Glossary

Americans with Disabilities Act (ADA)	Civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life and all public and private places that are open to the public.
Accessible Pedestrian Signal (APS)	Devices that communicate information about the "walk" and "don't walk" intervals at signalized intersections in nonvisual formats to pedestrians who are blind or have low vision.
Advisory Bike Lanes	Dashed bike lanes on low-volume streets too narrow for dedicated lanes.
Bicycle Signal Actuation	A device at a traffic signal that detects bicyclists and alerts the signal control box of a bicyclist's presence and need to cross.
Bike Box	Designated area positioning cyclists ahead of vehicles in traffic lane at signalized intersection during the red signal phase.
Bike Signal Faces	Bike-specific signal providing priority to cyclists where vehicle or pedestrian movements conflict.
Buffered Bike Lanes	Bike lane buffered from traffic with striping. When bollards or physical separation is used, the facility is often called a Protected Bike Lane.
Bus Rapid Transit (BRT)	Bus rapid transit (BRT, BRTS, busway, transitway) is a bus-based public transport system designed to improve capacity and reliability relative to a conventional bus system. BRT often incorporates dedicated bus lanes and traffic signal priority.
Capital Improvement Plan (CIP)	The Capital Improvement Plan (Program) is a short-range plan which identifies capital projects and equipment purchases, provides a planning schedule, and identifies options for financing the plan. It is the principal planning tool designed to advance the priorities of the Town.
Complete Street	A transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient, and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation. Complete Streets allow for safe travel by those walking, cycling, driving automobiles, riding public transportation, or delivering goods.
Curb Ramp	A combined ramp and landing to accomplish a change in level at a curb between the sidewalk and the street. This element provides a transitional access between elevations for pedestrians using wheelchairs, strollers, or other devices with wheels, and must comply with ADA Standards.

Glossary

Cycle Track	One- or two-way bike-only facility separated from traffic by physical barrier and pedestrians by curb or buffer.
Detectable Warning	Standardized surface feature built in, or applied to, walking surfaces to warn pedestrians with vision impairments of their approach to street crossings by delineating the boundary between pedestrian and vehicular routes, and to hazardous drop-offs such as the edge of boarding platforms at transit stations. Detectable warnings must meet ADA Standards. Truncated domes are a type of detectable warning.
Durham-Chapel Hill-Carrboro MPO (DCHC)	See MPOs.
East Coast Greenway	A bicycling and walking route that connects 15 states, 450 cities and towns, and 3,000 miles of people-powered trails from Maine to Florida.
Grade-Separated Crossing	A facility, such as an overpass, underpass, skywalk, or tunnel that allows pedestrians, bicyclists, and motor vehicles to cross each other at different levels to avoid conflicts and improve free flow of each mode.
Greenway Connector	A combination of signing, marking, traffic calming measures, and facilities that allow bicyclists and pedestrians to get safely from point A to point B in a priority corridor.
Hybrid/HAWK Signals	Special signals used for crosswalks/bike crossings on major streets where side streets do not warrant full signal. Photo on page 34.
Intersection Crossing Markings	Pavement markings indicating intended path of cyclists; typically include dashed edge lines with green pavement or sharrows.
Lane Reallocation	A technique to modify the number or width of travel lanes to achieve systemic improvements. Variants of the term reallocation include 4-to-3 lane conversion, lane reduction, and road diet.
Light Rail Transit (LRT)	A transit technology that is lighter than other traditional passenger rail systems like subways or commuter rail. Light rail operates in dedicated tracks with electrical power supplied from an overhead catenary system. The light rail vehicles are designed to operate in mixed traffic or in an exclusive right-of-way, either at grade or on an elevated structure.
Land Use Management Ordinance (LUMO)	Chapel Hill's set of development regulations.

Metropolitan Planning Organization (MPO)	A federally mandated and federally funded transportation policy-making organization in the United States that is made up of representatives from local government and governmental transportation authorities. Chapel Hill is within in the Durham-Chapel Hill-Carrboro MPO.
Midblock Crossing	A marked crosswalk that occurs in a location other than an intersection.
Modeshare	The percentage of commuters who travel to and from work by a certain mode (car, bike, walk, transit, work from home)
Multimodal	A transportation term which refers to planning that considers various modes (walking, cycling, automobile, public transit, etc.) and connections among modes. Multimodal transportation includes the mixing of different modes and supports the needs of all users whether they choose to walk, bike, use transit or drive. It means more connections and more choices.
Multi-Use Path	A facility, which should be designed to meet ADA Standards, that can be used by bicyclists, pedestrians, and other non-motorized users. They are separated from the roadway by an open space or a physical barrier or within an independent-right-of-way. Also known as a “shared use path” or “greenway.”
Non-Motorized	Active transportation which includes walking and bicycling and variants such as small-wheeled transport (skates, skateboards, push scooters and hand carts) and transport by wheelchair. Also known as Human Powered Transport.
NCDOT	North Carolina Department of Transportation
Overpass	A structure or bridge that crosses over a roadway, barrier, or natural feature. Also called a "grade separation."
Pedestrian Refuge Island	A raised island at intersection or mid-block crossing location that helps protect crossing pedestrians from motor vehicles and provides a place of refuge. Also known as a crossing island.
Priority Corridor	A low-stress route prioritized for bicyclist and pedestrian use connecting key destinations in the Town
Rapid Rectangular Flashing Beacon (RRFB)	A warning beacon activated by a pedestrian at an uncontrolled crossing location which uses an irregular flash pattern to signal drivers of a pedestrian’s presence and desire to cross.
Right-of-Way	A right to make a way over a piece of land, usually to and from another piece of land. It is a type of easement granted or reserved over the land for transportation purposes, this can be for a highway, sidewalk, bike paths, rail transport, canal, as well as electrical transmission lines, oil and gas pipelines.

Glossary

Separated Facility	A bicycle and/or pedestrian facility that is physically separated from motor vehicles and is on, adjacent to the roadway, or in an independent right-of-way. Separated facilities include cycle tracks, protected bike lanes, and multi-use paths.
Shared Lane Markings	A pavement marking symbol used to indicate a shared lane environment for bicycles and motor vehicles. These markings are also called "sharrows."
Traffic Calming	A traffic management approach that is intended to slow cars to speeds that are safer and more compatible to bicycling and walking as they move through commercial and residential neighborhoods. The traffic calming toolbox includes, but is not limited to: diagonal parking, neighborhood traffic circles, narrowing travel lanes, tightening curb radii, median islands, traffic diverters, and speed tables.
Transportation Demand Management (TDM)	The application of strategies and policies to reduce travel demand, or to redistribute this demand in space or in time to result in more efficient use of transportation resources.
Two-Stage Turn Queue Box	A designated area at an intersection intended to provide bicyclists a place to wait for traffic to clear before proceeding in a different direction of travel.
Uphill Climbing Lane	Bike lane marked on uphill portion of road with shared lane marking on downhill side.
Vehicles per Day	A measure of traffic volume and used as the unit for Average Annual Daily Traffic.
Wiki-Mapping	An online engagement tool for planners to identify barriers, problems, or safety concerns and simultaneously collect location information from the public.

APPENDIX A:
Public Involvement Detail Summary

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PART 1: Public Outreach Inputs to the Mobility Plan

This section summarizes the public input conducted for the plan which resulted in over 850 comments regarding overall mobility as it relates bicycling, walking, and access to transit in the town. Comments are summarized in Part 2. The following inputs were used for developing the plan:

- 20 agencies represented on the Mobility Plan Steering Committee
- 4 Pop-Up Outreach events were conducted with the intent of 'meeting people where they are' to receive input and feedback
- 505 responses were received to the Mobility Plan survey which was distributed in both paper and online format (3)
- An online wiki-map was made available for map-based input
- 82 Citizens attended and participated in the Open Houses for the Plan, excluding the Open House conducted for the final plan review (Part 4)

Steering Committee

A Steering Committee met during the planning process for information sharing and updates on May 25, 2016. This meeting included an invitation to representatives from the following agencies: UNC, Town of Chapel Hill (TOCH) Planning, TOCH Police Department, TOCH Planning, TOCH Fire Department, NCDOT, GoTriangle, TOCH Communications, GoTriangle, Town of Carrboro, City of Durham, TOCH Communications, DCHC MPO, TOCH Parks & Recreation, TOCH Police Department, TOCH Engineering, TOCH Planning, TOCH Transit, TOCH, Manager. Twenty agencies were represented on the Mobility Plan Steering Committee

Appendix A: Public Involvement Detail Summary

A kick-off meeting was held on March 28, 2016 that covered expectations, the project approach and schedule, data collection, community engagement, stakeholder identification, the Ephesus Fordham sub-area plan, placemaking, and lessons learned.

Pop-Up Outreach

The purpose of developing pop-up stations was to go Chapel Hill residents to get survey input in locations where they typically travel. "Outreach events" were conducted during the month of June. I-pads and survey hard copies were available so residents could fill out information in real time. At the September outreach event, handouts and flyer were used to advertise a timely upcoming public meeting, and the consultant team was available to answer questions.

- **Tuesday June 21, 2016** – Active outreach at Plaza 140 to collect survey input
- **Wednesday, June 22nd** – Team rides various transit routes throughout the day in Chapel Hill to collect survey input
- **Thursday, June 23rd** – Active outreach at Eastgate Shopping Center to collect survey input
- **Friday August 26th –** Active outreach at Cyclicious event at UNC-Chapel Hill

Survey

A survey was developed with Staff guidance so questions were asked to gain insights from a variety of residents on relevant topics. These include current pedestrian, cycling, and transit destinations, connectivity issues, and suggestions for improvements. Emphasis was placed on the Ephesus-Fordham District. The survey was open from mid-June until mid-September 2016 and received 505 responses. Due to the desire for input on pedestrian mobility, walking and accessibility were key components of the survey. A complete survey summary is included in Part 3.

Public Open Houses

Two public open houses were held at the Chapel Hill Public Library. The drop-in style open houses had a variety of interactive boards and a presentation to introduce residents to the planning process, and get feedback on the following: vision and goals of the plan; current issues with bicycling, walking, and access to transit; and voting on prioritization of projects. Both open houses also took open ended feedback for consideration in the plan. Overall 82 Residents attended and Participated in the Plan's Open Houses. See Part 4 for the Open House Summary on September 6.

- Thursday June 30, 3:30-7PM Drop-in session at Chapel Hill Public Library: 39 attendees
- Tuesday, September 6, 4-7 PM Drop-in session at Chapel Hill Public Library: 43 attendees

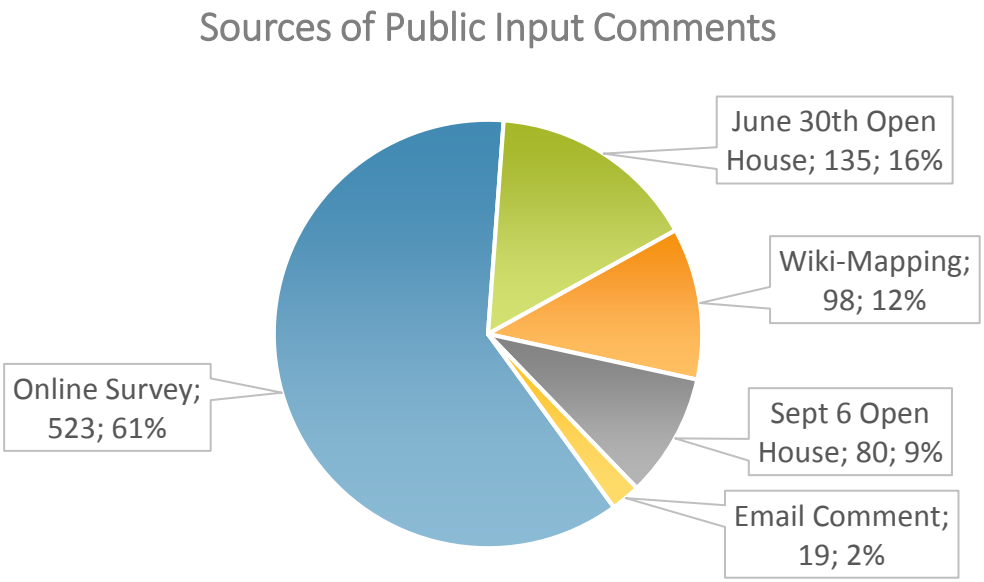
WikiMap

The Town of Chapel Hill used an online tool called WikiMaps to serve as a complement to the survey, and allowing community members to provide visual, map-based input about desired walking and bicycling routes, destinations, and problem intersections. Citizens were able to specify and comment on desired routes, transit stops, dangerous intersections, and destinations currently difficult or impossible to access using alternative modes of transportation.

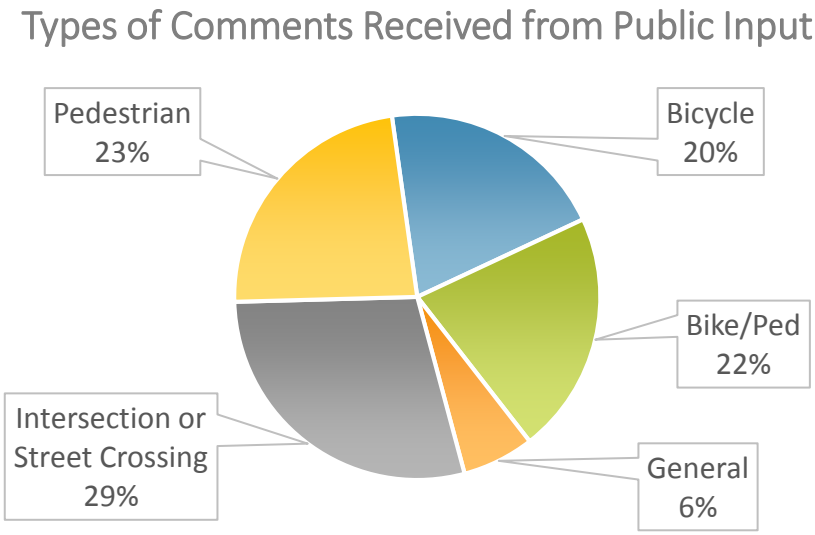
PART 2: Public Comment Summary

This section summarizes the public input conducted for the plan which resulted in over 850 comments regarding overall mobility as it relates bicycling, walking, and access to transit in the town.

Residents of the town were given numerous ways to give input. Over 850 comments regarding mobility issues were received through the open houses, e-mails, and wiki-mapping and Question 5 of the Survey.



These comments were categorized by the type of public input received. Where both modes were listed, a mode was not specified, or where greenways were concerned, comments were categorized as "Bike/Ped." The majority of comments were related to intersections or crossing the street (29%), followed by pedestrian-only comments (23%). Bicycle and joint Bike/Ped comments each comprised around 20% of the overall input.

