-430	North River Rd Trail (Remaining Section)	MUP	Independence Blvd	Sanders Rd	9,480				10' paved					NHC Greenway Plan 5-7
BP-433	Myrtle Grove Rd Trail	MUP	Carolina Beach Rd/College Rd	Carolina Beach Rd	22,700				10' paved					NHC Greenway Plan 5-7
BP-442	Lumina Ave Sharrows	Sharrow	Salisbury St	Causeway Dr	12,300									NHC Greenway Plan 5-38
BP-456	College Rd Bike Lanes	Bicycle Lanes	Market ST	Shipyard Blvd	17,000						5' (Each Side)			NHC Greenway Plan 5-47
BP-458	Wrightsville Avenue BikePed Improvements	Bicycle Lanes and Sidewalks	Dawson St	Wood Dale Dr	15,500					5' (Each Side)	5' (Each Side)			NHC Greenway Plan 5-47
BP-464	Carolina Beach Rd BikePed Improvements	Bicycle Lanes and Sidewalks	Burnett Blvd	St Andrews Dr	21,800					5' (Each Side)	5' (Each Side)			NHC Greenway Plan 5-47
468a	Downtown Trail Greenway (Phase I, Riverfront Boardwalk to Bess St)	MUP	Riverfront Boardwalk	Bess St	6,600				10' paved					NHC Greenway Plan 5-7, 5-10
468b	Downtown Trail Greenway (Phase II, Nutt St to Burnt Mill Creek)	MUP	Nutt St	Burnt Mill Creek	9,000				10' paved					NHC Greenway Plan 5-7, 5-10
469	Ocean Blvd MUP	MUP	S. Lake Park Blvd	Dow Rd	4300				10' paved					NHC Greenway Plan 5-7
556	17th St NHC Library Connection	MUP	John Barry Dr	Pine Valley Branch Library	2100				10' paved					NHC Greenway Plan 5-7
559	Cross City Trail MUP	MUP	S Kerr Ave	College Rd	3300				10' paved					NHC Greenway Plan 5-7

BikePed Intersections									
Intersection Project #	Project Name	Project Type	Curb Ramps (each)	Pedestrian Signals (each)	MUP (Width in Ft)	Sidewalk (Ft)	Crosswalk Length (Ft)	Crosswalk (Width in Ft)	Crosswalk (Painted or stamped)
560	US 421/Carolina Beach Rd and Halyburton Pkwy BikePed Crossing Improvements	BikePed Crossing at signalized intersection	10	8	10' paved (Future)		350	10	painted
561	Carolina Beach Rd & Myrtle Grove Rd	BikePed Crossing at signalized intersection	4	4			250	10	painted
563	Causeway Dr & Salisbury St	Crosswalk Improvement	4	4			200	10	painted
574	Drysdale Dr & Military Cutoff Rd	Crosswalk Improvement	4	Not signalized			115	10	painted
577	Bayshore Dr & Market St	Crosswalk Improvement	4	6			300	10	painted
579	Military Cutoff Rd & Station Rd	Crosswalk Improvement	4	4			118	10	painted
581	Carolina Beach Rd & College Rd	Crosswalk Improvement	8	8			620	10	painted
584	College Rd & Shopping Center Entrance	Crosswalk Improvement	6	6			350	10	painted
590	Military Cutoff Rd & Wrightsville Ave	Crosswalk Improvement	2	2			85	10	painted
591	Greenville Loop Rd. & Oleander Dr.	Greenway Crosswalk Improvement	2	2			90	10	painted
597	17Th St & Glen Meade Rd	Crosswalk Improvement	4	8			360	5	painted
604	Lewis Dr & Lake Park Blvd	Crosswalk Improvement	6	6			250	10	painted
619	Carolina Beach Rd & Antoinette Dr	Crosswalk Improvement	8	8			375	10	painted
625	Sanders Rd & River Rd	Crosswalk Improvement	6	6			100	5	painted
626	River Rd & Carolina Beach Rd	Crosswalk Improvement	6	6			275	10	painted
627	Piner Rd & Myrtle Grove Rd	Crosswalk Improvement	6	6			120	5	painted
633	Military Cutoff Rd & Cayman Court	BikePed Crossing at signalized intersection	4	4			112	10	painted

635	Parker Farm Dr & Military Cutoff Rd	Crossing/Pedestrian Signal	2	2			132	10	painted
636	University Drive & S College Rd	Crosswalk Improvement	2	3			200	10	painted
639	S 21st St & Market St	Crosswalk Improvement	2	4			40	5	painted
642	Eastwood Rd & Bay Creek Dr	Pedestrian Crossing (in-place)		In Place			NA		
644	Causeway Dr & LuminaSt	Crosswalk Improvement		In Place			NA		
646	College rd & Oleander Dr	Crossing/Pedestrian Signal	8	8			450	10	painted
647	Market St & Gordon Rd	Crossing/Pedestrian Signal	8	8			500	5	painted
648	Military Cuttoff Rd & Eastwood Rd	Pedestrian Crossing (in-place)		In Place			NA		
649	New Centre Dr & N College Rd	Crossing/Pedestrian Signal	in-place	3			475	5	painted
661	COLLEGE RD & RANDALL PKWY	Crosswalk Improvement	in-place	In Place			NA		
669	3RD ST & DAWSON ST	Crosswalk Improvement	2	6			220	5	painted
681	OLEANDER DR & DAWSON ST	Crosswalk Improvement	8	8			300	5	painted
700	MARKET ST & LULLWATER DR	Crosswalk Improvement	In-place				NA		
722	3RD ST N & RED CROSS ST	Crosswalk Improvement	In-place				NA		
744	10TH ST & DAWSON ST	Crosswalk Improvement	4	6			165	5	painted
765	10TH ST & WOOSTER ST	Crosswalk Improvement	4	6			165	5	painted
774	MILITARY CUTOFF RD & SIR TYLER DR/MAIN ST	Crosswalk Improvement	4	4			132	5	painted
775	MILITARY CUTOFF RD & DESTINY WAY_FRESCO DR	Crosswalk Improvement	4	4			132	5	painted
792	US 17/MARKET ST & N GREEN MEADOWS DR	Crosswalk Improvement	4	4			160	5	painted
795	GORDON RD & NETHERLANDS DR	Crosswalk Improvement	4	4			160	5	
834	Ocean Ave & Island Greenway	Crosswalk Improvement		Not signalized			25	10	painted
838	US 17 & OLDE WATERFORD WY/PLOOF RD SE	Crosswalk Improvement	4	4			280	5	painted

839	US 17 & W GATE DR/GRANDIFLORA DR	Crosswalk Improvement	6	6			350	5	painted
843	K AVE & 421	Crosswalk Improvement	9	8			260	10	painted
845	Harper and Canal Intersection Improvements	Crosswalk Improvement	2	2			in place	NA	
846	St. Joseph and Lake Park Intersection Improvements	Crosswalk Improvement	in-place	Not signalized			40	5	painted
854	Harper Ave and 7th St Intersection Improvements	Crosswalk Improvement	NA	Not signalized			40	5	painted

Multi-Use Paths

A multi-use path (also known as a greenway or shared-use path) allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of multi-use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.

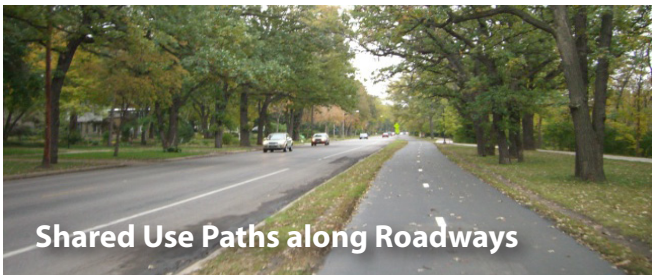
This Section Includes:

- General Design Practices
- Trails in River and Utility Corridors
- Trails in Abandoned Rail Corridors
- Trails in Existing Active Rail Corridors
- Shared Use Paths Along Roadways
- Natural Surface Trails
- Boardwalks
- Trail Bridges
- Local Neighborhood Accessways


General Design Practices


Trails in River and Utility Corridors


Trails in Abandoned Rail Corridors


Shared Use Paths along Roadways


Natural Surface Trails


Local Neighborhood Accessways

Multi-Use Paths

General Design Practices

Description

Multi-use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

Guidance

Width

- 8 feet is the minimum allowed for a two-way path and is only recommended for low traffic situations or under certain design constraints.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- Where there is not enough shoulder to meet off-sets at the top of a slope, consider the use of dense shrubbery (see image at right).

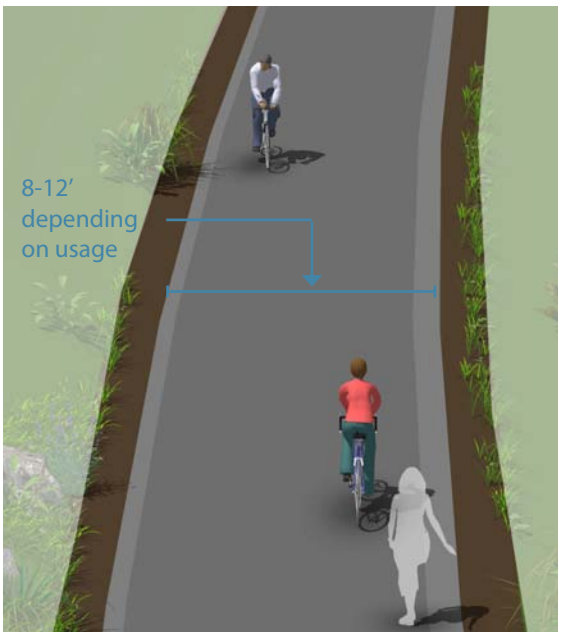
Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.



Discussion

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared use paths along roadways. Also known as "sidepaths", these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding when either entering or exiting the path.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-Use Paths

Paths in River and Utility Corridors

Guidance

Multi-use paths in utility corridors should meet or exceed **general design practices**. If additional width allows, wider paths, and landscaping are desirable.

Access Points

Any access point to the path should be well-defined with appropriate signage designating the pathway as a bicycle facility and prohibiting motor vehicles.

Path Closure

Public access to the 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

Duke Energy/Progress Energy Transmission ROWs

In 2012, Duke Energy/Progress Energy held a special workshop to address trails in transmission ROWs. A copy of the current Duke Energy Electric Transmission Rights-of-Way Guidelines/Restrictions for North Carolina is available at www.duke-energy.com/safety/right-of-way-management/transmission-restrictions.asp. A summary of the workshop findings may be obtained from Mecklenburg County (who hosted the workshop): Mecklenburg County Park and Recreation, 5841 Brookshire Boulevard, Charlotte, NC 28216; (704) 432-1570; Gwen.Cook@MecklenburgCountyNC.gov.

Description

Utility and waterway corridors often offer excellent path development and bikeway gap closure opportunities. Utility corridors typically include powerline and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.

Discussion

Similar to railroads, public access to flood control channels or canals is undesirable by all parties. Hazardous materials, deep water or swift current, steep, slippery slopes, and debris all constitute risks for public access. Appropriate fencing may be required to keep path users within the designated travel way. Creative design of fencing is encouraged to make the path facility feel welcoming to the user.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-Use Paths

Paths in Abandoned Rail Corridors

Guidance

Multi-use paths in abandoned rail corridors should meet or exceed **general design practices**. If additional width allows, wider paths, and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

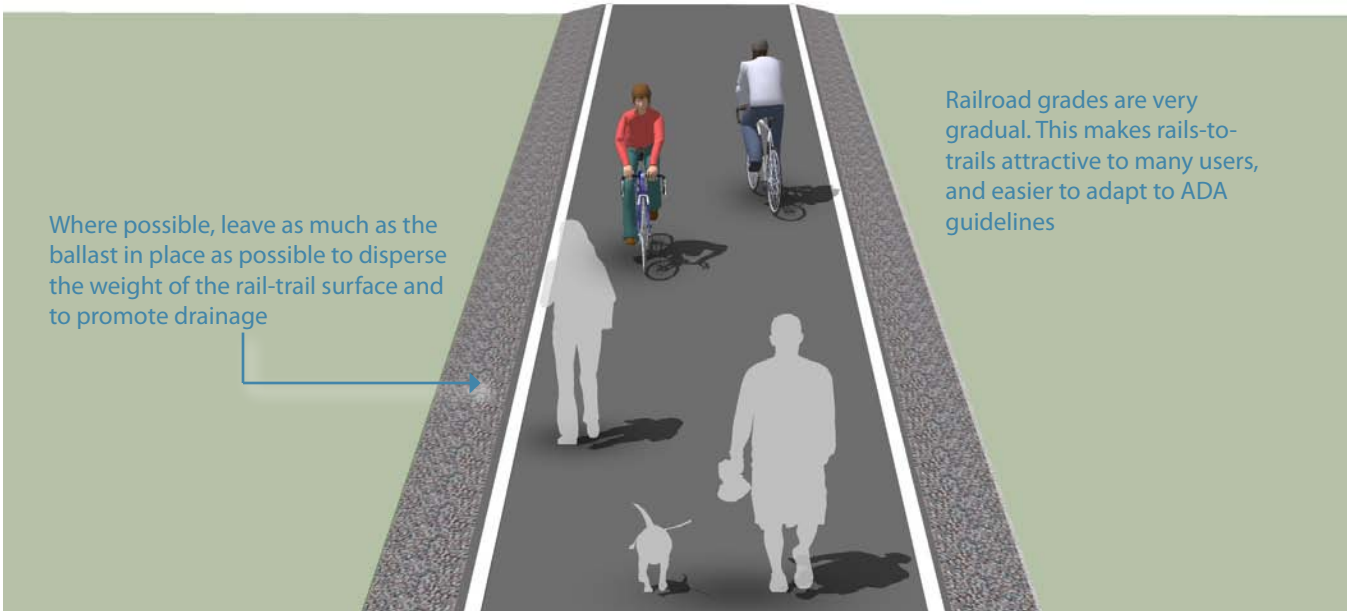
If converting a rail bed adjacent to an active rail line, see **Paths in Existing Active Rail Corridors**.

Description

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

In some cases, rail owners may rail-bank their corridors as an alternative to a complete abandonment of the line, thus preserving the rail corridor for possible future use.

The railroad may form an agreement with any person, public or private, who would like to use the banked rail line as a trail or linear park until it is again needed for rail use. Municipalities should acquire abandoned rail rights-of-way whenever possible to preserve the opportunity for trail development.



Discussion

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum path widths, but often lack preferred shoulder and lateral clearance widths.

Rail-to-trails can involve many challenges including the acquisition of the right of way, cleanup and removal of toxic substances, and rehabilitation of tunnels, trestles and culverts. A structural engineer should evaluate existing railroad bridges for structural integrity to ensure they are capable of carrying the appropriate design loads.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-Use Paths

Paths in Existing Active Rail Corridors

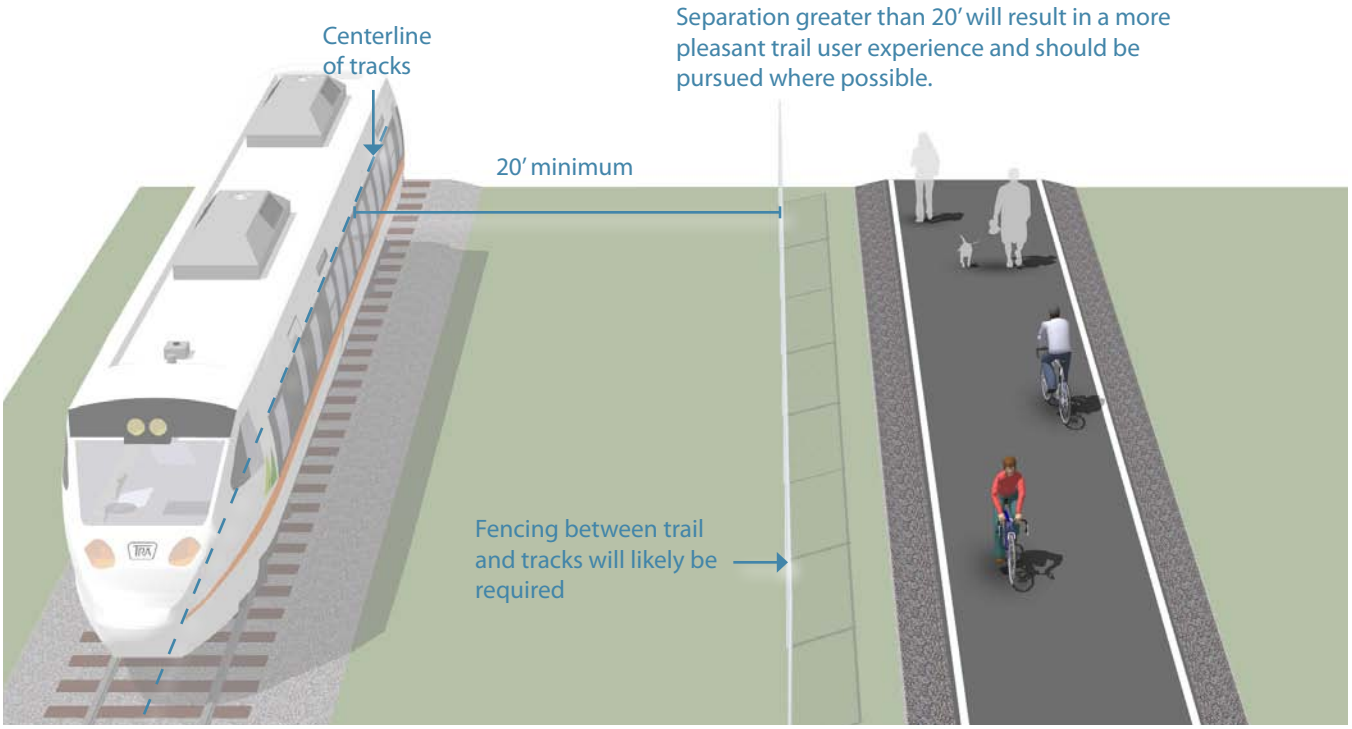
Guidance

Multi-use paths in utility corridors should meet or exceed **General Design Practices**. If additional width allows, wider paths, and landscaping are desirable.

If required, fencing should be a minimum of 5 feet in height with higher fencing 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.

Description

Rails-with-Trails projects typically consist of paths adjacent to active railroads. It should be noted that some constraints could impact the feasibility of rail-with-trail projects. In some cases, space needs to be preserved for future planned freight, transit or commuter rail service. In other cases, limited right-of-way width, inadequate setbacks, concerns about safety/trespassing, and numerous mid-block crossings may affect a project's feasibility.



Discussion

Railroads typically require fencing with all rail-with-trail projects. Concerns with trespassing and security can vary with the amount of train traffic on the adjacent rail line and the setting of the bicycle path, i.e. whether the section of track is in an urban or rural setting.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
FHWA. (2002). Rails-with-Trails: Lessons Learned.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-Use Paths

Shared Use Paths Along Roadways

Description

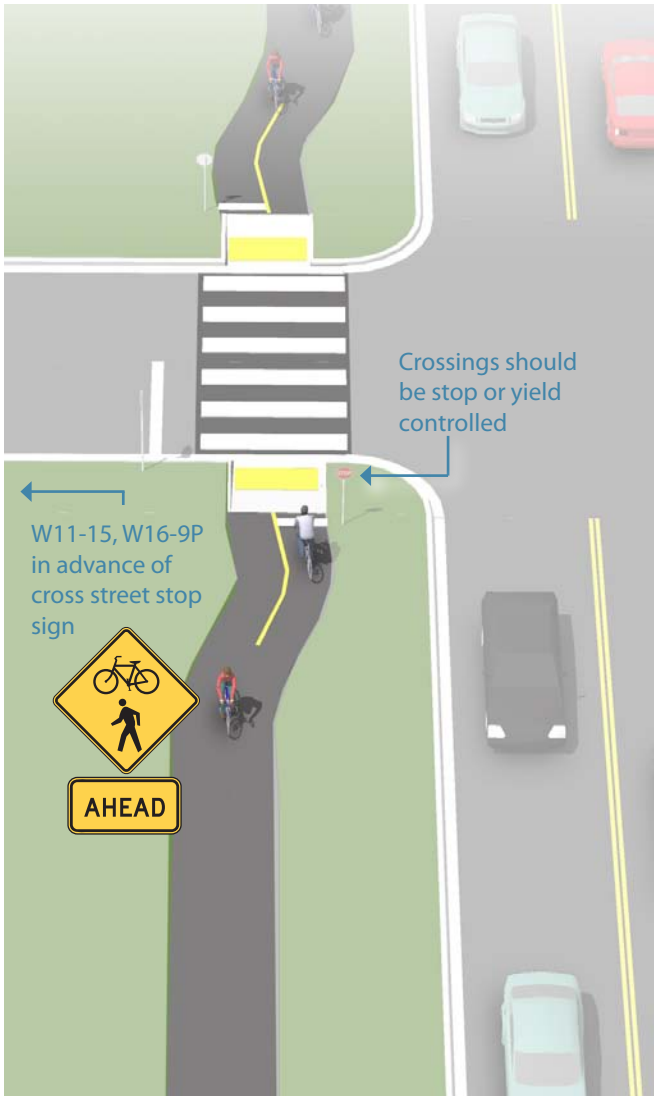
A shared use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path.

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared-use paths directly adjacent to roadways.

Guidance

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations or under certain design constraints.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.
- Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.



Discussion

When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are cycling for transportation purposes.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
NACTO. (2012). Urban Bikeway Design Guide. See entry on Raised Cycle Tracks.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

Multi-Use Paths

Natural Surface Trails

Guidance

Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.

Base preparation varies from machine-worked surfaces to those worn only by usage.

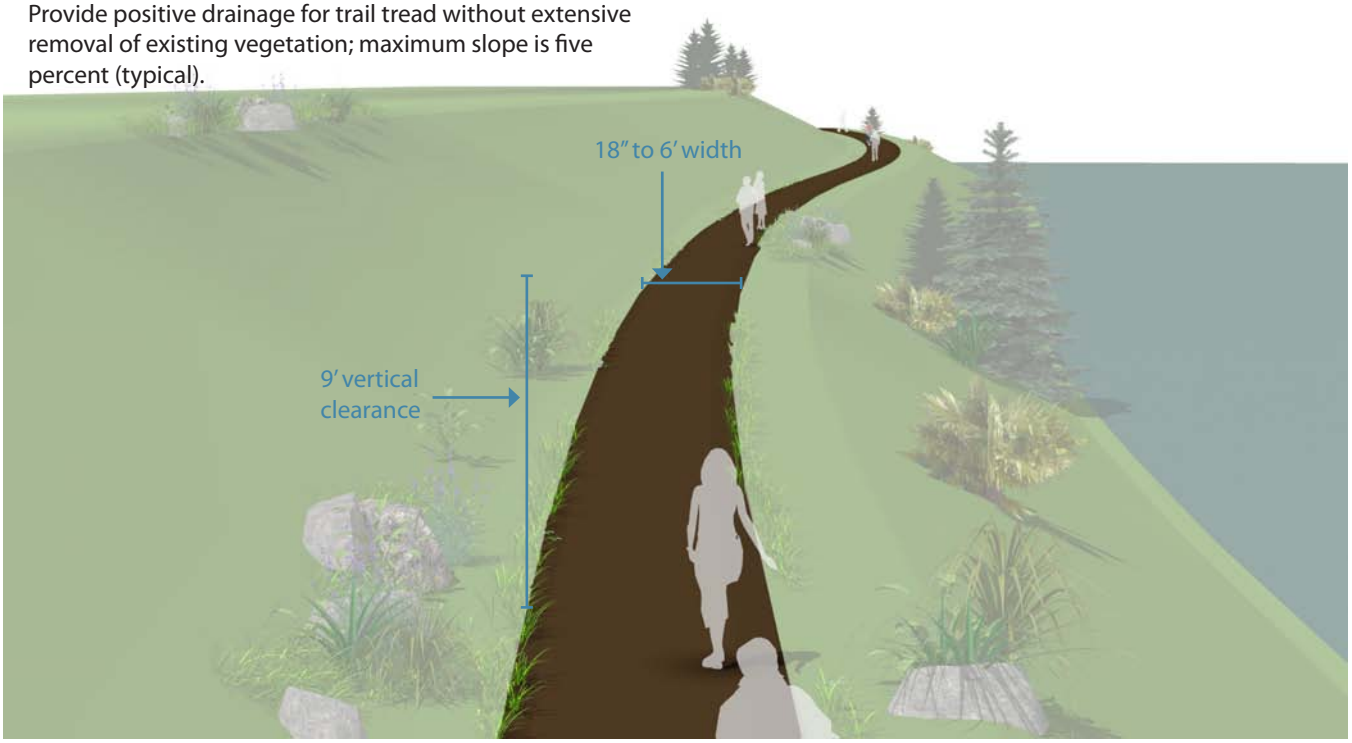
Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.

Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).

Description

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Guidance presented in this section does not include considerations for bicycles. Natural surface trails designed for bicycles are typically known as single track trails.



Discussion

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.

Additional References and Guidelines

Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

Materials and Maintenance

Consider implications for accessibility when weighing options for surface treatments.