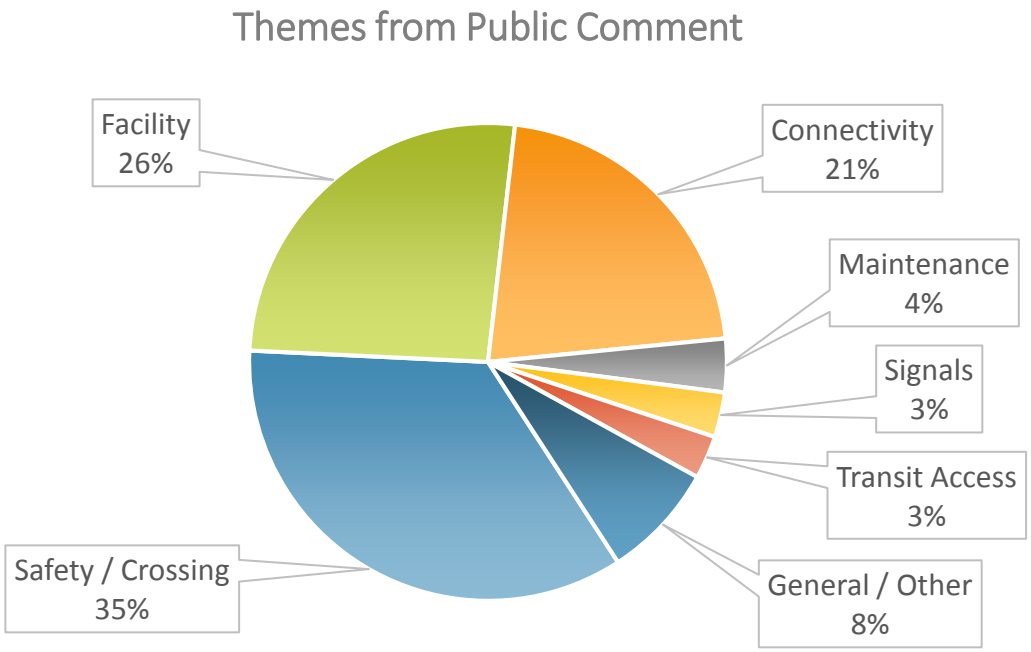


Appendix A: Public Involvement Detail Summary

Major Themes of Public Comments

From the comments, several major themes emerged:

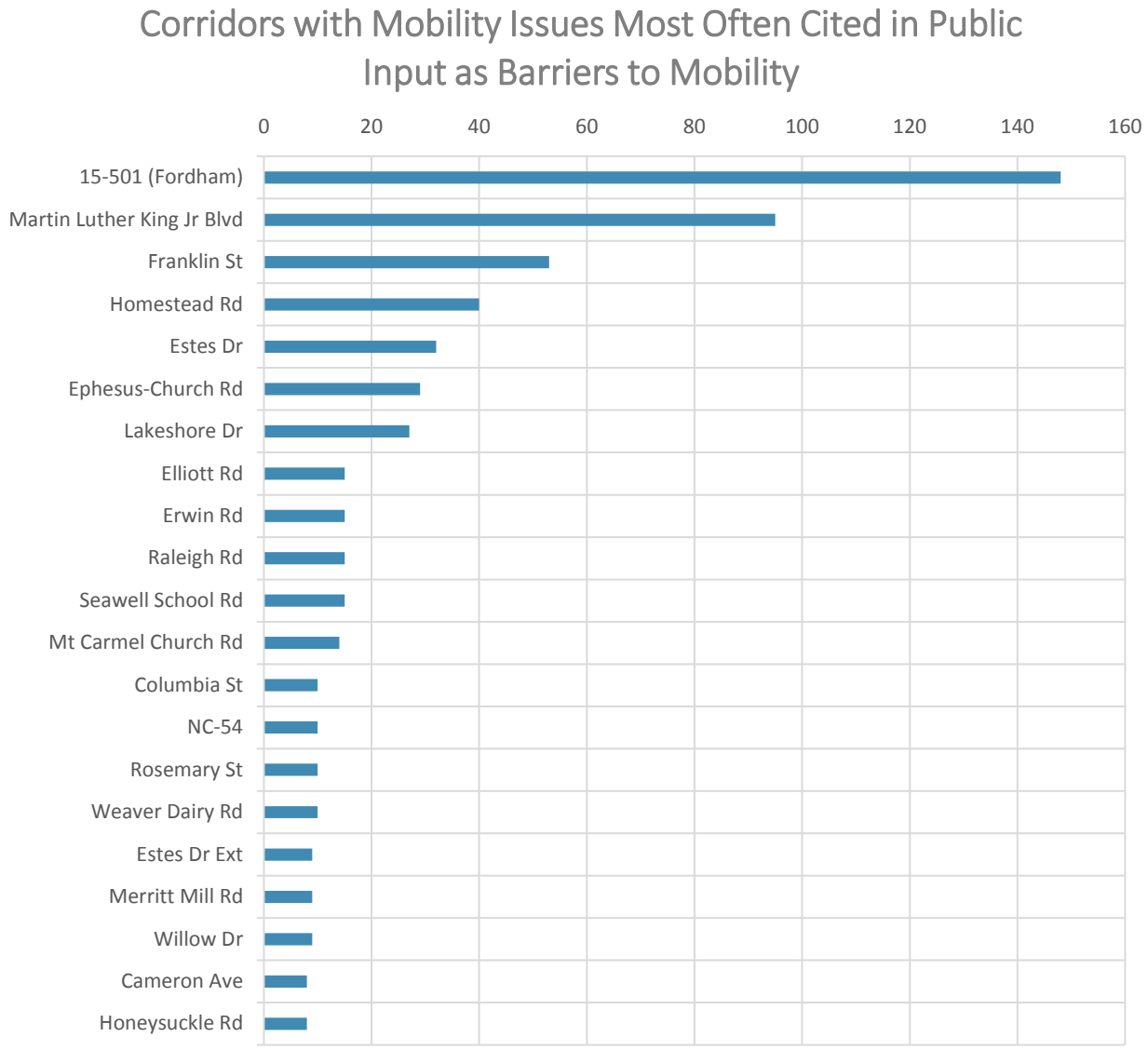
- **Safety, especially at intersections** – Over one third of the comments were related to safe crossing of busy streets. The majority of these comments were recommendations for crosswalks and safety improvements related to crossing busy intersections both on bicycle and on foot. Of these, 20 comments gave specifics regarding improvements to intersection signalization including pedestrian timing and bicycle detection.
- **Facilities** – Over a quarter of the comments were related to specific locations for facilities to improve bicycling or walking in the town.
- **Connectivity** – Residents want to see bicycle and pedestrian facilities link between neighborhoods, schools, and commercial centers. Nearly 20% of comments were related to making connections in the Town. The majority of connectivity comments were related to expanding and making connections with the greenway network followed by comments related to making connections between residential neighborhoods.



A number of comments were related to Maintenance, Signals, and Transit Access. Comments related to parking, lighting, signage and enforcement were cited to a lesser degree an included in the General/Other category.

Corridor Mobility

These comments were further categorized and located to gain a sense of which main corridors and intersections posed the greatest challenges in the Town for walking, bicycling and accessing transit. Greenway comments were considered separately. For brevity, this list does not include locations that were cited in comments less than 8 times.

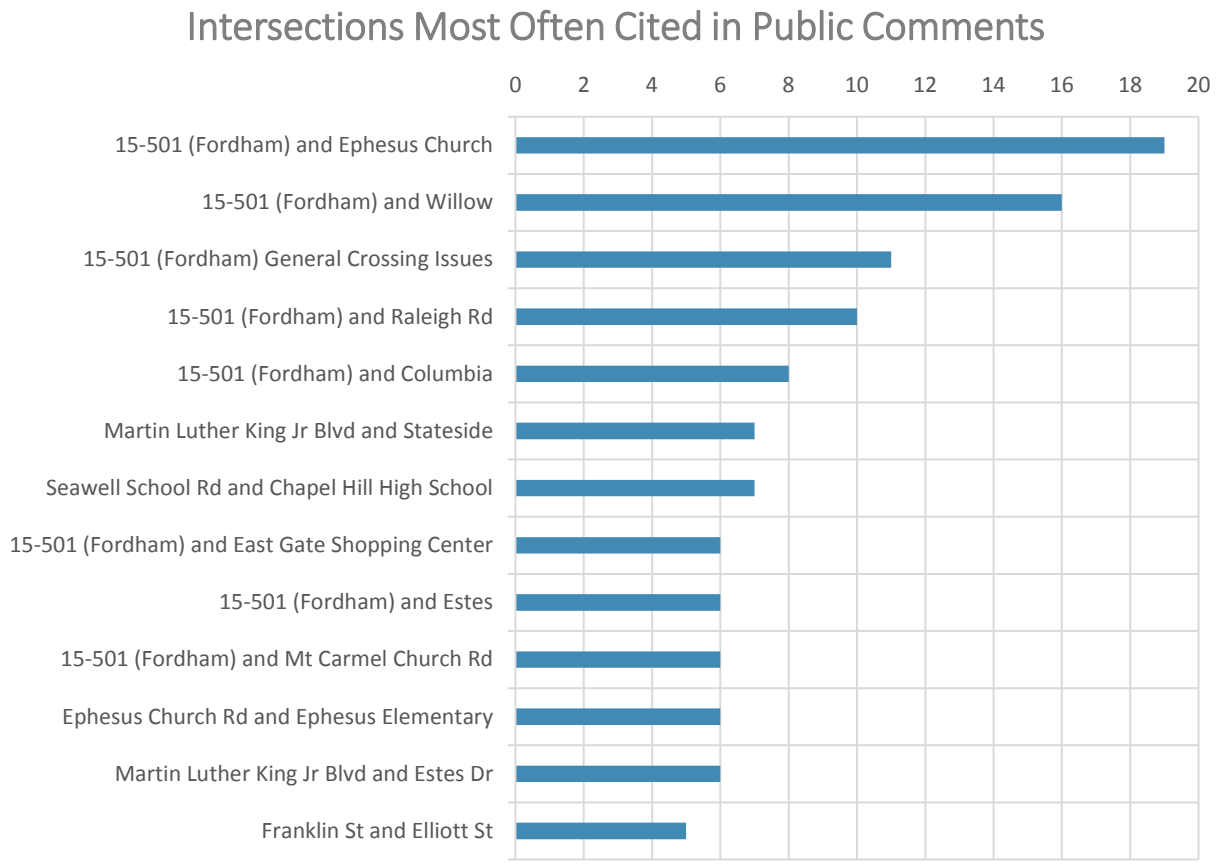


The portion of US 15-501, also called Fordham Blvd, which received more than 150 comments. Martin Luther King Jr Blvd was cited in comments nearly 100 times. Franklin Street received over 50 comments with the vast majority of these being on the eastern portion of the corridor. Homestead Rd, Estes Dr, Ephesus Church Rd, and Lakeshore Dr were the subject of over 20 comments each.

Appendix A: Public Involvement Detail Summary

Intersection Mobility

Where further detail was given, intersections were tagged and grouped from the public comment to further refine avoided, difficult or unsafe crossing locations in the Town. Only locations with five or greater comments are included. Lakeshore Dr was noted as being generally problematic for walking and bicycling due to speeds.



Greenways and Multi-Use Paths

The town received feedback on existing greenways and suggestions for connections and improvements. Many comments were received on general greenway connectivity with residents desiring a robust and low-stress transportation network to meet their daily needs. Connecting the greenway system was often cited to achieve mobility to key destinations in the Town. Public involvement more specific to destinations and more localized issues in the Ephesus-Fordham area are included in **Appendix E.**

Booker Creek and Bolin Creek Trail

Booker Creek Trail was most often cited in comments obtained through the Mobility Plan public involvement. Crossing Franklin Street and creating safe connection to/through East Gate Shopping Center made up the majority of comments related to the trail. Comments also revealed the desire for additional neighborhood connections to this greenway. The majority of specific comments related to the Bolin Creek Trail suggested extending the trail East toward the soccer fields on the other side of 15-501 (Fordham Blvd). A clear connection to/through Community Center and to East Gate Shopping Center was also expressed in many of the comments related to this trail. Citizens are interested in a clear, safe, and low-stress connection between the Bolin Creek and Booker Creek Trail and providing a route into downtown Chapel Hill.

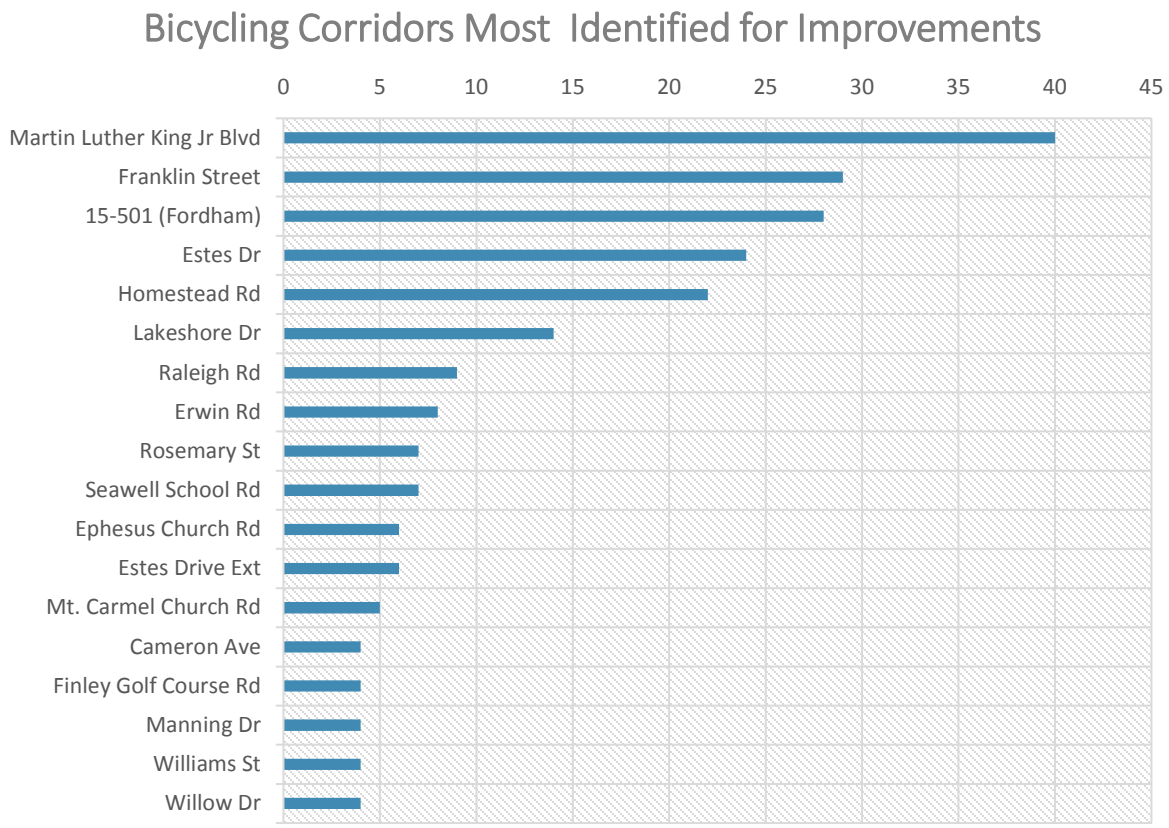
Chapel Hill Greenway Comments	Total
Booker Creek Trail *Extend Across Franklin St to/through East Gate Shopping Center*	**30**
Bolin Creek Trail *Extend East beyond Fordham Blvd, Extend North to Eastgate, Extend West*	**25**
Shared Use Grade Separation over 15-501 *Ephesus Fordham Area*	**21**
Morgan Creek Trail *Extend East to UNC and Beyond, Extend West, Morgan Creek Trail Bike/Ped Grade Separation at James Taylor Bridge*	**19**
Connection between Bolin Creek Trail and Booker Creek Trail (E Franklin St)	**19**
Improve Intersection at Bolin Creek Trail / Connectivity to Greenway System *Martin Luther King Jr Blvd*	**11**
N-S Greenway Connections (Including Carolina North)	**8**
General Greenway System Comments	**6**
Other Trail Connections: Estes Sidepath, McCauley Trail, Battle Brach Trail, Little Creek Trail, Meadowmont	**17**

Issues with greenways abruptly ending and stress with crossing intersections at those locations was clearly voiced in the comments. Two key locations were where trails intersect US 15 501 Fordham Blvd and Martin Luther King Jr Blvd. Individuals accessing the Carolina North Forest are often made from Martin Luther King Jr Blvd, Piney Mountain Rd, and Seawell School Rd. There is a desire for more clear, safe, and low-stress connections to this area and a North-South greenway due to conditions on Martin Luther King Jr Blvd. Some comments cited equity issues in this area of town in regard to greenway access. Individuals also cited the desire for making connections within the town and the connection of the greenway system to the Triangle Greenway System.

Bicycling Mobility

A summary of input specific to bicycling connectivity and issues are highlighted here. In terms of general comments not related to a specific location in the town, connecting with other communities outside of Chapel Hill and providing separated/protected facilities to residents was also expressed.

Roadway corridors that were not specified by mode and those that are listed as being problematic to both modes are included here. Start and end points were not always given. This does not include specific intersection issues which were separated because the input given generally called out intersections as being problematic for both bicyclists and pedestrians. The top corridors identified as being problematic for bicycling or requesting bicycle facilities through the outreach conducted in the Mobility Plan are as follows:

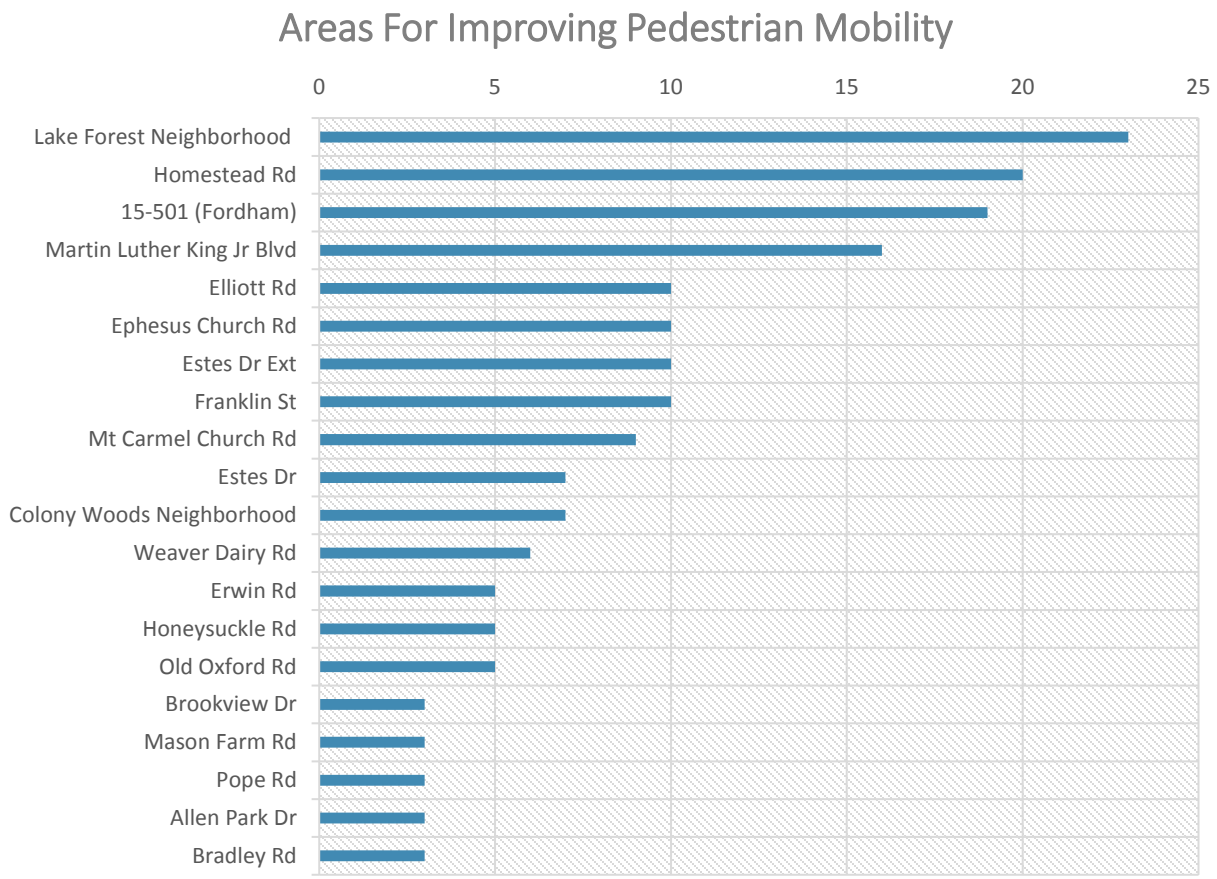


- People identified that not only are shared lane markings not sufficient for bicycle travel on Martin Luther King Jr Blvd, but that a dedicated bicycle facility is preferred here. Reducing travel lanes and slowing traffic were noted by many commenting on the current conditions in addition to the demand for a dedicated facility.
- Franklin St is an important connector between the Bolin Creek and Booker Creek Trail. It is a preferred route into the UNC Campus. Comments suggest speeding and lack of dedicated bicycling facilities as a barrier to traveling by bicycle on this route.
- Fordham Boulevard (US 15-501) was primarily identified as a barrier to travel or is confusing or dangerous to navigate.

- Desired improvements to Homestead Road to access to the schools and senior center were expressed as well as a desire for bicycling options out of the roadway.

Pedestrian Mobility

Input specific to pedestrian connectivity and issues is summarized. The top areas which received comments are shown in the figure.



- Turns, speeds, and topography in the Lake Forest Neighborhood make it dangerous to walk without sidewalks and residents cite that it is unsafe for children to walk and bike to area schools. N Lakeshore Dr, S Lakeshore Dr, Rolling Road, Kenmore Rd, Brookview Dr and Ridgecrest Rd. were requested for improvements.
- Recreation options for the residents of the Seymour Center on Homestead Rd (including connection with the Greenway) were requested. Most comments cite that the sidewalk here is discontinuous and that gaps should be completed, especially between Weaver Dairy Rd and Seawell School Rd.
- US 15-501 is a barrier to pedestrians. The following areas are specifically referenced in regard to discontinuous sidewalks: East Town to Sage Rd, Willow Rd to Estes Rd, and Ephesus Church Rd to Ram's Plaza along the Service Rd.
- Martin Luther King Jr Blvd was also frequently cited in comments, primarily due to gaps in the sidewalk. Areas between Homestead Rd and Airport Drive were frequently referenced for sidewalks.

- On Elliott, streetlights, slower speeds, sidewalk conditions, and lack of sidewalks on both sides of the street were all issues noted. Additionally, a connection is desired between Elliott and Willow in the Ephesus Fordham District.
- Sidewalk gaps were typically referenced on Ephesus Church Rd including Pinehurst to Pope Rd going east, and from Fordham to Ephesus Elementary on the south side of the roadway.
- On Estes Drive Extension, comments reference adding sidewalks or a multi-use path between Seawell and Martin Luther King Jr Blvd. Several comments discuss creating a connection to Ward St and Barclay Rd to shorten walking distances for the Elkin Hills neighborhood.
- Franklin St comments typically describe the corridor as having sidewalks that are crowded. Bicyclists ride on the sidewalk creating conflicts with pedestrians, creating a situation where the current sidewalks are too narrow for sharing. High traffic volumes and speeds near East Gate Shopping Center are also referenced as deterrents to pedestrian travel.

Access to Transit

Comments that discussed some improvement to conditions for accessing transit were grouped and assessed for common locations and themes. General comments cite connecting all bus stops to the sidewalk network in addition to providing ADA compliant level surfaces, transit shelters, and shade. Those comments are summarized here:

- On US 15-501 (Fordham Blvd) the following was noted: Lighting near the transit stops, crosswalks between adjacent transit stops, and access to transit stops on both sides of the road. Specifically, a lack of sidewalk to access the transit stop at Ram's Plaza.
- Arlen Park Dr has a sidewalk gap for residents from Southern Village to access the bus stop.
- Bradley Dr has transit stops that are unsafe to walk to due to traffic, hills, and curves.
- Where the Chapel Hill Library walkway meets Franklin St, a crosswalk on Franklin St is identified to access transit on both sides of the roadway.
- Old Durham Rd has a sidewalk gap between Cooper St and Scarlett St between the bus stops.
- Additional crosswalks on Martin Luther King Blvd for those accessing bus stops on either side of the roadway, including Airport Drive, Barclay Rd and Northfield Dr, and Stateside Dr.
- Sidewalks on Mt Carmel Church Rd and Bennett Drive to access bus stops.
- Sidewalks on Brookview to access transit stops on Honeysuckle.
- Sidewalks on Homestead Rd to access transit on Martin Luther King Jr Blvd.
- Old Oxford Rd sidewalk gap between Booker Creek Rd and Erwin Rd to access bus stops.
- Sidewalk on Ridgecrest Dr to connect with Oxford Rd to create access with transit stops.
- Sidewalks on Rogers Rd to provide access to transit stops.

PART 3: Survey Summary

A public input survey was deployed to gain insight into opportunities for improving mobility in Chapel Hill. A total of 505 responses were received from a wide range of age groups. A very large majority of these respondents walk or bike for leisure/health/recreation purposes. A majority of the respondents also walk or bike for errands/shopping.

The primary obstacles preventing respondents from walking or biking as much as they'd like are a lack of adequate sidewalks and paths as well as incomplete/discontinuous sidewalks or path networks. Other issues revealed in open ended responses include a lack of connectivity between roads, high traffic volume/speed, and unaware/inconsiderate motorists.

The following are the most challenging for walking and biking according to open ended responses.

Roads

- Ephesus Church Road
- Elliot Road
- Fordham Boulevard
- Estes Drive
- Franklin Street

Intersections

- Ephesus Church Road and Fordham Boulevard
- Estes Drive and Fordham Boulevard
- Willow Drive and Fordham Boulevard
- Elliot Road and Fordham Boulevard

Greenway Connections

- Multiple connections with Booker Creek Trail including:
  - Bolin Creek Greenway
  - The park
  - Franklin Street
  - Fordham Boulevard
  - Lower Booker Creek Trail in general was mentioned multiple times

Approximately 1/3 of respondents would not use transit to go to the places they want to go if they could safely walk or ride within the district. Respondents most frequently expressed a desire to go to the following destinations when walking or biking.

- Whole Foods
- Trader Joes
- East Gate Shopping Center
- Community Center/Community Center Park
- University Place
- University Mall
- Ram's Plaza
- Post Office

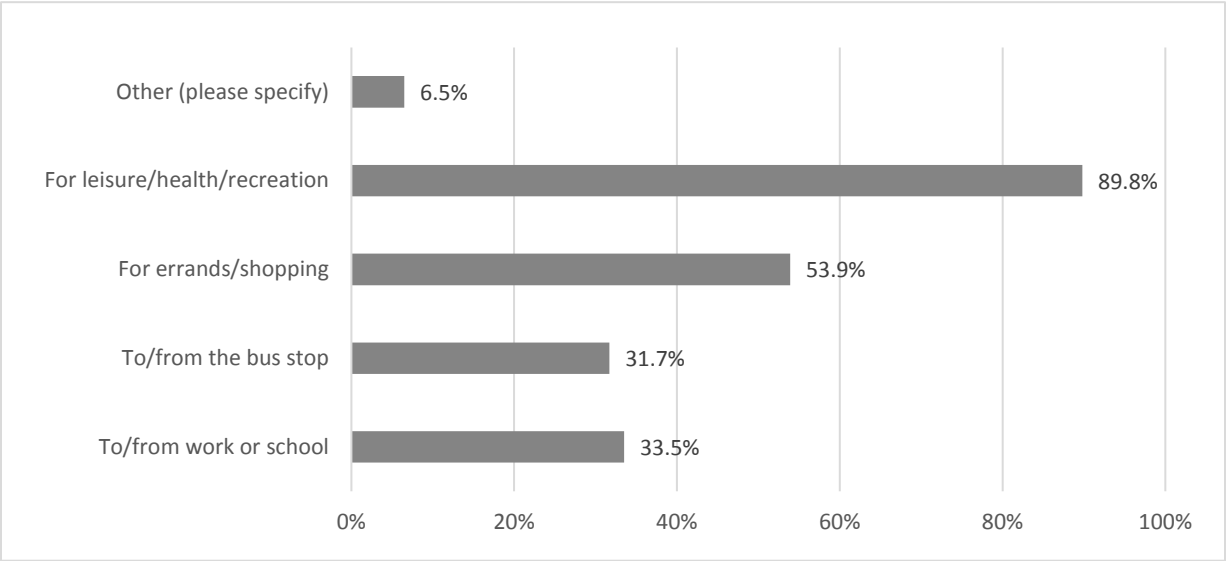
The following solutions are favored among respondents to increase overall mobility, walkability, connectivity, and safety include the following.

- additional sidewalks/paths/bikes lanes, particularly bike/pedestrian paths that are separate from motorists
- better connectivity of existing sidewalks
- additional pedestrian crossings
- reducing the speed of traffic
- increasing motorist awareness of pedestrians and cyclists
- better enforcement of traffic rules for motorists
- more bus routes and bus stops
- a solution for crossing Fordham Boulevard (15-501), such as a pedestrian/cyclist bridge

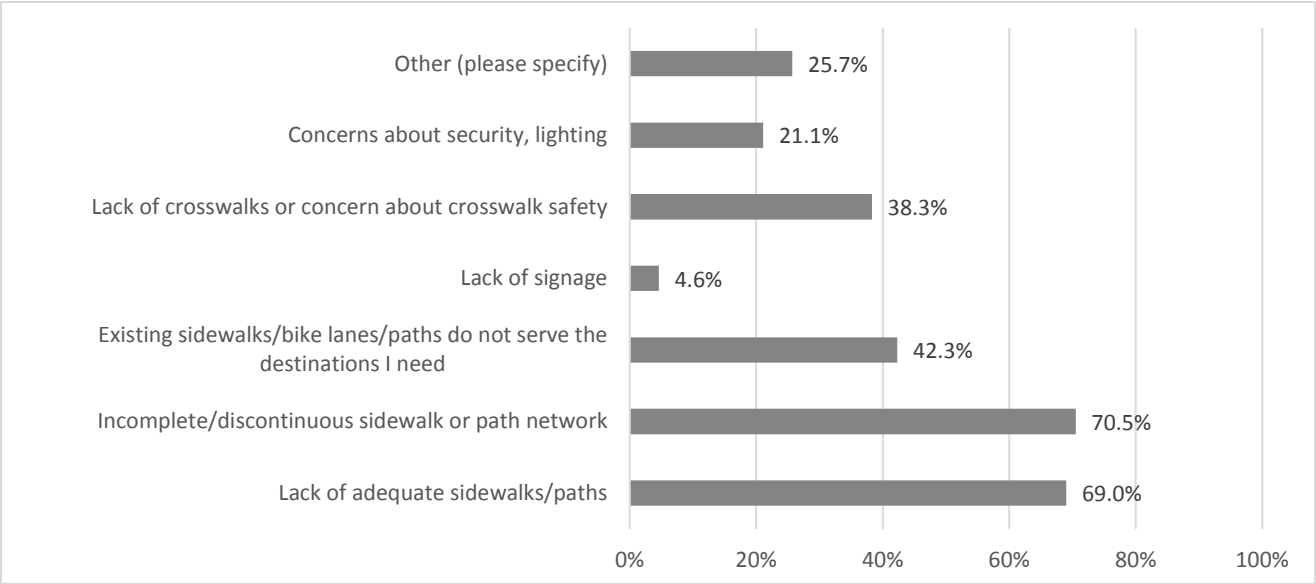
Appendix A: Public Involvement Detail Summary

Survey Questions

Question 1: In what circumstances do you walk or bike to your destination?
A very large majority of respondents walk or bike for leisure/health/recreation purposes. Over half walk or bike for errands/shopping. 1/3 of respondents walk or bike to/from work and school, and almost as many walk or bike to/from the bus stop. Open-ended responses included walking the dog, walking children to school, and walking to a friend's house.



Question 2: What barriers prevent you from walking or biking as much as you would like?
The primary barriers preventing respondents from walking or biking as much as they would like are incomplete/ discontinuous sidewalks or path networks and a lack of adequate sidewalks/paths. Other significant barriers are existing sidewalks/bike lanes/ paths that do not serve the destinations respondents want to visit and the lack of crosswalks or concerns about crosswalk safety. Recurring themes in open-ended responses include discontinuous/lack of sidewalks, fast traffic, and unaware/inconsiderate motorists.