Multi-Use Paths

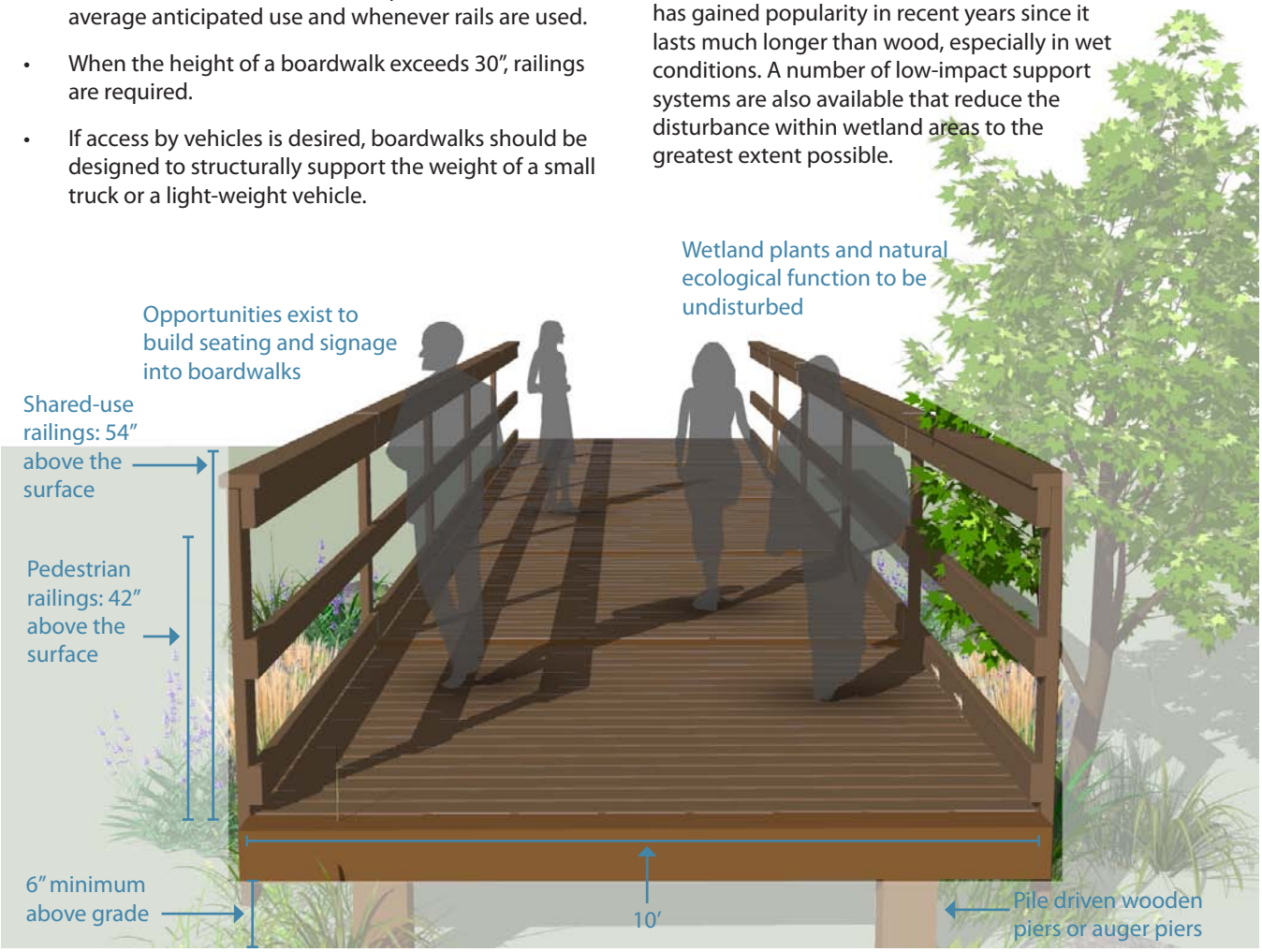
Boardwalks

Guidance

- Boardwalk width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with average anticipated use and whenever rails are used.
- When the height of a boardwalk exceeds 30", railings are required.
- If access by vehicles is desired, boardwalks should be designed to structurally support the weight of a small truck or a light-weight vehicle.

Description

Boardwalks are typically required when crossing wetlands or other poorly drained areas. They are usually constructed of wooden planks or recycled material planks that form the top layer of the boardwalk. The recycled material has gained popularity in recent years since it lasts much longer than wood, especially in wet conditions. A number of low-impact support systems are also available that reduce the disturbance within wetland areas to the greatest extent possible.



Discussion

In general, building in wetlands is subject to regulations and should be avoided.

The foundation normally consists of wooden posts or auger piers (screw anchors). Screw anchors provide greater support and last much longer.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2001). Wetland Trail Design and Construction.

Materials and Maintenance

Decking should be either non-toxic treated wood or recycled plastic. Cable rails are attractive and more visually transparent but may require maintenance to tighten the cables if the trail has snow storage requirements.

Multi-Use Paths

Trail Bridges

Guidance

- The clear width of thr bridge should allow for 2 ft of clearance on each end of the pathway.
- Bridge deck height should match that of the path surface to provide a smooth transition.
- Bicycle and shared-use paths should include a 54" guard rail where hazardous conditions exist.
- A minimum vertical clearance of 10 ft is desirable for motor vehicle access. Minimum height is 42 inches.
- Maximum opening between railing posts is 6 inches.
- A trail bridge should support 6.25 tons if motor vehicle access is permitted. (AASHTO 2002)

Description

Multi-Use Trail bridges (also 'bicycle/pedestrian bridges' or 'footbridges') are most often used to provide trail access over natural features such as streams and rivers, where a culvert is not an option. The type and size of bridges can vary widely depending on the trail type and specific site requirements. Some bridges often used for multi-use trails include suspension bridges, prefabricated span bridges and simple log bridges. When determining a bridge design for multi-use trails, it is important to consider emergency and maintenance vehicle access.

Discussion

If a corridor already contains a bridge such as an abandoned rail bridge, an engineer should be consulted to assess the structural integrity before deciding to remove or reuse it.

All abutment design should be sealed by a qualified structural engineer and all relevant permits should be filed.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
AASHTO. (2012). Bridge Design Specifications.
AASHTO. (2009). Guide Specifications for Design of Pedestrian Bridges.
AASHTO. (2002). Standard Specifications for Highway Bridges.

Materials and Maintenance

High quality prefabricated pedestrian bridges available.

Multi-Use Paths

Local Neighborhood Accessways

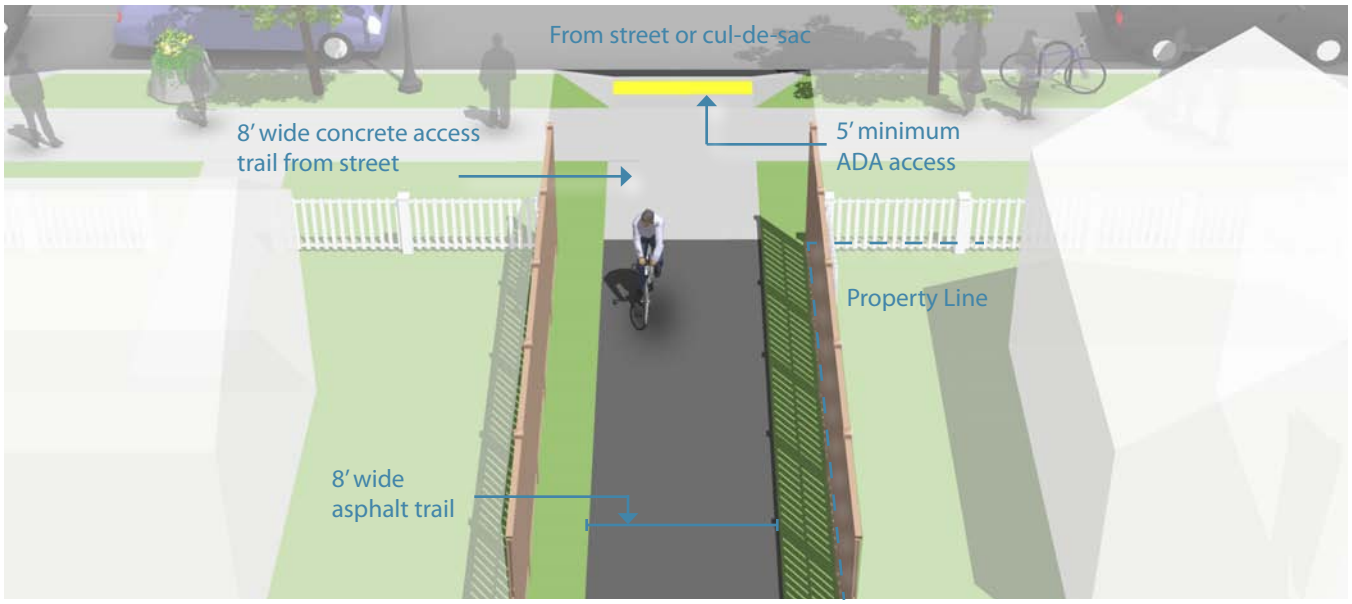
Guidance

- Neighborhood accessways should remain open to the public.
- Trail pavement shall be at least 8' wide to accommodate emergency and maintenance vehicles, meet ADA requirements and be considered suitable for multi-use.
- Trail widths should be designed to be less than 8' wide only when necessary to protect large mature native trees over 18" in caliper, wetlands or other ecologically sensitive areas.
- Access trails should slightly meander whenever possible.

Description

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, greenspaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, typically having their own rights-of-way and easements.

Additionally, these smaller trails can be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.



Discussion

Neighborhood accessways should be designed into new subdivisions at every opportunity and should be required by City/County subdivision regulations.

For existing subdivisions, Neighborhood and homeowner association groups are encouraged to identify locations where such connects would be desirable. Nearby residents and adjacent property owners should be invited to provide landscape design input.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
FHWA. (2006). Federal Highway Administration University Course on Bicycle and Pedestrian Transportation. Lesson 19: Greenways and Shared Use Paths.

Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

MULTI-USE PATHS

A multi-use path (also known as a greenway) allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Trail facilities can also include amenities such as lighting, signage, and fencing (where appropriate). Key features of multi-use paved trails include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the trail.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the trail where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.


General Design Practices


Trails Along Roadways


Natural Surface Trail


Boardwalks

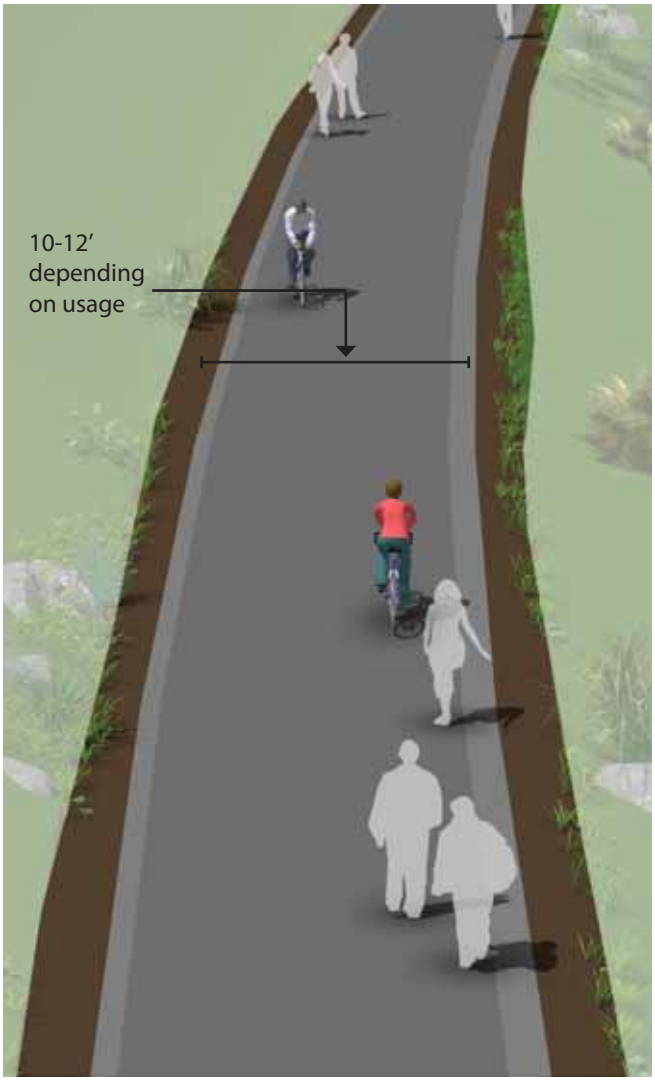

Trail/Roadway Crossings


Bridges

MULTI-USE PATHS

Description

Multi-use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle trails should generally provide directional travel opportunities not provided by existing roadways.



Guidance

Width

- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

Lateral Clearance

- A 2 foot or greater shoulder on both sides of the trail should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- If bollards are used at intersections and access points, they should be colored brightly and/or supplemented with reflective materials to be visible at night.

Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Discussion

Terminate the trail where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.

Additional References

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
FHWA. *Manual on Uniform Traffic Control Devices.* 2009.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

MULTI-USE PATHS ALONG ROADWAYS

Description

Multi-use paths along roadways, also called sidepaths, are a type of trail that run adjacent to a street.

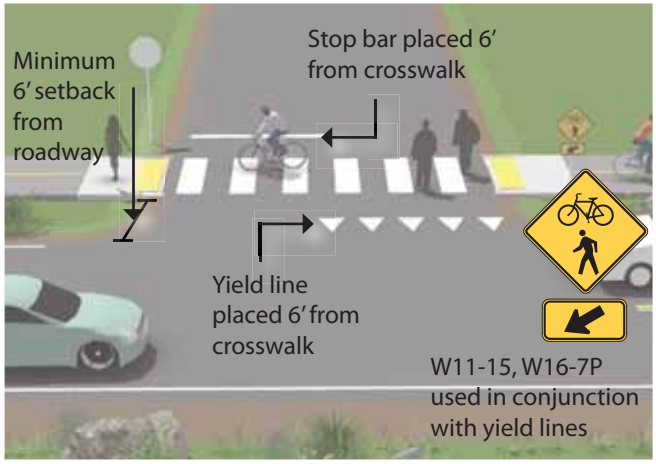
- Because of operational concerns it is generally preferable to place trails within independent rights-of-way away from roadways. However, there are situations where existing roads provide the only corridors available.
- Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the trail.
- The AASHTO Guide for the Development of Bicycle Facilities cautions practitioners of the use of two-way sidepaths on urban or suburban streets with many driveways and street crossings.

In general, there are two approaches to crossings: adjacent crossings and setback crossings, illustrated below.

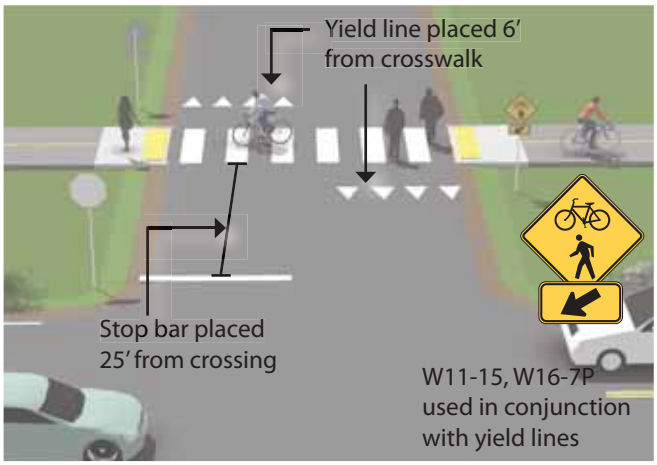
Guidance

- Guidance for sidepaths should follow that for general design practises of multi-use trails.
- A high number of driveway crossings and intersections create potential conflicts with turning traffic. Consider alternatives to sidepaths on streets with a high frequency of intersections or heavily used driveways.
- Where a sidepath terminates special consideration should be given to transitions so as not to encourage unsafe wrong-way riding by bicyclists.
- Crossing design should emphasize visibility of users and clarity of expected yielding behavior. Crossings may be STOP or YIELD controlled depending on sight lines and bicycle motor vehicle volumes and speeds.

Adjacent Crossing - A separation of 6 feet emphasizes the conspicuity of riders at the approach to the crossing.



Setback Crossing - A set back of 25 feet separates the trail crossing from merging/turning movements that may be competing for a driver's attention.



Discussion

The provision of a multi-use paved trail adjacent to a road is not a substitute for the provision of on-road accommodation such as paved shoulders or bike lanes, but may be considered in some locations in addition to on-road bicycle facilities. To reduce potential conflicts in some situations, it may be better to place one-way sidepaths on both sides of the street.

Additional References

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
NACTO. *Urban Bikeway Design Guide.* See entry on Raised Cycle Tracks. 2012.

Materials and Maintenance

Asphalt is the most common surface for bicycle trails. The use of concrete for trails has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of trail users.

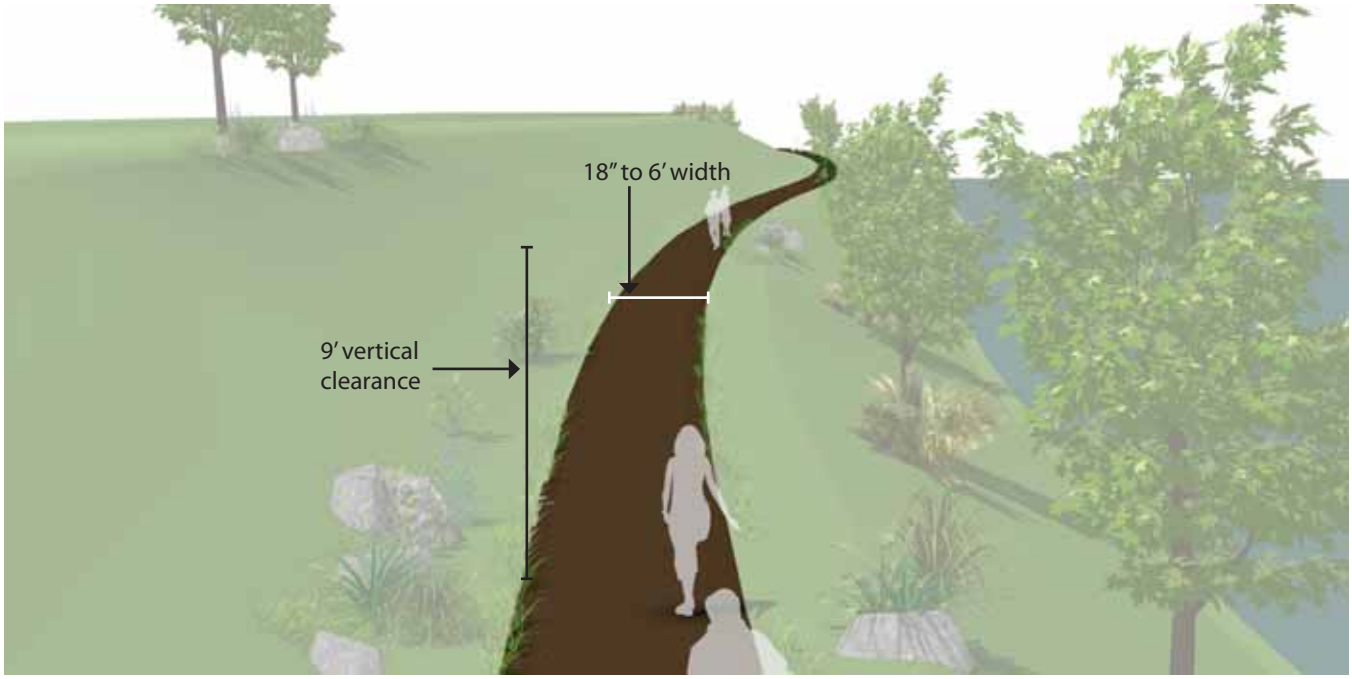
NATURAL SURFACE TRAIL

Description

Sometimes referred to as footpaths, hiking trails or single track trails, the soft surface multi-use trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Guidance

- Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.
- Mountain bike trails are typically 18-24 inches wide and have compacted bare earth or leaf litter surfacing.
- Base preparation varies from machine-worked surfaces to those worn only by usage.
- Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (a.k.a. "crush and run") that contains about 4% fines by weight, and compacts with use.
- Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent (typical).



Discussion

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion. Due to their narrow width and ability to contour with the natural topography, single-track mountain bike trails typically require the least amount of disturbance and support features of all types of trails.

Additional References

IMBA. *Managing Mountain Biking.* 2007.
IMBA. *Trail Solutions.* 2004.
Flink, C. *Greenways: A Guide To Planning Design And Development.* 1993.

Materials and Maintenance

Consider implications for accessibility when weighing options for surface treatments.

BOARDWALKS

Description

Boardwalks are typically required when crossing wetlands or other poorly drained areas. They are usually constructed of wooden planks or recycled material planks that form the top layer of the boardwalk. The recycled material has gained popularity in recent years since it lasts much longer than wood, especially in wet conditions. A number of low-impact support systems are also available that reduce the disturbance within wetland areas to the greatest extent possible.

Guidance

- Boardwalk width should be a minimum of 10 feet when no rail is used. A 12 foot width is preferred in areas with average anticipated use and whenever rails are used.
- When the height of a boardwalk exceeds 30", railings are required.
- If access by vehicles is desired, boardwalks should be designed to structurally support the weight of a small truck or a light-weight vehicle.

Discussion

In general, building in wetlands is subject to regulations and should be avoided.

The foundation normally consists of wooden posts or auger piers (screw anchors). Screw anchors provide greater support and last much longer.

Additional References

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.

FHWA. *Wetland Trail Design and Construction.* 2007.

Materials and Maintenance

Decking should be either non-toxic treated wood or recycled plastic. Cable rails are attractive and more visually transparent but may require maintenance to tighten the cables if the trail has snow storage requirements.

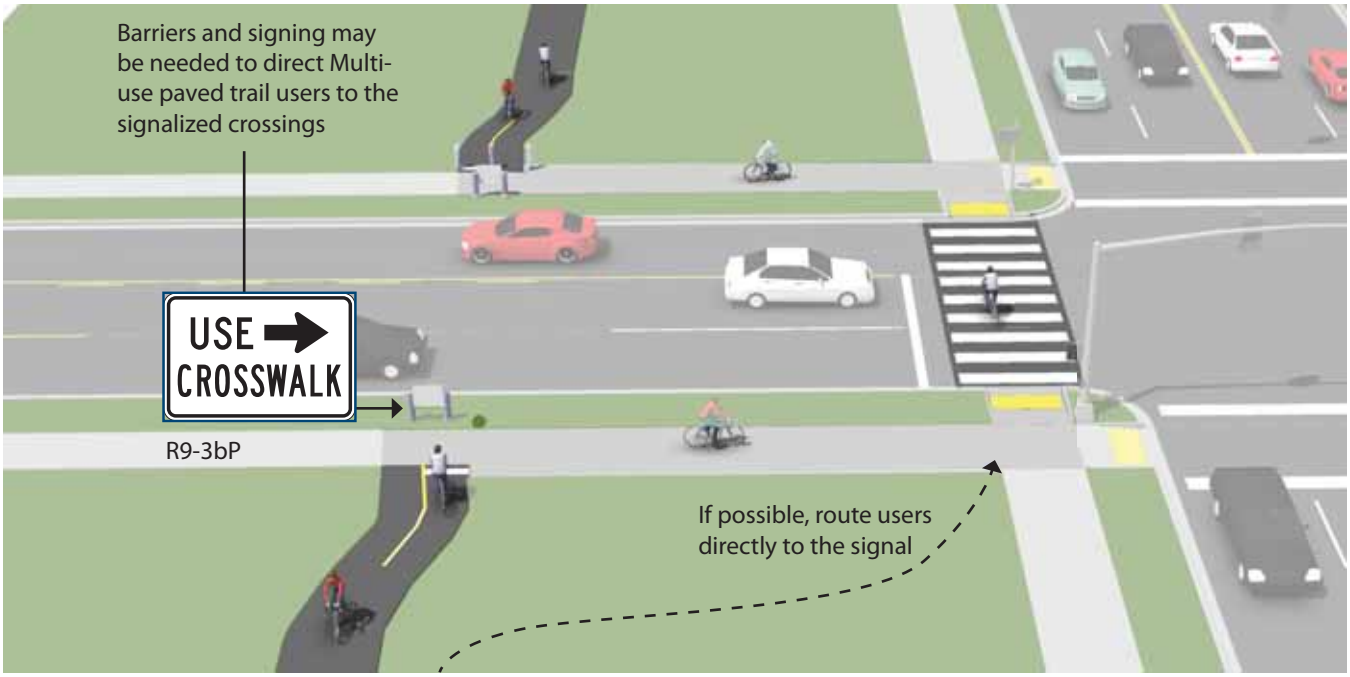
TRAIL/ROADWAY CROSSINGS: ROUTE USERS TO SIGNALIZED CROSSINGS

Description

Trail crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct trail users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.

Guidance

» Trail crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route trail directly to the signal.



Discussion

In the US, the minimum distance a marked crossing can be from an existing signalized intersection varies from approximately 250 to 660 feet. Engineering judgement and the context of the location should be taken into account when choosing the appropriate allowable setback. Pedestrians are particularly sensitive to out of direction travel and jaywalking may become prevalent if the distance is too great.

Additional References

AASHTO. *Guide for the Development of Bicycle Facilities.* 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* 2004.

Materials and Maintenance

If a sidewalk is used for crossing access, it should be kept clear of snow and debris and the surface should comply with ADA and PROWAG requirements and guidance

TRAIL/ROADWAY CROSSINGS: OVERCROSSINGS

Description

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, 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. There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group grade separation may be considered in many types of projects. Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below versus a minimum elevation differential of around 12 feet for an undercrossing. This results in potentially greater elevation differences and much longer ramps for bicycles and pedestrians to negotiate.

Guidance

- 8 foot minimum width, 14 feet preferred. If overcrossing has any scenic vistas additional width should be provided to allow for stopping. A separate 5 foot pedestrian area may be provided for facilities with high bicycle and pedestrian use.
- 10 foot headroom on overcrossing; clearance below will vary depending on feature being crossed.
- Roadway: 17 feet
  Freeway: 18.5 feet
  Heavy Rail Line: 23 feet
- The overcrossing should have a centerline stripe even if the rest of the trail does not have one.

Discussion

Overcrossings for bicycles and pedestrians typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings at 400 foot intervals, or 8.33% (1:12) with landings every 30 feet. Overcrossings pose potential concerns about visual impact and functional appeal, as well as space requirements necessary to meet ADA guidelines for slope.

Additional References

AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*. 2004.

Materials and Maintenance

Potential issues with vandalism.
Overcrossings can be more difficult to clear of snow than undercrossings.