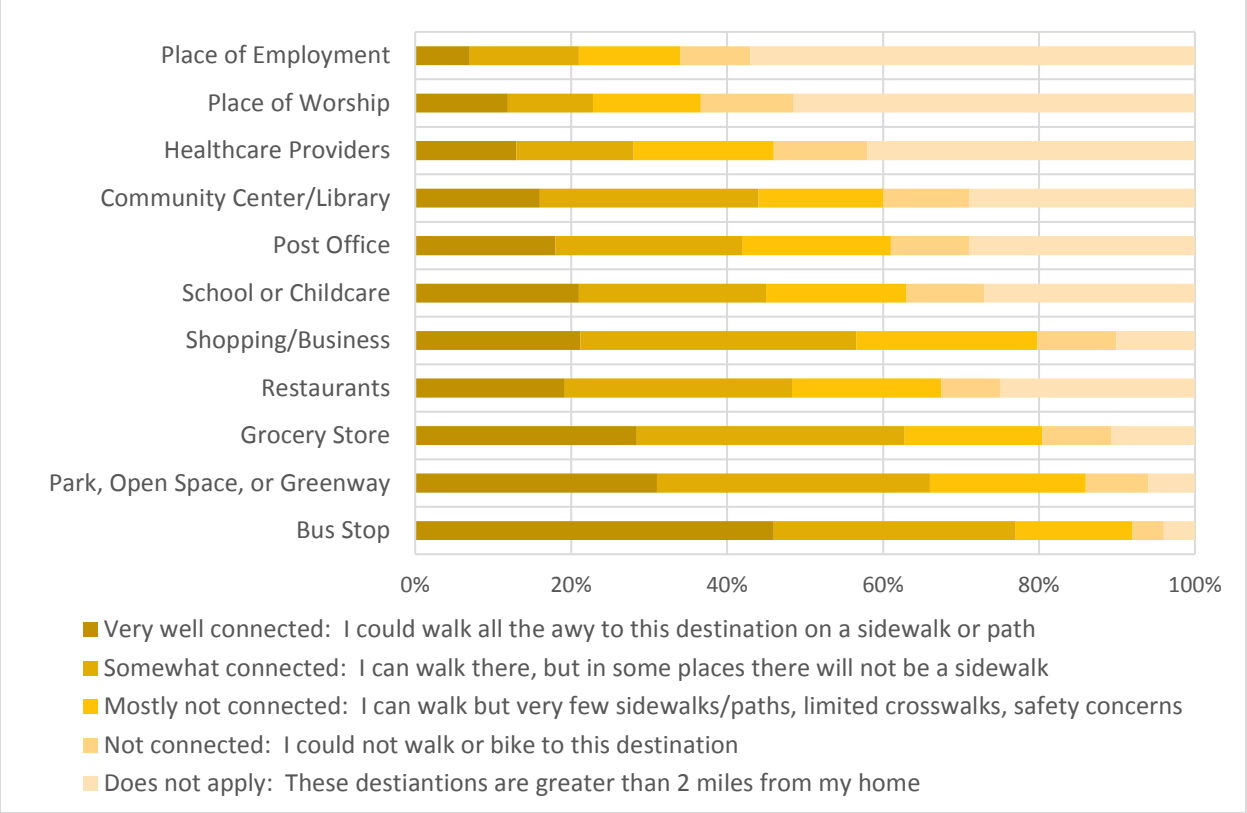


Question 3: How accessible/walkable are the following types of destinations in your neighborhood (can you walk or bike to them)?

The following question asked respondents to identify accessible/walkable destinations. The darker the line, the more accessible the destination from a person's home. Typically bus stops; parks, open space, or Greenways; and Grocery stores are well-connected or somewhat connected to respondents. Places of work, places of worship, and health care providers are often greater than 2 miles. The most opportunity for increasing mobility exists for destinations that are within an accessible distance, who are represented as being "not connected," "mostly connected," or "somewhat connected."

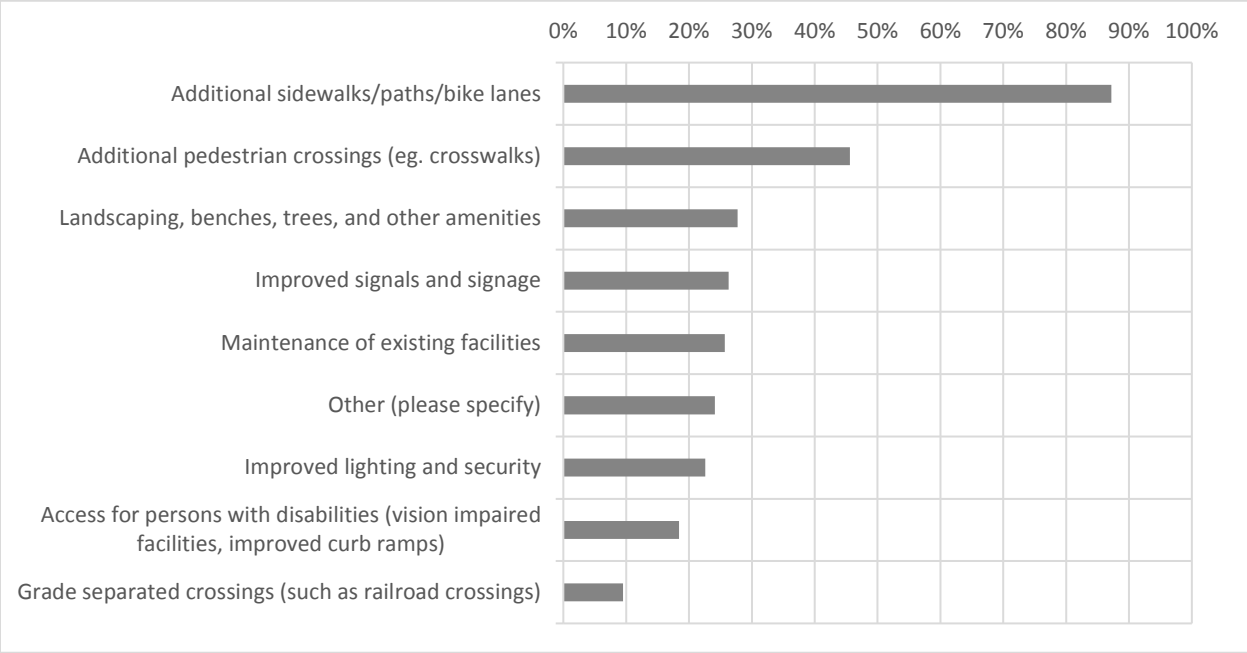
Responses indicate an issue with sidewalk connectivity, particularly connections to the following destinations, with over 60 percent of respondents categorizing these locations as somewhat connected, mostly not connected, or not connected.

- shopping/business
- restaurants
- park, open space, or greenway
- grocery store



Question 4: What improvements are needed to increase the walkability, connectivity, and safety of Chapel Hill and/or your neighborhood?

With a goal of increasing mobility for bicycling, walking, and transit, the survey asked respondents to identify what improvements would be needed to increase the neighborhood walkability, connectivity, and safety. Lack of adequate sidewalks, paths, bike lanes were the most cited responses. Another highly cited improvement was to provide safe crossing facilities Frequently mentioned in open-ended responses were the need for more bike lanes, bike/pedestrian paths that are separate from motorists, reducing the speed of traffic, and increasing motorist awareness and enforcement of traffic rules for motorists.



Question 5: Are there particular locations in your area that concern you with regard to walkability, mobility, connectivity, or safety? Please provide a street or intersection name and a description of the issue.

Recurring issues noted in open-ended responses include the following:

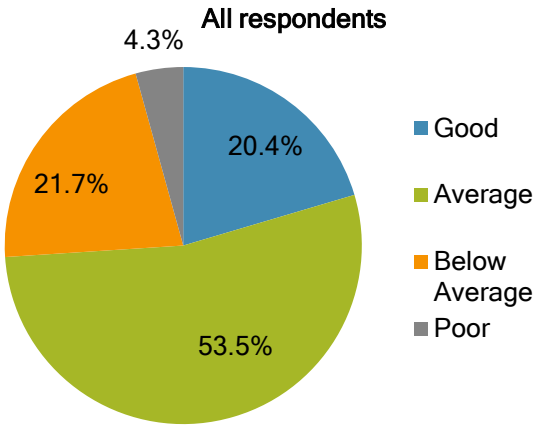
- Lack of sidewalk connectivity on Homestead Rd, such as between Seawell School Road and Martin Luther King Boulevard
- Lack of sidewalks/bike paths along Martin Luther King Boulevard
- Dangerous crossings along Fordham Boulevard, such as at Ephesus Church Road, Willow Drive, Estes Drive, and Sage Road
- Lack of sidewalk continuity on Weaver Dairy Road, such as between Sage Road and Erwin Road

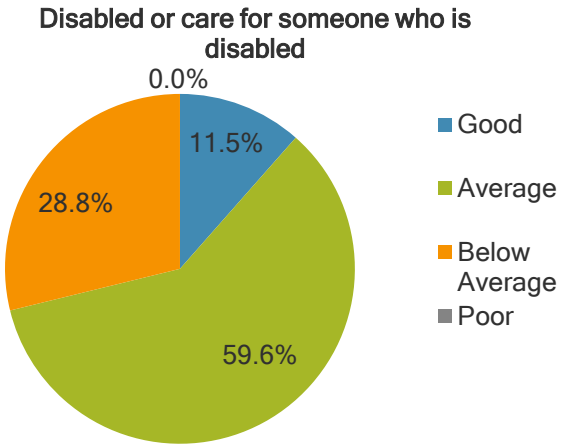
Accessibility Questions

Question 6: What would you like to see Chapel Hill do to increase mobility for persons of all ages and abilities?
Favored solutions for overall mobility as revealed by open-ended responses include more sidewalks, better connectivity of existing sidewalks, more pedestrian crossings, improved enforcement of traffic laws for motorists, paths for cyclists and pedestrians that are separate from motorists, more bus routes and bus stops, and a solution for crossing Fordham Boulevard (15-501), such as a pedestrian/cyclist bridge.

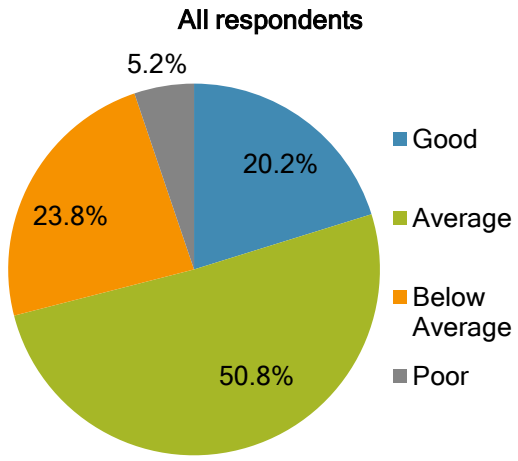
Question 10: How would you rate the current level of accessibility of the Town's sidewalk
Over half of all respondents rated the current level of accessibility of the town's sidewalks as average while nearly 1/3 rate the accessibility as either below average or poor. Responses from people who are disabled or care for someone who is disabled were analyzed separately. A lower percentage of that subset of respondents rated accessibility as good. Although respondents who are disabled or care for someone who is disabled chose a rating of below average, none of them assigned a rating of poor, making the combined categories of below average and poor approximately the same as for all respondents at 1/3.

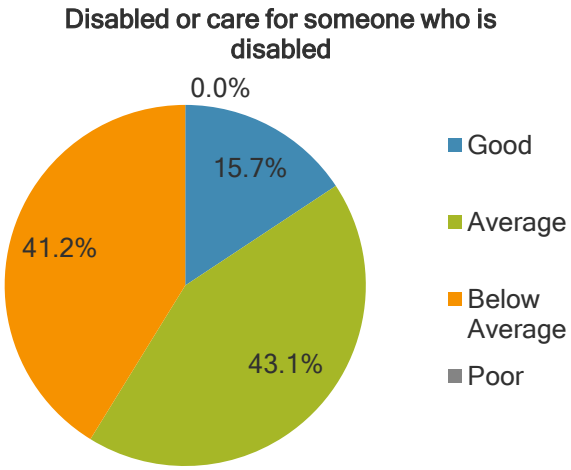
Question 11: How would you rate the current level of accessibility of the Town's pedestrian ramps?
Over half of all respondents rated the level of accessibility of the Town's pedestrian ramps as average, while 20% rated accessibility as good and 21.7% assigned a rating of below average. Respondents who are disabled or care for someone who I disabled rated accessibility of pedestrian ramps as good less frequently.





Question 12: How would you rate the current level of accessibility of crosswalks?
Approximately half of all respondents rated accessibility of crosswalks as average while 23.8% rated accessibility as below average and 20.2% rated accessibility as good. Respondents who are disabled or care for someone who is disabled were somewhat less likely to rate accessibility as good, and significantly more likely to rate accessibility as below average.





Question 13: Please list any specific curb, sidewalk, or crossing locations where you have accessibility concerns.

Recurring accessibility concerns in open-ended responses included the following issues:

- Crossing Fordham Blvd, Mt Carmel Church Rd, Ephesus Church Rd, Sage Rd
- Crossing Martin Luther King Boulevard, such as New Stateside Road, and Estes Drive

Question 14: If the town were to make accessibility improvements to curbs and sidewalks, how would you rank the following priorities? (1 is most important, 6 is least important)

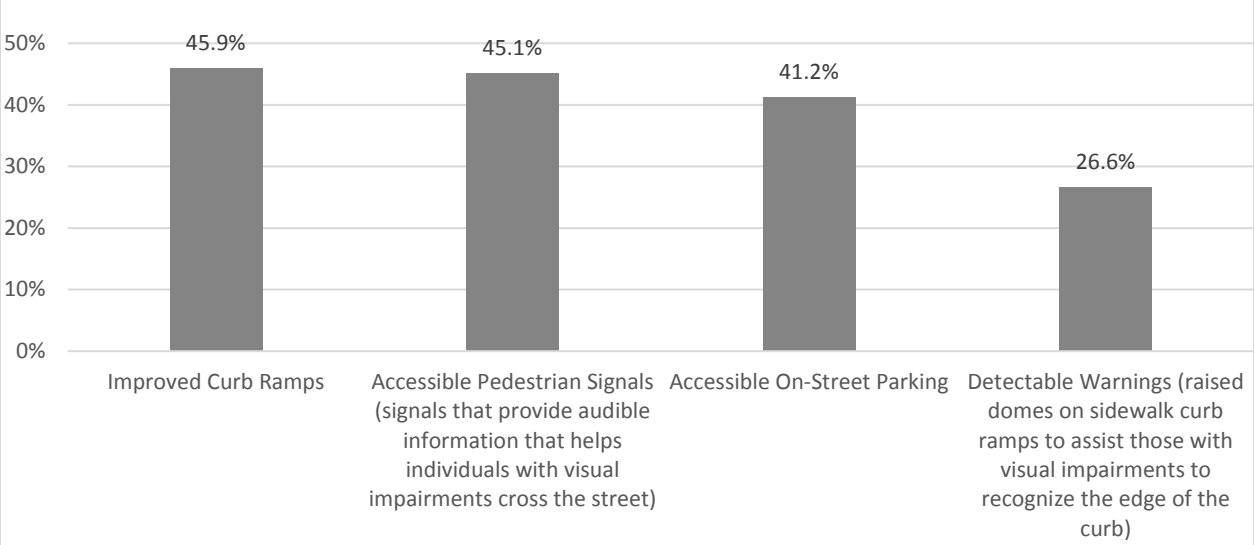
Priority Percentage of Respondents ranking priority as 1 or 2

- Commercial Areas 49%
- Town Facilities 16%
- Bus Stops 47%
- Schools - 60%

Residential Areas 37% Schools are the highest priority for accessibility improvements among respondents with 60% of respondents rating schools as either a 1 or 2 on the scale of 1 to 6. Commercial areas and bus stops are also high priorities, with nearly 50% of respondent rating these areas as either a 1 or 2.