BRIDGES

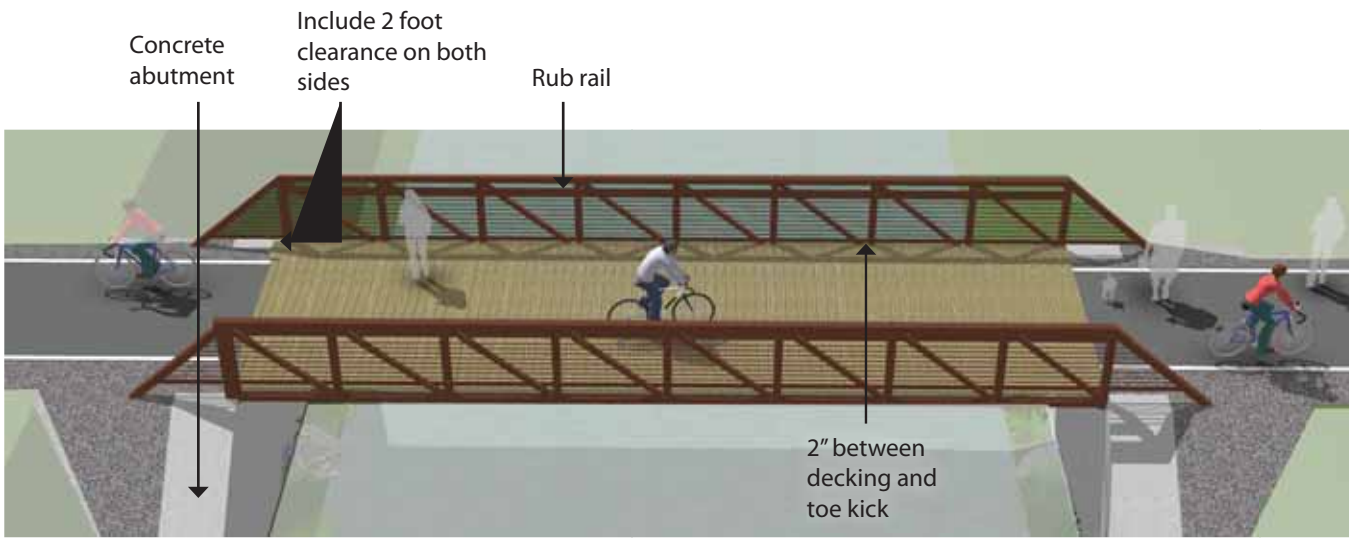
Description

Greenway trail bridges are most often used to provide user access over natural features such as streams and rivers, where a culvert is not an option or the span length exceeds 20 feet. The type and size of bridges can vary widely depending on the greenway trail and specific site requirements. Bridges often used for greenway trails include suspension bridges and prefabricated clear span bridges. When determining a bridge design for greenway trails, it is important to consider emergency and maintenance vehicle access.

Greenway trails that are poorly designed through water features can impact wetlands and streams, and become conduits for delivering sediments, nutrients, and pathogens to the watershed. Greenway trails that cross streams can exhibit bank and streambed erosion if not properly constructed.

Guidance

- The clear span width of the bridge should include 2 feet of clearance on both ends of the bridge approach for the shoulder.
- Bridge deck grade should be flush with adjacent greenway trail tread elevation to provide a smooth transition.
- Railing heights on bridges should include a 42 inch minimum guard rail, and 48 inches where hazardous conditions exist.
- A minimum overhead clearance of 10 feet is desirable for emergency vehicle access. Maximum opening between railing posts is 4 inches.
- A greenway trail bridge should support 10 tons for 10 foot wide greenway trails, and 20 tons for wider than 10 feet for emergency vehicle access.
- Bridges along greenway trails that allow equestrian use should be designed for mounted unit loadings.
- When crossing small headwater streams, align the crossing as far upstream as possible in the narrowest section of stream channel to minimize impact.
- Greenway trail drainage features should be constructed to manage stormwater before the greenway trail crosses the watercourse.
- All abutment and foundation design should be completed and sealed by a professional structural engineer licensed in the State of North Carolina.
- All greenway trail bridges will require local building permits, stormwater and land disturbance permits, floodplain development permits, and FEMA approval. Length and height of the bridge cords are governed by the width of the floodway and impacts to the base flood elevation of streams.



APPENDIX B:
FUNDING SOURCES

Overview | Federal - MAP-21 | Federal - Other | State | Local | Private | Trail Partnership Case Studies

OVERVIEW

When considering possible funding sources for bicycle and pedestrian projects, it is important to remember that not all construction activities or programs will be accomplished with a single funding source. It will be necessary to consider several sources of funding that together will support full project completion. Funding sources can be used for a variety of activities, including: programs, planning, design, implementation, and maintenance. This appendix outlines the most likely sources of funding from the federal, state, and local government levels as well as from the private and non-profit sectors. Note that this reflects the funding available at the time of writing. Funding amounts, cycles, and the programs themselves may change over time. The town of Leland should utilize WMPO for guidance on available federal funding sources.

FEDERAL FUNDING SOURCES

Federal funding is typically directed through state agencies to local governments either in the form of grants or direct appropriations. Federal funding typically requires a local match of five percent to 50 percent, but there are sometimes exceptions. The following is a list of possible Federal funding sources that could be used to support construction of pedestrian and bicycle improvements.

FIXING AMERICA'S SURFACE TRANSPORTATION (FAST ACT)

In December 2015, President Obama signed the FAST Act into law, which replaces the previous Moving Ahead for Progress in the Twenty-First Century (MAP-21). The Act provides a long-term funding source of $305 billion for surface transportation and planning for FY 2016-2020. Overall, the FAST Act retains eligibility for big programs - Transportation Investments Generating Economic Recovery (TIGER), Surface Transportation Program (STP), Congestion Mitigation and Air Quality (CMAQ), and Highway Safety Improvement Program (HSIP) - and funding levels between highways and transit.

In North Carolina, federal monies are administered through the North Carolina Department of Transportation (NCDOT) and Metropolitan Planning Organizations (MPOs). Most, but not all, of these programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system. For more information, visit: https://www.transportation.gov/fastact

Transportation Alternatives

Transportation Alternatives (TA) is a funding source under the FAST Act that consolidates three formerly separate programs under SAFETEA-LU: Transportation Enhancements (TE), Safe Routes to School (SRTS), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails. TA funds may also be used for selected education and encouragement programming such as Safe Routes to School, despite the fact that TA does not provide a guaranteed set-aside for this activity as SAFETEA-LU did.

Funding for the Surface Transportation Block Grant Program (STPBG) will grow from the current level of $819 million per year to $835 million in 2016 and 2017 and to $850 million in 2018 through 2020.

The FAST Act provides $84 million for the Recreational Trails Program. Funding is prorated among the 50 states and Washington D.C. in proportion to the relative amount of off-highway recreational fuel tax that its residents paid. To administer the funding, states hold a statewide competitive process. The legislation stipulates that funds must conform to the distribution formula of 30% for motorized projects, 30% for non-motorized projects, and 40% for mixed

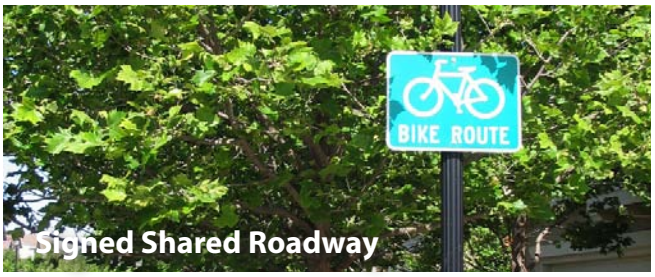
Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

Bicycle Boulevards

Bicycle boulevards are a special class of shared roadways designed for a broad spectrum of bicyclists. They are low-volume local streets where motorists and bicyclists share the same travel lane. Treatments for bicycle boulevards are selected as necessary to create appropriate automobile volumes and speeds, and to provide safe crossing opportunities of busy streets.



Signed Shared Roadway


Marked Shared Roadway

This section includes:

- Signed Shared Roadway
- Marked Shared Roadway

Shared Roadways

Signed Shared Roadway

Guidance

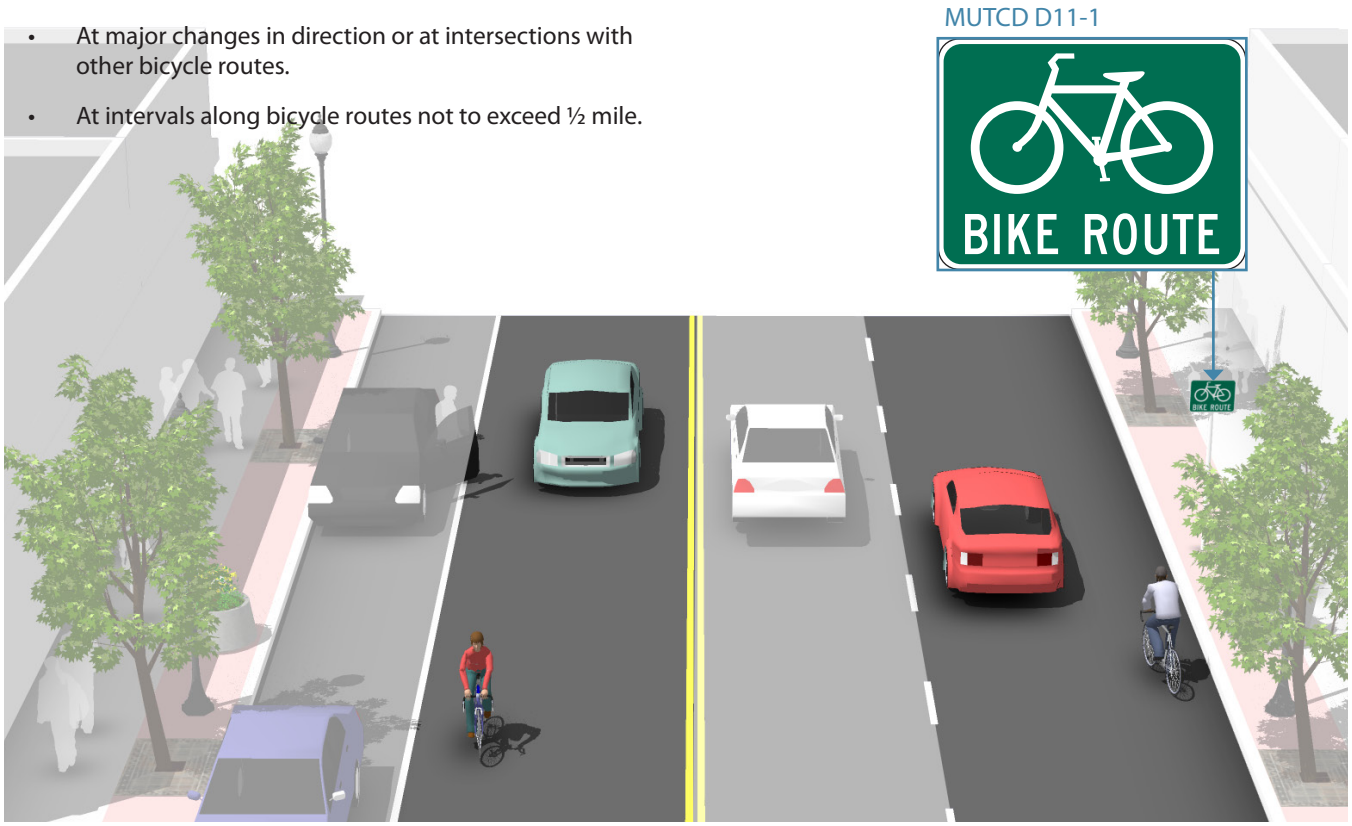
Lane width varies depending on roadway configuration.

Bicycle Route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:

- Beginning or end of Bicycle Route.
- At major changes in direction or at intersections with other bicycle routes.
- At intervals along bicycle routes not to exceed ½ mile.

Description

Signed Shared Roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.



Discussion

Signed Shared Roadways serve either to provide continuity with other bicycle facilities (usually bike lanes) or to designate preferred routes through high-demand corridors.

This configuration differs from a **Bicycle Boulevard** due to a lack of traffic calming, wayfinding, pavement markings and other enhancements designed to provide a higher level of comfort for a broad spectrum of users.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NCDOT. (1994). North Carolina Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

Shared Roadways

Marked Shared Roadway

Guidance

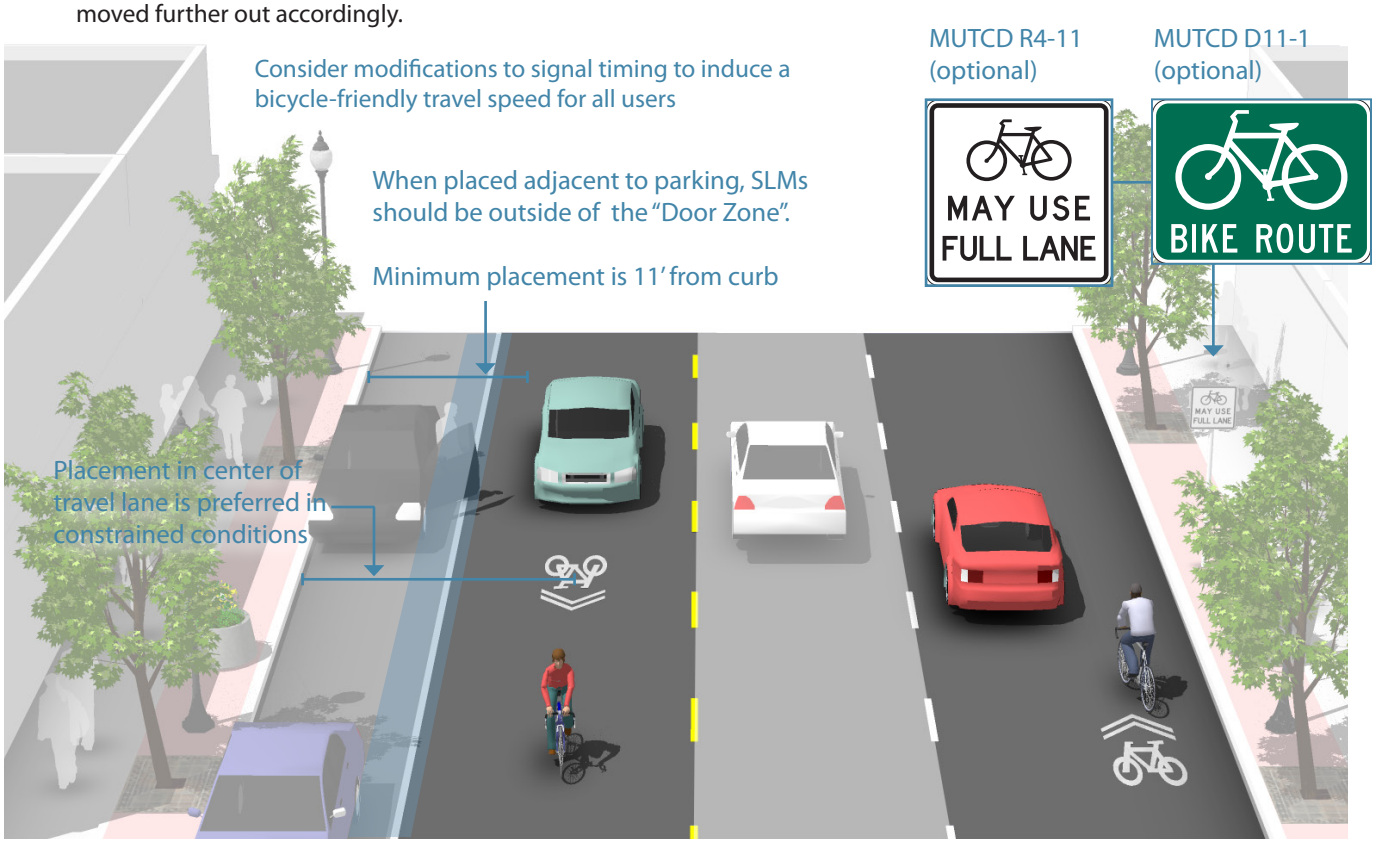
- In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.
- Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present, 4 feet from edge of curb with no parking. If parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.

Description

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.

In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles.

In all conditions, SLMs should be placed outside of the door zone of parked cars.



Discussion

Bike Lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated **Bike Lanes**, or to designate **Bicycle Detection** at signalized intersections. (MUTCD 9C.07)

This configuration differs from a **Bicycle Boulevard** due to a lack of traffic calming, wayfinding, and other enhancements designed to provide a higher level of comfort for a broad spectrum of users.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

Bicycle Boulevards

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

Jurisdictions throughout the country use a wide variety of strategies to determine where specific treatments are applied. While no federal guidelines exist, several best practices have emerged for the development of bicycle boulevards. At a minimum, bicycle boulevards should include distinctive pavement markings and wayfinding signs. They can also use combinations of traffic calming, traffic diversion, and intersection treatments to improve the bicycling environment. The appropriate level of treatment to apply is dependent on roadway conditions, particularly motor vehicle speeds and volumes.

Traffic conditions on bicycle boulevards should be monitored to provide guidance on when and where treatments should be implemented. When motor vehicle speeds and volumes or bicyclist delay exceed the preferred limits, additional treatments should be considered for the bicycle boulevard.

The Ann Street Bicycle Boulevard in Wilmington, NC

The Ann Street Bicycle Boulevard completes the River to the Sea Bikeway from downtown Wilmington to Wrightsville Beach, therefore making the bicycle boulevard accessible to most of Wilmington's population. According to Census 2000 data, there are about 16,000 who live in close proximity to the Ann Street Bicycle Boulevard.

The first Ann Street Bicycle Boulevard Group Ride from S 15th St to the Riverfront Farmers' Market drew about 30 people.

Route Selection


Basic Treatments


Minor Intersection Treatments

Major Intersection Treatments


Offset Intersection Treatments

This section includes:

- Route Selection
- Basic Treatments
- Minor Intersection Treatments
- Major Intersection Treatments
- Offset Intersection Treatments

Bicycle Boulevards

Route Selection

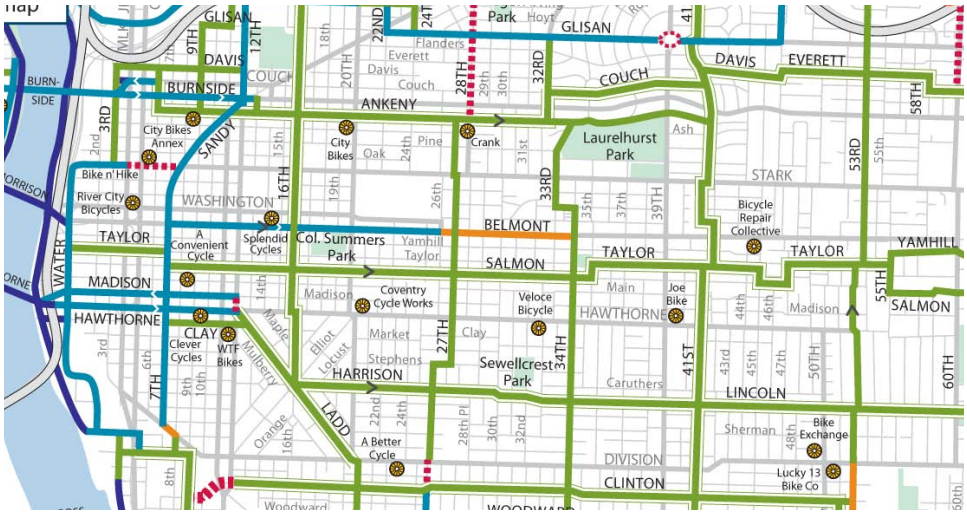
Guidance

- Streets are signed at 25 mph or less to improve the bicycling environment and decrease the risk and severity of crashes.
- Traffic volumes are limited to 3,000 vehicles per day (ideally less than 1,500) to minimize passing events and potential conflicts with motor vehicles.
- Use of streets that parallel major streets can discourage non-local motor vehicle traffic without significantly impacting motorists.
- Use of streets where a relatively continuous route for bicyclists exists and/or where treatments can provide wayfinding and improve crossing opportunities at offset intersections.
- Use of streets where bicyclists have right-of-way at intersections or where right-of-way is possible to assign to bicyclists.

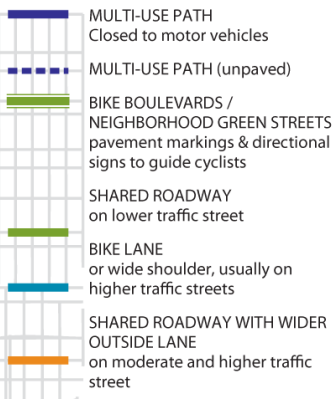
Description

Bicycle boulevards should be developed on streets that improve connectivity to key destinations and provide a direct route for bicyclists. Local streets with existing traffic calming, traffic diversions, or signalized crossings of major streets are good candidates, as they tend to be existing bicycle routes and have low motor vehicle speeds and volumes. Other streets where residents have expressed a desire for traffic calming are also good options.

Bicycle boulevards parallel to commercial streets improve access for "interested but concerned" bicyclists and complement bike lanes on major roadways.



In Portland, OR, the bicycle network includes a high density of bicycle boulevards parallel to streets with bike lanes.



Discussion

Bicycle boulevards should form a continuous network of streets or off-street facilities that accommodate bicyclists who are less willing to ride on streets with motorized traffic. Most bicycle boulevards are located on residential streets, though they can also be on commercial or industrial streets. Due to the presence of trucks and commercial vehicles, as well as the need to maintain good traffic flow and retain motor vehicle parking, bicycle boulevards on commercial or industrial streets can tolderate higher automobile speeds and volumes than would be desired on neighborhood streets. Vertical traffic calming can minimize impacts to large vehicles and parking.

Additional References and Guidelines

Alta Planning + Design and IBPI. (2009). Bicycle Boulevard Planning and Design Handbook.
City of Berkeley. (2000). Bicycle Boulevard Design Tools and Guidelines.
City of Emeryville. (2011). Bicycle Boulevard Treatments.

Materials and Maintenance

Repaving, street sweeping and other maintenance should occur with higher frequency than on other local streets.

Bicycle Boulevards

Basic Treatments

Description

Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard. Together, they visibly designate a roadway to both bicyclists and motorists. Signs, and in some cases pavement markings, provide wayfinding to help bicyclists remain on the designated route.

Guidance

Pavement Markings

Place symbols every 250-800 feet along a linear corridor, as well as after every intersection.

On narrow streets where a motor vehicle cannot pass a bicyclist within one lane of traffic, place stencils in the center of the travel lane.

See **Marked Shared Roadway** guidance for additional information on the use of shared lane markings.

A bicycle symbol can be placed on a standard road sign, along with distinctive coloration.

Signs

See **Bikeway Signing** for guidance on developing bicycle wayfinding signage. Some cities have developed unique logos or colors for wayfinding signs that help brand their bicycle boulevards.

Be consistent in content, design, and intent; colors reserved by the Manual on Uniform Traffic Devices (MUTCD) for regulatory and warning road signs are not recommended.

Signs can include information about intersecting bikeways and distance/time information to key destinations.

Discussion

Wayfinding signs displaying destinations, distances, and "riding time" can dispel common misperceptions about time and distance while increasing users' comfort and accessibility to the bicycle boulevard network. Bicycle boulevards frequently include offset intersections or 'jog' onto another street. Signs and pavement markings can help bicyclists remain on the route. In addition, fewer businesses or services are located along local streets, and signs inform bicyclists of the direction to key destinations, including commercial districts, transit hubs, schools and universities, and other bikeways.

Additional References and Guidelines

City of Milwaukie. (2009). Milwaukie Bicycle Wayfinding Signage Plan
City of Oakland (2009). Design Guidelines for Bicycle Wayfinding Signage
NACTO. (2012). Urban Bikeway Design Guide.

Materials and Maintenance

Pavement markings should be repainted and signs replaced as needed. Wayfinding signs should be regularly updated with new major destinations and bikeways.

Bicycle Boulevards

Minor Intersection Treatments

Description

Treatments at minor roadway intersections are designed to improve the visibility of a bicycle boulevard, raise awareness of motorists on the cross-street that they are likely to encounter bicyclists, and enhance safety for all road users.

Guidance

- On the bicycle boulevard, the majority of intersections with minor roadways should stop-control cross traffic to minimize bicyclist delay. This will maximize bicycling efficiency.
- Traffic circles are a type of **Horizontal Traffic Calming** that can be used at minor street intersections. Traffic circles reduce conflict potential and severity while providing traffic calming to the corridor.
- If a stop sign is present on the bicycle boulevard, a second stop bar for bicyclists can be placed closer to the centerline of the cross street than the motorists' stop bar to increase the visibility of bicyclists waiting to cross the street.
- Curb extensions can be used to move bicyclists closer to the centerline to improve visibility and encourage motorists to let them cross.

Stop Signs on Cross-Street


Traffic Circles


Bicycle Forward Stop Bar


Curb Extension

Discussion

Stop signs increase bicycling time and energy expenditure, frequently leading to non-compliance by bicyclists and motorists, and/or use of other less desirable routes. Bicycle boulevards should have fewer stops or delays than other local streets. A typical bicycle trip of 30 minutes can increase to 40 minutes if there is a STOP sign at every block (*Berkeley Bicycle Boulevard Design Tools and Guidelines*). If several stop signs are turned along a corridor, speeds should be monitored and traffic-calming treatments used to reduce excessive vehicle speeds on the bicycle boulevard.

Additional References and Guidelines

City of Berkeley. (2000). Bicycle Boulevard Design Tools and Guidelines.
City of London Transport for London. Advanced stop lines (ASLS) background and research studies.
Transportation Research Board. (2006). Improving Pedestrian Safety at Unsignalized Crossings. NCHRP Report # 562.

Materials and Maintenance

Vegetation in traffic circles and curb extensions should be regularly trimmed to maintain visibility and attractiveness. Repaint bicycle stop bars as needed.

Bicycle Boulevards

Major Intersection Treatments

Description

The quality of treatments at major street crossings can significantly affect a bicyclist's choice to use a bicycle boulevard, as opposed to another road that provides a crossing treatment.

Guidance

- **Bike boxes** increase bicyclist visibility to motorists and reduce the danger of right "hooks" by providing a space for bicyclists to wait at signalized intersections.
- Median islands provided at uncontrolled intersections of bicycle boulevards and major streets allow bicyclists to cross one direction of traffic at a time as gaps in traffic occur.
- **Hybrid Beacons**, **active warning beacons** and **bicycle signals** can facilitate bicyclists crossing a busy street on which cross-traffic does not stop.
- Select treatments based on engineering judgment; see National Cooperative Highway Research Program (NCHRP) Report # 562 *Improving Pedestrian Safety at Unsignalized Crossings* (2006) for guidance on appropriate use of crossing treatments. Treatments are designed to improve visibility and encourage motorists to stop for pedestrians; with engineering judgement many of the same treatments are appropriate for use along bicycle boulevards.