Question 15: What accommodations that increase accessibility do you believe are most needed in Chapel Hill?

All accessibility options presented in this multiple-choice question received a high level of support among respondents, with detectable warnings receiving the lowest percentage of support.



Ephesus-Fordham District Question Subset

Questions 7-9:

Are there challenging intersections or roads within the Ephesus/Fordham Area for walking and/or biking? Please specify.

Many of the same issues identified in Question 5 were also identified by respondents in this question.

The following roads, intersections, and greenway connections are the most challenging for walking and or biking according to open ended responses

Roads

- Ephesus Church Rd
- Elliot Road
- Fordham Blvd
- Estes Dr
- Franklin St

Intersections

- Ephesus Church Rd and Fordham Blvd
- Estes Dr and Fordham Blvd
- Willow Dr and Fordham Blvd
- Elliot Rd and Fordham Blvd

Greenway Connections

Multiple connections with Booker Creek Trail including:

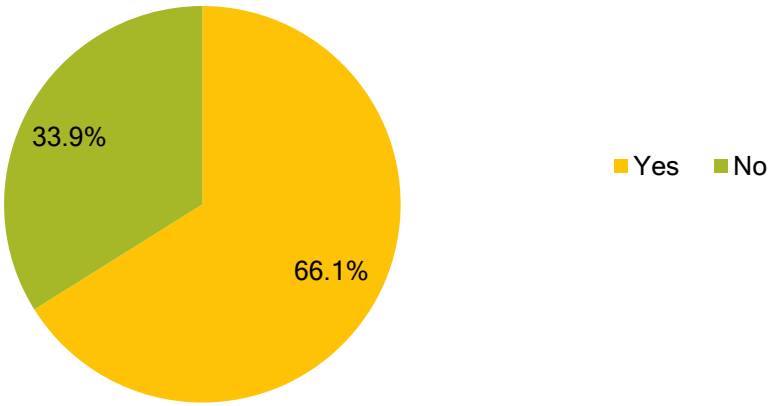
- Bolin Creek Greenway
- The park
- Franklin Street
- Fordham Boulevard

What destinations within the Ephesus/Fordham Area would you like to walk or ride your bike to?

Respondents most frequently expressed a desire to go to the following destinations when walking or biking.

- Whole Foods
- Trader Joes
- East Gate Shopping Center
- Community Center/Community Center Park
- University Place
- University Mall
- Ram's Plaza
- Post Office

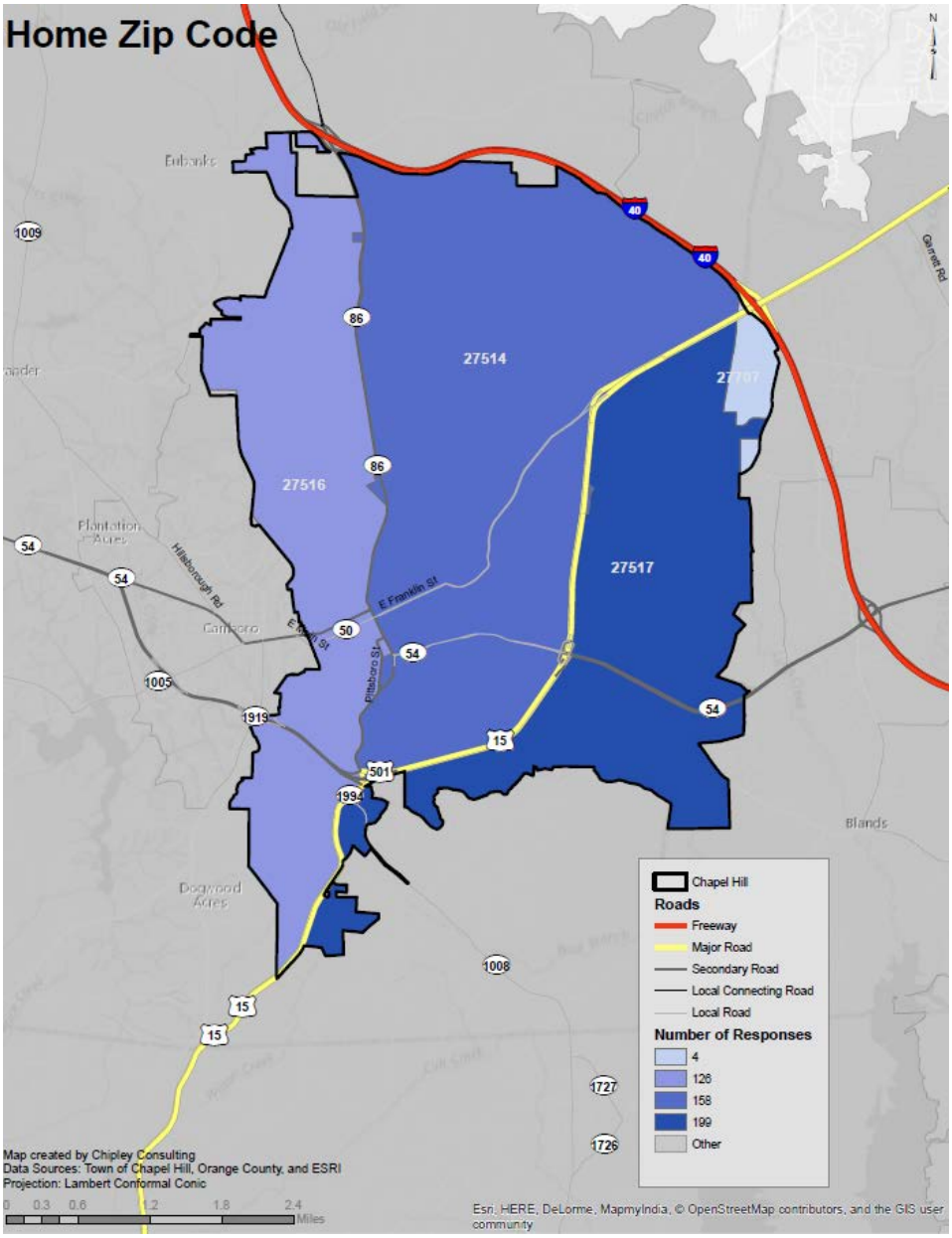
Would you use transit to go to this area if you could safely walk/ride within the district?



Approximately 1/3 of respondents would not use transit to go to the destinations they want to go in the Ephesus/Fordham area if they could safely walk/ride within the district.

Demographic Questions

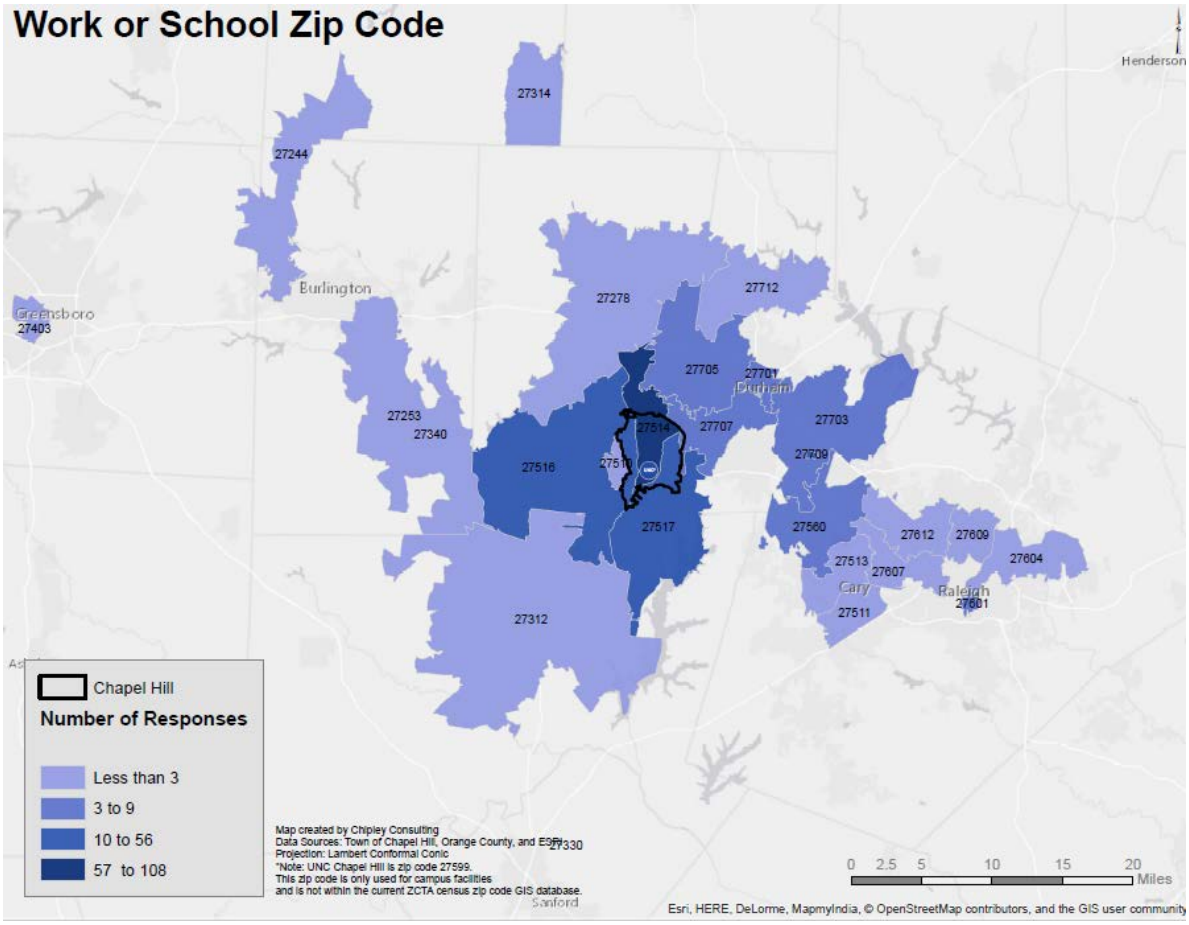
Question 16: What is your home zip code?



Most respondents live in one of the following zip codes, with a well-balanced proportion of responses from each area.

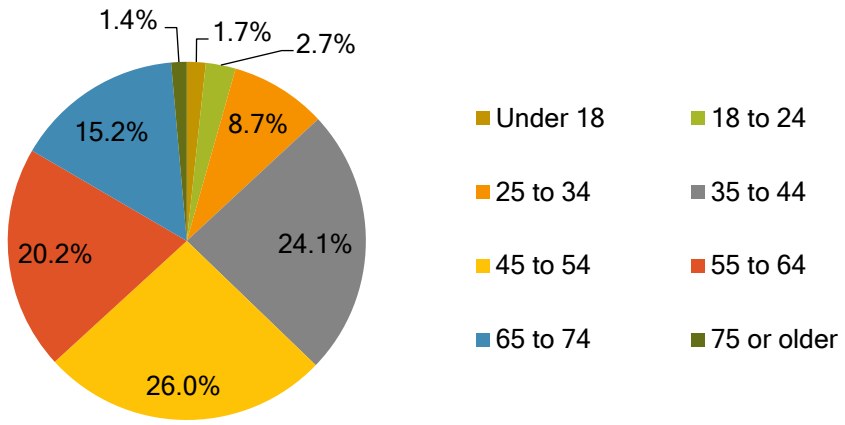
- 27514
- 27517
- 27518

Question 17: What is your work or school zip code?



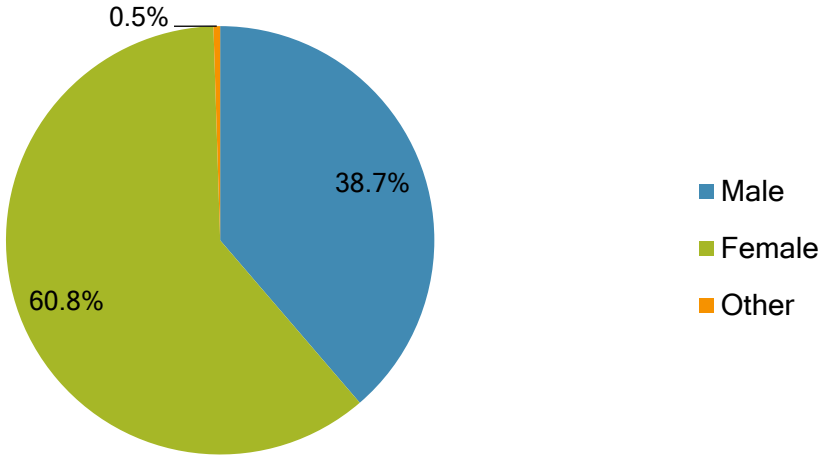
Many Chapel Hill respondents to the survey are commuting outside of the city for school or work. This is consistent with journey to work flows for the Triangle region which shows the majority of commutes to Durham and Wake County.

Question 18: What is your age range?



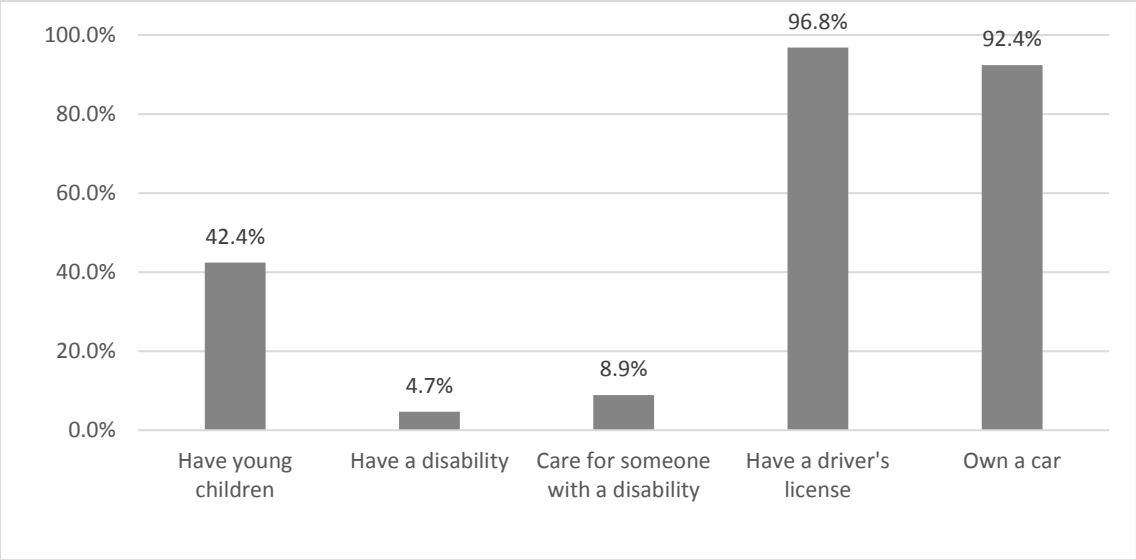
The ages of respondents were compared to the age distribution of the Chapel Hill population as a whole as described in the Chapel Hill Data book, which is derived from Census data. Responses were very low compared to the Chapel Hill population for age groups under 35, especially ages 18-24 which represent nearly ¼ of the Chapel Hill population but less than 3% of responses. Responses were very high compared to the Chapel Hill population for ages 35 and over.

Question 19: What is your gender?