Bike Box

Median Island

Hybrid Beacon (HAWK)

Rectangular Rapid Flash Beacon (RRFB)

Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.
Transportation Research Board. (2006). *Improving Pedestrian Safety at Unsignalized Crossings.* NCHRP Report # 562.
Federal Highway Administration. (2004). *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations.* FHWA-RD-04-100

Materials and Maintenance

Maintain signs, markings, and other treatments and replace as needed. Monitor intersections for bicyclist delay to determine if additional treatments are warranted.

Bicycle Boulevards

Offset Intersection Treatments

Description

Offset intersections can be challenging for bicyclists who are required to briefly travel along the busier cross street in order to continue along the bicycle boulevard.

Guidance

- Appropriate treatments depend on volume of traffic including turning volumes, traffic speeds and the type of bicyclist using the crossing.
- **Contraflow Bike Lanes** allow bicyclists to travel against the flow of traffic on a one-way street and can improve bicycle boulevard connectivity.
- Bicycle left-turn lanes can be painted where a bicycle boulevard is offset to the right on a street that has sufficient traffic gaps. Bicyclists cross one direction of traffic and wait in a protected space for a gap in the other direction. The bike turn pockets should be at least 4 feet wide, with a total of 11 feet for both turn pockets and center striping.
- Short **Bike Lanes** on the cross street assist with accessing a bicycle boulevard that jogs to the left. Crossing treatments should be provided on both sides to minimize wrong-way riding.
- A **Cycle Track** can be provided on one side of a busy street. Bicyclists enter the cycle track from the bicycle boulevard to reach the connecting segment of the bicycle boulevard. This maneuver may be signalized on one side.

Contraflow Bike Lane

Left Turn Bike Lanes

Short Bike Lanes on the Cross Street

Cycle Track Connection

Discussion

Because bicycle boulevards are located on local streets, the route is often discontinuous. Wayfinding and pavement markings assist bicyclists with remaining on the route.

Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.
Hendrix, Michael. (2007). *Responding to the Challenges of Bicycle Crossings at Offset Intersections.* Third Urban Street Symposium.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Facilities should be cleared of snow through routine snow removal operations.

Separated Bikeways

Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.


Shoulder Bikeway


Bike Lane with No On-Street Parking


Bike Lane with On-Street Parking


Buffered Bike Lane

This section includes:

- Shoulder Bikeway
- Bike Lane with No On-Street Parking
- Bike Lane Adjacent to On-Street Parking
- Buffered Bike Lane

Separated Bikeways

Shoulder Bikeways

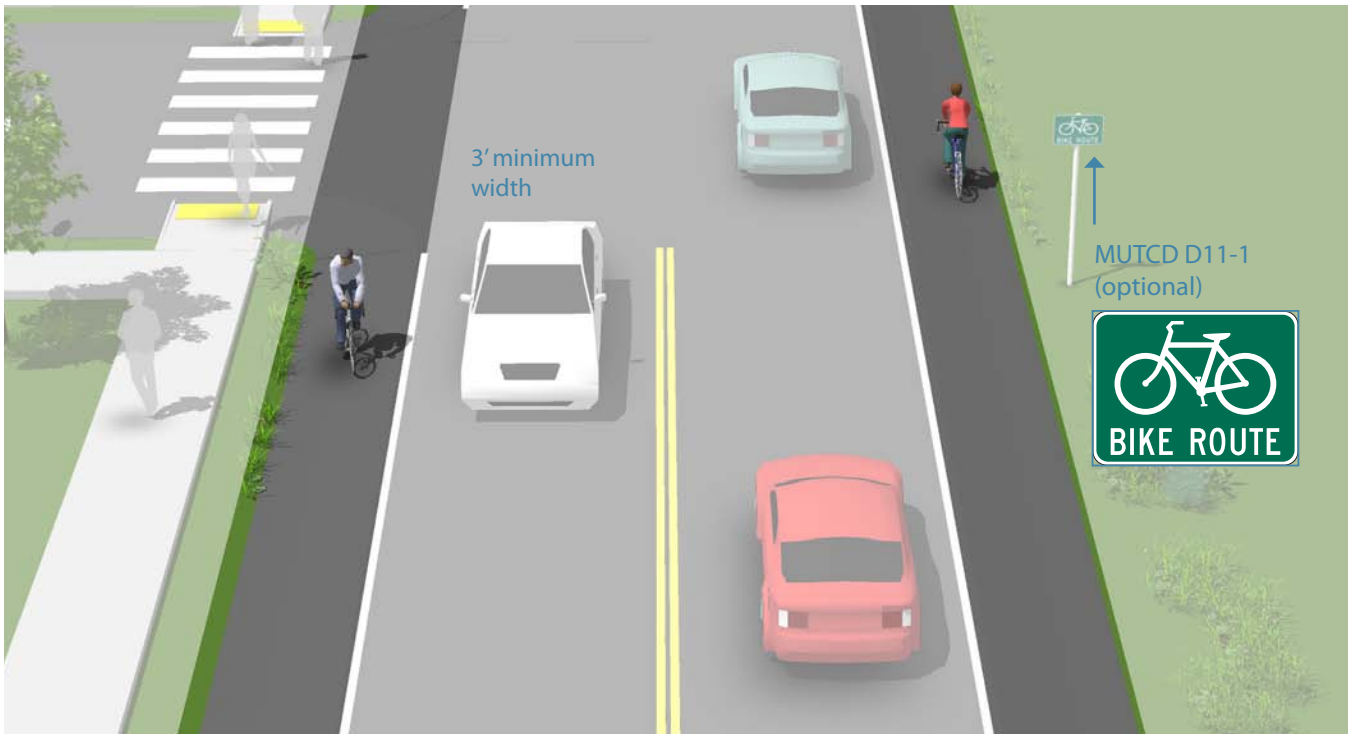
Guidance

- If 4 feet or more is available for bicycle travel, the full bike lane treatment of signs, legends, and an 8" bike lane line would be provided.
- 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.

MUTCD D11-1 (optional)

Description

Typically found in less-dense areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. Shoulder bikeways should be considered a temporary treatment, with full bike lanes planned for construction when the roadway is widened or completed with curb and gutter. This type of treatment is not typical in urban areas and should only be used where constraints exist.



Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a **marked shared roadway** in these locations.

Where feasible, **roadway widening** should be performed with pavement resurfacing jobs, but not exceeding desirable bike lane widths.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NCDOT. (1994). North Carolina Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

Separated Bikeways

Bike Lane with No On-Street Parking

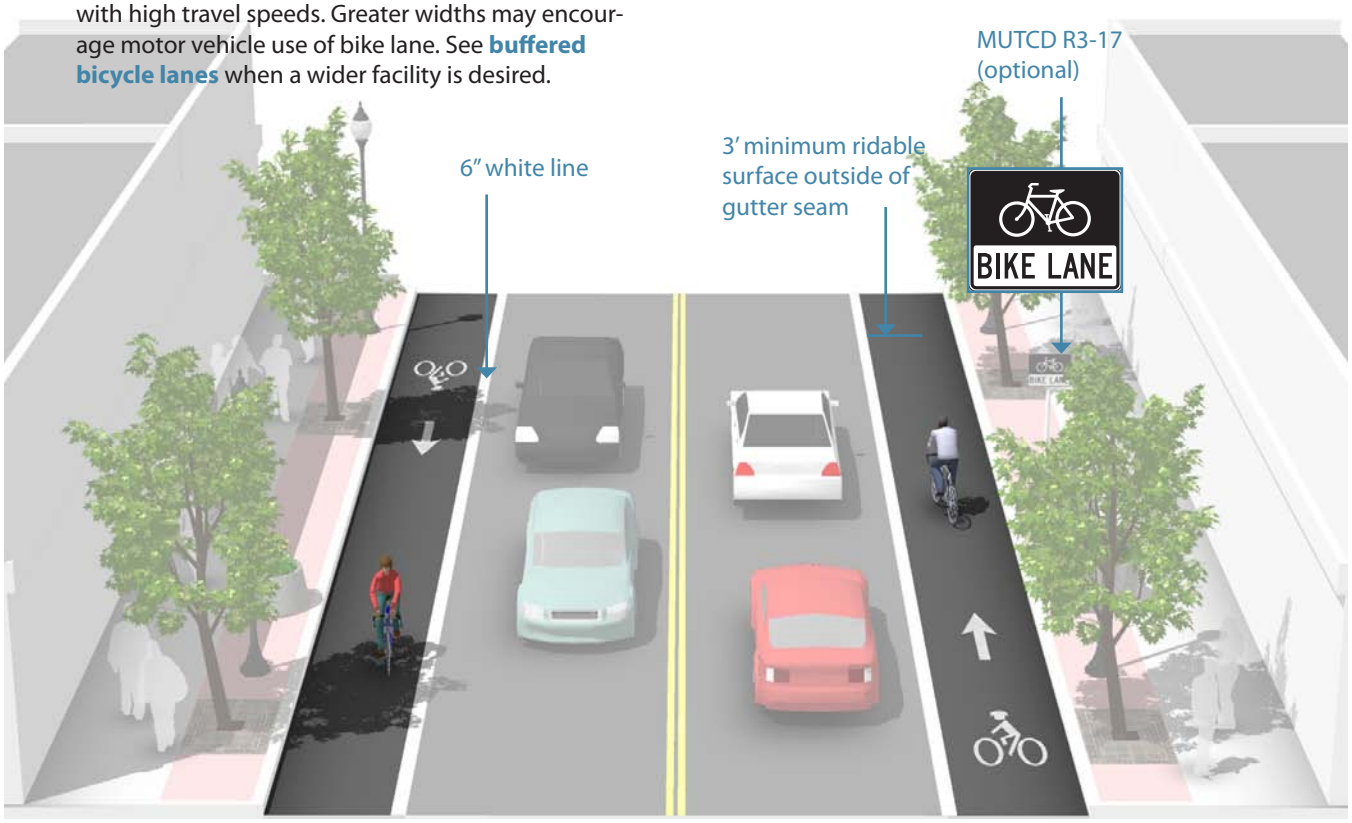
Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane. See **buffered bicycle lanes** when a wider facility is desired.

Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is typically located on the right side of the street, between the adjacent travel lane and curb, and is used in the same direction as motor vehicle traffic.

A bike lane width of 7 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bike lane, thereby increasing the capacity of the lane.



Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider **Buffered Bicycle Lanes** when further separation is desired.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.
NCDOT. (1994). North Carolina Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Separated Bikeways

Bike Lane Adjacent to On-Street Parallel Parking

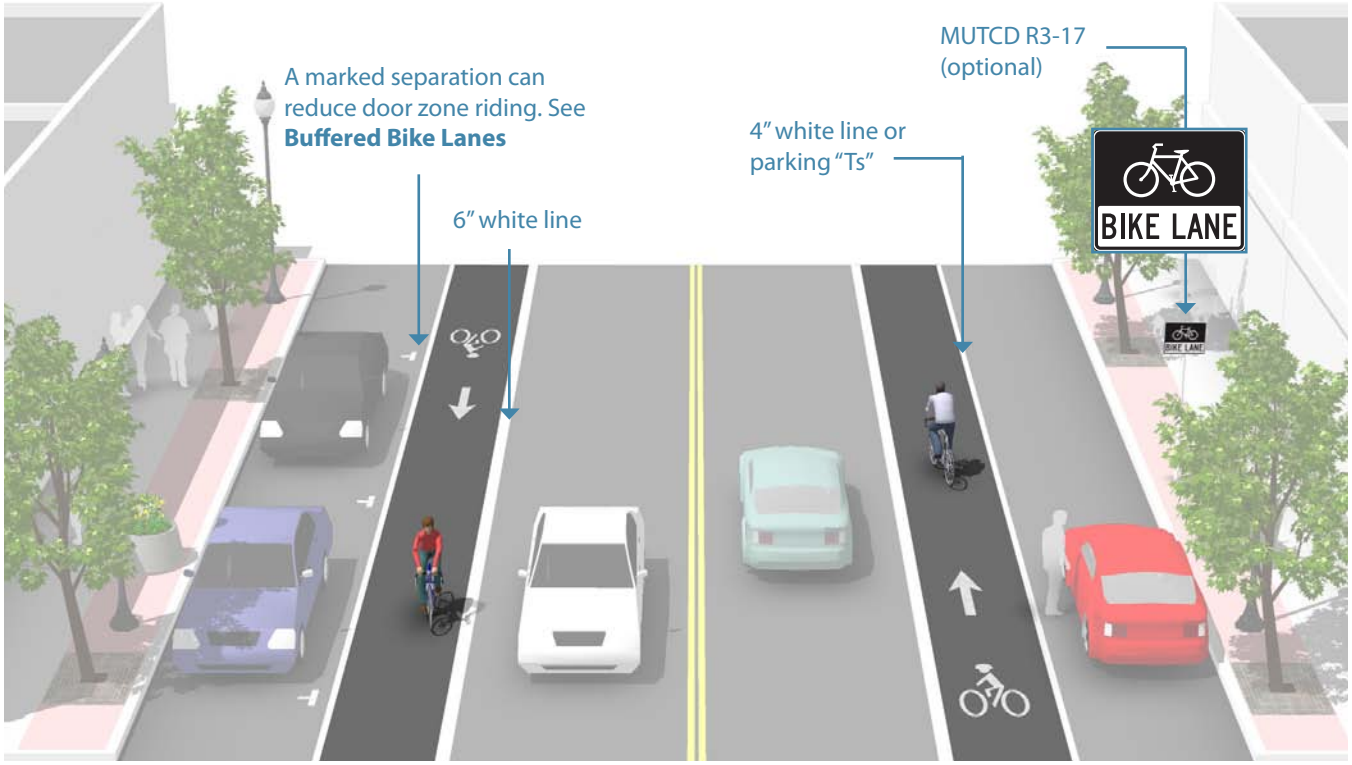
Guidance

- 12 foot minimum from curb face to edge of bike lane.
- 14.5 foot preferred from curb face to edge of bike lane.
- 7 foot maximum for marked width of bike lane. Greater widths may encourage vehicle loading in bike lane. See **buffered bicycle lanes** when a wider facility is desired.

Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.



Discussion

Bike lanes adjacent to on-street parallel parking require special treatment in order to avoid crashes caused by an open vehicle door. The bike lane should have sufficient width to allow bicyclists to stay out of the door zone while not encroaching into the adjacent vehicular lane. Parking stall markings, such as parking "Ts" and double white lines create a parking side buffer that encourages bicyclists to ride farther away from the door zone.

Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.
FHWA. (2009). Manual on Uniform Traffic Control Devices.
NACTO. (2012). Urban Bikeway Design Guide.
NCDOT. (1994). North Carolina Bicycle Facilities Planning and Design Guidelines.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

Separated Bikeways

Buffered Bike Lane

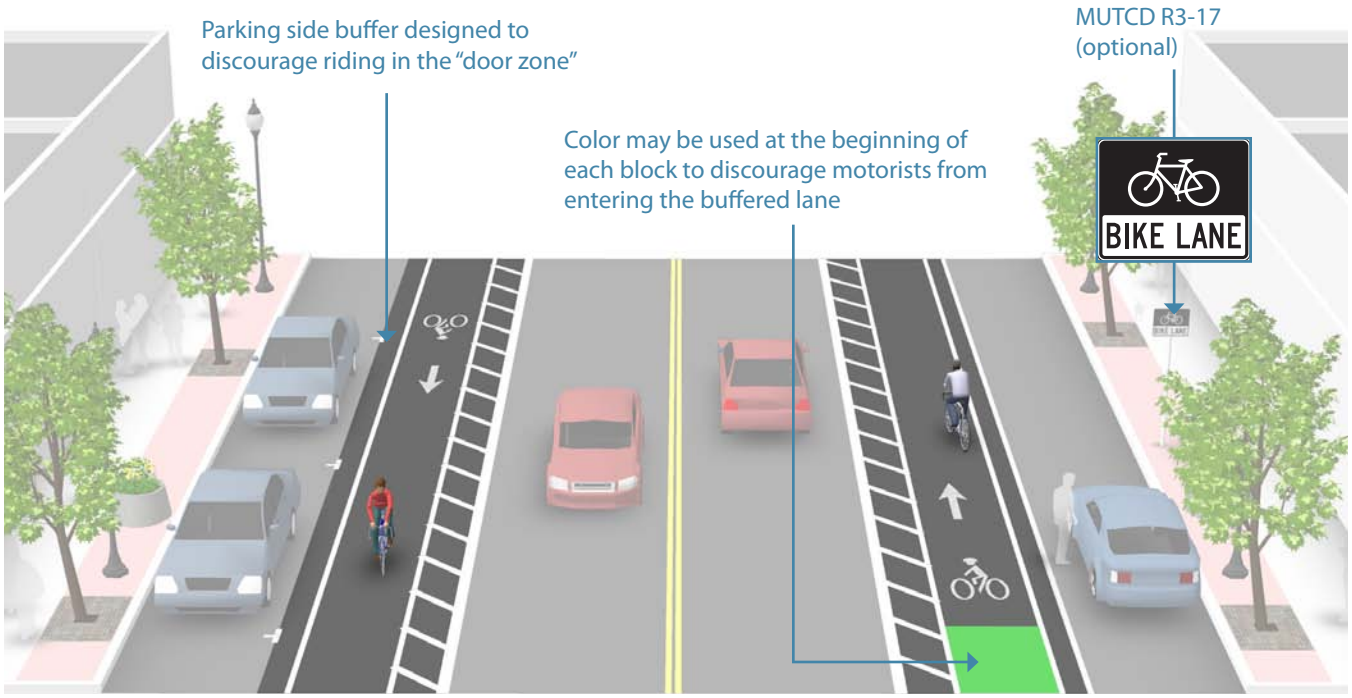
Guidance

- Where bicyclist volumes are high or where bicyclist speed differentials are significant, the desired bicycle travel area width is 7 feet.
- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching. For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.

Description

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes are allowed as per MUTCD guidelines for buffered preferential lanes (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.



Discussion

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices. (3D-01)
NACTO. (2012). Urban Bikeway Design Guide.
AASHTO. (2012). Guide for the Development of Bicycle Facilities.

Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

- **The Town should allow alleys for vehicular and service access in pedestrian-oriented residential developments**. The frontage streets in these types of developments should be designed to be pedestrian and bicyclist-friendly. Features such as medians, street trees, traffic calming techniques and devices, sidewalks, and bicycle facilities should be incorporated into the frontage street designs. Other features, such as bicycle-friendly inlet grates and adequate lighting, should also be utilized.

3.3 FACILITIES

As discussed above the Town cannot rely solely on new developments to provide bicycle facilities. These policies must be accompanied by an investment by the Town in bicycle facilities and connections. Given the proximity of the Town of Leland with the Towns of Belville and Navassa and the rate at which the Town of Leland is expanding into Brunswick County, coordination with adjoining communities, the County, regional planning agencies, and NCDOT is of paramount importance to ensure that future bicycle facility plans are compatible.

Detailed cost estimates are provided in Appendix D and can be recalculated at a later date if desired, utilizing updated unit cost prices.

Loops

To provide safe, usable, and attractive bicycle facilities, the Town of Leland should strive to develop and promote the following routes inside and immediately adjacent to the Town. These routes are shown on **Figure 3.1**. Please note that detailed cost estimates are included in Appendix D.

1. Village Road Loop (3.4 miles)
   a. Navassa Road
   b. Village Road
   c. Old Mill Road

This loop would provide access to the Town Hall and its recreation opportunities, the Senior Center, Leland Community Park, and commercial areas on Village Road. Access to the planned non-motorized boat access at Appleton Way and the off-road bicycle facilities in Navassa located along Old Mill Road north of Leland would be provided. Improvements needed on this Loop are primarily related to the provision of a four-foot wide paved shoulder on Navassa Road and Old Mill Road suitable for bicycle use, and the currently planned multi-use path on Village Road (TIP R-4063). One current issue is the non-bike-friendly bridge on Old Mill Road, but this is currently planned to be replaced as part of project B-4928. However, the newly constructed bridge on Navassa Road over Sturgeon Creek only provides a three-foot. offset and insufficient railing height, which may necessitate the placement of Share the Road signs at this location, as cyclists may need to enter the travel lane at this location. The completion of this Loop will require coordination with Brunswick County and the Town of Navassa. Approximate in-town cost – $1,300,000.00

2. Old Leland Loop (3.61 miles)
    a. Village Road
    b. Wayne Street
    c. Proposed New Connection between Wayne Street and Royal Street
    d. Royal Street
    e. Rampart Street
    f. Old Fayetteville Road
    g. Lossen Road
    h. Town Hall Drive

This Loop would provide travel around the core area of Leland, commonly known as "Old Leland" and would provide access to the commercial areas around Village Road, the Town Hall campus, and North Brunswick High School. The completion of this loop depends heavily on the construction of a connector (shown of **Figure 3.5**) between Village Road and Old Fayetteville Road that must traverse Sturgeon Creek via a bridge which could potentially be a significant cost and permitting constraint, as well as the planned improvements to Village Road as part of R-4063. A four-foot wide paved shoulder suitable for bicycle use is needed along Old Fayetteville Road, coupled with the multi-use path on Village Road planned as part of R-4063. The remaining roadways carry small volumes of traffic and should accommodate cyclists with their cross section. Approximate cost for this loop is approximately $1,900,000.00, which includes the construction of a wooden bridge to serve as the connector. This cost includes improvements along Village Road, which could be incorporated into the costs for the Village Road Loop.

3. Cedar Hill Loop (0.76 miles)
    a. Cedar Hill Road
    b. Mt. Misery Road
    c. Old Mill Road

While this Loop lies almost exclusively outside of the Town boundaries, many cyclists have indicated that this is an excellent bicycle route. The Town should encourage Brunswick County, NCDOT, and the Town of Navassa to improve the facilities by providing 4' paved shoulders on this loop and to incorporate this loop with the Village Road Loop and Old Lanvale Road. Special concerns for this loop include the need for rubberized flangeway fillers at the railroad crossings on Mt. Misery Road and Village Road (Village Road may require additional shoulders to allow cyclists to cross the railroad tracks at a 90 degree angle) and the presence of ditches in several locations which hinder the ability to provide adequate shoulders. TIP project R-4063 is located on this route. Approximate cost in-town for paved shoulders is approximately $300,000.00.

4. Chappell Loop (5.34 miles)
    a. Blackwell Road
    b. NC 133 (River Road)
    c. Chappell Loop Road
    d. Various Neighborhood Roads

This Loop connects central Leland with the Brunswick River Park and would compliment the park by providing a bicycle route near the park facilities and includes the provision of wide paved shoulders on NC 133. If possible, a connection should be made between North Olde Towne Wynd and Night Harbor Drive to create a larger Loop as shown on **Figure 3.6**. Coordination with Brunswick County and the Town of Belville will be needed as this loop lies almost exclusively in their jurisdictions. The approximate cost for this loop (which includes the connection between North Olde Towne Wynd and Night Harbor Drive) is $2,000,000.00.

5. Green Hill Loop (1.91 miles)
   a. Green Hill Road
   b. Crabapple Road
   c. Cherry Tree Road

This Loop will provide access to the Town Creek District Park. The Town of Leland should encourage the County and NCDOT to improve these roadways to accommodate paved shoulders where feasible. The approximate cost for this loop is $700,000.00.

Grandiflora / Pine Harvest / Palm Ridge Roads

Many cyclists have indicated that these roadways are excellent cycling routes. These roadways are very important to non-motorized mobility in the area, as they allow for north-south travel through a significant portion of the Town on roadways that carry substantially less volume than Lanvale Road. While sensitivity should be given to placing signage in residential areas, these routes should be indicated in Town mapping.

The success of these roadways as viable bicycle routes depends largely on the ability to provide connections to other areas. If a connection can be provided between Grandiflora Drive and Timber Lane, as discussed on pg 3-12 and shown in **Figure 3.7**, access would be opened up to the neighborhoods along and north of Old Fayetteville Road. Additionally, providing non-motorized access across the US 17 superstreet will further increase access to the commercial and residential areas to the south of US 17. The costs of the route lay largely in the cost of modifying the US 17 superstreet intersections and provide the connection between Grandiflora Drive and Timber Lane, as due to the low speeds, low vehicle volume, and residential nature of these streets, no bicycle facilities are needed.

The Recommended Bicycle Loops are shown in **Figure 3.1**.

Cross-Sections

A series of cross-sections were developed as part of this plan, ranging from a rural cross-section (best suited to areas with low density development) to a neighborhood cross-section (designed to accommodate automobiles, pedestrians, and bicyclists in a more densely populated area). These cross-sections are presented in the following figures and are color-coded to the collectors identified on the map. Each color does not represent one cross-section, in fact, an array of cross-sections are presented for each category for flexibility in design, while still maintaining amenities for pedestrians and bicyclists. Each recommended cross section was designed based on the most current version of NCDOT's Complete Streets Policies. This was done to ensure that each road was built to NCDOT design standards.

Land Use Intensity

A series of cross-sections were developed as part of this plan, ranging from a rural cross-section (best suited to areas with low density development) to a neighborhood cross-section (designed to accommodate automobiles, pedestrians, and bicyclists in a more densely populated area). These cross-sections are presented in the following figures and are color-coded to the collectors identified on the map. Each color does not represent one cross-section, in fact, an array of cross-sections are presented for each category for flexibility in design, while still maintaining amenities for pedestrians and bicyclists. Each recommended cross section was designed based on the most current version of NCDOT's Complete Streets Policies. This was done to ensure that each road was built to NCDOT design standards.

Cross-Section Categories

The following tables categorize the cross-sections developed as part of this plan. The requirements reflect the minimum cross-section allowed for each roadway designation The cross-section may be designed to any higher level designation, but must construct collector streets to the minimum standards, in accordance with NCDOT standards and to the specifications provided in the cross-sections. To avoid confusion, a sidewalk is defined as a recommended 5' facility, a bike lane as a recommended 5' facility, and a sidepath as a recommended 10' facility. A sidepath is the equivalent of a multi-use path for the purposes of this plan.

Figure 30 is color-coded to match a cross-section category, indicating which cross-sections categories apply to which proposed collector street. This allows flexibility in determining which cross-section is most appropriate for the context, while ensuring that pedestrian and bicycle amenities are in fact constructed as part of collector streets. It is important to keep in mind that the exact design of each of these cross-sections will ultimately be determined with input from NCDOT, in accordance with the Complete Streets Manual.