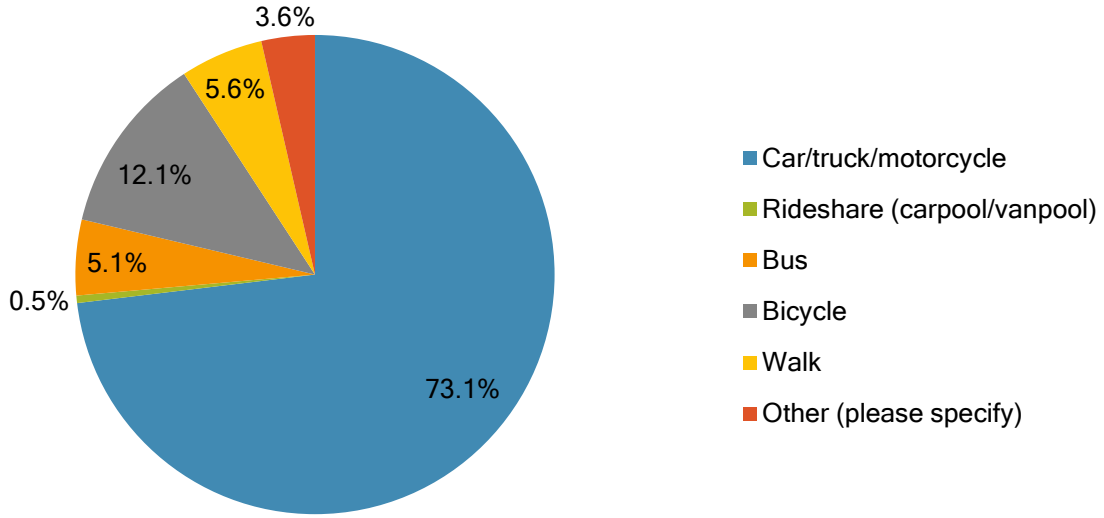
The majority of respondents identify as female while over 1/3 of respondents identify as male and less than 1% as neither male nor female.

Question 20: Select all of the following that apply to you.



A large majority of respondents have a driver's license and almost as many own a car. A good balance of responses were received from people who have young children and those who don't. Less than 15% of respondents either have a disability or care for someone with a disability.

Question 21: How do you travel most often?



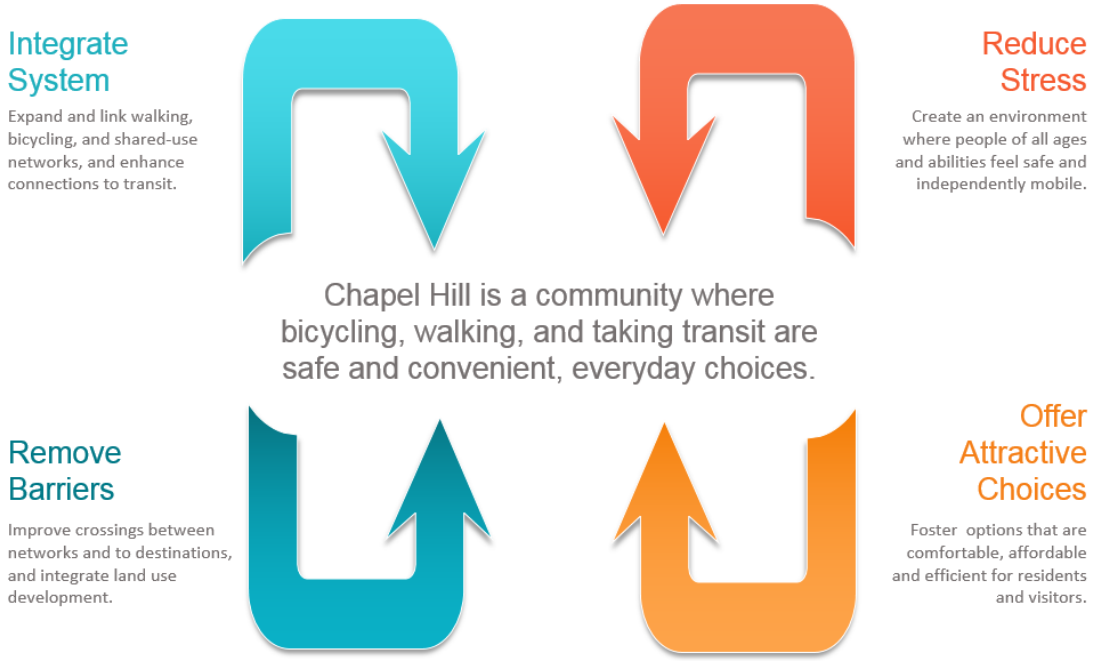
A large majority of respondents travel most often by car, truck, or motorcycle. 12% of respondents travel most often by bicycle while walking or riding the bus are the modes of transportation for approximately 5% of respondents. Open-ended responses indicate a small percentage of people use an equal mix of multiple modes of transportation rather than favoring a particular mode.

PART 4: September 9 Open House Summary

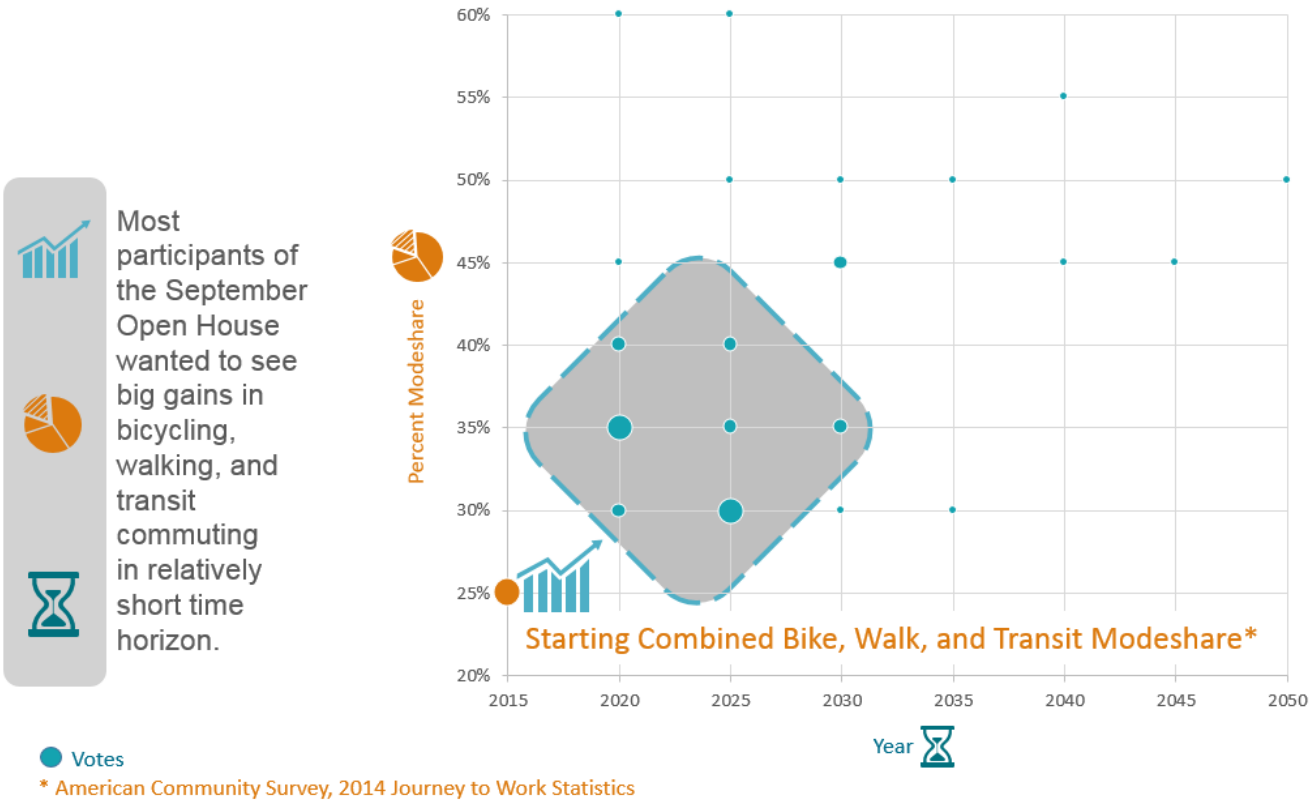
The open house had a presentation followed by five stations to gain specific inputs to the plan. The first was an orientation to the Mobility Plan process and stations, followed by stations where comments and input were taken. As this plan has several inputs on different modes and to alleviate any confusion on components to the planning process, the orientation was beneficial for those who may not have been familiar with the goals of this plan or planning work that is being incorporated. The presentation was followed by an interactive exercise on (1) the goals and vision for the plan, (2) existing conditions and opportunities, (3) expenditures on different types of projects as a town councilor for a day, (4) project prioritization, and (5) an open-ended survey to give additional comments on the plan.

Stations at the Interactive Drop-In Session at Chapel Hill Public Library

Those who commented on the vision and objectives for the plan resulted in a set of reworked objectives based on the originals set forth at the meeting that focused on an (1) integrated system, (2) removal of barriers, (3) a low-stress environment for bicycling and walking, and (4) choices that are attractive to use.



Reworked Goals and Objectives based on Feedback

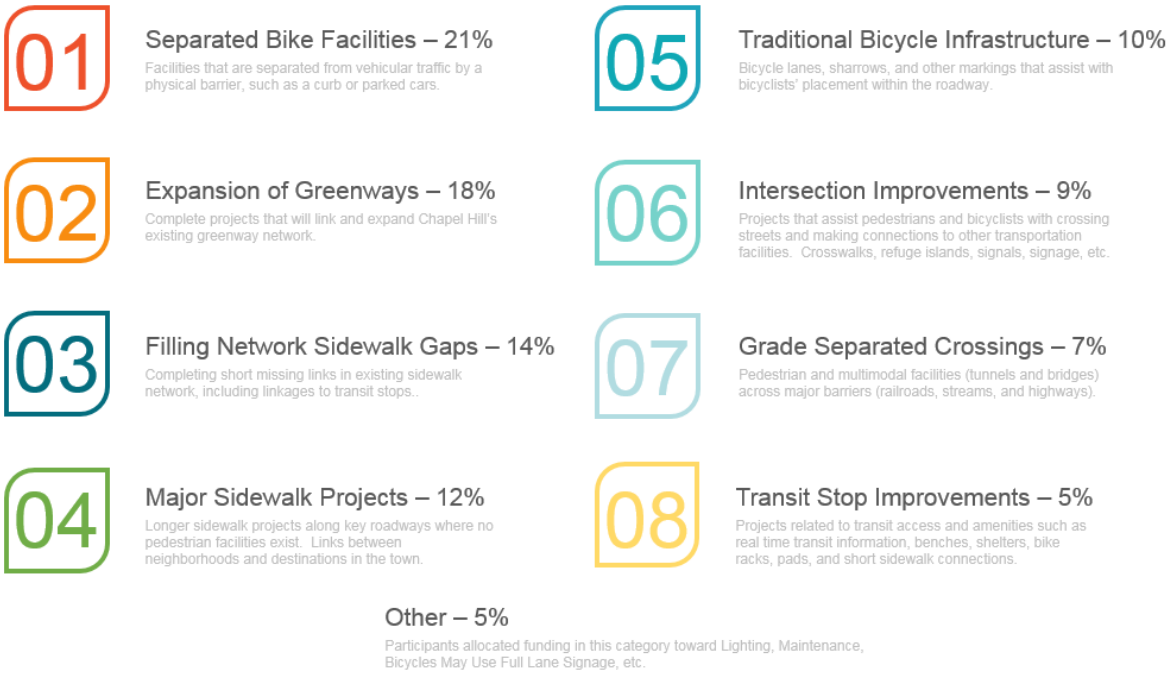


Goals Set for Future Mode Shift to Bicycling, Walking and Taking Transit

Comments and inputs based on existing conditions and opportunities and project prioritization were worked into the public involvement summary that follows which combined this information with inputs from the other

Participants of the Open House were also asked to set a goal for the Town to work towards. Given options to vote on how much to increase modeshare by a future date, the participants would like to see combined bicycle, pedestrian, and transit trips increase from a starting point of 25% (*2014, American Community Survey: Journey to Work Statistics*). Most participants wanted to see a shift of 15-20% to these modes within 5-15 years.

Individuals who attended the September Open House were also asked to prioritize how they would allocate a limited amount of pretend Chapel Hill money on different types of projects within the Town. Participants allocated most the money on two types of infrastructure – Separated Bicycle Facilities (21%) and Expansion of Greenways (18%) indicating a preference for facilities that are most separated from motor vehicles. The next two largest allocations went toward pedestrian improvements: Filling network sidewalk gaps (14%) and Major Sidewalk Projects (12%). The categories with 10% or less of the allocations included: Traditional Bicycle Infrastructure, Grade Separated Crossings, and Transit Stop Improvements.



'Councilor for a Day Exercise' Project Allocations

Appendix B – Planned Improvement Projects

PLANNED IMPROVEMENTS 2

NCDOT Projects 2

Town Capital Projects 4

Development Agreements 6

Carolina North 6

Glen Lennox 7

Carraway Village 7

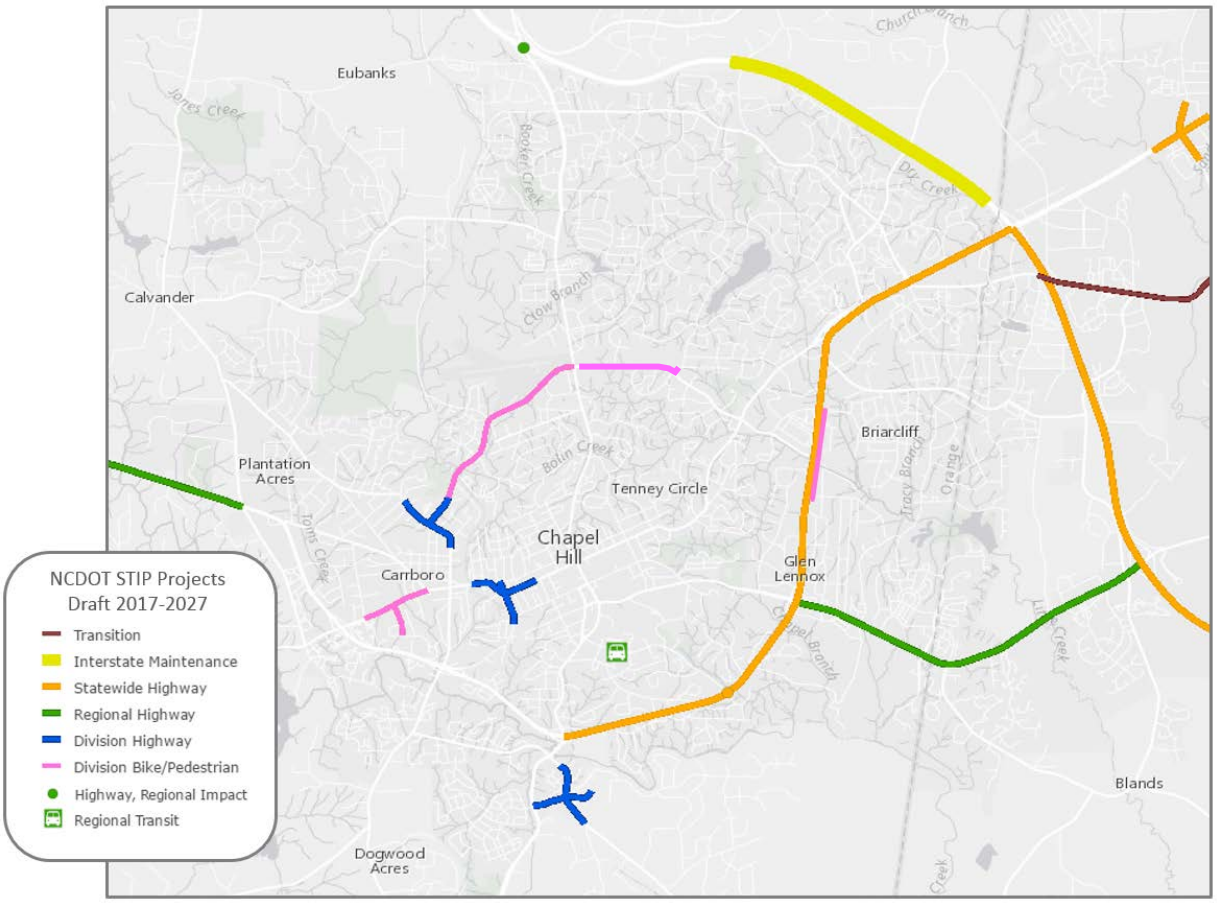
Obey Creek 8

Planned Improvements

NCDOT Projects

A number of projects in and around Chapel Hill are currently in NCDOT's State Transportation Improvement Program (STIP). The STIP identifies the construction, funding, and scheduling for transportation projects at the state level over a 10-year period and projects. Passed in 2013, NC's Strategic Transportation Investments law established the Strategic Mobility Formula which is used to allocate revenue based on data-driven scoring and local input. This prioritization process is currently beginning its fifth iteration (P5.0), with the previous two-year cycle wrapping up with the adoption of the FY2018-2027 STIP in Fall 2017. Based on the input of its member communities including Chapel Hill, the DCHC MPO will submit projects for all modes to NCDOT for the P5.0 process for the development of the FY2020-2029 Transportation Improvement Program

The map from the NCDOT State Transportation Improvement Program website shows the locations of these projects within the Town. Project draft summary reports can be found on the DCHC MPO website.