Group 1

Baseline	This facility will include: • two travel lanes and • a 2' to 4' shoulder
Baseline with Bike Lanes	This facility will include: • two travel lanes and • two on-road bicycle lanes
Baseline with Sidewalk	This facility will include: • two travel lanes and • a 2' to 4' shoulder and • sidewalks on one or two sides

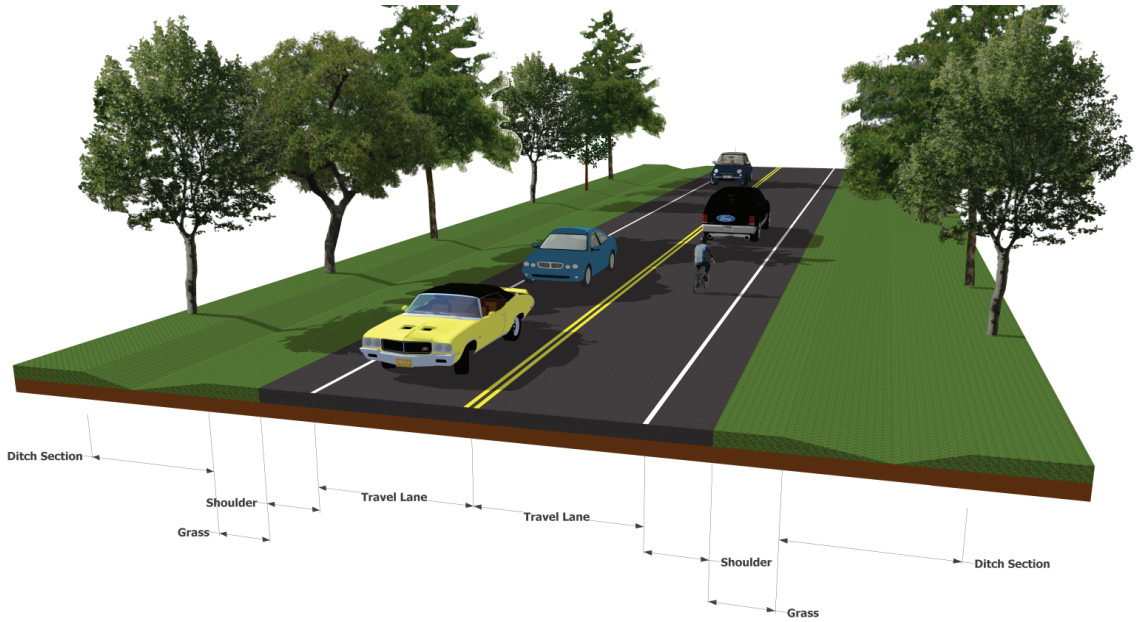


Figure 21: Baseline

Figure 22: Baseline with Bike Lanes

Figure 23: Baseline with Sidewalk (only required on one side)

Group 2

Baseline with Sidewalk and Bike Lanes	This facility will include: • two travel lanes, • sidewalks on both sides, and • two on-road bicycle lanes.
Baseline with Sidepath	This facility will include: • two travel lanes and • one separated sidepath.

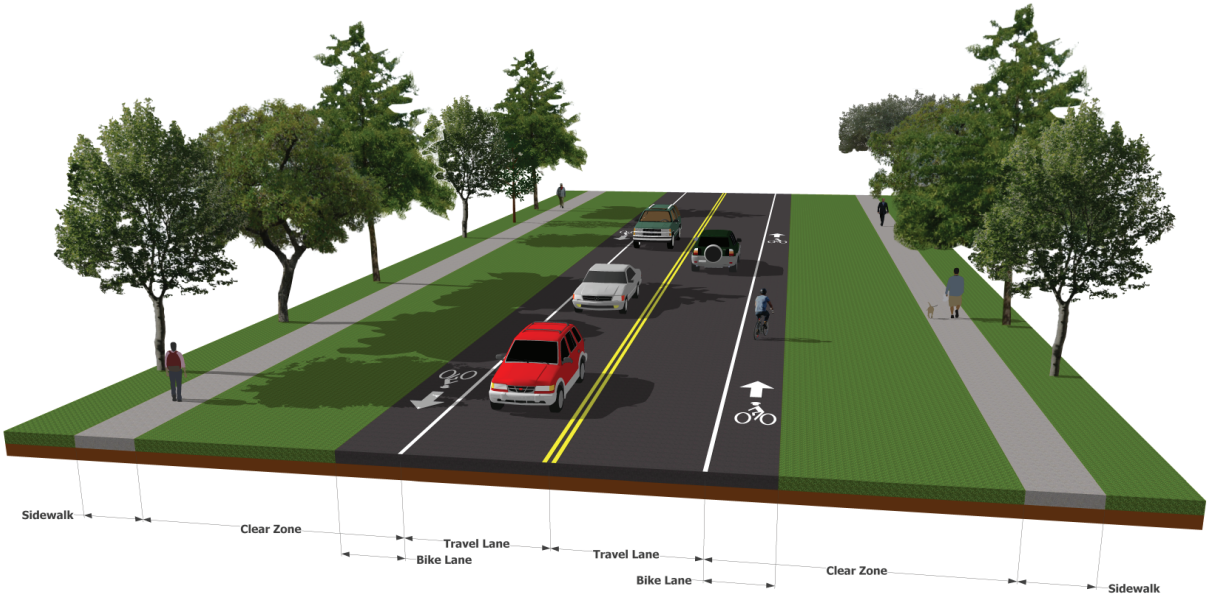


Figure 24: Baseline with Sidewalks and Bike Lanes

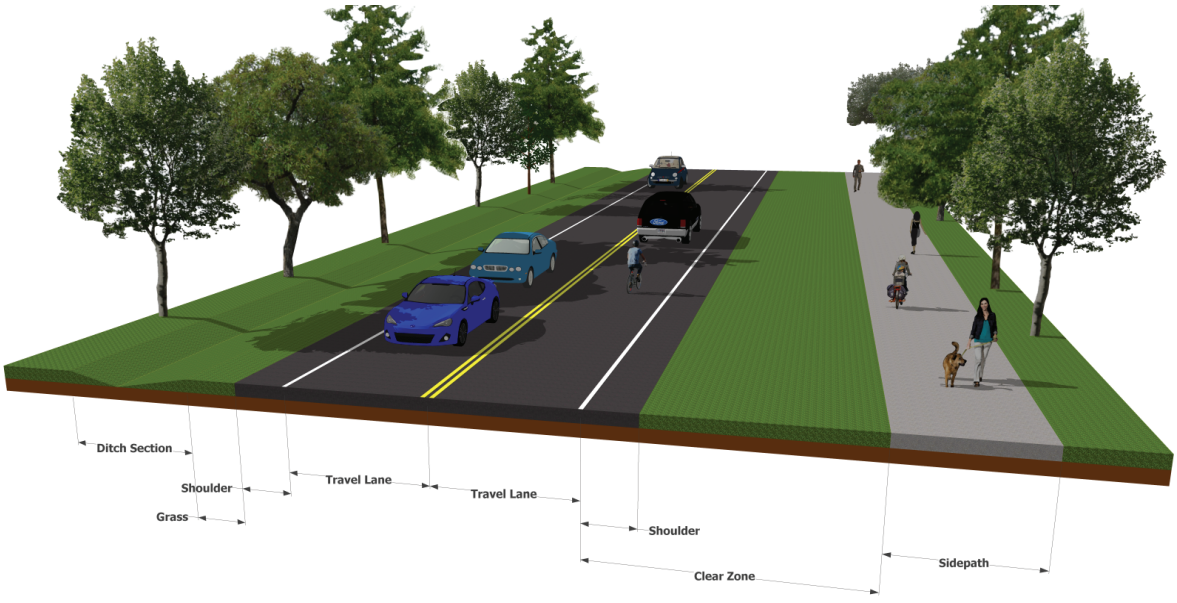


Figure 25: Baseline with Sidepath

Group 3

Residential with Sidepath (one side) or Sidewalk (both sides)	This facility will include: • two travel lanes and • either a sidepath on one side or • sidewalks on both sides.
Baseline with Sidepath	This facility will include: • two travel lanes and • one separated sidepath.

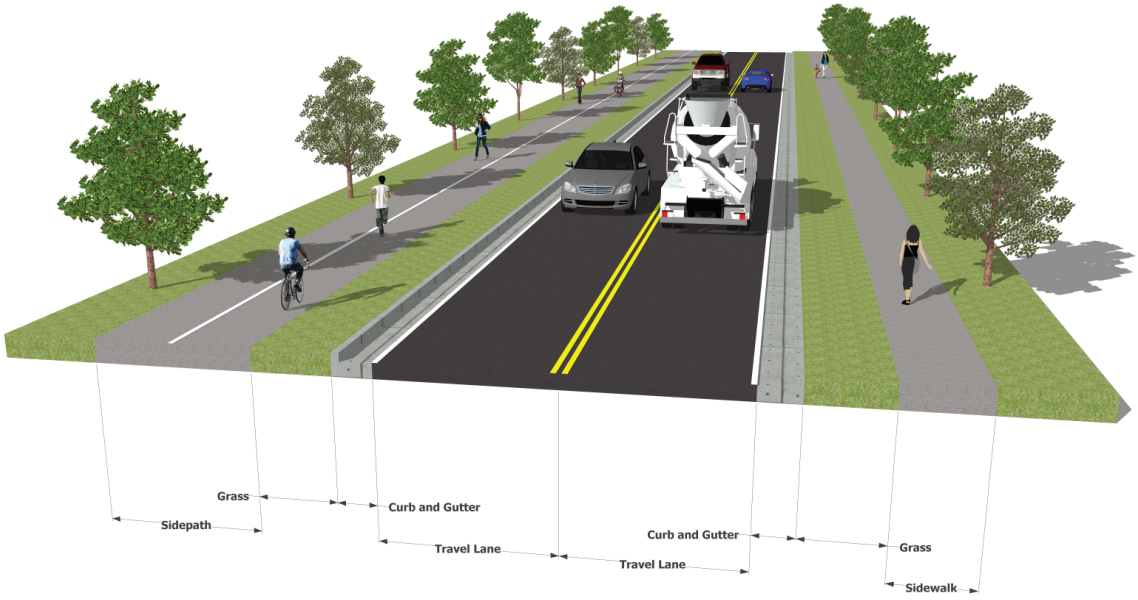


Figure 26: Residential with Sidepath (one side) or Sidewalks (both sides)

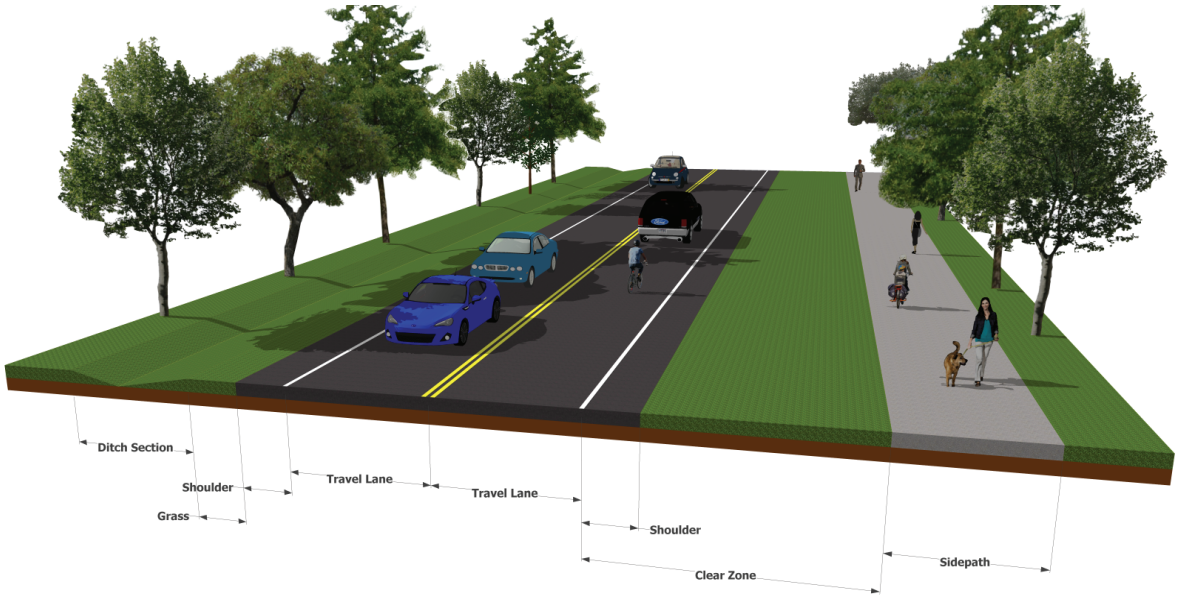


Figure 27: Baseline with Sidepath

Group 4

Residential Median-Divided with Bike Lanes and Sidewalk (both sides)	This facility will include: • a planted median; • two travel lanes; • two bike lanes, and • sidewalks on both sides
Neighborhood with Bike Lanes and Sidewalks (both sides)	This facility will include: • two travel lanes, • two bike lanes, and • sidewalks on both sides.

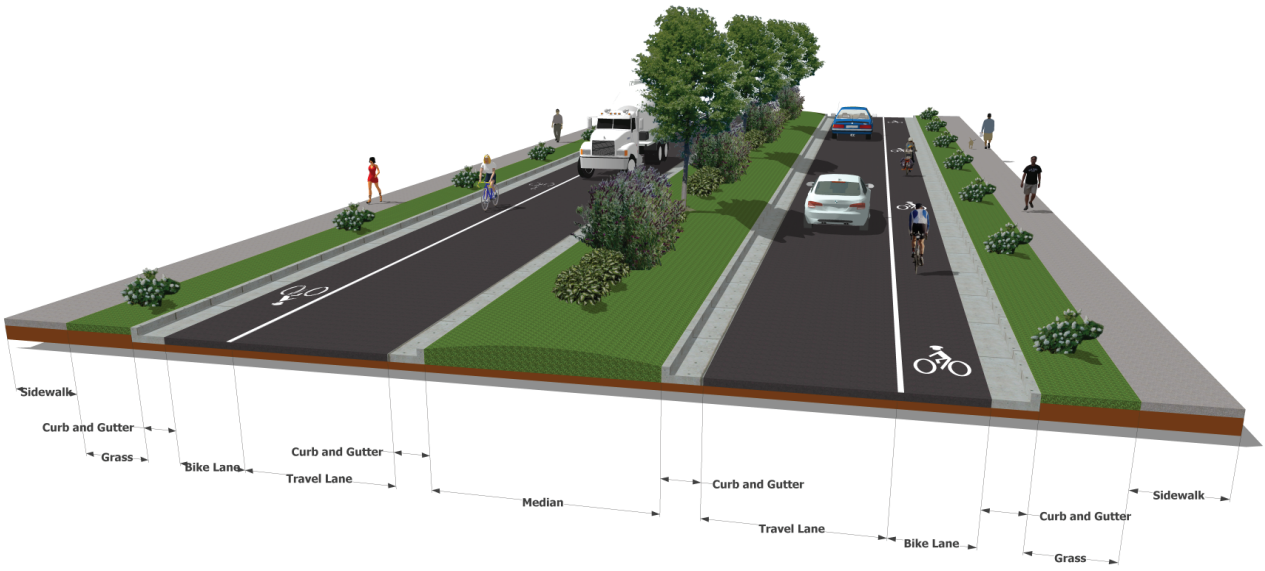


Figure 28: Residential Median-Divided with Blke Lanes and Sidewalks (both sides)

Figure 29: Neighborhood with Bike Lanes and Sidewalks (both sides)

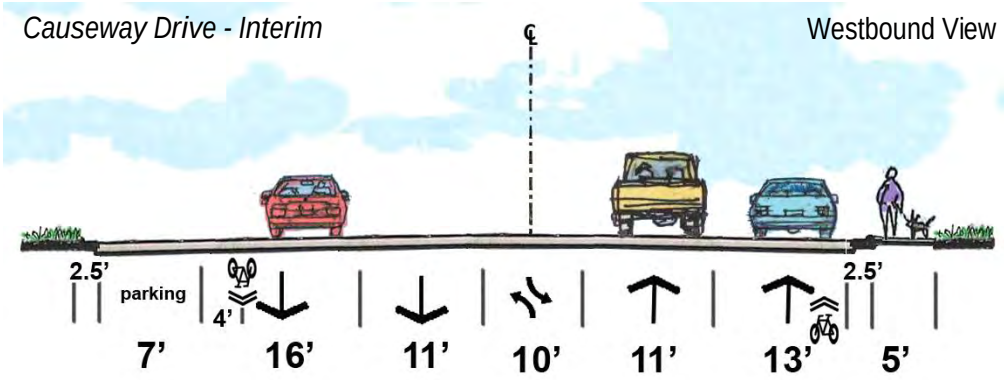
Recommended Cross Sections

Causeway Drive

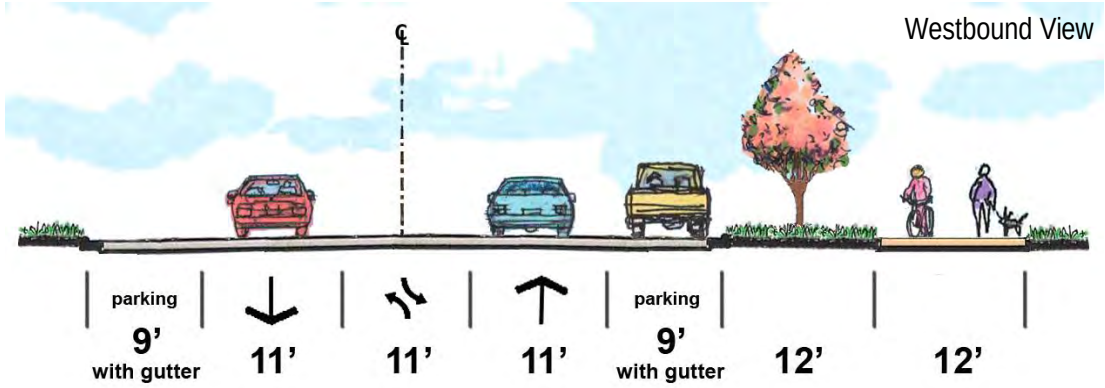
The recommended cross section for Causeway Drive is a simple shared lane marking or "sharrow" paired with wide outside lanes. Sharrows are a compromise between dedicated bicycle lanes (which are not feasible without widening or eliminating parking/ travel lanes) and unmarked outside lanes (which may require additional space and often still leave motorists unaware of bicycle traffic). Shared lane markings delineate space without setting a hard boundary between vehicle and bicycle areas, and they make all roadway users aware of the potential presence of bicyclists. Placement of the sharrow allows for a door zone on the side of the road with parking and is compliant with the Manual on Uniform Traffic Control Devices (MUTCD).

The planning process also explored a long-term alternatives if improvements to the bridge crossings are completed and if the community decides fewer travel lanes are appropriate for the Town's vision of community-focused streets. The alternatives presented here include either parking on both sides with normal travel lanes or wide lanes with parking only on the eastbound side. Before lane reduction is implemented a complete traffic study would be necessary.

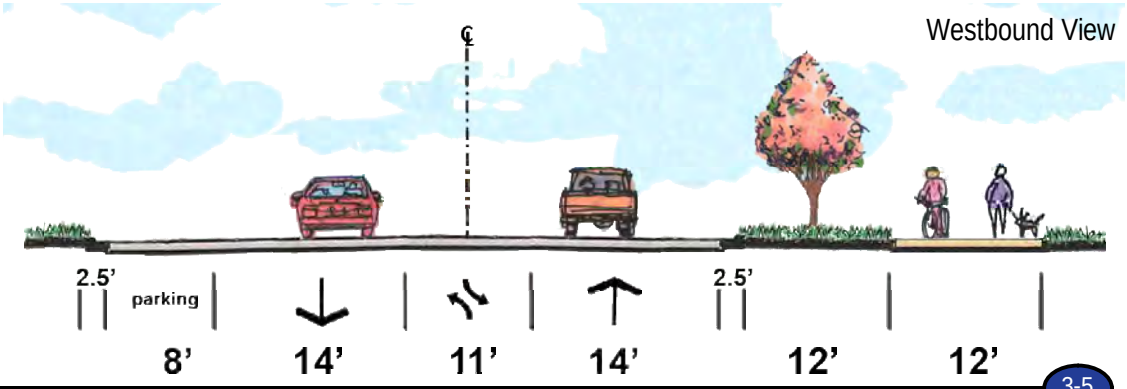
Causeway Drive - Interim Westbound View



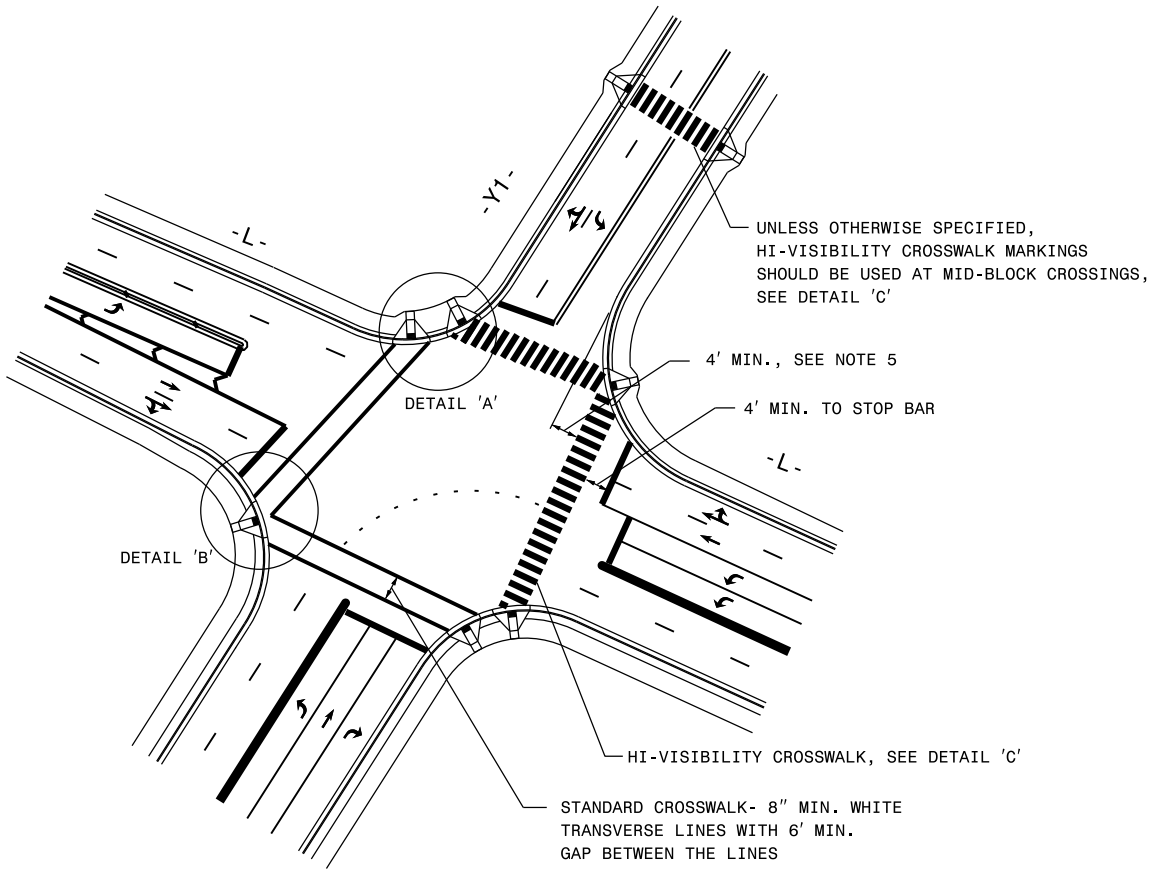
Causeway Drive – Potential Long-term Alternative 1

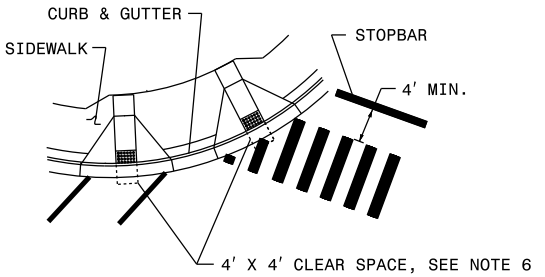


Causeway Drive – Potential Long-term Alternative 2

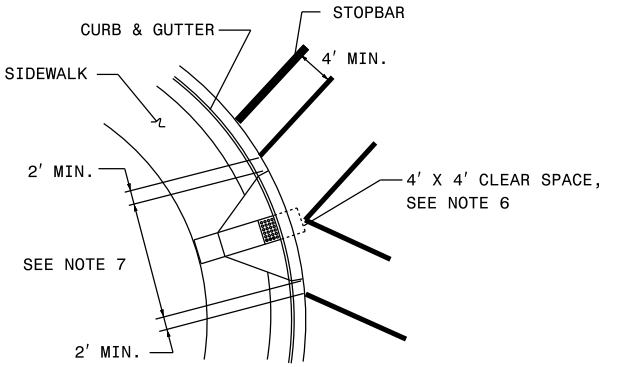


CROSSWALK PLACEMENT GUIDANCE

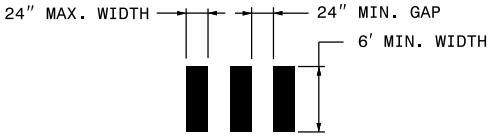




DETAIL 'A'- DUAL CURB RAMPS



DETAIL 'B'- SINGLE DIAGONAL CURB RAMP



DETAIL 'C'- HI-VISIBILITY CROSSWALK

GENERAL NOTES:

1- USE THE DETAILS ABOVE AND THE FOLLOWING NOTES FOR GUIDANCE IN PLACING CROSSWALK MARKINGS. REFER TO NCDOT ROADWAY STANDARD DRAWINGS, MUTCD AND ADA STANDARDS FOR ADDITIONAL GUIDANCE.

2- THE LOCATION AND TYPE OF CROSSWALK MARKINGS SHOWN ON THE ABOVE DETAILS ARE FOR REFERENCE ONLY. LOCATE CROSSWALK MARKINGS AS SHOWN ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER. THE CROSSWALK MARKING TYPE, STANDARD OR HI-VISIBILITY, SHALL BE INSTALLED AS SPECIFIED ON THE PROJECT DETAIL SHEETS OR AS DIRECTED BY THE ENGINEER.