Projects in the NCDOT Draft State Transportation Improvement Program for 2018-2027 Planning Horizon

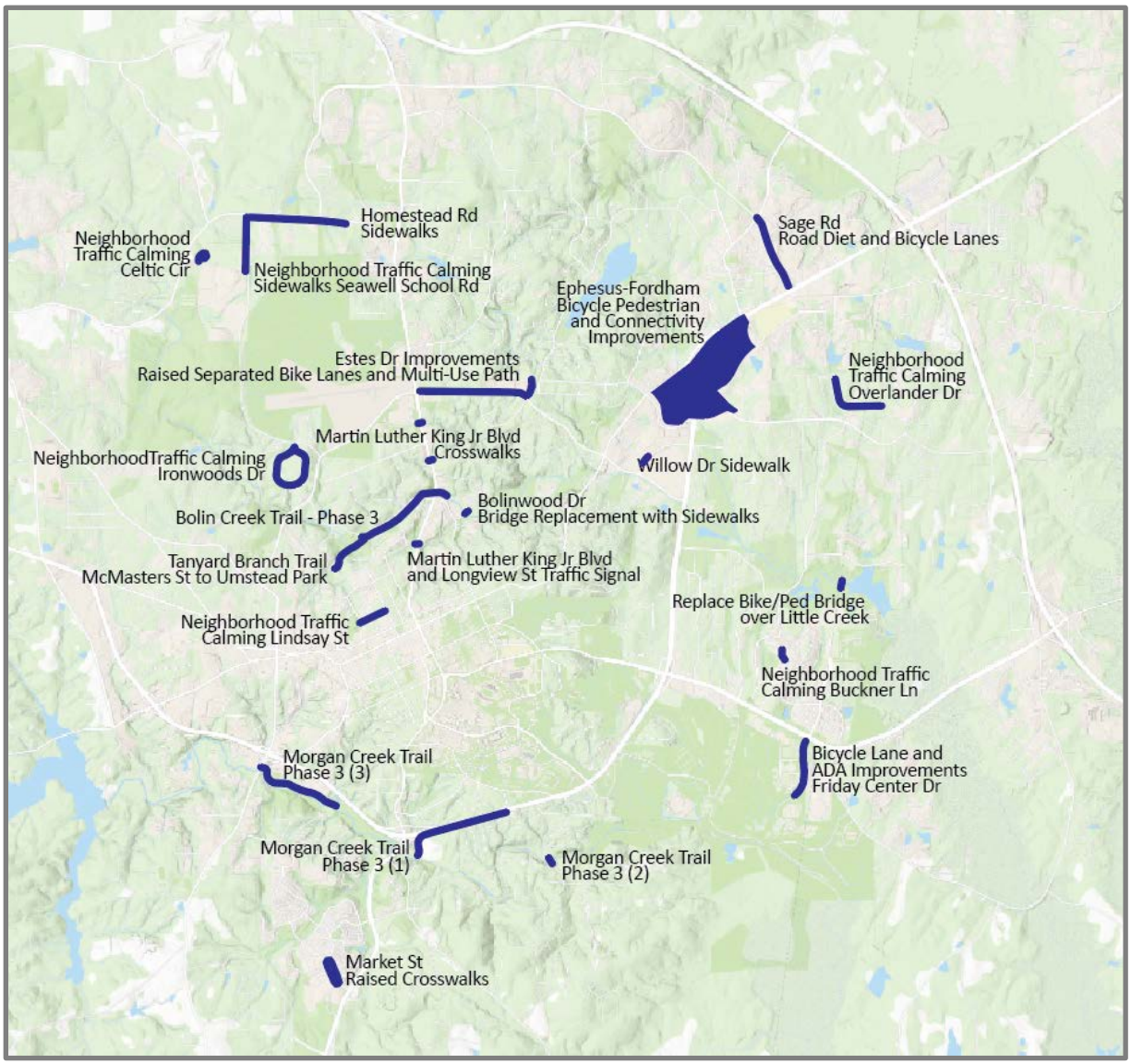
The STIP should be consulted for most current information on projects:

TIP	Route	ROW Year	Const. Year	Project Costs	Description
C-5179	SR 1750 (North Estes Dr)	2017	2017	$2,586,000	NC 86 (Martin Luther King, Jr. Blvd) To Caswell Drive. Construct 5' Sidewalks and 5' Bike Lanes. NC 86 (Martin Luther King, Jr. Blvd) To Elliott Rd in Chapel Hill. Construct 10' Multiuse Path.
EB-5721	Orange County Bicycle Route 1		2018	$558,000	Cleland Dr to Willow Dr in Chapel Hill. Upgrade Existing Off-Road Path and Construct New Section of Path.
U-5854	SR 1008 (Mt. Carmel Church Rd)	2017	2018	$775,000	SR 1913 (Bennett Rd) In Chapel Hill. Construct Roundabout and Related Safety Improvements.
U-5550	US 15-501 NHP C-2170 (Fordham Blvd)		2018	$2,170,000	SR 1742 (Ephesus Church Rd) In Chapel Hill. Intersection Improvements.
TD-5284	GoTriangle 400; 405; 420; 800; 805; CRX; FCXX		2019	$360,000	UNC Hospitals Area in Chapel Hill. Construct Neighborhood Transit Center Transfer Station.
U-5847	SR 1010 (W Franklin St / E Main St)	2018	2019	$775,000	SR 1771 / SR 1927 (Merritt Mill Road) / Brewer Ln Intersection in Chapel Hill and Carrboro. Intersection Improvements.
EB-5886	SR 1780 (Estes Dr). SR 1772 (N Greensboro St) in Carrboro to NC 86 (MLK Jr Blvd)	2020	2021	$4,410,000	Construct Multiuse Path, Sidewalks and Bicycle Lanes.
I-3306AC	NC 86	2021	2023	$16,500,000	NC 86 Interchange Improvements
B-5733	SR 1010 E Franklin St	2023	2024	$1,955,000	Replace Bridge 670039 Over Booker Creek
I-5822	I-40 Interstate Maintenance		2019	$12,450,000	I-85 to E of SR 1734 (Erwin Rd) – Pavement Rehabilitation
U-5774B	NC 54. US 15-501 In Orange Co to SR 1110 (Barbee Chapel Road) In Durham Co	2023	2024	$41,900,000	Upgrade Roadway Corridor and Convert At-Grade Intersection with SR 1110 To Interchange.
U-5304A	US 15-501. NC 86 (S Columbia St)	2024	2026	$ 13,000,000	Interchange Improvements
U-5304B	US 15-501. NC 86 (S Columbia Street) To NC 54 (Raleigh Rd)	2024	2026	$28,714,000	Capacity Improvements, With Sidewalks, Wide Outside Lanes and Transit Accommodations.
U-5304D	US 15-501. NC 54 (Raleigh Rd). To SR 1742 (Ephesus Church Rd)	2024	2026	$32,499,000	Capacity Improvements, with Sidewalks, Wide Outside Lanes and Transit Accommodations.
U-5304E	US 15-501. SR 1902 (Manning Dr).	2024	2026	$15,700,000	Convert At-Grade Intersection to Interchange.
U-5304F	US 15-501. SR 1742 (Ephesus Church Rd) to I-40.	2024	2026	$19,353,000	Corridor Capacity Improvements.

Town Capital Projects

Projects for cycling and walking are included in the Town's Capital Improvement Plan (CIP) updated each year with the annual budget. These all relate to the goal "Facilitate Getting Around" in the Chapel Hill 2020 Plan. The program is currently funded through 2025 with the following allocations:

Program	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023-26
Traffic Calming/BP	--						
Curbs/ADA	$50,000	$50,000	$50,000	$50,000	$50,000		$50,000/yr
Greenways	--	$80,000	$80,000	$80,000	$80,000		$80,000/yr



Bicycle and Pedestrian Projects in Town of Chapel Hill Capital Improvement Plan

A more detailed project list is given in the table below which lists the responsible department for carrying out the project and the project status in terms of delivery.

Project	Department	Start	End*	Status
Sage Rd. Road Diet	Planning and Sustainability	6/2016	10/2016	Complete
Bolin Creek Trail Phase III	Parks and Recreation	12/1999	6/2018	Construction/ Implementation
Ephesus Church / Fordham Phase I Roadway Improvements	Public Works	1/2014	6/2018	Construction/ Implementation
Market Street Raised Crosswalks	Public Works	3/2016	11/2016	Complete
Martin Luther King Jr Blvd Crosswalks	Public Works	4/2016	2/2017	Complete
Sidewalk & Bike Master	Public Works	1/2016	1/2018	Complete
Friday Center Drive Bike & Ped Improvements	Public Works	12/2015	9/2017	Acquisition
Annual Street Resurfacing and Reconstruction	Public Works	11/2017	10/2018	Planning
Bolinwood Drive Bridge Replacement	Public Works	11/2016	3/2021	Planning
Ephesus Church Road Sidewalk	Public Works	10/2016	6/2017	Planning
Estes Drive Bike & Ped Improvements	Planning and Sustainability	4/2015	7/2019	Planning
Homestead Road	Public Works	10/2016	11/2018	Planning
Installation of Quick Connections for Emergency Generators at Major Intersections	Public Works	8/2016	03/2017	Construction/ Implementation
Martin Luther King Jr Blvd and Longview Drive Traffic Signal	Public Works	4/2016	5/2017	Planning
Meadowmont Bridges	Parks & Rec	5/2016	5/2018	Acquisition
Morgan Creek Trail Phase 3	Parks & Rec	5/2016	12/2019	Aquisition
Annual Traffic Calming	Public Works	6/2015	6/2017	Post-Construction/ Implementation
Seawell School Road (East) Sidewalk Construction	Public Works	10/2016	02/2018	Planning
Tanyard Branch Trail McMaster Street to Umstead Park	Parks and Recreation	5/2016	12/2019	Aquisition
Variable Message Sign System	Public Works	12/2014	05/2018	Planning
Willow Drive	Public Works	10/2016	10/2017	Complete

Project timelines may shift

Development Agreements

The purpose of a development agreement is to strengthen the public planning process by encouraging private participation in the achievement of comprehensive planning goals and reducing the economic costs of development. These can include transportation and infrastructure improvements in addition to other community benefits and reduces the risks associated with development, thereby enhancing the Town's ability to obtain public benefits beyond those achieved through existing regulations and ordinances.

Development agreements are contracts entered into by the Town and a developer to expressly define a project's rules, regulations, and commitments.

Bicycle and pedestrian improvements have been incorporated into several mixed-use development agreements because of anticipated impacts as a result of the proposed development. These agreements help to meet the Town's transportation needs and comprehensive planning goals in the future. The Town of Chapel Hill has entered into the following development agreements:

Carolina North	
Date of Agreement	July 2009
Location	Bordered by Martin Luther King Jr Blvd to the east and Horace Williams Airport to the south
Related Studies/Documents	2016 Carolina North Development Agreement Annual Report
Relationship to Mobility Plan	Midlyne Priority Corridor -- Terminates at the site. As of 2016, construction on the property is on hold and new options are being considered by UNC. Carolina North was identified through public input as a key area for trail-based recreation, mountain biking, and desired walking and bicycling connections. A connection to Chapel Hill Schools is recommended.
• General alignments and descriptions of greenways are provided through the site but may be adjusted and require further study, including a north-south connection, east-west connection and a greenway along Martin Luther King Jr Blvd in conjunction with any frontage improvements. • Traffic calming improvements, bicycle facilities, sidewalk improvements, transit infrastructure, and various other improvements are spelled out in the agreement. • Annual reports performed to provide an update on the items spelled out in the agreement • Formal partnership for planning and funding bicycle, pedestrian, and greenway improvements.	

Carraway Village	
Date of Agreement	May 2014
Location	Eubanks Rd on the Northeast side of Chapel Hill adjacent to the Eubanks Rd Park and Ride.
Related Studies/Documents	The Edge Development Traffic Impact Study (2013)
Relationship to Mobility Plan	Treelyne – Utilizes proposed trail on west side of the site.

- Internal street grid with sidewalks
- 5' sidewalk and 4' bike lane on Eubanks Rd
- Access to the existing Eubanks Park and Ride via public streets
- Two-stage pedestrian crossing of Eubanks Rd
- Construction of a shared use path (greenway trail) on the east and west side of the site

Glen Lennox	
Date of Agreement	June 2014
Location	Bordered by Raleigh Rd and Fordham Blvd on the east side of Chapel Hill
Related Studies/Documents	Glen Lennox Development Transportation Impact Analysis (2013)
Relationship to Mobility Plan	Cross Cities Connector – Utilizes Fordham Blvd signalized crossing at Glen Lennox Dr (formerly Muirhead Ln) and proposed greenway and on-street bicycle lanes connection through the site as part of priority network.

- Sidewalks required on public streets, minimum six feet wide if at back of curb
- Bicycle loop detectors and pedestrian devices (curb ramps, audible signals, countdown heads, high vis crosswalk markings, etc.) on approaches to intersection of Hamilton Rd at Raleigh Rd and Glen Lennox Dr at Fordham Blvd.
- Bicycle lanes (5') on Glen Lennox Dr
- Ten-foot crosswalk and traffic signal between Hayes Rd and Christopher Rd
- North-south greenway with option to connect to Meadowmont greenway on NC 54
- Exclusive bus pull-out on westbound NC 54

Obey Creek	
Date of Agreement	June 2015
Location	Southern side of Chapel Hill adjacent to Southern Village.
Related Studies/Documents	Traffic Impact Study (April 2014) Village at Obey Creek Design Guidelines
Relationship to Mobility Plan	Southern Circuit Priority Corridor utilizes the proposed bicycle and pedestrian bridge and terminates at the site establishing a key connection to the existing park and ride and proposed BRT station.

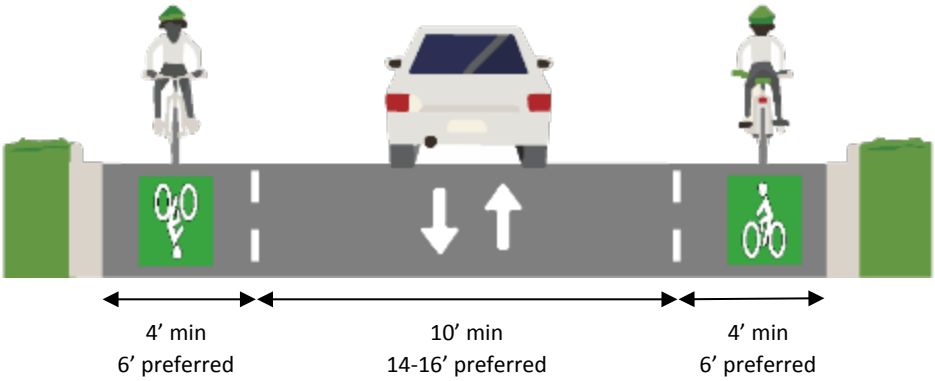
- Restriping of S Columbia and US 15-501 from Purefoy Rd to Mt Carmel Church Rd to include bicycle lanes
- A signalized bicycle and pedestrian crossing of US 15-501/Fordham Blvd at Oteys Rd
- A 12’ wide shared use bicycle and pedestrian bridge over US 15-501 between the Obey Creek development and Southern Village, linking Obey Creek to Southern Park and Mary Scroggs Elementary School.
- A paved sidepath parallel to US 15-501 along the property frontage
- Internal sidewalk network with walkable street grid
- Bicycle/pedestrian oriented signage and maps, bicycle racks and indoor storage facilities.
- A bus pull-out between Sumac Rd and Market St along the northbound US 15-501

Appendix C – Facility Guidelines

BIKE/PED FACILITIES 2
Advisory Lanes 2
Buffered Bicycle Lane 3
Cycle Track 4
Multi-Use Trail 5
Uphill Bicycle Climbing Lane 6
INTERSECTION IMPROVEMENTS 7
Bicycle Box /Two-Stage Turn Queue Box 7
Bike Signal Faces 8
Hybrid / HAWK Signals 9
Intersection Crossing Markings 10
Rapid Rectangular Flashing Beacons 11

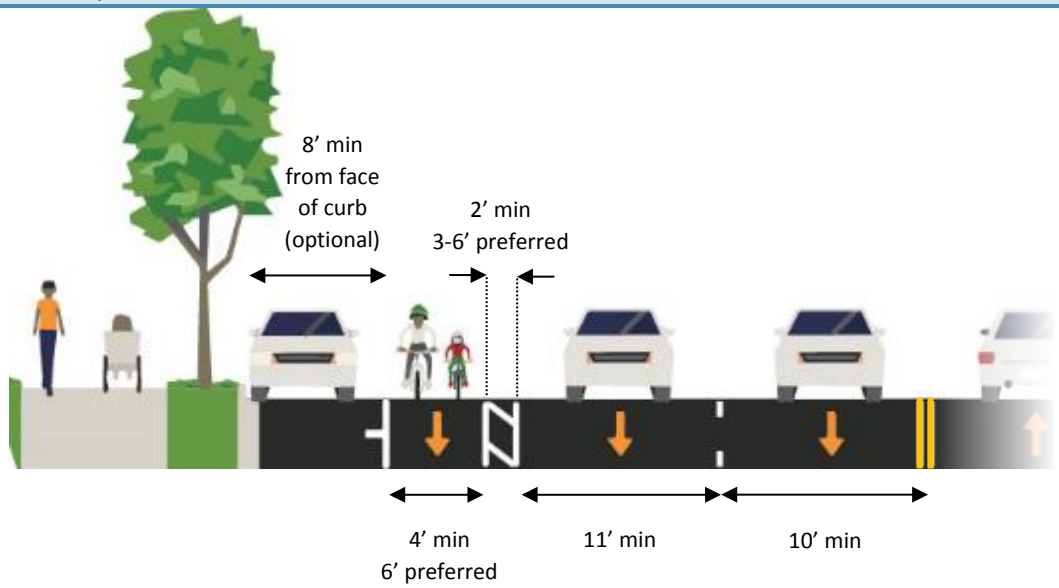
Bicycle/Pedestrian Facilities

Advisory Lanes



Typical Application	• Appropriate for neighborhood/local streets as greenway connectors • Insufficient road width for dedicated bike lanes • Traffic volumes less than 6,000 ADT, speeds less than 30MPH • Not a designated truck or bus route • Not part of a one-way street network
Design Elements	• Minimum width of 10 feet between dashed bicycle lanes, 14-16 feet preferred, 18 feet maximum (on Town streets) • Minimum width of 16 feet between dashed bicycle lanes with FHWA experimental/NCDOT approval (on state routes) • Bicycle operating area 4-6 feet in width • On-street parallel parking optional and may be buffered but if present should be highly utilized • Green colored pavement can be used in mixing/weaving locations and as a background to enhance pavement markings • Bike Lane signs (R3-17) and bicycle lane pavement markings in the dashed area are recommended (Town streets)/required (state routes)
Cities experimenting with Dashed Bicycle Lanes: Minneapolis, MN Columbia, MO Alexandria, VA Boulder, CO Hanover, NH *Example of dashed bicycle lanes on Flynn Avenue in Burlington, Vermont >*	

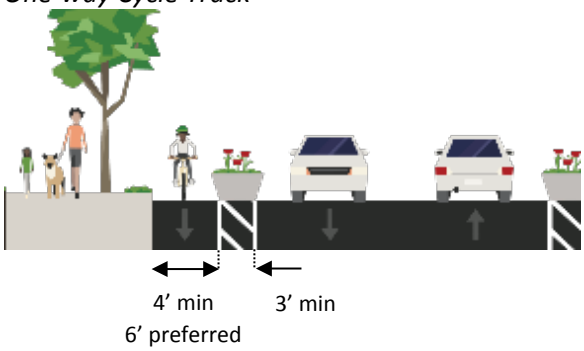
Buffered Bicycle Lane



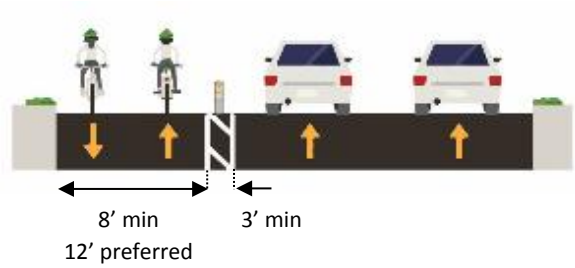
Typical Application	• Arterial street with higher traffic volumes • Posted speed limit at or above 35MPH • On-street parallel parking optional
Design Elements	• Bicycle lane 4-6 feet in width • Buffer width may vary, widths greater than 3 feet include hash mark in between the stripes. • Buffer may be placed adjacent to travel lane and parking. • Delineation (flexible posts, reflective markers, zebra lane separators) are optional, may provide a higher degree of bicyclist comfort
Example of a buffered bicycle lane in Raleigh >	

Cycle Track

One-way Cycle Track

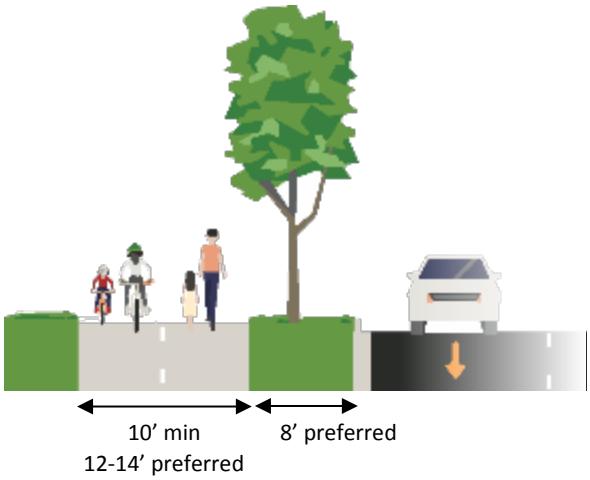


Two-way Cycle Track



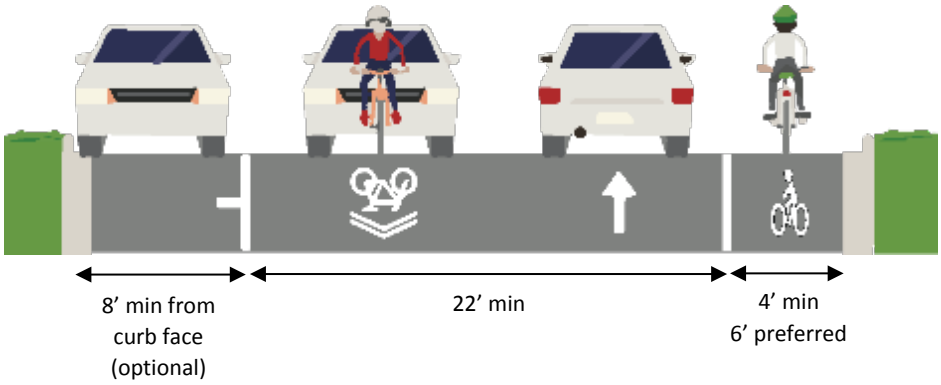
Typical Application	• Used on streets where contra-flow bicycle travel is desired • Routes with high bicycle volumes • High motor vehicle volumes and/or speeds and physical separation preferred and space available
Design Elements	• 4 feet minimum, 6 feet preferred width for bike lanes each direction • One-way facilities on both sides preferred on two-way streets • Two-way facilities on one-way street recommended if not implementing on both streets of one-way pair o Left-side cycle track may be preferred so cyclists closest to barrier travel in same direction as traffic • Directional bike lanes separated by dashed yellow centerline • Physical separation (delineation posts, curbs, concrete barriers, parked cars) are used between travel lanes and cycle track • Minimum buffer width of 3 feet from travel lane or parking lane • Special attention to sight triangles and crossing traffic at driveways and intersections; intersection markings and green paint across driveways recommended
Example of cycle track using planter buffer in Vancouver, BC >	

Multi-Use Trail



Typical Application	• Completely separated from the roadway and provided as an alternative to vehicle routes for bicycle and pedestrian travel • Serve as greenway connectors • Along arterials with high volumes and speeds • In easements along streams, utility, and former railroad corridors
Design Elements	• Inviting and safe for users of all ages, skills, and comfort levels • Serves a variety of user types including joggers, dog-walkers, utility cyclists, school groups, in-line skaters, families with trailers/strollers and others • Meets accessibility requirements for surface, grade, cross-slope and intersections • 10+ feet in width for two-directional path with wider trails in locations with high numbers of pedestrians or high user volumes
Example of multi-Use trail in Chapel Hill >	

Uphill Bicycle Climbing Lane



Typical Application	• Provided on an uphill grade to accommodate slower moving cyclists. • Used where speed differentials between cyclists and motor vehicles increases safety risks • On the downhill side of the roadway, bicyclists traveling at higher than average speeds may utilize full travel lane • Typical on streets where on-street parking limited ability to provide bike lanes on both sides of street
Design Elements	• Bicycle lane 4-6 feet in width on uphill slope. • May be paired with shared lane markings to indicate bicyclists position of travel on downhill side o Shared lane marking should be centered in travel lane to discourage passing when cyclist travelling at higher speeds • On-street parking may be maintained on one or both sides of street
Example of uphill climbing lane with parking in Raleigh >	

Intersection Improvements

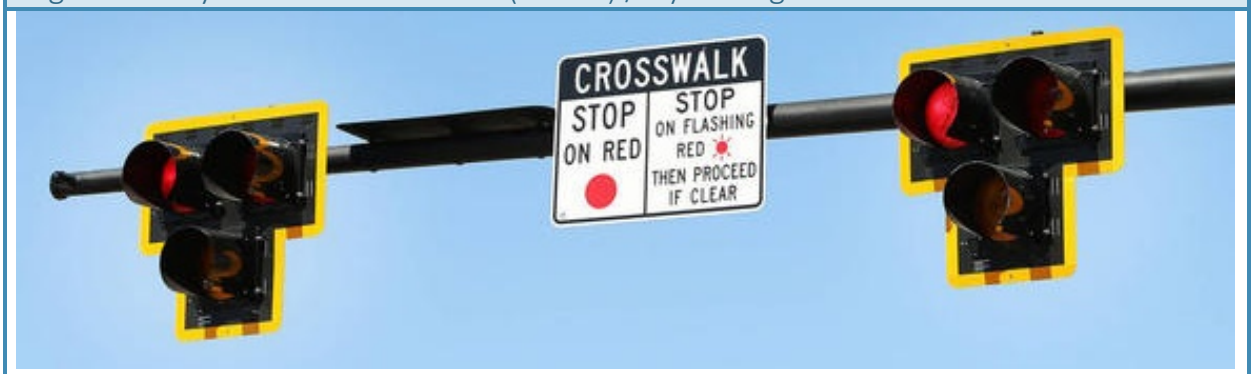
Bicycle Box	Two-Stage Turn Queue Box
Source: NACTO	*Source: NACTO*
Typical Application	• Used at busy signalized intersections to improve cyclist safety and comfort and provides formal queueing space for cyclists ahead of vehicles • Two-stage turn box used where a significant number of bicyclists turn left from a right-side facility • Two-stage turn box typically located where major bike facilities cross
Design Elements	• Designated to hold queuing bicyclists • Pavement markings include a bicycle stencil and arrow to indicate proper bicycle direction and positioning • Placed in a protected area, typically within on-street parking lane or between stop bar or perpendicular bike lane and pedestrian crossing • Colored pavement should be used as a background
Example of two-stage turn queue box in San Francisco, CA >	

Bike Signal Faces

Source: NACTO

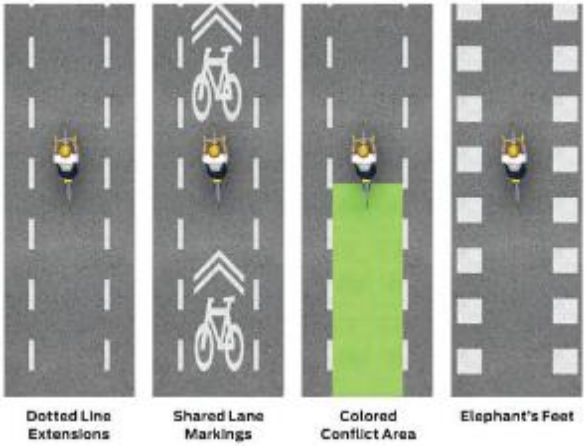
Typical Application	• Where a multi-use path crosses a street, especially where bicycle and pedestrian clearance time greatly differ • At intersections that are complex, with high numbers of bike/vehicle crashes, or near schools. • Transition areas between two facility types, such as a from cycle track to bike lane • At intersections with contra-flow bicycle movements
Design Elements	• Appropriate detection and actuation of bicyclists • Adequate clearance interval • Right turn on red is prohibited where bicycle signals separate through bicycle movements from right turning vehicles
Example of bicycle signals in Denver, CO >	

High-Intensity Activated Crosswalk (HAWK) / Hybrid Signals



Typical Application	• Where bicycle and/or pedestrian routes intersect major streets at locations without existing signalized crossings • At mid-block crossings of major roadways with high bicycle and/or pedestrian volumes • At multi-lane locations to counteract multiple threat crashes • At key access points to parks, schools, senior centers and at busy trail crossings
Design Elements	• Must meet warrants for crossing length, motor vehicle volumes and bicycle/pedestrian volumes based on roadway speed • Appropriate clearance intervals and signal timing with consideration for pedestrians and bicyclists • Follows MUTCD standards for design and location of beacons • Refuge islands may be used to create a two-stage crossing • The signal shall normally be dark and initiates upon actuation
Example of HAWK signal with refuge island in Phoenix, AZ >	

Intersection Crossing Markings



Source: NACTO

Typical Application	• Used on wide or complex intersections to guide bicyclists where bicycle path may be unclear • Where vehicle movements typically encroach in bicyclists space, such as across ramp style exits and entries • On roadways with bike lanes or cycle tracks to reinforce bicyclists priority over turning vehicles • Across driveways and intersections, especially to reduce conflict in known problem areas
Design Elements	• Dotted lines are used to “extend” the bicycle crossing space. • Striping width must be a minimum of six inches. • On crossings of two-way paths and cycle tracks, markings should indicate two-way traffic using chevrons and/or bicycle silhouettes • Green paint may be used
Example of intersection crossing markings in Seattle, WA >	

Rapid Rectangular Flashing Beacons

Source: NACTO

Typical Application	• To supplement standard pedestrian crossing and school crossing warning signs at uncontrolled intersections, including ingress and egress crossings of a roundabout • Limited to locations with the most critical safety concerns
Design Elements	• Crossing warning signs (each with RRFB and W16-7p plaque) shall be installed at the crosswalk on each side of the roadway • RRFB must be installed on the same assembly as the crossing signs for the approach the RRFB faces • RRFB shall normally be dark and initiates upon actuation
Example of rapid rectangular flashing beacons in Cary NC >	