3- THE STANDARD CROSSWALK IS TWO WHITE 8" MIN. TRANSVERSE LINES WITH A 6' MIN. GAP BETWEEN THE LINES. THE HI-VISIBILITY CROSSWALK IS WHITE 24" MAX. WIDE LONGITUDINAL LINES WITH 24" MIN. GAPS BETWEEN LINES, SEE DETAIL 'C'. HI-VISIBILITY CROSSWALKS SHOULD BE A MINIMUM OF 6' WIDE. CURB RAMPS SHALL BE WHOLLY CONTAINED WITHIN THE MARKINGS, EXCLUDING ANY FLARES.

4- STOP BARS SHOULD BE PLACED A 4' MIN. IN ADVANCE OF NEAREST CROSSWALK LINE.

5- SET BACK DISTANCE FROM INSIDE CROSSWALK MARKING TO NEAREST EDGE OF TRAVEL IS 4' MIN.

6- BEYOND THE BOTTOM GRADE BREAK, A CLEAR SPACE OF 4' X 4' MIN. SHALL BE PROVIDED WITHIN THE MARKINGS.

7- SINGLE DIAGONAL CURB RAMPS WITH FLARED SIDES SHALL HAVE A SEGMENT OF CURB 2' MIN. LONG LOCATED ON EACH SIDE OF THE CURB RAMP AND WITHIN THE MARKED CROSSING, SEE DETAIL 'B'.

8- CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST NCDOT ROADWAY STANDARD DRAWINGS. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT UNIT FOR DETAILS OR A SPECIAL DESIGN.

1-18

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR

PAVEMENT MARKINGS

PEDESTRIAN CROSSWALKS

SHEET 1 OF 1

1205.07

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

May 5, 2014

MEMO TO: Jon Nance, PE, Deputy Chief Engineer
Kevin Lacy, PE, State Traffic Engineer
Ricky Greene, Jr., PE, Director of Field Support
Mike Bruff, PE, Manager, Transportation Planning Branch
Roadway Design Unit Regional Managers
Richard Hancock, PE, Manager, Project Development & Environmental Analysis

FROM: Debbie Barbour, PE
Director of Preconstruction

SUBJECT: "Typical" Highway Cross Sections

The comprehensive planning and design "typical" highway cross sections have been updated in response to the Strategic Transportation Investments Law (House Bill 817) and are also consistent with SPOTOnline (used for Project Prioritization), NCDOT's GIS-based Web Application for providing automated, near real-time prioritization scores and project costs. This guidance establishes design elements that emphasize safety, mobility, complete streets, and accessibility for multiple modes of travel. These "typical" highway cross sections should be used as guidelines for comprehensive transportation planning, project planning and project design activities. The specific and final cross section details and right of way limits for projects will be established through the preparation of the National Environmental Policy Act (NEPA) documentation and through final design preparation.

Please provide this information to your Unit staff, Division staff, and to others as appropriate for their information and immediate implementation. This guidance is intended for State Transportation Improvement Program (STIP) projects and other applicable projects. If you have any questions, please contact one of the Roadway Design Unit Regional Managers, Glenn Mumford, PE, Roger Thomas, PE, or Doug Taylor, PE at 919-707-6200.

DMB/mb

Attachments

cc w/attachments: Mike Holder, PE
Susan Pullium
Rodger Rochelle, PE
Calvin Leggett, PE
Terry Gibson, PE

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
DIRECTOR OF PRECONSTRUCTION
1538 MAIL SERVICE CENTER
RALEIGH NC 27699-1538

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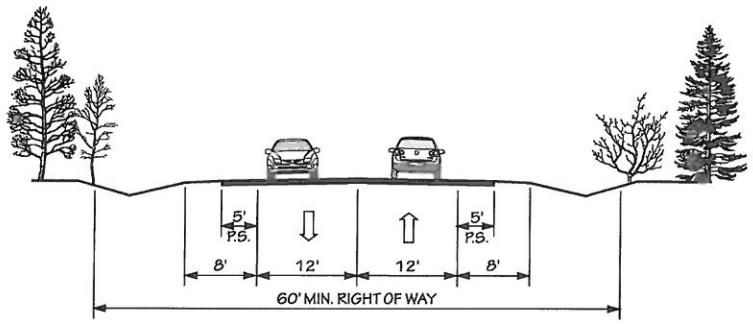
1 SOUTH WILMINGTON STREET
RALEIGH NC

Division Engineers
Don Voelker
Tom Childrey
Debbie Collins
Lauren Blackburn
Ron Hancock, PE
Division Design Engineers

"TYPICAL" HIGHWAY CROSS SECTIONS

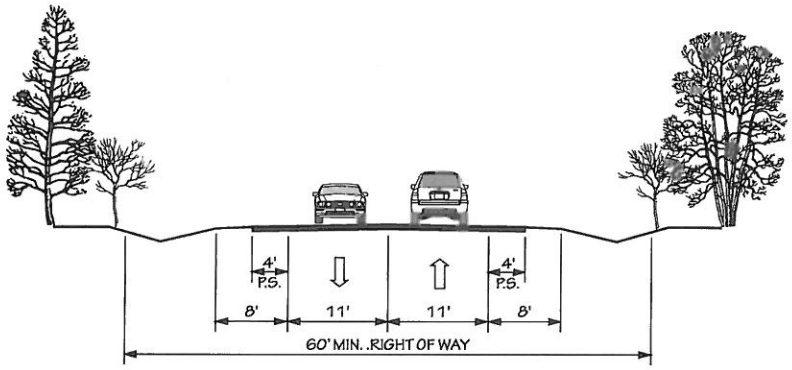
2A



2 LANE UNDIVIDED WITH PAVED SHOULDERS

POSTED SPEED 55 MPH

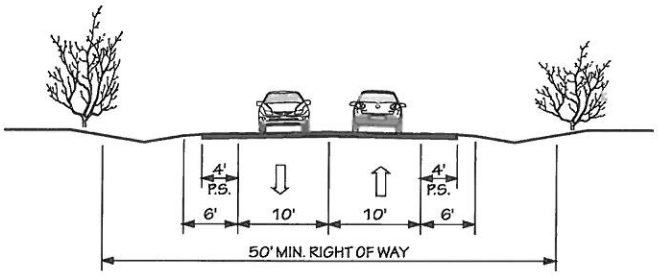
2B



2 LANES UNDIVIDED

POSTED SPEED 45 MPH OR LESS

2C

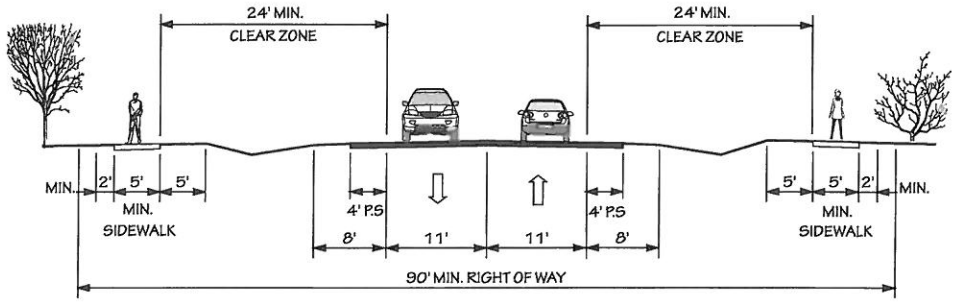


2 LANE UNDIVIDED WITH PAVED SHOULDERS

POSTED SPEED 25 - 35 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

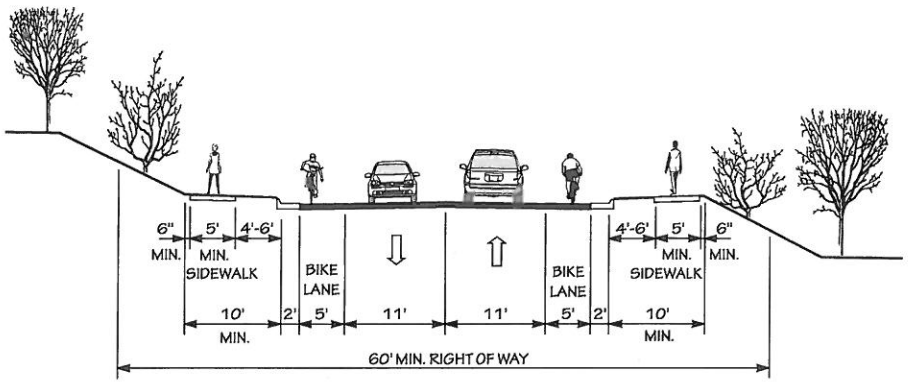
2D



2 LANE UNDIVIDED WITH PAVED SHOULDERS AND SIDEWALKS

POSTED SPEED 25-45 MPH

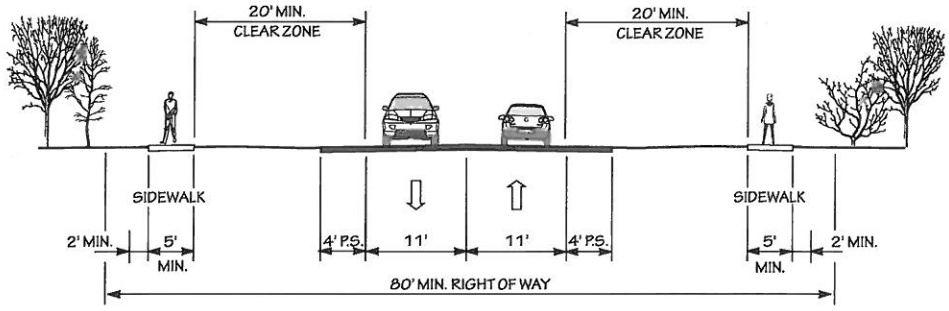
2E



2 LANE UNDIVIDED WITH CURB & GUTTER, BIKE LANES, AND SIDEWALKS

POSTED SPEED 25-45 MPH

2F

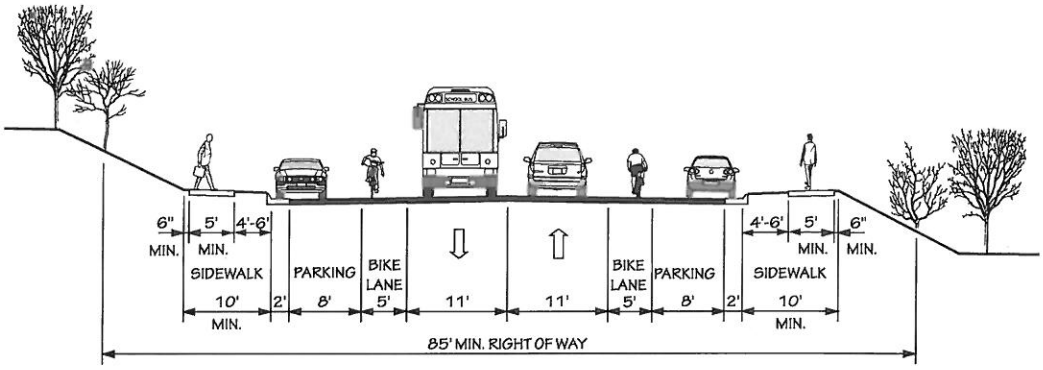


2 LANE UNDIVIDED WITH PAVED SHOULDERS AND SIDEWALKS
IN CAMA COUNTIES

POSTED SPEED 25-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

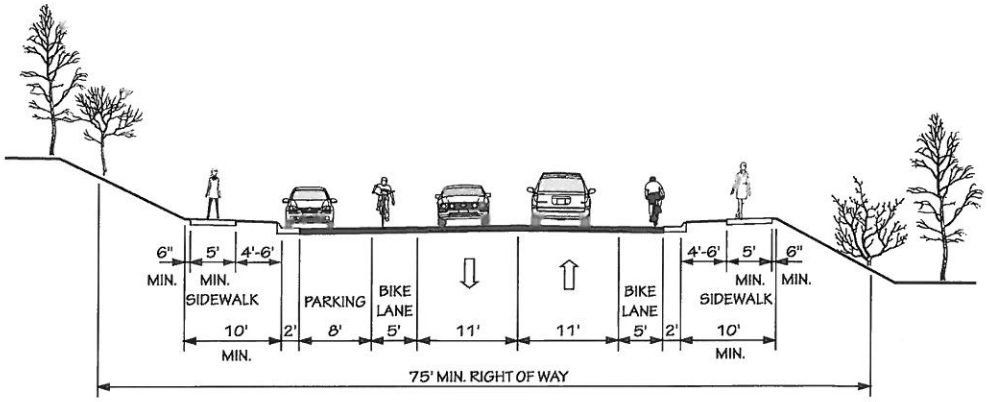
2G



2 LANE UNDIVIDED WITH CURB & GUTTER, PARKING BOTH SIDES, BIKE LANES, AND SIDEWALKS

POSTED SPEED 25-45 MPH

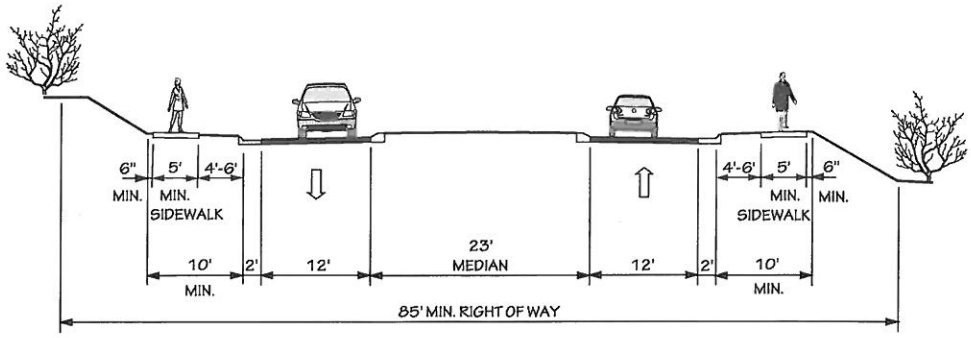
2H



2 LANE UNDIVIDED WITH CURB & GUTTER, PARKING ONE SIDE, BIKE LANES, AND SIDEWALKS

POSTED SPEED 25-45 MPH

2I

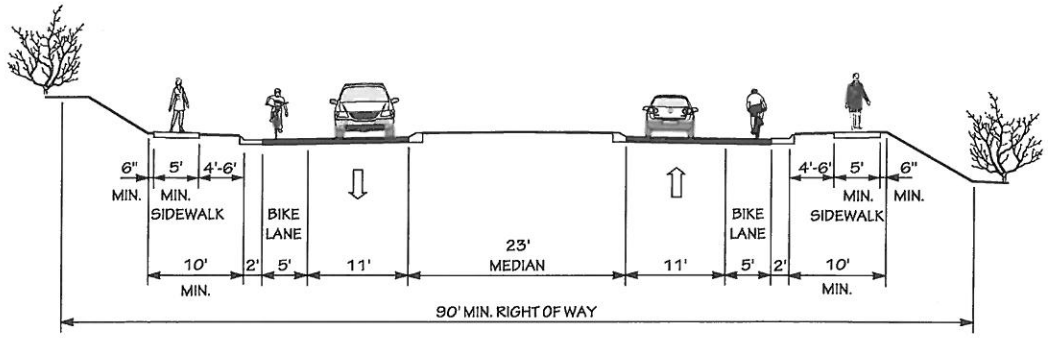


2 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER AND SIDEWALKS

POSTED SPEED 25-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

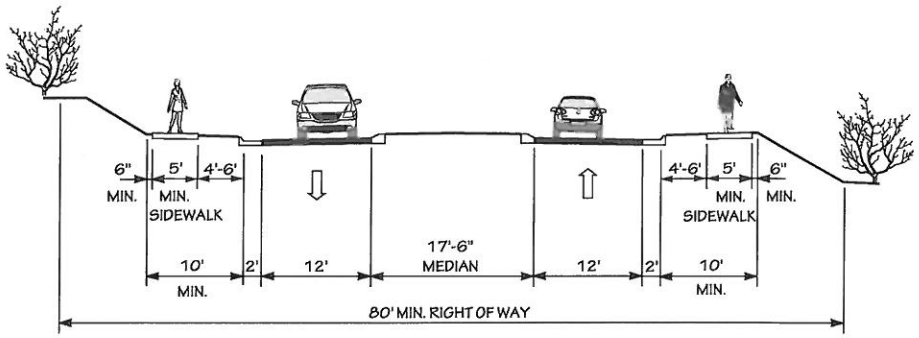
2J



2 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER, BIKE LANES, AND SIDEWALKS

POSTED SPEED 25-45 MPH

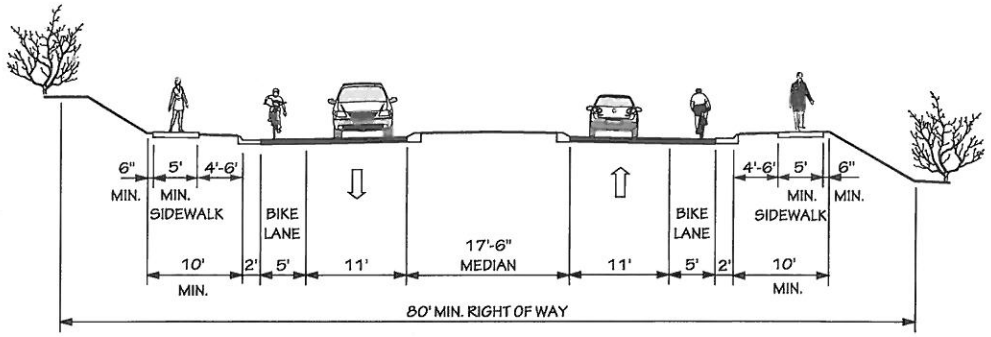
2K



2 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER AND SIDEWALKS

POSTED SPEED 25-45 MPH

2L

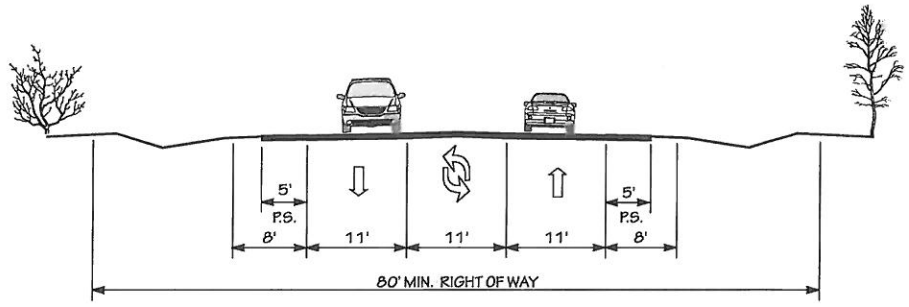


2 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER, BIKE LANES, AND SIDEWALKS

POSTED SPEED 25-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

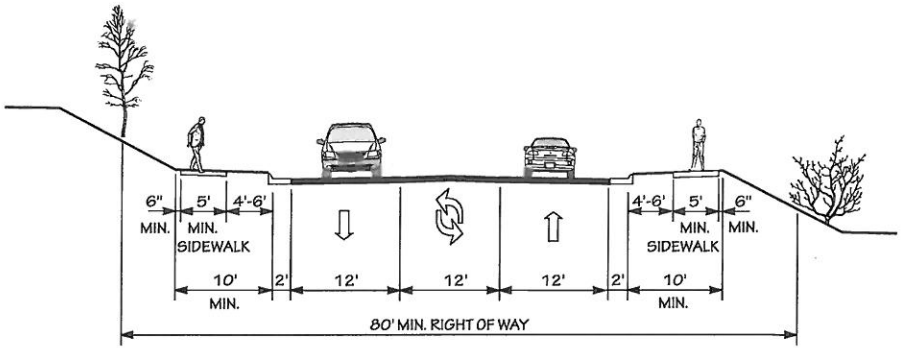
3A



2 LANE WITH TWO WAY LEFT TURN LANE, AND PAVED SHOULDERS

POSTED SPEED 25-55 MPH

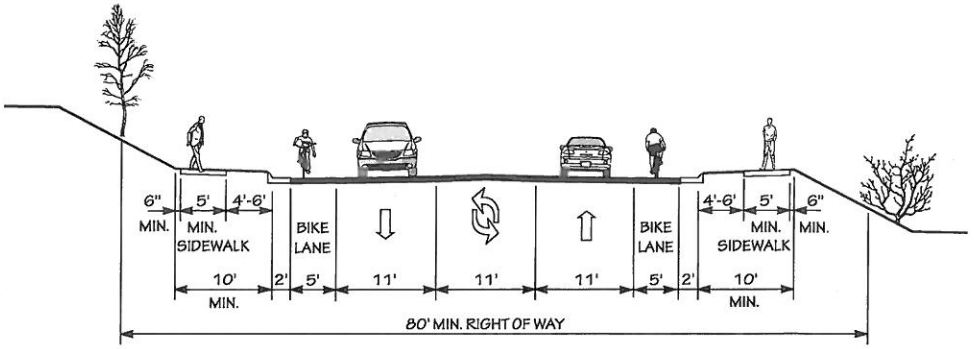
3B



2 LANE WITH TWO WAY LEFT TURN LANE, CURB & GUTTER, AND SIDEWALKS

POSTED SPEED 25-45 MPH

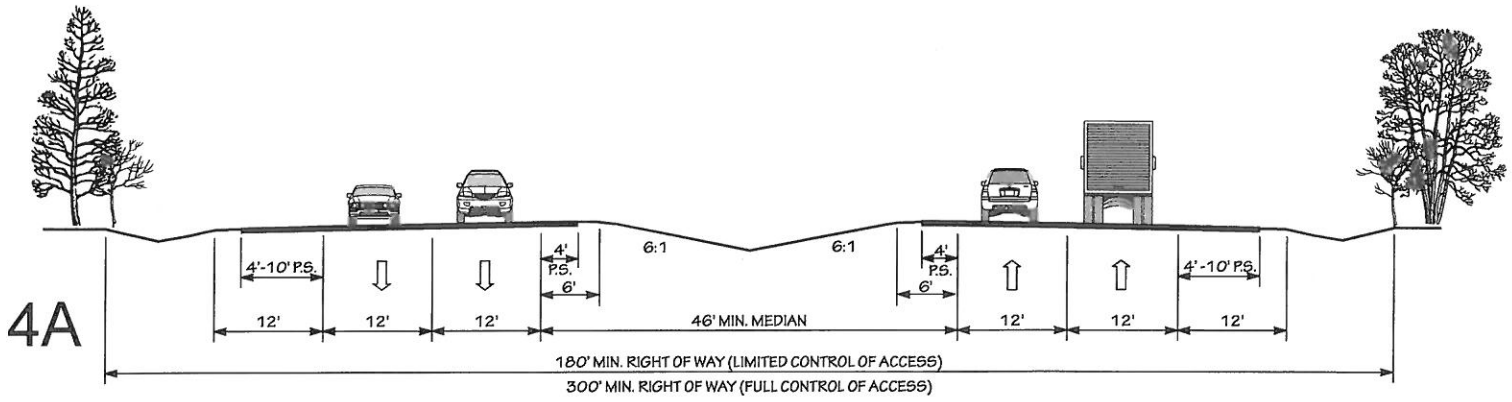
3C



2 LANE WITH TWO WAY LEFT TURN LANE, CURB & GUTTER, BIKE LANES, AND SIDEWALKS

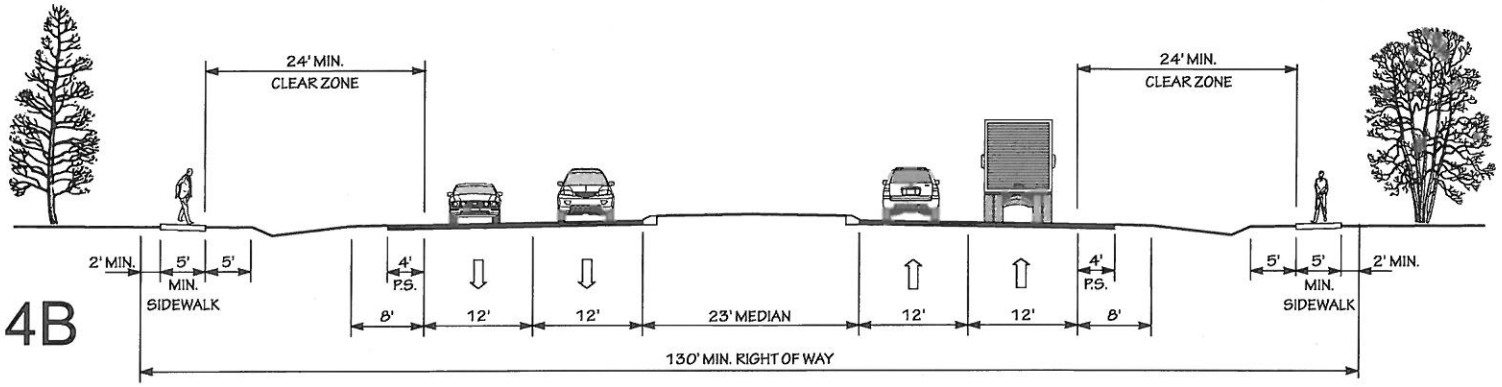
POSTED SPEED 25-45 MPH

"Typical" Highway Cross Sections



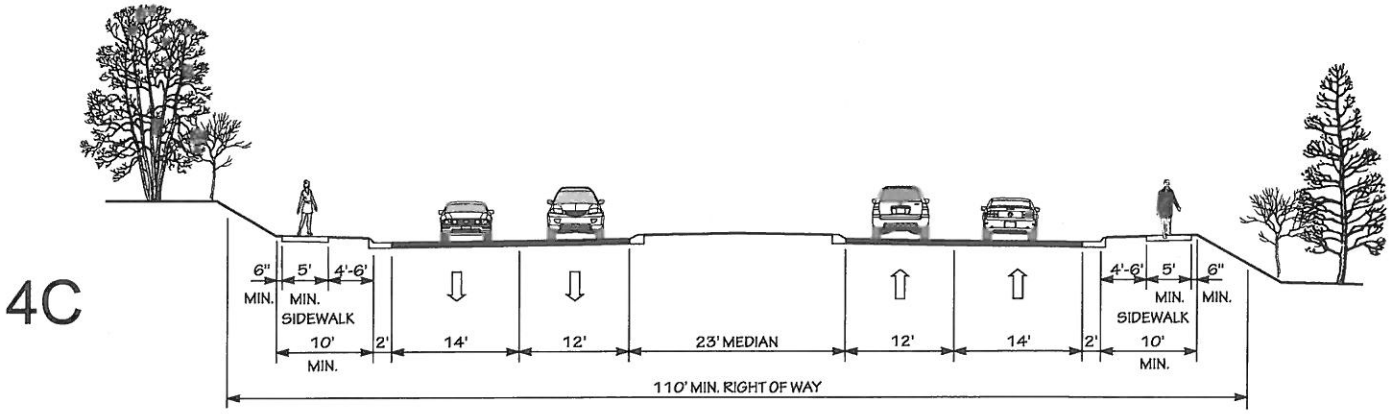
4 LANE DIVIDED (46' DEPRESSED MEDIAN) WITH PAVED SHOULDERS

POSTED SPEED 45-70 MPH



4 LANE DIVIDED (23' RAISED MEDIAN) WITH PAVED SHOULDERS AND SIDEWALKS

POSTED SPEED 35-55 MPH

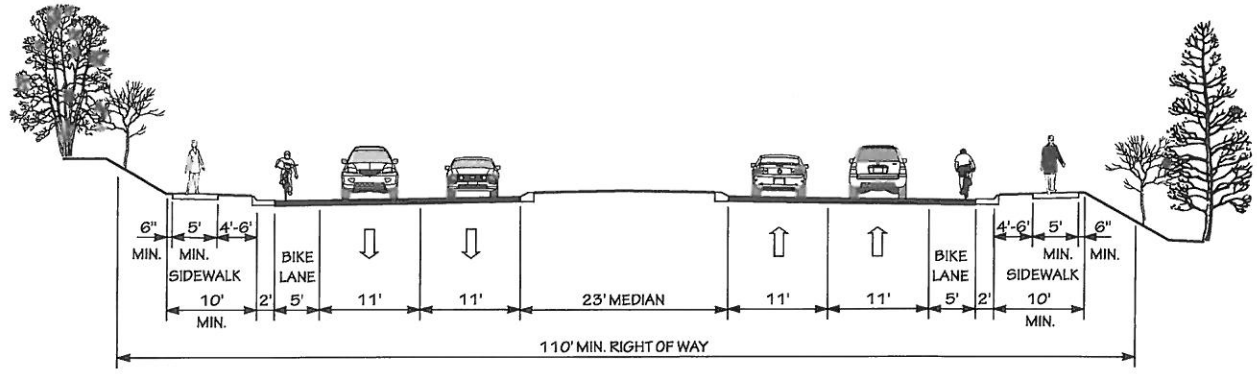


4 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER, WIDE OUTSIDE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

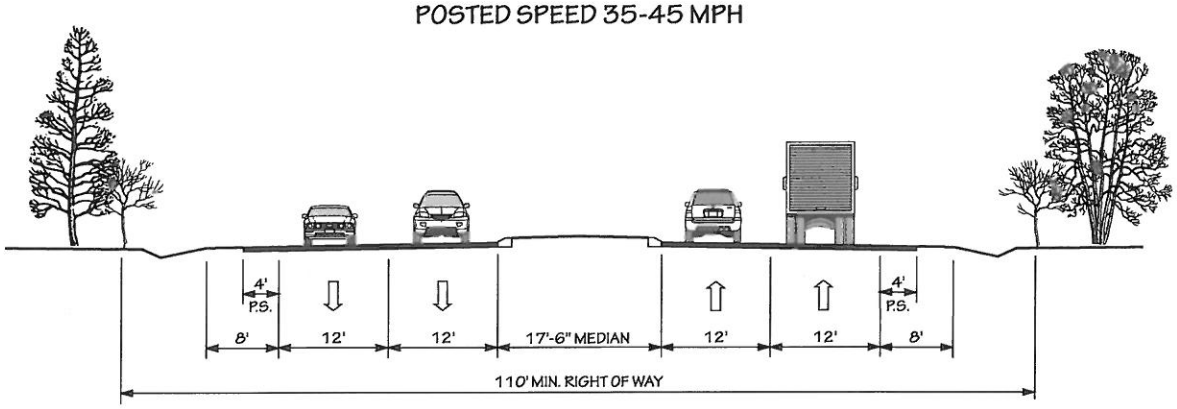
4D



4 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER, WIDE OUTSIDE LANES, BIKE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

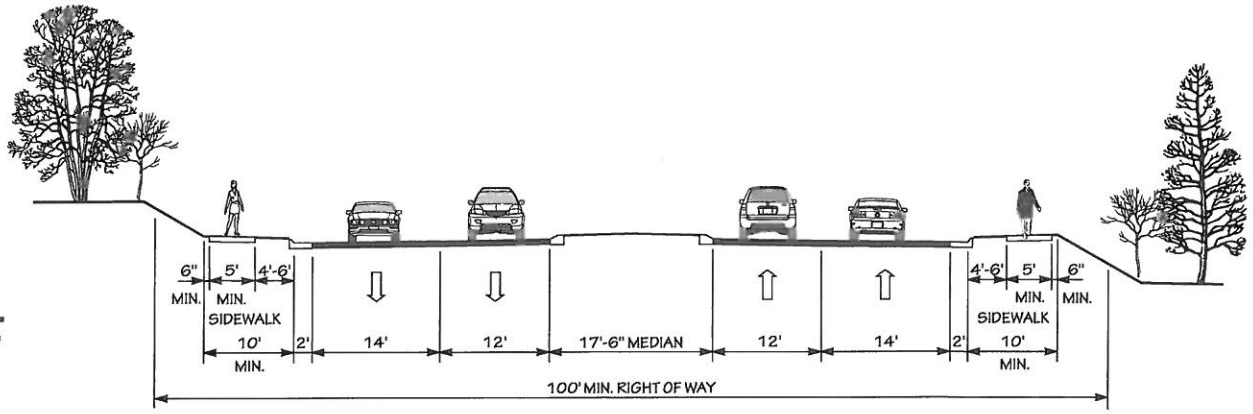
4E



4 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH PAVED SHOULDERS AND SIDEWALKS

POSTED SPEED 35-55 MPH

4F

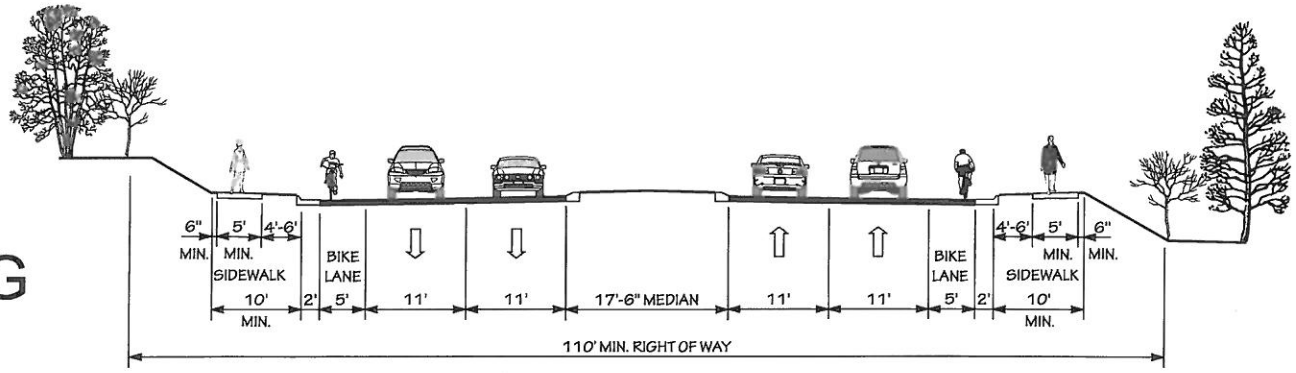


4 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER, WIDE OUTSIDE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS

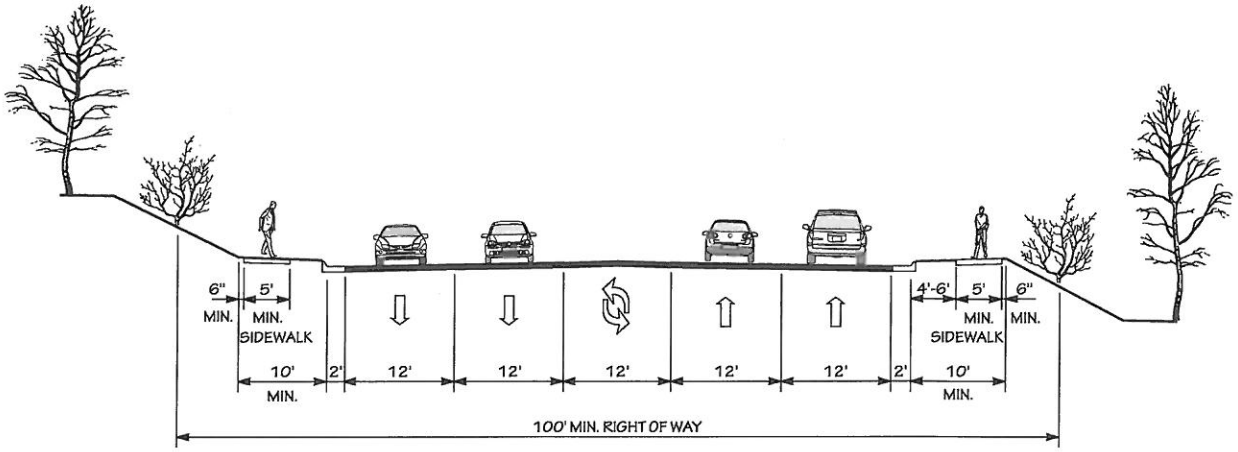
4G



4 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER, BIKE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

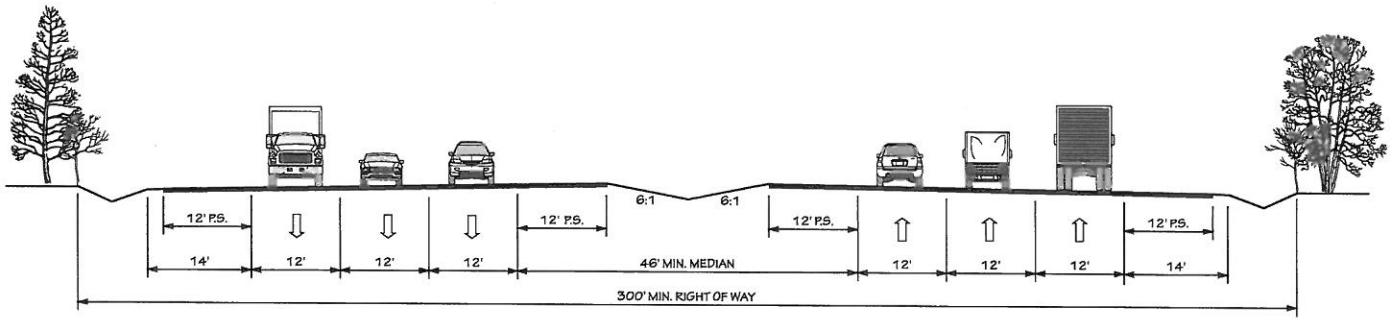
5A



4 LANE WITH TWO WAY LEFT TURN LANE, CURB & GUTTER, AND SIDEWALKS

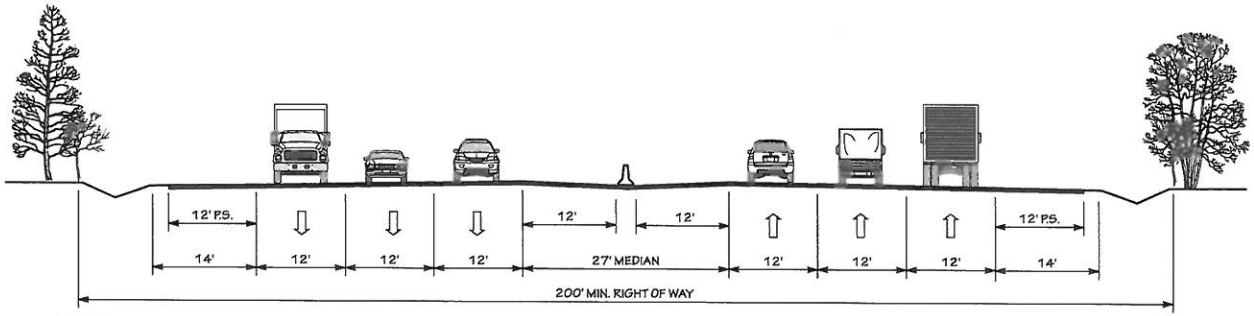
POSTED SPEED 35-45 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS



6A 6 LANE DIVIDED (46' DEPRESSED MEDIAN) WITH PAVED SHOULDERS

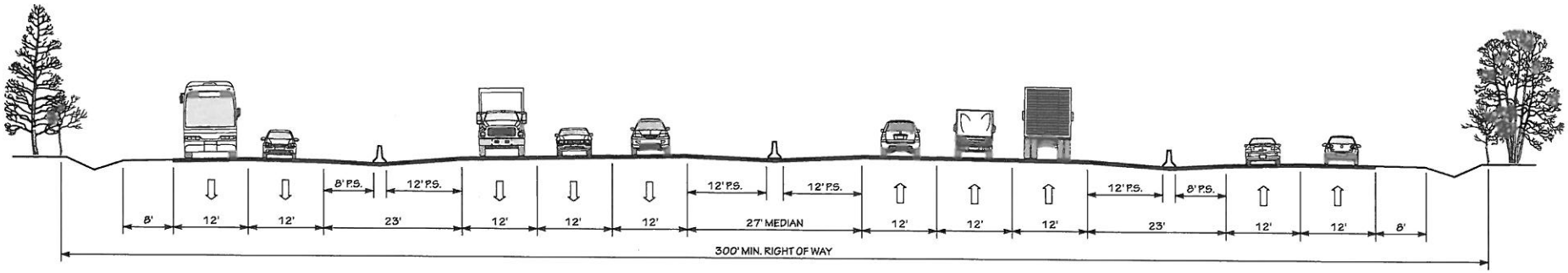
POSTED SPEED 45-70 MPH



6B 6 LANE DIVIDED (27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

POSTED SPEED 55-70 MPH

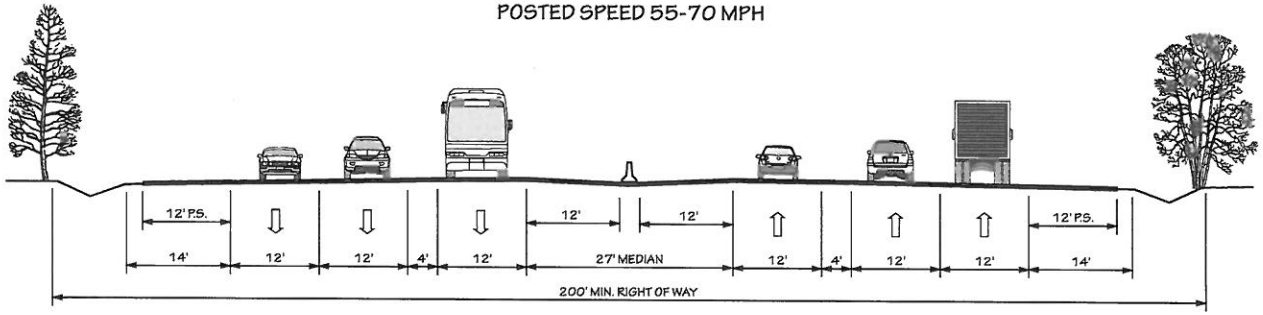
"TYPICAL" HIGHWAY CROSS SECTIONS



6C

6 LANE FREEWAY (27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS AND 2 LANE ONE-WAY SERVICE ROADS EACH SIDE

POSTED SPEED 55-70 MPH

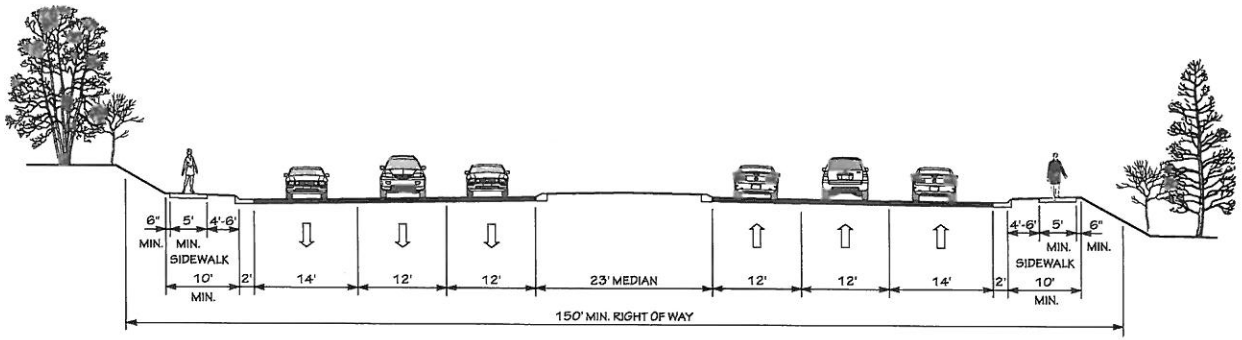


6D

6 LANE FREEWAY (4 GENERAL PURPOSE LANES, 2 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

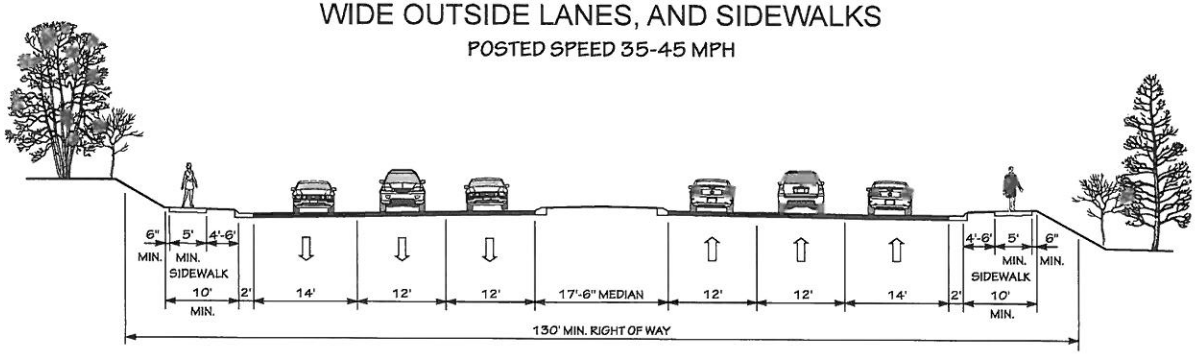
POSTED SPEED 55-70 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS



6E 6 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER, WIDE OUTSIDE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

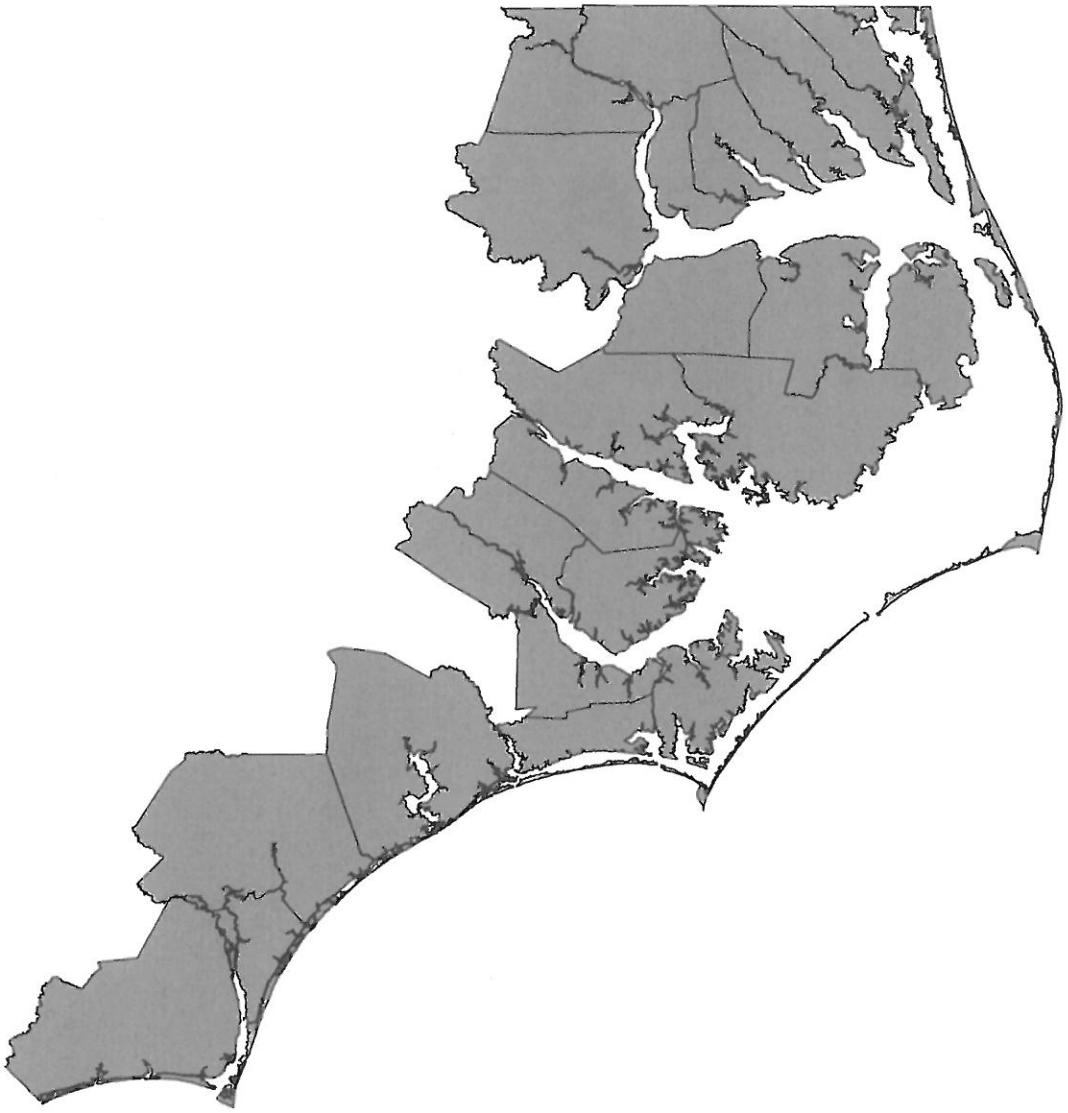


6F 6 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER, WIDE OUTSIDE LANES, AND SIDEWALKS

POSTED SPEED 35-45 MPH

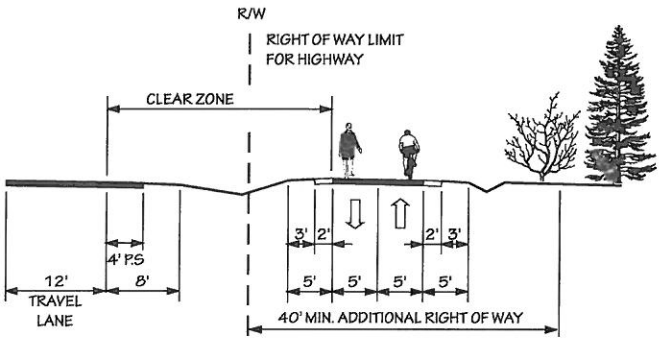
CAMA COUNTIES

Beaufort
Bertie
Brunswick
Camden
Carteret
Chowan
Craven
Currituck
Dare
Gates
Hertford
Hyde
New Hanover
Onslow
Pamlico
Pasquotank
Pender
Perquimans
Tyrrell
Washington



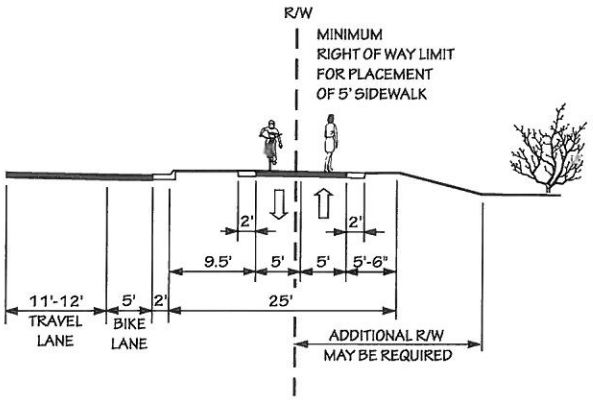
"TYPICAL" HIGHWAY CROSS SECTIONS

M A



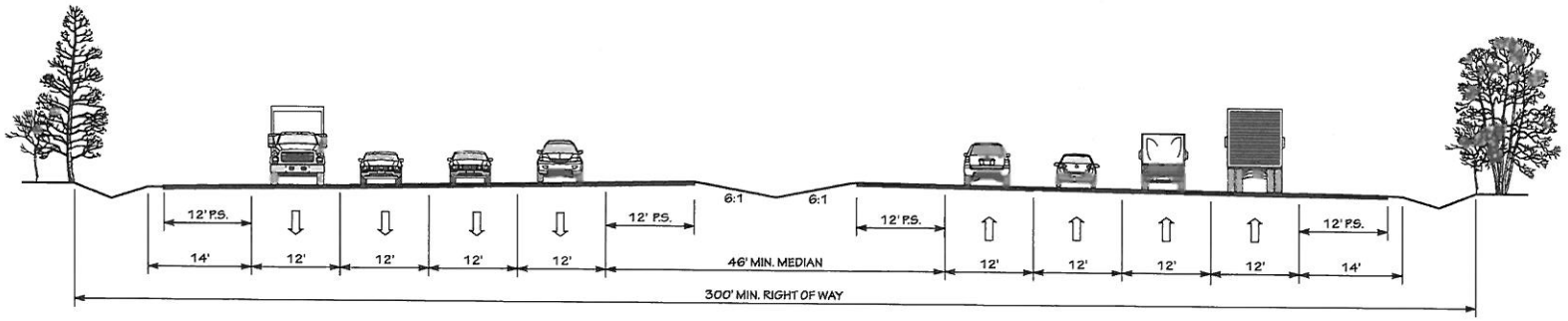
MULTI - USE PATH
ADJACENT TO RIGHT OF WAY OR SEPARATE PATHWAY

M B



MULTI - USE PATH ADJACENT TO CURB AND GUTTER

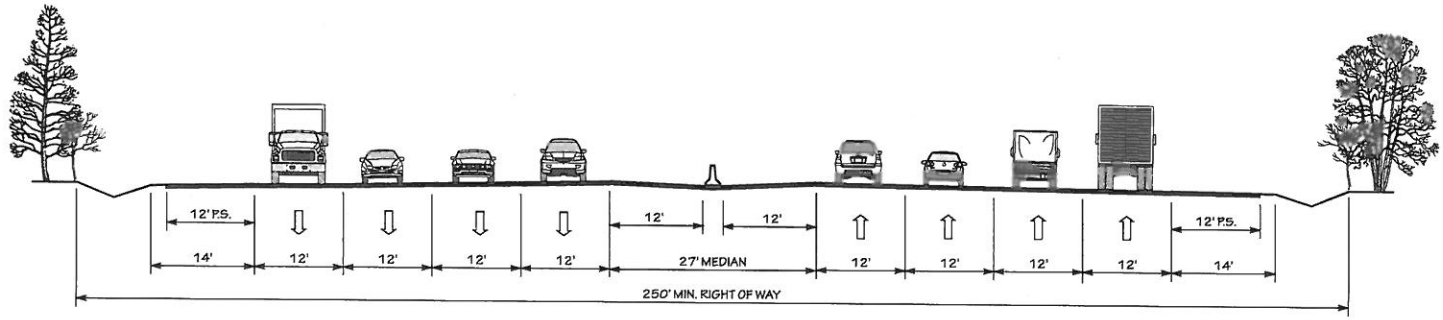
"TYPICAL" HIGHWAY CROSS SECTIONS



8A

8 LANE DIVIDED (46' DEPRESSED MEDIAN) WITH PAVED SHOULDERS

POSTED SPEED 45-70 MPH

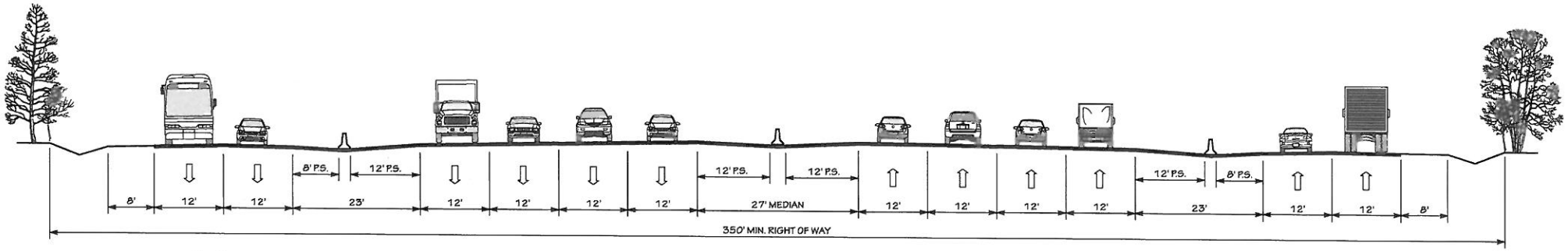


8B

8 LANE DIVIDED (27' MEDIAN WITH JERSEY BARRIER)
WITH PAVED SHOULDERS

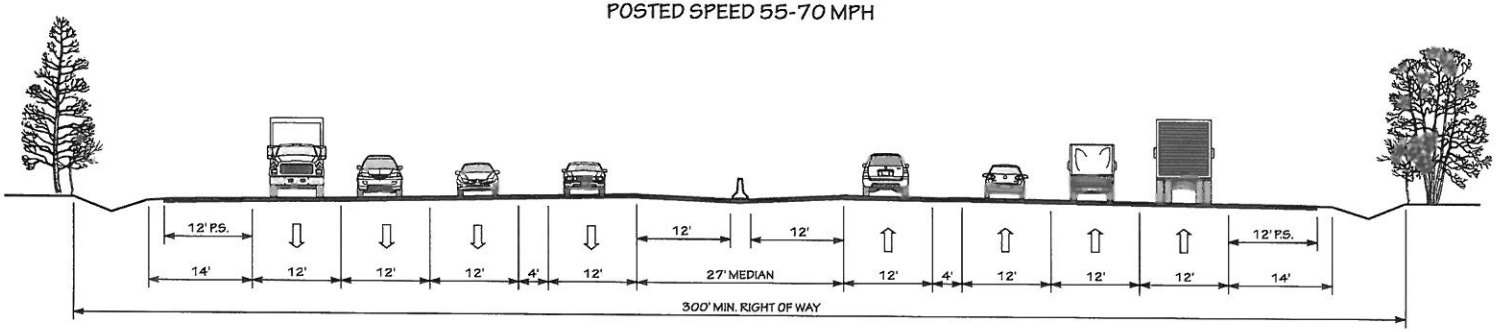
POSTED SPEED 55-70 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS



8C 8 LANE FREEWAY (27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS AND 2 LANE ONE-WAY SERVICE ROADS EACH SIDE

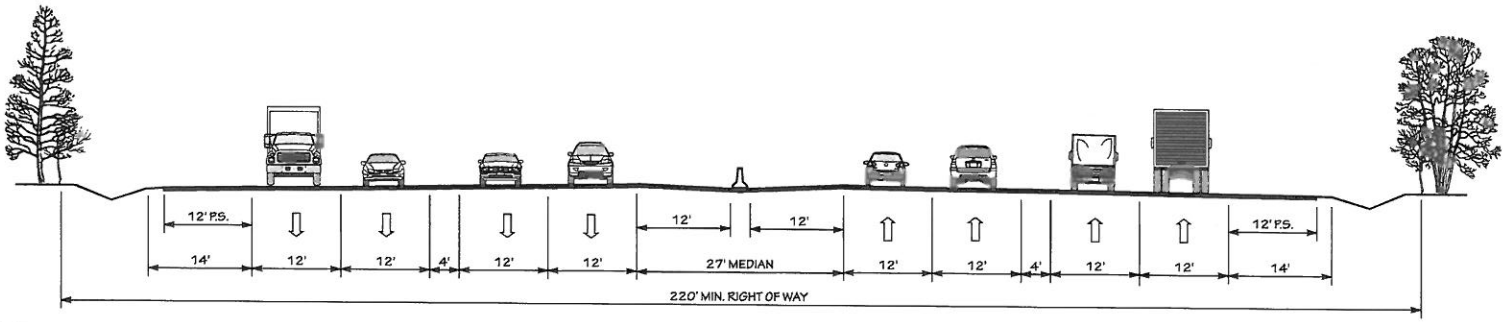
POSTED SPEED 55-70 MPH



8D 8 LANE FREEWAY (6 GENERAL PURPOSE LANES, 2 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

POSTED SPEED 55-70 MPH

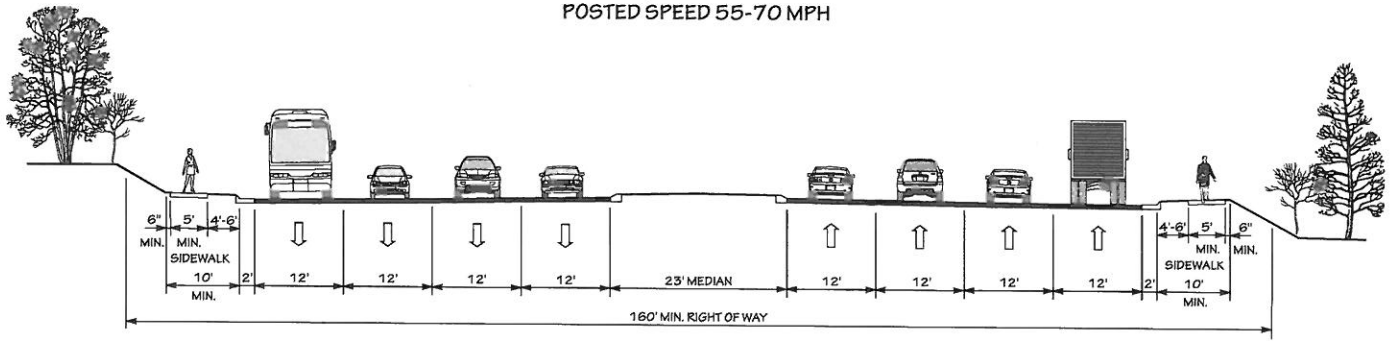
"TYPICAL" HIGHWAY CROSS SECTIONS



8E

8 LANE FREEWAY (4 GENERAL PURPOSE LANES, 4 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

POSTED SPEED 55-70 MPH

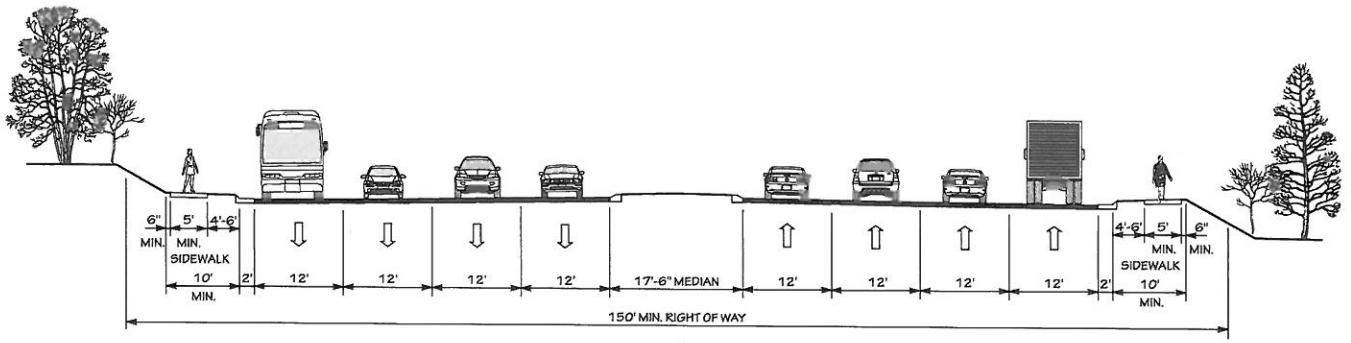


8F

8 LANE DIVIDED (23' RAISED MEDIAN) WITH CURB & GUTTER, AND SIDEWALKS

POSTED SPEED 35-45 MPH

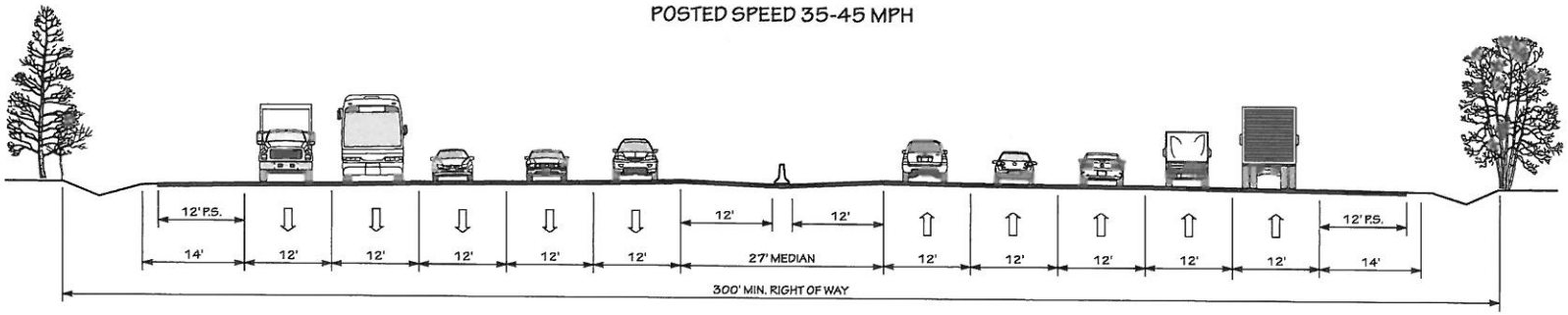
"TYPICAL" HIGHWAY CROSS SECTIONS



8G

8 LANE DIVIDED (17'-6" RAISED MEDIAN) WITH CURB & GUTTER, AND SIDEWALKS

POSTED SPEED 35-45 MPH

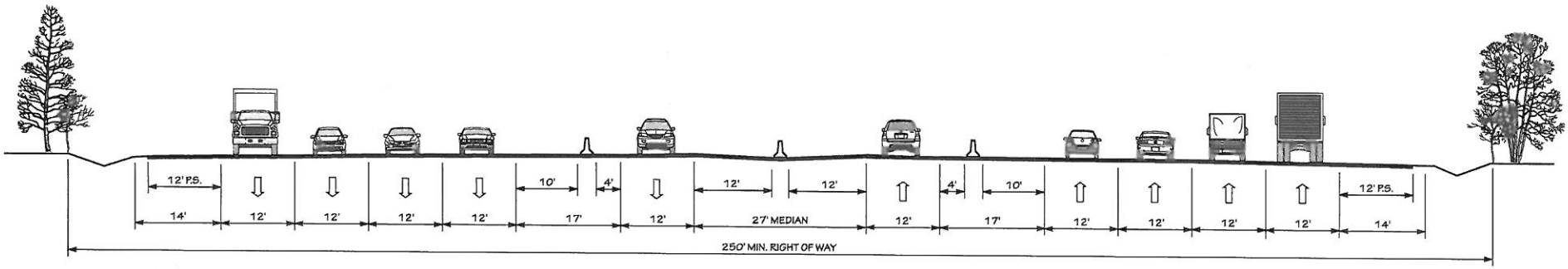


10A

10 LANE DIVIDED (27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

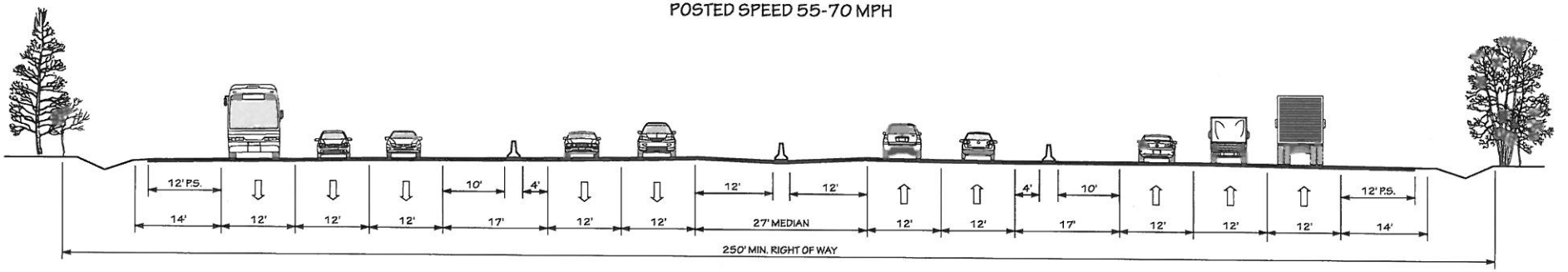
POSTED SPEED 55-70 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS



10B 10 LANE FREEWAY (8 GENERAL PURPOSE LANES, 2 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

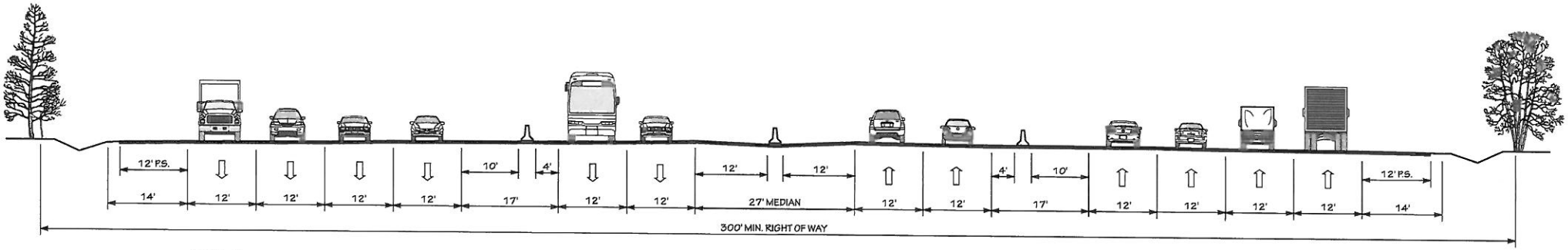
POSTED SPEED 55-70 MPH



10C 10 LANE FREEWAY (6 GENERAL PURPOSE LANES, 4 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

POSTED SPEED 55-70 MPH

"TYPICAL" HIGHWAY CROSS SECTIONS



12A 12 LANE FREEWAY (8 GENERAL PURPOSE LANES, 4 MANAGED LANES, AND 27' MEDIAN WITH JERSEY BARRIER) WITH PAVED SHOULDERS

POSTED SPEED 55-70 MPH

WMPO

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www.wmpo.org

MEMORANDUM

To: Bicycle and Pedestrian Modal Subcommittee Members

From: Abby Lorenzo, Senior Transportation Planner

Date: November 28, 2018

Subject: Cape Fear Moving Forward 2045 Bicycle and Pedestrian Goals and Objectives Rank and Weight Activity

The following goals and objectives have been developed by the Bicycle and Pedestrian Modal Subcommittee for the Cape Fear Moving Forward 2045 Metropolitan Transportation Plan. This activity sheet is to be completed as a committee utilizing the accompanying criteria flowchart handout as a guide.

Bicycle

Rank_____Weight_____% Goal A: Safety, Education, and Enforcement

Objectives:

__ Promote a campaign to educate law enforcement officers, motorists, bicyclists and pedestrians on laws & etiquette of sharing the road

__ Encourage law enforcement efforts to increase cyclist safety

__ Build facilities and traffic engineering solutions that prioritize cycling safety (signage, smart traffic lights, etc.) while considering the nature of adjacent traffic and the presence of any conditions hazardous to cycling (bridge gratings, discontinuous bike lanes, etc)

__ Increase driver education on motoring safely and legally with cyclists

__ Increase cyclist education on riding safely and legally with motorists

__ Contribute to a comprehensive, integrated, and validated reporting system for documenting bicycle (and pedestrian) crash data (including frequency, severity, location, and time of day and atmospheric conditions)

__ Promote the development of laws and ordinances to promote bicyclist safety

Rank_____Weight_____% Goal B: Multimodal Connectivity

Objectives:

__ Distribute information to increase bike trail and connection awareness through various public and private opportunities.

__ Improve connections between bicycling & other modes of transportation (public transportation & ferries)

__ Develop programmatic elements (such as increasing the capacity of bicycles on buses & the creation of bicycle amenities at bus stops) to ease the transition between bicycling & public transportation

__ Implement a bike share program that is integrated with the fixed-route public transportation network

Rank_____Weight_____% Goal C: Built Environment, Land use, and Connectivity

Objectives:

__ Build bicycle facilities and remove barriers in areas with high employment density such as medical campuses and retail centers

__ Increase bicycling facilities that fall within 1 mile of school campuses

__ Increase bicycle connections between parks & residential areas

__ Increase bicycle facility connections to grocery stores and resource centers

__ Increase connections to existing bicycling facilities including school campuses

__ Increase accommodation of older adults, persons with disabilities, young and low-income populations during the design of bicycle facilities and amenities (ie age-friendly design features)

__ Build bicycle facilities that allow safe usage of bridges, roundabouts, overpasses and other geographical barriers

__ Build bicycle facilities that mitigate barriers in existing built environment

__ Build trail connections that fill gaps in the roadway system that will allow for an uninterrupted bicycle route

__ Create off-road and recreational trails

Rank_____Weight_____% Goal D: Health

Objectives:

__ Provide health indicators and data along branded trails

__ Designate signed exercise loops for bicycling

Rank_____Weight_____% Goal E: Economic Development

Objectives:

__ Increase bicycle tourism in our region

__ Increase access and mobility projects targeting identified areas of low-income and minority residents

__ Incentivize public/private development around biking

__ Develop sponsorship policies and identify sponsorship opportunities (ie adopt-a-roadway program)

__ Develop a program to recognize bicycle friendly businesses

__ Incorporate mobile technology into the trail system

__ Increase accommodation of major cycling events in facility design

Pedestrian

Rank_____Weight_____% Goal A: Safety, Education, and Enforcement

Objectives:

__ Increase the number of crosswalks at existing signals, focusing on high traffic areas

__ Increase the use of audible pedestrian signals and flashing lights

__ Increase driver education specifically related to turning movements and crosswalk compliance

__ Promote law enforcement efforts to increase pedestrian safety

__ Prioritize pedestrian projects that occur at, or seek to improve the safety of, identified high risk/high crash locations

__ Contribute to a comprehensive, integrated, and validated reporting system for documenting bicycle and pedestrian crash data

__ Promote roadway and sidewalk design/redesign that increases pedestrian safety (adequate crossing times, medians, street trees, brick crossings, lighting, emergency call boxes, etc.)

__ Increase visual cues that prioritize pedestrian safety (traffic calming, “legally required to stop” cones, etc.)

Rank_____Weight_____% Goal B: Transportation Choice

Objectives:

__ Improve sidewalk and crosswalk conditions depending on the nature of adjacent traffic

__ Evaluate the installation sidewalks and crosswalks based on residential and employment density

__ Install crosswalks near bus stops

__ Increase/Improve sidewalk and crosswalk connections between transit facilities and medical services

Rank_____Weight_____% Goal C: Built Environment, Land use, and Connectivity

Objectives:

__ Increase pedestrian facilities that fall within 1 mile of school campuses

__ Increase pedestrian connections between parks & residential areas

__ Increase pedestrian facilities around libraries, community centers/senior centers, courthouses, local government centers

__ Increase pedestrian facility connections around grocery stores/farmers markets/resource centers

__ Increase connections between existing pedestrian facilities

__ Increase direct connections to public transportation and paths of travel from bus stops to surrounding destinations

__ Use traffic impact analyses (TIAs) to increase pedestrian connectivity

__ Plan for pedestrian facilities with the installation and upgrade of other transportation facilities

__ Create trail links that fill gaps between low traffic roadways to allow for pedestrian use while continuing to preserve the low traffic status of those roadways.

__ Build pedestrian facilities that mitigate barriers in existing built environment

Rank_____Weight_____% Goal D: Health

Objectives:

__ Incorporate health statistics and case studies in the promotion of transportation demand management (TDM) programs and wellness programs

__ Designate exercise loops for walking

Rank_____Weight_____% Goal E: Economic Development

Objectives:

__ Create and promote walking tours in our region through initiatives

__ Include pedestrian facility design in new developments

__ Create sponsorship policies for walking trails and identify sponsorship opportunities

__ Develop a program to recognize pedestrian friendly development

__ Incorporate mobile technology into the trail system

__ Include accommodation of major events in facility design

__ Develop downtown pedestrian friendly shopping areas

Step 1	Step 2*	Step 3	Step 4
• Weight goals	• Create criteria from goals and objectives • measureable and objective • Example goal B2	• rank the created criteria in order of importance	• weight criteria • sum of all criteria should equal the goal number

Goal A: Economic Development 60%

1 2 3 4

Objectives:

1.	~~Improve commercial aviation service for business travelers~~		
2.	Provide freight rail service to ILM *reword as criteria	1	30%
3.	Serve the needs particular to the region's target industries *reword as criteria	3	15%
4.	Develop aviation infrastructure to encourage additional commercial carrier, general aviation, and freight services	2	15%

Goal B: Regional Accessibility 40%

Objectives:

1.	Provide additional direct flight services to and from business centers and/or hubs *reword as criteria	3	5%
2.	Lower fare costs and maximize market shares for ILM in the region Project accommodates budget airlines at ILM	1	20%
3.	Provide multimodal transportation services to and from ILM to meet the needs of the area's target industries, such as:	4	5%
4.	Coordinate with roadway network projects that support the development of ILM to include accommodations necessary for truck/rail freight transportation to/from site *reword as criteria	2	10%
5.	~~Support international cargo operations, utilizing ILM's free trade zone status~~		

Notes:

- Criteria should be written such that anybody can complete them and come to the same score for each project
- When attempting to turn abstract or vague objectives into criteria think "how can this objective be measured" see objective B2 as an example

WMPO Wilmington Urban Area Metropolitan Planning Organization www.wmpo.org

WMPO

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MEMORANDUM

To: Bicycle and Pedestrian Advisory Committee

From: Abby Lorenzo, Senior Transportation Planner

Date: November 29, 2018

Subject: WMPO Bicycle and Pedestrian Advisory Committee 2019 Work Plan

The Bicycle and Pedestrian Advisory Committee is responsible for providing the WMPO Board with recommendations with regard to bicycle and pedestrian accommodations. The following work plan outlines the tasks the committee will undertake during 2019.

January	• MTP Project Criteria Development • R2SBR & B2WW Presentations • R2SBR & B2WW Subcommittee assignments • Review recommended station locations for Wilmington bike share
February	• Finalize MTP Project Criteria Development • R2SBR & B2WW Progress Update • Fall Bike Ride/Educational Outreach Event discussion
March	• MTP Policy Development • R2SBR & B2WW Progress Update
April	• Presentation on DA Program application and project process • Update on Draft STIP • Discussion on potential “Did you know?” Educational Outreach Campaign
May	No BPAC meeting – River to Sea and Bike to Work Week participation encouraged!
June	• River to Sea recap • Bike to Work Week recap
July	No BPAC meeting

August	• P6.0 Project Submittal Update and Presentation on Process
September	• Potential “Build a Better Block” Demonstration in partnership with WMPO TDM Program • Potential Fall Bike Ride/Educational Outreach Event
October	• Review of Bicycle and Pedestrian Project Database
November	• Continued Review of Bicycle and Pedestrian Project Database • 2020 Work Plan and Calendar preparation • Nominations for Election of officers for 2020
December	• Election of officers for 2020 • 2020 Calendar review and approval • 2020 Work Plan review and approval

The committee is encouraged to suggest additional topics or activities for the committee to pursue over the course of the year. Staff will make adjustments to the above work plan to accommodate additional requests by the committee.

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MEMORANDUM

To: Bicycle and Pedestrian Advisory Committee Members

From: Abby Lorenzo, Senior Transportation Planner

Date: November 29, 2018

Subject: Draft 2019 Meeting Calendar

The following table lists the second Tuesday of the month meeting dates.

2019 Bicycle and Pedestrian Advisory Committee Calendar
8-Jan
12-Feb
12-March
9-Apr
May - No monthly meeting Bike Month Events
11-Jun
July – No monthly meeting
13-Aug
10-Sep
8-Oct
12-Nov
10-Dec